

THE
UNITED STATES NAVY RIFLE,

Calibre 6 Millimetres.

Model 1895.

Description and Nomenclature.

PREPARED BY
PROF. P. R. ALGER, U. S. NAVY,
AND
ENSIGN N. C. TWINING, U. S. NAVY,
Under direction of the Bureau of Ordnance.



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PRESS OF THE CASE, LOCKWOOD & BRAINARD COMPANY.
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THIS arm is known as the Lee Straight Pull Rifle, and is essentially a rapid-fire or repeating arm, rather than a magazine gun, since there is no provision for cutting off the supply of ammunition from the magazine and using the arm as a single loader while the magazine contains cartridges. It may be used as a single loader if the magazine be not charged, but in general it will be used as a repeater, five cartridges in a clip being entered in the magazine and the gun not being reloaded until this charge is exhausted. In case loose ammunition is furnished, the magazine may be charged with single cartridges, any number from one to five being entered.

The calibre of the gun is 6m/m, or approximately ".2362; the gun should be referred to generally as a "6m/m rifle," as this notation expresses the calibre exactly, while the English equivalent is only an approximation.

The gun is furnished with an adjustable sling strap, a knife bayonet, and a cleaning cord, the latter carried habitually in a recess in the butt closed by a sliding cover.

The gun and accessories are described in detail in the following pages.

DESCRIPTION AND NOMENCLATURE.

The complete gun, with sights, bayonet, and sling, is shown in Plate I: fig. 1, top view; fig. 2, side view; fig. 3, section through upper band; fig. 4, section through lower band.

The weights and dimensions of the gun, sling, and bayonet, are given in Table I, at the end of the book.

For convenience of description, the gun may be considered as composed of the following principal parts:

1. Stock.
2. Barrel.
3. Receiver.
4. Breech mechanism.
5. Trigger mechanism.
6. Magazine mechanism.
7. Rear sight.
8. Bayonet.
9. Sling.

Under these general heads are grouped all the parts of the gun, bayonet, bayonet scabbard, and sling; these, with the parts of the clip, are included in the nomenclature table, and are shown in Plate II.

In following the descriptions of the parts of the gun and their functions, reference should be made to Plates III and IV as well as to the cuts of the several parts.

1. The Stock.

Under this head are included the *stock proper*, the *barrel-cover*, *upper* and *lower bands*, *stacking swivel*, *sling swivel*, *stock swivel base*, and *butt-plate*.

The *stock proper* (Pl. II, No. 76) is of black walnut, with half pistol-grip, and has a recess 6" deep in the butt for the reception of cleaning gear.

The *barrel cover* (Pl. II, No. 2), also of black walnut, covers the upper side of the barrel from the forward end of the receiver to a point about 1" forward of the lower band, being designed as a protection for the hand when the barrel is hot. It is secured in position by the lower band and by a bevel under the forward end of the rear sight base. Its inner surface is eccentric with the barrel, so that it does not come in contact with it except at the edges. This device serves the double purpose of preserving the cover from charring and of allowing free circulation of air about the barrel. It also has an asbestos liner to assist in preventing burning of the cover.

The metal fittings of the stock are of steel, the swivels being made of steel wire. The stacking swivel (Pl. V, Fig. 17, *a*) and bayonet lug (Pl. V, Fig. 17, *b*) are carried on the upper band; the sling swivel (Pl. V, Fig. 13, *a*) on the lower band. The stock swivel base (Pl. V, Figs. 9 and 10) receives the snap of the sling when the latter is adjusted for slinging the gun; when the sling is secured, the snap pin is passed through an eye in the forward end of the magazine (Pl. X, Fig. 2, *a*). The butt-plate (Pl. V, Figs. 1, 2, and 3) is provided with a slide (Figs. 7 and 8), covering the recess for cleaning material.

2. The Barrel.

Under this head are included the *barrel proper*, and the *front sight base*, *tip* and *pin* (Plate VI). The *barrel* is of nickel steel, 28 inches in length, and is rifled on the Metford plan (Fig. 5). There are six grooves of a uniform depth of ".004, having a twist of one turn in 7.5 inches. The grooves are arcs of circles of ".089 radius, and have a width of ".100 measured on the arc of the bore. The lands are ".0237 wide.

The *chamber* (Fig. 4) consists of the body *a*, rear slope *b*, neck *c*, front slope *d*, and bullet seat *e*. At the point *d* in the bullet seat the rifling commences, the depth of the grooves increasing from 0 at that point to ".004 at the point *g*.

The *front sight base* (Fig. 7) is brazed to the barrel, and has a groove in its upper side into which the tip (Fig. 6) is snugly fitted, being held in

position by a pin. The front sight is exactly in the center line of the barrel.

3. The Receiver.

Embraced under this head are the *receiver*, the *bolt stop*, *bolt release*, *firing-pin lock*, and the *lock-pin*.

The *receiver* (Plate VII, Figs. 1-5) is a single forging of high grade carbon steel. Its forward end has a screw thread on its interior surface, which receives the end of the barrel for a distance of ".75; it is open at the top to receive the bolt, and at the bottom for the magazine mechanism.

The recoil shoulder (Fig. 2, *a*), against which the corresponding shoulder on the bolt lies, backs up and supports the bolt when the gun is discharged.

On the left of the receiver are three locking devices, each of which locks its particular part when in its *upper position*; in other words, *to unlock any one of them, it must be pushed down*.

The *bolt stop thumb-piece* (Pl. VIII, Fig. 16) operates the bolt stop (Pl. VIII, Fig. 15), a flat steel block having a vertical motion in a groove inside the receiver. When this is in its upper position and the bolt is drawn back, the tail of the extractor strikes against it and brings the bolt to a stop.

The *bolt release* (Pl. IX, Fig. 5) serves to unlock the bolt when the latter is closed, and it is not desired to pull the trigger. When the bolt is closed, and before the trigger is pulled, the notch *a* in the fly (Pl. IX, Fig. 6) lies against the lug *a* on the cam lever (Pl. VIII, Fig. 11), and the bolt cannot then be opened. When the trigger is pulled the sear spring and the pressure of the fly against the cam lever hold the fly in position, thus still keeping the gun locked. When, however, the trigger is released the upper branch of the sear, rising, forces the fly against the lug *a* on the firing pin (Pl. VIII, Fig. 6), and causes it to sink into the slot *b* in the sear (Pl. IX, Fig. 2), thus releasing the cam lever and allowing the bolt to be drawn back.

To provide for unlocking the bolt without pulling the trigger, a lug *b* is placed on the fly which engages with a corresponding lug *b* on the inner branch of the bolt release, so that when the bolt is closed a downward movement of the bolt release draws the fly down into the slot *b* in the sear, releasing the cam lever.

The third locking device (Pl. VIII, Fig. 13) locks the firing pin when the gun is cocked. The lug *a* on its inner side has a cam action against the lug *a* on the firing pin tail (Pl. VIII, Fig. 5), forcing the pin to the rear and off the sear. The trigger and sear are then free to move, while the firing pin is held from going forward. This lock is held in its locking position by friction and a small wire spring (Pl. VIII, Fig. 14) in a recess in its forward surface.

The *lock-pin* (Pl. IX, Fig. 7) locks the bolt release and firing pin lock

in position. It has a split shank and a notch in one side of its head for convenience in dismounting.

4. Breech Mechanism.

The breech mechanism includes the moving parts of the breech action which are not connected with any other part of the gun. These are the *bolt*, *firing pin* and *collar*, *main spring*, *cam lever* and *handle*, *extractor* and *spring*.

The *bolt* (Pl. VIII, Figs. 1-4), which is perhaps the most important part of the whole system, and is peculiar to this gun, is a single forging of high grade steel, hardened. It is bored out to receive the firing pin, and machined to a general rectangular form to fit the receiver.

The recoil shoulder *a*, as already stated, lies against the corresponding shoulder in the receiver, and transmits to the receiver the shock of the discharge; it has an area of about $\frac{1}{4}$ of a square inch; its upper edge is in a horizontal plane with the center of the firing-pin hole, thus causing the thrust of the discharge to be slightly downward, tending to keep the bolt firmly closed.

Two lugs *b* and *c* on the left side of the bolt limit the motion of the extractor; the lug *d* moves in the slot *d* in the tail of the extractor (Fig. 18) when the slight downward motion is imparted to the bolt at the moment of closing.

A hole *e* in the bolt leading into the firing-pin cavity provides an escape for gases in case a primer is pierced, otherwise the whole pressure of the gas would be exerted against the firing pin, tending to blow it back, to the detriment of the main spring.

The slots *f* in the sides of the bolt are clearances for the ends of the follower guides.

The *firing pin* (Pl. VIII, Figs. 5, 6, and 7) is carried in the bolt, being locked in by the cam lever stud (Fig. 11, *b*); the latter can be drawn out only when the semi-circular cut *c* in the firing pin registers with the hole *g* in the bolt. The tail of the firing pin engages with the nib of the sear. The lug *a* (Fig. 5) is an element of the locking device already described, and also serves as a stop to prevent the pin being blown out to the rear in case of a "blow-back" of gas through a pierced primer.

The function of the *collar* (Pl. VIII, Fig. 8) is to compress the main spring and assist in cocking the gun; when the cam lever handle is first moved after firing, the nib of the cam lever bears against the tail of the firing pin and pushes it to the rear, the collar meantime having no longitudinal motion, as it is held by the stud of the cam lever; the rear end of the bolt rises, the rearward motion not commencing until the cam *d* (Fig. 10) has come upon the straight portion *b* of the cam-seat on the receiver (Pl. VII, Fig. 2) at the same moment the nib of the cam lever slips into the notch in the tail of the firing pin, and the first part of the cocking is complete.

If the bolt is now pushed smartly home the firing pin tail engages the nib of the sear; the lower branch of the sear bearing against the trigger, the upper branch cannot rise, consequently the forward motion of the firing pin is arrested while the bolt and the collar (still held by the cam lever stud) move forward, and the main spring is fully compressed. As soon as the firing pin is arrested the cam lever nib leaves the notch in which it has rested and the pin is held to the rear by the sear, the nib of which lies against that portion of the firing pin tail below the notch.

