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RECOVERY OF BULLETS FROM HIGH SPEED AMMUNITION

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In the sparsely populated areas of the Southwest, killings by means of firearms present a somewhat different problem than ordinarily come to the attention of the firearms identification expert elsewhere. Unlike the thickly settled urban localities of the East and Middle West, where most crimes are committed with small arms, which are more easily concealed and carried, here the majority of murders are committed with rifles.

From the opening up of frontier territory down to the present, ranchers and stockmen have carried rifles in the saddle scabbards wherever they went. There is hardly a ranch home without one or more rifles behind the kitchen door, conveniently at hand to take a shot at a lurking coyote, hawk, or even a trespasser. With weapons of this class in such common every day use, and with no necessity for concealment, even when carried into the towns, it is small wonder that rifles are used so frequently in crimes of violence. Small arms are not carried with the abandon of former days in spite of the lax laws in this section, though it is surprising the amount of "hardware" that can be shaken loose from the clothing of the native population at the usual Saturday night "baile." The rifle, however, still figures as the weapon of choice. The user can be farther away from the victim; hence concealment is easier. Many shootings that come to our attention occur from ambush, or at night into the window of a lighted room.

The comparison of empty cartridge cases is essentially the same problem in shootings by pistols as in shootings by rifles. However,

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when it comes to the recovery of bullets from rifles using the higher velocity ammunition, certain difficulties arise. The ordinary recovery box used by most firearms identification experts for bullet recoveries is unsuitable for recovering rifle bullets where the velocity exceeds that of the ordinary .22 caliber loads.

The rifle still in favorite use in the Southwest is the old Winchester .30 caliber centerfire, or "30/30" as it is commonly called. This caliber is widely distributed, and ammunition can be purchased at the smallest store or trading post anywhere. Next most popular are the .32/20 and .25/20, with the .44/40 close behind. Then come the various varieties of .22 caliber models, and, surprisingly enough, there are a number of .22 W.R.F.'s still doing duty. The small calibers offer no difficulty so far as recovery of bullets fired through their barrels is concerned; their most exasperating problems appear when making comparisons under the microscope, because of difficulties occasioned by the easy scouring of the bullet, or to the troublesome bubbling and flaking of the copper and cadmium coatings often used.

One occasionally sees the old black powder large bore guns figure in shootings—guns that came out in the early days of the West and have remained in use ever since. They may have been retained year after year, together with a handful of the old ammunition hoarded in a cigar box or tobacco tin. This part of the country would be a veritable collectors paradise were it not for the fact that these people are loath to part with the old breech loaders that came out with "Grandpappy," as they are still good shooting irons to their way of thinking. Now and again one of these old relics figures in the commission of a crime—.44/40, .45/70, etc., left-overs from the old Army of occupation or the buffalo days of the Santa Fe Trail. Traditionally, the ammunition most used in the Southwest is still of the type which could be used in either the revolver or rifle, e.g., the .25/20, .32/20, .44/40. Most of the old revolvers chambered for this ammunition have long since disappeared, but the rifles have persisted, and many are still in use. However, very often, even today, the .44 W.C.F. ammunition (.44/40) is fired in a .45 Colt old Service or Frontier model revolvers. This particular combination recently turned up in a murder case from Lincoln County, home of the erstwhile killer, Billy the Kid. It occasioned the firearms expert considerable difficulty for a time, because of the erratic course of the bullet in the barrel.

The ordinary box used for small arms recoveries is out of the

question in making recoveries from these "Big Berthas." The bullet goes right on through the cotton as well as the steel plate backing or whatever else happens to be in the way. Recovery boxes as usually described will stop small arms ammunition whose muzzle velocity seldom exceeds 820 to 860 feet per second. It was found that some other means of recovering bullets from the higher speed ammunition must be devised. The temptation at first was to reduce the powder load in the test cartridges to the point where the muzzle velocity was low enough not to exceed the stopping power of the ordinary recovery box of about four feet in length. One Government law enforcement agency actually recommends boring a hole in the cartridge and shaking out part of the powder load. This practice is to be frowned on for several highly objectionable reasons. More and more, defense attorneys are reading articles on firearms identification, and becoming more astute in their comments and objections to evidence submitted. Time and again with this procedure, defense council has objected on the ground that conditions were not duplicated, as compared to the loaded cartridge delivering the fatal shot. They are inclined to make a great issue of this one point. To a jury of laymen this may carry some weight. Consequently, an otherwise watertight case for the prosecution might be severely handicapped.

