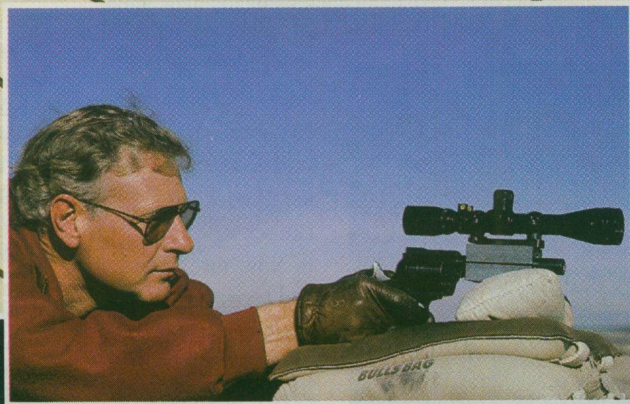
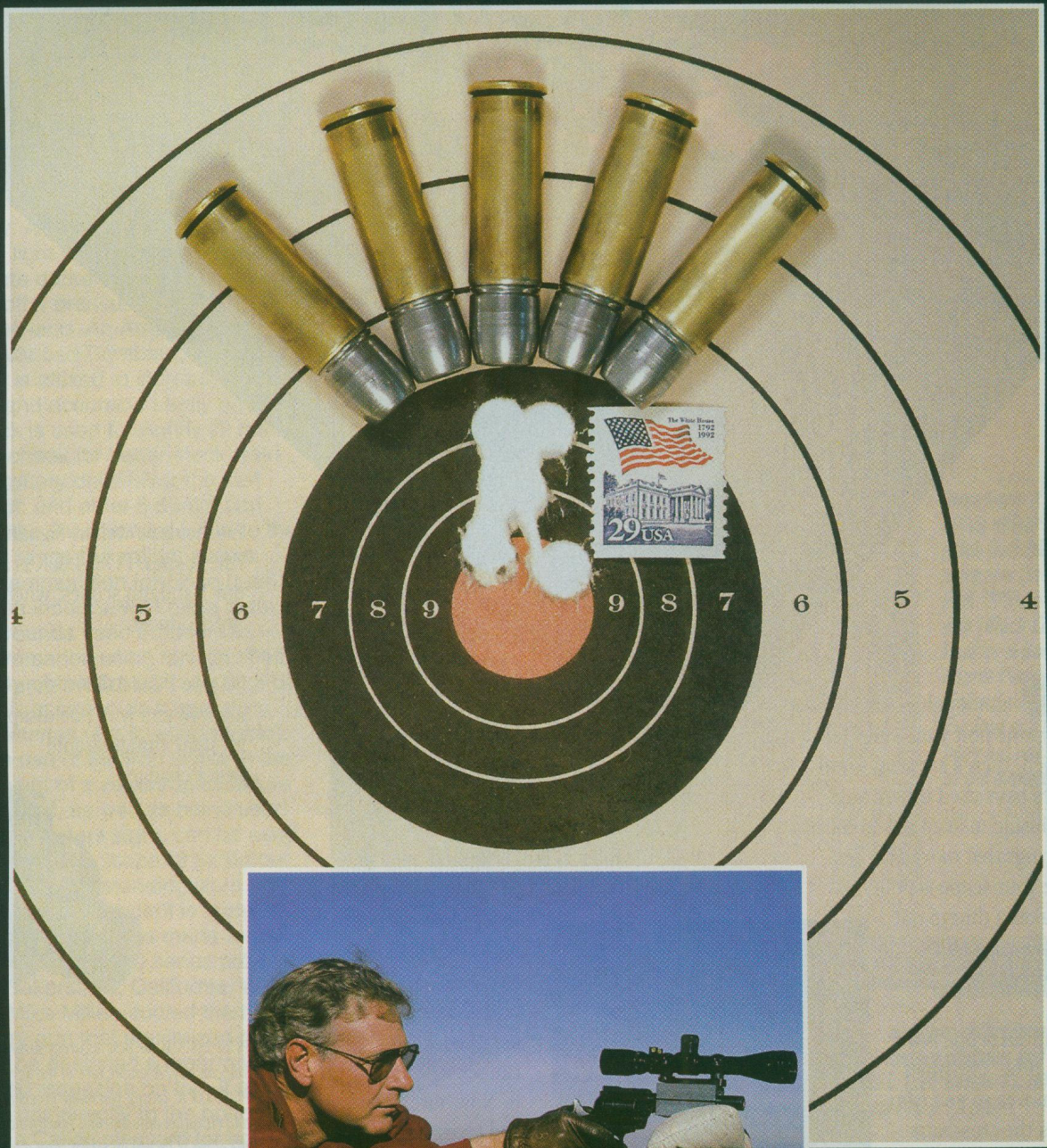


