

## TRENCH MORTARS AND AMMUNITION.

Nature and use.-Although the trench mortar was a weapon comparatively unknown before the present war began, it has proved to be of the first importance. None had been used by our Army except in an experimental way before we engaged in the conflict, and the entire field had to be developed by the Ordnance Department. The only weapon of the sort in existence in the United States Army was the 3.2-inch, which had never been in active service. None of the mortars designed by the allies, moreover, had been manufactured in this country before the declaration of war. It was, therefore, necessary for the military authorities to decide what type of mortars the American troops should use before the Ordnance Department could develop a source of supply. It was August, 1917, before the first definite decision was received from abroad, which was to adopt the British type of 3-inch Stokes mortar. Sixty of these mortars were thereupon imported from England for training purposes and were distributed among the camps. Subsequently other types were adopted, until now the five designs mentioned in the table were in regular production and others were being developed experimentally.

TABLE 21.—*Trench mortars and trench-mortar bombs.*

Type and caliber.	Weight of shell.	Weight and kind of charge in shell.	Fuze.	Maximum range.	Characteristics.
3-inch Stokes T. M., Mark I.	<i>Lbs. oz.</i> 11 11	Trojan shell explosive 2 pounds 6 ounces.	Mark V I .	<i>Yards.</i> 750	An infantry weapon; total weight of mortar, about 150 pounds; muzzle-loading shell and propellant.
4-inch Stokes T. M., Mark I.	15	Gas, smoke, incendiary, high-explosive.	Mark VI and fuze to be developed.	950	A weapon used only by troops of chemical warfare service; muzzle-loading shell and propellant.
6-inch T. M., Mark I.	52	Trojan shell explosive 11 pounds.	Mark VII, delay and nondelay.	1,800	Artillery weapon; muzzle-loading shell and propellant.
240-mm. T. M., Mark I.	156	Trojan shell explosive 76 pounds.	Mark VII, delay.	2,400	Artillery weapon; muzzle-loading shell, breech-loading cartridge case.
11-inch Sutton...	205	100 pounds.....	Mark VII, delay...	4,500	Experimental; loading same as for 240 mm.

<sup>1</sup> Approximately*Trench mortar bombs (European. manufacture).*

Bomb.	Propellant.	Fuze.	Packing.	Remarks.
3-inch Stokes (English manufacture).	One, 95 grain ballistite cartridge, four 110-grain cordite rings.	Pistol head or No. 146 (The All-ways).	Three rounds complete or three rounds with propellant separate.	Note carefully if cartridges and rings present.
58-mm. (French manufacture).	Bags with igniters base charge 60 grams, ballistite compound, B Z, and two "apoints" of 25 grams weakened ballistite, "A.T.T."	10 per cent railway, 20 per cent P. R. 1916 nondelay, 30 per cent P. R. 1916 delay, 40 per cent 1899-1915.	Two-L. S. bombs in crate, one-P. L. 84 crate, charges and accessories except fuzes 50, 57, and 60, box.	Furnish 110 per cent simplified obturating primers.
6-inch <i>Newton</i> (English manufacture).	Four 1 oz. bags gun-cotton yarn, two 14-ounce bags flaked cordite.	100 per cent No. 110.	Bomb in crate, 20 charges one box, 20 sets accessories one box.	
240-m. (French manufacture).	In 155-mm. brass cases; charge I 1,300 grams ballistite; charge II 900 grams ballistite.	100 per cent P. R. 1916, delay.	Bomb in crate, 10 charges in box, 30 fuzes in box.	

