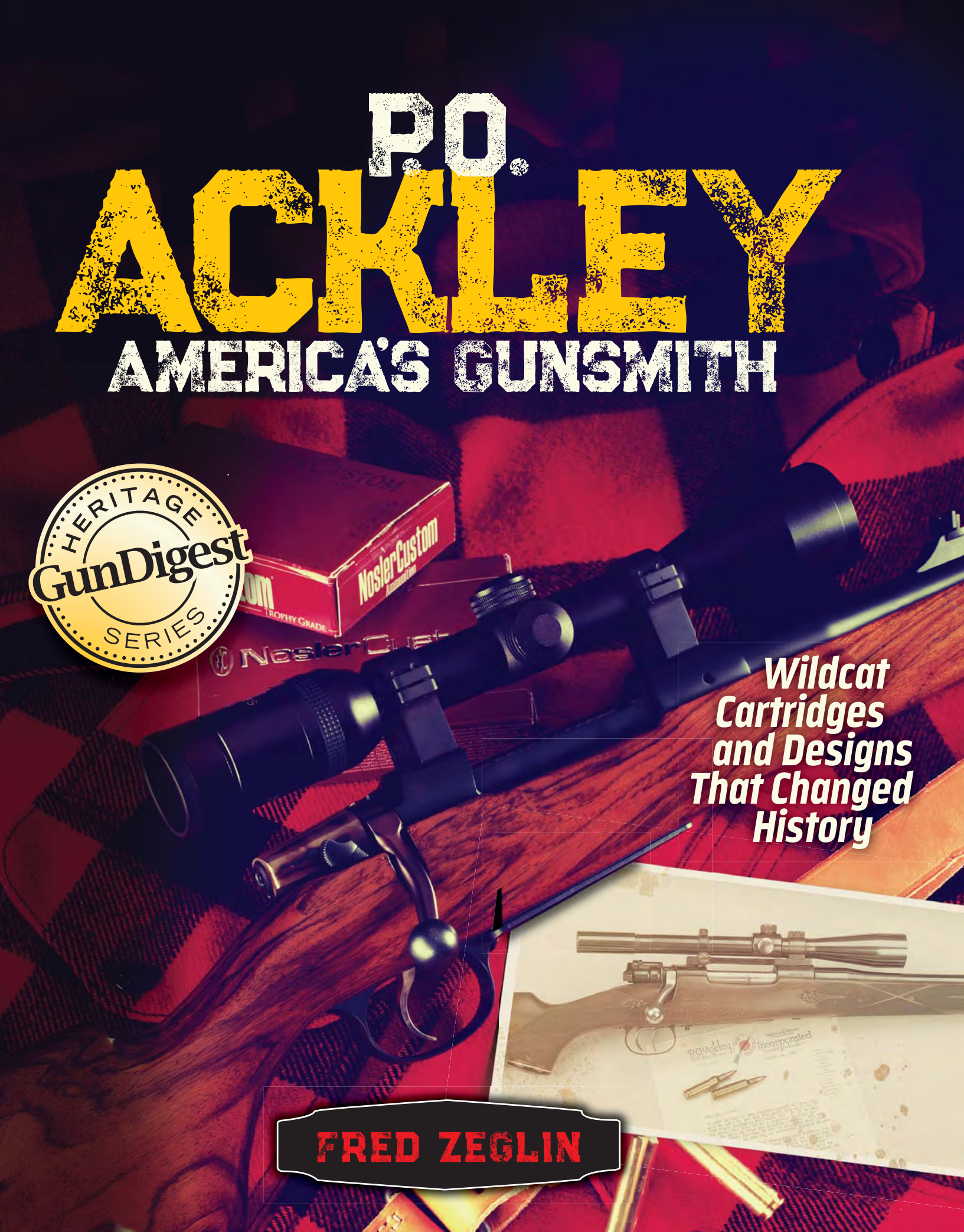
P.O. ACKLEY

AMERICA'S GUNSMITH

HERITAGE SERIES
GunDigest

Wildcat Cartridges and Designs That Changed History



FRED ZEGLIN

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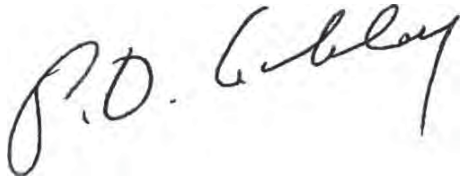
For you, Q-man.

Wildcatters have run wild in more ways than one. Without regulation of any kind, thousands of wildcat cartridges have been created which have little merit. Dozens of versions exist in each little phase of the business where one good one would do better. With no regulation to restrict such cartridges to a merit basis great confusion has resulted. Many loading-die makers have grown gray trying to keep up with the parade. Let there be no misunderstanding, though — we want no part of 'regulations!'

"In spite of these things, and in spite of competition and waning popularity, we will always have wildcats. With the thousands of obsolete guns about, and the abiding interest ever existing in things new, there will always be a place in the guns and the hearts of shooting enthusiasts for wildcat cartridges. Long live the wildcats.



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FOREWORD

My home state of New York has no shortage of icons in the history of firearms development. Names like Eliphalet Remington, Arthur Savage, and Daniel LeFever have gone on to become household names in the shooting industry. Certainly included in this list of prestigious names is one Parker Otto Ackley, a firearms and cartridge developer, whose series of cartridges would cause any serious rifleman to cock an eyebrow and give their undivided attention when they were being discussed. The moniker "Ackley Improved" has come to mean a cartridge that has been maximized; the taper has been taken out, the shoulder angle increased, and the performance enhanced, yet a rifle chambered to one of these cartridges can still fire the original parent ammunition. Simply put, the name Ackley equals improvement.

Parker O. Ackley was born in Granville, Washington County, New York — about two hours north of my home — in 1903, but came in to his own upon purchasing a gunsmithing shop in Oregon in his thirties. Ackley would go on to build custom guns, but his cartridge developments are what put him on the map. I remember reading custom riflemaker Kenny Jarrett's writings about the .280 Ackley Improved, and how it could nearly rival the ballistics of the larger-cased 7mm Remington Magnum. That began my own research into P.O. Ackley's work, and led to my appreciation for those who dedicated their time to wildcatting cartridges. I could go on about Ackley, but that's not my job here. That job belongs to Fred Zeglin, and it's my job to introduce you to Fred.

The science of ballistics in the 21st century has certainly evolved from that of the mid-20th century; the ability to measure and monitor our cartridges, as well as the materials themselves, has changed considerably from the days of P.O. Ackley. Fred Zeglin is the guy who embraces the changing technology. He is equal parts student, practitioner and teacher. I've known Zeglin for a few years now, and have come to appreciate his broad knowledge of the history of firearms and cartridges alike; being a devotee to the romantic period of cartridge development, it's nice to meet someone who shares a passion for the obscure. I look forward to seeing him at the SHOT Show each year; it's the equivalent of the fur-trader's rendezvous, except for us gun nerds. He's not only a devotee to the art of creating ammunition, he is a top-notch gunsmith — someone who understands the subtle nuances of cartridge development. As an instructor, Zeglin can explain the intricacies of the Ackley cartridge and its developments, as well as relate — in real world terms — the benefits, if any, of the Ackley Improvement.

It is a difficult task to write a book that is equal parts technical manual and biography, yet Fred Zeglin has done just that. Within the covers of this book you'll find the history of P.O. Ackley, and a glimpse into the man's life, as well as a comprehensive understanding of the cartridges that he left behind. And, as a wonderful bonus to those of us who still tinker with copper, lead and brass, there is a wealth of handloading recipes for the Ackley cartridges, using modern powders and projectiles, to allow today's shooter to connect with the wildcatter of yesteryear.

My own experience with Mr. Ackley's cartridges began with handloads built to fuel a .35 Whelen Ackley Improved, with the 40-degree shoulder, and it really didn't take long to realize the benefits of the added case capacity. I obtained a full 100 fps increase in

velocity, as well as a flatter trajectory, over the factory standard version. You'd think it'd be hard to improve on Col. Whelen's design — one that gives an already enhanced performance over its father, the .30-06 Springfield — but nonetheless the Ackley Improved version is undoubtedly a winner. I've loaded a few more of the Ackley cases, like the .30-06 Improved, and certainly the .280 Improved. Fred Zeglin's experience with Ackley cartridges far surpasses my own, as you're about to find out.

We hunters and shooters face a bit of a quandary: we feel an inexplicable connection to our forefathers, yet more often than not, we thoroughly embrace the most recent modern developments available. Fred Zeglin's book is a shining example of that duality, and brings the past effortlessly into the present. Whether you're a firearms historian, a lover of cartridges or a modern-day handloader looking for your next project, this book deserves a space on your shelf.

– Philip P. Massaro
West Coxsackie, New York, April 2016

INTRODUCTION

In writing this book I found many useful and pithy comments from P.O. Ackley. These comments express an understanding of guns and ballistics as only Ackley could, and are worthy of recording for coming generations to appreciate. I wanted to allow Ackley's voice to come through loud and clear, and at the same time, I felt it was important to add technically accurate information that completes the discussion where he may have been silent. The goal being to record accurately the history of P.O. Ackley's career and opinions, and at the same time make this book as complete as possible with regard to the subjects that it covers.

I think many shooters born after about 1960 might have trouble understanding why wildcatting was so prolific in the post-World War II years. One primary reason was tied to how business was done in the firearms trade. Manufacturers were slow to adopt new ideas or offer untried cartridges to the public simply because it took a huge investment in advertising and sales efforts to get said products pushed through the system and out to the public. Consequently, these adventurous shooters took it upon themselves to experiment and improve on factory cartridges.

What would P.O. Ackley have said if he knew that this book was going to be written? Well, I think I know. In 1962, he wrote an article for *Gun Digest* entitled, "Are Wildcats Dead?" He expounded for seven pages, telling about wildcats new and old, sharing his observations on the trends over the years, and finally predicting what would stand the test of time.

The final two paragraphs of that article appear on page 4. I think they tell us much about P.O. Ackley, his sense of humor and his love of wildcatting.

– Fred Zeglin

CHAPTER 1

ACKLEY'S ROOTS

Just when Nicholas Ackley and his bride Hannah Ford Mitchell came to the new world is not recorded. The first record of them in Hartford, Connecticut is in 1655 when mention of a piece of property owned by him appears in public records. In 1656 he married Hannah. The street that the couple lived on in Hartford was eventually named Trumbull, they owned lot #42. Years later one of their grandchildren would be named Trumbull.

Nicholas was listed as a "Chimney Viewer" in the town of Hartford in 1662, according to R.R. Hinman in his work, *A Catalogue of the Names of the First Puritan Settlers of the Colony of Connecticut*. The office of Chimney Viewer is often found attached to the names of early settlers. Hinman wrote, "Immediately after the organization of the town of Hartford as a town, or rather, as a company of land-holders, a law was enacted that all chimneys should be cleansed by the owner, once in a month, by a penalty provided by law. Therefore, that the law should be strictly obeyed and carried out by the inhabitants, for several years, a committee of respectable men (for no others held offices in that day) were appointed to see that all householders fully obeyed the law. It was also a law that each householder should provide a ladder for his house, where there was not a tree standing by this house, which reached within two feet of the top of the chimney."

Nicholas was one of twenty-eight men who purchased land in 1662 on what was then called, "30 Mile Island," later called "Haddam." In 1667, he moved his family to a fourteen-acre parcel in Haddam. He also owned a small island "at the lower end of the cove" along with six more acres toward Saybrook. The cove is where the Salmon River enters the Connecticut River. Nicholas died on Sept. 5 1695; his estate was divided among his survivors by agreement, as he left no will.

Eldest son John Ackley received a double portion of the inheritance, as was the custom then; he had been born in Hartford around 1662, though an exact date is unknown. John was a Sergeant in the local Militia. On May 23, 1699 he married Rebecca Spencer and they eventually had seven children. On August 25, 1736 he died leaving all his worldly goods to his children.

John's son Nathaniel Ackley was the next in line, he married Sarah Saxton. He served in the military during the French and Indian wars, and was listed on the roster for the Connecticut 3rd Regiment, 7th Company.[1] Their son Joseph married Hannah Archer;

Rifle Team from the Onondagan, 1927. Photo by Bruce Nichols

Top Row: Capellino, Solomon, Lacy, Daugherty, Strong, Merry
Second Row: MacNab, Pattington, Clinch, Satterthwaite, Schwarting, MacDonald
Bottom Row: Ackley, Kern, Rockwell, Love, Palmer, Brownell

they had seven children including Trumbull. Their son Joseph Jr. moved to Granville, New York, which probably had something to do with later generations moving there.

Joseph and Hannah's son Jonathan married Sally Bigsby and they had only one child named Joseph after his Grandfather and Uncle. Jonathon and Sally lived in Vermont. When Joseph Ackley II was 27 he married Lucy Maria Green and started a big family, they had nine children.

Lorenzo (Zach) Ackley was one of the children of Joseph and Lucy, at some time in his life he moved to Granville, New York, dying there on April 7, 1900. Emily Belle Matthewson was married to Zach and they had four children, one of which was William Ackley.

William was born September 21, 1877 in Tinmouth, Vermont. He registered for the draft in World War I but there is no mention of his serving in the war. He married Ida Parker of South Granville, NY, on February 21, 1901. William was a farmer for most of his life. When he and Ida had their one and only boy they named him Parker (middle name Otto, or "P.O.") after his mother. In

1936, Ida and William moved to Roseburg, Oregon with their son and his wife to help with the new business that P.O. had just purchased. William's health was declining at this time but he made the move anyway. He lived another eight years, following his son to Ogden, Utah when P.O. was asked to work with the Ogden Arsenal during World War II.

P.O. Ackley, 1927 yearbook photo.

Thus, Parker O. Ackley was born to William and Ida Ackley in Granville, New York, a small town on the Vermont border, May 25, 1903. He never liked the name Parker and preferred to be called P.O.[2] According to his longtime friend Les Womack, "Now and then someone mentions that he knows Parker Ackley personally, to which I can only reply: Not very well! To his friends he has always been known only as "Pee Oh." It seems that the Parker handle was hung on him when he was young and defenseless. It was simply his mother's family name and he acknowledges it with indifference."[3]

The family owned a potato farm and also operated a gravel pit. Les Womack was a longtime acquaintance of Ackley's, he had even attended gunsmithing classes in Trinidad, Colorado while Ackley was teaching there. He once asked P.O. when he first became interested in guns. "When I was born, I guess," replied Ackley. "At least I never remember *not* being interested." In the tender years of youth, Ackley started working on guns. He decided his little Stevens Crack Shot .22 was in need of a new stock and built for it a full-length Mannlicher type. "That was the first and about the *last* stock I ever made,"[4] Ackley told Womack.

"When a boy, my favorite pastime was hunting chucks with a .22 rimfire single shot rifle," wrote Ackley. "When seven or eight years old I tried out my first rifle, which happened to be an old Stevens Maynard tip up single shot, but a short time later I was granted the use of a brand new Stevens Favorite."[5]

In addition, Ackley used "an old .38-56, 1886 Winchester with a 26-inch octagon barrel." He went on to say about that gun, "This old cannon should have had wheels. But it shot like heck and being so heavy, the recoil was mild and didn't bother."[6] He also talked about trying to use a 12-gauge double to sneak up on chucks but found that it wore too much hide off the elbows to be much fun. "All this was before World War I," he said.

Ackley entered Syracuse University in 1923, and graduated *magna cum laude* in 1927 with a B.S. Degree in Agriculture from the school of Environmental Science & Forestry. The studies listed in records show Agronomy, Botany, Poultry Science and Chemistry. If Ackley studied engineering or metallurgy it was not until later in Colorado. I found reference to these later studies, but could not find actual records.

The *Syracuse Herald* reported on February 23, 1925 that Parker Ackley, a sophomore, attained 55 out of 57 honor points.[7] This supports the oft-reported high honors that he graduated with in 1927. According to Syracuse University records, he was a member of ROTC and attained a rank of 2nd Lieutenant as of June, 1927. His photograph appears in the 1927 "Onondagan" yearbook in several places. He was a member of the Rifle Team, Grange, and Agricultural Club. P.O. was even a member of *Sigma Tau*, a professional agriculture fraternity and *Gamma Alpha Epsilon*, honorary agricultural fraternity. Of the latter, he was the Secretary-Treasurer in the 1926-27 school year.

After graduation, Ackley returned to the family farm where he sold and delivered gravel in Model T trucks. During these years he operated a trucking business while helping with the farm. He soon became an expert in the maintenance and repair of his trucks, which started a lifelong love of mechanical

things. Bob West, a longtime friend of his said, "He knew every nut and bolt in them," referring to the Model T trucks. In 1932 the trucking business died out as a result of the Depression.

From 1932 to 1936 Ackley ran the farm full time, it was during this period that he became seriously interested in gunsmithing and started working on guns part-time. Once asked about his start in gunsmithing, and always the pragmatist, he said, "During the Depression there was nothing else to do anyway." Les Womack told how Ackley returned to the family farm to apply his newly acquired knowledge after graduation, and the first year produced a bumper crop of the finest potatoes known in the country. Times were bad, however, and there were no takers — even at ten cents a bushel.[8]

Parker Ackley married Winifred Elizabeth Forclyn Ross on August 21, 1928. They were to raise four daughters together. They were Jeanne Ackley Barney, born August 15, 1929; Virginia Ackley Maddy, born November 25, 1930; Ann Ackley Pearson, born October 29, 1933; and Jacqueline Ackley Chappell, born October 12, 1936.

Ackley noticed an ad in the classified section of the *American Rifleman*. Ross C. King had placed his gun shop on the market in Roseburg, Oregon. Ackley thought it over until a late spring freeze finished off his crop. That did it — he took the plunge. King wanted $2,000.00 for the whole setup; half down and "the rest when you can."[9] So, Ackley decided to buy the small shop on the west end of the river bridge.

Roscoe (Ross) Charles King, 1872-1954, went by "Ross King" & "Charles R. King," making him hard to track historically. In 1888, at the age of sixteen, King apprenticed to a gunsmith by the name of W.L. Pray at Fort Dodge, working for him for about four years. In 1893, King joined the 1st U.S. Cavalry and was assigned to Fort Grant, Arizona. When released from the Cavalry, he did gunsmithing. At the outbreak of the Spanish American War he enlisted in the 52nd Iowa.[10]

What makes Ross King interesting as a gunsmith is the fact that he worked for Ludwig Wundhammer in Los Angeles for five years (circa 1910-1915). King started his own shop for a time, but, when Wundhammer died in 1919, King bought the Wundhammer shop and continued to make custom rifles in the Wundhammer style.

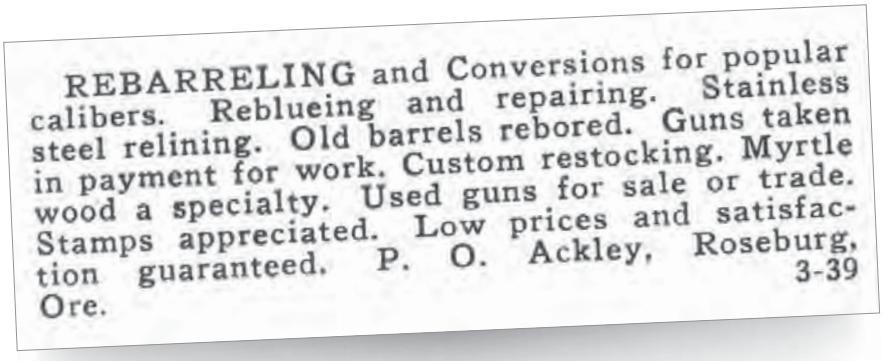
Ross King had this to say about the development of the Wundhammer stock in a letter to Major General F. C. Ainsworth: "I started to work for Mr. Wundhammer at the time that he first began to make sporting rifles from Springfields. I saw the first rifle he made, and it was very unlike the ones he turned out later on. Captain Crossman used to come into his shop nearly every day, and put in from an hour to two or three hours giving Mr. Wundhammer the benefit of his experience. He suggested many improvements in the shape of the stock. Mr. Wundhammer followed out these suggestions, and being a fine and painstaking workman, he turned out the best shaped and best fitting stock of all the gunsmiths."[11]

Wundhammer's name is remembered today for the palm, or "Wundhammer Swell" found on some modern guns. Otherwise, most shooters or even gunsmiths would not know his name. Ross C. King would be pretty much lost to history except for two important facts. First, he worked for Wundhammer and continued his style of stocking, and secondly, he sold his Oregon shop in 1936 to P.O. Ackley who was destined to become famous in his own right.

"It may be of interest to your readers to know that my old friend Ludwig Wundhammer left a worthy successor in the person of Ross C. King," said Edward C. Crossman, "who worked with him and who bought out the business from Mrs. Wundhammer.

I am familiar with Mr. King's work, and believe that he's got both the skill and the good taste of Wundhammer put into his rifle stocks and other work for the discriminating sportsman." [12]

Townsend Whelen said of King, "Mr. Ludwig Wundhammer of Los Angeles was perhaps the most celebrated of all the remodelers of rifles on the American type. When he



REBARRELING and Conversions for popular calibers. Reblueing and repairing. Stainless steel relining. Old barrels rebored. Guns taken in payment for work. Custom restocking. Myrtle wood a specialty. Used guns for sale or trade. Stamps appreciated. Low prices and satisfaction guaranteed. P. O. Ackley, Roseburg, Ore. 3-39

Classified ad from the *American Rifleman*, March, 1939.

August, 1939 classified ad from the *American Rifleman* magazine.

RELINING, Reboring, Rebarreling, Practical Conversions, General Repairing. Used guns for sale or trade. Excellent 351 Win. S.L. Rifle. Restocked, Redfield 102, extra mag., $35.00. Win. SS Hornet, Weaver 329, $25.00. P. O. Ackley, Roseburg, Ore. 8-39

ACKLEY ALLOY BARRELS for all popular calibers. Practical conversions. Enfield converted to upcock with adjustable trigger, Colt S. A. to .22 L.R. Barrels relined. Special barrels and chambers for experimenters. Write for information on .228 Ackley Magnum and .270 Newton. Suitable actions converted to .30 Newton. Used guns taken in trade. Correspondence invited, write your wants. Stamps appreciated. P. O. Ackley, Roseburg, Oregon. 12-40

Classified ad from the *American Rifleman*, December, 1940.

died two years ago, Mr. King, formerly his assistant, took over his work, and is continuing it on the same lines with the great satisfaction to all his customers."[13]

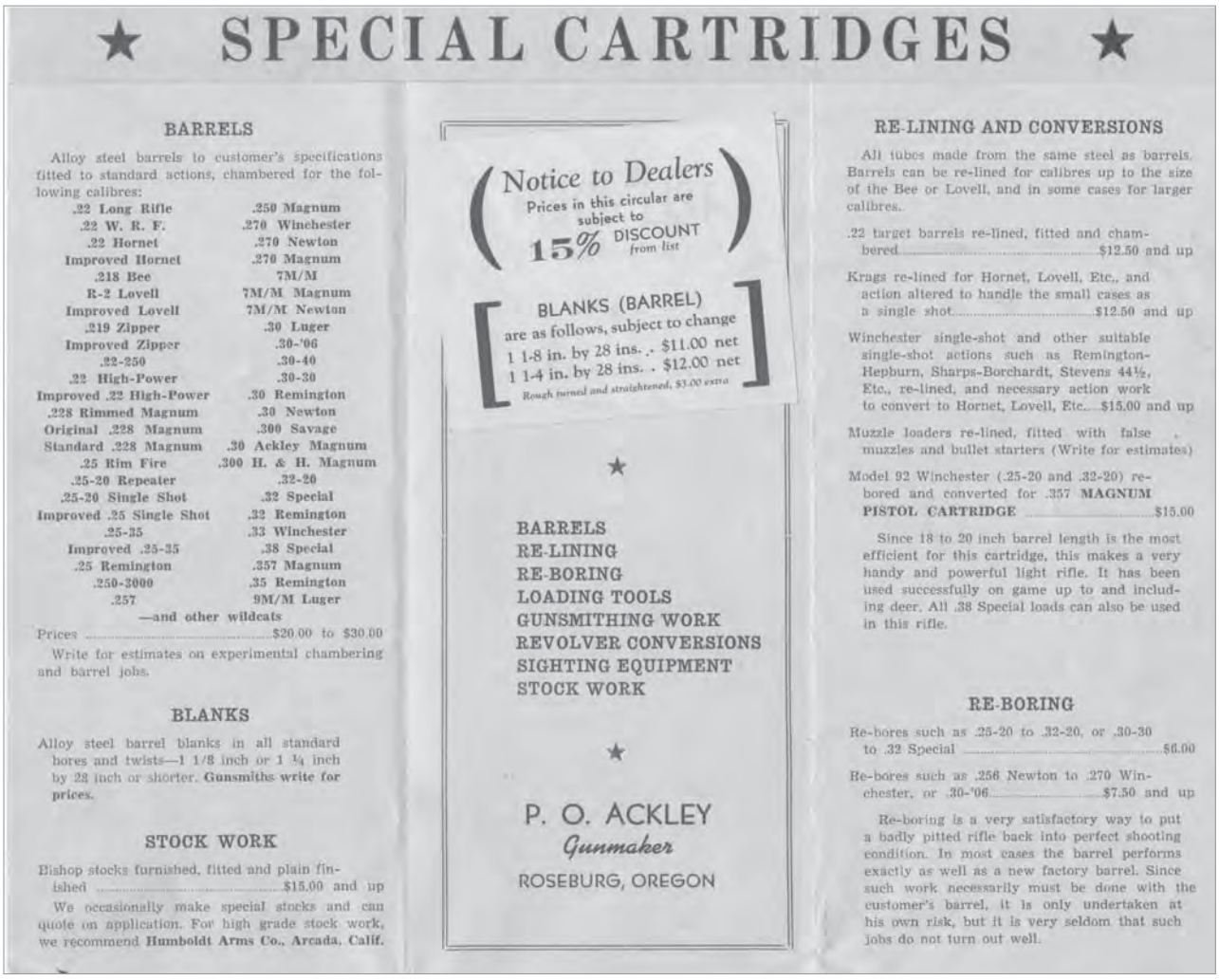
Ackley called Ross C. King "one of the old time gunsmiths on the west coast."[14] With the background of King working for and taking over the Wundhammer shop it's easy to see why Ackley respected him. Mr. King moved back to Los Angeles, California and continued his gunsmithing for some time before passing away in 1954. James V. Howe provides an address for King in his list of gunsmiths, Volume I of *The Modern Gunsmith*.

The Move to Oregon

It didn't take long to settle affairs in New York. In 1936 the family potato farm in Granville was sold off. Ackley loaded Ma and the kids into the old Oldsmobile on Memorial Day, 1936, and headed West — never looking back.

Ackley's parents made the trek to Oregon with their son and his family when he decided to make the move. P.O. spent much of the first year after the move to Roseburg in Cincinnati, working under friend and barrel maker Ben Hawkins.

Hawkins had been in the gun business for over four decades. "Come on back to Cincinnati," Hawkins said. "Work for me and we'll teach you something about barrel



★ SPECIAL CARTRIDGES ★

BARRELS

Alloy steel barrels to customer's specifications fitted to standard actions, chambered for the following calibres:

.22 Long Rifle	.250 Magnum
.22 W. R. F.	.270 Winchester
.22 Hornet	.270 Newton
Improved Hornet	.270 Magnum
.218 Bee	7M/M
R-2 Lovell	7M/M Magnum
Improved Lovell	7M/M Newton
.219 Zipper	.30 Luger
Improved Zipper	.30-'06
.22-250	.30-40
.22 High-Power	.30-30
Improved .22 High-Power	.30 Remington
.228 Rimmed Magnum	.30 Newton
Original .228 Magnum	.300 Savage
Standard .228 Magnum	.30 Ackley Magnum
.25 Rim Fire	.300 H. & H. Magnum
.25-20 Repeater	.32-20
.25-20 Single Shot	.32 Special
Improved .25 Single Shot	.32 Remington
.25-35	.33 Winchester
Improved .25-35	.38 Special
.25 Remington	.357 Magnum
.250-3000	.35 Remington
.257	9M/M Luger

—and other wildcats

Prices ..... $20.00 to $30.00

Write for estimates on experimental chambering and barrel jobs.

BLANKS

Alloy steel barrel blanks in all standard bores and twists—1 1/8 inch or 1 ¼ inch by 28 inch or shorter. **Gunsmiths write for prices.**

STOCK WORK

Bishop stocks furnished, fitted and plain finished ..... $15.00 and up

We occasionally make special stocks and can quote on application. For high grade stock work, we recommend **Humboldt Arms Co., Arcada, Calif.**

Notice to Dealers

Prices in this circular are subject to 15% DISCOUNT from list

BLANKS (BARREL)

are as follows, subject to change

1 1-8 in. by 28 ins. . $11.00 net

1 1-4 in. by 28 ins. . $12.00 net

Rough turned and straightened, $3.00 extra

★

BARRELS
RE-LINING
RE-BORING
LOADING TOOLS
GUNSMITHING WORK
REVOLVER CONVERSIONS
SIGHTING EQUIPMENT
STOCK WORK

★

P. O. ACKLEY
Gunmaker
ROSEBURG, OREGON

RE-LINING AND CONVERSIONS

All tubes made from the same steel as barrels. Barrels can be re-lined for calibres up to the size of the Bee or Lovell, and in some cases for larger calibres.

.22 target barrels re-lined, fitted and chambered ..... $12.50 and up

Krags re-lined for Hornet, Lovell, Etc., and action altered to handle the small cases as a single shot ..... $12.50 and up

Winchester single-shot and other suitable single-shot actions such as Remington-Hepburn, Sharps-Borchardt, Stevens 44½, Etc., re-lined, and necessary action work to convert to Hornet, Lovell, Etc. ..... $15.00 and up

Muzzle loaders re-lined, fitted with false muzzles and bullet starters (Write for estimates)

Model 92 Winchester (.25-20 and .32-20) re-bored and converted for .357 **MAGNUM PISTOL CARTRIDGE** $15.00

Since 18 to 20 inch barrel length is the most efficient for this cartridge, this makes a very handy and powerful light rifle. It has been used successfully on game up to and including deer. All .38 Special loads can also be used in this rifle.

RE-BORING

Re-bores such as .25-20 to .32-20, or .30-30 to .32 Special $6.00

Re-bores such as .256 Newton to .270 Winchester, or .30-'06 ..... $7.50 and up

Re-boring is a very satisfactory way to put a badly pitted rifle back into perfect shooting condition. In most cases the barrel performs exactly as well as a new factory barrel. Since such work necessarily must be done with the customer's barrel, it is only undertaken at his own risk, but it is very seldom that such jobs do not turn out well.

Brochure from Ackley's Roseburg, Oregon shop dated November, 1941.

making."[15] Hawkins apprenticed Ackley in the art of barrel making; this was to be the only formal apprenticeship he was to have. During that year Ackley's family ran the gun shop in Oregon.

Hawkins was not a barrel maker, he understood the mechanical process but never had much success making an accurate barrel. When Ackley arrived at his shop for training, he met "Fritz," a German machinist who was making barrels in Hawkins' shop. Fritz had begun his apprenticeship in the old country at age 12 and Ackley considered him to be a very good machinist.

Returning home to Roseburg in 1937, Ackley started building barrel-making machinery and tooling so he could put his training to work. His skills as a repairmen combined with his barrel making made him a success almost from the very start, according to C.P. Donnelly, who was among the first class at Trinidad in 1947, and who also became a lifelong friend of the Ackley family. Later, Ackley would tell Donnelly about his first shop in Roseburg. The Depression was still on, all that Ackley could afford to buy was one drill for barrels, so he ordered one in .22 caliber. He then made his own tooling to ream bores up to larger calibers. His first barrel-drilling machine required someone to crank the handle back and forth and Ackley knew this was not profitable. However, buying a motor to automate the process was out of the question.

Just as he got this hand-operated machine on line, P.O. received an order from

THE ".228 ACKLEY MAGNUM"

—is one of the most powerful Super .22 commonly being made up. The cases for the improved version are easily formed from .30-'06 cases which are always easily obtainable. Results have shown this to be a great killer and the accurate range is very great. The 70 grain bullet chronographs slightly over 4000 F.S. with full loads. With the full loads 5/8 inch mild steel plates can be pierced at 50 yards. On the basis of the DuPont charts, the loss of speed for the 70 grain Sisk 8 calibre point bullet is 250 feet at 100 yards and less than 1500 feet at 500 yards. The **sustained** velocity is very much **greater** than the light bullet Supers and less affected by wind. At present we have several makes of bullets available from 35 to 80 grains in weight.

THE STANDARD .228 ACKLEY MAG.

—is the older version and is only recommended for those who wish to use the .257 or 7M/M cases. The cases can be formed by simply necking either of these down with one operation. This cartridge is very similar to the original .22 Newton.

THE .228 ACKLEY MAG. RIMMED

—is made by reforming the .30-40 Krag case. It has been developed only for the man who wants a Super for handling the heavier series of bullets in a single-shot action. Speeds are somewhat less than with the standard rimless .228 Magnum.

THE .270 AND .276 NEWTON

—is our version of a long range, heavy calibre. It is easily formed by necking the .30 Newton case, in one simple operation. Bullets are available in a wide variety of

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★ ★ ★ NEW SERIES OF ACKLEY MAGNU

These cartridges are all made by reforming the .300 H. & H. case. They are designed with a comparatively sharp shoulder, long neck and straight body for reduced erosion and easy extraction. They are sufficiently short in overall length to work properly in standard actions, with NO alterations necessary except on the bolt face.

THE .250 MAGNUM

—develops higher velocities than most of the wildcat calibres yet developed, including the .22 calibres. With the 115 grain Magnum bullets speeds of over 3500 F.S. can be easily attained; with the 87 grain bullet, well over 4000; with lighter bullets, speeds approaching 5000 F.S. have been attained with experimental loads.

THE .270 AND .276 MAGNUMS

—use the same case as the .250 Magnum. It closely approximates in speed the .270 and .276 Newton, while being more compact and more practical for the shorter actions.

THE .30 MAGNUM

—utilizing the same cases as the above calibres, was designed to give added speed over that of the .30-'06, wanted by many

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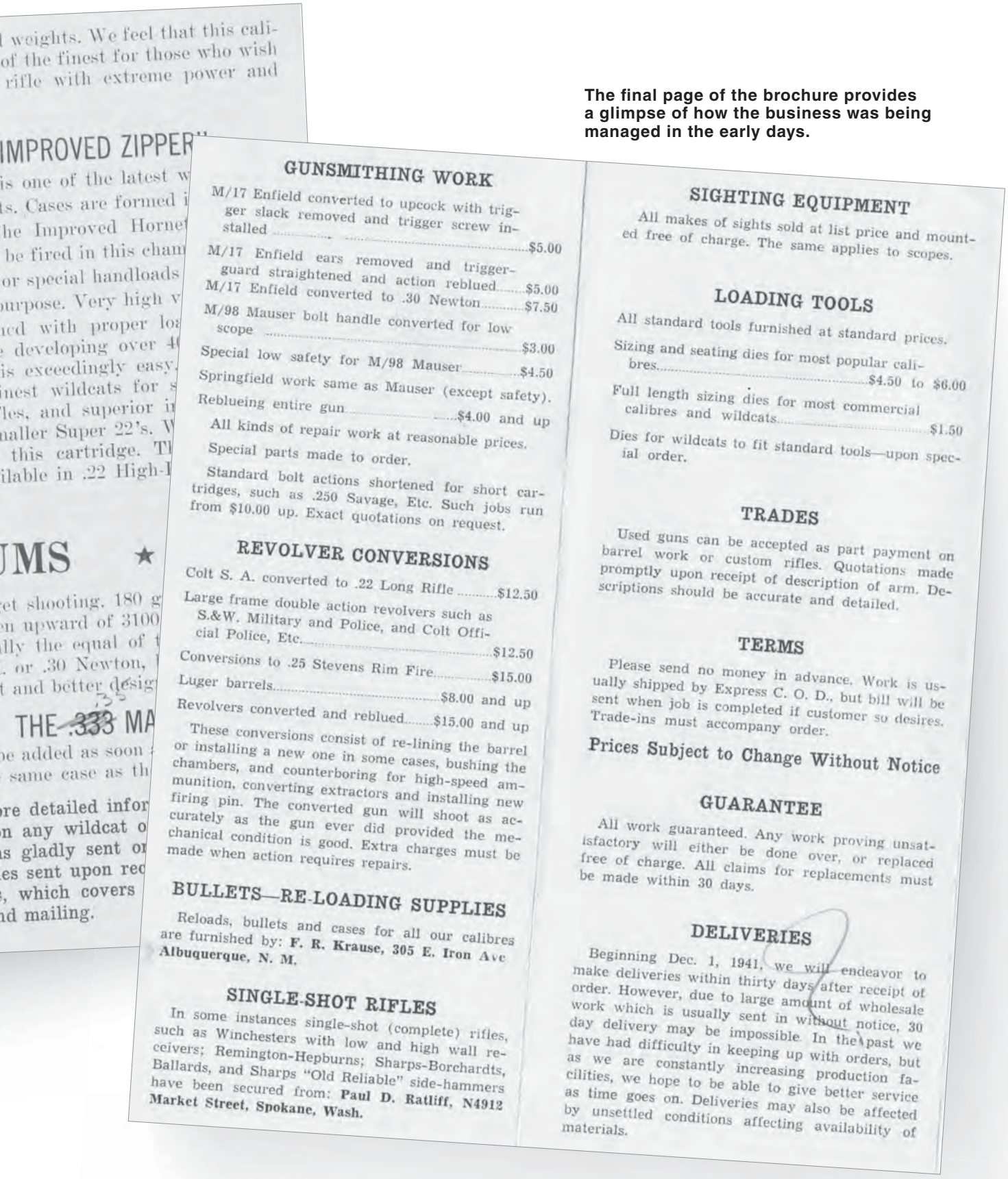
Descriptions of Ackley-named cartridges.



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GUNSMITHING WORK

M/17 Enfield converted to upcock with trigger slack removed and trigger screw installed $5.00

M/17 Enfield ears removed and trigger-guard straightened and action reblued $5.00

M/17 Enfield converted to .30 Newton $7.50

M/98 Mauser bolt handle converted for low scope $3.00

Special low safety for M/98 Mauser $4.50

Springfield work same as Mauser (except safety).

Reblueing entire gun ..... $4.00 and up

All kinds of repair work at reasonable prices.

Special parts made to order.

Standard bolt actions shortened for short cartridges, such as .250 Savage, Etc. Such jobs run from $10.00 up. Exact quotations on request.

REVOLVER CONVERSIONS

Colt S. A. converted to .22 Long Rifle $12.50

Large frame double action revolvers such as S.&W. Military and Police, and Colt Official Police, Etc. $12.50

Conversions to .25 Stevens Rim Fire $15.00

Luger barrels ..... $8.00 and up

Revolvers converted and reblued ..... $15.00 and up

These conversions consist of re-lining the barrel or installing a new one in some cases, bushing the chambers, and counterboring for high-speed ammunition, converting extractors and installing new firing pin. The converted gun will shoot as accurately as the gun ever did provided the mechanical condition is good. Extra charges must be made when action requires repairs.

BULLETS—RE-LOADING SUPPLIES

Reloads, bullets and cases for all our calibres are furnished by: **F. R. Krause, 305 E. Iron Ave Albuquerque, N. M.**

SINGLE-SHOT RIFLES

In some instances single-shot (complete) rifles, such as Winchesters with low and high wall receivers; Remington-Hepburns; Sharps-Borchardts, Ballards, and Sharps "Old Reliable" side-hammers have been secured from: **Paul D. Ratliff, N4912 Market Street, Spokane, Wash.**

SIGHTING EQUIPMENT

All makes of sights sold at list price and mounted free of charge. The same applies to scopes.

LOADING TOOLS

All standard tools furnished at standard prices.

Sizing and seating dies for most popular calibres ..... $4.50 to $6.00

Full length sizing dies for most commercial calibres and wildcats $1.50

Dies for wildcats to fit standard tools—upon special order.

TRADES

Used guns can be accepted as part payment on barrel work or custom rifles. Quotations made promptly upon receipt of description of arm. Descriptions should be accurate and detailed.

TERMS

Please send no money in advance. Work is usually shipped by Express C. O. D., but bill will be sent when job is completed if customer so desires. Trade-ins must accompany order.

Prices Subject to Change Without Notice

GUARANTEE

All work guaranteed. Any work proving unsatisfactory will either be done over, or replaced free of charge. All claims for replacements must be made within 30 days.

DELIVERIES

Beginning Dec. 1, 1941, we will endeavor to make deliveries within thirty days after receipt of order. However, due to large amount of wholesale work which is usually sent in without notice, 30 day delivery may be impossible. In the past we have had difficulty in keeping up with orders, but as we are constantly increasing production facilities, we hope to be able to give better service as time goes on. Deliveries may also be affected by unsettled conditions affecting availability of materials.

The final page of the brochure provides a glimpse of how the business was being managed in the early days.

Rutland Herald, Obituary

DATE: 4th of March 1944

Word has been received of the death in Ogden, Utah, on January 31 of William Warren Ackley, who was born here in 1877, the son of Lorenzo and Emily (Mathewson) Ackley. He lived in Vermont until 1899, when he went to Granville, N.Y., and married Miss Ida Parker. In 1936 they moved to Roseburg, Ore. Besides his wife, a son, four grandchildren, a sister, a brother, nieces, and nephews survive him.

It may well be that the death of William Ackley was one of the reasons that P.O. Ackley chose to leave Ogden when he did.

U.S. Hubble, an old Army Indian scout in Tensleep, Wyoming, to rebarrel a '98 Mauser action to .257 Roberts. After several days and a few sleepless nights, he turned out a barrel. "Everything on that thing was wrong. I never saw a barrel warp as badly as that one," Ackley said to Les Womack. He threw it in the corner and tried to forget the whole thing. There it lay until a letter came from Hubble telling him in no uncertain terms to, "Git that barrel job up here!" In desperation, Ackley finished the job and sent it off, fearing the repercussions that were bound to come.

Hubble, the old timer, went to rail-head to pick up his express package. Impatience from gunsmithing customers is nothing new, and he put a target up on a pile of crossties in the railway yard and proceeded to shoot a nice cloverleaf group. He sent this target and a glowing report off to Fred Ness, editor *at that time* of the Dope Bag section of *The American Rifleman*. "I never got caught up after that,"[16] Ackley says.

While doing researching for this book, the question of how P.O. Ackley became famous in the first place came up more than once. No one seemed to have an answer. When you look at the story above it appears the answer is pretty simple and almost mundane. It was luck as much as anything that U.S. Hubble mailed his target off to Ness with a recommendation and Ackley received the best press that any gunsmith in that day could ask for. A mention in the Dope Bag back then was equivalent to a national ad campaign. Obviously, Ackley saw the value of staying in touch with gun writers after that experience.

Also, Ackley put out a brochure from his Oregon shop that included numerous wildcats, including some of his early works like the .228 Ackley Magnum, Improved .25-20 Single Shot, Improved .25-35 and the Improved Zipper. The brochure outlined a wide variety of gunsmith work offered in the Ackley shop. Ackley was already making reloading dies for customers in these early days.

Ackley ran the shop in Oregon with steady gradual growth until 1942, sometimes employing help. During those first years in Oregon, he began corresponding with various gun writers and experts in the firearms industry. According to Bill Hause, who worked for Ackley in Salt Lake City, P.O. had developed a good reputation with Gen. Julian S. Hatcher and others as a gunsmith and experimenter. Just as Ackley was resolving his production problems and building an inventory of barrels, World War II broke out.

When Hatcher was placed in charge of the Army Ordnance Department, Ackley's ROTC record came in handy. Hatcher asked him to head the small arms shop at the Ogden Arsenal, which today is part of Hill Air Force Base. During his tenure at the Ogden Arsenal, Ackley worked with Fred Barnes (Barnes Bullets), Elmer Keith (writer), Ward Koozer (gunsmith and barrel maker) and Bliss Titus (gunsmith and barrel maker) among others.

No mention is made of selling the shop in Roseburg, in fact Ackley mentions taking the shop with him to Ogden. It seems that he was concerned with publicity for his work during the war, writing, "The shop was moved to Ogden in 1942 and operated on spare time, and in that way the product was kept before the public throughout the war."[17] Koozer and Ackley decided they would partner up in a gunsmithing business when the war was over.

There is a story about P.O. Ackley and Elmer Keith at the Ogden Arsenal that took place about the same time Ackley's father passed away. I have decided not to tell the story here. It involves conflict between the two men and Ackley's departure from the Arsenal. Since it is not possible at this time to conclusively check the facts I will leave it to another historian to work out. Keith alludes to the confrontation in his book, *Hell I was There*. Anyone reading Keith's account should keep in mind they are getting one side of the story. As many of that generation, Keith was polite enough not to spell out names; Ackley did apparently tell some friends his side of the story, but no written account was located.

Meanwhile, George Turner was advertising his business for sale in Cimarron, New Mexico when Ackley and Koozer contacted him. Upon completing his assignment at Ogden in 1944, Ackley moved his shop to Cimarron where he partnered with Turner and Koozer for a short time before moving on to Trinidad, Colorado.

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2 McPherson, M.L., "The Last Post, Parker Otto Ackley," *Precision Shooting*, October 2004
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CHAPTER 2

ACKLEY'S FIRST WILDCAT

Winchester recognized the influence of P.O. Ackley and others when they produced *The Winchester Western Ammunition Handbook* in 1964. Quoting, "Informed amateur experimenters have both asked and pressured arms and ammunitions manufacturers for more and more speed. These wildcatters proceeded to neck down large cases and to fireform cases both large and small to increase their powder-loading capacity, at times in a search for added flexibility but most often in a search for more and more speed per caliber … For example, Wotkyns and Roberts contributed to the .220 Swift and the .257 (Roberts); Page contributed to the .243 Winchester; Keith, in the field of slugging handgun cartridges; and Donaldson, Gipson, Ackley, and Niedner, in cartridge ideas that had commercial applications."[1]

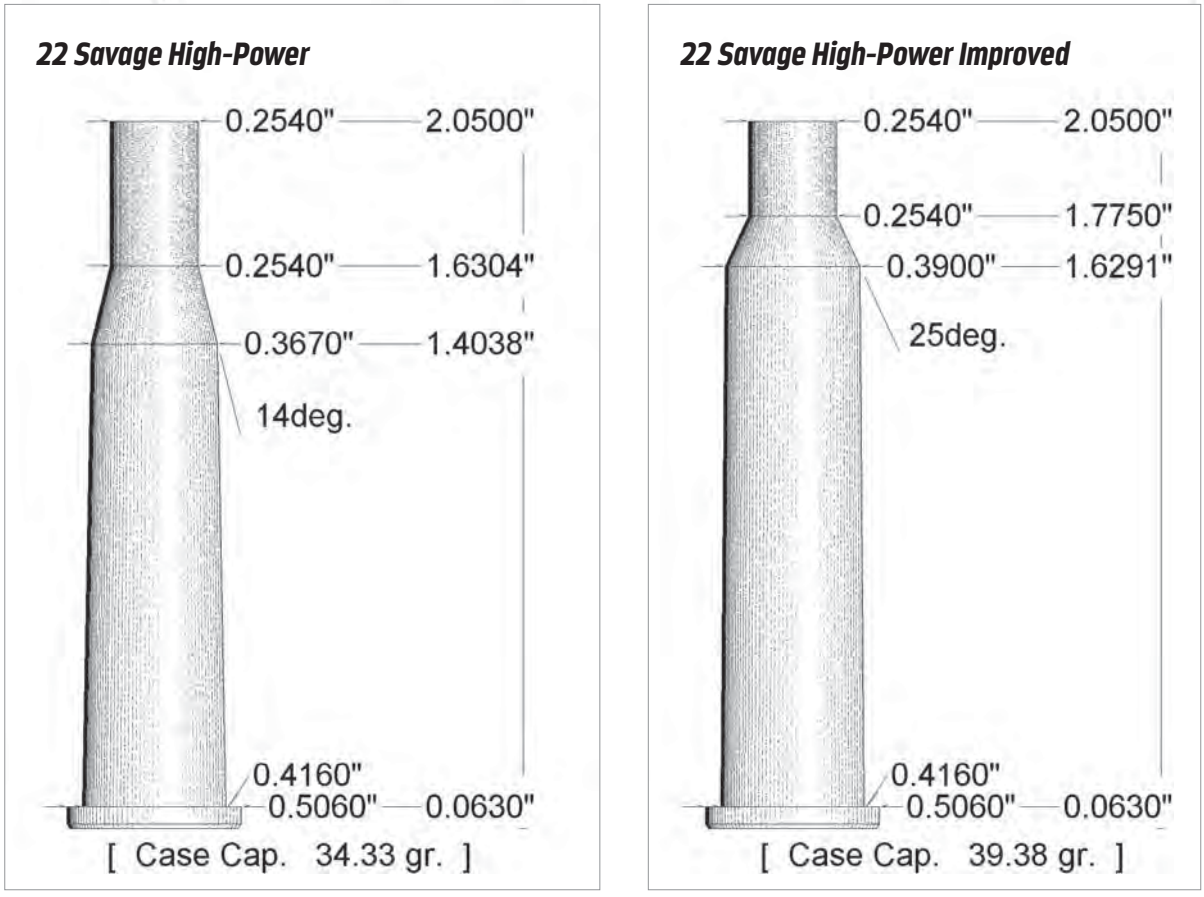
That line about amateur experimenters is certainly condescending, but none the less they give credit to the men who pushed the industry forward in the 20th century. With that in mind, let's start down the path of innovation that was P.O. Ackley's lifelong work.

Bob West suggests in his writings that Ackley's first wildcat was an improved version of the .22 Savage Hi-Power. It turns out that West was mostly correct. In *Wildcat Cartridges* by Richard F. Simmons, 1947, Simmons says, "Ackley states that he made up the reamer for this shell (.22 Hi-Power Improved) before making any other, including the Improved Zipper, so it is the first one he designed using this principle which was first introduced to the shooting public with the advent of the Kilbourn Hornet."

Let's take a little bird walk here. Ken Waters[2] and Frank C. Barnes[3] stated that Lysle Kilbourn and G.B. Crandall developed the .22 K-Hornet in 1939 or 1940. Ackley states that he developed and introduced his .219 Zipper Improved in 1938.[4] When we add that information to the statement in the above paragraph from Simmons' book, we find that Ackley's improved cartridge design clearly preceded the Kilbourn/Crandall designs by a year, probably more.

Who was first is always a hotly debated subject. Ackley was probably not the first to offer "fireformed improved" cases, but it does clarify his place in the timeline. Ackley himself never claimed to be the first so far as this author has been able to ascertain. For this reason alone it is likely he did not believe that he deserved that credit. He did understand the value of being first to do something and would probably have advertised that fact if he had felt vindicated.

Simmons mentions, "first introduced to the shooting public with the advent of the Kilbourn Hornet." Ackley was not inspired



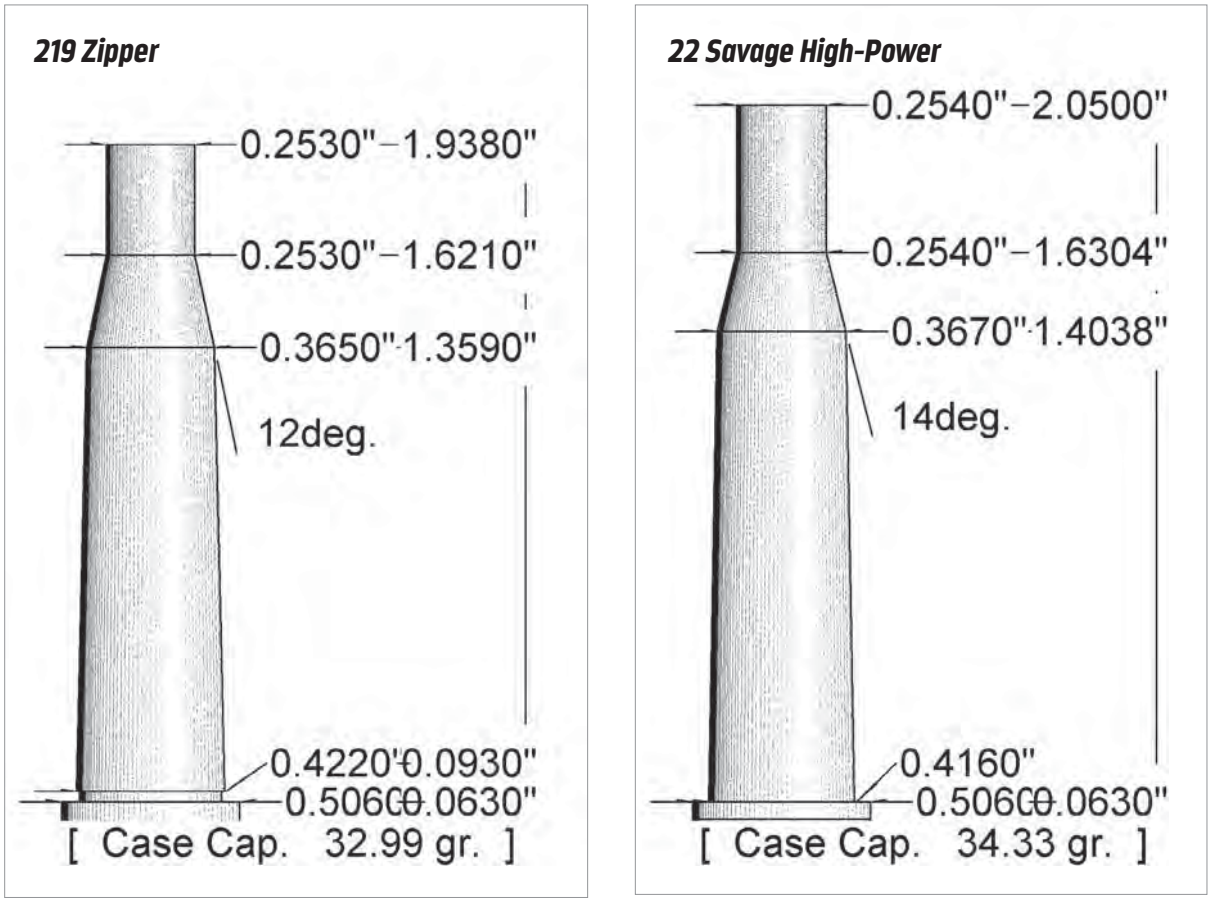
There are many versions of the Ackley Improved with different shoulder angles.

by the K-Hornet, because nearly all sources say it arrived on the shooting scene in 1940. Ackley introduced his .219 Zipper Improved in 1938, and from the rest of the quote above we know that Ackley designed the .22 Hi-Power Improved before that. It would appear that Simmons believed that the K-Hornet was the first fireformed and improved case to catch the attention of the shooting public. The K-Hornet did help to pave the way for Ackley's later success by making 'improved' cases acceptable to the shooting public.

Shoulder angles in the early part of the 20th century were very shallow. The industry was in transition from black powder to smokeless powders. This holdover from blackpowder-era designs was something that early experimenters played around with. Shoulder angles crept up from 5 degrees to anything approaching 20 degrees from the factories.

A good example of this progression is the .22 Savage Hi-Power, the case designed by Charles Newton in about 1905. Later Newton designed the .22 Newton for his own company, which was based on the 7x57 case and had a shoulder angle of 21 degrees. Newton had learned that a sharper shoulder produced better ballistics with smokeless powders. By 1912, Newton had cartridges with 24-degree shoulders on the market. Obviously he was years ahead of his time.

A.O. Niedner also had some cartridge



Comparing the factory .219 Zipper and .22 Savage Hi-Power.

designs in the 1920s that had 14-degree shoulders and later his .22 Magnum had a 22-degree shoulder. Compared to the case designs available at the time they had substantially sharper shoulders and probably seemed extreme and revolutionary, much like Newton's cartridges.

Elmer Keith once made a point that he thought that Charles Newton and Charlie O'Neil had plowed the field of the "improved" case, sharp-shoulder design 20 years ahead of Ackley.[5] It's easy to see why Keith said this. In comparison to the earlier factory designs, Newton's cartridges had sharp shoulders and relatively minimal body taper for their day. By contemporary standards they do not have sharp shoulders and today's wildcatters would still think they would need to be blown out.

Ackley did agree with Mr. Keith on this point. In the 1962 *Gun Digest* he wrote, "The trend for many years has been toward less body taper and relatively sharp shoulders. Charles Newton's fine line of cartridges, introduced prior to World War I, combined principles of case capacity, body design and sharp shoulder which have been proved eminently correct."[6]

Charles O'Neil did produce a .250 O'Neil wildcat that had a pretty sharp shoulder, he began the work on this case in 1936 at the same time that Ackley was apprenticing as a barrel maker, but it was a pure wildcat not a fireform improved case. The A.O. Niedner and Newton cases mentioned previously would not be what we would consider "Ackley Improved" today.

When you look at the .22 Savage Hi-Power, a cartridge designed by Charles Newton and introduced to the shooting public by Sav-

age in 1912, in comparison with the .219 Zipper, there is little difference. Ackley had just started making barrels and running his full-time gun shop in Roseburg, Oregon when Winchester introduced the .219 Zipper in 1937. In less than a year after the appearance of the Zipper, Ackley had an improved version of the case and was marketing it.

Obviously he had already cut his teeth on the .22 Hi-Power, so the .219 Zipper arriving at the scene on the heels of Ackley's first experiment with fireformed wildcats was a natural progression to the Zipper. Since the two cartridges are so similar in design it is reasonable to argue that when we discuss one, we are discussing the other, even though they are not mechanically interchangeable.

The .22 Savage Hi-Power used a .227-inch bullet, although it is often reported to use a .228-inch diameter, and the .219 Zipper was designed around the .224-inch bullet, which today is nearly universal in all modern .22 centerfire cartridges.

It would be logical to assume that Ackley started trying new designs right away. He had just left northern New York. During these pre-WWII years there was a great deal of wildcat activity tied to benchrest shooting and the Northeastern United States. Likely, Ackley knew of the experimentation that had been going on around his home turf. When he started making guns he would have naturally wanted to try his hand at the wildcatting he had heard or read about, and possibly seen. There is no evidence that Ackley ever met Lysle Kilbourn, however Kilbourn lived in Whitesboro near Syracuse, New York at the time that Ackley was going to college at Syracuse.

In researching why Ackley had decided to improve the .22 Savage Hi-Power, an article by Ken Waters about the cartridge sheds some light. Waters explained in detail about the problems he had with case stretch in this cartridge. He found that a combination of brass specifications that vary widely, and a long-tapered case, led to case stretch and often case head separations as a result.[7] When Ackley discussed improved case designs he often pointed to better case life and reduction of brass flow as primary reasons for making the design changes. Could it be that his first design may well have been for this very reason? Or maybe he just learned this important lesson very early in his career?

In 1937, Winchester chambered the Model 64 lever action for the .219 Zipper. The Model 64 was an updated, "modernized" version of the ever-popular 1894 Winchester, designed by John Browning. The combination of a lever action and a varmint class cartridge did not produce the level of accuracy that shooters were looking for on small targets like ground squirrels, chucks and prairie dogs. This top-eject lever action was not well suited to the mounting of a scope, which only served as a further handicap to the cartridge and action combination. The Model 64 was dropped from Winchester's line after World War II.

The Zipper found a following in single-shot custom rifles. It was also popular to convert the Krag action to the .219 Zipper. Marlin chambered the Zipper in the Model 336 until 1961. Factory ammunition was available from Winchester and Remington until 1962.

Like many wildcats the first attempt was not quite perfect. W.F Vickery was an Idaho gunsmith and author of the book, *Advanced Gunsmithing*, who specialized in Winchester Hi-Wall rifles chambered in .219 Zipper Improved. He wrote to Charles Landis about his chamberings on June 26, 1945: "I make up only the original Ackley Improved Zipper and as far as I know, Ackley makes up only the shortened version of this Improved Zipper. Ackley said there was about 0.040-inch difference in the length from head to shoulder. The reamers for both of us were made up by Red Elliot and Ackley had Elliot grind his back 0.040-inch at the shoulder, so Elliot told me."[8] Obviously, Ackley had decided that a slightly longer neck and a little less case capacity worked better, so he shortened up the Zipper Improved that he offered.

One senior shooter the author was acquainted with had a .219 Zipper Improved reamer in his toolbox. When asked about it he said, "Oh years ago I wanted to build the

This is a die manufactured and provided by Ackley with one of his custom barrel jobs. Note the .228 Ackley size die, chamber cast and cold formed case (not yet fireformed).

ultimate varmint rifle. So, I wrote P.O. Ackley and asked what he thought would be the very best for accuracy and versatility. He told me to find a Sharps Borchardt action and rebarrel it to .219 Zipper Improved. I did, and never regretted it. Later I had a Contender barrel that I rechambered using the same reamer, it was superbly accurate."

Landis called the .219 Ackley Improved Zipper "The most promising .22 wildcat cartridge in the whole Ackley line."[9] Quite a compliment for the second wildcat a gunsmith ever conceived. In Landis' book on woodchucks, there is both a Winchester Hi-Wall and a Sharps Borchardt pictured as made by Ackley Inc.

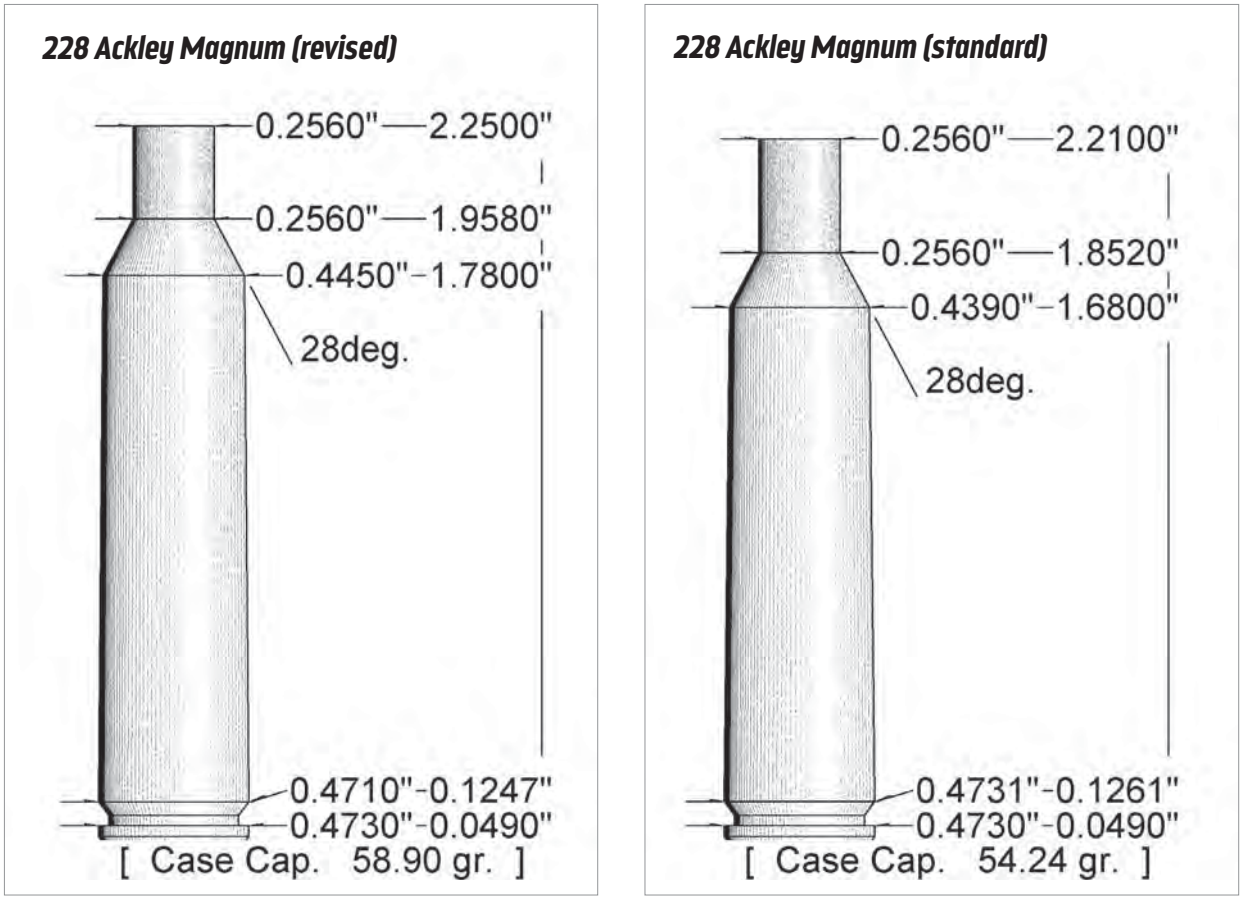
With all that said it is important to tell the whole story. Introduced in 1938, the .228 Ackley Magnum (Standard) was one of Ackley's first wildcats and the earliest version of the .228 Ackley Magnum. He built the first rifle for this cartridge while still working for Ben Hawkins in Cincinnati, in 1936.[10] Ackley wrote about his experiences in Landis' book with various .22 centerfire cartridges and that he thought he could do better. "I started to dream up a new cartridge. I knew that it must have everything from jet propulsion to Technicolor, and the first attempt resulted in the original .228 Ackley Magnum. The case was the .257 Roberts necked to take the .22 High Power bullets."[11]

In 1958 Ackley provided a write-up of the .228 Ackley magnum for a book titled, *Rifles — A Modern Encyclopedia*. Ackley said, "The .228 as I originally made it was nothing more than the .22 Niedner. At the time I had never seen the .22 Niedner and simply necked down the .257 case, but I later found out that the .22 Niedner was a 7mm case necked to .22, which make the two cartridges identical except for the bullets. I used the 90 grain and he used the 70 grain."

In part Ackley said, "Bullets are available in 60, 70, 75 and 80 gr., but the 70 and 75 gr. have proved to be the best." Ackley recommended these heavier bullets because he viewed the .228 as a big game cartridge and understood that bullet construction was the key to success.

He states that later experiments proved that the 90-grain bullets he first proposed for the .228 Ackley Magnum were less practical than 70- and 75-grain bullets. "Bullets are available only in heavy-jacketed type," he wrote. He mentioned the bullets made by Sisk and Barnes, "Both have tubing jackets and will not blow up under any normal conditions. (Note: These are big-game bullets, primarily, and also made to stand very high velocities.)"[12]

"Many .228 barrels are made with nine and ten twists and the centrifugal force or RPMs imparted to the thin jackets cause the bullet to blow up on the way to the target [Ackley often used an 11 twist. – Author]," wrote Ackley. "We conducted quite a few interesting experiments on such things. I doubt very much if the trouble is due to lead melting. If you spin a small lead wheel fast



Comparing the .228 Ackley Magnum, revised vs. standard.

enough it will fly apart because the tensile strength of lead is insufficient to hold it together after a certain number of RPMs are reached. The Remington Core-Lokt are somewhat better than some of the Winchester, Western or others, but do have a tendency to blow up on impact, which is exactly the thing which gives high-velocity rifles in general a black eye."[13]

Ackley recognized that shooters often try to use the wrong bullet in a cartridge. They do this for many reasons, but most common is that the shooter does not realize that various bullets are constructed to operate in specific velocity ranges. Therefore, thin jackets at high velocity become explosive on contact. Shooters using a thin jacket on big game often find the bullet does not penetrate sufficiently to make a humane kill. On this subject Ackley writes, "I refuse to make a .228 unless it is clear in the customer's mind that he must use the right bullets."[14]

Commenting on his .228 Ackley Magnum in 1981 he said, "That first .228, which was only a .225-inch groove diameter outshot any .228 I ever had so far as power or velocity was concerned. Lately I have had an idea that perhaps that was due to the tight groove diameter. Perhaps it stopped all the leakage or something like that. Anyway it was just a standard sporter barrel made from the old simplex steel made by the old Crucible Company which is similar to our common 2340, or perhaps 3140. [Authors note: These are grades of steel.] It was only a 22-inch barrel. All the bullets I could get were the ordinary soft point .22 Hi-Power bullets which measured between .227 and .228 inches.[15]

"Loaded with 45 grains of Hi-Vel #2 that thing would shoot through a 5/8-inch mild

steel plate. It would drive the steel plug into a green railroad tie, which we used for backing four or five inches. When we chopped these things out they would be sizzling hot. I thought I had revolutionized the industry, *of course*. The first three guns that were ordered were long heavy barrels. I made them standard groove diameter .226 to .227 inches with the same 12-inch twist and not one of them would even put a decent bump on the back side of that plate. And I have never yet had another that would equal that first one. But there had to be some reason that it had more steam with the same powder charge."[16]

Continuing his line of thought about tight bores Ackley commented, "I have one of the old H&R USRA pistols. That only has a bore diameter of around .212 or .213 inches. The groove diameter is way under standard. That would shoot through more pages of a telephone book or Sears catalog than any .22 rifle we used with the same ammunition. That pistol has an 8-inch barrel and I still have it. I will probably never get a chance to check this idea out, but I would like to know why that thing was so much better. That accuracy was just about the same as the long barrels."[17]

The .228 Ackley Magnum was not introduced publicly until 1938, after the groove diameter was changed to .227 from .225 inches. The "Standard" version above is the original design from 1936. This version is designed to utilize 7x57 or .257 Roberts brass for fireforming the new cartridge.

The "revised" version of the .228 Ackley Magnum was intended for shooters to use .30-06 brass to make cases. At the time that Ackley offered this option, 7x57 cases were much harder to acquire than .30-06.

Notice that the two cartridges are not interchangeable, they vary considerably in length and headspace. Fireforming brass is much easier in the standard version, and today both 7x57 and .257 Roberts brass are commonly available.

Some might argue that the .228 Ackley Magnum, which originated in 1936, was Ackley's first wildcat — and they would be right!

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CHAPTER 3

OGDEN ARSENAL. DURING WORLD WAR II

The Ogden Arsenal was established in 1921 but had a relatively small mission of storing ammunition and distributing it to various locations in the Western United States. During the prewar period, the Arsenal underwent expansions that ultimately made the base well suited for its service in the American war effort. The expansion of the facilities between 1935 and 1941 had made the Arsenal capable of producing bombs and small caliber artillery shells. During World War II, its facilities were greatly expanded around the nucleus which had been built during the Depression of the 1930s.[1] In 1951, the arsenal was absorbed as a part of Hill Air Force Base.

The call for women to enter the workforce escalated as more men marched off to war. For example, spanning the *Deseret News* want ads in a banner headline during World War II was the proclamation, "One Solution For Your Personnel Problem — Hire Women." The *Ogden Standard Examiner* declared in 1942: "It is in the nature of patriotic duty of the highest order to apply at once at the personnel office of the Arsenal ... and Ogden women of all ages are urged to lay aside all considerations of need for earning money and come to the Arsenal to make a direct and vital contribution to the United Nations victory in the war."

The call for women workers was success-

Ogden Arsenal, aerial view in the late 1970s. The arrow farthest north points to the location of the Small Arms Shop. The southern arrow points to the Ballistics Building. That general area was known as the Fuse Plant Area. In photos which were not available for publication berms were clearly visible on the downrange end of the ballistics building. To the west of the Fuse Plant area was originally the base housing area, these buildings have been demolished. Photo: Ogden Arsenal Archives at Hill Air Force Base.

Small Arms Shop at the Ogden Arsenal as it appeared in 1968.[5]

ful. Utah women responded to patriotic appeal and to promises of good salaries, pleasant conditions and steady work obtainable without experience. At the height of the war, the Ogden Arsenal employed 6,000 people, more than half of whom were women.[2] Women constituted 17.6 percent of the Utah labor force in 1940 and 36.8 percent by 1944.[3]

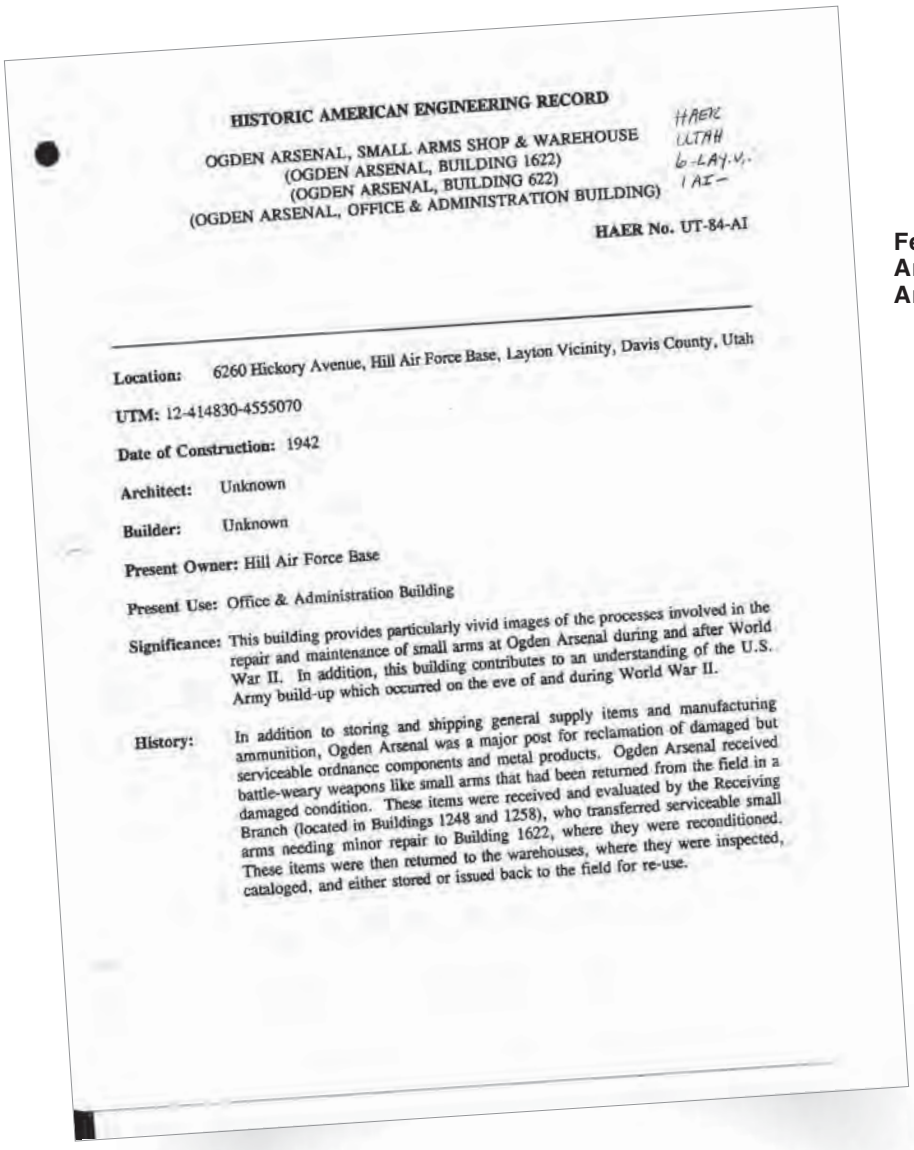
According to Bill Hause, who worked for Ackley in the early 1950s, P.O. had begun corresponding with well-known gun writers and experts in the industry during the early years of his career in Roseburg, Oregon. One of his correspondences was with Julian S. Hatcher who, in 1941, was appointed Brigadier General in command of the Ordinance Training Center. In 1942, Hatcher was ordered to Washington to head the Training Division of the Army Ordnance Department.[4] Hause said Ackley had told him that General Hatcher recruited him for the Small Arms Shop at Ogden Arsenal.

Records from the National Archives and Records Administration show that P.O. Ackley took a civil service position with the Ordnance Department at Ft. Lewis, Oregon on May 26, 1942 under executive order #9063, which provided for War Service Appointment. A "Letter of Authority" was issued by the Civil Service Commission for P.O. Ackley on May 25, 1942. He was appointed at a daily rate of $8.48 as an "Armament Machinist (Sr.)." On June 2, he was shipped to Fort Ord, California for "training in maintenance and repair of Ordnance material." Before P.O. finished his training at Fort Ord he was requisitioned by the Ogden Arsenal. On July 31, 1942 Ackley signed for his base pass at the Arsenal, so it's reasonable to assume that is the day he reported for duty.

Pay records and employment applications from Ackley's Civil Service records show that he moved up quickly at Ogden Arsenal. By February of 1943, he was Foreman of the Small Arms Shop. On his application for the foreman's position he stated he was supervising 12 people at that time.

The Small Arms Shop building was built in 1942, and had 2,410 square feet of space on the main floor. There is a basement but its wartime use is unknown. This is the building where P.O. Ackley and his associates would have made repairs to weapons returned to the Arsenal from the field. Battle weary weapons were received by the Receiving Branch, then sorted. Small arms requiring minor repairs were forwarded to the shop where they were reconditioned. These items were then returned to the warehouse, where they were inspected, cataloged and either stored or returned to service in the field.[6]

Many men who worked in the Small Arms Shop at the Ogden Arsenal were well-known or became popular in the gun industry after the war. Elmer Keith was an



HISTORIC AMERICAN ENGINEERING RECORD

OGDEN ARSENAL, SMALL ARMS SHOP & WAREHOUSE
(OGDEN ARSENAL, BUILDING 1622)
(OGDEN ARSENAL, BUILDING 622)
(OGDEN ARSENAL, OFFICE & ADMINISTRATION BUILDING)

HAER UTAH 6-LAY.V. 1AI-

HAER No. UT-84-AI

Location: 6260 Hickory Avenue, Hill Air Force Base, Layton Vicinity, Davis County, Utah

UTM: 12-414830-4555070

Date of Construction: 1942

Architect: Unknown

Builder: Unknown

Present Owner: Hill Air Force Base

Present Use: Office & Administration Building

Significance: This building provides particularly vivid images of the processes involved in the repair and maintenance of small arms at Ogden Arsenal during and after World War II. In addition, this building contributes to an understanding of the U.S. Army build-up which occurred on the eve of and during World War II.

History: In addition to storing and shipping general supply items and manufacturing ammunition, Ogden Arsenal was a major post for reclamation of damaged but serviceable ordnance components and metal products. Ogden Arsenal received battle-weary weapons like small arms that had been returned from the field in a damaged condition. These items were received and evaluated by the Receiving Branch (located in Buildings 1248 and 1258), who transferred serviceable small arms needing minor repair to Building 1622, where they were reconditioned. These items were then returned to the warehouses, where they were inspected, cataloged, and either stored or issued back to the field for re-use.

Federal record of Small Arms Shop on the Ogden Arsenal grounds.

inspector at the arsenal, he arrived there on January 31, 1943. The following week he was shipped off to Rock Island Arsenal for training and it appears from records that he returned to Ogden Arsenal on March 4, 1943 to assume his duties.

By the time Keith arrived at Ogden Arsenal he had written his first two books and had spent three and a half years as Arms Editor for *Western Sportsman* magazine. It is reported from many sources that Ackley and Keith did not like each other; based on the stories Ackley's friends tell, no real feud existed. According Ackley's friend Bevan King, "P.O. said that Elmer Keith was the biggest bullshit artist in the United States, but if he said he hit something at a thousand yards with a .44 magnum you'd better believe it, 'cause he could shoot."

I asked Anna Konuges-Floyd if P.O. Ackley and Elmer Keith were friends. Without hesitation she responded, "Oh, Yes! They might have been competitive but they were friends." I pressed further, did they argue? Anna answered, "Well, they certainly didn't take their guns to one another," then she laughed. Continuing she said, "They argued a little, but, I think they exchanged a lot of information. You know, you can respect one another, and learn from one another, without

Ballistics Building in 1968. According to Elmer Keith in *Hell I Was There,* this test range was built to his specifications.[7] All manner of small arms were tested here as part of the inspection process. Keith was appointed on March 4, 1944 to a Small Arms Technical Board whose purpose was to suggest the best design and location for a new Small Arms Function Firing Range.

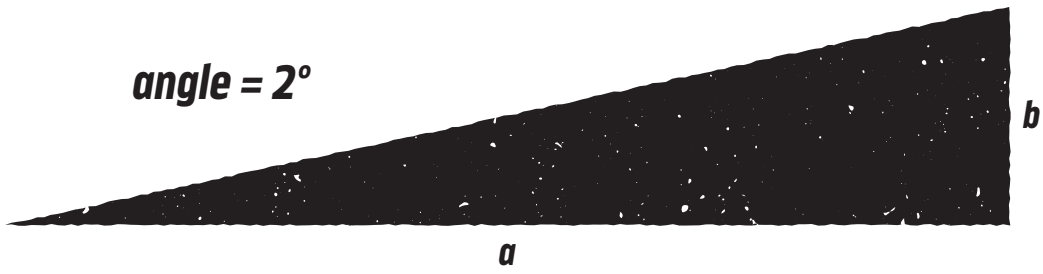
agreeing on everything. I know they were still corresponding when Ackley was in Trinidad." Anna even recalled an extended road trip that included a visit to Salmon, Idaho to see Keith.

Part of the work of the shop at Ogden Arsenal involved the repair and refit of some of the rifles acquired through the program detailed in the sidebar. "During the war I supervised overhauling many thousands of Enfield rifles at the arsenal,"[8] wrote Ackley. The Ordnance Department also purchased large quantities of shotguns from civilian sources to supply the military police with weapons, these shotguns were processed by the Small Arms Shop as well.

Ackley said very little in his writings about his time at Ogden. However, in his 1959 first edition of *Handbook for Shooters and Reloaders* he mentions an incident that took place there. It seems that an inspector used a hardened steel headspace gauge (No-Go or Field) to damage several hundred barrels on Enfield P-17 actions. Ackley approached Pete Brown, then arms editor for *Sports Afield*, with a question.

"How much forward pressure could be exerted on the Enfield bolt by a given amount of pressure on the bolt handle?"[9] Asked Ackley.

Brown responded: "I measured the angle of the cam surface on the Enfield bolt lugs using a new Bausch and Lomb measuring magnifier. I would say that the accuracy of this instrument is good for getting a measurement



Rifles Wanted !

From the *American Rifleman*, May 1942:

In connection with the newspaper reports concerning the Army's efforts to obtain .30 caliber Springfield and Enfield 1917 rifles, the following information has been compiled as a guide for those intending to submit rifles.

Additions which have been made to the rifle such as special front and rear sight; scope blocks; special swivels; special butt plates; sporting stocks, etc., should be removed by the owner and retained by him before shipping the piece to the Ordnance Depot. Holes drilled for scope blocks or receiver sights should not be filled prior to shipment.

Owners will be reimbursed on a scale of prices based on a maximum of $47.65 for Springfields and $12.50 for Enfields of service pattern in excellent condition. Prices will be reduced according to condition; expected life of the weapon as indicated by wear; and amount of labor and material required to put the rifle back into "as issued" condition (new stock, new sights, etc).

The following alterations will render the rifle unacceptable:

Model 1917 "Enfield" — Rear sight protective wings removed; front sight stud milled off; receiver lightened.

Both M. '17 and M. '03 — Barrel turned down or shortened; Receiver altered in any way other than holes for sight screws; Noticeable erosion or corrosion inside or outside; Rechamber job for any cartridge other than .30-06.

If otherwise satisfactory rifle will be accepted with the following alterations:

Model 1917 Enfield — Front sight guards removed; Bolt handle straightened; Barrel polished and reblued (but not altered); Bolt polished.

Model 1903 Springfield — Front or rear sight removed; Barrel polished and reblued (but not altered); Bolt polished.

Both M. '17 and M. '03 — Barrel drilled for sporting sight or scope blocks: Receiver drilled for sporting sight or scope; Bolt handle altered to clear scope; Hand guard removed; Sling swivels removed; Butt Plate replaced by special types; Stock converted to sporter or replaced by sporter stock: Sporting or target sight added; Scope mounts added (including scope blocks).

Rifles should be submitted to the Ordnance Officer at your nearest Army Post, or persons within driving distance of any of our arsenals may submit them to those points direct. The NRA is trying to work out a plan to more conveniently handle rifles for those members who do not live near an Army Post.

This move does not constitute a requisitioning of privately owned arms, nor is there any intention of attempting such a step. Sale of such rifles is purely at the discretion of the owner.

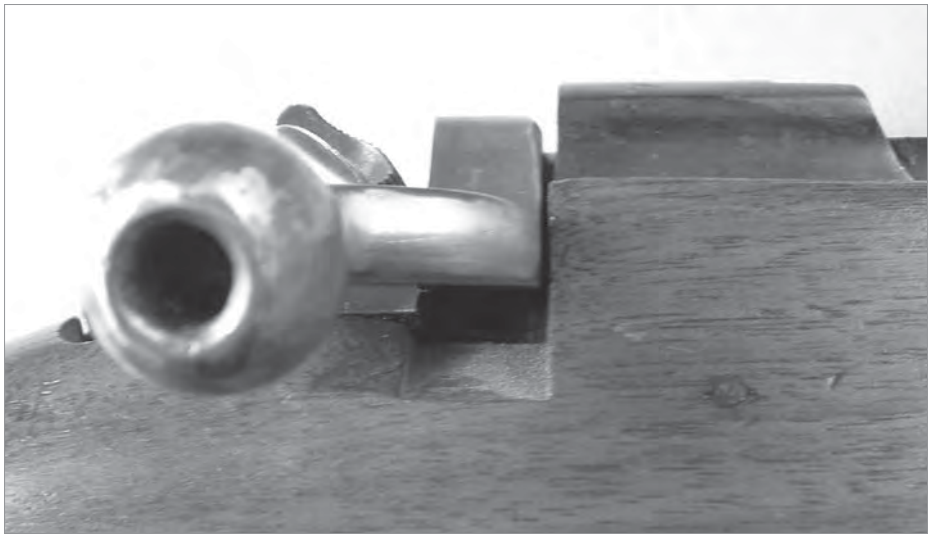
down within .5 of one degree. I measure the angle of incline on the cam surface to be between 1.5 and 2 degrees. This measurement was taken from the bolt you sent me.

We can determine the mechanical advantage of this cam just as we would determine it for an inclined plane and divide 'a' by 'b'.

For any given angle, 'a' and 'b' of course bear a fixed relationship to one another. A/b happens to be the cotangent of the angle which in this case is 2 degrees. Therefore the cotangent of 2 degrees is the mechanical advantage of the bolt lug. Cotangent of 2 degrees = 28.64.

Now we have the additional mechanical advantage of the bolt handle and this is simply a lever system. From the center of the bolt to the center of the lug is approximately .375 inches. From the center of the bolt to the center of the bolt knob is approximately

Headspace gauges.



Enfield with No-Go gauge in chamber.

Enfield with Go gauge in chamber.

2.5 inches. The mechanical advantage of the bolt lever is therefore 2.5 / .375 = 6.66

The total mechanical advantage of the system is 6.66 x 28.64 = 190.7. Therefore if a force of 100 lbs. is applied down on the bolt handle, the total forward thrust on the bolt head (less friction loss) would be 190.7 x 100 or 19,070 lbs. Individual bolts, because of fit, polish, etc., will vary in efficiency but let's assume an efficiency of 85 percent.

19,070 x .85 = 16,209.

With a force of 100 pounds down on the bolt handle we then end up with about 16,000 lbs. forward thrust on the bolt. If a heavy man really put all his weight into it while the gun action was held in a vise, he might conceivably double this pressure or even more.

The shoulder of the .30-06 case has, I figure, .233 square inches of surface. Therefore a 100-pound force on the bolt knob puts a pressure of 16,000/.233 = 68,679 lbs. per square inch on the shoulder of the chamber.

The pressure of fluidity of mild steel in pounds per square inch is 112,000. In order to flow the steel it would have been necessary to apply a pressure of 200 lbs. or more on the bolt knob. It is possible, however, that the headspace could be extended by virtue of the chamber bulging slightly. In view of these more recent calculations which I have made, I believe it is entirely possible to increase headspace by applying excessive pressure to the bolt handle when an excess headspace gauge is in the chamber."[10]

When Bill Hause volunteered the information earlier in this chapter about General Hatcher recruiting Ackley it reminded him of a story. "Elmer Keith worked under P.O. at Ogden Arsenal. Keith had rejected a bunch of 1917 Enfields for headspace, it became such an issue that General Hatcher actually made a point when at the arsenal to look up Keith (Hatcher and Keith were friends too).

"General Hatcher asked Elmer to show him how he did his headspace check. Keith dropped a No-Go gauge in the chamber of a 1917 and proceeded to use the palm of his hand to push the bolt all the way down. Hatcher took the gun from Keith and explained that force was not required for the test, and showed him to lower the bolt handle using only his thumb and index finger to hold it. Ackley told that story many times while I worked for him in Salt Lake." Bevan King told the story slightly differently, but

Chamber Cast with Cerrosafe, no visible damage to chamber. The photo is of the chamber cast from our test rifle after forcing the bolt closed. Note that there is no visible damage to the shoulder. However there is a relatively large surface area that would allow for the bolt to act like a jack and simply force the barrel forward in the receiver, thus changing the headspace.

the basic facts were the same.

Headspace gauges as pictured here are made from tool steel. Military-grade gauges were hardened well beyond the hardness of the barrels in Enfield rifles, mainly so they will be reliable and wear little if at all in use. So, when undue pressure was applied to a No-Go or field gauge the barrel could easily be damaged.

Testing of this issue was performed in the author's shop. It was not difficult at all to force the bolt closed on a No-Go gauge. We used a P-17 Enfield in original military configuration. Once the bolt was forced closed the headspace was changed enough that it was easily noticeable. A chamber cast was performed after the test, there was no visible change to the shoulder of the chamber, so it is most likely that the barrel was forced forward, perhaps deforming the barrel threads as they are much softer than the threads in the receiver. The gauges used in this test were measured before and after. They did not change, so the damage was definitely in the firearm itself.

This whole discussion of the Enfield headspace fiasco is the one documented case of Ackley and Keith disagreeing while at the arsenal. There are other stories but most are very hard to verify.

Ackley's father had a job at the Ogden Arsenal during the two years preceding his death. P.O.'s wife Winifred took aptitude tests and worked there as well. Ackley's father, William W. Ackley, passed away on January 31, 1944 from a heart ailment.

Parker Ackley resigned his position with the Ogden Arsenal on November 30, 1943, citing, "Gunsmith business at home provides income while caring for children and permits wife to continue work here." His resignation became final on December 29 of that year. Within months, P.O. left Ogden for Cimarron, New Mexico to begin his partnership with Turner and Koozer, to be discussed in the next chapter.

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1 Alexander, Thomas G., *Utah Historical Quarterly* Vol. 33, No. 3, 1965
2 Ibid.
3 Chambers Noble, Antonette, *Utah Historical Quarterly Vol.* 59, Spring 1991
4 *American Rifleman*, "Julian S. Hatcher Obituary," January 1964
5 http://hdl.loc.gov/loc.pnp/hhh.ut0637
6 *Historic American Engineering Record*, No. UT-84-AI-1
7 *Historic American Engineering Record*, No. UT-84-AI-AE-3
8 Ackley, P.O., "The Gunsmith," *Guns & Ammo*, April 1972
9 Brown, Pete, "Comments on Camming Power of the Enfield Bolt," *Handbook for Shooters and Reloaders*, 1959
10 Ibid.

