

# KICK THE HABIT! KICK THE HABIT! KICK THE HABIT!

■ In order to secure these revealing recoil studies, flashlight bulbs were taped to the muzzles of the guns and, for the rifles, to the scopes and the temple of the author's shooting glasses. The strobelight exposure was made a split-second prior to firing, and the traces made on the film by the bulbs records the movement of gun and shooter while the camera's shutter is open.

Very precise measurements of actual movements are possible in such pictures. To some extent, the velocity of movement can be judged by the thickness of the light; the thinner the trace, the faster the movement.

The characteristic zig-zag path for the muzzle trace which is revealed to a greater or lesser extent in every photo apparently results from an involuntary muscular

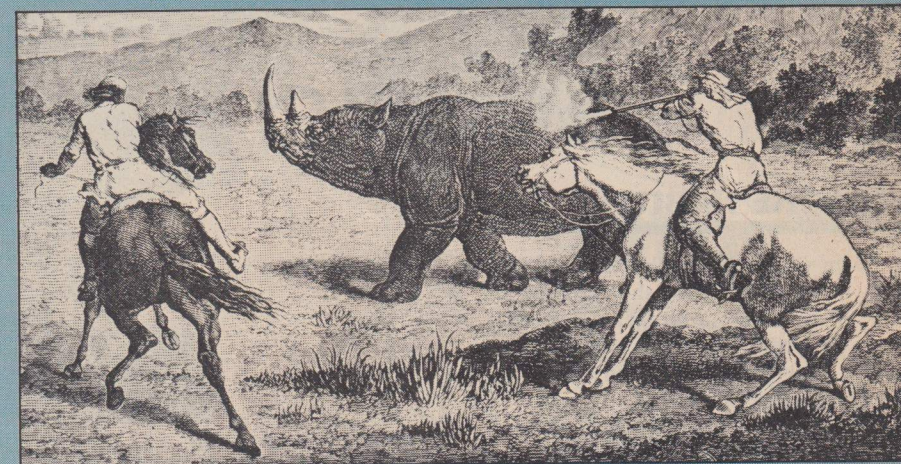
reaction to resist recoil forces on the part of the shooter, plus the elasticity of the body's bone-and-muscle structure. This is not a flinch, which actually occurs a fraction of a second before firing if it occurs at all.

The wavy movement of the shooter's head as it is driven backwards by rifles (and shotguns) with heavy recoil reveals how the head rocks on its skeletal support under such blows. Very close examination will reveal that the initial movement of the head is forward, perhaps 3/4-inch, in a sort of reverse whiplash motion as recoil begins to drive the body backward.

Secondary, ghost-like traces in some of the pictures record the movements of shiny portions of the guns, or of parts of the author's spectacles or ear protectors.

powerful enough to pick one of his African bearers up in each hand and knock their heads together "until they became good," but he had a ferocious muzzleloader named "Baby," heaving 3,500-grain balls, whose recoil he simply couldn't stand. I can see why not.

Listen to another of the great African elephant hunters of the 1870s, F. C. Selous, as he comments on a pair of four-bore guns with which he killed 78 elephants: "... they kicked most frightfully, and in my case the punishment I received from these guns has affected my nerves to such an extent as to have materially influenced my shooting ever since, and I am heartily sorry that I



Large African land animals that were hunted by Baker and others were shot with huge 4 and 8 bore rifles—the recoil generated by these mammoth guns nearly dished out equal punishment from both ends of the barrels.



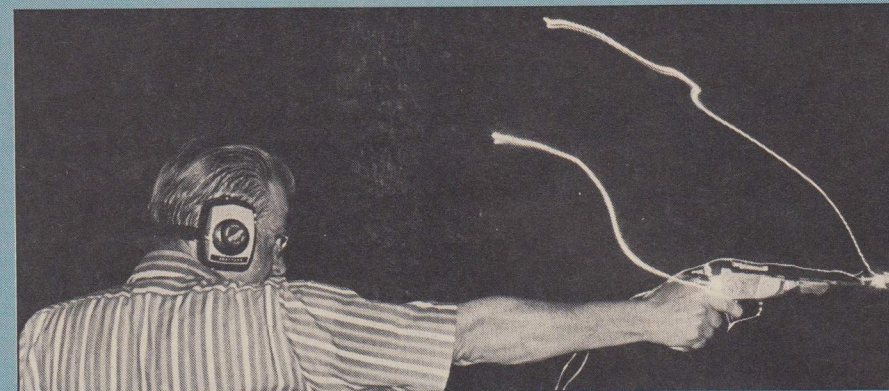
Results of a harder kick than most American hunters have ever felt are dramatically illustrated here. The rifle is chambered for the .416 Taylor wildcat cartridge and weighs 9½ pounds. The 400-grain bullet, being driven better than 2,400 feet per second, generates 44.5 foot pounds of free recoil energy. The total rearward rifle movement is 13½ inches and vertical muzzle rise equals 14½ inches. The shooter's head was driven not quite one foot to the rear, but the upward movement of the comb against the rifleman's cheek in this well-stocked rifle is less than 1½ inches. Very close examination of the trace of the bulb on the author's shooting glasses reveals an initial "whiplash" of his head forward as recoil drives his shoulder rearward.

