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Thompson Sub-Machine Gun

Philip B. Sharpe

his parole was revoked and he was returned to the penitentiary to complete his sentence.

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One witness testifying in this investigation cited a large number of typical examples of the effect of Marihuana of which the following is the outstanding case. A Mexican, under the influence, while going beneath a railroad viaduct imagined that he saw approaching him, at great speed, a rider on an enormous horse. Dodging behind a column for protection, when he looked out again, he realized that what he had seen was an old woman pulling a small wagon. Going home, despite the fact that his wife had that day given birth to a child, he compelled her to get out of bed and prepare his dinner. Still suffering from the characteristic hallucinations, as she was peeling an onion, he imagined that she was preparing to attack him, and seizing a club he hit her in the head with such force that she was knocked unconscious. While this is only one example, it is typical of conditions among habitual smokers.

THE THOMPSON SUB-MACHINE GUN

PHILIP B. SHARPE

Editor's Note: Since the Scientific Crime Detection Laboratory of Northwestern University, the Director of which is Editor of the Police Science Section of this JOURNAL, came into being as a direct result of the so-called Valentine Day Massacre which occurred in Chicago on February 14, 1929, a crime noteworthy for its speed of execution and the number of victims involved, both of which were made possible through the employment of the so-called "submachine gun," it seems quite fitting that an article exhaustively describing this weapon should appear in the section which he edits. Mr. Sharpe, as a perusal of his paper will show, is quite familiar with the history of the Thompson gun from its inception over ten years ago up to the present time. Persons interested in informing themselves upon the mechanism, function, and uses of this weapon, will find his contribution a most welcome one.

C. G.

At the National Rifle Matches at Camp Perry, Ohio, back in August, 1920, there appeared a strange looking weapon. It was neither rifle nor shotgun; pistol nor revolver. It had two odd-looking pistol grips with finger grooves in the forward surfaces. It had no buttstock. The user held the weapon on his hip by firmly grasping the two grips—and squeezed the trigger.

Then things began to happen. From the muzzle burst a sheet of flame containing a string of copper-jacketed pellets; from the breech

erupted a shower of shiny brass cases. Crowds gathered. Here was a deadly arm, capable of spraying the landscape with sudden death in the form of 230 grain .45 Colt Automatic pistol bullets.

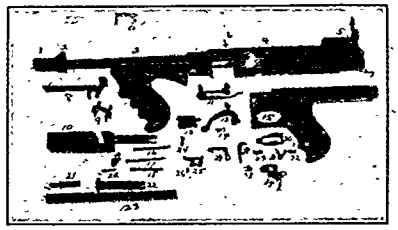

Figure I.

IDENTIFICATION OF COMPONENT PARTS, MODEL 21AC (Fig. I)
(No Tools Necessary for This Dismounting)

1. Cutts Compensator.
2. Front Sight (Dovetailed into Compensator).
3. Barrel.
4. Receiver.
5. Rear Sight (Lyman), leaf raised.
6. Ejector (Not removed for photo).
7. Frame Latch and Spring.
8. Actuator.
9. Lock.
10. Bolt.
11. Pivot Plate.
12. Sear.
13. Magazine Catch.
14. Magazine Catch Spring.
15. Frame with Grip Attached.
16. Extractor.
17. Firing Pin.
18. Firing Pin Spring.
19. Hammer.
20. Hammer Pin.
21. Buffer Pilot.
22. Buffer.
23. Recoil Spring.
24. Sear Spring.
25. Sear Lever.
26. Sear Lever Spring.
27. Safety.
28. Rocker Pivot, or Fire Control Lever.
29. Trigger Spring.
30. Trip.
31. Disconnector.
32. Disconnector Spring.
33. Rocker.
34. Trigger.

"What is it?' was the topmost question. "A machine gun? What's it for?"

The designers let their friends into the secret. It was a new development—and when prepared for the market would be known as the Thompson Sub-Machine Gun—one of the fastest firing weapons ever devised!

That same year the new gun was adopted by the New York Police. The first move in making the Sub-Machine Gun internationally famous had started—a move which has steadily spread until, with the start of 1932, several hundred police departments in the United States and Canada are equipped with the weapon which has made history in law enforcement.

The writer has been keenly interested in the Thompson gun ever since that initial showing at Perry. His interest has prompted the

preparation of this compilation of historical and practical data on a much misunderstood firearm.

