TECHNICAL REGULATIONS
No. 1365–14A

WAR DEPARTMENT.
WASHINGTON, *May 10, 1928.*

HARBOR DEFENSE AND RAILWAY ARTILLERY AMMUNITION

AMMUNITION FOR 14-INCH GUNS, M1907, M1907 MI, M1909, M1910, M1910 MI, AND M1920

Prepared under direction of the
Chief of Ordnance

SECTION 1

GENERAL

1. **Purpose and scope.**—These regulations are intended for the using branches. They give all necessary information regarding the construction, functioning, and identification of the different classes of 14-inch gun ammunition and the components thereof.

2. **References.**—*a.* Before attempting to handle ammunition of any type, personnel should be thoroughly familiar with TR 1370–A.

b. Proper nomenclature for ammunition described herein is given in Standard Nomenclature Lists (S. N. L.) E–1, "Guns and Mortars for Fixed Armament" and (S. N. L.) E–3, "Guns, Howitzers, and Mortars for Railway Artillery." This nomenclature is mandatory and will be used in all requisitions.

61719°—28——1

c. The following firing tables are based upon the use of the ammunition herein described:

Projectile	Firing Table No.
14-inch guns, M1907 and M1907 MI (1,400-pound projectile)	14–C–1.
14-inch guns, M1907 and M1907 MI (1,560-pound projectile)	14–D–1.
14-inch guns, M1907 and M1907 MI (1,660-pound projectile)	14–I–1.
14-inch guns, M1909, M1910, and M1910 MI (1,400-pound projectile)	14–B–2.
14-inch guns, M1909, M1910, and M1910 MI (1,560-pound projectile)	14–A–2.
14-inch guns, M1909, M1910, and M1910 MI (1,660-pound projectile–M. V.–2,350 f. s.)	14–H–1.
14-inch guns, M1909, M1910, and M1910 MI (1,660-pound projectile–M. V.–2,250 f. s.)	14–J–1.
14-inch guns, M1920 (1,200-pound projectile)	T. S.–180.
14-inch guns, M1920 (1,400-pound projectile)	14–E–1.
14-inch guns, M1920 (1,560-pound projectile)	R. E.–14–G–1.

d. TR 1315–14A, 1315–14B, 1315–14C, 1315–14D, 1315–14E and 1315–14F describe the operation, care, and maintenance of the guns and carriages for which this ammunition was designed.

SECTION II

GENERAL DISCUSSION

3. General remarks.—In general, all the different types of projectiles described herein are suitable for use in any of the 14-inch guns, although all types of projectiles have not been allocated to all models of guns. The ammunition for these guns is known as separate loading ammunition in that the loading of the gun is accomplished in three separate operations: First, inserting the projectile in the gun; second, inserting the propelling charge; and, third, inserting the primer in the breech mechanism of the gun.

4. Types of ammunition.—*a. Characteristics.*—Three general types of projectiles are provided, as follows: Armor-piercing projectiles, high-explosive projectiles, and target-practice projectiles. Subcaliber guns are provided for the 14-inch guns, the ammunition for which is described in TR 1370–C. Dummy projectiles and dummy propelling charges are also provided, for drill purposes, this ammunition being described in TR 1370–D.

b. Projectiles.—(1) All projectiles are of the base fuze type and are normally issued loaded, with the fuze assembled to the projectile. Some armor-piercing projectiles are in service unloaded and some loaded, but unfuzed, although future issues will consist of completely loaded and fuzed projectiles. A quantity of point-fuzed high-explosive shell, designed for use in the railway mount guns, is on hand, but this type has proved unsatisfactory and they will not be issued to the service.

(2) Projectiles of all types for these guns are usually packed in crates for shipment, the rotating band being further protected from injury by a rope grommet.

(3) The general allocation of the various types of projectiles and other components of the complete rounds to the different models of 14-inch guns and also the approximate weight of the main components are as follows:

Model of gun	Projectile				Fuze[1]	Weight of propelling charge (pounds)	Primer
	Type	Mark number or model	Weight, loaded and fuzed (pounds)	Weight of bursting charge (pounds)			
1907 and 1907 MI	A. P.	IX	1,560	31.4	X	330	Electric or friction.
	A. P. (shell)	1909	1,660	88.3	X	330	
	A. P. (shot)	1909	1,660	31.3	X	330	
	A. P.	VII	1,400	31.5	X	330	
	T. P.	(2)	1,400			330	
	do	1909	1,660			330	
	do	XI	1,560			330	
1909, 1910, and 1910 MI	A. P.	IX	1,560	31.4	X	435	Do.
	A. P. (shell)	1909	1,660	88.3	X	435	
	A. P. (shot)	1909	1,660	31.3	X	435	
	A. P.	VII	1,400	31.5	X	435	
	T. P.	1909	1,660			435	
	do	(2)	1,400			435	
	do	XI	1,560			435	
1920	H. E.	II	1,200	153.8	V	460	Combination percussion-electric, Mk. XV M1.
	do	XI M2	1,200	153.8	V	460	
	A. P.	IX	1,560	31.4	X	460	
	do	VII	1,400	31.5	X	460	
	T. P.	(2)	1,400			460	
	do	XI	1,560			460	
	do	XI M2[3]	1,200			460	

[1] Some A. P. projectiles are fuzed with the major caliber base detonating fuze, M1906 or the major caliber base detonating fuze, Mk. V.
[2] This target-practice projectile is Navy class B high-explosive projectile, sand loaded to weight.
[3] This target-practice projectile is the Mk. XI M2 high-explosive projectile, sand loaded to weight.
A. P. = Armor piercing.
H. E. = High explosive.
T. P. = Target practice.

c. Propelling charges.—(1) The propelling charges differ in weight for the different model guns, as shown in *b* (3) above, but the weight of propelling charge for each model gun is the same regardless of the weight of projectile used.

(2) Propelling charges are shipped complete with the necessary igniters in waterproof containers, known as "cartridge-storage cases," two Mk. III cartridge-storage cases or one single-section cartridge-storage case being required for each full propelling charge. Some issues of multisection propelling charges in Mk. III cartridge-storage cases were without the igniter being included and igniters were shipped in a separate cartridge-storage case, painted red. In future issues igniters will be packed in the same cartridge-storage case with the propelling charge.

d. Primers.—A different type of primer is used in the M1920, 14-inch gun, than in the other models of 14-inch guns, as shown in *b* (3) above. All types of primers are packed in waterproof metal cans, which in turn are packed in wooden boxes for quantity shipment. The electric and friction primers, M1914, are packed 20 in a can and the combination percussion-electric primers, Mk. XV M1 are packed 24 in a can.

e. Round of ammunition.—(1) A complete round of the various types of ammunition is made up of the following components.

Component	Armor-piercing ammunition			High-explosive ammunition		Target-practice ammunition	
Projectile	Mk. IX	M1909	Mk. VII	Mk. II	Mk. XI M2	M1909	Mk. XI
Fuze	Mk. X or major caliber M1906			Mk. V			
Bursting charge	Explosive D						
Propelling charge	Nitrocellulose smokeless powder						
Primer	Electric; friction, M1914; or combination percussion-electric, Mk. XV M1						

(2) It will be noted that a complete round of ammunition may be received in three distinct shipments, as follows:

(*a*) Projectile.

(*b*) Propelling charge (may be in either one or two cartridge-storage cases and igniters may be in separate cartridge-storage cases).

(*c*) Primer.

(3) In order that the using branches be informed of what constitutes a round of ammunition in instances such as this, where a round may be received in different shipments, "complete round labels" were adopted in 1924. In this system a complete round label is attached to the projectile by being wired to the rope grommet or other convenient place, the label being printed with full information as to what other components are required to complete the round. A typical complete round label is shown in Figure 1.

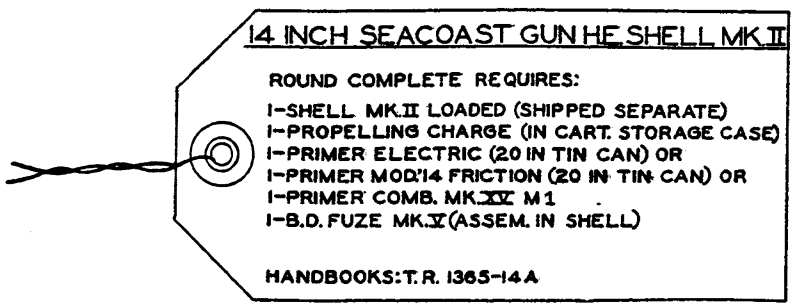


FIG. 1.—Complete round label, 14-inch seacoast gun high-explosive shell, Mk. II

5. Identification of components.—For identification purposes, practically all assembled units or components are given a mark number or model. The mark number form of identification was adopted in 1917, and in this system the first design of a certain component was called "Mark I," abbreviated as Mk. I or, in some cases, MI; the second design, "Mark II," abbreviated as Mk. II or, in some cases, MII, and so on. The previous method was to designate the component as the model of a certain year, for instance "M1909" indicating that it was designed in the year 1909.

SECTION III

PROJECTILES

6. Types.—The different models and mark numbers of the three types of projectiles authorized for use in these guns are—

a. Armor-piercing projectiles.

(1) M1909 (armor-piercing shell, 1,660 pounds).

(2) M1909 (armor-piercing shot, 1,660 pounds).

(3) Mk. VII (1,400 pounds).

(4) Mk. IX (1,560 pounds).

b. High-explosive projectiles.

(1) Mk. II (1,200 pounds).

(2) Mk. XI M2 (1,200 pounds).

c. Target-practice projectiles.

(1) M1909 (1,660 pounds).

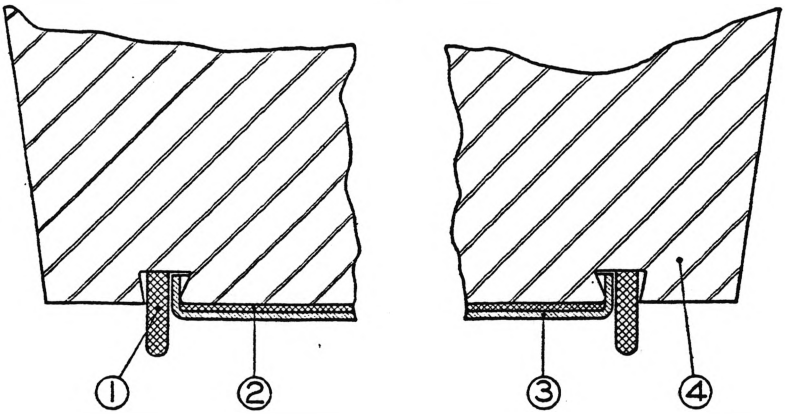
(2) Mk. XI (1,560 pounds).

(3) Class B high-explosive shell, inert loaded (1,400 pounds).

(4) Mk. XI M2 high-explosive shell, inert loaded (1,200 pounds).

7. General remarks.—*a. Base cover.*—All projectiles containing high explosive are fitted with a base cover, which is designed to prevent the gases from the propelling charge coming in contact with the high-explosive charge of the projectile through the joints between the base plug and the projectile or between the fuze and the base plug. The standard base cover for 14-inch projectiles is shown in Figure 2. It consists of a copper cup covering a lead disk, the copper cup being held in a groove in the base of the projectile by

means of a strip of lead calking wire, which is hammered or pressed down to completely fill the groove and to bend in the flange of the copper cup.



