No. 1761

HANDBOOK OF THE 2.95-INCH MOUNTAIN GUN MATÉRIEL AND PACK OUTFIT

(*Twenty-five Plates*)

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CONTENTS.

LIST OF PLATES.

HANDBOOK OF THE 2.95-INCH MOUNTAIN GUN MATÉRIEL AND PACK OUTFIT.

List of equipment furnished by the Ordnance Department pertaining to one mountain battery equipped with 2.95 inch mountain gun matériel.

No.	Equipment.	Class.	Section.
4	2.95-inch mountain gun	IV	2
4	2.95-inch mountain-gun carriage equipped with open and panoramic sights		
84	Ammunition chests		
24	Pack covers for kits		
8	Pioneer rolls		
4	Supply chests		
1	Schäller forge and tool chest		
79	Pack harness		

For description, this equipment is divided into the following parts:

Part I. The equipment issued with each gun and carriage—

(*a*) The gun, ammunition, and accompanying parts.

(*b*) The carriage and sights.

(*c*) Tools and accessories for the gun and carriage.

Part II. The packs for one battery—

(*a*) The pack harness.

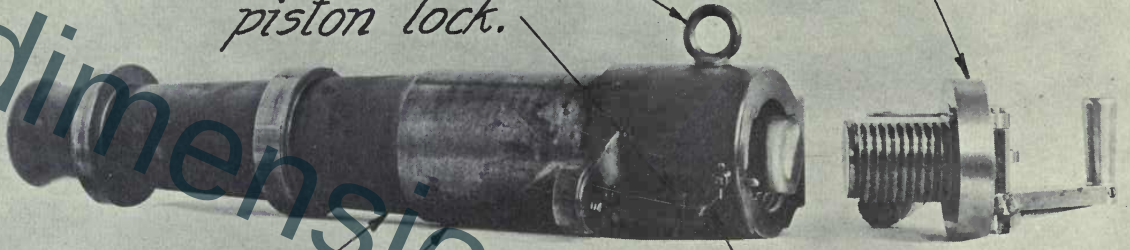
(*b*) The special pack equipment.

(*c*) The tools and accessories for special pack equipment.

Part III. Allowance of ammunition and targets.

Part IV. General information.

A description of each of these parts, together with a statement of the total equipment issued to one mountain battery, follows:



2.95 In. Mountain Gun.

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Part I (a). THE GUN, AMMUNITION, AND ACCOMPANYING PARTS.

The gun, weights, dimensions, etc.

Weight of gun, including breech mechanism	pounds	236
Caliber	inches	2.953
Total length	do	35.85
Length of bore, including chamber	do	31.6
Length of rifled portion of bore	do	24.33
Rifling, uniform, 1 turn in 25 calibers, right-hand twist:		
Number of grooves		30
Width of grooves	inch	.23
Depth of grooves	do	.023
Capacity of powder chamber	cubic inches	34.9
Weight of projectiles	pounds	{12.5 / 18
Weight of powder charge (N. C. smokeless):		
For 12½-pound projectile	ounces	8
For 18-pound projectile	do	7
Weight of cartridge case	pounds	1.45
Muzzle velocity:		
12½-pound projectile	feet per second	920
18-pound projectile	do	750
Maximum chamber pressure	pounds per square inch	18,000

Nomenclature of parts of gun.

Part.	Description or location.	Class.	Section.
Body	With lugs for carrier and piston rods integral	IV	2
Guide button	Screwed into barrel underneath		
Eyebolt	On rear of barrel, interchangeable with eyebolt on cradle.		
Breechblock	In breech of gun		
Pallet, hardened steel	Attached to breechblock with 2 screws		
Fixing screw	Secures cocking cam in breechblock		
Carrier	Pivoted to breech of gun body		
Carrier axis pin	With split pin fixes carrier to gun		
Cocking cam	In breechblock		
Extractor	Pivoted to breech near carrier hinge		
Extractor axis pin	With split pin fixes extractor to gun		
Firing pin	In center of breechblock		
Firing-pin point	Screwed into firing pin		
Guide plate	On rear of breechblock		
Hand lever	Pivoted to carrier		
Hand-lever axis pin	With split pin fixes lever to carrier		
Hand-lever catch	Locks hand lever in closed position to carrier		
Hand-lever catch spring	Actuates hand-lever catch		
Hand-lever catch pivot	Special split pin		
Locking bolt	In a recess in the carrier		
Locking-bolt rivet	Secures the locking-bolt spring to bolt		
Locking-bolt spring	Actuates the locking bolt		
Mainspring	Coiled spring in firing pin		
Trigger sear	Pivoted in carrier		
Trigger sear spring	Returns the trigger sear to engagement		
Trigger, complete, consisting of--			
Trigger	Assembled in breech of barrel, left side		
Trigger lever	With split pin, has an eye for lanyard		
Trigger spring	Coiled spring on trigger		

Serial list of component parts of breech mechanism.

[Numbers before components refer to numbers shown on Plates II and III.]