The few Thompson guns which have fallen into the hands of law breakers are much more in a minority than law enforcement executives believe. For nearly two years, it is safe to state, probably

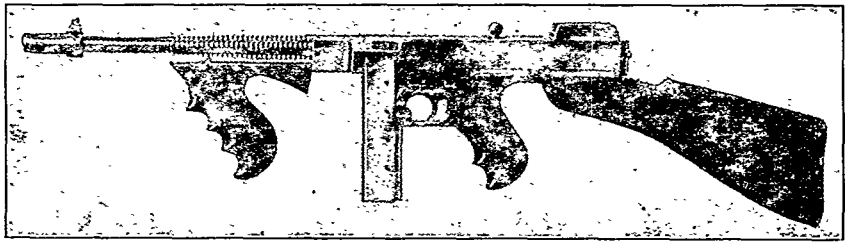

Figure II.
Thompson Sub-Machine Gun, Model 1921AC, fitted with Cutts Compensator, 20-shot clip magazine and detachable stock.

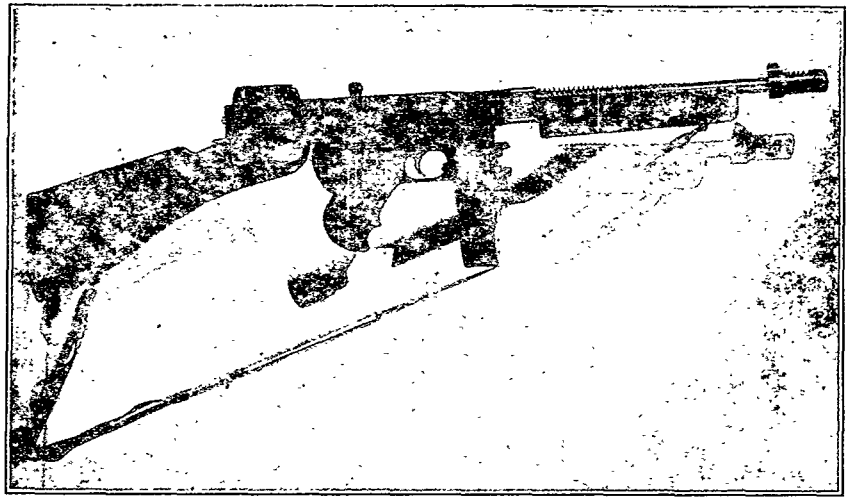

Figure III.
Thompson Sub-Machine Gun, (Navy model of 1928) fitted with Compensator, 50-shot drum magazine, sling strap, and detachable stock.

not one of these guns has gone astray, due to an entirely new sales system which will be explained later.

The original Thompson gun is the product of a mind well known in military circles—General John T. Thompson, U. S. A., retired. General Thompson served for many years in the Ordance Dept. of the Army, retiring in 1914. But even a retired war horse cannot be shoved into the background. When the World War broke out, and

American arms makers, together with various machinery firms, undertook to fill contracts for small arms for sundry Allied nations, the government stepped in to supervise this work. General Thompson was appointed Director of Arsenals, and the task fell on his shoulders.

The former Ordnance executive foresaw the entry of the United States into the affray, and his military experience clearly indicated that our two armories—Springfield and Rock Island Arsenal—could not be tooled up to handle properly the manufacture of the Model 1903 rifle in sufficient quantities to equip our large armies. So he carefully studied the foreign arms available.

The Remington Arms Company, at its Chester, Pennsylvania, plant, was manufacturing huge quantities of British Enfield rifles for England. To General Thompson, this arm seemed to be the most practical. Hence, when War was declared, General Thompson having been recalled to service, supervised the retooling of the Remington-Chester plant to manufacture this rifle chambered for the U. S. service cartridge. Thus the "Springfield-Enfield" or "U. S. Rifle, Model 1917," as it was officially known, sprang into existence to be added to the capacity outputs of our military small arms plants. That they served their purpose well, only to be abandoned with the coming of peace, is a matter of record.

With the cessation of hostilities, General Thompson turned his genius in other directions. The recent war had impressed on him the necessity for a new weapon, rapid in its rate of fire, yet sufficiently portable to replace the present Mauser type service rifle.