■ The name, date, and place are forever shrouded in the mists of history, but somewhere in Asia (most probably), perhaps during the 13th Century AD, a man fired the first shot ever discharged from a hand-held gun. We can envision the awestruck reaction to the roar and the smoke, but disagreement arises when we try to imagine the first words spoken after that historic bang. Some suggest a slit-eyed Khan shouting, "It works! By Confucius, we'll rule the world!"—but not me.

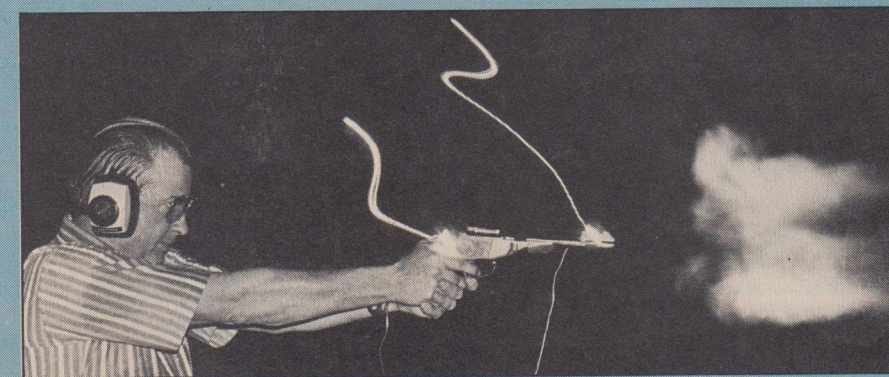
I think those first words were spoken as the world's first shooter ruefully rubbed himself, muttering, "Damn! That thing kicks!"

Whoever he was, he had discovered something that all the rest of us since then have individually discovered for ourselves—that all firearms produce recoil energy which must be absorbed by the shooter in one way or another, and that energy, in all but the least powerful weapons, is sufficient to degrade our marksmanship and make shooting less pleasant. In a few cases and in some firearms, it may even prohibit effective shooting entirely.

Sir Samuel Baker, a *muy macho* Victorian hunter and gun buff, was big and



This Thompson/Center Contender with a 10-inch, lightweight, .44 Magnum barrel proved to be one of the hardest to control of all the guns tested. Shooting commercial ammunition loaded with 240-grain jacketed bullet, the free recoil worked out to a whopping 27.4 foot pounds of energy, carrying the muzzle a full 14 inches straight up and 21 inches to the rear. Note the extremely high recoil velocity indicated by the thinness of muzzle trace.



A firm two-handed grip on the Contender .44 Magnum with the same load as used above made it possible to contain rearward movement of the gun within "only" 11.4 inches, but the vertical muzzle rise was slightly greater than with a one-handed hold—14.8 inches. Recoil velocity was still very high. Notice the violent muscular reaction to recoil, as revealed by the exaggerated "Z" in the muzzle trace as the shooter overcame the rearward thrust.