The *main spring* (Pl. VIII, Fig. 9) is of spring tempered steel piano wire and is screwed on the firing pin from the front end. It abuts against the firing pin shoulder *b* (Fig. 5) and against the collar. When the gun is cocked it is compressed between these two abutments, and on the release of the firing pin from the sear, its expansion being limited to the rear by the immovable collar, the spring forces the pin sharply forward against the cartridge in the chamber.

The *cam lever* (Plate VIII, Figs. 10 and 11) is one of the essential features of the gun and peculiar to it. As already explained, it is automatically locked into the bolt and can only be removed when all tension is off the main spring, and the semi-circular cut *c* in the firing pin registers with the hole *g* in the bolt. While this condition obtains after the gun is fired, the cam lever cannot be drawn or thrown out as its lower portion is held from transverse motion by the side of the receiver; the lever cannot therefore be removed under the conditions named unless the bolt is *out of the gun*.

The function of the nib *a* of the lever has been explained in the description of the fly.

There remains to be considered the action of the cam *d*, itself, from which the piece takes its name. The gun having been discharged and the trigger released, the bolt is free to move; on grasping the lever handle and moving it, its first motion is a circular one, the curved part of the cam moving about a shifting center in the cam seat of the receiver, as the rear end of the bolt rises. The first operation of cocking having been completed as above explained, the cam becomes tangent to the straight portion of the cam seat and the circular motion of the cam lever is converted into a rearward movement, communicated to the bolt itself. The reverse takes place on closing the bolt.

That the rearward pressure developed by the explosion of the cartridge cannot open the bolt is evident. First, the fly holds the bolt immovable until the trigger is released; secondly, the first motion of the bolt in opening is a circular one and not rearward; thirdly, the line of thrust of the discharge is from the center of the bolt face to the center of the recoil shoulder and this latter is machined to such an angle that the line of thrust is perpendicular to it. The thrust may therefore be resolved into two components, one acting in the axis of the bolt and

having no effect on the locking, the other acting vertically downward and tending to close the bolt more firmly.

The *extractor* (Pl. VIII, Fig. 18) serves in three capacities, viz.: extractor, ejector, and magazine stop. The magazine being charged, and the bolt drawn fully to the rear, the extractor lug *a* lies against the forward lug *c* on the bolt, the point of the spring lying in the triangular depression *c* (Pl. VII, Fig. 2) in the inner side of the receiver; on pushing the bolt forward, the friction between it and the extractor carries the latter with it until the point of the spring strikes the forward side of the depression in which it lies. The shank of the extractor in the meantime, under the pressure of the spring, lies diagonally across the mouth of the magazine preventing the follower spring from forcing the cartridge up out of the magazine; its position in the vertical plane is such that the upper cartridge lies high enough to be engaged by the face of the bolt and thus pushed forward into the chamber. As the forward motion of the bolt continues, the extractor having been arrested by the point of the spring striking the shoulder in the receiver as above explained, the bolt forces the extractor against the side of the receiver, compressing the spring; when the rear lug *b* on the bolt comes in contact with the tail of the extractor the forward motion of the latter is resumed, the spring is forced out of the triangular recess and the whole system moves forward, the extractor spring traveling in the groove *d* (Pl. VII, Fig. 2). As the cartridge is forced into the chamber, the bullet is pointed at an angle upward and, moving along the upper side of the chamber, is gradually forced into a horizontal position, thus causing the head of the case to rise between the face of the bolt and the extractor, whose projection is such that the nib enters the cannellure. From this point, bolt, extractor, spring, and cartridge move together until the forward motion of the bolt is completed. When the circular motion begins the small center lug *d* on the bolt travels in the slot *d* in the extractor tail, the rear bolt lug pushes down the tip *a* of the extractor spring (Fig. 17), and the latter, guided by the feather *b* in the feather slot in the extractor tail, rotates about its pin *c* until its point lies along the raised portion of the extractor head, holding it firmly against the cartridge head.

The gun is then discharged, the bolt raised and drawn to the rear, when the reverse movements of the extractor take place. It will be noted that the extractor does not begin its motion to the rear until the bolt has moved about $1\frac{3}{4}$ " when the front lug strikes it and draws it to the rear with a sudden jerk. This takes the place of the camming action by which the empty case is started from a turn-bolt gun. The bolt being drawn fully to the rear, the tail of the extractor strikes the beveled front face of the bolt stop, which arrests it suddenly and imparts to it a quick though short transverse motion by means of which the empty case is ejected. The extractor spring plays no part in the ejection.

5. Trigger Mechanism.

This embraces the *trigger*, *sear*, and *fly*, with their *pins*, *screws*, and *springs*.

The *sear* (Pl. IX, Fig. 2) is an S-shaped piece of which the lower branch *c* engages the trigger and the upper branch *a* the cocking-toe or tail of the firing pin. The functions of this piece and of the fly have been previously described in detail.

The *sear spring* (Pl. IX, Fig. 4) is a double branch flat spring; its lower branch lies in the notch *a* in the trigger (Pl. IX, Fig. 1) and its upper branch in the notch *d* in the sear. Its own upper end is notched to receive the fly.

The *trigger* (Pl. IX, Fig. 1) is of the "double" or "arrested" pull type. The *trigger spring* (Pl. X, Fig. 15) bearing on the shoulder *b* (Pl. IX, Fig. 1) keeps the point of the trigger away from the sear until about half the pull is completed.

6. Magazine Mechanism.

This includes the *trigger guard* and *magazine*, with *dowel*, *screws*, and *bushing*, the *elevator arm*, *elevator spring*, *shaft*, and *pins*, the *follower*, *follower guides*, *pins*, and *rivets*, and the *clip guide*.

The *trigger guard* and *magazine* (Pl. X, Figs. 1-5) are in one piece, a solid forging machined to shape; the tangs at the ends furnish bearings for the *trigger guard screw* and the *receiver tang screw*; the former (Fig. 8) is entered from the bottom and engages a female thread in the lower forward portion of the receiver; the latter (Pl. VII, Fig. 6) is entered from the top, tying together the rear end of the receiver and trigger guard. It has a bushing (Pl. VII, Fig. 7) the function of which is to take up the recoil of the gun and distribute it through the stock to prevent the splitting of the latter. It also insures the receiver and guard being kept in their proper relative positions. Inside the guard, at the rear end, and composing a part of it, are the two *clip release ways* (Pl. X, Fig. 2, *b*); these are sharp at their upper ends and when the clip is pushed into the magazine from the top, one or the other of them, as the case may be, passes between the body of the clip and the loop of the locking wire; being wedge-shaped, the *release way* turns the loop over, releasing the cartridges.

In the forward end of the guard is a hole *a* for the latch pin of the sling strap snap swivel. Just above this is the seat *c* for the elevator spring and shaft.

The *follower guides* (Pl. X, Fig. 6) are curved pieces of steel riveted to the inner sides of the magazine and serving as guides for the tail lugs (Fig. 9, *a*) of the follower. They are hook-shaped at their upper ends, the hooks acting as stops to limit the upward motion of the follower when it has reached a horizontal position.

The *elevator arm* (Pl. X, Fig. 10) and *follower* (Pl. X, Fig. 9) are connected by a hinge rivet and, together with the elevator spring, constitute

a parallel motion system for raising the cartridges from the magazine in a horizontal position and presenting them successively in front of the bolt.

The *elevator spring* (Fig. 14) is a flat coil spring placed upon a shaft (Fig. 13) and engaging by means of a hole in its inner end a hook on this shaft. The ends of the elevator arm being placed over the ends of the shaft, the spring is seated in position at the forward end of the magazine and a tension is maintained by a small pin, *d*, on the guard itself, which enters a hole in the outer end of the spring.

The extreme ends of the elevator spring shaft are round and have a bearing in the guard, at *c*, an upward pressure and fixed center of motion being assured by the tension of the spring.

The *follower stop pin* (*b*, Fig. 9) serves to prevent the front end of the follower from flying up when the tail lugs bring up against the stops on the guides.

The *clip guide* (Pl. X, Fig. 7) is a small piece riveted inside the magazine at the points *e* (Fig. 2) between the clip release ways and slightly to the rear of them; its function is to prevent the clip being entered in the magazine in rear of the release ways and so cause failure to unlock the wire.

7. Rear Sight.

The rear sight consists of the *base*, *leaf*, *leaf spring*, and *slide* with the *base screws*, and the small parts of the device for holding the slide in the desired position.

The *base* (Pl. XI, Figs. 8-12) is secured to the barrel by two screws and carries the flat spring (Fig. 21) by which the leaf is held erect. The tension of this spring and its bearing on the leaf are so adjusted as to hold the leaf erect (Fig. 7) or to hold it firmly down either to the rear (Fig. 6) or to the front (Fig. 3).

The *slide* consists of three pieces, the *slide* itself (Fig. 22), the *catch* (Fig. 28), and *catch spring* (Fig. 27). The *catch* is a pinion thrust through the slide and having a small spiral spring in its left end by which a knife edge *a* on the lug on the left end is forced into the notches on the sight leaf. The right end, *b*, of the catch is enlarged and knurled for ease in manipulating; pushing in on it releases the knife edge from the leaf notch and leaves the slide free to be moved as desired.

The *leaf* (Figs. 17 and 18) has notches on its side to receive the knife edge of the slide catch as above explained. It also has a stop screw at *a* to prevent the possibility of the slide being accidentally slipped off the top.

The assembled sight is shown in Figs. 1-7, Pl. XI.

The marking of the sight is as follows: Leaf down, and slide in rear position (Fig. 3), 300 yards. Leaf down and slide pushed forward (Fig. 5), 600 yards. The sight has been adjusted in this position for a range of 500 yards, but it is marked 600 as the error at that range will be less

by using the 500 yard sighting than by going to the next mark, 800 yards.

The figures 3 and 6 will be found on the left of the sight base under the corresponding positions of the slide. The leaf is marked for each 100 yards from 800 to 2,000 yards inclusive. Each range is indicated by a line to which the upper edge of the slide is to be brought; resting on each line is a large figure denoting the range in hundreds of yards; thus 8 means 800 yards, 10, 1,000 yards, etc. Even ranges are on the right-hand side of the leaf, odd ones on the left-hand side.