	Class.	Section.
1. Breechblock	IV	2
2. Carrier		
3. Hand lever		
4. Firing pin (with removable point)		
5. Mainspring		
6. Guide plate		
7. Extractor		
8. Locking bolt (with spring)		
9. Sear (with spring)		
9*a*. Sear stud		
9*b*. Sear bent		
9*c*. Sear safety arm		
9*d*. Sear actuating arm		
9*e*. Sear spring		
10. Trigger and spring with trigger lever and split pin		
11. Gear segment of breechblock		
12. Hand-lever bevel pinion		
13. Cocking piece, showing cams		
14. Studs on firing pin		
15. Safety groove in breechblock		
16. Groove in breechblock in which projection on trigger-sear safety arm travels during unlocking		
17. Protection on trigger-sear safety arm		
18. Carrier axis pin (with split pin)		
19. Hand-lever catch (lower portion)		
20. Hand-lever axis-pin lugs		
21. Hand-lever axis pin (with split pin)		
22. Hand-lever stop		
23. Hand-lever catch (with split pin)		
24. Hand-lever catch spring		
25. Firing-pin recocking hook		
26. Firing-pin bent		
27. Extractor axis pin (with split pin)		
28. Short arm of extractor		
29. Spring catches for piston rod (with screw, washer, and spring)		

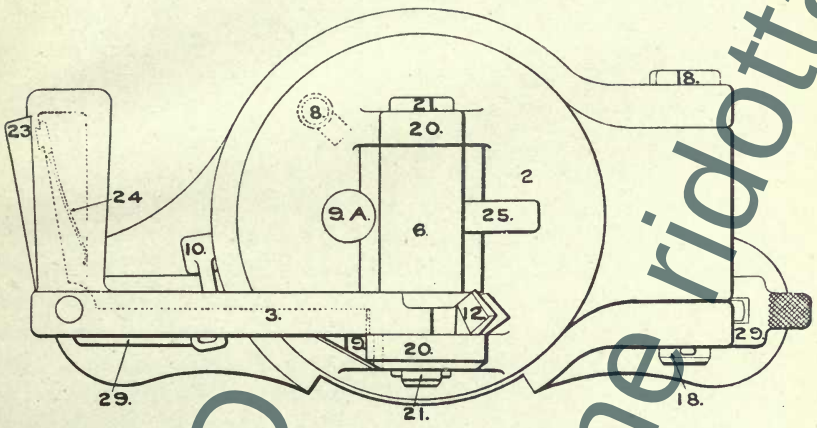
DESCRIPTION OF THE GUN.

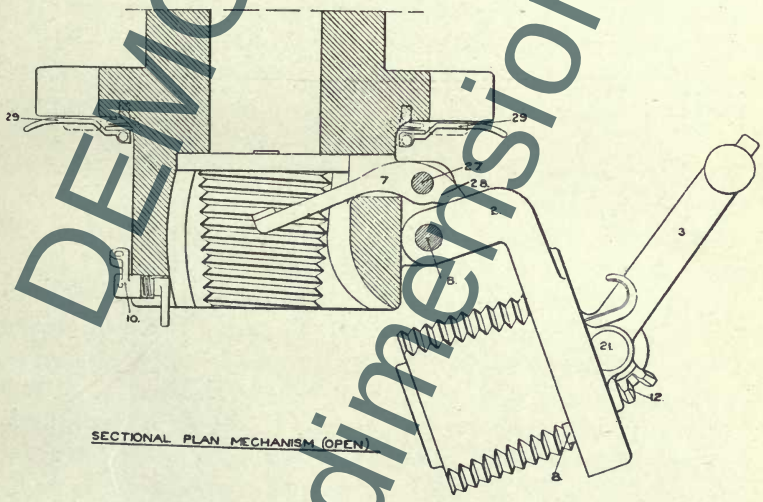
The 2.95-inch mountain gun is designed for pack transportation and consequent rapid assemblage to, and dismounting from, its carriage. The term "gun" is used to include the body of the piece and breech mechanism. The body is one piece of steel having in addition to the usual lugs provided for the hinge of a swinging breechblock two others, at right and left of the breech, for attachment to the piston rods of the carriage. The exterior of the body for a distance of 8.5 inches forward of these lugs is cylindrical and, supplemented by two collars of the same diameter formed farther forward, constitutes the bearing of the gun in the cradle. The guide button on the bottom of the barrel slides in a groove in the cradle and resists the twist due to the rifling. The vertical and horizontal planes passing through the axis of the bore are indicated on the muzzle by the grooves cut in the metal. Fine threads or wires may be stretched across in these grooves to make a front bore sight for use in verifying sights, etc. An eyebolt is threaded into the body at the breech for lifting the gun.

The breech mechanism consists of the breechblock and cocking cam, carrier, hand lever, firing pin, mainspring, guide plate, ex-

REAR VIEW BREECH (CLOSED)

Plate II





SECTIONAL PLAN MECHANISM (OPEN)

Breechblock.—The breechblock locks into the body with an interrupted screw. The center of the block is chambered in front for the firing pin and in rear for the cocking cam, the latter being separate from the block for manufacturing reasons only and solidly secured to it by two lugs and the fixing screw. In the rear face of the breechblock are cut two concentric grooves and with the partition between them cut away in two places to allow the projection on the end of the safety arm of the sear which engages these grooves to pass from one to the other. On the rear face of the breechblock is a circular toothed segment which is engaged by the segmental bevel pinion of the hand lever. There is also a recess on the rear face of the block lined with a hardened steel pallet into which the locking bolt enters when the block is revolved sufficiently to disengage the interrupted threads; the locking bolt then preventing further rotation of the block while moving with the carrier in and out of the breech.

Carrier.—The carrier which holds the breechblock is pivoted to the right side of the breech by the carrier axis pin. It is bored partly through and threaded to engage the continuous threads at the rear end of the breechblock. A reduced bore passes through the carrier and receives a boss on the guide plate. A recess on the inner or front face receives the locking bolt and its spring, which is secured to the locking bolt by a rivet; a recess in the lower hand-lever axis-pin lug on the carrier engages the hand-lever catch, thereby securing the hand lever when the breech is closed. On the rear face of the carrier are two lugs. The hand-lever axis pin passes through holes in these and through a hole in the guide plate which it secures in place. Between the two lugs is a slot which embraces the stud on the rear face of the trigger sear.

