

STUDY UNIT 11

STUDY
UNIT
11

BLACKPOWDER, ITS GUNS AND ACCESSORIES

TWO HUNDRED YEARS
AGO AND TODAY!

Pioneer Americans used muzzleloading arms out of necessity. In their day, a slender, long-barreled Kentucky rifle represented "the state of the art!" But why would anyone want to resort to the use of obsolete firearms today in this rapid-fire era? Probably just to escape, if only for a few hours, from the ever-pressing urgency of modern living — to return to an age when life was possibly no less dangerous for the individual, but all the same, far less complicated — and a man could feel that he had some personal control over his own fate!

The modern-day counterpart of the American Colonial can feel the lure of the Appalachian wilderness as he strokes the soft glossy finish of his "Kentucky" rifle, smell the musty backwoods of yore in the acrid blackpowder fumes, and faintly hear the eerie echo of the black catamount roaring, in the "boom" of his frontloading rifle. And if that's not enough to recapture the *real* American experience, he can even adopt the apparel of the pioneer, and relive in spirit a time when America offered every man a wealth of land and living, had he but the strength to take it.

Actually, the thunder of muzzleloading guns and the billowing plumes of blackpowder smoke have never completely faded from the American scene. The traditional pride that Americans took in their unerring aim has never waned in many rural communities, removed from the castrating influence of downbeat, loser-oriented TV and motion pictures.

The Colonial Sun Still Rises in Indiana

From the time of the Colonies, Americans have taken their marksmanship seriously. When they weren't engaged in defending their homes against attack from without, they kept their hands in with hunting and "turkey shoots." The picturesque Laughery Valley, at Rising Sun in Indiana, has been the setting for continuous muzzleloader competition

since 1804, save for the four years of World War II. Today's twice-annual, week-long Blackpowder "Nationals" are conducted by the National Muzzle Loading Rifle Association on the Walter Cline Range, a 450-acre reservation, encompassing an 800-foot covered firing line with ranges from 25 to 300 yards, centered in that same idyllic valley.

The NMLRA saw its beginnings over 40 years ago, when Oscar L. Seth, president of the Western Railway YMCA Rifle and Revolver Club in Portsmouth, Ohio, complained to E. M. "Red" Farris, a local gunsmith, that hill-born railroad men freely boasted of their prowess with the long rifles of their ancestors. Seth and Farris staged a muzzleloader match on George Washington's birthday in 1931, perhaps because they intended this to be a test of veracity as well as marksmanship. The YMCA offered a glittering \$100 trophy as bait to lure the wary mountain men down from their lofty hideouts in the Southern Hoosier Hills.



FIGURE 1 — Modern-day "pioneers" adopt the dress of our ancestors, and relive vicariously the thrills and adventure of frontier America.

BLACKPOWDER, ITS GUNS AND ACCESSORIES



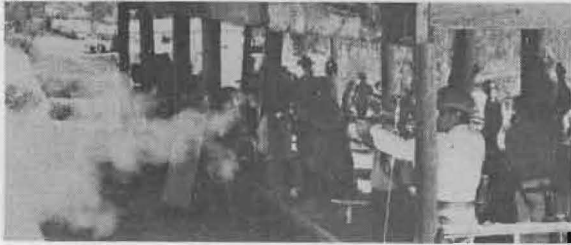


FIGURE 2 — The thunder of muzzleloading guns and the plumes of blackpowder smoke have never really disappeared from the American scene. Many people still observe the tradition of the Sunday afternoon “turkey shoot!”

That first match brought 67 competitors to the firing line, with rusty shootin’ irons dredged from attic and cellar, but not a single mountain man was to be found among them! However, the not inconsiderable local interest aroused inspired two more matches in succeeding years. In 1933, Farris and a few other hard-core blackpowder enthusiasts, including the famed Walter M. Cline (for whom the range was later named), formed the NMLRA in Portsmouth. Tragically, Cline died in April of 1941, and never lived to see the range that bears his name. It wasn’t until 1942 that the NMLRA purchased the tract of land bordering Laughery Creek, and set up the small range that has grown to such gargantuan proportions.

Nowadays the bi-annual matches at Friendship attract upwards of 3,000 competitors and spectators, and the NMLRA has expanded its membership to over 18,000. A wide variety of events is provided at the Nationals, with rifle shoots conducted at ranges from 50 to 500 yards, at such colorful targets as bison silhouettes, a mechanical turkey head bobbing from behind a distant log, and crossed strings that must be cut by the rifle ball in order to score. Some matches require period dress, either buckskins or homespun. The atmosphere encourages dress in keeping with the arms used. Family participation is encouraged, as evidenced by the number of matches given over to the ladies and youngsters. Front-loading scattergunners are provided with trap and skeet, plus quail walk competition. Pistol matches include both flintlock and percussion single-shot pistols, as well as cap ‘n’ ball revolvers, at 25 and 50-yard ranges.

Perhaps the most entertaining match is the “Seneca Run,” in which contestants dressed either as Indians or frontiersmen jog-trot a predetermined course, firing at random targets as they appear along the wilderness path. Rules prohibit loading on the run, so

each contestant must stop when he spots a target, load and fire, then be off at a trot for the next one.

By the time they reach Friendship, shooters have already proved their mettle at numerous regional matches held by over 200 affiliated charter blackpowder clubs throughout the country. A portion of the entry fees for these local matches goes to help support the parent organization, which in turn furnishes trophies for the regionals. As might be expected, the highest concentration of NMLRA membership is near its birthplace in Illinois. Interestingly, next in line is the West Coast.



FIGURE 3 — Some of the bi-annual matches held by the National Muzzle Loading Rifle Association require that contestants dress to match the period of the arms they fire in competition. On the left is a man with a flintlock Kentucky rifle, dressed as Daniel Boone might have been, with a modern-day “Kit Carson” showing him a typical plains rifle.

So, If the Spirit Moves You . . .

The vast majority of muzzleloader buffs could be termed “shirt sleeve” shooters, but a large segment resides in the “traditionalist” camp and goes all out to adopt period dress, faithfully duplicating the costumes of the early-day pioneers who used frontloaders as a way of life. Thus it is that you may encounter groups looking like Mormon settlers trekking west, somehow transported to another cen-

tury. Or you might see a troop of North-South Skirmishers, dressed in blue or gray uniforms of the Civil War, complete with sabers and Zouave rifles, perhaps realistically engaged in mock battle!



FIGURE 4 — North/South skirmishers, dressed in the authentic blue and gray uniforms of the Civil War period, shoot side-by-side at targets.

You Do Have Business Being in Blackpowder

If no muzzleloading clubs exist in your area, you as a gunsmith are in an enviable position to act as a catalyst in getting one started! Kindred souls are usually found at your local target range. A notice tacked on the bulletin board will likely garner sufficient members to form an NMLRA affiliate. You should write to the NMLRA for sample club by-laws and suggestions for safe range construction and practices.

If you stock blackpowder and parts for muzzleloaders, your shop could well become the mecca of blackpowder shooters in your region, leading to a profitable sideline for you. Don't forget to stock rifle and pistol kits. Muzzleloader shooting is the most "self-made" sport going! A recent survey revealed that nine out of ten single-shot muzzleloading pistol shooters had built their own guns. Of those shooting caplock rifles, five out of eight were do-it-yourself gunsmiths. The ratio of homemades among flintlock shooters was seven to one! However, the average beginner *buys* his first gun, so it behooves you to have a good selection in stock. More on that later.



FIGURE 5 — Your store could become a mecca for blackpowder shooters. You should be prepared to meet their needs for information and products.

BASIC BLACK

Before considering what rifles to keep on hand, you should become familiar with the three basic styles of muzzleloading rifles, and the two basic ignition systems or locks. The original American rifle was the familiar "Kentucky," named more for the wilderness it tamed than for its point of origin. The Kentucky rifle began its life as a flintlock, and evolved into a caplock. The plains rifle was born caplock, and the Civil War Zouave arrived barely ahead of the breechloading cartridge gun. From a military standpoint, it represented the highest order of frontloading rifles.

Evolution, Kentucky Style

The birthplace of the Kentucky rifle was in Pennsylvania, among the largely Deutsch gunsmiths of the area, immigrants who brought their skills with them from the Continent. Rather than being "invented" in the usual sense, the Kentucky rifle evolved through a gradual slenderizing and shortening of the massive, yawning-bored Jaeger hunting rifle of the Fatherland.

Clearly identifiable Kentucky rifles emerged in about 1760, from a welter of experimental rifles developed by frontier gunsmiths to meet the unique requirements of

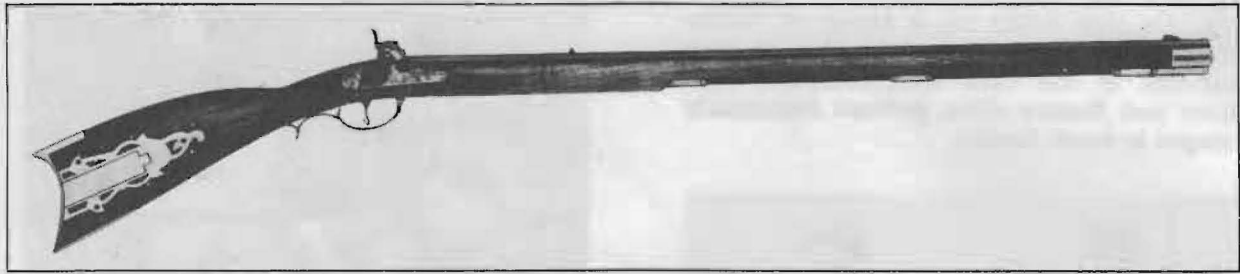


FIGURE 6 — By 1760, clearly identifiable Kentucky rifles emerged from a welter of experimental rifles created by Pennsylvania smiths. They were notable for their grace of line, and marked by a greater than usual drop of the buttstock because they were fired almost wholly offhand. The Kentucky began life as a flintlock, but later evolved into a percussion cap lock.

the Appalachian wilderness. European guns were ponderous and heavy, with large bores, burdensome to pioneers who traveled mostly afoot, and only occasionally mounted on horseback. The largest animals encountered were deer and black bears. Perhaps most dangerous were the black panthers. However, the cats were for the most part shy rather than fierce. Squirrels abounded, and provided excellent table fare. Thus the "squirrel rifle" was born, with bore diameters varying from .30 to .45 caliber, compared to an average of .70 caliber for the Jaeger rifles. A pound of lead provided but 16 shots from a .70 bore, whereas the .45 caliber could get 48 round balls from a pound of metal, and many more shots per horn of powder — both compelling advantages to the hunter or adventurer who might be absent from any settlement for months at a time, carrying his entire life support system in his leather "possibles" bag.

Before going on, please do Programmed Exercise number 1. Make sure you write your answers on a separate sheet of paper before looking at the answers on the page specified.

PROGRAMMED EXERCISE

1

1. What are the three basic styles of muzzleloading rifles in America?
2. What two ignition systems have been in use in America for muzzle-loading rifles?

Answers on Page 6.

The Frontier Gunsmith Forged His Own

If you think you've got it tough, harken to the tribulations of the early frontier gunsmith. He learned his trade from older members of the family, or was indentured by his parents as an apprentice to a man of known repute, usually to serve until age 21. His metamorphosis complete, the newborn gunsmith normally left the immediate area to avoid competition with his master, often moving to the fringes of the frontier, where the clientele couldn't afford to be too fussy about perfection of craftsmanship. As always, the young gunsmith was the innovator, trying new patterns, varying the old, to attract customers and gain a reputation.

The beginning frontier gunsmith necessarily made his tools himself from scratch, smelting his own iron in a crude charcoal furnace consisting of a pit in the ground, called a "Catalonian forge," after the Spanish province where it originated, fashioning files, saws, planes, knives, etc. from materials provided only by nature.

Then he ironed out narrow iron strips called "skelps," which were hand-forged around a mandrel called a "bick iron," and lap-welded a half inch at a heat, usually requiring the efforts of two men for half a day to complete a 48" barrel. The rough-hammered tube was then bored with a crude hand-cranked machine, often mounted upon a heavy log, and rifled laboriously by pushing through a homemade cutter on a hickory rod, twisted by a wooden rifling guide. The octagon flats that were roughly hammered on the outside were draw-filed true to the bore and breech plug fitted. Only then could the gunsmith begin his labor of love, shaping the slender stock, possessed of symmetry and balance, carved and inlaid with silver or brass. Early smiths were forced to make their own locks as well, calling for many more hours of meticulous effort. The results were often comparable in finish and precision to the inwards of a fine watch!