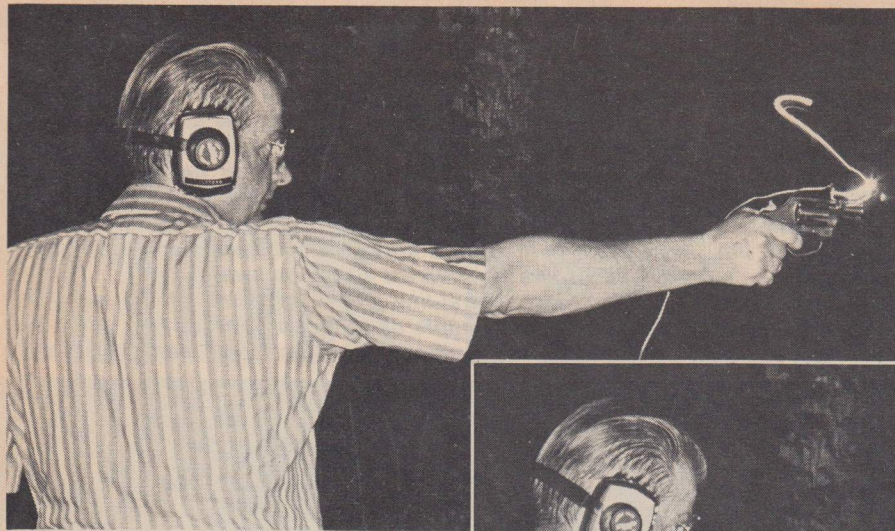
Surprisingly, this 7 mm Remington Magnum with factory 175-grain ammunition churned up less recoil than the .30-06 Springfield with handloads used in these tests—only 19.3 foot pounds of free recoil energy in a rifle weighing 8¾ pounds. The milder recoil is verified by trace measurements—only 7.6 inches vertical muzzle rise, while the shooter's head was displaced by only 5.8 inches. Certainly, maximum handloads would develop more velocity and more recoil, but these results are interesting in view of the overall effectiveness of this magnum cartridge on game animals.

ever had anything to do with them."

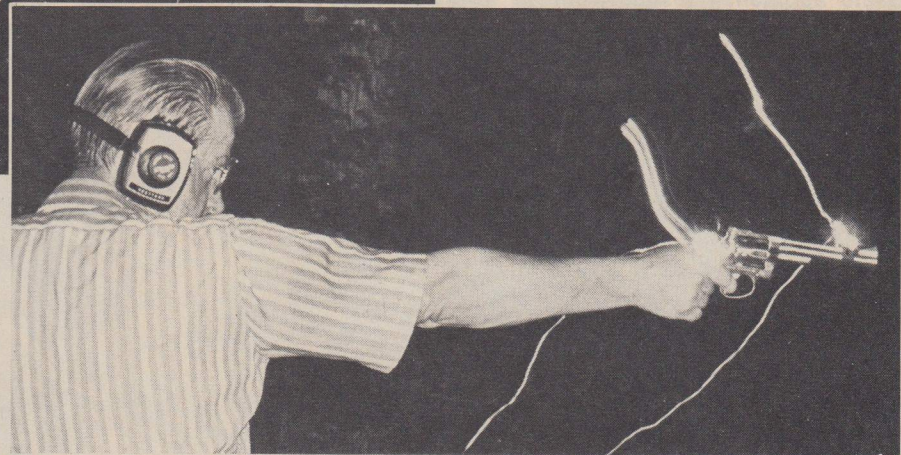
In this century, John Hunter, a famous East African professional hunter was once asked why he used no rifles larger than .50 caliber in an era in which most of his colleagues preferred such cannons as the .577 and .600 Nitro Express rifles. Paraphrased, his answer was that he simply couldn't stand the recoil. And the greatest of all the elephant hunters, W. D. M. Bell surely didn't kill more than 1,000 tuskers with such pipsqueak cartridges as the 6.5 mm Mannlicher and 7x57 Mauser because he thought them superior to the then-standard elephant cartridges. He used them because he despised recoil and because he was good enough to get away with assaulting African elephants with said pipsqueaks.

Some of the most famous riflemen and hunters of our own day have espoused such cartridges as the .270 and denigrated the popularity of magnums because they didn't like to get booted around by a rifle. Nobody does, and although the recoil tolerance of different shooters varies considerably, everybody has a limit.

Contrary to popular belief, that limit has nothing whatever to do with how big, how tough, or how hairy-chested a shooter may be. I know a pretty young lady who can't weigh 100 pounds load-



The Charter Arms "Undercover," at about 18 ounces is billed as the smallest and lightest steel-framed .38 Special on the market. Here it's fired with maximum loads behind 158-grain jacketed bullets to produce muzzle velocities just under 1,000 fps, and free recoil amounting to 11 foot pounds. Movement is mostly muzzle-flip with little rearward thrust.



This six-inch barreled .357 Magnum reacts to the firing of 1,300 foot per second loads with the 158-grain jacketed bullet. In the 2½-pound revolver free recoil energy was about 10 pounds, causing a 10.2-inch vertical rise in the muzzle and a rearward movement of the muzzle of 8.3 inches.