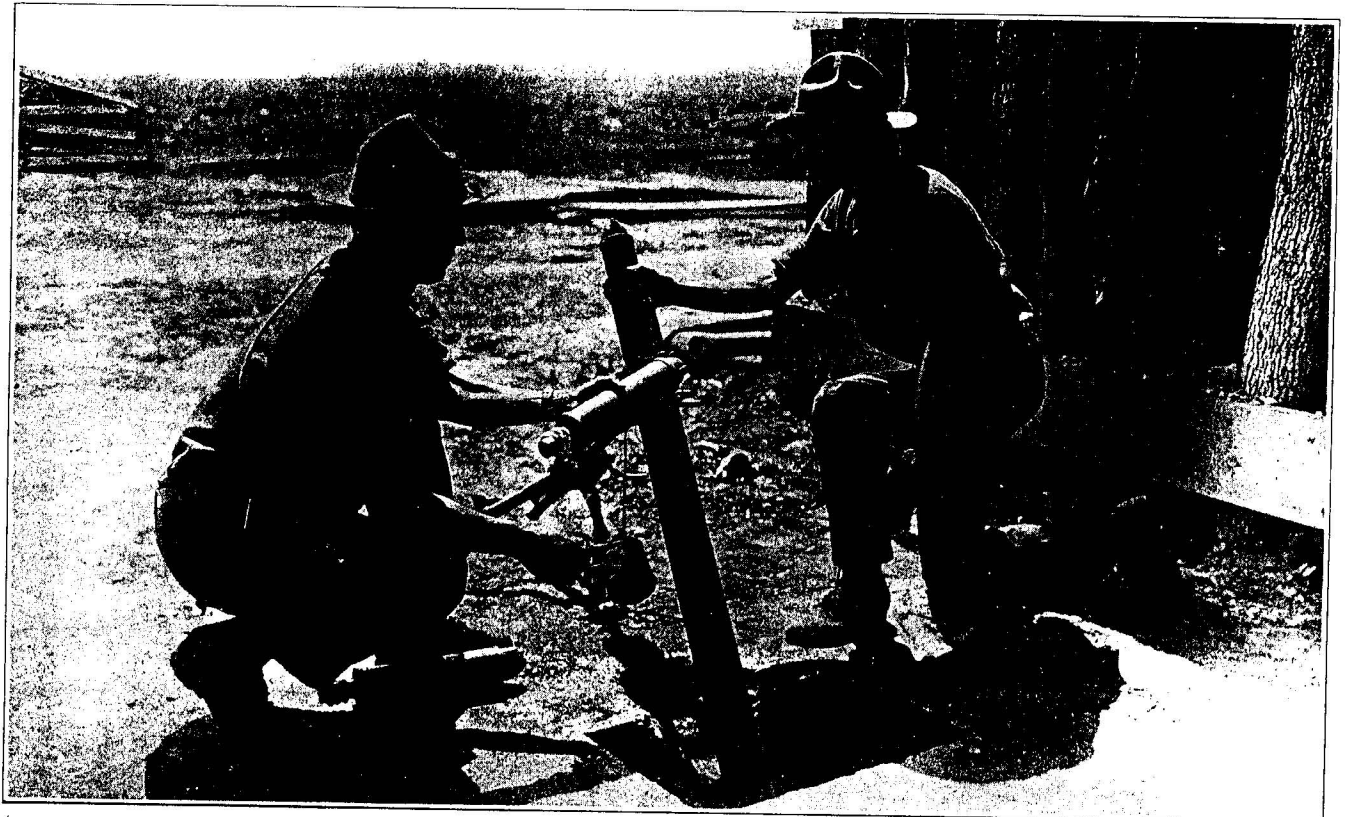


FIG. 95.—3-inch Stokes trench mortar. Loading for firing. The nature of the projectile can be seen by the shell held by the soldier on the left,

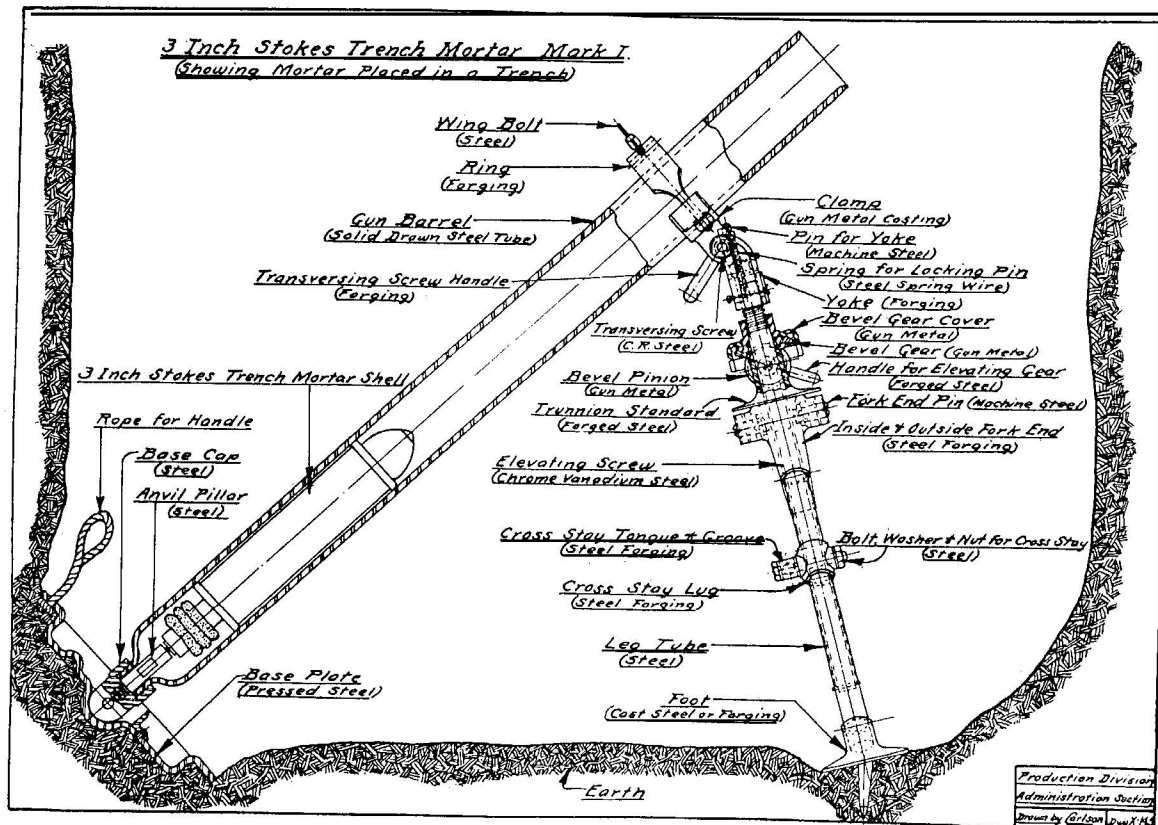
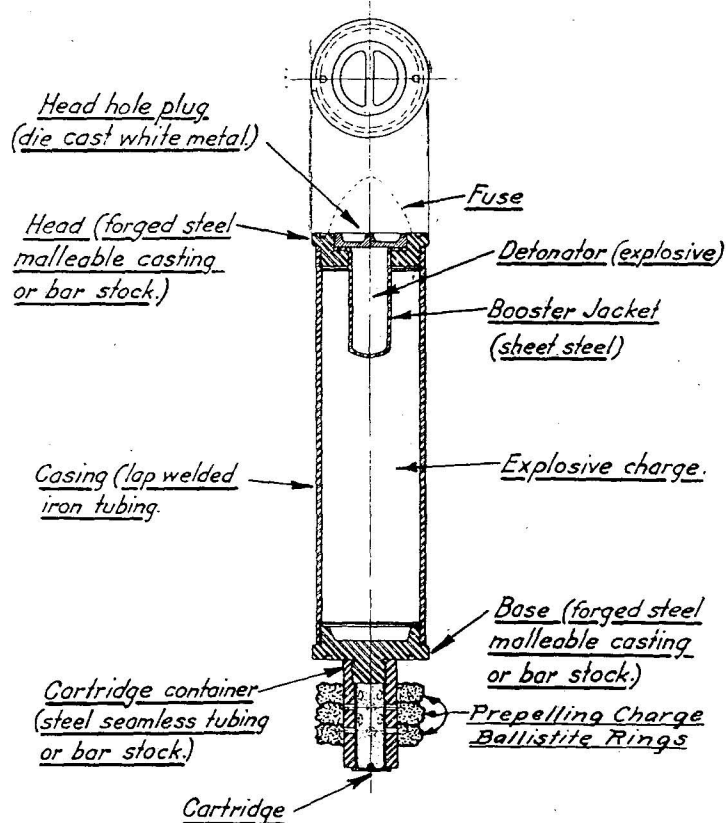