The Revolutionary War Changed Smithing Practices

Gunsmiths of colonial days were hard pressed to keep up with the demand for their rifles from pioneers probing into the Kentucky wilderness. When the Revolutionary War brought a far greater demand from colonial governments, the number of people attracted to the trade increased tenfold. Large commercial shops sprang up, using water-wheel power to drill and rifle, and grind flats on barrels. Other shops specialized in making only locks.

The war's end in 1883 suddenly diminished the demand, and the spectre of real competition arose between makers for the first time. The following 25 to 30 years are often referred to as the "Golden Age" of the Kentucky rifle, when the design reached its highest degree of refinement and ornamentation. Rococo decoration was used by top makers to attract customers. Stocks were made of the finest curly maple, with intricate and beautiful silver inlays, raised carving of fine detail, and lace-like patchbox patterns.

The era of the Kentucky rifle gradually ebbed away, but in the Great Smoky Mountains the art of creating the regal Kentucky never died. In the mountain vastness of Pennsylvania, Kentucky, and Tennessee, the spark of the real down-to-earth rifle smith of colonial America has been kept alive by a few rugged individuals, whose rare wares are in constant demand by the mountain people

who still favor the rifles of their great-grandfathers, and regard with suspicion "them new-fangled ca'tridge guns." These people keep alive the tradition of the Sunday afternoon shoot, taking dead aim across a log at a charred board with a white X scratched across it.

The Kentucky Rifle — Midwife for a Nation

Occasionally one of these mountain men will surface to remind America of its heritage as a nation of riflemen, as did Sergeant Alvin York, who took his mountain-bred rifle skill to war and practically conquered the Kaiser's army single-handed, using naught but a bolt-action Enfield!

Frontier riflemen played a decisive role in winning America's freedom from England. British disdain for frontier colonists was transformed into fear when they realized that "out of range" meant two entirely different things when applied to smoothbore muskets and Kentucky rifles. A puff of smoke and a dull "thud" in the far distance were often accompanied by a black hole through a proud red tunic!

In 1775, the *London Chronicle* printed a warning sent by a Philadelphia printer, "This province has raised 1,000 riflemen, the worst of whom will put a ball into a man's head at 150 to 200 yards, therefore advise your officers who shall hereafter come out to America to settle their affairs in England before their departure."

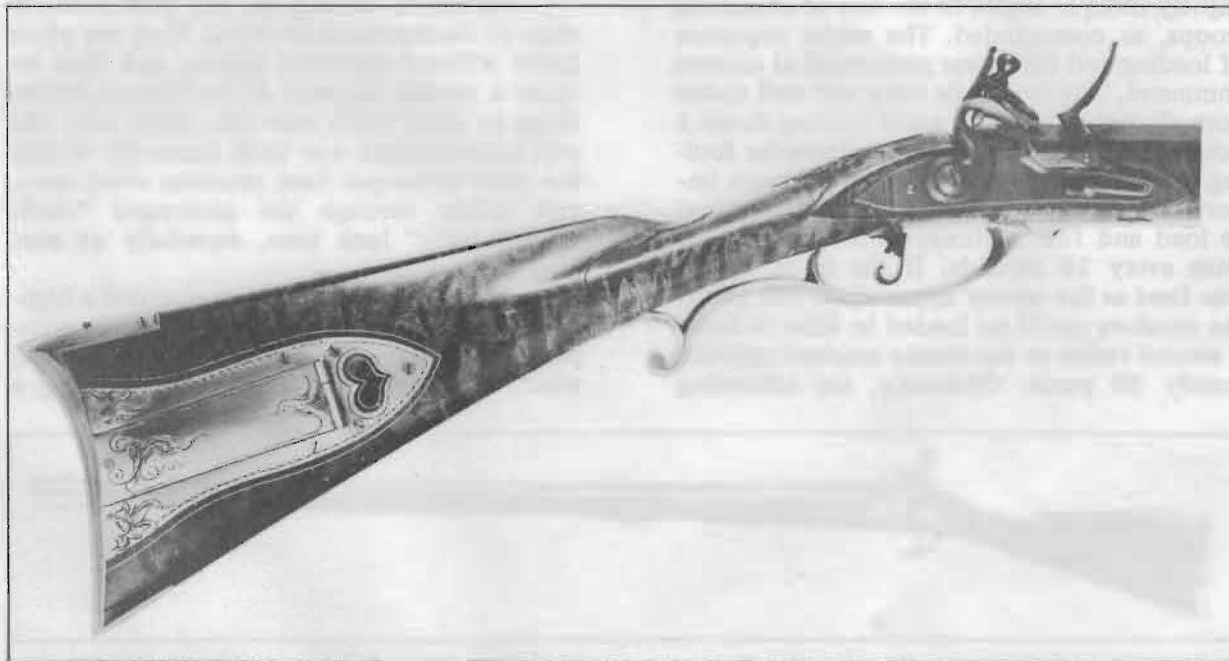


FIGURE 7 — Following the end of the Revolutionary War, there came the "golden age" of the Kentucky rifle, with fine carving and inlay used to attract customers.

ANSWERS

1

1. Kentucky rifle, plains rifle, and Zouave.
2. Flintlock and caplock.

Unfortunately, there weren't enough rifles to go around to all of the Continental forces, so they were forced to share the basic shoulder arm used by the English, the flintlock "Brown Bess" musket, a .75-caliber smoothbore that launched a ponderous .69" round ball, weighing over an ounce. Later in the Revolution, after France openly allied itself with the struggling colonies, the French .69-caliber musket with its .63" ball displaced the larger bore as the favored arm of the Continental Regular. The ungainly muskets with 42" to 46" barrels totaled about five feet in length. For the sake of uniformity and ease of training, "Committee of Safety" arms made in the colonies were virtual copies of the European muskets.

The bulk of the Continental Army consisted of regular infantry, which participated in pitched battles in the European tradition. Defending ranks stood shoulder to shoulder, firing volleys at the oncoming formations, parallel to the ground, either straight on or at slightly oblique angles to the line of advancing troops, as commanded. The entire sequence of loading and firing was performed at express command. The lead balls were cast well under bore diameter to allow rapid loading down a bore caked with stubborn blackpowder fouling. Speed of fire was considered far more important than accuracy. Recruits were required to load and fire 15 times in 3½ minutes, or once every 15 seconds. If the initial volley was fired as the enemy approached 100 yards, the muskets could be loaded in time to loose a second volley as the enemy reached approximately 30 yards. Obviously, the advancing

forces suffered awesome casualties — mainly because they didn't know enough to disperse into scattered units. After the second volley, the troops closed to hand-to-hand fighting, and the bayonet decided the issue.



FIGURE 9 — Closeup of flintlock of Brown Bess reveals bulky design, albeit a dependable shooter.

Smoothbores Have Their Place, Too, Regardless of Effect

Despite the fact that smoothbore muskets are in no way practical target or hunting arms, the Brown Bess pattern replica guns have become quite popular because of the Bicentennial which started April 19, 1975, 200 years after "the shot heard 'round the world." As if it needed an added liability, the Brown Bess is a flintlock, which blackpowder beginners find hard to master.

Flintlocks belong in the post-graduate class of blackpowder shooting. They are often balky without apparent reason, and thus require a certain amount of mechanical knowledge to keep them sure-fire. Also, only the well-indoctrinated can hold staunchly during the flash-in-the-pan that precedes every shot, and follow through the prolonged "click-whoosh-bang" lock time, especially on running game.

At that, the flintlock represented a highly sophisticated firearm ignition system compared to what went before. The matchlock, which consisted of a simple lever holding a

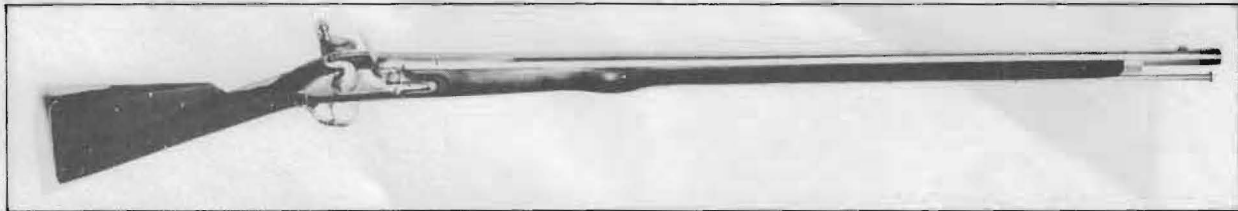


FIGURE 8 — The British "Brown Bess" musket became the major arm of both sides in the Revolutionary War. There weren't enough rifles to outfit the bulk of the colonial forces. The smoothbore was long, cumbersome, and inaccurate, designed only for volley firing.

glowing wick that was rotated into contact with a pan holding a priming charge, emerged early in the 15th century and endured for a hundred years. Successor to the crude matchlock was the highly complicated wheel-lock, consisting of a serrated wheel with a spring inside. The wheel was wound against spring tension and held in contact with pyrite. When released by the trigger, the wheel spun, throwing a shower of sparks into the pan. The snaphaunce which followed later in the 16th century was a crude forerunner of the flintlock. By mid-century, the flintlock had gained grace and simplicity, and comparatively high reliability.



FIGURE 10 — Despite the fact that Brown Bess muskets are not practical target or hunt-int arms, they have become popular with shooters because of the Bicentennial, and the yearning for the days of yore.



FIGURE 11 — Results on the target from the smoothbore leave something to be desired, but a good time was had by all!



FIGURE 12 — Numerous Bicentennial groups have been formed to recreate the events of the Revolutionary War.

Flintlock Believers Were Skeptical of Advances

So highly regarded was the flintlock on the American frontier, that the introduction of the percussion cap in 1814 was greeted with more suspicion than enthusiasm. Early caps were highly corrosive, and exhibited the nasty habit of eating away at the barrel inside and out. Caps that became wet in a drenching downpour or while fording a stream, both daily occurrences on the frontier, became useless. Often caps decomposed merely from exposure to damp air. Barring all disasters, once the limited supply of caps was consumed from the frontiersman's shoulder-carried "possibles bag," his gun became no more than an over-long club! Flints, on the other hand, were compact and rugged. In an emergency, substitute flints could be chipped from native agate, widely available afield. With time, percussion caps were improved and the flintlock grudgingly gave way. Regretfully, many a fine flintlock Kentucky rifle was converted to caplock, and late rifles in the Kentucky pattern were almost wholly caplock.

A Thing of Beauty, But No Saddle Mate

The passing of the Kentucky rifle was mourned by many. No other rifle ever made exhibited such grace and beauty. The Kentucky weighed from 7 to 9 pounds, with its 43" to 47" bottom half barrel encased full-length by a slender shell of crisp, hard maple or cherry wood, tiger-tailed end to end with chocolate stripes, with butternut spacers, hand rubbed to a deep, enduring luster. Kentucky stocks were possessed of exaggerated drop, for easy holding in the offhand position. Brightly polished brass or silver "furniture" accented the whole.

Beauty was sacrificed to utility with the coming of the shorter, huskier plains rifle. When westward expansion emerged from the dense Appalachian forests and faced the vast expanse of prairies in Middle America, the limitless horizons and endless miles dictated that pioneers adopt, as never before, the horse. Plains distances required the horse's speed and mobility, and the Kentucky rifle just didn't fit in. The Kentucky that served so well in murky forest glades proved awkward in the saddle. The balance point of the Kentucky was almost midway along the over-long barrel, resulting in an untenable overhang to the rear or right, depending upon how the gun was held by the rider. Remember that the plainsmen and mountain men *hand-carried* their rifles, riding or afoot! Also, the wrist and buttstock was thin and fragile. The small-diameter round balls from the Kentucky rifle were too light for long-range shooting. They quickly ran out of energy and fell to the ground. And they lacked the knockdown power to stop bison or grizzly bears.

And Then, the Homely American Was Born

Thus it was that barrels again shortened and swelled in diameter as bores grew larger, and stocks thickened in a throwback to the old familiar pattern of the German Jaeger rifles that started the cycle. However, it

wasn't quite full circle. Bores never returned to the tunnel-like proportions of the past, and in the interim the patched ball and caplock had been developed.