IN SEARCH OF THE *MINUTE-OF-ANGLE*



The hunt for the rarest of the rare—a wheelgun that can outshoot most rifles!

By Ross Seyfried

REVOLVER

There are few certainties in shooting, but I can safely say that the more you know about revolvers, the less apt you are going to be to believe what I am about to say. Not only is it possible, but if you do everything right it is probable, that a revolver will shoot one-inch groups...at 100 yards!

Trust me, I was right there with you as a disbeliever. I have heard rumors of the "inch revolver" for years. I viewed them like the stories from the fellow who thumped his deer at 500 yards with his .30-30. If he would just make a good, honest 300-yard lie I would believe it. It's the same with revolver accuracy. If they had told me that they occasionally got a two-inch group I would have swallowed it. But then the inch rumors persisted and they began to come regularly from a very reliable source. It was still easier to deny than investigate for a couple of years, but finally the argument and explanation from Veral Smith became too credible to ignore. It also came with real names and phone numbers.

When I contacted these "inch-shooters" I was still very ready to hear from the fellow who could do it every time, with iron sights. That would have made my life a lot easier. But instead of the flat-out lies, I heard a loud ring of truth that went much like this: "It's darn tough to do; even if the gun will shoot, I can't prove it every day. The dimensions have to be perfect, the air has to be perfect and I have to be having a good day. Iron sights? You have to be joking!" Similar stories came from different shooters, in different parts of the country, using very different guns. But they all went at it in almost exactly the same way. Darn, there were people out there actually holding minute of angle with revolvers! The gauntlet was set—I had to prove it to myself.

Their guns were an interesting array: Dan Wesson .41, S&W .357, Ruger Security Six .357, Ruger Redhawk .44

and a Freedom .454. What this tells us is that super-accurate revolvers do not necessarily come out of custom shops and they are not predicated on price or caliber. They are, however, very special, in a way that you can make your own. I won't pretend that every revolver is capable of extreme accuracy, but with the application of the following principles most revolvers will outshoot their shooters.

Fine revolver accuracy is essentially the result of four interrelated qualities with their importance more or less in order. Keep in mind that like a chain any weak link will cause failure. To be very accurate a revolver must have

**Super-accurate
revolvers do not
necessarily come out
of custom shops and
they are not predicated
on price or caliber.**

them all: dimensions, barrel, bullet and alignment.

Unquestionably the dimensional relationship between the cylinder throat, groove diameter and bullet diameter must be compatible for the gun to shoot. In simplest terms, the revolver must get smaller from rim to muzzle. If I had to state what, at the moment, I believe to be the ideal revolver, in numbers, it would be as follows. These numbers represent half-thousandths of an inch and are relative to the revolver's groove diameter at the muzzle: muzzle .0000 inch, breech .0005 inch, bullet .0010 inch, cylinder throat .0015 inch. The bullet clears the cylinder throat by one-half-thousandth and is one-half-thousandth larger than the grooves at the breech end. The barrel tapers one-half-thousandth from

forcing cone to muzzle. The gun story that actually made me a believer in the inch-revolver concept focused on dimensions. A shooter had a Freedom Arms .454 that was just plain inaccurate. It suffered from a not-uncommon disease: the cylinder throats were smaller than the grooves. In spite of the tight tolerances and perfect alignment, this gun's accuracy was doomed. It had tight .4515-inch throats and a huge .454-inch barrel. Put somewhat dramatically, once the bullets were squeezed through that tiny throat, they never touched the barrel. Fortunately the gun's owner was knowledgeable and able. He took the cylinder to a machine shop with a bore hone and had the cylinder throats enlarged. Next he had a bullet mold made to fit and voila, one of the most accurate revolvers I have encountered.