The sight is adjusted for "medium" sighting at all ranges; that is, the front sight should just fill the lower portion of the notch, its upper edge being brought on a line with the shoulder between the straight and the inclined portions of the notch (*aa*, Fig. 13).

The marks on the leaf mark the correct position of the slide for an initial velocity of 2,460 feet; with service ammunition this velocity will seldom be exceeded while it may frequently not be reached; consequently it may be necessary at long ranges, to set the slide a notch or two higher than the mark. The notches are ".02 apart and give ample means of adjustment in individual cases.

The leaf-notch is exactly in the center of the leaf, no allowance being made for drift, which is so small as to be almost inappreciable at 300 and 500 yards. The notch in the slide is set to the left about ".05, accurately compensating for the drift at 800 yards; a slight left holding will correct any excess of drift for greater ranges.

No wind gauge is provided and due allowance must be made in firing.

8. Bayonet.

The *blade*, *a*, and the *tang*, *b*, of the bayonet (Pl. XII, Fig. 2) are in one forging, of fine cutlery steel, while the *guard* (Fig. 10), and *pommel* (Fig. 2, *c*), are separate pieces. The guard has a ring *d*, which fits over the end of the barrel, and is held between the shoulder *e* (Fig. 1) and the pin *d*.

The pommel is riveted to the tang; it has in its upper side a T-shaped groove (Fig. 3, *f*) which slides over the bayonet-lug on the upper band of the rifle when the bayonet is fixed. In this groove is a spring catch (Fig. 4) which, lying behind the bayonet-lug, holds the bayonet against any force tending to draw it off the gun; it is released by pressing the button (*g*, Fig. 2) on the side of the pommel.

The *grasp scales* are of black walnut, riveted to the tang.

The bayonet scabbard (Pl. XIII) consists of five principal parts, the *body* (Fig. 6) and *frog* (Fig. 1) of leather, and the *tip* (Fig. 5) and *mouth casings* (Fig. 3) and *jaws* (Fig. 2) of steel.

The casings are fastened to the body by cement and rivets, while the jaws are entered in the top of the mouth casing and secured to it by

a screw. Their function is to exert a pressure on the blade to hold it in the scabbard..

The scabbard and frog are riveted together, and are attached to the cartridge belt by a brass hanger, passing through the loop of the frog.

9. Sling.

The *sling* (Pl. I, Fig. 7) consists of *strap, a, securing hook, b, slide c, snap swivel d*, and button *e*. The snap swivel and button are of forged steel, the other fixtures of steel wire.

The snap swivel is in five parts, shown in the plate (Pl. II). On pushing in on the head of the spring plunger, the latch pin is released from its seat in the fixed arm of the swivel, and the latch and pin are free to rotate about the end of the plunger.

Directions for assembling, attaching, and manipulating the sling are given under the head of "DISMOUNTING AND ASSEMBLING."

10. Cleaning Cord.

This consists of the *cord*, the *weight*, the *bristle*, and the *loop*.

The cord is extra indicator cord tested to 45 lbs. strength. The weight, loop, and bristle-head are of yellow brass, while the bristle consists of a piece of short hair bristle twisted in with a brass wire. The knots of the cord are entirely inside the brass pieces so that they present no obstruction to the passage of the cleaner through the bore.

The method of using the cleaner is explained under "CARE AND PRESERVATION."

AMMUNITION.

The standard Navy ball cartridge consists of cartridge case, primer, bullet, and charge. The case is of solid drawn brass and has no rim, but is provided with a cannellure in which the nib of the extractor engages.

The primer is similar to primers used in .45 calibre and other small arm ammunition, and requires no special description.

The bullet is of hardened lead (95% lead, 5% antimony) with a jacket of a material known as cupro-nickeled steel. It is steel plated with an alloy of copper and nickel. The weight of the bullet is 135 grains.

The charge of powder varies in weight as it may also in kind. The ammunition at present issued to the service is loaded with 33.2 grains of Troisdorf smokeless powder, which gives an average velocity to the standard bullet of 2,460 feet per second at 60 ft. from muzzle, with a maximum chamber pressure of 49,000 lbs. per square inch and an average pressure of 46,000 lbs.

With this velocity a penetration of 62 inches in pine at 5 feet from the muzzle is obtained. The penetration in steel boiler plate is about "7/16 at the muzzle and "3/8 at 100 feet.

The ammunition is furnished to the service in steel clips, five cartridges in each, and packed four clips in a box, fifty boxes to the case.

The *clip* (Pl. XIV) consists of the *clip body* and the *locking wire*. To charge it, place the wire in the groove, the loop through the hole, place five cartridges in it successively, the edges of the clip lying in the cannellures; adjust the cartridges centrally so that the wire projects the same distance beyond each of the end cartridges; then with the fingers or in any convenient way, turn the loop flat against the back of the clip. This turns the wire on edge, firmly locking the two end cartridges, and the hooked ends, lying along the chamfer on the cartridge heads, hold them against transverse displacement. The middle cartridge is left free to turn. The pack is now firm and solid and will rarely come adrift under rough handling. The clip wire is turned and the cartridges and clip automatically released in the gun as described under the head of "MANIPULATION."

The clips are intended to be used only once and cannot be depended on to work satisfactorily after the first time, consequently the packs *must not be tampered with, nor the loops turned except in the gun.*

BELTS.

The belts issued to the service are of dark blue woven material, with twelve woven pockets, each covered by a leather flap, buttoning to the front of the pocket; each pocket is designed to hold three packs of five cartridges each, the middle one of the three being put in the pocket with the clip up, the others with the points of the bullets up. With each belt are two shoulder straps, eyeletted together, and having hooks in each end which hook into the eyelets in the belt both in front and behind. These should never be unhooked, but the belt put on and removed by throwing the straps on and off the shoulders.

The belt is usually to be worn high up above the waist, with the cross of the straps at the back but for convenience in reaching ammunition the belt may be shifted front in rear if desired.

MANIPULATION.

The operation of the various parts of the gun has been described in detail in the foregoing sections; the descriptions are here reviewed and connected in an abridged form. The description may be followed by reference to the plates of the individual parts and to Plates III and IV, which, to avoid confusion, are not lettered.

The gun being completely assembled, the bolt closed as after a cartridge has been fired (Pl. IV, upper figure), the breech is opened by drawing the bolt smartly to the rear with the right hand on the cam lever handle. The motion of the hand, while not strictly "straight pull," is such in effect, as the operator makes no other motion of the hand than in a direc-

tion straight to the rear. The conformation of the cam and cam seat, as already explained, causes the first motion of the bolt to be a circular one, the rear end rising and carrying the hand with it.

The rising of the bolt effects the first operation of cocking, as before explained.

The rearward motion of the bolt is checked by the striking of the extractor tail against the bolt stop. Supposing an empty case to have been in the chamber, it has now been extracted and ejected as heretofore explained.

The chamber is now empty and the breech open, bolt drawn back to its full extent (Pl. III). With the right hand grasp a pack of five cartridges between the thumb and the first two fingers, preferably near the heads, and pushing the extractor to the left with the lower cartridge, insert the pack in the magazine, either side up, keeping the clip close to the face of the bolt. With the thumb of the right hand press the pack down hard as far as it will go. This forces the loop of the clip wire down in rear of one or the other of the clip release ways, while the clip itself is made to pass down to the front by the clip guide; the wedge-shaped way turns the loop and wire and frees the cartridges, which are at once raised by the follower until the top one brings up against the extractor, lying partially across the top of the magazine.

The clip is now free, and will drop through and out the bottom of the magazine at the first or second fire.

The magazine being charged, push the bolt smartly forward; the top cartridge, having a portion of its head in front of the bolt, is pushed forward and into the chamber. When the bolt is about two-thirds closed, the cartridge assumes a horizontal position, the cannellure rising directly under the extractor and being grasped by it.

The operation of the extractor and spring during the forward motion of the bolt have already been described.

The bolt having been pushed entirely forward, is cammed down into position, the recoil shoulder resting against the shoulder in the receiver, the main spring being compressed meantime as already described.

The cartridge is now in the chamber, held tightly against the face of the bolt by the extractor, and the bolt is bearing against the recoil shoulder of the receiver (Pl. IV, lower figure).

The bolt cannot now be opened, unless the trigger be pulled and released, or the bolt release pushed down. The method by which the fly thus holds the bolt has been previously described.

If it be not desired to fire the gun at once, the firing pin may be locked by pulling up the lock on the left of the receiver; this cams the tail of the pin off the sear, and the trigger may be pulled without releasing the firing pin. The lock *must be pulled up smartly to its full travel*; it is moved with some difficulty, having to draw back the firing pin against the already compressed main spring.

Pushing the lock down releases the firing pin, and if the trigger be now pulled the piece is discharged.

Upon discharge, release the trigger and draw the bolt back smartly as at first. The empty case will be extracted and ejected, and, on closing the bolt again, a second cartridge is loaded into the chamber.

Care should be taken to make the rearward motion of the bolt sharp, as a failure to eject the fired case will cause a jam, a second cartridge being lifted and started into the chamber with the empty case lying above it, which will jam against the receiver. "Double loading" is not possible if this precaution is observed, as a second cartridge cannot be pushed forward unless the bolt be drawn fully back, in which case the first cartridge will have been thrown out whether fired or not.

In special instances it may be desired to use ammunition without clips. The magazine may then be charged with single cartridges, which should be put in *under* the extractor and near the rear of the magazine, though a considerable latitude in position is practically allowable.

The magazine will hold only five cartridges; a sixth may, however, be placed in the receiver forward of the extractor, in which case, before closing the bolt, those in the magazine must be pushed down slightly to disengage the head of the upper one from the face of the bolt; if the bolt be now closed the gun is charged for six shots.

In single loading, no special care need be observed in placing the cartridge; it may be placed either in front of the extractor or under it. The bolt can be closed and the cartridge loaded into the chamber equally well in either case, the nib of the extractor gripping the shell in any event.

The direction of the ejection is to the right and slightly to the front, so that the empty shells clear the operator and the man at his right in the case of squad or company firing in close order.