FIG. 96.—Method of placing 3-inch Stokes mortar in trench.

### 3 INCH STOKES TRENCH MORTAR SHELL

#### Tubing Construction



Production Division  
Gun Section  
Bureau of Ordnance  
James H. Lyon  
Lieut. Ordnance  
Drawn by [illegible] Eng. No. X-107

Fig. 97.—Detail of 3-inch Stokes trench mortar shell.

**3-inch Stokes trench mortar.**—The 3-inch Stokes trench mortar is an adaptation of a British device with the same name. It consists essentially of a barrel weighing 43 pounds, a mounting weighing 37 pounds, and a base plate weighing 28 pounds. These three parts, which can easily be transported to the front line by hand, are assembled when the gun is put in position. In spite of its light weight,

the mortar has a range of from 100 to 800 yards. Its mechanism is simple. The shell, which has a blank cartridge attached to one end, is dropped into the muzzle of the piece, cartridge end first. It slides easily downward to the breech, where the percussion cap of the cartridge strikes a firing pin or anvil pillar fixed in the base of the barrel. This fires the cartridge, which propels the shell from the gun. The cartridge case, being attached to the shell, leaves the barrel along with it. To obtain a range of more than 300 yards one, two, or three ballistite rings are placed around the cartridge as a supplementary propellant. When the shell strikes the ground a percussion fuze explodes the detonator, by means of which the booster charge and the bursting charge are in turn set off. The normal rate of firing of the gun is 10 rounds per minute.

**4-inch Stokes trench mortar.**—This mortar is adopted from the English and is the same as the 3-inch Stokes trench mortar in general design, with the exception of the size and weight of the barrel and the weight of the legs. It is used to fire gas, incendiary, and smoke shells, and, on account of the rapidity with which it can be handled, it is considered the best trench mortar for these particular shells. The rate of firing is 25 per minute. This makes it possible to spread 175 pounds of gas per minute. Like the 3-inch Stokes trench mortar, the 4-inch mortar consists of a barrel, a mounting, and a base, with a total weight of 132 pounds. The propelling charge consists of a 12-gauge cartridge containing 150 grains of cordite and three rings containing 250 grains of cordite each. The mortar is fired in the same manner as the 3-inch Stokes trench mortar; that is, the shell is dropped into the barrel, and the cartridge is fired by striking an anvil, which is screwed in the bottom of the barrel, the rings being fired by the flash of the bursting charge of the cartridge passing through holes in the cartridge container. On the gas shell an instantaneous fuze is used, while on the incendiary and smoke shells time fuzes are used. The maximum range, which is obtained by using the three cordite rings, is 1,160 yards.