Beyond being the correct size, relative to throat and bullet our barrel should be smooth and straight. That is to say the pitch and depth of the rifling must be uniform as must be the groove diameter. One of the great obstacles to accuracy is choke where the barrel screws into the frame. Virtually every revolver has it to some degree. If the barrel is choked, it sizes the bullet down, making it impossible for the bullet to fit the barrel perfectly for the rest of its ride to freedom. The reason for the taper mentioned above is to give the bore an ever-tightening grip on the bullet. The course to a perfect barrel is often through fire-lapping (see *G&A* July 1993). Virtually all of the one-inch revolvers I have encountered have been fire-lapped.

To good dimensions and a fine barrel we must add a good bullet. If you happen to be a disciple of the Freedom Arms school, you will automatically assume that you must have a jacketed bullet to qualify. In general just the opposite is the truth. Cast lead bullets are normally the accuracy champions. Again in generality, the accurate bullets tend to be LBT long flatnose and

MINUTE-OF-ANGLE REVOLVER

wide flatnose shapes, with gas checks. These have a long bearing surface with a wide front driving band. Together they take the extreme forces that generate bullet rotation when it engages the rifling in a uniform, repeatable way. The cast bullets should be very hard, either of hardened wheel weights or Linotype. Both have hardnesses in the 20 to 24 Brinnell range. Jacketed bullets cer-

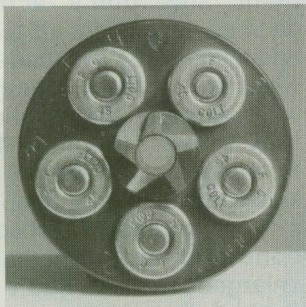
of somewhat loose cylinder lockup and random misalignment that allows some production revolvers to be superstars. If we have a very tight cylinder lockup and less than perfect alignment the bullets must be bent, sliced or oveled in order to get into the bore. With this mistreatment it is unlikely that they will all go the same direction.

So far my life in the world of super-accurate revolvers had been hearsay.

variable in the accuracy quest. Along with the barrels themselves we wanted to test some throating techniques as well. Several barrels with known dimensions and a fine reputation for accuracy would greatly simplify the accuracy search. With this thought in mind we ordered a length of Pac-Nor hand-lapped barrel, specifying that the groove diameter must fall between .4515 and .4520 inch. This barrel measured .4516 inch. From this one blank, three six-inch barrels were made and fitted to the frame with its line-bored cylinder. One barrel had a standard forcing cone, another no forcing cone and the third a Taylor throat. This is a freebored (non-rifled) section five-eighths of an inch long at the breech end. The cylinder gap was set on all three at .002 inch.

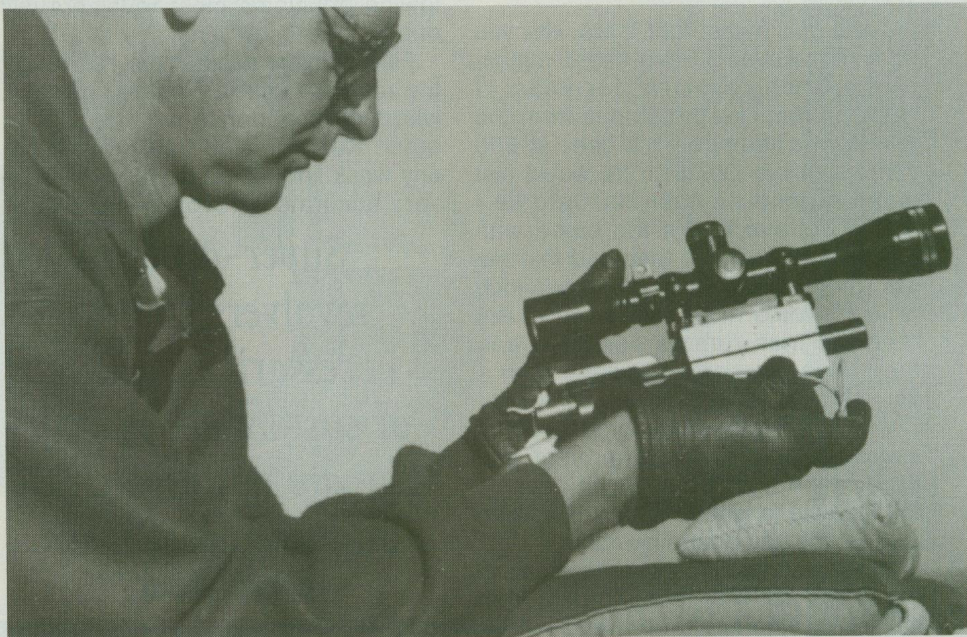
The gun did not have an ejector rod or sights. Instead I would use my slave (universal) scope mount that clamps onto the barrel to hold the 10X Burris