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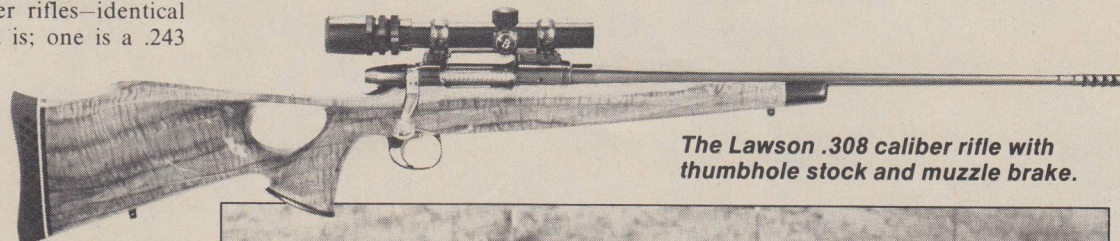
ed down with gold jewelry who can and does shoot neat, three-shot cloverleafs from a benchrest with her .375 H&H Magnum, and who has successfully tackled such large and touchy beasts as elephants and Cape buffalo.

On the other hand, I know some very muscular males who dislike the recoil sensation of a .30-06, or even of a .270 WCF. I know two brothers of about the same build and shooting experience who own identical deer rifles—identical except for caliber, that is; one is a .243 WCF and the other is a .308 WCF. Each of these guys thinks his brother's rifle kicks more than his!

Obviously, we have some other factors at work here besides the laws of physics. They're psychological factors and are not involved with physique or pain threshold. They're really not even factors with which the conscious mind can deal. They involve subjective perceptions of recoil rather than actual recoil forces; in short, if you think you're getting kicked painfully, you might as well be getting kicked painfully. The effective result will be the same, and that result will be what we call a "flinch."

If you happen to think that a flinch is just a little twitch in the trigger finger to which women and small children are occasionally subject, you have another think coming. The word can apply to such a symptom, but it can also describe a range of more and more severe reactions up to and including the total inability to pull a trigger! In even its mildest form, it's ruinous to accuracy with rifle, shotgun, or pistol, and at its worst it can actually cause an enthusiastic shooter to abandon shooting entirely.

What makes flinching so insidious is that it is a completely involuntary reaction which can creep up on a shooter without his realizing what is happening



The Lawson .308 caliber rifle with thumbhole stock and muzzle brake.



Thanks to a thumbhole stock design and muzzle brake, rifles in the .30 caliber class can be used one-handed. The shooter absorbs most of the recoil in his hand and arm, while the muzzle brake (inset) redirects gasses to keep muzzle jump and recoil down to a tolerable level.



In 1963, Winchester offered their Model 12 shotguns equipped with a Hydro-Coil unit which reduced felt recoil.

The Hydro-Coil acts like a shock absorber as the gunstock's comb remains stationary while the rest recoiled rearward within the comb.

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to him. Even a knowledgeable and observant shooting coach may not be able to spot a flinch—as long as the gun fires. When it doesn't (when the shooter expected it to do so), the flinch becomes painfully obvious. The trigger may be yanked so convulsively that the muzzle is jerked a foot off-target, the shooter's shoulder is thrust forward to meet the expected recoil, he may close his eyes and lift his head, and every muscle in his body contracts spasmodically. It's a truly piteous spectacle.

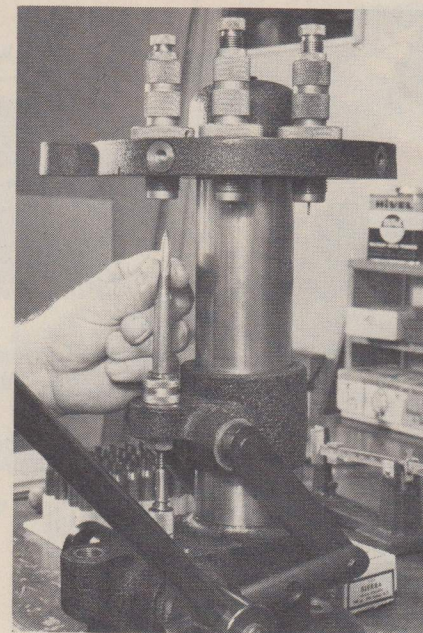
And the flincher is always the most surprised guy there. I will always remember the feeling from a time about 20 years ago when the mourning doves were flying hot and heavy and I was shooting about as fast as I could reload. The trouble was that I wasn't hitting anything, and I grew angrier with myself with every miss. Then it happened. I snapped a shot at a passing bird and the chamber of the 12-gauge was empty. I flinched so badly that I almost stuck the gun's muzzle in the ground at my feet! I remember holding the gun out and looking at it as if I'd never laid eyes on it before, in total astonishment.