A military man with a background of experience realizes that any new equipment, to be adopted, must not only shoot, but must withstand the test of time, weather, wear, and carelessness on the part of enlisted men. The self-loading or "automatic" rifle intrigued him, although none of the existing types of actions met his critical approval.

The Browning Automatic Rifle, model 1918, was a moderately successful arm, although its disadvantages were prominent. It was too heavy. The empty gun and magazine weighed fifteen pounds, fifteen ounces. With the loaded clip of 20 rounds of service ammunition, another pound was added. Furthermore, General Thompson believed that a gas operated arm was not practical because of its necessarily complicated structure. Yet the many Brownings turned out of the Colt plant managed to give a successful account of themselves.

Thompson, however, set forth to design a mechanical action having the following features:

Simplicity
Accessibility
Positive action under all conditions
Normally light weight
High rate of *controlled* fire.

He designed and manufactured at the Colt plant in Hartford, Conn., twenty new type rifles which were submitted to the Army for tests, along with a number of other makes, both in the standard .30/06 caliber and also chambered for a new cartridge, the Pedersen .276. Results of this test were never made public, and it is doubtful if an automatic or self-loading rifle will be adopted by our Army and Navy for some time to come.

A number of years ago I had an opportunity to handle, but not dismount, the .30 Thompson rifle at Springfield Armory. The gun weighed but ten pounds, and despite its long receiver, balanced well. These rifles were built to hold five shots and fired a single shot for each complete pull and release of the trigger. Since that time, two other rifles equipped with twenty shot magazines have been manufactured and submitted to the military authorities.

While designing this full-length arm, General Thompson spent much time on a smaller and more portable weapon chambered for the .45 pistol cartridge. This was known as a "sub-machine gun," partly because it used the pistol instead of a rifle cartridge, and partly because it was smaller, lighter, and more readily portable than any other machine gun ever developed.

There has been much misunderstanding about the original and present models of sub-machine guns, partially due to a false start which the manufacturing company made in circulating literature on contemplated models, rather than on arms in actual production. Here is the history of this weapon, as recorded in my notebooks, and verified by Mr. Walter B. Ryan, Jr., President of the Auto-Ordnance Corporation, up to a short time ago the only organization concerned with the manufacture and sale of the Thompson gun. The writer also desires to acknowledge the courtesy of Mr. Ryan, and of Mr. George E. Goll, of the Auto-Ordnance Engineering Department, in supplying certain details which were missing from my notes, that this data might be technically correct and complete within its scope.

The first eight guns manufactured, including the original weapon displayed at Camp Perry in 1920, weighed but seven pounds each. They were not constructed with a buttstock attachment, nor did they have sights. Those models were purely experimental. From these,

the present model, an arm weighing 8½ pounds (Model 1921A) without buttstock, was developed.

The action of the Thompson gun is unusually simple. There are no screws, inaccessible pins, or other difficult features to contend with in dismantling. A person who understands firearms—or any other form of mechanical device—can be taught how to dismantle and assemble the weapon in fifteen minutes.

The principle of locking the action against the explosion is similar to other pressure-friction ideas, yet its application in the Thompson gun is radical, essentially different, and stands alone in the automatic field.

A wedge-shaped piece of metal weighing one ounce locks the entire mechanism purely through friction on sliding surfaces created by the breech pressure while the bullet remains in the barrel. When this pressure is relieved, as happens when the projectile passes to the open air, this wedge is released and unlocks the mechanism.

The idea is not new. Naval men discovered many years ago that their heavy fixed pieces played them pranks. They noticed that in firing the ten and twelve-inch rifles with service shot or target projectiles, the guns behaved according to the handbook. But when blank salutes or light practice charges were fired, the heavy interrupted-screw type breach block cammed itself open automatically. Naval ordnance experts set forth to solve the puzzle mathematically —and did. Commander John Blish is credited with arriving at the correct solution, and his principles were applied to several pieces of ordnance during the late war—most common of which was the three-inch anti-aircraft rifle which unlocks its breech and ejects the empty cartridge case as the projectile starts skyward.

The original Thompson sub-machine gun had but eleven parts. It was purely experimental and handled the .22 long rifle cartridge. The early guns manufactured for release, both the hand-made models turned out at a Cleveland plant, and the production run built by Colt, contained the same number of parts as the present models—thirty-eight, including all pins, screws, and what-nots.