The fact that this arm is essentially a *repeating* or *rapid-fire* rifle should be borne in mind. It is not a magazine gun in the sense that it has a reserve supply of ammunition for rapid fire at a critical moment, but it is *always* ready for rapid fire, as the time consumed in opening the breech and inserting a clip is very short, when five shots are instantly ready for delivery, and this can be repeated as long as the individual operator's supply of ammunition lasts. The five shots may be delivered without taking the gun from the shoulder, as it need only be brought to the loading position when a new clip is to be entered.

The gun should, therefore, be habitually carried empty and with firing pin down, *i. e.*, after closing the breech the trigger should be pulled. It is then ready for immediate loading. In situations of great danger, where instant firing may be required, the piece may be carried with the magazine charged, one cartridge in the chamber, *and the firing pin locked*.

If desired, under special circumstances, the magazine may be charged

and the bolt closed on an empty chamber; in this case the precaution must be taken to press the pack down slightly while closing the bolt to avoid pushing a cartridge into the chamber. Before firing, when loaded in this way, the bolt release must be pushed down and the bolt drawn fully back and closed again to load the piece. Under these circumstances the firing pin should not be locked, as the breech cannot come open accidentally, and thus cause the piece to be inadvertently loaded, while the fact that the pin was locked would possibly be overlooked and valuable time might be wasted.

This method of carrying the gun should only be resorted to, as stated above, under special circumstances of rare occurrence; otherwise it should be carried with magazine and chamber empty.

It should be noted that the gun must be cocked in order that the firing pin lock may be used; with the pin down the lock is of no effect.

Before firing, always make sure that the bolt has been pushed home, and that the bolt stop is *up*.

In rapid firing count the shots, and do not drop the gun from the shoulder until after the last shot of the string.

Do not touch the barrel after rapid firing; it becomes very hot, the barrel cover being provided as a guard for that part of the barrel and receiver with which the hand comes in contact in firing.

The sight, being attached to the barrel, is also likely to become warm, but it cools quickly.

DISMOUNTING AND ASSEMBLING.

To take down:

The gun being completely assembled, breech closed, chamber empty, to remove the bolt: Unlock by pressing down on bolt release; this frees the cam lever from the fly and allows the bolt to be drawn to the rear until its motion is arrested by the bolt stop. The bolt is then freed by pushing down and to the left on the bolt stop thumb piece. It may then be drawn out from the receiver to the rear. Put the thumb on the tail of the extractor as soon as it comes out of the receiver, to prevent its dropping. Remove extractor spring by rotating it about its pin to free the feather on the rear end from the feather slot in the tail of the extractor.

To remove the firing pin from the bolt: Grasp the bolt in the left hand, left side up, thumb against the small stud on the tail of the pin. Press the pin to the rear to free it from the nib of the cam lever. With the right hand turn the cam lever down until the handle is at right angles to the bolt, then let go the pin, when it will fly forward, clear of the cam lever; draw out the cam lever to the right and the firing pin to the rear. Remove the collar from the firing pin and take off main spring by unscrewing to the front.

To dismount trigger guard and magazine: Remove trigger guard screw and receiver tang screw, and draw trigger guard and mechanism

out from the bottom. Lay trigger guard in left hand, right side up, and with fingers of right hand press elevator arm and follower down (taking care to prevent follower from dropping between the elevator arms), until tail of follower is opposite clearance cut in magazine wall, then spring elevator arm up (to right) until tail lugs of follower clear guides; then allow elevator arm to rise under tension of elevator spring, turning it completely over, or through 180°; enter the point of screw-driver under elevator spring and give a slight upward pressure to release spring from the pin on the guard, then remove spring from its seat.

Remove sear spring and fly. The trigger spring, trigger, and sea are removed by taking out the pins and screws securing them.

To dismount barrel and receiver: remove band screws and bands. In removing upper band, when it strikes the front sight turn it bottom up and draw it off over the sight.

To remove barrel cover, raise rear sight leaf to vertical position and push slide to top, then draw barrel cover forward to clear the bevel under rear sight base, lift it up, turn through 90° and slip off over rear sight; lift barrel and receiver out of stock.

With point of screw-driver bear out and down on bolt stop thumb-piece until the bolt stop is clear of its slot. Remove lock pin by engaging point of screw-driver or nib of extractor in the notch on the front face of its head. Spring out bolt release to clear guide pin from its slot, and bolt release will drop out from its seat. Push firing pin lock entirely down and remove it by springing it out from the side of the receiver. When free draw it through to the outside (left).

To assemble: proceed in inverse order.

Enter firing pin lock in its lowest position and push it up home; return bolt release to its seat and spring it into position; enter lock pin and force it home, being careful to see that the notched face is forward; enter bolt stop in guide slots and slide it home, springing thumb-piece out until stop is up; as the two sides of the bolt stop are unequal in length, it is sometimes difficult to enter it fairly and push it home, owing to its tendency to "cramp"; *force must not be used*. Replace barrel in stock, put on cover and bands.

Assemble trigger mechanism with guard, being careful to replace fly and sear spring properly, the notch in the end of the long arm of the sear spring embracing the shank of the fly, the latter resting in its own seat in the upper branch of the sear.

To replace elevator arm (from which the spring has not been removed), grasp it in the right hand, follower down, and push spring into its seat; the guard being held in left hand, then with the thumb or forefinger of right hand press the spring downward with a rolling motion until it brings up, then, pressing spring shaft up into its seat, turn elevator arm over to the left; if the spring has failed to engage the pin on the guard,

the fact will be at once made known by the absence of tension; the spring being engaged as shown by tension, the elevator arm is turned over, follower being kept up from between the two sides of the elevator arm, the follower lugs sprung into place and allowed to rise against the guide stops.

To return guard and magazine to position: Turn gun bottom up, enter guard, and replace screws. If the fly has been correctly put in, all parts will be found in place without any special care being used in assembling. Reassemble bolt, putting firing pin in first and pushing it forward until the cut on its upper side is fair with hole in bolt for cam lever shank; enter cam lever to its seat and compress main spring by turning cam lever back.

Assemble extractor and spring, being careful to enter feather in proper slot; grasp bolt with right hand, the thumb holding tail of extractor against forward lug on left side of bolt; enter bolt and extractor in receiver together and push home. Pull up bolt stop to locking position.

In putting main spring and collar on firing pin, see that end of spring rests in notch provided for it on the forward end of the collar.

In general no dismounting further than the removal of the bolt and firing pin should be done by any but armorers, except in the way of instruction.

To remove the sling from the gun: Draw the slide forward until the sling hangs loose; remove the button and draw the loose end of the strap out from the snap swivel, and through the slide; disengage the securing hook from the stacking swivel, remove it from the strap and draw the strap through the sling swivel.

To attach the sling proceed in inverse order, passing the strap first through the sling swivel *from the rear* and last through the snap swivel from underneath so that the free end shall turn over on its own part between the gun and the strap.

When the gun is to be carried unslung, or stored, the snap swivel is snapped into the eye at the forward end of the trigger guard, the securing hook is engaged with the stacking swivel, *hook down*, and the strap is tautened along the stock by drawing the slide as far as possible to the rear.

To prepare for slinging the gun, first loosen the strap by pushing the slide forward a short distance, then disengage the securing hook and let it hang freely in the bight of the strap; then remove snap swivel from trigger guard and snap it into stock swivel; lastly, push slide as far forward as is necessary to give ample length of strap. The gun thus slings between the stock swivel and the sling swivel.

CARE AND PRESERVATION.

The powder used in the service cartridges produces little smoke and leaves only a slight residue in the barrel and it is not necessary or desir-

able that the barrel should be cleaned during the course of firing. As soon as possible after the completion of a day's firing it should be thoroughly cleaned with the cord cleaner and oily cloths carried in the butt stock, and upon being returned to the armory, should be again cleaned carefully with oily cloth or waste.

In using the cleaner in the field or on the range, drop the weight into the muzzle and let it run through the barrel; when it drops into the receiver pick it out and draw the cord and bristle entirely through the bore and chamber; repeat this two or three times, and if the bore appears dirty still, thrust a piece of soft cloth, flannel, or serge preferably, saturated with oil, and of a size not greater than 1" 1/2 square, through the loop of the cleaner and draw through again. The bolt may be removed to facilitate this cleaning.

The cleaner must *never* be drawn through from the breech end, as the cord drawn across the edge of the muzzle will injure the rifling.

To clean the chamber put the small cloth cleaner in the loop and thrust into the chamber from the rear; the bristle end of the cleaner is made sufficiently long for this purpose.

The small amount of residue left by smokeless powder is destructive to the barrel, and after each day's firing, as before stated, the bore should be again thoroughly cleaned, dried, and lightly oiled. It should be remembered that clean fresh water is one of the most efficient as well as the most available of cleaning materials. A warm solution of soda will be found good for cutting out the powder residue. After using pure water or a soda solution, care must be taken to dry the gun thoroughly and to oil the bore and the mechanism.

If a rod is used in the armory it must not be thrust into the muzzle of the gun; *all cleaning must be done from the breech*.

Care must be taken not to use a piece of cloth larger than the prescribed size or a piece of waste of greater bulk, as cloth or waste jammed in the bore can often be removed only by drilling it out.

The chamber must be kept thoroughly clean, and if oiled, only very lightly, and should be wiped out dry before firing.

The bolt and working parts of the mechanism should be lightly oiled to protect them against rust.

As the front sight projects to a considerable distance above the barrel, great care must be taken to preserve it from injury; leaning the gun against a bulkhead or a wall is not permissible as the sight is the natural point of contact. If no rack is at hand, the gun should be laid flat on deck, ground, or thwarts of a boat.

The life of a barrel being shorter than with black powder guns, the work should be evenly distributed among the guns of a ship as far as possible.

Guns should always be snapped on being returned to armory racks to relieve the tension of the main spring.

In the best of ammunition a primer will occasionally be pierced and gas will enter the firing pin cavity. In case this occurs the bolt and pin should be dismounted, the cavity, pin, and spring cleaned and oiled.

While the rear sight is so made that the leaf will turn down flat either to the front or to the rear, it should be remembered that its normal position is to the front.