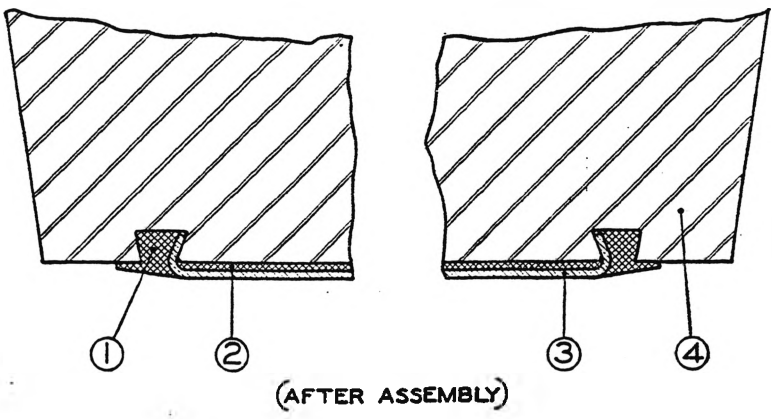


FIG. 2.—Base cover

1. Lead calking wire.
2. Lead disk.
3. Copper cup.
4. Base of projectile.

b. Rotating band.—(1) The functions of the rotating band are to impart rotation and thus to maintain the stability of the projectile during flight, to prevent the propelling charge gases from escaping past the projectile when the gun is fired, to seat the projectile properly in the bore of the gun and to maintain this position when the gun is elevated. The rotating band is a cylindrical ring of copper, pressed into a groove near the base of the projectile. The surface of this groove is formed with a number of inverted V-shaped, waved, circumferential ribs or ridges, which prevent the rotating band from slipping while the projectile is being rotated in the bore of the gun. In the case of the cast-iron target-practice projectiles, where it is impractical to machine these waved ribs, the band seat is knurled to serve the same purpose.

(2) When the projectile is rammed in the gun in loading, the rotating band seats in the forcing cone above the powder chamber and thus seats the projectile in its proper location in the gun. When the projectile is rammed in the gun properly the rotating band is wedged in the forcing cone with sufficient force to hold the projectile and to prevent the projectile from sliding back when the gun is elevated.

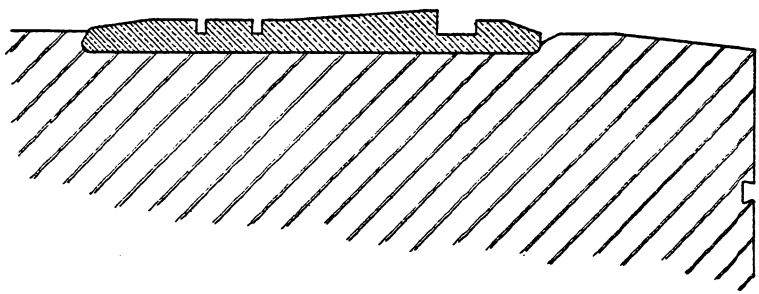


FIG. 3.—Rotating band

(3) When the gun is fired, the rotating band engages with the rifling in the gun barrel, which is of a spiral or screw shape, and thus the projectile is forced out of the barrel of the gun with a rotating motion. Since the diameter of the rotating band is greater than the diameter of the rifling grooves in the bore of the gun, the rotating band completely closes the bore of the gun and prevents the propelling charge gases from escaping past the projectile.

(4) Rotating bands must be made of a comparatively soft metal that will flow readily and fill the rifling grooves in the gun barrel. The material must be sufficiently soft to prevent excessive wear of the

lands in the gun barrel and at the same time not so soft as to strip under the resistance met in rotating the projectile. The rotating band material must also have a high melting point. Copper is probably the best available material and is used for all rotating bands. Some projectiles contain rotating bands made of cupro-nickel, but this material is no longer used. Figure 3 shows a cross section of the latest type of rotating band for 14-inch projectiles. Care should be exercised to avoid rough handling of the projectile, so as not to deform the rotating band. Such handling may result in deformation to such an extent that the projectile can not be loaded in the gun.

c. Painting and marking.—(1) All projectiles are painted, both as a means of ready identification and as a rust preventive.

(*a*) Projectiles containing high explosive (exp. D.), such as the armor-piercing and high-explosive projectiles, are painted yellow.

(*b*) Projectiles which are inert or inert loaded, such as the target-practice projectiles, are painted black.

(2) Projectiles are also stenciled to show the caliber, weight, type of gun used in, kind of filler, type and mark number, ammunition lot number, etc.

8. Armor-piercing projectiles.—*a. General description.*—(1) As the name implies, armor-piercing projectiles are designed to pierce armor plate. At one time armor-piercing projectiles were subclassified as "armor-piercing shot" and "armor-piercing shell." The term "armor-piercing shot" applied to a projectile with relatively thick walls and a correspondingly small explosive charge. The term "armor-piercing shell" applied to a projectile with thinner walls and a greater explosive charge than the "armor-piercing shot." These types are exemplified by the two M1909 armor-piercing projectiles, listed in paragraph 4 *b* (3). It will be noted that, while the total weight (1,660 pounds) is the same for both types, the "armor-piercing shot" type has an explosive charge of 31.30 pounds, while the "armor-piercing shell" type has an explosive charge of 88.31 pounds. These terms "armor-piercing shot" and "armor-piercing shell" are no longer applied to the modern projectiles, the term "armor-piercing shell" or, more commonly, "armor-piercing projectile" being used. The modern design of armor-piercing projectiles follows more closely the design of the old armor-piercing shot. Figure 4 illustrates a typical armor-piercing projectile, the Mk. IX.

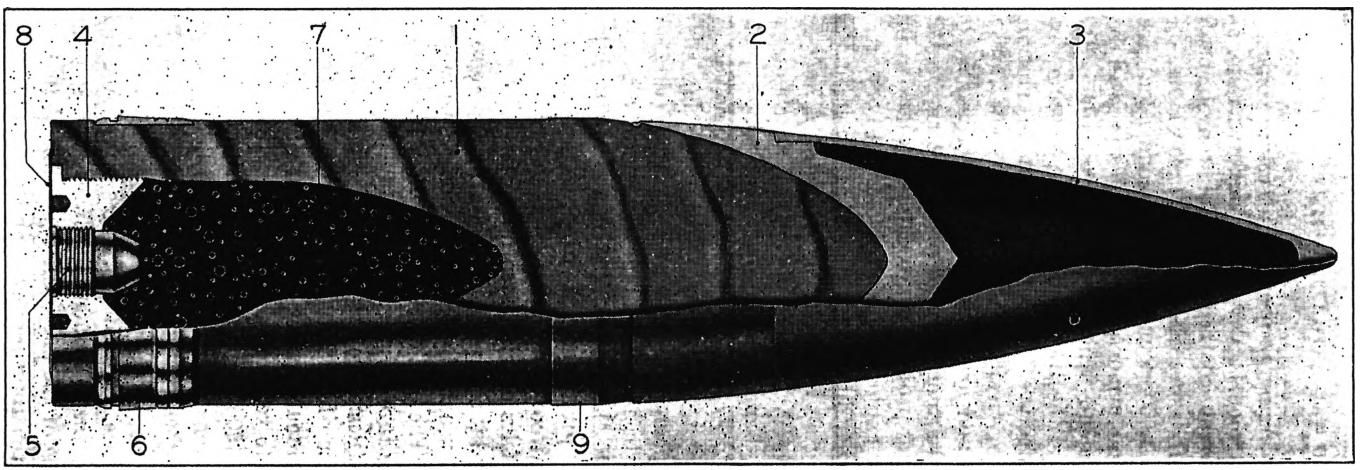


FIG. 4.—Armor-piercing projectile

1. Steel shell.
2. Armor-piercing cap.
3. Windshield.
4. Base plug.
5. Fuze.
6. Rotating band.
7. Bursting charge (explosive D).
8. Base cover.
9. Bourrelet.

(2) The armor-piercing projectiles in service consist of quite a number of different models, varying in minor details, as manufactured by the different contractors. For convenience, these are grouped into three divisions, based on the three weights of projectiles in service, namely, 1,660 pounds, 1,560 pounds, and 1,400 pounds. No more 1,660-pound armor-piercing projectiles will be manufactured. The 1,560-pound armor-piercing projectile is the standard for manufacture, and the 1,400-pound armor-piercing projectile is a substitute for manufacture. For simplicity in description, the 1,660-pound armor-piercing projectiles are grouped and described as the M1909, the 1,560-pound armor-piercing projectiles, as the Mk. IX, and the 1,400-pound armor-piercing projectiles as the Mk. VII.

(3) Armor-piercing projectiles are painted yellow to indicate that the filler is a high explosive (explosive D). They are also stenciled in black for identification purposes, as shown in Figure 5.

b. Armor-piercing projectiles (1,660 pounds), M1909.—(1) Under this model are grouped, for convenience, all armor-piercing projectiles weighing, loaded and fuzed, approximately 1,660 pounds. They consist of several types and models varying in minor details, as manufactured by different contractors. The projectiles of this model and weight (1,660 pounds) are all of old manufacture and no more of this weight will be manufactured. They are authorized for use in the M1907, M1907 MI, M1909, M1910, and M1910 MI guns. The projectiles in this group consist of two general types—armor-piercing shell and armor-piercing shot—as described in *a* above.

(2) These projectiles consist essentially of a steel shell, to which is attached, usually by crimping, a steel armor-piercing cap and to this cap is attached, usually by screw threads, a steel wind shield, for ballistic purposes. The base of the projectile is closed by a steel base plug, into which the fuze is inserted.

(3) These projectiles were originally designed to take the major caliber base detonating fuze, M1906. This fuze has since been superseded by the base detonating fuze, Mk. X, but since this latter fuze has not yet been issued to replace the older fuzes, the major caliber base detonating fuzes, M1906, are assigned to these projectiles. Due to a shortage of base detonating fuzes, M1906, some of these projectiles may have major caliber base detonating fuzes, Mk. V, temporarily assigned to them.

(4) The Mk. X fuze is considerably larger in diameter than either the base detonating fuzes, M1906, or Mk. V, and it is necessary to modify the base plug of the projectile to accommodate the Mk. X fuze. A modification of the rotating band and the addition of a groove

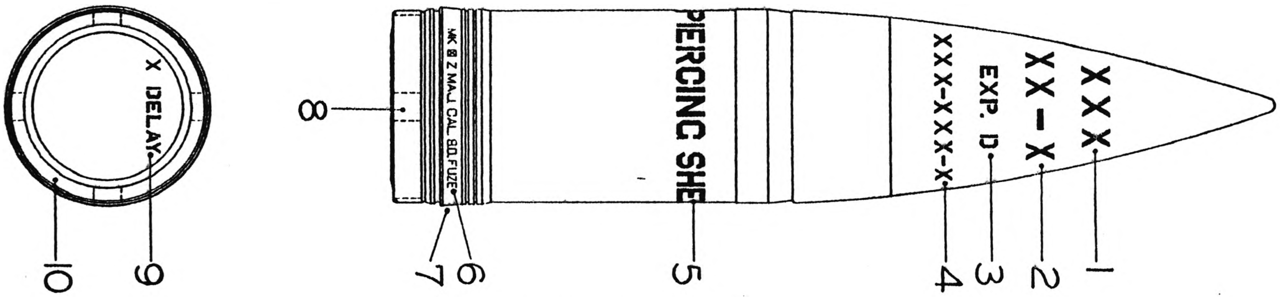


FIG. 5.—Marking of armor-piercing projectile

1. Weight of loaded and fuzed projectile (in pounds).
2. Caliber and type of cannon—"14 SCG" (14-inch seacoast gun).
3. Explosive filler—"EXP. D." (Initials indicate kind of explosive.)
4. Ammunition lot number of filled projectile and caliber letter ("V" for 14-inch). Ammunition loaded after February, 1928, will not be stenciled with a "V."
5. Type of projectile and mark number (location of this stenciling indicates center of gravity of loaded and fuzed projectile).
6. Type of fuze to be assembled in projectile. After projectile has been fuzed the lot number of fuze is stamped immediately following this.
7. The ammunition lot number, in addition to being painted on the projectile (No. 4), is also stamped on the rotating band on the opposite side from fuze stamping.
8. Four black stripes, 2 inches wide, indicate that fuze has not been assembled in the projectile. These stripes are painted out with yellow paint after fuze has been assembled.
9. Base cover is stenciled with the amount of delay of fuze.
10. Caliber and type of cannon, mark number of projectile, lot number of unfilled projectile, initials or symbol of machining plant, and inspector's stamp (stamped on projectile, under paint).

back of the rotating band of these projectiles has been found to improve the ballistics of these projectiles.

(5) The present policy is to unload and reload the explosive charge to a higher density and to modify the rotating bands and base plugs at depots or arsenals where such work can be performed satisfactorily, when the new Mk. X fuzes become available.

(6) In the past these projectiles were issued empty to the various harbor defenses and loading of a certain percentage of the projectiles was accomplished by the personnel of the batteries by hand methods. It was found that proper loading could not be accomplished in this manner and projectiles so loaded will be unloaded and reloaded under proper methods. The present policy is to issue the projectiles completely loaded and fuzed. Therefore these projectiles will be encountered in all of the conditions enumerated above.