Everything that is necessary can be dismantled by one person *without the aid of a tool!* This includes complete stripping of many parts that need not be touched unless the gun should accidently become immersed in water and thus require a thorough cleaning. With a little experience the complete stripping can be accomplished in total darkness. One test the writer made was the removal of thirty parts in total darkness. (The sights, stocks, and similar fixed "parts" were

obviously left out of the test.) It took over a half hour to reassemble the gun in darkness so intense that not even hands were visible, but the task was finally accomplished.

For ordinary cleaning purposes, however, it is necessary merely to remove the frame from the receiver, extract the buffer, buffer pilot, recoil spring, bolt, lock and actuator in the order named. This strips the receiver of all movable parts with the exception of the breech oiler, which ordinarily need not be disturbed. It requires but a few second to slip it from its grooves, however.

A total darkness test for this series of operations discloses that the dismounting can be completed in from twenty to thirty-five seconds, while assembly requires a minimum of 1¼ minutes and an average of 1½ minutes. The longest test I made included the dropping of the lock in the dark and wasting valuable time finding it. Assembly on this occasion required 2¾ minutes. The gun can be stripped and assembled in daylight in about one minute.

This article will not endeavor to deal with the entire nomenclature of the Thompson gun, nor will it give a detailed technical explanation of the action of its various parts. Officials and others who are interested in such matters may find them in the "Handbook of the Thompson Sub-Machine Gun" which may be obtained through the Auto-Ordnance Corporation, 302 Broadway, New York City. This discourse, for the most part, is intended to contain data not available in the handbook.

The lock is perhaps the most interesting piece of mechanism, since it is around this item that the entire mechanism functions.

First of all, its appearance is outstanding. Shining like a piece of gold, it is in direct contrast with the polished steel bolt, or the heavily blued actuator into which it fits. It is formed of titanium aluminum bronze, an alloy selected for the obvious reasons of coefficient of friction, strength, toughness, resistance to wear, and others.

This lock is designed like an "H" with oddly shaped lugs on either side. The sides of the "H" engage with grooves in the bolt, the bar with the actuator, and the lugs with the receiver grooves.

The surfaces between the bolt and lock are at an angle of 70 degrees to the axis of the gun. Those between the lock and receiver are at an angle of 45 degrees to the axis, so that there is formed on the lock an intercepted angle of 25 degrees between the bolt bearing and the receiver bearing surfaces of the lock.

The chamber pressure is transmitted to the lock through the

bolt, and the angle of the receiver and bolt slots with the corresponding lugs of the "H" wedge have been figured so that the coefficient of friction of the alloy plus the breech pressure of the cartridge causes the adhesion of the lugs to their corresponding slot surfaces in the receiver walls. At the proper time this pressure falls to a point wherein it is just sufficient to recoil the bolt to the rear and operate the mechanism. This reduced pressure will not permit the locking surfaces to adhere, the wedge slides upward, releases its locking effect, and the action functions by reason of the energy of recoil still remaining.

Should any police departments have a Thompson gun in which the lock has been "altered" or "smoothed up" by some over-energetic gunner or repairman, it would be wise to replace this lock with a new one. The various angles have been carefully determined, and *must not* be changed. Should they be filed down too much, the gun might open early, with considerable surprise to the gunner. However, Thompson engineers state that the action is built sufficiently strong to resist the slam of the bolt even though the locking surfaces were removed entirely.

Design of the weapon forestalls damage of the lock while within the action; should it become damaged while outside, replacement rather than repair would be the best policy.

One of the first forty original Thompson guns was designed to fire at the rate of 1500 rounds per minute. Early literature and advertising quoted this rate of fire as "standard," for full automatic fire. At this rate it took about two seconds to deliver the contents of a fifty shot drum. A burst of ten shots sounded like the tearing of a rag—one long roar. However, the most effective fire rate, as determined experimentally and released as the "Model 1921-A" is the present standard of about 879 rounds per minute. All guns now released fire at this rate, with the exception of the carbine and Navy model.

With the increase of the gun from the original seven-pound mark by adding about twenty-four ounces of metal, sights, and facilities for attaching a buttstock, the adaption of the gun to practical needs began. That 1500 shot rate was too fast. The effect on a burst of five shots, full automatic, was a climbing of the muzzle, with a similar, but more important effect on the target. The bulk of the shots were wasted—over the top of the object under fire.