It is to be remembered that to lock the firing pin, the lock must be drawn *entirely up*; when it first strikes the lug on the pin a resistance to further motion will be felt, but this must be overcome and the stop pushed to its top position.

TABLE I.

Barrel.

Diameter of bore, land to land,	6m/m.
Total length,	28"
Length of rifled portion,	24".965
Length of chamber,	3".035
Horizontal distance between sights,	23".125
Number of grooves of rifling,	6
Width of grooves, measured on arc of bore,	".1
Radius of grooves,	".089
Depth of grooves, uniform,	".004
Twist, uniform, 1 turn in,	6".5
Width of lands,	".0237

Bayonet.

Length of blade,	8" ¹ / ₄
Width " "	1" ¹ / ₁₆
Weight of bayonet,	11 oz.
" " scabbard,	5 ¹ / ₂ oz.

Gun complete.

No. of different parts,	77
" manufactured parts,	86
Length, with bayonet fixed,	4' 3 ¹ / ₄ "
" " " unfixed,	3' 11"
Weight, " " fixed, and with sling,	9 lbs. 7 oz.
" " " unfixed, " "	8 lbs. 12 oz.
" " " " and without sling,	8 lbs. 8 oz.

TABLE II.

Ammunition.

Weight of primed cartridge case,	164 gr.
" " charge,	33 gr.
" " bullet,	135 gr.
" " cartridge complete,	332 gr.
Average weight of clip,	76 gr.
" " " charged clip,	1,736 gr.
Weight of 180 rounds in clips,	8 lbs. 10 oz.

Length of cartridge case,	2".355
" " bullet,	1".24
" " cartridge complete,	3".11
Diameter of head of case,	".447
" " bullet, cylindrical portion,	".244

Belt.

No. of pockets, for 3 clips each,	12
Weight of belt, empty,	1 lb. 7 oz.
" " loaded belt,	10 lbs. 1 oz.

TABLE III.

Nomenclature of Rifle and Equipments. Numbers refer to Plate II.

1. Barrel.
2. Barrel cover (wood).
3. Bolt.
4. Bolt stop.
5. Bolt stop thumb-piece.
6. Bolt stop thumb-piece pin.
7. Bolt release.
8. Butt plate (steel).
9. Butt plate slide.
10. Butt plate slide button.
11. Butt plate slide spring.
12. Butt plate slide spring screw.
13. Butt plate screws (2).
14. Cam lever.
15. Cam lever handle.
16. Cam lever stop pin.
17. Clip (loading).
18. Clip lock wire.
19. Clip guide.
20. Clip guide rivets (2).
21. Extractor.
22. Extractor spring.
23. Extractor spring pin.
24. Elevator arm.
25. Elevator spring.
26. Elevator spring lock pin.
27. Elevator spring shaft.
28. Elevator spring shaft pin.
29. Follower.
30. Follower stop pin.
31. Follower hinge rivet.
32. Follower guide, right hand.
33. Follower guide, left hand.
34. Follower guide rivets (8).
35. Firing pin.
36. Firing pin collar.
37. Firing pin lock.

38. Firing pin lock spring.
39. Front sight base.
40. Front sight tip.
41. Front sight pin.
42. Lock pin.
43. Lower band.
44. Lower band pin.
45. Lower band screw.
46. Main spring.
47. Receiver.
48. Receiver tang screw.
49. Receiver tang screw bushing.
50. Rear sight base.
51. Rear sight base front screw.
52. Rear sight base rear screw.
53. Rear sight leaf.
54. Rear sight leaf joint screw.
55. Rear sight leaf spring.
56. Rear sight slide.
57. Rear sight slide stop screw.
58. Rear sight slide catch.
59. Rear sight slide catch spring.
60. Sear.
61. Sear pin.
62. Sear spring.
63. Sear fly.
64. Sling swivel.
65. Sling strap.
66. Sling strap button.
67. Sling strap slide.
68. Sling strap slide sleeve (2).
69. Sling strap securing hook.
70. Sling strap securing hook sleeve.
71. Sling strap snap swivel.
72. Sling strap snap swivel latch.
73. Sling strap snap swivel latch pin.
74. Sling strap snap swivel spring plunger.
75. Sling strap snap swivel spring.
76. Stock (wood).
77. Stock swivel base.
78. Stock swivel base screws (2).
79. Stacking swivel.
80. Stacking swivel pin.
81. Trigger.
82. Trigger pin.
83. Trigger guard.
84. Trigger guard dowel.
85. Trigger guard screw.
86. Trigger spring.
87. Trigger spring screw.
88. Trigger spring stop pin.
89. Upper band.
90. Upper band screw.

91. Bayonet blade.
92. Bayonet guard.
93. Bayonet guard pin.
94. Bayonet pommel.
95. Bayonet pommel rivet (2).
96. Bayonet grasp scale (2).
97. Bayonet grasp scale rivet (2).
98. Bayonet grasp scale rivet washer (2).
99. Bayonet catch.
100. Bayonet catch nut.
101. Bayonet catch spring.
102. Bayonet scabbard body.
103. Bayonet scabbard mouth casing.
104. Bayonet scabbard tip casing.
105. Bayonet scabbard casing fasteners (4).
106. Bayonet scabbard stud washers (2).
107. Bayonet scabbard jaws.
108. Bayonet scabbard jaw screw.
109. Bayonet scabbard frog.

ERRATA.

PLATE I, Fig. 7, letter designating button of sling strap, read *e* instead of *c*.

PLATE II, for numbers 110, 111, and 112, read, 107, 108, and 109.

TABLE III, No. 65, sling strap; not shown in Plate II.

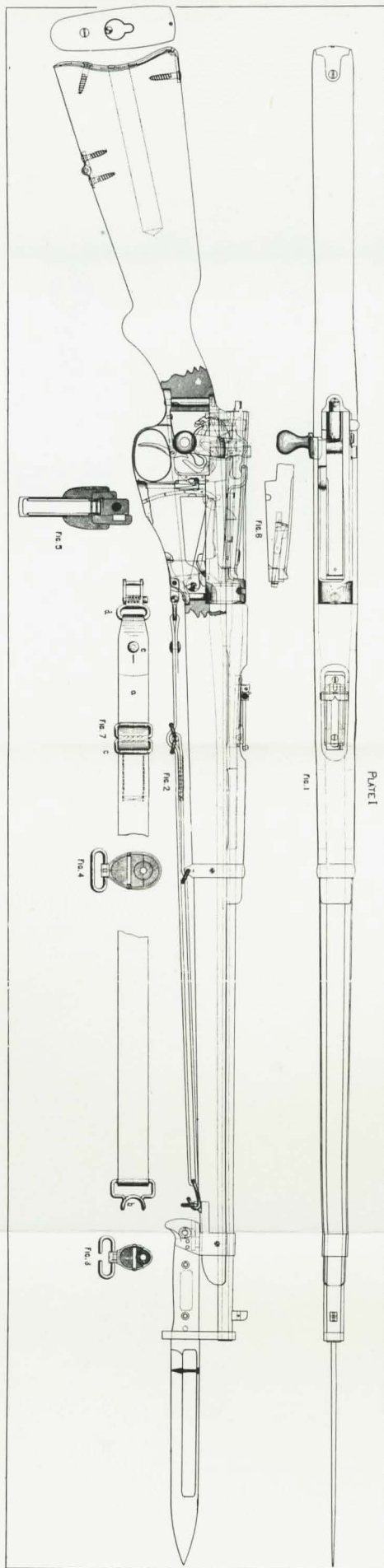
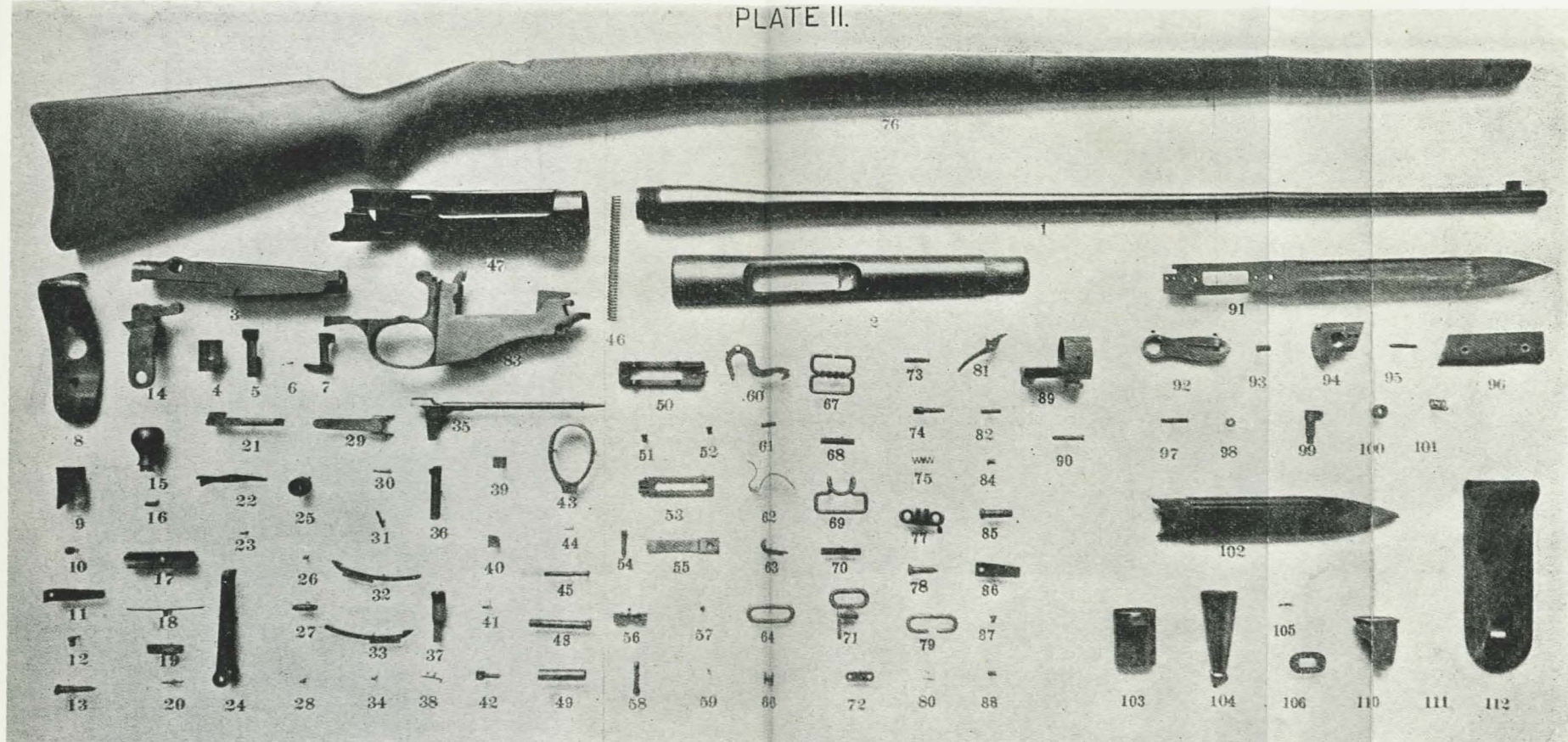


PLATE II.