Extreme accuracy requires extreme consistency. The author made sure the cartridges were always oriented in the same way, with "FC" headstamp outermost, to keep things as consistent as possible.



tainly can be accurate, but because they come in "fixed" diameters you must be lucky enough to have a gun that fits the size that is available.

Finally, the business of alignment between barrel and cylinder must be addressed. I wish I could apply some absolutes here, but the variables are immense. I have reached some conclusions that lead us in the right direction. If we define the "perfect" revolver, every chamber will line up and look perfectly straight down the bore. With line-boring (cutting the cylinders individually in their corresponding frame) and other precision techniques this perfection, or something close to it, is possible. Pair this perfect alignment with dead-solid lockup so that the cylinder is not able to wobble, flex or rotate when the trigger is pulled and the hammer is down and you have an ideal revolver. Conversely, I believe that if the alignment is less than perfect a somewhat sloppy cylinder lockup may actually be beneficial. This "play" in the system allows the cylinder to be somewhat self-aligning—the bullet can actually tweak the chamber into alignment with the bore as it leaves the throat. I think that it is this combination



As the experimental barrels were not fitted with ejectors, a piece of insulated copper wire was used to punch out empty cases. Even though each case was fired dozens of times with high-pressure loads, no sticky extraction was encountered during the course of the author's shooting tests.

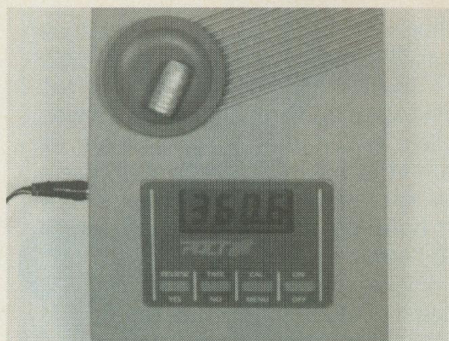
If they were real, one should be able to create the "inch" revolver on demand. The place to look for such a gun was extremely simple. While I am sure others exist, I knew only one man who might create such perfection on request. I rang Hamilton Bowen and placed a very simple order: "Make me a Bisley five-shooter in .45 Colt that is dimensionally perfect." Fortunate timing coupled my call with Bowen's start-up of his line-boring operation. This technique would assure near-perfect barrel/chamber alignment.

We felt that barrels could be the Achilles' heel and certainly a great

IER scope. I poked out the empty cases with a length of insulated copper electrical wire.

When the gun arrived I was confronted with the intimidating task of making ammunition that would allow the revolver to demonstrate its potential and what I felt was the awesome challenge of shooting it with a degree of finesse that would equal one-tenth-inch groups with a rifle. I was playing a game akin to benchrest rifle shooting and felt that I should follow suit with some of their case preparation techniques.

First I started with a new box of



In order to get the tightest possible groups, bullets were weighed individually using a PACT electronic scale and any that were more than one grain off were discarded prior to loading.