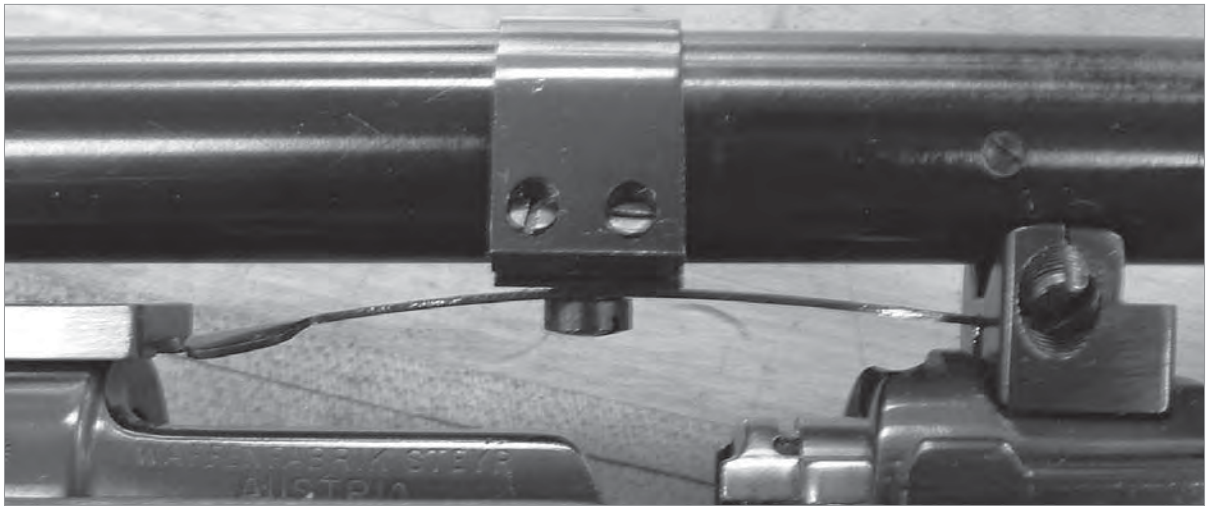
CHAPTER 4

ACKLEY-TURNER SCOPE MOUNT

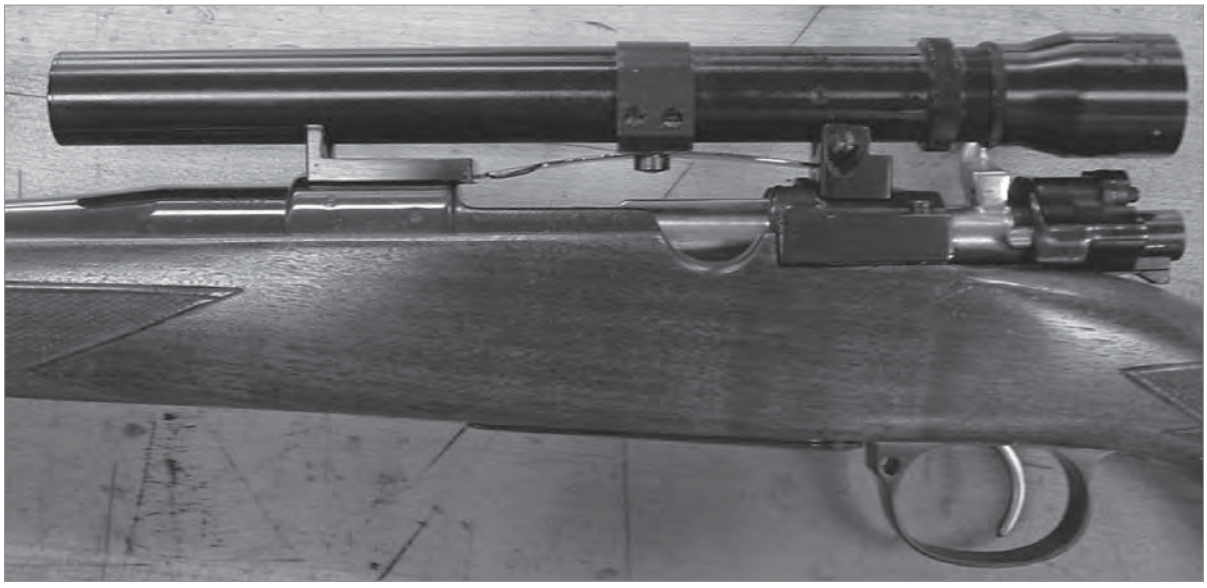
Ad from *American Rifleman*, 1942, for the George Turner scope mount.

George K. Turner received Patent# 2,125,828 on his "Mount for Telescopic Rifle Sight" on August 2, 1938. The patent was filed almost a year before that date, on August 16, 1937. P.O. Ackley's resignation from the Ogden Arsenal was effective December 29, 1943. According to the Ackley family they moved to Cimarron, New Mexico in 1944 and stayed there for a year.[1]

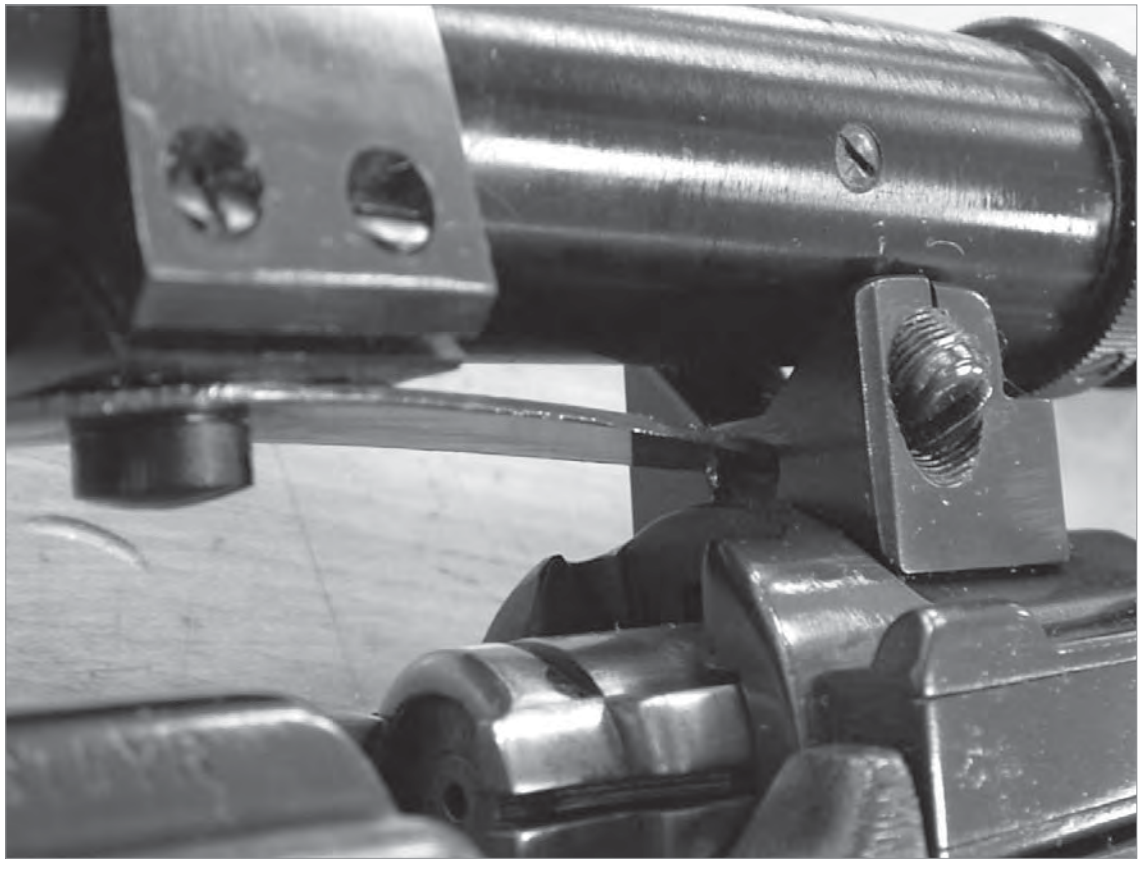
It is not known when Ackley and Turner became acquainted. They both ran ads in the *American Rifleman*. It is possible that Ackley became interested in the scope mount that Turner was selling. One source says that Turner had his gun business up for sale and that Ward Koozer and Ackley negotiated the purchase before leaving Ogden.



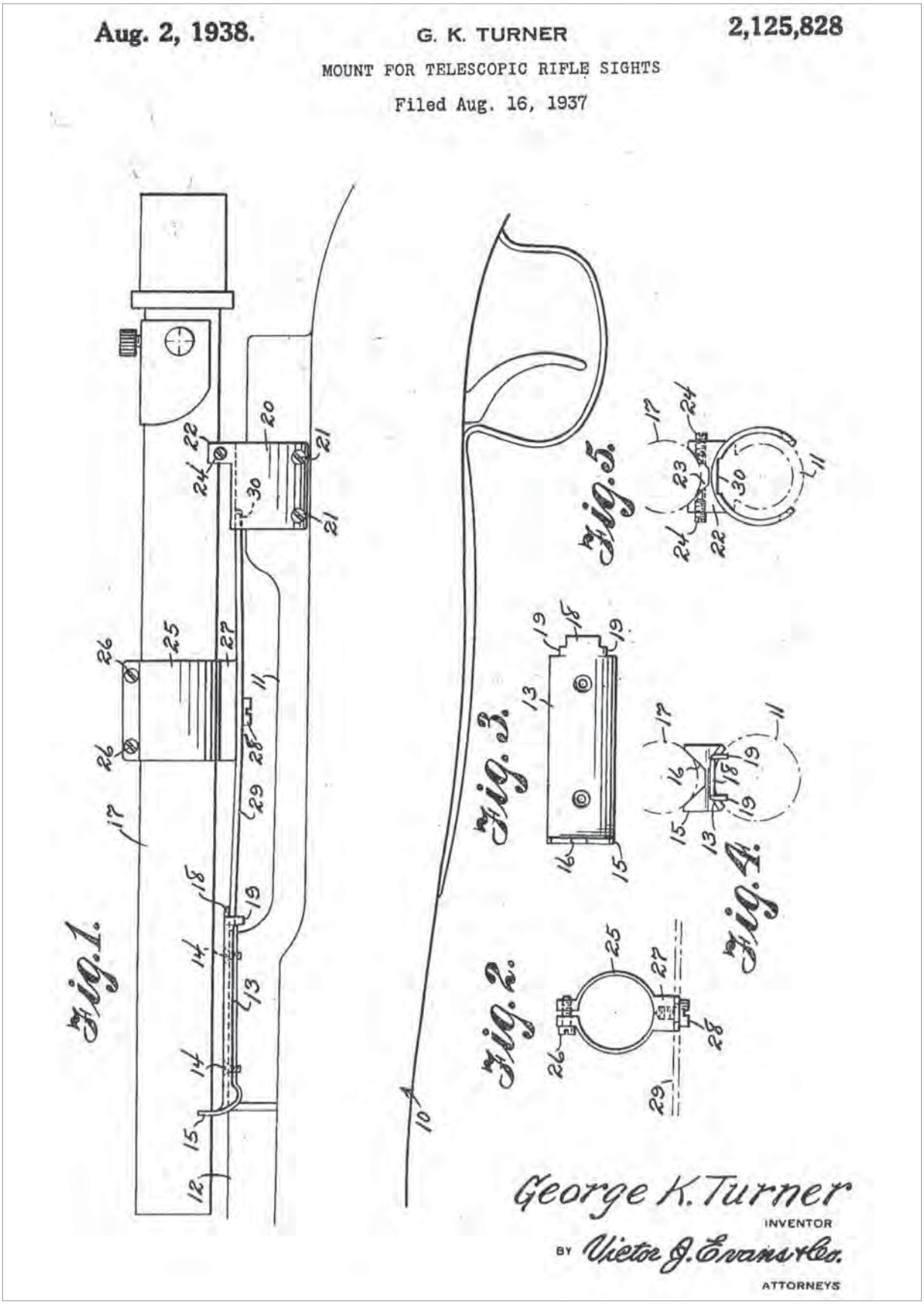
Closeup of the Turner-Ackley scope mount.



Ackley quick-release mount on a 98 Mauser action, Weaver scope above.



You can see the pivot screw in the bottom of the scope ring, the rear base, and the way that the attachment spring contacts the rear base. It's easy to see why these are commonly called "V- block" bases.



Patent drawing for the Turner Mount for Telescopic Rifle Sights.

Note the front base and the "V" in which the scope rests. Just behind the base there is a tab of metal protruding just right for your right thumb to depress and release the spring to the side, allowing the scope to quick release.

What is known is that when Ackley left Ogden Arsenal in 1944 he and Ward Koozer moved together. It was there that they partnered with George Turner for a short period. The isolation of Cimarron was soon felt, and Ackley convinced the Ration Board of their need to move to a town with rail service. This proved to be Trinidad, Colorado. They were provided with gasoline ration stamps and away they went.[2]

Upon visiting the Trinidad State Junior College, Gunsmithing Program in June of 2007, the author found that the department had an Ackley-built rifle on display, more on that in Chapter 5. This gun was built by Ackley, the mount came from the personal collection of Keith Gipson, one of the current instructors in the Gunsmithing Program at TSJC. The Gunsmithing Department at the school added the Ackley Mount to the gun to make a complete package.

In the photo at the bottom of page 34 note how the rear base functions with the windage screws at an angle, providing for both elevation and windage, so with a fixed point of aim scope like the Weaver pictured it would have been a difficult job to sight in with this mount. Each turn of a windage screw would move the point of impact diagonally on the target. Close inspection of this particular set of mounts produced no makers mark anyplace that was visible.

The only mentions of George Turner that appeared in newspapers from the Cimarron area referred to his time as a member of the New Mexico State Game Commission. Apparently Turner served for about 7 years. In 1958, he became embroiled in a controversy during the election cycle for Governor of New Mexico. Apparently, the firing of State Game and Fish Director Homer Pickens was seen as a political football by Turner and some others. Turner put his support behind John Burroughs, the opponent in the Governor's race, while the incumbent was Governor Edwin Mechem. Ultimately Burroughs lost the election and no more was heard from Turner in the public record.

According to Bill Prator who worked as Ackley's shop foreman later in Trinidad, "Turner wanted Ackley to go into the cattle chute business. Ackley didn't want to, he wanted to stay with guns. So it wasn't too long before he moved the company to Trinidad, Colorado." From that time forward Ackley produced a version of the Turner mount, for a time under several names including "Snap-on." (No connection to the tool company by that name.) Other names used to market the scope mount were, "Ackley-Turner Mount," and finally just the "Ackley Mount."

This mounting system was mentioned in *The Gun Digest Book of Scopes and Mounts* by Bob Bell, and in the *1955 Gun Digest*.

1 "Obituary for Winnifred Ackley," *Desert News*, August, 17, 1995
2 Womack, Lester, "The Extraordinary P.O. Ackley," *Gun Digest*, 1985

CHAPTER 5

TRINIDAD, COLORADO

From 1945 to 1951 P.O. Ackley called Trinidad, Colorado his home after a very short stay in Cimarron, New Mexico where he and Ward Koozer had partnered with George Turner. The business in Cimarron went by the name of Ackley & Turner. That business manufactured the Turner Scope Mount, produced some rifle barrels, and performed general gunsmithing services. Ackley found Cimarron to be isolated, which limited growth of the business. Turner stayed in Cimarron when the Ackley-Turner company dissolved.

Koozer and Ackley had met and worked together at the Ogden Arsenal during the war. Koozer, by his former wife's account, was in Cimarron with Ackley and continued their partnership in Trinidad. Ackley states that the selection of Trinidad was because it had several attributes that would benefit his business. He and his associates wanted a location which had rail service, mail facilities in all directions, and that it be on the east side of the divide, which supposedly was better for mail order business. Upon moving to Trinidad, Ackley reformed his company as "Ackley, Koozer, and DeMiller Engineering Co."

The name on the shop windows in the pictures later in this chapter is "P.O. Ackley and Company, Gun Makers." In 1947 the company was incorporated under the name, "P.O. Ackley, Inc."[1] It was at this time in 1947 that Ward Koozer decided to leave the company. One of the primary investors in the corporation was A.T. "Doc" Kapelke, he was heavily involved in the negotiations when the corporation was later sold to Eastman.

Syracuse University records give an address for Ackley's business of 160 Elm St., Trinidad, Colorado in July of 1945. According to Ackley when first opened in Trinidad, the business was located on Elm Street in a shop of about 4,000 square feet. He guessed that about six employees helped to build the business when it became established there. Anna Konuges-Floyd said that the back of the shop opened on an embankment, the employees used that bank to test fire finished projects.

Almost as soon as the doors were open in downtown Trinidad the staff of Ackley's shop learned that there was a population of retired folks who lived within walking distance of the shop. Soon these duffers were hanging out and, of course, wasting time. This was at least a partial reason for building a new facility outside of town. Les Womack asked Ackley if the move helped with the unwanted visitors. "Nope," Ackley said ruefully, "they just brought their lunches!"[2]

During his stay in Trinidad, Ackley ran

◄ 160 Elm St., first location of Ackley business in Trinidad, Colorado.

▶ The old Ackley Home at 316 Ash Street, circa 2007.

what he called "one of the largest custom gun shops in the nation." He reportedly employed as many as 25 people during this time. The new company manufactured the Turner Mount under the name "Snap-in," made barrels, custom rifles, and offered general gunsmithing.

Business came from all over the world, but most from the United States, Canada, and Alaska. Amazingly, 20,000 to 25,000 letters were answered by P.O. Ackley, Inc., between 1947 and the sale of the business in 1951.

In the Trinidad City directory for 1948, P.O. Ackley had three addresses listed. The first is at 121 N. Commercial St. That specific address does not appear on any of the buildings on Commercial St. There is a bank, law offices, and a couple of retail stores on the ground floor of the building. The notation next to Ackley's name for this address says, "Gun shop instructor Trinidad Jr. College." C.P. Donnelly mentioned that Cole Agee, the well-known engraver, worked for Ackley in Trinidad, and in Custom Built Rifles author Dick Simmons lists the Trinidad National Bank building as the address for Cole Agee in Trinidad. Likely Ackley rented this space for Agee to work in. Note: Cole Agee is in the group photo this chapter.

Ackley's home address, 316 Ash, was listed in the city directory as well; the listing reads, "P.O. Ackley (Winifred) pres & mgr P.O. Ackley Inc." Finally P.O. Ackley Inc. is listed as being at 124 N. Chestnut. There is no building at that address as of this writing.

Early in the fall of 1948, the P.O. Ackley, Inc. shop was moved outside of the

This picture was taken in front of the Ackley shop at 160 Elm St.[3] Back Row, l to r: unknown, unknown, Eugene Hopper, Perchoisky, unknown, Cole Agee, Ward Koozer. Second Row: Charles Rundel, Ann Konuges-Floyd, Glen Malin, Dick Adair, Kathy, P.O. Ackley, Earnest Parks. Front Row: Ruben Gutierrez, Bill Prator, O'Neal, Pano Ortiz, Paul Mayer.

city limits of Trinidad. The location was on Highway 12 west of town, Ackley had a new building built out of which the company could operate. The new shop contained almost 12,000 square feet of space that included offices, store-rooms, vault, shipping rooms, tool rooms and more. That building burned down many years later (after Ackley Inc. had been sold), and a new building was built on the foundation of the original.

It was in the new shop building that an accident took place that caused quite a stir. Anna Konuges-Floyd told about an explosion that injured two men. She said that the building was "U" shaped and she was leading a tour for some visitors at one end of the building. The two men were working with a grinder and there was a box on the floor with black powder in it. The sparks set off the powder and caused a small explosion, both guys were on fire and went outside and rolled on the ground and other employees used blankets to put out the fire. Anna ran to the office and called for the fire department only to find they were already on the way. Both men survived. This story was supported by another witness. The injuries were very minor.

While interviewing Anna Konuges-Floyd for this book I asked her what she learned from P.O. Ackley. "Actually he was my first boss. Of course, I learned about how to deal with people and the public. I learned a lot about people. P.O. would dictate letters to me in the evening, when he got tired of dictating he would often tell me about his experiences. For instance, he was head of the small arms department in Utah during the war. He would tell about the people he met and the places he had traveled. I was just a young girl of seventeen when I started working there, so I learned things I would have never learned. Because we lived in a very small town, and my father was an immigrant, although he worked hard and made a good life for us, we just were not exposed to a lot of culture. I learned from P.O. that whatever you wanted to do you

Location west of Trinidad that once was home to P.O. Ackley, Inc. The Ackley building burned to the ground, this new building was put up on part of the original foundation.

Fisher's Peak was the view from Ackley's office at the P.O. Ackley Inc. building, west of Trinidad. Today from the former site of the shop the peak is not visible, trees have grown across the highway from the building site, blocking the view.

did not have to wait to be dictated to by others, that you could make your own way. Also he was very respectful of his mother, he saw after her all the time. He had no pretentions, everybody was equal."

Anna went on to say, "You know I had to learn to load my own ammunition. If we were going somewhere to go hunting or shooting, they made me take care of my own ammunition." Anna had a .228 Ackley Magnum, which she has now passed along to her son.

Ackley wrote to her years later when he was in Salt Lake City. "I hope you're in no hurry for your rifle," he wrote. Anna said, "That was our song in Trinidad. We told people, 'If you're in a hurry take your rifle back right away, we're not going to do the work on it.'" So she understood that she would have to wait for the work. Customers being in a rush was nothing new, it seems.

"Today, P.O. is a busy man but not in the type of work that brings him greatest pleasure — for he would be happier doing his own work, with his own hands, in a small shop," said Roy Dunlap in 1950.[4]

"When we were in Colorado we were tooled up to make ribbed barrels just like the ones made in Germany, either half octagon or full octagon, with a full rib. They were not very hard to make, but at that time we had a big Cincinnati milling machine and we used a pair of 45-degree cutters,"[5] wrote Ackley to barrel maker, Bevan King.

P.O. Ackley was known to buy out other gunsmiths from time to time, an example would be the Turner Scope mount, or when he purchased the shop in Roseburg, Oregon at the start of his career from Ross King. In his Gunsmith column for *Guns & Ammo* magazine, he mentioned that he purchased the tooling and design from Arnold Terhaar for an action design. "Arnold Terhaar made a few rifle actions, in fact, I have one of the prototypes myself which is never barreled.

This ad is from a 1950 *American Rifleman* magazine.

And some 25 or more years ago, I bought the tooling from Terhaar for his actions. Shortly thereafter we sold our corporation and all of this tooling went with the other equipment and I suppose it has been long since junked."[6]

According to Charles Landis, P.O. Ackley, Inc. bought out Malcom Company, a scope maker. This would have dated prior to 1951 when Landis published his book on woodchuck hunting and rifles.[7]

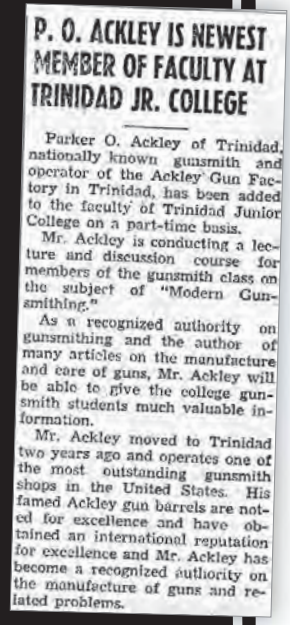
The Birth of the First Gunsmithing School in the United States

Anna Konuges-Floyd said that she had been on a trip with the Ackley's and they had left a temporary secretary at the shop to take care of business. When they returned the temp pointed at two desks in the office that were buried in mounds of mail and said, "They all want to know about the school." Anna laughed and said, "There wasn't any gunsmithing school at that time." Apparently, Jack O'Conner had answered a question from a reader in his column saying that he thought P.O. Ackley had started a school.

"We only had 'on the job' trainees, it was not a school," said Anna. It was in 1945 and '46, when these veterans returning from the war wrote P.O. Ackley wanting to be trained as gunsmiths. During that time period he received 4,000 applications for on-the-job training, and the Trinidad Chamber of Commerce received another 1,000 letters according to one source. P.O. then approached the

New Gunsmithing School Makes the Associated Press Wire Service

Pottstown Mercury Newspaper
DATE 9 MAY 1947,
Pottstown, Montgomery, Pennsylvania



P. O. ACKLEY IS NEWEST MEMBER OF FACULTY AT TRINIDAD JR. COLLEGE

Parker O. Ackley of Trinidad, nationally known gunsmith and operator of the Ackley Gun Factory in Trinidad, has been added to the faculty of Trinidad Junior College on a part-time basis.

Mr. Ackley is conducting a lecture and discussion course for members of the gunsmith class on the subject of "Modern Gunsmithing."

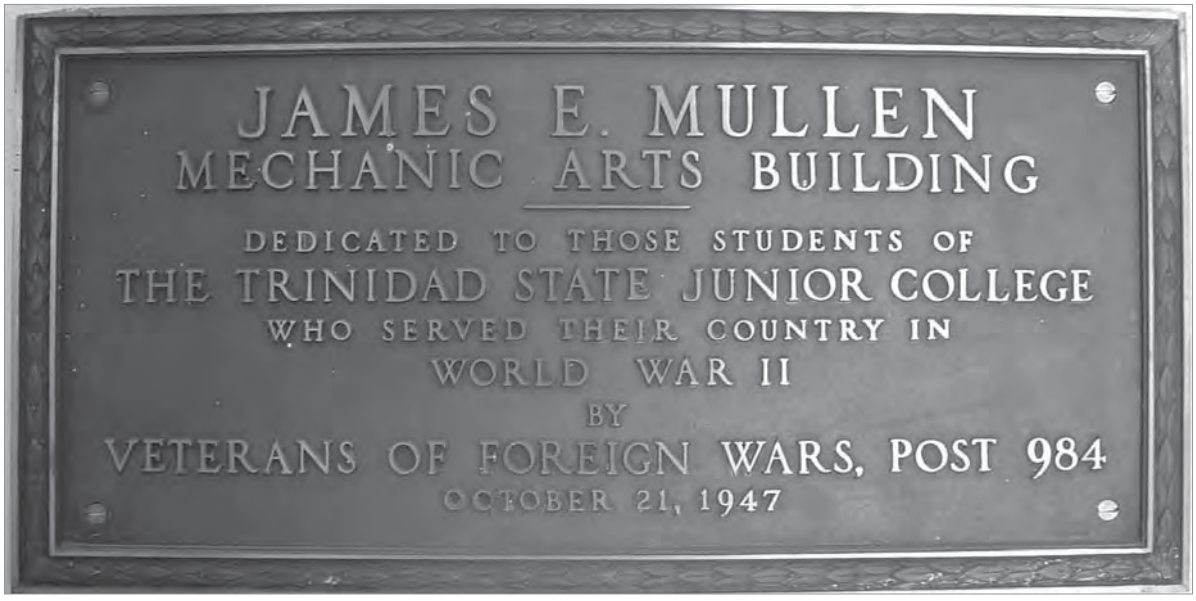
As a recognized authority on gunsmithing and the author of many articles on the manufacture and care of guns, Mr. Ackley will be able to give the college gunsmith students much valuable information.

Mr. Ackley moved to Trinidad two years ago and operates one of the most outstanding gunsmith shops in the United States. His famed Ackley gun barrels are noted for excellence and have obtained an international reputation for excellence and Mr. Ackley has become a recognized authority on the manufacture of guns and related problems.

TRINIDAD, Colo., May 8, 1947 (AP) — A two-year course in gunsmith training, believed by the school authorities to be the first of its kind in the nation, is to be open late this month at Trinidad Junior college.

In announcing the new course, President Dwight C Baird said the college has received inquiries and applications from 22 states. Many of these came from former service men whose interest in firearms had been awakened during the war and who wanted to make a life's work as gunsmiths.

The idea for the new course came from P.O. Ackley, nationally known gunsmith and operator of a Trinidad gun shop. He received many inquiries from men wanting to learn his trade and, not wishing to undertake the training of apprentices himself, he referred the applicants to the college.[9]



Dedication plaque for the Mullen Building, which still housed the Gunsmithing Department at TJSC in 2007.

Trinidad State Junior College fathers about adding gunsmithing to their curriculum. The school agreed.

Dean C.O. Banta, was head of the vocational school at Trinidad State Junior College and was enthusiastic about a gunsmithing curriculum. The new president, Dwight C. Baird, soon had Ackley on the staff to head up the department. A flurry of activity produced enough space and machine tools to start the course, and in January of 1947 the first group of students started class.[8]

Similar articles ran in newspapers all over the country. A survey of newspapers turned up announcements about the new gunsmithing school in such diverse cities as Mansfield Ohio, Oakland California, Long Beach California, Joplin Missouri, and even in the town where Ackley had gone to college, Syracuse, New York. A news release the week of April 10, 1949 prompted most of these as the articles read nearly identically. Headlines varied however, "Gun Crazy Students Flocking to Trinidad Junior College,"[10] "Colorado Town Well Armed, Gunsmith Course Draws Hundreds of Students,"[11] "College Course for Trigger Happy,"[12] and "Gunsmith Class Grows."[13]

In the March issue of the *American Rifleman* for 1950 there was an article that discussed the various gunsmithing schools available at the time and their programs. Trinidad was one of the schools visited and profiled in the article. There is a photo of Ackley lecturing and drawing an illustration on a blackboard along with a description of the courses, cost of attendance, and the following: "P.O. Ackley, well-known as a commercial gunsmith and barrel-maker, conducts classes at Trinidad and works closely with the school in handling the entire course. Ackley received a Bachelor of Science degree from Syracuse University in 1927 [In agriculture, editor]; also attending Colorado A&M. Teaches theory of gunsmithing and metallurgy."[14]

Ackley worked at Trinidad State Junior College as an instructor, lecturing two hours a day in Theory of Gun Making, and Metallurgy from 1947 to 1951. C.P. Donnelly was a student at Trinidad, graduating in 1947. Donnelly became well-known for the barrels he made under the business name of Siskiyou Rifle Works. He remembers Ackley's business in Trinidad started out in an old Safeway store and later a building was built specifically to house the business.

According to Donnelly, when lecturing on firearm design, P.O Ackley would disassemble a gun with his back to his students. He would

Tom Elliot stands in front of the historical display in the Mullen Building at TSJC. The rifle was built by P.O. Ackley, a custom 98 Mauser in .270 Winchester, and sports a Turner-Ackley scope mount.

also reassemble it in the same fashion, never showing them directly how it was done, but talking to them about the process. Then they'd have to figure it out on their own in lab. This was his way of forcing the students to become familiar with the particular gun they were studying.

Les Womack described Ackley's years of association with the students of Trinidad Junior College was a two-way street. The students supplied him with lots of enthusiastic help for his experiments. All he had to do was suggest an experiment, and everyone was ready to go. It was at this time that he ran a series of blow-up tests on military rifle actions to determine their strength and suitability for sporter conversion. Bill Hause stated that he did the record keeping for some of the blow up tests. He said they started in September of 1950. This was an eye-opener and remains the only scientific approach made on the subject.

Ackley had been making up wildcat cartridges for many years, and now he encouraged students to experiment with most anything within the limits of safety. To keep a damper on the students' heady enthusiasm, he insisted on a chronograph report before accepting any ballistic data. "Figures don't lie, but liars do figure," Ackley reportedly said. The chronograph is an impartial judge.[15]

Womack wrote further, "Adulation of one's professor is nothing new, but in Ackley's case the students at Trinidad felt it was more than justified. In spite of his 16-hour days, he was always available to anyone in need of help. He gave freely of any information he might have. He used to say that anybody in the gun business who thought he had a trade secret wasn't kidding anyone but himself."[16]

Early in the course, Ackley pointed out to the students that gunsmithing wasn't necessar-

Trinidad Trojan Tribune, January 15, 1947

Gunsmithing Course Will be First in Entire Nation

Details concerning the establishment of a two-year course in gunsmith training, believed to be the first course of its kind ever offered by a college in the United States, were announced today by officials of Trinidad Junior College who said applications for the course are now being received and the class will meet for the first time on either January 27 or February 3.

The announcement concerning the new course, which is expected to attract a capacity enrollment, dominated by veterans of World War II, was made by Dwight C. Baird, president of the college and C. 0. Banta, dean of the vocational department.

Already inquiries and applications from students in 22 different states have been received, Dean Banta said, ranging from Massachusetts and New Hampshire to California, and from Montana to North Carolina. Veterans will be able to enroll under the GI Bill of Rights and Public Law 16.

Post-World War II left incredible numbers of men in need of a career after military service. That demand almost forced the creation of the gunsmith school at Trinidad.

Establishment of the gunsmith training course marks another "first" in vocational education pioneered by Trinidad Junior college.

There will be many strange faces at Trinidad Junior College Monday as 50 students arrive to attend the newest additions to our school, gunsmithing and handcraft classes.

At the present time 30 students have been accepted for gunsmithing and 20 are expected for hand-craft with many more applications pouring in.

The many arrivals come from many states which include Missouri, Kentucky, Idaho, Virginia, Massachusetts, Wisconsin, Pennsylvania, Illinois, Minnesota, Texas, Ohio, Colorado and Nebraska.

The first arrivals are Wilton L. Bose of Birch Tree, Mo., and Thomas C. Elliott of Corbin, Ky., who, luckily arrived early and have had no difficulties in securing rooms which now are creating quite a problem.

ily a road to riches. Since a gunsmith must be proficient at machining, wood working, heat treating, and a myriad of other skills, was the student also prepared to equip a shop? If not, did he have assurance of employment in an established shop upon graduation? Even if he had his own shop and equipment at the time, was he willing to put in long hours at low pay in order to make a living?

A simple love of firearms wasn't enough to pull one through as the public wasn't disposed to pay a premium price for a man to work long hours on their weapons. As a hobby, you could take all the time you wanted, but gun work was done on a flat rate basis, and one must do the job as quickly as possible when your bread and butter depended upon it. "If my wife hadn't had a good job, I would have starved to death long ago," Ackley used to say, only half in jest.[17]

Mort Wilson at the 60th reunion.

▼ **A sales pamphlet from P.O. Ackley, Inc., 1949. It's interesting to note that this date came from the files of H.P. White Co. The firm has a long history of performing scientific testing for the firearms industry. In some articles, primarily for *American Rifleman*, the H.P. White Co. performed tests on cartridges like Ackley's and provided data for the readers of the publication.**

.250 .270 .30 .35

ACKLEY
BELTED MAGNUMS

This series of magnums known as the Ackley Magnums are designed with the conventional 28 degree shoulder. This comparatively sharp shoulder has given exceedingly good results in both magnums and smaller calibers. These magnums are designed with an over all length short enough to work through standard actions without excessive alteration. The over all length is practically the same as the standard 30-06. They are designed with a comparatively long neck and straight body taper which results in reduced throat erosion and easy extraction.

The illustration shows these magnums in full size. It will be noted that the body dimensions are the same for all the Ackley Magnums, which means that the smaller ones can be reborred to the larger size without changing the chamber and headspace and have to be neck reamed only.

THE ACKLEY .250 MAGNUM. This popular load developes higher velocities than most of the wildcat calibers yet developed, including the .22 calibers. With the 115 grain Magnum bullet speeds of over 3400 fs. can be easily attained. With the 87 grain bullet, up to 4,000. With lighter bullet, speeds approaching 5,000 fs have been attained with experimental loads. The design of this super .250 caliber as well as its larger brothers is modern, yet conservative. The powder capacity is maximum for good efficiency, and the general design is conducive-to easy extraction and minimum bolt thrust. Greater powder capacity is likely to reduce barrel life and lower efficiency. We feel that this design, although conservative, is the equal of any now available.

Average velocities will be found in the accompanying table.

THE ACKLEY .270 MAGNUM. The .270 Ackley Magnum is becoming increasingly popular. Bullets weighing from 100 grains to 180 grains can be used. Velocities range up to 3600 fs. Average velocities for various bullet weights will be found in the table at the bottom.

Bullet weights over 160 grains are not recommended. The 160 grain bullet is recommended only for the largest game. The 130 grain bullet is a good all round weight to use. The 100 grain bullet is recommended only for specialized shooting. It should not be used at the highest velocities except for big game where only a small number of shots will be used—otherwise the barrel life will be greatly reduced.

Barrel life is reasonably good with the heavier bullets; recoil is similar to the regular 30/06. The .270 Magnum is recommended as an ideal rifle for the largest game at long ranges, where flat trajectory and elimination of guess work is of prime importance.

This same case can be also furnished in 7 mm or .276.

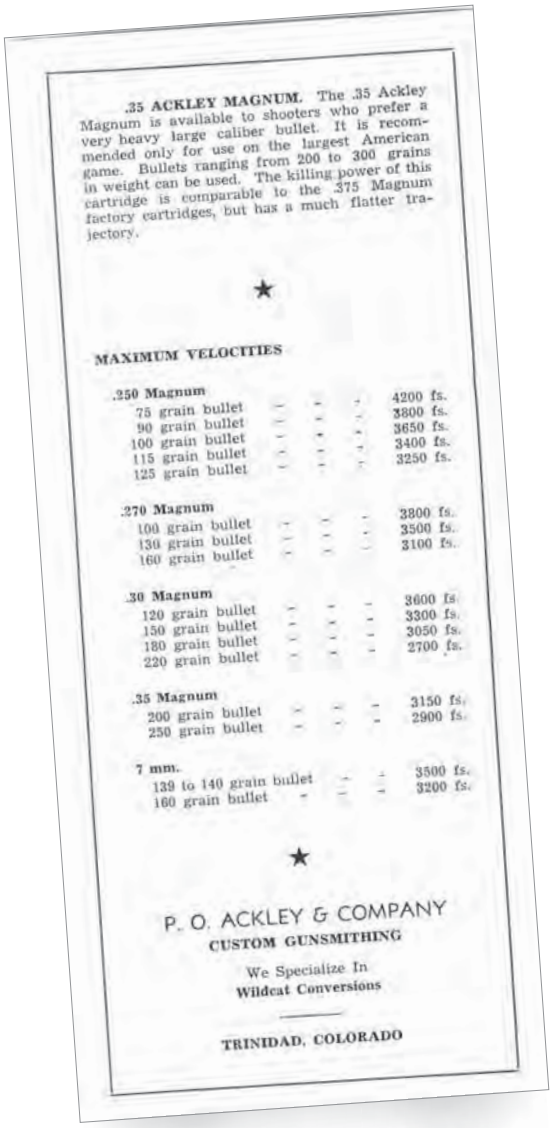
.30 ACKLEY MAGNUM. This .30 Magnum developes ballistics the same as or better than the standard 300 H & H Magnum cartridge, as loaded by the various commercial ammunition manufacturers. It is recommended for use in shorter actions in preference to the full length magnum cartridges because no extensive alteration of the action is necessary, which results in a reduced margin of safety to a dangerous degree. This magnum will work through actions such as the 1903 Springfield or 1917 Enfield without any alteration with the exception of cutting out the bolt face to accommodate the larger head. It will work through any Model 98 actions with a minimum of alteration without any reduction of the margin of safety.

60 Years Later

While attending the 60th Reunion of the Gunsmithing Department at Trinidad State Junior College in June of 2007, the author was able to interview Tom Elliot, the same man mentioned in the article above. He was a member of the first class to start in the Mullen Building on the Campus of TSJC. "The building was not finished when we moved in for classes," Elliot said. "The roof was not on the building yet so when it rained or snowed, the ceiling leaked."

The machine shop on the main floor of the Mullen Building has windows all along one wall and part of the rear wall. There is also a roll-up garage door at the rear that opens onto a grade. The shop is filled with lathes and other machinery and according to Elliot that room had work benches all along the windows and a mix of machine tools that presumably were acquired by the school from war surplus, many of which he did not know how to use. The instructors were DeMiller and Ackley.

"Ackley's Theory class stressed headspace, improved chamber designs, and discussed both internal ballistics and external ballistics



.35 ACKLEY MAGNUM. The .35 Ackley Magnum is available to shooters who prefer a very heavy large caliber bullet. It is recommended only for use on the largest American game. Bullets ranging from 200 to 300 grains in weight can be used. The killing power of this cartridge is comparable to the .375 Magnum factory cartridges, but has a much flatter trajectory.

★

MAXIMUM VELOCITIES

.250 Magnum	
75 grain bullet	4200 fs.
90 grain bullet	3800 fs.
100 grain bullet	3650 fs.
115 grain bullet	3400 fs.
125 grain bullet	3250 fs.
.270 Magnum	
100 grain bullet	3800 fs.
130 grain bullet	3500 fs.
160 grain bullet	3100 fs.
.30 Magnum	
120 grain bullet	3600 fs.
150 grain bullet	3300 fs.
180 grain bullet	3050 fs.
220 grain bullet	2700 fs.
.35 Magnum	
200 grain bullet	3150 fs.
250 grain bullet	2900 fs.
7 mm.	
139 to 140 grain bullet	3500 fs.
160 grain bullet	3200 fs.

★

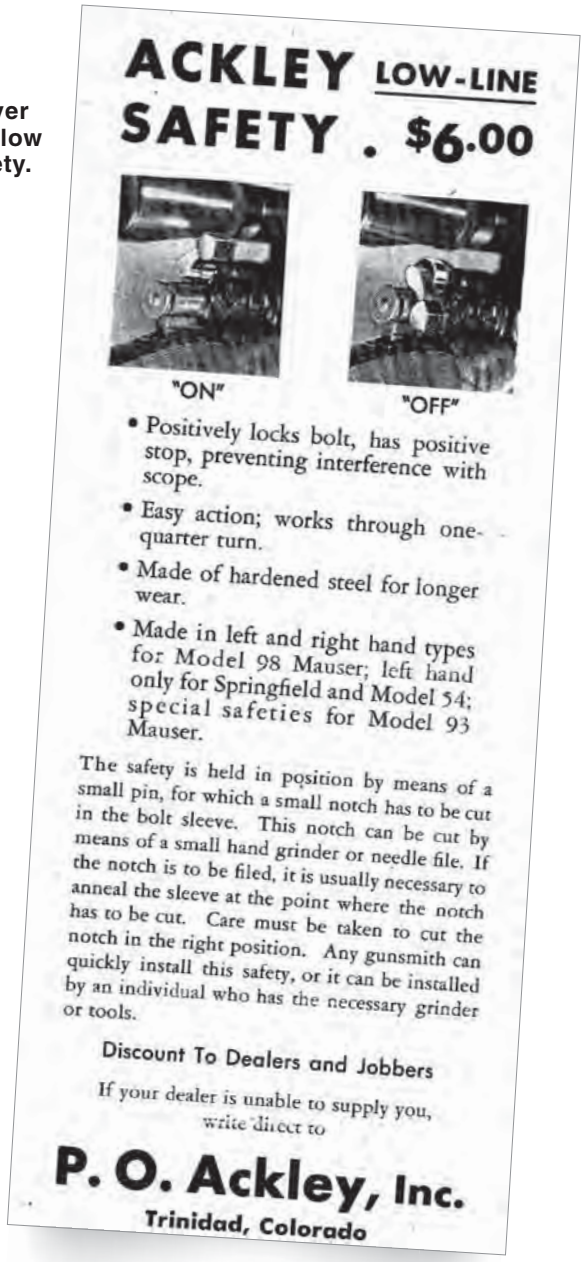
P. O. ACKLEY & COMPANY
CUSTOM GUNSMITHING

We Specialize In
Wildcat Conversions

TRINIDAD, COLORADO

▲ Outside cover of the Ackley brochure.

► Sales flyer for Ackley low scope safety.



ACKLEY LOW-LINE SAFETY . $6.00

"ON" "OFF"

- Positively locks bolt, has positive stop, preventing interference with scope.
- Easy action; works through one-quarter turn.
- Made of hardened steel for longer wear.
- Made in left and right hand types for Model 98 Mauser; left hand only for Springfield and Model 54; special safeties for Model 93 Mauser.

The safety is held in position by means of a small pin, for which a small notch has to be cut in the bolt sleeve. This notch can be cut by means of a small hand grinder or needle file. If the notch is to be filed, it is usually necessary to anneal the sleeve at the point where the notch has to be cut. Care must be taken to cut the notch in the right position. Any gunsmith can quickly install this safety, or it can be installed by an individual who has the necessary grinder or tools.

Discount To Dealers and Jobbers

If your dealer is unable to supply you, write direct to

P. O. Ackley, Inc.
Trinidad, Colorado

as well. Ackley discussed the strength of various actions, he had already performed some of his tests by that time. He talked about the Japanese action being the strongest he had tested. He discussed the .17 caliber and talked about the fact the bullets were not yet available to handle the velocity that it could generate, some would just blow up in the air in front of the gun. Some of the tests for the .17 included shooting at rail material from old railroad tracks. The .17 would blow straight through the track," recalled Elliot.

Mort Wilson graduated from the program in 1952, so his first year in school was Ackley's last year there. "Ackley taught strictly theory, he had a classroom in the Berg Building where he held court. That class had some theory but it was more about supply sources and ballistics. He talked a lot about various calibers, and tried to compare the ballistic performance from various calibers. For example, the .25-35 verses the .257 Roberts. It was somewhat of a ballistics class, of course we never had any chronographs, the best technical tool we had available was a ballistic pendulum.

In *Checkering and Carving of Gunstocks* by Monty Kennedy this gun is pictured with an Ackley-Turner scope mount. It also appears in Charles Landis' book, *Woodchucks and Woodchuck Rifles*. Courtesy of Bill Hause. Photo by Stan Trzoniec

"The one thing that stands out to me that Ackley never taught in theory class was barrel making. I would have loved to learn about rifling design, and how to make the tools, how to figure the correct proportions to make an accurately rifled barrel. To my knowledge, he never discussed that material in class. He did talk some about cutters in general.

"Ackley's reputation drew a lot of people here to this program. He was very knowledgeable in the heat treatment of metals. I am a retired tool and die maker, so looking back on the time I spent sitting in P.O. Ackley's class and listening to him teach, I would say that if I weighed him in the balance, I would find him wanting as a teacher. He had built a good reputation prior to the war as a quality gunsmith. There were few well-known gunsmiths in the West at that time, being a barrel maker probably helped with Ackley's notoriety. His barrels were considered to be as good as any other maker available at that time. Articles in the pre-war years carried much more weight with readers than they do today, of course there were less distractions, no TV, etc. The articles written about Ackley prior to the war probably went a long way toward developing his reputation, he was friendly with several writers," stated Wilson.

Dennis Katona of Wallingford, Connecticut was a member of that first class in 1949. He packed his bags and headed out to Trinidad to study gunsmithing under P.O. Ackley. "The guy is an icon," said Katona, referring to Ackley. After graduating, Katona headed home to practice his new trade as a Certified Gunsmith.

In 1949, Ackley recommended Robert (Bob) G. West to the school in Trinidad. West first met Ackley in 1946, hung around a bit during the famous blow-up experiments and later became a close friend. West used Ackley barrels in his custom rifle business, located in Loveland, calling them "very

P.O. Ackley (Left) and Russ Hightower inspecting rifles.[21]

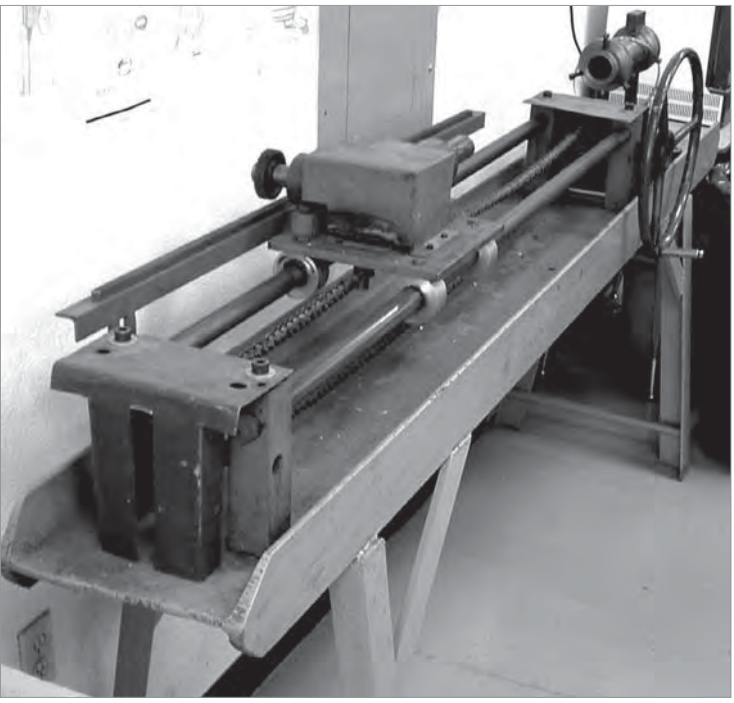
good" quality. Trinidad State Junior College hired Bob as an instructor, he handled the second year shop students in the school. "I learned more from him than I would have been able to anywhere else," West said of Ackley. "He was never too busy to help with any problem that came up.

"He had a sharp, analytical mind and a memory like an elephant. He could quote loads by the hour. He had no secrets about the gun business. He was not egotistical or swell-headed about his fame or ability. He was just P.O."[18]

West also told a story that, during his tenure at Trinidad, Roy Weatherby made a trip to the school. While there he reportedly sat down with Ackley and West to discuss a problem he was having. According to West, he was working on his .257 Weatherby Magnum and having pressure problems. Ackley and West quipped to Weatherby, "Cut back on the powder charges." Weatherby responded, "You don't understand this is a marketing problem. My cartridges are known for ultra-high velocities, I have to get that velocity."

Ackley and West explained that if Weatherby would freebore his chambers, pressures would be relieved to some extent and he would be able to reach his desired velocity with safe pressures. The rest, as they say, is history.

In support of this story, Anna Konuges-Floyd said as a result of her three years working in the P.O. Ackley offices, where she took dictation and typed all of Ackley's letters, she believed that "Roy Weatherby received a lot of assistance and advice from Ackley in developing the Weatherby line of cartridges, certainly more than he ever



▲ **Bill Prator built this rifling machine specifically to teach barrel making at TSJC.**

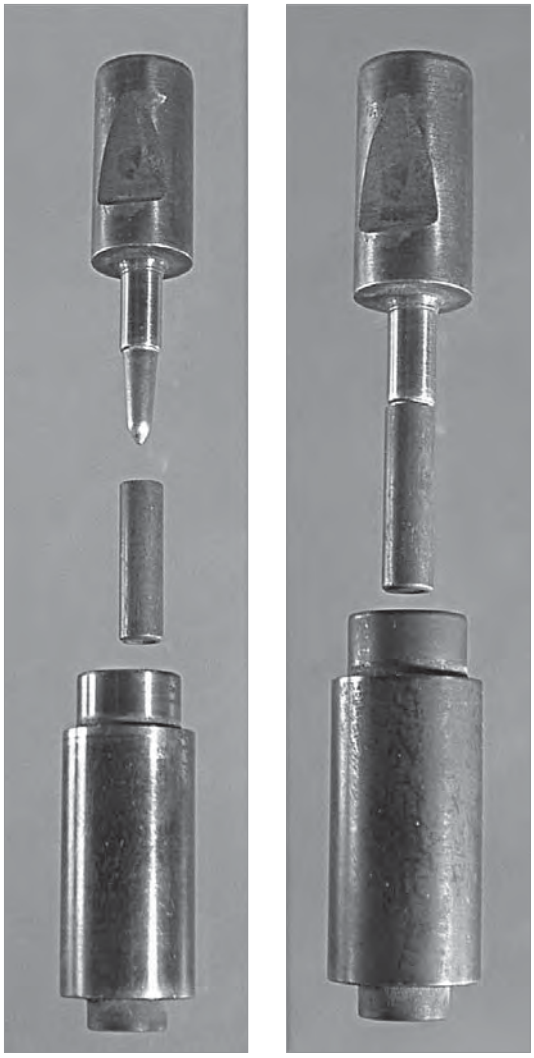
▼ **Box of Ackley ACE bullets, these are .270 cal., 100-grain, round point. From the collection of Jim Erickson.**

received credit for."

Roy F. Dunlap, author of the respected book, *Gunsmithing* wrote about Ackley in 1950, noting that, "P.O. Ackley has risen to be amongst those at the top in the gunsmithing field. A well-rounded education, plus a natural inquisitiveness do not allow him to accept unproved statements."[19] Dunlap goes on to explain that since moving to Trinidad after the war, Ackley's fame and business grew to the point that it paid for a new building, and he had about 30 gunsmiths working in his shop. His modern cartridge designs ranged from the .17 Pee Wee through a whole hat full of improved calibers on up to his custom magnum calibers. The P.O. Ackley shop in Trinidad offered general gunsmithing, manufactured barrels, custom rifles, rebored barrels, manufactured scope mounts and safeties.

Ackley listed the tooling at P.O. Ackley Inc. "We have the usual run of machines for this type of shop. We have three automatic rifling machines, two deep-hole drilling machines (one is my original and the other is a Pratt & Whitney latest type double-spindle machine). One of the rifling machines is a Pratt & Whitney exactly like the one used by Winchester, one is the latest type Builder's machine and the other is the latest type hydraulic machine of my own design. In addition, we have an old original hand-rifling machine. For barrel fitting, we have six small bench type lathes, mostly Clausing and South Bend and a factory type chambering machine. There are three small milling machines, a Quick-Way cylindrical grinder, a K.O. Lee universal cutter and tool grinder, several bench grinders, one large and one small drill press, a band saw, two automatic lapping machines (one of which is a gang machine which will lap four barrels at a time), two punch presses, numerous bench vices and adequate tool room supplies. Of course we have a little better than ordinary bluing set up for both stainless and alloy steels and a batch of good polishing equipment."[20]

On pages 160 through 163 of Monty Kennedy's *Checkering and Carving of Gunstocks* (Stackpole Books, 1952) two of the checkering patterns used in the Ackley shop are depicted. That is not to say that Ackley himself



These are actual Jacket swage tools used by Ackley in the production of his ACE bullets. Courtesy of Keith Gipson.

cut these checkering patterns and carvings. By all accounts, including his own, Ackley did not do stock work personally, he always hired that work out.

During the years in Trinidad, Ackley's shop had many employees and work was divided by specialty. He employed Bill Prator, Glen Malin, Russell Hightower and Ward Koozer among others. All the men made and fitted barrels, while Hightower did the stock work. Apparently Hightower was insulted that his name was not mentioned in Kennedy's book, even though he was a paid employee of P.O. Ackley, Inc. It's likely that Kennedy did not know the working arrangements in the Ackley shop and just requested examples of the work they did for his book.


ACKLEY (Patent Applied For)
CONTROLLED EXPANSION BULLET

A bullet that WILL NOT disintegrate at any velocity and yet opens reliably at velocities under 1500 f./sec. Has been tried in the West in excess of 10 years with excellent results on big game, but only now being put into production for general distribution. This is the bullet used by Jim Bond on one of his Alaskan trips with the .22B to kill several head of big game in the Yukon. This bullet will stand a much higher velocity than any existing cartridge will drive it. It transforms the small bore high-velocity rifle into a killer of Big Game never dreamed of before. Many of the "Wilds of the Future" have been extensively advertised. This bullet makes them practical TODAY! In the words of one expert, "This is the only bullet on the market today that justifies the Magnum."

Cal.	Wt.	100	Cal.	Wt.	100
.22	50 gr.	$4.00	.22	90 gr.	$5.25
.228	70 gr.	5.00	.25	100 gr.	5.50
6 mm	90 gr.	5.25	7 mm	140 gr.	5.85
6 mm	100 gr.	5.50	.270	120 gr.	5.75
6.5 mm	120 gr.	5.75	.30	150 gr.	6.00

Quantity discounts to Dealers. Write for Circular and "Report of Results." Barrel Blanks—unturned or grooved, in standard calibers, Carbon Manganese, Chrome Moly, or Stainless Steel. Available for immediate delivery. Write for Price Lists. Custom Made Guns and all types of gunsmithing.

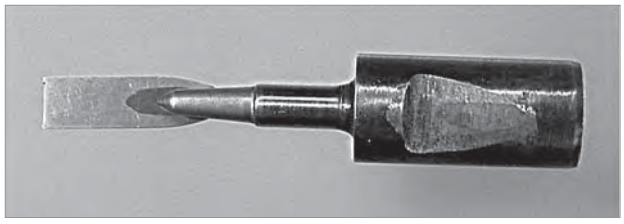
P. O. ACKLEY, INC.
TRINIDAD COLORADO

***American Rifleman*, January 1950.**

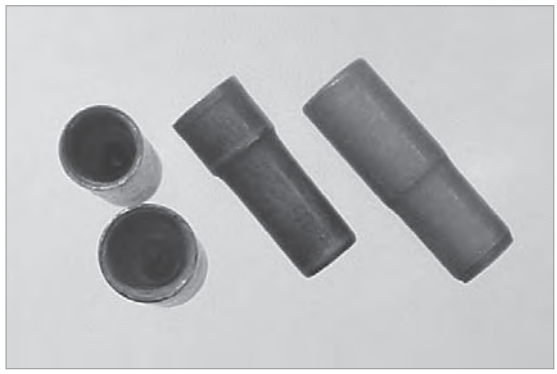
P.O. Ackley and Bill Prator would get into arguments and Ackley would fire Prator. In a day or two he'd hire him back at a 10 to 12 cent per hour raise. This happened at least twice according to Prator when interviewed for this book. After years of working as Ackley's shop foreman, Bill Prator became head gunsmithing instructor at TSJC. During one of their arguments, Ackley told him that, "If he could make better barrel-making equipment, then he'd better do it!" Actually, Prator did just that, and those are the machines that the college used to train students to make barrels for many years.

According to Randy Selby, who was a student at Trinidad from 1969 to 1971, "Barrel making was listed as part of the curriculum at Trinidad. However, Bill hadn't taught the class for a time, so several of us, Horace Harvey of Montana, Pat Ratcliff, a 70 years young retired tool and die maker from Amarillo, Texas and I, struck a deal with Bill to teach the barrel-making class, if the three of us would help him. Pat obtained the steel from Texas and we cranked up the machines and made barrels. Mine shot 3/8-inch groups. Pat was a lot of help as he had 50 years of tool making under his belt. This was a highlight of my two years in Trinidad, along with the friendship of Pat, who lived to be 96 or 97 years old and we always kept in touch.

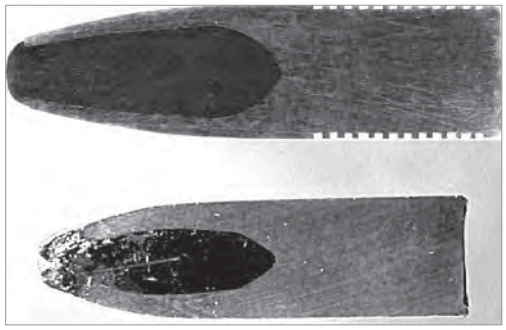
"Bill had made the deep-hole drill machine from the floor up, and even cast the castings for the head and other parts. The reaming machine was, as I remember it, made from an old lathe bed. The rifling machine was also built from the floor up by Bill. Things were a little crude, but every student was able to make a barrel. I managed to make two," said



Note how the core matches the punch. Courtesy of Keith Gipson.



These are Ackley CE Jackets in various stages of swaging, the deep core cavity is formed first. Courtesy of Keith Gipson.



Ackley CE on the bottom. North Fork on the top. Mike Brady Collection.

Selby. Bill Prator confirmed these details.

When in the shop at Trinidad State Junior College the author saw one of Bill Prator's rifling machines. The instructor, Keith Gipson and former instructor, Dave Nolan tell me they decided that this machine should be restored and that they hoped to offer barrel making as a class again at some point.

Thomas "Speedy" Gonzales was another instructor for the gunsmithing program at TSJC. He expressed the same concept that all the staff embraced — that the college has a rich history in gunsmithing and has contributed to the industry in very tangible ways.

The instructors at TSJC clearly understand the important history for which they have become the caretakers as they continue the mission of teaching the next generation gunsmiths and, equally important, craftsmanship.

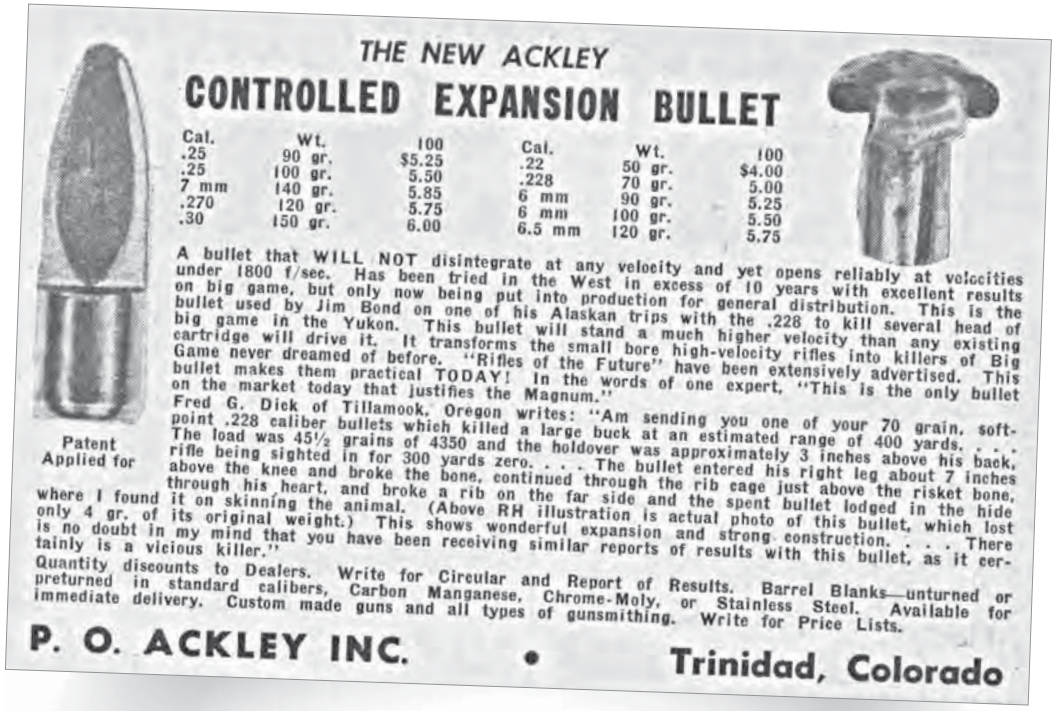
Ackley Bullets

P.O. became interested in designing his own bullets because he felt that the primary area left for improvement in ballistics was in the projectile. His interest was in hunting bullets, so he designed ones with strong construction that would penetrate deeply but still open up to generate shock while opening a large diameter wound canal. These bullets had a solid base with a small lead core in the front. They were designed for production on a punch press. Ackley referred to his bullet as the ACE (Ackley Controlled Expansion), according to former employee Bill Hause.

From Ackley's *Handbook for Shooters and Reloaders,* 1959: "The Ackley Controlled Expansion bullet is not a conventional core and enclosing jacket construction as is the RWS. Instead, a solid copper base half is machined and/or drawn to form an extension forward with a partial cavity. The core, inserted, projects about ¼ its length to form the soft point. The core is shaped almost symmetrical from front to rear having a spitzer front, and a spitzer tail which fits the shape of the base cavity. Upon impact, the front half, mostly core, expands violently, while the solid copper rear half penetrates well, holding its shape and direction. Unfortunately, due to the high cost of manufacture, this bullet is only a future possibility rather than a present day reality. It is hoped Ackley can make arrangements in the near future to again produce this bullet."[22]

It was during 1949 and '50 that Ackley designed a new bullet. "Recently Ackley brought out a newly designed bullet of great promise which will properly expand at any velocity and yet always hold together," reported Roy Dunlap. "The Ackley venture into bullet-making, produced a controlled-expansion bullet featuring a solid copper

This ad ran in the *American Rifleman*, April, 1950. No later ads were found in the publication.



THE NEW ACKLEY

CONTROLLED EXPANSION BULLET

Cal.	Wt.	100	Cal.	Wt.	100
.25	90 gr.	$5.25	.22	50 gr.	$4.00
.25	100 gr.	5.50	.228	70 gr.	5.00
7 mm	140 gr.	5.85	6 mm	90 gr.	5.25
.270	120 gr.	5.75	6 mm	100 gr.	5.50
.30	150 gr.	6.00	6.5 mm	120 gr.	5.75

Patent Applied for

A bullet that WILL NOT disintegrate at any velocity and yet opens reliably at velocities under 1800 f/sec. Has been tried in the West in excess of 10 years with excellent results on big game, but only now being put into production for general distribution. This is the bullet used by Jim Bond on one of his Alaskan trips with the .228 to kill several head of big game in the Yukon. This bullet will stand a much higher velocity than any existing cartridge will drive it. It transforms the small bore high-velocity rifles into killers of Big Game never dreamed of before. "Rifles of the Future" have been extensively advertised. This bullet makes them practical TODAY! In the words of one expert, "This is the only bullet on the market today that justifies the Magnum."

Fred G. Dick of Tillamook, Oregon writes: "Am sending you one of your 70 grain, soft-point .228 caliber bullets which killed a large buck at an estimated range of 400 yards. . . . The load was 45½ grains of 4350 and the holdover was approximately 3 inches above his back, rifle being sighted in for 300 yards zero. . . . The bullet entered his right leg about 7 inches above the knee and broke the bone, continued through the rib cage just above the risket bone, through his heart, and broke a rib on the far side and the spent bullet lodged in the hide where I found it on skinning the animal. (Above RH illustration is actual photo of this bullet, which lost only 4 gr. of its original weight.) This shows wonderful expansion and strong construction. . . . There is no doubt in my mind that you have been receiving similar reports of results with this bullet, as it certainly is a vicious killer."

Quantity discounts to Dealers. Write for Circular and Report of Results. Barrel Blanks—unturned or preturned in standard calibers, Carbon Manganese, Chrome-Moly, or Stainless Steel. Available for immediate delivery. Custom made guns and all types of gunsmithing. Write for Price Lists.

P. O. ACKLEY INC. • Trinidad, Colorado

base. The bullets were turned from solid stock in somewhat cylindrical form, with one end hollowed deeply, a lead slug is inserted in this hollow, and then the assembly swaged to bullet shape, with pointed lead nose. The rear section of the bullet is solid copper, or rather copper alloy, which cannot blow up at any range at any velocity now attainable, while the soft land in the thin jacket can expand readily. No matter what happens to the tip the base remains solid, a one-piece slug."[23]

Ackley spent a fair amount of time on the development of this new bullet. It was his opinion that bullets were far behind barrels, powder, cases, and primers in development. He wanted to produce a high quality bullet that would maximize the accuracy and performance offered by ever improving components in the firearms trade. His bullet design was to be of a soft copper material, making it different from most others on the market at that time. Roy DeRouen was hired to build the dies and adapt machines for the bullet-making process. DeRouen also helped with the building of some of the barrel-making equipment used by P.O. Ackley, Inc.

From the *American Rifleman* Dope Bag section: "If a bullet is constructed so that it mushrooms properly at short ranges without going to pieces, it may not mushroom at longer ranges when velocity has been greatly reduced."[24] Instead of trying to control expansion by lead hardness and bullet jacket design, Ackley was working with solid copper or high copper alloy. His design incorporated a lead core in the nose of the bullet. So expansion was limited by the depth of the lead core. At high velocity it was able to expand to a large mushroom, while at lower velocities it will still expand to some degree expending energy and enlarging the wound canal.

Nearly all designs require a compromise and Ackley's controlled expansion bullets were no exception. Because the base of the bullet below the lead core was monolithic solid copper, this bullet design was longer than its full lead-core counterparts, simply because copper weighs less than lead.

"Another thing is that the bullet is made of dead soft copper which is much tougher and less prone to metal fouling than gilding metal," Ackley commented. "Gilding metal used in this kind of bullet has a tendency to break off so that it is only a square slug left,

The attendees of the 60th Reunion in Trinidad, summer of 2007. There were several Alumni in attendance who were among the early graduates of the program and trace their gunsmithing roots directly to P.O. Ackley and the years he spent in Trinidad.

this losing considerably more weight than a solid copper bullet."[25]

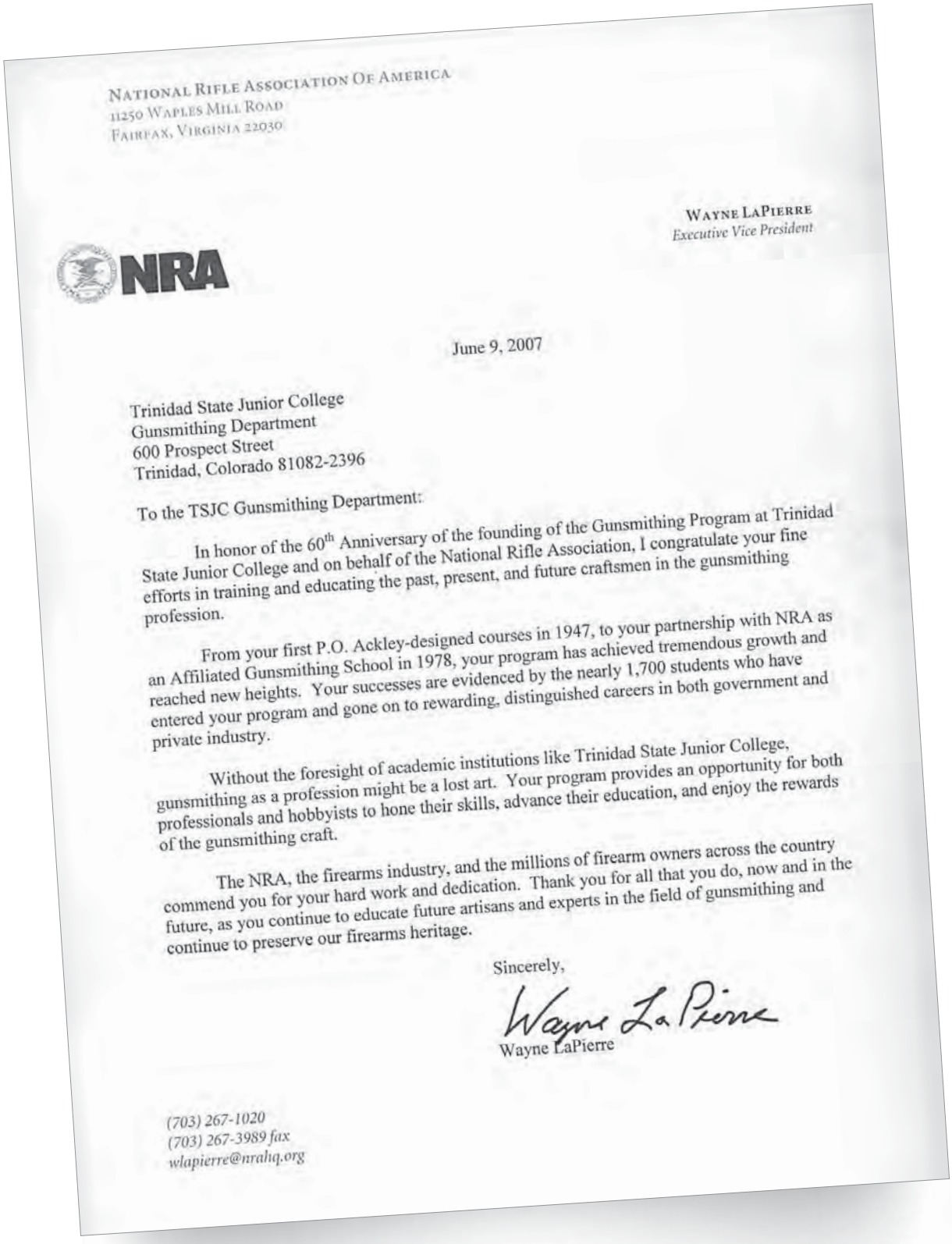
Although Ackley did get the bullets working and into limited production they never really made the leap to successful adoption by the shooting public. Prator said that the cost of production was simply too high to make it profitable. It was about this time that the corporation was sold, which took Ackley's new bullet design off the market for quite some time.

In 1956, Ackley tried to bring the ACE bullet back to market, but tooling issues, material and labor costs simply made it unprofitable.

Henry Stebbins described the ACE bullet in his book, *Rifles — A Modern Encyclopedia*. "The Ackley controlled expansion, which carries on further the idea of the old German DWM Strong Jacket, in which the last third or so of the jacket was about as thick as the lead core inside it. The Ackley jacket is thinned at the front, for expansion, and its lead core goes only a little more than halfway down, the rear section being solid copper. Ackley has made, and may make again a solid copper bullet with hollow point. It gave, he says, even better expansion than the cored bullet and less loss of weight in its path through game."[26]

P.O. wrote concerning the CE bullets in 1979 that, "Everything on the old CE bullet has been destroyed one time or another, so I don't have a thing on it. The method that we used was not good. It took too much power. The best idea is to knock a hole in a copper blank by impact extrusion. This is done with sort of a round nose punch, more or less circular on the working end. This gets the initial hole and then it can be drawn up around different punches to get the shape of the cavity that is necessary. All of this means that you have to start with an oversized blank."[27]

The basic design of the Ackley bullet was reborn when North Fork Technologies of Glenrock, Wyoming introduced their line of bullets. The author was introduced to Mike Brady, founder and designer, during the very early stages of development. Brady is a meticulous experimenter, he tested numerous combinations of materials and configurations of jacket and/or core in the process of mak-



NATIONAL RIFLE ASSOCIATION OF AMERICA
11250 WAPLES MILL ROAD
FAIRFAX, VIRGINIA 22030

WAYNE LAPIERRE
Executive Vice President

NRA

June 9, 2007

Trinidad State Junior College
Gunsmithing Department
600 Prospect Street
Trinidad, Colorado 81082-2396

To the TSJC Gunsmithing Department:

In honor of the 60th Anniversary of the founding of the Gunsmithing Program at Trinidad State Junior College and on behalf of the National Rifle Association, I congratulate your fine efforts in training and educating the past, present, and future craftsmen in the gunsmithing profession.

From your first P.O. Ackley-designed courses in 1947, to your partnership with NRA as an Affiliated Gunsmithing School in 1978, your program has achieved tremendous growth and reached new heights. Your successes are evidenced by the nearly 1,700 students who have entered your program and gone on to rewarding, distinguished careers in both government and private industry.

Without the foresight of academic institutions like Trinidad State Junior College, gunsmithing as a profession might be a lost art. Your program provides an opportunity for both professionals and hobbyists to hone their skills, advance their education, and enjoy the rewards of the gunsmithing craft.

The NRA, the firearms industry, and the millions of firearm owners across the country commend you for your hard work and dedication. Thank you for all that you do, now and in the future, as you continue to educate future artisans and experts in the field of gunsmithing and continue to preserve our firearms heritage.

Sincerely,

Wayne LaPierre

Wayne LaPierre

(703) 267-1020
(703) 267-3989 fax
wlapierre@nrahq.org

From the Trinidad State Junior College archives.[29]

ing his controlled expansion bullets.

Even though the company has since sold, Brady's design for North Fork Bullets are still some of the finest hunting bullets I have ever used for hunting. They are the most uniform and accurate hunting bullet I have ever used. They are reliable terminally, delivering deep penetration, yet mushrooming and leaving a wide wound canal. So in the final analysis, Ackley was right again.

Bullets with a solid base present a pressure concern, conventional jacketed bullets have a soft core that will conform during firing to manage the deformation caused by the rifling in the barrel. Mike Brady solved this problem by putting grooves on his North Fork bullet, he quickly discovered a desirable side effect of the grooves: they help prevent fouling by acting like a squeegee when each progressive shot is fired. This development happened a few years before the Triple-Shock was introduced by Barnes.

Mike Brady would be the first to tell you that Nosler tried grooves on their Zipedo bullet and at one time placed a crimping groove over the solid web on the Partition bullet as well. Form follows function as it often does.

Over the years, Ackley tried several times to bring the ACE bullet to the market. Mentions of the bullets are found in letters often. Easton tried for a short time to solve the production problems. Later Ackley worked again with Roy DeRouen in Trinidad, but the system created was largely manual and copper prices at the time stalled the project. There are at least two mentions of companies submitting samples of the bullets and then going bankrupt before they could get to production. One of these was a Belgian company. Cost of producing the ACE bullet was a problem Ackley never solved.

"I have temporarily given up the controlled expansion idea because of the extremely high cost of material and labor, and have taken on the jobbership of the Nosler bullets as a substitute," wrote Ackley to W.F. Vickery, July 1956.

"If you ever get any dope on that trick bullet, let me have it," wrote Ackley to Vickery. "There is a local boy who has talked about a flat-shooting bullet that has some kind of waist or small portion in the bullet on the same order as some of the super-sonic planes. I don't suppose any of the boys need to worry about these things, because the bullets we have will shoot four or five times as far as they can hit anything. It will be a long time before the human element will be improved."[28]

Leaving Trinidad

A letter to A.A. Easton dated November 7, 1950 indicates that Easton had approached Ackley about purchasing the P.O. Ackley business. It eludes to the fact that partnerships rarely work out well, suggestive of an all-out sale of the business. It is clear that this is the second communication Ackley and Easton had on the subject.

In the letter mentioned above, Ackley is very open about the details of the business as it stood and with the benefit of hindsight we could say he was even a little naïve about the details he shared. "Perhaps you have at least the start of a plan. If so, give me a skeleton outline and then I will see what I can do with it in the way of development at this end." Ackley was eager for an offer.

Ackley went on to say, "In any event, I definitely want to get away from this section of the country as soon as it can be arranged. I have considered several plans whereby this may be accomplished, but want to take the necessary time to make a decision because this is the LAST move I want to make.

"No one is pestered worse than I am because of the presence of 120 or more gunsmith students over at the college. I write such as this, one paragraph at a time usually. Incidentally, this school is one thing that I would like to be a long way from."

He closed his letter saying, "There are ways of handling the stockholders without difficulty which I believe would be satisfactory to all. At least I wouldn't look for any difficulty in that direction."[30] It has been suggested by some that Ackley was forced to sell by his investors. Nothing could be further

from the truth. In a letter dated January of 1951, negotiation for the sale of P.O. Ackley Inc. to A.A. Easton began in earnest. On the 25th of that month, Ackley forwarded a copy of the profit and loss statement for the year of 1950 to Easton. He stated that the stockholders were agreeable to discussions and that some of the key employees would be willing to go along with the business.

On July 1, 1951 sale of the Ackley Corporation to Easton Engineering Company was consummated and the company was moved to Salt Lake City. P.O. Ackley had contracted to work for the new owners for one year, so he packed up and moved with the business to Salt Lake City. We have a hint of the moving date from a letter by Ackley to Easton on July 7, 1951, in which Ackley mentions a display at the NRA Convention in San Fancisco, which took place in October of that year. Ackley suggests that Easton display at the convention and have a grand opening at the same time in the new store in Salt Lake, even though they would be in the middle of the move. According to Bill Hause the move to Salt Lake City took place in September of 1951.

Ackley hired three promising young gunsmiths who had just graduated from the school in Trinidad; Paul Marquart, Bill Atkinson, and Bill Hause moved to Salt Lake and worked for Easton. Ackley convinced several of the gunsmiths who were working for him to move along to Salt Lake City and work for Easton as well and, according to Bill Atkinson's records, about ten men total made the move.

In a letter to Fred Barnes of Barnes Bullets, Ackley quipped, "I remember that you once said, 'I want just my own itty bitty old business.' And you don't know how smart that was!!!! The men at the plant are all fed up and want me to get out and take them along too, but I don't plan to ever hire any number of men again."[31]

Anna Konuges-Floyd stated, "The real reason that Ackley stated when he moved to Salt Lake was to slow down. But, it never really worked out."

In 2010, the Students of TSJC opened a new shooting range, christened the Bill Prator range in honor of the man who devoted so many years of his life to training gunsmiths at the school. You can bet that Ackley would be very proud of his one-time employee and longtime friend for receiving such a tribute.

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CHAPTER 6

THE SALT LAKE CITY, UTAH DAYS

On July 1, 1951 P.O. Ackley Incorporated was sold to Easton Engineering Company and moved to Salt Lake City. The final date of the move is unclear, letters from Ackley in Trinidad to A.A. Easton date as late as August 15, 1951. Many sources mention the company as A.A. Easton, so the name probably changed over the years. Easton first came on the reloading scene around 1940 with two reloading presses and a primer pocket forming press.

Post war, the A.A. Easton Company (as it was sometimes identified), was in the business of making reloading dies as well as presses. They offered 55 different rifle calibers — including several Ackley designs — and 16 pistol calibers, all of which worked in their reloading presses. Easton also offered arbor press-type dies, primer pocket swaging tools, bullet swaging dies, cast bullet sizers, a collet-type bullet puller, custom reloading and form dies.

Following the sale of his business, Ackley personally contracted to work for the new owners for one year, so he packed up his family and moved with the business to Salt Lake City.

Many of his employees and friends

This ad appeared in the *American Rifleman*, October, 1951.

P.O. Ackley and daughter Jackie answering letters from customers and fans. Courtesy of Bevan King.

moved as well and worked for Easton. Among these were Bob West, Bill Atkinson, Paul Marquart, Bill Hause, Russ Hightower and Leonard Base. Bill Hause said that Ackley set about the business of preparing his personal shop at his home almost as soon as they arrived.

At the Easton facility in Salt Lake City, Ackley and his co-workers began making barrels and building guns. It did not take long for everyone, especially Ackley, to realize that the store was in financial trouble. The owners had believed that by bringing Ackley's operation in they could salvage the business, but had not told him about their financial problems before the transaction. According to Hause, Ackley fulfilled his obligation to Easton, but as soon as he had done so he opened up his own shop.

Hause confirmed that Ackley did not have much use for Andrew Easton. In fact, he went on to say nobody much liked Easton. Apparently, Easton had a coarse personality and lacked people skills, in particular when it


EASTON PRESSES & ACKLEY RIFLES

The fascinating processes of bullet making in the EASTON SUPER GIANT Loading and Bullet Making Press appeals to every handloader. The One Piece Precision Dies make the bullet in the same way as the finest factory bullets are formed; completely inside the dies and leave no ring or offcenter ogive on the bullet. Perfect, concentric bullets are formed every time.

$42.50

This fine gun is an example of what can be done with a military rifle at the Ackley Dirthem of our Plant. However, it is neither necessary and not always desirable to go to this expense to make a thoroughly reliable and accurate gun from that military rifle you now have. We can do the simplest remodeling and refitting job or the most elaborate, depending on your taste. But you can be sure it will be done right by our Master Craftsmen all of whom have had five or more years experience and supervised by the well known P. O. Ackley. For that special pet gun we have at present barrels in all calibers in Hi-Chrome Stainless Steel.

The toughest, non-rusting, smoothest bored and rifled barrel you can buy.

Write for our Free profusely illustrated catalogue

EASTON ENGINEERING CO. & P. O. ACKLEY Div., 1554 So. 2nd W. Box 1074, Salt Lake City, Utah

This ad appeared in *American Rifleman*, December 1951.

This ad ran in the April issue of the *American Rifleman*, 1952. Note the "Successor to" comment under the address.

came to dealing with employees. Easton did not adhere to high quality standards for the products produced, which rubbed Ackley the wrong way as well.

Writing to Anna Floyd, Ackley said, "When Andy Easton was looking at stainless steel barrels one day he said, 'Now here is something I can merchandise.' It turned out that merchandising was something you could tell the most lies about."

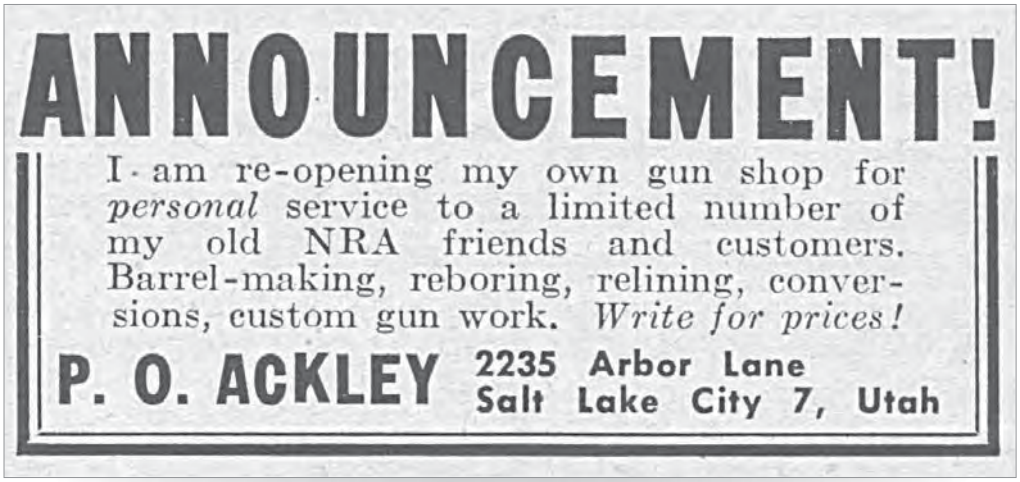
Things fell apart at Easton very quickly, considering that it normally takes three months to insert an ad in a magazine like the *American Rifleman*. In April of 1952, only seven months after the announcement of the merger, P.O. Ackley's name was removed from the company ads of Easton Engineering.

It is known that Ackley protected his name in later sales contracts, limiting its use. So it is likely that he had built in some stipulations in the contract for the sale of P.O. Ackley Inc. that allowed him to retrieve his name for business purposes.

Bill Atkinson sat down with Tim Hixon in July of 2005 and they recorded some of his reminiscences. "I got fired, P.O. Ackley laughed, and two days later Ackley got fired too," Atkinson recalled.

Correspondence between Ackley and some of his business acquaintances make it clear that his contract with Easton allowed him to set up his home shop. Almost immediately on arrival in Salt Lake he purchased some more machinery and started tooling up to make barrels again. "Ackley would build machines to do the various jobs of barrel making, and he had a knack for it. He built a barrel machine that would drill, ream, and rifle a barrel in one set-up." According to Bob West it worked well.

Ackley wrote to Fred Barnes in April 1952, "Easton is sure having a hard time. No one to turn, re-bore or straighten barrels and all his steel warps like a corkscrew. He is telling that I wouldn't cooperate with him and for once he is telling the truth. No one can coop-



Ackley's ad ran in the *American Rifleman*, June 1952.

erate with methods like his and lately I have been making no pretense of doing so. Knowing I had to get out and not being able to quit I had to force the thing in another way. I simply gave him the silent treatment and my nerves are a lot better than his. I thought it would take a month or so longer but he broke pretty quick. That let me out without any legal entanglements."[1]

The Easton merger was clearly a difficult transaction. July of 1952 was apparently the deadline for completion of the sale. "We got settled up with AA and have no connection with him anymore," wrote Ackley to Barnes. "That is, the old corp. is gone and we swapped around and got him out of the deal by taking the contract he had against the old store up town."[2]

According to Richard F. Simmons in his book *Custom Built Rifles* (1955), "The Easton Engineering Company … Salt Lake City, Utah, is a Midwestern firm that is specializing in custom built rifles of all types: sporter, varmint, target, and bench rest as well as one 12- to 14-pound .457 caliber big game rifles in the supermagnum class. This firm makes loading tools, loading dies for most every standard caliber as well as most every wildcat design, barrels, and chambering for their own special design of wildcat cartridge cases. It is one of the largest machine and gun shops in the midwest area."

Ackley's original plan was to operate it as a one-man business. But the demands on him were too great and it was not long before he had to hire more people to help keep up with the work. Word of mouth soon had him busier than he really wanted to be.

In a letter to Bob Brownell he wrote, "What you say about letting a business get out of hand is surely true. One can handle up to 4 or 5 men OK. You can find that many GOOD ones, but after that Oh boy!! And stockholders etc. — Phooey."[3]

Very soon after opening his shop, Paul Marquart and Bill Atkinson went to work for Ackley, but according to Hause they did not stay long. Atkinson went to West Virginia to work for Douglas Barrels, then later he and Marquart got together and formed A&M Gunshop.

Ackley logo.

In September of 1952 Bob West went back to work for Ackley fitting and chambering barrels as well as performing other custom work. During this time Bill Hause did all the

bluing and a lot of custom work in the shop.

Bob West partnered with Ackley for two years, after the working arrangements at the Easton store in Salt Lake fell apart. When it became obvious that the new P.O. Ackley business could not support them both, West decided to move on. "The final straw was when P.O. left me to run the shop while he took a vacation," said West. "When Ackley returned from his trip, I told him I needed a vacation, P.O. told me he could not afford for me to be gone. So I returned to carpentry for a short time before being hired by Martin Marietta as a machinist, a job which I retired from many years later."

After retiring from Martin Marietta, West moved to Eugene, Oregon "where the salmon fishing was good." He returned to gunsmithing and barrel reboring in his retirement and was a charter member of the American Custom Gunmakers Guild. One of West's rifles was featured in issue #186 of *Rifle* magazine.

P.O. Ackley imported scope. These scopes have no great value, but are interesting to any gun buff who likes history.

According to Bill Hause, "P.O. was once offered the Nikon camera distributorship for the United States, and turned it down." Hause did not know why Ackley turned it down but suspected that the offer arose out of the scopes that Ackley was importing at the time.

When asked what it was like working for P.O. Ackley, Bill Hause said, "I am 81 years old and as you might imagine I have worked for a few people. P.O. Ackley was the finest gentleman I ever worked for."

Ackley dabbled with products that he could resell, beyond the well-known actions, scopes and books. In a letter to W. F. Vickery, he talked about reselling reloading presses and dies. He told Vickery that he had an exclusive deal for reloading dies with his trademark on them and was looking for a reloading press he could get an exclusive jobbership on.[4] Even in the 1950s, manufacturers were giving jobber prices to just about anyone who would pony up for the minimum order, which made price competition stiff. There are only 24 hours in a day and you only have two hands, so anytime you can sell a product you don't have to work on and make a decent profit, it makes sense to add it to your offerings.

Importing Mauser 98 Actions

Around 1966 P.O. Ackley decided to import a Mauser 98 copy under his own name. He imported 100 right-hand and 50 true left-hand 98 commercial design actions from a company in Japan. Unfortunately the company making the actions went bankrupt after the delivery of the first ones, so there were to be no more imported. Frank de Hass reviewed two of the right-handed actions for his book, *Bolt Action Rifles*.

The aforementioned actions were a close copy of the commercial FN 98 that was being imported to the U.S. at that time. Most important was the fact that Ackley had ordered some true left-hand Mausers. In other

words, there were two completely separate designs being made, as Ackley would not tolerate a cobbled 98 left-hand, all the parts had to be engineered to work as a left hand.

"First of all they are marked on the left receiver wall: P.O. Ackley Salt Lake City, Utah," wrote de Hass. "The serial number, preceded by No. is stamped on the right side of the receiver ring. The words MADE IN JAPAN are stamped on the flat area under the receiver ring. My two actions have four-digit serial numbers."[5]

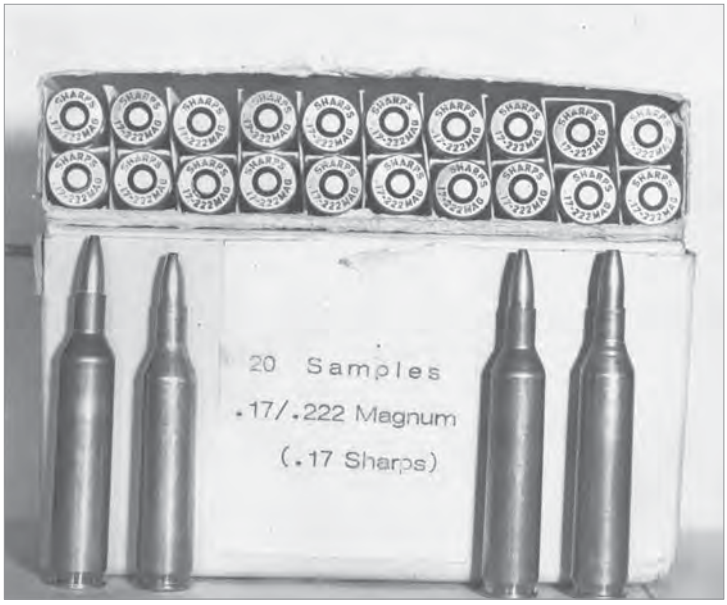
These actions were all steel, the trigger guard/magazine assembly were milled steel. Magazine length was 3.55 inches so they would work with any standard length cartridge in .30-06 length, and of course they could have been converted to magnum by simply opening the bolt face. Triggers were an adjustable type with three adjustments; pull weight, over travel, and sear engagement or creep. Incorporated into the trigger was a thumb safety with a built-in bolt lock.

Ackley's owners manual for these rifles stated that he offered them in several calibers — .22-250, .25-06 Rem., .308 Win., .243 Win., .270 Win., 7mm Rem. Mag., 6mm Rem., .30-06 and .300 Win. Mag.

An article in the September/October 1970 issue of *Rifle* magazine included a description of an Ackley Mauser action. "Fit and finish on these actions is excellent. All parts are forged and/or machined, with no use of stampings. The shape of the bolt handle is aesthetically pleasing, adding to the general appearance of quality."[6] Overall, this article sang the praises of the Ackley Mauser with the exception of the fit of the cocking piece to the firing pin, causing trigger problems, but this would be an easy item to correct.