Hand lever.—The hand lever is pivoted to the carrier by the hand-lever axis pin. The handle or grip is recessed to receive the hand-lever catch, which is pivoted in the hand lever by a large split pin (hand-lever catch pivot), a leaf spring (hand-lever catch spring) being seated in the catch to insure its engagement when the breech is closed. The segmental bevel pinion of the hand lever is concentric with the axis pin and engages the toothed segment of the breechblock. When the hand lever has been pulled around on its axis until the breechblock is properly disengaged, a projection on the hand lever adjoining the pinion contacts with the rear face of the block and prevents further rotation of the hand lever. The hand levers that were manufactured at Watervliet Arsenal are not interchangeable with those of guns purchased from Vicker's Sons & Maxim.

Firing pin.—The firing pin is a hollow sleeve provided with two lugs which ride upon the cam surfaces of the cocking cam. A hook, which extends to the rear through recesses in the carrier and the guide plate, prevents the firing pin from turning when the breechblock is

rotated and makes recocking possible without opening the breech. Near the rear end of the body of the firing pin the metal is cut away, forming a bend or notch into which an arm of the trigger sear drops. The firing-pin point is screwed into the firing pin and is replaceable.

Mainspring.—The mainspring is a helical spring which fits inside the hollow in the center of the firing pin and into a recess in the guide plate. The guide plate retains it in place.

Guide plate.—The hand-lever axis pin passes through a hole in the guide plate, thus retaining it in position. The guide plate is recessed to receive the mainspring, and recesses on the sides allow the recocking hook of the firing pin and the sear stud to pass through.

Extractor.—The extractor is pivoted near the carrier hinge on the extractor-axis pin. At the end of the extracting arms are claws which engage with the rim of the cartridge. It is actuated by the carrier striking against its short arm just before the breech is fully open.

Locking bolt.—The locking bolt fits in a recess in the front face of the carrier. When the breechblock is fully rotated ready to swing out, a recess formed in it comes opposite the bolt, which latter, acted on by its spring, moves forward and locks the block to the carrier. The locking-bolt spring is secured to the locking bolt by a rivet.

Trigger sear.—The trigger sear is pivoted to the carrier by means of a stud which fits in a groove in the center of the carrier and is secured there by the guide plate. Safety during loading is provided by means of the arm, which has a projection at its outer extremity which engages in the groove during the period when the breechblock is being locked. While this projection is in this outer groove the firing pin is engaged by the sear, so that the firing pin can not move forward and strike the primer. The sear has also another arm the outer end of which lies above the trigger lever when the breechblock is home. The arm has the sear spring attached to it, which causes the sear to engage the firing pin in the cocked position.

Trigger.—A square shaft on the trigger passes through a square hole in the trigger lever and is held in place by a split pin. The trigger is fitted in the breech of the gun; the trigger lever terminates in a loop to which a lanyard can be attached. When this is pulled the trigger revolves, causing the trigger to lift up the arm of the sear and so release the firing pin from the sear. The trigger is kept in its normal position by the small spring called the "trigger spring."

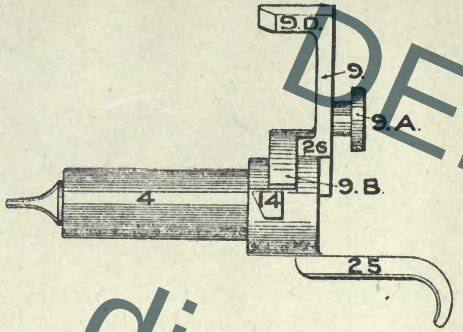
ACTION OF MECHANISM.

On grasping the handle of the hand lever the hand-lever catch is pressed in and its lower extremity thereby moved clear of the recess in the lower hand-lever axis-pin lug so that the hand lever is unlocked.

Plate III.

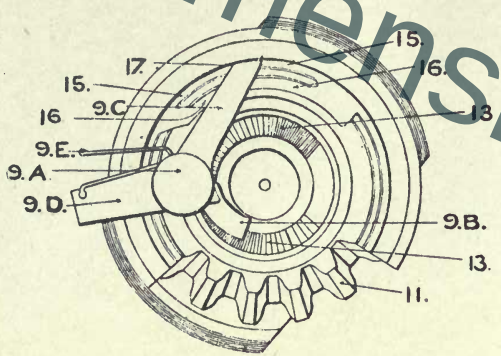
FIRING PIN AND SAFETY SEAR IN COCKED POSITION

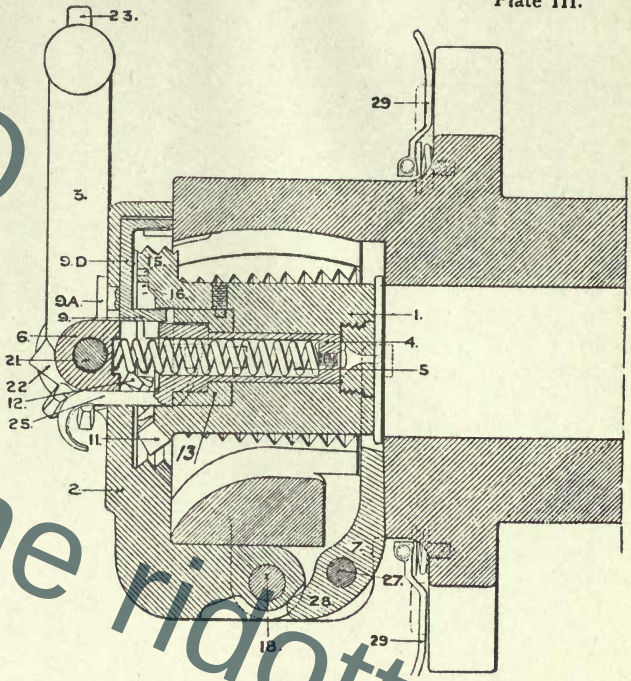
FIG. 1



REAR VIEW OF BREECH BLOCK SHOWING SAFETY SEAR

FIG. 2





Sectional Plan Mechanism (closed).