Catalog data on these arms state that the arm "can be fired 300 shots per minute full automatic." This means that this number of

shots can be discharged in that length of time, including the time necessary to change magazines.

In the early days of Thompson experimentation it was planned to release the gun in several different calibers.

Literature in my files received in 1921 specified that the gun was to be made in .22 long rifle, rim fire, .32 A.C.P., .38 A.C.P., and .45 A.C.P. The .22 weapon weighed three pounds, had but eleven parts and was indicated to measure sixteen inches in overall length. But one of these, an experimental model, was made, and that carried a long rifle barrel making the overall length 39½ inches. It was not satisfactory. No guns in .32 or .38 calibers were ever built, although several were constructed to handle the 9 m/m Mauser and 9 m/m Luger cartridges (both in the same gun) for demonstrations before the Belgian Government.

The literature in my files bearing my dates of 1926 indicates that the gun was manufactured in the .45 automatic, 9 m/m Mauser, 9 m/m Luger and .351 Winchester Automatic Rifle calibers. This, too, was incorrect. Only the .45 automatic caliber has ever been released for home consumption. Also listed is a model with horizontal fore end, and another with such a fore end and a 14½ inch barrel having a bipod at its forward end. Actually but a few of the latter were manufactured, but the longer barrel added nothing to the accuracy and was abandoned in favor of the more compact type. None of these were ever placed on the market. The 10½-inch barrel has remained standard on all models.

In the .351 Winchester caliber, but one gun, and that of an experimental nature, was ever built. A standard 20-inch Winchester barrel was fitted to a 1000 round per minute action. The accuracy proved exceptionally fine, but the firm decided to concentrate on the weapon for the more economical and more readily obtainable .45 pistol cartridge, and the .351 idea was abandoned.

This .45 pistol cartridge, in the arm designed for it, delivers about 810 foot seconds velocity. In the 10½-inch barreled Thompson it delivers about 925 f.s.

Tests indicate that accuracy and penetration is very good, even at the longer ranges. A few feet from the muzzle the 230 grain bullet, tested on ¾-inch yellow pine boards spaced one inch apart, ran 6¾ boards. At 100 yards it would plough through six boards; at 200 yards through 5¼; at 300 yards, 4½; at the 400 mark through four boards, and at 500 yards it would still stumble through 3¾

boards—sufficient to cause very unpleasant sensations in the body of a victim.

The accuracy of the sub-machine gun is decidedly interesting. File records of the Auto-Ordnance firm indicate that in a Mann rest test fired at Hartford, Conn., May 2, 1921, the mean radius using a Remington Standard 230 grain bullet at 100 yards ran 1.89 inches. At 200 yards mean radius was 4.92 inches; at 300 yards 7.63 inches at 400 yards it increased to 18.31; while at 500 yards it jumped to 20.45 inches. Accordingly, one can assume that the accuracy of the more or less spent bullets is quite uncontrolled at the longer ranges. This writer suggests that the effective range of the weapon is under 300 yards.

At 200 yards, using the gun from the sitting position, I experienced no difficulty in placing deliberate fire in "killing" portions of the standard Colt Police Pistol "silhouette" target. It is safe to state that an officer could readily "get his man" at that range. which is well out of normal revolver range.

Further factory figures of Mann rest tests fired at 200 yards on June 10, 1922, include six lots of ammunition, commercial and Government. One lot of war ammunition showed an extreme vertical deviation of 37.6 inches as compared with 18.04 inches average for the other five lots. Even with this poor lot included, the tests show an average extreme horizontal deviation of 15.9 inches; extreme vertical average of 21.3 inches; and an average mean radius of 5.8 inches.

The writer fired several hundred rounds of ammunition at the various short ranges using the inverted "T" target and aiming at the converging point where the vertical meets the horizontal line. One 5 shot group of slow untimed fire at 100 yards, prone, center to center of extreme bullet holes, measured 2½ inches horizontal and 2¼ inches vertical.

Fifteen shots, prone, at 75 yards, time 9¾ seconds, measured 4½ inches horizontal and 3¾ inches vertical. One shot went wild, however, and was two inches from the main group.