In a letter to a customer, Ackley said he expected another shipment of actions to leave Japan on August 31, 1967. He quoted a price of $77.50 for either right- or left-hand

Les Bowman with one of the Sharps Arms Co. experimental rifles. Randy Selby collection.



.17 Sharps (17/222 Rem. Mag.) test rounds. Randy Selby collection.

models. Unfortunately, the maker went broke before delivery could be completed.

Obviously there are very few of these actions around. That does not make them highly valuable but it does mean that if you locate one you have something few others have, and probably few would appreciate. Buzz Huntington (whose father Fred Huntington started RCBS), stated that he has one of Ackley's left-hand rifles in his collection at the Huntington's store in Oroville, California. If you can ever stop in at the store, they have a huge custom gun collection on display in the back half of the store.

The Colt Sharps

P.O. Ackley's involvement with the Colt Sharps rifle came about in 1968, a little over a year before Colt actually became interested in the project. Arthur L. Swanson was the key player in the project, he had managed to get a company based in Salt Lake City named EMDEKO to financially back his idea of reviving the Sharps Arms Co. Swanson was in Salt Lake City working out the details of setting up the new company when he met P.O. Ackley for the first time.

The idea was to redesign the Sharps Borchardt. They produced a small number of guns and proved the concept. Les Bowman and Ackley were longtime friends and Bowman became involved in developing a cartridge for the Sharps project in 1969.

Swanson asked Ackley if he could suggest a local company to prototype his new design, a company was suggested. However, they apparently lacked the necessary experience and skills to do the job, producing five actions, two of which worked fairly well and three only so-so. At that point Ackley and Swanson made a trip to the east coast to look for another engineering company to prototype the actions. They selected a company by the name of Bellmore-Johnson.

The plan was to introduce the new rifle at the 1969 National Sporting Goods Association show held that year in Houston. This was an unusually short timetable for such a large undertaking. Originally, they planned to have six rifles complete and ready for the show, it turned out only one was ready so they went to the show with one rifle.

The Sharps rifles completed by EMDEKO had Ackley barrels. In the beginning, Swanson planned to have the bulk of the parts for his design made back east. Barrels would be manufactured in Salt Lake City, and a small staff would perform final fit and finish of the guns. P.O.'s small shop on the property next to his house was simply not large enough to handle the expected volume and staff required if the rifle became a success.

EMDEKO made Ackley an offer to buy his company, including the name, which was well-known. They would hire him to run the new factory.[7] An agreement was reached and all of Ackley's machinery was moved to a large area in the EMDEKO company warehouse. Offices were set up in the same location. New barrel-making machines were purchased, so that the barrels could be produced using button rifling. They planned to continue to sell Ackley barrels to the gun

trade as well. "In fact, the entire barrel department consisted of women,"[8] Ackley stated.

In May of 1969, Colt sent management personnel to Salt Lake City to look over the Sharps Arms Co. EMDEKO had bit off more than they could chew trying to bring a new firearm from drawing board to retail. So when Colt made them an offer, they sold.[9] Colt did not buy the barrels, machines or the P.O. Ackley name.[10] Les Bowman went back east and worked with Colt for nearly a year doing test work at the Lyman test range. Colt eventually shelved the project after very few guns were produced. Costs were very high and at that time demand for single shots did not justify the expense.

Al Dunbar with his EMDEKO/Ackley rifle. Dunbar met Ackley at the company introduction for the rifles and ultimately ordered two "Pre-production" rifles (a .30-06 and a .25-06 serial numbers A0190 and A0723 respectively) and one production rifle in .270 Winchester.

EMDEKO Inc. did some other work with Ackley. Under the P.O. Ackley Inc. name, EMDEKO produced over 5,000 bolt-action hunting rifles. Calibers were mostly .25-06, .270, and .30-06 although others were made on a special order basis.

Al Dunbar was a distributor for EMDEKO products and as such was invited to a factory unveiling of the new rifles. "When EMDEKO was negotiating with P.O. Ackley to make a rifle for them, Ackley was making custom made rifle 'samples' for the EMDEKO executives, each one a little different, which were called 'pre-production' rifles until EMDEKO decided which rifle they wanted to be the final 'production' rifle," said Dunbar. "Being a large distributor for EMDEKO, I was invited to Salt Lake City to purchase some of these pre-production rifles and meet Mr. Ackley."

Dunbar related that, at this event with the new rifles, a promotional video was shot with movie actor Audie Murphy. Murphy was also famous as the most decorated American soldier of World War II. When they shot the promotional video the production rifle had not yet been selected, so it must have been in 1969 prior to the sale of the Sharps Arms Co. to Colt.

In the video, Murphy uses one of the EMDEKO Sharps rifles and Dunbar said that Murphy made that choice on his own from the guns on display. There was talk of reshooting the video, but Murphy was killed in a tragic plane crash May 28, 1971, not long after making the first film. This is likely the last time Murphy stepped in front of a camera.

The details of these rifles are not very inspiring. They were made on Interarms, Mark X actions. Barrels were Ackley five-groove button rifled 24 inches in length, made in the EMDEKO facility. None of the guns had iron sights. Scopes and scope mounts were an optional item. The wood was good, straight grain, plain walnut from Bishop, in a Monte Carlo style. Finished with a gloss finish, a plastic grip cap and a recoil pad, and no contrasting forend tip.

Quality-wise they were decent hunting rifles much like a standard Interarms, Mark X rifle. The only added value they had to offer was the Ackley name and barrel. At the time of this writing these guns are not particularly collectable. So values tend to be based more on their being a "decent hunting rifle" than who made them. Rarity does not always mean valuable.

Ackley also used his contacts to get private labeling for EMDEKO scopes, which were offered as an option with the Ackley rifles. It appears that a fixed 4x or a 3-9x variable

TOP: Markings on one of the pre-production EMDEKO guns. BOTTOM: Caliber markings on a production EMDEKO gun.

were the two options.

Once Ackley finished his production run with EMDEKO and they had sold the Sharps project to Colt, Ackley simply moved back to his own shop and went back to work making barrels and reboring.

Back at the Homestead

Sometime in the 70s Ackley was involved in a serious car accident. His love of cars nearly did him in. According to Randy Selby, it was a Buick station wagon that had been left in neutral and, as Ackley passed in front of it the car rolled and pinned him between the bumper and the concrete wall of the shop building.

In a letter to Anna Kanuges-Floyd, January of 1984, Ackley told about the incident. "I guess you know I got both legs broken when fooling with a hot rod, and they told me I would never walk on the left leg again. The bones were all broken and were sticking out of a seven-inch hole which was full of sand. I was bleeding like a stuck hog. One of my

The author (left) with Al Dunbar (right) and Dunbar's pre-production .30-06 Ackley/EMDEKO rifle.

men here who has first aid experience stopped the bleeding almost instantly. My old secretary had presence of mind to call the sheriff within a minute or so after it happened. Inside another minute or two we could hear the ambulance cruising around up above us, they happened to be within a few blocks.

"In the meantime our doctor arrived, he took one look at me and said, 'There is nothing I can do, it is beyond me.' He called Ma [Mrs. Ackley] down at her Tandy leather store and asked if she wanted the best Dr. he could get. She told him to get the best there was. In the meantime the ambulance showed up, they loaded me in that thing and started tearing down the street with the siren going for about ten miles, up to the LDS Hospital."

More trouble came in July of 1975, when Ackley reported to the local sheriff that his home had been burglarized. The burglar took eight guns, a television and a watch.[11]

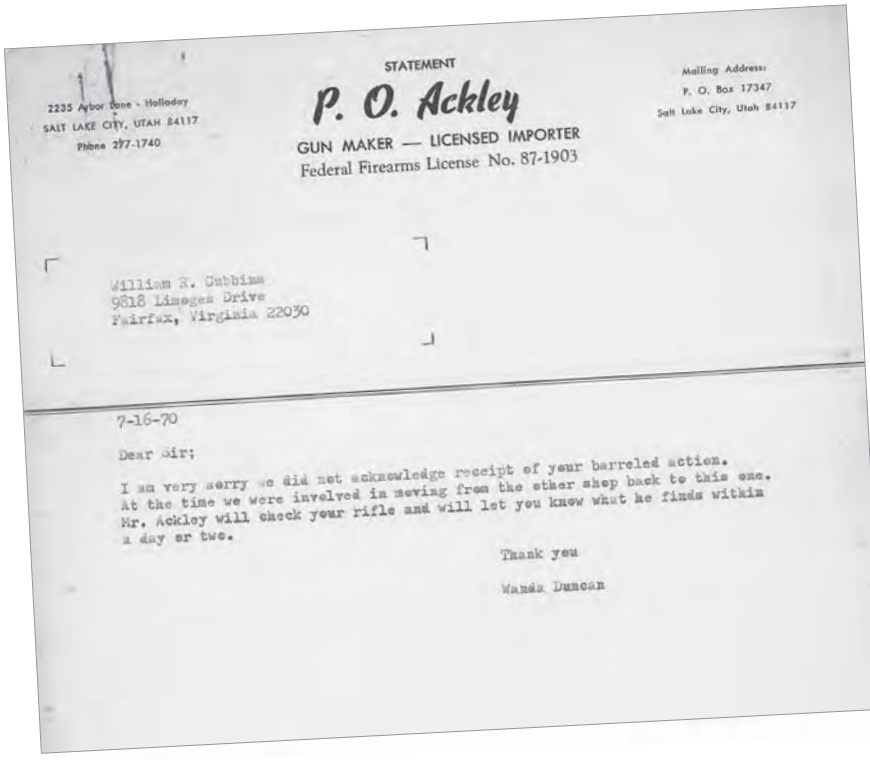
One letter to a client indicates that Ackley had returned to his shop on his property following his stint working with EMDEKO.[12] This closely establishes the date of the move to the summer of 1970.

EMDEKO scope.

Hired Help

"With three employees I am doing about 50 percent of the business we had in Trinidad with twenty-five," wrote Ackley to a former student. "Even so, it is not a get rich quick deal, but what I cannot understand is how we broke even like we did in Colorado, in fact sometimes the thing used to show a


The recoil pad on the production rifle from Al Dunbar's collection. The Bishop name on the pad helps clarify that the stocks used on the EMDEKO guns were indeed made by Bishop Gunstocks.



STATEMENT

P. O. Ackley

GUN MAKER — LICENSED IMPORTER
Federal Firearms License No. 87-1903

2235 Arbor Lane - Holladay
SALT LAKE CITY, UTAH 84117
Phone 277-1740

Mailing Address:
P. O. Box 17347
Salt Lake City, Utah 84117

William R. Cubbins
9818 Limoges Drive
Fairfax, Virginia 22030

7-16-70

Dear Sir;

I am very sorry we did not acknowledge receipt of your barreled action. At the time we were involved in moving from the other shop back to this one. Mr. Ackley will check your rifle and will let you know what he finds within a day or two.

Thank you

Wanda Duncan

Letter dates the move from EMDEKO back to the Chicken Coop.

slight profit."[13]

In the later years of Ackley's career he solved the problem of keeping hired help around once they were trained. Most guys who go to work in a gunsmith shop have dreams of going out and opening their own venture. Ackley found that women had always done a good job in other aspects of his business, so he consciously chose to try training women to do the bench work in his shop.

"Florence Conti was his last full-time shop employee, and I asked him one time how she worked out," said Womack. "'Great … she puts in an hour's time for an hour's pay. She has eagerly learned to do every job and do it well. She isn't interested in going into business for herself. Best of all, I can leave the place and be assured the work goes on as if I was here.'"[14] Womack asked Ackley when he was in his late 70s if he had thought about retiring. "Got too many things to do to even think of that nonsense,"[15] Ackley snorted.

Retirement is something that comes hard for a man who loves his work. "I am still doing a little work," wrote Ackley in his *Guns & Ammo* column. "I have been trying to retire but I have never been able to make it work because old customers of 25 to 35 years standing keep sending in work. And now I have decided I don't want to anyway."[16]

Ackley sold his barrel-making operation to Max Graff in American Fork, Utah in January of 1978. In March of that year, he told Bevan King that he was still making daily trips to help the new owner learn the barrel-making process. This was the last time that Ackley had any direct ties to his barrel-making business. Graff later sold the business to Dennis Bellm and Ackley used that sale as an opportunity to finally retire from the barrel business for good.

Dennis Bellm purchased P.O. Ackley Barrels from Max Graff in February, 1979. His price list from October of 1982 shows calibers from .204 to .475. Bellm carried over some calibers from Ackley that were unusual. He was probably the only barrel maker in 1982 that offered the .204 caliber. The other unique caliber Bellm was making was the .228, this was the diameter used for the .22

Dennis Bellm (right) consulting P.O. Ackley (left).

Savage Hi-Power. Ackley preferred it for his .228 Ackley Magnum. Also listed was .230, Ackley admitted in his retirement years that he never really made any .230 caliber barrels, this was just a name change to deal with the Wyoming law that required bullets larger in diameter than .228.

Interestingly, Ackley did provide some technical advice to Bellm when he purchased the company from Graff, but it was not long before he retired for good. Bellm wrote a short article for AmmoGuide.com and there are some interesting photos there from Bellm's affiliation with Ackley. (Search "Ackley tribute" at ammoguide.com.)

According to Bellm, "I had ingested every "Gunsmith Column" by Ackley throughout grade school, high school and college in Illinois & then Logan, Utah, never dreaming I would someday walk through the doors of his shop in Salt Lake City at the right time and end up doing the work I only dreamed about for years. His shop was on one side of the Salt Lake Valley, mine was on the opposite side.

Famous Gunsmith P.O. Ackley Dies

Obituary from *American Rifleman*, October 1989

P.O. Ackley, the author of the two volumes Handbook for Shooters and Reloaders and among the most famous American gunsmiths, cartridge designers and barrel makers. He died at Salt Lake City, Utah, August 23, 1989. Parker Otto Ackley was 86.

Born in Granville, New York, May 25, 1903, Mr. Ackley was a 1927 magna cum loude graduate of Syracuse University. He began his professional gunsmithing career at Roseburg, Oregon, in 1936 taking time out during World War II to work for the Army Ordnance Department at Ogden Arsenal. After operating a gunsmithing business for a few years at Cimarron, New Mexico he moved to Trinidad Colorado where he was associated with the creation of the Trinidad State Jr. College School of Gunsmithing beginning in 1946.

Ackley moved to Holladay, Utah in 1951 and there he continued his gunsmithing and barrel making business which brought him fame. His handbooks appeared in 1962 and 1966, and along the way he authored works on gunsmithing and wrote columns for shooting publications. A profile of his life appeared in the American Rifleman for November, 1980 page 32.

Survivors include his widow, three daughters, 18 grandchildren and 19 great grandchildren. Entombment was at Larkin Sunset Lawn, Salt Lake City.[17]

We never actually worked together but visited each other's shops. And we talked — a LOT.

"P.O. laid the foundation for me to work from, but most importantly, he taught me to think through things. It was not a matter of learning to do things just one way. P.O. was a chronic experimenter, continually challenging all the accepted 'truths' that turned out to have flawed logic that did not hold up in the real world. That is what has pretty much set my course. It also tends to set one at odds with the rest of those in the gun trade that don't agree with what I can easily demonstrate when it flies in the face of 'common wisdom' or accepted practice.

"For many, many years, I turned guns and ammo around in my head after reading about them in Ackley's writings and others. I was told by my highschool counselor I tested very high in spatial ability and this seemed to develop more fully trying to conceptualize details about guns. Stimulation and challenge by P.O. pressed it to the limit. He would explain anything but never showed me anything. That left me walking away having to figure out what to do. He gave me the concepts, but I had to do it.

"It wasn't until a few days after he passed away on August 23, 1989 that it dawned on me what he had done. He made me learn to think. He could only tell me so much about so many things, but learning how to think was the foundation that has proven invaluable."

Of the lessons he learned from his mentor, Bellm said, "Ackley can best be described as a mindset, not just the straight wall, sharp shoulder design he made famous. Ackley is an analytical, realistic way of getting into problems and finding solutions. It is a love of rifled sporting firearms and the guys who use them. It is also an attitude that looks at the common wisdom put out by the shooting industry with a jaundiced eye and challenges it when it does not stand up to the light of day.

"For me … it is also apparently an addiction. P.O. and his daughter, Jackie, had a system autographing his books. She laid them out, and he signed them, one after another. I should have more pictures than I do, but was not into the notoriety thing that much. I was just doing what I did for the most part. The really upsetting day was the day Jackie said they had thrown out several pickup truck loads of old correspondence. That in itself would have been the basis for a graduate course in barrels, chambers and metal work."

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1 Ackley, P.O., Letter to Fred Barnes, April 15, 1952
2 Ackley, P.O., Letter to Fred Barnes, July 8, 1952
3 Ackley, P.O., Letter to Bob Brownell, December 30, 1951
4 Ackley, P.O., Letter to W.F. Vickery, July, 1956
5 De Hass, Frank; Van Zwoll, Wayne, *Bolt Action Rifles, 4th Edition*, 2003
6 Mason, James D., "A Custom .256 Newton," *Rifle Magazine*, September/October, 1970
7 Hagel, Bob, "Revival of the Sharps," *Gun Digest*, 1971
8 Ackley, P.O., Letter to Bevan King, August 1, 1979
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13 Ackley, P.O., Letter to 1st Lt. Ralph T. Walker, April, 1955
14 Womack, Les, "The Extraordinary P.O. Ackley," *Gun Digest*, 1985
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17 *American Rifleman*, October, 1989

CHAPTER 7

PIONEERING THE .17 CALIBER

Who was first to make a .17 caliber in the United States? Ackley did not claim that title, although he did not profess to know who was first either. He was aware of the sub calibers that were produced in Europe long before his .17s. He also mentioned Alton Jones of Portland, Oregon in connection with early experiments in .14 caliber, such as the .14 Jones, pioneering work that was done in the 1920s.[1] Mike Thomas clears up the matter even further when he reported that Alton Jones was the first to work with both the .14 and .17 calibers in the United States.[2] The powders available to Jones so early on hampered his experiments and limited his results greatly, thus he was forced to rework existing powders to finer granulation (don't ever try that, it's extremely dangerous).

From all available evidence Ackley was probably the first to make .17 caliber barrels in the U.S. on a commercial basis. Landis and Simmons both wrote about Ackley's new .17 caliber cartridges in their respective books in 1947. If others were making .17 barrels or cartridges these writers would have probably reported on them.

What was P.O. Ackley's reason for researching .17 caliber barrels and cartridges? Ackley himself tells us in *Handbook for Shooters and Reloaders, Vol. II*. Around 1943, Charlie O'Niel of OKH fame had an idea for a .17 caliber cartridge. Ackley thought it was probably based on the Hornet case.[3] During the war it was hard to get tooling and Ackley said that it took a while to acquire the tools necessary to bore .17 caliber barrels. By the time the tools arrived, O'Niel was occupied with other projects so the tooling lay dormant until 1945 when Ackley decided to try the tooling out and make a few barrels with some of his associates.

The very first .17 that Ackley assembled into a shooting rifle was built on a custom bolt action patterned on the .30 Remington (a commercial version of the P-17) design shrunk down to the correct size for the Ackley Pee Wee, which was a .30 Carbine case necked down to .17 caliber. The action was made by an unknown Oregon gunsmith, Ackley does not state who owned this first gun. Ward Koozer stocked the rifle as he was a partner of Ackley's at the time, and apparently it was a quick stock job so that testing could commence. Ackley was not impressed by the beauty of the little rifle assembled for the first .17 Pee Wee.[4] Bullets for that first rifle were made from copper wire.[5] Now that would be a collectors dream to find the first .17 Pee Wee. If any readers run onto it, this author wants pictures!

Because of a lack of suitable actions for the Ackley Pee Wee it was decided to design other cartridges that would lend themselves to available actions. So the .17 Ackley Hornet, .17 Ackley Bee, and .17/222 were naturals. Ackley reports that between 1962 and 1965 the demand for .17 caliber barrels from his shop doubled.[6]

Apparently, Ackley perceived a problem developing for shooters. Popular local hunting spots after WWII were becoming more urbanized. So cartridges that were less prone to ricochet — using projectiles with less mass — were one answer to this problem. The .17 caliber uses very light bullets and produces a relatively low report, but the ranges on small targets might be very long. Charles Landis said it this way, "… the bullet only weighs 20 to 26 grains when held in the loaded cartridge. There is no possible way to splatter Farmer Yonson's choice Guernsey heifer with a chunk of lead and copper the size of a marble if the minute bit of metal-jacket is no larger than the diamond in a $9.99 engagement ring. That is what you have in the .17 caliber." Landis stated that Ackley was pretty much the sole source for .17 caliber barrels immediately after the war.[7]

"This extremely small bore is gaining a certain amount of popularity, especially among varmint shooters who are forced to hunt in thickly settled areas where loud report and dangerous ricochets are important," wrote Ackley. "Accuracy has been rather erratic, but is improving as the barrel makers learn more about producing these extremely small bores to closer tolerances. There are numerous versions of cartridges the better ones have case capacity of less than 25 grains."[8] The author of this book will attest to the truth of that last comment. In fact, I would further limit the statement to say that 18 grains is the upper limit of a good .17 cartridge, as it requires much less cleaning and does not foul nearly as quickly as larger capacity cases.

Landis predicted that the .17 caliber would possibly one day outshine the .22 in popularity. We have not yet come to that point, a half-century after he suggested it. However, the .17 is now widely known and accepted. The introduction of rimfire cartridges like the .17 HMR, .17 Mach II, and the .17 Hi-Standard or Aquila have greatly increased the popularity of the caliber. The natural outcome will likely be shooters who desire more flexibility wanting centerfire cartridges rather than rimfire offerings. So Landis may be correct after all, though time will tell.

Ackley had several .17 caliber cartridges. He had the advantage over most gunsmiths because he was making the barrels, so he could do more testing and experimenting than the average gunsmith. The standard bore size for a .17 caliber is .168-inch bore, .172-inch groove. It appears Ackley began working with .17s shortly after leaving Ogden Arsenal. In 1945, when Landis was preparing his book, *Twenty-Two Caliber Varmint Rifles*, Ackley reported on his progress with .17 caliber testing.

In the 1951 book, *Woodchucks and Woodchuck Rifles* Landis stated that all his barrels in .17 came from P.O. Ackley. Landis designed and tested several cartridges in .17 caliber.

Advice from Ackley concerning the .17 caliber bore: "Case capacity greater than 25 grains is impractical. .17 caliber barrels seem to give the best results with a 10- to 12-inch twist, and usually the best accuracy is obtained with bullets not over 25-grain weight but for those interested in experimenting with longer bullets as heavy as 45 grains in an extremely quick twist barrel, such bullets are available from Fred Barnes.[9]

"When designing, or a better word is 'concocting,' cartridges of this type, there are several things which must be taken into consideration. One of the most important is the availability of actions ... When planning a new cartridge — give it sufficient neck length; neck length should be 90 percent of caliber or greater. I.E. if you have a .308 caliber cartridge the neck needs to be .277 inches or longer to provide appropriate neck tension and strength to hold the bullet. Two other things which have to be considered when contemplating a new cartridge: keep the powder capacity within reason, and select some case which will lend itself to easy

reforming operations," wrote Ackley in his article, "Those Amazing .17 Calibers."[10]

One thing is certain, P.O. Ackley and his contemporaries who experimented with the .17 caliber bore and worked out its problems are completely responsible for the fact that we have factory .17 caliber cartridges today. These barrel makers cut a fresh trail and were wildcatting in the truest sense of the term. They also had to work out bullet design, including jacket thickness to make the .17 a viable caliber.

In the *American Reloaders Association Bulletin*, June 1971, Ackley wrote on bullets for the .17 caliber: "The problem has been bullets. None of the .17 caliber bullets which have been available up until now are capable of going over 3,700 fps without some fouling problem. But now that Remington is coming out with the Power Lokt type of bullet, all this may be changed." Experienced reloaders will tell you that even today any bullet approaching the 4,000 fps barrier will likely cause fouling. It's pretty much a fact of life that until we find a new jacket material that does not foul this will be a problem.

In the 1972 *Gun Digest,* Bob Zwirz was more inclined to say that the biggest problem that .17 caliber fans had up to that time was barrel quality. Many of the early barrels were quite literally experimental and the bores were not as smooth or uniform as we are used to seeing today. Zwirz made his point in connection with the announcement of the .17 Remington and stated that Remington's new .17 bores were, "a barrel far superior to many previously available."[11] In the same article he praised the .17 caliber barrels made by A&M, two guys who, coincidently, honed their trade while working for Ackley.

Ackley tried to interest his longtime friend Les Bowman in .17 calibers. It took many years before he finally became interested. In the early 1960s, Ackley was pushing the .17 Ackley Hornet and the .17 Pee Wee (presumably the latter because surplus M1 Carbines were then available). Bowman credits the wildcatters in that time period, Ackley included, with working out the .17 caliber and making it viable. They determined the correct case capacity, design, bullet weight and construction, in particular the proper jacket thickness. It was this wildcatting that paved the way for factory .17 caliber cartridges, the .17 Remington and the newest introduction, the .17 Remington Fireball (too bad they didn't just adopt the .17 Mach IV, basically the same design).

"I suppose we didn't make more than a dozen barrels that year (1945)," said Ackley of .17 caliber barrel production. "Then it gradually increased until, in 1968, I must have made about 2,000, but that was probably about twice as many as we made in any other year."[12] Bill Hause said that Ackley did not like making .17 caliber barrels because of the rejection rate. "We rejected two out of every three we drilled, of course we redrilled those rejects to larger calibers but the time was lost. It was tough to get a drill that small to drill straight."

In connection with barrel quality Ackley decided to try a three groove design, he passed this suggestion along to the other barrel makers he was friendly with, like Les Bauska and Bevan King. In a letter to King he says, "I never made very many of them and I don't think I ever sold any in .17 caliber, but I did send out several for testing. When you get to thinking about it the Shilen barrels all have eight grooves, which mutilates the bullet nearly three times as much as a three groove does. When I made these .17 caliber three groovers I did it with the idea that it would reduce fouling. I had forgotten all about it until just lately. They were made without the corners on the lands. Now as I remember it, Shilens were #1 in fouling and the six grooves were next, and then our five groove barrels were next. So as the number of grooves are reduced things work better each time.[13]

"Sisk made the first .17's for me and we had one test gun for the .220 Swift necked down to .17 and we never did experience any fouling at any speed we could get out of that. Then the next one the .22-250 necked down and we never had any trouble with that with his bullets. But when these thin jacketed things came along, including the Hornady, that is when the fun started. There are all

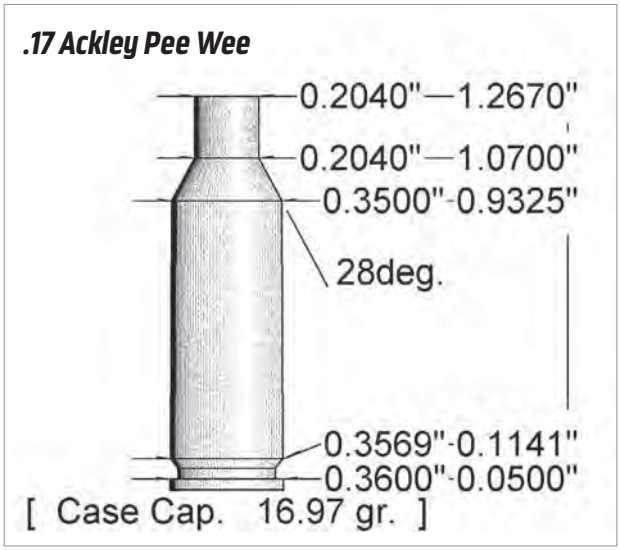
sorts of theories and I don't believe any of them. I have had more experience with .17s than practically all the other put together, but I still don't know what the trouble is,"[14] wrote Ackley.

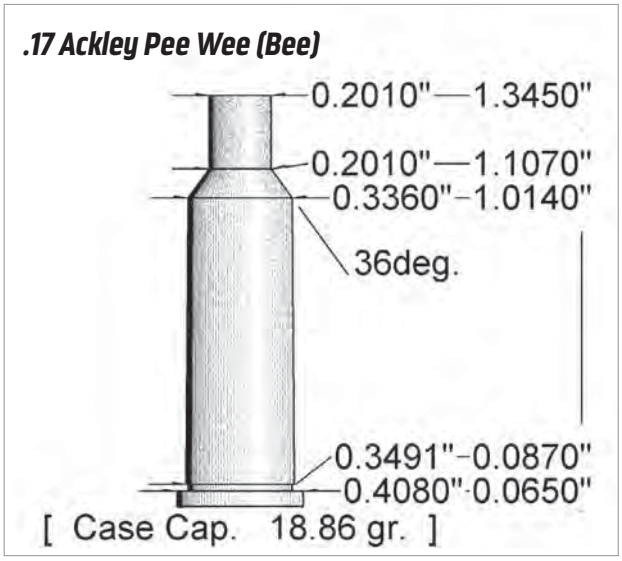
"I asked P.O. to send me samples of his .17-caliber cartridges," wrote gun writer Layne Simpson. "Expecting to receive perhaps a dozen or so, I was absolutely amazed when I opened the box and counted 38 cartridges of that caliber on cases ranging in capacity from the shortened .22 Hornet to the full-length .220 Swift."[15] In that same article, Simpson indicated that not all the samples he received represented cartridges that had actually been chambered in a gun. Rather, they represented Ackley's experimenting at the loading bench as well as actual cartridges for which Ackley chambered.

Wildcatting in the pre- and post-WWII era was truly wild. Over time we have settled on some guidelines in the industry that most gunsmiths and reamer makers follow — an unwritten law. The most important of which is that we no longer use the same name for alternate variations of a cartridge design. This is important because in earlier times it was common to make a rimmed and a rimless version of the same cartridge and call them by the same name. In terms of external ballistics they were the same case, but they are clearly not interchangeable. Some designs were even from totally different families of cases, but since they ended up with the same case capacity, they used the same name. With that in mind let's look at Ackley's first .17s.

.17 Ackley Pee Wee

The original design was a .30 Carbine case necked down to .17 caliber. This was Ackley's very first .17. He stated that the design was discontinued soon after introduction in favor of the .17 Ackley Bee (then considered to be the rimmed Pee Wee), simply due to availability of suitable actions.[16] When the federal government released the M1 Carbine to the surplus market, the demand for the





.17 Pee Wee quickly surged.

In Richard F. Simmons' book, Wildcat Cartridges (1947), the Pee Wee is also referred to as the "O'Neil-Ackley .177 inch. Charles O'Niel, of course, developed several cartridges with Elmer Keith such as the .333 OKH and .334 OKH. Simmons states that the case was designed by O'Niel and the reamers were made by Ackley.[17] Most likely, O'Niel had considered the .30 Carbine case for his wildcat and Simmons knew that. Ackley states in his writings that O'Niel had the idea for a .17 caliber cartridge about 1943 but that he never designed the cartridge for it, the Pee Wee was the first cartridge Ackley tested in .17 caliber.[18] Of course, Ackley was probably the only source for .17 barrels at

the time. In addition, Ackley said that the .17 Pee Wee saw some popularity when M1 Carbines came on the surplus gun market.

.17 Ackley Rimmed Super Pee Wee

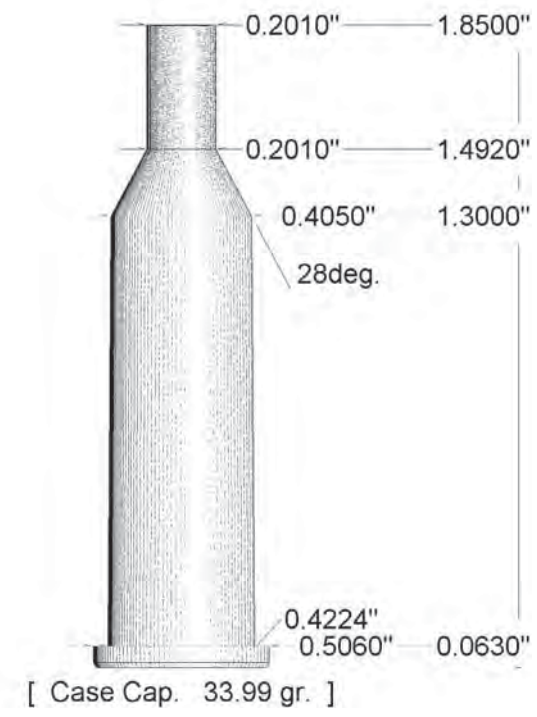
Landis described the Super Pee Wee as, "A circus midget on the outside of three shots of bay rum plus a chaser of lemon extract; in such a condition he proposes to the fat lady and is immediately accepted!" In its day, the Super Pee Wee was an unusual cartridge with a relatively short, fat design, the long neck only added to the unconventional look of the case.

Ackley formed them from the .219 Zipper or the .25-35 case. The neck measured .358 inches. It is pure speculation, but perhaps this was Ackley's experiment with a long neck slowing the erosion of the chamber throat. Theoretically, the brass would then take some of the abuse of the hot gases churning past the shoulder.

C.S. Landis is credited with assisting Ackley with the development of this cartridge.[19] Case capacity was huge, holding more powder than the much later .17/222 Remington Magnum wildcat.

Ackley offered a rimless version of the Super Pee Wee cartridge based on the .25- or .30-caliber Remington case. A modern version of the rimless case could be made from the Remington 6.8 SPC, though the neck would be a little shorter, which would probably be a good thing. Velocities reported in Landis' book put the .17 Ackley Super Pee Wee at 200 feet per second faster that the .220 Swift, no small achievement, especially in its day.

.17 Super Pee Wee (Rimmed)



.17 Ackley Hornet*

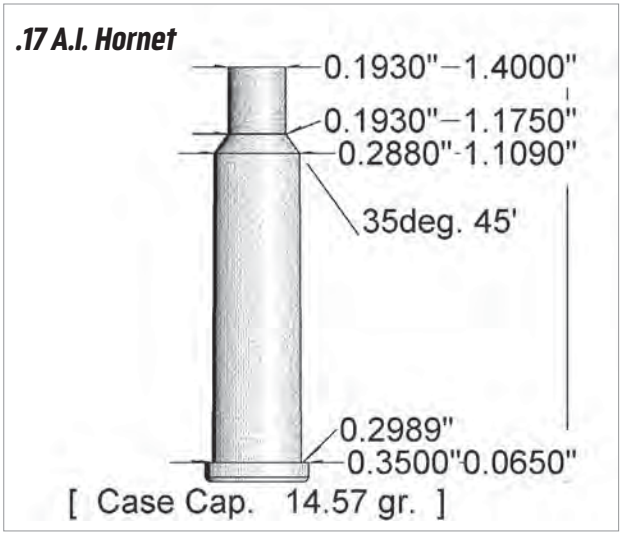
Interestingly, and not surprisingly, Ackley was not the first to neck the Hornet down to .17 caliber. That honor goes to a Portland, Oregon gunsmith by the name of Alton Jones. Mike Thomas reports on a rifle chambered in .17 Hornet along with a set of dies made by Jones. Thomas' rifle is a Winchester low wall single shot, the chambering is Jones version of what is now known as the .17 Ackley Hornet.[20]

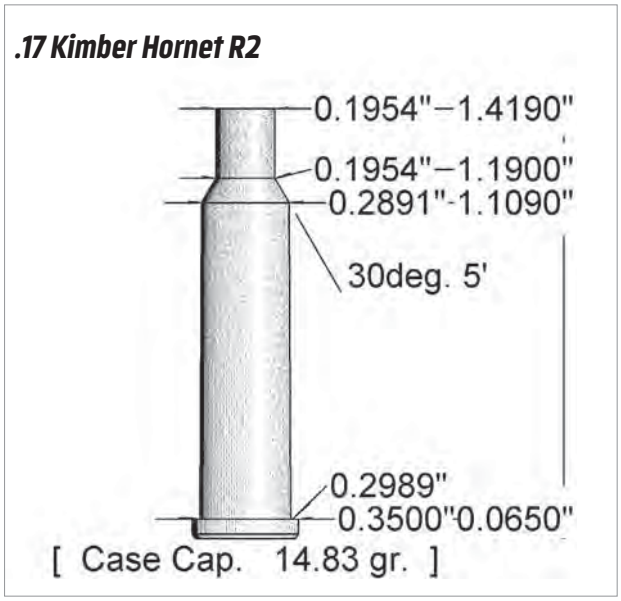
In his 1959 Handbook for Shooters and Reloaders, P.O. Ackley candidly states that, "There are numerous versions of this cartridge being made by other gunmakers. All possess equal merit and loading data given for one can be used for the others. This small cartridge is one of the best, if not the best of the .17 family and can be recommended for game such as woodchucks and jack rabbits." Ackley's version of the .17 Hornet, however, seems to have out lived all others — probably due as much to the iconic Ackley name as to anything else.

"A classic exception to the fussiness of these guns is P.O. Ackley's .17 Improved Hornet," said Bob Hutton in his Guns & Ammo column. "Ackley once loaned me a beautiful BRNO action rifle chambered .17 Improved Hornet. His loading instructions were simple. Stand all the sized and primed cases upright in a small box. Pour the box full of 4198 and shake lightly. Pick out the

cases, now filled to the top with powder and seat a 25-grain bullet, crushing the powder. Poor loading practice? It seems so until you look carefully at what was being done. The choice of 4198, actually rather slow for this size case, is the secret. A case full of 4198, with a little crushing, still gave very mild pressures. Higher velocities can be obtained with faster powders but unless the charges are separately weighted, the consistency is no better than the quick and dirty method."[21] This method should not be used with any other cartridge.

The .17 Ackley Hornet is an excellent cartridge, it does not suffer from the cleaning problems that many .17 owners complain about. Case capacity in .17 caliber cartridges affects the frequency of barrel cleaning required. Cartridges with relatively low powder capacity like the Ackley Hornet do not foul quickly. While many .17's will need cleaning every ten shots or so, the .17 Ackley Hornet can go much longer between cleanings. This makes it very desirable for the varmint shooter. With velocities up to the 3,300 feet per second range, low recoil, and relatively low muzzle report, the cartridge is pretty attractive and still has a strong following as of this writing.





At one time Kimber chambered a .17 Hornet, yet they did not choose to use the longstanding Ackley version. Kimber selected the Dick Saunders version of the chamber for their run of rifles. The idea actually came from Kimber's largest distributor at the time, Lawrence Frestad. In May 1984, Frestad hosted a prairie dog hunt that was attended by Dick Saunders and Layne Simpson, where Simpson pointed out the .17 Hornet name was already taken by the Ackley version of the cartridge. So they renamed their offering the ".17 Kimber Hornet R2 (revision 2)."[22] In comparing the drawings there is very little difference.

Ackley's personal load of choice for the .17 Ackley Hornet was a full case of IMR 4198 and a bullet up to 25 grains. This delivers a compressed load that will push a 25-grain bullet at 3,500 fps. More loads can be located in Nick Harvey's Practical Reloading Manual for this cartridge.

Referring to cartridge designs for the .17 caliber, "I think the two best ones are the .17 Hornet and the .17 Bee,"[23] wrote Ackley.

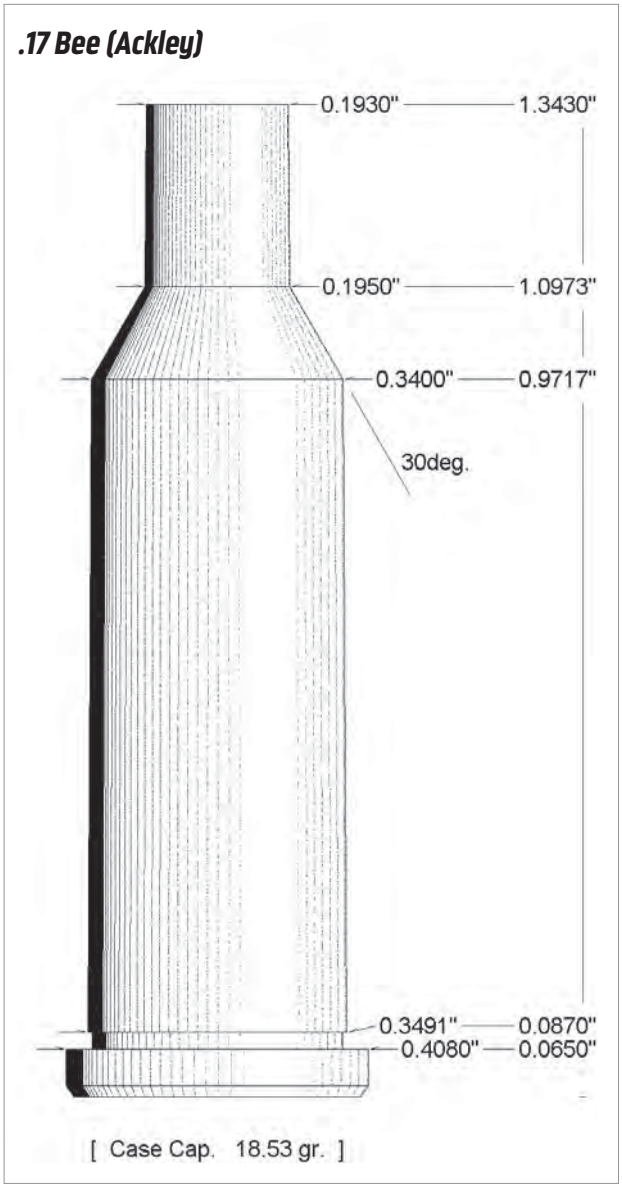
.17 Ackley Bee*

As with the .17 Ackley Hornet, P.O. was the first to admit that there were other versions of this case around and that they were essentially all the same. When he first started necking the .218 Bee to .17 caliber he considered it to be a rimmed version of his .17 Pee Wee cartridge. He was the consummate salesman, so it is likely that

he realized that changing the name to connect with the parent cartridge would make the cartridge more identifiable to potential clients. Ultimately this cartridge succeeded the .17 Ackley Pee Wee.

In his handbook, he suggested that when loading the .17 Ackley Bee with 4198 he was able to fill the case full, scrape it off level with the mouth and seat a bullet for a compressed load. He said that when such charges were weighed out they ran 14 grains. The velocity that Ackley reported was taken from a ballistic pendulum, 14 grains of 4198 giving him 3,534 feet per second. Depending on the length of the barrel this may be pretty close to real world muzzle velocity. Frank C. Barnes stated in Cartridges of the World, 6th Edition, that cartridges in .17 caliber with more capacity than the .17 Bee tend produce erratic results and inferior accuracy. Nick Harvey's Practical Reloading Manual includes data for this cartridge.

Ward Koozer's son, Dan Koozer mentioned to the author that his father had developed the .17 Bee when he and Ackley were partners. In Ackley's article, "Those Amazing .17 Calibers," he mentions that Koozer was his partner at the time that they developed the Pee Wee and that it was abandoned for the Hornet and Bee designs almost immediately. It is logical that Koozer would have been involved in the development of new cartridges in the shop, as he was an expert barrel maker and did much of the chamber work for the Ackley shop in those days. He later went on to have a successful solo career doing rebore and custom barrel work.



"P.O. sent the only dummy round he had for the cartridge, some targets, and load data to a writer, Ward had built the 17 Bee for me, in fact at the time that it was first written up, I think in the *American Rifleman*, I owned the only rifle in that caliber," Ward Koozer's first wife, Dorris Landsburry told me. "I was a little perturbed that the writer had told the story as if he had shot the targets and tested the loads personally, since the gun had never left my possession. Ward and P.O. told me not to get upset, that is just the way things go sometimes." According to her, the cartridge being reported in the article as the .17 Ackley Bee put some strain on the relationship between Ward Koozer and Ackley. However, Koozer would not have said much about it because, "He was a very quiet person." At the time that all this took place the name on the door of the shop was Ackley, so it's logical that work coming from that shop would carry that name as well.

"Mr. Ackley has developed or helped develop many new cartridges and ideas from the big earthquake magnums on down, I do believe, pound for pound, caliber for caliber,

coins for coins, this .17 Ackley Bee is the most astonishing brainchild he has developed,"[24] wrote A. Lee Robertson.

"A very satisfactory action for the .17 Bee is the small Martini,"[25] noted Ackley in his *Guns & Ammo* column.

.17 Lovell

Listed as an Ackley design in the September 1954 *American Rifleman* "Trade Dope" column.

.17 Mach IV

Many books and articles have stated that the .17 Mach IV is the work of Vern O'Brien. However, while O'Brien certainly marketed this cartridge and built up his company around it, the design was given to him by a friend.

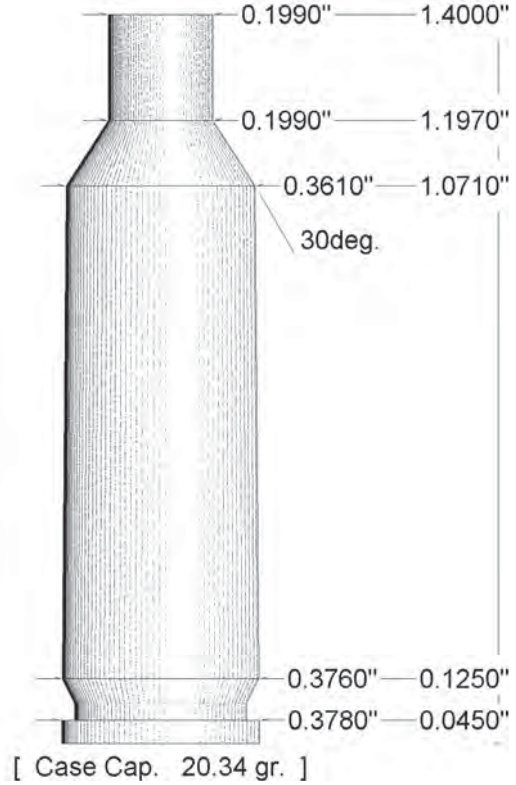
In Layne Simpson's article, "The Truth About the .17" in the April 1989, *Shooting Times* magazine, Simpson states clearly that soon after the .17 Mach IV was introduced by Ackley, that O'Brien Rifle Company began to market the caliber. Ackley states that O'Brien introduced the cartridge under the moniker .17 Mach IV and copyrighted that name.

I spoke to Simpson about the .17 Mach IV and asked where he picked up the details about its history. "P.O. told me himself. He was friends with Vern O'Brien and handed the design off to him," Simpson said. Wayne van Zwoll also credits Ackley with designing this cartridge in *Modern Sporting Rifle Cartridges*. Finally, Michael Bussard in the 3rd Edition *Ammo Encyclopedia* credits Ackley with the .17/221 Improved, this has to be the Mach IV as no other example of this cartridge has surfaced.

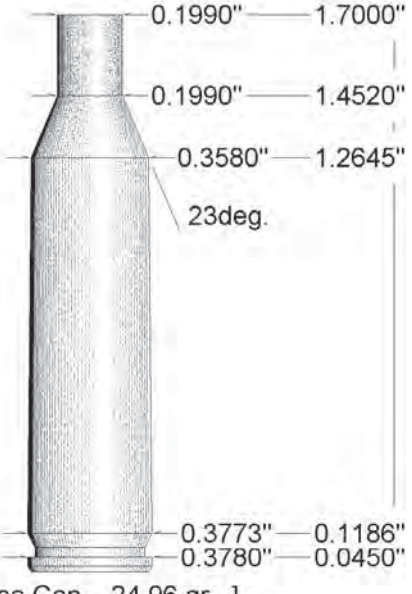
According to most sources this cartridge (.17 Mach IV) first appeared in 1962, which is interesting or maybe amusing, since the .221 Fireball (parent case for the Mach IV) came out in 1963.

In Volume II of Ackley's *Handbook for Shooters and Reloaders*, which was first published in 1966, you will find a short write-up on "Sub Calibers." Incorporated in that article are pictures from a goat hunt on Santa Catalina Island. More important to us

.17 Mach IV



.17/222 Remington



here is that Ackley used his personal Remington 600 chambered in .17 Mach IV on that hunt. He mentions, "the .17 Mach IV which is now being marketed by the O'Brien Rifle Company." The context seems to indicate that the .17 Mach IV was not always an O'Brien cartridge.

With the introduction of the .17 Remington Fireball in 2007, another of Ackley's designs has been legitimized by the factories. Although not identical to the Mach IV the .17 Remington Fireball is the factory version of this venerable wildcat.

.17 Mach III

Simpson confirmed in an article that the Mach III was an Ackley creation. This is exactly the same cartridge as the .17 Mach IV but loaded for an XP-100 pistol, which developed 3,000 feet per second with a 20-grain bullet. Ackley mentioned this loading in his article, "Those Amazing .17 Calibers" for *Handloader* magazine, later reprinted in Wolfe Publishing's Wildcat Cartridges Volume II. No mention of the Mach III in connection with O'Brien Rifle Company has surfaced as of this writing.

.17/222 Remington

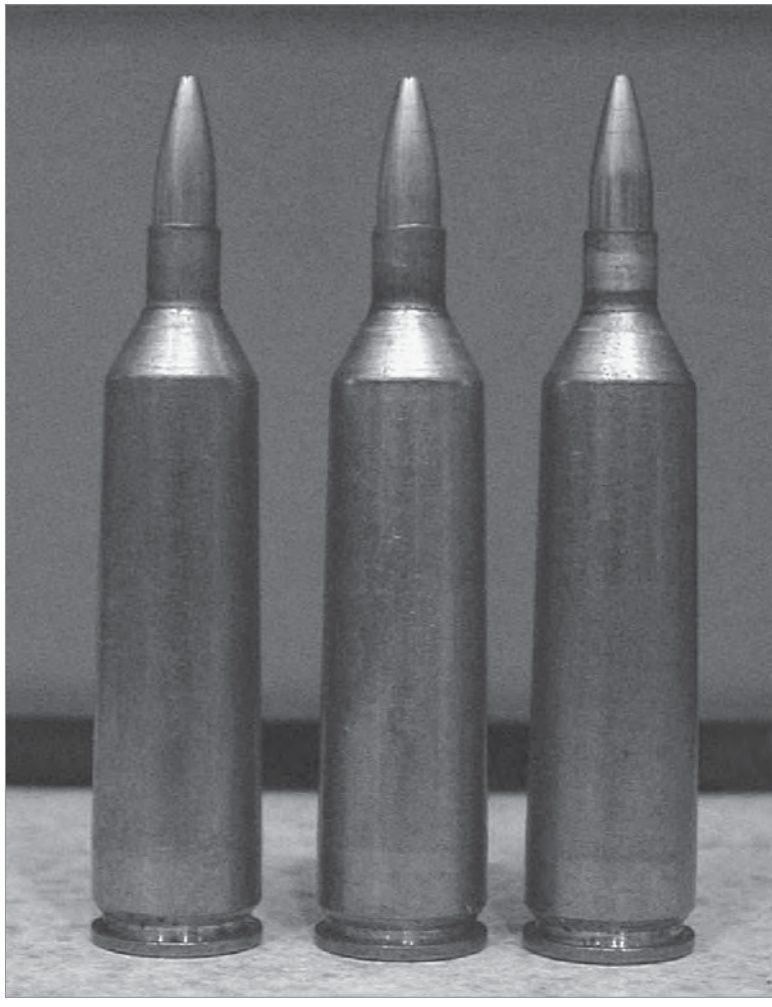
Ackley reports in his handbook that the .17/222 as he offered it was simply the full-length case necked to .17 caliber. He notes that some other shops were offering a shortened improved version, which gave the same ballistics. He liked the simplicity of necking the case down with no other changes and understood that most reloaders would prefer that version. He did not consider the .17/222 to be as good a cartridge as the smaller cases he offered. Powder capacity was about as large as Ackley thought useful and practical for the .17 bore.

.17 Magnum (Ackley)

Les Bowman tells us that Ackley necked the .222 Remington Magnum down to .17 and called it the ".17 Magnum."[26] In 1968, Ackley wrote that this was his most popular .17 caliber cartridge.[27] It is also one of the calibers that Bowman tested in the EMDEKO Colt Sharps rifles mentioned in Chapter 6.

.17 Ackley Improved (.17-223 AI)

Ackley mentions that this cartridge was designed for Dave Wolfe of *Shooting Times*. It utilizes a 30-degree shoulder.[28] The sharper shoulder of the Ackley Improved design is credited with curtailing the problem of necks growing in length during the firing and reloading process, according to Bowman.[29] This is one of the cartridges that has suffered at the hands or reamer makers, for there are several versions of the cartridge in existence.



.170 Landis Rimless Super Eyebunger. Ed Reynolds collection.

Landis .170 Woodsman's Special or .17 Landis Woodsman

Ackley had a hand in the development of this cartridge and probably did the chambering for it when Landis was promoting it. It was made by necking a R2 Lovell or the .22 Kilbourn Lovell to .17 caliber. The cartridge was said to give 3,800 feet per second velocity, loaded to 2 inches overall, it had a .250-inch neck length, a case length of 1.633 inches, and the shoulder was 1.30 inches from the head, no shoulder angle is reported.[30]

"The tiny .170 Landis Woodsman drives a 25-grain Sisk soft-point bullet at 3,500 fps muzzle velocity, and is made from the old R-2 case necked down," reported C.S. Landis in the 1951 *Gun Digest*. "The report is negligible, recoil is also. It almost never gives a ricochet. I killed 173 woodchucks with it in 11 days, in 1948, on a trip to Ontario — all in front of witnesses."[31]

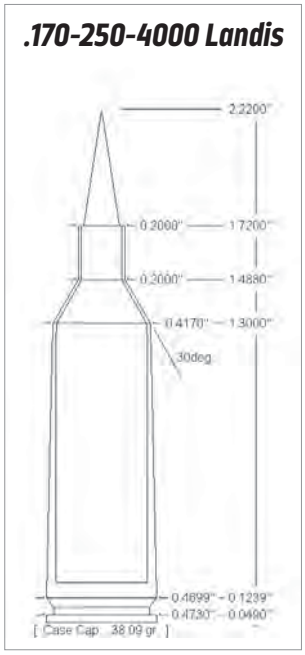
.170 Landis Rimless Super Eyebunger

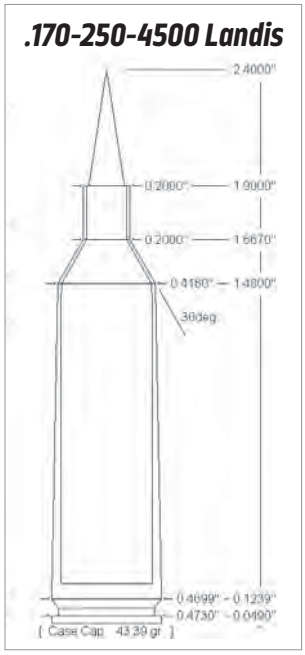
This cartridge is primarily attributed to C.S. Landis, well-known writer and friend of P.O. Ackley. Because of the date of the cartridge (around 1946 or 1947) Ackley had to be involved in the development because he was the only barrel maker offering .17 caliber tubes at that time. When Simmons mention this design in *Wildcat Cartridges*, he reports that Landis closely collaborated on the Ackley Rimmed Super Pee Wee.

The cartridge itself was a .25 Remington case, the shoulder diameter .400 inches, moved forward .050 inches and given a 30-degree slope.

.170-250-4500 Landis

Charles Landis designed this one, a .250-3000 Savage case necked down to .17 caliber. In *Woodchucks and Woodchuck Rifles* he states P.O. Ackley made and tested the rifle and cases for the cartridge.





.170-250-4000 Landis

This is a shortened version of the 4500 listed above. Another Landis design that Ackley built and tested.

.17/225 Ackley

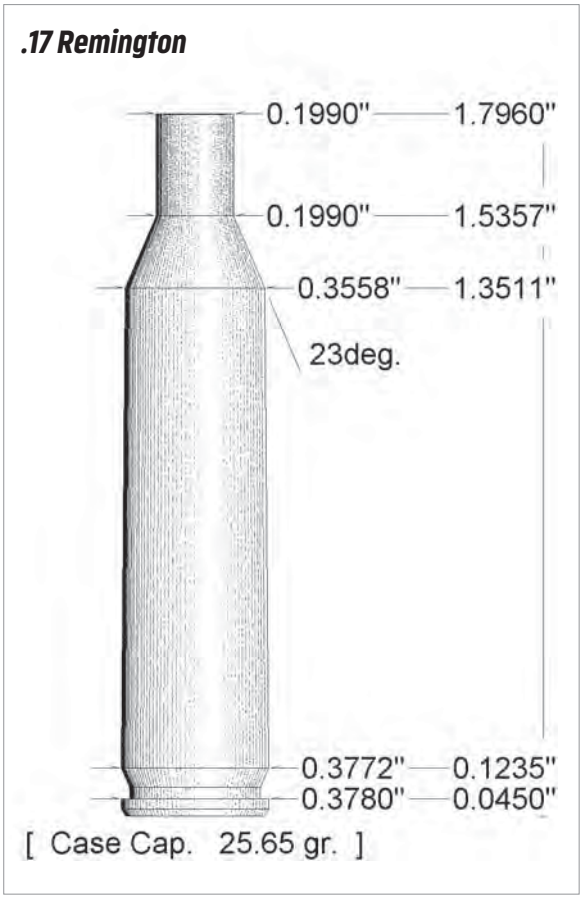
In the 1969 *Gun Digest*, the iconic editor John T. Amber writes about a .17/225 that P.O. Ackley barreled for him. Despite his comments to C.S. Landis in 1945 that case capacity in a .17 should not exceed 25 grains as it would be impractical, Ackley told Amber that "a bit surprisingly" he found the .225 Winchester case to not be too badly overbore for .17 caliber and that it delivered high velocities.

At the time of the writing, the .17/225 Ackley had only seen preliminary testing but Amber had achieved 4,348 feet per second average from his 24-inch Ackley barrel. Groups were not great, running up to 2 7/8 inches, though Amber attributed the lack of accuracy to the new barrel needing to be broke in. Then in discussing the chronograph tests Amber mentions lead smudges on the screens (they were using the disposable shoot through screens) so the bullets were on the verge of breaking up. Amber points to bul-

lets leaving round holes in the target at 100 yards as an indication that all was OK. More likely, if they had dropped the velocity down to about 4,000 fps or less, better accuracy would have been achieved.

The Ackley barrel had three grooves and was installed on one of the Mauser-style actions that Ackley was importing from Japan at the time. He reported using 31 grains of Reloader 21 and an unknown brand 25-grain bullet for a velocity of 4,328 feet per second from a 22-inch barrel. Further, he stated that a load of 33.5 grains of 4350 and a 25-grain bullet gave 4,444 feet per second.

Amber says that Ackley supplied three forming dies and a standard two die reloading set. Apparently the case necks were a little thick and may have caused some of the accuracy problems. Reaming or turning necks would have relieved this concern about thick brass in the neck area. The photo in the article shows a 30-degree shoulder on the .17/225 Ackley case.



The description of the .17/225 is given in an Ackley article. "This new .17 caliber cartridge has been made by reforming the new .225 Winchester — necking it down, using a 30-degree shoulder, and shortening the body slightly in order to obtain sufficient neck length for easy handloading. The 'excuse' for this cartridge is that it can be made to work through standard actions."[32] One advantage this design has is its semi-rimmed case can be used in a bolt action, or it would make a descent single-shot cartridge. However, at the time of this writing, .225 Winchester brass is in very limited availability and is obsolete for all intents and purposes.

Paraphrasing a comment by Ackley to Bevan King in a letter, 'The .17/225 has never been a satisfactory cartridge.'[33] Apparently when Ackley had more time to test the cartridge it lost some appeal.

.17 Flintstone Eyebunger

This is simply the .22-250 case necked down to .17 in an effort to find out whether any additional velocity is possible by using a badly overbore capacity case. Obviously this cartridge will work in any action that will accept a .22-250 case. Chronograph tests which Ackley reported on indicated that no increase in velocity over the .17/225 was achieved by the increase in case capacity. The Flintstone required about 4.5 grains more powder to achieve the same velocity, this would of course be hard on barrel life.

.17-220 Swift (.17 Swift)

Ackley mentions that he built a test rifle in this caliber that he took on a Rockchuck hunt in July of 1946. He implied that large capacity .17-caliber cartridges would require pretty tough bullets to take advantage of the case capacity. Thin jacketed bullets simply could not handle the velocities produced by a full load in big cases. Naturally, barrel life and fouling are much bigger issues when you push the velocity limits as well.

The .17 Goes Factory

John Wootters wrote of the matter, "If the .17 caliber ever becomes 'respectable' it will be due entirely to the wildcatting fraternity. It will also be one of the few innovations of major significance about which the Europeans do not suppress a yawn and point to something similar they did 25 years ago."[34]

According to Ackley, "I received a drawing for the new .17 Remington, but, in the meantime, I was able to rechamber my own .17/222 to the new Remington cartridge. I may not have done it exactly right, but I suspect that I have the chamber dimensions within a couple of thousandths on headspace. Now I have a drawing and have ordered a headspace gauge and finish reamer. I did some chronographing on it and the factory claims 4,020 fps with the 25-grain bullet. With 23.0 grains of 4320, and a 25-grain bullet, I got 4,016 fps without any correction for muzzle velocity; that was instrumental velocity and with the first screen 20 feet from the muzzle. So that probably is about what they are using for the factory load. The pressure was very mild. Of course, my barrel is a 22-inch length and 3-groove and the factory uses a 24-inch 6-groove. Whether this would make any difference or not with this small bore, I don't know.

"I ran a couple of loads using 748BR, but the charge was too hot," Ackley continues. "I got one pierced primer but the primer was not loose. The small Sako action will produce pierced primers without any other indication of pressure because of the light firing pin assembly. You can take the same loads and shoot them in a Remington 600 or 700 without any signs of pressure.

"Anyway, 24.0 grains of 748BR gave 4,309 fps. I tried to find some powder which I could use by simply pouring the cases full and that turned out to be Norma 205. With only slight tapping, I was able to get 26.0 grains of N-205 into the case and that made it just level full, delivering 3,963 fps. Only the 25-grain bullet was used. Actually, we have been able to get about the same velocities with the whole series of .17 caliber cartridges based on the Remington brass, beginning with the Mach IV and going up through the .222 Magnum, neck down. The Mach IV probably will not produce top velocity but will go 4,000 fps without any trouble."[35]

One would think that Ackley would have had more to say when the factories started adopting the .17 caliber bore. After all, this was clearly something he had personally pioneered. The more one reads Ackley's letters and articles the more it becomes obvious that he would not worry about getting credit for such things. Especially since, by 1971, he had been in the gun business for 35 years and was 68 years old. There was no need or desire for notoriety or advertising at that stage of his life.

John Olson in *Book of the Rifle* (1974) discusses several .17 caliber wildcats designed by Ackley. He then follows up with this comment: "I've owned and used a number of Ackley designed wildcats and I've never had occasion to be unhappy with any of them. If you're seriously interested in the .17 caliber I don't think you could go wrong with an Ackley version."[36]

*Recommended to clients by *Ackley in Rifles—A Modern Encyclope*dia, Henry M. Stebbins, 1958.

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CHAPTER 8

.30-06 ACKLEY IMPROVED CONTROVERSY

Shortly after World War II, P.O. Ackley developed the .30-06 Ackley Improved. And he was the first to admit that his design was one of many for the .30-06 case; his simply caught on.

Wildcatting has its enemies. Sound paranoid? Well, after over 30 years as a professional gunsmith this author has run into them more than once. Many ask why, if factories offer every possible category of cartridge, they would want or need a wildcat. There is no point in trying to sell this guy on wildcatting, his mind is made up.

The wildcatter is the guy who asks, "what if?" — and is the source for all new factory cartridges since the early 1900s in one way or another. The factories do not set out to copy wildcats normally, but it's just good business that they would notice what the public is interested in. A good example is the proliferation of guns, ammo and components that are now on the market for obsolete old black powder cartridges. The factories see the market created for them by Cowboy Action Shooting.

Check your history, did these start out as wildcats — .22-250, .220 Swift, .250-3000, .243 Winchester, .257 Roberts, .25-06, 7mm Remington Mag., .300 WSM, .338-06, .358 Norma, .375 Dakota, .416 Remington or .458 Lott? That is a short list, there are many more, and yes they all have wildcat roots.

It is often argued that case shape cannot substantially change the ballistics for a cartridge. On the flip side of that coin are those who oversell their wildcat, saying it will do things that are not possible without unsafe pressures, or dishonest reporting. Obviously the latter is of no value; however, excessive pressures are incorrect as well. If case design has no effect on ballistics then wouldn't all magnums look like the .300 H&H, all rimmed cases like the .38-55 and all rimless bottlenecks like the .30-06?

The truth is, over time we learn from trial and error. For this reason cartridges have gradually changed to reflect the general concept of improved design. New offerings tend to have minimum body taper and sharper shoulders than they did just a decade earlier.

How Improved Is It?

Two cartridges, one a commercial, the other an 'improved' version, were objectively compared for performance. The results may surprise you.

By William F. Wieman

H.P. White Laboratory — Originally published December 1953 *American Rifleman*

Will an 'improved' cartridge out-perform its supposedly more sedate commercial brother? Many shooters say it will. And they will rise to defend the merits of their favorite 'improved' cartridge.

An 'improved' cartridge is a type of 'wildcat,' a standard commercial cartridge case which has been modified, usually by increasing its powder capacity, in an attempt to obtain higher velocities. The designer hopes, too, that the new case is a more efficient combustion chamber, and attaches the 'improved' tag to indicate that he has designed a better performer than the commercial cartridge. To qualify as an 'improved' cartridge, the caliber of the original cartridge is unchanged and the case modifications can be accomplished by fireforming; i.e., firing a standard commercial case in an 'improved' chamber.

A New Approach

However, the claims of superiority for this wildcat cartridge rest largely upon the personal observations and conclusions of individual experimenters. No one, to our knowledge, ever has used standard industrial equipment and test procedures to determine the actual difference in performance between a given commercial cartridge and an 'improved' version of the same case.

As this is the only way to evaluate accurately the relative merits of a standard cartridge and an 'improved' version, we decided to conduct such a test under controlled conditions.

In planning the experiment, we decided to test for velocity and pressure only. We would not test for accuracy, for this is a product of the gun as well as the cartridge. Also, we decided to concentrate on one cartridge. Of course, testing one 'improved' cartridge can not prove or disprove the value of all such wildcats, but it can furnish enough basic data to aid in the evaluation and testing of other 'improved' cartridges.

We chose the Ackley Improved .30-06 as a test cartridge. This cartridge was developed shortly after World War II by P.O. Ackley, the well-known gunsmith and wildcat cartridge designer of Salt Lake City, Utah. When it first appeared, the Improved '06 attracted the attention of many handloaders. Enthusiasts claim it is capable of higher velocities that the standard .30-06; it is in reasonably wide use, and it is fairly representative of the 'improved' variety of wildcat.

The first step in evaluating the Ackley Improved .30-06 was to prepare the ammunition for tests. We fired several hundred rounds of a selected lot of 1942 Frankford Arsenal .30-06 ammunition in a Springfield Arsenal Mann test barrel and action. This test barrel was then rechambered to handle the Ackley Improved .30-06, and the rest of the lot of ammunition was fired in this chamber, plus fireforming the cases. All the cases were sized full length and reprimed using the same lot of primers. Sizing dies for the Ackley Improved cases were made with the same reamer used to rechamber the Mann test barrel.

With the exception of the overload shown in the tables, all loads were planned to develop from high-medium to near-maximum pressures. The overload was tested to determine the ability of the Ackley Improved case and chamber to handle unusually high pressures.

Loads IV and V are maximum capacity loads in the standard and Ackley .30-06 cases respectively, if the bullet we used is seated so the loaded round will function through the average rifle magazine. They were tested to further evaluate any possible advantage the 'improved' case might gain from its extra powder capacity.

Table 8-1

Load	Bullet	Seating Depth	Primer	Powder Weight	Powder
I	110 Speer	.250	Fed #210	54.5	IMR 3031
OVERLOAD	150 Ackley	-	-	-	-
II	180 Sierra	.400	Fed #210	48.5	IMR 3031
III	220 Express	.500	Fed #210	44.5	HiVel #2
IV	220 Express	.500	Fed #210	55.0	IMR 4350
V	220 Express	.500	Fed #210	57.0	IMR 4350

Table 8-2

.30-06 CASES				Ackley Improved cases		
Load	*Velocity (fps)	*Pressure (psi)	Extreme Variation (fps)	Velocity (fps)	Pressure (psi)	Extreme Variation (fps)
I	3,416	51,810	58	3,398	50,430	35
OVERLOAD	3,134	59,570	60	3,156	62,550	30
II	2,675	51,230	49	2,666	50,430	21
III	2,334	44,980	21	2,331	44,160	16
IV	2,501	44,950	18	2,440	46,710	36
V	-	-	-	2,524	49,680	64

**Average for 10 rounds fired.*

Bullets used in the test were selected for uniformity, and the powder charges were weighed to one twentieth (1/20) of the grain. The .30-06 loads were fired in a Springfield pressure barrel mounted in a modern-bond universal receiver, and the pressures recorded for each shot. Simultaneously, the velocities were measured at twenty feet from the muzzle of the gun with photo-electric screens in the Potter Counter chronograph. After all the loads had been fired in the .30-06 cases, the pressure barrel was rechambered with the reamer used throughout the test for the Ackley Improved .30-06 cartridge. The headspace was kept to the minimum tolerance allowed in the pressure barrel. The Ackley Improved loads were chronographed and tested for pressure in the same manner as the standard .30-06 cases.

Analyzing the Results

The results of these tests as shown in table 2, failed to reveal any more superiority of the 'improved' case over the standard version. As indicated by the lower extreme variations in velocity between rounds, the Ackley Improved case did produce more uniform velocities than the standard 30-06. However, the main results of the pressure and velocity tests seem to favor the standard version of the 30-06. Pressures for loads I, II, and III were slightly lower in the Ackley Improved cases than in the orthodox .30-06, but the velocities were proportionally lower too. Load IV also produced lower velocities in the Ackley case, but pressures were considerably higher than those recorded in the unaltered cases. The capacity powder charge of load V in the Ackley case did produce an increase in veloc-

ity, but it also resulted in a much higher pressure. In addition, this load showed a marked loss of uniformity in velocities from round two. Finally, despite the larger case in the 'improved' load, and although the gain in velocity was very slight, the overload produced a much higher pressure in the Ackley Improved case than it did in the standard .30-06 case.

As a further check on the relative merits of the two cases, we increase the loads in the Ackley Improved cases until the velocities equal those of the .30-06 loads already tested. Even though this was but a few feet per second, the resultant increase in chamber pressure was disproportionately high. Further increases in powder charges working up to maximum pressures failed to give an appreciable increase in velocity. Powders IMR 4064 and IMR 4895 also were tried with no difference in results.

To complete the experiments we retested loads I, II, and III in the .30-06 case for velocity at maximum pressure levels. Invariably, we were able to secure a slightly greater gain in velocity with standard .30-06 case than with the Ackley Improved case.

Conclusions

What does this series of tests reveal? Apparently, a higher velocity can be reached at a safe chamber pressure with the standard version of the .30-06 than the experimenter can attain with the Ackley Improved .30-06.

Firing identical loads, the Ackley case produced lower velocities than the standard case. Duplication of standard case velocities resulted in an undesirable rise in pressure in the 'improved' case. Also, the Ackley Improved case produced a much higher pressure with an overload than the standard case generated with the same load.

Therefore, it would seem evident that the Ackley Improved .30-06 should not be fired with any load which would not be considered safe in the standard .30-06 case. Certainly, the 'improved' version is not the case for 'hot' or magnum loads.

In one respect only did the Ackley Improved .30-06 outperform the unmodified cartridge. It did produce more uniform velocities from round to round; that is, as a look at Table 2 will show, with loads of moderate velocity and pressures.

Actually, we don't believe that this 'improved' case is valueless, for it can produce more uniform velocities and therefore should be capable of finer accuracy, than the standard .30-06.

However, in all other respects, in so far as we can discover, the Ackley Improved .30-06 can not do anything that the normal old-fashioned .30-06 can't do just as well or better.

Sure, part of this is sales, but part is results oriented as well. You might sell someone on your new .300 Whiz-Bang based on looks and slick packaging, but he is no fool, and when he goes to the range and out hunting with his .300 Whiz-Bang and it does not perform he will notice and tell all his buddies about it (right *after* he sells it).

In an article that played on this controversy over case design, Douglas Faulkner[1] made a point that is well taken. Faulkner was not a fan of wildcats. He suggested that if you want a cartridge to do a specific job then it's smart to pick one that is bigger in capacity than you need to get the results. The reason being, that the case will easily produce the ballistics you're after with a moderate load. Barrel life will be much better and likely accuracy as well. He argued against picking a small case that you will have to overload to get your desired velocity, which stresses the gun with every shot. That's good advice for any wildcatter and agrees with much of P.O. Ackley's comments on the subject.

In the December 1953 issue of the *American Rifleman*, William F. Wieman of H.P.

White Laboratory wrote an article titled, "How Improved is it?" The idea was to compare the commercial .30-06 Springfield case directly with the Ackley Improved version to see how they stacked up. See sidebar page 85.

Ackley, not surprisingly responded to this article, for in the October 1954 issue of the *American Rifleman* a "rebuttal" ran. The title not too subtly deals with the article's apparent bias against 'improved' cartridges right off the bat. Ackley answers Wieman, however he does so with gentlemanly behavior and information, something that is becoming a lost art these days. He also delivers his own test results to refute the conclusions of the H.P. White Laboratory tests.

Reading the above article several times to be sure I was not injecting my personal bias I came to the conclusion that "How Improved is it?" could have been better written and more clear on some details, but that by and large it was objective. The primary flaw that I see with the tests are twofold, first they did not choose powders well for the tests and secondly they did not stick to bullets that are popular for the caliber. Tests with a 180-grain bullet and perhaps two or three powders would have been much more conclusive than jumping from bullet to bullet and switching powders with each bullet weight.

An interesting point is brought out by the above article. Ackley wrote, "Pressures for

'Improved' Cartridges

By P.O. Ackley

Originally published October 1954 issue *American Rifleman*

There has been considerable writing for and against 'improved' cartridges. First a definition of 'improved' cartridge may be in order. Improved cartridges are those which have been changed in shape to give increased capacity. Rifles chambered for improved cartridges will also accept the standard factory cartridge from which the improved version was derived. Naturally the factory case fireforms or reshapes to fit the 'improve chamber.'

The word 'improved' is an unfortunate choice, and just grew up in connection with certain developments which were made with several objectives. One consideration is increased velocity. Another is mechanical improvement, which results in minimizing certain faults of standard cartridges. For example, extraction with some improved cartridges is easier. Forward flow of brass is arrested and bolt thrust is reduced. Such changes result in improvements only in proportion to the extent the cartridge is changed for the optimum characteristics.

Another factor in this is the ratio between bore capacity and case capacity. When a cartridge is already excessively large for the bore, such as a .300 Magnum, there is no appreciable improvement possible, other than mechanical.

The Improved .30-06 could be called a borderline example. Since the capacity of the original case is almost top for the .30-caliber bore, the possible increase in velocity is not very much. On the other hand, with cartridges such as the .219 Zipper a great increase can be realized. These smaller cartridges can be blown out to accept considerably heavier powder charges which result in increased velocities. When such cartridges are blown out, the velocity per grain of powder is proportionately lower but the increase in capacity is great enough to produce several hundred feet per second increase in velocity. Also the case life is lengthened, extraction is better, and the improved cartridges are generally more satisfactory.

Recently there have been tests of the

loads I, II, and III were slightly lower in the Ackley Improved cases than in the orthodox .30-06, but the velocities were proportionally lower too. Load IV also produced lower velocities in the Ackley case, but pressures were considerably higher than those recorded in the unaltered cases." If the sharper shoulder of the .30-06 Ackley Improved causes higher pressures in the chamber with the same load, as compared to a standard .30-06 as suggested by Wieman, then would it not make sense that if we sharpen the shoulder to 90 degrees that we will see a corresponding increase in pressure with the same load? Just following the logic of Mr. Wieman's article.

There are of course other items that were not addressed by Ackley. It is likely that he did not wish to further muddy the waters by bringing in new variables to consider. No mention of throat length appears in either article, yet in a fair test the throat should have started out the same in all respects. Robb Lucas pointed out in his 1996 *Gun Digest* article about Ackley that many detractors of the .30-06 AI would use barrels 22 inches for their tests to hold down the velocity.[2]

In "How Improved is it?" the experimenter jumped all over the place on powders and bullet weights, not conclusively dealing with any single powder or bullet. If testing were limited to one powder in both cases then the results would be more apples to apples, in improved .30-06, unfortunately I do not believe the tests used were best for this cartridge. With the help of Malin Hardy, a student at the University of Utah, I made further tests to see exactly what results might be obtained with loads commonly used and recommended for this cartridge. An issue Springfield rifle was used.

However, it should be noted that there is considerable difference among individual rifles. Some will fire, without trouble, loads which would be positively dangerous in others. The rifle used in the following tests had no trouble with heavier loads than could be normally used in other rifles, but these tests were made for comparison purposes only and loads used *are not necessarily ones which would be recommended for other rifles or for general use*.

Table 8-3 .30-06 Springfield

IMR 4064 in grains	Velocity (fps)
52	2,783
54	2,863
55	2,894
56	2,988

IMR 4350 in grains	Velocity (fps)
57	2,731
58	2,805
60	2,917

First the rifle was tested with the original military chamber, and the following results were obtained using Western Super X cases, Remington 9 1/2 primers, and Barnes 180-grain bullets.

The barrel was then rechambered for the improved .30-06 without any other changes and without headspace adjustment, with the following results.

Table 8-4 .30-06 Ackley Improved

IMR 4064 in grains	Velocity (fps)
55	2,866
56	2,944
57	2,990

IMR 4064 in grains	Velocity (fps)
58	3,019
59	3,045

The last load loosened the primer to approximately the same extent as the last load in the preceding table.

Table 8-5 .30-06 Ackley Improved

IMR 4350	Velocity (fps)
60	2,825
61	2,897
63	3,002
64	3,045
65	3,080
66	3,122

Studying these figures, it will be noticed that before the primers loosened using 4064 powder (which is not particularly recommended for the improvement .30-06) there was a possible increase of three grains of powder, for an increase in velocity of approximately 96 feet per second. With 4350 powder the loads could be increased approximately six grains, for an increase in velocity of 205 feet per second. When using 4350 powder in the standard case, not enough powder could be crammed in to show any pressure signs on the primer, but the improved case would accept enough powder to loosen the primer, which occurred with 67 grains.

At the beginning of these comments certain things were pointed out as possible and prudent, but nothing was said concerning pressure. Whether the handloader or wildcat enthusiast is right or wrong, he is interested in several things, most important of which are increased velocity and whether the bolt stays in the gun. If he can achieve these two results without serious complications, he is not overly concerned with the actual pressure readings in pounds per square inch.

From the handler's point of view, the amount of bolt thrust is of great importance. The pressure transmitted to the walls of the chamber can be safely contained by the use of high tensile strength steel in the barrel.

It has been the practice of many arms experts to judge the strength of actions by the pressure of the cartridge which was designed

other words the data would have greater relevance to the actual case designs in question. There is not enough difference in case capacity to justify changes in powder selection. The same is true of bullets, by staying with one bullet and weight we would learn more from the direct comparison in the two designs.

The use of military brass would deliver conservative loading data, so that it is likely that the shooting public would not be hurt by shooting those loads. It is well accepted that military brass is thicker in the case wall, thus having less case capacity than its commercial counterpart. Of course, taking this route also skews the data to represent only military brass and as a result utilizes less powder for the same velocities overall for both designs. Since there is the possibility that by changing the average case capacity by utilizing commercial brass the overall test might have a different outcome, leaving more room for questions. Possibly a test using both types of brass would remove any doubt about the results.

In October 1956, the *American Rifleman* ran an article, "Loads for the .30-06" by M.D. Waite. Coincidentally, H.P. White provided ballistics for this article just as they had for the earlier article "How Improved is it?" by Wieman. It is interesting to compare the data they used in these two articles, and Ackley's response from 1954.

to be used in them. For example, it has been written that the Japanese Arisaka 6.5 action would be unsafe for pressures over 38,000 pounds per square inch. It has also been written countless times that the U.S. Model 1898 Krag action was designed for pressures not over 41,000 pounds per square inch, giving the impression that if greater pressures were used the action would blow up. Such statements fail to take into account the head area and shape of the cartridge, which are quite different in different cartridges and therefore determine the total load on the bolt lugs fully as much as the unit of gas pressure does. Many loads which result in loose primers will not blow up the stronger actions but when primers begin to fall out any handloader should have sense enough to reduce his loads.

To obtain further information concerning the ratio between bore and cartridge capacity, the rifle used in the above tests was rechambered for the short .30 Ackley Magnum, a cartridge of overall length approximately the same as the standard .30-06 and with a case capacity of 76 to 77 grains of 4350 powder when compressed. The following results were obtained using the Remington 9 1/2 primers and 180-grain Barnes bullets.

Table 8-6 .300 Ackley Magnum

IMR 4064	Velocity (fps)
59	2,830
61	2,910
62	2,936
64	3,027
65	3,076
66	3,100
67	3,112

The last load resulted in loose primers.

We also used a standard military Enfield chambered for the Ackley Improved .300 Magnum, a cartridge which is similar to the other blown out versions. 78 grains of 4350 gave a velocity of 3,196 feet per second using the same primers and bullets.

From these figures it can be observed that the efficiency of the .30 caliber cartridge drops off very rapidly after a capacity of 65 grains is reached.

It appears that case capacity for .30 calibers should be kept around 65 grains or less, with capacities for smaller bores proportionately less.

Table 8-7

SOURCE	BULLET	POWDER	VELOCITY
Wieman	180 Gr.	IMR 3031	2,666
Waite	180 Gr.	IMR 4350	2,759
Ackley	180 Gr.	IMR 4350	2,825

In Wieman's test, a 180-grain bullet maxed out at 2,666 fps using 3031, Ackley used 4350 for a velocity of 2,825 starting load in the .30-06 AI, while in the '06 article the best H.P. White Laboratories could get from a 180-grain bullet and 4350 was 2,759 fps for a 64 fps improvement over the .30-06 standard. But isn't it interesting that just by switching to a more appropriate powder H.P. White was able to get a 93 fps increase in the standard .30-06, plus the pressure was less than 49,000 cup with the later load, noticeably less pressure.

The Ackley load above was developed by running the charges up until the primer was loosened, then absolute max pressure was considered to be one grain less. Using that information the 2,825 fps load reported in the paragraph above is 10 percent below the absolute maximum in terms of powder weight. For as long as I can remember this method of backing off 10 percent from the top has been recommended as a way of setting a top limit and retaining a safety margin.

Utilizing this same methodology on loads

for 4064, P.O.'s test gun would have given 2,800 fps +/- 20 fps with a 10 percent reduced load. The best that H.P. White could do with 4064 and a 180-grain bullet in the standard .30-06 was 2,738 fps, a difference of 62 fps. When you collate the information from all three articles you find that the .30-06 Ackley Improved delivers increased velocities of 60 to 70 fps on average with a safe load. Obviously, most handloaders are guilty of pushing past these numbers based on most of the load data published over the years for the .30-06 Ackley Improved.

Ackley makes an important point that is nearly always glossed over in writings when this subject is discussed. "Whether the handloader or wildcat enthusiast is right or wrong, he is interested in several things, most important of which are increased velocity and whether the bolt stays in the gun. If he can achieve these two results without serious complications, he is not overly concerned with the actual pressure readings in pounds per square inch."[3] This point is still true today and likely it will be for the foreseeable future. However, the gun community and particularly gun writers seem to think that it is heresy to say and write such things. Ackley was not endorsing that behavior, he was just aware of it and took it into account when designing and testing.

He understood something that was and is lost on most gun experts that write on this subject. His designs were meant to redirect the forces of pressure to the chamber walls and away from the bolt. The forces on the bolt face and consequently on the locking lugs of the action when a round is fired are trying to drive that bolt away from the chamber. Here is the heresy: *Ackley believed that he could redirect that force by redesigning the cartridge case, and worse yet he stated so openly.* It's really just a math problem, if you distribute the forces equally around the chamber then there is less force applied to the case head and therefore the bolt face. More on this can of worms in Chapter 14.

When this whole pressure discussion comes up, consider traditional methods of watching for pressure when working up loads. These factors alone, with no further debate or salesmanship, will tell you that Ackley was correct. His "improved" designs do redirect pressure! Prove it you say? OK, if you have experience with any of the Ackley Improved cases, and you probably do if you're reading this book, then you will realize that you can load these designs to deliver velocity well beyond what their factory counterparts produce. You may not have considered the fact that you're probably pushing the pressure envelope in doing so. Look at your basic pressure signs, case head expansion, primers flattened or cratered, brass picking up tool marks from the bolt face, stiff bolt lift, etc.

Because today's testing equipment is so precise, we know that by the time any of these traditional signs appear you are clearly beyond safe pressures. I will go so far as to say that Ackley may have been incorrect about the "why" and "how" his designs appear to handle pressure better; but again, see Chapter 14.

If you use case life as your guide you can be pretty comfortable with your results, if you can reload your brass a half dozen times with no signs of failure or primer pocket expanding (loosening) then your load is safe in your gun. Funny thing is, Ackley proposed throughout his career that brass life was the best safety gauge the average shooter has at his disposal. Every reloader has this tool in hand and it still works.

Speer Steps up to the Plate

In *Speer Wildcat Rifle Loads, Volume 2* (1956), Raymond and Vernon Speer took up Ackley's cause. They provided load data and general information on many of Ackley's designs, not the least of which was the .30-06 Ackley Improved. What they had to say is below:

The 30/06 Ackley Improved

One of the most controversial wildcats ever cooked up was P.O. Ackley's .30-06 Improved. There are two schools of thought. One is that it is just as good, if not better, than

the standard .300 Magnum, which, we blush to say, is faint praise at best. At the other extreme are the lads who claim that the .30-06 Improved is actually inferior to the 30-06.

Just how the .30-06 Improved stacks up depends pretty much on what powders are used in it. With a sharp shoulder and straight body it is more efficient with the slower burning powders and with the light bullets. One can use 4350 in the .30-06 Improved with 110-grain bullet and get very respectable velocities, whereas that is pretty much impossible with the standard case. That is likewise true with the 150-grain bullet and this with slow burning powders. For instance with the .30-06 Ackley Improved 64 grains of 4831 is the 150-grain bullet 3,053 feet per second. With the same bullet 60 grains gives 2,831 whereas with the standard .30-06 case, velocity is less than 2,700 with that charge of powder. Apparently the sharp shoulder facilitates the burning of slow powder. With 60 grains of No. 4350 to 150-grain Speer bullet turns up 3,117 in the .30-06 Improved and this is with a 26-inch barrel. It is hard to show that much lost to be in most .300 Magnum rifles. With the 180-grain bullet and 61 grains of 4831 the chronograph with the 26-inch barrel shows 2,800, and that is about what is turned up with a factory .300 magnum load, and 60 grains of No. 4831 in the 200-grain bullet shows 2,721. It turns out, then, that both the fans of the improved .30-06 and the detractors are right. With the slow-burning powders, the sharp shoulder very definitively increases combustion and efficiency and, in truth, the sharp shoulder does make the improved .30-06 the equal of the factory loaded .300 H&H Magnum cartridge. However, with heavier bullets and fast-burning powders the detractors are absolutely correct and the Improved '06 gives probably lower velocities and higher pressures. For example a maximum load with No. 4320 in the Improved .30-06 with the 180-grain bullet is 48 grains for a velocity of only 2,637, a good deal less than can be obtained with the standard .30-06, and with a 200-grain bullet and No. 4320 the maximum load is 2,503 and with No. 4064 only 45 grains can be used for 2,474 with the 200-grain bullet. The figures would seem to show, then, that anyone who has an Improved .30-06 and who uses the fast-burning powders in it simply does not know what he is about.

"Apparently the sharp shoulder facilitates the burning of slow powder."[4] This point, made in the Speer wildcat manual article above, is important. It clears up the fact that incomplete tests and the selection of inappropriate powders made the conclusions in Wieman's article incorrect. Like almost every cartridge, tradeoffs are a part of the ballistics. There is no cartridge that does everything well, even though some fans may be so attached that they cannot see the shortcomings. It is no less a mistake to dismiss a cartridge without the necessary experience and testing to really know its capabilities.

L.R. "Bob" Wallack wrote frequently for the *American Rifleman* in the 1950's. One article, titled "Why Wildcats?"[5] was emphatic that some wildcats have real value but that many simply walk the same path as their factory counterparts. Wallack singled out the .30-06 Ackley Improved as a cartridge that was not worth the effort. He referred to the December 1953 article referenced above as his proof. Wallack was a wildcatter himself and a full-time gunsmith, which would make Ackley and him direct competitors (and acquaintances, by the way).

Wallack is best known for his claim on the development of the .375 Whelen — there is no doubt that he did the development work, however, a letter written by Whelen himself to the famous gunsmith Fred Adolph on August 23, 1919 indicated that he and Neidner were working on a .38 Whelen based on the Springfield case.[6] When Wallack named the .375 for Whelen, Townsend Whelen accepted the honor graciously. Did Whelen suggest the idea to Wallack? Who knows? That would be a great subject for further research.

In *Wildcat Cartridges, Vol. II* Earl E. Etter Sr. wrote of the .30-06 Ackley Improved. "My loading data for the .30-06 Improved indicate that the cartridge really becomes efficient with bullets weighing 180 grains or

more."[7] As with any cartridge that is either optimum bore capacity or overbore capacity, heavier bullets for caliber will deliver better velocities. The added mass of a heavier projectile provides more time in the bore, allowing powder to burn more completely than with a lightweight projectile which moves down the bore with less resistance, thus a smaller percentage of the powder is burned before the bullet exits the muzzle.

Another article in the same book by Gil Sengel came to the conclusion that the .30-06 Ackley Improved was of little value. Mr. Sengel shows that his test rifle gave an average increase of about 60 fps with various bullet weights.[8] The cost of chambering multiple barrels for tests as well as range time and components make it impossible for any writer to conclusively test a cartridge, so results from such tests are to be averaged into the overall picture.

The chamber dimensions given in the Sengel article incorrectly changed headspace dimensions from standard and reduced case capacity by 0.5 grain in water weight, which amounts to about .75 of one percent. Of course, that's not enough volume to make a difference that would amount to more than a statistical variation, however, it shows that many folks in this discussion do not check all the details before drawing a conclusion. The difference in case design is important. Make sure you are getting the correct dimensions when you order a custom chamber, for it could be dangerous if your chamber is not what you expected.

In *Cartridges of the World, 6th Edition*, Frank C. Barnes had an opinion about the .30-06 Ackley Improved, too. "This has always been a controversial cartridge with its detractors claiming it's not as good as the standard '06, and its defenders claiming it was better than the .300 H&H Magnum. Actual chronograph tests have proven it to be definitely superior to the standard cartridge with slow-burning powders, but not with medium to fast-burning powders. With slow-burning powder, it will add a little over 100 fps muzzle velocity to any bullet weight, as opposed to what is possible with the standard cartridge. This does make it equal to the original factory-loaded .300 H&H Magnum."[9]

Phillip Sharpe included a great deal of load data for the .300 H&H in his *Complete Guide to Handloading*. The data included CUP pressure data for many of these loads. Since this material dates back into the 1930s it gives us a comparison that is more contemporary to the original claims for the .30-06 AI made in the post-WWII years. There is no doubt that the .30-06 AI did very nearly equal the .300 H&H as it was factory loaded in those pre-war years.

Sam Fadala wrote about the .30-06 Ackley Improved in *The Complete Shooter*. He discussed the standard .30-06 vs. the .30-06 AI in terms of exterior ballistics. His experience with the cartridge, like many before him, was that it delivered about 100 fps greater velocity than the factory '06 case. Fadala found that with a 180-grain bullet he was able to get 200 fps more than with the standard '06, which corroborates the results of other reports. His bottom line was essentially that you gained 1 inch less drop out to 300 yards with the 180-grain bullet and, of course, some increased energy as a result of the increased velocity. He suggested that the value of this conversion was up to the individual shooter.[10]

In 1959, when Ackley published his first version of *Handbook for Shooters and Reloaders,* he had this to say about the controversy: "Various articles have appeared in sporting magazines written by individuals who do not believe in the "improved" idea. Invariably loads appear in these articles which do no credit to the cartridge while the loads which really show something have been carefully left out. A cartridge which has gained such worldwide popularity does not do it without merit."[11]

In a day and age when any handloader can afford to own a reliable chronograph, there should no longer be any controversy surrounding the .30-06 Ackley Improved. We have a good selection of slow-burning powders that were not available when this cartridge first appeared. We have more bullets to choose from than ever before, so there

is no reason to force the wrong bullet in the case over the wrong powder and then cry foul. Would you put diesel fuel in your gas mower and then complain that it would not run? It's the same thing.