(7) Under the old policy, loaded projectiles were stored unfuzed, with the fuzes in metal containers, stored separately, except for a certain percentage which were stored fuzed, for tactical reasons. In these loaded projectiles, the fuze cavity in the explosive charge is protected by a thin aluminum fuze seat liner, which conforms to the shape of the fuze. Several types of these fuze seat liners were necessary, due to the different shapes of base plugs of the different makes of projectiles and due to different models of fuzes assigned to the projectiles. Sufficient fuze seat liners, bushings, and fuzes should be on hand at each harbor defense to complete the assembly of all projectiles on hand at that defense. A fuze hole plug is provided which is assembled in the base plug over the fuze and this plug should be kept in place whether or not the projectile is loaded or fuzed.

(8) Fuze seat liners are not used in projectiles prepared for the Mk. X fuze. Projectiles fitted for this fuze when unfuzed will be provided with a metal fuze hole plug, the exterior dimensions of which approximate those of the Mk. X fuze. Instructions for the loading, modification, and fuzing of these projectiles are covered in special bulletins, regulations and specifications.

c. Armor-piercing projectiles (1,560 pounds), Mk. IX.—(1) Under this mark number are grouped all armor-piercing projectiles weighing, loaded and fuzed, approximately 1,560 pounds, consisting of several types and models, varying in minor details as manufactured by different contractors. This type of projectile is the authorized type and weight for future manufacture and represents a modern armor-piercing projectile. These projectiles are authorized for use in all models of 14-inch guns. This type of projectile is shown in Figure 4.

(2) These projectiles consist essentially of a steel shell, to which is attached, usually by crimping, a steel armor-piercing cap and to this cap is attached, usually by screw threads, a steel wind shield, for ballistic purposes. The base of the projectile is closed by a steel base plug, into which the fuze is inserted. The explosive charge is approximately 31 pounds of Explosive "D".

(3) The projectiles of this type now on hand were originally designed to take the major caliber base detonating fuze M1906 and some of the projectiles were issued as described in *b* above. A number of projectiles of this type have been issued loaded and fuzed with the Mk. X base detonating fuze. These also had the proper modifications made to the rotating bands. Should the Mk. X fuze be removed from any of these, for any reason, a metal fuze hole plug, the exterior dimensions of which approximate those of the Mk. X fuze, should be inserted in its place.

d. Armor-piercing projectiles (1,400 pounds), Mk. VII.—(1) Under this mark number are grouped all armor-piercing projectiles weighing, loaded and fuzed, approximately 1,400 pounds, consisting of several types, varying in minor details as manufactured by different contractors. This type of projectile was procured from the Navy Department and made suitable for use in Army guns by modification of the rotating band. This type is authorized for manufacture as a substitute for the 1,560-pound armor-piercing projectile. It is authorized for use in all models of 14-inch guns.

(2) These projectiles consist essentially of a steel shell, to which is attached, usually by crimping and soldering, a steel armor-piercing cap, and to this cap is attached, usually by screw threads, a steel wind shield, for ballistic purposes. The base of the projectile is closed by a steel base plug, into which the fuze is inserted. The explosive charge is approximately 31.5 pounds of explosive D.

(3) Projectiles of this type are issued completely loaded and fuzed with Mk. X base detonating fuzes. None have been issued to the service unloaded or unfuzed. They also have had the proper modifications made to the rotating bands. Should the Mk. X fuze be removed for any purpose, a metal fuze hole plug, the exterior dimensions of which approximate those of the Mk. X fuze, should be inserted in its place. A few projectiles of this type have been issued loaded and fuzed with the Navy type of fuze, which is similar to the base detonating fuze, Mk. V.

9. High-explosive projectiles.—*a. General description.*—High-explosive shell are used primarily in railway mount guns, for demolition of targets such as do not require armor-piercing projectiles.

High-explosive shell have comparatively thin walls and greater quantity of explosive filler than armor-piercing projectiles, and therefore can not be used successfully against heavy armor plate. They are authorized for use in the M1920 gun only. Two types are authorized for issue, the Mk. II and the Mk. XI M2. These are both base-fuzed projectiles and weigh, loaded and fuzed, approximately 1,200 pounds. Some point-fuzed high-explosive shell are on hand, but these have proved unsatisfactory and will not be issued.

b. High-explosive shell, Mk. II.—The Mk. II high-explosive shell is the standard high-explosive shell for manufacture and issue. It is shown in Figure 6. The radius of the ogive of this shell is 9.09 calibers.[1] The extreme point of the ogive is, however, somewhat blunt. The base has a slight boat tail, being tapered off for a short distance at an angle of 6°. The rear end of the shell is closed with a steel base plug, into which the Mk. V base detonating fuze is inserted. The explosive charge is approximately 154 pounds of explosive D.

c. High-explosive shell, Mk. XI M2.—These shell are authorized for issue as a substitute for the Mk. II shell. The shell on hand were procured from the Navy and they are practically identical with the Mk. II shell.

d. Marking.—High-explosive shell are painted yellow to indicate that the filler is a high explosive (explosive D). They are stenciled in black for identification purposes, as shown in Figure 7.

10. Target-practice projectiles.—*a.* As the name implies, these projectiles are used only for target practice. In general, these are specially designed projectiles made generally of cast iron and are, therefore, much less costly to manufacture than service projectiles. The cast-iron target-practice projectiles are designed to be of the same exterior dimensions, to weigh the same, and to have the same center of gravity as the service projectile that they represent. They, therefore, have practically the same flight characteristics as the service projectiles. They are supplied in four different weights, 1,660 pounds, 1,560 pounds, 1,400 pounds, and 1,200 pounds. At present, while surplus stocks of high-explosive shell are available, the 1,400-pound and 1,200-pound weight target-practice projectiles are furnished by loading high-explosive shell to the required weight with sand or other inert material and closing the fuze hole in the base plug by a steel plug or dummy fuze. Special cast-iron target-

[1] By caliber is meant the diameter of the bore of the gun (14 inches). A radius of ogive of 9.09 calibers is therefore a radius of 9.09 by 14, or 127.27 inches.

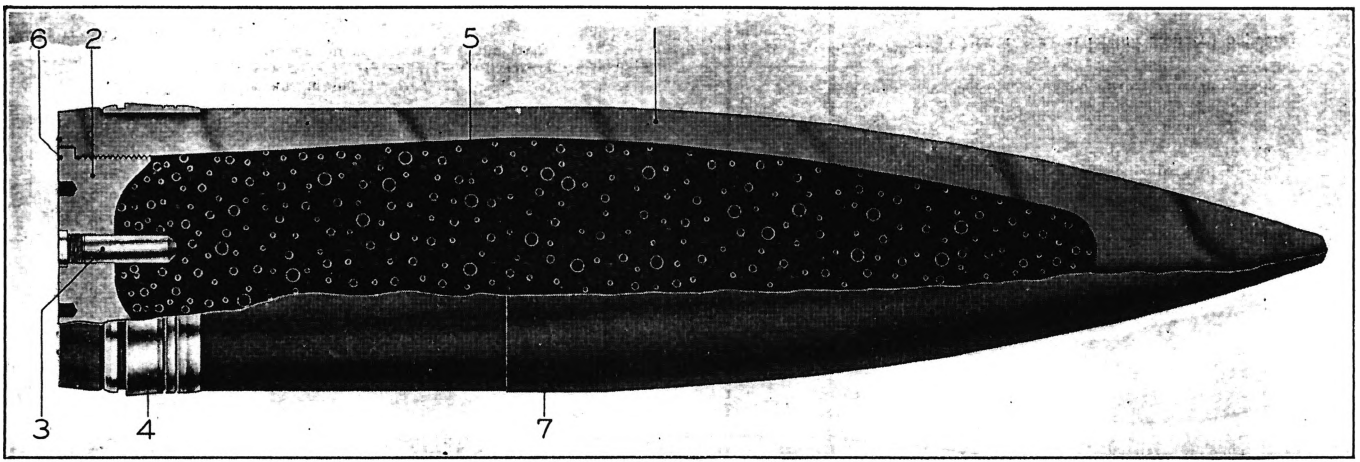


FIG. 6.—High-explosive projectile

1. Steel shell.
2. Base plug.
3. Fuze.
4. Rotating band.
5. Bursting charge (explosive D).
6. Base cover.
7. Bourrelet.

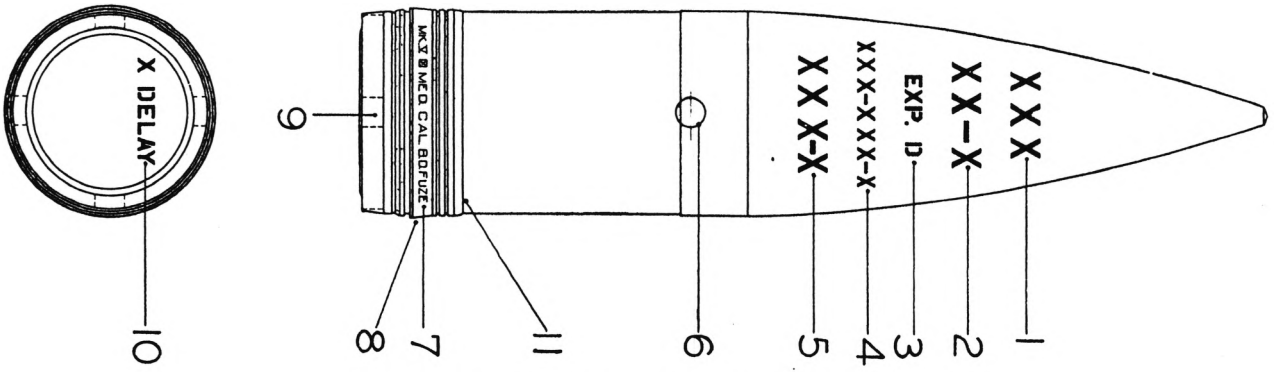


FIG. 7.—Marking of high-explosive projectile

1. Weight of loaded and fuzed projectile (in pounds).
2. Caliber and type of cannon—"14 SCG" (14-inch seacoast gun).
3. Explosive filler—"EXP. D." (Initials indicate kind of explosive.)
4. Ammunition lot number of filled projectile and caliber letter ("V" for 14-inch). Ammunition loaded after February, 1928, will not be stenciled with a "V."
5. Mark number of projectile.
6. Location of center of gravity of loaded and fuzed projectile.
7. Type of fuze to be assembled in projectile—⊠ = "G," "H," or "M" (for gun, howitzer, or mortar). After projectile has been fuzed, the lot number of the fuze is stamped immediately following this.
8. The ammunition lot number, in addition to being painted on the projectile (No. 4), is also stamped on the rotating band on the opposite side from fuze stamping.
9. Four black stripes, 2 inches wide, indicate that the fuze has not been assembled in the projectile. These stripes are painted out with yellow paint after the fuze has been assembled.
10. Base cover is stenciled with the amount of delay of fuze.
11. Caliber and type of cannon, mark number of projectile, lot number of unfilled projectile, initials or symbol of machining plant, and inspector's stamp (stamped on projectile, under paint).