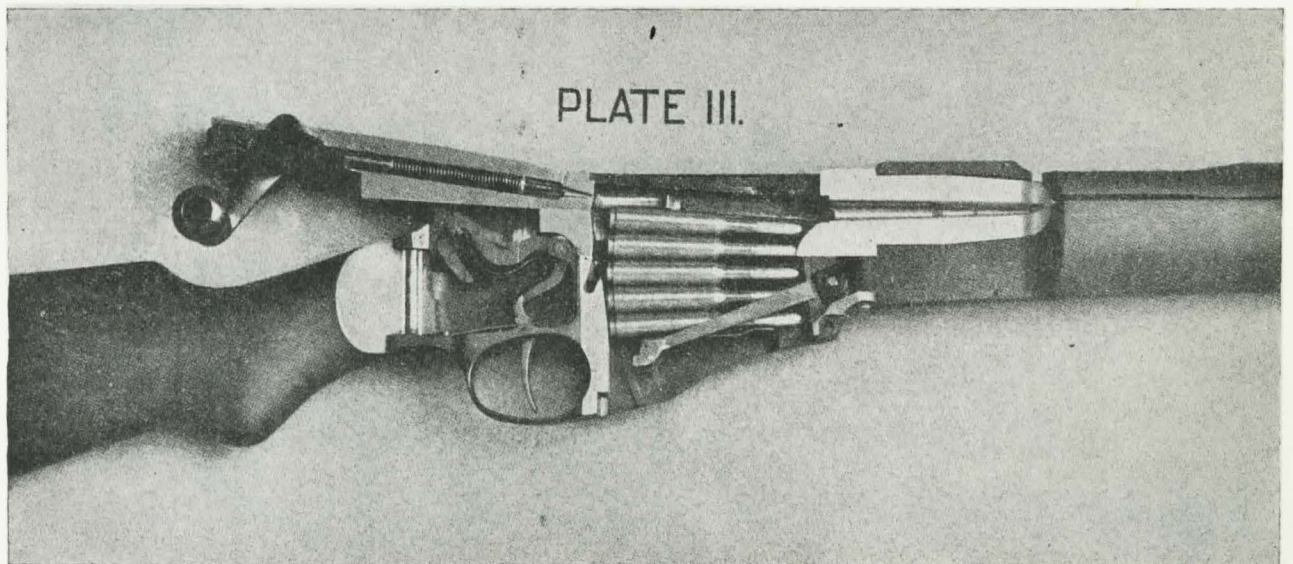


PLATE IV.

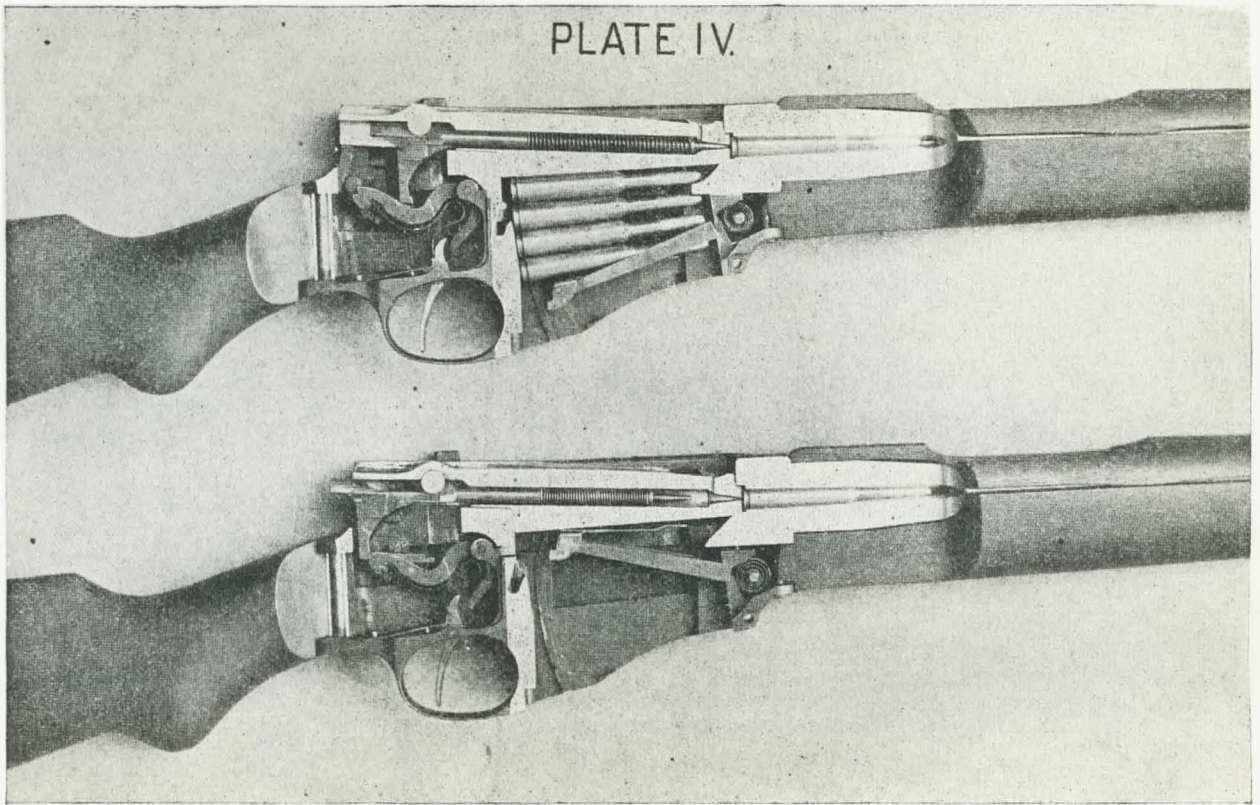
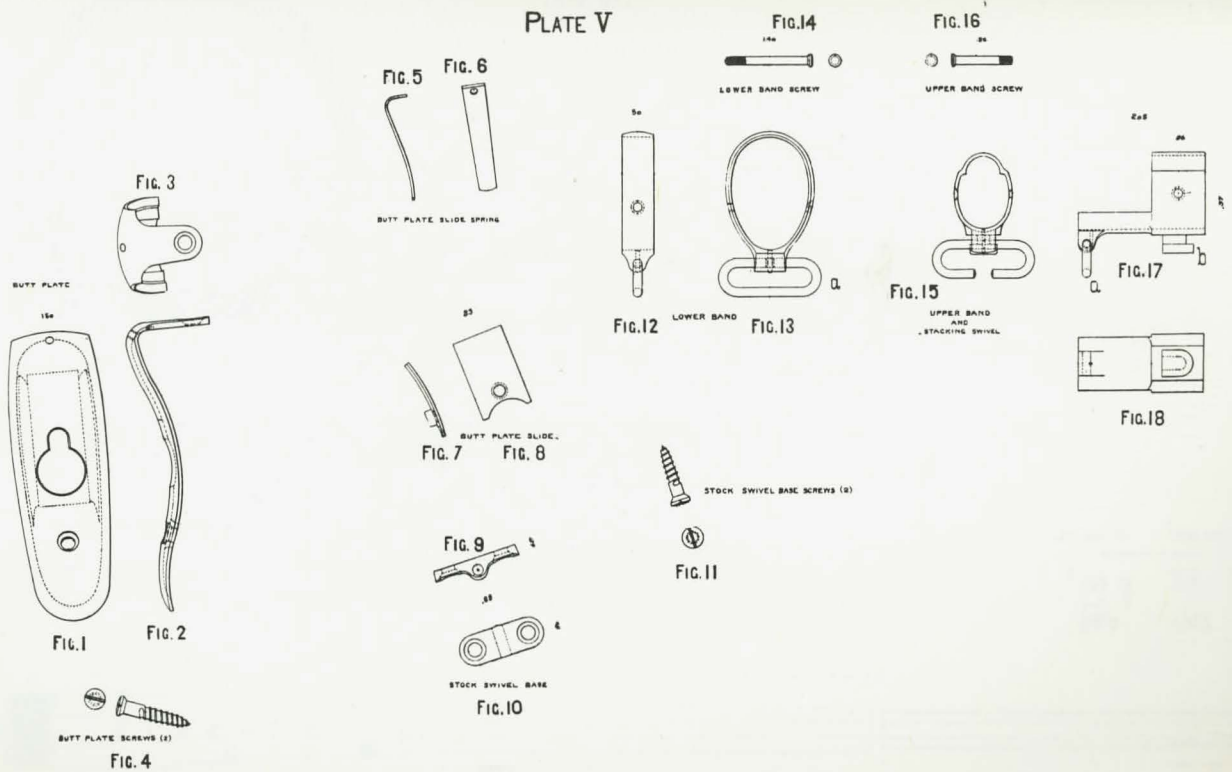


