

CROWNING GLORY

Improper Muzzle Crowning Can Destroy Accuracy; Here's What To Do About It!

SOME YEARS ago, a competition shooter showed me what I initially thought to be one of the finest target rifles I've ever seen. He had just returned from the range where he had found that this seemingly perfect rifle was throwing its shots all over the target. This was despite the fact that it had a new barrel of super target grade that was meticulously bedded.

He explained his troubles in detail, elaborating on the fact that he had spared no expense in having it built for competition shooting, only to find that it wouldn't hit the side of the proverbial barn!

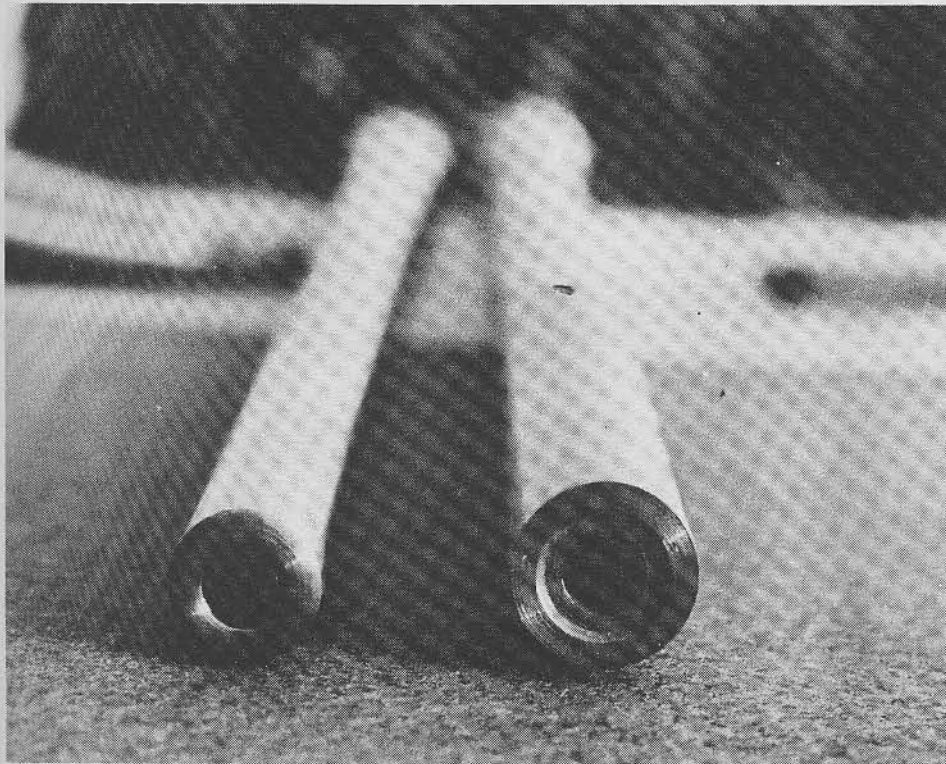
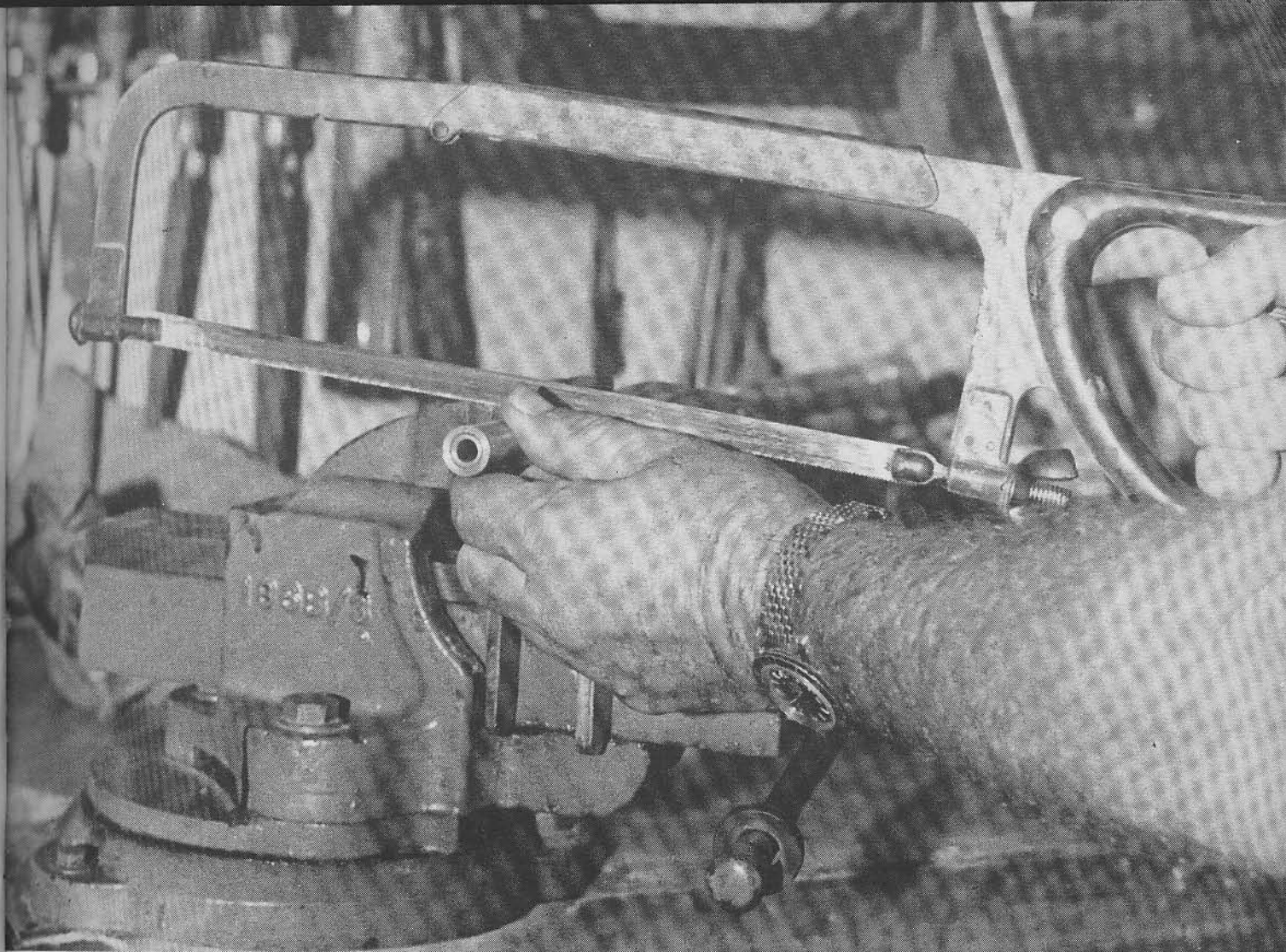
Appearances alone cannot reveal the quirks that make a rifle shoot erratically. Even a thorough visual examination of each part may fail to detect the fault.