It is well established that the .30-06 AI works best with bullets 180 grains or heavier, so why fight it? Barrel lengths have tended to get shorter over the years, at least from the factories. A barrel of 24 or 26 inches will increase velocities nominally, making the .30-06 AI very comparable to most .30 caliber magnums but with much less powder and therefore less recoil.

If you're intellectually honest, you can see that the .30-06 Ackley Improved does produce higher velocities than the standard .30-06.

Bottom line ... the controversy is over!

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CHAPTER 9

THE BARREL MAKER

In his 1946 book, *Twenty-Two Caliber Varmint Rifles*, Charles Landis writes that, "Ackley barrels have established a good reputation for themselves, not only in the Rocky Mountain and far Western trade, but are imported into Canada in considerable numbers where they are being rechambered or mounted as chambered by G.B. Crandall and Ellwood Epps, both of whom have reported privately to the author upon the excellence of these tubes."

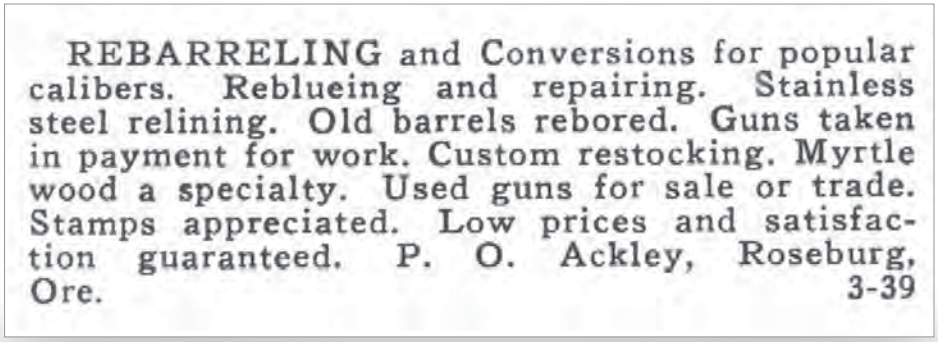
Over a 30-year period, P.O. Ackley provided 23 barrels for Col. Charles Askins according to Askins' personal count. "By far, most of these tubes have been for wildcat calibers," wrote Askins. "I have yet to find any of them that were not splendidly accurate."[1]

In 1936, when Ackley bought his first gun shop in Roseburg, Oregon he was relatively inexperienced in the firearm business. The Great Depression was in full swing. There were few sources for new barrels in those days. Ackley must have realized that, in order to have the barrels he needed to build and rebuild customers' guns, he would have to make them. So, he apprenticed for several months with Ben Hawkins, a barrel maker in Cincinnati, Ohio that Ackley had known for some time.

As soon as he returned to Oregon after his time with Hawkins, Ackley began the process of acquiring and building the machines he would need to make barrels. Next he fabricated the tooling necessary for the job. Soon he was producing barrels, and word spread quickly that there was a good gunsmith in Roseburg, which propelled a successful business, which he ran until the onset of World War II. See Chapter 3 Ogden Arsenal to read about Ackley during the war years.

After the War

When Ackley left Ogden Arsenal in 1944 he headed to Cimarron, New Mexico. There he opened a new business with George Turner and Ward Koozer (see Chapter 4) performing general gunsmithing, barrel making and reboring. Supposedly it was during this time that Ackley had many cowboys


REBARRELING and Conversions for popular calibers. Reblueing and repairing. Stainless steel relining. Old barrels rebored. Guns taken in payment for work. Custom restocking. Myrtle wood a specialty. Used guns for sale or trade. Stamps appreciated. Low prices and satisfaction guaranteed. P. O. Ackley, Roseburg, Ore. 3-39

This ad ran in the *American Rifleman* in 1939.

bring in Savage 99 lever guns chambered in .250-3000, which was apparently popular with these ranch hands. Their complaint was, "This here rifle is gittin' mighty sticky on the pullin' out o them empties."[2] As the story goes, Ackley looked the problem over and ended up solving it with the development of the .250 Ackley Improved — a cartridge that extracts much easier thanks to its minimum body taper.

Barrel marking.

Bill Prator, longtime Ackley employee from the Trinidad, Colorado days stated that it was more Ackley's barrels than anything else that created his reputation. He indicated that in the time he worked for Ackley in Trinidad, barrel making was the most important part of the business.

G.B. Crandall, the gunsmith who helped Lysle Kilbourn design and develop the .22 K-Hornet, purchased barrel blanks from Ackley for use in his shop in Canada. "These Ackley barrels being sent to Canada are fine-looking boring jobs,"[3] said Crandall.

Elwood Epps, another well-known Canadian wildcatter and gunsmith, used Ackley barrels on most of his custom rifles in the post-war years.[4]

The very first Weatherby catalog contained Roy Weatherby's thoughts on high velocities, a description of his wildcats with some load data, and a price list of available gunsmithing services. One of the options that one could order was Ackley barrels.[5]

Jerry Fisher, famous custom rifle maker, commented that he used Ackley barrels in the 1960s. Several times in conversation with Fisher he stated that Ackley was a fine man and that he was very astute.

Robert Snapp was a student at Trinidad around 1949-51, the last two years that Ackley taught there. Snapp said that Ackley told about how during the war years he managed to come up with materials to make barrels. He went to a local junkyard and asked if they had any Model A axels. The guy running the shop said, "Sure, come back and I will have one for you." Ackley told him, "No you don't understand, how many do you have? I will take them all." This caused more than a little excitement. When Ackley returned a few days later there was a large pile of axels waiting for him, he bought up the shafts and hauled them home. Next he dug a deep pit and built a bonfire in it and laid the axels in the coals and buried the whole mess. When he dug them up in a few days the axels were annealed so that he could machine them into barrels (each shaft would make two barrels).

Ackley was aware of Alton Jones, a gunsmith in Oregon who had experimented with sub-calibers in the 1920s — long before anyone else in the United States thought about it. In an article for Varmint Hunter magazine, Richard Cundiff mentioned that Alton Jones was known to make barrels from old truck axles, and experimented with calibers as small as .12 and .14, his big bore a .17 caliber. One has to wonder if Ackley got the idea for making barrels out of axles from him.

According to C.S. Landis in 1946, "Ackley seems to largely control the field on the

manufacture of .17 caliber rifles in the United States; once the public becomes impressed with the capabilities of the cartridge it may have a good sale."

Jack O'Connor reported after World War II, "P.O. Ackley, rifle maker of Trinidad, Colorado, tooled up to furnish barrels in just about any length, twist, and caliber."[6]

Ackley's involvement with the .17 caliber came about through his association with Charlie O'Niel, of OKH fame, around 1943 while Ackley, O'Niel, and Keith were all at Ogden Arsenal. As it happened, O'Niel had an idea for a .17 caliber cartridge and asked Ackley to tool up for the caliber. This was during the war and tooling was next to impossible to get. It was a couple of years later that the tools arrived and by then O'Niel had moved on to other projects.

"Ackley is perhaps best known for his barrels, which are shipped to gunsmiths all over the Americas, and for his modern cartridge designs," said Roy F. Dunlap.[7] Dunlap also reported that, "P.O. Ackley, Inc. is our largest custom maker. With a large, well equipped shop, Mr. Ackley produces almost everything desired, from barrel blanks to complete custom rifles. He also manufactures the Ackley quick-detachable scope mount, made on the Turner patent. After the war he went to Cimarron, New Mexico and opened a gun and barrel shop, but then moved to the larger and less isolated city of Trinidad, Colorado. Here he developed the large and progressive business now in existence. He attempted to run a G.I. training program, teaching gunsmithing in his own plant, but found he could not keep up with the quality of the production, so ceased this line. However the college in Trinidad instituted a course and hired Mr. Ackley to teach some classes.

"In addition to covering practically all phases of barrel work, several Ackley cartridge improvements have been made, principally in new reforming of standard cases to improve ballistic performance. Constantly striving for progress in rifle development, considerable experimentation has been done with stainless steel barrels to the end that Ackley can now furnish dependable stainless barrels, or blanks. To blue these barrels, both for production and for customers, a system has been set up using the PX formula furnished by the Heatbath Corporation. Mr. Ackley advises me that the setup required is more expensive and not practical for small shops, so that he will refinish the stainless barrels for other gunshops or concerns. Of the present stainless steel is type 416, with some molybdenum. This machines quite well." [8]

Ackley had this to say about barrels when he wrote to Roy Dunlap for Dunlap's *Gunsmithing* (1949) book: "We have found it impossible to predict what any particular type of steel will amount to, after it has been made into a barrel. There seem to be a lot of factors which are more important than the material itself, and also, certain alloying elements are doubtless of value. I feel that the tensile strength and freedom from stresses are more important than the analysis itself.

"All of our experience with tool steel has been poor — we have never found any advantage in it in any way, unless graph-mo might wear very slightly longer. Then, graph-mo has the very bad characteristic of being very susceptible to rust. In fact, if government primers are fired in a graph-mo barrel, it takes days to get it cleaned, and if it is set away without being thoroughly protected, it is very apt to be ruined by rust. This tendency to rust is much greater than you might think. The steel seems to almost have an affinity for rust, which is hard to explain. So that characteristic lets graph-mo out entirely, and it is extremely hard to work, which is true of all tool steels. I can find nothing in our analysis to warrant their use as barrel steels over the regular alloy steels.

"We always attempt to use a steel rather high in manganese, at least a steel with 1.25 manganese, for good machinability. Manganese also probably helps to get a more uniform heat treatment throughout the bar so they will not be hard only on the outside. We've had batches of steel shipped to us which tested 340 Brinell on the surface but when tested in the center portion sometimes showed 100 points less. Manganese has a

tendency to do away with this. Most likely molybdenum, nickel or similar alloying elements increase the wearing qualities slightly, but this increase might be so slight that such barrels would not live up to the advertising put out about them. I say this because I have made two barrels from the same bar of steel and chambered for the same or similar calibers, with one barrel going many thousands of rounds while the other shoots out in a relatively few rounds and for all we could tell, the two bores were identical. Tests with stainless steel seem to indicate that this type might give longer wear. Chrome and nickel always seemed to increase wearing qualities and of course are present in much greater amounts in stainless steels.

"Our standard barrel steel is very similar to 4150 but has a higher content of manganese so that it is actually a high carbon, high manganese chrome moly steel. It has approximately 55 points carbon and 1.25 manganese. The Brinell is 280, but we're trying to get the same material heat treated to 340 and if it turns out as we expect it to, we will standardize on it for the future. This will be a special steel, supplied by the Crucible Steel Company."[9]

According to Ackley's friend Bevan King, "P.O. never made any stainless barrels." This referring to the later years in Salt Lake, because we have many quotes from Ackley about stainless barrels in earlier years. In a letter from Ackley to a client in February, 1973, he wrote, "I no longer bother with stainless steel."

In December of 1954, The Salt Lake Tribune ran an article entitled, "His Aim: Make 'em Shoot Where They Aim," by John Mooney, Tribune Sports Editor. In the article Ackley was quoted, "I started out in the barrel-making business more than 20 years ago in New York as sort of a sideline or hobby. But when the Depression hit the east, I headed west and bought out an old-time gun-maker in Oregon. However most of the machines in our plant are our own inventions, or adaptations, because you can't afford to buy rifling machines, for example, unless you intend to turn to mass production. We cater to the custom-made gun. We will give you anything you desire in the gun or a barrel, or in cartridges. But because our work is custom-made, we had to have equipment which we could adapt to various specifications, and that forced us to develop our own."[10]

According to a quote from Henry Stebbins' book, *Rifles — A Modern Encyclopedia*, Ackley experimented not only with various alloys for his barrels but also tried infusing the bore surface with Molybdenum Sulfide back in 1958. This was decades before it became a fad among reloaders to coat bullets in Moly.[11]

On rifling, Ackley said, "If I were rifling a barrel for my own use, I'd use a three groove for mine. The fewer the grooves in the barrel, the less chance of mutilating the bullet as it passes through the barrel and the less mutilation, the better the accuracy.

"The eight groove is the easiest to make, and the four or six are the easiest to measure and set up. We worked a year and a half inventing and perfecting this rifling machine and it still fascinates us. That's the most fun about the whole deal, the rifling, because although you fool around with it all the time, you never find out much about it. I believe though, that the fewer the grooves you use, the better. And, I favor the odd number against the common even number of grooves. However, try to sell a marksman on the three-groove barrel," he laughed.[12]

In light of these comments from Ackley on barrel construction, Wayne York passed on a story from his longtime friend Bob West, about Ackley's endless testing of barrels, which seems to fit right in. According to West, Ackley would make an experimental barrel, cut it apart for inspection and toss it in a pile behind the shop. Then he would make another barrel with a different twist, change the configuration of the rifling cutter or the number of grooves, then shoot it and split it open for visual inspection, and start all over again. Periodically, Ackley would call a scrap dealer to come haul the pile away. West said the scrap man was always amazed that the pile was full of barrels all cut up.

Ackley's thirst to find the best barrel configuration never really waned.

This is a good place to mention a comment from Randy Selby on things that the current generation of gun designers and engineers need to learn. Selby pointed out that Ackley's extensive testing of barrels over the decades taught him many things. Further, he says that Ackley would have warned today's designers about radial expansion. When the WSM and similar cartridges came on the scene, several gun makers (including at least one big manufacturer) made the mistake of trying to put them in guns with too small a diameter at the breech end. In short, the wall of the barrel over the chamber was too thin allowing the barrel to expand in an unsafe manner. It's too bad that every generation seems to have to re-learn proven facts. Randy suggests that Ackley would have snickered at this mistake.

W.F. Vickery wrote to P.O. asking about the change in 6mm bore diameters, and Ackley responded, "The bore diameter in the 6mm is a little problem, the reason being that the data sheets for both of the new factory cartridges specify a bore diameter of .237 inches. And for that reason a lot of gunsmiths are buying reamers with a pilot of a full .237 inches and they kick back the .236-inch bores. Thus causing a lot of headaches on both ends, so I had to enlarge the bores to the standard requirements of the two new factory cartridges. We always did make them .236 inch before the factory version came out. Personally I prefer the .236 inch idea, in fact I would rather have them slightly under in both bore and groove."[13]

The Ackley shop also offered twist rates that were not on the standard chart, so the client could order any combination of caliber and twist they preferred.

"As a barrel maker I get into lots of arguments about twist, or perhaps I shouldn't say arguments, but criticism, from some customer who believes that twist is the all important thing," said Ackley. "For example, lately I rebored a barrel for a customer for a .358 Winchester with a 14-inch twist and he claimed that his barrel was ruined because I didn't use a 16-inch twist which must make

WIDTH OF LANDS

Caliber	4 Groove	6 Groove
.22	.043	.028
.25	.049	.032
.270	.053	.035
.30	.059	.039

WIDTH OF GROOVES

Caliber	4 Groove	6 Groove
.22	.129	.084
.25	.147	.096
.270	.195	.105
.30	.177	.117

Winchester wrong because they use a 12-inch twist. My conclusion is that this customer didn't know what he was talking about and he would probably have gotten equal results with a 12-, 14- or 16-inch twist.[14]

"About the only thing that I could tell you definitely about this twist problem is that the twist must be quick enough in the average barrel to handle all available bullets for the caliber for which the barrel was made. For example, many people will order a 14-inch twist in the .25 caliber barrel, which seems to be fine for bullets around 90 grains in weight or lighter, and then they try to use 117- and 125-grain bullets and these long bullets appear to leave the barrel crosswise. While if he had ordered the barrel with a 10-inch twist it would handle all available weight bullets reasonably well, especially the medium and heavy weight bullets.

So if we use a twist which is just a little bit fast we usually do not run into any trouble, but if we use one as slow as we can for some given bullet, then very often it will not handle other weights of bullets and the owner has a barrel of very limited use."[15] Ackley does a good job of describing a perennial problem in the barrel making and gunsmithing fields. Almost forty years after he wrote the foregoing words about selecting a twist rate, we still

BARREL SPECIFICATIONS From P.O. Ackley Inc. 1950				
Caliber	Bore Dia.	Groove Dia.	Rifling Twist (Inches)	# of Grooves
.22 LR	.217	.223	16	4&6
.22 Hornet	.219	.224	14	4&6
.22/3000	.219	.224	14	4&6
.219 Zipper	.219	.224	14	4&6
.22/250	.219	.224	14	4&6
.220 Swift	.219	.224	14	4&6
.228 Ackley	.220	.226	10	4&6
.250/3000	.250	.257	14	4&6
.257	.250	.257	10	4&6
6mm	.236	.242-.243	10	4&6
6.5mm	.256	.263	10	4&6
.270 Win.	.270	.277	10	4&6
7mm	.276	.284	10	4&6
.30-06	.300	.308	10 and 12	4&6
.300 H&H	.300	.308	10 and 12	4&6
.375 H&H	.368	.375	10 and 12	4&6

have the same discussions with clients.

In *Woodchucks and Woodchuck Rifles,* Steve Gallt states that he had P.O. Ackley make up a .20 caliber barrel for him with a .200-inch bore and .206-inch groove.

Writing to barrel maker J.R. Buhmiller in 1953, Ackley talked about his development of button rifling. "I have developed a new rifling system which makes it possible to rifle .22 barrels in less than 5 minutes with perfect results as to finish, size, and uniformity," wrote Ackley. He describes the button, calling it a "forging die." He goes on later in the letter to say, "I am going to call it the "Ultrarifling" system and have applied for copyright letters on this, as well as the design of the machine to do the job (other cals. very soon to be done this way)." Finally near the end of the letter, this most interesting tidbit: "I would also ask that you refer to these barrels as Douglas, 'Ultrarifled' when sold, but with no royalty to pay for them." Many ads for Douglas barrel used to say "Button Rifled since 1953."

It's fairly obvious that there had to be some sharing of information between Ackley and Douglas or this letter to Buhmiller would not exist. Unfortunately, the rest of the story seems to be lost to history. Tim Gardner of Douglas Rifle Barrels said he was not aware of any connection with Ackley. He pointed out that Ackley was not mentioned in the patent papers. G.R. Douglas received two patents for his rifling systems. Patent #2917808 and #3071840 cover the buttons and the machine used to perform the button rifling process. It's interesting that Douglas pushed the button the same as Ackley, most makers today pull the button through the barrel.

"What are the advantages of button rifling?" asked Ackley. "I would say that the

main advantage is the much lower cost of production. Claims are made that button rifle barrels last longer because of the ironing effect of the button which has a tendency to close the pores as it passes thru the barrel and also in some kinds of steel a work hardening action may take place which very slightly hardens that surface of the grooves, all of which are pretty farfetched claims.

"I would say that the two main advantages of button-rifled barrels are the cost of production and the ease of holding tolerances. Rifling buttons are made of tungsten carbide and if the same kind of steel is used, or at least steel of the same uniform hardness, the groove diameter can be held to much closer tolerances than is possible with the older methods. What I mean is that the carbide button when it is made to a certain size and has been proven to produce a certain groove diameter, will continue to produce exactly the same groove diameter for a long period of time so long as the same kind of steel is used with a uniform hardness. I might add that there is nothing to some claims which would have us believe that it is necessary to use only relatively soft material for the button rifling method. It seems to be possible to rifle steel even harder than you can with a regular cutter."[16]

Robert Schuetz, at the time of this writing the owner of Olympic Arms, was partnered with Ackley in 1964-65. He was already a barrel maker when he agreed to move to Salt Lake City to work with him. At that time, Ackley was making his own rifling buttons out of carbide and wanted to use a push method of rifling, so Schuetz fabricated a rifling machine that would push the buttons. When built, the machine was not even on a stand, it remained on the floor when they first tested it. A set of plates were spaced out along the support shafts so that they would support the rod used to push the button. Each plate had a guide hole of about .45 caliber and that was enough to support the rods so they would not bend.

When the button was pushed, the plates would collect in a bunch as the ram moved toward the barrel blank. The support or guide plates were attached with small chains so that as the ram was returned home it would automatically space the plates out again. "The machine worked fine even though the common method is to pull the button," said Schuetz. "Ackley liked to push the button because that eliminated any problems with the button pulling off the rod during the rifling process." Bevan King built his rifling machine on this pattern via Ackley's recommendations and is still using it as of this writing.

George Metz of Danjon Mfg. Corp. shared a couple of letters from the files of the company from P.O. Ackley, who had bought carbide drill tips and a selection of rifle button blanks and rifle buttons from Danjon. These letters date from 1969-70. Metz told me that Ackley was on a trip to the east and called to see if he could stop in and see the shop. He said he was honored when P.O. asked to talk to him personally. Metz went on to explain that Ackley treated him as the expert, which made him feel very humble knowing Ackley's reputation as a firearms guru. Actually, Metz was deserving of the respect Ackley paid him.

"There is no difference between the accuracy of a four-groove and a six-groove barrel," wrote Ackley in his *Guns & Ammo* column. "In fact, all the U.S. Government military barrels have always had four grooves except the ones which were made with two grooves. They always felt that the four grooves were superior to the six. What it amounts to is that a four-groove barrel is every bit as good as a six-groove provided both barrels are equally well made."[17] Ackley preferred three grooves in .17 caliber barrels; he felt that they fouled less.

Regarding freebore, Ackley writes: "No freebore, as such, is necessary in any rifle, except those chambered for .308 Norma and .358 Norma, and of course, the Weatherby cartridges (present day this list of cartridges that require some freebore would include STW, RUM, RSAUM, and WSM). All others require just the standard throating job, which is short enough so that handloaders loading their own ammunition can seat the bullets out far enough to just touch the

lands. Freeboring affects accuracy adversely. It does reduce pressures, but it also reduces velocity in about the same proportion. However, when factory cartridges are loaded on the maximum side, such as the Norma, then some freeboring is necessary in order to keep the pressures within limits."[18]

Mike Bellm was the last guy to buy out the Ackley business. "While P.O. did a lot of separate throating, many of his reamers did have the throat on them," he said. This would support Ackley's comments about freebore.

According to Steve Fotou, Ackley met Harry Pope. "He talked of the day when he first met Harry Pope and how impressed he was with the quality of work that Pope turned out considering the rudimentary tools at his disposal."[19]

"There are men who would pay any price for a barrel with his name (Pope) stamped on it," said James V. Howe, "yet if you were to walk into his shop and purchase the lathe on which these super-accurate barrels are made, and were to give him over $50 for it, it would be through the generosity of your nature. Nevertheless, for years he has turned out barrels on this lathe which have never been equaled by modern machinery."[20]

Side note: To learn more about Harry Pope read *Rifling Machines and Methods* by Cliff LaBounty, which has some valuable information about the Pope rifling machine and the meaning of Pope's barrel markings.

Ackley barreled the very first actions for Les Bowman's 7mm-338 Winchester Magnum. RCBS's Bill Keyes built the first loading dies and this was to later become the 7mm Remington Magnum in 1962 through Les's long friendship and association with Wayne Leek and Mike Walker of Remington. A Cody man still has one of the first rifles built in this caliber and it was stocked with a tortoise shell maple stock by Anthony Guyman. The rifle is still like new according to Selby.

However, the 7mm Remington Magnum was not strictly the result of Les Bowman's experiments. There were numerous magnum wildcats in 7mm at the time — Mashburn, Ackley, Carlson, Payne, Reynolds, Williams, Durham, ICL, Bennett, and Barnes all had 7mm magnum cases that caused the boys at Remington to take notice and ultimately adopt what we now call the 7mm Remington Magnum. Earlier commercial cartridges like the 7x61 Sharpe & Hart and the .275 H&H helped to pave the way as well. Bowman's affiliation with Remington certainly put him in a position to suggest the new cartridge. It's interesting to know that Ackley barrels were used in the testing of this cartridge by Les Bowman.

In a letter from Bowman to Selby, May 16, 1983 Bowman had this to say about Ackley barrels: "One real bad thing about most all Ackley barrels was that they were all somewhat bell muzzles, some outstandingly so. That was because P.O. did not believe in normalizing the barrels he made after button rifling. So the muzzle end opened up when the barrel was shaped or contoured. Mike Walker, who held most the patents on button rifling, said that he found a barrel needed normalizing during its manufacturing process 3 times."[21]

Author's note: A simple solution to this belled muzzle would have been to order your barrel a couple of inches longer than you intended to finish it. This would allow the gunsmith to cut off the muzzle portion that expanded as stresses were relieved during turning. It would not totally solve the problem but would greatly minimize it. This is a major reason that nearly all the button rifle barrel makers today stress relieve during the barrel-making process.

Several years later, Les Bowman wrote to Randy Selby again about reboring barrels, on March 5, 1987. "Ackley was for years the only one that really knew how to do a quality job of that but though he'd do one for me, I don't want to put him to the trouble as he is not in good health and does very little gun work and states he wishes he did not get any. He cannot drive any more. P.O. is ten years my junior."[22]

On .17 caliber barrels, Ackley said, "I have been trying to guess how many .17 caliber barrels I have made in the last 25 years. I made the first one in 1945, if I remember correctly and I suppose we didn't make more than a dozen of these barrels that year. Then

it gradually increased until, in 1968, I must have made about 2,000, but that was probably about twice as many as we made in any other year. All told, we must have made quite a few. Then other barrel makers started getting on the bandwagon, four or five years ago (1966-67), so it has been quite a thing for custom gunsmiths.[23]

"Sometimes I have to smile slightly at some of the statements put out by various arms makers. The one that I noticed was one concerning the Crusader .17 caliber rifle. These hammered barrels have been made for some time in Austria by Fanzoj. I have had samples from them more than two years ago and I don't think there was anything new about it then. The smoothness thing which is so often proclaimed in the various discussions of the .17 caliber barrels is a myth. It sounds good but it has no basis in fact. I have worked with .17 caliber barrels now for more than 25 years and although I admit I don't know very much about barrel making after more than 30 years at it, I do know that the best way to get an answer to the problem is to ask someone who has never made a barrel. They can always tell you.

"The hammered barrels from Austria didn't shoot as well as our own and contrary to popular thought, or perhaps contrary to old wives tales, there is not much correlation between fouling and the smoothness of a bore. In fact, the worst fouling occurs in the smoothest bores and this is very easily demonstrated. When the fouling is thoroughly removed from one of these 'smoothies' and then the barrel roughed up a little bit by an acid treatment which simply etches the surface slightly, the tendency toward fouling is reduced measurably. We have experimented quite extensively with lapping. I have a special machine which will do more in a few minutes than a man can do by hand in several hours. But no amount of lapping has proved to be of any great benefit."[24]

Jack O'Connor reported occasionally about the barrels made by Ackley's shop. "P.O. Ackley … has experimented with three-groove barrels. His theory was that these barrels would give less pressure and higher velocity. He found no particular advantage in them, however."[25]

Barrel maker Lester Bauska confirmed that when he started tooling for .17 caliber barrels, Ackley told him to use three grooves because it would minimize fowling. Bauska said the advice panned out.

On Magnum calibers, Ackley notes that, "Ball powder will help the barrel life in these large, overbore-capacity cartridges. Some say it increases the barrel life several times, some claim as much as fifteen times. On the other hand, some say that it makes no difference at all, but apparently it is actually somewhat easier on the barrel."[26]

At one point, Ackley offered advice to a reader on crooked barrels. "The barrel on your 95 Winchester is probably a little bit crooked. Actually, this does no harm except you have to adjust the sights to compensate for it. The other way is to straighten the barrel. As long as the barrel groups satisfactorily, there would be no point in replacing it. If you can get the proper adjustment on the sights to get the point of impact where you want it, do not worry about it, just use the gun as is."[27]

Barrel diameter is a common concern whenever a shooter orders a new barrel, the shooter often asks if the diameter of the barrel will affect the accuracy. This is the advice that Ackley gave his clients and readers: "I have found that when full heavy barrels are turned to light or featherweight that accuracy remains about the same so long as a good bedding job is maintained.

"Contrary to some ideas, I have never found heavy barrels more accurate than equally good light ones, except that they may be less susceptible to outside influences such as bedding, jerking the trigger, etc. You can give the trigger of a 30 pounder quite a jerk without moving the point of impact much as compared to what a good haul on the trigger of a featherweight would do. I gave up hauling extra pounds of iron over the mountains a long time ago. All of my guns are featherweight or at least lightweight. So long as you maintain sufficient metal over the breech section and for a short distance ahead of the

breech, the muzzle end can be trimmed down like the tip of a fly rod."[28]

Some old gunbug tales die harder than wives tales. There was a commonly held belief that somehow during the black powder era and later with the military, the makers had worked out the perfect place to cut the barrel or align the rifling for best accuracy. Consequently if you cut the barrel down you run the risk of ruining the barrel or at least losing some accuracy. Ackley responded to this fallacy. "There is nothing to the story that rifling in the rifle barrel is made to correspond to the length of the barrel. The rifling in any given model of rifle barrel is the same for any length whether it is 16 inches or 36 inches. Cutting the barrel will not materially affect the accuracy, although you will lose a little velocity."[29]

While there is no magic or secret method to create an accurate barrel at a specified length there is a way to seek greater accuracy through testing, at least with rimfire barrels. A group of washers can be spread along the length of the barrel near where you would like to cut it off to crown. When fired the vibration of the barrel will cause the washers to migrate to a harmonic node on the barrel. Theoretically, if you cut the barrel at this point and crown, it will be more accurate. This of course would limit you to that particular ammunition too.

"There is no evidence which substantiates the claim that one cartridge design is more accurate than another," said Ackley. It certainly cannot be demonstrated that inaccurate barrels can be made more accurate by simply rechambering them to some so-called 'improved' cartridge of Wildcat caliber."[30]

It is possible to improve accuracy sometimes by rechambering a factory barrel. This is simply because the custom gunsmith can take the time to set the barrel up properly in the lathe to align the chamber to the bore. Factory barrels are made in a high speed production environment and accuracy is not the most important factor to a company that makes just a few percentage points of profit per item they produce. There are no guarantees, however. An inaccurate barrel may be just that and no amount of gunsmithing can resurrect it.

Reboring Barrels

In the post-war years, as today, there was some disagreement or concern about the accuracy of rebored barrels. Ackley wrote in response to an earlier article in the *American Rifleman* on this. "I have rebored thousands of barrels during the past twenty years, everything from .22 to .45 caliber with results every bit as good as was obtained with new barrels without cutting the barrel off. I feel that the reading public should be set straight on this subject.

"It is true that a certain amount of 'choke' will result from the use of some rifling heads and cutters. On the other hand, there are types of rifling heads, for example the double scrape cutter type as used by Springfield for a good many years, which will not produce any appreciable 'choke.' Even if a slight amount of choke is left in the muzzle end of the barrel, I am not sure that accuracy is materially affected. In any event, I have rebored numbers of bull gun barrels which were continued in use as target rifles and these barrels have shown accuracy equal to their original accuracy prior to reboring."[31]

Pierre Pulling wrote in the 1959 *Gun Digest* an article, "New Barrels from Old!"[32] In it he mentions the prominent gunsmiths who were providing rebore work at the time. He says that he was able to test only one Ackley rebore for the article, a .270 barrel bored from a .220. He lists 5-shot groups from the gun measuring 2 3/16 inches center to center, fired at 100 yards from a rest, .250 inches better than the factory rifle they tested against with the same ammo. Far from a conclusive test, but on average all the barrels tested for the article shot at least as well as their factory counterparts, and in many cases shot better.

In the same article, information about rebore work that Ackley was offering is listed. "Ackley rebores from .22 to .475 caliber; right-hand twist only, from 4 to 36 inches. Number of grooves is six, running about twice as wide as the lands, but at a nominal

extra fee, other rifling forms can be cut.

"Ackley, having developed new rifling cutters, says that there is no necessity now for having to cut off any of the muzzle after rifling. A small degree of choke effect may, in fact, be found in his rebored barrels. This does no harm, may even be helpful. A lot of old barrels were deliberately muzzle-choked. Ackley offers prompt, almost 'return delivery,' he says, and his 'losses' with rebored barrels don't run 2 percent. Reboring, including rechambering, runs from $15 to $30. Barrel lining is also done."[33]

Ackley made and rebored barrels for about 40 years. G.R. Douglas and him were the first custom barrel makers to develop button rifle barrels for the custom market. Ackley trained a large number of barrel makers and gunsmiths during his long career. Many companies today that offer rebore work or manufacture barrels can trace their history to Ackley through the people that he trained. Indeed, he left a lasting legacy on the barrel making trade as well as the firearms trade as a whole.

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CHAPTER 10

ACKLEY'S CUT RIFLING MACHINE

This chapter was written by P.O. Ackley for what was intended to be the third in his *Handbook* series. It was written sometime between 1967 and 1988. It was in 1988 that Ron Pearson received from his Grandfather, P.O. Ackley, the original Ackley rifling machine.

That final book was to be about making barrels and how to produce them in a one man shop. Pearson started working for his Grandfather Ackley at the tender age of eight years old. Many years later, Ackley gave him his prized rifling machine. When he did so he must have decided the book was never going to be printed. He literally tore the chapter about the rifling machine from the original manuscript and handed it to Pearson, who has graciously agreed to share it with us here.

Page one of the chapter is missing, so we pick up the story on page two, as P.O. talks about his time training with Ben Hawkins in Cincinnati, Ohio. There are a couple of tidbits here that substantiated stories I picked up interviewing folks for this book. No material changes were made to the following pages except minimal editing for clarity; so it's pure P.O. Ackley.

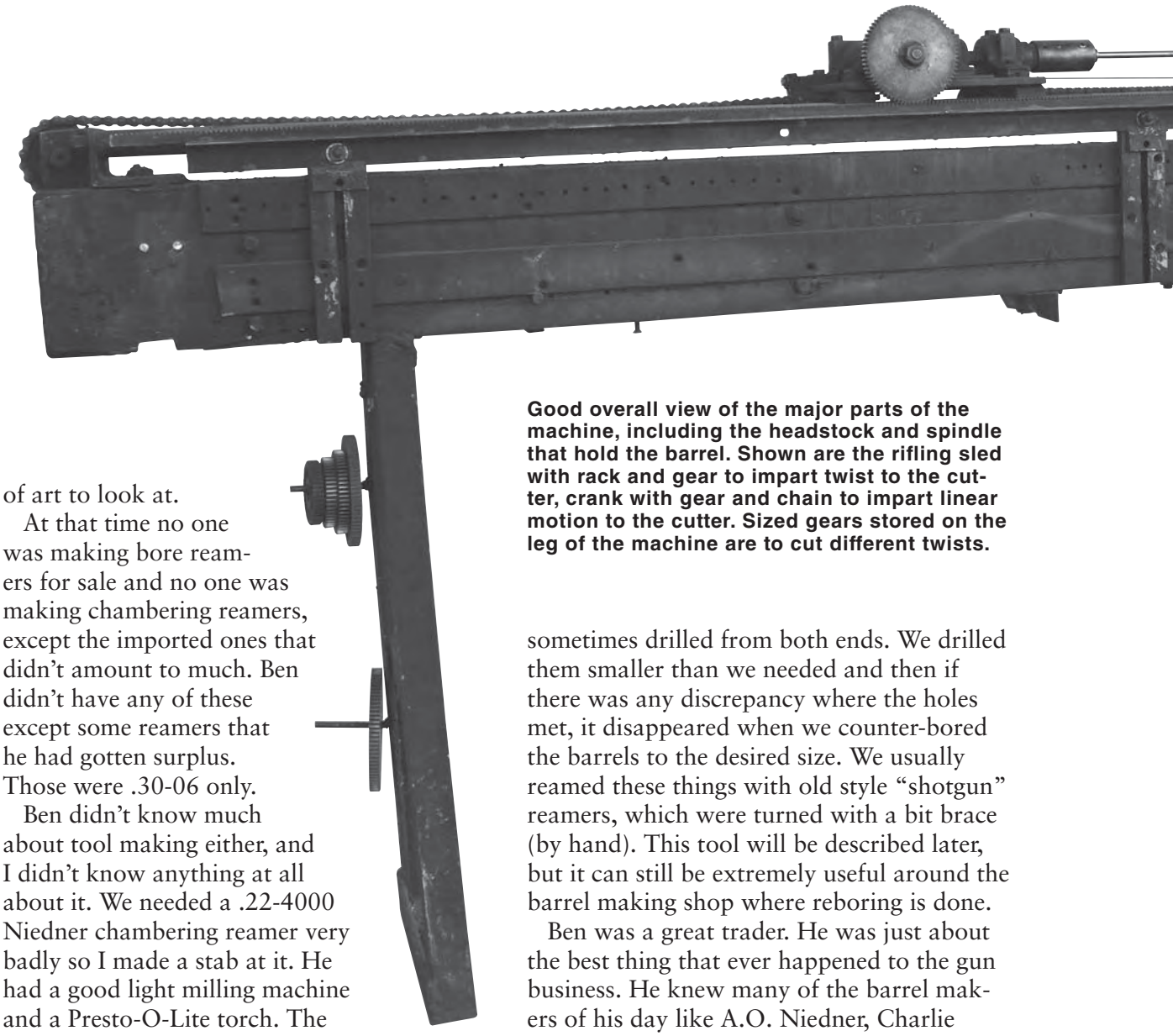
My First Rifling Machine

By P.O. Ackley

Ben had been in the gun business for over 40 years but never was able to make a barrel. Ben had complete barrel making equipment and a German machinist working for him, turned barrel maker, but he was only to stay on about another two weeks after I got there. His first name was Fritz, but I can't remember what his last name was. It was a typical long German name.

Fritz had started serving his apprenticeship in Germany at the age of 12. I don't think I have ever seen a better machinist than he was. He spent the whole two weeks with me pointing out the various things he thought I ought to know to start with. Ben described his own barrel making ability by saying that he could play a piano, but he couldn't get any music out of it. He could make a rifle barrel, but it wouldn't amount to much. So he always had to have a barrel maker there to make barrels for him.

The basic rifling machine used the same principle as the one that I am describing in this chapter. Ben had one of the old model Pratt & Whitney World War I barrel drilling machines, a hand rifling machine, and a real nice Monarch lathe that he got surplus after World War I. He didn't have a barrel reaming machine so that was all done on the Monarch lathe. When I got back to Roseburg, I had to concoct some kind of rifling and reaming machine, which I did out of scraps that I could find in the junk yard. It worked alright, but it surely was not a work



Good overall view of the major parts of the machine, including the headstock and spindle that hold the barrel. Shown are the rifling sled with rack and gear to impart twist to the cutter, crank with gear and chain to impart linear motion to the cutter. Sized gears stored on the leg of the machine are to cut different twists.

of art to look at.

At that time no one was making bore reamers for sale and no one was making chambering reamers, except the imported ones that didn't amount to much. Ben didn't have any of these except some reamers that he had gotten surplus. Those were .30-06 only.

Ben didn't know much about tool making either, and I didn't know anything at all about it. We needed a .22-4000 Niedner chambering reamer very badly so I made a stab at it. He had a good light milling machine and a Presto-O-Lite torch. The tool I came up with did bear some resemblance to a chambering reamer and worked fine, so from that time on I made all of my own reamers, until the business got too large. Even then, I made most of the tools. I did buy some chambering reamers from F.K. "Red" Elliott. He made the best. Later on toolmakers began to make chambering reamers which were fine.

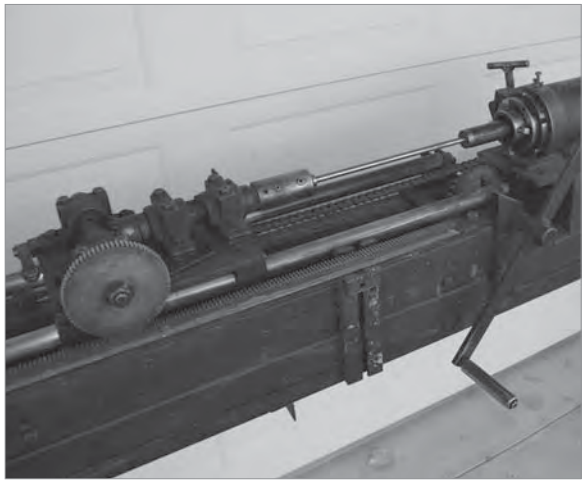
Ben dealt mainly in muzzleloading barrels, specializing in relining these barrels with stainless steel liners. We usually used ¾-inch 416 stainless steel bar stock. Some of them were over 40 inches long so they were sometimes drilled from both ends. We drilled them smaller than we needed and then if there was any discrepancy where the holes met, it disappeared when we counter-bored the barrels to the desired size. We usually reamed these things with old style "shotgun" reamers, which were turned with a bit brace (by hand). This tool will be described later, but it can still be extremely useful around the barrel making shop where reboring is done.

Ben was a great trader. He was just about the best thing that ever happened to the gun business. He knew many of the barrel makers of his day like A.O. Niedner, Charlie Diller, Charles Johnson, and people like that. After I returned to Oregon to get my own shop in operation, Ben sent his work to me until the time of his death, which was some 30 years or more ago.

My Original Rifling Machine

Figure # 1 [Editor's Note: Ackley's image figures don't correspond to the photographs in this chapter. His text is preserved for historical importance only .] shows the operating side of my machine. The angle iron frame can be seen on the back side of the machine.

Figure # 2. This contained a board with a number of holes drilled in it so different calibers of rifling tools could be held in place: figure # 3 is a top view of the machine. In the lower right hand corner the rear sprocket can be seen, while the front sprocket operates the carriage and can be seen in front of the spindle where the operating crank is attached. The rack gear can be seen on the right side of the machine. This rack gear is about four feet long and is mounted in slots so this gear can be moved up and down for different sizes of change gears. This rack gear is mounted on a ½-inch x 2-inch flat cold rolled bar. I had change gears for all sort of twists from 2 ½ inches to 36 inches. They can be changed in a matter of two or three minutes. Figure # 4 shows the arrangement of the miter gears. The base for this assembly is a flat steel plate, and the change gear, which appears to be one to produce



The rifling is done by cranking the handle that is attached to a gear and chain which gives the linear motion to the rifling tool sled.

the 16-inch twist, can be seen on the far side engaged in the rack gear that is barely visible at the extreme right of the picture.

The operating chain can be seen attached to both ends of the carriage. The miter gears are of the spiral type, but the straight type will work alright. Personally I believe the spiral miter type is worth the difference in price. These are 2 inches in diameter and made for ¾-inch shafts. At the far left the chuck, or socket, can be seen where the fitting of the rifling rod is attached. As this assembly is moved back and forth the gears will rotate the tool assembly one complete turn every 16 inches of travel. There is also a ball thrust bearing.

There is also a pair of these thrust bearings on the cross shaft. The gears are available from most any large gear manufacturer. These happen to be from the Boston Gear Works, but some of the change gears which I have bought lately are from Browning Power Transmission Company.

This machine was built and put into operation about 1939. The first barrel produced on it was a .257 Roberts made for an old Indian scout who lived in Tensleep, Wyoming by the name of U.S. Hubbel. [1]

He told me exactly how he wanted the barrel made. He wanted a 16-inch twist, which would be completely wrong these days. At that time flat nosed bullets were about the

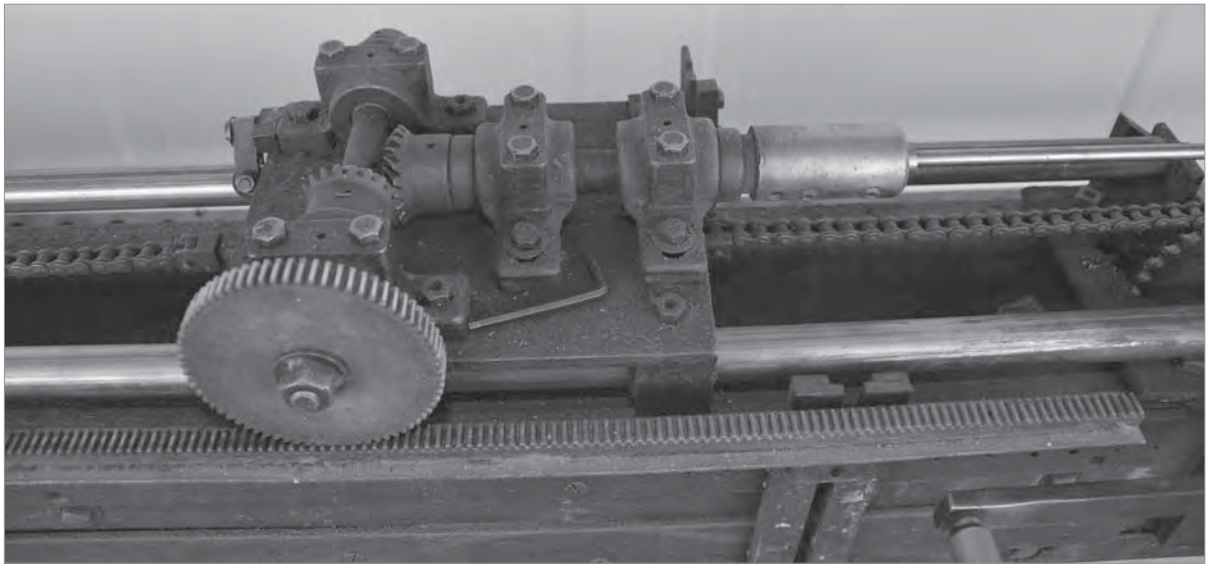
only thing available for handloading and the 117-grain flat nose bullets worked fine in the 16-inch twist. But the same weight of bullet with a long streamlined spitzer point would key hole and look as though it had come out of the barrel sideways when it hit the target. Anyway, he went ahead and won a lot of matches with it. He sent a letter telling the story to the late Fred Ness, who at that time was writing the "Dope Bag" column in the *American Rifleman*. Fred, who later became a very good friend of mine, published the letter. From that time on I never got caught up on barrel making work.

This rifling machine did not look like the pictures when I originally built it because I didn't have money enough to buy all the stuff and I had to do the best I could with what I could scrounge from odds and ends. This was because we were still in the "Great Depression." The bed was made of two 2 x 8-inch planks. Those are still visible on the machine. This plate shown in Figure # 4 on which the gear assembly is mounted was about the same size as the one in the picture, but the miter gears were only about 1 inch in diameter. The rack gear is the original one and some of the other change gears are original.

There were just small rollers on each corner of the plate that rolled along on a couple of flat pieces of steel screwed on top of the wood bed pieces. There was no headstock as shown in the pictures. I made a king-sized clamp to hold the barrel in line with the chuck holding the rifling tool.

In order to index the thing, I went to the junkyard and got a flange off an old automobile pinion shaft which connected the pinion shaft with the universal joint. This had six holes evenly spaced. I mounted this flange behind the chuck on the shaft. The chuck was then attached to the shaft so it turned freely. On the chuck was an arm long enough to coincide with the outside of the flange. This arm fitted closely to the flange and a spring loaded pin was fitted to the arm that fitted into the holes in the flange. When the pin was in place the two parts were locked securely together.

Then to index the tool, which was already mounted in the chuck, all that was necessary was to pull the pin and move it to the next hole. This simply moved the chuck and rifling rod and rifling head assembly one sixth of a turn, or to the next groove. This was slightly tapered to compensate for any wear, making the pin fit tightly in the hole. The cross shaft on which the change gear was mounted was long enough to accept an old



The twist of the barrel is determined by the large gear that runs along the rack. The size of the gear determines the twist rate of the barrel. The rack is adjusted up or down on the vertical T blocks which adjust for the size of the gear. As the handle is cranked, the gear runs along the rack, which rotates the worm gear and imparts the twist and linear motion to the cutter.

Dodge steering wheel that in turn produced the power to operate the machine. When a different change gear was needed in order to change the twist for some different caliber, the steering wheel was removed, the gear slipped off, and another one slipped on in its place. The steering wheel and gears were held from turning by means of keys which eliminated any chance of their slipping. The wheel was then reinstalled and tightened securely. This locked everything together so there was no play in the entire mechanism, which included the indexing attachment and the rifling rod assembly.

This was a big improvement over the machine that Ben had. On his machine the change gear was held in place by a setscrew. Every now and then the setscrew would get loose and slip and ruin a barrel. Sometimes it would slip a little bit every revolution, which resulted in a smooth bore since the rifling tool was allowed to move slightly each time it passed through the barrel.

One night, Fritz and I were rifling one of the stainless steel liner tubes. It was about 40 inches long and long thin chips were coming out. They looked like fine steel wire. Fritz said, "Just look at dot ting cut!" when the gauge would go in he cleaned the tube out and it was an almost perfectly smooth bore. The change gear had become slightly loose and moved each time the rifling cutter passed through, causing one corner of the scrape cutter to slice off a thin "wire," thus cutting the lands completely out. He threw down his tools and headed for home without saying a word. The situation was obviously beyond words. Since a bullet mold was ordered with the job, I tightened up the gear and cut new grooves and made a special mold for it. Fritz never believed that was the same tube. The whole thing turned out fine.

Improvements Added

Two round rods were mounted on the bed and a sliding bearing was attached to each corner of the carriage. These can be seen in Figure 3. This made a more accurate arrangement than the original and work easily on the rods. These rods are 1 ¼-inch round cold-rolled steel shafting. These bearings have been in use since they were installed in 1945. They are now becoming work to a point where they must be replaced. This will be done because I wish to keep this old machine in perfect condition from purely a sentimental standpoint. I still do use it some now and then for a new barrel or a rebore job. This is the original machine that I started with and with this small repair it will be as good as ever.

As business increased, walking back and forth with the old steering wheel got over being fun. So I decided to install a pair of sprockets and a roller chain so that the operator can stand in one place and at the same time be in the proper position to clean the rifling cutter or set the cutter up without moving. A ¾-inch diameter shaft was mounted in a couple of ball bearings and the rear sprocket, or the idler sprocket, is about 3 1/2 inches in diameter. The diameter of this one is not particularly important. The front sprocket is 5 inches in diameter. This is the one that pulls the carriage back and forth by means of a crank. The crank handles are 18 inches from end to end. These sprockets must be mounted at a level which allows the chain to be perfectly parallel with the top of the carriage to which the chain is attached at each end, with one end arranged so it can be adjusted for tension.

Sprockets and chains can be obtained from any company furnishing or manufacturing

Rifling head.

machine equipment. The sprockets used on this old machine were obtained from the Boston Gear Works. Originally there was a chuck on each end of the spindle. Each chuck was fitted with four setscrews. These are standard 3/8-inch square head setscrews, about 2 inches in length. The ends of these screws were ground and polished to prevent marring of the finish of the barrel.

Later the front chuck was replaced with suitable bushings to fit the threads of the various types of barrels that would be rebored. These bushings are most easily made of aluminum alloy, but they can be made out of steel. One was made for each common barrel thread, such as Mauser, Springfield, Enfield, etc. And the Enfield, being the largest one, was the one used for barrel blanks. When the barrel blanks were prepared, one end was turned to fit this bushing.

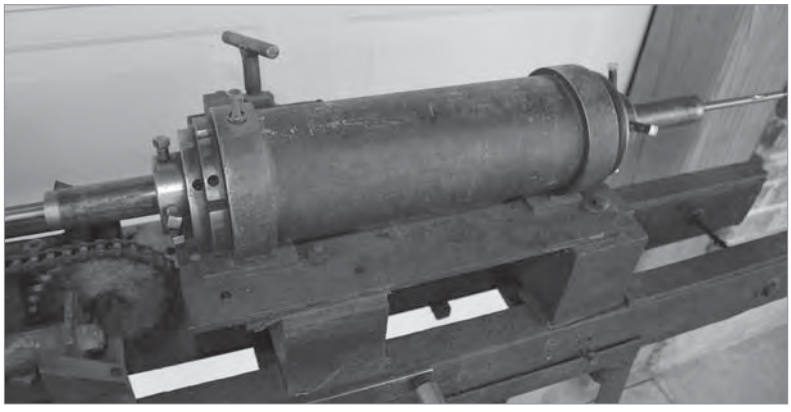
Bushings must be carefully fitted so they will run perfectly true in the spindle. They are held in place with only one simple setscrew. The outboard chuck was left with the regular four setscrews. By using four setscrews, or a four jaw chuck, octagon barrels can be perfectly centered with setscrews or jaws that will fit each side of the octagon barrel. The four setscrew arrangement fits both round and octagon barrels.

Ben's old machine had a three jaw chuck on the breech end and the one on the muzzle end was the regular four setscrew idea as shown in the picture.

This spindle is mounted in big ball bearings inside a larger tube, which can be seen in the illustration. This was done because I figured it would be motorized some time, which happened. This particular machine is now motorized so it can be used for drilling, reaming, as well as rifling.

A later heavier machine of this type is about the same. It is also arranged for drilling, reaming, and rifling. That one is still in use, but is now being used for only reaming. It can be changed almost instantly from drilling to reaming, and again to rifling. It is possible to drill, ream, and rifle a barrel blank in about 1 1/2 hours, which is almost as good as can be done with separate machines.

Both of these machines are probably the only ones in existence. On second thought, I guess there are a few others built almost exactly the same. There is one in Switzerland, and one in Italy. At least I know of these two that I helped the men build by correspondence. There may be some others which some of my ex-employees have built from time to time after they went into business for themselves. This old machine at the present time is exactly as the picture indicates except the addition of a counter shaft to turn the spindle with a 1/2 h.p. motor for counterboring and reaming barrels when reboring.



Good view of the headstock and spindle. The drilled and reamed barrel blank is placed through the spindle and indexed to dead center by using the cat head adjustments. The spindle is divided by an equally spaced six (6) V groove plate with a stop mechanism. T handle on the backside of the head stock is used to lock into each groove individually. The barrel is manually rotated after each pass of the cutting head. The rifling machine was originally used for rifling only, but after Ackley retired he installed a pulley on the rear of the spindle and attached a motor, which allowed him to manually drill and ream a barrel. Even in retirement he wanted to keep his fingers in barrel work.

Then there is an oil tank under the machine and a large oil pan. The oil is pumped through with a high pressure pump. This assembly, including a 2 h.p. motor, is now under the machine. There is an auxiliary chuck that can be instantly installed in the chuck, or socket, that was already on the machine

to hold the rifling tool. There is a flexible high pressure oil tube running from the oil tank through this fitting, which has a Jacobs chuck arranged so the different size oil tubes can be changed instantly and will accept tubes from 5/32 to 3/8 inch in diameter. The later machine that I mentioned is arranged for drilling and is equipped in the same way for oil pressure. It also has a counter-shaft that is controlled by a variable speed reducer so the spindle can be turned from about 100 rpms for reaming, up to close to 3,000 rpms for drilling. This combination machine was not available for pictures at the time this was written.

This should be an ideal machine for small gun shops where the owner would like to make a few barrel blanks for his own use and also do some reboring. Although the drill was hand fed, it can be arranged for a hydraulic cylinder for automatic operation. I later built some drilling machines equipped with the hydraulic cylinder idea, one of which was fed off the city water lines.

Also a couple of these machines were made with a lead screw and fed like a lathe. In fact, I used a lathe screw and half nuts obtained from the Clausing Lathe Company. This will be described in more detail for deep hole drilling machines that can be easily made by the small shop owner.

Figure 5 shows the indexing mechanism for the present machine. It consists of a plate that can be seen with six notches. The lever appearing at the top of the picture is spring-loaded and attached to a dog, which engages these notches. This can be seen on the back side of the index plate. This is operated by turning the rear chuck for the next groove. The notches are V-shaped. The lever shown is spring-loaded so the dog will snap out of the notch when pressure is applied and drops into the next one as the spindle is turned by means of the chuck setscrews.

This picture also gives a good view of the operating crank, which can be seen at the lower right hand corner. The sprocket that turns the chain and also the round bars that form the bed of the machine can also be seen. All these things are bolted to the original 2x8-inch wood pieces. The whole contraption is sort of a result of a process of evolution. It has not been necessary to make any further changes, except to motorize the spindle, for at least the last 25 years.

I have always regretted that I didn't keep records of the number of barrels made on this old outfit, which I have kept all these years, mostly out of sentimental considerations. But I also use it all the time just to keep my hand in a little bit. Of course, it is not being used to make new barrels. It is only used for reboring. However, it can be used to drill barrels and make a complete barrel blank with one set-up.

The overall length of this machine is ten and a half feet. There is a pan mounted on the bed that is not shown in any of the pictures. However, in Figure 1 there is a flat surface shown at the end of the machine where the oil comes out when reaming or drilling. There is a pan mounted on this surface where the oil is caught and returned to the tank. The drip pan extends the whole length of the bed. The oil, as it comes out of the barrel, runs down into the chip pan and then back toward the rear end and from there into the oil tank.

This tank holds about 25 gallons of cutting oil. When rifling the barrel there is a small pan which is simply set under the rifling tool that holds a small amount of cutting oil that can be brushed on the cutter. This supplies cutting oil to the rifling head and cutter, as well as cleaning the cutter each time through in order to remove the chips.

Author's Note: Pearson says that the machine had been updated and added to over the decades so that it was multi purpose, drill, reamer, and rifler. He chose to return it to its original form of a simple cut rifling machine. The pictures provided by him depict the machine in the restored form. Thanks to Ron Pearson for sharing his legacy with gun aficionados everywhere.

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1 http://www.tensleepcemetery.com/personal%20Histories/Hubbel,%20US.htm

CHAPTER 11

THE GUNSMITH

In the 1956 Speer Bullets, *Wildcat* reloading manual, P.O. Ackley was called "Gunsmith, cartridge designer, and philosopher."

Ackley was an expert in the field of cartridge design. That statement really does not go far enough; he is an icon in gunsmithing. His life's work included wildcatting, barrel making, chambering, establishing headspace parameters, chamber pressure research, mechanics, metallurgy and firearms design. There are very few such experts who exist today. Truth is truth, so most of what Ackley opined and/or wrote, even in the 1950s, still holds true today. As our ability to measure and test internal ballistics improves, Ackley's concepts will either be proven or disproven, only time will tell. In many cases he has already been vindicated.

"Ackley has always been very modern in his idea on case shapes, bullets, barrel steels, and action conversions, while at the same time he did not adopt doubtful or untried ideas, the kind that generally are only a 'flash in the pan,' never lasting long in general practice," wrote Richard F. Simmons.[1] "Ackley is a modern gunsmith who does good work at very reasonable prices."

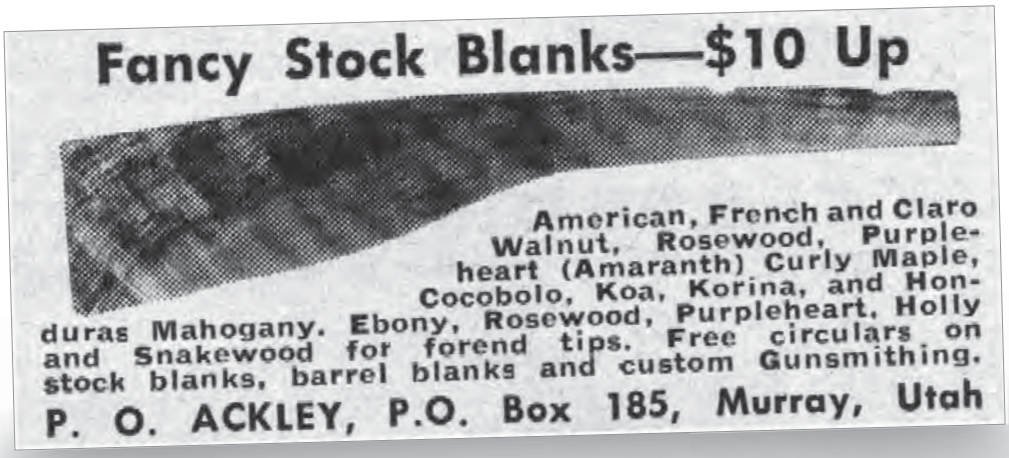
P.O. Ackley had no intention of withholding the dimensions and designs of his wildcats as proprietary. He went so far as to make an offer in the May 1954 *American Rifleman* that any gunsmith who wanted his cartridge dimension need only send postage. He said the reason for doing this was to encourage standardization and to make life easier for the reloading die makers. In the 1959 edition of the *Handbook for Shooters and Reloaders* he published the minimum chamber dimensions for many of his most popular wildcats.

Then, as now, many so-called gunsmiths try to copy a wildcat design and in so doing create a cartridge that is neither the factory equivalent nor the wildcat the client asked for. Ackley said that RCBS received die orders for more than 20 different versions of the .257 Roberts Ackley Improved. He always offered the correct dimensions for his work as there was no secret in his mind about the designs. He felt it was better to share the dimensions and avoid the "just as good" copies. His offer to share correct drawings was repeated in the September issue of *American Rifleman* that same year complete with a list of calibers.

Ackley on Selecting Cartridges

"Anyone interested in wildcat cartridges should always investigate the field before making a selection, to make absolutely sure that he should have a wildcat cartridge in the first place, and if so, to make sure that you select the correct one," wrote Ackley.

"First he should ask himself, 'Do I thoroughly understand the problem of headspace, and can I make cartridge cases which will be safe to use,'" he continued. "It is of the greatest importance that the owners of wildcat rifles be able to make their own cases because otherwise they will find themselves absolutely at the mercy of custom loaders …



Ackley sold many gun-related items during his long career.

making the cost almost prohibitive.

"Second, is he judging some particular wildcat cartridge on its actual merits or by some of the inflated statements made by the enthusiastic owners of individual rifles which do not represent the line as a whole. Or, is he judging a particular wildcat by the word of the regulator who has an inflated opinion of the merits of his brainchild. He must keep in mind that there are no wildcat cartridges which are actually revolutionary. There are a few which will fill the gaps between existing commercial cartridges. There are many more which are no better, or perhaps not as good, as their commercial counterparts.

"At the present time, there is a tendency toward filling the widest gaps by the commercial factories, for example, the two new 6mms namely the .243 Winchester and the .244 Remington, either of which is just as good as any of the wildcat 6mm cartridges previously designed.

"Sometimes shooters purchase wildcat rifles without having the slightest knowledge of headspace, then find that they are never able to make ammunition which is safe for them to use in the rifle. Considerable skill is required to make cartridge cases, especially of the rimless type with corrected headspace, with concentrically reamed necks, proper overall length, and the many other requirements which enter into this problem.

"Personally if I were converting a Mauser to .35 caliber I would stick with the .35 Whelen, which is simply the .30-06 necked up to .35 caliber. The .35 Whelen for many, many years has been a real old stand-by to many hunters who are interested in the heavy bullets,"[2] wrote Ackley in his *Guns & Ammo* column.

"The .30-338 is an excellent cartridge," said Ackley. "I consider it much better than the .300 Winchester except for the fact that you can't buy ammunition for it. It sure is a mystery why Winchester did not bring the .30-338 out on the market instead of the

.300 Winchester with the extremely short neck, which is detrimental to handloading. As you probably know the .264 Winchester and 7mm Remington, the .338, and the .458 Winchester are all on the same case. It should have been a simple matter to insert the .30 caliber rather than bring out a completely new cartridge which is not as good."[3]

Given a choice between a .30-06 and a 7x57 which would P.O. Ackley choose?

"Personally I would rather have a 7x57 than the .30-06, but the .30-06 is more gun. The question arises whether you need more gun or not; because the fact still remains that the 7mm is equal to any of the game in North America,"[4] he wrote.

Ackley developed a reputation in the early 1960s of disliking magnum cartridges, some went so far as to say he hated them. He assured his readers that he did not hate magnums, only those that were, "…so inefficient that no one in his right mind could see anything good in them except sales possibilities."[5]

"The Newton series of cartridges which are now obsolete, worked better than any of the (belted) magnums in every way,"[6] he wrote to another gunsmith.

One reader asked Ackley to explain why he preferred a 6.5x55 Swedish over the .264 Winchester Magnum. He responded, "In addition to the .264 Winchester we have other cartridges like the Weatherby and my own Magnum series, all of which have the same faults and the same low number of virtues. Therefore … this criticism extends to all of the similar ones including my own and if ever there was a cartridge which stinks it is my own 6.5 Magnum and its very close relative the .250 Magnum."[7] Ackley went on to say several major factors went into his low opinion of overbore magnum calibers. Primary among these was the lack of high quality hunting bullets that could withstand the extreme high velocity generated by magnums. Next was the fact that it takes a huge amount of powder to develop that additional velocity. This increased recoil, noise and throat erosion, the latter shortening accurate barrel life noticeably. Ackley promoted smaller cartridges, which are better balanced and thus are more flexible in loading — in other words, they will shoot a wider variety of components with better accuracy.

P.O. offered to supply components for anyone who wished to try to overcome the speed limit imposed by powder and other variables. He was pointing out that cartridges smaller than about 7mm do not make good magnums. Why? Simply because you reach a point of diminishing returns very quickly in terms of usable case capacity. Once this point is reached it takes large increases in capacity and powder to get a small increase in velocity.

"Sometimes the big magnums will be worn out before a good load is found for them, then they produce velocities which are very much in excess of what the custom or factory bullet is capable of withstanding,"[8] Ackley said. The most important part of that statement is the quality of projectiles issue. Most of the current manufacturers of large scale production bullets design theirs to perform at a fairly low terminal velocity, some even give an effective velocity range for their bullets on the package.

Bullets with a two-part core — Nosler Partition, H-Mantle bullets, Swift A-Frame — will work better at high velocity because the rear half of the bullet will retain its mass and continue to penetrate even if the front half is destroyed. Barnes X bullets and Triple Shocks perform more like the two-part core bullets, for when terminal velocity is too high the petals formed by the mushrooming of the front half of the bullet often tear off. Bonded core bullets from custom makers are a better choice for hunting big game than the plain old non-bonded core bullets. So Ackley's mantra that we need better bullets before velocity can reasonably be increased is still true today since bullet technology has progressed little since Ackley wrote his opinions.

North Fork bullets were designed like the Ackley ACE bullet to open at low velocity but still hold together at high velocity. These are some of the best hunting bullets this author has ever tried. They perform well at a wide range of velocities. Funny that they are pretty much a modern interpretation of the Ackley ACE bullets, proving the adage there

is very little in the gun business that has not been tried.

P.O. did mention that while he was not a fan of the .264 Winchester, he liked the 7mm Remington Magnum, mainly because it was more versatile than the .264. Given the same cartridge case, if you went to .30 caliber (.30-338) he liked it better, then the 8mm-338 he felt was better yet, and for each caliber you neck up that case the better Ackley liked it.

He told friend Bevan King that if he were to use a magnum cartridge, which he had no intention of doing, he would have set his reloading die so that it barely bumped the shoulder, thus headspacing on the shoulder instead of the belt to remove the question of brass tolerances from the equation.

"It would be fine if by putting a belt on a case and advertising it as a magnum it would revolutionize the industry, but it only revolutionizes sales," Ackley insisted. "As I mentioned above, I am always happy to furnish equipment and materials for anyone who wishes to come to my laboratory and prove me wrong."[9]

"Getting back to the .338 (Winchester) and the .340 (Weatherby), I suspect that if you had a pressure gun and loaded both cartridges to the same pressure you would be getting the same velocity, but the .338 would require considerably less powder. However, the Weatherby will make a lot more noise, which impresses a lot of customers."[10]

Another point that Ackley makes with regard to choosing Magnum or standard calibers should be allowed to speak for itself. "Then it is my private opinion that an animal being shot with any of these guns wouldn't have much preference as to whether there was 100 fps difference in velocity or not."[11]

On Bull-Pup Carbines

"My opinion of the Bull-pup idea in general would not be very complimentary, and like the man once said, 'If you can't say anything good about it, then don't say anything at all.' Therefore, I am silent as HELL on this subject."

On Cartridge Headspace

"Often gunsmiths who have produced and sold wildcat rifles received complaints from the owner that his rifle has headspace," Ackley wrote in 1972, "without being aware that headspace is of little importance in the rifle itself, so long as he is able to produce ammunition to fit the chamber and even though such a chamber might have slightly different headspace than some other similar one.

"If he would study his dies, especially the forming and full-length sizing die, he would see that they are fully adjustable and capable of producing ammunition to fit almost any chamber of the same caliber, in spite of slight differences in headspace."[12] Many reloaders are unaware that dies are adjustable, they just screw them down to touch the shell holder and go to work. Lucky for them brass is pretty soft and forgiving.

Ackley offered plenty of opinion on resizing belted cases, too. "I would recommend continuing to full length size the cases, by setting the die at the proper height so that the shoulder is not set back more than .001 of an inch. Like rimmed brass, the shoulder is often blown ahead in standard chambers for belted cartridges, this is one of their faults. Another one of their faults is that there is a wide tolerance in the manufacture of the width of the belt and the so-called headspace control is not as accurate as it might be. Once the cases have been formed to fit the chamber and then the die set so that the shoulder is not set back to the original position but just enough to enter the chamber freely, this fault is nullified."[13]

In 1978 Ackley wrote to Bevan King on the matter. "I checked out some .300 Winchester-Peters ammunition against some new Winchester unprimed cases. There was .018-inch difference in length from the forward edge of the belt to the datum line on the shoulder. In other words, the bolt would just close on the Peters ammunition with a little pressure with the headspace set at .220 inch (on the belt), while with the Winchester the brass was blown ahead .018 inches, which means that if we were thinking in terms of rimless cases,

there would be .018-inch headspace. This will result in case separation, head separation with rimless cartridge."[14]

Case separation is a definite sign of headspace either caused by actual headspace in the rifle or by setting the shoulders of the cases back in the sizing die.[15] Ackley said this because the only cause of case head separations is excessive headspace, separations are never caused by pressure alone. "Excessive headspace can result in case separation somewhere along the body of the case," he explained. "Since you have a wildcat, headspace is of no great consideration because when you are necking the cases down the first time, the dies should be so adjusted that the headspace is correct for the chamber. In other words, set the dies out a little bit from the shell holder and neck a case down and then try it in the gun. If it will not close, then set the die a little closer and repeat this until the bolt can be closed with a definite 'feel.' Then lock the lock ring on the dies so there will be no question about the proper setting from then on."[16]

He went on to clarify that "[w]hat I am trying to point out is that the owner of any rifle chambered for a wildcat cartridge has to make his own ammunition and no matter what the headspace is — whether it be minimum, less than minimum, maximum, or more than maximum — he has still got to adjust the dies for the chamber on his rifle to take care of the tolerances for all of the components which he is using, namely the rifle, the dies, and the loading tool. It is only an accident that a standard, full-length sizing die, for example, can be set down against a shell holder in the average tool and make a case which will fit the chamber perfectly. This applies to factory cartridges equally."[17]

On Headspace and Reloading Dies

Die makers have even greater problems than the gun maker. There are numerous makes of loading tools that accept the same type of dies. Each manufacturer has different manufacturing tolerances, types of shell holders and other parts, thus preventing them from being able to produce a standard set of dies which can be used with one setting in any tool. Redding offers "Competition Shell Holder" sets to help deal with these headspace variables, so the manufacturers are fully aware of the problem.

The handloader must become familiar enough with the operation and his dies to be able to adjust for any combination of tolerances from all possible sources. He should understand that he must adjust his dies regardless of the fact whether the die may be set down close to the shell holder of the tool or not, so that the cases that he makes will enter the chamber of his rifle freely with the headspace measured correctly to produce a definite "feel" on the bolt as it is turned down into the locked position on one of the cases he has made. Once he is able to adjust his dies to produce cases with this kind of fit there will never be any danger of excessive headspace.

In his July 1967 column for *Guns & Ammo* Ackley discussed this very matter. "The die must be adjusted correctly so that the headspace is correct for the gun in which the ammunition will be used," he wrote. "This is done by setting the die out a little bit from the shell holder and the operation (of sizing) repeated until the empty case will enter the chamber and allow the bolt to be closed with just a slight 'feel.' In many instances the sizing die is too long and will have to be shortened a little by cutting off the bottom in order to allow the die to be properly adjusted for the individual rifle."[18]

Many reloaders run into the condition that Ackley describes in the previous paragraph and fail to recognize the issue. Often only one of two cartridges from a batch of reloads will be hard to chamber. It is important to recognize the reloading presses have some spring when sizing cases. Watch carefully when you size a case, how much does the gap between the shell holder and the die increase? If it is a noticeable increase you will have to set the die closer to the shell holder to solve the problem. If that does not suffice, you probably need a stronger reloading press

and/or better case lube.

"He (the gunsmith) also receives complaints of high pressures," said Ackley. "It must be said here, that pressures in wildcats are exactly what the owner builds into his own ammunition. This is just as true for commercial cartridges which are being handloaded by the owner of the rifle. The problem of pressure is quite prevalent among wildcat rifles and cartridges because of the fact that so much of the loading data published or issued for the various versions is so far on the maximum side.

"If a study is made of the loading data of some particular standard commercial cartridge as is found in the various reliable handloading manuals, and this data is compared to that given in various publications, catalogs, etc., for some wildcat cartridge of similar capacity and caliber, the reader will immediately be struck with a seemingly great superiority of the wildcat cartridge. This is because the data for the wildcats is so many times on the maximum side, even to the extent of listing loads positively dangerous in many individual rifles, while the loading data given for the commercial cartridges is usually kept within completely safe limits.

"Take for example a popular wildcat, the data for which shows loads as high as 48 grains of 4350 powder to give velocities considerably higher than those quoted for a corresponding commercial counterpart, which for all practical purposes is an identical cartridge. Looking further along in the description of this wildcat, is found the statement that the charges recommended are in no way guaranteed in a rifle and are to be used with caution, and the handloader should start with something like 8 grains of power under the maximum load shown.

"Too many owners of such rifles run over these lists of loading data and settle on the heaviest load because that is the only one that appears to have high enough velocity to appeal to them, and start out with that one. Now and then rifles will accept such loads without trouble. On the other hand, too many produce a dangerous situation. There is one thing we can safely conclude, and that is that many wildcat cartridge reloaders reload their cartridges to what many 'authorities' considered dangerous pressures, in order to make a wildcat cartridges live up to the expectations or claims which are usually several hundred feet per second velocity higher than the commercial counterpart.

On Rimmed Case Headspace

"Rimmed cartridges do not present the problems to the wildcatter that rimless cartridges do because the headspace is completely controlled by the thickness of the rim which has been pre-established by correct manufacture at the factory," said Ackley.

He continues, "Although a handloader is able to set the shoulder of his case back to a distance sufficient to cause a rupture at this point, it will still not develop a dangerous condition because of the headspace feature of the rim. He is always assured that, provided his rifle has correct headspace, the headspace is not liable to be further altered by any cartridge forming process. He may produce incorrect ammunition with a shoulder too far back, the neck too long, or the overall length too short, and various other mistakes, but it will never produce the dangerous condition that develops when rimless cartridges are made with improper shoulder location."[19]

Making Belting Dies

Ackley wrote instructions to Bevan King about how to fabricate dies for swaging a belt on .30-06 cases. This gives us a glimpse of how he created his belted cases for some of his wildcats. The instructions are paraphrased for clarity.

'First, it is necessary to make up a set of reamers, the set would include a standard chambering reamer, a sizing reamer, and a roughing reamer. On the roughing and sizing reamers it is necessary to have the belt cutter built in (that is the part that cuts the recess for the belt). The belt should be almost exactly the size of the base of the unfired '06 case. On the chamber reamer the belt cutter must be larger in diameter to create clearance

for the belt to feed into position.

'The #1 belting die can be made by simply reaming it with the resize reamer to the point where the belt cutter just begins to cut the bottom of the die blank. Then the sharp corner at the mouth of the die should be radiused about 1/32-inch. The top end of the #1 die can be relieved all the way down to about a quarter inch from the bottom of the die. This can be done simply by running a drill bit in from the top that is larger in diameter than the .30-06 case at the base.

'The #2 belting die is made the same way but the mouth of the die where the brass is inserted is left sharp.

'When the case is run into belting die #1 it will size the body of the case down to .450 inch which is the body dimension just ahead of the new belt. Die #1 will leave a radiused corner where the belt is formed at the base of the case. Die #2 with its sharp corner on the belt cut will square up the belt and leave a small burr all the way around the belt. Adjust the dies to set the new belt at .220 inch from the head of the case.

'The sizing die will have the minimum diameter for the belt built into it by the resize reamer as described previously, and the belt cut in the resize die will be cut to normal depth and left sharp. These two features will combined to trim the burr off the belt and sharpen up the corners.

'Finally you will need to make a set of dies to form the upper end of the case and trim it to length. When belting it is necessary to use only new unfired cases since fired cases are usually swollen at the web and the head is left off center, this will cause the belt to be out of round.' The last thing P.O. had to say about this process was, "All of which makes it more work than the whole thing is worth."

Scope Mounts

In the post-war years, Ackley's shop produced a scope mount which it sold to the trade as well as using on guns produced in his shop. It was based on the Turner Patent, referred to variously as the King-Pike or the Ackley-Turner. This was a quick detachable scope mounting system. The Ackley mount was very simple and well made, easily mounted and adjusted. The V-block principle it incorporated re-centered the scope accurately when removed and replaced.[20] See Chapter 4 for more about the Ackley-Turner mount.

Experimenting

P.O. Ackley is nearly the only gunsmith of his generation who developed a reputation for experimenting to prove or disprove the facts concerning ballistics, and firearms. This in large part set him apart from his contemporaries. As Roy Dunlap said, "Ackley believes in 'proving the pudding by the eating thereof.'"[21]

Ackley continued experimenting for nearly his entire career. Like most successful people he realized that you never know "everything."

Action Strength

After World War II, many gunsmiths and self-appointed experts were vigorously condemning certain military actions and praising others. Meanwhile, Ackley set to work testing each action design to its limits. He actually blew up guns on purpose to learn about their strengths and weaknesses. This work was performed in a scientific way in order to gather data that would explain the relative strength of each action tested. While Ackley's tests are still the most extensive published on the strength of various bolt-action designs, even he felt that the sampling size was too small to be totally conclusive. It did, however, provide more information than was previously available, and still serves as a guide for gunsmiths today. You can locate the summation of these tests in Ackley's *Handbook for Shooters & Reloaders Vol. II*.

Bill Hause said that while in Trinidad in 1950 and 1951, he helped with some of the above mentioned blow-up tests. He kept records of the loads used for the tests and some of the results. He said that these tests were performed over an extended period of time but were complete by the time Ackley moved to Salt Lake City in 1951. The students in

the Trinidad Gunsmithing classes did most if not all of these tests at Ackley's direction.

Rolling Blocks

A reader wrote into Ackley about a Peabody Rolling Block in .45-70 that he had acquired, wanting to know if the action would handle pressures recommended for the Model 86 Winchester in that caliber. Ackley responded in part, "The rolling block is much stronger than it appears to be from casual inspection and will withstand any loads which anyone in his right mind would ever shoot. On the other hand, my experience with these actions has been that they do not handle extremely high pressures very well simply because of the inherent design which allows the breech block to spring backwards under high pressures, thus sometimes bending the head of the case out of line with the axis of the bore. Therefore, it would be my recommendation to rebarrel these actions for only relatively low pressure cartridges."[22]

Ross

In addition to rolling blocks, Ross rifle actions were tested by Ackley. "Some years ago I tried to blow some of these actions up and I found that they were as strong as any, and stronger than some popular actions,"[23] he wrote.

Eddystone

One of Ackley's readers once challenged him concerning his comments on the strength of Eddystone actions. The reader pointed out Hatcher's comments on the Eddystone as well as Ackley's own tests as reported in his books, stating that both indicated the Eddystone was substantially weaker than other P-17 Enfields. Ackley wrote in part, "General Hatcher once told me that some of the Enfield barrels were too small in diameter and they were bumped up by forging, which caused them to sometimes fail. However, all metallurgists will tell you that forging refines the grain and improves steel. Actually almost any make of rifle barrel will fail now and then because there are hidden defects that cannot be spotted without highly specialized equipment.

"During the war I supervised overhauling many thousands of Enfield rifles at the arsenal. And most of these, of course, were Eddystone. Each one was tested by firing six government blue pill loads. And not one ever developed any signs of weakness. So if I have a good sound Eddystone action I would use it without any thought of danger. Actually, any action can be blown up if you try hard enough. And this includes the Enfield like all other makes."[24]

Writing to Bevan King on the subject, Ackley said, "Almost all the P-14 Enfields, and the largest part of the P-17s, were made at the Eddystone Arsenal. The P-14s were often stamped ERA, which stands for Eddystone Remington Arsenal. The Eddystone plant at Eddystone, PA was owned by the government but operated by Remington. So probably the ones marked ERA, or Eddystone M17, should be about the same as the Remington actions. However, what I have found in my testing is that the Remington runs on the soft side. They are hard to blow up because they stretch rather than shatter. They do develop headspace faster than the harder ones. Apparently the limit of the hardness for the receiver is in the neighborhood of 54RC, a receiver this hard will shatter if the head (of the case) is blown. Remingtons just blow up like a balloon without rupturing when the head is blown. So, you can take your choice. Neither one will give any trouble with anything that should be put in them."[25]

Carcano

In Ackley's *Guns & Ammo* column he once mentioned further tests which were not included in the article in Vol. II of his book. According to this 1962 write-up, four 6.5 Carcano Carbine actions were destroyed in the tests. "…I would certainly never accuse this rifle of being weak because it was probably the biggest surprise that I ever had when conducting action blow up tests.

"We had always been lead to believe that the firing pin in these particular actions being held in place only by a small lug, would blow out in the shooter's face and although I wouldn't say that this is impossible, it certainly proved to be impossible for us to blow it out in our tests. In fact we had four of these actions, one of which had a cracked sleeve which holds the firing pin in place and we blew up all four actions using this one cracked sleeve without it showing any further weakness.

"In spite of the fact that the locking lugs looked as though you could knock them off with a tack hammer, we were unable to damage any one of the four bolts appreciably. When the actions finally let go the receiver ring flew off, but this didn't come until we had reached loads which had previously blown up P-17 Enfields. So at least these four actions, if we can judge anything by that small number, could not be classed as weak. We probably reached pressure levels of over 80,000 psi.

"I wish to point out, however, that none of this should be used to conclude that the rifle could ever be made into a desirable hunting arm because that is a fairly good definition of the word impossibility."[26]

He later said of actions, "Of course, things like this cannot be judged by one bolt sleeve and four actions but I would think that it is an indication that these actions are not as weak as we have been lead to believe. I am sure that they are safe enough for the recommended handloads or factory loads."[27]

98 Mauser

Ackley had great experience with and respect for the Mauser 98 action. "The best of the Mausers are the model 98s dated between 1924 and 1940, but later ones are fine except they are rougher," he wrote. "The older models like the Model 93 and 95 are not as desirable, but they are fairly good actions. If anyone is contemplating building a fine custom rifle, the Model 98 is the best one to consider. It will cost a little more but the resale value will be enough to offset the cost. World War I Model 98s are also OK but not a good as the ones mentioned above."[28]

He continued to sing the praises of the 98 as the best overall design. "Anything that has been produced lately that has claimed to be better is only better in the advertising."[29]

"The production rifles now being manufactured in this country are both strong and safe and there is probably little choice between the different makes," he wrote in 1967. "Personally, I feel that there is not domestic design comparable to the original 98 Mauser but this type of action is expensive to make and the cost of such an action, if it were made in this country would be prohibitive."[30]

"The Model 98 does not have all the best features, but, it has more good features than any other design."[31]

Conversion of a Military 98 Mauser action requires some work and investment, and Ackley had some thoughts on that. "Using a Model 98 Mauser sometimes the resulting rifle is equal to, or sometimes better than a commercial rifle, which could be purchased for the same amount. There is another consideration that must be taken into account — the resale value of a converted military rifle. After any military rifle has been completely sporterized, even to the extent of several hundred dollars, it is still an old obsolete model. This has quite a marked effect on its resale value."[32]

Commercial Mauser 98

Ackley was familiar with the Mauser variants, including Interarms Mark X, Santa Barbara, Centurian and Fabrique Nationalle (FN). "The Mark X was made by an old company which has been in business for 150 years or so in Yugoslavia, but they always made military rifles up until a few years ago," he wrote in a letter to King. "The Santa Barbara action was made by the La Coruna Arsenal in Spain, which is government owned, and one man had the commercial rights until some time in the early 80s. The Centurian Mauser was simply the forerunner of the Santa Barbara. My experience has been that the Mark X is the better

action of the two."[33]

For a .375 H&H, Ackley recommended an FN action because they were better suited for the long case.

93 and 95 Mauser

When asked about the suitability of a 93 Mauser for conversion to 7x57 Ackley Improved, he said, "A Model 93 Mauser in good condition is a relatively strong action. I am very careful about recommending conversions of such actions for the Improved 7x57mm and similar ones because we can usually assume that anyone interested in the Improved version of wildcat cartridges is interested in the highest possible velocity and will probably use handloads which often exceed safe pressure limits. Quite a few of the Model 93 and Model 95 Mauser actions are soft. Gunsmiths must be very careful these days since product insurance is very hard to get. And if you can get it, the price is extremely high. Therefore, we try to stay very conservative with such recommendations."[34]

In another column Ackley went on to say, "In our blow-up tests the Model 95 and Model 93 handled as much pressure as Enfields that were tested during the same period. The only conclusion we could draw after blowing up about 100 actions of various types was that any of them in unaltered condition are safe for reasonable pressure.

"None of the actions which we tested were safe with loads that would blow primers, but none of them blew up at these pressures. The pressures had to reach a point where the whole head of the case was blown out. Then there were different reactions between the various military rifles. But when primers begin to fall out or the heads begin to expand, you should always reduce charges, whether they are in a Model 95 Mauser or one of the most modern rifles."[35]

Schmidt-Rubin M1911

Ackley viewed the 1911 and late-model Swiss rifles as being relatively strong. "We ran some blow-up tests for one of the large dealers and we were really surprised that the Swiss action withstood so much without any damage," he wrote in 1971. "Then we had one of our own that we tried in comparison and it gave us the same results. Both were converted to .308 Winchester. Basing my opinion on these two tests, I would say that the rifle would be safe enough for the .243 and certainly the .358 Winchester."[3]

SMLE

In response to a question about the British SMLE action Ackley said, "As a general rule, military rifles were never intended for sporting purposes and even when a rifle has proved to be a good military rifle, it does not mean that it is well-adapted for sporting purposes — although anything can be used for hunting game. If you stop to enumerate the things that are necessary to make a certain military rifle into something comparable to the average commercial model, you will find that you have a lot of money in it."[37] Paraphrasing Ackley, "For example, using the SMLE, you will need a new stock, sights, and modifications/refinish the metal. Including the original cost of the rifle you will have invested nearly the amount equal to a good quality commercial sporting rifle, which is bound to be more accurate and satisfactory for use in the game fields."[38]

"The SMLE is safe enough for recommended loads in the .303 British cartridge," he writes, "but I cannot say that I would consider it worth spending much money on. You can get a 98 Mauser for just a little bit more and it will stand any modern cartridge that will work through the magazine."[39]

Winchester Hi-Wall

While known for his work on bolt actions, Ackley did tackle the Hi-Walls. "The Winchester Hi-Side is about the best single-shot action for cartridges like the .220 Swift or the .225 Winchester. A good Hi-Side handles the .220 Swift all right and being a semi-rimmed cartridge the extractor works satisfactorily if carefully fitted."[40]

M1-Garand

While it enjoys a strong following even today, the M1 Garand was not to Ackley's liking — at least as a hunting rifle — and he minced no words saying as much. "I am fairly familiar with the M-1 Garand rifle since I had charge of an Arsenal overhaul shop during the War and my opinion of the rifle for sporting use is lower than a snake's belly.

"It is my firm conviction that a semi-automatic military rifle was never intended for hunting big game and never would make a satisfactory sporting rifle except by those who feel that they must defend themselves against the game being hunted by filling the air so full of bullets that the animal could not possibly penetrate the barrage. I certainly wouldn't consider it very sporting and no one is going to convince me that these rifles are desirable for sporting purposes. The description "the old clunk" quite aptly fits these rifles from the sporting standpoint in my own estimation.

"Please understand that these are personal views and anyone is welcome to hunt with a Garand complete with bayonet and several bandoleers of ammunition if he wishes."[41]

Ackley further elucidates his lack of love for the Garand. "I have been guilty of calling the M1 Garand a "Clunk" alright, so far as a hunting rifle is concerned. My opinion has not changed a bit. However, I have no objection to anyone who likes the thing to praise it. There are a few who swear by this pot bellied wonder which I doubt was ever intended for a sporting weapon. But for those who do like it, more power to them."[42]

M1 Carbine

Ackley liked sporting rifles, and semi-automatic military weapons he regarded as ill-favored machines. Yet he received such a demand for work on carbines that he opened the doors. In fact, he made a working arrangement with a carbine specialist to handle the rush in his shop, but the deal fell through.

"It is beyond me," he says, "why anyone would want a wildcat cartridge in a semi-auto which throws cases all over the landscape and is just a crude piece of equipment at best."

Having put himself on record, his inborn tendency to rise to a mechanical challenge took over: "I'll be converting them to anything the customer wants, except I'll not go over the .357 Magnum revolver cartridge. The .256 is a good cartridge, and so are the .17/30 and .22/30, which we'll be doing.

"I don't think it will be popular, but making manual repeaters out of these little actions makes some sense — at least, it will save hunting cases. So far as accuracy is concerned, I think that good barrels make accuracy regardless of caliber," [43]Ackley said.

Arisaka

"The Arisaka actions are extremely strong but pretty undesirable," Ackley reported. "I should mention that strength should not be confused with desirability. This is another one that I would not recommend spending much money on."[44]

Mannlicher-Schoenauer

"Something to leave strictly alone are the surplus Mannlichers unless you rebarrel them to the original 6.5x54 cartridge," wrote Ackley. "The surplus Mannlicher actions are fairly strong but not well adapted for use with a scope and it is nearly impossible to convert the magazines because these actions are designed for one cartridge only and it is best not to attempt any change."[45] Conversion of these actions is normally limited to wildcats on the 6.5x54 case, the easiest to work with are the .22, .25, and 6mm versions. These are all simply designed as the same case body necked down to the desired caliber.

Martini (B.S.A.) .310

"The B.S.A. .310 Martini seems to work fine for the .219 Zipper," wrote Ackley. "Of course, the breech block should be bushed for a smaller firing pin, but other than that there is no alteration necessary except to refit

the extractor."[46]

In an article, author Robert McNeill talked about a Cadet that he had Ackley barrel for him. Ackley's suggestion for McNeill's rifle was a rimmed .222 Remington. The rimmed version of the cartridge was popular among Australian owners of rebarreled Cadets at the time. The context of the article indicates that the rifle was rebarreled in the 1960s. McNeill found that imported brass was available and it worked well with the existing extractor system.[47] McNeill made it clear that this rifle was still a prize possession many years after it was built.

Modern Commercial Actions (1967)

P.O. commented on the changing quality of American actions in general, noting, "… due to the modern trends which include the cost of production, the lack of skilled labor, and many other difficulties connected with the manufacture of any article such as a rifle. What I am trying to say is that all manufacturers have found it necessary to cut corners wherever they can without sacrificing strength and safety in order to stay in business.

"Then manufacturers of all kinds of products have indulged in expensive and extensive advertising claims which are aimed at indoctrinating the buying public to accept the things which many describe as a lack of quality and workmanship. This trend has proceeded to a point where all of the rifles and guns in general, made in this country, are simply production items.

"Skilled artisans, capable of making fine double-barreled shotguns and comparable weapons, have become nonexistent in this country and just because of this nonexistence, it is becoming a lost art. This is also the trend in European countries. Their cost is going up and skills are going down.