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breechblock to rotate. The rotation of the breechblock when being unlocked causes the lugs on the firing pin (which can not rotate) to ride on the surface cams of the cocking cam, thus compressing the mainspring; when the firing pin reaches the cocked position, the sear is forced by the action of the sear spring to engage with the firing pin, and at the same time the lug on the safety arm, which has traveled along the inner groove, is forced outward to the entrance of the groove; the threads on the breechblock are now clear of those in the breech of the gun and at this instant the hand-lever stop bears against the face of the breechblock and the locking bolt moves forward, locking the breechblock to the carrier so that the continued motion of the hand lever causes both to swing away from the breech together. When the block is clear of the breech the carrier strikes the short arm of the extractor, causing the latter to eject the empty cartridge case to the rear.

A new cartridge is inserted by hand, and, on moving the hand lever to the left, the breechblock (which is still locked to the carrier) enters the breech and forces the cartridge home. As soon as the carrier comes against the face of the breech the locking bolt is pressed in, releasing the breechblock from the carrier, so that the continued motion of the hand lever causes the block to revolve by means of the pinion, thus locking it securely in the breech. As soon as the hand lever is quite home the lower end of the hand-lever catch, actuated by the hand-lever catch spring, engages in the recess in the lower hand-lever axis-pin lug. The outer end of the arm of the trigger sear is now above the trigger, so that on pulling the lanyard (which is attached to the trigger lever) sharply to the rear, the arm of the trigger sear is lifted up and the firing pin is released from the sear, so that moving forward by the action of the mainspring it strikes against the primer and explodes the charge.

In the event of a misfire the mechanism can be recocked by placing the loop of the lanyard over the recocking hook of the firing pin and pulling sharply to the rear until the sear engages the firing pin and retains it.

DISMOUNTING AND MOUNTING THE BREECH MECHANISM.

Dismounting.—Remove split pins from the axis pins for hand lever, carrier, and extractor.

Close the breech and release the mainspring.

Press in guide plate and take out hand-lever axis pin.

Remove guide plate, mainspring, and firing pin.

Replace hand-lever axis pin and open breech.

Take out hand-lever axis pin and remove hand lever.

Press in locking bolt and unscrew breechblock from carrier.

Remove sear, locking bolt, and spring.

Take out carrier axis pin and remove carrier.

Take out extractor axis pin and remove extractor.

Mounting.—The assembling of the mechanism is performed in the reverse order to that of dismounting.

In inserting the block into the carrier the former should be held squarely against the face in such a position that the slot for the locking bolt is just under the slot in the carrier for the sear before commencing to screw it in.

AMMUNITION.

(Plate IV.)

Fixed ammunition is used in the 2.95-inch mountain guns, and is made up with the following types of projectiles:

Common steel shell, 12½ pounds.

Common shrapnel, 12½ pounds.

Cast-iron shell, 12½ pounds.

Cast-iron shell, 18 pounds.

No more 18-pound projectiles or cast-iron shell will be manufactured. Shell of future manufacture will be of steel.

The rounds as made up vary in length with the type of projectile used. The number of each kind to be carried is a matter for regulation by proper authority. Each round is issued with projectile filled and fuzed. The weights of the projectiles are 12½ and 18 pounds. The components of one round are the cartridge case with primer, the powder charge, projectile, and fuze.

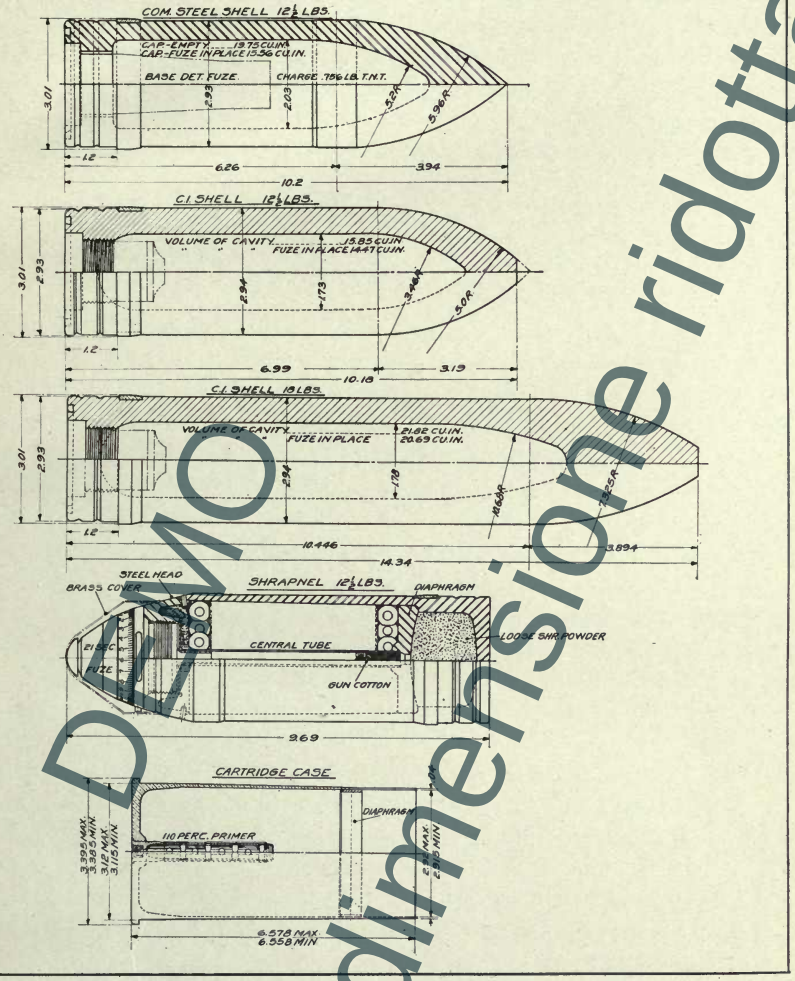
THE CARTRIDGE CASE.