Beginning with the action, the headspace was found to be perfect. The bedding, too, appeared to be as perfect as man could make it, showing no high spots that could cause barrel warp when heated. Tightness of the sights was checked for possible creep under recoil, but they were solid.

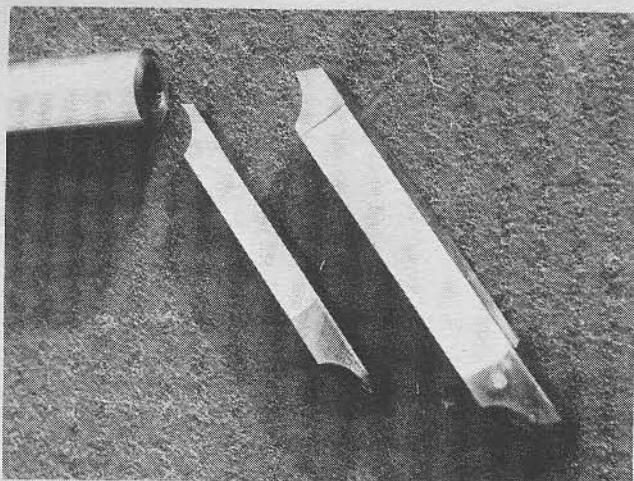
The premier-grade target barrel had been purchased as a blank, requiring threading, chambering and final finishing to the caliber desired by the purchaser. When purchased, the barrel was twenty-six inches in overall length, but had been cut to twenty-four inches in the final stage of finishing.

After several hours of close study of the rifle, I was about to give up when I recalled the owner saying that this had been a twenty-six-inch blank and had been cut to twenty-four inches. Then something began to turn in my mind.

It finally dawned on me that I had overlooked — and had forgotten to check — one of the most important factors that can mean the difference in a rifle being accurate and one that shoots like a shotgun. About three minutes after arriving at my workbench, I had nailed the trouble down as to why this otherwise fine rifle persisted in being so target erratic. The crowning of the muzzle had been done so haphazardly that the rifle could only spew out bullets in a general direction, with no accuracy.