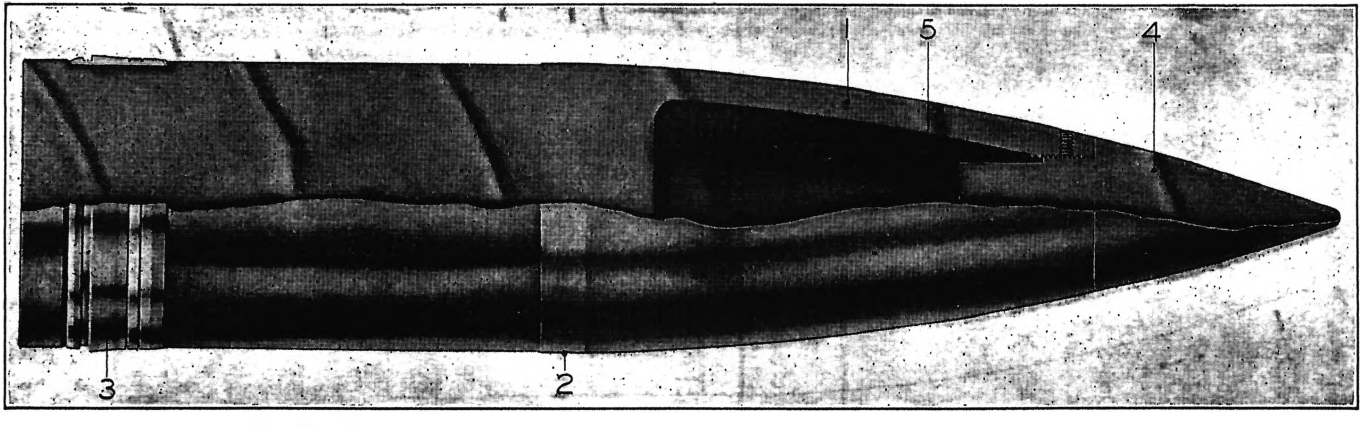


FIG. 8.—Target-practice projectile

1. Cast-iron body. 2. Bourrelet. 3. Rotating band. 4. Nose plug. 5. Empty cavity.

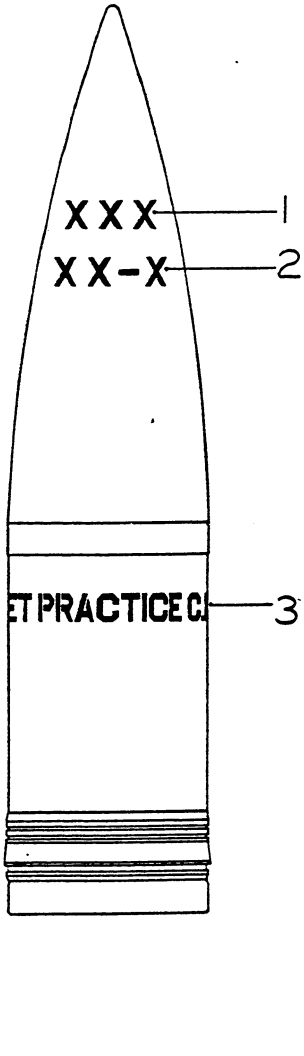


FIG. 9.—Marking of target-practice projectile

1. Weight of projectile (in pounds).
2. Caliber and type of cannon—"14 SCG" (14-inch seacoast gun).
3. Type of projectile and mark number. (Location of this stenciling indicates center of gravity of projectile.)

practice projectiles are furnished for the other two weights, as follows:

(1) Target-practice projectile, M1909, 1,600 pounds.

(2) Target-practice projectile, Mk. XI, 1,560 pounds.

b. The general design of these two is the same and Figure 8 shows the Mk. XI 1,560-pound target-practice projectile.

c. Target-practice projectiles are painted black to indicate that they are inert or inert loaded. They are also stenciled in white for identification purposes, as shown in Figure 9.

SECTION IV

FUZES

11. Types.—*a.* A fuze is a device inserted in a projectile and used to detonate the bursting charge of the projectile at the time and under the circumstances desired. The following types of fuzes are used in 14-inch projectiles:

(1) Base detonating fuze, major caliber, M1906. (Fig. 10.)

(2) Base detonating fuze, Mk. V. (Fig. 11.)

(3) Base detonating fuze, Mk. X. (Fig. 12.)

b. The base denoting fuzes, major caliber, M1906 and Mk. X, are used in armor-piercing projectiles and the base detonating fuze, Mk. V, is used in high-explosive shell.

12. Base detonating fuze, major caliber, M1906.—*a. Description.*—(1) This fuze is an obsolete model, having been superseded by the base detonating fuze, Mk. X. It will be continued in service only until such time as Mk. X fuzes become available for its replacement. This fuze is not a bore-safe[1] type of fuze and projectiles which are fuzed with this fuze should never be shipped or subjected to rough handling.

(2) Figure 10 shows this fuze together with the names of the principal parts. The percussion plunger (1) is armed by centrifugal force, in that the firing pin (2) is thus unlocked and revolved to the armed position, so that on impact the percussion plunger is driven forward, overcoming the resistance of the restraining springs (3).

[1] A "bore-safe" fuze is one in which the detonating train is interrupted between the detonator and the explosive charge of the projectile until the projectile has cleared the muzzle of the gun. This prevents premature action of the explosive charge of the projectile in the bore of the gun, due to malfunctioning of the more sensitive elements of the fuze.

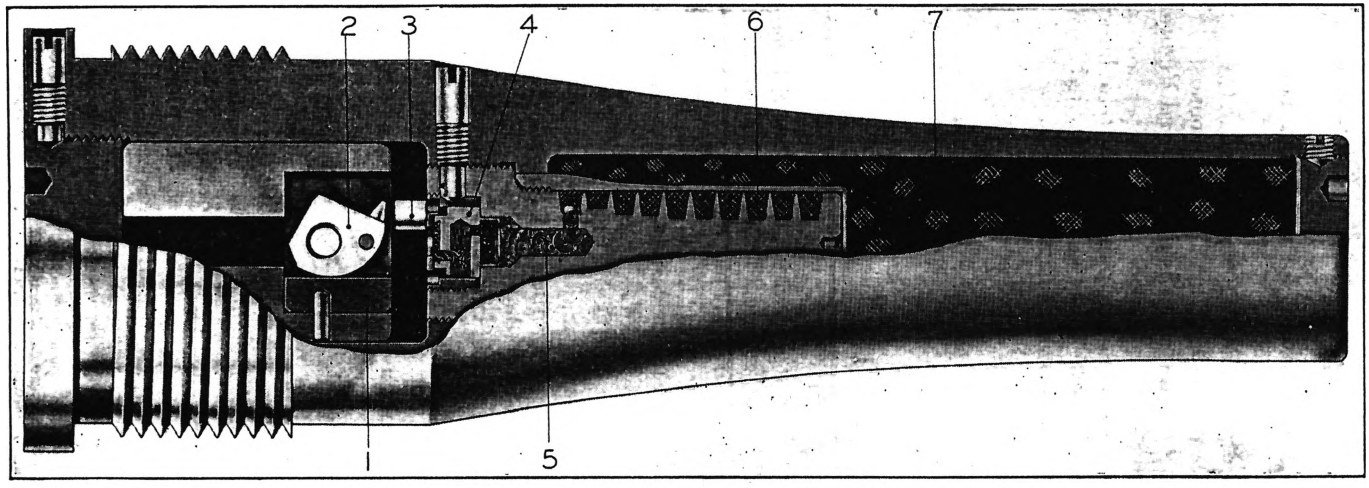


FIG. 10.—Base detonating fuze, major caliber, M1906

1. Percussion plunger.
2. Firing pin.
3. Restraining spring.
4. Percussion primer.
5. Guncotton.
6. Detonator.
7. Booster charge.

The firing pin (2) strikes and explodes the percussion primer (4). This primer has a delay pellet of black powder and when this pellet has burned through, the flame ignites the guncotton (5), which in turn explodes the detonator (6) consisting of approximately 100 grains of fulminate of mercury. This in turn detonates the booster charge (7) consisting of approximately 780 grains of T. N. T. This in turn detonates the explosive charge in the projectile. The tapped holes in the base of the fuze are used as an aid in removing the fuze from the projectile. After the fuze has been unscrewed from the base plug a threaded pin is inserted in this tapped hole and the fuze thus withdrawn. This fuze weighs approximately 3 pounds.

b. Marking.—(1) The exterior of this fuze is painted with black, nonacid paint, to prevent corrosion of the steel body and to prevent chemical action between the steel of the fuze and the explosive charge in the projectile. The rear plug of the fuze is stamped with the name of the fuze, name of manufacturer, lot number, date of manufacture (year), and drawing and revision numbers. A letter is also stamped on the base plug to indicate the type of plunger and primer used. These letters and their meaning are as follows:

A=Semple plunger, 2,000 r. p. m., 0.08 delay primer.
B=Semple plunger, 2,000 r. p. m., nondelay primer.
C=Semple plunger, 1,300 r. p. m., nondelay primer.
D=F. A. centrifugal plunger, 2,000 r. p. m., 0.08 delay primer.
E=F. A. centrifugal plunger, 2,000 r. p. m., nondelay primer.
F=F. A. centrifugal plunger, 1,300 r. p. m., nondelay primer.
G=Semple plunger, 1,300 r. p. m., 0.08 delay primer.
H=Semple plunger, 1,500 r. p. m., 0.04 delay primer.
J=Semple plunger, 1,500 r. p. m., 0.08 delay primer.
K=Semple plunger, 1,500 r. p. m., nondelay primer.
L=Semple plunger, 2,000 r. p. m., 0.04 delay primer.

(2) Fuzes marked "A," which arm at 2,000 revolutions per minute and have an 0.08 delay primer, are prescribed for use in 14-inch armor-piercing projectiles. This delay action is incorporated in the fuze to insure that the projectile has time to penetrate armor plate before detonating.

c. Shipment.—These fuzes should never be assembled in projectiles for shipment. They are issued packed in individual hermetically sealed metal cans, which in turn are packed in wooden packing boxes containing 20 cans or fuzes.

d. General remarks.—Great care should always be taken in handling these fuzes. They contain a relatively large detonator as compared with the Mks. V and X fuzes and, as stated before, they are *not* bore safe. In most of these fuzes the three main elements of the

fuze are locked to the body by means of set screws. Any work done on these fuzes, such as replacing primers, etc., should always be done behind a barricade and only by experienced, careful personnel.

13. Base detonating fuze, Mk. V.—*a. Description.*—(1) This fuze is used in high-explosive shell, where nondelay action is desired. This is a bore-safe fuze, and loaded projectiles will be issued with the fuze assembled in place. Figure 11 shows this fuze and gives the names of the principal parts. Two types of these fuzes are in service, the medium and major caliber types, the only difference being in the size of the head. For 14-inch high-explosive shell the medium caliber type is used. Some armor-piercing projectiles may have major caliber base detonating fuzes, Mk. V, temporarily assigned to them.

(2) When the projectile is fired, no action takes place in the fuze while the projectile is in the gun. The percussion plunger (1) is similar to that used in the major caliber base detonating fuze, M1906, and is armed by centrifugal force, in that the firing pin (2) is thus unlocked and revolved to the armed position. On impact the percussion plunger is driven forward, overcoming the resistance of the restraining spring (3). The firing pin (2) strikes and explodes the percussion primer (4), which causes explosion of the detonator (5), consisting of about 12 grains of fulminate composition. This in turn detonates the booster charge (6), consisting of approximately 116 grains of T. N. T. and tetryl. This in turn detonates the explosive charge in the projectile.

(3) The bore-safe device consists of an "interrupter," which prevents any action of the primer (4) or detonator (5) from being transmitted to the booster charge (6) until the projectile has left the muzzle of the gun. The percussion plunger (1) arms at about 2,000 revolutions per minute. This fuze weighs approximately 3.27 pounds.

b. Marking.—(1) The exterior of this fuze is painted with black, nonacid paint, to prevent corrosion of the steel parts of the fuze and to prevent chemical action between the steel of the fuze and the explosive charge in the projectile.

(2) The head is stamped for identification as follows:

(*a*) BASE DETONATING FUZE.
(*b*) MARK V.
(*c*) NONDELAY.
(*d*) G (for gun. Howitzer fuzes are stamped H and mortar fuzes are stamped M).
(*e*) MEDIUM (caliber. Fuzes with large heads are stamped MAJOR).
(*f*) SEMPLE TYPE.