What finally emerged was the plains rifle, best typified by the guns produced in the St. Louis shop of the Hawken brothers, Jake and Sam. The "Hawken" rifle averaged 10 to 12 pounds in weight, with .45 to .53-caliber octagonal barrels, 28" to 34" in length. They were half-stocked, straight and sturdy at the wrist. The plains rifle was born and bred a percussion caplock, and so it remained. The pretty patchbox of the Kentucky was abandoned as unnecessary, and niceties of design and decoration were forgotten. Indians and mountain men often decorated their own guns with brass tacks, beads, etc. All in all, it made for a rather homely rifle, albeit a highly practical one!

One War Too Many, And the Last Frontloader

The final frontloader was mothered by a pointless war between the states. The .58-caliber 1862 Remington, popularly known as the "Zouave," was designed to take advantage of the bullet developed by French Captain Minie. It was a huge picket ball with a hollow base that expanded to fill the rifle grooves, thus eliminating the need for a patch to seal the bore. The Minie ball had a number of circular grooves that, in theory at least, scraped the blackpowder fouling out of the bore with each shot. In practice, they were less than successful. In a clean bore, the ball would slide down with little persuasion from the steel ramrod, but after a few rounds were fired without cleaning, they had to be hammered home. The result was that field commanders were wont to order the balls well undersized to facilitate easy loading, thereby defeating the excellent accuracy of which the rifles were inherently capable.

The Zouave rifle itself reflected traditional military thinking, though not too

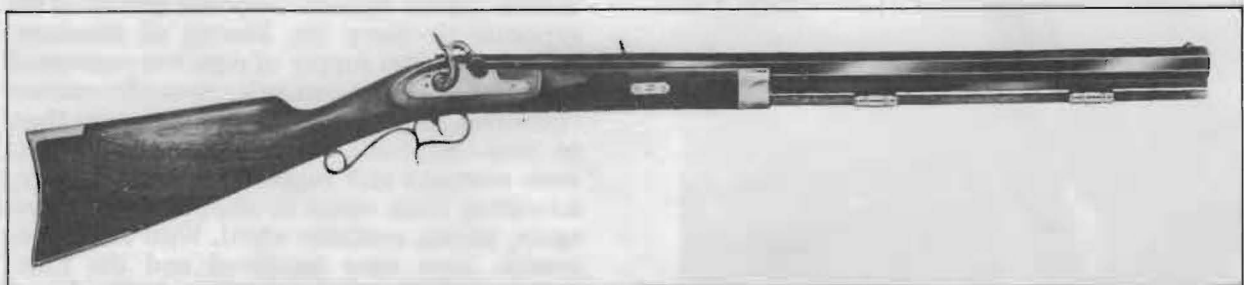


FIGURE 13 — The plains rifle that followed the Kentucky was shorter, of bigger bore, and thicker through the wrist of the stock. It was plain and unpretty, but highly efficient as a shooter, thus a favorite with modern blackpowder buffs. Shown here is a replica offered by Navy Arms in .58 caliber, capable of downing animals as large as elephants!

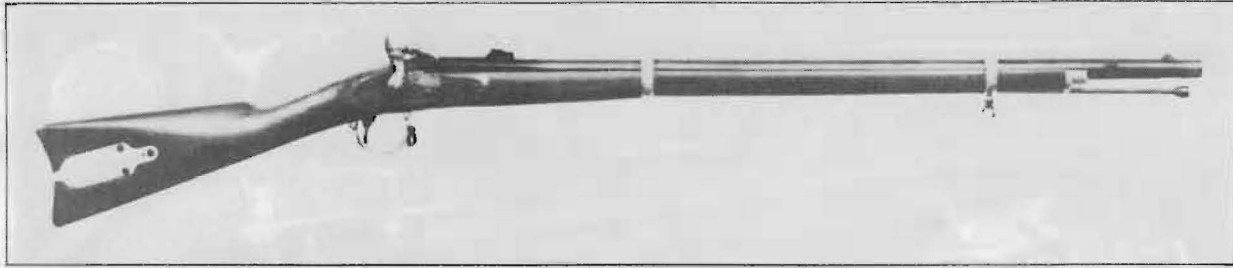


FIGURE 14 — The last major development of the muzzleloader was the military .58-caliber 1862 Remington Zouave, made under contract to the Federal Government to outfit Union troops. It used the hollow-based Minie bullet.

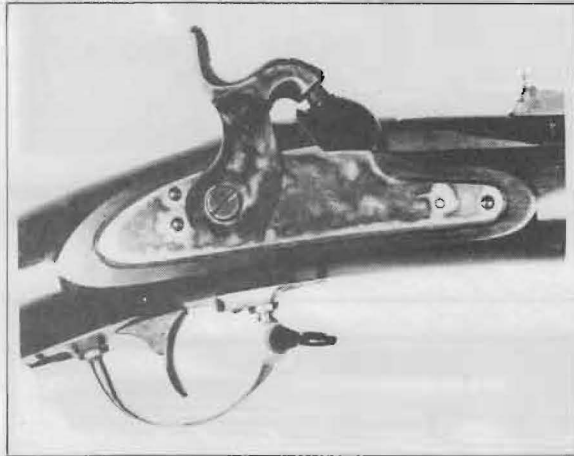


FIGURE 15 — Closeup of the Zouave percussion lock, which used the large "tophat" musket caps, reveals how rugged it was.

practical. The Civil War rifle was *hell for strong*, but about as graceful and handy as an uprooted tree stump! However, resplendent in gleaming brass, blued steel, and polished walnut, it was something to behold!

HANDGUN DEVELOPMENT, AND YOUNG SAM COLT

For centuries the development of handguns roughly paralleled that of long arms, until 1836 when young Sam Colt took a hand in the proceedings. Then one-hand guns took a leap forward that carried their combat effectiveness well beyond that of contemporary rifles.

Colt's Paterson holster pistol, now accepted as the first successful revolver, fell somewhat short both functionally and financially, but it provided the inspiration and springboard for the rugged, reliable Walker Model, a ponderous 15½", 4½-pound revolver, largely designed by renowned Texas Ranger Captain Sam Walker.

The unchallenged "magnum" of its day, the Walker launched a 137-grain round ball at 1,150 fps ahead of 60 grains of ffg blackpowder, exceeding the performance of many

rifles of the day and unmatched by modern handguns until the advent of the .357 magnum. Power was sacrificed to lightness and improved balance to produce the Colt Navy Model in 1851. Although the bore was reduced to .36-caliber, the gun proved deadly in close combat, and was a favorite of the vaunted Wild Bill Hickock.

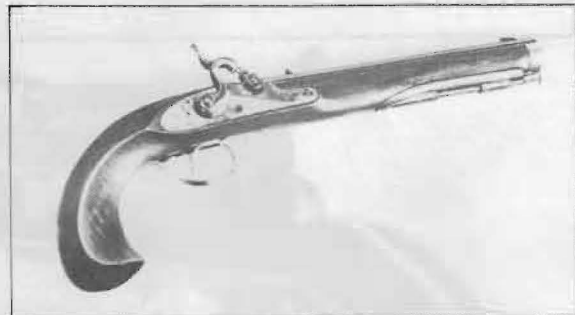


FIGURE 16 — For centuries the development of handguns closely paralleled that of rifles, as exemplified here by the companion to the graceful Kentucky rifle, the equally graceful single-shot muzzleloading pistol.

By 1860, improvements in steel alloys enabled the design of a far lighter .44 caliber with almost as much punch as the Walker. The deftly streamlined, superbly balanced 1860 Army Model Colt, justly famed for its fit-any-hand-grip, soon became the most popular of all of the Colt cap-and-ball revolvers. The only major competition for Colt's wheel guns came from the Remington 1861 Army Model in .44 caliber and the .36-caliber Remington Navy Model, both with solid frames, as opposed to Colt's two-piece construction.

Blackpowder Replicas And Renovations

Replica Remingtons find great favor with modern-day cap 'n' ball fans because their solid top strap frame will accept practical target sights. Both Navy Arms and Hawes Firearms offer Remingtons with excellent factory-installed adjustable target

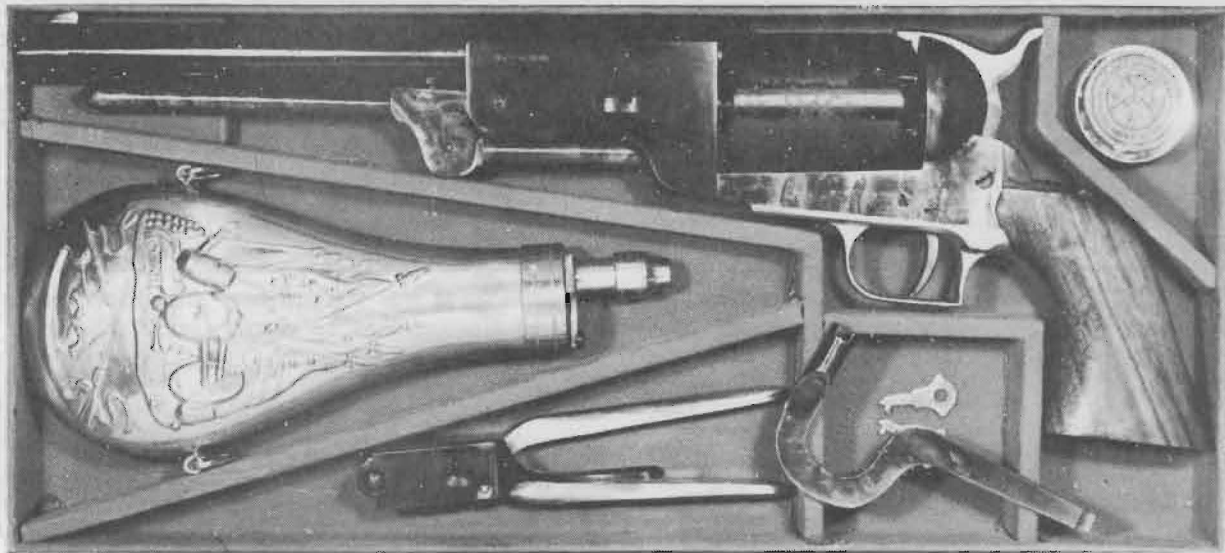


FIGURE 17 — The huge Walker Model Colt revolver was the first repeating handgun to see wide use in the West. Colt was resurrected from bankruptcy to build the gun by Texas Ranger Captain Sam Walker (Shown here cased with accessories).



FIGURE 18 — The Navy Model Colt was only .36 caliber, but it proved effective in close combat. The Colt became a favorite of both sides in the Civil War, and later went west to become one of the first tools of the early gunfighters.

sights. Authentic replica cap 'n' ball revolvers echo the assets *and faults* of the originals. Most disturbing to serious shooters is their lack of adequate sights. This defect is overcome in Bill Ruger's "Old Army" .44-caliber percussion revolver, which is not a replica of any original, but rather a modern gun designed solely for blackpowder use, blessed with excellent micro-adjustable sights.

The basic frame design, grip straps, sights, and action parts are those of the Ruger Blackhawk. The frame was necessarily lengthened to accommodate the loading lever, and to allow space ahead of the cylinder for seat-

ing short bullets as well as round balls. The lever is only notched into the base pin and rammer for easy disassembly, to facilitate cleaning. The frame and cylinder are high-tensile-strength, chrome-moly steel, and the nipples are of corrosion-resistant stainless steel. Deep recesses are milled into the cylinder between the nipples, into which the hammer nose can be lowered, to make the gun safe to carry with all six chambers loaded. The deeper than normal chambers will accept up to 45 grains of ffg blackpowder, making this 7½" barreled, 47-ounce "hogleg" the true *cap 'n' ball magnum* when fully loaded!