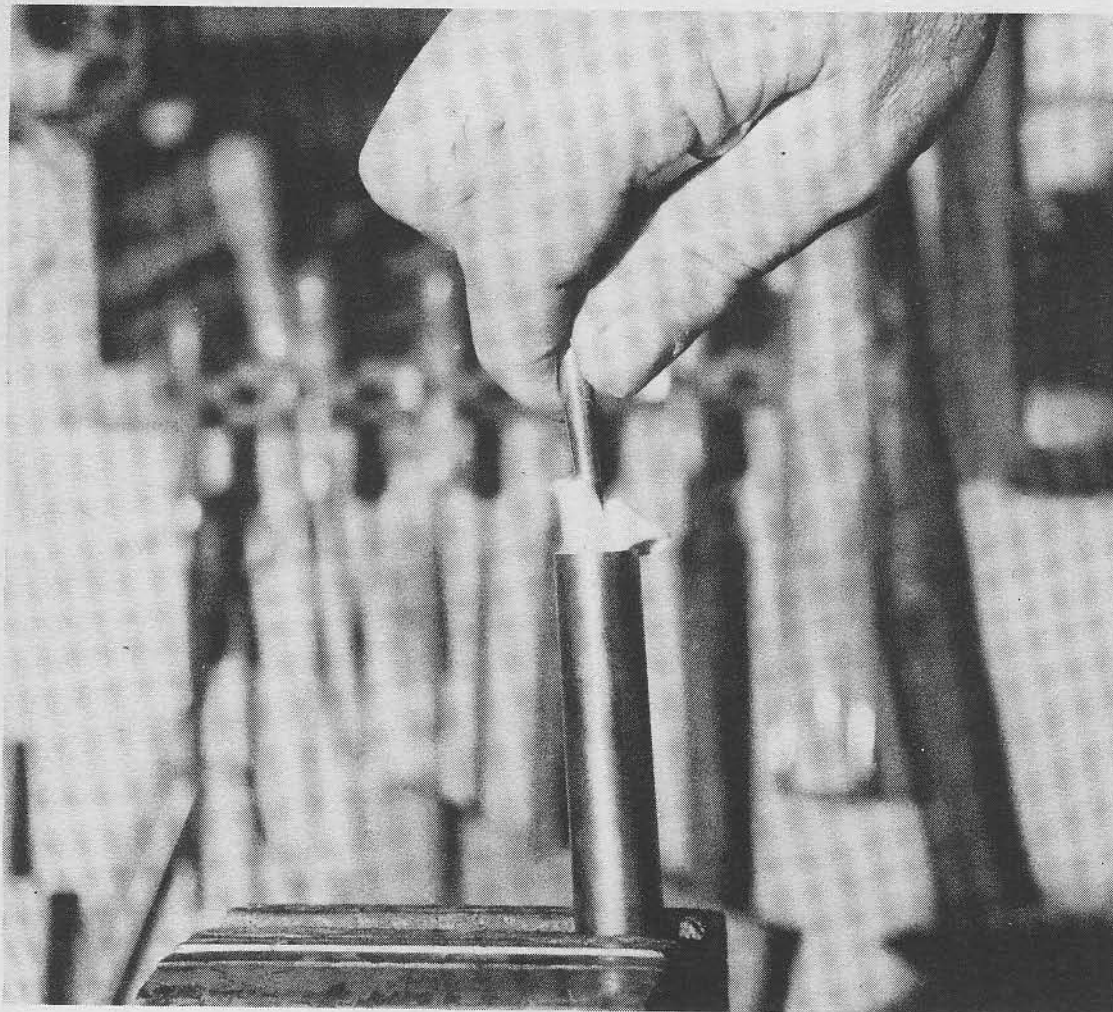


Above: In cropping a barrel by hand, leave one-sixteenth inch for filing, squaring the muzzle. Cut is made with a hacksaw with 18 teeth to the inch. (Left) The better grade barrels are crowned, ready for installation. Others are unfinished so that they may be shortened as required.



Special barrel crowning bits such as these in 1/4 and 3/8 inch are available for those who have a lathe available.

Before beginning to cut off the barrel, one should run a patch an inch down the bore. This precaution prevents the steel chips removed from dropping into rifle's bore.