PLATE V



FROM END OF CHAMBER TO CUSLE. 25.560

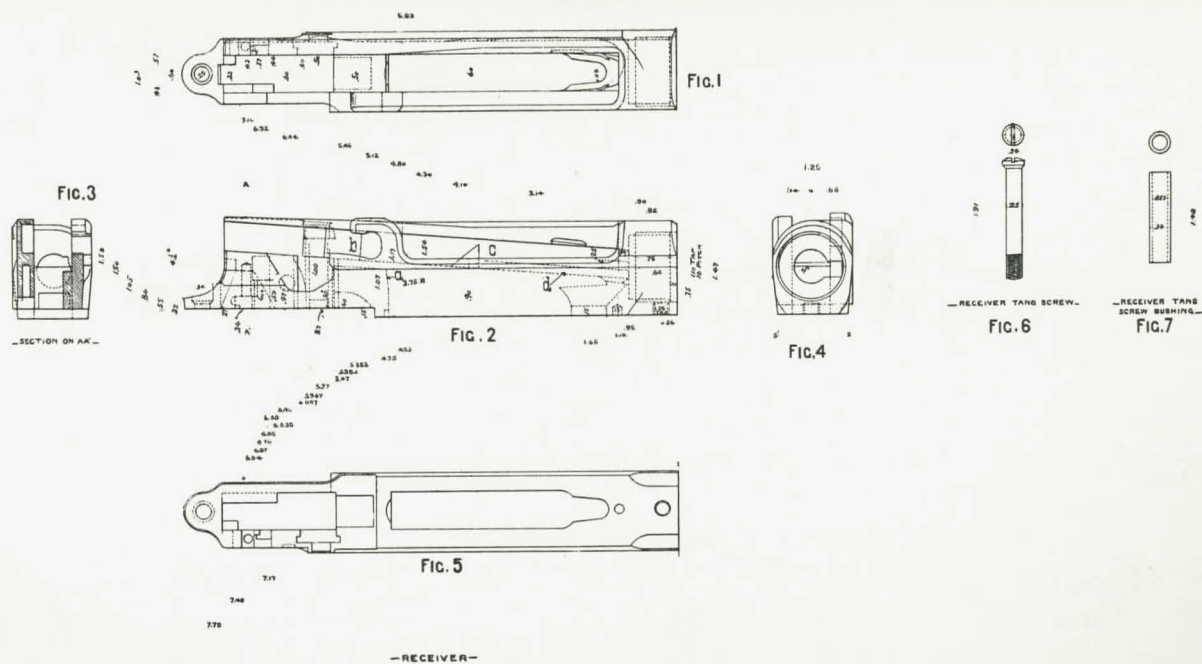
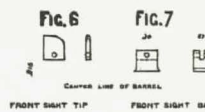