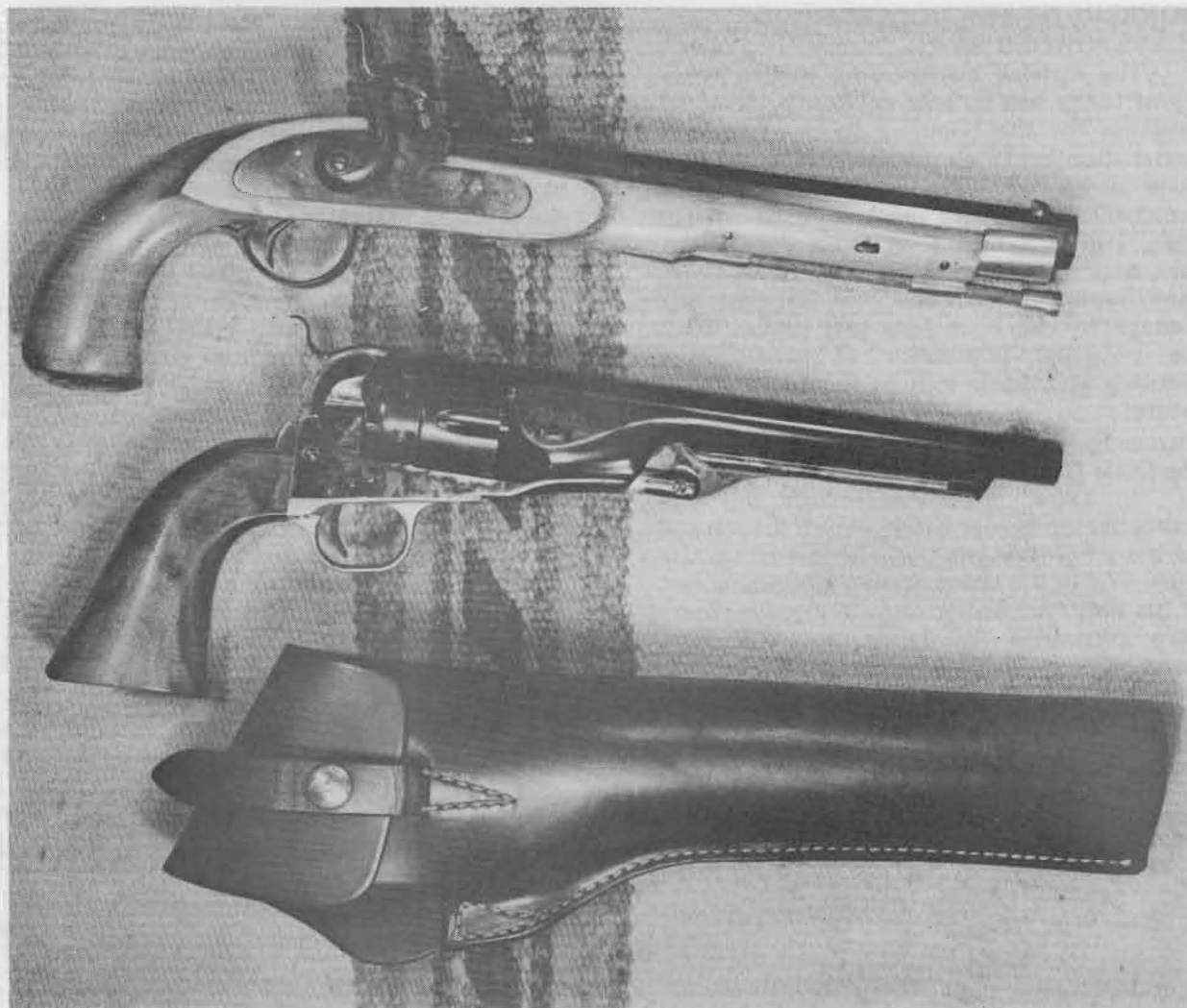


FIGURE 19 — By 1860, improvements in steel alloys allowed Colt to make a .44-caliber cap 'n' ball with almost as much power as the Walker, but far lighter and handier. The 1860 Colt is shown (center) compared to a single-shot of the Kentucky era (top). The Colt .44 became the favored holster sidearm of many early gunfighters, including the formidable John Wesley Hardin!



FIGURE 20 — Replica Remington revolvers find great favor with today's cap 'n' ball fans because they have better sights than the Colt revolvers, and the solid top strap allows the use of target sights.

PIONEERS OF THE MODERN BLACKPOWDER ERA

The thriving blackpowder replica industry of today was both an answer to and an inspiration for the booming sport of muzzle-loader shooting. Two pioneers of the industry share about equally the credit for having launched the modern production of ancient arms. Turner Kirkland, of Dixie Gun Works, Inc., and Val Forgett, of Navy Arms Company/Replica Arms, had the foresight and courage to risk both time and capital when the potential popularity of blackpowder shooting was visible only in the dimly distant future!

Turner Kirkland and the Dixie Gun Works

In 1954, blackpowder buff and avid gun collector Turner Kirkland quit his job and started a full-time gun business in a garage. He knew that in the Great Smoky Mountains east of his home in Union City, Tennessee, there were gunsmiths fashioning beautiful Kentucky rifles in much the same manner as their great-grandfathers had done before them.

However, the virtually hand-made products were of necessity rather expensive. Turner recognized the need for a Kentucky replica that could be sold to blackpowder shooters at a reasonable price. He initiated production of the original "Dixie Squirrel Rifle" in 1955, at a Belgian arms plant. This was the first production-line replica muzzleloader as we know them today!

Dixie Gun Works evolved into a blackpowder supermarket unlike anything anywhere else in the world, currently grossing \$4 million annually. The huge warehouse and retail store is jammed to the high rafters with muzzleloading rifles, pistols, shotguns, cap 'n' balls, etc. Many are replicas manufactured by Dixie and other firms that have sprung up over the years. Others are true antiques. Turner also has military accoutrements of wars long past, even suits of armor, flails, maces, and swords. Powder horns, flasks and flints, even nodules of raw flint, are available from Dixie, plus tons of parts for muzzle-loading arms, and complete kits for individual guns.



FIGURE 21 — The Ruger "Old Army" revolver is not a replica of any original, but it incorporates the best of today with the assets of yesterday to provide the best yet cap 'n' ball "shooter!"



FIGURE 22 — Turner Kirkland, of Dixie Gun Works, Inc., started the first production-line replica muzzleloader, the Dixie Squirrel Rifle shown here, in Belgium in 1955.

Dixie deals direct, via their 400 + page catalog, listing over 10,000 different items, but they also offer you as a dealer attractive discounts on all products, including the catalog itself. Incidentally, the Dixie catalog contains a college education in muzzleloader lore! Your first best move as a dealer in muzzle-loading arms is to send \$2.00 to Dixie Gun Works, Inc., (Union City, Tennessee 38261) and read that catalog cover to cover!

Navy Arms Company/ Replica Arms

Another catalog you'll need costs \$1.00 from Navy Arms Company/Replica Arms (689 Bergen Blvd., Ridgefield, New Jersey 07657). This book displays in full color the widest array of muzzleloading arms offered by any single company. And the finest in quality as well! It all began in 1957, when Val Forgett contracted with the time-honored Italian firm of Vittorio Gregorelli to reproduce an exact replica of the 1851 Colt Navy Model cap 'n' ball revolver. Later he added a copy of the brass-framed Confederate Griswold and Grier revolver and a Zouave rifle. All of his original production was geared to appeal to the interest generated by the then still-to-come Civil War Centennial. More recently, he has added the Brown Bess musket, Hessian flintlock pistol, etc., geared to the Revolutionary War Bicentennial celebration. You can stock guns from Navy Arms, or sell them from the catalog in full confidence that every single one will be as good as or better than the originals in fit and finish.

You can assure your customers that it is in no way demeaning to shoot copycat! Good originals are now all too expensive to use as shooters. Most are in the hands of collectors. Even owners of original arms shoot replicas to avoid damage to their collector's items.

Thompson/Center Arms

Thompson/Center Arms, Rochester, New Hampshire 03867 (send \$1.00 for catalog), represents a new breed in the muzzleloading field, oriented strictly toward the blackpowder shooter. Owner Robert Gustafson thinks modern, and builds his guns in America to resemble those of yore, but with innards as up-to-date as an orbiting space lab! Piano wire coils replace the old-style flat springs, and Allen screws rear their practical heads, fully adjustable open sights top tackhole-accurate button-rifled barrels. T/C has carried out extensive blackpowder ballistics experiments, exploding many well-established muzzleloading myths, and stands alone in supplying each buyer with explicit loading and shooting instructions with every gun. T/C also offers a kit containing every item required to

actually shoot the gun, from mold to cleaning rod!

Although not an exact duplicate of any original, the T/C Hawken rifle effectively echoes the lines of the half-stocked plains rifle, with a 28" octagonal barrel, 15" to 16" across the flats, button-rifled with 12 grooves and lands, one turn to 48 inches. The hook breech allows quick removal of the barrel for cleaning. The micro-adjustable rear sight is higher and the selected walnut stock straighter than those of the original plains rifles, but these are practical improvements that no shooter will fault. The color-cased lock, hammer, and steel trigger guard add beauty as well as practical hardness for longer wear. Double-set triggers release when you merely think "shoot!" Polished brass furniture and patchbox add eye appeal that makes these guns easy sellers for you. The T/C Hawken is available in both percussion cap and flintlock, in .45 or .50 caliber.

The T/C Seneca rifle trims 2½ pounds from the 8½-pound Hawken, and comes in .36 or .45 caliber. The Seneca offers all of the major features of the Hawken, but at a lighter weight.

Companion piece to both is the Patriot single-shot pistol from Thompson/Center, with .45-caliber 9" barrel, 13/16" across the flats, rifled one turn in 48 inches, and topped with micro-adjustable sights. The coil spring-powered caplock is shrouded, with a graceful dolphin-shaped hammer. Double-set triggers respond to a mere touch. The comfortable pistol grip stock is selected walnut, and the trigger guard, grip cap, thimbles, and wedge are all of polished brass. The whole totals up to 36 ounces of sheer elegance! You'll find T/C guns easy to sell, and they unfailingly result in satisfied customers!

Numrich Arms Corporation

A complex of store, warehouse, and manufacturing buildings nestled in the foothills of the Catskill Mountains at West Hurley, less than two hours' driving time north of downtown New York City, bills itself as "America's Largest Gun Store." The Numrich "World Guide to Gun Parts" (send \$1.00 to Numrich Arms Corporation, West Hurley, New York 12491) puts access to 38 million gun parts as near as your post office. Numrich manufacturers the famed Hopkins & Allen muzzleloading rifles, replicas of the guns developed in New England during the 1830's. These unique underhammer rifles and pistol were noted for the simplicity of their percussion cap locks, and the sure-fire qualities they displayed. The Numrich replicas are just as neat and reliable as the originals. The trigger



FIGURE 23 — Thompson/Center Arms provides the look of the past in guns with modern workings, to provide unparalleled accuracy and totally reliable functioning. Here is a closeup of the T/C Hawken rifle and their Patriot single-shot muzzleloading pistol. Note adjustable double-set triggers and micro-adjustable sights. Locks incorporate coil spring works.

pulls are consistently excellent, and the safety notches are actually safe! And the accuracy of Numrich barrels has proved itself at matches the world around. In addition, Numrich manufacturers their Kentucky-styled "Minute-man" rifles, plus shorter half-stocked rifles in the image of the Pennsylvania era, in both flint or caplock, as complete rifles or in kit form for the do-it-yourselfer.

BLACKPOWDER ENTHUSIASTS HAVE PLENTY OF QUESTIONS FOR YOU

There are other firms selling muzzleloaders, but the above represent the major makers. You will no doubt find yourself beset with myriad questions from beginning blackpowder shooters. It behooves you to read widely on the subject so you'll have the right answers. Question number one will be: "What gun should I buy?" Most muzzleloading

shooters start on the target range, but many of them will end by taking their frontloaders hunting (more on that later). On the range, the smaller-bores make a lot of sense. They require less lead, less powder, and cause less ruckus in firing, all of which tends to increase accuracy as well as keeping expenses down.

On The Range

Muzzleloading matches are scored according to the position of the *center* of the hole in the target rather than the *edge* of the hole, as is the case with cartridge guns. Thus the big-bore does not enjoy any advantage over the smaller bore. As a result, .36, or even a .32 caliber looks pretty good on the target range.

Before going on, please do Programmed Exercise 2. Make sure you write your answers on a separate sheet of paper before looking at the answers on the page specified.



FIGURE 24 — Thompson/Center is the only firm that furnishes a kit including all of the items needed to actually fire the gun, save caps and powder. Top is mold handles and blocks, short starter and ramrod attached to the same wooden ball, instruction manual, (bottom) Maxi-Lub lubricant, pre-cut patches, adjustable powder measure, spare nipple, nipple wrench, and finally an Allen wrench.