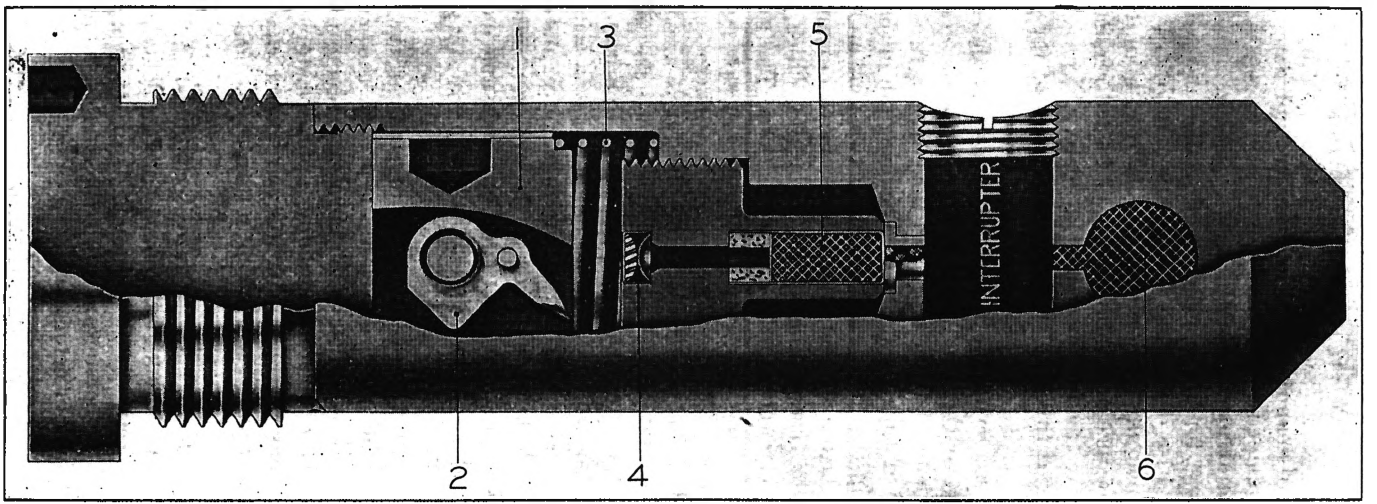


FIG. 11.—Base detonating fuze, Mk. V (medium caliber)

1. Percussion plunger.
2. Firing pin.
3. Restraining spring.
4. Percussion primer.
5. Detonator.
6. Booster charge.

(3) The name of manufacturer, lot number, and date of manufacture are also stamped on the fuze.

14. Base detonating fuze, Mk. X.—*a. Description.*—(1) This is the standard fuze for armor-piercing projectiles and will replace the major caliber base detonating fuzes, M1906, or Mk. V, now assigned to armor-piercing projectiles, pending receipt of this fuze. This is a bore-safe fuze and future issues of loaded armor-piercing projectiles will have the fuze assembled in place. Figure 12 shows the general details of this fuze and gives the names of the principal parts.

(2) As in the case with the two fuzes previously described, no action takes place in the fuze while the projectile is in the gun. After the projectile has left the muzzle of the gun, the fuze is armed through the action of centrifugal force. The firing pin in the plunger is normally held in the unarmed position by two pins and springs, which, under the action of centrifugal force, move outward, away from the axis of the fuze and unlock the firing pin, which, also due to centrifugal force, rotates to the armed position. The rotor, containing the detonator, is also held in the unarmed or safe position by two pins and springs, which release the rotor, due to centrifugal force, in a similar manner to the way the plunger is armed. Centrifugal force also rotates the rotor into the armed position. The rotor stop pin serves to stop the rotor in the armed position. In the armed position of the rotor the rotor lock pin aligns with a hole provided in the fuze body and, due to centrifugal force, moves partly into this hole, thus locking the rotor in the armed position. The rotor lock-pin lock is provided as an additional lock and moves into its position either due to air retardation or "creep" in the projectile or else on impact.

(3) On impact the plunger overcomes the resistance of the restraining spring and the firing pin is driven in the primer, thus exploding it. This ignites the delay pellet, which burns a predetermined time and then explodes the detonator containing approximately 9 grains of fulminate of mercury, which detonates the booster charge, consisting of about 470 grains of tetryl, and in turn the explosive charge in the projectile.

(4) The bore-safe feature in this fuze is contained in the rotor, which carries the detonator out of alignment with the delay pellet and booster until the projectile has left the muzzle of the gun, thereby preventing action of the booster and projectile charge due to premature action of the primer or detonator.

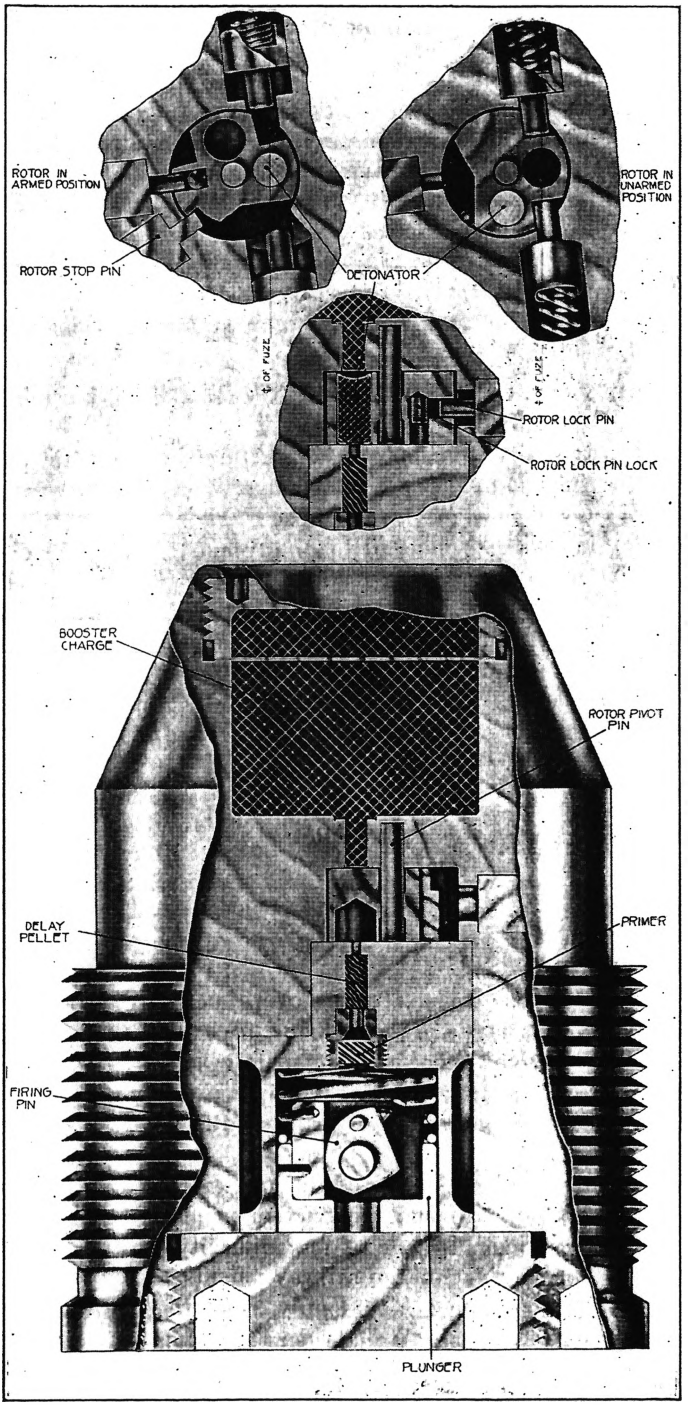


FIG. 12.—Base detonating fuze, Mk. X

(5) The plunger and rotor of this fuze arm at 1,300 revolutions per minute, thus making the fuze suitable for use in gun, howitzer, or mortar projectiles. This fuze weighs approximately 8 pounds.

b. Marking.—(1) The steel parts of this fuze are zinc plated as a rust preventive. That part of the fuze which may come in contact with the explosive charge of the projectile is painted with black, nonacid paint, to prevent chemical action between the metal of the fuze and the explosive D in the projectile.

(2) The base of the fuze body is stamped for identification as follows:

(*a*) BASE DET. FUZE, MK. X (name and mark number of fuze.
(*b*) Initials or symbol of manufacturer of the metal parts.
(*c*) Amount of delay (in seconds).
(*d*) Lot number of loaded fuze.
(*e*) Initials or symbol of loading plant.
(*f*) Month and year of loading.

c. Shipment.—These fuzes are normally shipped assembled in the loaded projectiles. When shipments of these fuzes are made to replace obsolete types of fuzes, the Mk. X fuzes will be shipped in individual, hermetically sealed, metal cans, which in turn will be packed in a wooden packing box, containing 20 cans or fuzes.

SECTION V

PRIMERS

15. Types.—*a.* Two general types of primers are necessitated, since the M1920 guns have a different firing mechanism than the other models of 14-inch guns. The electric primer and friction primer, M1914, are used in all models of 14-inch guns, except the M1920. The combination percussion-electric primer, Mk. XV M1, is used in the M1920 guns.

b. For all models of guns on fixed mounts, except the M1920, the electric primer is standard and the friction primer, M1914, is used as an emergency primer, in case of any difficulty with the electric firing device of the gun. Guns on railway mounts, except the M1920 gun, use the friction primer M1914 only, since these guns are not equipped to fire electrically. At one time a combination electric and

friction primer was used, but due to its complicated structure and expense in manufacture no more of this type will be made.

16. Electric primer.—*a. Description.*—(1) This primer is used in 14-inch guns, M1907, M1907 MI, M1909, M1910, and M1910 MI, fitted with electric firing devices. The primer, with the names of its principal parts, is shown in Figure 13.

(2) One end of the contact wire (11) is soldered to the contact plug (4), which is insulated from the body (1) by the plug insulator (5) and insulator (6), and attached to the wire (2), which is also insulated from the body by the paper insulation (15). Electrical contact is formed through the button (3) with the external circuit by means of clips attached to the firing mechanism of the gun. The back of the button is insulated by an insulated paper washer (26) shellacked to the button. The opposite end of the contact wire (11) is soldered to the contact sleeve (8), which is in electrical contact with the body (1). An electric current of sufficient intensity to heat the platinum contact wire (11) ignites the guncotton (14) and through this the primer charge, consisting of loose black powder (13) and black powder pellets (12), is exploded. A maximum current of 1.1 amperes is required to fire this primer.

(3) The mouth of the primer is closed by a thin brass cup (10) to seal the primer against the entrance of moisture. The primer is close fit in its seat in the spindle of the breechblock and the walls of the primer body (1) are made thin so that they are expanded by the gas pressure against the primer seat, thus obturating the gas at this point, and there is no escape for the gases through the primer itself.

b. Marking.—A shallow groove is machined around the outside of the head of the primer body, which is a distinguishing feature of the electric primer. The base of the head is also stamped as follows:

(1) Initials or symbol of loading plant.
(2) Lot number of loaded primer.
(3) Year of loading.

c. Shipment.—These primers are shipped packed in waterproof metal packing cans, containing 20 primers to the can, which in turn are packed in wooden packing boxes. Primers are affected by moisture, and care should be taken that they are kept dry after the can has been opened.

17. Friction primer, M1914.—*a. Description.*—(1) This primer is used in 14-inch guns, M1907, M1907 MI, M1909, M1910, and M1910 MI. Guns of these models fitted with electric firing mechanism ordinarily use the electric primer, and in these guns the

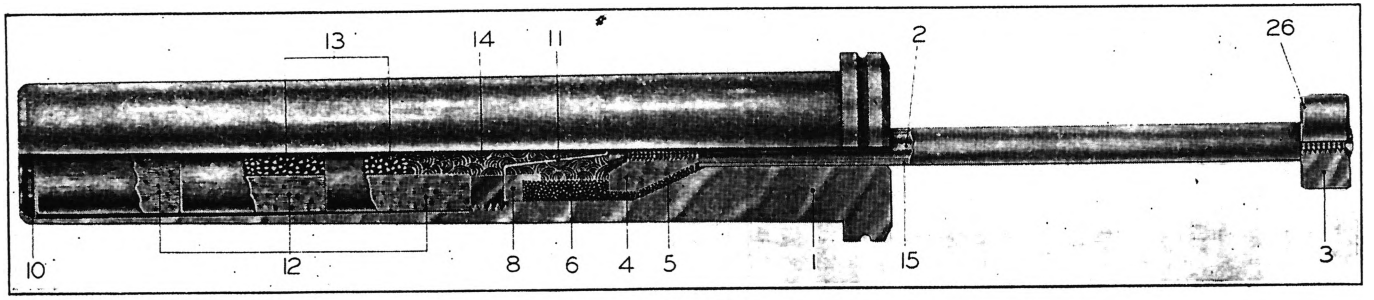


FIG. 13.—Electric primer

1. Body.
2. Wire.
3. Button.
4. Contact plug.
5. Plug insulator.
6. Insulator.
8. Contact sleeve.
10. Closing cup.
11. Contact wire.
12. Black-powder pellets.
13. Loose black powder.
14. Guncotton.
15. Paper insulation.
26. Paper washer.

friction primer M1914 is used as an emergency primer in case of failure of the electric circuit. This primer is also used in railway mount guns of the above models, where electric firing is not used. The friction primer M1914 is also used in all of the above model guns for drill purposes to replace the special drill primers which will no longer be issued. The primer, with the names of its principal parts, is shown in Figure 14.