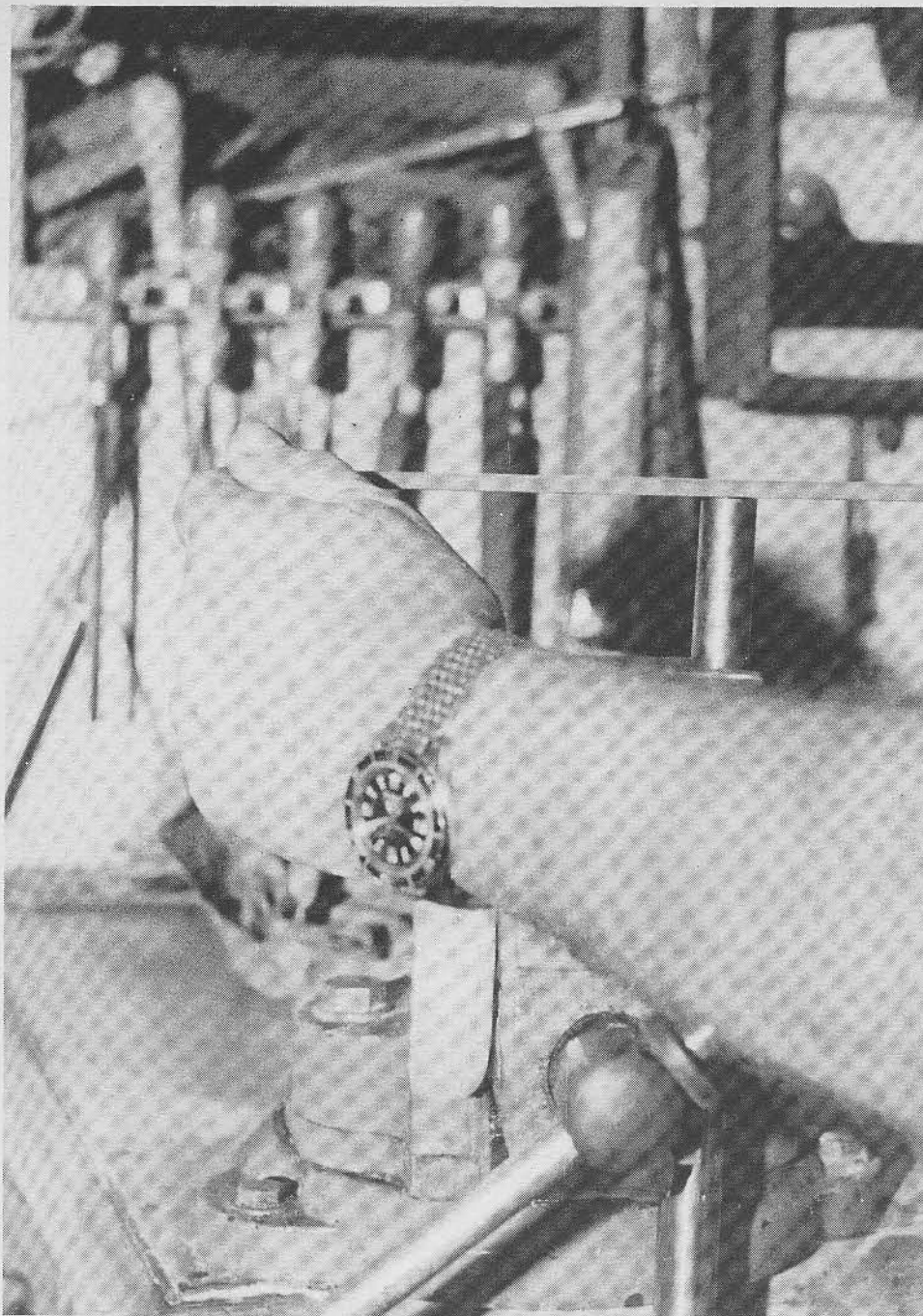


With a steel machinist's square, an assortment of files and a crown lapping tool, I soon had the crown of the barrel straightened up. At least, it was about one hundred percent better than it had been. Despite the fact that it was now about 1 a.m., I put through a call to my friend, getting him out of bed to tell him I was quite sure I had found the trouble. He wanted to jump into his car, drive the seventy-odd miles to my home and shoot the rifle then and there! It finally was agreed that he would be at my home about nine that morning.

Not yet explaining just what I felt the trouble had been — I wasn't absolutely certain that this was the whole trouble as yet myself — we arrived at the range, obtained a shooting station, placed our targets in the racks at a hundred yards, then crossed our fingers.

The first five shots from benchrest were all in the black, the group measuring about two inches in diameter! Following shots shrunk the groups to less than an inch in the hands of my friend. Eleven separate five-shot groups were fired that morning. The groups remained consistently under one inch. The erratic shooting of the rifle had been eliminated by only a few minutes of work, but several hours in the process of elimination were expended before the fault was detected.

An improperly crowned barrel means an inaccurate rifle and, the smaller and lighter the caliber of the bullet, the more erratic it will be.



Cut to the prescribed length, plus a fraction for finishing, the muzzle is filed with a 12-inch mill bastard file until square. The surface then can be finished with emery cloth wrapped on the file. Be sure of the file angle.