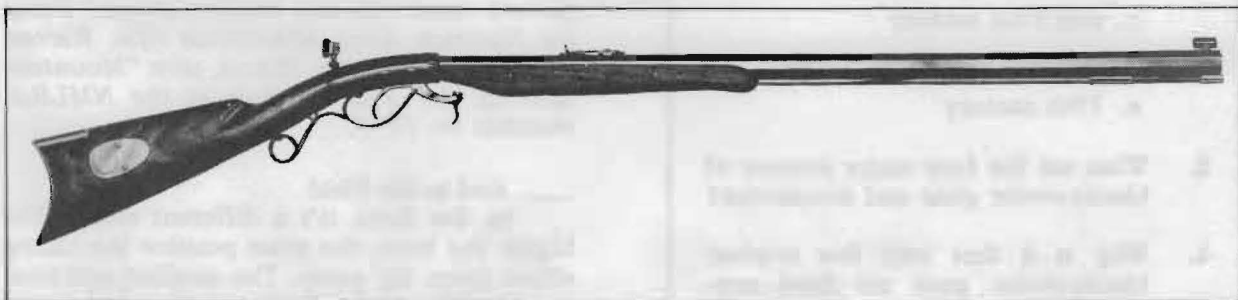


FIGURE 25 — Numrich Arms Corporation manufactures the underhammer Hopkins and Allen rifles, which are highly reliable and reasonable in cost. Shown here is the Heritage model, with adjustable target sights.

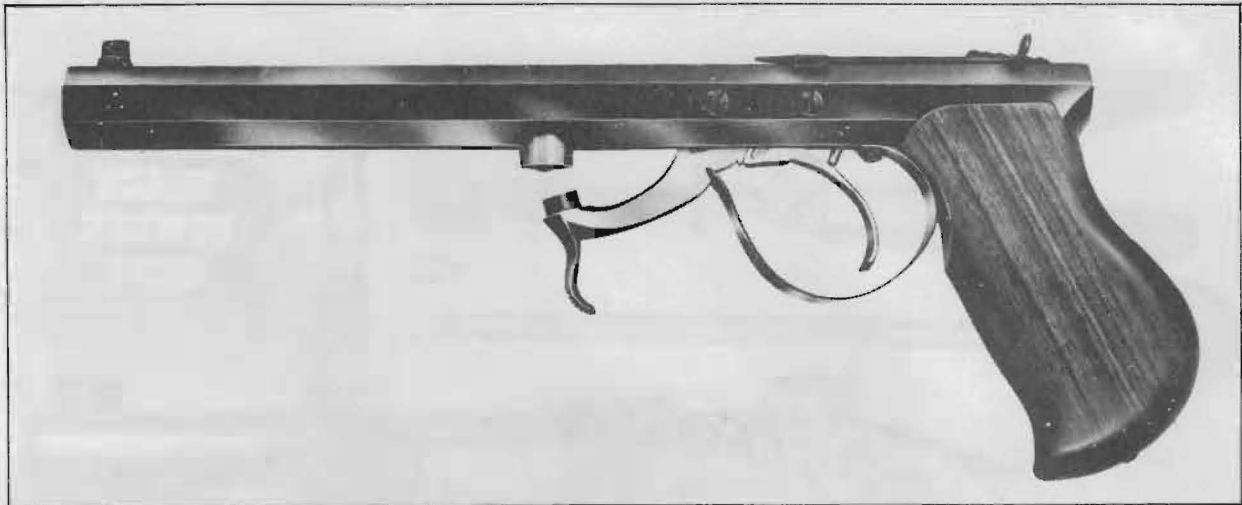


FIGURE 26 — The Hopkins and Allen Boot Pistol features the reliable Numrich underhammer lock. It can be loaded to deliver the same energy as a .38 Special cartridge!

PROGRAMMED EXERCISE "

2

1. What was the purpose of the circular grooves on Minie balls used in the Zouave rifle?
2. Identify the progressive development of the ignition systems below by matching them with their approximate (first) period of use.
 - 1. wheel-lock
 - 2. caplock
 - 3. flintlock
 - 4. snaphaunce
 - 5. matchlock
 - a. 15th century
 - b. early 16th century
 - c. mid 16th century
 - d. mid and late 16th century
 - e. 19th century
3. What are the four major sources of blackpowder guns and accessories?
4. Why is it that very few *original* blackpowder guns are fired anymore?

Answers on Page 22.



FIGURE 27 — Can a straight-from-the-box, factory-made rifle win target matches? Using his Numrich Arms Minuteman rifle, Warren Boughton of Harvey, Illinois, won "Mountain Man of the Year" awards at the NMLRA matches in 1971.

... And in the Field

In the field, it's a different story! The bigger the bore, the more positive the killing effect upon big game. The smallest practical bore is .45 caliber, which makes a pretty good compromise for both field and range. Using the 220-grain Maxi-Ball, an elongated bullet, from Thompson/Center, the .45 *Hawken* can

whip up a respectable 1,160 foot pounds of muzzle energy, adequate for all but the largest animals. The .58-caliber Zouave rifle and carbine, and the Navy Arms *Buffalo Hunter*, a "sporterized" version of the same, are popular as budget-priced hunting muzzleloaders. Navy also offers high-quality plains-styled rifles in .50 and .58 caliber, designed expressly for hunting.

Recommended loads for these two are rather awe-inspiring! The .50-caliber uses a 377-grain Minie ball ahead of 140 grains of ffg blackpowder. The .58-caliber launches something akin to a freight train (a 610-grain Minie ball) with a massive 175-grain charge of ffg, developing energy equal to that of a .458 Winchester!

Normally, the big-bores like this would be used only with the coarser-grained ffg powder, and much smaller charges. Blackpowder of ffg granulation is normally confined to bores of .45 or smaller, and to handguns. This apparent contradiction is made possible by the use of the long, heavy Minie balls in place of the usual patched round ball. Their greater inertia and longer bore time allows the over-large charges of blackpowder to be totally consumed.

Only so much blackpowder can be consumed in a given bore and barrel length. The excess is expelled out of the muzzle, unburned. Oldtimers fired their rifles over clean snow to see at what point they began to waste

powder, thereby setting their top hunting loads. A good starting point is half your ball weight, about 70 grains for a .45; or 1½ calibers, equaling 67½ grains. You can work up from there. You can emulate the pioneer's method of topping out your load, or use a chronograph, if available, until you reach a point of diminishing returns in velocity. You should peak out between 2,200 and 2,300 fps (using a patched round ball) with bores of .45 to .50; at 2,300 to 2,500 with .38 to .40 calibers. If your primary interest is target accuracy, work *down* from the suggested starter loads, a few grains at a time, firing at least five rounds per test group, until you get the tightest pattern on the target.

For hunting, Minie balls offer greater knockdown power than round balls in the same bore size. The heavier projectiles also retain velocity better and resist the vagaries of the wind more staunchly. Because they require no cloth patch, Minie balls are quicker to load in the field, when a second shot in a hurry is more the rule than the exception. The Minie balls can be lubricated in advance by filling their hollow bases with a heavy grease, such as Dixie's "Beare Grease," or Hodgdon's "Spit Patch." Paper cartridges are easy to make with Minie balls, and offer ease of handling and speedy loading afield.

Hunting with muzzleloaders is constantly increasing in popularity throughout the U.S. Many states, such as Alabama, Colorado,

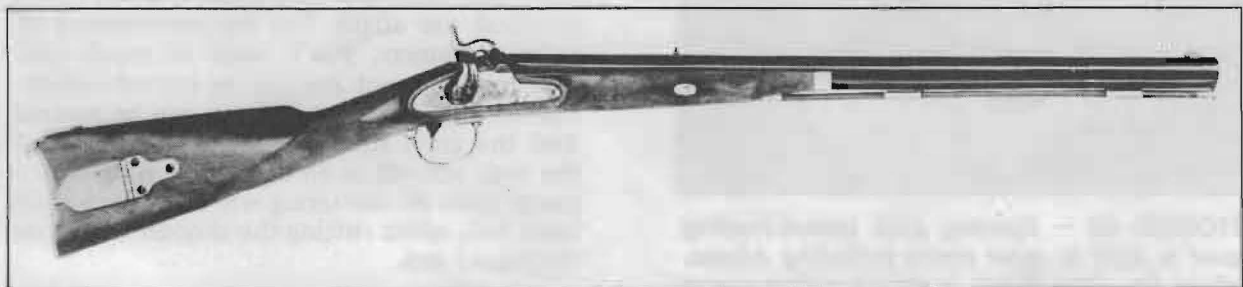


FIGURE 28 — The Navy Arms Buffalo Hunter rifle, a "sporterized" version of the .58-caliber Zouave, is a favorite among big game hunters because of its handiness and relatively light weight, combined with impressive knockdown power.

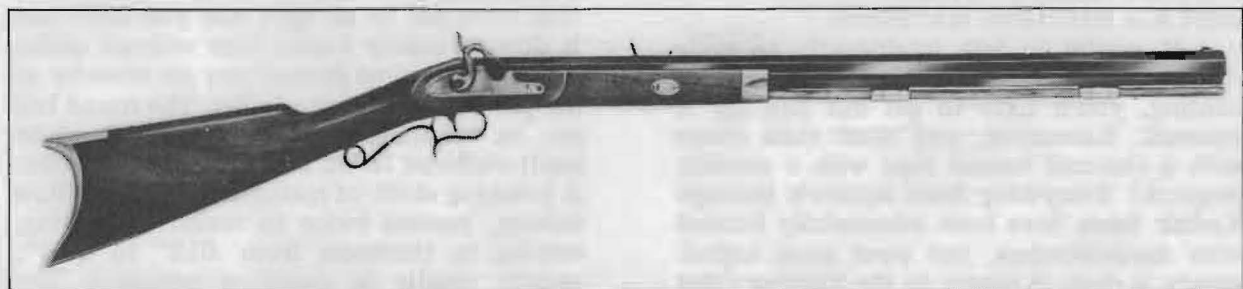


FIGURE 29 — The Navy Arms Hawken Hurricane is available in either .45 or .50 caliber. In the larger bore, it has been used to take African big game. You can recommend this to your customers without reservation.

Mississippi, New Hampshire, Oregon, Oklahoma, and Washington, have special primitive-weapons deer-hunting seasons. Most states allow the use of muzzleloaders during regular deer seasons. Kentucky designated a 7,300-acre tract of the Daniel Boone National Forest exclusively as a primitive-weapons hunting area. Deer, wild turkeys, rabbits, squirrels, grouse, and quail abound. Ohio set aside a total of 49,000 acres of public and private land for primitive weapons hunting, calling it "Wildcat Hollow." In 1970, Florida held a trial primitive weapons white-tail deer hunt on 12,350-acre St. Vincent Island.



FIGURE 30 — Hunting with muzzleloading guns is legal in most states including Alaska, where Dr. Gary White is shown with a moose taken with a side-by-side double muzzleloading rifle.

REPLICA ARMS REQUIRE REPLICA HUNTING METHODS

If you're to talk intelligently to your customers on the subject of muzzleloader hunting, you'll have to get out and try it yourself. Remember, you must stalk closer with a charcoal burner than with a modern magnum! Everything from squirrels through Kodiak bears have been successfully hunted with muzzleloaders, but your most logical quarry is deer. A return to the hunting rifles of our ancestors calls for a return to their hunting methods as well. They learned to stalk as silently, unobtrusively, and relent-

lessly as a catamount! They could track a wounded buck by searching out a bent blade of grass, a broken twig, a barely discernible trace of blood, following for days if need be, until the animal was brought to bag. The pioneers knew that a lung-shot deer could travel a long way before hemorrhaging finally brought it down. Therefore they aimed precisely at the heart, and took only those shots that allowed certain bullet placement.

If Blackpowder Is Your Bag, Then Your Bag Must Have Necessary Accessories

You may choose to go all the way and adopt buckskin garb, which is picturesque to be sure and helps hide you from your quarry, but a blaze orange hat is good insurance against being taken by another hunter for the original owner! You'll need a "possibles" bag hung from your shoulder, containing the accessories that our ancestors with great justification termed "necessaries." A normal assortment might include lead balls, pre-cut cloth patches or a swatch of material and a patch knife to cut it, a plastic bottle of Black-Solve or its equivalent for wetting patches and cleaning, plus a nipple wrench, and caps or spare flints. Hung on the same strap as the bag should be a powder horn and measure and a starter.