(2) This primer is called a "friction primer" because it is functioned by means of friction. The assembled primer is inserted in the breechblock of the gun and is held in place by the slide. The firing leaf engages the button (3), which is threaded and riveted to the wire (2). When the lanyard, which is attached to the firing leaf, is pulled, the wire (2) draws the gas check (16), which is fitted with serrations or saw teeth, through the friction composition (19), causing it to explode. The flame from the explosion of this friction composition ignites the black-powder charge in the primer, consisting of the black-powder pellets (12) and the loose black powder (13).

(3) The mouth of the primer is closed by a thin brass cup (10), to seal the primer against the entrance of moisture. The primer is a close fit in its seat in the spindle of the breechblock and the walls of the primer body (1) are made thin so that they are expanded by the gas pressure against the primer seat, thus obturating the gas at this point. After the gas check (16) is pulled through the friction composition (19), it seats itself in the cone shaped recess in the primer body, thus preventing the escape of the powder gases through the primer.

(4) A pull of from 35 to 75 pounds is required to fire this primer. The lanyard should be pulled from a position as near the rear of the gun as possible. A strong, steady pull from one man, with as short a lanyard as practicable, should be used. Where a long lanyard is used, the slack causes the force to be applied slowly, increasing the chances for a misfire. If a primer can not be fired by one man, it should be rejected and another used. Two men pulling on a lanyard may injure the firing mechanism. When a primer is pulled and fails to fire, it should be removed from the vent and the wire should immediately be bent around the primer through an angle of about 180° to prevent its being used again. Instructions to the above effect are printed on the labels of the packing cans in which the primers are packed and they must be followed if the best results are desired.

(5) When a primer fails to fire it will be seen that the gas check (16), being then seated in its recess in the rear of the cavity in the primer body, the wire (2) will be free to move forward to its original

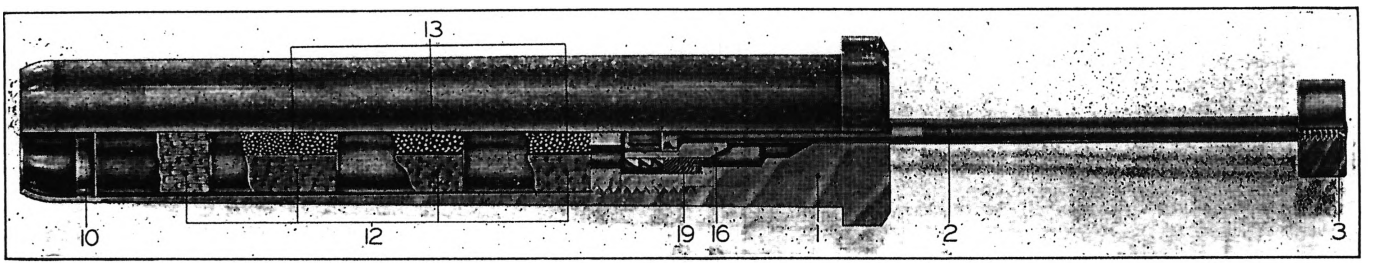


FIG. 14.—Friction primer, M1914

1. Body.
2. Wire.
3. Button.
10. Closing cup.
12. Black-powder pellets.
13. Loose black powder.
16. Gas check.
19. Friction composition.

position without moving the gas check (16) with it; there is some danger of firing the primer by reverse movement of the wire.

b. Marking.—No distinguishing marks are machined on this primer body, as is the case with the electric primer. The base of the head is stamped as follows:

(1) Initials or symbol of loading plant.
(2) Lot number of loaded primer.
(3) Year of loading.

c. Shipment.—These primers are shipped packed in waterproof metal packing cans, containing 20 primers to the can, which in turn are packed in wooden packing boxes. Primers are affected by moisture, and care should be taken that they are kept dry after the can has been opened.

18. Combination percussion-electric primer, Mk. XV M1.—*a. Description.*—(1) This primer is used in 14-inch guns, M1920, only. It is of Navy design and manufacture. This primer, with the names of its principal parts, is shown in Figure 15.

(2) When fired by percussion action, the striker, or firing pin in the breech mechanism of the gun, drives the plunger (24) into the primer cap (21), thus exploding it. The flame from this explosion passes into the ignition cup (22) and ignites the loose black powder (13), which in turn ignites the loose black powder (13) in the metallic seal (23). The charge in this primer is approximately 30 grains of loose black powder. The end of the metallic seal (23) is slotted, to permit the discharge of the hot gases and flame through the vent in the breechblock and against the igniter of the propelling charge.

(3) When fired electrically, electric contact is made on the plunger (24). When the circuit is closed, the resistance heats the platinum contact wire (11), firing the wisp of guncotton (25), which is wrapped around the contact wire (11) and ignites the loose black powder charge (13). The plunger and plunger cup are insulated from the primer body (1) by the insulators (6) and (9).

b. Shipment.—These primers are shipped packed in waterproof metal packing cans, containing 24 primers to the can, which in turn are packed in wooden packing boxes. Primers are affected by moisture, and care should be taken that they are kept dry after the can has been opened.

SECTION VI

PROPELLING CHARGE

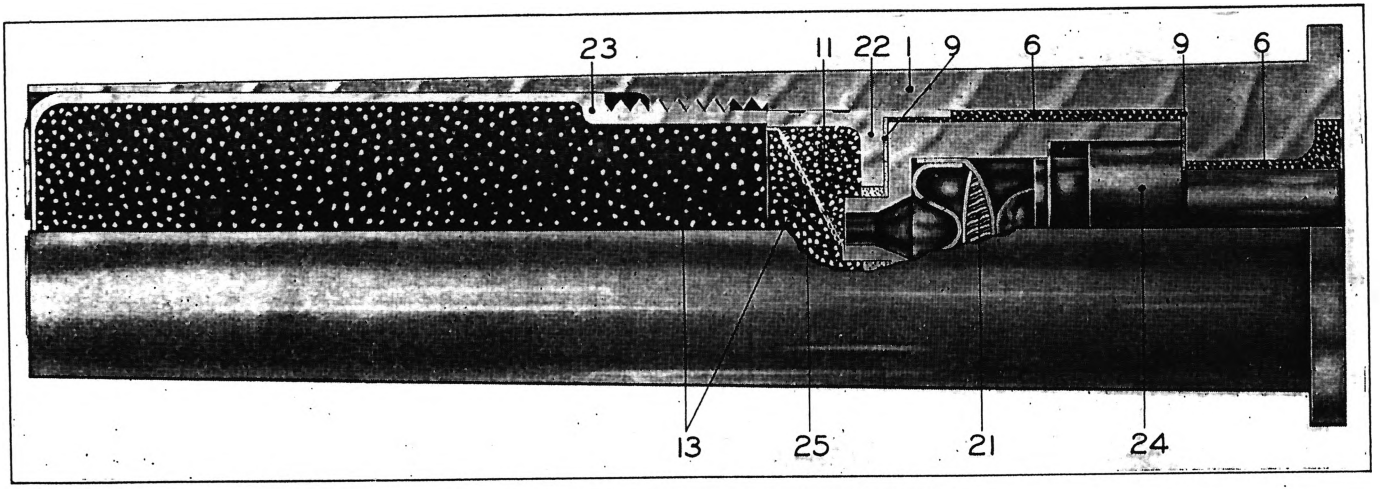


FIG. 15.—Combination percussion-electric primer, Mk. XV M1

1. Body.
6. Insulators.
9. Insulating washers.
11. Contact wire.
13. Loose black powder.
21. Primer cap.
22. Ignition cup.
23. Metallic seal.
24. Plunger.
25. Guncotton.

19. Propelling charge.—*a. General.*—The propelling charge for 14-inch guns is nitrocellulose smokeless powder. A grain of this powder will burn freely in the open, and has none of the characteristics of an explosive until it is confined. If the powder is confined in a chamber, the rate of burning is very rapid, as the rate of burning increases as the gases are liberated and the pressure in the chamber increases.

b. Action.—(1) The pressure of the gases from the burning powder expels the projectile from the gun. If these gases are created too rapidly, too much pressure will be developed and the gun may burst. On the other hand, if the gases are not generated rapidly enough, the projectile will leave the muzzle of the gun before the powder grains are entirely burned and at a lowered velocity. It is therefore necessary to make the grains of powder of such size that when the projectile has reached the muzzle of the gun they will have completely burned and the pressure will not have exceeded a certain

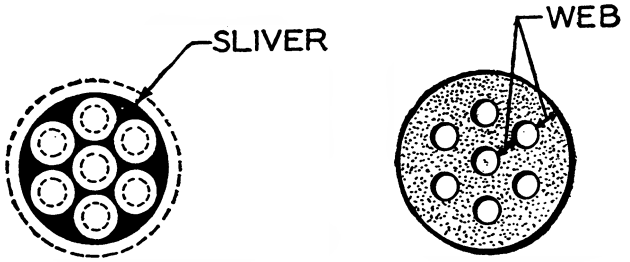


FIG. 16.—Grain of smokeless powder

prescribed limit. To meet this condition, it has been found desirable to make the grains of powder with a number of holes or perforations running lengthwise of the grain. Since the grain is perforated, it will burn on the inside and outside surfaces at the same time and gas will be created much faster than if the grain were solid. The size of the grain for the 14-inch gun propelling charge is about ⅞ inch in diameter by about 2 inches long, with 7 perforations running lengthwise of the grain. The color varies from a light brown to a black.

(2) It is assumed that all the exposed surfaces of the grain of powder begin to burn at the same time. Figure 16 shows the end view of a typical grain of powder and also the progressive burning action until the grain is practically consumed. The dotted lines show the original shape of the grain of powder. The small tri-

angular sections are called "slivers." These slivers will burn if the powder is properly designed.

(3) The maximum allowable pressure in all the models of 14-inch guns is 38,000 pounds per square inch.

20. Cartridge bags.—*a. Use.*—Cartridge bags are used with separate loading ammunition, forming a suitable and convenient means of containing the smokeless powder propelling charge. Two classes of cloth are used in the manufacture of cartridge bags, known as *cartridge-bag cloth* and *cartridge-igniter cloth.* These two classes of cloth are both divided into five grades, according to their respective tensile strengths. The grades are lettered A to E, A being the strongest grade and E the weakest. For the 14-inch gun, multisection propelling charge, grades A, B, and C cartridge-bag cloth are used for the various components of the cartridge bags and grade B cartridge-igniter cloth is used for the igniter bag.

b. Cartridge-bag cloth.—Cartridge-bag cloth is made of pure silk, wool, or mohair, raw silk having been found to be the most practical material. This cloth is used in the manufacture of all components of the bags, except those components containing the igniting charge of black powder. It is necessary that the cartridge-bag cloth have sufficient strength to withstand service conditions of handling and at the same time it must be entirely consumed during combustion of the propelling charge.

c. Cartridge-igniter cloth.—Cartridge-igniter cloth is made of pure silk and has properties similar to cartridge-bag cloth, but it is more closely woven to prevent the igniting powder from sifting through the cloth. All igniters used with cartridge bags are manufactured from cartridge-igniter cloth. In order to avoid any possibility of error and to clearly indicate that they contain black powder, all igniters are dyed bright red.

21. Types of charge.—*a. General.*—Two types of charges are in service at present, the "single-section type" and the "multisection type." In the single-section type the charge, complete with igniter, is contained in one bag, whereas in the multisection type the charge is contained in four separate bags and the igniter in another bag, making five bags in all. The single-section type has been found difficult to handle on account of its size and weight, and consequently no more of this type of charge will be issued.

b. Single-section charge.—This type of charge is obsolete for future manufacture, but most charges now on hand in the coast defenses are of this type, and they will be used until replaced by multisection charges. The single-section charge is made up of one bag, having a

central tube which passes longitudinally through the center of the bag, as shown in Figure 17. This tube is filled with approximately 72 ounces of black igniting powder. Approximately 14 ounces of black igniting powder is also quilted in each end of the bag. The bag is laced along both sides, to make the bag rigid. The size of the bag is so proportioned that the entire space between the base of the projectile and the mushroom head of the breechblock is occupied.