Still another prone group fired from 60 yards consisted of 9 shots in 25 seconds, and gave a group measuring just two inches center to center of widest holes.

At fifty yards, prone, five shots fired in 6½ seconds ran 2¾ inches horizontal by 1½ inches, vertical. These groups were among the best for the given ranges, but compare favorably with the other firing results.

In this respect it is well to note that the horizontal deviation indicates a personal error, as all machine rest firings show that the cartridge fires mostly vertical groups.

All target firing for accuracy as conducted by the writer was carried out with the fire control lever set at "single," *i.e.,* the mechanism was set to discharge but one cartridge at each separate pull and release of the trigger. Furthermore, this writer is convinced that the arm should be fired in this manner *at all times* except in case of hip fire where bursts would be more effective in controlling a riot, or in spraying a speeding gangsters' car to prevent escape.

For many years the .45 automatic cartridge was sold commercially by all ammunition makers loaded with a 200 grain bullet delivering a muzzle velocity of 910 f.s. in the five inch pistol barrel. During the past three years it has been obsolete and is now difficult to find. Therefore data on the performance of this cartridge in the Thompson will not be detailed here. Suffice to say, it was not popular, and while it was powerful and accurate at the shorter ranges, it did not sustain its good points as the range increased.

An interesting development of the year 1922 was the Remington-Thompson .45 cartridge. This had a case or shell about one-eighth inch longer than standard, that it might not accidently be fired in a .45 caliber pistol. Results would have been disastrous because of the excessive pressure.

This Remington-Thompson load used a 250 grain bullet driven at a muzzle velocity of 1,450 f.s. It had a penetration of about fifteen boards at the muzzle, and better than eight at the 500 yard mark. However its production was abandoned when it was found that the accuracy was not as great as that of the 230 grain standard load, and its 1050 foot pounds muzzle energy as against 430 foot pounds for the standard load did not appear to deliver the increased *shocking* power which was expected of it. Guns using this cartridge were never sold commercially, although very complete tests were run by the Auto-Ordnance Corporation.

Another interesting cartridge developed by Remington, which appeared on the market for a short time, was the .45 Automatic Riot load—a compound bullet consisted of a hollow short copper jacket containing a round lead ball; a .45 caliber lead disc about one-sixteenth of an inch thick, having a flat-topped hump in the center to fit into the jacket base; and two flat lead discs.

My notebook indicates that the first two lead discs over the powder charge measured .116 inches in thickness; the third ran .059

at the shoulder and .124 at the center of the hump, which was shaped to make it cling to the hollow jacket while in flight. The weight of these components totaled 205 grains.

Although I had no opportunity to fire these in a sub-machine gun, I did fire a number in a pistol on the range at the Colt factory several years ago. They showed a consistent average of three holes in the paper for each shot fired; the jacket, ball and first (humped) disc clinging together, while the other two discs separated. This was noticed at a range of forty feet. The accuracy was very poor.

Still another cartridge developed for the Thompson gun in 1922 was the .45 automatic Peters-Thompson Shot cartridge. This ammunition requires the use of a special 18-shot box magazine (Type XVIII). It consists of a waxed paper bullet containing about 150 No. 8 chilled shot propelled by what appears to be Ballistite shotgun powder. A perforated tin cup separates the paper-covered shot charge from the powder and maintains the alignment in the bore until it leaves the muzzle. Where it goes afterwards is a mystery—test firing at 25 feet fails to locate the cup on the Colt silhouette target.

This load has been manufactured since that date by the Peters Cartridge Company of Kings Mills, Ohio, and is available through any of their dealers. It is particularly recommended for police use in riot calls where it is not desired to create serious injury on the person of offenders.

Perhaps the biggest development along the lines of fire control with the sub-machine gun is the Cutts Compensator which appeared in 1926. This attachment, contrary to the belief of many experienced shooters, does not act as a silencer, nor does it slow down the rate of fire because it cannot create back-pressure like a silencer. It consists of a short steel attachment on the muzzle, having a bullet-exit hole but slightly larger than the bullet. Inside is a slightly enlarged chamber with ports or "saw slots" above and crossing the axis of the bore. The escape of a portion of the power gases through these has its reaction in pushing the muzzle downward, thus counteracting the natural tendency of the muzzle to "climb," particularly in full automatic fire.