"From the standpoint of the custom gun maker, it is all to the good because there is still a large segment of the gun-buying public which is still conscious of fine quality and workmanship and if they want a gun which will generate pride of ownership, they have to patronize the custom gun maker."[48]

Winchester 71 and 86

In an article by Bob Hutton about wildcats in the Winchester 71 Ackley is quoted, "The M71, if properly assembled, is a fine, strong action, entirely suitable for these higher pressures, but don't include the older M86 in this category, because it does not have the strength that is necessary for such cartridges."[49]

Barrel Length

In Ackley's 1959 *Handbook for Shooters and Reloaders* there is a short description of a test to determine how much velocity is lost for each inch of barrel length. He started with a barrel 31-inches long and cut it 1 inch at a time recording the velocities from three different loads. All were loaded with 100-grain Barnes .257 caliber bullets, the chambering was a .250 Ackley Magnum. Powders tested were 4064, 4350, and 4831, loads were listed as maximum for the particular barrel used in the test. A quick calculation showed that the average velocity loss per inch of barrel was 58 fps.

This test is far from conclusive because it only utilizes one barrel in one caliber, and the details of the test protocol are not included. The cartridge used has the same capacity as the .25-06 Ackley Improved, within one grain by water weight. It does tell us a little about the fact that overbore cases are subject to greater loss of velocity than a case that is better balanced in terms of case capacity and bore volume. Phil Sharpe did a similar test and reported on it in the *American Rifleman* in 1950. His test utilized the .30-06 and seven different loads. He described his test protocol in detail, carefully tabulated his data, and graphed the results. In the Sharpe test it was found that velocity loss was much lower; only 12 fps average. So although this could easily be tested further and the current data string is too small to be conclusive, it does appear that magnum cases (overbore cases) experience a much greater fluctuation

in velocity in relation to barrel length than do cases that are not overbore.

Interestingly, Ackley edited this barrel length test out of his later editions of the *Handbook*. Perhaps he felt it was not a conclusive test.

P.O. mentions performing a powder vs. barrel length test for Jack O'Connor starting with a 30-inch barrel, shortening it an inch at a time, down to 18 inches. Ackley reported that IMR 4350 and IMR 4831 did surprisingly well in the short barrel. He stated that by his recollection IMR 4064 did the best of all the powders tested, meaning it had the smallest loss of velocity for inch of barrel removed.[50]

Comments on Stock Design

In Henry M. Stebbins' book, *Rifles — A Modern Encyclopedia* comments from a few prominent gun authorities were presented on the subject of custom stock design. Ackley had this to say. "We try to be flexible enough to furnish something the customer wants so that when he gets it, it will look like something he had in mind instead of something that the stock maker thinks it should. This is a very common fault with many inflexible stock makers because all of their stocks look as if they have been cast in a mold, regardless of whether some are light or some are large and heavy.

"I usually try to talk people out of ornate things like the ridiculous inlays that we have seen in some of the stocks, the very radical humpback Monte Carlos which are so badly out of place in a hunting rifle, and work on the theory that the stock can be beautiful and useful at the same time.

"I hate to have a beautiful piece of wood with a great deal of character and then throw a ridiculous inlay in the middle of it, or to carve it up in the ornate manner that we see in so many. To me, this indicates a lack of taste.

"We try to make the pull to fit the individual customer and the standard pull is approximately 14 inches, which would be entirely too much for women or smaller men. The rest of the universal stock can remain the same and fit a large percentage of the people.

"I still am at a loss to understand why the American stockmakers get the 'club' accent. They seem to think it necessary to have a pistol grip close enough to the trigger so that you have to turn yourself inside out to get a hold on it. This might be all right for the Bench Rest profession, but on a sporting rifle it is completely out of place.

"We also have this Monte Carlo complex, or sort of a monstrous creation with the comb slanting down or up or crosswise or what have you.

"I think that if some of these guys would try it out they would find that a straight stock without a Monte Carlo would not whip as much as these radical ones, thus making it more pleasant to shoot."[51]

Random Thoughts

The 1951 *Gun Digest* pictured an Ackley-built 98 Mauser with a full stock, high grade walnut, with a scope in an Ackley mount, and the receiver was completely covered in Damascening (jewelling). The rifle looked very much like what we call an American Classic today, in terms of styling.

Fred C. Ness reported in *Practical Dope on the Big Bore* that P.O. Ackley was among a long list of custom gunsmiths who had contemplated the idea of building a limited production single-shot action.[52] This statement was written in 1948, interestingly, for many years later Ackley became involved in The New Sharps Arms Company, which eventually sold out to Colt.

Ackley recalled a visit with Fred Barnes. "In 1940 I stopped there when he was in Bayfield and stayed around several days. We made the first tubing jacket bullet while I was there. They were .25 caliber. He had a .250 Gipson Magnum. We took the thing out to Animas Forks, which is around 11,000 feet elevation, where the rockchucks were really thick. The bullets worked fine, we were surprised because we had no idea how they would work at the time."[53]

Discussing the .450 Alaskan in a Model 71 Winchester he said, "Especially for the .450

conversion, it is necessary to weld a band to the forearm tip so that it extends over the barrel to prevent the magazine being kicked loose. The terrific recoil of the .450 is sufficient to yank the dovetail attachment of the forearm tip and magazine parts loose from the barrel."[54] Interestingly, this is how Harold Johnson modified the guns he built in this caliber when he originated it.

Henry M. Stebbins mentions in *Rifles — A Modern Encyclopedia* that P.O. Ackley was willing to make left-handed rifles based on the Mathieu Arms Co. left-hand action, which exhibited characteristics of the Springfield '03. The Mathieu was one of the first commercial left-hand actions made in the United States. Mathieu actions are scarce. Weatherby also used them prior to the introduction of their own Mark V left-handed actions.

Steve Fotou wrote to Dave Brennan at *Precision Shooting* magazine concerning P.O. Ackley. One quote in particular stands out in that letter. "Boy, if you only knew one third what that man has forgotten, you'd be the most knowledgeable person in firearms today."

Brownells gunsmithing supply still uses a quote from Ackley to sell their lathe files.

"LATHE FILES – 'The only way to file a barrel in a lathe – P.O. Ackley.'

"Heavy and stiff, with about twice as much slant on the teeth as a standard file. Produces a shearing cut on the lathe."[55]

Ackley was not afraid to turn away work if it was outside his area of expertise. In a 1966 sports page article from *The Lima News*, (Lima, Ohio) a shooter named Jim Wilkin sent Ackley a barreled action to build a 1,000-yard groundhog rifle. Ackley declined the work and sent Wilkin to a gunsmith who could do the work, Al Hoyer of Mifflintown, Pennsylvania.

Concerning working with Elwood Epps, Ackley says, "I don't think I have any data sheet on Epps necked down to .25. I don't remember whether I made the original reamer for him or not. But I did make some reamers for him for wildcat cartridges."[56]

A classified ad from the *Salt Lake Tribune*, September 23, 1957 read, "While supply lasts — 2 ½ X scopes with mount installed on rifle $24.95 and up. Bows and custom rifle. Made to order slings, scope mounts, loading tools, and dies. Bullets for big game, other shooting accessories. P.O. Ackley, Arbor Lane."

"In this business there is no 'expert' as exasperating as a Benchrester," Ackley once wrote. "They are nuts to start with. They don't expect to be pleased and they never consider their own ability. If they make a lousy score, it is never them to blame. I have always found it possible to work for normal human beings without catering to this bunch."[57]

Again referring to benchrest shooters, Ackley's letter to Dr. H. Henderson said, "I think this class in general are more or less psychopathic and adolescent in their whims and fancies, which change more often than the wind."[58]

"Not all gunsmiths have reamers for the 6mm Donaldson, however," said Bob Hutton in the 1962 *Gun Digest*. "P. O. Ackley, actually an advocate of decreased capacity cartridges, got together with like-minded Harvey Donaldson — the father of modern bench rest shooting — and made Harvey the first benchrest rifle in 6mm Donaldson; a day later I received the second."[59]

And as to the matter of gunsmithing costs and overall quality, no one ever said it better than Ackley himself:

"I have no quarrel with the man who has a lower price," Ackley said. "He knows better than anyone else what his product is worth."

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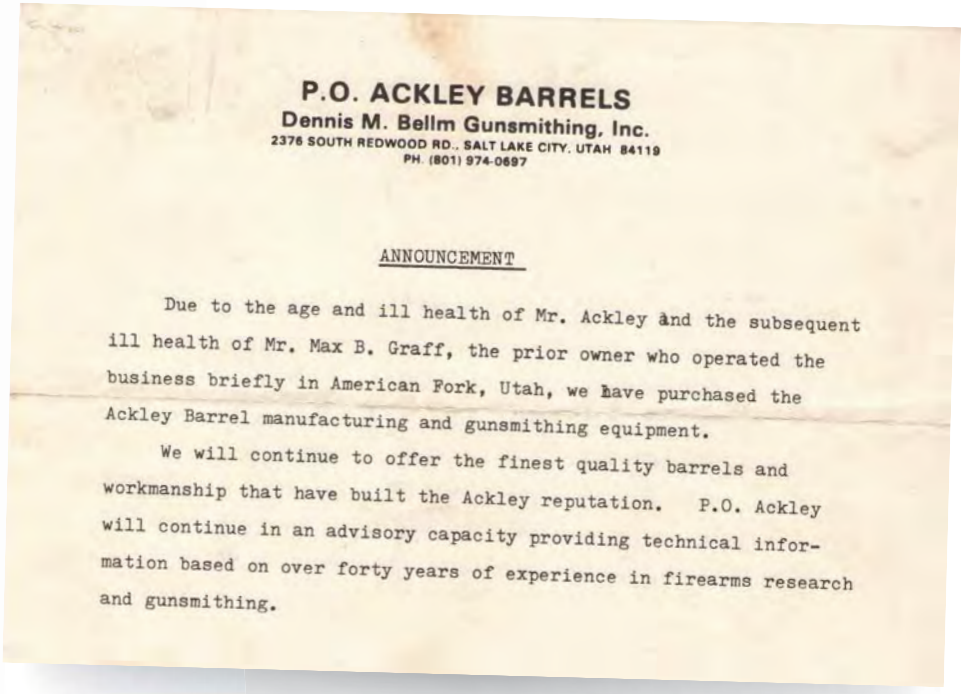
◄ Photo of the man himself, P.O. Ackley, from the collection of gunmaker Jerry Fisher. Fisher visited Ackley in the mid-1970s and remembers him talking about all facets of gunmaking. Making a living was a key subject in the discussion.

P.O. Ackley (left) with grandson Ron Pearson.

Author, Fred Zeglin (left) with Dennis Bellm (right).

◄ The limited edition Nosler Custom Rifle (NCR) is available in .280 Ackley Improved and two other standard chamberings — .300 WSM and .338 Win. Mag. — and is the top-tier rifle in the Ackley chambering from Nosler. The company's other M48 series rifles are also available in the popular .280 Ackley chambering.

▼ Dennis Bellm's announcement of his purchase of the P.O. Ackley business.

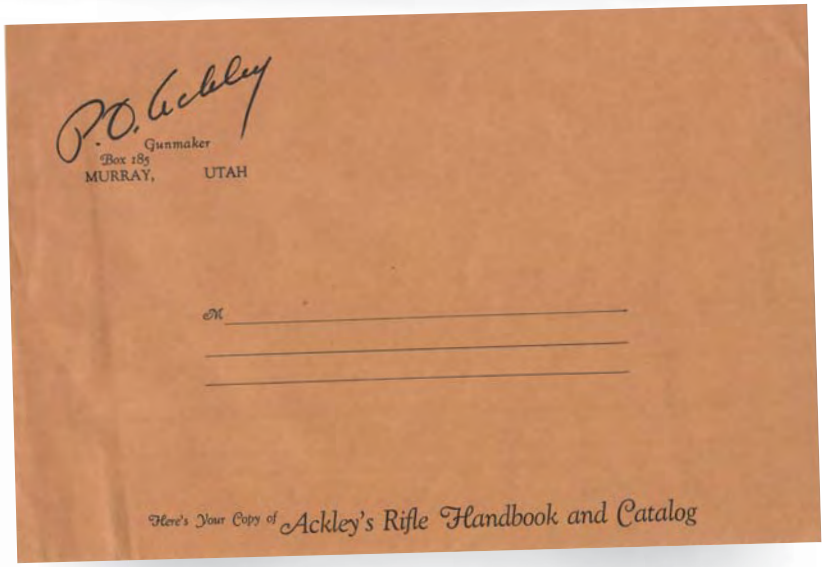


P.O. ACKLEY BARRELS
Dennis M. Bellm Gunsmithing, Inc.
2376 SOUTH REDWOOD RD., SALT LAKE CITY, UTAH 84119
PH. (801) 974-0697

ANNOUNCEMENT

Due to the age and ill health of Mr. Ackley and the subsequent ill health of Mr. Max B. Graff, the prior owner who operated the business briefly in American Fork, Utah, we have purchased the Ackley Barrel manufacturing and gunsmithing equipment.

We will continue to offer the finest quality barrels and workmanship that have built the Ackley reputation. P.O. Ackley will continue in an advisory capacity providing technical information based on over forty years of experience in firearms research and gunsmithing.



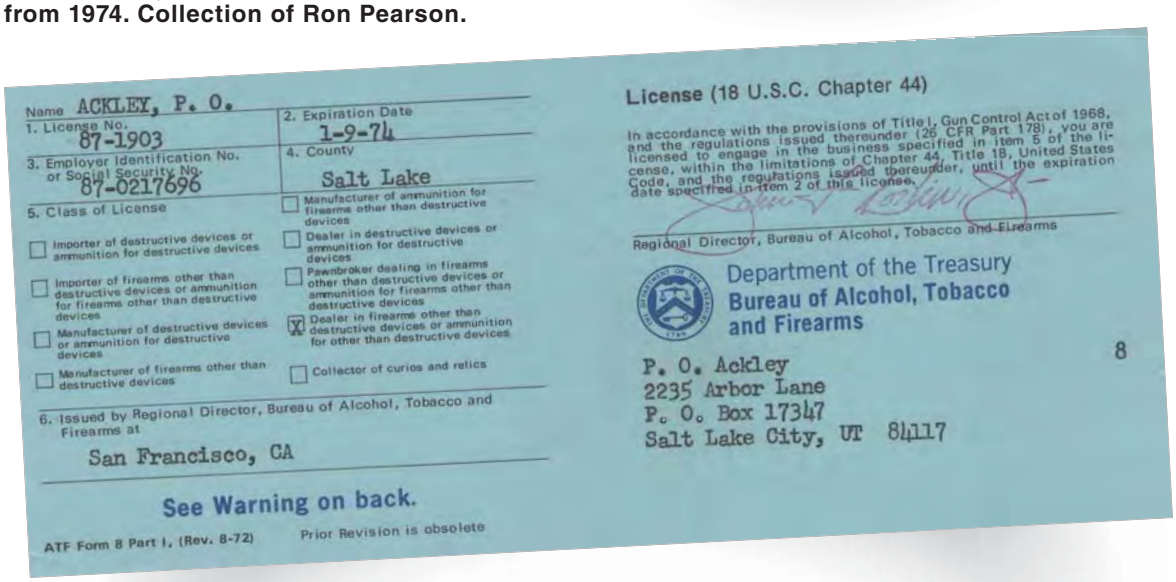
P.O. Ackley
Gunmaker
Box 185
MURRAY, UTAH

Here's Your Copy of Ackley's Rifle Handbook and Catalog

▲ Envelope used to mail the earliest edition of the Ackley *Handbook and Catalog*. It's likely the success of this early version of the handbook led to the books for which Ackley is now famous. These early handbooks are not copyright dated. From the collection of Ron Pearson.

◄ **Business Cards of P.O. Ackley.**

▼ **P.O. Ackley's Federal Firearms License from 1974. Collection of Ron Pearson.**



▼ **Ackley began marketing specialty work from the very beginning of his career in Oregon.**

★ SPECIAL CARTRIDGES ★

The illustration shows several special cartridges along with three well-known commercial loads for purposes of comparison; the three commercials being the .300 H. & H. Magnum, the .30-'06 and the .257 Roberts.

Nos.
1.—IMPROVED HORNET
2.—R-2 LOVELL
3.—IMPROVED LOVELL
4.—IMPROVED ZIPPER
5.—.22-250

Nos.
6.—.228 RIMMED MAGNUM
7.—.228 MAGNUM
8.—.257 ROBERTS
9.—.250 MAGNUM
10.—.270 MAGNUM

Nos.
11.—.30 MAGNUM
12.—.30-'06
13.—.270 NEWTON
14.—.30 NEWTON
15.—.300 H. & H. MAGNUM

THE "IMPROVED" HORNET

—is our own version of the Hornet and is a more efficient cartridge than the standard Hornet, being of a more modern design and having greater capacity. Factory loads can be fired in this chamber without trouble. Handloads can be loaded to considerably greater velocities than the standard type.

THE "IMPROVED" LOVELL

—is one of the latest versions of this popular cartridge. The capacity is about 2½ grains greater than the popular R-2 and the case is of a more modern design. Considerably higher velocities are possible with this one than with many of the earlier versions.

THE ".22-250"

—is probably the most efficient **light** bullet cartridge yet developed in the "Swift" class. Exceedingly high velocities can be attainted when loaded with light bullets. Velocities upwards of 4500 F.S. have been recorded. Fine with bullets weighing up to 55 grains. Almost any well-made standard action such as M/17 Springfield, M/98 Mauser, Etc., will handle this load without radical changes. This particular cartridge is known under several names and all are almost identical.

▲ **Close up of Bill Hause's rifle. Chambered in .224 Ackley Belted Express, it is a well- loved rifle still in amazing condition 60 years after it was built. Photo by Stan Trzoniec**

▲ **Cooper Rifles is yet another rifle maker turning out guns in Ackley chamberings, including this gorgeous Western Classic model.**

P. O. Ackley
160 Elm Street
Federal License No.

Gun Makers

[redacted] Incorporated
Trinidad, Colorado

Makers of
Ackley Barrels
Turner
Scope Mounts
Ackley
Magnum Rifles
Precision
Scope Mounting
Practical
Conversions
Relining
Barrel Blanks
Special Parts
Expert Repairing

Dear Sir:

We have had so many calls for information on work on the Japanese rifles that we found it necessary to get out this form letter, which will answer most of the questions that the average owner will ask.

There are two general types of these rifles---the 6.5 mm and the 7.7 mm. The 6.5 is popularly known as the .256, 25 or 6.5. These all apply to the same rifle. The larger caliber or the 7.7 is also known as the 31 caliber Jap. The 7.7 action is in no way as good as the 6.5 action. It is very crude and rough and not as well designed and there is no American ammunition available for it.

This can not be rechambered or rebored; the present chamber is somewhat larger than any standard American cartridge. The only solution is to rebarrel this action and normally it is not worth the cost of a new custom made barrel. Our price for rebarreling such an action is $60, but there are some gunsmiths who will fit military barrels and convert the action for 30-06 at a lower price. For those who wish to proceed with the conversion of the 7.7 Jap this is the best way. The 7.7 caliber barrel can be rechambered for the standard 30-06 cartridge, but it is not advisable because the chamber is slightly oversize. It can also be set back and rechambered for the 300 Savage. We attempt such work only at the owner's risk.

There are also some cast actions in this caliber and they are not to be used under any circumstances because they are simply made of the poorest type of cast iron.
The milled steel actions can be readily distinguished from the cast actions by the fact that the cast actions have the tang cast integral with the receiver and trigger guard.
The 6.5 Arisaka rifle can be rechambered for the 6.5 Mannlicher cartridge, at a cost of approximately $7.50, but this is recommended only to customers who have a supply of this ammunition on hand, because the American ammunition industries have discontinued the manufacture of this cartridge. The original barrel can be rebored and the action converted to handle regular standard 7mm Mauser cartridges at a cost of about $25. This action, being much better made and designed is usually worth a new barrel if the owner wishes to go to that expense. A Barrel fitted to this action is $50 and can be chambered for several standard American calibers such as the .257 Roberts or 7mm Mauser. The 6.5 action is too short for American calibers such as .270 Winchester or 30-06.

There is a small amount of action work necessary to make this action satisfactorily handle most American calibers and an additional charge has to be made for this work, which would run about $5.

No guarantee is made covering this action work, so far as reliability of operation is concerned, but normally the actions will feed cartridges such as .257 or 7mm without any trouble.

Any work that we accept is subject to our examination of the action and any reboring work has to be done at the owner's risk.

When shipping the rifle for rechambering or reboring, we appreciate it if the customer will send four or five loaded cartridges for testing purposes, because it is extremely difficult for us to obtain enough ammunition for testing purposes.

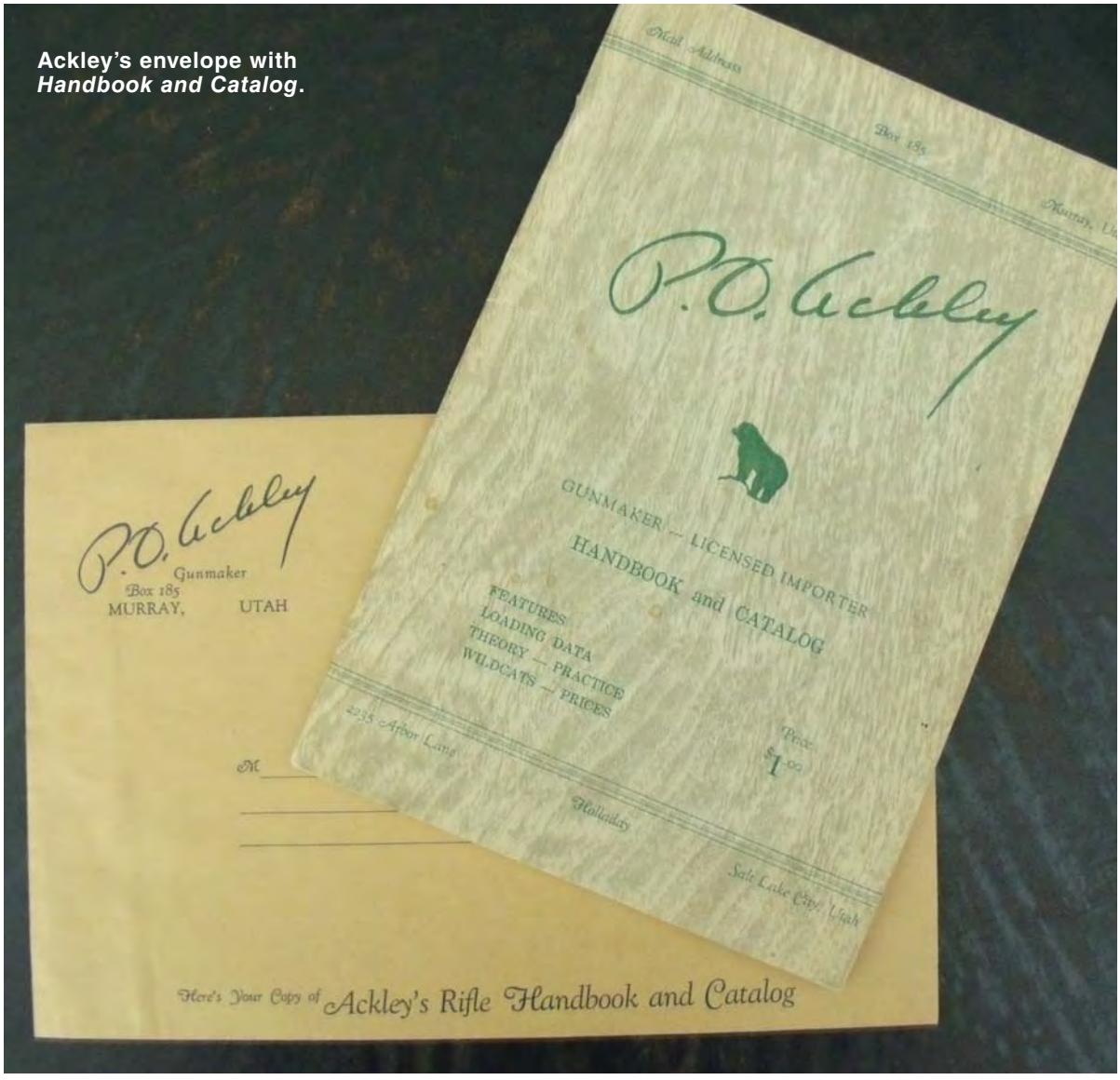
Very truly yours,

P. O. ACKLEY, INCORPORATED,

General Manager.

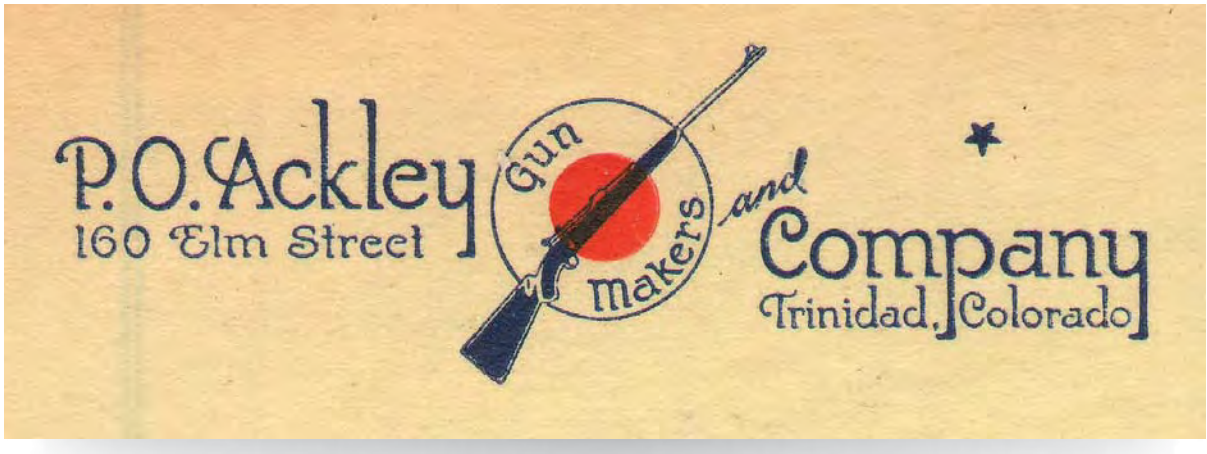
ajk

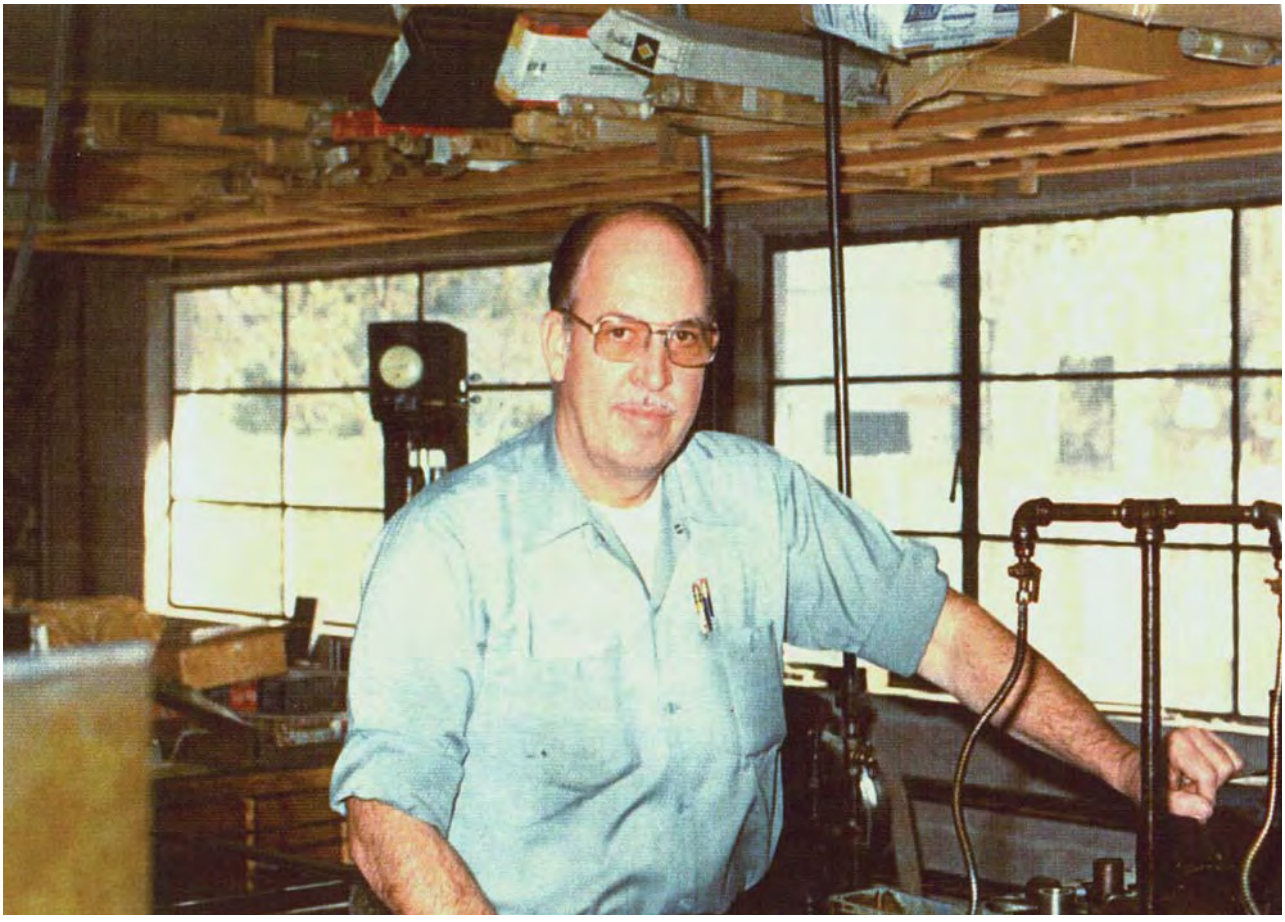
Form letter from P.O. Ackley, Inc. on the subject of Japanese rifles. Obviously they were receiving large numbers of inquiries on the subject of these guns as they were cheap and available.

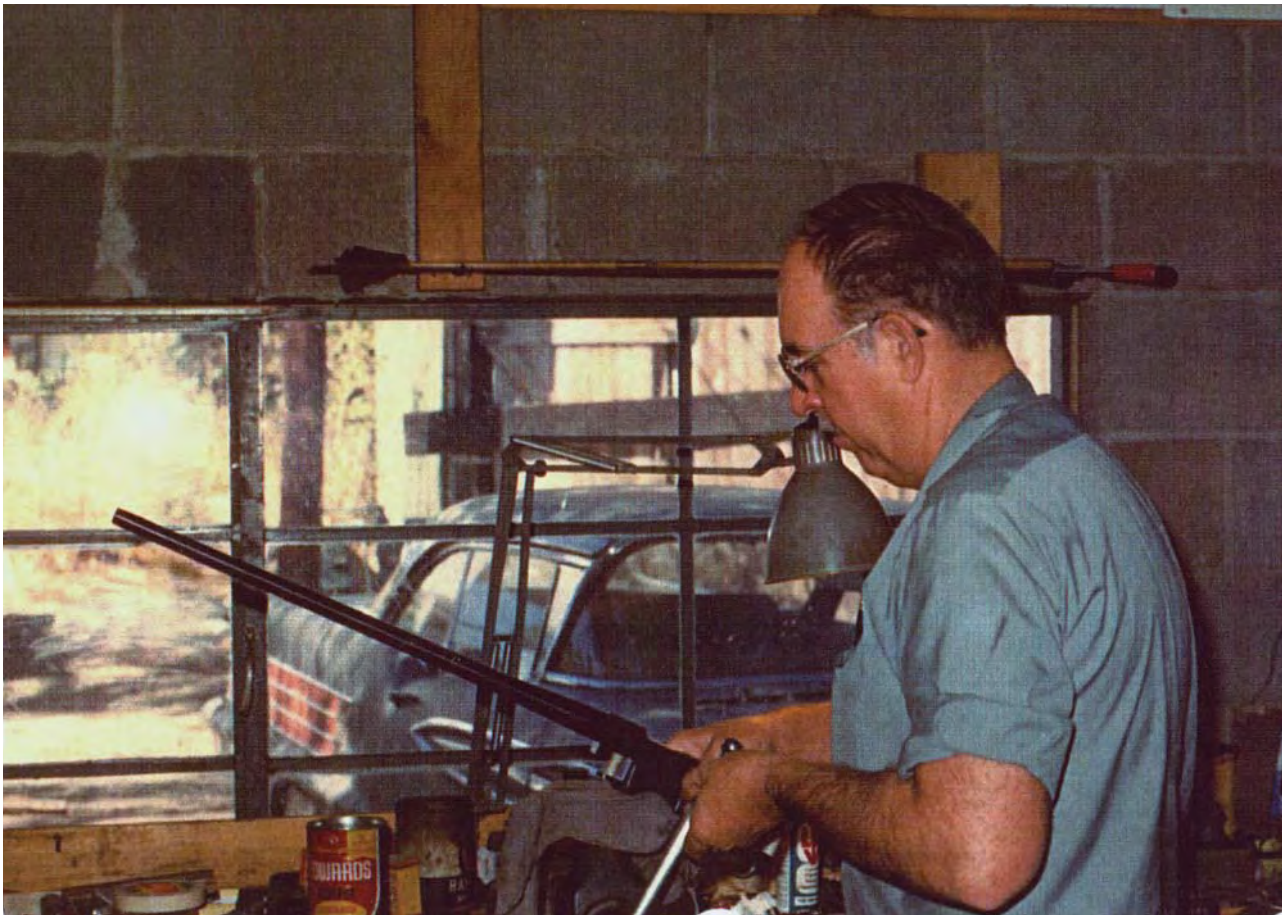


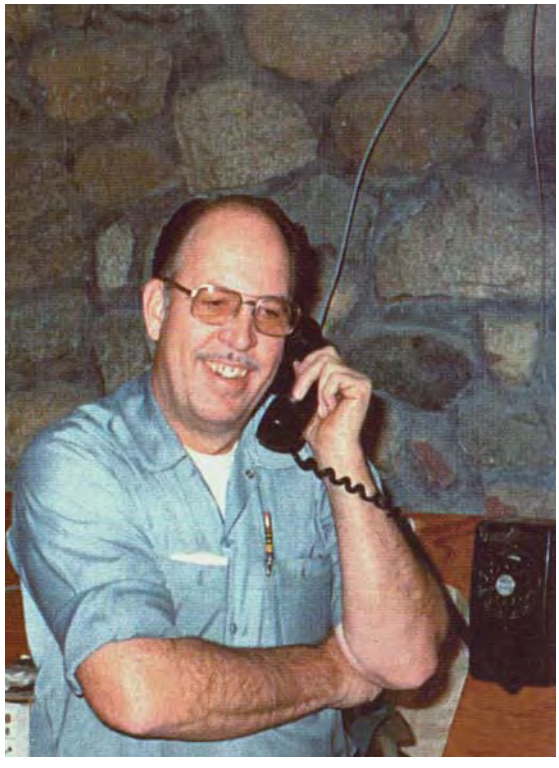
Ackley's envelope with *Handbook and Catalog*.

▼ **Letterhead logo from the early days in Trinidad. Collection of Ron Pearson.**









Bill Atkinson in his shop. Courtesy of Atkinson family.

P. O. ACKLEY

2235 Arbor Lane
Salt Lake City 17, Utah
Barrelmaker Tel. CR 7-1740 Gunsmith
Mail Address: P. O. Box 185 — Murray, Utah

Not connected with any company, individual or corporation.

TERMS

Please send no money in advance for gunsmithing or barrel work unless otherwise specified. Advance payments are asked for actions, scopes and other accessories.

TRADES

Used guns can be accepted as part payment on gunsmithing or custom rifles.

SHIPPING INSTRUCTIONS

Due to confusion with mail deliveries my MAILING address has been changed from 2235 Arbor Lane, Salt Lake City 7, Utah to P. O. Box 185, Murray, Utah. Murray is our branch of the Salt Lake City Post Office, although mail will be delivered to the above street address or simply addressed, Holladay, Utah, customers are urged to use the Murray address. EXPRESS SHIPMENTS: Express shipments should be sent to Murray, Utah. Express is handled much more carefully than parcel post and is a better method of shipping firearms, but slightly more expensive than parcel post. ALWAYS INSURE ALL SHIPMENTS.

VISITORS ALWAYS WELCOME

Arbor Lane is in Holladay, a suburb of Salt Lake City. The approximate location of Holladay is 2300 East and 4800 South. Telephone CR 7-1740.

SIGHTS AND ACCESSORIES

All standard sights, scope
sories can be furnished at
prices.

GUARAN

All work guaranteed. A
satisfactory will either be d
free of charge. All claims
be made within 30 days.

CORRESPON

Every effort is made t
spondence, but sometimes
letters are received daily
keep them from piling up
promptly answered, you
will be taken care of at t
It has also always been
tions for those interes
pertaining to them, wit
formation is kept as
possible.

RE-BARRELLING

(Calibers .22 to .45 — up to 26" long)

Chrome Moly Sporter Barrels made to customer's specifications, fitted to suitable actions furnished by customer $50.00

Ordnance Type Steel Barrels—

same as above $40.00

Prices include bluing the entire assembly.

Special Caliber Chrome Moly Barrels

Calibers .17 ..... $55.00
Price includes necessary action work

Calibers .450 and .475 Magnums $65.00
Price includes extra integral re-coil lug
Fitted to Enfield or FN Magnum Mauser actions

Convert Enfield Action to .450 ..... $15.00

.475 Magnum

BARRELS

RE-BORING

REBORING WORK CAN BE ACCEPTED ONLY AT OWNER'S RISK

Common re-bores such as .22 Hi-power to .25-35 or .30-30, .30-30 to .32 Spl., etc.... $15.00

Single shots, M86 Win. M95 Win. or Marlin Standard Bolt actions such as Springfield, Newton, Mauser, etc. 17.50

6.5 Jap to 7mm, .300 Sav. or .308 Win. 20.00

Re-bore and convert M99 Savage to .250-3000 or .300 Sav. 25.00

Re-boring is a very satisfactory way to put a badly pitted rifle back into perfect shooting condition. In most cases the barrel performs exactly as well as a new factory barrel. Since such work necessarily must be done with the customer's barrel, it is only undertaken at his own risk, but it is very seldom that such jobs do not turn out well.

RE-BLUING

Complete Rifle ..... 10.00 to 15.00
Pistol ..... 7.50 to 15.00
Shotgun ..... 10.00 to 15.00

●

GUNSMITHING

ENFIELD

Convert to upcock with speed lock 7.50
Mill ears, re-blue receiver 7.50
Cut off and re-crown barrel 2.50
Straighten guard and re-blue 3.50
Reduce depth of magazine 2.50
Convert standard Enfield to .300 Mag. using original barrel 18.00

MAUSER, SPRINGFIELD, etc.

Alter bolt for low scope, using new bolt handle 7.50
Furnish and install low line safety 6.50
Lengthen magazine 2.50
Install trigger adjusting screw 2.00
Re-chamber 6.5 Jap. to Spence Special 10.00
Re-chamber 7.7 Jap to .300 Sav., .30-06 or .308 Winchester 12.50
Re-chamber for Improved calibres (most bolt actions) ..... 10.00 to 15.00
Re-chamber for Wildcat or Mag. Cartridges ..... 10.00 up

●

Install scope mounts (price depends on make or type) ..... 2.00 to 10.00
Drill and tap for receiver sights ..... 2.00 up
Furnish and install scope blocks 4.50

SINGLE SHOTS

Re-barreling prices: same as others

Bush block and re-build extractor for high pressure cartridges ..... 7.50 to 10.00
Bend tang for pistol grip ..... 2.50 to 10.00

RE-LINING

A limited amount of re-lining work can be accepted. Quotations given upon receipt of description of work contemplated.

RE-STOCKING

Plain American walnut stock with cheek piece and pistol grip, made to customer's specifications, sporter type 40.00
Standard checkering ..... 15.00 extra
Fancy stocks, including Mannlicher type ..... 65.00 up
Bench rest stocks ..... 75.00 up
Send specifications for quotation.

Price list for P.O. Ackley in Salt Lake City, circa 1960. Collection of Ron Pearson.

P. O. Ackley
160 Elm Street
Gun Makers and Company
Trinidad, Colorado

DO NOT FILL IN THIS SPACE

Code No. .....

Date Received .....

Date Shipped .....

Customer's Name .....

.....

.....

Price Quoted

BARREL

Calibre ..... Twist .....

Length ..... Breech Diameter ..... Muzzle Diameter .....

ACTION

Make ..... Number ..... Model .....

CONTOUR of BARREL
(Use sketch if necessary)

.....

STOCK

Length of pull ..... Drop at Comb .....

Drop at Heel .....

SIGHTS

Scope—Make ..... Model ..... Power .....

Mounts—Make ..... Type .....

Iron Sights—Front ..... Rear .....

LOADING and SIZING DIES

Make of Customer's Tool .....

Seating Die ..... Sizing Die .....

Forming Dies .....

MISCELLANEOUS

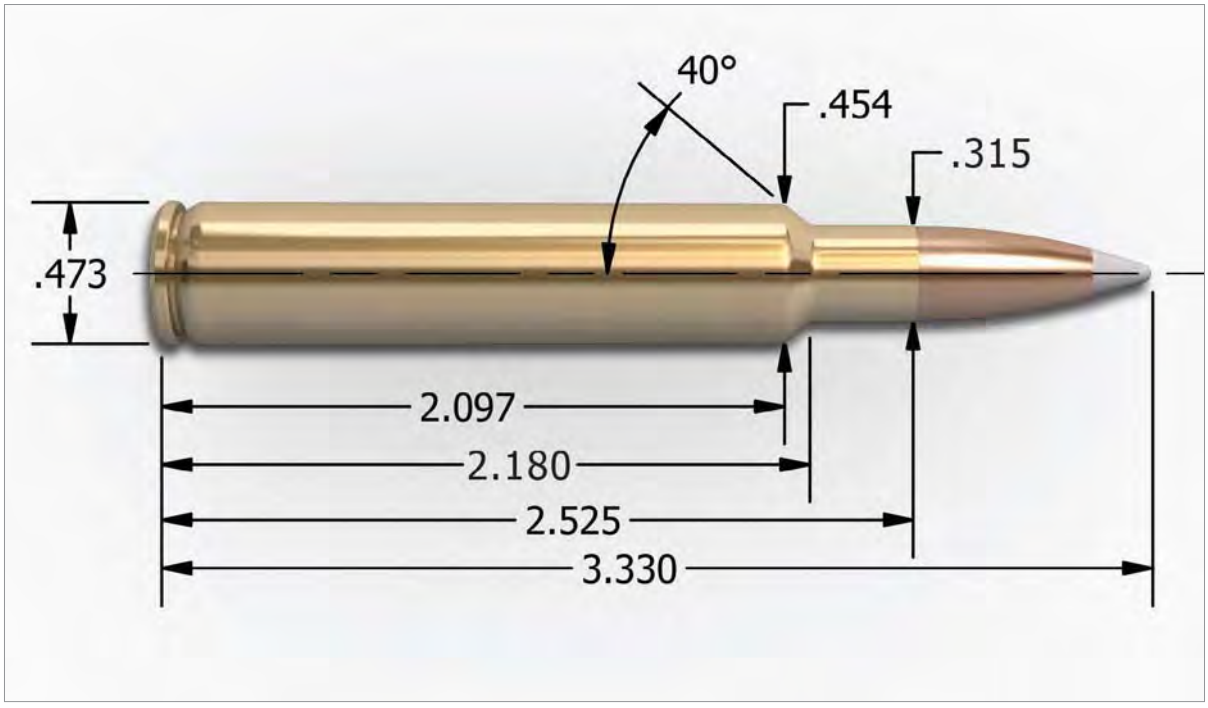
.....

.....

.....

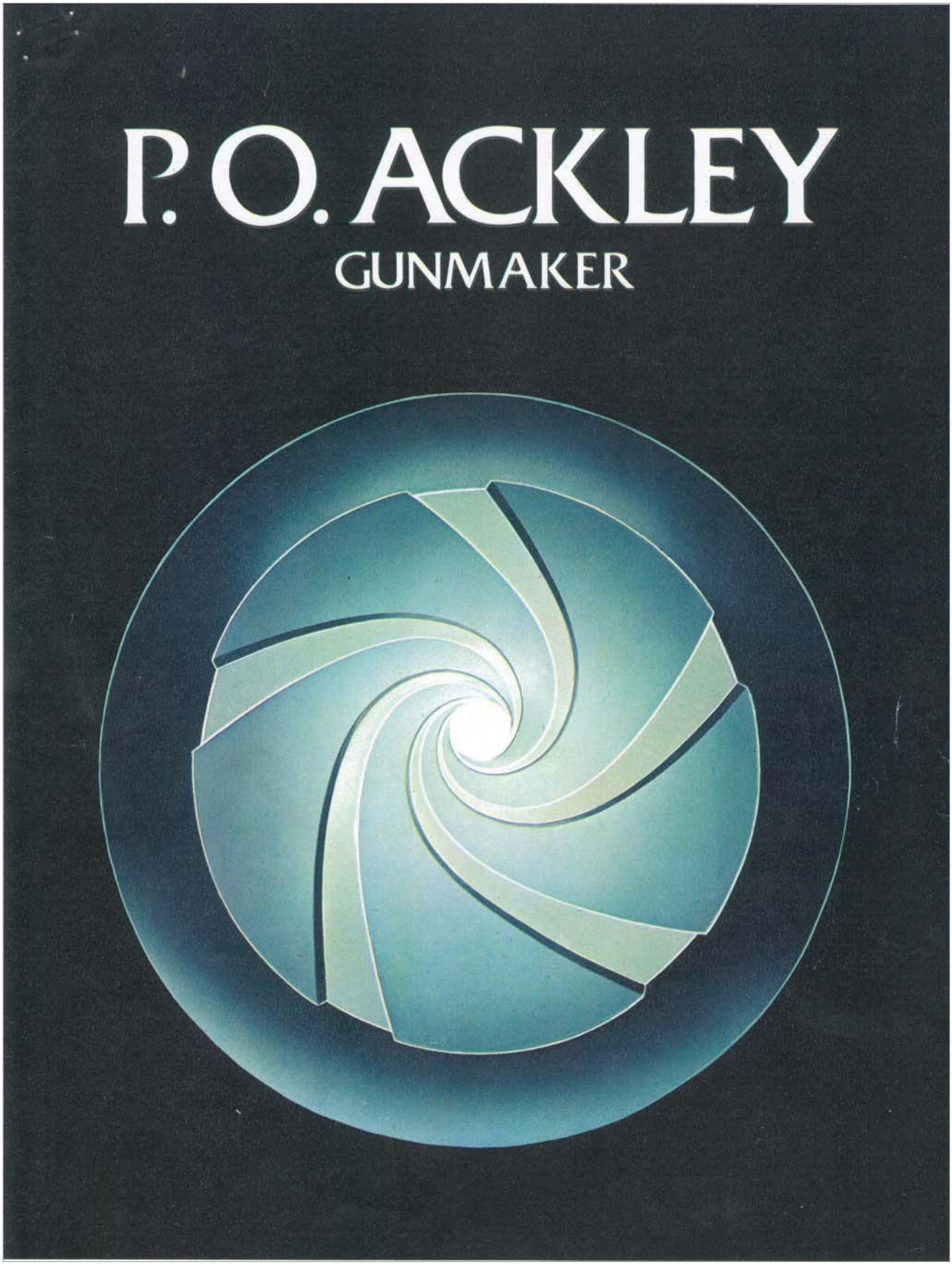
.....

P.O. Ackley and Company order form. This was the form used in-house to track and complete orders. Collection of Ron Pearson.



Cartridge dimensions for the .280 Ackley Improved. Courtesy Nosler Ammunition.

In addition to their Trophy and Match Grade lines, Nosler Ammunition is offering custom loadings in .280 Ackley Improved.


P. O. ACKLEY
GUNMAKER

P. O. Ackley

World's renowned gunsmith creates an extremely fine line of rifles in several calibres for EMDEKO with the accent on Craftsmanship.

P. O. Ackley has been in the gunmaking business for over 43 years. He has served as a technical advisor for the Army Ordnance Department, as an instructor in the theory of arms production and metallurgy at Trinidad State Junior College, and has carried on experimental work on arms manufacturing. He has also served as an advisor on ballistics and related high velocity tests for the space program.

He is the author of numerous articles and books on ballistics, manufacture of component arms parts, and wildcat cartridges. His **Handbook for Shooters and Reloaders** (Volumes 1 & 2) serves as a bible for avid loaders. Currently, P. O. Ackley is technical editor for **Guns and Ammo** and gunsmithing columnist for **Shooting Times.** Through his expertise in detail wind drift, pressure problems, loading techniques, headspacing, bore capacity, and strength of military actions, he has now developed for EMDEO International the P. O. Ackley Custom Rifle, the finest sporting rifle available today.

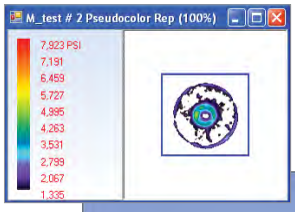
- All rifle receivers drilled and tapped for Scope mounting
- Iron Sights not available
- Scope, Rings and Mounts are optional

5448 Riley Lane
Salt Lake City, Utah 84107

EMDEKO Scopes shown in this brochure are also available from your local EMDEKO dealer.

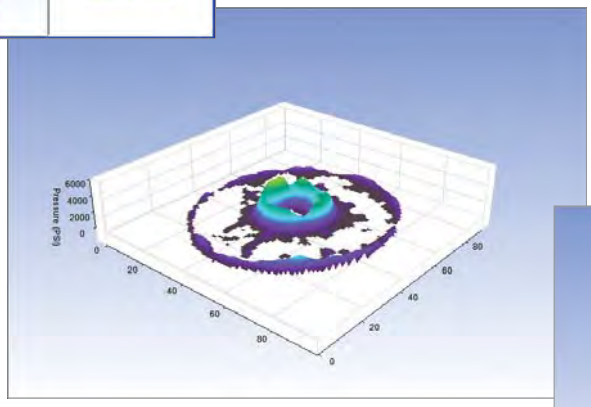
Prescale Tactile Pressure Indicating Film Tests

See Chapter 15 for details of bolt-thrust tests

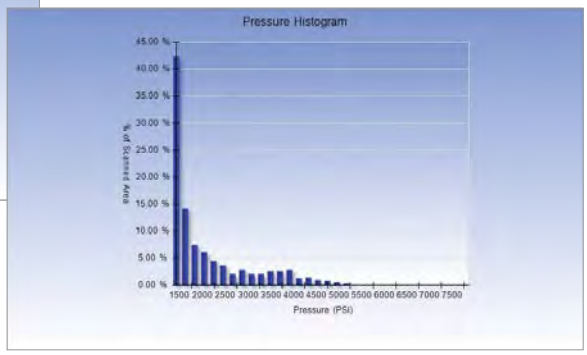


◄ This image provides a straight-on view of where the pressure was applied to the breach of the test gun.

▼ Shot fired at approximately 42,000 psi chamber pressure with .000-inch headspace and a dry chamber. This is how the film appears when it comes out of our test gun. Note: Only the primer actually registered any pressure.

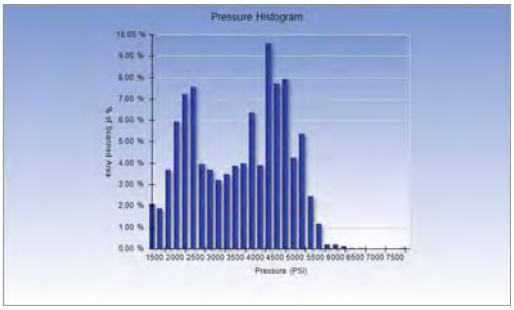


▲ This image shows pressure by graphing it from zero to the maximum registered amount.

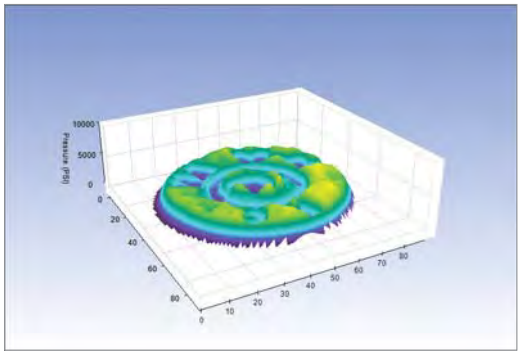


▲ This chart tells us how much of the area scanned registered at any given pressure. It should be noted on all of these graphical representations that the outer ring is essentially noise caused by the cutting of the film.

◄ Shot fired at approximately 42,000 psi chamber pressure with .000-inch headspace with oil in the chamber. Same ammunition as used in the previous test. This is how the film appears when it comes out of our test gun. Note: The entire head of the case engaged the film.



▲ This chart tells us how much of the area scanned registered at any given pressure.



▲ Image depicts pressure by graphing it from zero to the maximum registered amount. When the case was not able to adhere to the chamber much more pressure is exerted on the bolt face.

CHAPTER 12

THE WRITER

P.O. Ackley was a self-promoter.

Contrary to what many people think, that is not a bad thing. In Ackley's case, he promoted in a way that many folks would overlook, advocating wildcats in general thus by association drew attention to his own work. When you're in business it is important to learn to blow your own horn, because quite honestly nobody else will. Ackley seems to have understood this lesson better than most gunsmiths, though he did it in a soft-spoken manner … for the most part.

Anna Konuges-Floyd worked for P.O. as a secretary during the Trinidad years and said of him, "He was not a seeker of notoriety. P.O. was a very low key man, dressed like a peasant. Every night when we finished dictation, everyone left at the shop would go to the café for a cup of coffee and to visit, Ackley included."

Ackley wrote in 1963, "Naturally I do not expect everyone to agree with all of my opinions but on the other hand I try to give an honest answer to all questions and usually I have good reasons for these, otherwise I wouldn't give them."[1]

"Throughout any conversation with this man, and notably in his text, *Handbook for Shooters and Reloaders*, his most becoming sense of modesty prevails," wrote Col. Charles Askins. "Indicative of Ackley's modesty are his comments about the 6mm Ackley Magnum, he says, 'this is another overcapacity cartridge which in no way compares to the .243 and 6mm Rem. in their various versions. The case is made by shortening and necking the .300 H&H brass to accept the 6mm bullet. The 6mm Mag., I'd not recommend. It is inefficient, hard to make, and it lacks flexibility.' Ordinary, pride would prevent a fellow being quite as honest as this."[2]

Almost every serious reloader, or wildcatter will have the two-volume *Handbook for Shooters & Reloaders* that Ackley penned. Volume I was originally published in 1962. Of course at that time it was not yet known as Volume I. It appears that the first edition had a red hard cover with gold lettering. Later hardcovers had a black leather with gold lettering. In 1966, the second volume was published for the first time.

In November 1965, *Guns & Ammo* printed one chapter from Ackley's then upcoming Vol. II book, presumably to help one of their staff writers with the sales of the work. The chapter printed was "A Few Causes of Blowups." Publishing this chapter also lent credibility to P.O. Ackley, in effect saying to the reader: This guy is worth reading, he knows what he is talking about.

Ackley's "Just Out" ad appeared in the May 1966 *American Rifleman*. Just one month earlier in the April issue of that magazine, Volume II of the *Handbook* was reviewed by William Dresser. Even in this early review of the book Dresser made a point that he thought many of the loads were unsafe and warned the reader to be careful.

Typos were a featured subject in the review. In a letter from P.O. to Bruce Hodgdon, of Hodgdon Powder, Ackley points out that errors in the first volume were to be corrected

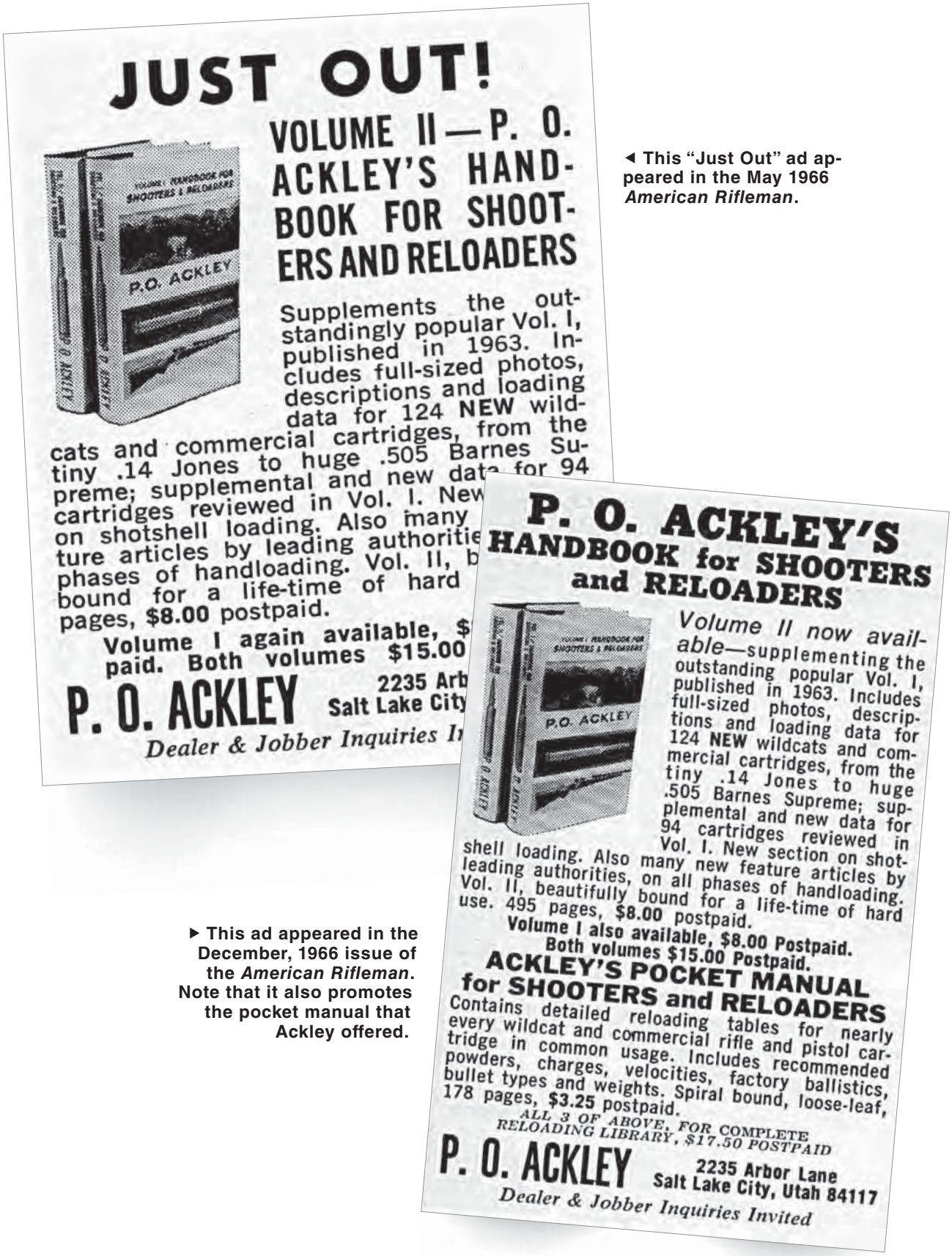
These are the more commonly known books of P.O. Ackley. He produced sales pamphlets prior to the early versions of the *Handbook*s for which he became famous.

for all subsequent printings. Apparently an errata sheet was included with books to notify the reader of any important errors. Ackley cared about providing correct information as this letter showed, so later printings would have likely had all known errors corrected.

Dresser in his review stated that he felt a large part of the value of this book was the vast amount of compiled load data for standard calibers. Considering that in the mid-1960's there was a limited amount of load data available it is easy to see why he drew this conclusion.

Over time it has been the wildcats and the snapshot of history that these two books provide that have made them so popular and valuable to reloaders, gunsmiths and shooters of all persuasions.

Prior to the well-known 1962 and 1966 editions of the work, there was a 1959 version bound with a plastic comb, with card stock covers, which was 156 pages and contained many of the same articles that would later appear in the 1962 Vol. I. The First Edition of the *Handbook for Shooters and Reloaders* had a yellow cover with a bolt-



◀ This "Just Out" ad appeared in the May 1966 *American Rifleman*.

▶ This ad appeared in the December, 1966 issue of the *American Rifleman*. Note that it also promotes the pocket manual that Ackley offered.

action rifle, angling the muzzle of the gun toward the spine of the book. That same year, 1959, Belding and Mull, a reloading tool company, produced a new loading manual. Unfortunately it had a yellow cover with a bolt-action rifle on it as well. Although not identical, they looked similar enough that Ackley must have seen a need to differentiate his book, especially since Belding and Mull had a bigger advertising budget.

There is an Ackley *Pocket Manual for Shooters and Reloaders*. As you might imagine, it is a smaller format than the *Handbooks*. Two styles of bindings have been reported — the earlier editions were bound with a metal spiral. Others were assembled with a plastic comb binding. The *Pocket Manual* contains less articles and is centered more on load data, it is copyrighted 1964. Like the 1959 *Handbook* the manual contains the complete dimensions for Ackley's wildcats and many others.

Prior to the 1959 release of the *Handbook*, P.O. Ackley published a *Handbook and Catalog*. This precursor probably proved to him that there was a market for a handbook that included reloading data for the myriad of wildcats that were prevalent at the time. The catalog had a few articles that you would recognize from later handbooks, but the latter half focused on Ackley's cartridges and provided a price list for the work done in his shop.

In 1956, he told Vickery that he had "sold nearly 400 out of the first 1,000 handbooks printed without any announcement in the magazines."[3] He was soliciting ideas from Vickery for an expanded edition of the handbook in the same letter.

Ackley's last book was published in 1969 by Stackpole books, *Home Gun Care & Repair*. This book was written specifically with the novice gun owner in mind. The material covered would help a new shooter get a head start on what can be a complicated hobby. A description from the dust jacket in part says, "P.O. Ackley, one of America's leading technical experts, shows the average gun owner what he can and cannot do safely and adequately at home."

"This is certainly not intended to be any sort of gunsmithing book, a brand to which I would most strenuously object," Ackley says, "*Home Gun Care & Repair* grows out of, and fulfills the need for adequate advice about, the gun owner's desire to make minor repairs, adjustments, and improvements not requiring great technical skill and large investments in time and tools."

Such books had a great deal more audience in the days before the Internet. The availability of good technical advice was limited to what you could find in print.

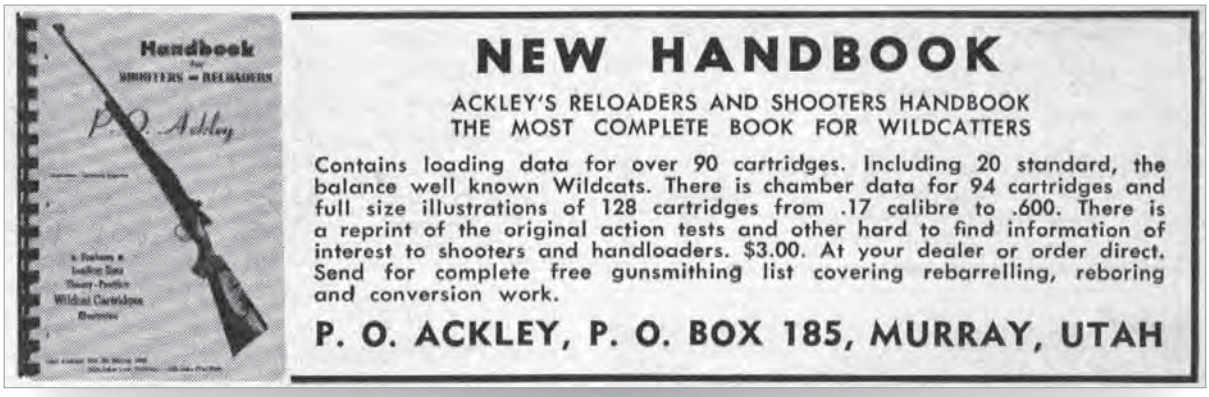
Ackley was well aware that while his opinion carried weight with some readers, there were still more who would have their own strong opinions. In a response to a reader of *Guns & Ammo* in the March, 1965 issue P.O. wrote, "The best varmint cartridge ever developed." He had this to say: "If I were to tell you what I believe is the best varmint cartridge ever developed, I would probably have 1,000 gun cranks on my neck because they would have entirely different ideas. My own opinion is that it is hard to beat the .22-250, which was originally designated the .22 Varminter by Jerry Gebby of Dayton, Ohio."

Handbook for Shooters and Reloaders, Vol. III

Handbook for Shooters and Reloaders, Volume III will probably never be published. In researching this book it was learned that M.L. McPherson had edited the manuscript for the third volume. He said, "It is a much more personal book than the earlier volumes, in some ways a memoir." In Ackley's letters to Bevan King he mentions that the book would focus a great deal on barrel making for the one man shop. Ackley understood that there would probably always be guys who wanted to make barrels on a small scale. Much of the technology in the firearms trade is changing rapidly these days, but barrel making is still a pretty low-tech part of the business, well suited for the one man shop.

Ackley was working on the manuscript for Volume III for many years and right up to the time of his death. He wrote concerning

First Edition of the *Handbook for Shooter and Reloaders.*



it, "We are getting along with the book fairly well. But I have found it necessary to ask for an extension of time on that deadline of June 1st because I am just about pooped out on it."[4] According to the publisher it was supposed to contain photos and drawings not previously published. It should be interesting reading if it ever comes out.

In a letter dated 1983 to Anna Konuges-Floyd, P.O. stated, "I spend more time in the garden than I do in the shop. I have an idea I will quit entirely as soon as I can get this book finished. I am finally making some progress on that, after that, I am hoping to find some time to play. I have the correspondence pretty well cut down, mostly it's just for information. As you know I have been a world source for information and I will never live long enough to get rid of that."

In another letter while sending a set of books to Anna, P.O. referring to the covers on the softbound editions said, "I don't like the covers on these at all, the next batch will be regular bound black cover. I have been working on the third volume lately, I hope we can get it done soon as we have sold about one hundred thousand of these others."

Not Just Books

P.O. wrote columns for *Guns & Ammo* and *Shooting Times* magazines. He started writing for *Guns and Ammo* around 1960, offering technical advice in a question and answer format. He wrote the Gunsmith Column for *Guns & Ammo* until 1974. In the November issue for that year he is listed as the author for the column, but J.B. Wood was the actual contributor for that month. In the December issue, Wood is listed as the Gunsmith Column author. Wood explained, "In 1974 P.O. was doing 'The Gunsmith' for both *G&A* and *Shooting Times*. This was a little weird, as these publications were fiercely competitive (if you wrote for one, the other would not accept your articles!). For P.O. Ackley they obviously made an exception. In mid-1974, P.O., who was growing older, told *G&A* he could no longer do the column for them. They called me and I did the column from November 1974 to January, 1982."

In *Shooting Times* letters from readers, the section titled "Times Flyer," October 1962, a J.D. Tanner of Jamestown, Colorado wrote in: "After some twenty years in the gunsmithing field, I feel I can pretty well judge your articles for accuracy. Parker Ackley is tops and knows his business — always gives proper answers to queries."

Ackley's columns graced *Shooting Times* from the inaugural issue in March 1960 — an article called "Those Tricky Barrel Steels"— until 1981. His final column for the magazine ran in the January issue 1981. So, for twenty years he was "The Gunsmith" to countless readers. According to J.B. Wood, "In 1981, P.O. Ackley told *Shooting Times* that continuing a monthly column was just too much

Revised cover, 1959 *Handbook for Shooters and Reloaders*.

trouble. The *Shooting Times* people called me, so for the second time I took over from Mr. Ackley. As they say, a hard act to follow!"

In a letter to a friend, Ackley wrote, "I took on another magazine column lately which I shouldn't have done. But they begged so hard that I gave in. This magazine is a new one called *The Gun Journal*. It looks as though it may be a success. Anyway they are a lot easier to work for than any of the others I have ever written for. One of the reasons is that they agree with me in that all the letters that are sent in for information should be answered."[5] It is likely that these comments refer to *Handloader*, *Ammunition Reloading Journal* and *Rifle Magazine*, by Wolfe Publishing. Ackley remained on the masthead of this publication from its inauguration up to the 31st issue, retiring from it in early 1970.

When Brownell's Inc. wanted to publish a new book called *Gunsmith Kinks*, a collection of useful how-to tidbits for gunsmiths, they turned to Ackley for some help with information on headspacing cartridges properly.

Ackley was a founding member of the American Reloaders Association (ARA). The organization came into being in 1963. On the masthead of their newsletter it was described as "A Non-Profit Corporation Dedicated to Ballistics Research and Development." Its newsletter, *The Bulletin*, was edited by Dean A. Grennell, a gun writer and editor for *Gun World* magazine for many years.

In Ackley's *Pocket Manual for Shooters and Reloaders* he included the following.

An Introduction to the American Reloaders' Association

By Dan Cotterman, Executive Director

Early in 1963 plans for an association of reloaders began taking form. The objective of such an organization would be to unite amateur and professional reloaders and ballistics experimenters for the purpose of an open exchange of ideas and experimental results. A monthly A.R.A. Bulletin was instituted as a vehicle for this free exchange.

In addition to existing as a unifying force for the advancement of reloading, initial planning included a design for providing reliable information to each member. In order to include every facet of reloading activity, a Technical Advisory Staff of experts was assembled, this adding a necessary element of authority to the forum.

The need for an organization that would be able to perform specific services for reloaders and grant them individual recognition under their own banner had long been apparent. It was a need common to many thousands of people who were not "… just shooters," but shooters who were discriminating enough to

The *Belding and Mull Handbook* (1959) looked too similar to the Ackley book, thus future covers of Ackley's handbook were changed.

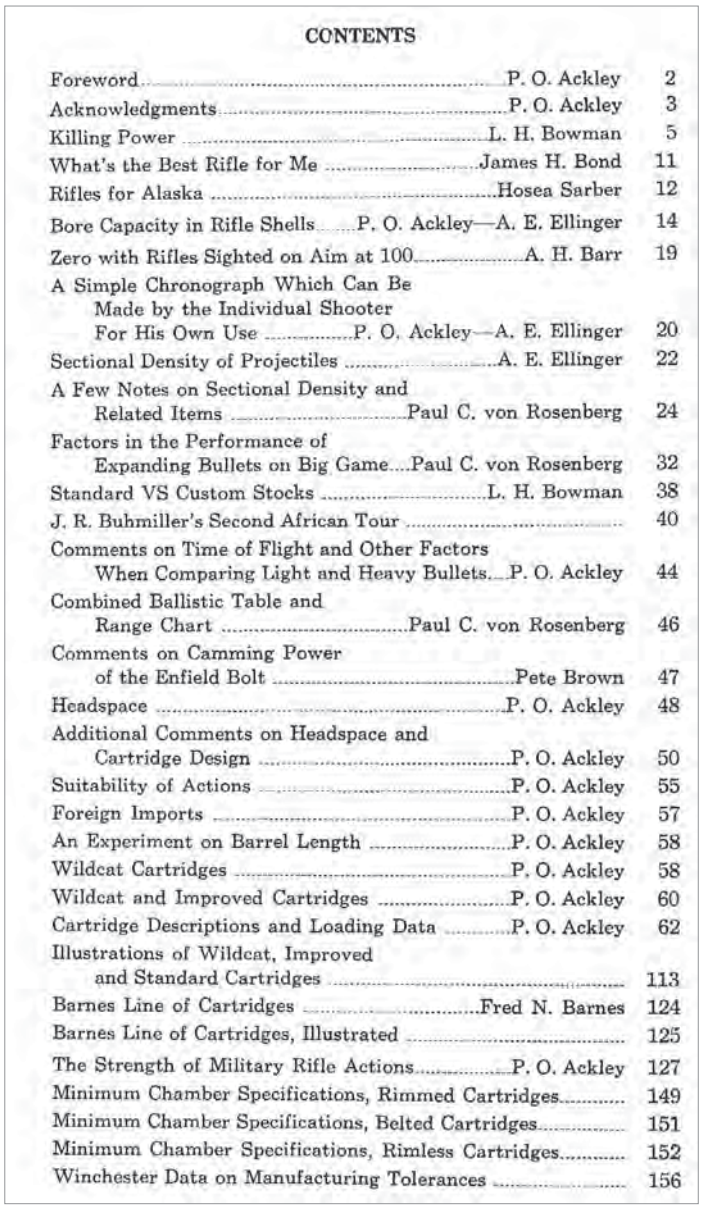
want to tailor ammunition to gun and purpose, for improved performance!

The American Reloaders' Association has enjoyed wide acceptance and approval through its young life. It exists today as a vigorous, enthusiastic organization of beginning and advanced reloaders alike, who are taking an active part in its growth and planning for the future.

The function of the A.R.A. has by no means been limited to providing information. Indeed, the advancement of reloading and shooting encompasses the preservation of the basic American right to keep and bear arms! In this area, the A.R.A. has been constantly active in its opposition to proposals to legislate against reloading and shooting.

The American Reloaders' Association is justifiably proud of its distinguished staff of technical advisors. These men have dedicated their services through frequent contributions to the monthly A.R.A. Bulletin and through a willingness to answer questions on reloading and ballistics from within the growing A.R.A. membership roster. Their names are listed in alphabetical order: P.O. Ackley- gunsmithing, barrel making, cartridge design; Rolla B. Boughan- advanced ballistic theory; Dr. Edgar L. Eichhorn- advanced ballistics theory; Dean A. Grennell- practical reloading for rifle and handgun; Jim Horton- shotshell reloading and shotshell reloading tools; Homer S. Powley- ballistics, all phases; George N. Vitt- shotgun slugs, reloading tool design, cartridge nomenclature. There is an overlapping of the categories of specialization listed in connection with these names… none of the experts is limited to specific areas of reloading. Rather, their flexibility reflects the versatile nature of the A.R.A. in its vital ability to mold itself to the needs of the Membership!

This author heard the A.R.A. described as the equivalent to an early version of an Internet message forum. Members wrote in with ideas or questions and either other members, the advisors, or the editor would answer. As an advisor, Ackley would occasionally provide answers to



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There are a few articles that did not make the cut in the 1962 edition. The best way to illustrate this change is to compare the table of contents from the 1959 edition (pictured here in this chapter) with a later copy of *Handbook for Shooters and Reloaders, Vol. I.*

some of these questions. Also from the few copies of the newsletter this author was able to locate it appears that excerpts of personal letters that pertained to guns and reloading were occasionally printed. Research has not turned up the date that this organization ceased to exist, my copies of the newsletter are from 1970 through 1972.

In the April 1972 issue of *Guns & Ammo* P.O. delivered a feature article on converting 98 Mauser actions for sporting use. He obtained samples of most of the available military actions at that time and tested them for heat treat as well as discussing the mechanical differences. He seemed very much taken with the Siamese Mauser because it will accept rimmed cartridges like the .45-70 and the .348 Winchester. Indeed, he was a proponent of having 98 Mauser actions re-heat treated for strength. A limited amount of discussion covered accuracy problems with the Mauser action and how to diagnose them. The overall purpose of the article was to explain what is required to make a useful and attractive sporting rifle from a surplus 98 Mauser action.

In researching for this book the author read an untold number or old *Guns & Ammo*, *Gun Digest*, *American Rifleman*, *Shooting Times*, and *Handloader* magazine issues specifically looking for the words of P.O. Ackley. One thing became obvious — Ackley was a generous and loyal friend. He often recommended gunsmiths who had worked for or with him over the years. Whenever a question arose that he thought one of these gunsmiths could deal with he recommended their services to the public.

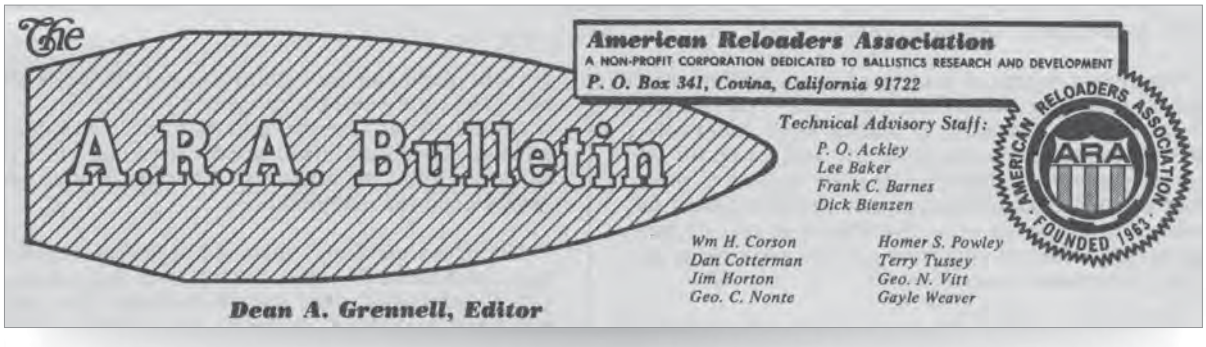
Words of Wit and Wisdom

P.O. Ackley was careful about the words he published for the general public verses the comments he might write to a friend. A few examples of these comments come from his private letters written to friends and acquaintances.

For example, on large capacity magnums he declares, "Of course, these big ones make more noise and they would be highly efficient if you could scare animals to death."

"If you look through my Volume I book

Masthead from the American Reloaders Association (ARA) newsletter.



you will find that about 2,800 fps is about all anyone has been able to get out of a .35 caliber 250-grain bullet, regardless of what case is used," Ackley wrote to Bevan King. "So anyone claiming 3,400 is either using some highly specialized system or he is a liar. And I am pretty much of the opinion that the latter is correct."[6]

Discussing extreme rifle accuracy he wrote to a friend that, "There are not a very high percentage of the shooters who are able to shoot like that no matter how well the gun is made or how accurate it is. I have noticed that some benchrest shooters or target shooters would shoot fifteen or twenty groups and then throw away all but one and then they would brag about their rifle being able to do that every time. You should have seen some that had been thrown away. The more rabid they get on the accuracy kick the more psycho they become."[7]

"I have been making barrels for forty-four years or more and I don't know half as much about it as someone who has been at it four years,"[8] said Ackley to a friend.

"I don't think Elmer Keith would be caught dead hunting with anything smaller than a .300 Magnum. And he used to tell me that was about minimum for deer. For other stuff he starts up from there. Of course, if you figured things proportionately guns for moose or bear; the gun would probably be at least 37mm,"[9] Ackley wrote.

On property tax, "When I sold the land out back I intended to fix up the house. When we moved to Holiday in 1951 … taxes have gone up so much that I am just letting the joint fall down. If I do any work on it they will come around and reassess it. Like everywhere else we have a surplus of public parasites."[10]

1 Ackley, P.O., "The Gunsmith," Guns & Ammo, October 1963
2 Askins, Col. Charles, "America's Greatest Wildcatter," *American Rifleman*, November, 1980,
3 Ackley, P.O., Letter to W.F. Vickery, July, 1956
4 Ackley, P.O., Letter to Bevan King, May 24, 1982
5 Ackley, P.O., Letter to Bevan King, March 27, 1981
6 Ackley, P.O., Letter to Bevan King, June 5, 1980
7 Ackley, P.O., Letter to Bevan King, Mach 27, 1981
8 Ackley, P.O., Letter to Bevan King, December 1, 1981
9 Ackley, P.O., Letter to Bevan King, December 31, 1976
10 Ackley, P.O., Letter to Anna Floyd, 1980

CHAPTER 13

CHAMBERING FOR ACKLEY CARTRIDGES

> *The only wildcats worth considering are those that will accept factory ammunition in the same chamber, as exemplified by the Ackley Improved .257 Roberts…*[1]
>
> – *Fred Ness*

Did Ackley invent the fireformed chambering process? Probably not.

He did not make any such claim in all his writings, in fact he mentions the fact that others were experimenting with similar designs. He was probably not the originator but he was definitely the guy who popularized it, and more importantly you might say P.O. Ackley standardized the improved cartridge concept.

After some trial and error he came to conclusions about what degree of body taper was necessary for reliable extraction, and what shoulder angles worked best. Ackley was of the opinion that a shoulder angle of 28 degrees was optimum for efficiency, accuracy, reliable headspacing, and easy case forming. "Most of our .22 cases, such as the .228 Ackley, the Improved Zippers, the .17 caliber, are all 28-degree shoulder," wrote Ackley. "We can see very little difference in small changes of shoulder angle. We have tried the 45-degree shoulders but did not like the results; we can see no increase in efficiency over the 30 degree or even the 28 degree but with the too-sharp angles the headspace is hard to maintain."[2]

Obviously, even though Ackley preferred the 28-degree shoulder, he quickly saw that his clients wanted the sharper 40-degree shoulder, and at 40 degrees his tools lasted longer than with sharper angles. He knew from experience that this would not harm accuracy to any important degree, and that it had no real affect on ballistics. It was simply a marketing issue, clients perceived that a sharper shoulder was somehow better. He would sell them what they wanted, especially if the difference was minimal.

Headspace

Before we discuss chambering it is important to understand how headspace is measured for all standard cartridge case designs. Ackley explained basic headspace methods in *Handbook for Shooters and Reloaders*. Nothing has really changed in the field since that time, however this author will reiterate the information here and perhaps with different wording

Standard headspace gauges.

it will help more shooters, reloaders and gunsmiths to fully grasp what is happening when headspace is in question.

Rimless and rebated cases utilize the datum line. This method of measurement refers to a specified point on the shoulder of the cartridge that is a predetermined diameter. Headspace is measured from the bolt face to the datum line. By way of example, the .270 Winchester's datum line is the point along the shoulder of the chamber or gauge that measures .375 inch. Depending on the specific case, the datum line varies with the size of the case. Cases that are registered with SAAMI will have dimensions specified on drawings for that case and approved by SAAMI. Wildcats can and should have a datum line, too.

Rimmed cases are headspaced by the thickness of the rim. The distance from the bolt face to the front edge of the cartridge rim is the headspace. The forward edge of the case rim should fully contact the back of the barrel when the bolt is in the closed position. Rim thicknesses vary; the majority range from .060 to .070 inches.

Belted cases measure headspace from the face of a fully locked bolt to the front edge of the belt. For standard magnums based on the H&H case this measurement is .220 inches. At the time of this writing the only exceptions are the .240 Weatherby, which is a belted .30-06 case — according to SAAMI it headspaces at .219 inch — and the other is the .378 or .460 Weatherby case head, this family of cases headspace at .252 inches.

Rimless pistol cartridges are usually straight walled, with no shoulder or rim on which to headspace. Headspace on such cartridges is measured from the fully locked breech face to the mouth of the case. One of the best known examples of this is the .45 ACP.

There is normally a difference of .004 inches in length between the Go and No-Go gauge, likewise there is another .004 inch between the No-Go and the field gauge,

making maximum allowable headspace .008 inches. Most gunsmiths will suggest repair of the firearm if the No-Go gage will "go." This is a good practice and your gunsmith knows that if the problem is not repaired, headspace will increase exponentially. If the gun will close on the field gauge it is considered unsafe to fire.

With new, unfired brass you will seldom see any problem with .008 inch of headspace, although accuracy will probably suffer. However, when such brass is reloaded, if the shoulder is set back to correct headspace for the cartridge the brass will stretch again on the next firing in the gun with excessive headspace and within one or two reloadings case head separation will ensue. Also, if headspace exceeds .008 inch, head separations are likely. The higher the peak chamber pressure, the quicker they will occur and the more headspace the sooner separations will occur.

Unfortunately, many wildcatters have failed to establish headspace standards for their creations. As a result, when you pick up a used wildcat or improved rifle, it is often necessary to chamber cast the rifle if no dies or fired cases come with it. Often gun bugs will gripe to you that they wish Ackley had produced drawings and set standards. In truth of fact he did, in his 1959 edition of the *Handbook* and in his later *Pocket Manual*, where he published not only his most popular cartridge dimensions but many other wildcats as well. Unfortunately, some of the problems we run into with wildcats today come from reamer makers not having the original information either.

This author will state here and now, there is no defensible reason for this situation to continue. Today the reamer makers have developed an understanding that if Joe Gunsmith sends in a design and says he wants to hold it as a proprietary design, that it is good business to honor that request. You can argue whether this is a good idea or not, there are good arguments on both sides of the issue.

Either way, if you record the prints with the reamer maker, the dimensions are already standardized. Also, SAAMI will accept drawings of wildcats for their archives, though they will not register the design as they would with a SAAMI-approved design, but at least the "official" dimensions are permanently recorded.

The firearms industry is changing rapidly. Today we can have short runs of custom brass or ammo made for any wildcat with proper headstamps, something that was cost prohibitive in the past. So, it's more important than ever to "standardize" improved and wildcat designs. The liability associated with building rifles with non-standard headspace is growing with our society's penchant for lawsuits.

Ackley discusses this problem in his handbooks, saying that, "the gunsmith will find it necessary to determine the headspace himself as nearly as possible. This means there will be considerable variation in the headspace of some wildcat cartridges as they are chambered for by different gunsmiths."[3] His cure for this problem was to supply dies with the rifle when he delivered it, a solution that worked for him. Headspace for Ackley Improved cases should be a no-brainer. Ackley set up what is probably the simplest headspace system for a line of wildcats that any gunsmith ever devised.

According to Ackley, "Shoulder angles in chambers and also on factory cartridges vary more than one would think. Sometimes the shoulder angle of the chamber is a little bit steeper than that found on the factory cartridges. Then, when the neck is enlarged, the point of contact is changed, resulting in excessive headspace. If the angle in the chamber is the same as the angle on the new cartridge, the headspace will not have to be changed." Headspace adjustment, if needed, may necessitate setting the barrel back a turn.[4]

Referring to Ackley Improved case designs he writes, "When checking the headspace, a standard 'Go' gauge with .004 inches ground off the head is the proper one to use. In other words, the headspace has to be minimum-minus .004 inch in order to prevent case head separations." So the standard "Go" gauge for the parent caliber becomes the "No-Go" gauge for the Ackley Improved chamber.

Ackley commented on forming brass and

possible problems if the headspace is not correct. "When fireforming new cases, separation troubles may not appear the first time a case is fired but there is a weakness created the first time a case is fired, unless the headspace is sufficiently tight to create a crush fit on the unformed new case."[5] In a letter to another gunsmith Ackley wrote, "When a factory cartridge is chambered in the improved chamber, it should require some force to close the bolt. When the empty case is extracted you can see a definite ring right at the base of the shoulder (junction of the neck and shoulder) where it contacted the chamber."[6]

Chambering an Improved Rimmed Case

Rimmed cases are the easiest of all improved or wildcat cases to chamber. The rim is the headspace control feature on such cases. The rim is trapped between the bolt face and the rim cut in the back of the barrel. So if the rim is headspaced correctly you can have almost any shape of case fireformed beyond the rim, so long as it will extract. The action of the firearm is not sentient; it does not care what the chamber looks like. So rimmed cases utilize standard headspace gauges for the caliber, no Ackley gauges needed.

There is no need to set the barrel back on a rimmed cartridge when you convert it to an improved design. Why? Because the rim controls headspace, the fact that the shoulder will be moved forward and the neck shortened has exactly *no effect* on headspace. Reamers for improved cases normally have the rim cutter integral to their design. Simply paint the rim cut in the barrel with machinist's blue, when the rim cutter gets close to this material just watch close and, as soon as it scratches the material, stop reaming. Utilizing this method there is no danger of changing the headspace of the gun in the process of improving the chamber.

Rimmed cases headspace on the rim of the case only. Improved cases of the rimmed variety often incorporate a shorter neck, thus the shoulder is moved forward to increase capacity and shoulder diameter. Often rimmed cases benefit the most from an 'improved' design, simply because they gain a much higher percentage of case capacity.

Chambering an Improved Belted Chamber

What was said of rimmed cases above is also true of belted cases. Belted designs headspace on the belt much the same way rimmed cases headspace on the rim. The distance between the bolt face, and the belt cut in the barrel, is the headspace for these cartridges. Like the rimmed designs, improved belted cases use the standard headspace gauges, no Ackley gauges.

While it is possible to use machinist's blue as suggested with the rimmed case, you will quickly find that it is much harder to determine if the blue has been scratched, for there is simply much less area to view. For this reason, it is a good idea to set the barrel back when doing a belted magnum improved case. If the barrel is slick with no sight holes drilled you can set it back .006 to .008 inch so that the bolt will not close on the Go gauge. Then rechamber with the improved reamer until the Go gauge will allow the bolt to close normally.

If your barrel has sight holes, it will be need to be set back a full turn to align or "time" the barrel with the receiver properly otherwise your sights will not be at top dead center. Once the barrel is set back you can simply rechamber to correct headspace.

Rimless or Rebated Improved Chambers

Ackley Improved cartridges in this category seem to receive the most abuse at the hands of hobbyists and local gunsmiths who do not understand the proper headspace of Ackley Improved designs. P.O. Ackley did establish specific headspace dimensions for all his improved case designs. The process is extremely simple and for this reason alone folks seem

to think they need to make it more complex. Keep it simple.

The most important innovation that Ackley brought to the "improved" concept was with regard to bottleneck rimless cases. He chose the simplest of mechanical solutions to insure that his improved cases would safely fire factory loads. He shortened the chamber by .004 inch. Because the factory case is then a crush fit between the bolt face and the junction of the neck and shoulder, proper headspace is insured. This is why Ackley prescribes setting the barrel back on such cases. You will note that if you follow these simple guidelines there is no confusion about the headspace measurements for "Ackley Improved" designs in rimless or rebated cases.

Some confusion seems to arise about the setup for rimless bottleneck cases versus rimmed or belted cases when discussing improved chamberings. Rimless and rebated cases are the case designs that always require a barrel setback to be properly headspaced. As mentioned in the paragraph above, headspace on an Ackley Improved rimless or rebated design is .004 inch shorter than standard. The shorter headspace means you have no choice but to set the barrel back if you want correct headspace.

There are special Ackley Go-gauges with the same shoulder angle as the parent case but shorter. This ingenious method effectively controls headspace with factory cartridges in the larger improved chamber. The parent Go-gauge becomes the No-Go for the new chamber. This system works because the parent Go-gauge is .004 inch longer than the Ackley gauge, exactly the same as the difference between the parent Go-gauge and No-Go gauge. Example: .30-06 Ackley Improved Go-gauge is used with the standard .30-06 Go-gauge as the No-Go gauge.

The only place the factory case will touch in the new chamber that matters is the bolt face and the junction of the neck and shoulder on the case. It will actually slightly crush the case shoulder when you close the bolt on the factory round. If you eject such a case unfired you will normally see a shinny area on the shoulder where the case was crushed just a little. This crush fit maintains proper headspace during the fireforming process.