**6-inch trench mortar.**—The 6-inch trench mortar, adopted from the English 6-inch Newton trench mortar, is a medium-weight mortar firing a 52-pound cast-iron shell loaded with high-explosive to a range of about 1,800 yards. It consists of a steel base mounted upon a wooden platform and a barrel which rests in a spherical recess and is supported and adjusted by guys with adjusting screws. The shell is of the vaned type. The propellant charge, ignited by a special cartridge, consists of bags of cordite or ballistite and gun-cotton yarn, the bags being held between the vanes by means of wire. This mortar, like the 3-inch and 4-inch Stokes trench mortar, is fired by dropping the shells into the barrel. It is used with an instantaneous fuze, primarily for breaking up wire entanglements.



Fig. 98.—6-inch trench mortar. Loading projectile and charge. Note in the foreground gas ejector employed as a piston to expel gases after a discharge.

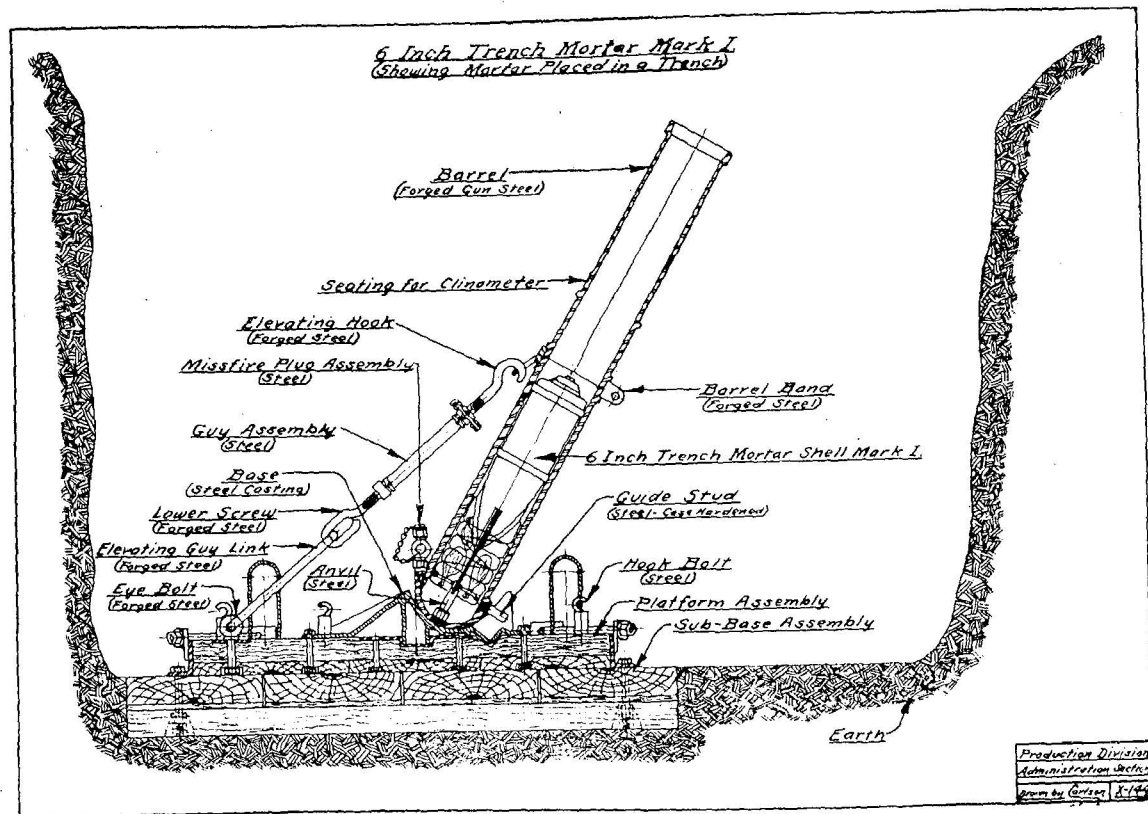


Fig. 99.—Method of placing 6-inch mortar in trench.