You'll need a ramrod that doubles as a cleaning rod. Those that come with replica rifles are without exception too short for practical use afield. For the convenience of your customers, you'll want to stock split hickory rods, not the cut or turned variety. Splitting is the only way you can be assured that the grain runs parallel to the length of the rod, not off at an angle. Cut rods have a nasty habit of shattering when seating a stubborn ball, often cutting the shooter's hand on the jagged end.

Learning Muzzleloading

Loading a muzzleloader is simplicity itself, but first you must choose a proper ball/patch combination. Your ball/patch combination must not be so tight that you can't seat it down a mildly fouled bore without undue effort, yet it must prevent any gas blow-by up the grooves around the bullet. The round ball can be anything from exact bore (land to land) diameter to no more than .005" under. A patching cloth of mattress ticking or pillow ticking, washed twice to remove all sizing, varying in thickness from .012" to .016", usually results in excellent accuracy. The patching must be thick enough to engrave the texture of the fabric on the *pure lead* ball in the area of the grooves as well as the lands. To

check, lay a swatch of patching material over the muzzle, and lay a ball over the bore. (Always make certain the ball is neatly centered and the sprue left from casting is pointing up.)

You must have a device known as a "starter," consisting of an orange-sized wooden ball with two hickory prongs at right angles to each other. One will be about 6" long, the other no more than ¼". The "short starter" is used to seat the ball just below the edge of the muzzle. A patch knife is normally used to trim off the excess material at this point and the "long starter" is used to seat the ball farther down the bore. The ramrod is then used to ram the ball home, firmly down on the powder charge. However, this time, instead of using the long starter, pull the ball back out of the bore by means of the patching material and examine it. If the texture of the material is not engraved upon the ball in the area of the grooves, you need either a larger ball or thicker patching material.

If the ball requires more pressure than you can comfortably exert with the ramrod in getting it down the bore, you must reduce the ball size or patch thickness. Most target shooters clean their bores between shots to increase accuracy and to make loading easier. While hunting, a smaller ball or thinner patch allows more shots before requiring cleaning. When hunting, if a second shot is needed in a hurry, you can sometimes simply seat a naked ball down the bore without benefit of patching. Accuracy is not so great, but if you're close that won't matter!



FIGURE 31 — You may want to go all of the way and adopt buckskin garb, but it's a good idea to wear a blaze orange hat to prevent another hunter from mistaking you for the original owner!

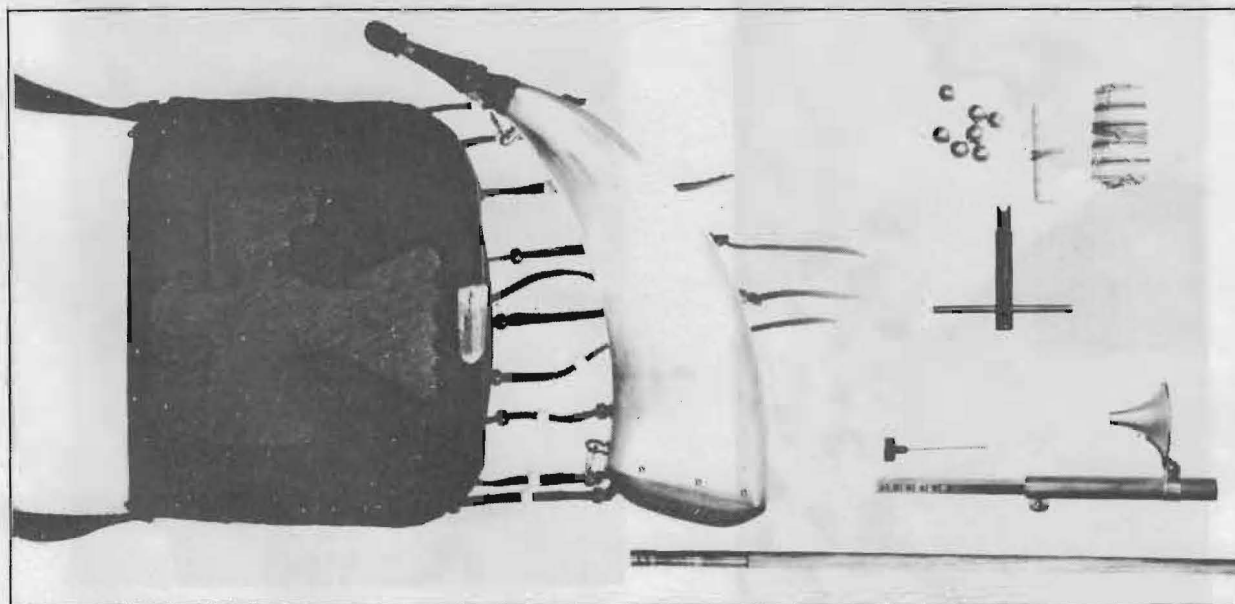


FIGURE 32 — Some of the accessories you'll require when in the field (and which you must stock for your customers) are: powder bag, powder horn, adjustable powder measure with integral pouring funnel, pick for clearing nipple, nipple wrench, patches and round balls, and hickory ramrod.

PHOTO STUDY: CAP 'N' BALL MUZZLELOADING



STEP 1 – Pour powder from a horn or other container into the powder measure.



STEP 2 – Pour powder down the bore of the rifle, using a small funnel to prevent spillage.



STEP 3 – Lubricate the patching material with a soluble oil solution or commercial lubricant.



STEP 4 – Cover the muzzle with the patching material and start a round ball with the short starter. It is sometimes necessary to use a light hammer to seat a tight ball.



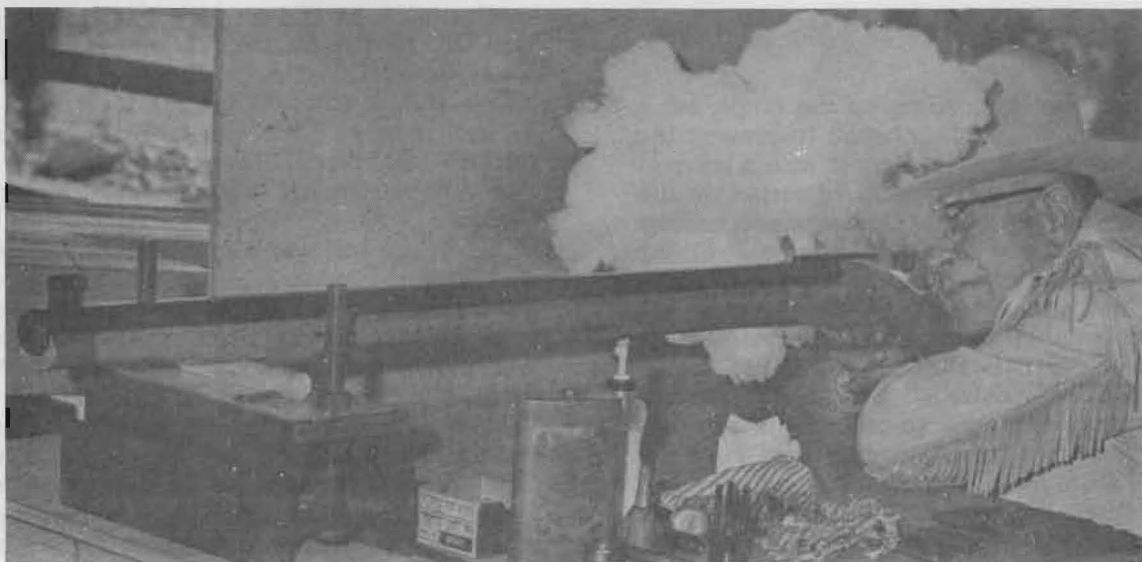
STEP 5 – Trim away excess patching material with a sharp knife.



STEP 6 – Use a long starter to set the ball down deep enough to use the ramrod.



STEP 7 – Then use the ramrod to seat it all the way.



STEP 8 – The final step is firing! Heavy bench rifles such as this one are capable of accuracy that rivals the best of today's cartridge rifles. Note that smoke from powder in the pan of a flintlock creates quite a cloud before the bullet emerges from the muzzle.

1. Theoretically, the grooves were supposed to scrape the blackpowder fouling out of the bore with each shot. The theory just didn't work too well, as the bores leaded up after just a few shots were fired.
2.
 1. B
 2. E
 3. D
 4. C
 5. A
3. The Dixie Gun Works (Turner Kirkland).
Thompson/Center Arms.
Numrich Arms Corporation.
Navy Arms Company/Replica Arms.
4. Most originals are in the hands of collectors, and they are too expensive to use as shooters. It is more advisable to fire replicas rather than taking a chance on damaging an original.

Muzzleloading on the Range

For ease of loading on the range, cut a V notch in the loading bench to prevent the rifle from falling over. Line it with a scrap of carpet. Use another swatch of carpet on the ground under the butt. Open the proceedings by running a couple of dry patches down the bore to remove excess oil. Wipe the nipple clean and fire a couple of caps to clear the nipple opening. Point 1 for safety: NEVER USE ANYTHING BUT BLACKPOWDER IN A MUZZLELOADER! Smokeless powder, semi-smokeless, even so-called bulk powder, *will blow up* a muzzleloading gun! Pour the charge from horn or flask *into a measure* and thence into the bore via a small funnel. *Never* pour a charge directly from the horn into the bore. In the unlikely event that a live spark should lurk in the barrel from the previous shot, the charge could ignite and turn the horn into a bomb! Seat the ball, sprue up,

just below the muzzle. Gather the excess patching material up in one hand and, cutting away from you with a sharp knife, trim the cloth flush with the muzzle. You can use pre-cut patches, about twice the ball diameter, carefully centered over the bore. Use the long starter and then the ramrod to seat the ball down firmly upon the powder charge. *Never* allow a ball to stop *partially* down the bore! If you were to try to "shoot the ball out," the inevitable result would be either a burst or ringed barrel! Once your powder charge is standardized, mark your ramrod so that you can check for a forgotten load before leaving the range.

This is no time for idle conversation or wool-gathering! Concentrate on your loading, lest you seat a ball without preceding it with a powder charge. Should that happen, if your gun has a cleanout screw in the drum that holds the nipple, remove the screw and work in as much blackpowder as possible to shoot out the ball. Check the depth of the ball with the ramrod. Sometimes the force of the cap alone is enough to drive the ball part way up the bore. If so, reseal before shooting it out. If you're shooting a flintlock, you will probably have to remove the breech plug to get the ball out of the bore. For safety, never cap the gun until it is pointed down-range, ready to fire. Patching material must be lubricated, either with a commercial lube such as Hodgdon's Spit Patch, or a solution of 1 part soluble oil to 15 parts water, which you can carry in a handy plastic spray bottle.

Before leaving the range, swab out the bore with some of the above, and follow with dry patches. Spray it well with good rust preventive, such as Outer's Laboratories no. 45 Gun Oil. Also spray around the lock and nipple. This treatment eases the chore of cleaning. In fact, it can hold the gun for a week or so if necessary. Such blackpowder cleaning solvents as "Black Solve" or "Hoppe's 9-Plus" make cleaning much simpler than before.

Because ball size is so critical to accuracy with a muzzleloader, and because it is a cut-and-try matter, you can do your customers a favor by stocking up on a variety of round ball molds (available from Lyman, RCBS, SAECO, etc), a good electric furnace (such as those available from Lyman or SAECO), and casting balls for them. You can supply a few different sizes for each gun to allow your customers to try each. After they find the correct size, you'll have a customer for a mold and maybe a furnace!

Our treatment of loads and loading is limited here by space. However, there is one really excellent manual available, the recently

released "Lyman Black Powder Handbook," available for \$7.95 from Lyman Products (Route 147, Middlefield, Connecticut 06455). This manual contains the most thorough treatment of the subject that has appeared.



FIGURE 33 — With an electric furnace like the Lyman Mold Master, you can cast round balls for your customers quickly, to make a profitable sideline. You can also sell the furnaces!



FIGURE 34 — Lyman makes the widest range of round ball and Minie ball molds available in the industry. Quality is consistently excellent!