Federal .45 Colt cases, trimming them all to identical length. Then I weighed and sorted until I had a dozen that were within one-half grain. The flash holes were deburred and chamfered. Next I drew on advice from inch-shooters that I had talked to. The cases were only neck sized. That is, I pushed

sion to calculated laziness. Benchrest rifle shooters normally do not weigh their powder. I loaded the ammunition right on my old Dillon 450 press, using the Dillon powder measure. I could always resort to more time-consuming loading methods if this didn't work. I filled the primer tube with Federal #155 large pistol magnums and the powder hopper with Winchester 296.

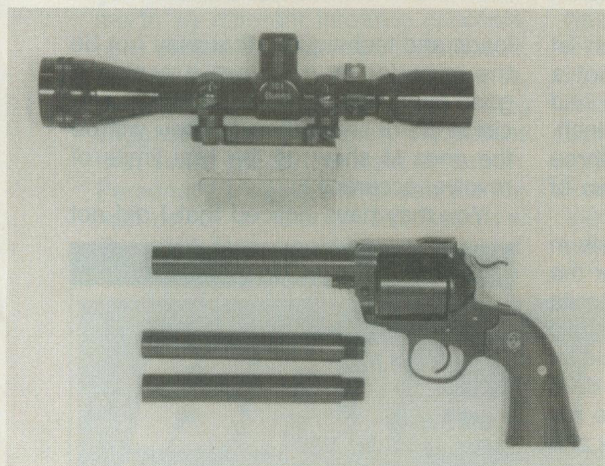
My first bullets were LBT 325-grain LFNs, cast from wheel weights and quenched in cold water. I made a sizing die for my Star that would squeeze them to .4524 inch. This diameter can just be pushed through the cylinder throats with modest hand pressure. Sizing procedure is important. The bullets should be pushed into the die nose first. The gas checks should be annealed to soften them and the punch that pushes the bullets and seats the checks should be very close to (.020 inch less than) bullet diameter. This punch should have a narrow ring

help eliminate shooter error. This was an ACD anti-cant device, or bubble level, on the scope. Inconsistent canting with such high trajectory over the long range would be fatal to accuracy. With the bubble level I could be certain that the revolver was oriented in the same vertical plane every time.

I used an Uncle Bud's sandbag combined with a 25-pound shot bag filled with sand for a rest. The combination offered fine support of both the gun and my hands, helping with the ultra-critical task of holding the gun with perfect uniformity from shot to shot.

My first attempts using the standard throat did not make any inch groups. They did offer some tantalizing strings and clusters with a few fliers. I had some groups in the two to four-inch range. After some shooting I rechecked the notes that came with the gun. They detailed that the alignment of chambers three and four was suspect. Bowen's gauges detected about .001 inch runout in number three and possibly as much as .003 inch in number four. This first line-boring setup had displayed some need for adjustment. With this information I began to shoot with the three perfect chambers and the groups shrunk. I had several that were less than two inches. I also tried some 300-grain Speer Plated Jacket bullets. They measured just over .451 inch and actually nudged that magical inch. Fire-lapping this already nearly perfect barrel seemed to improve consistency. Some experiments with different bullet molds showed added promise. Success was right there in front of me...I could almost touch it. Although I really believed that the freebore in the Taylor-throat barrel would be a detriment, I had to try it.

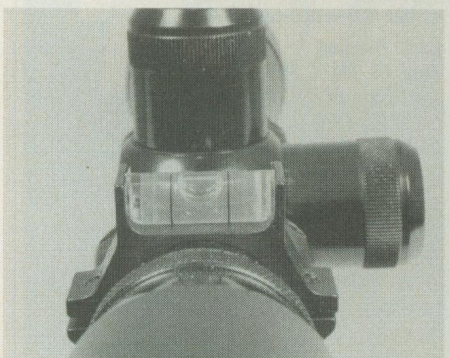
Along with the Taylor barrel installation I made a new batch of bullets. These were the big 360-grain WFN, but cast out of Linotype. This metal is the most likely to make a perfect bullet and has a reputation for accuracy. The reamer used to make the Taylor throat was actually oversize, cutting the freebore slightly larger than the cylinder throat. This meant that some gas and/or powder would be able to get past the bullet, further diminishing my hopes for this tube. But after a few shots to condition the barrel I knew my intuitions had been wrong. After a quick swab with fine steel wool to remove the fine coat of leading, I began to shoot in earnest. The first three made a horizontal cut 1.5 inches wide. The following three shots were a five-eighths-inch cloverleaf. I followed