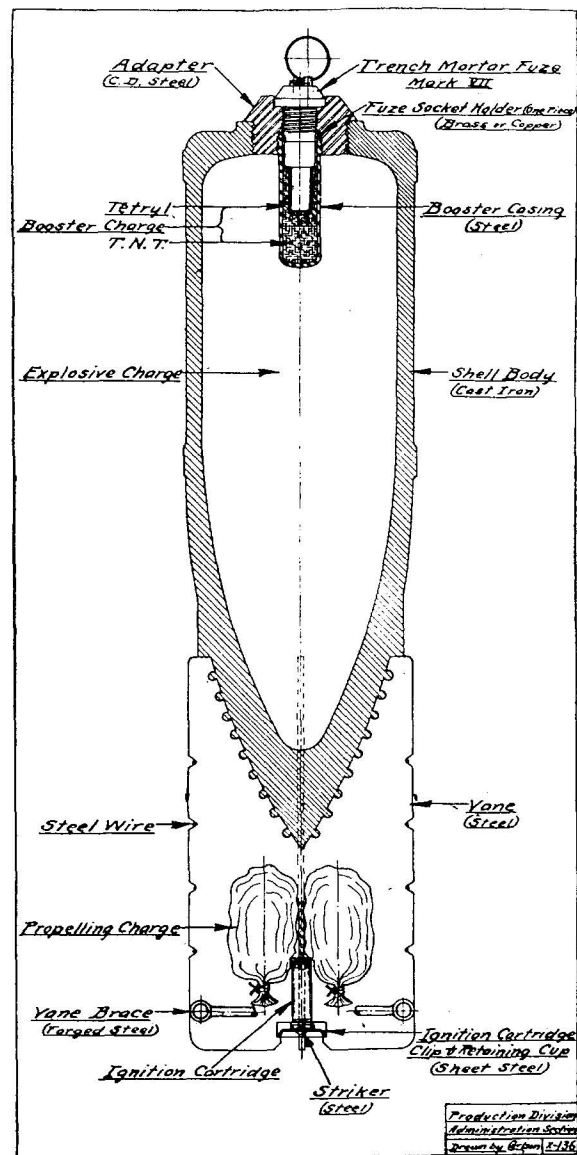


FIG. 100.—Detail of 6-inch trench mortar shell, Mark I.

6-inch trench mortar shell, Mark I.—The shell or bomb is made of gray iron with its front end threaded for an adapter, and the rear end fitted with steel vanes which serve to keep the bombs steady in flight. Steel wire is wrapped around the vanes to hold the powder bags in position. The rear ends of the vanes are strengthened by connecting vane braces of forged steel. The bomb weighs 39½ pounds and the explosive charge is about 13 pounds of TNT.



FIG. 101.—Three craters formed by explosion of 6-inch Newton projectiles fired at same angle with delay fuze.

**Propelling charge.**—The propelling charge consists of 1-ounce bags of guncotton yarn and similar bags of ballistite tucked between the vanes in the wire wrapping according to the number used with the range desired. Four guncotton bags and two ballistite bags constitute the maximum charge and the range varies from 100 to 1,600 yards. The propelling charge is ignited by an igniting cartridge which contains 12½ grains of guncotton yarn dusted with as much meal and black powder as it will hold.

**Operation.**—In firing this mortar a fuze of the Mark VII type shown on page 243 is screwed into the adapter, powder bags pushed between the wire vanes of the cartridge clip, and cartridge put into place after proper laying of the mortar, in which process a clinometer of special form is employed, and the shell is dropped into the muzzle of the barrel, fuze first, sliding down until it strikes the anvil, which is kept tight by a long-handled socket wrench. Contact with the anvil sets off the percussion element in the cartridge, which in turn ignites the powder and guncotton bags. After each round the gas ejector is pushed down the bore to force out the hot gas.

**Bed.**—The bed consists of a cast steel base plug secured to the platform by a boss on the inside of the plug. The base plug is prepared on the other side with a socket for the reception of the rounded end of the barrel. The lifting or traversing guys are arranged on the right end. Left and right upper sides, respectively, of the bed, secured at one end with eyebolts. The other ends of the guys are attached to the loops on the barrel when the latter is mounted in position on the bed. For the purpose of transportation hooks are placed on the bed, to which the ends of the guys are engaged and the barrel dismounted. Four wire handles are provided on the side of the bed to facilitate transportation.





FIG. 102.—240-mm. trench mortar. Loading with projectiles. These are carried in a tray with handles.