The first Thompson guns to be equipped with Cutts Compensators were shipped to the Marine Corps in October, 1926. Since then, tests have clearly demonstrated that the compensator is an exceedingly useful and practical attachment, and it is now available on all models of Thompson guns.

The late Philip P. Quayle undertook extensive research into the

theory and practice of the compensator, and his detailed explanations, together with formulae and excellent spark photographs showing the various stages of operation of compensator-fitted guns, appear in Army Ordnance, Vol. VII, No. 41, March-April, 1927, printed through the courtesy of the Department of Commerce with which Mr. Quayle was connected at the time. It is quite possible that The Army Ordnance Association, 806 Mills Building, Washington, may have reprints of this article on hand; A large quantity were printed for general distribution at that time.

From the writer's personal experience in firing Thompson guns with and without the Compensator, the device is a great help, both in full automatic fire, and in rapid single fire from the shoulder—it would certainly be advisable to include it as standard, rather than optional, equipment on each arm.

At the present time there are three models of Thompson submachine guns and two types of ammunition available for general consumption—the standard .45 automatic cartridge, loaded by all companies with a 230 grain bullet only, and the Peters-Thompson Shot cartridge, loaded only by Peters.

Of the gun types, the most popular is the Model 1921A or Model 21A, as it is often called. (Models listed with a "C" following the number indicate that a Compensator has been fitted.) (Fig. II) the Model 21A has the pistol grip type forearm. The Model 1927 is similar except that it is listed as a "carbine," since the fire control lever is missing and the automatic or machine gun feature is lacking.

Forearm on both the 21A and the carbine can be obtained in the large horizontal type on special order, if desired.

The U. S. Navy Model of 1928 (Fig. III) is similar to the 1921A in many particulars, has a horizontal forearm and sling strap, and features the slowed down action. This is the model which has been officially adopted by the Marine Corps. Sing Sing prison has a dozen of these guns, and a few others have been shipped to police departments and penitentiaries. Most guns sold, however, are of Model 21A, the most popular type.

The slowing down of the Navy action is accomplished by using a lighter recoil spring, a more slender buffer of one-piece construction rather than two, fitted with a single fiber washer to absorb the shock, and a weighted actuator. Also, the firing pin spring is shorter.

Equipment for the Thompson gun includes four types of magazines. There is available a 20-shot clip, a fifty-shot drum and a 100-

shot drum for ball ammunition, plus the 18-shot box magazine or clip for the shot cartridge.

Loading of the magazines is remarkably simple and rapid. The normal loading time of the writer for a 20-shot clip is about forty seconds, including the breaking of the seal on a box of ammunition. The fifty-shot drum can be loaded in 3½ minutes, including the removing of the cover of the magazine, breaking the seal on an ammunition box, charging the drum, replacing the cover, locking, and winding. These figures are normal; faster records can easily be set.

A check of a Model 21AC and accessories gives the weights quoted below:

Gun, without buttstock or magazines	8 lb. 13 oz.
Buttstock only	1 lb. 12 oz.
20-shot magazine, empty	6 oz.
18-shot magazine, empty	6 oz.
50-shot magazine, empty	2 lb. 8 oz.
100-shot magazine, empty	3 lb. 15 oz.
20-shot magazine, loaded	1 lb. 6 oz.
18-shot magazine, loaded (No. 8 shot)	1 lb. 3 oz.
50-shot drum magazine, loaded	4 lb. 13 oz.
100-shot drum magazine, loaded	8 lb. 8 oz.
Gun, complete, with loaded 20-shot box magazine	11 lb. 15 oz.
Gun, complete, with loaded 50-shot drum magazine	15 lb. 6 oz.

Despite the obviously heavy weight of the arm with the 50-shot drum (which this writer believes to be more practical than the 100-shot variety) the sub-machine gun balances better than one would expect; accurate firing can be done with it in any position, and the weight is not noticeable even after continued carrying, as in guard duty.

While the Thompson gun is a simple one to handle, it should not be used indiscriminately by *any* member of a police department. Machine gunning is a job requiring experience. The well regulated department has a squad which has been trained in the use of the weapon. Instruction in dismantling in total darkness, while not practiced by law enforcement officials generally, should be compulsory. It may save an officer's life in an emergency.

The type of fire is controlled through a small "half-moon" lever on the left side of the frame, directly above the magazine release.