The .45 Colt Bowen custom Ruger Bisley used in the author's accuracy experiments was fitted with three different barrels, each with a different type of throat. A Burris 10X IER scope with parallax adjustment is mounted to an aluminum block that clamps around whatever barrel is in use.

around its outer edge that does all of the work. This ring irons out the edge of the gas check, making the critical edges of the bullet base as flat and true as possible. I weighed each bullet, segregating them into plus- or minus-one-half-grain batches, discarding any that were more than a grain light or heavy. The light ones would have air bubbles, while the heavy ones were the result of the mold not being perfectly closed.

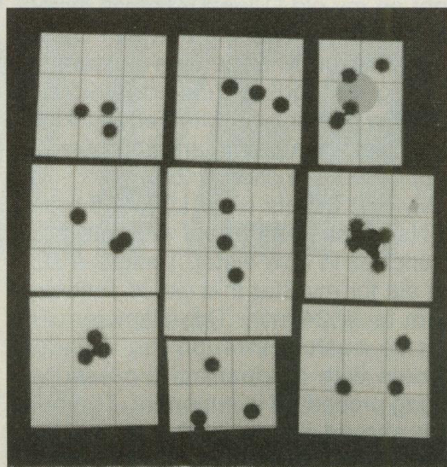
I did not move the powder measure setting from my standard hunting load for the five-shot .45s. It would drive the big bullets close to 1,400 fps and generate over 45,000 psi chamber pressure. Other shooters had suggested that full throttle was the way to go. With ammunition in hand, it was time to stop procrastinating and go to the shooting bench. I was truthfully intimidated by the challenge. Shooting tiny groups at 100 yards wasn't going to be easy and I really hate the word *can't*. I did make one addition to the gun to



The ACD spirit level mounted atop the scope helped ensure that the handgun was held perfectly straight for each shot—a must for the ultimate in accuracy.

them into the RCBS carbide sizer only one-half inch, sizing only the portion that held the bullet. Every time I fired the cases they were oriented in the chambers the same way. The FC on the headstamp was always next to the outside of the cylinder, at the top, in firing position. In the midst of all of this effort and concern I made one conces-

MOA REVOLVER

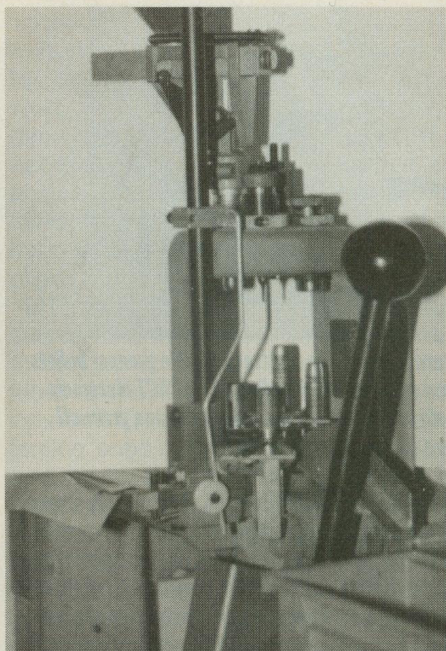


All of these groups were fired at 100 yards; squares on the grid measure one inch. Note several are strings that would be much tighter if pulled together. Most stringing is probably due to shooter error or slight changes in the wind.

this with a 1.1-inch group and then let the tiny breeze bite me and shot a three-incher. To really be happy I had to land five shots in that magical inch. The means would be to shoot the three perfect chambers, then reload two of them and continue the string.