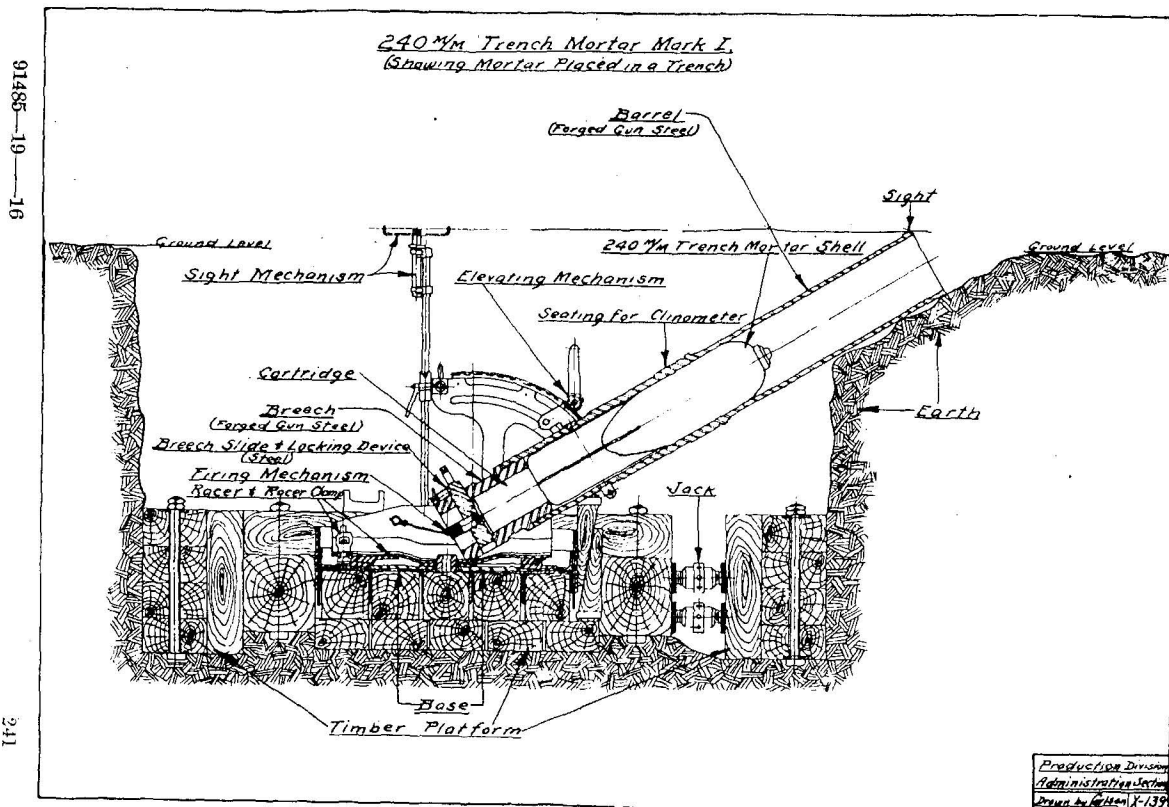


FIG. 103.—Method of placing 240-mm. mortar in trench.

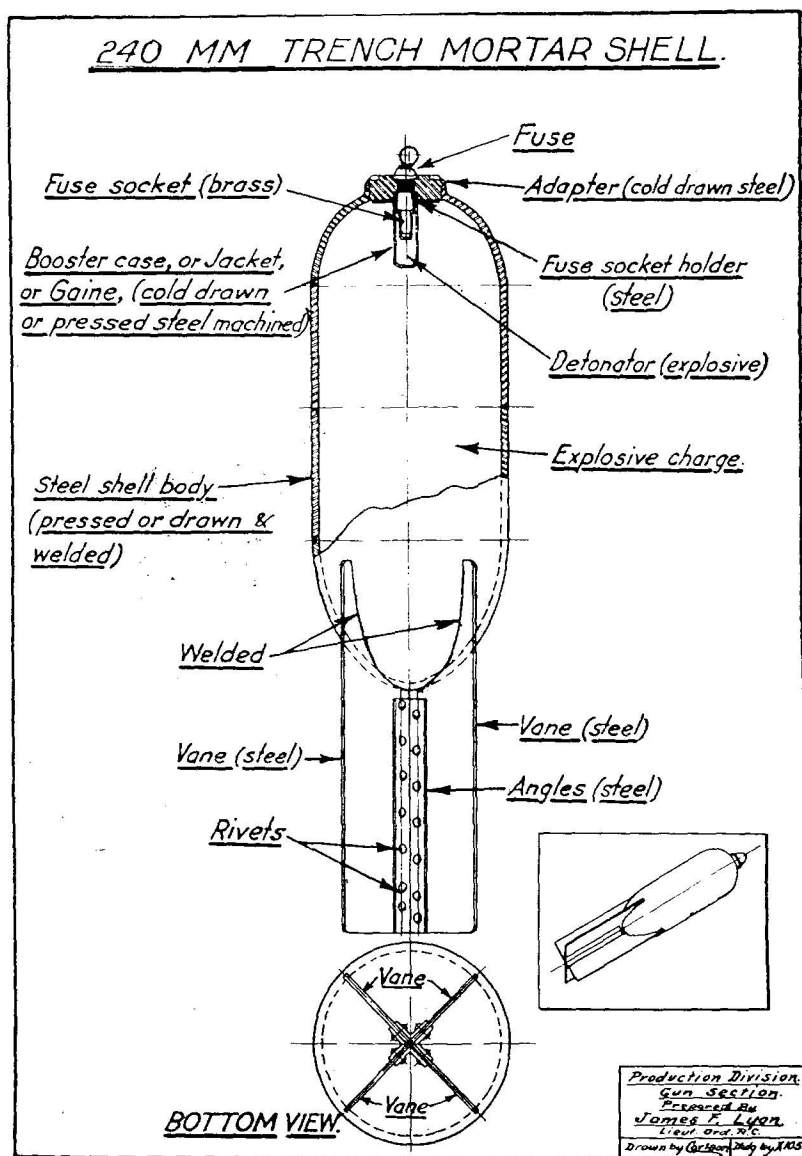


FIG. 104.—Detail of 240-mm. trench mortar shell.

The 240-mm. trench mortar.—This weapon is modeled on the French 240-mm. short trench mortar. This mortar weighs approximately 7,500 pounds, of which 5,500 pounds are for the wooden platform. The barrel is unrifled. The maximum range is about 2,400 yards and with a low charge of about 660 yards. The mortar is muzzle loading for the shell and breech loading for the charge.