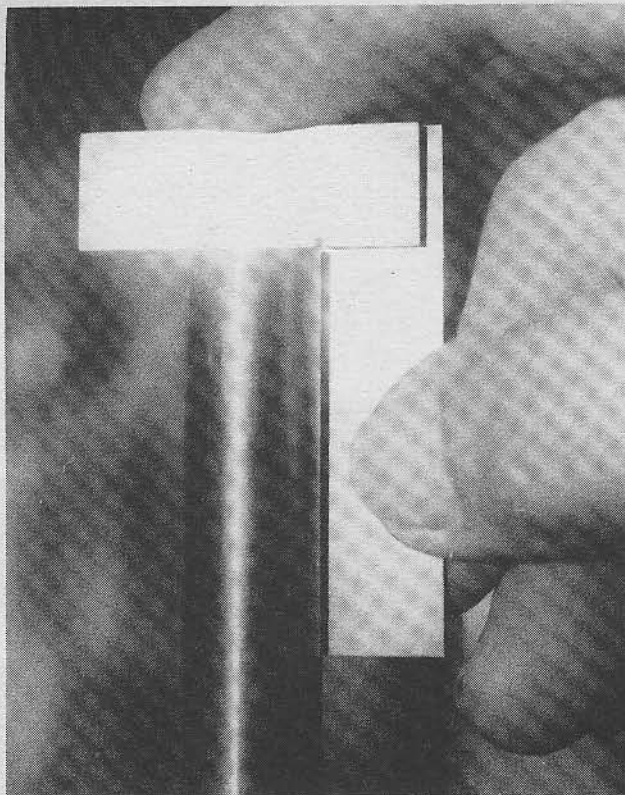
Proper crowning of a rifle barrel, as well as that of a pistol, means that it must be cut perfectly square so that the bullet will leave the muzzle with a true and equal bearing surface around its entire circumference. Should one side of the crown be low — as little as 0.001 inch and invisible to the eye — the escape of gases will be to that side, upsetting or tilting the bullet as it emerges from the muzzle. This results in erratic flight, even keyholing, if the bullet hits the target at all!

The best, easiest and most precise method of barrel

crowning is accomplished on a lathe, using specially ground barrel crowning bits. However, for the home craftsman, this job may be accomplished entirely by handwork if great care and precise workmanship are exercised.

For those who do not have a lathe, the best means of assuring a perfect barrel crowning job may be accomplished with nothing more than the few tools mentioned earlier: a machinist's steel square, a few files and a barrel crown lap.