On my third try I had three bullets in little more than an oval hole. After the reload, the fourth fell only a diameter to the right. I've been to three world championships and shot a couple of buffalo with a handgun and that darn tiny cluster, 100 yards away, gave me the shakes. I forced myself to relax and manage the trigger as well as I ever have. "Relax, don't fight it, be gentle, let the gun behave normally" were admonitions I would have applied to anyone under those circumstances. I did all of those things, loosened my grip and watched the bullet hit fully two inches high. Four tries later I remembered how to shoot, held the gun *exactly* the same for five shots in a row and had a five-shot 100-yard group that a postage stamp would cover. It may sound silly, but that first "inch group" stands as one of the very memorable events in my shooting career.

Applying some realism after the fact, I realized that in 15 groups the big one was just over three inches and most were under two inches. I have the gun and loads tuned to the point that, in four tries, I can offer a high probability of a three-shot group very close to an inch. Holding the consistency for five shots is a little less common, but it can be generated on demand. I really feel that those groups smaller than an inch are flukes. However, with new bullets,



All ammunition for 100-yard accuracy shooting was loaded using a Dillon 450 progressive reloader.

loads and techniques, that may not be the case for long. There are also a good many men who are far better precision pistol shots than I. They will be the ones to show us the real limits of revolver accuracy.

You may have noticed that I did not

DIRECTORY

Bowen Classic Arms
Dept. GA, P.O. Box 67
Louisville, TN 37777
(catalog \$2)

DHB Products
Dept. GA, P.O. Box 3092
Alexandria, VA 22302
(scope ACD—anti-cant device)

Dillon Precision
Dept. GA, 7442 E. Butherus Drive
Scottsdale, AZ 85260
1-800-223-4570
(reloading tools and accessories)

LBT
Dept. GA
HCR 62, Box 145
Moyie Springs, ID 83845
(bullet molds, lubes, cast bullet handbook; catalog \$2)

Pac-Nor
Dept. GA, P.O. Box 6188
Brookings, OR 97415
(precision barrels—they do not work on revolvers)

P.A.C.T. Inc.
Dept. GA, P.O. Box 535025
Grand Prairie, TX 75050
1-800-PACT-INC
(chronographs, powder/bullet scales)

Tonoloway Tack Drivers
Dept. GA
HCR 81, Box 100
Needmore, PA 17238
(Uncle Bud's bags)

engage in serious load development. I tried H-110 and Winchester 296 powder with virtually equal success. The new VihtaVuori N 110 was responsible for the smallest groups, but by a slight margin. A new 360-grain LFN mold with a long .500-inch nose shot well but so far hasn't quite equaled the WFN. Also, a new Taylor-throated barrel with the freebore portion exactly at bullet diameter should improve results. Incidentally, the barrel without any forcing cone seems to show the least potential at the moment. But with jacketed or other kinds of cast bullets it might begin to work.

With all of this we are certainly left with some nagging questions. Which bullet shape, powder charge and throat configuration will offer the most consistent results? In effect I have exposed the tip of an iceberg by at least demonstrating to myself that a revolver can be extremely accurate. With this one gun I have a test vehicle that will allow me to try different throating concepts, bore treatments/coatings, bullet lubes, etc. As with other shooting extremes, there will be no absolutes, only strong suggestions and a variety of opinions that point us in the right direction. Personally I would like to see the formation of a "Benchrest-Revolver Society." This would be an organiza-

tion that would conduct competition and broadcast information. This might be linked to one of the rifle organizations or could start anew. I would suggest that the shooting be done at 100 yards, with not less than five chambers and with bores .35 caliber and larger. If you are interested in organizing and directing such a concept, please let me know and I will pass your identity on to other shooters.

Finally, let's keep this in perspective. Occasionally I grew disappointed with my revolver. These were times when it (or I) was shooting four or five-inch groups at 100 yards. These, by the way, were the very worst groups it has turned in. Good grief! That by itself is screaming good accuracy that not a handful of living humans could prove with iron sights. Sub-two-inch groups can usually be demonstrated only under fine conditions from a bench rest. What I am saying is not to rush out and throw away your revolver because it and you are not making inch groups at 100 yards, or even 50 yards for that matter. View this for what it is: totally impractical pursuit of extreme accuracy, in the same environment as benchrest rifle shooting. Few riflemen would condemn a one-inch rifle; none of us should condemn a five-inch revolver.