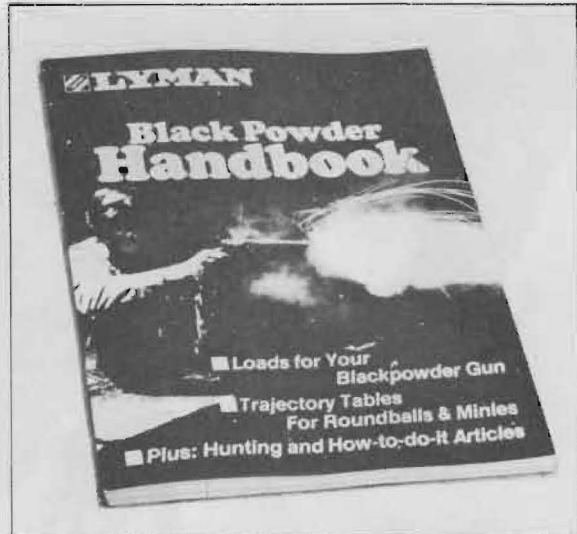


FIGURE 35 — The 240-page "Lyman Black Powder Handbook" is the best, most complete treatment of the ballistics of black-powder thus far published.

Loading a Cap 'n' Ball Revolver

Loading a cap 'n' ball revolver is rather like loading a muzzleloading rifle (sans patch) times six. First wipe all six chambers clean of oil, and fire caps on each nipple to clear the vents. Using a powder flask with a metering tube of appropriate size for your caliber revolver, dump a charge of fffg powder into one chamber. Place a ball in the chamber, sprue up and centered, and rotate the cylinder to bring that chamber under the rammer. Force the ball into the chamber with the rammer until it is flush with the front of the cylinder.

Ideally, ramming the ball home should leave a small ring of lead at the chamber mouth which you will peel away with your thumbnail. This use of a slightly oversize ball will assure a tight seal at the front of the chamber. If this is lacking, the usual result is double-firing, wherein the second chamber is set off by fire from the discharge of the first. It can be a rather startling experience the first time it happens! As an added seal, and to provide necessary lubrication, dab Crisco (cooking shortening), Lyman Revolver Lubricant, or their equivalent over the front of the bullets.

If you enjoy juggling, it is possible to charge all six chambers at one time, taking care not to tip the revolver enough to transfer some powder from one chamber to another, or possibly to the ground. Don't attempt to put the balls in all six chambers at once, as was suggested by one manual. You'll find that you can't turn them past the barrel! If you should get too much powder into a cham-



FIGURE 36 — The cap 'n' ball revolver is loaded using a powder flask with a metering tube to get the correct charge. Only one chamber at a time is loaded for safety and ease of handling. Powder is followed by round balls, covered with Crisco or other lubricant. Then the nipples are capped.

ber, and the ball refuses to compress enough to allow the cylinder to rotate, you will have to take a knife and trim off enough lead to let it slip past the rear of the barrel. The caps you use should be a snug fit to resist the jar of recoil. Don't cap your piece until you're ready to go into business on the range. In the field, it is recommended that you load only five chambers, leaving an empty under the hammer for safety. This precaution isn't required with the Ruger Old Army cap 'n' ball.

The fun part of being a gunsmith and gun store owner comes when you join your customers at the range and in the field. This is especially true when it comes to black-powder shooting. By mixing with your potential customers, you can also improve business. That's one of the few ways in which a man can "eat his cake and have it, too!"

Before going on, please do Programmed Exercise 3. Make sure you write your answers on a separate sheet of paper before looking at the answers on the page specified.

PROGRAMMED EXERCISE

3

1. How did the oldtimers top out their loads, and determine how much powder to use, without the benefit of a chronograph?
2. If your round ball is too small, what will be the result?
3. What will happen if you use smokeless powder in a muzzleloading gun?
4. You should never allow a ball to stop *partially* down a bore. Why?

Answers on Page 29.

BLACKPOWDER APPENDIX

The following data, compiled by author John Lachuk, have been selected to give you necessary facts about basic blackpowder components, without telling you more than you need to know if you are just getting started.

As you will see, some of that data has been developed by Mr. Lachuk, and he has also referred to established data published by the Dixie Gun Works and the Thompson/Center Arms Company.

We are grateful to the Dixie Gun Works and Thompson/Center Arms Company for permission to use their data. Complete blackpowder data, loading manuals, catalogs, etc, are available from the sources listed in Study Unit 11.

<u>GUN</u>	<u>CALIBER</u>	<u>BALL SIZE & WEIGHT</u>	<u>BARREL LENGTH</u>	<u>HUNTING LOAD</u>	<u>MUZZLE *VELOCITY in fps.</u>	<u>TARGET LOAD</u>	<u>ENERGY IN FOOT POUNDS</u>
Navy Arms 1860 New Model Army	.44	.451, 143 gr.	8"	42 gr. FFFg	860	28 gr. FFFg	
Numrich Hopkins & Allen Target	.45	.440, 125 gr.	32"	70 gr. FFFg	1680	70 gr. FFFg	
Numrich Boot Pistol	.45	.440, 125 gr.	6"	70 gr. FFFg	1945	30 gr. FFFg	
Dixie Squirrel Rifle	.40	.395, 94 gr.	40"	86 gr. FFFg	2273	60 gr. FFFg	
Dixie Kentucky Pistol	.40	.395, 94 gr.	9"	48 gr. FFFg	1220	30 gr. FFFg	
Navy Arms Zouave	.58	.575 Minie, 476 gr.	32½"	65 gr. FFg	965	50 gr. FFg	
Navy Arms Revolving Carbine	.44	.451, 143 gr.	20"	40 gr. FFFg	1250	24 gr. FFFg	
Navy Arms Yank revolver	.36	.375, 80 gr.	7½"	24 gr. FFFg	1000	18 gr. FFFg	
Navy Arms New Model Army	.44	.451, 143 gr.	8"	40 gr. FFFg	890	28 gr. FFFg	
Navy Arms Army Belt Model	.36	.375, 80 gr.	6½"	32 gr. FFFg	1040	20 gr. FFFg	
Navy Arms Walker Model	.44	.445, 137 gr.	9"	60 gr. FFFg	1150	35 gr. FFFg	
Numrich Arms Corp. Minuteman Percussion	.45	.445, 130 gr.	39"	60 gr. FFFg	1600		742
				85 gr. FFFg	1998		1150
				110 gr. FFFg	2170		1360
				125 gr. FFFg	2236		1446
				135 gr. FFFg	2275		1500
same	.45	.445, 250 gr. (Lyman no. 445599 Minie bullet)	39"	75 gr. FFg	1472		1210
				95 gr. FFg	1634		1490
				110 gr. FFg	1745		1700
				125 gr. FFg	1862		**1930

TABLE 1 – Recommended loads for blackpowder replicas.

GUN	CALIBER	BALL SIZE & WEIGHT	BARREL LENGTH	HUNTING LOAD	MUZZLE *VELOCITY in fps.	TARGET LOAD	ENERGY IN FOOT POUNDS
Dixie Gun Works Plainsman	.45	.445, 130 gr.	32"	85 gr. FFFg	1855		1000
				110 gr. FFFg	2002		1160
				125 gr. FFg	2150		1335
same	.45	.445, 250 gr. (Lyman no. 445599 Minie bullet)		110 gr. FFg	1700		1610
				125 gr. FFg	1832		**1870

All loads chronographed and recommended by the author, John Lachuk, for the modern replicas listed. Velocities may vary somewhat in individual guns.

* Instrumental velocity measured with a Telepacific Electronics Co. chronograph, 10 feet from the muzzle.

** This compares well with such venerated deer rifles as the .40-40, firing a 200-grain soft-point at 1,320 fps, with 985 foot pounds at the muzzle, and the .30/30 Winchester, firing a 170-grain soft-point at 2,220 fps, with 1,860 foot pounds at the muzzle.

TABLE 1 (con't)

SYMPTOMS	CAUSES	CURES
1. Black streaks and charred holes where patch lay in grooves.	Patch too thin. Gas blow-by in grooves burns cloth.	Use a thicker patch. Ball diameter may be increased if much under bore diameter.
2. Frayed holes worn through where cloth touched lands.	Rough, rusted lands tear cloth.	Try a patch of stronger material. Freshout or recut bore if possible.
3. Slits in cloth along contact of patch and land corners.	Lands too sharp. Patch is cut while loading.	Scrub bore with steel wool, or lap. Try stronger cloth, or slightly thinner.
4. Annular slit, cut part way round where ball lay on patch when being loaded.	Muzzle too sharp. Cuts patch when ball is started into bore.	Chamber muzzle. Try a stronger cloth.
Black circle in center where ball lay, some soiling from powder fouling, minimum of burnt streaks at groove marks, cloth everywhere intact.	Good lubrication, bore good, patch can't wear or burn through.	None needed. Rifle should shoot accurately with correct powder charge.

TABLE 2 — Difficulties and remedies in shooting a Kentucky rifle. (Courtesy Dixie Gun Works)

Percussion caps are something of a problem to fit correctly on a nipple. The sizes are not exactly standard. Our modern-made nipples generally measure .163" tapered to .168" plus or minus .002 from top to bottom. The .167-8 caps will have a snug fit on some nipples; others will fit only by forcing. If the cap that you are using must be forced on your nipples, you can grind or polish the neck of the nipple to reduce the diameter and thus allow your caps to fit better. It is hoped that this chart will serve to further enlighten the subject.

	Inside Diameter	Length Of Cap
No. 10 Alcan	.167	.178
No. 11 Italian	.168	.153
No. 1075 German	.170	.170
Eley No. F4-12	.170	—
No. 1055 German	.170	.220
No. 11 Remington	.170	.190
No. 11 Italian (Dixie)	.172	.206
Eley No. F4-21	.175	—
No. 11 Winchester	.175	.200
Eley No. F4-25	.177	—
No. 12 Alcan	.178	.195
No. 12 Remington	.178	.180

TABLE 3 — Cap size. (Courtesy Dixie Gun Works)

C. A. .451 flintlock rifle of new manufacture has been chronographed. The round ball was shot in a greased patch. Its weight was about 135 grains. Barrel length was 44 inches. The charge of FFFg black powder shown gave the following muzzle velocities. Striking energies at muzzle have been added on basis of the above bullet weight.

FFFg Charge (grs.)	Velocity (f.p.s.)	Energy (ft. lbs.)
30	1180	420
40	1560	730
50	1700	865
60	1800	970
70	1940	1130
90	2100	1325
100	2140	1375

TABLE 4 — Muzzle velocities of the .451 flintlock rifle. (Courtesy Dixie Gun Works)

CHART OF BALL SIZES TO USE IN DIXIE RIFLE BARRELS MADE BY DOUGLAS

Caliber	Land To Land	Ball Size
.22	.321	.315
.36	.363	.365
.40	.403	.395
.45	.451	.445
.50	.501	.495

CHART OF BALL SIZES TO USE IN DIXIE BARRELS MADE BY NUMRICH

Caliber	Land To Land	Ball Size
.31	.297	.290
.36	.347	.340
.45	.443	.435
.58	.570	.565

DIXIE RIFLE AND PISTOL BARRELS OF .40 CALIBER

Caliber	Land To Land	Ball Size
.40	.400	.395

TABLE 5 – Dixie Gun Works ball and barrel data. (Courtesy Dixie Gun Works)

TYPE AND CALIBER	SIZE BALL USED	POWDER CHARGE IN GRAINS
.69 U.S. Muskets Models 1808-1812-1821-1831-1840-1842	.680	80 FFG
.69 U. S. Musket Models 1821-1840-1842, rifled from smooth bore	.680	75 FFG
.69 Whitneyville Plymouth Navy Rifle	.680	70 FFG
.58 Remington Zouave	.570 to .575	60 FFG
.58 U.S. Civil War Rifles Models 1855-61-63	.570 to .575	60 FFG
.67 Tower Flint Pistol	.650	35 FFFG
.58 U.S. Springfield Pistols Model 1855	.570 to .575	40 FFG
.577 English Enfield Rifle	.570 to .575	60 FFG
.58 Fayetteville, Richmond, Cook Bros., Columbus and other Confederate Civil War Muskets	.570 to .575	60 FFG
.54, 1804-1814-1817 U. S. Rifles	.535	75 FFFG
.54 U. S. Mississippi Rifle	.535	75 FFFG
.52 Sharp's Carbines & Rifles	.535 to .555	60 FFFG
.54 U.S. Pistol Models 1819-21-26-36-42	.535	35 FFG
.54 Halls Carbine	.535	85 FFG
.54 Halls Rifle	.535	100 FFFG
.54 Burnside	.558	60 FFFG

TABLE 6 – Standard muzzleloading charges. (Courtesy Dixie Gun Works)



NOTE: The Maxi-Ball should be shot as cast. Sizing will alter the diameter of the first bearing band and destroy the efficiency of the projectile. Do not attempt to size the bullet.