The most important thing to remember in crowning a

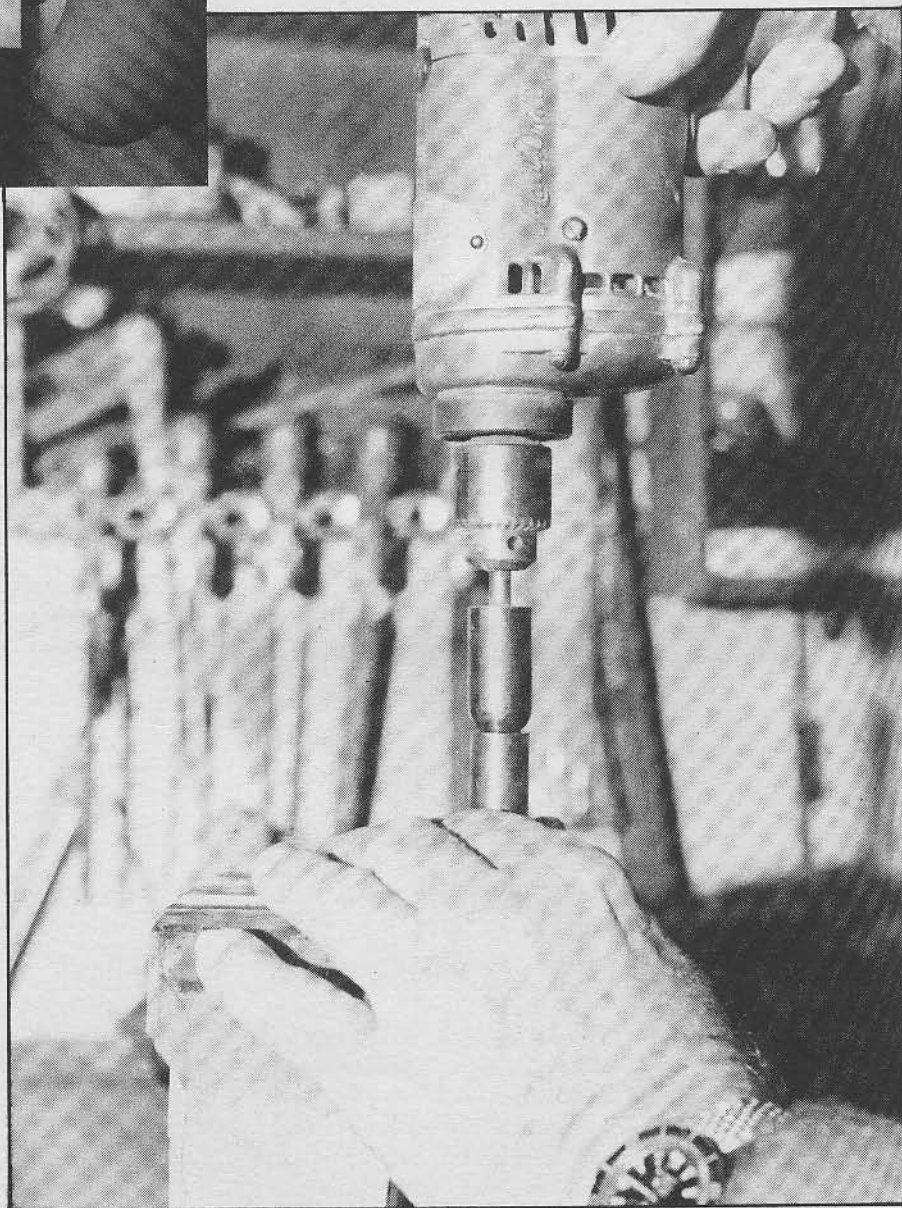


Above: During the filing of the muzzle it should be checked on a continuing basis for squareness, using a steel machinist square. (Right) Deburring the bore should be done with a crowning lap that is treated with a mixture of oil/600-grit emery dust. The lap is rotated by hand or power drill.

barrel by hand is that precision is the keynote. Remember that 0.001 inch I mentioned earlier? This is so slight as to be undetectable visually, but with careful use of the steel square and judicious use of the files and crowning lap, a perfect job is possible.

One may want to shorten the barrel of a certain rifle for ease of carrying or packing on horseback. Again, the best method is with a lathe, but it can be accomplished with nothing more than a hacksaw and the aforementioned hand tools. The cut is made with the hacksaw, allowing a full one-sixteenth-inch in additional length of the barrel for crowning and squaring up of the barrel.

Crowning on a lathe is a fairly simple job. It consists of merely lathing off the barrel to proper length. Then, changing to a crowning bit on the lathe, run this bit into the pre-squared muzzle until it has the desired roundness or crown. Should one possess a lathe, then these crowning bits may be purchased from Brownell's of Montezuma, Iowa, in the one-quarter- or three-eighths-inch size. Too, these tools





The crowning lap is coated lightly with the abrasive compound after it first has been coated with machine oil.

are extremely difficult to grind properly, so it is best to buy them already ground to the correct contour for barrel crowning.

Should barrel crowning be done by hand, during hack-sawing and filing, almost undetectable burrs of metal will be left around the edges of the newly cut crown. These burrs will be inside the bore itself and must be removed for a job that will result in greater accuracy. Some leave these minute burrs intact within the bore, maintaining that after a few rounds are fired, they will disappear anyway!

These burrs should be removed with the lapping tool mentioned earlier. This tool may be used in an electric hand drill. The rounded face of this lap is coated with a fine abrasive compound mixed with oil, then is placed squarely onto the bore of the barrel. It is rotated, either by hand or

power tool, until the burrs are polished away, leaving the bore unobstructed.

But the whole trick in a perfect muzzle crown is having it absolutely and precisely square! Any variation — however minute — will affect the bullet's flight.

A factor that must be taken into consideration, when using a machinist's square to square up a crown, is the possible taper of the barrel's exterior surfaces. This taper, slight though it may be, must be taken into consideration when using the exterior barrel surfaces as a plane by which to square up the muzzle. Should the taper be too pronounced, a precise instrument such as a dial indicator, must be employed.

But regardless of the method, that muzzle must be perfectly square to assure the best possible accuracy.