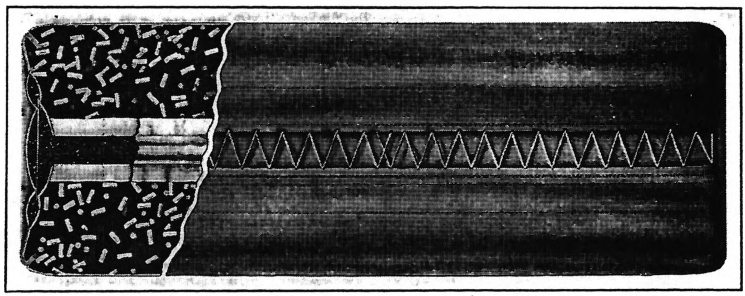


FIG. 17.—Single-section propelling charge

c. Multisection charge.—(1) This is the standard charge for issue and future manufacture. In this type of charge, the charge is contained in four bags, each containing the same amount of powder. A separate igniter pad containing about 48 ounces of black powder is used. The igniter pads have commercial brass safety pins attached to enable them to be fastened to the rear of the propelling charge. This should be done at any convenient time during or just prior to use. Care must be taken to have this red igniter pad at the rear of the charge, as the charge will probably fail to ignite upon firing if the igniter pad is not in its proper place. Recent issues of multisection charges have been made with the igniter pad pinned in place on one end of one of the sections. Since the Mk. III cartridge-storage case contains only two sections, or half of one full charge, and since each cartridge-storage case contains an igniter, it will be seen that there will be two igniters for each full charge. Two igniters must *not* be used with the multisection charge, and care must be taken to remove the extra igniter and to *use only one igniter.*

(2) The multisection charge is shown in Figure 18. The propelling-charge powder is loaded into a straight cylindrical bag and, after sewing the opening for filling the bag, the bag is rolled by machine and a long puttee strap is wrapped spirally around the bag to tighten it and to make it firm and serviceable.

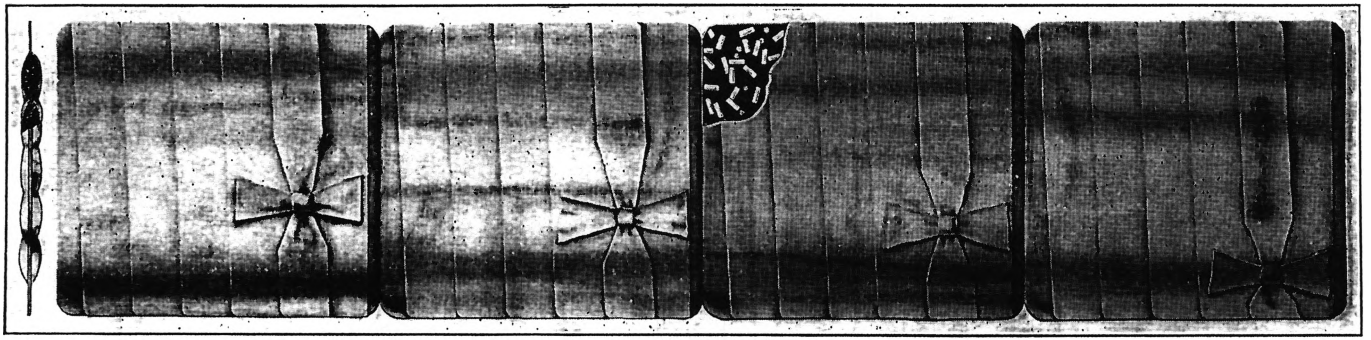


FIG. 18.—Multisection propelling charge

d. Weight of charge and muzzle velocity.—Only one weight of propelling charge of any particular lot of powder is provided for a particular model of gun, whereas three different weights of projectiles are available for each model gun. This condition results in a different muzzle velocity for each different weight of projectile. The weight of powder listed is approximate only, and will vary with different lots of powder, since the powder charge is so adjusted as to give the specified muzzle velocity. The weight of propelling charge and the muzzle velocity for the different weights of projectiles in the different models of 14-inch guns are as follows:

Weight of charge and muzzle velocity

Model of gun	Weight of projectile (pounds)	Muzzle velocity of projectile (feet per second)	Weight of propelling charge (pounds)
1907 and 1907 MI	1,400	2,200	330
	1,560	2,170	330
	1,660	2,150	330
1909, 1910, and 1910 MI	1,400	2,400	435
	1,560	2,370	435
	1,660	2,250 and 2,350	435
1920	1,200	3,000	460
	1,400	2,700	460
	1,560	2,650	460

e. Marking.—(1) Each charge has a tag attached to it, containing the following information:

(*a*) Name of loading plant.
(*b*) Date loaded (day, month, and year).
(*c*) Caliber and model of gun.
(*d*) Weight or weights of projectiles.
(*e*) Powder lot number.
(*f*) Name of manufacturer of powder.
(*g*) Size and model of gun or howitzer for which the powder was made in case of a lot of powder being used in a different gun or howitzer from the one for which it was originally intended.
(*h*) Weight of charge, weight of igniter, and velocity and pressure for each particular weight of projectile.

(2) *Before inserting the charge in the gun, this tag should be removed.*

(3) The side of the single-section charge is stenciled with the caliber and model of the gun, lot number of the powder, and name of manufacturer of the powder. Each end is stenciled with the words "Igniting powder."

(4) The end of each section of the multisection charge is stenciled with the powder lot number, caliber and model of gun, and the fractional part of the charge (¼) represented by the section. The igniter is stenciled with the weight, grade, and lot number of the igniting powder and caliber of the gun.

f. Primer protector cap.—(1) On single-section charges, in order to protect the igniting charge of black powder in the ends of the charge, "primer protector caps" are furnished. These consist of cup-shaped cloth covers about 5 inches deep, which fit over each end of the single-section charge. They are fastened to the charge by means of a drawstring at the open end of the primer protector cap and by a wide cloth "trace" which passes longitudinally around the charge over the primer protector caps, the ends of the trace being tied together at one end. Primer protector caps are furnished on multisection charges when they are shipped with the igniter pad in place. Only one primer protector cap is furnished, since the igniter is on only one end of the charge.

(2) The primer protector cap is made of heavy cloth with a disk of thick felt sewed on the inside of the bottom. A cloth handle is sewed on the outside of the bottom to facilitate removal of the primer protector cap. The primer protector caps must be removed from the charge before loading the charge in the gun.

(3) The side of the primer protector cap is stenciled with the words PRIMER PROTECTOR CAP, followed by the size and model of the gun. The words REMOVE CAP BEFORE INSERTING IN GUN are stenciled in two places on the bottom and in one place on the side of the primer protector cap.

22. Storage.—All propelling charges are stored and shipped in "cartridge-storage cases." A full description of the cartridge-storage cases is contained in paragraph 25. Storage should be in places where the temperature is as near 60° Fahrenheit as possible and in no case should the temperature be above 100° Fahrenheit. Extreme care must be taken that no moisture enters the containers. The powder should be tested from time to time to determine its characteristics and stability. The temperature of the powder and its moisture content materially affect the pressure when the charge is fired.

SECTION VII

PACKING

23. Projectiles.—Projectiles of all types for these guns are usually shipped in crates as shown in Figure 19. These crates are made of heavy lumber and they furnish protection to the rotating band, wind shield, and cap. However, in some cases, more commonly in the case of high-explosive and target projectiles, the projectiles may be shipped without crates. Whether crated or uncrated, the rotating band is always protected by a rope grommet, as shown in Figure 20. When shipped uncrated, the projectiles must be firmly secured against movement for transportation. Figure 21 shows a satisfactory method of packing projectiles in freight cars for shipment. In this method of shipment, the projectiles should preferably be stood on their bases and they must be properly braced to prevent excessive movement. Rows of projectiles should be separated by heavy pieces of board to prevent the rotating band from being damaged, should the rope grommet slip out of place. If projectiles are shipped on their sides, they must be separated by heavy pieces of board, so as to prevent the projectiles coming in contact with each other.

24. Packing boxes for fuzes.—Ordinarily fuzes will be shipped assembled in the loaded projectiles. However, for replacement purposes, shipment of fuzes separately is made. All fuzes used in 14-inch ammunition are shipped in individual hermetically sealed metal cans, which in turn are packed in wooden boxes. The major caliber base detonating fuzes, M1906, are shipped 20 to a box which in some cases also has a metal lining; base detonating fuzes, Mk. V, are shipped 25 to a box; and base detonating fuzes, Mk. X, are shipped 20 to a box. In the case of the major caliber base detonating fuze, M1906, the percussion plunger is not assembled in place in the fuze for shipment but is packed in a separate compartment in the metal container, and before assembling this fuze in a projectile it is necessary to remove the rear plug of the fuze, insert the percussion plunger, and then replace the rear plug. Care must be taken in placing the percussion plunger in the fuze that the restraining springs and their housings are not displaced. The other fuzes are shipped in condition for immediately assembling into the projectiles.

Fig. 19.—Crate for shipping projectile

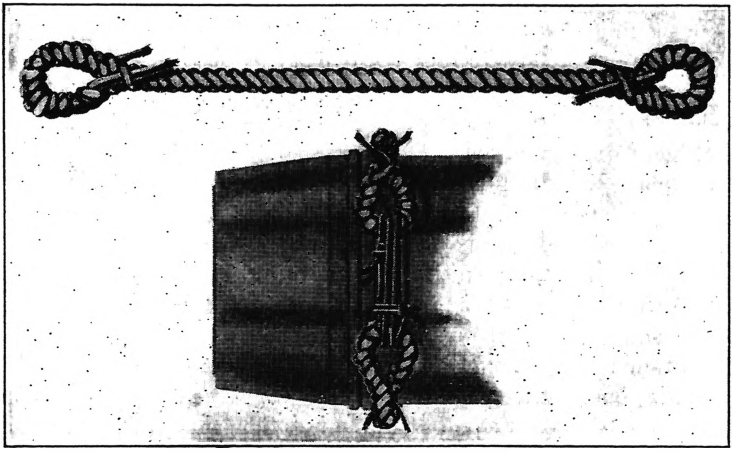


FIG. 20.—Rope grommet

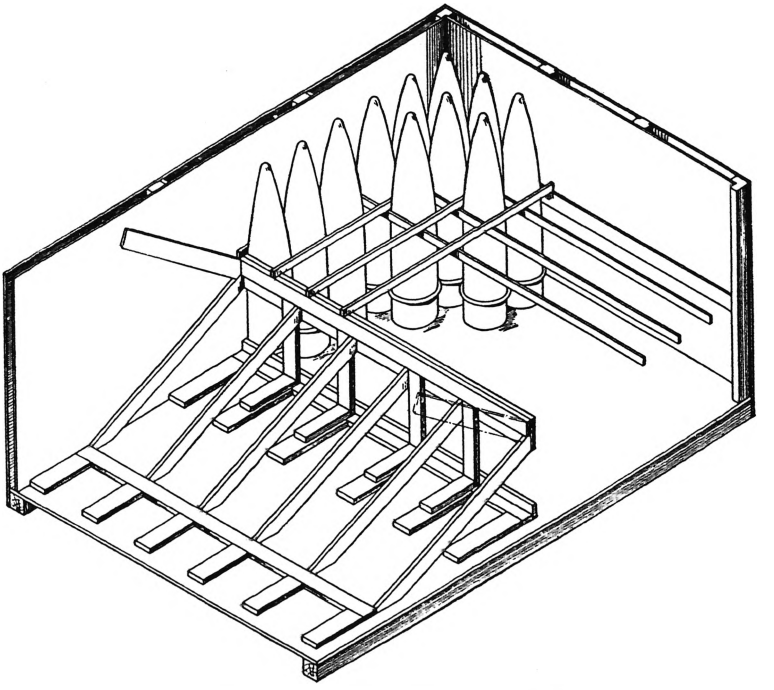


FIG. 21.—Method of packing projectiles in freight cars

25. Cartridge-storage cases.—*a. Purpose.*—(1) The storage of the propelling charge is important, and, since moisture affects the smokeless powder, all charges are packed in waterproof containers, known as "cartridge-storage cases." Two types are on hand, the single-section cartridge-storage case and the Mk. III multisection cartridge-storage case.