The Maxi-Ball is lubricated with Thompson/Center Maxi-Lub. The use of this specially prepared bullet lubricant is extremely important to accuracy. Using your fingers, rub Maxi-Lub into the lubricating grooves as pictured, making certain that all sides of the bullet are well covered.

FIGURE 1

First let us state that there is no "one load" for a muzzleloading firearm. A round ball or Maxi-Ball can be driven with any reasonable charge of blackpowder. At specific ranges, some charges (usually the lighter ones) give better accuracy than others. For hunting, however, it may be that the shooter wishes to sacrifice optimum accuracy for a higher velocity and bullet energy and, consequently, heavier loads are selected.

The following charts show the range of ballistic performance that is possible in Thompson/Center firearms through charge variations. These charges represent a range of optimum efficiency which we feel is proper for our firearms. Heavier loads are not to be used, nor is a substitution of powder granulation to be attempted. Thompson/Center Arms is not accountable for loading information printed in sources other than this handbook.



SUGGESTED ROUND BALL LOADS FOR THE .36 CALIBER SENECA

(Use No. 11 Percussion Caps)

Use with T/C Patch Material. Patch should be lubricated with T/C No. 13 Powder Solvent and Patch Lubricant.

40 Grains FFFG Muzzle Velocity 1,894 F.P.S. Muzzle Energy 518 Ft. Lbs.	60 Grains FFFG Muzzle Velocity 2,150 F.P.S. Muzzle Energy 667 Ft. Lbs.
50 Grains FFFG Muzzle Velocity 2,034 F.P.S. Muzzle Energy 597 Ft. Lbs.	(Test figures obtained using DuPont Black Powder)



SUGGESTED ROUND BALL LOADS FOR THE .45 CALIBER SENECA

(Use No. 11 Percussion Caps)

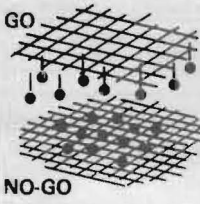
Use with T/C Patch Material. Patch should be lubricated with T/C No. 13 Powder Solvent and Patch Lubricant.

50 Grains FFG Muzzle Velocity 1,584 F.P.S. Muzzle Energy 707 Ft. Lbs.	80 Grains FFG Muzzle Velocity 1,904 F.P.S. Muzzle Energy 1,022 Ft. Lbs.
60 Grains FFG Muzzle Velocity 1,701 F.P.S. Muzzle Energy 816 Ft. Lbs.	90 Grains FFG Muzzle Velocity 1,980 F.P.S. Muzzle Energy 1,106 Ft. Lbs.
70 Grains FFG Muzzle Velocity 1,800 F.P.S. Muzzle Energy 914 Ft. Lbs.	(Test figures obtained using DuPont Black Powder)

TABLE 7 – Suggested loads for Hawken and Seneca rifles. (Courtesy Thompson/Center Arms)

To determine granule size, a "Go" and "No Go" system was employed. Powder was passed through a series of screens which contained a given number of meshes per square inch. These screens became progressively finer so that powder was trapped, separated, and graded at various stages in relation to its coarseness.

BLACK POWDER WAS PASSED THROUGH A SERIES OF SCREENS TO DETERMINE ITS GRANULE SIZE . . .

GO	"Go"	"No-Go"	Designation*
	10 Meshes per in.	14 meshes per in.	-FG
	16 Meshes per in.	24 meshes per in.	-FFG
	24 Meshes per in.	46 meshes per in.	-FFFG
	46 Meshes per in.	60 meshes per in.	-FFFFG

*The designation shown in this chart (a series of the letter "F") is the accepted method of identifying the various granule sizes of black powder.

TABLE 8 – Blackpowder granule sizes. (Courtesy Thompson/Center Arms)

To perform its tasks properly, the patch material must be extremely tough and it must be under considerable compression – not only in the area where it bears on the lands, but also at the bottom of each groove. If the material is not compressed in the grooves, the expanding gas will force its way around the projectile.

PATCH AND BALL FIT



To form a gas seal, the patch must also be compressed in the grooves.




When a perfectly patched round ball is driven through the barrel, it will show cloth marks around its circumference. The ball will be heavily engraved where it bore on the lands and lightly engraved in the groove area. As it is too difficult to load by hand, a combination this tight is seldom used in a hunting rifle.


Thus, an optimum condition results in complete and absolute bore sealing. Unfortunately, this perfect situation is extremely hard to obtain due to the mechanical problem of loading a muzzleloader. Some compromise must be reached between loadability and complete bore sealing. You must be able to start the ball into the muzzle and seat it on the powder without excessive battering or flattening of the projectile itself. To obtain accuracy, it is equally essential that the front of the ball remain round.


TABLE 9 — Patch and ball criteria. (Courtesy Thompson/Center Arms)


 <p>SUGGESTED LOADS FOR THE .45 CALIBER MAXI-BALL IN THE SENECA RIFLE (Use No. 11 Percussion Caps) Do not use a cloth patch. Lubricate bullet with T/C MAXI-LUB.</p>	
<p>60 Grains FFG Muzzle Velocity 1,369 F.P.S. Muzzle Energy 915 Ft. Lbs.</p>	<p>80 Grains FFG Muzzle Velocity 1,541 F.P.S. Muzzle Energy 1,160 Ft. Lbs.</p>
<p>70 Grains FFG Muzzle Velocity 1,456 F.P.S. Muzzle Energy 1,036 Ft. Lbs.</p>	<p>(Test figures obtained using DuPont Black Powder)</p>
 <p>SUGGESTED LOADS FOR THE .45 CALIBER MAXI-BALL IN THE HAWKEN RIFLE (Use No. 11 Percussion Caps or T/C Flints) Do not use a cloth patch. Lubricate bullet with T/C MAXI-LUB.</p>	
<p>80 Grains FFG Muzzle Velocity 1,564 F.P.S. Muzzle Energy 1,195 Ft. Lbs.</p>	<p>100 Grains FFG Muzzle Velocity 1,743 F.P.S. Muzzle Energy 1,485 Ft. Lbs.</p>
<p>90 Grains FFG Muzzle Velocity 1,659 F.P.S. Muzzle Energy 1,345 Ft. Lbs.</p>	<p>(Test figures obtained using DuPont Black Powder)</p>

TABLE 10 — Thompson/Center Arms loading data. (Courtesy Thompson/Center Arms)

 <p>SUGGESTED LOADS FOR THE .36 CALIBER MAXI-BALL IN THE SENECA RIFLE (Use No. 11 Percussion Caps) Do not use a cloth patch. Lubricate bullet with T/C MAXI-LUB.</p>	
<p>40 Grains FFG Muzzle Velocity 1,761 F.P.S. Muzzle Energy 882 Ft. Lbs.</p>	<p>60 Grains FFG Muzzle Velocity 2,001 F.P.S. Muzzle Energy 1,138 Ft. Lbs.</p>
<p>50 Grains FFG Muzzle Velocity 1,843 F.P.S. Muzzle Energy 965 Ft. Lbs.</p>	<p>(Test figures obtained using DuPont Black Powder)</p>

 <p>SUGGESTED LOADS FOR THE .50 CALIBER MAXI-BALL IN THE HAWKEN RIFLE (Use No. 11 Percussion Caps or T/C Flints) Do not use a cloth patch. Lubricate bullet with T/C MAXI-LUB.</p>	
<p>80 Grains FFG Muzzle Velocity 1,271 F.P.S. Muzzle Energy 1,328 Ft. Lbs.</p>	<p>100 Grains FFG Muzzle Velocity 1,418 F.P.S. Muzzle Energy 1,652 Ft. Lbs.</p>
<p>90 Grains FFG Muzzle Velocity 1,344 F.P.S. Muzzle Energy 1,484 Ft. Lbs.</p>	<p>(Test figures obtained using DuPont Black Powder)</p>

 <p>SUGGESTED ROUND BALL LOADS FOR THE .45 CALIBER HAWKEN (Use No. 11 Percussion Caps or T/C Flints) Use with T/C Patch Material. Patch should be lubricated with T/C No. 13 Powder Solvent & Patch Lubricant.</p>	
<p>50 Grains FFG Muzzle Velocity 1,605 F.P.S. Muzzle Energy 732 Ft. Lbs.</p>	<p>90 Grains FFG Muzzle Velocity 2,003 F.P.S. Muzzle Energy 1,140 Ft. Lbs.</p>
<p>60 Grains FFG Muzzle Velocity 1,720 F.P.S. Muzzle Energy 841 Ft. Lbs.</p>	<p>100 Grains FFG Muzzle Velocity 2,081 F.P.S. Muzzle Energy 1,231 Ft. Lbs.</p>
<p>70 Grains FFG Muzzle Velocity 1,825 F.P.S. Muzzle Energy 947 Ft. Lbs.</p>	<p>110 Grains FFG Muzzle Velocity 2,158 F.P.S. Muzzle Energy 1,324 Ft. Lbs.</p>
<p>80 Grains FFG Muzzle Velocity 1,929 F.P.S. Muzzle Energy 1,054 Ft. Lbs.</p>	<p>(Test figures obtained using DuPont Black Powder)</p>

 <p>SUGGESTED ROUND BALL LOADS FOR THE .50 CALIBER HAWKEN (Use No. 11 Percussion Caps or T/C Flints) Use with T/C Patch Material. Patch should be lubricated with T/C No. 13 Powder Solvent & Patch Lubricant.</p>	
<p>50 Grains FFG Muzzle Velocity 1,357 F.P.S. Muzzle Energy 761 Ft. Lbs.</p>	<p>90 Grains FFG Muzzle Velocity 1,950 F.P.S. Muzzle Energy 1,571 Ft. Lbs.</p>
<p>60 Grains FFG Muzzle Velocity 1,434 F.P.S. Muzzle Energy 850 Ft. Lbs.</p>	<p>100 Grains FFG Muzzle Velocity 2,052 F.P.S. Muzzle Energy 1,739 Ft. Lbs.</p>
<p>70 Grains FFG Muzzle Velocity 1,643 F.P.S. Muzzle Energy 1,115 Ft. Lbs.</p>	<p>110 Grains FFG Muzzle Velocity 2,135 F.P.S. Muzzle Energy 1,583 Ft. Lbs.</p>
<p>80 Grains FFG Muzzle Velocity 1,838 F.P.S. Muzzle Energy 1,396 Ft. Lbs.</p>	<p>(Test figures obtained using DuPont Black Powder)</p>


 <p>SUGGESTED LOADS FOR THE .45 CALIBER PATRIOT (Use No. 11 Percussion Caps) Use with T/C Patch Material. Patch should be lubricated with T/C No. 13 Powder Solvent & Patch Lubricant.</p>	
<p>20 Grains FFG Muzzle Velocity 650 F.P.S.</p>	<p>30 Grains FFG* Muzzle Velocity 840 F.P.S.</p>
<p>25 Grains FFG Muzzle Velocity 765 F.P.S.</p>	<p>35 Grains FFG Muzzle Velocity 900 F.P.S.</p>
<p>*approximate loading for best accuracy.</p>	

TABLE 10 (con't)

ANSWERS

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1. They fired their rifles over clean snow (or other white surface) to see at what point they began to waste powder, by inspecting the snow after firing to see if unburned powder was coming out of the gun.
2. Gas blow-by, with resultant loss in velocity and accuracy.
3. The gun will blow up.
4. If you try to shoot the ball out, the result will be either a burst or ringed barrel.

NOTES

1. The first part of the report is a general introduction to the project. It describes the objectives and the scope of the work. It also mentions the names of the people who were involved in the project.

2. The second part of the report is a detailed description of the methods used in the study. It explains how the data was collected and how it was analyzed.

3. The third part of the report is a discussion of the results of the study. It compares the findings with previous research and discusses the implications of the results.

4. The final part of the report is a conclusion. It summarizes the main findings of the study and offers some suggestions for further research.

NOTES

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