The cartridge case (Pl. IV) is a solid drawn-brass case 6.58 inches long; it has a capacity of 34.9 cubic inches and weighs, empty, 1.45 pounds. The head of the case has a projecting flange or rim under which the lip of the extractor engages. The center of the head is bored out to form a seat, into which the primer is forced. These primer seats are first mandreled to near the finished dimensions with a tapered steel plug to toughen the metal of the cartridge case around the primer seat and then reamed to finished size. This toughening is necessary to prevent expansion of the seats under gas pressure and consequent loose fit of the primers in subsequent firing. The primers are inserted in the case by the small primer-inserting press to avoid injury to the primer seat. Special decapping tools are also issued for use in removing exploded primers from cartridge cases.

THE PRIMER.

To insure the ignition of smokeless-powder charges in cartridge cases it is necessary that the primers either contain in themselves, in

PLATE IV.



powder, or that an auxiliary charge of such powder be placed at the rear of the cartridge case to communicate the flame from the percussion primer and thoroughly ignite the smokeless powder. The percussion primer, known as the "110-grain percussion primer," contains an igniting charge of 95 grains of black powder in addition to the essential elements of a percussion primer.

The "110-grain percussion primer" is shown in Plate IV, and consists of a brass case resembling in shape a small-arms cartridge case. The head or rear end of the primer case is countersunk, forming a cup-shaped recess, in which is seated the cap or percussion primer proper. The latter consists of the cup, the anvil, and the percussion composition, assembled as shown on Plate IV. The percussion composition is known as the "H–42" mixture, and contains the following ingredients:

	Per cent.
Chlorate of potash	47.206
Tersulphide of antimony	30.829
Flowers of sulphur	21.965

The percussion-cap recess is connected with the interior of the primer case by a small vent. The body of the case contains 95 grains of black powder, constituting the rear "priming" or igniting charge for the smokeless powder. This black powder is inserted under a pressure of 30,000 pounds per square inch, and is pressed into the primer body around a central wire, which is then withdrawn, leaving a longitudinal hole the full length of the primer. Eight radial holes are drilled through the primer and compressed powder, affording 16 vents for the free exit of the black-powder flames. After filling the case the front end is closed by two cardboard wads, the end being crimped over the wads and the inside of the mouth covered with shellac. The radial perforations in the body of the case are covered by a tin-foil wrapper to retain in the case any loose black powder, as well as to exclude all moisture.

In action the blow of the firing pin explodes the percussion cap, which ignites the black powder; the flames of the latter shoot out through the vents in the primer case and ignite the smokeless-powder charge.

The primer just described is known as the "110-grain percussion primer," and is used only with smokeless-powder charges. A shorter primer, known as the "saluting primer percussion," is issued by the Ordnance Department for use in blank cartridges. The percussion elements and the dimensions of the seat in the cartridge case for both types of primers are identical. The primer charge of the saluting primer consists of 20 grains of loose rifle powder, held in place by a paper wad shellacked in the mouth of the primer case. The "20-grain saluting primers" are issued in hermetically sealed tin boxes,

25 in a box. The boxes should not be opened nor the cases primed until shortly before they are required for use.

The small primer-inserting press is provided for inserting both types of primers, which must be carefully pressed, and not hammered, into their seats in the cartridge cases. Special decapping tools are also issued for removing old primer cases from cartridge cases without injury to the latter.

THE POWDER CHARGE.

The powder is a nitrocellulose powder composed of single perforated cylindrical grains. In making up the cartridges, a brass diaphragm is placed in the mouth of the case on top of the powder charge and soldered fast, thus holding the powder charge in the rear position of the cartridge case in contact with the primer.

Smokeless powder *must not be used* for blank charges. For that purpose the Ordnance Department furnishes special powder for saluting purposes.

THE PROJECTILES.

The projectiles used in this gun are the 12½ and 18 pound cast-iron shell, 12½-pound steel shell, and the 12½-pound shrapnel.

The 12½-pound steel shell is 10.2 inches long. It has a capacity of 15.56 cubic inches, with fuze in place. It contains a bursting charge of 0.756 pound of T. N. T.

The medium-caliber base detonating fuze is used in this shell.

The 12½-pound cast-iron shell (Pl. IV) is 10.18 inches long, weighs 12½ pounds loaded and fuzed, has a capacity of 14.47 cubic inches, a bursting charge of 6.88 ounces of black powder, and is provided with a base percussion fuze, medium and major caliber.

The 18-pound cast-iron shell (Pl. IV) is 14.34 inches long, weighs 18 pounds loaded and fuzed, has a capacity of 20.69 cubic inches, a bursting charge of 9.92 ounces of black powder, and is provided with a base percussion fuze. Medium and major caliber shell of future manufacture will be of steel, loaded with high explosive and fuzed with detonating fuzes.

The manufacture of 18-pound projectiles has been discontinued.

COMMON SHRAPNEL.