PLATE VIII

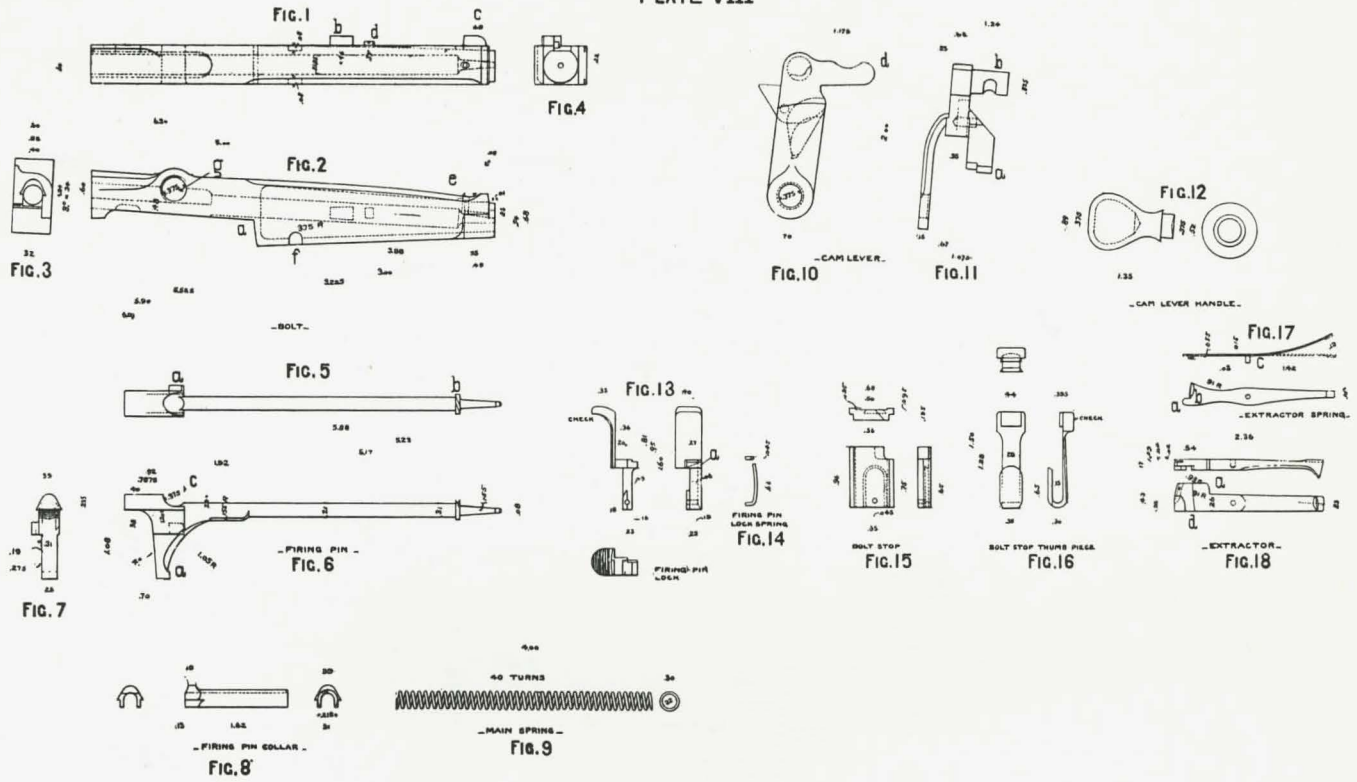


PLATE IX

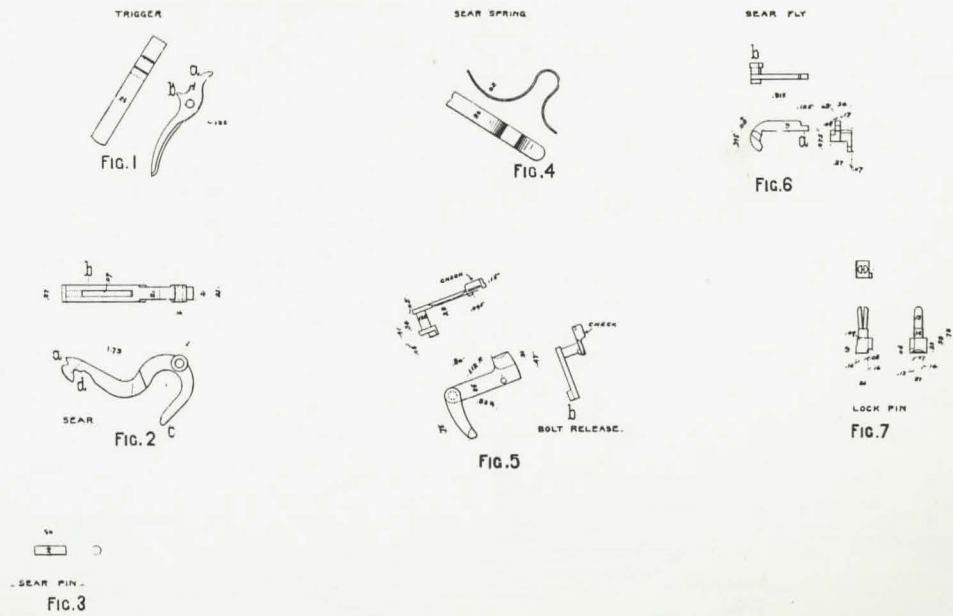


PLATE X

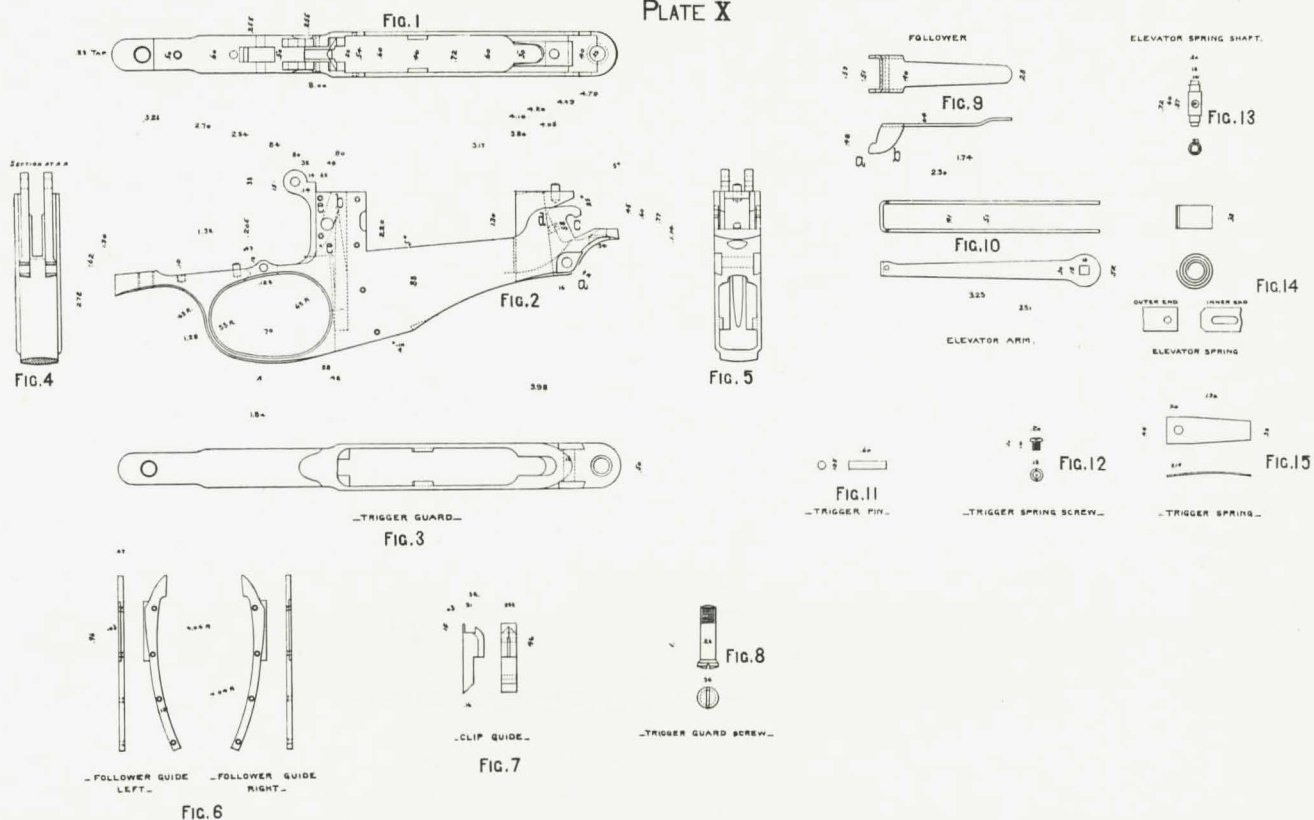


PLATE XI

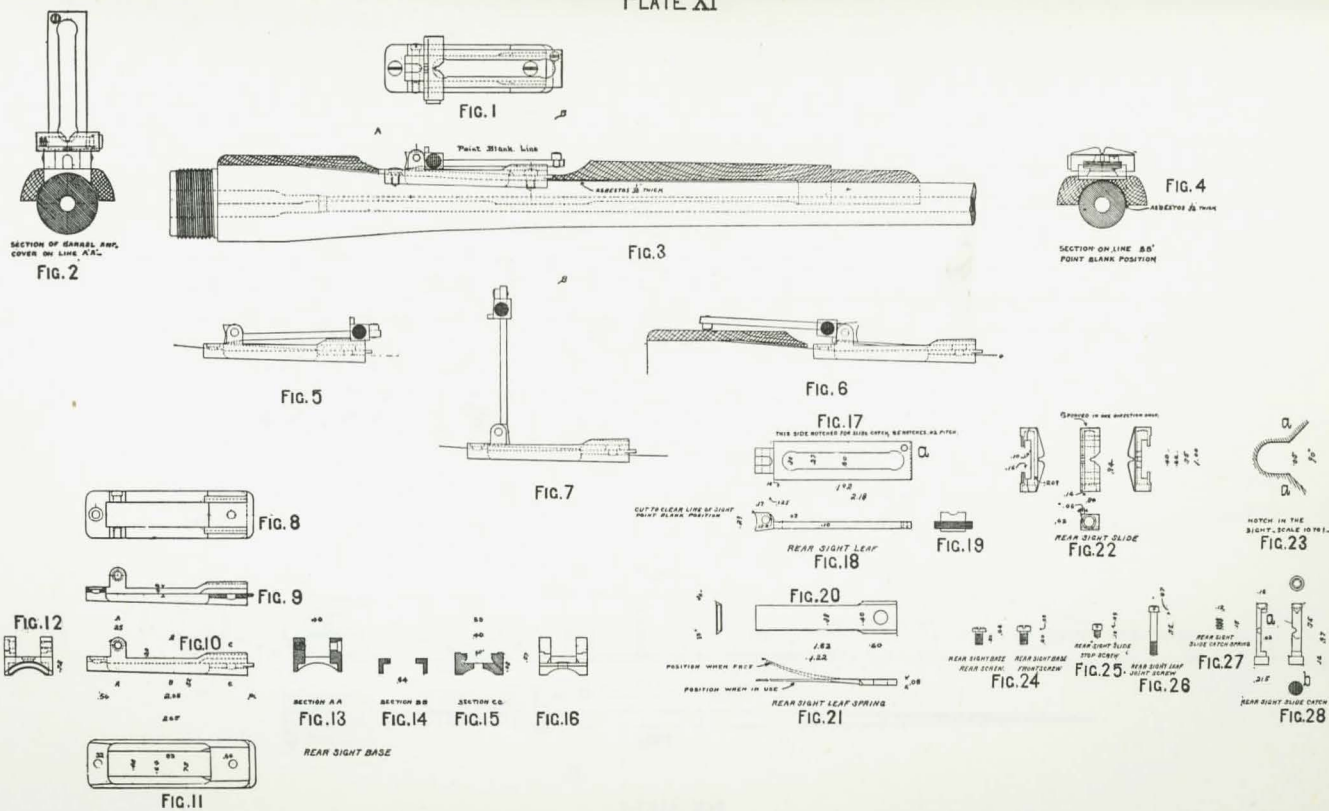


PLATE XII

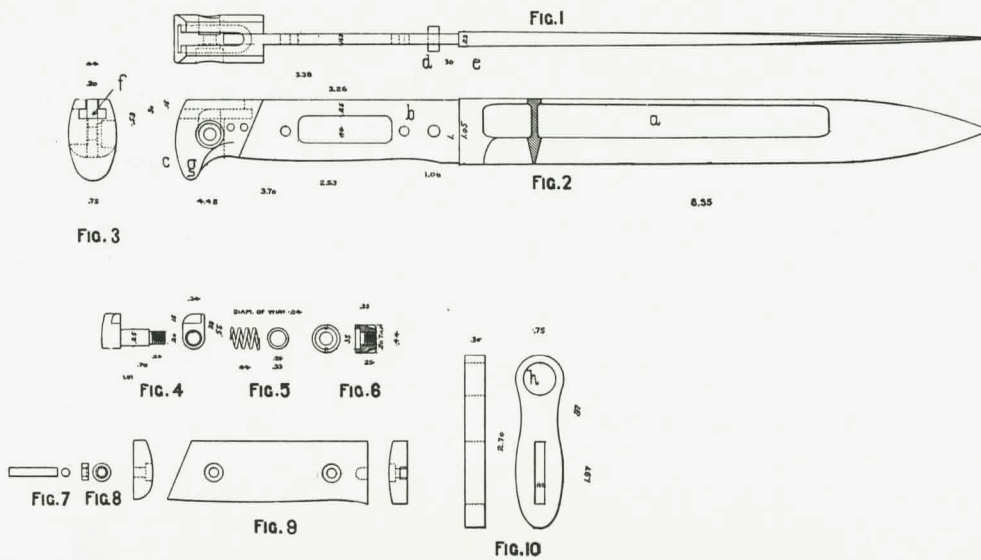
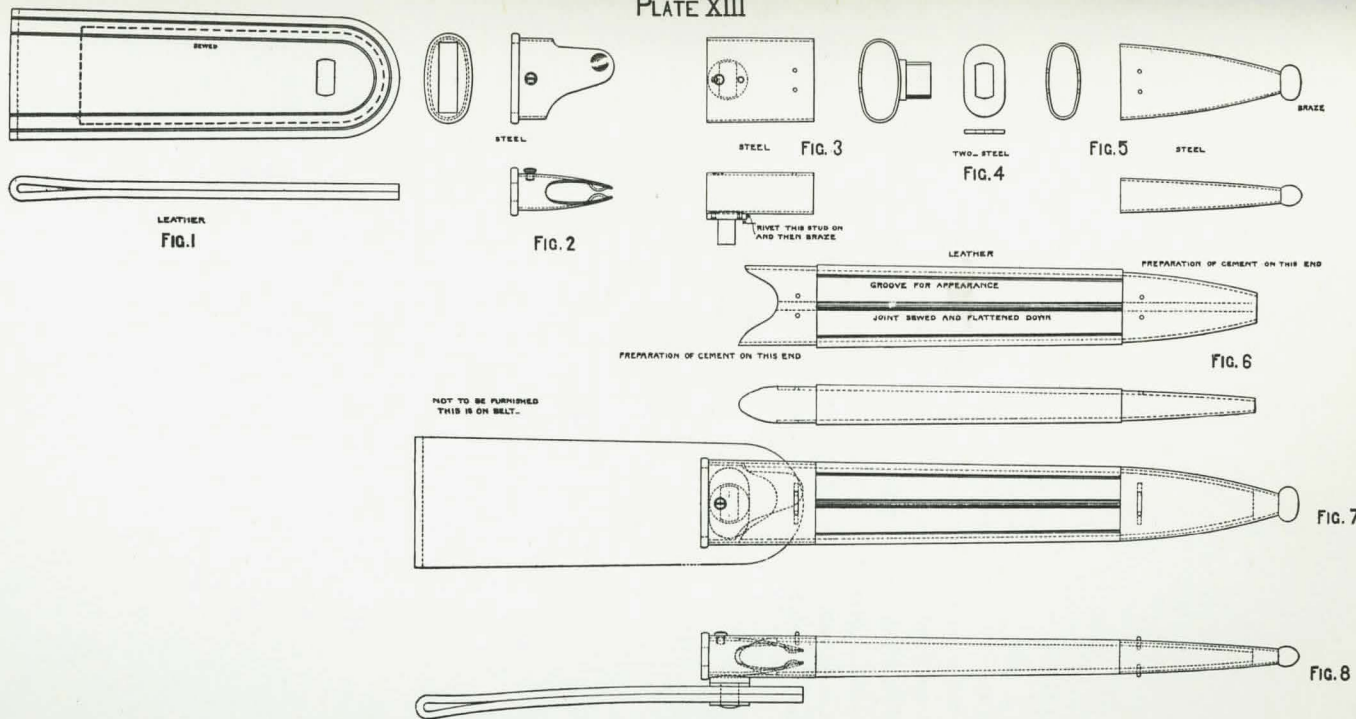


PLATE XIII



NAVY MODEL 1895

This rifle of caliber 6 millimeters was far ahead of its time in many respects. Its small bore was typical of several rifles introduced in the early '90's for military use. But the propellants then available were unsuited to the cartridge and barrel combination. The Model 1895 used a cordite-type powder which burned with great heat and had quite a corrosive effect on the bore.

The small size (about caliber .22) made effective cleaning so difficult that the rifle was retained in service only for a short time.

Berkeley R. Lewis,
COLONEL, ORDNANCE CORPS, U.S.A.