Ackley wrote this comment to another gunsmith concerning polishing chambers. "For improved cartridges where fireforming will be done by using factory ammunition, you have to be extremely careful not to round the corner at the junction of the neck and the shoulder, because this will increase the headspace dangerously on factory ammunition."[7]

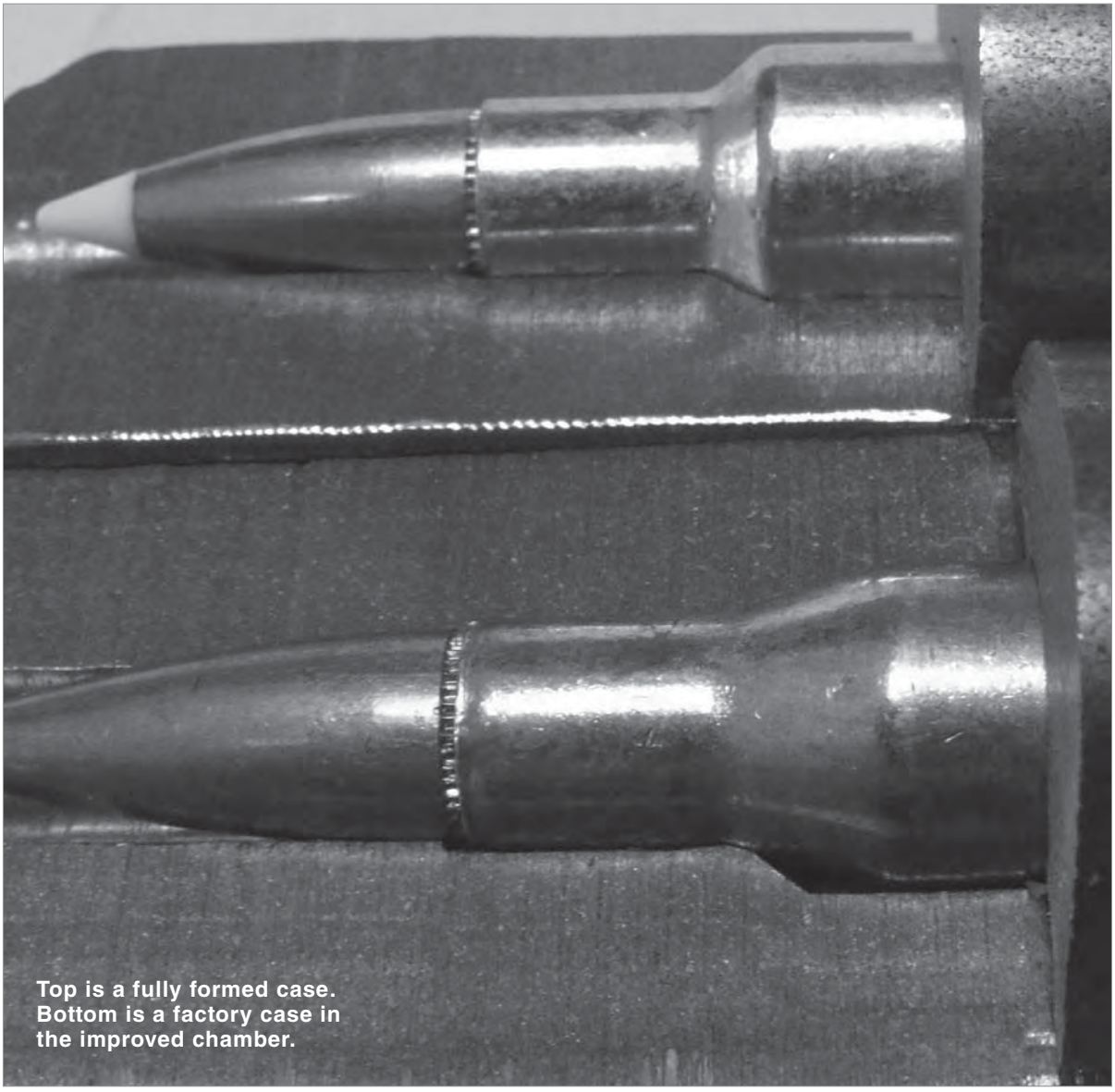
In recent years, several of the commercial reamer makers have decided to offer Ackley gauges with the "Improved" shoulder angle. This change represents one more way that novices can be confused about the headspace on Ackley Improved cases. However, all such gauges this author has seen still provide the same headspace measurements, so the finished product is the same as Ackley intended.

Fireforming Cases

Rimless and rebated cases are easy to fireform for Ackley chambers if the headspace is correctly set as described earlier in this chapter. You can fire factory ammunition for the parent caliber in the chamber with no ill effects. The result will be velocity slightly reduced as compared to firing the same load in a standard chamber. This loss of velocity is primarily as a result of energy being used to form the brass, secondarily because the larger volume of the improved chamber requires more powder to get the same velocity.

Rimmed or belted designs headspace on the rim or belt respectively so you can fire factory ammo and in most cases will produce good results most of the time — even though the shoulder is often blown forward. One exception would be using old fired brass: often it is too brittle and will split during fireforming. So using new unfired cases is recommended for fireforming.

If you happen to have a wildcat that requires a large amount of forming, firing factory ammo will sometimes cause an unacceptable loss of brass, resulting in split cases. This happens because the cases expand so quickly that if there is a flaw or weak spot in the brass it will pop like an overfilled bal-



Top is a fully formed case. Bottom is a factory case in the improved chamber.

loon. One example of this would be the .219 Zipper Ackley Improved. If you experience this there are two possible solutions. Try annealing the neck and shoulder down the body to as much as half way along the body. Make sure you do not anneal the case head or the thick web area just above the head. Annealing the head will greatly reduce the case's ability to handle pressure. Once annealed, load the cases as normal and try fireforming a few. Initially don't load more cases than you are willing to pull bullets from.

Fireform using corn meal or "Cream of Wheat." George Nonte, in *Home Guide to Cartridge Conversions*[8] tells how to develop fireforming loads using no bullet. In *Custom Cartridges*[9] Ken Howell expanded on the concept.

First insert a spent primer (for safety) in an unformed case. Fill the case with Bullseye® pistol powder to the top of the neck (DANGER, never to be fired). Then pour this charge into the pan of your powder scale and weigh the charge. Divide that amount by 10, so that 1/10 of the total volume will become your starting load. Now take that 10 percent load for your case and put it in your normally primed case. It may take some testing to get a load that fully forms the case. Tear a single sheet of toilet paper in quarters,

insert one quarter as a wad over the powder charge. Now fill the rest of the case with your inert filler (corn meal, or fine ground hot cereal, etc., dry of course). You will want to place a wad of some sort over the cereal so it does not spill. Bees wax, bullet lube, or toilet paper work, it must be light enough so that the wad can be blown down the barrel without doing any damage.

You are ready to fireform a case. Keep in mind that even without a bullet these loads could be deadly, so use all normal gun safety practices. Pointing in a safe direction fire the first load. If it is not fully formed, bump your 10 percent load by one-half grain at a time until you get a fully formed case. It is possible to generate dangerous pressures if you use too much powder in these inert filler loads, so be careful. The interesting thing about this method is that it will often form cases without any loss to ruptures when a factory load will cause ruptures.

L.R. Wallack wrote this method up for *American Rifleman*. After describing the method he said, "I then did 10 cases with this load with no splits and all formed nicely. Such success has been practically unheard of, as anyone who has formed cases for this wildcat well knows. I have no hesitation, therefore, in recommending the method."[10]

Selection of Appropriate Actions

Feeding of wildcats in Mauser 98 actions is often misunderstood or overlooked by gunsmiths and hobbyists. If you look at the magazine box of a 98 Mauser you will notice that in most examples there is a recoil shoulder machined into the box. This shoulder is placed in the box at a point where the original factory cartridge's shoulder would have been in the magazine. Its purpose is to prevent the cases from moving forward under recoil, a great design feature that protects projectiles from damage and keeps them from being forced into the cartridge under recoil. When a new cartridge is fit to a 98 Mauser it is a good idea to see where the shoulder of the new case mates up with the recoil shoulder in the magazine box. If the cartridge shoulder is ahead of the recoil shoulder in the magazine box it can cause the alignment of the cases to interfere with smooth feeding.

A bigger issue with feeding in a 98 can be the way the rails of the action are cut. Often they are set up for a specific length cartridge. If the shoulder of your case is too far forward, and the case is pushed toward the center of the magazine too much, it is possible for a cartridge to jump out of the magazine early, eliminating the advantage of controlled round feeding.

Your gunsmith should modify the magazine so that cases stay in the magazine until the correct time, insuring the controlled round feed continues to work. This is simply a matter of cutting the recoil shoulder farther forward, though on rare occasions you may find an action that is too narrow in the feed ramp area. Some careful filing will fix this problem. The feed rails must be polished after these modifications or the brass will be badly scratched or dented in feeding.

Generally speaking, if the action is available in the factory version of the Ackley cartridge, then it will be capable of handling the improved version of the cartridge. A common error in selecting actions is choosing one with the wrong bolt face diameter; make sure your action can be adapted for the correct size bolt face. The next most common error is selecting an action that is not well suited to the cartridge in question, i.e. rimmed cartridges have very limited use in bolt-action rifles. Rimmed cases are well suited to single shots and lever actions as a rule.

Going Factory

There was a fair amount of buzz among Ackley fans when Nosler decided to take the .280 Ackley to SAAMI in 2006. Nosler wanted to pay Ackley the honor of using his name, they even called the Ackley family and asked permission to use the name as a courtesy, both admirable acts. While it's not all that unusual for a company to legitimize a wildcat, it is, with few exceptions, unusual for the cartridge to retain the designer's origi-

Comparing traditional gauges with true 40-degree gauges. They produce the same result.

nal name. There is a reason for this. Whenever a factory decides to bring a wildcat to commercial production they are concerned about the fact that many gunsmiths will copy a wildcat, but won't be diligent about headspacing it as designed.

When Nosler contemplated the idea of bringing a fifty-something year old wildcat to the industry as a factory offering, they looked around to see how the cartridge had been treated during its history. Many gunsmiths are vague on the proper headspace for an Ackley Improved bottle-neck cartridge. An Ackley Go gauge for the cartridge in question is utilized to set correct chamber length. The No-Go gauge in a traditional (traditional meaning the way Ackley did it) Ackley gauge set is the Go gauge designed for the factory cartridge. The method is so simple, yet people try to make it more

complex and become confused. Since we are talking about the .280 Ackley Improved, a "traditional" gauge set would have a Go gauge marked ".280 Ackley Improved." The No-Go gauge would be marked .280 Remington "Go." Let's look at why this simple system works.

The difference in length between the two gauges just mentioned is .004 inch or, 4/1000 of an inch. The difference between a standard .280 Remington Go and No-Go gauge is .004 inch. So when you chamber a factory .280 case in a .280 AI chamber it is crushed at the point where the neck and the shoulder meet. This crush holds the case tight against the bolt face for fireforming.

All sounds pretty simple, right? Well, apparently not. Many gunsmiths in the trade fail to follow this simple formula. So, their so-called Ackley chambers may be too long or too short depending on how they misapply the headspace gauges. To complicate matters further, Nosler found out that Remington's custom shop had been supposedly

Table 13-1

Factory Cartridge	Bullet Weight In Grains	Factory Velocity	Ackley Improved Velocity	% Increase of Velocity
.219 Zipper	55	3,110	3,450	10.9
.22-250 Remington	50	3,719	3,947	6.1
6mm Remington	75	3,400	3,553	4.5
.243 Winchester	100	2,960	3,089	4.4
.25-35 WCF	117	2,230	2,579	15.7
.250 Savage	100	2,820	3,129	11
.257 Roberts	117	2,780	3,120	12.2
.25-06 *	117	2,990	3,051	2
6.5-06 A-Square	140	2,954	3,095	4.8
.270 Winchester *	150	3,010	3,048	1.3
7mm-08	150	2,823	2,865	1.5
7x57 Mauser	160	2,690	2,791	3.7
.280 Remington	160	2,795	2,988	6.7
30-30 WCF	150	2,370	2,535	6.8
.30-40 Krag	180	2,445	2,740	12.1
.30-06 Springfield	150	2,900	3,117	7.3
.30-06 Springfield	180	2,690	2,865	6.7
.300 H&H	220	2,565	2,835	10.5
.348 Winchester	250	2,297	2,470	7.7
.35 Whelen	250	2,400	2,575	7.4
.375 H&H	250	2,690	2,940	9.2
.375 H&H	300	2,600	2,800	7.7

**P.O. Ackley did not recommend these cartridges in the improved form; it's easy to see why in this comparison.*

setting the headspace on their .280 Ackley Improved chambers .014 of an inch shorter than the Ackley standard, though research proved this information to be erroneous.

Most wildcatters, and for that matter reamer makers, subscribe to a policy that if you change the dimensions for a cartridge you must clearly mark those changes on the reamer or firearm, or better yet rename the cartridge to avoid confusion. Even Ken Green, formerly with SAAMI said that, "If the industry is going to mine the field of wildcats and CIP cartridges, we should use them as designed or change the name." SAAMI has no veto power over its members if they decide to offer a cartridge in any given configuration, the decisions are made by a vote of the member companies.

It turns out that when Nosler took the .280 Ackley Improved to SAAMI they had the dimensions correct; however, the confusion with the public is over the prints issued for the cartridge. The prints for the Nosler version appear to show a headspace that is .014 inches shorter than the traditional gauges. However, they are in fact the same — the difference in length is caused by an error in calling out the shoulder angle. When gauges are made with a 40-degree shoulder the datum line is in fact .014 inches shorter than if the gauges are made with the traditional shoulder angle of 17 degrees, 30 minutes. Empirically, the gauges are interchangeable.

P.O. Ackley created a simple and reliable method to headspace his improved designs. It's not an earth-shattering principal, but if followed makes the gunsmith's and the reloader's job easy. Ackley's understanding that a uniform and simple system would be beneficial provides a glimpse into his intelligence.

Comparing Ackley Chambers to Factory

Layne Simpson is a fan of some of Ackley's improved designs. He mentioned in his article, "Wildcatting," from *Shooting Times*, February 1991 that his favorites were the .22-250 AI, .250 Savage AI, and the .257 Roberts AI. When you look at the chart below you will note that these cartridges are among the most "Improved" of Ackley's designs.

The column on the right shows the percentage of increase in velocity that Ackley designs achieve over their factory counterparts. Any cartridge that falls in the 3 percent or less range is statistically identical to the factory cartridge.

1 Ness, Fred C., Practical Dope on the Big Bores, 1948
2 Landis, Charles S., Twenty-Two Caliber Varmint Rifles, 1946
3 Ackley, P.O., Handbook for Shooters and Reloaders, Vol. I, 1962
4 Cotterman, Dan, "New Zing for Old Barrels," Gun Digest, 1967
5 Ackley, P.O., "Q&A," Guns & Ammo, February, 1967
6 Ackley, P.O., Letter to Bevan King, October 23, 1974
7 Ackley, P.O., Letter to Bevan King, May 25, 1973
8 Nonte Jr., George C., The Home Guide to Cartridge Conversions, 1961
9 Howell, Ken, Custom Cartridges, 1995
10 Wallack, L.R., "Dope Bag," American Rifleman, July, 1956

CHAPTER 14

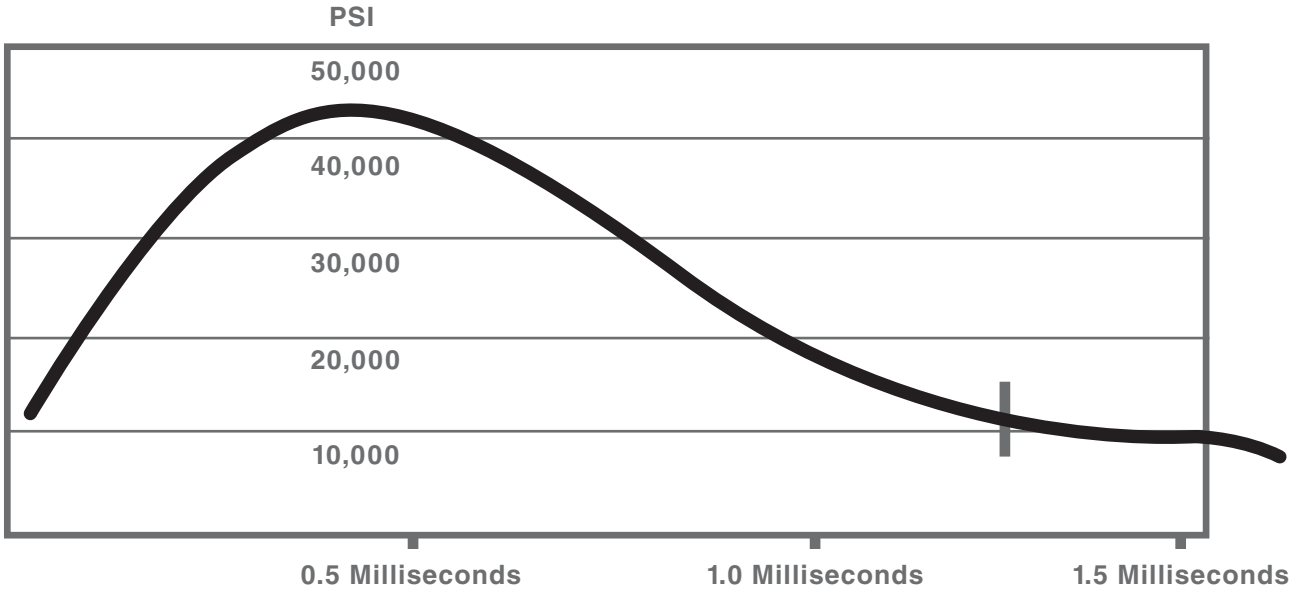
PRESSURE

Right from the start it is important to point out that the description of pressure changes with the technology utilized to measure it. Unfortunately, for nearly a hundred years when pressure was measured with Crusher methods, the firearms industry reported these results as Pounds per Square Inch (psi). In all actuality they were Copper Units of Pressure (CUP) or Lead Units of Pressure (LUP).

CUP is more relative than accurate when related to psi, however, it was not until about the mid-1960s that true psi readings were becoming available as a result of the Piezo-Electric transducer. This is when the various pressure measurement systems used in the firearms industry began to carry their own designations. CUP is utilized to measure pressures over 15,000 psi; when pressure is below this threshold LUP is used. So, when you read books or articles written in the 1960s or earlier if you see psi mentioned in all actuality CUP is the method utilized.

Copper Units of Pressure has lived on as a well-accepted method of testing pressure. Firearms and cartridge designers use it to determine the pressure their designs develop. Ammunition makers, for obvious reasons,

Sample Pressure Curve



are interested in quality control and the CUP method was a relatively cheap and accurate way to test. It specifically measures peak pressure with no information on how pressure changes from the time the primer ignites until the bullet exits the muzzle.

Piezo-electric transducers slowly gained popularity with the firearms industry as the cost and availability improved (first appearing in firearms circles in the 1920s). Results from such transducers are reported in psi. Its main advantage is that it delivers a picture of the pressure curve as it rises to a peak and then falls as the bullet moves down the bore and eventually exits. The time interval is likely less than 2/1000 of a second, depending on the load, barrel length and other variables. Time is represented horizontally, pressure vertically when the curve is plotted. The tick mark near the end of the pressure curve on the sample curve shown in this chapter is the point where the bullet exits the muzzle.

Most recently, the development of strain gauge pressure measuring systems has made it possible for the average shooter to collect data on his loads. Just a few years ago, only big companies could afford to invest in such technology. The strain gauge system measures the stretch of the barrel steel over the chamber. Results are delivered in psi but they should be annotated as having been measured by the specific system.

In the case of the Oehler Model 43, results are normally listed as "Model 43 psi" or "M43 psi," while the Pressure Trace system results are listed as "PT psi" or "Pressure Trace psi." In the long term it is likely that the term "strain gauge psi" will cover all systems that utilize this technology. These designations are necessary because the strain gauge is an indirect method of measuring pressure, whereas the other systems discussed above are direct; meaning they actually tap into the chamber to collect the data. Repeatability is excellent with strain gauges and when calibrated against a known factory load the information collected is extremely accurate.

Oftentimes folks think that P.O. Ackley was flying by the seat of his pants his whole career. Nothing could be further from the truth. As technology improved, Ackley moved with it. Early on he used steel plate penetration and long-range drop tests to determine velocity, also he built a ballistic pendulum (an early tool for measuring velocity).

When Chronographs were made available, first by companies like Speer, Ackley availed himself of the accurate data they provided. According to James D. Mason in an article for the *Handloader* January-February 1970 issue, "P.O. Ackley has an English crusher setup that can use the barrel out of the handloader's own rifle. In this English system, the crusher is placed between the movable breech under pressure to deform the crusher. The results of this system differ very little from the Universal-Bond apparatus used by most ballistics laboratories in this country."[1]

From *Gun Digest*, 1968, "Ackley has just written that he's acquired a new pressure gun, this one based on the English crusher system rather than on the type used in the United States. In the English method, pressures are taken at the rear of the cartridge, the thrust being backward against the copper crusher. Because of this, Ackley says he can pressure-test most any barrel a customer may send in, merely using one or another of several available bushings to accommodate a given barrel. The big advantage of such a system lies in the pressure being actually taken in one's own barrel, but another — and not inconsiderable — benefit is a big reduction in cost. Ackley believes that he will be able to do a thorough test of a barrel for about $25, plus shipping charges. Other loads could be tested at the same time, he points out, at nominal extra cost."[2]

The Discussion

Zero-sum thinking is common when this discussion of pressure occurs, in other words, pressure in a modern firearm is a complicated subject and all too often is over-simplified when described in writing, thus ignoring many important variables. If we were willing to fool ourselves with that limited perspective then we could keep it simple, however most gun bugs prefer to know the truth, so we have to dig deeper.

The reason for oversimplification of pressure discussions is probably because writers don't want to lose the reader's attention to a boring description, or more likely it gets cut due to a lack of space in the publication. For those of us who desire full understanding it is necessary to wring the subject out fully. First realize that each variable that you alter in the gun or the ammunition can change the ballistics.

Ackley wrote the following on pressure problems: "There are several causes of excessively high pressure in rifles regardless of caliber. First, the rifle should be checked for headspace. And if it is found to be excessive it should be adjusted. Tight chamber necks cause pressures to rise excessively. And if the chamber is found to have a relatively tight neck, it should be reamed out a little. You can check this by trying a bullet into the neck of a fired case. It should slip in without any effort. In other words, it should almost fall into the case. Short throats in barrels also raise pressures. All of these things can easily be checked by a competent gunsmith who has headspace gauges."[3] It should be noted that headspace has no effect on pressure but excessive headspace can mimic pressure.

In Speer #2 Manual the editor wrote, "P.O. Ackley, however says he does not care what pressures are just so long as he does not have extraction trouble or primer leaks, and he says that the straight body facilitates extraction and prevents undue backthrust on the bolt. In that, he is probably correct, and more and more ballisticians are inclined to agree with him."[4] Many years later Ackley wrote, "Of course the pressure of any wildcat cartridge depends on how it is loaded. Owners of wildcat-cartridge rifles are often hot-rodders, and as long as the gun doesn't blow up they are happy."[5]

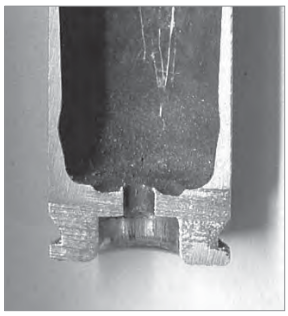
On handloading and pressure he notes, "Handloaders often make the mistake of thinking that the more coal they burn, the more steam they get. This is not always true. Some individual rifles which will not accept maximum loads as used in some other rifle, is probably giving just as much velocity with less powder. We do not know the reason for these things, be we do know it is true. So each individual rifle must have maximum loads developed for it."[6]

We now have tools like the Oehler Model 43 and the Pressure Trace that provide pressure information via a transducer glued to the barrel. As a result, Ackley has been proven correct concerning the idea that individual guns may need less powder to develop pressure. Since pressure and velocity are directly related you can be sure that if your gun is giving the same velocity as some known pressure tested load that you are pretty close to the same pressure, assuming barrel lengths are the same. It's not how much powder you burn that makes velocity, it's how much pressure is being developed by the powder you are burning.

"Loading data given for commercial cartridges in the various handloading manuals is kept within reasonable limits and is usually safe in the average rifle, while loading data for wildcat cartridges is often worked up in some individual rifle which accepts exceptionally heavy loads," wrote Ackley. "This data is then printed which conveys the impression that the average rifle will accept the loads quoted by the originator. This is one of the problems common to all wildcat cartridges which can perhaps be described as over enthusiasm on the part of the originator, or on the part of an enthusiastic user. Oftentimes we see velocities and loads quoted for a wildcat cartridge which are far in excess of the ones quoted for a practically identical factory cartridge."[7]

He continues, "Of course when you get down to the .300 Winchester magnum, which is altogether too large a capacity for the .30

caliber. It is going in the wrong direction to neck it down. And high velocities from that monstrosity are only obtained by going overboard on the pressures, which is also possible with a smaller case. What I am getting at is that you can overload any cartridge, no matter what design it is, and get higher velocity."[8] Here is an example that Ackley gave to Bevan King on a later date in an effort to further clarify his point. "When the 7x61 Sharpe & Hart cartridge came out, they were loading this ammunition to about 60,000 psi [Actually CUP as mention at the start of this chapter. – Author]. A lot of trouble developed because this is the borderline between safety and danger. They were advertising around 3,400 fps with a 160-grain bullet. We were advertising 3,100 fps for our 7mm Magnum, which was a better cartridge. They kept cutting down the loads until things held together and they wound up with about the same velocity as we claimed. Generally speaking, 3,100 fps is as fast as you can drive a 7mm bullet no matter what the case may be."[9]



Note the thinning of the case at the web.

When a cartridge is fired in a chamber, the firing pin drives the case all the way forward in the chamber. If headspace is set to 0.00 inches then there will be no stretching of the case. If there is .002 inch headspace, when the firing pin strikes the primer the case will be driven forward against the shoulder, when the primer ignites the powder, gas pressure builds in the case, the thinnest part of the case will obdurate first sealing the chamber so that gases do not escape back around the brass cartridge case. Then imagine the case acting like a balloon, as pressure builds the case inflates from the thinnest to the thickest part of the case body as pressure rises in the case. When the pressure gets to the web area of the case the brass is so thick that it will expand very little under normal chamber pressures. So at a point along the web, near the solid head, the brass stretches allowing the case head to move back to engage the bolt face. This limited stretching will not cause any problems. "If the headspace is very small or zero, the case stretching is within the elastic limit of the brass and no permanent deformation results,"[10] wrote Gardner Johnson in the November 2004 issue of *Precision Shooting* magazine.

If the headspace is increased another couple of thousandths of an inch (.002), and the case is fired as above, the amount of case stretch will be enough so that you can feel it with a feeler inserted through the mouth of the empty case. Or, if you section the case you will be able to see where the brass is thinning just above the solid head. In a normal case the wall will not have a dip here, which is the area that is stretching.

If headspace is increased further it is possible to actually get a case head separation, i.e. the brass thins so much that it breaks off, leaving the body of the case in the chamber. Rimless or rebated cases are the most susceptible to the creation of excessive headspace using your reloading dies, by setting the shoulder back too far. This will cause the same result as if the gun itself had excessive headspace.

In the *Precision Shooting* article by Johnson mentioned above, he discussed the sealing effect of the brass as the pressure rises inside the case. He used hydraulics in his tests to determine the effects of pressure in stretching and deforming cases as well as bolt thrust. "This very strong sealing effect was repeatedly demonstrated in the slowly rising pressure test … and confirmed that it takes a force much greater than the tensile strength of the brass to slide the sealed portion of the case longitudinally in the chamber."[11] In other words, the brass will stretch in length; once the brass expands and adheres to the chamber wall the unexpanded portion of the brass will stretch. The point at which it will stretch is near the solid head of the case where the brass is too thick to expand and adhere to the chamber wall.

When case head separations occur it is possible to have white hot, high velocity gas escape from the case. Normally however, the

case head is simply pulled off the empty case when the action is opened, leaving the case body stuck in the chamber. Escaping gas may cause minor or major problems depending on how catastrophic the case failure. Most common is a carbon line or gas cutting in the chamber where the separation occurred if the problem is not repaired. If such a condition of headspace is allowed to continue the headspace will grow progressively as a result of the pounding of the action when fired.

The above is discussed to help the reader understand the important relationship between headspace, pressure and bolt thrust. Ackley understood that backthrust or bolt thrust, are not the same thing as chamber pressure. Chamber pressure and bolt thrust are by no means equal, although they are directly correlated. The most important factor that determines bolt thrust is cartridge diameter.

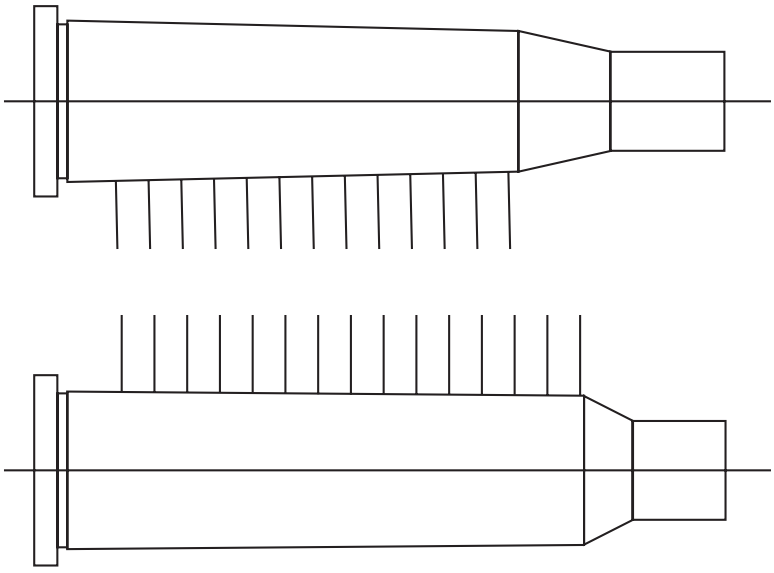
According to Stuart Otteson in *The Bolt Action*, "The (t)hrust we are discussing is a factor of (p)ressure times effective (a)rea or (p x a = t). When we talk about effective area the diameter is smaller than the case head, why? The effective area is the diameter inside the case at the head, so the diameter is measured inside the case walls at the head, simply put this is the actual area where the chamber pressure affects bolt thrust. It should be obvious that a large diameter case like a .460 Weatherby Magnum when compared to a .223 Remington can produce the same chamber pressure, but the bolt thrust of the larger case would be substantially higher because of the increased effective area of the case."

Al Barr wrote for the *American Rifleman* for many years, he was an accepted expert on firearms in his day. He wrote the following in an article about pressure: "Too few shooters realize that the maximum safe load for any rifle is largely dependent on one thing — the strength of the brass cartridge case. The cartridge case is the weakest link when it comes to pressure. Given the finest of cartridge cases, an experimenter can work up loads to develop 60,000 pounds of pressure or more and consider them safe in a rifle. Given the same rifle with faulty brass and the case may go at 50,000 pounds pressure or even less."[12] Keep in mind Barr was talking CUP numbers, then described as pound per square inch. He went on to discuss the fact that the design of the action and how well it contained the head of the case has much to do with how well any given design will handle pressure.

Ackley believed that another important factor was often overlooked when bolt thrust was discussed — case design. He believed that a case with minimum body taper would have less bolt thrust than an equivalent design with a relatively steep body taper. As a result, he designed experiments to test that theory. He wrote concerning improved cases that, "It must be kept in mind that improved cartridges will handle high pressures more safely than the extremely tapered cartridges, such as the .250/3000 or the .280 Ross. We can contain pressures which we measure at right angles to the axis of the bores with high tensile strength steel and the thing we are interested in is how much of that pressure is transmitted to the bolt in the form of thrust."[13]

As a simple math problem, Ackley was incorrect, but it's more complicated than that. If you compare a standard factory .30-30 case to an Ackley Improved .30-30 you will see that the effective area used to calculate bolt thrust is virtually unchanged in the improved design. So, from that perspective, if you have 42,000 psi in either design the bolt thrust will be statistically identical. In other words, the difference would be so small as to be within standard deviation. Only real world tests can tell us if Ackley was correct or not.

A scholarly research paper was published by J.F. Archard in 1957 in the *Proceedings of the Royal Society of London. Series A, Containing Papers of a Mathematical and Physical Character* titled, "Elastic Deformation and the Laws of Friction." Archard put forward evidence that could be applied to cartridge cases under pressure. His experiments showed that Amonton's 1st Law applies when the average pressure is less than about 1/5th of the elastic limit. Consequently if the pressure is higher than 1/5th of the elastic limit of the material, friction will remain relatively constant. Here pressure refers to the amount



Lines perpendicular to the case wall demonstrate the angle at which pressure is applied to the chamber wall. We could call them "lines of force."

of load applied in relation to friction.

The three laws below were attributed to dry friction, which makes them applicable to a brass cartridge case being fired in a steel chamber.

1. The force of friction is directly proportional to the applied load. (Amontons 1st Law)
2. The force of friction is independent of the apparent area of contact. (Amontons 2nd Law)
3. Kinetic friction is independent of the sliding velocity. (Coulomb's Law)

With all that in mind our hypothesis would be, "If you have enough chamber pressure to cause the brass to adhere to the chamber wall (friction), then increasing that pressure will not materially change the amount of bolt thrust, because the friction is relatively constant." In other words, case design has little to do with bolt thrust. Later in this chapter we will discuss an experiment designed to test this hypothesis.

Experiments performed by Ackley attempted to prove that the cartridge case is capable of carrying some of the backthrust. On page 140 of his *Handbook for Shooters and Reloaders Volume I* (1962), Ackley describes the process he went through to prove that the case can carry a portion of the chamber pressure. He started with a 94 Winchester lever action chambered for the .30-30 AI with correct headspace. It was test fired normally with factory .30-30 ammunition to prove the chamber was correct. Next the barrel was unscrewed one full thread and the gun fired again, this time the primers backed out until they met the bolt face, but the case remained forward in the chamber, so the brass withstood the pressure at this point.

Then he oiled two factory cartridges and fired them in the chamber with the barrel still turned out one thread. These cases did move back in the chamber and fully formed, so that the primers were completely seated in the primer pocket. Demonstrating that when the cases were not able to grip the chamber walls (or when friction is removed from the equation) the case will move back, this is a direct example of backthrust. We also learn from this example how important a clean dry chamber is to the testing process as well as to safe operation of the firearm.

Apparently there was some discussion at the time of Ackley's tests with the 94 about dry chambers, oily chambers, and ammo with resize lube still on the cases when fired. Gardner[14] pointed out that at the 1920 National Matches one shooter had discovered that if you put Mobilubricant grease on your cartridges that they fed and extracted very smoothly. Other shooters picked up on this idea and many tried it that year. After the matches an unusual number of damaged rifles were reported, including at least two '03 Springfields that had blown up.

Arsenal personnel did some testing and found that the grease presented two major problems. First, cases could not adhere to the chamber wall and second the grease could act as a partial bore obstruction. Thus, increasing bolt thrust and pressure all at once. Ackley would have been fully aware of these find-

ings, his tests would have been to further prove that small amounts of lubricant could cause problems.

From the point of view of the reloader and wildcatter, Ackley also proved that oil could be used to insure that a fireformed case was fully formed to the new chamber because it could not adhere to the chamber when in a forward position upon firing.

He did not stop there but for the point of this discussion it is clear that the cartridge case is capable of supporting or carrying at least some of the backthrust. The author decided to duplicate some of Ackley's experiments with the .30-30 and the .30-30 AI case and try to go even further to prove the point that backthrust and chamber pressure are two distinct issues.

Table 14-1 Tensile Strength

MINIMUM PROPERTIES FOR CARTRIDGE BRASS[16]	
Ultimate Tensile Strength, psi	58,000
Yield Strength, psi	45,000
Elongation in 2 inches	25%
Rockwell Hardness	B60-80

Table 14-2 Area of an Annulus

$area = \pi R^2 - \pi H^2$	R is the radius of the outer circle
	H is the radius of the inner 'hole'
	π is Pi, approximately 3.142
which simplifies a little to: $area = \pi(R^2 - H^2)$	

Mike Bellm was the last guy to buy out P.O. Ackley's business and was mentored by him. Bellm wrote about improved case design with regard to the straight case wall. He pointed to the .219 Zipper as a good example of the problem of a steeply tapered cartridge design. When developing top loads for the Zipper, the difference between a safe load and one that locked up the action was very small. The reason for this, according to Bellm, is what he calls "the tapered shape of the cork (case) in the barrel."[15] Straight-walled cases do not wedge to the rear like tapered cases do under pressure.

The diagram on page 169 helps to show the angle at which pressure is being directed at the barrel, and demonstrates the "wedge effect." Our example is a .219 Zipper vs. a .219 Ackley Improved, each drawn proportionally correct. Grab a straight edge and compare the obvious difference as you extend the line beyond the drawings.

By way of example, this author has seen instances of this issue over the years, one was an 8x68S rifle belonging to a client. It was built by a well-known gunsmith who builds high quality rifles and shotguns. The client brought it to me when neither he nor the gunmaker could solve a problem with cases sticking in the chamber. If you look at the 8x68 you will see it has a very tapered case design. I found that with light for caliber loads the cases never stuck, but as you worked up to full power loads they began to stick.

Ultimately I discovered by taking careful measurements that although the rifle did not have headspace that the cases would stretch so that they became excessive in length from the head to the datum line (shoulder). The solution was simple: either load fairly light, which makes little sense as this is a magnum capacity case, or re-chamber to a straighter case design. This is an example where the Ackley Improved design would solve the problem with the cases stretching.

Brass has limited elasticity, so when in a tapered design under full pressure there is a tendency for the case to grow in length at peak pressure, but not spring back when pressure drops and the case cools. Mike Bellm's analogy of a cork when referring to the cartridge case is apt, a tapered case wants to back out under pressure. When a straight walled case is subjected to the same level of pressure the

energy is angled more directly at the chamber wall and less to the breech. So while the breech thrust is virtually identical for the two designs from a mathematical viewpoint we still must consider the wedge or cork effect caused by a tapered case.

Tensile Strength

Tensile strength is the number of pounds per square inch of pull necessary to pull the metal apart.

Let's see if these numbers make sense utilizing the .30-30 Winchester case. We know from the information in Table 14-1 that tensile strength of cartridge brass is 58,000 psi (this value varies by source, however this appears to be an average value). The wall thickness ahead of the web is .029 inch; by using the formula for finding the area of an annulus below we arrive at a cross sectional area of .037 inch. Multiply that times the tensile strength of cartridge brass and you get 2,146 pounds applied to the cross-section area, enough to cause the average .30-30 case to fail. The maximum pressure for the .30-30 Winchester according to SAAMI is 42,000 psi, this would provide 1,554 pounds of pressure to the cross-section area, well below the pressure needed to cause total case failure, although it might cause some stretching. This would explain why a Winchester 94 lever gun can have excessive headspace to the point of misfires and not have case head separation.

The area of the annulus is the area of the ring-shaped space between the two circles that define it. This is the area of the entire disk, minus the area of the 'hole' in the middle. See table 14-2.

Yield Point

The yield point is just above the elastic limit and is the point at which permanent deformation of the material occurs. It is generally considered to be the limit of the serviceability of the material. See Table 14-1.

Headspace practices in the gun industry are set up to take this information into account, although it may not have been part of the thinking that established the standards. Simply put, the mechanics and physics of the cartridge case dictated the safety standards that have become accepted industry standards.

As discussed in the chapter on chambering for Ackley cartridges, there is normally a difference of .004 inch in length between the Go and No-Go gauge, likewise there is another .004 inch between the No-Go and the field gauge, making maximum allowable headspace .008 inches. These numbers are directly related to the yield point of brass. When headspace is held to the above limits, case head separations will only occur with brass that has been reloaded because of the ability of the brass to stretch up to the yield point.

Locking lug design can make a huge difference in an action's ability to handle pressure and therefore backthrust. Recently, while developing a wildcat, the author used a CZ 527 action for a .19 Hawk design. This is a 7.62x39 necked to .198 inch. The cartridge worked well and a .20 caliber version will follow. Of interest to us here, the locking lugs on the 527 action are relatively small and, as

Table 14-3

BACKTHRUST TABLE FOR .30-06 FACTORY LOAD AT 58,000 PSI		
Pressure Circle	Backthrust Area	Back Thrust
.400 inch	.126 square inch	7,308 pounds thrust

Table 14-4

$$a = \pi * r^2$$

The area of a circle is pi times its radius squared.

a	is area of the circle
r	is radius of the circle
π	is Pi, approximately 3.142

a result, the action is highly sensitive to backthrust. Load testing was limited by the bolt lift becoming sticky on what should be moderate loads by all estimates. Further tests will be performed in a firearm with larger locking surfaces to see if the same result occurs.

Backthrust can be calculated as equal to the maximum *internal* cartridge base area multiplied by chamber pressure. This is perhaps a simplified approach, but it is accurate enough for a realistic calculation as the strength of all modern actions are intentionally designed with a built-in safety factor. A more complicated view of this problem might be more accurate but it would not change the outcome enough to make a real world difference in the results (that should keep the engineers at bay). In the table below we have calculated the backthrust for the average .30-06 case.

To determine the backthrust area you will have to calculate the backthrust area or diameter. This will be a circle in a cartridge case so the formula below applies. See table 14-4.

In "Ackley's Mistake," Gardner Johnson discussed this maximum internal base area with regard to bolt thrust, using the same math process described above. "The peak thrust to the rear on firing is simply the peak chamber pressure multiplied by the area of the pressure circle." [17]

Also in Johnson's article, he treated the area of the brass case wall mathematically as a solid piece of brass. In reality, it is a ring of brass with much more surface area. Surface tension is a known factor that can change the response of a material to outside forces. The results of our real world firing of .30-30 cartridges proved that more factors are at play than Johnson considered. Cases did not stretch at all in testing although Johnson had predicted they would.

See Chapter 15 for application of these facts to real world tests. Math can only take you so far, then empirical data is needed to prove things out.

Case Shape

A great deal of discussion has been directed at how the shape of the cartridge case might effect pressure and velocity in a given design. In the July 1946 issue of the *American Rifleman*, C.C. Merideth came to the conclusion that, "…any variation in pressure to velocity ratio ensuing from any alteration in chamber shape is negligible as compared to other purely mechanical changes such as altering bullet diameter, wear in throat and many other differences between apparently identical rifles."

Many years later, Robert Hutton of *Guns & Ammo* took up the question. He approached it by using his experience to create a test. He was shooting benchrest with a .219 Donaldson Wasp at the time, so he was intimately familiar with that cartridge. Hutton then designed a new wildcat that was shorter and fatter with the same case capacity as the Wasp. It was based on the .250 Savage case shortened and necked to .22 caliber and named the ".223 Bench Rester," the idea was that shorter, fatter cases will utilize slower powders and as a result a cooler rifle over a 50-shot string, with longer, more accurate barrel life. However, he found that the new case required the same exact powder charge as the Wasp, delivering the same results.[18] So, the complete change in the shape of the powder column had no affect whatsoever upon the pressure or velocity.

Today's benchrest shooters favor short, fat cartridges over the older and longer designs, despite the facts of Bob Hutton's tests. Most likely the reason is twofold: First, shorter cases by the nature of the brass are stiffer and less prone to incidental damage, which would lead to accuracy issues. In other words, reloaders are less likely to damage the brass, thus introducing variables of which they are unaware. Second, the more shooters that utilize any given cartridge design, statistically that design has a better chance of winning matches. So, inadvertently a trend develops toward short and fat cases.

If, in any given year, the top ten competitors in any benchrest division switched to the .219 Donaldson Wasp there would be

a sudden flurry of rebarreling all over the benchrest community. Not because the wasp is suddenly a better cartridge, but because shooters see matches being won with it. Accuracy has more to do with good gunsmithing and an experienced shooter than any other factor.

Primers

Primers are often touted as a source of information concerning the pressure of a given load. Over the years the value of primer deformation in determining pressure has been disproven to the point that no reloader should look to the primer for such information. A large part of the reason for this is the fact that no two makers provide the same type of primers — they vary in thickness, hardness and construction. Primers are not a reliable source of information with regard to excessive pressure.

"Pierced primers such as the one which you sent are caused by several things," wrote Ackley. "Among these are overloads, or too heavy a powder charge, too long, or too sharp firing pins, an oversized firing pin hole in the bolt, or an undersized firing pin tip, or a weak mainspring. As long as extraction is free and easy, the powder charge is probably all right and the cause of the trouble is one of the others. In case the firing pin hole in the bolt is enlarged, this is a difficult thing to repair and is best done by replacing the bolt body. If the firing pin is too long, or too sharp any competent gunsmith can install a new firing pin or repair the old one. If the mainspring is too weak, it is a simple matter to install a new spring."[19]

Of course when primers are pierced there is normally some gas that escapes through the action. Sometimes it's just a curl of smoke, sometimes it's much worse.

"You don't want to trust the gas vent in the side of the action to alleviate danger from pierced primers because very often gas, or even pieces of brass or powder granules, can find their way back through the bolt itself into the shooter's eye," Ackley said. "This is true of almost all bolt actions and not common to the Enfield alone. In other words, it is dangerous to use loads which are resulting in pierced primers.

"If no repair is made to the pin or bolt, the trouble can be cured by reducing the powder charge to the point where pierced primers do not occur. Wearing shooting glasses is always a good idea. Most of the eyes lost from escaping gas, etc. would have been saved by shooting glasses."[20]

Primer Pocket Expansion

The following response from Ackley to a question in his *Guns & Ammo* column could not be simpler or more accurate. "There is nothing that can be done to correct your problem of expanded primer pockets except to cut the load,"[21] he wrote.

Regardless of what you see printed in a loading manual, article, book, etc., if a given load is too hot for your gun it does not matter if somebody published it as safe. Ink is not a license to stuff powder into a case without repercussions. There are many variables that can affect the actual pressure that your rifle generates with a specific load. Here's a brief list:

- **Chamber dimensions**
- **Headspace**
- **Throating**
- **Seating depth of the bullet**
- **Neck tension**
- **Brass too long**
- **Poor choice of powder**
- **Tight neck in chamber**
- **Variations in brass by lot**
- **Variations in Powder by lot**
- **Variation in Primers by lot**

Those are the obvious items that come to mind, a complete list would be even longer.

"Primer pocket expansion is the number one indication of excessive loads and no headspace adjustment or anything else will alter the situation,"[22] wrote Ackley.

Freebore

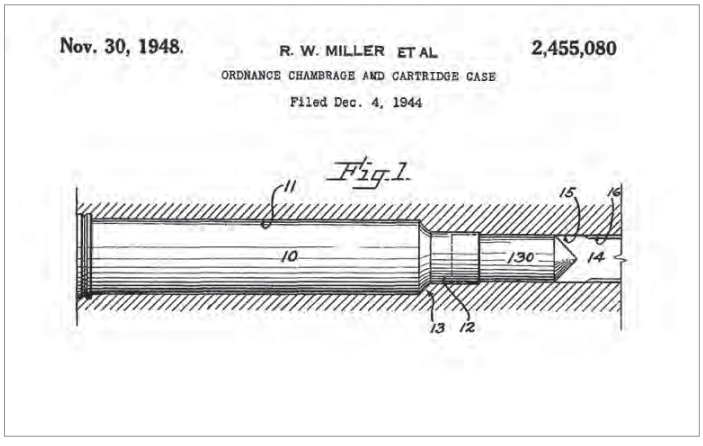
Over the years the idea that "freebore" is a terrible thing has crept into our collective consciousness as shooters. Throat and freebore are nearly synonymous. If you check your loading manual most have a short description in the glossary that then points to the other term as further reference. All rifles have throats (at least if they are chambered correctly), but not all throats have large amounts of freebore. According to Dr. Edgar L. Eichhorn freebore is, "That distance, measured along the barrel axis, that a bullet has to travel from its seated position in the cartridge case, until its frontal part connects with the leade."[23] In simpler terms, the amount of "jump" the bullet makes from its seated position until in engages the lands of the rifling is "freebore."

Art Alphin, founder of A-Square, points out quite correctly that, "The throat is that area into which the bullet protrudes when the cartridge is fully seated in the chamber and the bolt is locked. That space has to exist or the bullet would be jammed into the rifling or forced down into the cartridge case."[24] Equally important is the fact that a small amount of jump is beneficial as it allows the projectile to gain some momentum before it engages the lands of the rifling. This momentum minimizes the rapid increase in pressure, a fact easily proven by taking pressure readings with a bullet seated into the lands with "zero freebore" and with the same load, bullet seated off the lands .050 inch. Zero freebore increases the initial pressure spike because the gasses must build up enough to force the bullet into the rifling.

P.O. Ackley never made it a practice to freebore the rifles he built for clients. He would freebore upon a client's request. However, he suggested that the term freebore not be applied to chambers with less than one inch of "jump." This idea never caught on, today we would consider one inch of jump to be pretty extreme freeboring.

In 1965 Ackley wrote, "The term freebore is a relatively new one in the gun business. The Germans used to call a version of it 'floating chamber.' As I remember, this is just what we would call a long throat, but I don't suppose there is anyone who could tell us where the taper leaves off and the freeboring begins." Obviously Ackley is referring to what we call the leade angle where the lands meet the throat of the chamber. He went on to say, "The .284 Winchester requires a three-degree throat and shows a cylindrical portion of .290 inches in diameter, quite similar to the Norma requirements, but I cannot stretch my imagination enough to make it sound like a freebore."[25] In October of 1977 he wrote, "I am not an advocate of freeboring. I did quite a bit of experimental work with the freeboring idea and the results were quite disappointing."[26]

Bob Hutton quoted an early Norma handbook on the subject. "In starting off the bullet, the gas pressure has to push it out of the case, which requires a thrust of 80-90 lbs., and then force it into the rifling, which takes a lot more. With a suitable amount of freeboring, these two jobs are taken care of at one time, resulting in a slower rise in breech pressure. A barrel



This diagram is from Miller's patent. "The body of the cartridge case is shown as 10 in the rifle chamber 11 … The rifle barrel 14 may either be the standard barrel with standard rifling, or, as we prefer, the barrel may be freebored, as shown at 15, for a distance of about 2-inches from its breech end, with the rifling lands 16 beginning at that forward point," reads the patent in part.

must, however, never be freebored to such an extent that the bullet loses guidance and hits the rifling at an angle. That kills accuracy."[27]

Ackley chambered for some of the PMVF calibers which incorporated freebore. It is very likely that the first modern gunsmith to freebore a rifle and record it was Ralph Waldo Miller. That does not make him the first, just the first recorded. In the 1940s, he designed the MVF series of cartridges that later were improved when E. Baden Powel became involved in a partnership with him, thus becoming the PMVF (Powell Miller Venturi Freebored)[28] series of cartridges. Still later these cartridges became known as Controlled Combustion Chambrage (CCC).

Again our point is that Miller is likely the first gunsmith to document his use of freebore, although this practice had been around for some time. Miller lost control of these cartridge designs to E. Baden Powell, his one-time partner. When told that the cartridge's name would be changed to CCC and what that stood for, he quipped, "Only DuPont and God control combustion!"

Freebore is often claimed to hinder accuracy. This cannot be conclusively shown to be true since there are numerous cases of such rifles winning matches. The problem with freebore is that it must be done exactly correct for best results, meaning it has introduced another variable into the accuracy equation. Most custom gunsmiths decline to freebore if they can help it, simply to avoid the possibility that the rifle will be less accurate. Ackley wrote, "Too much freeboring is detrimental to accuracy, but 3/8-inch or a little more is not noticeable."[29] Based on Ackley's various comments in his column it seems he felt that under .30 caliber it was wise to hold freebore to about caliber length.

Freebore does have an affect on pressure and therefore velocity. When freebore is added to a rifle the effect is that the chamber capacity is increased, not allowing more room inside the case, only adding area for combustion as the bullet moves into the rifling. Consequently, we know from tests that if we fire the same load in a rifle with no freebore, and then freebore it, the pressures drop as do the velocities as a result. These same tests prove that you can add more powder to return to the original factory pressure levels but velocity will tend to lag. Any gain in velocity will likely come from the use of slightly faster powders and the ability to burn more powder than would be possible without freebore.

It is important to understand that if a rifle is chambered and throated for long, heavy bullets, when shorter, lighter bullets are loaded they will not be able to seat out close to the lands, in effect creating a degree of freebore. So keep in mind that freebore is relative to the selected projectile based on its shape and length.

Ackley answered a client about freebore like this: "I never freebore rifles unless the customer so orders because I have found freeboring does no good. However it does aid materially in some of the high-powered advertising, because it allows the use of considerably more powder which seems to be the measuring stick used by some shooters. For example, if you have a .300 Magnum, which produces 3,100 fps with a top load behind the 180-grain bullet, the barrel can be freebored about 1.5 inches and then four or five more grains of powder can be used. When this is done, it is not necessary that the owner be told that his velocity drops at the same time and when he has built up his new loads to the original pressure, the velocity is the same as before."

Ackley did qualify this statement by saying that when chambering a Weatherby he copied the Weatherby freebore so that factory ammunition can be fired in the gun safely. Obviously his knowledge of ballistics accompanied by a sense of practicality caused him to dislike big magnum cases, not because they had more recoil, but because what you had to trade off was not worth the result, at least in his view.

Additional Ackley Experiments on Pressure and Chambering

Ackley experimented with firing oversized bullets in a given bore to see what would happen to the pressure. Early in benchrest

shooting, it was popular to shoot what was called a "super caliber" bullet, which were normally .001 inch oversized for the bore. To accommodate such bullets, custom throating was preformed so that the bullet would not be deformed or damaged in any way when the round was chambered.

In effect, the bullet was then squeezed into the bore upon firing. This process also sealed the throat so that no gas cutting occurred in the throat area ahead of the case mouth in the barrel. Consequently, accurate barrel life in such guns was exceptionally long. This however fueled a running controversy among "experts" as to whether this practice was safe and how it affected pressure.

P.O. could not leave such things untested, his curious nature demanded that he determine exactly what the truth was by empirical testing. However, in classic Ackley style, it was not enough to simply test "super caliber" bullets. The first test he ran on oversized bullets was in 1947 or 1948 by his account, while teaching in Trinidad. "We got to talking about this problem in class one day. Since we had a number of the 6.5 Jap rifles in the shop we decided to try a 7mm through the barrel. We did this by using a 7mm chamber reamer without a pilot and then we throated it with a little freebore. The factory loads went through it without any signs of pressure whatever."[30]

Ackley sent the results of these tests to Al Barr, editor of the "Dope Bag" section in the *American Rifleman* at that time. Barr said it just couldn't be so, and it must have been the freebore that did the trick. So Ackley repeated the test with another rifle, this time with barely enough throat to accept the 7mm bullet; results were exactly the same. Ackley wrote, "The students had numbers of these rifles and quite a number of them rechambered their rifles for the 7mm and the results were satisfactory from every standpoint. When an oversized bullet is fired through an undersize barrel it only has to travel half its length before it becomes the proper size. Regardless of what pressure it may take to size the bullets, this happens a long time before maximum pressure is reached."[31]

To clarify, look at 7mm bullets in the 140- to 160-grain range. If you measure the overall length of the bullet and then measure the contact area of the bullet you will find that it is pretty close to half the length of the bullet. This is the point that Ackley is making.

Ackley stressed, "It must be emphasized that the tests that we have made utilize standard chambers, except for the neck size which was changed for each size bullet. But, the headspace and the major part of the chamber always remained the same."[32] This was not a case of the wrong cartridge being fired in the chamber, rather the chamber was altered to accept the larger bullet with normal neck tolerances.

"We fired numerous 8mm bullets through a .30-06 barrel by simply necking up the chamber and throating it to take a standard 8mm bullet. We replaced the .30 caliber bullet in commercial .30-06 ammunition with the same weight of 8mm bullet, everything worked fine with no signs of pressure or anything. But, our pressure gun showed a reduction in pressure as well as a reduction in velocity which we were unable to explain. We have also done this same thing using 150-grain .35 caliber bullets to replace 150-grain G.I. bullets with no signs of pressure with the original powder charge."[33]

Ackley wrote to a friend about later tests. "I had a retired engineer do the work because he liked to do it and he is an experienced ballistician. He was sure that the thing would blow up. But our original test, which convinced us that this is just an old wives tale, were simply duplicated. We took velocities and pressures at the same time. The man who did the work, George Evans, built a very ingenious pressure gun. We used that throughout the test." It may well be this pressure test equipment that is pictured in an article by Ackley in the May/June 1966 issue of *Handloader* titled "Wildcat."

"We started with a standard .30-06 barrel using a load of known pressure furnished by Dupont. We checked this out with standard bullets. Then we switched to .311-inch bullets with no noticeable change in any way. Fairly large numbers of shots were fired for each stage of the test. We then reamed the

neck and throat out for 8mm bullets weighing 150 grains and using exactly the same powder charge. We tested these thoroughly. Finally we made another special tool and reamed the neck and throat for 150-grain .35 caliber bullets. We had a time finding any 150-grain .35 caliber bullets, but finally found a box of Remington bullets made for the .35 Remington cartridge at one of the local dealers. That gave us three oversized bullets, all weighing 150 grains. We used exactly the same powder charge throughout. No increase in pressure could be noticed."[34]

It was Ackley's contention that the information above proved that there was no correlation between bore diameter and pressure. "This is easy to prove although ever since the introduction of modern firearms they would have us believe that a slightly undersize bore will raise pressures,"[35] he said. He went on to say that he could prove the lack of correlation (explained above) but it is difficult to explain the reason why. So, he felt it was difficult to make the average shooter fully understand these facts. As he often did, Ackley said that he would provide materials to anyone who did not believe the results to run the tests for themselves and try to prove him wrong.

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CHAPTER 15

EXPERIMENTING WITH BOLT THRUST

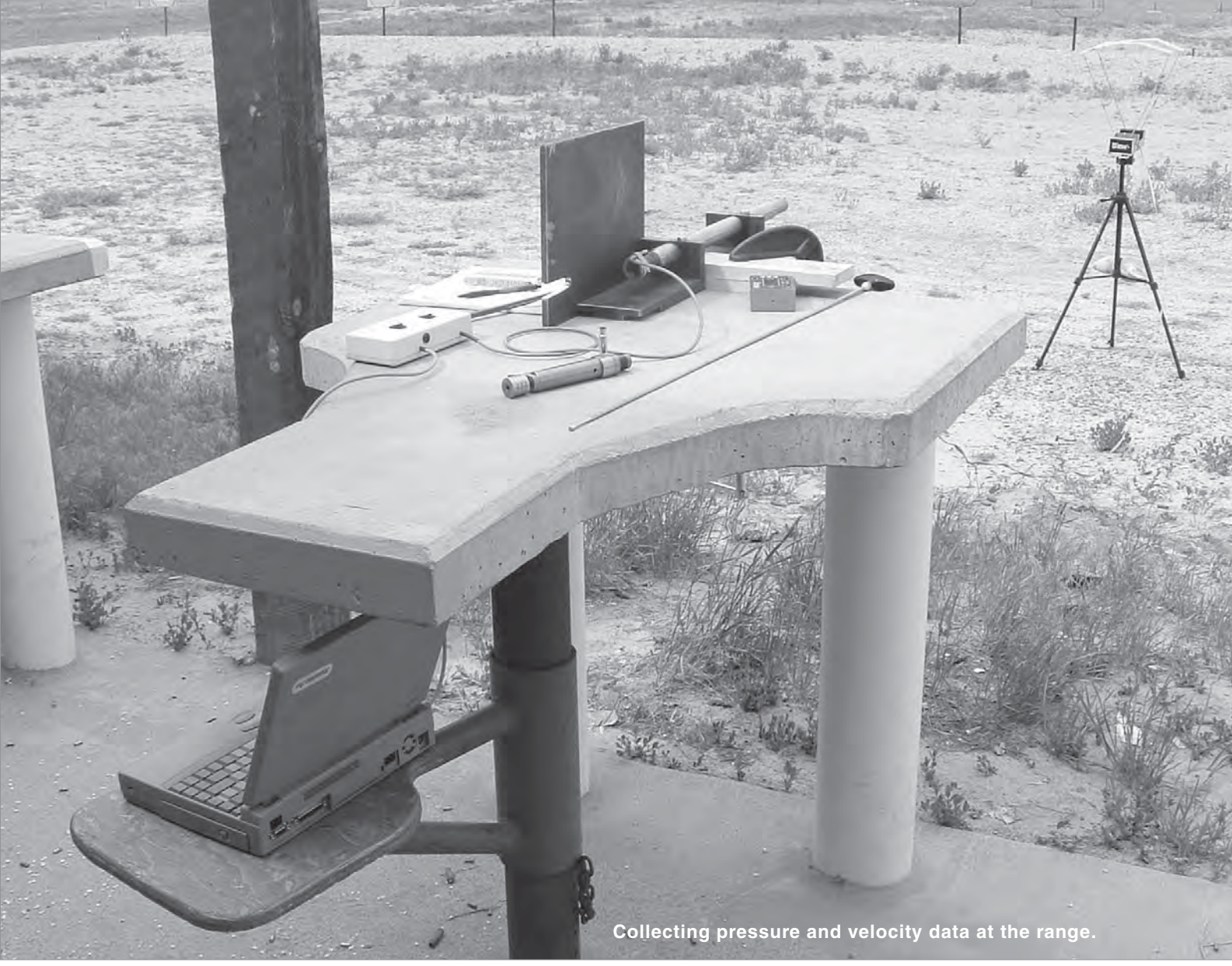
Since the post-WWII years, if not before, there has been an ongoing argument concerning whether breech thrust (bolt thrust) is reduced by the improved case design. P.O. Ackley has certainly influenced the argument. The definition of an improved case is pretty simple. The case body is blown out to minimum body taper, which is described by Ackley as 0.0075 per inch taper. Shoulder angles between 28 and 45 degrees are normally considered to be improved, although it could be argued that any shoulder sharper than the original parent case is improved. Finally, an improved design allows the firing of a factory cartridge in order to fireform the brass for the new design.

Shoulder angles between 35 and 40 degrees seem to provide the advantage of minimizing brass flow without negative effect. When the shoulder angle is greater than 40 degrees, brass is unnecessarily hard to form and chamber reamers do not last as long. Headspacing becomes much more critical with a sharper shoulder because there is less taper, making it harder to hit the correct measurement. Also, sharp shoulder angles do not feed as smoothly as more tapered ones. When the shoulder angle is less than 35 degrees, brass flow becomes more of an issue. There are some cartridges, like the .220 Swift Improved, which do not receive any real improvement in velocity, but are popular because they improve brass life by arresting stretch, thereby increasing brass life.

It is not unheard of to measure breech thrust, however the cost of tooling for such testing made it impossible for the purpose of writing this book. However, a method of recording breech trust was necessary in order to go beyond the somewhat subjective experiments that P.O. Ackley wrote about in *Handbook for Shooters and Reloaders Vol. I*. There Ackley used a Model 94 Winchester because, as he stated, "We often hear that the Winchester Model 1894 action was designed for low pressures and is an action which could be described as 'weak.'" The purpose of his experiment with the '94 was to prove that the improved case design minimized bolt thrust; that the brass will support and contain *some* pressure; that oily chambers increase bolt thrust; and finally, the notion that actions are designed for specific pressure ranges is a fallacy.

Our Test

The Pressure Trace (a product of Recreational Software, Inc.), was used to measure the chamber pressure for all ammo tested in this chapter. The goal of this test was to repeat Ackley's experiments with the .30-30



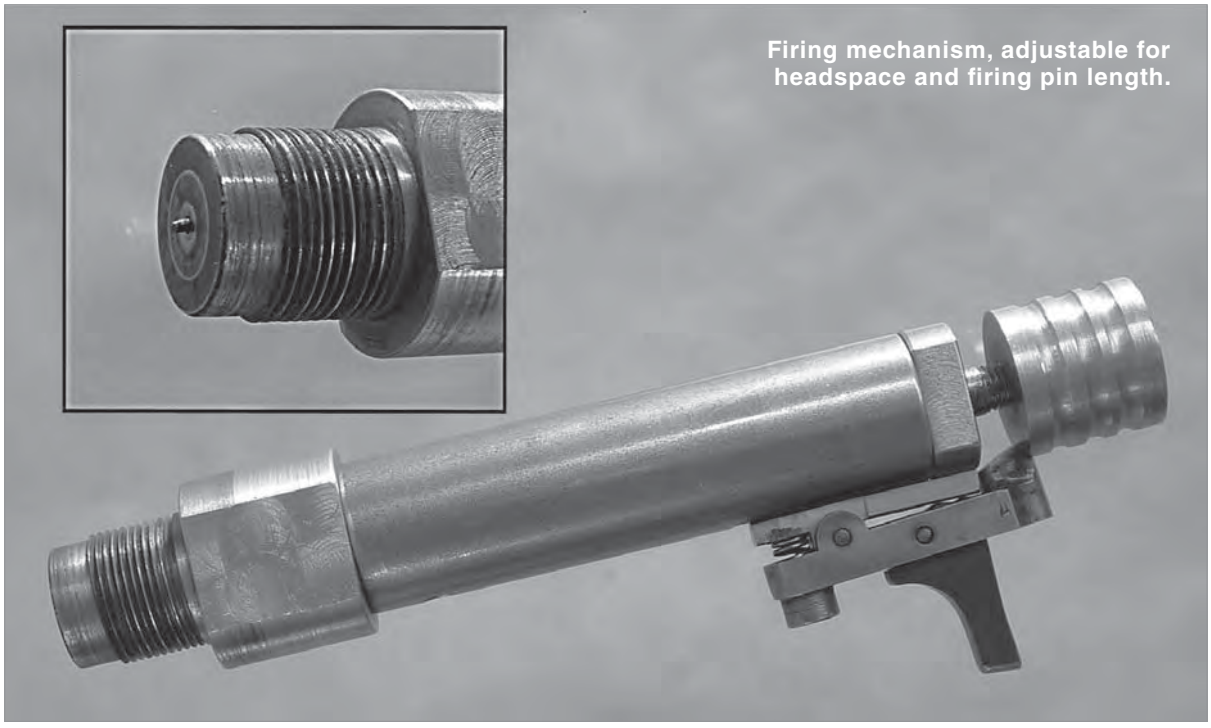
Collecting pressure and velocity data at the range.

Ackley Improved, but to increase the value of the data collected by taking measurements of the thrust against the bolt face. This experiment is repeatable. The author designed and built a custom jig to hold a .30 caliber barrel with a universal breech plug to allow for adjustable headspace, and to accommodate the strain gauge utilized by the Pressure Trace. The firing pin had to be designed to allow for headspace adjustment, too.

The initial tests were done with factory loaded ammunition in .30-30 Winchester to provide a baseline comparison. The second wave of tests was performed after the barrel was rechambered to .30-30 Ackley Improved. The breech of the barrel was turned to 1.050 inches so that wall thickness would be thin enough to provide good data with the relatively low-pressure factory .30-30 Winchester loads. We also left the wall thickness in the area of threads as large as possible so that it would be less likely that the breech would expand, allowing the breech mechanism to move rearward and partially nullifying our test results.

The bolt thrust test had the following goals:

- Determine empirically if the cartridge case contains some pressure at factory levels.
- Determine difference in bolt thrust between factory and improved designs, if any.
- Determine if chamber pressure can be increased over factory with the same bolt thrust regardless of pressure.



Firing mechanism, adjustable for headspace and firing pin length.

For the .30-30 AI, run pressure up to the point where the brass separates, and compare results to mathematical predictions.

Oil cases to see if bolt thrust is increased with the same load as Ackley stated.

.30-30 Test

In this first stage of testing with factory ammunition, we fired 60 rounds to work out technical issues, and insure that the test rig would work for the designed purpose. While firing these early test rounds we also checked to see if we could fire rounds with excessive headspace as this was part of Ackley's earlier tests. We first fired a batch with .010-inch headspace. The cartridges were pushed forward so that the rim was in contact with the breech of the barrel. When fired, the primer backed out .010-inch to take up the headspace, the case stayed fully forward and did not measurably stretch.

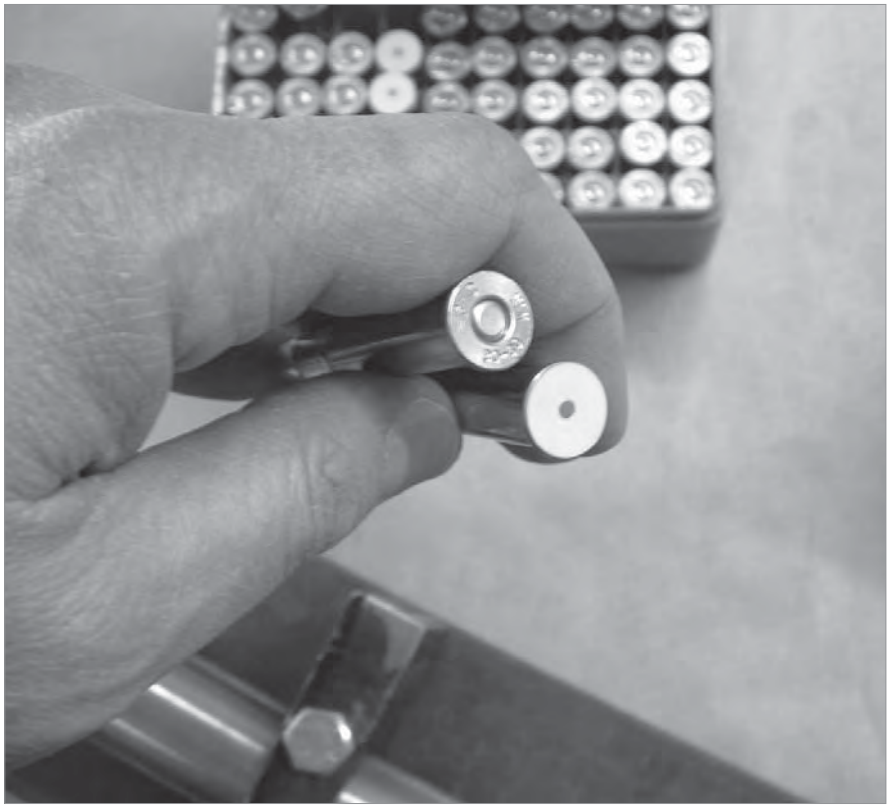
We then experimented and found that the maximum amount of excessive headspace we could generate without the primer failing was .046 inches. When we exceeded this amount the primer ruptured and left us with lots of pieces and carbon in the breech gap.

Primer failed with excessive headspace of .046 inches.

Thus, before we even started the test in earnest, we had proven that the cartridge case of the .30-30 Winchester can contain all of the pressure of a standard factory load without stretching and that the primer is actually the weakest part of the cartridge. That bit about the primer is no real surprise to you reloaders.

The reason the neck and shoulder are dimpled in the photo this chapter is simple. Gasses slipped back around the neck. It is likely that the pressures were higher in the barrel than in the case once the primer failed — venting gases into the breech gap. So the higher pressure gas in the barrel was seeking an outlet around the case neck.

Once we were confident in our results, we then recorded the data listed in the table below by firing 10 rounds of each load. Average readings are used to help keep all comparisons apples to apples. The factory ammo



Prescale film in place, note the hole in the film for the firing pin.

did produce some pressures over 40,000 psi, which means it is loaded close to the safe limit set by SAAMI.

A product called Fujifilm Prescale offered by Sensor Products, Inc., of Madison, New Jersey, was used to record bolt thrust. Prescale is a Mylar-based film that contains a layer of tiny microcapsules. When pressure is applied to the film the microcapsules are ruptured, producing an instant and permanent high resolution image of the pressure variations across the contact area. The film we used was .004-inch thick and comes in varying pressure sensitivity. By placing the film between the case head and the bolt face we are able to take a reading of the exact and true bolt thrust in real time. The film can also be sent to the company for computer analysis, which will reveal the exact pressure exerted, including detail of where the pressure was applied and where it was less intense.

Seating depth in all the loads listed for the .30-30 Ackley Improved here was 2.535 inches, seated to the canelure of the bullet.

Note that the last load in the table above, 35.5 grains of IMR 3031, is a compressed load, and there is no room for any more powder. This is approximately 140 fps faster than published data for this powder and bullet weight in the standard .30-30 WCF, and there is clearly not enough room with this powder to get into pressure problems.

Prescale Film from Tests

⬅ **Fired in an Oiled Chamber**

⬅ **Fired with .010" Headspace**

⬅ **Fired with.000" Headspace**

Table 15-1

.30-30 WINCHESTER BARREL, 24 INCHES, 1-10 TWIST. FACTORY AMMO. SAAMI maximum pressure for the .30-30 WCF is 42,000 psi.			
Headspace	Bullet	Average Velocity	PressureTrace Average psi
0.00	150 gr.	2,479 fps	35,878
0.00	170 gr.	2,301 fps	36,621

Ammunition used to provide this reference sample, Federal Power-Shock.

Table 15-2

SAME BARREL RECHAMBERED TO .30-30 ACKLEY IMPROVED, FIREFORMING FACTORY AMMO.			
Headspace	Bullet	Average Velocity	PressureTrace Average psi
0.00	150 gr.	2,345	26,490
0.00	170 gr.	2,188	26,440

Ammunition used to provide this reference sample, Federal Power-Shock.

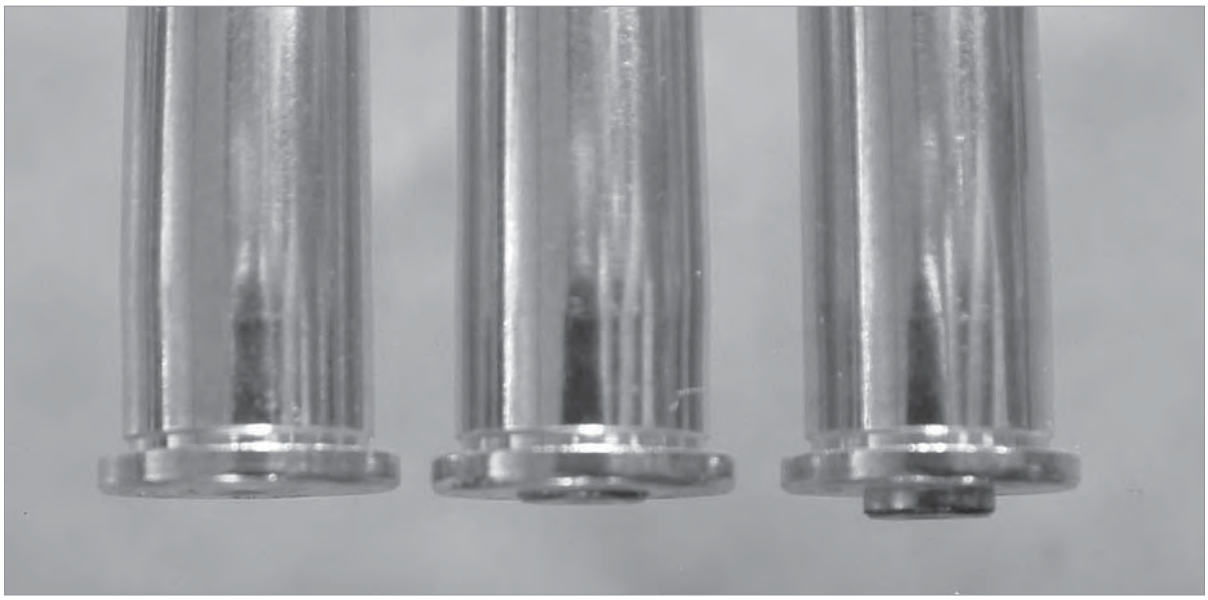
Table 15-3

.30-30 ACKLEY IMPROVED, IMR 3031, FULLY FORMED CASES.				
Headspace	Power Charge	Bullet Sierra RN	Average Velocity	PressureTrace Average psi
0.00	32.5	150 gr.	2,269	26,775
0.010	32.5	150 gr.	2,259	28,234
0.00 Oiled	32.5	150 gr.	2,278	29,075
0.00	35.5	150 gr.	2,444	34,720

The 35.5 grains of H322 was used as it produced factory level pressures in the .30-30 AI chamber. Excessive headspace of .010-inch was set. When fired, the case did not move back, the primer backed out and marked the Prescale film. Edges of the film show color only because the film was cut to fit the case head. The color or light readings around the primer pocket are "noise" from the vibration of the bolt during the firing of the mechanism. This was proven by dry-firing the mechanism, during which similar marks appeared in the film.

When you study the table following here, it will be obvious that we have exceeded the SAAMI pressure limit of 42,000 psi with H322. This powder allowed us to get more powder in the case because of its smaller granules. 35 grains would be the safe maximum in our test barrel if you were staying with the SAAMI pressure limit, and at 2,600 fps we are nearly 400 fps past the published data for the same powder and bullet weight in the .30-30 WCF. Of course, this is only true in our test barrel, it would be necessary to use normal load development for any individual firearm, as we were able to generate far more pressure than is advisable in a .30-30 AI under normal conditions.

Those loads that exceeded the 42,000 psi



Note how easy it is to spot headspace from the primer protrusion on a .30-30. Case on the left has zero headspace.

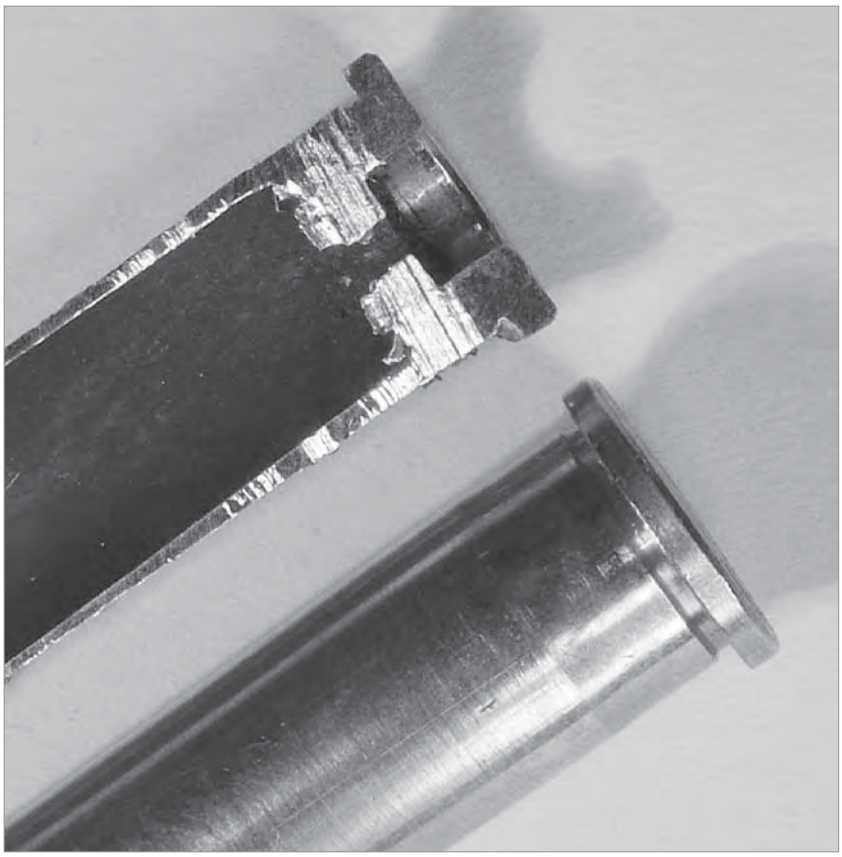
Table 15-4

.30-30 ACKLEY IMPROVED, H322 WARNING: Pressures over 42,000 psi exceed SAAMI maximum!				
Headspace	Power Charge	Bullet Sierra RN	Average Velocity	PressureTrace Average psi.
0.00	33.5	150 gr.	2,414	35,796
0.00	35.5	150 gr.	2,614	42,555
0.010	35.5	150 gr.	2,631	40,271
0.00	36.5	150 gr.	2,661	46,093
0.00	37	150 gr.	2,696	46,093
0.00	37.5	150 gr.	2,726	49,239
0.010	37.5	150 gr.	2,716	46,553

limit were tested for two purposes: To see how much pressure could be generated in the .30-30 AI case, using powders that are appropriate in burning rate for said case. And to determine at what point the brass will yield and stretch with excessive headspace.

We started with 0.000-inch headspace as before. The oil on the cases did not allow them to adhere properly to the chamber walls under pressure. Consequently they moved to the rear and applied full pressure or bolt thrust to the bolt face.

This is a stark comparison to the earlier test where the dry case was able to adhere to the camber wall and only the primer backed out against the bolt face.



The brass from our hottest loads shown here, were intentionally shot with excessive headspace. Expansion of the brass to full chamber diameter is normal and can be seen on the fired case. The expansion line on the bottom case is where you would expect to see case stretch if it were present. Looking across at the sectioned case, there is no sign of stretching of the case wall, i.e. no thinning of the case wall.

Table 15-5

.30-30 ACKLEY IMPROVED, H4895				
Headspace	Power Charge	Bullet Sierra RN	Average Velocity	PressureTrace Average psi.
0.00	35.0	150 gr.	2,544	
0.00	36.0	150 gr.	2,574	
0.00	36.5	150 gr.	2,566	43,137

Table 15-6

.30-30 ACKLEY IMPROVED, BL-C(2)				
Headspace	Power Charge	Bullet Sierra RN	Average Velocity	PressureTrace Average psi.
0.00	38.5	150 gr.	2,558	38,381
0.00	38.7	150 gr.	2,552	38,602
0.00	39*	150 gr.	2,595	42,980

*The above two tables show that the .30-30 Ackley Improved delivered an additional 180 to 200 fps with these powders in our test barrel. The pressure curve on the H4895 loads had an undesirable form in the .30-30 AI: instead of the pressure curve rising early and tapering off, we found that it had a second pressure spike much higher than the first just before the bullet exited the barrel. For this reason alone I would avoid this powder in a .30-30 class cartridge. *Exceeds SAAMI Maximum.*

Table 15-7

BOLT THRUST TEST 30-30 ACKLEY IMPROVED	
QUESTION	**OUTCOME**
Does cartridge case contain some pressure at factory levels?	Yes, there is no/zero bolt thrust except for the force of the primer backing out.
Difference between factory and improved bolt thrust?	No difference at/or above SAAMI maximum pressures for the .30-30.
Does bolt thrust change as pressure increases?	Not in the .30-30 case. This cartridge case is too small in comparison to the bore to produce the pressure necessary to push the pressure past the yield point of the brass.
What pressure causes cases to stretch and fail with excessive headspace? How does this compare to the math?	The .30-30 case is thick enough that it can contain all pressures that can be developed with appropriate powders. This is supported by the math.
Do oiled cases increase bolt thrust with the same load?	Yes, the case is not able to bond to the chamber under pressure and slips back unhindered.

So, was Ackley right about all his findings?

Yes, but he may have missed a point or two.

Since .30-30 brass is thick and pressures are low relative to brass strength and case capacity, with most appropriate powders pressure is not a big problem. To be fair, we did find some powders that will develop pressure far beyond SAAMI levels for the .30-30 AI case. Because the brass is so thick, it actually cannot stretch and cause head separations due to excess headspace. In that respect the .30-30 is not a good choice for Ackley to prove that improved designs handle pressure better.

However, Ackley used the .30-30 because the '94 Winchester action had been labeled weak. In this respect, Ackley did prove that the '94 can handle anything the .30-30 or .30-30 AI can dish out, without any question.

Editor's note: See the center color section of book for images from the Prescale pressure indicating film tests.

CHAPTER 16

EFFICIENCY AND THE CARTRIDGE CASE

In an article in the *American Rifleman*, February 1951, Bill Corson made a comparison of three popular wildcats, the .219 Wasp, .219 Zipper Improved, and then wildcat .22-250. Corson was to join Ackley many years later in the American Reloaders Association when it was formed, both men active as technical advisors for the group. The purpose of the 1951 article was to determine if there was such a thing as an inherently accurate cartridge.

These three cartridges were selected because one barrel could be rechambered from the smallest (Wasp) in progression to the largest (.22-250). All other parameters of the rifle were maintained as close to the same as Corson could hold them, over the months of shooting and testing.

Twenty-five groups of five shots each were fired in each chambering, then an average of the groups was calculated. The Wasp produced an average group of .5340 inch, the Zipper Improved average group was .5216 inch, and the .22-250 averaged .5220 inch. Corson came to the conclusion that statistically there was no real difference between the cartridges because they all grouped within what would be a reasonable margin of error for the test, with a variation of only a little over 2 percent in group size. Corson stated that for a cartridge to show a significant advantage in accuracy he would expect to see at least a 10 percent reduction in average group size.

It seems that Corson was hung up on the popular phrase "efficient design." He points to an earlier series of articles from 1946 in the *American Rifleman* by C.C. Meredith. Apparently Meredith did some testing to prove whether any change in case design or shoulder angle can affect the relationship between pressure and velocity. He concluded that in cases with the capacity of the Wasp and Improved Zipper that case design did not change the relationship. This is a fact that is unchanged to this day. The laws of physics and combustion still apply.

P.O. Ackley's comment on shoulder angle as it relates to this discussion is this, "At this stage of the game, however, the value of shoulder angles seem to lie in their sales appeal."[1]

Corson went on to say that, "efficient design" does not apply to velocity, and from his own experiment it could not apply to accuracy either. He half jokingly suggested that anyone who uses the phrase "efficient design" is talking through their hat. Unfortunately, he did not understand the use of the phrase as gunsmiths like Ackley applied it.

Ackley did not make the wild claims for his cartridges that some of his contempo-

raries did for theirs. He generally provided load data and allowed it to speak for itself. A simple proof of this point is that in the days before affordable chronographs, Ackley built and used a Ballistic Pendulum in his shop (described in his *Handbook for Shooters and Reloaders, Vol. I*), and when talking to his friends and students he referred to the Pendulum as "The De-Liar."

When Ackley talked about efficiency it is reasonable to state that he was talking about the relative efficiency of a design, in other words, the idea that if a smaller cartridge with less capacity can deliver essentially the same results, why burn more powder?

I find it amusing that detractors of the "Improved cartridge" often say they are not worth the trouble and expense. Yet if you ask them about the .22 K-Hornet they will rave about the increased velocity and easier loading. Is that because that cartridge belongs to Kilbourn instead of Ackley?

Let's compare the ballistics of two cartridges of the same bore diameter with wide variation of case capacity. Let's look at the .220 Swift as compared to the .222 Remington Magnum, both 26-inch barrels. Loads with the same bullet weight and powder with similar pressure readings were purposely selected to illustrate two points. First, while pressure and velocity are directly correlated, when you change the volume of the combustion chamber you increase the amount of gas, which will increase velocity. (Think of it like stroking an engine.) Second, an "efficient design" delivers a good compromise between case capacity and the potential velocity of the case with safe loads.

You will note that it took an additional 38.5 percent of the same powder for about a 12.2 percent increase in velocity. Is that efficient?

Let's put it in other terms. We are currently paying about $3.00 per gallon of gas in our .222 Remington Magnum hatchback economy car with a four banger.

Then … we hit our mid-life crisis and decide we absolutely must have a .220 Swift two seater hard-top except it has a really big V-12 engine so we will be burning more gas. The difference in mileage is equal to paying $4.16 for that same gallon of gas.

The really good news is the engine (barrel) in the .220 Swift will only last about half as long as our engine did in our .222 hatchback. Is that efficient?

Who cares? *Give me that sexy two seater!*

Ackley fully understood this, but his "improved" cartridges fall in the area between the two. If you increase case capacity a little you do not reduce barrel life appreciably, but it allows you a larger combustion chamber, and therefore more gas to push that bullet down the bore a little faster. This has the advantage of much less recoil than

Table 16-1

.222 REMINGTON MAGNUM[2]				
Bullet	Powder	Charge	Velocity fps	Pressure CUP
55 gr.	H335	26 gr.	3,294	48,100

.220 SWIFT[3]				
Bullet	Powder	Charge	Velocity fps	Pressure CUP
55 gr.	H335	36 gr.	3,696	50,400

a magnum and still giving you better ballistics than the factory cartridge offered. In no way does that make an improved case design a magnum, it just means that you will normally see more velocity in the new case with its increased case capacity.

Another useful benefit is the fact that sharp-shouldered cases minimize stretch or brass flow so brass lasts longer and requires less trimming for length. Ackley would probably point to his Improved Zipper or his improved .25-35 as good examples of how an improved case can be an "efficient" design, because they delivered the greatest increase in velocity for the change in capacity. Full disclosure though: Ackley would have gone for the car with the V-12 engine, he loved cars.

It might be appropriate to comment at this point that Ackley was concerned mainly with old-style case designs with too much taper and too little case capacity to take advantage of the advances in smokeless powder. He did not consider his magnum cases to be "improved" designs, rather they were "Magnums."

Often Ackley is pigeon holed as an "extreme velocity" proponent. While he certainly did his part to expand the ballistic frontiers in helping to set velocity records, he was really more interested in practical hunting ballistics. He felt that magnum calibers were not necessary for most North American game. In his usual colorful way, he said, "No one will ever scare an animal to death by making more noise. A 3,000 fps velocity out of a reasonably sized case is just as efficient when the bullet strikes the animal as the same velocity is out of a larger case which makes more noise."[4]

He had this to say about bullet selection and high velocity cartridges: "It is entirely wrong to criticize rifles because of their velocities because the criticism should be aimed at the real source of the trouble, which is the bullet itself. All that it amounts to is that bullets have not kept up with the development of high-velocity cartridges. Most of the bullets now on the market are very little better than the first jacketed bullets introduced in 1909; by that I mean that if you were able to find some jacketed bullets made fifty years ago, you would probably find them just as good as anything you had now."[5]

There are two major categories of wildcat

cartridges. The first is the "fireformed improved" most often simply referred to as the "improved" case, this type today is almost generically called the "Ackley Improved." Simply put, this type of wildcat is designated by the fact that factory ammunition for the parent cartridge can safely be fired in the new wildcat chamber. An "improved' design is a reconfiguration of a factory cartridge, which is a big advantage over a unique wildcat that cannot fire any factory ammunition to form the new cartridge.

"The best taper we have been able to come up with on the Improved cartridges is 0.0075 per inch, probably varying a little one way or the other wouldn't make much difference," Ackley wrote. "Cases can be made straighter but sometimes extraction troubles develop if the body of the chamber reamer is not exactly straight. That is, if it cuts slightly bigger somewhere along the line it may make the cases stick, but 0.0075 inch taper per inch eliminates this possibility."[6]

Ackley did not like the term improved. "The word 'improved' is an unfortunate selection because any 'improved' cartridge has little relation to its commercial counterpart except for the fact that the 'improved' chamber will accept factory ammunition without any danger to the shooter."[7] The purpose of such designs is to increase case capacity and when this practice first began, to modernize the case design as well. The majority of improved cases have minimal body taper and a relatively sharp shoulder angle. This author would argue that these "improved" designs are not true wildcats because factory ammunition can be fired safely in their chambers.

P.O. Ackley told Bob Borden, "I almost regret using the word 'improved' to describe many of my wildcat developments. Pretty soon everyone was 'improving' cartridges, and I'm not so sure they were all really improving things."[8]

The second major category of wildcats would be those which must be formed in dies before they can be fired in the gun. In other words, there is no form of factory ammunition that can be safely fired in one of these chamberings. This latter group of calibers would be true wildcats.

Jack O'Connor wrote on wildcats. "Still more complicated is the wildcat case based on a factory case that has been shortened, necked down (or up), and then fireformed.

The Ackley series of wildcats (author's note: referring to Ackley Magnums) designed by P.O. Ackley, the Trinidad, Colorado, gunsmith, are made by shortening, necking down, and then fireforming Holland & Holland magnum cases. So are the Weatherby magnum cartridges. In either instance the making of cases is a slow and painful procedure of running cases through two or three dies, trimming, and fireforming … May the Saints preserve me from such an ordeal."[9] O'Connor was no fan of wildcats, at least with respect to forming cases. He emphatically recommended that all but the most avid reloader and gun crank avoid them. Clearly he looked on reloading as a chore and did not consider it an enjoyable extension of his time in the field.

In 1954 Ackley said, "Many of the mechanisms or actions, and a lot of our cartridges, were advocated by Charles Newton more than 35 years ago. But Newton's ideas were so radical the sportsmen wouldn't buy them, even though they were improvements and Newton died broke."[10]

Ackley pointed out an industry trend in his 1962 article for *Gun Digest*, "Are Wildcats Dead?" He said, "The latest factory cartridges all incorporate the general idea which most wildcatters have used for many years — the .222 Remington, the .243, .264, .308, and .338 Winchester, etc. all boast minimum body taper (or a taper approaching that condition) and shoulders as sharp as deemed advisable from the production standpoint. It is safe to predict any new factory cartridges introduced in the future will possess these features." Ackley's crystal ball was working well the day he wrote those words.

"Charles Newton, P.O. Ackley, Rocky Gibbs, and others have ably led the arms industry in its quest for more effective, and more efficient cartridges,"[11] wrote Wayne van Zwoll in his 1998 treatise, *Modern Sporting Rifle Cartridges*. In 2007, Ruger introduced the .375 Ruger, the first big game rifle cartridge to ever bear that company's name, which follows the trend that Ackley pointed out 45 years earlier. Also introduced that year was the .308 Marlin Express, which also meets the guidelines of minimum body taper and sharp shoulder — all indicating that Ackley had the right idea about the future of cartridge design.

In 1964, O'Connor pointed out that Ackley had designed wildcats that for years had filled a niche in the market. It just took time for the factories to notice and pick up on the idea. "Anyone who has seen a case for one of the Ackley short magnums and who has then seen a Winchester .264 or .338 will note that like the Ackley wildcats the Winchester cases have short, straight bodies and sharp shoulders — both features which Ackley said promoted greater efficiency twenty-five years ago."[12]

In the 1975 *Gun Digest* Bob Hagel wrote, "P.O. Ackley, probably the most prolific wildcatter of all time, has come up with some very useful and efficient cartridges. However, as far as I know, none of his cartridges has been commercialized in identical form."[13] Since that statement was penned a few things have changed.