(2) Some propelling charges for the 14-inch guns, M1909–M1910, were packed in 16-inch Navy tanks, Mk. II. In this packing, four tanks were required for one complete charge—one tank contained one section with an igniter attached and the other three sections each contained one section without igniter. Additional igniters were packed 37 in a tank. Each tank was plainly marked to indicate its contents. In addition, the tank containing igniters only was painted red. That containing one section with igniter had a red band painted around its center and a red stripe on each end. The tanks containing sections without igniters had no red painted bands or stripes.

b. Single-section cartridge-storage case.—(1) This type is obsolete for future manufacture, having been superseded by the Mk. III cartridge-storage case. It is used primarily for the single-section charge, although it may be used for the multisection charge. One single-section cartridge-storage case will hold one complete charge, either of the single-section type or the multisection type.

(2) It is made of heavy gauge sheet steel, the seam in the body and the joint where the bottom attaches to the body being welded. It is approximately 17 inches in diameter and approximately 73 inches long for M1907 guns, 50⅛ inches long for M1909 guns, and 92½ inches long for M1910 guns. The cover is clamped in place in a manner similar to that for the Mk. III multisectional cartridge-storage case.

c. Mk. III multisection cartridge-storage case.—(1) This type has superseded the single-section cartridge-storage case and is the standard for future manufacture. It is shown in Figure 22. It contains two sections of the multisection propelling charge; therefore two cartridge-storage cases of this type are required to contain one full propelling charge. In some cases igniters are not packed in the cartridge-storage case with the propelling charge, but are packed separately in the same type of cartridge-storage case, which is painted red. More recent and future issues will consist of packing in each Mk. III cartridge-storage case two sections of the multisection propelling charge with an igniter pinned in place on one end of one of the sections. This end is protected with a primer protector cap.

(2) The Mk. III cartridge-storage case is approximately 17 inches in diameter by approximately 51 inches long and is made of heavy gauge sheet steel, the seam in the body and the joint where the

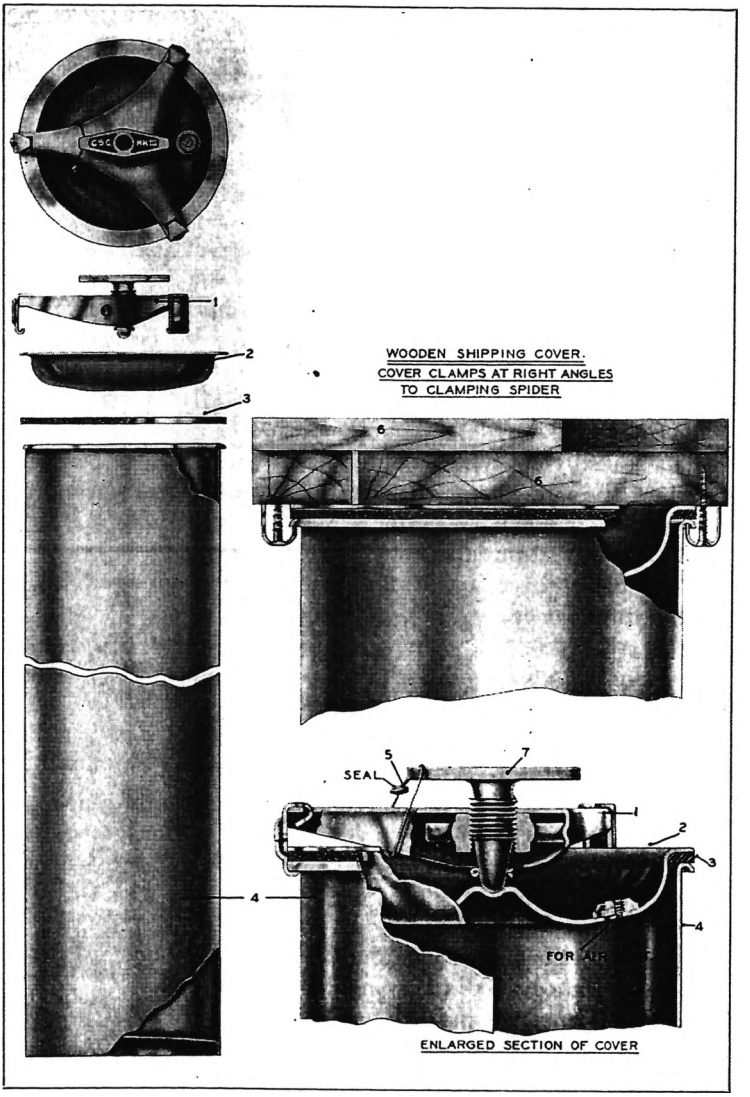


FIG. 22.—Storage case for propellent charge

1. Clamping spider.
2. Cover.
3. Rubber gasket.
4. Body.
5. Wire seal.
6. Shipping cover.
7. Clamp screw.

bottom attaches to the body being welded. The cover (2) is clamped to the body (4) by a clamping spider (1), through the three spider hooks, the hooked ends of which engage under the flange at the mouth of the body. The cover is sealed to the body against the entrance of moisture by a rubber gasket (3). The clamp screw (7) is used to compress the rubber gasket between the cover and the body, thus insuring an air-tight seal. This rubber gasket should be examined frequently and it should be replaced by a fresh rubber gasket when it has stretched or dried out to such an extent as to render leakage possible. To remove the charge, it is necessary to break the wire seal (5) between the clamp screw and the clamping spider, unscrew the clamp screw until the spider hooks are free to be raised, when the clamping spider and cover can be removed.

(3) After the charge has been packed in the cartridge-storage case and the cover has been clamped in place, the cartridge-storage case is tested for leaks by applying an internal air pressure of 5 pounds per square inch through the test hole in the cover. Leaks are indicated by an air-pressure gauge. After satisfactorily passing this test, a pipe plug is screwed into the test hole to seal it.

(4) The body, cover, and clamping spider are embossed with the following information:

(*a*) C. S. C. MK. III (cartridge-storage case, Mk. III).
(*b*) Initials or symbol of manufacturer.
(*c*) 14″ GUNS.

The clamp screw is embossed as follows:

C. S. C. MK. III (cartridge-storage case, Mk. III).

d. Marking.—(1) Cartridge-storage cases containing propelling charges are painted battleship gray. (Cartridge-storage cases containing igniters only are painted bright red.) They are stenciled in black paint or have a printed tag glued to the outside with the following information:

(*a*) Name of loading plant.
(*b*) Date loaded (day, month, and year).
(*c*) Number of propelling charges or sections of propelling charges contained and type.
(*d*) Caliber and model of gun.
(*e*) Weight or weights of projectile that charge may be used with.
(*f*) Name of powder manufacturer.
(*g*) Powder lot number and size and model of gun or howitzer for which the powder was made, in case of a lot of powder being used in a different gun from the one for which it was originally intended.

(2) Since these cartridge-storage cases are not boxed for shipment, they are also stenciled with shipping instructions. In shipment, for the purpose of protecting the cover end of the Mk. III cartridge-storage case, this end is fitted with a wooden shipping cover (6).

26. Packing boxes for primers.—*a. Electric primer and friction primer, M1914.*—These primers are packed in waterproof metal cans, containing 20 primers to the can. The inside of the can is lined with cardboard and tow is packed around the primers to prevent movement. The can is about 2¾ inches in diameter and about 4.1 inches long. The cover is held in place by a soldering strip, which must be torn off in order to remove the cover and the primers. A label is pasted around the can, on which is printed the quantity, name, manufacturer, etc., of the contents, together with directions for using the primers. The cans in turn are packed in wooden packing boxes, for quantity shipment. The standard box contains 25 cans and 500 primers. This box is approximately 16⅝ inches long, 16 inches wide, and 5$\frac{13}{16}$ inches high, outside dimensions, and weighs about 41½ pounds.

b. Combination percussion-electric primers, Mk. XV M1.—These primers are packed in waterproof copper cans, containing 24 primers to the can. The primers are held in position by means of cardboard separators. The cans are about 4.8 inches long, 3.3 inches wide, and 3 inches high. The can is made in two halves fastened together by a soldering strip, which must be torn off to separate the two halves of the can and to remove the primers. A label is pasted on the top half of the can, containing the quantity, name, etc., of the contents. The cans in turn are packed in wooden packing boxes, for quantity shipment. The standard box contains 42 cans and 1008 primers. This box is approximately 12 by 12 by 24 inches, outside dimensions.

c. Storage.—Primers must always be stored in a dry place, as excessive moisture may cause them to fail to function.

[A. G. 062.12 (6–20–27).]

BY ORDER OF THE SECRETARY OF WAR:

C. P. SUMMERALL,
Major General,
Chief of Staff.

OFFICIAL:

LUTZ WAHL,
Major General,
The Adjutant General.

ADDITIONAL COPIES
OF THIS PUBLICATION MAY BE PROCURED FROM
THE SUPERINTENDENT OF DOCUMENTS
U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON, D. C.
AT
10 CENTS PER COPY

HARBOR DEFENSE AND RAILWAY ARTILLERY AMMUNITION

AMMUNITION FOR 14-INCH GUNS, M1907, M1907 MI, M1909, M1910, M1910 MI, AND 1920

CHANGES No. 1

WAR DEPARTMENT,
WASHINGTON, *January 2, 1929.*

TR 1365–14A, May 10, 1928, is changed as follows:

21. Types of charge.

* * * * * * *

c. Multisection charge.—(1) This is the standard charge for issue and future manufacture. In this type of charge the charge is contained in four bags, each containing the same amount of powder. A separate igniter pad containing about 48 ounces of black powder is used. Igniter pads for propelling charges are issued with commercial safety pins attached. The object of these pins is to hold the pad in place during shipment, it being expected that the igniter would be further secured to the charge when it was prepared for loading. The danger element arises if the charge is placed in the gun with the igniter fastened thereto by safety pins; therefore, before firing, the safety pins should be removed and the igniter pad attached to the charge by sewing it on, the stitching being caught in at least three places 120° apart. The stitching should be through the edge of the igniter pad outside of the black powder. Care must be taken to have this red igniter pad at the rear of the charge, as the charge will probably fail to ignite upon firing if the igniter pad is not in its proper place. Recent issues of multisection charges have been made with the igniter pad pinned in place on one end of one of the sections. Since the Mk. III cartridge-storage case contains only two sections, or half of one full charge, and since each cartridge-storage case contains an igniter, it will be seen that there will be two igniters for each full charge. Two igniters must *not* be used with the multisection charge, and care must be taken to remove the extra igniter and to *use only one igniter.* (1928.)

* * * * * * *

(3) (*a*) Excessive pressures, which may be dangerous, are likely to develop if the diameter of the propelling charge or any section thereof is so large as to seriously interfere with the projection of the flame from the igniter to the front of the powder chamber by re-

stricting or eliminating the space between the top surface of the charge and the top of the chamber wall. Such condition can occur if—

1. The diameter of the charge as made up is too large.
2. The sections of the charge are not laced or wrapped tightly enough to prevent bulging of the sections when rammed.
3. Excessive force is used in ramming, especially when the bag material has been weakened, due to age.

(*b*) The total length of a charge when firing maximum service charges should be at least 9/10 of the length of the powder chamber, measuring from the face of the mushroom head to base of the projectile. The following precautions will be observed when firing:

1. Each section of the charge will be tightly wrapped or laced.
2. The powder charge will be inserted in the powder chamber so that it will be pushed into place by the mushroom head when the breech is closed.
3. No charge or section thereof will exceed the maximum allowable diameter as determined by gauges furnished for this purpose.

(*c*) Reduced charges will be of the same diameter as the full charge, but will not be remade to comply with the requirement as to length referred to above.

[A. G. 062.12 (11-1-28).]

BY ORDER OF THE SECRETARY OF WAR:

C. P. SUMMERALL,
Major General,
Chief of Staff.

OFFICIAL:
C. H. BRIDGES,
Brigadier General,
Acting The Adjutant General.

U. S. GOVERNMENT PRINTING OFFICE: 1929