In order to make a direct comparison between fatal and test bullets, one must have the same components in both test and fatal bullets. This would be possible only if the powder charge were not altered. The velocity of the bullet through the barrel must be nearly the same in all cases so that the bearing surface of the lands and grooves will exert nearly the same radial compressive forces on fatal and test bullets shot through the barrel. Bullets pushed through a gun barrel by slow mechanical force, or propelled through the same barrel with a reduced load of powder are not at all suitable for comparison with the fatal bullet. This the writer has demonstrated to his own satisfaction on many occasions.

Today's high speed projectiles in most instances have a lead core, encased in a gilding metal jacket. Autopsies of bodies shot with such ammunition almost invariably disclose that the metal jacket has been stripped from the lead core and retained in the body. Sometimes the core itself emerges, and, if deformed as it usually is, it will leave a large, ragged wound of exit. The jacket is more or less distorted and crumpled, but often, fortunately for identification purposes, the base portion of the jacket retains pretty

much of its original cylindrical shape with the barrel engravings thereon. The composition of the gilding metal happily furnishes a medium on which the engravings of the inside of the rifle barrel are faithfully reproduced. Comparison is far easier in most cases where a jacketed bullet or jacket alone is found, than in the case of lead bullets. This is particularly true where black powder has been used in firing the lead bullet.

It is surprising what can be done with these sloughed, distorted jackets, if persistence and a series of clean undistorted recoveries are used for comparison. One needs every bit of help possible in arriving at a conclusion when the case involves one of these badly distorted fatal bullets.

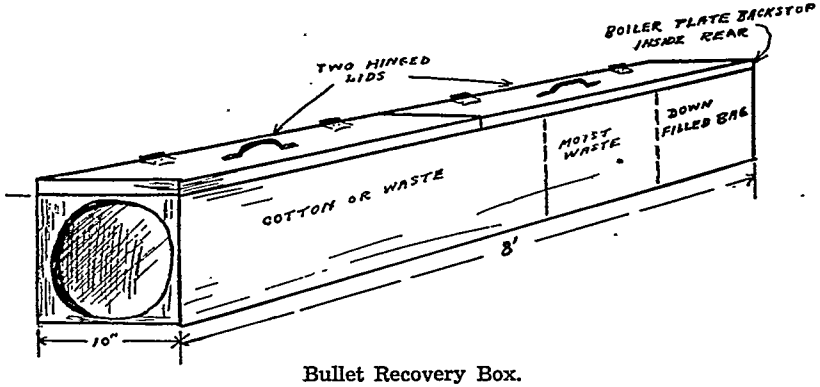
The author as a surgeon has been intensely interested for a number of years in the effects of bullets on the human body, and he has had considerable opportunity to observe these effects. It is of more than ordinary interest that the vast majority of rifle bullets, even among the larger calibers delivering a high muzzle velocity, are stopped within the human body. The bullet may plow through a vertebra, slide along a rib, or enter the abdominal cavity to curve around the iliac crest in the most startling manner, and come to rest beneath the skin. Any one who has seen many gun shot wounds must be impressed with the bizarre and unpredictable course a bullet takes when penetrating human tissues. There may be several reasons why a bullet fired at high velocities behaves in this fashion. Lymph and blood are present in living body tissue, and the soft parts are in semi-fluid and elastic condition. What happens on the sudden impact of a small object at high speed can only be conjectured. There is probably a sudden reflex spasm from nerve stimulus, coupled with certain electro-chemical changes in the fluid filled tissues themselves. The same conditions do not hold in dead, inert animal tissues, as many experiments conducted by the author have failed to duplicate the action of bullets on living animal tissue.

It is quite essential that recovered bullets for comparison with fatal bullets show as many of the characteristics of the gun barrel as possible. Fatal bullets may be so distorted that they cannot be compared around their circumference, land for land and groove for groove. With this in mind, an effort was made to determine which method was best suited for recovering undistorted, clean cut test bullets from rifles having high muzzle velocities. There are several objections to the use of dead flesh as a recovering medium, aside

from the economic and esthetic point of view. It acts as too sudden a brake to the speed of the bullet, and even without bones in the way, the jacket has a tendency to strip or crumple.