The common shrapnel (Pl. IV) is a base-charged shrapnel fitted with the 21-second combination fuze. The case is of steel with solid base. The rotating band is forced into an annular groove cut in the case 1.2 inches from the base. The front or mouth of the case is closed by a steel head, screwed in and tapped to take the service combination time and percussion fuze. The bursting charge is composed

of loose black powder, covered by a steel diaphragm. The diaphragm supports a brass central tube which extends forward to the fuze, and thus affords a conduit for the flames from the fuze to the bursting charge. At the lower end of the central tube a stopper of dry gun-cotton is fitted to prevent the loose powder charge from getting into the tube and also to help ignite the bursting charge. The shrapnel filling is composed of 212 balls, each approximately 167 grains in weight. They are approximately 0.5 inch in diameter and are poured around the central tube and rest upon the steel diaphragm, the interstices containing a smoke-producing matrix.

In action the case is not ruptured upon the explosion of the bursting charge; the head is stripped and the balls are shot out of the case with an increase of velocity from 250 to 300 feet per second.

FRANKFORD ARSENAL COMBINATION FUZE, MODEL OF 1907 M.

This fuze consists of the following parts:

a Body, bronze.
a' Stop pin, brass.
b Closing cap, brass.
b' Vents in closing cap.
c Upper time-train ring, Tobin bronze.
c' Washer for time-train ring, graduated, felt cloth.
d Time-train ring, graduated, Tobin bronze.
d' Washer for body, felt cloth.
*d*² Rotating pin, brass.
e Concussion plunger.
e' Concussion-resistance ring, brass.
g Vent leading to upper time train.
h Compressed-powder pellet.
i Upper time train, compressed powder.
j Compressed-powder pellet, in vent leading to lower time train.
j' Compressed-powder pellet in lower time-train vent.
k Lower time train, compressed powder.
l Brass disk locked in place.
m Compressed-powder pellet in vent *o*.
o Vent leading to magazine.
p Powder magazine.
q Percussion plunger.
r Percussion primer.
s Vents leading from percussion primer to magazine.
u Bottom closing screw, brass.
v Washer for closing screw, muslin.
w Washer for closing screw, brass.

The body *a* of this fuze is machined from a bronze forging. The time-train rings *c* and *d* are turned from hard-rolled rods of Tobin bronze. An annular groove in the shape of a horseshoe is milled in the lower face of each of the time-train rings. Meal powder is compressed into these grooves under a pressure of 68,000 pounds per square inch, forming a time train, the total length of which is 9 inches.

The time element of this fuze is composed principally of the following parts: The time or concussion plunger *e*, the concussion-resistance ring *e'*, the firing pin, the vent *g*, leading to the upper time train, the compressed-powder pellet *h*, the upper time train *i*, the vent *j*, the lower time train *k*, the compressed-powder pellet *m* in the vent *o*, leading to the powder magazine *p*.

The plunger *e* is cylindrical in shape and contains the percussion composition in a recess at its base. The weight of the plunger rests upon the concussion-resistance ring *e'*, which keeps the primer from contact with the firing pin. At discharge of the gun the resistance of the ring is overcome and the primer is exploded by contact with the firing pin.

As stated above, the annular grooves into which the meal powder of the time train is pressed are in the shape of a horseshoe, a solid portion being left between the ends of the groove in each ring or disk.

The upper time-train ring *c* is prevented from rotating by pins which are halved into the fuze body and the inner circumference of the ring.

The vent *g* is drilled through the walls of the concussion-plunger chamber, and is exactly opposite a hole in the inner surface of the upper time train leading to the end of the train from which the direction of burning is anticlockwise.

The hole *j* is drilled through the upper face of the lower time-train ring *d* to the end of the lower time-train groove, from which the direction of burning is clockwise. The lower time-train ring is movable and is graduated on its outer edge in a clockwise direction from 0 to 21.2, each full division corresponding to one second time of burning in flight; these divisions are subdivided into five equal parts corresponding to one-fifth second. A radial pin d^2 is provided in the lower ring for engagement with a notch in the fuze setter for setting the fuze. A line on the lower flange of the fuze stock is the datum line for fuze settings.

The vent *o* is drilled through the flange of the fuze stock to the powder magazine *p*, and leads to the same end of the lower time train as the vent *j*—that end from which the direction of burning is clockwise—when the fuze is at its "zero" setting.

The action of the fuze as a time fuze is as follows:

Assuming the "zero" setting, at discharge of the gun the time plunger arms and fires its primer. The flame from the primer passes out through the vent *g*, igniting the pellet *h*, the end of the upper time train *i*, down through the vent *j*, to the end of the lower time train *k*, and thence through the vent *o* to the magazine *p*, the flame from which is transmitted to the base charge in the shrapnel. It will be seen that for the "zero" setting of the fuze the origins of both upper and lower time trains are in juxtaposition. Assume any other setting, say 12 seconds: The vent *j* has now changed its position with respect to the vent *h*, leading to the beginning of the upper time train, and the vent *o*, leading to the powder magazine *p*, both of which points are fixed by the angle

now passes out through vent g and burns along the upper time train in an anticlockwise direction until the vent j is reached, where it passes down to the beginning of the lower time train and burns back in a clockwise direction to the position of the vent o, whence it is transmitted by the pellet of compressed powder m to the powder magazine p.

For the 21.2-second setting the vent j, leading to the beginning of the lower time train, is opposite the end of the upper time train, and the end of the lower time train is opposite the vent o, leading to the powder magazine. It will now be seen that to reach the magazine p and burst the shrapnel the entire length of time train in both rings must be burned.