At the time of this writing, Ed Brown Rifles are available in .280 Ackley Improved; Cooper Arms is offering seven different chamberings in Ackley Improved configuration. Nosler has added the .280 Ackley Improved to their list of chamberings and custom brass. Quality Cartridge, a custom loader, is now offering several calibers of Ackley designs with correct headstamps and will be adding more on a regular basis. For many years A-Square rifles were available in .450 Ackley. So, the industry is finally catching up to Ackley, or at least taking notice.

In Search of Early Data

When preparing for this book the author looked high and low for write-ups or articles that were released concurrent to the development of the cartridges. The closer a source is to the date of origination for any given caliber the less error has been added

by misquoting the source material. It seems some of the writers of the day went to great pains not to say much one way or the other about Ackley's work.

The author discussed this idea that, "some writers avoided the subject of Ackley's work" with Wayne York of Oregunsmithing, a custom rifle shop. York's opinion was interesting, for he was a longtime friend of Bob West who knew Ackley in the years when he was developing his name and doing most of his experiments and later partnered with him for a couple of years in Salt Lake City. He reported that West said, "Ackley was an authority in the field of cartridge development, reloading, barrel making, and gunsmithing, so he often rubbed writers the wrong way. Ackley would not abide foolish concepts or comments and was not afraid to tell anyone when they were wrong. To add insult to injury, Ackley did so much testing that he could often site results to back his opinions." It is surprising in light of the fact that Ackley himself "offended" so many gun writers, that "Ackley Improved" became such a widely accepted concept in the firearms industry.

In November of 1980, Col. Charles Askins placed an article in the *American Rifleman* entitled, "Americas Greatest Wildcatter." Near the end of that article Askins says, "A somewhat critical acquaintance said to me the other day, 'You know old Ackley worked up all these wildcat rounds just for his own amusement.' This I refuse to accept. With a total interest in the shooting game, with a dedication and a devotion to rifles and their loads, the man had given countless hours, money and effort to the betterment of the existing American family of rifle cartridges. The debt of the shooters of this country to Parker Ackley is a major one."[14]

Col. Askins was a personal acquaintance of P.O. Ackley, they corresponded for years on projects, barrels and calibers. Askins knew of what he spoke, Ackley was indeed dedicated to learning more about what works and why, when it comes to cartridges. Virtually all of his experiments and developments are a result of that desire to learn, and let's not forget, to make a living.

Dave Scovill of Wolfe Publishing was a longtime friend of Bill Atkinson, who worked for Ackley and remained friends with him through the years. Scovill relayed that Atkinson said of Ackley's wildcatting, "P.O. was not an opportunist, he just did what he thought was interesting, and it turned out a lot of other folks thought it was interesting too."

Does Case Shape Really Matter?

As far back as July, 1946, *American Rifleman* ran an article by C.C. Merideth discussing this very question. His conclusion, "… we must arrive at the conviction that any variation in pressure to velocity ratio ensuing from any alteration in chamber shape is negligible as compared to other purely mechanical changes, such as altering bullet diameter, wear in the throat and many other possible differences between any two apparently identical rifles."

Bob Hutton knew of the Merideth article mentioned above, he was sure he could disprove the conclusions drawn there almost 20 years earlier. He created a wildcat with the same case capacity as the .219 Donaldson Wasp in a short, fat configuration. Prior to testing he expected that the design would allow the use of slower burning powders for better overall results. In testing he found that it required the exact same powder and charge and delivered identical results.[15]

Hutton, while discussing the concept of modern cartridge design (including improved cases), wrote, "Shape, in the mathematics of interior ballistics, makes no difference."[16] It is important to understand that we are talking about internal ballistics not how the case functions in a given chamber design. The idea is simple and easily demonstrated. If a cartridge holds 40 grains of powder and if all other variables are equal it will produce statistically identical results along with any other design of the same caliber with any shape chamber you can imagine so long as it

also holds 40 grains of powder.

Another writer tackled this issue in *Guns & Ammo*. G.O. Ashley did an article that required a fair amount of actual range work. He and a couple of gunsmiths used a .257 Ackley Improved and a wildcat called the ".25x60mm C.A." The idea was to have cartridges of the same caliber and capacity with totally different shapes (the exact discussion we are interested in here). The two cartridges ended up within 1.1 grains water weight capacity, about as close as you could get. These tests showed that the Ackley case delivered between 3 and 12 fps more velocity than the .25x60mm C.A., statistically that is a zero, especially since the 1.1-grain edge in capacity belonged to the Ackley Improved. All this is in support of Hutton's statement that case shape has *no effect* on internal ballistics or how the powder is consumed in the process of driving a projectile down the bore.[17]

Most recently, the SMc line of cartridges came to the market. Mic McPherson and By Smalley partnered to create www.superior-ballistics.com (a now defunct web site) to promote their ideas. "SMc naming designation accounts for caliber and usable case capacity. For example, our 5/35 *SMc* is a 20-caliber (5mm) cartridge holding about 35 grains of water (to base of neck). One important patented design characteristic of all *SMc* cartridges is a powder column that is between about 2 times and about 2.1 times bullet diameter."[18]

This is the newest design to claim improvements in ballistics via case design. In reading over the data provided on their site no pressure data was provided. Knowing that pressure and velocity are directly correlated you have to assume from the velocities reported for the 5/35 SMc that they are not afraid to load hot. Now to be fair, they are using high quality brass and this probably helps with handling pressure as the cases are relatively thick in the wall and designed for top pressures.

The only new information that this line of cartridges brings to the table is a fairly extensive test of barrel heating. The conclusion of McPherson in a nutshell is that the SMc design produces less barrel heating and possibly less throat damage than other cases tested.

It appears from the data reported that contentions about barrel heating were proved out in McPherson's tests. He went on to say that the test should be repeated to insure the results were accurate. So, how does this relate to our axiom that case design has no effect on internal ballistics and velocity? I would say that only further testing could determine if the ideas of the SMc really have merit. Nearly thirty years of experience in gunsmithing, reloading, and barrel making tell me that it's not likely that any increase in velocity is a result of the design in question, but rather a result of hot loads.

So where does the increased velocity come from in an Ackley Improved case design? It's very simple — more case capacity. Ackley did not merely change the shape of the case. He added, in most cases, a fair amount of case capacity, which allows for more powder while holding the overall pressure to the same limits. This added capacity is only available for increased loading after the cases are fireformed to the chamber.

Customers often ask, "What pressure does that wildcat operate at?" The answer is, exactly the same pressure as the factory counterpart, or parent case.

Ackley thought he could exceed the pressures of the factory cases … that might be true with antiquated designs like the .30-30 WCF or the .25-35. Cases with a lot of taper were often originally held to lower chamber pressures. It is not true of more modern designs that already have relatively straight walled cases and sharp shoulders, also modern cases normally are designed for higher pressures. A good example of a high pressure design is the .270 Winchester, it was one of the first cases to be loaded to full potential by the factory, modern SAAMI specifications show the .270 at 65,000 psi.

The .30-06, which many consider to be modern in design, is limited to 60,000 psi by SAAMI. The factories tend to load .30-06 ammo below that pressure level. Why?

Because there are large numbers of older and often weaker rifles in general use, so it is wise of the factories to hold those pressures down.

In the case of the .270 Winchester, it was never available in these weaker actions from the factories, and they do not have to take responsibility for custom guns on old actions, so they load it to full potential. This gives us an insight into the reason that Ackley perceived his .270 AI to be no real improvement over the .270 Winchester.

Once fireformed, a .30-06 AI can be loaded to the full potential of the brass. In a modern high quality action that is at least 60,000 psi, and most wildcatters will go straight for the 65,000 psi as SAAMI uses with the .270 and many other modern cartridges.

If you check the pressure on the average handload in any caliber you will find that it is well above the pressures of factory ammunition. So it's easy to see why folks think that case shape increases velocity. In reality it is simply more powder and the fact that you are probably loading hotter than the factory. Check out Chapter 14 for a more detailed discussion of this interesting subject.

Ackley should have the final word here. "There are no Wildcat cartridges which are actually revolutionary. There are a few which fill gaps between existing commercial cartridges. There are many more which are no better and perhaps not as good as their commercial counterparts.

"There is no evidence which substantiates the claim that one cartridge design is more accurate than another. It certainly cannot be demonstrated that inaccurate barrels can be made more accurate by simply rechambering them to some so-called 'improved' cartridge or Wildcat caliber."[19]

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CHAPTER 17

SECONDARY EXPLOSION EFFECT (S.E.E.)

P.O. Ackley tells us that he first heard about secondary explosion effect, or S.E.E., (although it had not been named at that time) in about 1940 or shortly after the introduction of DuPont 4350 powder.

"Fred Barnes was just developing his bullets with copper tubing-jackets," Ackley noted. "He and I made the first .25 caliber tubing-jacketed bullets to use on a woodchuck hunt in the spring of 1941, if memory serves me correctly. One of the rifles was a .250 Gipson Magnum.

"We intended to use 4350 powder, with which neither of us had any experience. We started relatively low, using something in the neighborhood of 38 grains. We were firing the gun in Barnes' basement. Pressures were exceptionally high, causing us to wonder if the thick jacket on the bullets was the cause of the trouble. None of the primers were loose, but all showed a great deal of extrusion around the firing pin, and extraction was difficult.

"Then in desperation, we decided to 'blow the works' and upped the powder charge to around 55 grains. The pressure signs disappeared and no further trouble was experienced."

A little research shows that 55 grains of IMR 4350 would be an expected maximum load for the .250 Gipson Magnum with an 87-grain bullet.

This chapter will seem to wander away from P.O. Ackley, but it's necessary. In short, we are discussing a technical problem that he was well aware of and for which he ran many tests to attempt to gain understanding. This chapter covers much data that Ackley would have considered as he tried to work out the problem himself.

We frequently see comments from self-proclaimed experts that S.E.E. has never been duplicated in laboratory conditions. This is absolutely false. First, we have warnings from powder manufacturers about this potential danger. Second, we have numerous research projects both private and government-funded that have found definite evidence of the phenomenon no matter the name or theory used to explain it. This chap-

ter reports on much of this material.

It was about 1959 when Jack O'Connor, famed gun writer of *Outdoor Life* magazine, mentioned the danger of loading light loads of slow-burning powder in large cases. For some time, there was a hot debate in the various gun magazines about whether this problem really existed or not. Why in the world anyone would want to load a small amount of the wrong powder in a large capacity case makes little sense. Yet it did go on and still does from time to time. Practice with a .22 if you want to save money and avoid recoil. Anyway, it seems that enough guns were being damaged that this issue was considered important enough to report to the shooting public.

Bob Hutton weighed in on the subject in *Guns and Ammo*, reporting that after three years of trying to blow up guns with light loads he had not been able to do so. Two reliable sources admitted during this time period that such light loads were not a good idea. First, Nils Kvale wrote in the *Norma Gunbug's Guide* that unusually high pressure can occur with very low charges of smokeless powder. Then P.O. Ackley received confirmation from C.I. Johnson at DuPont in a letter that the phenomenon existed.[1]

Here is what Nils Kvale, Swedish engineer for Norma wrote on the subject. "Is there any danger in loading too light? Powder experts claim there is. If a load is reduced so much that the case is filled to, say one third of its volume, there is a possibility that the primer flash will rush along the surface of the powder, igniting part of it, creating enough pressure to push the bullet into the forcing cone where it comes to a halt — and then, when the ignition has spread to the entire powder charge a few thousandths of a second later, the lodged bullet cannot again accelerate fast enough to keep a dangerous pressure from arising. As a matter of fact, guns have blown up under conditions for which no other explanation could be found."[2]

The letter from C.I. Johnson at DuPont said in part, "Our tests with reduced loads of slow-burning powder in oversized cases indicate it is possible, at times, to obtain excessive pressures…"[3]

According to Hutton it was Ackley's opinion that since most of the incidents were reported by gunsmiths, it could have been that muzzles were pointed down into shooting tubes for test firing. The idea Ackley was looking at here was that, in such a case, the powder would be forward in the case at the base of the bullet. In Volume I of Ackley's *Handbook for Shooters and Reloaders* he included a chapter entitled "Reduced Loads." It starts off, "In this author's opinion there is sufficient evidence that reduced charges of slow-burning powders cause detonation effects which warrant concern on the part of handloaders."

The final issue of *Handloader* magazine for the year 1966 carried a small commentary under a shared byline from Dick Woolman and Al Biesen, "The Secondary Explosion Effect." This article was little more than a cautionary reminder not to load light loads of slow-burning powder in large cases with small bore diameters. Even though it did not say anything that had not been in print before, it was apparently the last straw for Col. G.O. Ashley, sometimes gun writer. Ashley took to the range and then to the typewriter to question the existence of S.E.E.

"The Mystic S.E.E"[4] was the title of the article Ashley wrote. Col. Ashley devised a test to attempt to recreate S.E.E. He utilized two .25 caliber rifles, a sheet staked to the ground to collect any unburned powder, and a tire with which to tie the rifles down, just in case he was wrong.

When I first graduated from gunsmithing school, I worked in a shop where we had an indoor range. I recall the unburned powder collecting on the floor and the janitor sweep-

ing it up once a week. I had been taught somewhere along the line that some powder remains unburned, but, seeing that powder in a pile every week drove the point home. Ashley discovered this fact for himself with his test. This caused him to suggest that Piobert's Law (pronounced 'pee o bear') might *not* be infallible.

Piobert's Law states, "The rate of regression of a burning propellant surface, measured normal to the surface, is known as the linear burning rate. It is expressed usually in terms of inches per second. Several factors affect the burning rate, including the pressure at which the burning takes place, initial temperature of the propellant, gas velocity over the burning surface, and composition of the propellant."

Cream of Wheat was used as a filler in some of the loads in Ashley's tests to hold the powder back against the flash hole in the case. This might have been an interesting test to follow up with, but it only served to reduce the number of shots fired in the test that had potential S.E.E. conditions.

In discussing his test results, Ashley mentioned that he had one load of 30 grains, Norma 205, with an 87-grain Sierra spitzer that flattened a primer. He says, "I offer no explanation for this; I have none. If others have, let us hear about it." Well, here was the proof of S.E.E. that he was looking for and he missed it. All his loads in the test aside from this *one* showed no signs of pressure, whether greater or lesser in powder charge. S.E.E. is an otherwise unexplainable pressure spike! Ashley assumed that because his pressure spike did not blow up his rifle that it was not S.E.E. Unfortunately, he fired less than 100 rounds with various loads before discontinuing the tests and making the pronouncement that the existence of S.E.E. "just isn't so!"

That fall, Professor Lloyd Brownell of the University of Michigan wrote to *Handloader* with "The Mystic S.E.E." article in mind. Professor Brownell stated in part, "As the Editor of 'The Handloader' magazine you have an obligation to your readers to provide reliable information on handloading … Therefore, I request that you publish a suitable commentary from Norma or DuPont, or select what you wish from this letter. I will try to help by providing data on some actual blow-ups and some discussion based on ballistic texts." Brownell eventually wrote a multipart article entitled "Pressure" which ran for more than two years in the early days of the magazine.

In Brownell's letter, he made the point that most experts did not seem to understand the phenomenon known as S.E.E. Most, including G.O. Ashley, did not understand that it does not relate to normal burning characteristics of the powder in question, rather it is more an example of statistical deviation.

Brownell, as an example of this lack of understanding, pointed out that when the NRA published test results for a .270 Winchester loaded with surplus 4831 powder, various loads from light to normal volume were loaded in lots of 10 and the results averaged. By averaging, the anomalous loads that produce either higher or lower than normal pressure are in effect not reported. This is the opposite result we would desire if we are trying to learn about the pressure excursions that have been reported to *rarely* blow up guns. "We must remember that it is not the average pressure that takes the gun apart but the single excursion,"[5] wrote Brownell.

With regard to Piobert's Law, Brownell pointed out numerous sources that clearly indicate the reasons the powder may burn incompletely. The most commonly available book he mentions is Earl Naramore's *Principles and Practice of Loading Ammunition*. On page 183, in the chapter on combustion Naramore explains, "Incomplete combustion is exactly what the term indicates — the powder fails to burn completely. This condition may be related to under-ignition but the most common cause lies in using charges that are below the powder tolerance (Authors note: wrong powder for the job). A certain amount of heat and pressure are necessary to burn powder. If charges burn at too low a pressure, there just is not enough heat to keep them burning and some of the grains may not burn at all or the fire may go out be-

fore the powder is all burned, with unburned or partially burned grains often remaining in the bore of the cartridge case."[6] In other words, Ashley did not disprove Piobert's Law, he simply did not know all the characteristics of gun powder.

Brownell shared a fair amount of statistical data from his own tests showing that light loads can produce a wide range of absolute pressure readings. He also provided Oscilloscope traces that showed the erratic pressure curves produced by reduced loads vs. conventional loads for the same caliber.

In research, I located a paper by Lloyde E. Brownell, copyrighted 1965. Titled: *Report #1 Absolute Chamber Pressure in Center-fire Rifles. Du Pont Ballistic Grant Studies, The University of Michigan, Ann Arbor, Michigan.*

In it, there are some relevant passages in reference to S.E.E., the first of which talks about "Pressure Excursions." Discussion begins with light loads of IMR 3031 in a .30-06 with 180- and 220-grain bullets. "There is obviously a 'Pressure Excursion' with some firing loads in this range in which the maximum pressure for replicate firings may differ by factors of more than 2 to 1."

Later in the paper Brownell states, "This corresponds to a pressure ratio of 2.44 or 244 percent increase in pressure from minimum to maximum."[7] It's important to understand that these same loads also produced normal pressures in some firings. I think most reloaders know that if you have a 244 percent increase in pressure over normal levels the system will fail.

Following his explanation of pressure excursions, Brownell states emphatically that he believes his test results are directly related to reports of excessive pressures reported in conjunction with the use of reduced loads of slow-burning powders.

You would think that over the years the powder manufacturers, bullet makers and ammunition producers would have all experienced this phenomenon and documented it for posterity. Well, there is a simple explanation why they have, or have not — they are interested in loads that are going to produce results appropriate to the case design in question. So, they load in the range that would produce normal velocities. Consequently little, if any, of the extensive testing that goes on is performed in the range where this problem occurs.

Loading manuals do not recommend light loads of slow-burning powders because it is a well-known fact that ideally loaded cases will be between 80 and 90 percent density, such loads deliver better standard deviation and accuracy. Actual density varies with the bulk density of the powder. Load density should be explained here: Load density is the ratio of powder charge weight and the water weight for a full case. It is not the percentage that the powder fills the powder space in the cartridge case.[8]

So when cooking up loads for various bullets the ballisticians at these bullet and powder companies look for powders that will do a better job of filling the case. In other words, appropriate powders are selected for the job at hand. It is handloaders who tend to say, "What if?" when looking at the various powders they have on the shelf.

An added difficulty with S.E.E. is that it is not easily reproduced in a laboratory. Even if it were possible to reproduce the effect on demand very little can be learned from the event as today's technology cannot explain why the excessive pressures occur on an erratic basis, only that they do occur. Ackley pointed out that compared to the number of shots fired each year the number of detonations is extremely small, but that he received reports often enough over his career to be certain that it was a real effect.

"There are several theories as to the cause," said Ackley. "The military refers to it as shock waves. We in the gun business usually refer to it as denotation. The term "secondary explosion" is a new one on me, for I have never heard of anything in this reaction that could be described as secondary. The bullet does not stop and start again when detonation occurs, but passes through the bore just as though the powder charge were reacting in the conventional manner … The military explains it by calling it shock waves which can continue on into the barrel and, in some instances, pieces

of barrel have been completely blown out near the breech end."[9]

To more clearly understand this "Wave Theory" let's look at the book *Theory of the Interior Ballistics of Guns* by J. Corner, PhD. In Chapter 9, "The Hydrodynamic Problems of Internal Ballistics," Corner states, "The first and most important of the hydrodynamic problems of the gun is of respectable age, having been studied first by Lagrange in 1793. This problem is to find the distribution of pressure, density, and gas velocity between the breech and the base of the shot at all times during the firing. That there will be usually higher pressure at the breech is obvious from the fact that the propellant gases have themselves to be accelerated by this difference in pressure.

"On further examination, it is not obvious why the acceleration of all parts of the gas should be directed down the bore at all times, so that it is not necessarily true that the pressure at the breech is always higher than that everywhere else in the gas. This introduces the theory of wave of finite amplitude, associated particularly with the names of Riemann and Hugoniot."[10] Corner goes on later to state that waves have been found in guns under conditions of inefficient ignition.

Yet another theory is that the reduced charge of powder becomes strewn across the length of the case so that when the primer ignites it has access to a far greater surface area than is possible in a full density load. It is a principle in chemistry that the more area exposed the faster the reaction. Consequently, more gas would be created during a smaller time interval causing the case to fail as the pressure exceeds its ability to carry the pressure.

In Richard Lee's *Modern Reloading, Second Edition* another theory is mentioned. In this case the idea is that the powder strewn across a cartridge case lying horizontally in the chamber allows for a large surface area and when the powder is ignited it acts as a shape charge directing gases in a single direction rather than expanding in all directions.

Ackley's personal theory was that a small volume of powder could become compacted in the case right behind the bullet, in effect making the powder and bullet into a bore obstruction, which on rare occasions ignites in such a way that the case is not able to contain it. Most of the time the damage to the rifle is caused by a case failure, which allows white-hot gasses to escape through the action. This sudden release has the effect of a detonation as the gases expand at a high rate of speed, damaging the action and stock.

The test fire method used in Ackley's shop had the barrel pointing directly down into a pit to catch the bullet. He found that when testing light loads he occasionally had misfires. When the cartridges were taken apart to see the cause, he found that the powder had become an almost solid mass behind the bullet and had only partially burned.

Quoted from Ackley's article on S.E.E. for *Handloader*, "Certain French experiments made to determine the effects of unsymmetrical charges (small charge loose in large chamber) showed that when the charge was placed loose in the chamber, the maximum pressure attained was 34 tons per square inch as compared to 14 tons produced by a symmetrical charge (held in place) of the same weight."[11] In short, light loads of slow-burning powder in a large chamber are a bad idea.

In the chapter titled "Reduced Loads" in Ackley's *Handbook for Shooters and Reloaders* he quotes from the 1959 edition of *Naval Ordnance,* a textbook prepared for the U.S. Naval Academy:

"During the small interval of time when the charge is being ignited, there may be produced in the gun, under certain conditions of loading, abnormally high pressures known as wave pressures. These pressures appear to result from hurling back and forth of the gas mass between the breech block and the base of the projectile, and seems to be of the nature of the best phenomenon, in which two such pressure waves come into phase with each other to create a pressure abnormally high. If wave pressures continue after the projectile has begun to move, they may act on portions of the bore not strong enough to withstand them."

Roger Stowers did several articles for *Handloader.* Of interest to us here is an article

titled, "The Secondary Explosion Effect… again and again and again." Stowers was in the process of testing a .240 Gibbs rifle when he ran onto S.E.E. and found he could reproduce the effect at will.

His initial loads for the rifle were made up of relatively slow-burning IMR 4831, and after comparing several sources of data he decided that 49 grains would be a good place to start behind a 105-grain Speer spitzer loaded .040 inch off the lands, which put the base of the bullet at the junction of the neck and body of the case. Immediately he noted pressure signs. Stowers tells in his article of spending a couple of weeks checking every detail of his rifle, chamber and loads looking for the problem, not having S.E.E. on the brain. After carefully rechecking headspace, firing pin protrusion, throat length, chamber and case dimensions, all the variables had been eliminated. Velocities from these light loads ranged in the 2,800 to 2,900 fps area with two powders, both of which caused excessive pressures.

At this point he decided to start with fresh brass so he set up to fireform some new cases. He used Rocky Gibbs' suggested method of forming cases where the bullet is inserted nose first in the case just finger tight over a fireforming load and the rifle held upright while the case is inserted in the camber so the bullet will not fall out. This puts the base of the bullet into the lands and at the same time holding the case tight against the bolt face for firing. One result of this is that some of the air space in the case was taken up by the nose of the bullet. Ultimately, Stowers found that he could fireform with the same loads that previously had created high pressures.

He decided to try seating his bullets deeper in the case in an effort to take up some air space and to prevent powder from building a "log jam" behind the bullet in the neck. Once he made a point of seating the bullets below the neck and shoulder junction, he never had problems with S.E.E. again. Once the pressure problem appeared to be solved, he decided to work up loads normally and ended up with an 85-grain bullet going 3,596 fps with no pressure signs, while utilizing about 20 percent more powder. Light for caliber loads are often described as 20-30 percent below a normal charge.

The theory that the bullet starts and stops could be tested, but it seems highly unlikely based on the laws of inertia. However, at least in the case of Roger Stowers' tests it is clear that when the bullet base was seated flush with the base of the neck it had .040-inch jump (freebore) to the lands; once the bullet was seated deeper it made at least four important changes: It took up some of the air space in the case minimizing the amount of free space; it prevented the as yet unburned powder from creating an obstruction in the case neck and shoulder area; it provided more jump (freebore) so the bullet would have more momentum by the time it hit the lands, thus it would be less likely to slow or stop due to friction in the bore; and finally, it created some turbulence, or at least a void in the powder charge as the bullet moved forward under pressure, allowing any "log jam" to break up.

Handloader magazine ran an article by Charles E. Petty titled, "Mystery Solved" in their June 1997 issue #187. In this article Petty describes how an ammunition manufacturer develops and tests loads for new caliber offerings. Loads are developed using a universal receiver, in this case there were no SAAMI standards available in psi, and so copper crushers were utilized. Once loads were developed that were within safe limits according to the single data point provided by the copper crusher system, the manufacturer tests the ammunition in actual field grade guns to insure it will perform as expected for the shooting public.

One test rifle chosen for the field rifle portion of the tests was a Swedish Mauser, of either 95 or 96 Mauser design. In the testing process they ran into a catastrophic failure with one of the test rifles. The damage was identified as being caused by a high pressure failure. In other words, the brass failed under pressure and the release of white hot gasses at ultra high velocity destroyed the action. The barrel was inspected and found to be undamaged, so it was fitted with a collar for the universal receiver and a transducer was attached to allow for complete pressure data

to be collected.

Eight shots were fired, the first four showed a progressive increase in velocity and pressure. The fifth shot showed a drop in velocity, then successive shots increased in pressure, the eighth shot registered at 82,120 psi and the tests were stopped for safety reasons. When the pressure data was analyzed it was found that early in the ignition of the powder charge there was a drop in pressure, the theory being that the bullet jumped from the case to the barrel where it stopped or nearly stopped moving. As a direct result of the bullet moving forward the case volume is greatly increased, thus dropping the pressure in the case momentarily until enough powder is consumed to raise the pressures again.

We know that pressure is required to cause powder to burn correctly, so it is not hard to understand that if pressure suddenly drops that the powder will at least momentarily slow its burning process. Now imagine that the bullet is lodged in the bore just ahead of the throat as a result of the initial pressure spike. When the pressure builds the second time it now has to overcome the inertia of a stuck bullet in the bore so pressures are forced even higher. In a nutshell that is the evidence that Petty brings to the table.

Doubters will point out that the 6.5x55 is not a high capacity case and thus not a good choice as a S.E.E. candidate. At first glance this is true, but think about what happens when the bullet moves down the bore. A 6.5x55 like those used would have the CIP-style chamber, in which the throat is a very long tapered affair. This would allow the bullet to move a long way into the bore before it might stall out — increasing effective case capacity by a large amount. It is interesting that the evidence found in this laboratory test is repeatable and it does shed light on the concept that slow-burning powders might be forced to burn in an inefficient manner in a large capacity case if light loads were used.

In an article "Arcane, or Forbidden Knowledge about Handloading,"[12] P.T. Kekkonen tells about an instance of S.E.E. that one of his cohorts had while working with subsonic loads in a .308 Winchester.

NOTE: The following examples are from the "Arcane" article mentioned above. They have not been tested by this author and should be presumed to be totally unsafe under any conditions.

Special loading techniques have been developed by Finnish hunters as they utilize silenced firearms when hunting. The load that Kekkonen used in his .308 was 1 gram or 15.4 grains of N310, such loads include the use of Dacron filler material to hold the charge at the base of the cartridge. The bullet was an 11-gram (169 grain) Lapua D-46 seated point backwards to help take up airspace in the case. Velocity was 539.7m/s average or 1,770 fps. He reports that the pressures from this load appear to be close to factory-loaded ammunition for this cartridge, although no pressure testing was done.

Mr. Kekkonen reports that another "well educated writer" that he knew did not believe in the warnings about S.E.E., also known in Finland as "Reduced-Charge Detonation." This second writer loaded some test ammunition with 0.2 grams or 3.1 grains of N310. When fired, the force completely wrecked a good quality .308 Winchester rifle. So, it would appear that the problem of sub-minimum powder charges will happen with faster powders as well.

The newest theory I have found in relation to S.E.E. is the idea that "mechanical push" is responsible for the rare instances of S.E.E. This idea relates to how actual explosives work versus what gun powder normally does. The usual explosives utilized in mining, drilling and the military can mostly be handled with ease. They are hard to ignite, burn slowly when in the open. To make these substances explode a high speed detonator is used to provide "mechanical push."

In this latest theory, somehow one or more kernels of propellant are accelerated in the turbulence caused by the primer flash and the subsequent limited burn until they crash into the shoulder of the case or base of the bullet, in effect being "mechanically pushed" to the point of detonation. This mechanically pushed detonation is responsible then for causing a chain reaction among the remain-

ing powder granules.[13]

P.O. Ackley never published an opinion stating he had the answer to S.E.E. because this is a problem that is rare and not easily duplicated. The various theories discussed in this chapter combined with the number of companies, governments, and universities who have undertaken to understand this phenomenon indicate it is a complicated subject. There may well be more than one explanation for S.E.E. As with many aspects of ballistics, variables are everything.

Related Documents:

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Charge Design Considerations and Their Effect on Pressure Waves in Guns by Ingo W. May and Albert W. Horst December 1980

An Investigation of Interior Ballistics Ignition Phase by B. Porterie and J.C. Loraud September 1994

1 Hutton, Bob, "On the Technical Side," Guns & Ammo, October, 1962
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CHAPTER 18

ACKLEY CARTRIDGE DESIGNS

In his Gunsmith column for *Guns & Ammo*, Ackley wrote, "Don't believe too many claims made for many wildcat cartridges. Some things are impossible. You can rest assured that no one is going to revolutionize the industry by making a few changes in a cartridge case. The revolution comes by raising the sights on the typewriter."[1]

Many have accused Ackley of inflating his results. If you look carefully at the data provided by him for *his cartridges only* the information is generally fairly accurate. Remember that most of his chronograph data came from a ballistic pendulum in the early days. Much of his data was checked by folks who did have chronographs, when they became available. Data in the Speer Wildcat manuals #2 & #4 were tested at Speer's facility using a then top-of-the-line Potter Electronic chronograph.

Much of the data in Ackley's books that folks object to are loads provided by the developer of the cartridge (not Ackley). There are also many loads for factory calibers in his books that were actually worked out on the Powley computer by Bob Hutton, one of Ackley's cohorts at *Guns & Ammo*.

These days I frequently see negative comments on Internet forums about Ackley cartridges going so far as to claim he was a reckless old fool. Most are ignorant comments from guys who have fired more rounds from their keyboard than at the range. Ackley was a careful and intelligent experimenter who used chronographs and pressure guns for many of his experiments. Dismissing his lifetime of work without any real world experience is to miss out on some of the best cartridges that wildcatting has to offer.

.17 Caliber Wildcats designed by P.O. Ackley are described separately in Chapter 7, "Pioneering the .17 Caliber." **Recommended to clients by Ackley in* Rifles — A Modern Encyclopedia, *Henry M. Stebbins, 1958.*

.22 Ackley Improved Hornet

There were several versions of the Improved Hornet offered by gunsmiths all over the map. In *Wildcat Cartridges* by Richard F. Simmons this now obsolete cartridge is given equal treatment to the .22 K-Hornet. Over time, the Kilbourn version of the cartridge won the long-term battle to survive in the wildcat market. The K-Hornet probably survived because it was well advertised by Kilbourn and Crandall in both the U.S. and Canada. The Ackley Improved version of the .22 Hornet was equal ballistically to the K-Hornet design. They both had the advantage of allowing for simple fireforming of factory cases in the improved chamber. Ackley's version of this case appeared in a 1941 sales circular from his Roseburg, Oregon shop.

Ackley was never afraid to drop a cartridge from promotion if some other version was more popular; after all, the gunsmith makes the same paycheck regardless of the chamber reamer used on the job.

.22-3000 Ackley Improved Lovell

The .22-3000 Lovell was made by necking the .25-20 Single Shot down to .22. Later, Harvey Donaldson revamped the case and it became known as the R-2 Lovell. The R-2 was so popular that Griffin & Howe had cases manufactured with the correct headstamp, which were available as late as 1962.[2] It's not at all clear when Ackley worked up his version of the .22-3000, however it had about 2.5 grains more case capacity than the R-2. Simmons mentions that the Ackley version is capable of more velocity than the earlier versions of the cartridge. As a side note, Simmons also notes that Vernor Gipson had designed an improved Lovell case around 1940, the implication being that Gipson's design preceded the Ackley.[3] It's hard to know for sure, the "Improved Lovell" appeared in Ackley's 1941 sales circular from Roseburg, Oregon. He called the Improved Lovell the "latest version of this popular cartridge." Other cartridges referred to in this manner were as much as three years old.

.22 Ackley Improved Jet

Ackley reports that this cartridge came about because he had made tooling for a client who wanted a .17/357 case. That .17 caliber project never worked out because it was near impossible to neck the .357 cases to .17 without loss of a high percentage of brass. When the .22 Remington Jet came on the market, Ackley pulled his tooling from the earlier project off the shelf and quickly had an improved version of the .22 Jet. He considered this cartridge a good choice for small-framed single-shot rifles, or even the 92 Winchester. Candid as Ackley often was, he reports in his *Handbook for Shooters and Reloaders* that the .22 Sabre, and the .22 Super Jet are similar wildcats and that each will perform about the same. Ackley's version is intended to use .357 Magnum brass.

.218 Bee Ackley Improved

Simmons reports on this case in *Wildcat Cartridges*. There he pictures a formed, loaded case; it has minimum body taper but the neck length was left equal to the factory case. He indicates that if the shoulder were blown forward the Ackley case would be more popular, and this would have made it a duplicate of the Mashburn Bee. As with many of Ackley's designs, he realized when they were overshadowed or made obsolete by another man's design and he simply stopped promoting them. He even went so far as to pick up other gunsmiths' designs and chamber for them to meet customer demand.

.222 Ackley Improved

In Ackley's description of this cartridge, he did not even attach his own name to it, simply stating that there were numerous versions of this wildcat. He even goes as far as to state that he doubts that accuracy is changed by the improved case. He is quoted by Bob Borden to say about the .222 Improved, "The original cartridge was already an improved design — that is, it had a fairly sharp shoulder and minimum body taper."[4]

.222 Remington Magnum Ackley Improved

Offered as a special order cartridge from Ackley's shop, he must not have been impressed with it, since he did not provide load data for it. The improved version offers about 5 percent more case capacity than the factory .222 Magnum case. P.O. does suggest that this would make a good 6mm cartridge for light to medium weight bullets.

.22 Hi-Power Ackley Improved

This is widely reported as Ackley's very first wildcat, however, he had already built his .228 Ackley Magnum by then.[5] In 1937, when he returned to Oregon from his barrel making apprenticeship with Ben Hawkins in Ohio, Ackley made a reamer for the .22 Hi-Power Improved. According to Simmons, "Ackley states that he made up the reamer for this shell before making any other, including the Improved Zipper." We do know from these various sources that this was the first fireformed, improved design that Ackley tried. Simmons reports an improvement in velocity of 300 fps for the Ackley Improved .22 Hi-Power cartridge, pretty amazing results for a first attempt.[6] Heavy bullets work well in this cartridge.

.219 Zipper Ackley Improved

First developed for the Savage 99 lever action, it was introduced in 1938, only one year after the factory introduced the parent cartridge. One of the most popular and best-balanced of the rimmed varmint cartridges, pre- and post-World War II, was the .219 Ackley Improved Zipper. It is well suited to single shots and developed a good reputation for accuracy in those guns. The Ackley Improved Zipper is a good example of changing a poorly designed case to one which will burn powder better and produce excellent velocity and accuracy in relation to case capacity.[7]

Simmons had a Savage 99 rebarreled by P.O. Ackley for the .219 Improved Zipper. Accuracy in that rifle was not great, about 2.5-inch at 100 yards, which many would consider acceptable for a lever gun and iron sights.[8] Case life was very good, though, especially when velocities were held under 3,750 fps. The Improved Zipper had the advantage of being a pretty flexible case when it came to reloading. It would accept a variety of components and produce high velocity and good barrel life. Ackley highly recommended the .219 Zipper AI as, "one of the finest of the high powered .22s for use in the Krag action as well as in single shots."[9] He also mentioned that, "the Improved Zipper will accept loads recommended for the .225 Winchester."[10]

In the *Speer Wildcat Manual #4* a version of the .219 Zipper Improved is covered. There it is described as a cousin to the .219 Donaldson Wasp. The manual also compares the .219 Zipper Improved to the .22-250 case for ballistics.[11]

When first offered, cases could easily be fireformed from factory .219 Zipper ammo or brass. When production of sporting ammunition resumed after the war the factory changed the specifications for Zipper brass. These changes forced Improved Zipper owners to make brass from .30-30 or .32 Winchester Special, which added a fair amount of work to the process for making brass. These brass problems likely hastened the decline of this wildcat's popularity.[12] Ackley later offered a .22/30-30 AI case, mainly as a result of Zipper brass going out of production.

.22/30-30 Ackley Improved*

This cartridge appeared in an Ackley sales brochure somewhere between 1951 and 1955. In that brochure Ackley refers to this as a new cartridge, we just can't be sure what 'new' meant to him.

When .219 Zipper brass was changed by the manufacturer following World War II, Ackley decided that his Improved Zipper was essentially obsolete. As a result, he designed the .22/30-30 AI. This cartridge utilizes a full-length .30-30 case necked to .22 with a 40-degree shoulder. Ackley reported velocities approaching those of the .220 Swift.[13] The ad-

vantage to this cartridge is that it can be used in actions designed for .30-30, specifically single shots, or the Savage 99 would be good choices as this cartridge will produce pressures not recommended for the Winchester 94.

Ackley recommended this case, "because of its ease of forming brass from .30-30 or .32 Special cases, as compared to similar cartridges such as the improved zipper, .219 Wasp and others."[14]

.22-250 Ackley Improved

It should be mentioned that at the end of World War II there were many gunsmiths who had picked up the idea of necking the .250-3000 case down to 22. Each shop tried to market nearly identical versions under various names. Ackley was no different, offering a .22-250 Ackley.[15] He was reportedly friends with Jerry Gebby, who marketed the .22-250 under the moniker of .22 Varminter. Ackley never marketed the .22-250 very hard. Likely when the .22 Varminter became the popular version, he simply offered his improved design to differentiate and establish his own market. Eventually the Varminter was adopted with minor changes by the factories as the .22-250 in 1965. Today the .22-250 Ackley Improved is quite popular.

Two shoulder angles were offered by Ackley for this cartridge — 28 and 40 degrees. Apparently, he saw no real advantage to either design and recognized that there was a market for both so he let the client choose. He mentions that the improved design of this cartridge helped to control brass stretching.[16] Load data according to him would be the same as the factory .220 Swift, and just to double check this idea the author checked the case capacity for a .22-250 AI and a standard .220 Swift; in the brass tested the .22-250 AI had more case capacity by 3.8 grains water weight than did the Swift case. So, it would be safe to use Swift data to load the .22-250 AI, at least in the cases measured. (Be sure to check case capacity in your brass if you intend to try this.) At the time of this writing the .22-250 AI is still a very popular wildcat, which has the widely accepted 40-degree shoulder.

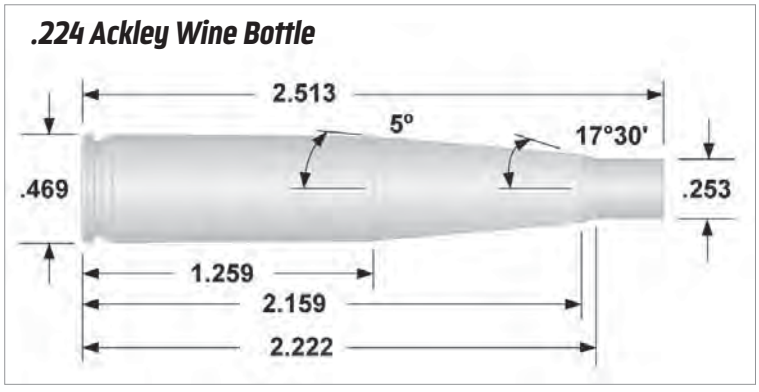
In 2004, Serengeti Rifles introduced their new Red Mist, a premier custom rifle designed for high performance varmint hunting. The Red Mist was based on the popular M1999 short action design and available in many calibers, not the least of which was the .22-250 Ackley Improved.

.220 Swift Ackley Improved

Lysle Kilbourn and Roy Weatherby offered their own versions of the improved .220 Swift case. Respectively they were the .220 K-Swift and the .220 Weatherby Rocket. Ackley clearly stated that he saw little value in the increased case capacity, he felt the advantage was purely mechanical.[17] That is, the improved cases were easier to extract, lasted longer and required less trimming. He did offer a ballistic concession to this design that heavy-for-caliber bullets would perform better than lighter projectiles.

.224 Ackley Wine Bottle

Collector Ed Reynolds brought this cartridge to my attention. Ackley was a prolific experimenter, and this cartridge is probably another of his attempts to see how capacity and the shape of the case effect pressure and velocity. It might also relate to his experiments with secondary explosion effect, or S.E.E. as outlined in Chapter 16 of this book. No references to this cartridge were located.



.224 ACKLEY WINE BOTTLE	
Rim Dia.	.469
Rim Len.	.045
Groove Dia.	.407
Groove Len.	.079
Bevel Len.	.116
Head Dia.	.470
1st Shoulder Dia.	.449
1st Shoulder Len.	1.259
2nd Shoulder Dia.	.293
2nd Shoulder Len.	2.159
Neck Dia.	.256
Neck Len.	2.222
Mouth Dia.	.253
Case Len.	2.513
OAL max	3.060
Trim to	2.503
Parent	.270 Winchester
Bullet Dia.	.224

.22-06 Ackley Double Shoulder

Pictured in *Wildcat Cartridges* by Simmons, 1947.[18] Likely this cartridge was a continuation of the experiment Ackley made with the .228 Ackley Double-jointed Magnum. It appears that the cylindrical section ahead of the lower shoulder is about the same length as the case neck. Case capacity would be less than with the various .22-06 wildcats that exist today, but it would still be a very overbore cartridge. Most likely this was only an experiment.

.22 Eargesplitten Loudenboomer

Ackley described this as a purely experimental cartridge made especially for Bob Hutton of the Technical Department of *Guns & Ammo*, in an effort to set a world's record velocity for the .22 caliber cartridge. The cartridge is made by necking down the .378 Weatherby with a sharp-cornered, 40-degree shoulder.

In the August, 1964 issue of *Guns & Ammo,* this project was mentioned by Bob Hutton in his column. The barrel was being made by P.O. in a length of 36 inches. Expected velocities were 5,000 fps for a 50-grain bullet and 7,000 fps with 15-grain sintered iron bullets pulled from Remington .22 Rocket Shorts.[19] Preliminary testing of this cartridge gave velocities of 4,600 fps with a 50-grain bullet when Ackley shot it.

Rumors abound about the cartridge; it can be tough to sort fact from fiction.

.224 Belted Express (Ackley)

Based on the .228 Ackley Medium (examined later), this one is only for use with .224-inch diameter bullets. Ackley offered a revision of his .228 Magnum, with reduced capacity as compared to his revised .228 Ackley Magnum. It also sported a 35-degree shoulder.[20] It should be evident that the .224 Belted Express (Ackley) is for .224 bullets only.

.228 Belted Express (Ackley)

Here we have a true wildcat. It is necessary to form the brass for this cartridge in dies before fireforming. There is no factory ammunition that may safely be fired in this chambering, the factor that commonly defines a wildcat cartridge. Ackley swaged a belt onto a .30-06 case to manufacture cases for this wildcat. The process is described in some detail in chapter 17 of the Landis' book *Woodchucks and Woodchuck Rifles*.

Trim length appears to be 2.25 inches. P.O. recognized that making such cases was not for the average shooter and, in spite of this, he seemed to feel this belted '06 case design had merit. He developed a total of five wildcats on this design ranging from .224 to .257, named as Ackley and Hightower.[21] The

business of Nonte-Taylor of Decatur, Illinois was producing brass for this series of cartridges in the 1960s, so there must have been some following for them. Ackley states that a Col. E.L. Lyman, USMC, used the .228 Belted Express worldwide on big game and offered high praise for the cartridge.[22]

.228 Krag Ackley

The .228 Krag Ackley is formed using the full-length Krag case. For bolt-action fans, Ackley suggested the P14 Enfield as this action was designed for rimmed cases. He stated that this cartridge was enjoying some popularity in the P-14 in the late '50s when he was assembling his first handbook. One advantage to this rebarrel was that no other alteration was required to make the .228 Krag Ackley function through the action. Like all the .228 cartridges, heavy bullets work best. Loads for 75-grain bullets indicated velocities over 3,900 fps. Bullets as heavy as 120 grains were tested, a twist of 5.5-inches was proven correct for these extremely long projectiles. Ackley also mentions that he found that fast twist barrels did not work well with thin-jacketed bullets 70 grains or less because the centrifugal forces would tear the bullet apart in flight.[23]

This cartridge of course has too much pressure for the Krag action. Ackley himself recommended it as a good single-shot cartridge, and mentions using it in the Sharps Borchardt, Remington Hepburn and Farquharson. Ballistically, the .228 Krag Ackley is very similar to the .228 Belted Express described above.[24]

The only other mention of this cartridge located in research was listed as a ".22 Krag." Under that heading Ackley reports, "This particular wildcat was designed for Griffin & Howe many years ago. They apparently had calls for a more powerful single-shot cartridge. I was sent a Winchester Hi-Side single-shot to be rebarreled for the new round. I finally settled on a design with a 30-degree shoulder. It's a little overbore capacity as a .22 cartridge and works a lot better as the neck size is increased, even up to 7mm."[25]

.228 Ackley Magnum (Standard)

Introduced in 1938, this is one of Ackley's first wildcats and the earliest version of the .228 Ackley Magnum. He built the first rifle for this cartridge while still working for Ben Hawkins in Cincinnati. It had a .225-inch groove diameter with a 12-inch twist, and the barrel was only 22-inches long, but Ackley said, "It produced the highest velocity of any of these rifles I've ever made since."[26] Ackley described the Standard .228 Ackley Magnum this way: "This cartridge is very similar to the original .22 Newton."[27] It was a good idea for an up and coming young gunsmith to build on the work of those who went before him.

Much like Charles Newton and the .22 Savage Hi-Power, Ackley envisioned the .228 Ackley Magnum as a big game cartridge. The only way that this cartridge could do that job reliably was with 70- to 80-grain bullets of good construction. Powders had improved enough and would improve more during the war years that "Super" velocities were becoming attainable. In Newton's day, the powders were not yet refined to the point he needed for success.

Unfortunately, the shooting public does not always understand the reason for such a limited bullet/cartridge combo. Hunters using lighter bullets experienced poor terminal performance and eventually several states began setting minimum caliber regulations, effectively putting an end to .22 calibers for big game. Al Barr wrote on this subject, "I have worn out at least three barrels for the .228 Ackley Magnum cartridge. I gave up because I couldn't get decent bullets regularly. I would recommend only the 70-grain bullet and 10-inch twist of rifling … and it will give you a flat-shooting load."[28]

The .228 Ackley Magnum received some press in the *American Rifleman*. "P.O. Ackley of Roseburg, Oregon, is another experimenter who has decided the .257 Roberts or 7x57 case has the right capacity for attaining maximum efficiency with small bore barrels. Ackley did not claim to be first on this design, in fact, he points out that, 'Doubtless

it was necked to .22 caliber minutes after the 7mm hit the market by some enterprising gunsmith.'"[29]

Ackley used the larger bullet diameter (.228-inch) or the .22 Savage Hi-Power 70-grain bullet and the oversized 63-grain Sisk bullet.[30] The .228 Ackley Magnum (standard) according to Ackley delivered the same ballistics as the .22 Newton but had less body taper.[31] Note that the .22-4000 is a wildcat of the same basic dimensions utilizing a now standardized .224 bullet.

Bill Hause, who worked for Ackley in Salt Lake City, said that he thought the .228 was always one of Ackley's personal favorites.

.228 Ackley Magnum (revised)*

This cartridge appeared in a P.O. Ackley sales flyer dated November 15, 1941, in which he stated that the cases for the improved (revised) version can easily be formed from easily obtainable .30-06 brass. In Ackley's writings, he treated the standard and the revised cartridges as one in the same, probably because in his view the revised version superseded the standard — although both versions remained in the Ackley lineup for some time. Revision of the .228 Ackley Magnum came about mostly to make brass easier to acquire. It had less body taper and a sharper shoulder than the "standard" design, yet overall loaded length of the two were identical.[32] Velocities were reported as being chronographed at over 4,000 fps.

In 1948, Fred Ness in *Practical Dope on the Big Bores* wrote, "In the .228 Ackley Magnum we can give this bullet sufficient velocity to equal the trajectory of the .220 Swift and thus make it practical for our purpose." He was referring to a 70-grain heavy jacket bullet for big game.

Ackley states in his *Handbook for Shooters and Reloaders Volume I*, that he recommended using .30-06 brass to form the cartridge. The revised case holds about 5 grains more powder, or about a 10 percent increase over the standard version. Cases for the .228 are made by necking down and shortening the '06 case for a capacity of about 55 grains.

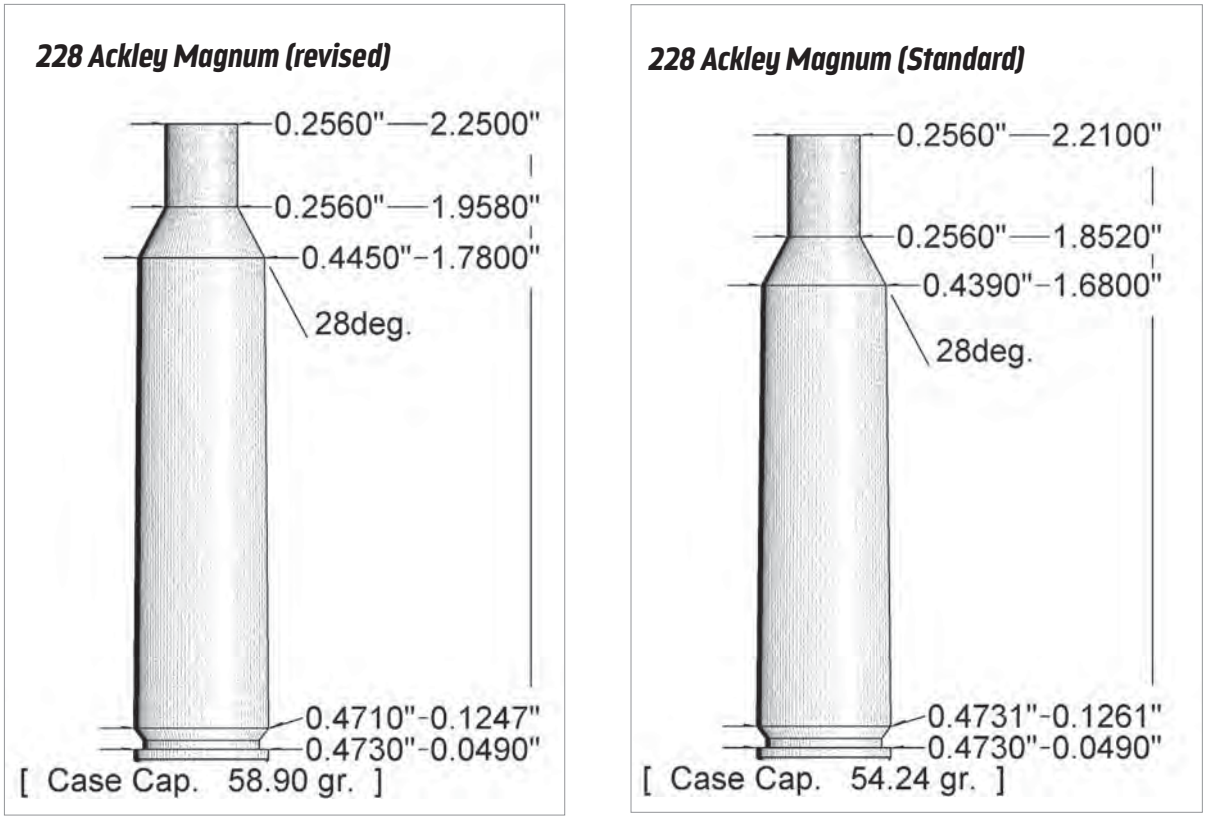
"The case was made as large as possible with the idea of sacrificing efficiency and barrel life in favor of the highest practical velocity for a 70-grain bullet," wrote Ackley. "Also, the longer case functions through standard bolt actions better than extremely short ones, this making it more reliable in the field."[33]

The cartridge was designed for use with heavy bullets in .228-inch diameter (60 to 75 grains). Ackley was adamant that with good quality bullets this was a fine hunting cartridge for deer-sized animals. It was definitely a high velocity round, pushing the 70-grain bullet at an average speed of 3,650 fps. "The 70-grain bullet has been most popular and has been the one used on big game mostly,"[34] he wrote. Of course, today there are few bullets available in this diameter. Hornady still offers a .227-inch bullet (for varmints) with a lone weight of 70 grains, and there are some other custom makers and imports for the .227 to .228-inch diameter.[35]

Simmons experimented with 90-grain bullets made by Barnes for this caliber, though velocities were poor, pressures high, and they were hard to stabilize, so he decided that they were simply too heavy.[36] Best overall results seemed to come from the 70-grain bullet.

Frank C. Barnes in *Cartridges of the World 6th Edition* wrote, "Rifles in .228 caliber using heavy jacketed bullets designed for big game have been used very successfully all over the world. Bullets of this type were made in weights of 70 grains to over 100 grains by Fred Barnes, but are now difficult to obtain. Rifles in this class have proven rather conclusively that the difficulty encountered with the .220 Swift and other high-velocity .22s has been mostly a matter of improper bullet design. Factory loads are all made for varmint shooting and don't hold together or penetrate deeply enough on big game."[37]

Ackley wrote of his .228 Magnum, "This cartridge has proved to be an exceptional killer of big game and has been quite popular for use on such big game as antelope, deer, etc., and for varmint shooting such as long range rabbit, woodchuck, and coyote shoot-



Comparing the two common versions of the .228 Ackley Magnum.

ing."[38] He continued, "Cartridges of this class are often ineffective on big game because thin jacketed bullets disintegrate upon impact, thus producing superficial or surface wounds. This invariably leads to the condemnation of high velocity bullets for use on big game by certain 'authorities' who either do not have the imagination or the gumption to make further tests with correct components, or they do not want to admit high velocity bullets are an advance over medieval ideas."[39]

Early tests with this caliber showed problems with throat erosion; however, to be fair the reported velocities included loads in excess of 4,000 fps. Even today if such high velocity loads are consistently shot through a barrel the accurate life will be relatively short. There were also many types of steel being tested for use as barrel material at the time, though some were poor choices for barrels, which is the most important thing learned from such testing. Erosion problems varied from 150 to 500 rounds depending on the alloy.[40] Keep in mind that heat treatment of the barrel steel was a largely untested factor at that time.

When used on deer, one shot kills were the norm. Of course, in most states today minimum cartridge requirements would make the .228 Ackley Magnum a no-no for big game. But it would still buck the wind well for varminters.

The .228 Magnum was popular enough that in the May 1942 issue of the *American Rifleman* it was included in a bullet drop chart for the Dope Bag section. Philip B. Sharpe gave a load table for the .228 Ackley Magnum in his 1948 supplement to the *Complete Guide to Handloading*. And Fred Ness, one-time technical editor for the *American Rifleman* extensively tested this cartridge. He was impressed and stated, "In this outfit we have had the flattest shooting of our career."[41]

According to Ackley, Wally Taber used a .228 Ackley Magnum in Africa during a 1948 Safari. With the 70-grain Ackley CE bullet, Taber took two large Zebra — with one shot! The bullet penetrated the first beast completely to fell the animal standing

behind it.[42]

Ackley and Les Bowman were longtime friends; Bowman was a well-known guide and outfitter in Wyoming. Ackley reported, "Les was with me once when I killed a big elk at 300 yards with a featherweight .228 Ackley. After that shot, Les looked at me and said, 'Make me one of those rifles.' I did."[43]

.228 Ackley Medium

In an effort to meet the desires of his clients, Ackley offered a version of his .228 Magnum that had slightly less capacity than the revised .228 Ackley Magnum, but also sported a 35-degree shoulder.[44] He dubbed it the .228 Ackley Medium. Average loads for the 70-grain bullet were apparently about 3,500 fps. This would provide substantially longer accurate barrel life, yet still be a very flat-shooting cartridge. The case was also made from commonly available .30-06 cases. In an effort to serve all shooters, Ackley also offered this case for use with .224 bullets, logically called the .224 Ackley.[45] Obviously, the .228 Ackley Medium is for .227 to .228-inch bullets only, and the .224 Ackley is for .224 bullets only.

.228 Ackley Magnum Rimmed

Based on the .30-40 Krag case, this rimmed version of the .228 delivers slightly less velocity than the standard .228 Ackley case. Ackley recommended this case for single-shot rifles and the shooter who wanted heavy .22 caliber bullets. He also made it clear that this cartridge was not for use in the Krag action, suggesting the .219 Zipper Improved for the Krag if a .22 was desired.[46] This was among his chamberings in his 1941 Oregon sales flyer.

.228 Magnum Experimental

Ackley provided a dummy round for this experimental case to Richard F. Simmons for *Wildcat Cartridges*. The case appears to have a long neck, sharp shoulder and virtually no body taper. Ackley suggested it might be a good case for use with IMR 4350. The design was arrived at by combining the popular ideas that were being bandied about at the time to see if they offered any real advantage.[47]

.228 Sisk Belted Magnum

R.B. Sisk of Iowa Park, Texas, well-known bullet maker, ordered this custom design from P.O. Ackley. Simmons reported on this case in *Wildcat Cartridges*, yet Sisk had not had time to fully test the case.[48]

Ackley .22 PMVF Magnum

Described in *Wildcat Cartridges*, Ackley stated that 60 grains of 4320 and a 48-grain Swift bullet delivered 3,850 feet per second. That gives us some idea of the case capacity as the cartridge is not clearly described.

The most interesting thing about this cartridge is the following statement that accompanied the write-up in Simmons' book. "At the end of 250 shots the barrel rifling was completely shot out for the first 12 inches from the breech. It gave a great deal of trouble with hang-fires, due to the excessive capacity of the cases, and we were at once convinced that it would be practical only with the largest bores — at least .35 caliber or above."[49]

.228-300 Ackley Double-jointed Magnum

Ackley created this case with two shoulders and a very strange overall look for one purpose: he wanted to know if a long powder chamber would burn powder more efficiently than would a short, fat one. He used 5 grains of 2400 in the base and filled the remainder of the case with IMR 4350 powder. Steel plates were often used as a means of guessing the velocity of a given bullet, the amount of penetration to determine velocity. Ackley guessed this round was pushing a 70-grain bullet over 4,000 fps.

This was purely an experimental cartridge; Ackley never intended to offer it to the shooting public. The body ahead of the first

shoulder is totally without taper, a sharp shoulder is used to neck down to the .228 diameter, a full-length .300 H&H case was used to form the case. Surprisingly, Ackley found that this case was more efficient than his .228 Ackley Belted Magnum, which used more powder.

.230 Ackley (Short)

In the late 1950s and early 1960s many states restricted the use of cartridges for big game, requiring a bore diameter of .230 or greater. Ackley responded by producing a cartridge to meet this minimum size. Cases are made for this shorter .230 by necking down .250-3000 cases. Think of the .22-250 and simply neck it up .006 to .230 inches.

The cartridge is a good example of how when, on the verge of being overbore, it can produce better velocity from heavier bullets than from light. Ackley's loads in *Handbook for Shooters and Reloaders, Volume II* show that a 60-grain bullet loaded with 4350 powder maxed out at 3,843 fps, while a 75-grain bullet with the same powder maxed at 3,905 fps. This point is born out further when you look at the .230 Ackley Long (below), it could not approach the same velocities yet had more case capacity.

.230 Ackley (Long)

According to Frank C. Barnes this and the short version mentioned above came about in the 1957-58 timeframe.[50] Like the .230 Ackley Short, this is simply an attempt by Ackley to circumvent new regulations passed by many western states making the .228 caliber illegal for big game hunting. At the time of Ackley's 1959 *Handbook*, he stated that only a few rifles had been built in this caliber. The cartridge was nothing more than the .228 Ackley Magnum necked up to .230 inch. To visualize this case, think of a 6mm AI neck to .230 inch. They are not interchangeable but there is little difference in case capacity, the .230 Ackley being slightly larger in capacity. Ackley pointed out that the cartridge was pleasant to shoot and was especially good for the recoil-conscious shooter. Bullets were available in 60, 70, and 75 grains for the .230 caliber.[51] Since the 6mm Remington and the .243 Winchester came along in 1955, the market for this cartridge would have been limited to those folks who just have to put their toes on any line drawn in the sand. That, coupled with the need for specialty bullets, and the .230 Ackley was never likely to break any sales records.

Here is a little surprise, and proof one never knows what will pop out when you set out to do some research. "Wyoming had a law against anything under .230," Ackley said, "So I stamped all the .228 rifles I made for Wyoming hunters '.230 Ackley.'"[52]

.230 Belted Express (Ackley)

Les Bowman was a fan of this cartridge and wrote an article about it in the November 1963 *Guns & Ammo* entitled, "Bust'Em with .23's and .24's." From what we know about the dimensions of the various .228 cartridges mentioned previously, this one is identical to the .228 Belted Ackley Express. Bowman reported using a total of four die operations — dies made by Ackley to form the belt and case for his .230 Belted Express.

"Ackley and I have felt for years that caliber size alone was not the answer to good, clean kills on game," wrote Bowman. "We concurred that next to correct bullet placement, the bullet itself was a vital factor. We believed better bullets were needed and could be made and the place to start testing was not with cannon-sized caliber but with the smallest legal size cartridge allowed."[53]

6mm/.30-30 Ackley Improved

As the name implies, this is the .30-30 necked to 6mm and blown out with the Ackley 40-degree shoulder. In 1964, Bob Hutton mentioned the 6mm/30-30 Improved in his *Guns & Ammo* column. "Here's a wildcat P.O. Ackley thought up simply because, following recent experiments mainly with the .284 Winchester in various calibers, we ended up with a Mauser action with the bolt altered

for the .219 Donaldson (same case as the .30-30) and a good 6mm benchrest barrel."[54]

It is comparable to the later wildcat 6mm-225, and Ackley even points out that necking up .225 brass to 6mm will deliver similar results with less work. Since that time, the .225 has died away in popularity, although Winchester is still making ammunition for it. Consequently, the .30-30 case is once again the best choice for a 6mm in this design category. Ackley suggests this is a good case for either a single shot, or the Savage 99 lever action.[55] When many states outlawed the .228 caliber, the 6mm/.30-30 AI became one of the alternatives for reboring or rebarreling old rifles in .22 Savage Hi-Power.[56] Ackley recommended a 1/10 twist rate as the best all-around twist for the 6mm bore.

.240-250 (6mm-250) Ackley Savage

This cartridge was mentioned in passing by longtime gun writer Al Barr. "I have used an Ackley version of the necked-down .250 Savage case in a .240 caliber rifle made by Ackley. The cartridge proved to be about the equivalent of the .240 Cobra."[57] Barr did mention that he liked to use "Ackley Controlled Expansion Bullets" in his personal .240 Cobra. Originated by custom gunsmith Homer Brown, the .240 Cobra was formed from .220 Swift brass, necked up and fireformed to 6mm. Reported ballistics make it competitive with the .243 Win. and 6mm Rem. cartridges.

.243 Winchester Ackley Improved

On this cartridge Ackley writes, "Since the advent of the .243 and the .244, 6mm wildcat activity has subsided, although there seems to be a growing interest in improved versions of each of these. Although there was some doubt as to the possibility of much improvement by making changes in these commercial cartridges, many shooters have case-stretching troubles and began to insist on changes to alleviate this and other problems. Contrary to the writer's [P.O. Ackley's] predictions, some noticeable advantages have become evident."[58]

Ackley stated that the .243 Winchester AI was developed strictly to meet popular demand. No great increase in velocity was expected for it.

.244 or 6mm Remington Ackley Improved

The first version of the .244 AI retained the 26-degree factory shoulder with the body of the case blown out to minimum taper. Clients pushed Ackley for the 40-degree modification, preferring the sharper shoulder. The common version today is the 40-degree shoulder design. Speer bullets included the .244 AI in Volume II of their Wildcat reloading manual in 1956.

Ackley felt that the 6mm Remington, originally introduced as the .244 Remington was very close to optimum case capacity for the bore.[59] In order to achieve any great increase in velocity substantial increase in the powder charge was necessary in this case. In this respect, Ackley was highly practical, he felt it was a waste to burn more powder when it really did not deliver any improvement ballistically, an opinion that he did not limit to this case.

.243 (6mm) Belted Express (Ackley)

This cartridge is identical in design to the .228 Belted Express, simply necked up to 6mm. It is nearly identical in capacity to the 6mm Lee Navy or the 6mm/220 Swift wildcat. Frankly, the author sees no purpose for this wildcat since the advent of the .243 Winchester and the 6mm Remington in 1955. Ackley produced this cartridge prior to 1951 when wildcatting the 6mm was popular as there were no American factory cartridges in this caliber, and in all fairness to him this cartridge is part of a line of cartridges based

on his Belted Express case. "In view of the existence of the two very fine 6mm commercial cartridges," wrote Ackley, "the 6mm Express is not often recommended, in spite of its many desirable characteristics."[60]

In an article titled ".240 Wildcats," Al Barr discussed several 6mm wildcats with 4,000 feet per second potential. Most of the load data was for the .240 Cobra, designed by Homer Brown in the late 1940s. Barr stated, "Another version of the .240 is the .243 Express, developed by P.O. Ackley of Trinidad, Colorado, using a belted, shortened, and necked-down .30-06 case. The case handles approximately the same loads as the .240 Cobra."[61]

.243 (6mm) Belted Express Long (Ackley)

In Volume I of *Handbook for Shooters and Reloaders* Ackley said that two versions existed. One a shortened case like the .228 Belted Express (above) and the other a full-length '06 case on which a belt was swaged. This author added the "long" case designation to simplify keeping track of the variations.

6mm Krag (Ackley Short Version)

This interesting creation was designed specifically for use in single-shot rifles using rimmed cases. Ackley intended it to be a medium capacity case with good, efficient design. Shortening .30-40 cases necked to 6mm provided the desired capacity. The shoulder of the case depicted in Ackley's books appears to be 28 degrees,[62] and from letters he wrote to C.S. Landis we know that this is the angle that Ackley believed gave the best overall results. Indeed, it may be that this case was designed to meet what he felt was ideal for this case, but that is just supposition. The capacity of the cartridge is at the tipping point where heavier bullets perform better than light ones with the same powder, so it is probably best suited for 90- to 105-grain bullets.

6mm Krag Ackley Improved (Long)

Ackley designed this case for clients who wanted a high velocity 6mm cartridge for use in single-shot actions. Full-length .30-40 cases are necked to 6mm and then fireformed in the chamber to form the trademark 40-degree shoulder on the cartridge. Capacity would be about 10 percent less than the 6mm-06. It should go without saying, this cartridge is too hot for a Krag action.

6mm Magnum (Ackley)

Made from .300 H&H cases, shortened, and blown out, this case had more capacity than a 6mm-06, at least based on Ackley's comments. He did not consider this magnum design in 6mm to be of much value. In fact, he said concerning this cartridge, "The 6mm Magnum is not recommended because of its inefficiency, hard to make and expensive brass, and its lack of flexibility … Barrel life is relatively short."[63]

.25-20 Single-Shot Ackley Improved

We know this cartridge has its origins in Ackley's earliest days wildcatting in Oregon, and that he simply felt this case needed to be modernized. The .25-20 Single-shot became obsolete many years ago. This is not the same case as the .25-20 WCF. Single-shot cases were about .300-inch longer than the WCF; however, the difference in case capacity is not as much as you might guess because the WCF case is fatter at the base than the Single-shot.

.25 Belted Express (Ackley)

This mysterious cartridge is the same case design as the .228 Belted Express, necked up to .257. It's part of a family of cartridges that Ackley designed on a belted .30-06 case. The four calibers in the family are the .224, .228, 6mm, and .25. This is the largest bore of the

Ackley Belted Express cases, yet surprisingly there are very few references to it. Ackley left it out of his books except for a mention in Vol. I of the *Handbook* under the .228 Belted Express description. "The .25 used the full-length case only,"[64] he wrote. This would make the case very similar in ballistics to the .25-06.

.25-35 Ackley Improved*

Long before the .22 Savage Hi-Power became illegal for hunting in many states, Ackley recognized that reboring these barrels to .25 caliber and chambering for the .25-35 AI gave new life to old hunting rifles. In 1941, he already listed the cartridge among his standard offerings. Following World War II, the brass for the .25-35 was apparently thinned out in the shoulder area by the manufacturers and, as a result, fireforming this case with factory ammo caused shoulders to rupture resulting in the loss of most of the brass.

It became necessary to form the cases from .30-30 WCF brass, which of course removed some of the charm. Ballistically, the .25-35 AI delivers velocities approaching those of the .250-3000 — a nice cartridge for both lever actions and single shots.

Ackley commented that a more modern version of this wildcat would be the .225 Winchester necked to .257 inch. "Simply neck up the 225 Winchester," he said. "It will give you nearly the same ballistics as the 25-35 Improved. But it would simplify the making of brass, since all you would have to do is neck up the .225 to accept the .25-caliber bullet. There is no fireforming required, with the resultant loss of brass."[65] Of course when Ackley wrote those words, .225 brass was much easier to get.

.250-3000 Ackley Improved (.250 AI)*

Two versions of this cartridge exist. Like the .244 Remington, Ackley's first version of the cartridge retained the factory shoulder angle of 26 degrees in the 1940s.[66] Later clients demanded the Ackley signature 40-degree shoulder. Both designs sport minimum body taper and the shoulder angle does not change the loading data or the velocities achieved.

The .250 AI, as it is often called, delivers a better improvement in velocity than most improved designs. Ackley considered this cartridge to be one of the best in his line but recognized that it was not well known.[67] According to Bill Hause, the .250-3000 was one of Ackley's pet cartridges, along with the .228.

According to Ackley himself, "It shows a greater percentage increase in velocity than almost any other "improved".[68] He continued, "Old M99 Savage rifles which fail to extract the standard .250 cases will work perfectly with this new design, thus making it much easier on the lever type of action. Savage rifles can be altered at a low cost, and we feel that the results will more than justify the outlay."[69]

.257 Roberts Ackley Improved*

According to Simmons, the .257 AI was added to Ackley's list of .25 calibers just before the writing of *Wildcat Cartridges* in 1947. The added capacity in this case allows for a considerable increase in velocity when properly loaded.[70] "This cartridge seems to perform exceptionally well with 87- and 100-grain bullets,"[71] wrote Al Barr. In addition, Speer bullets included the .257 Roberts AI in their *Wildcat Volume II* reloading manual in 1956. Fred Ness commented on the .257 Roberts AI and the .257 Wby.: "As compared to the best handload in the factory case these wildcats fully loaded with No. 4350 and 125-grain Barnes bullets demonstrate an appreciable improvement in field ballistics."[72]

Roy Dunlap had this to say about the .257 Roberts Improved: "The Improved .257 is one that Mr. Ackley does recommend highly. When reloaded it delivers very creditable velocities — the 87-grain bullet can be driven around 3,400 fps; the 100-grain 3,250 fps; and the long 125-grain hunting bullet from 2,950 to 3,000 fps."[73]

Philip B. Sharpe mentions loading a .257

Roberts AI with a 125-grain Barnes soft point and his friend, Earnst Miller, used it for hunting. "The bullet has good sectional density and Earnst has killed wapiti with one shot," Sharpe said, "as well as bear at closer ranges, so this Ackley idea is apparently no chuck load and seems to work well."[74]

Loads were included in *Nick Harvey's Practical Reloading Manual* for five different bullet weights and numerous powders for the .257 Roberts AI. His real world, tested loads show that with bullets up to 100 grains the .257 Improved is equal to the .25-06 Remington in nearly every way.

"The .257 Roberts Improved is one of the improved cartridges which has gained wild acclaim," said Ackley. "In the writer's opinion, it is about the largest capacity case that can be used for good over-all results with the .25 caliber bore."[75] He also noted that, "It is a relatively efficient cartridge, flexible and comes close to the mythical "all around cartridge."[76] Then, "Factory loads fired in the improved chamber show a reduction in velocity of approximately 100 fps, but the fireformed cases can be reloaded to considerably higher velocity, and this cartridge has definitely proven itself on all types of large game in the United States."[77]

.25 Short Krag (Ackley)

In the beginning, the .25 Short Krag was intended for single-shot rifles where shooters wanted high velocity. P-14 Enfield bolt actions were designed for the .303 British cartridge, so many were converted to rimmed wildcats in this general configuration. The rimmed cartridge delivers velocities very close to the .257 Roberts.

"For the .25 Short Krag and similar cartridges the best overall twist is 10-inch," Ackley wrote. "This will handle bullets from 87-grains to 125-grains."[78]

.25 Krag Ackley Improved

Utilizing the full-length .30-40 Krag case, necked to .25 caliber with a 40-degree shoulder, results should be similar to the standard .25-06 Remington. In terms of capacity the case is identical to the .257 Roberts Ackley Improved, so it amounts to a rimmed version of the Roberts AI. This design should never be chambered in a Krag action as it produces more pressure and back-thrust than the Krag can safely handle. It would be a good choice for a P-14 or single-shot action.[79]

.25-06 Ackley Improved

This cartridge is overbore, meaning it has more case capacity than the bore can efficiently utilize. Ackley had many reservations about this wildcat. In the early 1960s it was fairly common for reloaders to use light loads for fireforming. This has proven to be a poor practice, not only in the .25-06 AI, but in most any high intensity cartridges. Full power loads should be used to fireform brass, otherwise the brass may not fully form, creating headspace problems in the brass. Of course, today the .25-06 is a factory offering so you can fireform using factory ammo.

Overbore cartridges are normally considered to be short on accurate barrel life. They are often inflexible in the loads they will shoot accurately. Another characteristic of overbore cases is that they vary widely in results from one gun to another; in other words, what is safe in one gun may blow up the next. So special attention must be paid to working up loads for the individual rifle.

Like any other cartridge, even with the caveats listed above, this cartridge has an avid following. "It is recommended for shooters desiring the highest velocity from the .25 bore regardless of other considerations,"[80] Ackley declared.

He wrote to Harvey Donaldson that, "Some of the ones that I would not recommend have fallen into the hands of enthusiasts who have written up glowing accounts of what they have done, resulting in some poor ones becoming more popular than some of the better ones. A good example is the .25-06 Improved which is a sour number if there ever was one. But the customers insist on getting them and continue to brag about

the results."[81]

When Ackley put out his early handbook, which was more like a sales brochure, he left the .25-06 AI out in favor of the .257 Improved. He stated later that he was roundly criticized by clients and gunsmiths for this decision and added it to later editions.[82]

.25 Or .250 Ackley Magnum

The .250 Ackley Magnum is derived from the .300 H&H case shortened and necked to 25 caliber. Most .25-caliber magnums have more case capacity than this case. Ackley was more interested in barrel life and accuracy than getting every single foot per second out of the case. He points out that 25-caliber magnums rely on good quality bullets for success and suggests the use of slow-burning powders.[83] In the 1950s there was what Ackley called a .25 caliber magnum "epidemic." He had been ahead of the curve once again as he had this cartridge on the market shortly before World War II.

Among his earliest wildcat endeavors, the .250, .270, and .30 Ackley Magnums were featured along with other wildcats in a sales brochure from the Roseburg shop in 1941. His stated purpose for creating this line of cartridges was as follows: "They are designed with comparatively sharp shoulder, long neck, and straight body for reduced erosion and easy extraction. They are sufficiently short in overall length to work properly in standard actions, with NO alterations necessary except on the bolt face."[84]

Speer listed this cartridge as one of the first .25 caliber wildcats on a shortened .300 H&H case. They also said, "The principal fly in the ointment of this interesting cartridge is relatively short barrel life — something that is inescapable when a lot of powder is funneled through a small hole at high pressure."[85] Loads for this cartridge also appear in Phil Sharpe's *Complete Guide to Handloading*, 1948 Supplement.

Ackley did some chronograph testing on this cartridge using a Barnes chronograph. Using the now obsolete powder, HiVel No.2, Ackley measured 87-grain bullets at 4,260 fps, 90-grain bullets at 4,160 fps, and 125-grain projectiles at 3,510 fps.[86] In the 1959 edition of *Handbook for Shooters and Reloaders* he reduced these maximums considerably — the 87-grain maxed at 3,537 fps, 125-grain at 3,200 fps suggesting that he learned more about pressure and the prolonged use of heavy loads in the intervening years.

Writing to W.F. Vickery, Ackley said concerning the .25-06 Ackley, "In fact, my experience has been better with the .250 Magnum which I also left out because I believe that this .25 case should not be over 55-gr. capacity for best results including barrel life, etc."[87]

6.5x55 Ackley Improved

This cartridge does not appear in Ackley's writings. There is a 6.5x55 Arch listed in Volume I of *Handbook for Shooters and Reloaders*. It is likely that Ackley saw no need to step on a friend's work and the 6.5 Swedish did not gain popularity in this country until much later in P.O Ackley's lifetime. It is, however, a very popular cartridge today.

6.5x57 Ackley Improved*

This would be a 7x57 Mauser Ackley Improved necked down to 6.5mm with no other changes.

6.5-06 Ackley Improved

This is yet another cartridge that Ackley did not consider a real improvement over the "standard" 6.5-06. Ballistics indicated that this case was overbore since the "improved" version did not produce any real increase in velocity. He probably only offered this design because clients demanded it. The cartridge is really a hybrid (per Speer Manual #2) since there is no factory 6.5-06 cases available. You can neck down .30-06 or neck up .25-06 cases to .264 and then fireform in the Ackley chamber.

In the intervening years, A-Square took the 6.5-06 to SAAMI and had it standardized. Reamers are frequently marked 6.5-06 A2

(A2 = A squared). The A-Square brass is not common.

"I never recommend the Improved 6.5-06," wrote Ackley in his popular *Guns & Ammo* column. "It is not as good as the standard 6.5-06. With 100-grain bullet, the 6.5-06 produces a maximum velocity of close to 3,500 fps and with a 140-grain bullet, it goes about 3,175 fps. All of which makes it doubtful if it is quite as good as the standard .270 Winchester."[88]

.270-308 Ackley Improved

Neck the .243 Ackley improved up to .270 or neck the .308 Winchester down to .270 and fireform, either way you get the .270-308 AI. With a case capacity approximately 10 percent less than the .270 Winchester, this cartridge is flexible to load and produces nearly the same ballistics as the Winchester case. Using less powder produces less recoil so this might be a good cartridge for folks who do not like recoil. Ackley even tells us in his *Handbook* for whom the first rifle in this caliber was built.

.270/257 Ackley Improved

This cartridge appeared in an Ackley sales brochure with his Salt Lake City address on it, which places the date of birth for the cartridge somewhere between 1951 and 1955 — sometime after Ackley moved to Salt Lake City, and before 1956 when Speer mentions the cartridge in their manual.

Speer called this cartridge a hybrid,[89] which makes sense because the case must be necked up before fireforming. This is really a wildcat rather than a true improved design. It is simply the .257 Roberts AI or the 7x57 AI necked to .270 caliber. The cartridge will produce velocities that closely match the .270 Winchester, but with less powder. It should be more versatile in loading due to the reduced case capacity over the Winchester. The ability to push a 170-grain bullet near 2,700 feet per second makes this a great cartridge for anything in North America.

.270 Winchester Ackley Improved

Ackley was not impressed by this cartridge; he considered it to be overbore. He did use it in some of his tests to show that when cartridges are overbore it takes huge increases in powder to add small amounts of velocity. Actually, he considered the standard .270 Winchester to be superior in design to the improved version. Truthfully, if you are inclined to use only the heavy-for-caliber bullets with slow-burning powders you may see some desirable results with the improved design.

Tests were performed by Ackley using the .270 Win. AI cartridge. He reports on this testing in Volume I of *Handbook for Shooters and Reloaders* in 1962. Bore capacity is an issue worth considering. To prove it, he took a barrel that was first chambered for a .270/308 wildcat, with maximum loads established by working up until the primer was blown. It was increased to within one grain of where the primer would blow, this was the max load for each chambering tested, insuring that he had an apple to apple comparison. The Ackley improved .270 Winchester allowed 8 more grains of powder than the .270/308 wildcat, velocity was only increased 82 fps. Then the barrel was rechambered a final time to a wildcat .270 with a short neck that Ackley did not name, but it was likely a 270 Gibbs. An additional 5 grains of powder could be burned in the last cartridge with a whopping gain in velocity of just 4 fps. — proving that there is a point of diminishing returns with any bore diameter.[90]

.270 Ackley Magnum

Ackley designed his .270 Ackley Magnum before World War II while still living in Oregon, and it appeared in his 1941 sales literature. He selected the belted .300 H&H case that would be readily available for years to come, yet his new design pretty well mirrored the results of the Newton wildcats he had been offering. Note that unlike many of his contemporaries Ackley did not use excessive case capacity.

"Various other experimenters have brought out .270 Magnum cartridges," wrote Jack O'Connor, "but the only other I have had much experience with is the .270 Ackley Magnum, which is like the Weatherby, based on a shortened and blown out .300 H&H case. It uses a little less powder (about 3 grains as a rule) than the Weatherby and gets somewhat less velocity. The Ackley rifle I played with was heavy but very accurate. Once when making a drop test by shooting from the back window of a station wagon I discovered I had made a 6-inch group at 500 yards."[91]

The .270 Weatherby and the .270 Ackley Magnum are the only worthwhile large capacity cartridges in .270 caliber. P.O. Ackley designed a series of high intensity cartridges based on the .300 H&H case (the .25, .270, .30 and .35 Ackley Magnum), which were well-suited to the large military bolt actions that were commonly available on the market at the time. He held the overall length of the loaded round very close to that of the .30-06, which allowed his designs to work in these various actions without major alterations. It was possible to simply open the bolt face of a 1903 Springfield or P-17 Enfield to handle the magnum case with no other feeding changes to make use of the Ackley magnum designs.[92]

Ackley, not too surprisingly, considered the .270 Ackley Magnum to be overbore, here too he held the case capacity lower than some other wildcatters of the time. "This class of shooters are interested in top velocity at any cost and work on the theory that the more coal, the more steam, without regard to the law of diminishing returns,"[93] he wrote. Simmons tested this cartridge and reports that he chronographed a 130-grain load up to 3,500 fps and never saw any signs of pressure.[94]

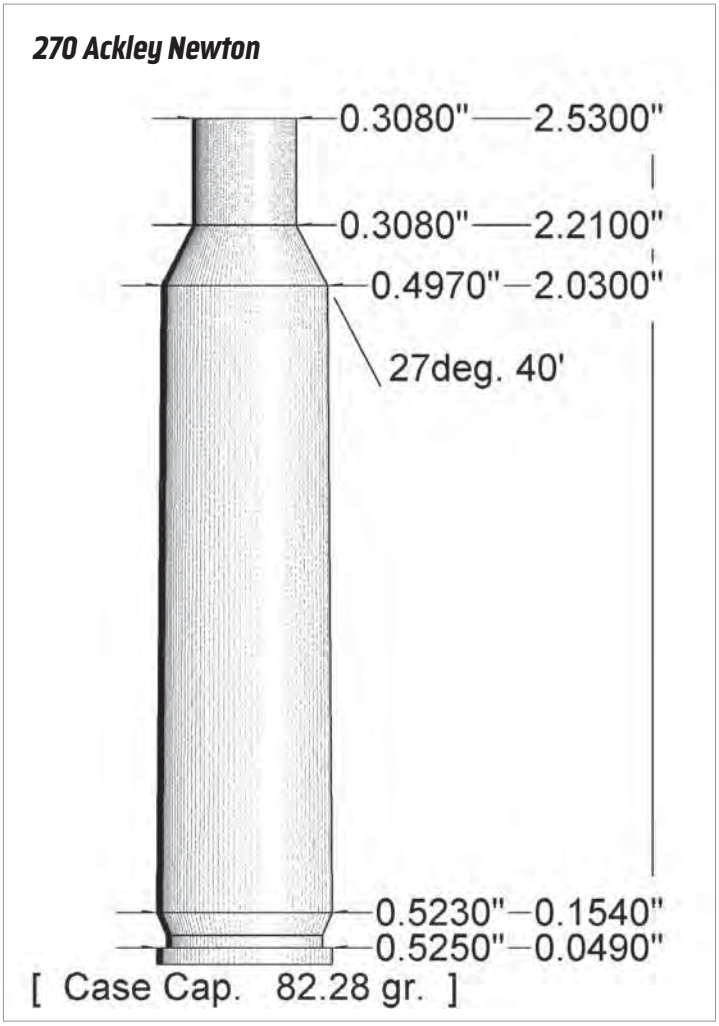
According to Fred Ness, "P.O. Ackley reported recent chronograph tests. In the .270 Ackley Magnum, 160-grain bullets gave 3,100 fps, 140-grain delivered a little over 3,200 fps, and a 100-grain bullet gave a velocity of 3,740 fps, all were tested in a 26-inch barrel."[95]

Author's Note: I have seen a .270 Ackley Magnum listed by a reamer maker using the full length 8mm Remington Magnum case (same case as the 300 H&H). This is not an Ackley design and should not be confused with the cartridge described above.

.270 Ackley-Newton

Ackley .270 Newton cases were formed by simply necking the .30 Newton down to .270 caliber, creating a wildcat, as Newton never offered this caliber on the .30 Newton case. This would be a flat-shooting magnum class cartridge. Ackley probably suggested the use

270 Ackley Newton



of heavy bullets as the 160-grain Barnes bullet is mentioned in connection with this case. Simmons wrote in 1947 that he thought Ackley would be dropping this cartridge soon as brass was no longer being made.[96]

Jack O'Connor reported, "Jim Wilkinson, formerly of Illinois, and now of Prescott, Arizona, has for years used a 7mm based on the .30 Newton case necked down (known as an Ackley .276 Newton). He swears by it. P.O. Ackley, the custom rifle manufacturer, can furnish barrels in both .270 and 7mm for wildcats based on the .30 Newton case."[97]

Ackley was offering these wildcats on the .30 Newton case while still in Oregon and it appears that the wildcats preceded the development of the Ackley Magnums. What he learned from these wildcats he applied to his own line of magnum cartridges.

7x57 Ackley Improved (7mm Improved)*

Ackley wrote of this cartridge that, "This is one of the best of all the 'improved' cartridges."[98] The 7x57 AI, like the .257 AI, offers a good improvement over the factory case. Of course, being an improved design, you can still fire 7x57 factory ammo in the improved chamber. This allows you to fireform brass without any muss or fuss, and in a pinch on a hunt you're not dead in the water if your ammo somehow did not make the trip.

Like all the Ackley Improved designs, the case is blown out to minimum body taper and a sharp shoulder. To quote the Speer wildcat manual, "Then it is stuffed full of powder and turned loose."[99] The 7x57 AI is capable of taking any North American game animal. Like most hunting calibers in this size range good quality bullets make it an even more effective hunting tool.

In Speer's 1956 *Wildcat* manual Ackley is referred to concerning pressure in relation to the test data for the 7x57 AI. "P.O. Ackley, however, says he does not care what pressures are just so long as he does not have extraction trouble or primer leaks, and he says that the straight body facilitates extraction and prevents undue back-thrust on the bolt. In that he is probably correct and more and more ballisticians are inclined to agree with him."[100]

7mm/06 Ackley Improved (7mm-06 Improved)

This cartridge became pretty well obsolete when the .280 Remington came out in 1957 and Ackley improved that cartridge. This earlier version used .30-06 brass necked to 7mm and blown out to minimum body taper. Case capacity is almost 5 percent above the parent case. Here again, Ackley pointed out that best results will come from heavy-for-caliber bullets. Actually, .280 Remington load data could be used as a starting point for this cartridge when developing loads.

.280 Remington Ackley Improved (280 AI)

The 280 Remington is nothing more than an American adaptation of the 7x64 Brenneke. One could argue that it is the commercial version of the 7mm-06 wildcat. Others claim it's just a cousin to the .270 Winchester. Ackley even points out that the .280 pretty well duplicates the venerable .285 OKH wildcat.[101] In truth, Remington chose to move the shoulder forward on the .280 by about .050-inch in order to prevent shooters from chambering a .280 Remington in a .270 Winchester chamber. Consequently, it has slightly more case capacity than the 7mm-06, about 5 grains by water weight, and by the time you get to the .280 Ackley Improved you have 7.4 grains more capacity by water weight over the 7mm-06.

This cartridge first appeared in the 1959 *Supplement to the Handbook for Shooters and Reloaders*. Amusingly, Ackley credits the cartridge to RCBS and states that the load data for his 7mm-06 Ackley Improved can be used in the .280 Improved. This little detail seems to have been lost on most shooters.

The .280 Ackley Improved as it has be-

come known, can push a 175-grain bullet as fast as the 7mm Remington Magnum. Think that sounds crazy? Check published load data for it and the 7mm Mag., you will be surprised how close they are in performance with the 175-grain bullet. Of course, with lighter bullets the Magnum probably has some advantage in velocity. So the .280 Ackley Improved can delivery magnum performance with less powder and therefore less recoil than the magnum cartridge. On top of that, there is a following for cases without belts. So, versatility in loading, lower recoil compared to the 7mm Mag., and a non-belted case are probably why the .280 AI continues to be a popular wildcat.

At the time of this writing, Nosler is offering one of their limited edition rifles in .280 Ackley Improved. Nosler is also offering their quality brass headstamped for this cartridge as well.

.276 Ackley-Newton or 7mm Ackley-Newton

Like the Ackley .270 Newton these cases were formed by necking a .30 Newton case to 7mm. Ackley was not the only gunsmith chambering for this cartridge, there are at least two rifles mentioned in Bruce Jennings Jr.'s book about Charles Newton, one built by Griffin and Howe. Newton had done some development on a .276 Newton, but if it ever made it to the public it is as rare as hen's teeth. The Newton version of this cartridge was supposedly on a different cartridge case, the wildcat versions are all on the .30 Newton case. Ackley listed this cartridge in his sales literature from 1941 in Oregon.

"A fine long-range cartridge which takes a case that, although not belted, is one of the strongest and best designed cases that has ever been put on the American market," wrote Simmons. "Fred Barnes did some testing with this cartridge and found that it was relatively insensitive to variations in loading. He fired a group at 200 yards with two different bullet weights and had a 5-inch group."[102] In 1946, Western Cartridge Company announced that they did not plan to revive the .30 Newton cartridge in their post-war production, which would have been the beginning of the end for the .276 and .270 Ackley Newton cartridges.

According to Fred C. Ness, the Fred Barnes rifle mentioned above was chambered by P.O. Ackley. Ness reported that it was a medium weight barrel on a P-17 action, and groups were about 2.5 inches at 200 yards. Bullets of 160 and 180 grains were tested.[103]

7mm Ackley Magnum or Ackley .276 Magnum

Among Ackley's lineup of magnum cartridges designed in Roseburg before World War II is the 7mm Ackley Magnum. Utilizing the same case design as the .270 Ackley Magnum, it is simply necked to 7mm. Ackley designed this case to max out capacity under 70 grains of powder, in fact he shows no loads over 65 grains[104] (which should be approached with great care). Capacity of this case is very similar to the 7mm Sharpe & Hart to the point that Ackley says loads are interchangeable.