How does such a horrible thing happen to an experienced shooter? It happens when his subconscious mind becomes convinced that firing a gun may injure him. What we call "flinching" is nothing more than a self-protective reaction arising in the subconscious. It is exactly the same thing that makes us jump when someone slams a door unexpectedly behind us, and causes a pedestrian to leap for the curb at the squeal of tires over his shoulder. Because it is not a conscious reaction, it is completely beyond the control of a shooter's conscious mind. No amount of determination or self-discipline can cure or prevent a flinch; in fact, such efforts actually make it worse.

By far the best way to avoid flinching



Recoil can play havoc on a shooter's pulmonary and nervous systems. Here a shooter was "wired" to an oscilloscope to measure the devastating effects of recoil on the human body.



Through judicious handloading, one can learn to live with recoil by concocting lighter recoiling loadings.

problems is simply never to allow them to become established, and the only way to do that is never to allow a gun to hurt you. This takes a thorough understanding of how the body absorbs recoil and a bit of careful planning.

Basically, recoil forces arise from three things—the classic "equal and opposite" reaction to acceleration of the bullet in the barrel (or shot charge and wads, or whatever), the same reaction

to acceleration of powder gases in the barrel, and the rocket effect of still-expanding gases jetting from the muzzle after the projectile departs. Bullet acceleration is by far the most important of these, and the last-mentioned—the rocket effect—contributes from as little as five to as much as 25 percent of the total foot-pounds of recoil, the higher percentages coming in cartridges which burn a lot of powder through a relatively small bore, such as the .257 Weatherby or .264 Winchester Magnums.

Obviously, recoil force is increased by heavier bullets, by driving them faster, and by burning more powder. The force is reduced by more weight—thus, more inertia—in the gun itself. The perceived force, or recoil effect, may be reduced in several other ways, at which we shall look in a moment.

Recoil force is transferred to the shooter's body wherever the gunstock touches it. In the case of a pistol this will be only in one or both hands; with a long arm, it includes both hands, the shoulder, and the cheek. Now and then some recoil energy will be transferred to the shooter's forehead by the eye-piece bell of a scope, drawing blood and setting up a kingsized flinch, even though this is abnormal.

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Usually, discomfort from recoil arises from energy transfer at the shoulder and face, especially the latter as the muzzle tends to rotate upward around the point of support against the shoulder. The subjective effect of this can be similar to the effect of a Muhammad Ali right cross to the jaw; it not only hurts but it can actually have a stunning effect. It's the source of what the English call "gun headache," and literally comes from the brain's getting rattled around in its case.

Although the blow at the shoulder is seldom painful (provided the buttstock is mounted properly), it does snap the upper body backwards and causes the neck to pop with a sort of reversed whiplash effect, which can clearly be seen in the accompanying photos, and which contributes to the aforementioned cranial discomforts.

With all this in mind, certain things become obvious. For one, the more recoil energy which can be absorbed by the hands (where it doesn't hurt), the less will have to be soaked up by the shoulder and head (where it may). The role of the left hand for a right-handed shooter, in dealing with recoil is often overlooked, but its absence on the forearm to absorb energy and tame muzzle-jump is the major reason any rifle seems to kick so much more viciously from a benchrest. Thus, a rounded or pearshaped, hand-filling, well-checked forearm on a rifle or shotgun has a definite effect in reducing *apparent* recoil. The right, or fire-control hand has other and more delicate work to do, but it can and should serve to pull the buttstock back firmly against the shoulder, and it needs a full, fairly tightly-curved pistol grip on a hard-kicking gun to accomplish this most effectively.

The comb is all-important in buttstock design. The straighter the stock (ie: the closer the center of the buttplate can come to coinciding with the line of thrust through the bore's axis), the more recoil motion will tend to be straight backward, and the smaller the upward, cheek-clobbering movement will be. This is why the lower barrel of an over-under shotgun seems to kick less than the upper barrel. However, the shape of the human body is such that a normal, sporting-type stock still must have *some* drop at heel and comb, so the next best solution is to form the comb-line so that it tends to slide straight back or even slightly downward as it recoils.

Length of pull also has its effect on recoil sensation, and if the designer must err it's best to err on the side of *too long* a pull rather than *too little*. A too-short stock is pure murder, and can be responsible for the aforementioned

scope-slashed forehead, as well as fatigued lips and bent noses resulting from having the shooter's right thumb collide with them.