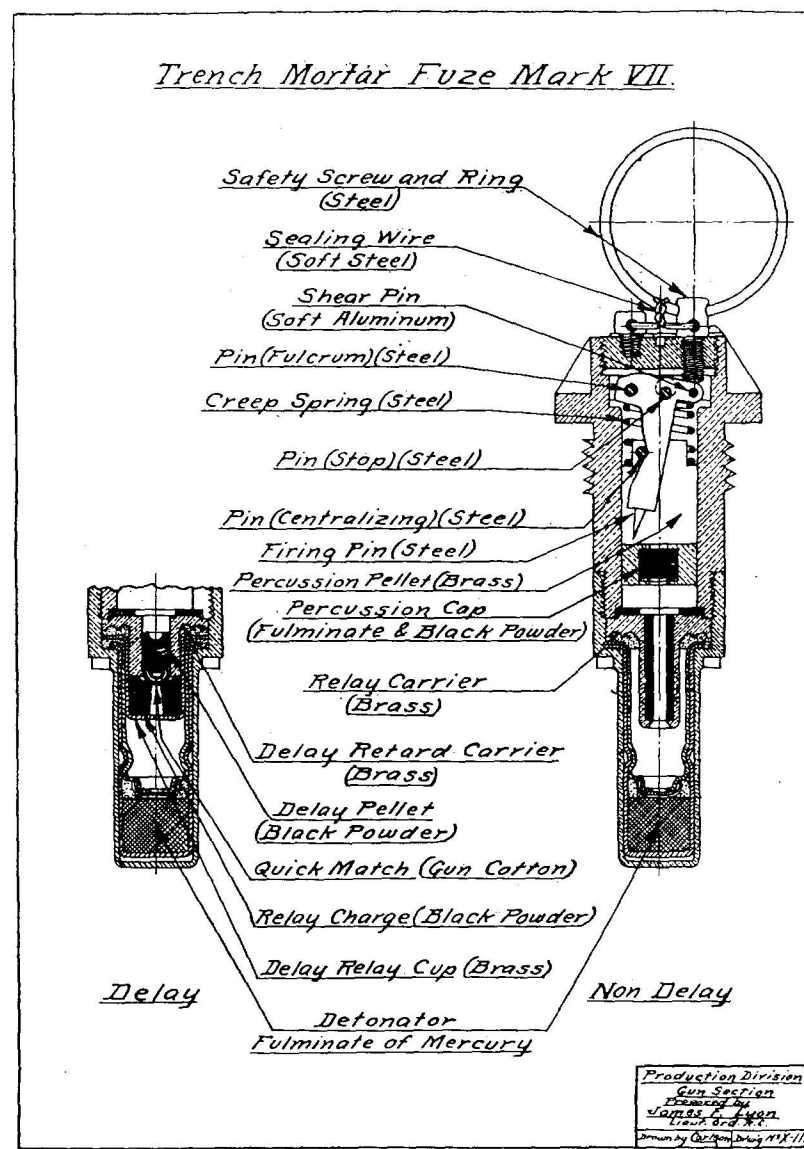


FIG. 105.—Detail of trench mortar fuze, Mark VII.

Mark VII trench mortar fuze.—This fuze modeled on the French fuze, Mark IV, was supplied with a new interior mechanism where a firing pin ordinarily held safe by a small wire is thrown into alignment with the primer when the shell is accelerated. This fuze is of both the delay and nondelay types, the former for the 240-mm. trench mortar, and both types for the 6-inch trench mortar.