As already stated, the annular grooves in the lower face of each ring for the powder trains do not form complete circles, a solid portion being left between the ends of the grooves in each. This solid portion is utilized to obtain a setting at which the fuze can not be exploded, known as the "safety point."

This point is marked by a line on the outer edge of the movable time train, surmounted by an "S" and is located about halfway between the zero mark and the 21.2-second graduation. When this point is brought opposite the line on the lower flange of the fuze body the vent j is covered by the solid metal between the ends of the upper train, and the vent o, leading to the powder magazine p, is covered by the solid metal between the ends of the lower or movable time train.

At the safety setting it will be seen that the upper train may burn entirely out in case of accidental firing of the time plunger, or in case it may be desired to burst the shrapnel by impact or percussion without the flame being able to reach the magazine p.

The cloth washers c' and d' are glued to the upper face of the graduated time-train ring and to the upper face of the flange on the fuze stock. These surfaces are corrugated, as shown, to make the washers adhere more strongly. The function of the washers is to make a gas check and prevent premature action of the fuzes.

The compressed pellet j', in the vent leading from the outside to the beginning of the lower time train, is to release the pressure of the gases due to the burning train. The gases from both time trains escape into the outer air through the annular spaces shown in the illustration and the vents b' in the closing cap.

The percussion element of this fuze as shown in the plate consists of a percussion plunger q and an ordinary percussion primer r.

The system of vents s through the walls of the fuze shown in figure 1 conduct the flame from the percussion primer to the magazine p.

The bottom closing screw closes the percussion-plunger recess and keeps the powder in the magazine. The muslin washer s is seated

with shellac and held in place by the brass washer w, over the outer edge of which a projecting lip is crimped.

These fuzes are issued assembled in shrapnel. For transportation the fuzes should always be set at the safety point.

The fuze is provided with a waterproof hood of thin brass, hermetically sealed. The hood should be stripped off before an attempt is made to set the fuze.

FRANKFORD ARSENAL COMBINATION FUZE, MODEL OF 1915.

[Plate V.]

The fuze consists of the following parts, assembled as shown in the drawing:

- a Body, steel.
- a' Stop pin, brass.
- b Closing cap, steel.
- b' Vents in closing cap.
- c Upper time train ring, Tobin bronze.
- c' Washer for time train ring, graduated, felt cloth.
- d Time train ring graduated, Tobin bronze.
- d' Washer for body, felt cloth.
- d^2 Rotating pin, brass.
- e Concussion plunger.
- e' Concussion resistance ring, brass.
- f Concussion firing pin, brass.
- f' Safety pellet, compressed powder.
- f^2 Safety cap, brass.
- g Vent leading to upper time train.
- h Compressed powder pellet.
- i Upper time train ring, compressed powder.
- j Compressed powder pellet in vent leading to lower time train.
- j' Compressed powder pellet in lower time-train vent.
- k Lower time train compressed powder.
- l Brass disk, locked in place.
- m Compressed powder pellet in vent o.
- o Vent leading to magazine.
- p Powder magazine.
- q Percussion plunger, brass.
- q' Percussion plunger sleeve, brass.
- q^2 Restraining spring, brass.
- r Percussion primer.
- s Vent leading from percussion primer to magazine.
- t Percussion firing pin, German silver.
- u Bottom closing screw, brass.
- v Washer for closing screw, muslin.
- w Washer for closing screw, brass.
- w' Bottom closing screw disk, paper.

The time element of this fuze is exactly like that of the model of 1907 M, the time-train rings and concussion plunger being the same and the closing cap the same, with the exception that it is made of steel for the model of 1915, where in the model of 1907 M it is made of brass.

The action of the fuze as a time fuze is exactly like the model of 1907 M, described previously.

The action of the fuze as a percussion fuze is as follows:

When the gun is fired, and the concussion or time plunger e fires its primer, the flame besides passing through the vent g and igniting the upper time train, also passes through the four holes in the concussion firing pin f and ignites the safety pellet f'. When this burns out completely, the percussion plunger q is free to move forward in its

PLATE V

21 SECOND COMBINATION FUZE-MODEL OF 1915.

FIG. 1

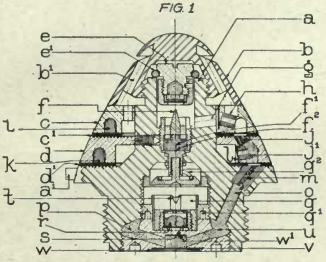
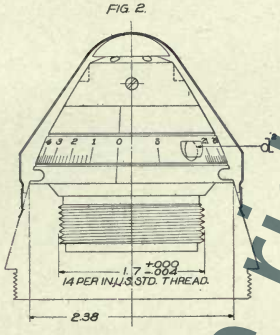


FIG. 2.



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BASE PERCUSSION FUZE, MEDIUM AND MAJOR CALIBER.

FIG. 1.

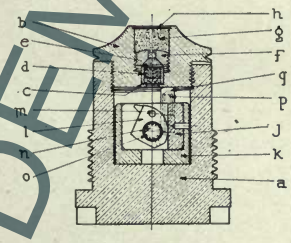
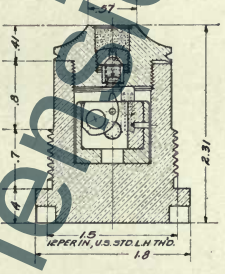


FIG. 2.



36-23-93

DEMO

dimensione ridotta

The restraining spring q^2 prevents the percussion plunger from creeping forward during the flight of the projectile and on impact the plunger flies forward, overcoming the resistance of the spring and the primer is exploded by the firing pin *t*. The flame passes through the vent *s* to the powder magazine *p*. The paper disk *w'* keeps the powder in the magazine from entering the percussion plunger cavity.