Ackley compared the 7mm Ackley Magnum to the 7x57 Ackley Improved, "From the standpoint of the average shooter, the 7x57 AI should prove to be a much more interesting cartridge because it drives the various weights of bullets nearly as fast as the Magnum with considerably less powder, it is more flexible and barrel life is much better, and after all, the 7x57 AI with the right bullet is sufficiently powerful for almost any type of big game."[105]

7mm-338 (Winchester Magnum)

Ackley worked on this cartridge with Les Bowman providing a barrel and chambering the first rifle in the caliber. Bill Keyes of the RCBS custom shop saw to it that they had the dies they needed for testing. The cartridge is a collaboration Bowman and Ackley design, as a result Ackley certainly had a hand in what eventually became the 7mm Remington Magnum.

.30 Baby Magnum

This is the .30-40 Krag case shortened to 1.270 inches. It's specifically designed for use with light .30 caliber bullets like the 110-grain .30-30 bullet. Ackley also resized .32-20 bullets weighing 115 grains for this cartridge.

.30-30 Ackley Improved*

The .30-30 AI was introduced in the late 40s to early 50s, the exact date is not recorded. The cartridge easily produces an additional 200 to 300 fps while staying within the pressure limits of the 94 Winchester.[106] Probably more .30-30s have been made by Winchester than any other maker, but Marlin has certainly put out their share. "Quite decidedly a surprising cartridge," Ackley said of the design. Of the many improved cartridges credited to him, the .30-30 Ackley Improved is one of the best. It delivers everything that one might want from an improved design — better case life, more velocity, good accuracy, and turning the lever action, often thought of as underpowered, into a pretty powerful hunting tool.

The primary reason for the improved ballistics from this case is that a rimmed design allowed Ackley to move the shoulder forward and blow it out. Consequently, the case capacity is greatly increased.

Sam Fadala likes the .30-30 AI. "I wanted the improved ballistics of the .30-30 Improved case in that custom rifle, and I am convinced that I got them. The proof resides in my chronographed loads, of course. And though I do use a 24-inch barrel in my .30-30 Improved, the round has also done very well out of a 20-inch barrel."[107] Fadala went on to point out he found the ballistics of the .30-30 AI superior to other cartridges that are often thought of as good deer-class cartridges. For instance, the .257 Roberts has nearly 15 percent less retained energy with a 100-grain bullet at 200 yards than the .30-30 AI with a 150-grain bullet. If both rifles were sighted in for a 200-yard zero, there would be about 2 inches difference in drop at 300 yards, the edge going to the lighter bullet in the .257 on trajectory. Everything is a trade off in ballistics.

Some shooters badmouth the .30-30 AI, saying, "Why not just get a 308?" The answer to those folks is pretty simple, "That's not what I wanted." That answer is good enough for this writer. There are certain guns that will work well with the rimmed .30-30 case that would not handle the rimless .308 case, i.e. 94 Winchester, most single shots, and 336 Marlins. As of this writing Marlin has recently introduced the .308 Marlin Express and I will make a prediction that the .308 Marlin Express will be long dead, while the .30-30 Ackley Improved will still be around for decades to come.

.30-40 Ackley Improved*

According to Ackley this case is "relatively strong"[108] and many of his clients who used the caliber were able to get velocities approaching those of the .300 H&H factory loads. The velocities that accompany the above comments are competitive to the data published for the .300 H&H, and compare to Phil Sharpe's *Complete Guide to Handloading* from 1937. Many modern writers fail to take into account the time in which comments were made, and it's important to look at the context. By using Sharpe's book we are looking at the data that Ackley would have compared to when he designed this cartridge.

Recommended mainly for single shots like the Winchester Hi-Wall, Sharps Borchardt, P-14 Enfield, or the old Winchester model 54 in .30-30,[109] popularity of this cartridge was always limited by the availability of good actions and other cartridges on the market that duplicated or exceeded the ballistics of the .30-40 AI. As Ackley told Bob Hutton, "You'd be surprised what an improved .30-40 will do."

.30-06 Ackley Improved*

Now standardized by Commission Internationale Permanente (C.I.P.), Ackley's design for this cartridge was settled upon in 1944, although he started tests and experiments with an improved '06 before the war. Accord-

ing to Frank Barnes, author of *Cartridges of the World*, "the .30-06 Improved is one of the most popular and widely used of the improved breed."[110] Over the years this cartridge has remained very popular. All sorts of claims have been made for the .30-06 AI and its performance, but P.O. Ackley himself made little attempt to boost those claims. "Almost every conceivable thing that human imagination could conjure up has been done to the famous old 30-06," wrote Ackley. "We might describe it as the 'lover's lane special,' because it has been 'necked' more than any other cartridge in history."[111]

He also said in the 1962 *Gun Digest* that, "The .30-06 Ackley Improved is by no means the original, it was simply the first to catch on, thus overshadowing earlier forms which were similar and just as good. To determine without question the originator of the Improved .30-06 would be practically impossible. Doubtless the idea is fifty years or more old." [112]

Ackley unequivocally declared that, "The .30-06 AI could equal the .300 H&H factory loaded ammunition."[113] The cartridge has survived and remained popular simply because it has value. Probably the best test of how good a wildcat design is comes from how long it stays in the market place. Ackley's version of the .30-06 Improved appeared shortly after WWII, and over sixty years later it still appears on the RCBS special order die list, that's more than half a century in the market. There are perfectly good factory cartridges that did not last that long.

Julian S. Hatcher wrote to Ackley on behalf of the *American Rifleman* in May, 1952. "Your Improved .30-06 and other wildcats seem to have gotten around quite a bit. We seem to get quite a lot of correspondence on them. You seem to have made a name for yourself along these lines."[114] Hatcher went on to ask for load data for anything Ackley could offer, with the idea they would quote Ackley in responses.

In *Nick Harvey's Practical Reloading Manual* you will find loads for the .30-06 AI with bullets ranging from 130 to 220 grains. When compared to published data for the .300 H&H, such as in *Complete Guide to Handloading* from 1937, it is obvious that the .30-06 AI produces velocities totally equal to the venerable old Magnum with the loads that made it famous. Of course, with the powders we have today, the .300 H&H will perform better, by about an additional 100 fps with various bullet weights.

The .30-06 Ackley Improved has been the subject of some controversy, too. See Chapter 7 devoted to this cartridge for the full details.

.30 Ackley Magnum No. 1* & No. 2

Ackley considered these two cartridges to be short magnums, which makes sense, for when they were developed the .300 H&H was *the* cartridge by which all were compared. The No. 1 was originally introduced in 1939 and was a little shorter case than the .30-06, so it was not possible to rechamber barrels so chambered to this caliber unless they were set back. The short design was intended to prevent accidental firing of .30-06 cases in the chamber,[115] so it was originally intended as a setback and rechambered in .30-06 barrels.

The No.1 Short .30 Ackley Magnum could be considered the Great Grandfather to the .300 WSM and its brethren. Not because the two designs are similar in look, they are not, but because it proved the concept that a short magnum could be efficient. Bob Hagel wrote, "It is fairly certain, however, that his (Ackley's) work with shortened belted cases in various calibers, especially .30, has influenced our modern short magnums."[116]

A few years later, the .30 Ackley Magnum No. 2 came about. The No. 2 was long enough to clean up a .30-06 chamber without the need for a barrel setback. Ballistically, the two cartridges were interchangeable. In fact, ballistics are comparable to the .300 H&H but with a standard length case, plus other advantages like easier extraction and longer barrel life. The design of this case allowed for a simple conversion of .30-06 rifles, the only real change to the action was to open the bolt face and fit the extractor for the magnum case.[117]

"Since the advent of the .338 Winchester

Magnum there has been an epidemic of necking this cartridge down to .30 caliber,"[118] said Ackley. The common name for the cartridge is the ".30-338." Ackley thought the name that would stick would be the ".30 Belted Newton." He also pointed out that the .30 Ackley Magnum, .30-338 and the .308 Norma Magnum were so similar that the load data could be interchanged, and his only caveat was that the brass selected might make some top loads dangerous. In truth, the shorter No. 1 and No. 2 Ackley Magnums are pretty well obsolete because of the simpler wildcats that now exist in that standard length magnum category, like the .30-338.

.30-348 Ackley Improved

This number was specifically designed for Bob Hutton, who at the time was writing for *Guns & Ammo* magazine. It was the smallest caliber in the series of wildcats Ackley designed on the .348 case. He points out that this cartridge may have too much pressure to be chambered in a 71 Winchester or Browning because of the proportionally small diameter breech section on the barrels of those guns. The case capacity is only about 2 grains less by water weight than the .300 H&H, so this would probably be a good choice for single-shot use, although the ballistics are not much different from a standard .30-06 when pressures are held to Model 71 levels.

The initial test gun that Hutton reported on in this caliber in the June 1964 *Guns & Ammo* issue was owned by film star Robert Middleton and was rebarreled by P.O. Ackley for testing. It was found to be an accurate cartridge in the 71 Winchester action.

.300 (H&H) Ackley Improved Magnum

This cartridge has the same case capacity as the now well-established .300 Weatherby. Differences include a 40-degree shoulder as opposed to the Weatherby double venturi shoulder. The main advantage for the Ackley .300 H&H is better case life as the minimum body taper reduces stretch. Of course, the same is true for the .300 Weatherby. Hutton said that he thought if Ackley tried more modern powders in his "overbore" cases he would not see them as being so inflexible in loading, would see better results from them and be less inclined to talk them down.[119]

At one time, the Western Cartridge Co. produced ammunition for the .300 Ackley Improved Magnum to be used by GIs at Camp Perry. This cartridge did win the 1,000 Wimbledon Cup one year, according to Hutton. "In the past twelve years the Wimbledon Cup has been won eleven times with .30 caliber rifles — .300 H&H, .300 Ackley Magnum or .30-06," he reported.

In recent years, 1,000-yard shooters have continued to use the cartridge, referring to it simply as the ".300 Ackley Magnum." Serious long-range shooters are using Norma .300 Weatherby brass to form their Ackley Magnum cases, as Norma brass is said to be more uniform than other brands. Disadvantages would be relatively short barrel life and less flexibility in loading.

8mm-06 Ackley Improved

Like most Ackley Improved cases in the '06 family the case capacity of this cartridge is about 5 percent greater than the standard 8mm-06. It's a hybrid improved design (as Speer said of the 7mm-06 Improved) because there is no factory 8mm-06 case. You can neck .30-06 cases up to 8mm and fireform them in the Ackley chamber. The 6.5-06 AI and the 7mm-06 AI fall into this same category, since there is no factory ammo in those calibers, either.

Ackley liked this cartridge enough to recommend it over the 8mm-06. His attitude was that since both cartridges required reloading you might as well take the one that offered the best ballistics. Many 8x57 Mausers have been converted to the 8mm-06 Ackley Improved.

.333 Ackley Short Magnum

This is the No.2 Ackley Magnum necked up to .333. Ackley saw this cartridge as a heavy bullet design, and the data he provided in his sales brochure was for 275- and 300-grain bullets only. When the .338 Winchester came on the scene, effectively killing the .333 bore, this cartridge became obsolete — a fate that befalls many wildcats when the factories adopt a similar cartridge.

.333 Ackley Improved Magnum

This design is arrived at when a .300 (H&H) Ackley Improved Magnum is necked up to .333 with no other changes. Consequently, it would be very similar ballistically to the .340 Weatherby. The Ackley cartridge had the trademark 40-degree sharp shoulder.

.348 Ackley Improved

Clients came to Ackley asking for this cartridge for their 71 Winchesters. It is still a fairly popular conversion, both in the original Winchesters and in the later production Browning 71 lever guns. The original Winchester case design had a steep body taper with a shallow shoulder angle so it increased bolt thrust greatly. Case capacity of the Ackley chambering is considerably higher than the factory, potentially allowing for an honest 200 fps gain in velocity.

Loosely quoting John Kronfeld, "All things being equal, if you start from scratch and buy a Browning 71 rifle or carbine, have it rechambered to .348 AI, you will have a cartridge that gives a 28 percent increase in striking energy over the .348 Winchester."[120] Not many of Ackley's improved cartridges could equal that kind of energy gain. The .348 Ackley improved is a very worthwhile conversion, for a simple rechamber is pretty cheap as gunsmithing work goes.

According to Bob Hutton, "The .348 Ackley Improved is a good example of an 'improved' case that shows a real improvement in performance. The improved case has a capacity of 84 grains of 4350 whereas the standard case is filled with 76 grains [Note: we are talking gross capacity, not load data]. That space must be utilized or the so-called improvement is useless."[121]

An important issue has come to light in recent years for the .348 Ackley Improved chamberings and derivatives such as the .35-348 Ackley Improved. It appears that there are at least two versions of these chamberings being offered by the various reamer makers. Shoulder length varies from one maker to another, so while they will all fireform easily, it is important to work up loads for your specific chamber because the shorter chambers will produce higher pressure while a load in a longer chamber will handle it fine. *Be extra careful on this one!*

.35 Whelen Ackley Improved*

Townsend Whelen himself designed the .35 Whelen in 1922, and for 65 years the cartridge hung on with a steadfast if not large following. When Remington made the .35 Whelen a factory chambering in 1987, they created a whole new interest in the improved cartridge, albeit inadvertently. About 5 percent greater case capacity than the standard 35 Whelen is delivered by the Ackley improved design.

"The .35 Whelen Ackley Improved is a good and broadly useful cartridge, adequately powerful and flat shooting for virtually all North American game requirements,"[122] wrote Garry Sitton.

In *Cartridges of the World,* the .35 Whelen AI is discussed along with the standard 35 Whelen. That author clearly believed the improved design was far superior to the original. The idea that the shoulder diameter on the Whelen case is too small to headspace is mentioned, though this so-called problem is a myth and simply does not exist. Once upon a time, a gun writer assumed this would be a problem, and over the years it has been repeated so many times that locating the source has become the equivalent of looking for a needle in a haystack.

From a mechanical standpoint there is plenty of shoulder on the standard .35 Whelen, the case is tapered, and this combined with the shoulder creates what is

known in machining as an "interference fit." Such designs are used specifically because it is difficult to force them beyond their desired stopping point, i.e. disturbing the headspace.

It is one of Ackley's better designs, as it provides case capacity that is needed for the relatively heavy bullets normally used in a .358 caliber. Pushing a 250-grain bullet near 2,600 fps from a barrel as short as 20 inches[123] makes this an honest 300-yard cartridge. Of course, if you go to a more conventional barrel length of 24 inches, you can conservatively add 60 fps just for the barrel length. From experience, H4895 is the powder to use in this cartridge, for it will deliver good velocity and is normally very forgiving on pressures on a case this size with a large diameter bullet.

.35-348 Ackley Improved

If you're a fan of the .348 Winchester then you should love this cartridge. By necking up to .358 the selection of available bullets grows by at least tenfold. Top that off with the increased case capacity of the Ackley design and you have a hard-hitting cartridge specifically designed for the 71 Winchester or Browning. As with the .348 Ackley Improved there are more than one version of this cartridge under this name from various reamer makers, so work up your loads carefully.

.35 Ackley Magnum (Short)*

The largest bore diameter in Ackley's line of standard length magnums is the .35 Ackley Magnum. "It makes a very powerful and hard-hitting big game rifle," wrote Simmons.[124]

Ackley thought in terms of reboring existing barrels, so his designs were made so that as a barrel wore out in a smaller bore diameter it could be rebored, a new neck and throat cut and the gun put back into use. He introduced his .35 Ackley Magnum in 1939 based on the .30 Ackley Magnum No.1 in 1946; later, when the No. 2 came along, the .35 was updated to the newer design,[125] and he said that he had the .35 Newton in mind when he developed the cartridge.[126] The No. 2 version was made longer to insure that when .30-06 barrels were rebored and rechambered that the original chamber was completely cut away without the need for a barrel setback.

In a 1953 letter to Fred Huntington of RCBS, Ackley verifies dimensions to Huntington for all the Ackley Short Magnums. In so doing he verified that three versions of the .35 Ackley Magnum — the No.1, No. 2, and the final version that corresponds to the .358 Norma Magnum — exist. The final version moved the shoulder forward about an 1/8th inch and was created between 1953 and 1959. The 1959 *Handbook for Shooters and Reloaders* only depicts the final version.

When the .358 Norma Magnum came out in 1959, Ackley told clients they could shoot the ammo or use the brass in his .35 Ackley Magnum chambers because there was virtually no difference. The slight variation in shoulder angle would fireform on the first shot.[127] Wayne van Zwoll pointed out that there were many other wildcats of similar capacity and design including the .350 G&H, .350 Mashburn Super Magnum, .358 Barnes Supreme, .35 Apex and the .35 Belted Newton.[128] Jon R. Sundra, another well-known author, went so far as to write that, "Essentially, the .358 Norma is a legitimized .35 Ackley Short Magnum."[129]

Nils Kvale, of Norma, developed the .358 Norma Magnum chambering in the 1950s. It essentially duplicated the long obsolete .35 Newton, which had been introduced to the U.S. market in 1915. Unfortunately, the only factory rifles that chambered the .358 Norma Magnum were produced by Husqvarna, of Sweden, and Schultz & Larsen, of Denmark. Had Norma managed to persuade a major U.S. gunmaker to chamber this round, it seems likely that it might have become as popular as has the .338 Winchester Magnum.[130]

In *Practical Dope on the Big Bores,* Ackley says that the .35 Magnum pushed the 200-grain Remington bullet at 3,185 fps and a 250-grain bullet at 2,920 fps.[131]

Of the .35 Ackley Magnum Jack O'Connor

wrote, "Dozens of medium-bore wildcats have been introduced in the United States but most have not been popular. P.O. Ackley, the Salt Lake City rifle-maker, says that the .358 Norma is identical to his short magnum .35 caliber wildcat, which he designed and introduced a decade or more ago.[132]" If you look at all the standard length magnums — .308 Norma, .300 Winchester, .338 Winchester, .264 Winchester, .358 Norma — you will note that they were all introduced between 1958 and 1960, long after Ackley introduced his magnum designs both pre- and post-World War II. While the factories may have arrived at their designs independently, it's doubtful that they were not aware of what was going on in the wildcatting community.

.35 Ackley Magnum Improved (Long)

This is Ackley's .300 H&H Improved necked up to .358 caliber. Ackley saw this cartridge as a natural for reboring shot-out .300 Magnums. At one time, Griffin & Howe offered a similar cartridge.[133] Since it utilizes the full length of the H&H case, long magnum actions are required for this cartridge. If efficiency interests you then consider that this .35 magnum is more flexible in loading than the same cartridge in .30 caliber. Interestingly, the .35 Ackley Magnum (Short) will deliver similar ballistics with far less powder, and correspondingly, less recoil.

.375 Whelen Ackley Improved

Research by Michael Petrov turned up interesting data concerning the .375 Whelen. It has long been told that Pennsylvania gunsmith Bob Wallack developed this wildcat and named it for Whelen. Turns out that Whelen himself had been involved in developing a .38 Whelen in the 1920s. Petrov reports in the January 1923 *American Rifleman* that Townsend Whelen was sending shooters to Neidner's shop in Michigan for the .38 Whelen cartridge and barrel jobs.[134]

Development of the Ackley Improved version of the cartridge probably took place in 1958 or 59, it first appears in the *Supplement to the Handbook for Shooters and Reloaders* in 1959 but was not in the main book. Loads for a 350-grain bullet are mentioned with a velocity of about 2,100 fps in the *Supplement*. From experience, this author would use a 250-grain bullet and velocities would be more like 2,500 fps, making for a more modern trajectory and still delivering a punch when the bullet arrives.

The .375 Ackley Improved is simply the .35 Whelen AI necked up to .375 caliber, a gain of about 5 percent more capacity over the standard Whelen case. Before the .35 Whelen became a factory offering in 1987, brass for this cartridge would have been made simply by necking .30-06 up to .375 and fireforming. However, today it's easier to use .35 Whelen brass from Remington to form the case, and it would be advisable to neck the brass up to .40 caliber first and then resize for correct headspace.

While it's a good cartridge, the .375 Whelen AI has never developed a large following. However, it uses inexpensive brass, is fuel efficient, and produces relatively low recoil for the energy that it delivers to the target.

.375 H&H Ackley Improved

The earliest write-up located for this cartridge was in Ackley's 1959 edition of *Handbook for Shooters and Reloaders*. There he wrote that, "…it is a good killer on big Alaskan bear, moose, etc., and all large varieties of African and Indian game when good bullets are used."[135]

Nick Harvey included the ".375 Ackley Magnum" in the *Practical Reloading Manual*. His loads showed only a nominal increase in velocity over the .375 H&H, then barrel lengths were checked, his test rifle for the standard .375 H&H was 5cm (1.97 inches) longer than the Ackley chambering.[136] Most magnums will deliver an easy 30 fps per inch of barrel. It pays to check the test barrel length any time you compare data.

The wildcat has out-lived the .375 Weatherby. Many .375 H&H owners find that case

stretch is a problem if they reload. The .375 Ackley Improved solves that problem. Case capacity is increased by about 10 percent with this design, and that coupled with a relatively large bore make this a useful wildcat. A simple rechamber will convert a .375 H&H to the Ackley Improved. Obviously, if the .375 H&H will handle African game, then the Ackley will be totally satisfactory with an added 200 fps of velocity.

.40-348 Ackley Improved

Originally designed for the .411 bullet, a .416 version of this cartridge is available, although it is not likely that Ackley designed the latter. As with the other .348 variants in the Ackley line, be aware that reamers may vary in design from one maker to another. Work up your own loads, do not rely on published data.

This particular cartridge was developed for Bob Hutton and Wally Apperson of the Technical staff at *Guns & Ammo*, who took on the job of working up loads and testing. Naturally they used a model 71 Winchester. The .40-348 Improved and the .45-348 Improved were the first cartridges to have published data developed from the Powley Computer, a mini-milestone. Ackley designed the wildcat, rebored and chambered the barrels for these tests, which were reported on in the February 1962 issue of the magazine. Reboring the factory barrel left a pretty thin-walled barrel, and this author has seen many of these guns come through the shop over the years, which work just fine, but thanks to lawyers and insurance companies, today rebore shops will not bore a barrel as thin as these old timers. As Hutton pointed out, "The .40/348 AI wildcat cartridge fires a 400-grain bullet at almost the same velocity the .405 Winchester fired a 300-grain bullet."[137]

.400 Ackley Magnum

Ackley thought this case would push a 300-grain bullet at 2,800 to 3,000 fps.[138] Actually, 2,600 fps is much more realistic. It is likely that when Les Bowman wanted a .40 caliber magnum about 20 years later, Ackley simply dusted off this idea and updated it for the then available .338 or .458 Winchester case.

"This type of shell would be much safer to use than one of the .400 Whelen type," wrote Simmons, "which has neither belt nor proper shoulder to insure correct and safe headspacing."[139] It is true that the belt on this case would make it easier for reloaders to work with since most reloaders do not fully understand headspace. A small shoulder will headspace a cartridge safely and efficiently but it does require more finesse and care than the average case does when reloading.

.411 Bowman

Les Bowman and P.O. Ackley were friends for years and worked together on several research projects. The .411 Bowman came about from discussions between Bowman and Fred Huntington, ten years before the .416 Taylor, and was created by necking the .338 Winchester up to .411 diameter. It will easily push a 300-grain bullet at 2,600 fps and a 400-grain bullet at 2,300 fps, highly respectable ballistics from a standard length action. Ackley built the first .411 Bowman, while Al Biesen blued the metal and stocked the rifle.[140] It was intended for use on an African hunt in 1962 that never came together. An extensive article on this cartridge and gun was published in *Handloader* #178 by Al Miller.

According to Miller, the Bowman rifle was barreled with a 14 twist, and he surmises that is the twist that Bowman wanted. Ackley says that a standard twist for the .411 would be a 16. This author's experience with .411 calibers would indicate that Ackley was correct — in fact 18 and 20 twists will work well, too.

.450-348 Ackley Improved

Frank Barnes states that this cartridge came into being in 1956, and if Barnes were correct the .450 Alaskan preceded Ackley's design by four years.[141] However, in a letter

dated May 29, 1952, Fred Barnes of Barnes Bullets (an associate of Ackley's from the Ogden Arsenal days) suggests that Ackley created the .450-348. So as it turns out the two designs were developed concurrently, with no way to know which was really first.

Ackley described the recoil from this cartridge as "quite violent," as apparently he did not enjoy shooting this one. He also states clearly that, "This is the oldest of the large bore cartridges based on the 'improved' .348 design." He was not prone to such statements unless he believed them to be true. Accordingly, he must have developed this cartridge on the .348 case ahead of any others mentioned in the Ackley line. He did point out that the .450 Alaskan required less alteration to the 71 action than his .450-348 Improved. He goes so far as to recommend the .450 Alaskan over his own design because of the design characteristics and feeding through a 71 action.[142]

.450 Ackley Magnum

Charging Cape buffalo, 10-foot Kodiak bears, and stampeding Elephant come to mind when you pick up a .450 Ackley Magnum round and feed it into the magazine of an express rifle. Even if you have never had any of those experiences, cartridges like this cause you to dream.

The .450 Ackley Magnum was developed in about 1951. "This is one of the most powerful Wildcat cartridges available," Ackley said. "It is especially designed for use on heavy dangerous game for the sportsman who wishes to have a surplus of power."[143] That comment still holds true 50 years later.

An article in the *American Rifleman*, September 1952, titled, "The Big 450" by Hal Stephens may well be the first article to feature Ackley's .450 cartridge. The rifle was specifically built for Fred Barnes, originator of Barnes Bullets. Just for this powerful wildcat Barnes designed a heavy jacket bullet (.049-inch) in 400, 500, and 600 grains. His bullet for the .45-70 at that time only had a .032-inch jacket, and Barnes clearly wanted a tough bullet that could penetrate deeply on thick-skinned animals.

The first rifle was built on an Enfield action to which Ackley fitted and chambered one of his barrels. He modified the action creating a square recoil lug between the trigger guard and the tang of the action to help transmit recoil to the stock without splitting it, and two recoil lugs were attached to the barrel. Keith Stegall of Gunnison, Colorado stocked the rifle. The final product weighed in at 12 lbs. Barnes chronographed loads for his 500-grain bullets at 2,470 fps, and 600-grain bullets at 2,260 fps. That last load would deliver 83.7 foot pound of recoil. Compare that to your average .30-06, 180-grain load in a 12 lb. rifle delivering 14.88 foot pounds of recoil. Can you say ouch?

In Hal Stephens' article he tells a story about Norman Brown and him flipping a coin to see who would shoot the big rifle. Brown lost the coin toss. Stephens remarks that after the first shot, fired prone, Brown shook his head (presumably in disbelief) and crawled back into position for the second shot.[144]

Jack Lott's .458 Lott is the nearest ballistic cousin to the .450 Ackley Magnum. The Ackley has one major advantage mechanically speaking: the shoulder on the case makes it much easier to load. The straight-sided neck is much easier to seat a bullet in than the .458 Winchester and the .458 Lott. Anyone who has loaded the Winchester or Lott knows the case is sized down much smaller at the mouth than it is in the .450 Ackley, the result is that when you seat a bullet in those tapered, shoulderless cases you form a neck by seating the bullet. The Ackley has a neck length of about .420 inches, which is totally sufficient to supply good neck tension on the bullet. Like the Lott it will fit in any .375 H&H length action.

Now that .458 Lott brass is offered by Hornady it is a simple matter to fireform .450 Ackley by firing .458 Lott in the "improved" chamber, thus avoiding any complicated processes.

Layne Simpson described the .450 Ackley Magnum as a good example of a cartridge designed to push bullets faster than any com-

mercially available — with both cartridge efficiency and velocity high on the priority list of the designer.[145]

According to Ackley, "This big cartridge with its tremendous recoil is actually too powerful for any North American hunting. In spite of this it has gained a measure of popularity. On Elephants it has proven especially effective."[146] The .450 Ackley Magnum can push a 500-grain bullet at 2,400 fps, producing over 3 tons of energy. It was effective enough, and had a good enough reputation, to attract A-Square to make this one of their factory cartridges.

According to Terry Wieland, "I think P.O. Ackley did it right on this one. It is a flexible, efficient and easy to use big bore. Overall the .450 Ackley is one of the most enjoyable cartridges you will ever use. It is *fun*. There is just no other word for it."[147]

.475 Ackley Magnum

This is the largest cartridge in the Ackley line, it looks like a .458 Lott on steroids. Ackley recommended it, "only for use on the heaviest and most dangerous game."[148]

Utilizing a cylindrical .375 H&H case, full length, the .475 Ackley is essentially a straight-walled case with a belt for headspace. In Ackley's day, Barnes was about the only source for bullets in .475. So he was limited to 600-grain soft or solid bullets. Today, we can get bullets ranging in weight from 300 to 600 grains, with stops along the scale including 350, 400, and 500 grains. With more than 3 tons of energy at the muzzle this cartridge demands respect and gets it.

Post Script:

P.O. gave load data for nearly all the wildcats on the .284 Winchester case in his 1966 edition of *Handbook for Shooters and Reloaders, Vol. II*. Only the .22-284 and the .375-284 were not listed. He had done the barrel and chamber work for Bob Hutton of *Guns & Ammo* for the .25-284 and the .30-284 as soon as they could get brass from Winchester. In 1963, Hutton published the results of all their tests in the June 1966 issue, where in his column he tells us that G&A paid for the whole test so that they would be the first to publish a full series on the then new .284 case.

The .22-284 was worked up in 1964 when Forker and Hutton of the same publication placed an order for three barrels in .22-284 with Ackley. They used those barrels to set a new velocity record of 5,350 fps with a 31-grain bullet custom made by Ray Speer for their tests. Later, Ballistician Homer Powley suggested they try some 15-grain sintered iron bullets taken from Remington .22 Rocket Shorts. As a result, another velocity record was set — 6,585 fps using a 15-grain bullet and 50 grains of 4227.[149]

It appears that the .338-284 and .375-284 were done much later, by others. However, Ackley was involved in three wildcats on the .284 Winchester case, but he did not take credit and probably rightly so, as he was paid to do the work and it was not his original idea according to the articles I found.

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CHAPTER 19

RELOADING DATA FOR ACKLEY CARTRIDGES

There are no loads in this chapter that are taken from the writings of P.O. Ackley. This data is compiled from modern sources that have gone to the trouble to pressure test the data. It is standard practice in wildcatting to use the pressure limits for the parent case for the new wildcat. Unfortunately, many wildcatters completely ignore pressure when it comes to both ballistics and safety.

"There are many times that I recommend loads especially for wildcat cartridges," said Ackley. "I try to keep them on the conservative side or on a level which I think would be safe for the average rifle. But, arguments usually start because some individual has a rifle which will accept considerably heavier loads than are recommended and that is the reason why we usually recommend a certain load, and then caution a shooter to start low and slowly work up to the maximum. Very often a rifle will be found which will only accept minimum recommended loads, while some other one of the same caliber and apparently identical in every way will accept several grains heavier loads. Factory ammunition is almost always loaded to a safe level which means that many rifles would accept considerably heavier loads when carefully developed. I might add that when little velocity is gained by trying to ride the border line, it is hardly worth the chance that has to be taken."[1]

A-Square's reloading manual, *Any Shot You Want* contains data for the .450 Ackley Magnum. In preparing the data for this chapter the author requested permission from Art Alphin of A-Square to reprint that data. He generously said yes, with only one small caveat. Art asked that I also reprint the following:

"Cratered or flattened primers may mean high pressures. They may also indicate a mechanical problem. If you get cratered or flattened primers, *cease fire* and check for the problem. If the problem is not mechanical then you know your pressures are way too high.

"The same thing applies to sticky bolt lift. Stop. If there is no mechanical problem, your pressures are way too high.

"If you get pressure marks on the headstamp, you have a real pressure problem and

must immediately *cease fire*, disassemble or destroy the cartridges and start over.

However, absence of cratered or flattened primers, absence of sticky bolt lift, and absence of pressure marks does *not mean your pressures are OK."*

Understanding Reloading Myths

There are some myths about reloading that should be cleared up:

Myth No. 1: Manuals are written to make the lawyers happy, maximum loads are shown well below "real" maximums.

Answer: Not true. There are a number of factors that result in the maximums seen in the average reloading manual. The loads are often tested in only one barrel, so the results are only true for that barrel, providing only a general reference for the reloader. This is the reason that we have industry standards that set safe limits. In the United States this is done by SAAMI, in Europe the organization is CIP. It is known that all new manufactured guns can handle the limits that are set, and all older guns must be accommodated to. Whatever the pressure limit published for your cartridge, living by that limit will insure you live a long shooting life, unfettered by spontaneously disassembled firearms. Some loads are lower than in manuals of 30 years ago, but that is a result of much more sophisticated and accurate pressure testing equipment currently available combined with reformulation of gun powders.

Myth No. 2: Modern rifles are so strong you can't blow them up.

Answer: Modern firearms are indeed very strong. All machines designed to contain pressure, such as a rifle barrel and action, are engineered to be stronger (by a large margin) than the average pressure they will repeatedly handle in their lifetime. However, that margin is there to protect the user from mishap. If you purposely overpressure the system what do you think will eventually happen?

Modern cartridge brass is superb in quality, yet we must remember it is designed, in part, as the weak link in the system. In this way a case will fail due to excessive pressure, and if we pay attention to the pressure signs we will have plenty of notice before a catastrophic failure occurs.

Rifles seldom actually "blow up" in the sense that the locking system or materials fail. Instead, the case fails and the rifle has to control and vent escaping high pressure gases away from the shooter. If you're paying attention to the danger signs it is likely you will never have a problem, but, ignore the early signs of pressure and you could end up injured, blind or worse.

Myth No. 3: It's worth anything to get another 50 fps muzzle velocity.

Answer: Ideal ammunition will feed reliably, chamber smoothly, provide safe pressures over a wide temperature range, extract and eject effortlessly. Premium accuracy is normally found somewhere below the top velocity range. This is simply because when the load is burning uniformly from shot to shot the best accuracy will show up 99 out of 100 cases.

Aside from the reliability and accuracy issues, never has an animal suddenly dropped over dead because you showed up with the hottest proof load you could work up for your gun. If you select an effective caliber for the game you're chasing, then there is no need for an extra 20 feet per second, except for bragging rights, or as Ackley probably would have said, "Advertising, not ballistics."

Chris Hodgdon of Hodgdon Powder kindly allowed the use of data assembled by his company to be supplied here. The folks from Sierra Bullets also kindly supplied data that they have compiled. Western Powders gave permission for the reprint of data Accurate Arms had collected. The rest comes from the author. It should be recognized that as with

all loading data, the data was correct for the barrel in which it was tested. Your barrel will likely be different, so always start low and work up. Your brain is the best safety equipment you have, but only if you use it.

The data for the .22-250 Ackley Improved below was supplied by Sierra Bullets. While it does not include pressure data we can publish, it was tested in a Savage Model 11 according to Sierra. Talking to the ballisticians in the industry, if they work with a wildcat, they normally use the pressure limits of the parent case as the limit for the wildcat.

Table 19-1

.17 ACKLEY HORNET					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure CUP	Grs.	Vel. (ft/s)	Pressure CUP
20 GR. V-MAX	20	H4198	.172	1.800	11.5	3,246	32,700	12.5C	3,515	44,400
20 GR. V-MAX	20	H4227	.172	1.800	8.5	3,080	41,200	9.2	3,238	45,700
20 GR. V-MAX	20	Lil'Gun	.172	1.800	9.4	3,369	40,600	10.0	3,509	45,300
25 GR. HDY HP	25	H335	.172	1.760	12.5	2,898	35,500	13.3	3,046	45,400
25 GR. HDY HP	25	H322	.172	1.760	12.0	2,894	42,500	13.0C	3,153	45,400
25 GR. HDY HP	25	H4198	.172	1.760	10.9	3,015	38,800	11.6	3,176	45,900
30 GR. BER HP	30	BL-C(2)	.172	1.800	13.0	2,795	36,900	13.5	2,922	43,200
30 GR. BER HP	30	H335	.172	1.800	11.7	2,752	38,500	12.5	2,894	44,500
30 GR. BER HP	30	Benchmark	.172	1.800	12.2	2,900	43,200	13.0C	2,975	44,800
30 GR. BER HP	30	H322	.172	1.800	11.5	2,745	36,100	12.2	2,984	45,700
30 GR. BER HP	30	H4198	.172	1.800	10.0	2,711	33,400	10.7	2,923	45,600

Courtesy of Hodgdon Powder Co.

NEVER EXCEED MAXIMUM LOADS

Table 19-2

.17 ACKLEY BEE 22" BARREL					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure CUP	Grs.	Vel. (ft/s)	Pressure CUP
25 GR. HDY HP	25	BL-C(2)	.172	1.650	16.0	3,100	33,000	17.0	3,294	39,300
25 GR. HDY HP	25	H335	.172	1.650	16.0	3,080	32,400	17.0	3,288	39,600
25 GR. HDY HP	25	H4198	.172	1.650	12.5	2,976	32,400	13.5	3,365	45,300
25 GR. HDY HP	25	H4227	.172	1.650	10.0	2,910	36,500	11.0	3,131	45,300

Courtesy of Hodgdon Powder Co.

NEVER EXCEED MAXIMUM LOADS

Table 19-3

.17 MACH IV 24" BARREL					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure CUP	Grs.	Vel. (ft/s)	Pressure CUP
25 GR. HDY HP	25	BL-C(2)	.172	1.770	19.0	3,372	38,700	20.0	3,674	48,000
25 GR. HDY HP	25	H335	.172	1.770	19.0	3,360	38,000	20.0	3,680	48,800
25 GR. HDY HP	25	H4198	.172	1.770	15.0	3,237	36,500	16.0	3,576	49,800

Courtesy of Hodgdon Powder Co.

NEVER EXCEED MAXIMUM LOADS

Table 19-4

.17-222 24" BARREL					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure CUP	Grs.	Vel. (ft/s)	Pressure CUP
25 GR. HDY HP	25	H380	.172	2.070	22.0	3,476	40,900	23.5	3,655	46,400
25 GR. HDY HP	25	BL-C(2)	.172	2.070	20.0	3,521	40,400	21.3	3,755	49,400
25 GR. HDY HP	25	H335	.172	2.070	20.0	3,509	39,600	21.0	3,740	49,400
25 GR. HDY HP	25	H4895	.172	2.070	19.5	3,439	39,800	20.5	3,646	48,000
25 GR. HDY HP	25	H4198	.172	2.070	16.2	3,448	42,500	17.2	3,601	49,800

Courtesy of Hodgdon Powder Co.

NEVER EXCEED MAXIMUM LOADS

Table 19-5

.22-250 ACKLEY 26-INCH BARREL					Starting Loads		Maximum Loads	
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Grs.	Vol. (ft/s)
40 BlitzKing ™	40	IMR3031	.224	2.380	34.2	3,700	39.0	4,300
40 BlitzKing ™	40	IMR4895	.224	2.380	35.6	3,700	40.1	4,200
40 BlitzKing ™	40	Varget	.224	2.380	36.0	3,700	42.0	4,300
40 BlitzKing ™	40	RL-15	.224	2.380	36.5	3,700	41.9	4,300
40 BlitzKing ™	40	N140	.224	2.380	36.8	3,700	42.2	4,300
45 Spitzer	45	IMR3031	.224	2.385	34.2	3,600	38.2	4,000
50 BlitzKing ™	50	Varget	.224	2.400	35.8	3,600	39.6	3,950
50 BlitzKing ™	50	IMR4064	.224	2.400	35.0	3,600	39.2	3,950
50 BlitzKing ™	50	BigGame	.224	2.400	38.0	3,600	41.9	3,900
50 BlitzKing ™	50	RL-15	.224	2.400	35.0	3,600	38.9	3,900

Table 19-5 *continued*

.22-250 ACKLEY	26-INCH BARREL				Starting Loads		Maximum Loads	
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Grs.	Vol. (ft/s)
50 BlitzKing ™	50	760	.224	2.400	41.5	3,600	44.5	3,900
52 MatchKing™	52	IMR3031	.224	2.390	31.2	3,400	37.2	3,900
52 MatchKing™	52	IMR4895	.224	2.390	32.0	3,400	37.2	3,800
52 MatchKing™	52	Varget	.224	2.390	33.8	3,500	38.0	3,800
52 MatchKing™	52	IMR4064	.224	2.390	34.9	3,500	39.9	4,000
52 MatchKing™	52	BigGame	.224	2.390	36.3	3,500	41.1	3,900
55 BlitzKing ™	55	IMR3031	.224	2.400	33.1	3,400	37.5	3,800
55 BlitzKing ™	55	Varget	.224	2.400	34.7	3,400	37.1	3,700
55 BlitzKing ™	55	N140	.224	2.400	32.6	3,400	36.5	3,700
55 BlitzKing ™	55	BigGame	.224	2.400	35.1	3,400	41.4	3,850
55 BlitzKing ™	55	760	.224	2.400	39.1	3,400	44.5	3,850
60 Hollow Point	60	IMR4064	.224	2.400	34.0	3,400	36.4	3,600
60 Hollow Point	60	BigGame	.224	2.400	37.3	3,300	39.7	3,500
60 Hollow Point	60	RL-15	.224	2.400	33.4	3,300	37.3	3,600
60 Hollow Point	60	IMR4831	.224	2.400	38.4	3,300	42.2	3,700
60 Hollow Point	60	H4831sc	.224	2.400	41.6	3,300	44.9	3,600
69 MatchKing ™	69	IMR4895	.224	2.500	30.3	3,000	33.3	3,200
69 MatchKing ™	69	BigGame	.224	2.500	34.0	3,000	40.0	3,500
69 MatchKing ™	69	760	.224	2.500	34.2	3,000	39.3	3,300
69 MatchKing ™	69	RL-19	.224	2.500	38.2	3,100	42.1	3,400
69 MatchKing ™	69	H4831sc	.224	2.500	37.7	3,000	43.3	3,400
90 MatchKing ™	90	RL-19	.224	2.610	33.6	2,900	39.6	3,300
90 MatchKing ™	90	IMR4831	.224	2.610	36.4	2,900	41.2	3,300
90 MatchKing ™	90	H4831sc	.224	2.610	34.2	2,900	40.6	3,300
90 MatchKing ™	90	RL-22	.224	2.610	37.5	3,100	40.3	3,300

Courtesy of Sierra, The Bulletsmiths®

Table 19-6

.257 ROBERTS AI	26-INCH BARREL				Starting Loads		Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Grs.	Vel. (ft/s)	Pressure PSI
75 Sierra HP	75	AA 2700	.257	2.790	50.4	3,435	53	3,654	59,100
75 Sierra HP	75	AA 4350	.257	2.790	49.5	3,213	55	3,651	58,900
75 Sierra HP	75	AA 3100	.257	2.790	50.4	2,966	56	3,371	45,600
75 Sierra HP	75	AA 8700	.257	2.790	54.9	2,496	61	2,836	37,000
85-X Barnes	85	AA 2700	.257	2.865	48.5	3,230	51	3,436	60,500
85-X Barnes	85	AA 4350	.257	2.865	47.7	3,056	53	3,473	61,700
85-X Barnes	85	AA 3100	.257	2.865	50.4	2,931	56	3,331	53,000
85-X Barnes	85	AA 8700	.257	2.865	54.9	2,435	61	2,767	40,200
90 Sierra BTHP	90	AA 2700	.257	2.835	46.6	3,100	49	3,298	57,400
90 Sierra BTHP	90	AA 4350	.257	2.835	47.7	3,021	53	3,433	59,900
90 Sierra BTHP	90	AA 3100	.257	2.835	50.4	2,907	56	3,303	53,200
90 Sierra BTHP	90	AA 8700	.257	2.835	54.9	2,448	61	2,782	40,600
100 Nosler BT	100	AA 2700	.257	2.945	46.1	2,991	48.5	3,182	59,600
100 Nosler BT	100	AA 4350	.257	2.945	46.4	2,886	51.5	3,279	61,600
100 Nosler BT	100	AA 3100	.257	2.945	49.5	2,825	55	3,210	56,600
100 Nosler BT	100	AA 8700	.257	2.945	54.9	2,380	61	2,705	39,500
115 Nosler Part.	115	AA 2700	.257	2.945	44.7	2,831	47	3,012	61,400
115 Nosler Part.	115	AA 4350	.257	2.945	44.6	2,685	49.5	3,051	60,200
115 Nosler Part.	115	AA 3100	.257	2.945	48.6	2,727	54	3,099	59,800
115 Nosler Part.	115	AA 8700	.257	2.945	54.9	2,385	61	2,709	42,700
120 Speer SBT	120	AA 2700	.257	2.920	44.7	2,790	47	2,968	63,500
120 Speer SBT	120	AA 4350	.257	2.920	44.6	2,660	49.5	3,023	61,700
120 Speer SBT	120	AA 3100	.257	2.920	48.6	2,689	54	3,056	60,000
120 Speer SBT	120	AA 8700	.257	2.920	54.9	2,364	61	2,686	43,000

Courtesy of Accurate Arms Powder, Loading Guide, Number One,

NEVER EXCEED MAXIMUM LOADS

Table 19-7

.280 ACKLEY IMPROVED					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure PSI	Grs.	Vel. (ft/s)	Pressure PSI
120 GR. NOS BT	120	H1000	.284	3.320	62.0	2,924	45,100	66.0C	3,120	54,400
120 GR. NOS BT	120	H4831	.284	3.320	61.1	3,024	52,200	65.0C	3,240	60,900
120 GR. NOS BT	120	H4350	.284	3.320	55.5	3,120	54,000	59.0	3,271	61,400
120 GR. NOS BT	120	H414	.284	3.320	53.1	3,059	52,700	56.5	3,237	62,000
120 GR. NOS BT	120	Varget	.284	3.320	47.0	2,988	52,200	50.0	3,153	61,300
120 GR. NOS BT	120	BL-C(2)	.284	3.320	50.3	3,089	55,800	53.5	3,242	61,900
120 GR. NOS BT	120	H4895	.284	3.320	44.7	2,974	51,800	47.5	3,128	60,700
120 GR. NOS BT	120	IMR 7828 SSC	.284	3.320	59.2	2,997	52,500	63.0	3,219	62,200
120 GR. NOS BT	120	IMR 4831	.284	3.320	56.4	2,967	48,900	60.0	3,223	60,100
120 GR. NOS BT	120	IMR 4350	.284	3.320	55.0	3,056	53,100	58.5	3,222	60,900
120 GR. NOS BT	120	IMR 4007 SSC	.284	3.320	53.2	3,028	51,800	56.7	3,222	62,100
120 GR. NOS BT	120	IMR 4320	.284	3.320	47.5	2,970	51,000	50.5	3,141	60,300
120 GR. NOS BT	120	IMR 4064	.284	3.320	47.8	3,046	54,200	50.9	3,180	60,400
120 GR. NOS BT	120	IMR 4895	.284	3.320	47.7	3,039	54,100	50.7	3,174	60,800
120 GR. NOS BT	120	IMR 3031	.284	3.320	45.1	3,014	55,700	48.0	3,120	60,200
120 GR. NOS BT	120	760	.284	3.320	53.1	3,059	52,700	56.5	3,237	62,000
120 GR. NOS BT	120	748	.284	3.320	48.0	3,005	52,800	51.0	3,177	60,600
130 GR. SIE HPBT	130	H1000	.284	3.320	60.6	2,910	51,600	64.5C	3,065	59,800
130 GR. SIE HPBT	130	H4831	.284	3.320	57.3	2,910	53,800	61.0	3,060	61,300
130 GR. SIE HPBT	130	H4350	.284	3.320	50.8	2,913	53,300	54.0	3,051	60,000
130 GR. SIE HPBT	130	H414	.284	3.320	50.3	2,932	53,500	53.5	3,071	61,700
130 GR. SIE HPBT	130	Varget	.284	3.320	44.7	2,855	53,500	47.5	2,991	60,800
130 GR. SIE HPBT	130	BL-C(2)	.284	3.320	46.5	2,888	52,600	49.5	3,026	61,300
130 GR. SIE HPBT	130	H4895	.284	3.320	42.8	2,813	51,200	45.5	2,953	60,300
130 GR. SIE HPBT	130	IMR 7828 SSC	.284	3.320	56.4	2,907	52,800	60.0	3,079	61,300
130 GR. SIE HPBT	130	IMR 4831	.284	3.320	54.8	2,939	52,800	58.3	3,128	62,000
130 GR. SIE HPBT	130	IMR 4350	.284	3.320	51.3	2,901	53,200	54.6	3,067	61,200
130 GR. SIE HPBT	130	IMR 4007 SSC	.284	3.320	49.4	2,878	51,200	52.5	3,048	60,500
130 GR. SIE HPBT	130	IMR 4320	.284	3.320	43.2	2,787	51,000	46.0	2,948	60,400

Courtesy of Hodgdon Powder Co.

Table 19-7 *continued*

.280 ACKLEY IMPROVED					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure PSI	Grs.	Vel. (ft/s)	Pressure PSI
130 GR. SIE HPBT	130	IMR 4064	.284	3.320	44.2	2,859	52,400	47.0	3,007	61,800
130 GR. SIE HPBT	130	IMR 4895	.284	3.320	44.7	2,867	52,300	47.5	2,982	58,000
130 GR. SIE HPBT	130	IMR 3031	.284	3.320	42.0	2,830	53,800	44.6	2,941	60,300
130 GR. SIE HPBT	130	760	.284	3.320	50.3	2,932	53,500	53.5	3,071	61,700
130 GR. SIE HPBT	130	748	.284	3.320	44.8	2,851	52,000	47.7	2,994	60,600
140 GR. NOS BT	140	H1000	.284	3.330	60.0	2,778	48,200	64.0C	2,972	58,700
140 GR. NOS BT	140	H4831	.284	3.330	58.3	2,841	53,600	62.0C	3,012	61,100
140 GR. NOS BT	140	H4350	.284	3.330	52.2	2,893	55,200	55.5	3,012	61,600
140 GR. NOS BT	140	H414	.284	3.330	50.3	2,830	52,700	53.5	2,991	62,200
140 GR. NOS BT	140	Varget	.284	3.330	44.6	2,754	54,100	47.4	2,903	60,400
140 GR. NOS BT	140	H4895	.284	3.330	42.8	2,737	53,600	45.5	2,876	61,600
140 GR. NOS BT	140	IMR 7828 SSC	.284	3.330	56.2	2,738	48,600	59.8	2,967	60,200
140 GR. NOS BT	140	IMR 4831	.284	3.330	54.5	2,821	51,200	58.0	3,025	60,900
140 GR. NOS BT	140	IMR 4350	.284	3.330	52.0	2,814	52,700	55.4	2,992	61,800
140 GR. NOS BT	140	IMR 4007 SSC	.284	3.330	49.8	2,772	51,600	53.0	2,936	60,100
140 GR. NOS BT	140	IMR 4064	.284	3.330	43.7	2,728	52,300	46.5	2,876	61,200
140 GR. NOS BT	140	IMR 4895	.284	3.330	44.2	2,737	52,800	47.0	2,870	60,500
140 GR. NOS BT	140	760	.284	3.330	50.3	2,830	52,700	53.5	2,991	62,200
150 GR. BAR TSX	150	H1000	.284	3.230	54.5	2,592	54,100	61.0C	2,826	56,900
150 GR. BAR TSX	150	H4831	.284	3.230	54.1	2,705	51,900	57.5C	2,840	59,900
150 GR. BAR TSX	150	H4350	.284	3.230	49.5	2,736	55,600	52.7	2,855	61,600
150 GR. BAR TSX	150	H414	.284	3.230	47.3	2,689	53,200	50.3	2,818	60,100
150 GR. BAR TSX	150	Varget	.284	3.230	43.0	2,632	53,800	45.8	2,750	60,900
150 GR. BAR TSX	150	H4895	.284	3.230	41.4	2,598	52,800	44.0	2,716	59,900
150 GR. BAR TSX	150	IMR 7828 SSC	.284	3.230	54.0	2,737	53,900	57.5	2,863	59,200
150 GR. BAR TSX	150	IMR 4831	.284	3.230	51.2	2,756	53,500	54.5	2,881	60,800
150 GR. BAR TSX	150	IMR 4350	.284	3.230	51.0	2,746	52,600	54.5	2,893	60,100
150 GR. BAR TSX	150	IMR 4007 SSC	.284	3.230	49.0	2,714	54,000	52.0	2,843	61,600

Table 19-7 *continued*

.280 ACKLEY IMPROVED					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure PSI	Grs.	Vel. (ft/s)	Pressure PSI
150 GR. BAR TSX	150	IMR 4064	.284	3.230	44.2	2,686	54,600	47.0	2,799	61,900
150 GR. BAR TSX	150	IMR 4895	.284	3.230	44.7	2,665	51,600	47.5	2,805	62,000
150 GR. BAR TSX	150	760	.284	3.230	47.3	2,689	53,200	50.3	2,818	60,100
150 GR. SFT SCIR	150	H1000	.284	3.330	58.5	2,724	57,100	62.2C	2,883	60,300
150 GR. SFT SCIR	150	H4831	.284	3.330	53.6	2,657	51,500	57.0	2,773	61,200
150 GR. SFT SCIR	150	H4350	.284	3.330	48.0	2,676	51,900	54.5	2,908	61,700
150 GR. SFT SCIR	150	H414	.284	3.330	46.1	2,601	52,900	51.5	2,808	56,000
150 GR. SFT SCIR	150	Varget	.284	3.330	43.5	2,647	51,700	46.3	2,796	59,300
150 GR. SFT SCIR	150	H4895	.284	3.330	42.0	2,633	52,100	44.6	2,773	61,200
150 GR. SFT SCIR	150	IMR 7828 SSC	.284	3.330	54.0	2,668	51,600	59.0	2,902	60,600
150 GR. SFT SCIR	150	IMR 4831	.284	3.330	51.0	2,650	50,600	56.0	2,922	60,000

Courtesy of Hodgdon Powder Co.

.280 ACKLEY IMPROVED					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure PSI	Grs.	Vel. (ft/s)	Pressure PSI
150 GR. SFT SCIR	150	IMR 4350	.284	3.330	52.0	2,739	50,800	55.3	2,932	61,200
150 GR. SFT SCIR	150	IMR 4007 SSC	.284	3.330	47.5	2,638	52,300	50.5	2,790	61,400
150 GR. SFT SCIR	150	IMR 4064	.284	3.330	44.0	2,665	50,700	46.5	2,834	61,100
150 GR. SFT SCIR	150	IMR 4895	.284	3.330	45.1	2,764	55,900	48.0	2,850	60,400
150 GR. SFT SCIR	150	760	.284	3.330	46.1	2,601	52,900	51.5	2,808	56,000
160 GR. NOS AB	160	H1000	.284	3.330	57.3	2,672	54,200	61.0C	2,808	61,100
160 GR. NOS AB	160	H4831	.284	3.330	54.0	2,674	55,000	57.5C	2,812	62,000
160 GR. NOS AB	160	H4350	.284	3.330	48.4	2,633	54,100	51.5	2,747	60,700
160 GR. NOS AB	160	H414	.284	3.330	47.5	2,594	52,700	50.5	2,736	60,800
160 GR. NOS AB	160	Varget	.284	3.330	43.2	2,551	53,200	46.0	2,685	62,000
160 GR. NOS AB	160	H4895	.284	3.330	40.9	2,496	52,300	43.5	2,615	59,500
160 GR. NOS AB	160	IMR 7828 SSC	.284	3.330	54.5	2,667	51,900	58.0	2,849	61,300
160 GR. NOS AB	160	IMR 4831	.284	3.330	52.2	2,663	53,100	55.5	2,847	61,900

Table 19-7 *continued*

.280 ACKLEY IMPROVED					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure PSI	Grs.	Vel. (ft/s)	Pressure PSI
160 GR. NOS AB	160	IMR 4350	.284	3.330	50.5	2,647	53,600	53.7	2,813	61,600
160 GR. NOS AB	160	IMR 4007 SSC	.284	3.330	47.8	2,587	53,100	50.8	2,741	61,400
160 GR. NOS AB	160	IMR 4064	.284	3.330	42.3	2,517	52,900	45.0	2,668	61,400
160 GR. NOS AB	160	IMR 4895	.284	3.330	43.0	2,532	51,300	45.8	2,670	60,000
160 GR. NOS AB	160	760	.284	3.330	47.5	2,594	52,700	50.5	2,736	60,800
162 GR. HDY BTSP	162	H1000	.284	3.325	56.8	2,653	52,300	60.4	2,797	61,300
162 GR. HDY BTSP	162	H4831	.284	3.325	53.0	2,662	54,200	56.4	2,788	61,400
162 GR. HDY BTSP	162	H4350	.284	3.325	47.6	2,629	52,900	50.6	2,755	60,800
162 GR. HDY BTSP	162	H414	.284	3.325	47.0	2,610	52,600	50.0	2,730	60,300
162 GR. HDY BTSP	162	Varget	.284	3.325	42.6	2,570	54,600	45.3	2,690	62,000
162 GR. HDY BTSP	162	H4895	.284	3.325	40.9	2,535	53,800	43.5	2,651	61,400
162 GR. HDY BTSP	162	IMR 7828 SSC	.284	3.325	54.0	2,678	53,600	57.3	2,824	61,900
162 GR. HDY BTSP	162	IMR 4831	.284	3.325	51.5	2,697	54,700	54.8	2,850	62,000
162 GR. HDY BTSP	162	IMR 4350	.284	3.325	49.4	2,677	54,400	52.5	2,797	60,800
162 GR. HDY BTSP	162	IMR 4007 SSC	.284	3.325	48.0	2,641	53,100	51.0	2,782	61,100
162 GR. HDY BTSP	162	IMR 4064	.284	3.325	42.0	2,556	53,700	44.5	2,673	61,000
162 GR. HDY BTSP	162	IMR 4895	.284	3.325	42.3	2,547	53,100	45.0	2,675	61,100
162 GR. HDY BTSP	162	760	.284	3.325	47.0	2,610	52,600	50.0	2,730	60,300
162 GR. HDY BTSPL	162	Varget	.284	3.325	42.6	2,570	54,600	45.3	2,690	62,000
168 GR. SIE HPBT	168	Retumbo	.284	3.330	59.0	2,652	49,000	63.0C	2,831	59,300
168 GR. SIE HPBT	168	H1000	.284	3.330	57.8	2,641	52,500	61.5C	2,789	61,100
168 GR. SIE HPBT	168	H4831	.284	3.330	54.0	2,653	55,100	57.7	2,779	62,000
168 GR. SIE HPBT	168	H4350	.284	3.330	48.4	2,621	54,500	51.5	2,734	61,800
168 GR. SIE HPBT	168	H414	.284	3.330	47.0	2,571	53,200	50.3	2,717	61,600
168 GR. SIE HPBT	168	Varget	.284	3.330	43.0	2,518	53,700	46.0	2,667	62,100
168 GR. SIE HPBT	168	H4895	.284	3.330	40.4	2,474	52,300	43.0	2,595	60,900

Courtesy of Hodgdon Powder Co.

Table 19-7 *continued*

.280 ACKLEY IMPROVED					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure PSI	Grs.	Vel. (ft/s)	Pressure PSI
168 GR. SIE HPBT	168	IMR 7828 SSC	.284	3.330	53.8	2,618	52,600	57.2	2,776	61,000
168 GR. SIE HPBT	168	IMR 4831	.284	3.330	52.0	2,633	51,400	55.3	2,798	61,400
168 GR. SIE HPBT	168	IMR 4350	.284	3.330	49.8	2,632	53,100	53.0	2,762	61,100
168 GR. SIE HPBT	168	IMR 4007 SSC	.284	3.330	47.0	2,590	53,000	50.0	2,711	60,900
168 GR. SIE HPBT	168	IMR 4064	.284	3.330	42.3	2,532	55,900	45.0	2,643	62,300
168 GR. SIE HPBT	168	IMR 4895	.284	3.330	42.8	2,530	53,700	45.5	2,650	61,300
168 GR. SIE HPBT	168	760	.284	3.330	47.0	2,571	53,200	50.3	2,717	6,1600
175 GR. SFT SP	175	Retumbo	.284	3.270	56.7	2,604	52,400	60.3C	2,743	59,800
175 GR. SFT SP	175	H1000	.284	3.270	55.5	2,544	52,700	59.0C	2,675	61,100
175 GR. SFT SP	175	H4831	.284	3.270	52.0	2,496	51,900	55.5	2,651	62,000
175 GR. SFT SP	175	H4350	.284	3.270	47.7	2,515	54,700	50.7	2,626	62,100
175 GR. SFT SP	175	H414	.284	3.270	45.9	2,469	52,600	48.8	2,594	59,700
175 GR. SFT SP	175	IMR 7828 SSC	.284	3.270	53.1	2,505	51,400	56.5	2,686	61,700
175 GR. SFT SP	175	IMR 4831	.284	3.270	51.7	2,545	51,200	55.0	2,702	61,400
175 GR. SFT SP	175	IMR 4350	.284	3.270	50.0	2,529	51,300	53.3	2,681	60,700
175 GR. SFT SP	175	IMR 4007 SSC	.284	3.270	46.1	2,485	52,700	49.0	2,598	59,900
175 GR. SFT SP	175	760	.284	3.270	45.9	2,469	52,600	48.8	2,594	59,700

Courtesy of Hodgdon Powder Co.

NEVER EXCEED MAXIMUM LOADS

Table 19-8

.30-30 ACKLEY IMPROVED 24-INCH BARREL					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure PSI	Grs.	Vel. (ft/s)	Pressure PSI
Sierra 150 RN	150	IMR 3031	.308	2.535	32.5	2,269	26,775	35.5	2,444	34,720
Sierra 150 RN	150	H4895	.308	2.535	35.0	2,544		36.5	2,566	43,137
Sierra 150 RN	150	BL-C(2)	.308	2.535	38.5	2,558	38,381	39.0	2,595	42,980
Sierra 150 RN	150	H322	.308	2.535	33.5	2,414	35,796	35.5	2,614	42,555

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NEVER EXCEED MAXIMUM LOADS

Table 19-9

.30 ACKLEY MAGNUM #2 26" BARREL					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure CUP	Grs.	Vel. (ft/s)	Pressure CUP
110 GR. SIE HP	110	H4831	.308	3.160	73.0	3,229	37,800	80.0	3,563	50,100
110 GR. SIE HP	110	H4350	.308	3.160	72.0	3,202	39,400	77.0	3,506	51,200
110 GR. SIE HP	110	H414	.308	3.160	68.0	3,508	45,500	74.0	3,687	52,000
110 GR. SIE HP	110	H380	.308	3.160	65.5	3,452	45,500	71.0	3,609	51,100
110 GR. SIE HP	110	H4895	.308	3.160"	59.0	3,339	41,400	64.0	3554	53,000
130 GR. HDY SP	130	H1000	.308	3.275	80.0	3,211	44,400	84.0	3,333	46,400
130 GR. HDY SP	130	H4831	.308	3.275	73.0	3,201	40,800	79.0	3,302	45,900
130 GR. HDY SP	130	H4350	.308	3.275	71.0	3,139	42,400	74.0	3,292	51,400
130 GR. HDY SP	130	H414	.308	3.275	66.0	3,211	46,800	72.0	3,449	52,300
130 GR. HDY SP	130	H380	.308	3.275	64.5	3,263	49,200	70.0	3,415	50,900
130 GR. HDY SP	130	H4895	.308	3.275	59.0	3,166	42,600	64.0	3,388	50,500
150 GR. NOS PART	150	H1000	.308	3.300	79.0	3,090	46,600	83.0	3,279	50,800
150 GR. NOS PART	150	H4831	.308	3.300	70.0	3,157	47,800	76.0	3,258	51,900
150 GR. NOS PART	150	H4350	.308	3.300	69.0	2,914	43,100	73.0	3,188	51,200
150 GR. NOS PART	150	H414	.308	3.300	62.5	3,007	47,300	68.0	3,226	52,400

NEVER EXCEED MAXIMUM LOADS

.30 ACKLEY MAGNUM #2 26-INCH BARREL					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure CUP	Grs.	Vel. (ft/s)	Pressure CUP
150 GR. NOS PART	150	H380	.308	3.300	63.5	3,028	48,200	68.0	3,221	52,400
150 GR. NOS PART	150	H4895	.308	3.300	57.0	2,940	42,000	62.0	3,192	54,700
168 GR. SIE HPBT	168	H1000	.308	3.250	75.0	2,939	47,100	79.0	3,123	52,000
168 GR. SIE HPBT	168	H4831	.308	3.250	69.0	2,944	43,800	75.0	3,140	52,300
168 GR. SIE HPBT	168	H4350	.308	3.250	68.0	2,880	42,000	72.0	3,114	51,000
168 GR. SIE HPBT	168	H414	.308	3.250	61.0	2,884	46,400	67.0	3,087	54,000
168 GR. SIE HPBT	168	H380	.308	3.250	62.0	2,995	50,100	67.0	3,079	52,100
168 GR. SIE HPBT	168	H4895	.308	3.250	56.0	2,859	48,200	61.0	3,059	52,100
180 GR. HDY SP	180	H1000	.308	3.345	72.0	2,769	45,900	76.0	2,940	51,900
180 GR. HDY SP	180	H4831	.308	3.345	67.0	2,865	43,200	73.0	3,022	52,300

Table 19-9 *continued*

.30 ACKLEY MAGNUM #2 26-INCH BARREL					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure CUP	Grs.	Vel. (ft/s)	Pressure CUP
180 GR. HDY SP	180	H4350	.308	3.345	65.0	2,770	43,000	69.0	2,999	52,800
180 GR. HDY SP	180	H414	.308	3.345	58.0	2,772	50,500	63.0	2,908	54,300
180 GR. HDY SP	180	H380	.308	3.345	58.0	2,746	48,600	63.0	2,847	51,400
180 GR. HDY SP	180	H4895	.308	3.345	54.0	2,732	48,200	59.0	2,898	53,400
190 GR. HDY BTSP	190	H1000	.308	3.435	70.0	2,711	45,500	74.0	2,891	51,100
200 GR. NOS PART	200	H1000	.308	3.400	69.0	2,674	47,400	73.0	2,859	54,500
200 GR. NOS PART	200	H4831	.308	3.400	64.5	2,662	44,400	70.0	2,889	52,700
200 GR. NOS PART	200	H4350	.308	3.400	63.0	2,740	44,700	67.0	2,851	52,100
220 GR. HDY RN	220	H1000	.308	3.360	66.0	2,449	46,000	70.0	2,672	52,000
220 GR. HDY RN	220	H4831	.308	3.360	63.0	2,437	42,600	68.0	2,697	52,700
220 GR. HDY RN	220	H4350	.308	3.360	61.0	2,519	42,200	65.0	2,707	52,800
250 GR. BAR RN	250	H1000	.308	3.360	64.0	2,392	46,400	68.0	2,501	53,500

wNEVER EXCEED MAXIMUM LOADS

Table 19-10

.300 ACKLEY MAGNUM (H&H IMPROVED)					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure CUP	Grs.	Vel. (ft/s)	Pressure CUP
125 GR. SIE SP	IMR	IMR 7828	.308	3.475	83.0	3,333	45,600	89.0C*	3,550	53,200
125 GR. SIE SP	Hodgdon	H4831	.308	3.475	84.0	3,322	46,000	90.0C	3,527	53,100
125 GR. SIE SP	IMR	IMR 4831	.308	3.475	79.0	3,366	47,000	85.0C	3,573	53,500
125 GR. SIE SP	Hodgdon	H4350	.308	3.475	77.0	3,347	46,300	82.5	3,547	53,200
125 GR. SIE SP	Hodgdon	H414	.308	3.475	73.0	3,321	46,600	78.5	3,518	53,900
125 GR. SIE SP	IMR	IMR 4350	.308	3.475	77.0	3,397	46,100	82.5	3,590	53,300
125 GR. SIE SP	Winchester	760	.308	3.475	73.0	3,321	46,600	78.5	3,518	53,900
125 GR. SIE SP	IMR	IMR 4007 SSC	.308	3.475	74.0	3,309	44,500	80.0	3,538	53,600
125 GR. SIE SP	Hodgdon	H380	.308	3.475	70.0	3,215	46,900	75.5	3,428	53,300
125 GR. SIE SP	Hodgdon	Varget	.308	3.475	65.0	3,386	49,500	69.0	3,492	53,700
125 GR. SIE SP	IMR	IMR 4064	.308	3.475	65.0	3,311	48,800	69.4	3,471	53,700

Table 19-10 *continued*

.300 ACKLEY MAGNUM (H&H IMPROVED)					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure CUP	Grs.	Vel. (ft/s)	Pressure CUP
130 GR. BAR XLC BT	Hodgdon	H4831	.308	3.500	84.0	3,306	46,200	89.5C	3,467	53,000
130 GR. BAR XLC BT	Hodgdon	H4350	.308	3.500	78.0	3,287	46,300	83.0	3,485	52,800
130 GR. BAR XLC BT	Hodgdon	H414	.308	3.500	75.0	3,238	45,300	80.0	3,446	53,100
130 GR. BAR XLC BT	Winchester	760	.308	3.500	75.0	3,238	45,300	80.0	3,446	53,100
130 GR. BAR XLC BT	Hodgdon	H380	.308	3.500	71.0	2,331	46,700	76.0	3,410	54,100
140 GR. BAR XBT	Hodgdon	H1000	.308	3.500	84.0	3,130	46,000	90.0C	3,295	51,400
140 GR. BAR XBT	Hodgdon	H4831	.308	3.500	79.0	3,179	47,600	85.0	3,386	54,600
140 GR. BAR XBT	Hodgdon	H4350	.308	3.500	71.0	3,140	47,500	76.5	3,320	54,000
140 GR. BAR XBT	Hodgdon	H414	.308	3.500	67.0	3,151	50,500	71.3	3,272	54,400
140 GR. BAR XBT	Winchester	760	.308	3.500	67.0	3,151	50,500	71.3	3,272	54,400
140 GR. BAR XBT	Hodgdon	H380	.308	3.500	64.0	2,987	46,900	68.0	3,148	53,700
140 GR. BAR XBT	Hodgdon	Varget	.308	3.500	59.0	2,997	42,300	63.2	3,175	53,200
140 GR. BAR XBT	Hodgdon	H4895	.308	3.500	58.0	3,026	44,400	62.0	3,194	54,400
150 GR. BAR TSX	Hodgdon	H1000	.308	3.570	83.0	3,056	43,500	88.0C	3,220	49,900
150 GR. BAR TSX	IMR	IMR 7828 SSC	.308	3.570	79.0	3,146	45,600	86.5C*	3,400	54,200
150 GR. BAR TSX	Winchester	Supreme 780	.308	3.575	80.4	3,167	45,100	85.5	3,328	50,000
150 GR. BAR TSX	Hodgdon	H4831	.308	3.570	77.0	3,031	45,200	84.0C	3,275	52,900
150 GR. BAR TSX	Hodgdon	Hybrid 100V	.308	3.575	70.0	3,103	42,500	76.5	3,310	49,100
150 GR. BAR TSX	IMR	IMR 4831	.308	3.570	76.0	3,154	46,400	82.7C	3,437	54,100
150 GR. BAR TSX	Hodgdon	H4350	.308	3.570	70.0	3,084	44,700	76.5	3,310	53,800
150 GR. BAR TSX	Hodgdon	H414	.308	3.570	67.0	3,007	44,400	72.5	3,201	53,000
150 GR. BAR TSX	IMR	IMR 4350	.308	3.570	73.0	3,151	45,400	79.5	3,396	54,300
150 GR. BAR TSX	Hodgdon	H380	.308	3.570	63.0	2,908	44,200	69.5	3,142	53,800
150 GR. BAR TSX	Hodgdon	Varget	.308	3.570	59.0	2,935	42,200	64.5	3,155	54,000
150 GR. BAR TSX	IMR	IMR 4064	.308	3.570	62.0	3,045	44,200	67.0	3,244	51,900
150 GR. BAR TSX	IMR	IMR 4895	.308	3.570	61.0	3,011	44,000	66.0	3,214	53,100

Table 19-10 *continued*

.300 ACKLEY MAGNUM (H&H IMPROVED)					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure CUP	Grs.	Vel. (ft/s)	Pressure CUP
150 GR. BAR TSX	Hodgdon	H4895	.308	3.570	57.0	2,926	42,200	61.5	3,112	54,100
150 GR. BAR TSX	IMR	Trail Boss	.308	3.580	19.0	1,334	20,300	27.5	1,656	28,900
165 GR. NOS BT	Hodgdon	H1000	.308	3.560	84.0	3,014	45,600	89.7C	3,216	54,200
165 GR. NOS BT	IMR	IMR 7828	.308	3.560	77.0	2,957	46,800	82.0	3,145	53,400
165 GR. NOS BT	Winchester	Supreme 780	.308	3.560	80.4	3,083	46,700	85.5	3,245	51,900
165 GR. NOS BT	Hodgdon	H4831	.308	3.560	75.0	2,934	46,400	80.2	3,113	54,000
165 GR. NOS BT	IMR	IMR 4831	.308	3.560	73.0	2,981	46,600	78.0	3,175	54,100
165 GR. NOS BT	Hodgdon	H4350	.308	3.560	69.0	2,908	45,400	74.0	3,074	54,100
165 GR. NOS BT	Hodgdon	H414	.308	3.560	65.0	2,892	48,200	70.0	3,034	53,700
165 GR. NOS BT	IMR	IMR 4350	.308	3.560	70.0	2,973	46,900	75.0	3,143	53,400

NEVER EXCEED MAXIMUM LOADS

.300 ACKLEY MAGNUM (H&H IMPROVED)					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure CUP	Grs.	Vel. (ft/s)	Pressure CUP
165 GR. NOS BT	Winchester	760	.308	3.560	65.0	2,892	48,200	70.0	3,034	53,700
165 GR. NOS BT	IMR	IMR 4007 SSC	.308	3.560	67.0	2,901	44,300	73.3	3,101	53,400
165 GR. NOS BT	Hodgdon	H380	.308	3.560	63.0	2,787	46,300	67.5	2,950	53,700
165 GR. NOS BT	Hodgdon	Varget	.308	3.560	58.0	2,873	46,300	62.0	3,033	54,200
165 GR. NOS BT	Hodgdon	H4895	.308	3.560	58.0	2,871	48,000	62.5	3,028	54,200
180 GR. SPR BTSP	Hodgdon	H1000	.308	3.560	83.0	2,971	43,800	88.5C	3,151	53,500
180 GR. SPR BTSP	IMR	IMR 7828	.308	3.560	75.0	2,583	47,000	80.5	3,064	53,400
180 GR. SPR BTSP	Winchester	Supreme 780	.308	3.560	77.5	2,927	46,300	82.5	3,127	53,100
180 GR. SPR BTSP	Hodgdon	H4831	.308	3.560	76.0	2,910	45,300	81.5	3,096	54,000
180 GR. SPR BTSP	Hodgdon	Hybrid 100V	.308	3.560	70.0	2,954	46.100	77.0	3,171	54,600
180 GR. SPR BTSP	IMR	IMR 4831	.308	3.560	70.0	2,835	47,100	75.5	2,997	53,500

Table 19-10 *continued*

.300 ACKLEY MAGNUM (H&H IMPROVED)					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure CUP	Grs.	Vel. (ft/s)	Pressure CUP
180 GR. SPR BTSP	Hodgdon	H4350	.308	3.560	69.0	2,876	44,600	73.5	3,022	54,000
180 GR. SPR BTSP	Hodgdon	H414	.308	3.560	67.0	2,825	45,600	71.5	2,984	53,000
180 GR. SPR BTSP	IMR	IMR 4350	.308	3.560	68.0	2,865	46,200	72.6	3,018	53,000
180 GR. SPR BTSP	Winchester	760	.308	3.560	67.0	2,825	45,600	71.5	2,984	53,000
180 GR. SPR BTSP	IMR	IMR 4007 SSC	.308	3.560	65.0	2,799	45,400	71.0	2,986	53,300
180 GR. SPR BTSP	Hodgdon	H380	.308	3.560	62.0	2,734	45,000	67.0	2,896	54,000
180 GR. WIN FS	Hodgdon	H1000	.308	3.560	78.0	2,921	47,800	83.0C	3,111	54,600
180 GR. WIN FS	Hodgdon	H4831	.308	3.560	74.0	2,892	50,200	79.0	3,013	54,600
180 GR. WIN FS	Hodgdon	H4350	.308	3.560	67.0	2,813	46,500	72.0	2,974	54,600
200 GR. NOS AB	Hodgdon	Retumbo	.308	3.590	79.0	2,753	45,800	84.5C	2,942	53,100
200 GR. NOS AB	Hodgdon	H1000	.308	3.590	77.0	2,709	45,800	83.0C	2,884	53,700
200 GR. NOS AB	Hodgdon	H4831	.308	3.590	70.0	2,702	49,300	75.0	2,839	54,400
200 GR. NOS AB	Hodgdon	Hybrid 100V	.308	3.590	68.0	2,737	45,900	73.5	2,940	54,000
200 GR. SFT	Hodgdon	Retumbo	.308	3.510	80.0	2,764	46,100	85.5C	2,981	54,400
200 GR. SFT	Hodgdon	H1000	.308	3.510	79.0	2,766	43,200	85.0C	2,963	53,400
200 GR. SFT	IMR	IMR 7828	.308	3.510	73.0	2,693	48,100	78.3	2,872	53,800
200 GR. SFT	Winchester	Supreme 780	.308	3.590	69.6	2,570	38,900	74.0	2,808	50,700
200 GR. SFT	Hodgdon	H4831	.308	3.510	72.0	2,708	44,700	77.5	2,869	52,900
200 GR. SFT	Hodgdon	Hybrid 100V	.308	3.510	67.0	2,699	44,900	73.0	2,906	53,200
200 GR. SFT	IMR	IMR 4831	.308	3.510	68.0	2,641	45,800	73.0	2,806	53,400
200 GR. SFT	Hodgdon	H4350	.308	3.510	66.0	2,706	45,800	71.0	2,866	54,300
200 GR. SFT	IMR	IMR 4350	.308	3.510	66.0	2,680	46,000	70.5	2,807	52,800
220 GR. HDY RN	Hodgdon	Retumbo	.308	3.565	79.0	2,679	45,900	84.0C	2,853	54,000
220 GR. HDY RN	Hodgdon	H1000	.308	3.565	77.0	2,670	45,100	82.5	2,833	53,400
220 GR. HDY RN	IMR	IMR 7828	.308	3.565	70.0	2,569	47,200	75.3	2,739	54,100
220 GR. HDY RN	Winchester	Supreme 780	.308	3.565	71,7	2,602	44,400	76.3	2,765	51,300
220 GR. HDY RN	Hodgdon	H4831	.308	3.565	71.0	2,630	47,200	75.7	2,766	54,500

Table 19-10 *continued*

.300 ACKLEY MAGNUM (H&H IMPROVED)					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure CUP	Grs.	Vel. (ft/s)	Pressure CUP
220 GR. HDY RN	Hodgdon	Hybrid 100V	.308	3.565	65.0	2,579	45,100	71.0	2,762	53,900
220 GR. HDY RN	IMR	IMR 4831	.308	3.565	65.0	2,529	46,000	70.0	2,657	53,600
220 GR. HDY RN	Hodgdon	H4350	.308	3.565	66.0	2,599	45,900	70.0	2,725	53,800

Table 19-11

.35 ACKLEY MAGNUM (SHORT) 24-INCH BARREL					Starting Loads		Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Grs.	Vel. (ft/s)	Pressure PSI
200 Hornady	200	AA2700	.358	3.200	71.1	2,641	79.0	3,001	59,900
200 Hornady	200	AA4350	.358	3.200	72.9	2,617	81.0	2,974	50,500
225 Sierra	225	AA2700	.358	3.280	69.3	2,528	77.0	2,873	62,000
225 Sierra	225	AA4350	.358	3.280	72.9	2,626	81.0	2,984	60,100
250 Nosler	250	AA2700	.358	3.280	65.7	2,380	73.0	2,705	62,200
250 Nosler	250	AA4350	.358	3.280	70.2	2,498	78.0	2,839	63,000

Courtesy of Accurate Arms Powder

Table 19-12

450 ACKLEY MAGNUM					Starting Loads			Maximum Loads		
Bullet Weight (Gr.)	Order BW	Powder	Bullet Diam.	C.O.L.	Grs.	Vel. (ft/s)	Pressure PSI	Grs.	Vel. (ft/s)	Pressure PSI
465 Mono-Solid	465	H4895	.458	3.650	81.0	2,283	52,300	86.0	2,422	61,800
465 Mono-Solid	465	IMR4064	.458	3.650	81.0	2,253	48,800	86.0	2,404	60,900
465 Mono-Solid	465	RL12	.458	3.650	83.0	2,196	42,800	88.0	2,395	60,300

Courtesy of Art Alphin "Any Shot You Want"

Reloading Safety Tips

Always wear safety glasses when reloading.

Pay attention. Be careful at all times, reloading can be dangerous if distracted and not paying strict attention.

Keep powders, primers, and other combustible materials separate, remove all sources of ignition from your reloading area. NO SMOKING near powders and reloading work area.

Keep out of the reach of children, use lockable storage for powders, primers and other reloading components.

Store powders in the original container, label powders correctly, DISCARD powders that are old or of unknown origin. Never mix different powders in same container!

Clean up powder spills immediately. Use a damp cloth or brush and dustpan. Never use a vacuum, it can ignite the powder.

Develop a consistent routine of reloading safety procedures that incorporate a "safety mindset each step of the way. Avoid distractions when reloading.

Use only one powder and bullet at a time. Always double check your powder type, bullet, and weight of charge before assembling loads.

Inspect your brass cases with a magnifying glass for cracks, splits, deformities or foreign matter.

No two rifles are the same, work up loads from a powder charge 5 to 10 percent lower than the recommended maximum charge weight. Watch for excessive pressure signs — sticky bolt extraction, flattened, cratered, or blown out primers, gas leaks or unusual muzzle blast and recoil.

Inspect often your weighing process of powder charges: check the accuracy of your powder charges every five charges. Using calibration weights to test the scale is the best way to validate its accuracy.

Visually inspect cases to avoid double charging or overfilling. Never exceed maximum recommended loads.

Trim cases within recommended parameters, and after seating bullet, check the OAL (overall length) of cartridge to appropriate length for your chamber.

Do not attempt to decap live primers from brass; rather shoot primers in a firearm SAFELY prior to decapping primer.

Keep complete and detailed records of your developed handloads. When starting with any new lot of components you must work the load up again.

Properly stow your powder and primers when finished reloading.

ALWAYS "work up" powder charges in .5 grain increments to the optimum load; maximum loads seldom produce the best accuracy.

DISCLAIMER: Any and all loading data found in this book, including past or future editions, is to be taken as reference material only. The publishers, editors, authors, contributors, and their entities bear no responsibility for the use by others of the data included in this book.

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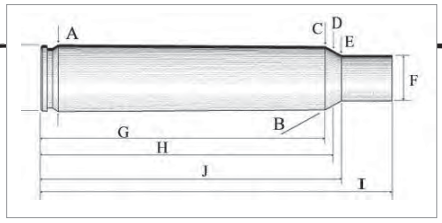
1 Ackley, P.O., "The Gunsmith," *Guns & Ammo*, November, 1962

CHAPTER 20

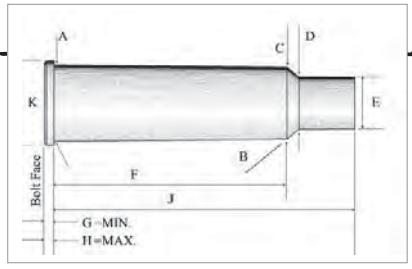
ACKLEY MINIMUM CHAMBER SPECIFICATIONS FOR RIMLESS CARTRIDGES



CARTRIDGE	A	B	C	D	E	F	G	H	I	J	Trim
.17 Javelina	.3740	32°	.362		.2010		1.16		1.535	1.290	1.530
.17/222	.3775	22.5°	.358	.330	.202	.200	1.272	1.293	1.701	1.4496	1.70
.17 Mach IV	.3769	30°	.3617		.204	.202	1.066	1.1036	1.3976	1.201	1.395
.22/284	.5042	35°	.476	.420	.257	.255	1.775	1.81	2.180	1.982	2.170
6mm/284	.5042	35°	.476	.420	.282	.280	1.775	1.81	2.180	1.917	2.170
.25/284	.5042	35°	.476	.420	.294	.292	1.775	1.81	2.180	1.910	2.170
.257 Roberts AI	.4722	40°	.455		.292	.291	1.785	1.837	2.253	1.891	2.243
7x57 AI	.4722	40°	.452	.375	.322	.3207	1.80		2.253	2.878	2.540
.30-06 AI	.473	40°	.454		.340	.3395	2.00		2.494	2.069	2.490
.338-06 AI	.473	40°	.454		.363	.362	2.00		2.494	2.053	2.490
.35 Whelen AI	.473	40°	.454		.388	.387	2.00		2.094	2.028	2.490
.375 Whelen AI	.473	40°	.454		.397	.396	2.00		2.494	2.018	2.490

CHAPTER 21

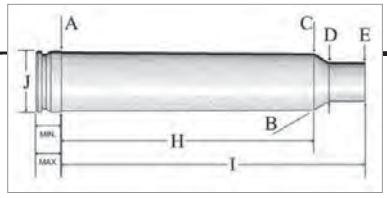
ACKLEY MINIMUM CHAMBER SPECIFICATIONS FOR RIMMED CARTRIDGES



CARTRIDGE	A	B	C	D	E	F	G	H	J	K	Trim
.17 Ackley Hornet	.300	30°	.289	.195	.194	1.0437	.065	.069	1.3437	.360	1.400
.17 Ackley Bee	.349	30°	.340	.195	.193	.9067	.065	.069	1.3125	.415	1.353
.219 Zipper Improved	.4168	28°	.399	.254	.253	1.485	.063	.067	1.885	.507	1.938
.228 Krag	.458	30°	.443	.260	.258	1.625	.064	.068	2.0825	.553	2.1265
.22/30-30 Ackley Imp.	.4168	40°	.410	.254	.253	1.5625	.063	.067	1.958	.507	2.025
6mm/30-30 Ackley Imp.	.4168	40°	.410	.277	.276	1.5625	.063	.067	1.985	.507	2.025
.6mm Krag	.458	30°	.443	.277	.276	1.625	.064	.068	2.0825	.553	2.1465
.6mm Krag Long	.458	30°	.443	.277	.276	1.781	.064	.068	2.2281	.553	2.314
.25 Krag Ackley Imp.	.458	40°	.450	.293	.291	1.781	.064	.068	2.281	.553	2.314
.25-35 Ackley Imp.	.4229	40°	.410	.2845	.2825	1.5625	.063	.067	1.958	.507	2.314
.30-40 Krag Ackley Imp.	.458	40°	.4525	.340	.339	1.790	.064	.068	2.281	.553	2.314
.450/348 Ackley Imp.	.550	40°	.535	.487	.485	1.6875	.065	.069	2.195	.610	2.255

CHAPTER 22

ACKLEY MINIMUM CHAMBER SPECIFICATIONS FOR BELTED CARTRIDGES



CARTRIDGE	A	B	C	D	E	H	I	J	Trim	MIN.	MAX.
.228 Belted Express	.450	35°	.440	.265	.263	1.5625	2.0625	.470	2.260	.220	.223
6mm Belted Express	.450	35°	.440	.280	.278	1.5625	2.0625	.470	2.260	.220	.223
6mm Ackley Magnum	.514	28°	.490	.285	.283	1.6875	2.260	.533	2.450	.220	.223
.250 Ackley Magnum	.514	28°	.490	.293	.291	1.6875	2.260	.533	2.450	.220	.223
.270 Ackley Magnum	.514	28°	.490	.314	.312	1.6875	2.260	.533	2.450	.220	.223
7MM Ackley Magnum	.514	28°	.490	.325	.322	1.6875	2.260	.533	2.450	.220	.223
.30 Belted Newton	.514	25°	.492	.342	.341	1.824	2.300	.5167	2.500	.220	.223
.30 Ackley No. 1	.514	28°	.490	.341	.340	1.6875	2.250	.533	2.450	.220	.223
.30 Ackley No. 2	.514	28°	.495	.341	.340	1.750	2.330	.533	2.532	.220	.223
.300 Ackley Improved Magnum	.514	40°	.495	.341	.340	2.125	2.653	.533	2.850	.220	.223
.333 Ackley Magnum Short	.514	28°	.495	.367	.365	1.750	2.330	.533	2.532	.220	.223
.333 Ackley Improved Magnum	.514	40°	.495	.367	.365	2.125	2.653	.533	2.850	.220	.223
*.35 Ackley Magnum No. 2	.514	28°	.495	.392	.390	1.750	2.330	.533	2.532	.220	.223
.35 Ackley Magnum	.514	28°	.495	.392	.390	1.875	2.330	.533	2.532	.220	.223
.35 Ackley Improved Magnum	.514	40°	.495	.392	.390	2.175	2.653	.533	2.850	.220	.223
.375 Ackley Improved Magnum	.514	40°	.495	.409	.407	2.232	2.650	.533	2.850	.220	.223
.450 Ackley Magnum	.514	40°	.505	.482	.481	2.1875	2.650	.533	2.850	.220	.223
.475 Ackley Magnum	.514				.500		2.6875	.533	2.850	.220	.223

**Variation confirmed in a 1953 letter to RCBS from P.O. Ackley*

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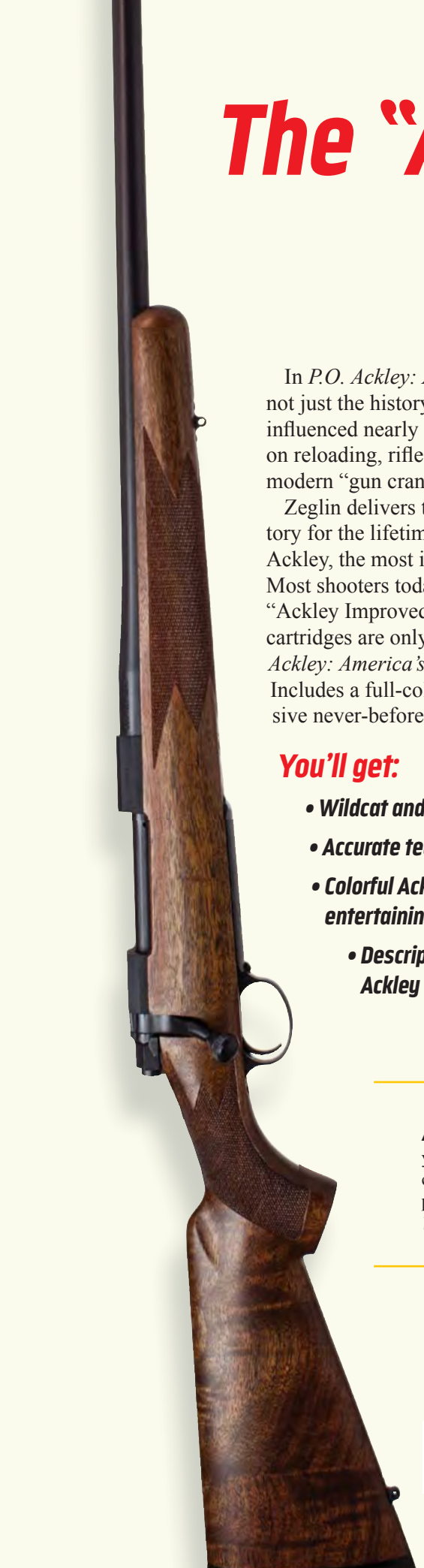

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About the Author Fred Zeglin has been building custom hunting rifles for over thirty years. Zeglin has taught classes for the NRA Short Term Gunsmithing program at three separate colleges and is the Coordinator/Instructor for the Firearms Technology program at FVCC. He has published two books, *Hawk Cartridges Manual* and *Wildcat Cartridges, Reloader's Handbook of Wildcat Cartridge Design*.

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