Various materials or combinations of materials, such as cotton, cotton waste, waste and soap, kapok, etc., proved inadequate. The materials either did not brake the velocity sufficiently, or else they scoured the surface, particularly in the case of lead or lead alloy bullets. Ammunition with muzzle velocities of over 2,200 feet per second resulted in deformed bullets which could not be used for comparison purposes. Anyone who has made recoveries from small caliber arms knows almost to an inch how deep in the recovery medium he has to look for the bullets fired therein. The penetration into cotton or cotton waste progresses more or less in proportion to the ballistic coefficient of the ammunition fired. This is not a hard and fast rule, but depends upon the ability of the recovery medium to "ball around" the projectile and bring it to a stop without too much scouring of the bullet surface. (Incidentally, the author wishes to report that for years he has been recovering his .22 caliber bullets in a foot of soft laundry soap backed with cotton, which combination produces clean cut test bullets. Cotton and other plant products simply scour off the elements which must be preserved.)

Were the penetration of bullets constant we could make a recovery box sufficiently long, and figured mathematically, which would hold bullets fired from the highest speed ammunition. For most investigators, however, this would be highly impractical because of size and also because of other factors, chief among which is the destruction of the very elements which are necessary for perfect recoveries, even though there were no distortion. More-



Bullet Recovery Box.

over, braking the speed of a bullet is not the whole story. It is believed that the following arrangement and recovery media are the most effective for recovering undistorted, clean-cut bullets having a maximum number of gun barrel markings on their surfaces.

The recovery box (illustrated above) is eight feet long, of heavy 1 inch stock, 10 by 10 inches on the sides, lined with sheet steel (¼ inch thick), and backed on the closed end with boiler plate (⅜ inch thick).[1] The hinged cover is in two sections, so that it can be used for the recovery of low velocity bullets by simply lifting the front section of the lid without disturbing the rear half. In the case of high-speed recoveries, the front half may be disregarded, the rear lid being raised when searching for the bullets. It may be mounted on trestles or on a long bench in a convenient safe place. But wherever mounted, too much trust should not be placed in the stopping power of the recovery medium or of the boiler plate. It is best to keep the closed end with the boiler plate backstop against a brick or stone wall or against a bale of peat moss or cotton waste, just as a precaution. This may be an unnecessary warning, but the author has seen at least two police officers try to recover rifle bullets in the most flimsy makeshift equipment with almost disastrous results. (Nothing need be said here regarding the inexcusable practice of firing rifle bullets into banks of wet sand or earth. This is as reprehensible a practice as an autopsy surgeon who claws out a bullet with toothed forceps instead of using rubber tipped forceps or his fingers for its removal from the body.)

The recovery box is packed firmly for the first six feet with cotton waste free of lumps, or with long staple cotton of surgical grade. The latter is expensive but it is a very satisfactory braking material. Then comes a foot of cotton waste *lightly* dampened with water. (In the dampening process do not soak the waste; dampen it lightly in layers of a few inches at a time.) Behind this, press firmly a light canvass bag of down feathers, somewhat compressed. Lacking a canvass bag, a large down-filled feather pillow case may be stuffed into place.

When this arrangement and recovery box were first tried, too many bullets were crashing into the boiler plate backstop with other combinations of materials until a bag of feathers was used as outlined above. Instantly trouble ceased, and clean undistorted recoveries were obtained. The cotton waste and moist cotton seem to act as a sufficient brake before the feathers are reached. The bullets do not always ball in the cotton, but are slowed sufficiently

[1] Thinner linings and plating may be used in order to keep down the weight of the box, but the above measurements provide for a considerable margin of safety.

so that when the mass of feathers is reached, there is a violent upset in the flight of the slowed bullet and it tumbles over rapidly, often coming to a stop with the nose pointing to the front of the box. This is probably due to the many small air spaces between the fine elastic fibres of the feathers. There is a sudden compression of air in many planes, coupled with as many stresses exerted on the bullet, which upsets it violently but not sufficiently to distort or rumple it in any way. It is hoped that this method, arrived at by trial and error, will be of assistance to firearms identification experts who may have occasion to recover high velocity rifle bullets for comparison purposes.