Next, the area of the buttplate or pad makes a small but worthwhile contribution to recoil sensation, positive or negative. The greater the area, the smaller the force delivered *per unit* of area. A quite noticeable difference in felt recoil on the shoulder can result from merely widening the butt's surface by 1/2-inch.

Pitch, which is the inclination of the line from toe to heel of the butt to the axis of the bore, is also important, and usually overlooked. Too much pitch can make a mild-kicking rifle or shotgun into an absolute mule. Few modern longarms come from the factory with excessive pitch, but it's not too uncommon to find that a gunsmith has inadvertently changed the pitch while sawing off the stock preparatory to installing a recoil pad. A temporary "fix" is merely shimming the toe of the buttplate or plate out from the wood until the obnoxious recoil sensation goes away.

There are several ways to deal with a gun which kicks too much for comfort. One is adding weight, which I find just about as obnoxious as the recoil itself. Most sensible, in my eyes, is redesign of the stock, or even restocking, with an eye to the matters mentioned above. Next comes the installation of a high-quality rubber recoil pad. Of equal importance is a systematic effort to accustom oneself to the recoil of a particular firearm, about more will be said later.

There are, however, several mechanical approaches to reduction of recoil sensation about which every shooter must make up his own mind. One, which was commercially unsuccessful for several reasons, was the Winchester Hydro-Coil stock, which partially collapsed to absorb recoil energy via an internal system of springs and hydraulic cylinders. Even older is the idea of a muzzle-brake which harnesses a portion of the energy of powder gases at the muzzle to counteract recoil.

The Mag-Na-Port system, applicable to rifles, pistols, and shotguns equally, is a sort of muzzle brake, but is in a class by itself within the category. It's expensive, but does not materially change the appearance or balance of the weapon, and it does very smartly reduce recoil *sensation*.

The other recoil-reducers are various sorts of machinery which are fitted into the buttstock, and are typified by the Edwards, which is particularly popular with trap-shooters. In my opinion, although these do offer some reduction in perceived recoil, they cause an undesirable change in the balance and "feel" of a rifle or shotgun, especially for field shooting.

Probably the single most effective way to learn to love a hard-kicking rifle is simply to shoot it a great deal. The

pitfall in this method is that if it isn't done right, it will just about guarantee the acquisition of a flinch. The right way to do it is as follows.

Handload (or have handloaded by a *knowledgeable* reloader) a number of cartridges for the rifle in question, using the lightest available bullets and powder charges which give from half to two-thirds normal velocities. These will deliver recoil energies reduced by about the same factors as the velocity, and should be very pleasant to shoot. After firing enough rounds of this ammo to convince your subconscious mind that the rifle is a real pussycat, move up to a load about 10 percent heavier. As you become accustomed this level of recoil, move up again, and continue in this fashion until you can fire full-charge hunting loads without noticing recoil. Take your time with this process, remaining at each level for as long as is required. For some shooters this may mean 25 to 40 rounds at each step, and for others it may be 100 or more. The real trick is to *enjoy* the shooting, so don't overdo it at any one sitting. If the stocks fits you properly and you use good shooting technique and don't rush it, you should be able to adjust to almost any reasonable hunting cartridge in this fashion—with the extra benefit of coming out of the recoil-acclimation process a much more accurate marksman than you went into it.

With very hard-kicking rifles, neither you nor anyone else can ever learn to completely ignore recoil, nor should you. But you will no doubt notice that you develop a knack of setting apart a small portion of your concentration to deal with the blow you know is coming, without utterly destroying your attention to the essential niceties of sight-picture and trigger squeeze, and without flinching. Once your subconscious is convinced that recoil presents no physical danger, it will no longer present a psychological threat to good shooting.

Sometime, somewhere, some very popular firearms writer commented that "the average hunter cannot shoot well with any rifle with more recoil than the .30-06." That statement, at best, is an oversimplification. A .30-06 which is poorly stocked or too light, or both, will simply knock your block off and *nobody* can shoot well with it. I'm convinced that the "average" shooter (whatever that is) can *learn* to shoot not only a .30-06 well but a 7 mm Remington Magnum, a .300 Magnum, a .338, and probably a .375 H&H Magnum without discomfort and with excellent results—but not without careful attention to detail and copious practice.

That's what that fellow in the fur hat in Asia in the 13th Century *didn't* have—practice. It's one of the penalties of being the first to try anything, and I'll bet he came up with another "first," a king-sized flinch!