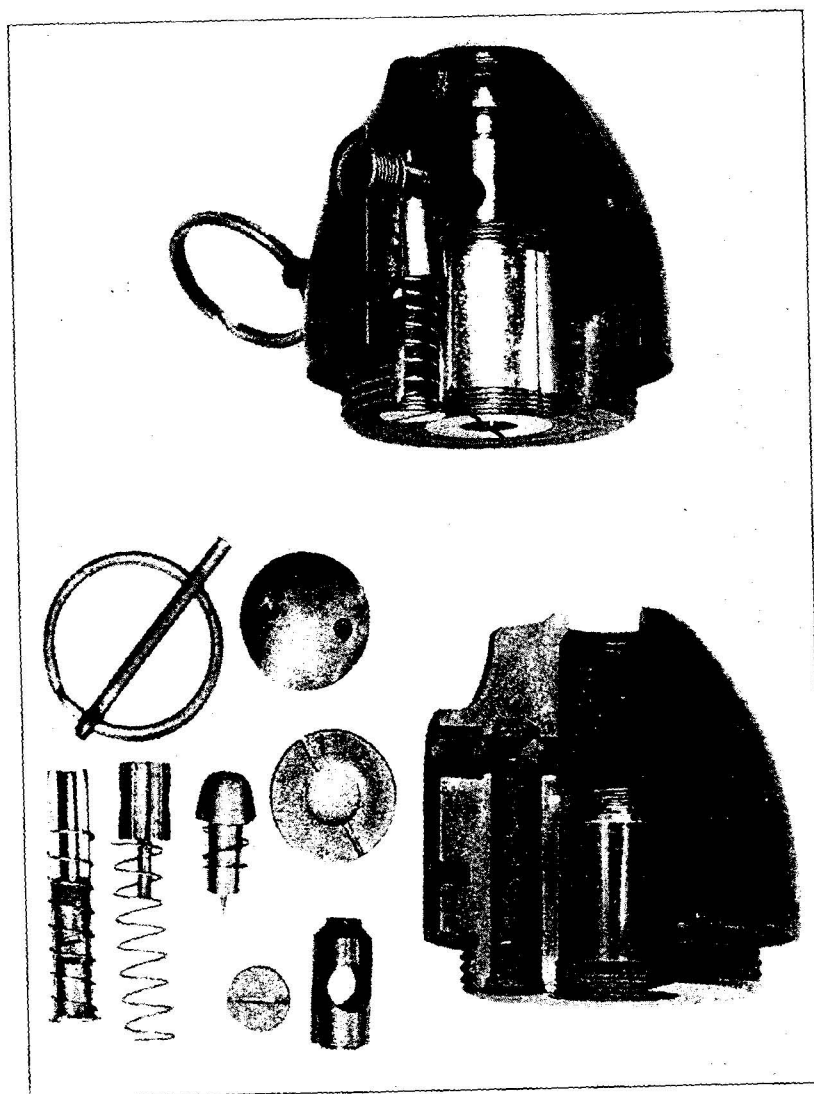


FIG. 106.—Trench mortar fuze, Mark VI. Assembly and section.

**Mark VI trench mortar fuze.**—Used with the 3-inch and 4-inch Stokes trench mortar shell, this fuze has a double percussion element which functions positively irrespective of the position in which the shell strikes on impact. It was designed by Lieut. F. A. Sutton, R. E., and improved by Lieut. Col. E. J. W. Ragsdale, U. S. A. The safety pin and ring must be removed before firing, leaving the set-back pellet supported by friction until the shell leaves the barrel. As acceleration of the shell starts the safety fork is ejected and the striker is

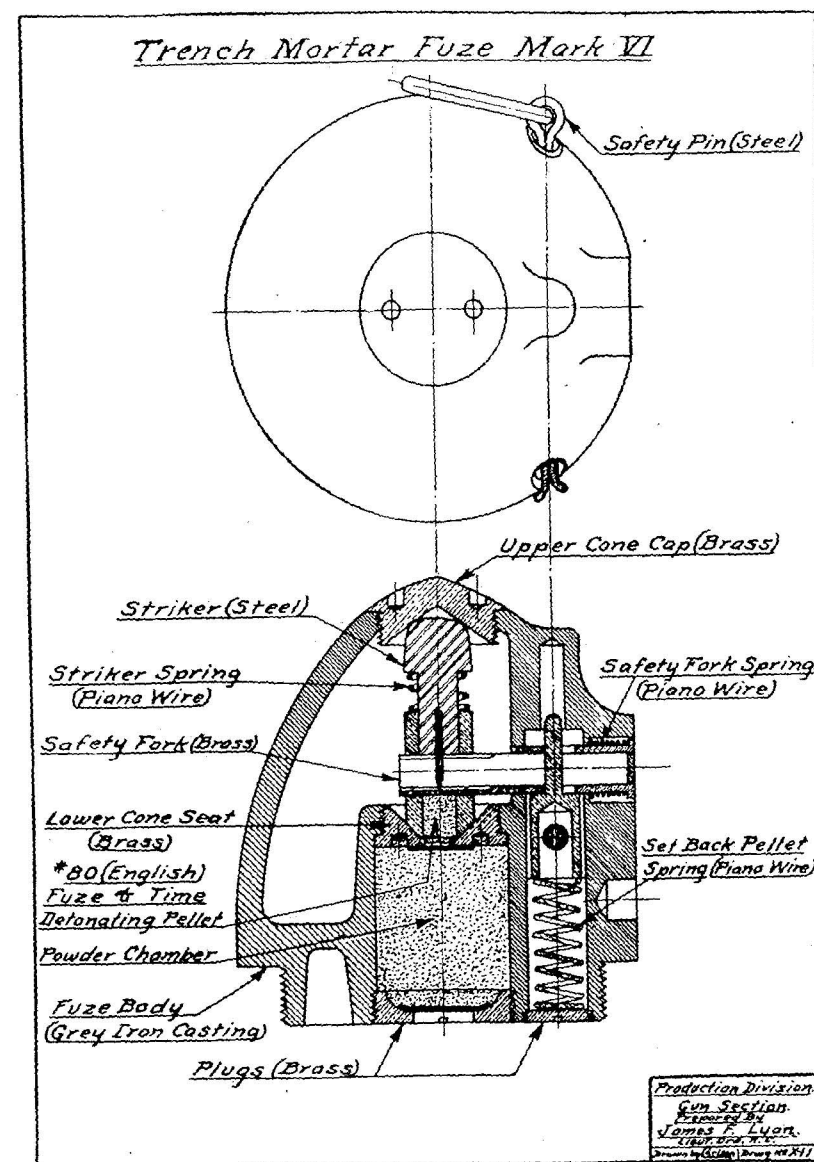


FIG. 107.—Detail of trench mortar fuze, Mark VI.

free to reach the detonating pellet or percussion element when impact takes place. This ignites shrapnel powder in the powder chamber and the flash then passes to the detonator and booster. The booster charge is contained in a cardboard tube and consists of two pellets of tetryl which fit around the detonator and one pellet of TNT below the detonator. The tube is closed with felt discs.