BASE PERCUSSION FUZE, MEDIUM AND MAJOR CALIBER.

[Plate V.]

The fuze consists of the following parts assembled as shown in the drawing:

a Body, brass.
b Closing cap screw, brass.
c Primer shield, brass.
d Primer body, brass.
e Primer disk, paper.
f Primer closing screw, brass.
g Reinforcing charge, loose shrapnel powder.
h End closing disk, brass.
j Plunger brass.
k Plunger housing, brass.
l Firing pin, brass.
m Firing-pin fulcrum, steel.
n Safety pin, brass.
o Safety-pin spring, brass.
p Restraining spring, brass.
q Restraining-spring housing, brass.

The plunger *j* is provided with a slot to receive the firing pin *l*, which is mounted on the fulcrum *m* and kept in the unarmed position, figure 1, by two safety pins *n*, in recesses on opposite sides of the plunger and held in the hole in the firing pin by the tension of the springs *o*. These springs are designed to suit the velocity of rotation of the particular projectile in which the fuze is used. The centrifugal force due to the rotation of the projectile forces the pins outward against the tension of the springs and releases the firing pin, which is rotated by the same centrifugal force into its armed position, figure 2. The entire plunger and housing is held to the rear by two springs *p*, pressing on the closing screw through the housing *q*.

MARKING ON AMMUNITION PACKING BOXES.

Both ends and sides of the box are marked with conspicuous characters to facilitate the rapid identification of the ammunition contained therein. The conspicuous marking consists of the following symbols:

The ordnance escutcheon is always in red for mobile artillery ammunition. The numerals 2.95 refer to the caliber and the letter G to the gun. The numerals 2.95 and the letter G are in yellow for common shrapnel, black for common steel shell, and blue for blank

In addition to the conspicuous marking, the quantity and type of ammunition are indicated without symbols by the marking "4 fixed common shrapnel," etc., so that in case one is not familiar with the conspicuous marking system he can immediately ascertain the key by this additional marking.

Also on both ends and sides of the box the "Lot" followed by a number appears. This refers to the ammunition lot, and in case of any trouble arising with regard to the functioning of the ammunition, this lot number should be quoted in the report.

On the sides of the box in addition to the marking described is found a pictorial stenciled symbol indicating the type of projectile and the fact that the ammunition is fixed.

When shot is packed the conspicuous marking is as follows:

The entire marking in this case is black. The numerals 2.95 refer to the caliber, the letter "Z," zone, and the numerals 1, 2, or 3 following the "Z," the fact that one zone, two zones, or three zones are used.

On the top of the box near one end is stamped a general description of the contents, as "Ammunition for cannon with explosive projectile," when the projectiles are of the explosive type, as shell or shrapnel; "Ammunition for cannon with empty projectiles," for shot; and "Ammunition for cannon without projectiles," for blank ammunition. To one side of this stamping appears the seal of the post where packed and the inspector's stamp.

BLANK AMMUNITION.

Blank metallic ammunition is for use in salute firing, morning and evening gun firing, maneuver firing, etc., and consists of the following components: A brass cartridge case, a percussion primer, a charge of black powder, cloth powder bags, and a tight-fitting felt wad.

The powder charge is contained in a cloth bag, which is placed in the case after the primer is inserted and then the wad is inserted and sealed. This is to prevent any powder from leaking out in the event of the dislodgement of the wad, due to rough handling in transportation or jolting in the caissons and limbers.

THE CARTRIDGE CASE.

The cartridge case for blank ammunition is identical with the service cartridge case. Cartridge cases are issued unprimed, and primers should not be inserted until the ammunition is to be prepared for use.

Cartridge cases that have become deformed in service should be turned in to the posts or arsenals designated in current orders for

THE PRIMER.

The saluting primer (percussion) is used in the preparation of blank metallic ammunition. The primer should be a tight fit in the primer seat in the cartridge case, and must be pressed into place with the primer-inserting press provided for the purpose, and not hammered in. No primer should be used that is not a tight fit in its seat in the case.

Cartridge cases should be primed just before the insertion of the powder charge, and under no circumstances will primers be inserted after the powder charge has been inserted.

Primers are issued in hermetically sealed tin boxes, which should not be broken open until the primers are to be used, as they deteriorate when exposed to atmospheric influences.

THE CHARGE.

The charge to be used in the preparation of blank metallic ammunition for the 2.95-inch mountain gun is 1 pound 2 ounces of saluting powder.

PREPARATION OF BLANK METALLIC AMMUNITION.

Blank metallic ammunition will be assembled at posts or in the field under the personal supervision of a commissioned officer, who will be held responsible that it is prepared in the manner prescribed in orders.

For this purpose there are issued blank-cartridge cases, black powder in bulk, cloth powder bags, tight-fitting felt wads, rubberine or other quick-drying paint, primers, etc.

When saluting powder is issued in bulk for use in blank cartridges, the bags should be requisitioned for separately and should be separately invoiced.

Before assembling, the cartridge cases should be carefully inspected to see that they are in sound condition and thoroughly clean and dry. They should also be tested by trying them in the gun, to determine whether they have become deformed. Any cases that do not readily enter the chamber in the gun or that are otherwise seriously deformed should be laid aside for resizing. After inspecting the cartridge cases the blank ammunition should be prepared as follows:

(*a*) Insert the primers with the primer-inserting press.

(*b*) Pour the proper weight of powder into the cloth bag and tie up the mouth of the bag with string. Before inserting in the case, see that the opening in the bottom of the bag is free to allow it to settle around the primer.

In tying the bag, use no more string and leave no more cloth in the "choke" than necessary and place the bag in the case with the "choke" end toward the mouth of the case.

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