It is plainly marked. Pointing forward, it offers full automatic fire; to the rear, a single shot for each pull of the trigger.

In carrying the gun prepared for action, the safety should always be "On." This lever is to the rear of the fire control device. The safety works through a "bolt" principle; when "Off" the sear operates through a slot milled across the portion inside the frame. When turned in the opposite, or "On" position, this slot shifts its position and the solid shaft effectively blocks the sear and prevents its disengagement from the bolt proper.

As in other machine guns, the Thompson "cocks" by drawing the bolt to the rear where it catches through the engagement of the sear with a notch milled in the under surface. The somewhat heavy trigger-pull (10 pounds) disengages the sear, the bolt springs forward scooping a cartridge from the magazine, and firing it as it rams it home in the chamber. The heavy bolt, flying forward, gives a noticable mechanical recoil, similar to that experienced in releasing the lock-back slide of the .45 automatic pistol while empty. This mechanical recoil, while slight, seems to be the only noticeable "jump" to the sub-machine gun in slow fire. With the Compensator there is even a marked tendency to pull slightly away from a shooter, so there is little danger of bruising the cheek in rapid shoulder fire.

Miscellaneous test firing by the writer extended over a period of several weeks. Extensive tests for functioning, automatic firing, penetration and rapidity of controlled fire were conducted with Remington, Peters and Frankford Arsenal National Match 230 grain cartridges, and the Peters shot load. There seemed to be no noticeable difference in accuracy between the three lots, although a quantity of 1918 wartime loads failed to perform accurately, and out of 200 rounds, six jams were noted. With the commercial loads no jams were observed, although the arm was fired upside down, and on each side, full automatic, to create a jam or malfunction, if possible. Tests with the Peters-Thompson cartridge at 25 feet show a wide dispersion of the shot on the Colt Silhouette target, covering the entire paper, and a goodly portion of the atmosphere. Penetration tests were conducted in pulp paper magazines—bundles of "Short Stories" size 6¾ x 10 x ½ inches (180 pages) which offer a uniform homogeneous structure and resistance to bullets. Tests fired at 12 feet from the muzzle indicate that an average of 100 pellets strike the magazine, (66 per cent of the charge) and most of these penetrate *through* two copies. At 25 yards the penetration is *nil.* However, tests at four feet from the muzzle show that all the 150

pellets concentrate in a 3½ inch circle, smashing through three magazines and partly through the fourth.

Still further firing at 2½ feet from the muzzle shows the group to average a 2¼ inch circle, about the same penetration, and, incidentally, with terrific destruction.

These large groups at such a short distance from the muzzle indicate the impracticability of attempting to concentrate a charge of shot from a rifled barrel. The spinning tends to throw the charge off on a tangent, and this is very evident at the longer ranges. However, the load is not intended for bird shooting—it is a riot load with all of the bang, which would be effective in keeping a crowd under control, yet fail to do serious damage.

Every effort has been made to make the Thompson gun available only to *properly constituted authorities.* In past years sales were handled through many large sporting goods dealers; the burden of determining the integrity of a purchaser thus falling on the dealer's shoulders. Experience has taught the makers of this weapon that such a policy is greatly abused, corrupt employees making sales to emmisaries of gangdom and falsifying records to make the transaction appear "regular." A new policy now in force will eliminate these troubles.

Police Departments, sheriffs and District Attorneys' forces, penitentiaries, prisons and jails, responsible banks, and bonded armored truck despatch services may purchase the various models and equipment. However, sales are no longer made through jobbers, dealers, or agents. The Auto-Ordnance Corporation has made the Federal Laboratories of Pittsburgh, Pa., its exclusive distributor. This corporation sells direct to the above mentioned agencies only after proper investigation of the buyer. Purchases are made on officially signed orders from chiefs of police, mayors, city purchasing agents, or officials occupying such capacities in their localities. Papers must be signed, certifying that neither the weapon nor any of its accessories may become the property of an *individual.*

This new arrangement prohibits a sheriff from purchasing a submachine gun and taking it with him when he retires from office. For the gun is sold to the department *only.* This also applies to any other purchasing organization.

No private individual may purchase a Thompson gun. There are no exceptions.

In other words, the Auto-Ordnance Corporation has carefully regulated the sale of its products, assisting law enforcement agen-