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FRAGMENTATION DROP BOMB, MARK IIA.

The Fragmentation Drop Bomb, Mark IIA, is intended for use against personnel, such as troops in the field or on the march, in railroad depots and rest billets, or wherever the protection afforded is slight. The standard 3-inch artillery shell is fitted with stabilizers and a very sensitive firing mechanism which protrudes from the nose of the shell; this is so rapid in action that detonation is caused before the shell has penetrated the ground.

The average radius of effective dispersion is between 40 and 50 yards from the point of impact. However, the danger zone is considerably greater, as fragments are at times hurled to a distance of 200 yards or more.

The bomb consists of three major parts:

- (a) The shell
- (b) The firing mechanism
- (c) The explosive elements.

(a) THE SHELL

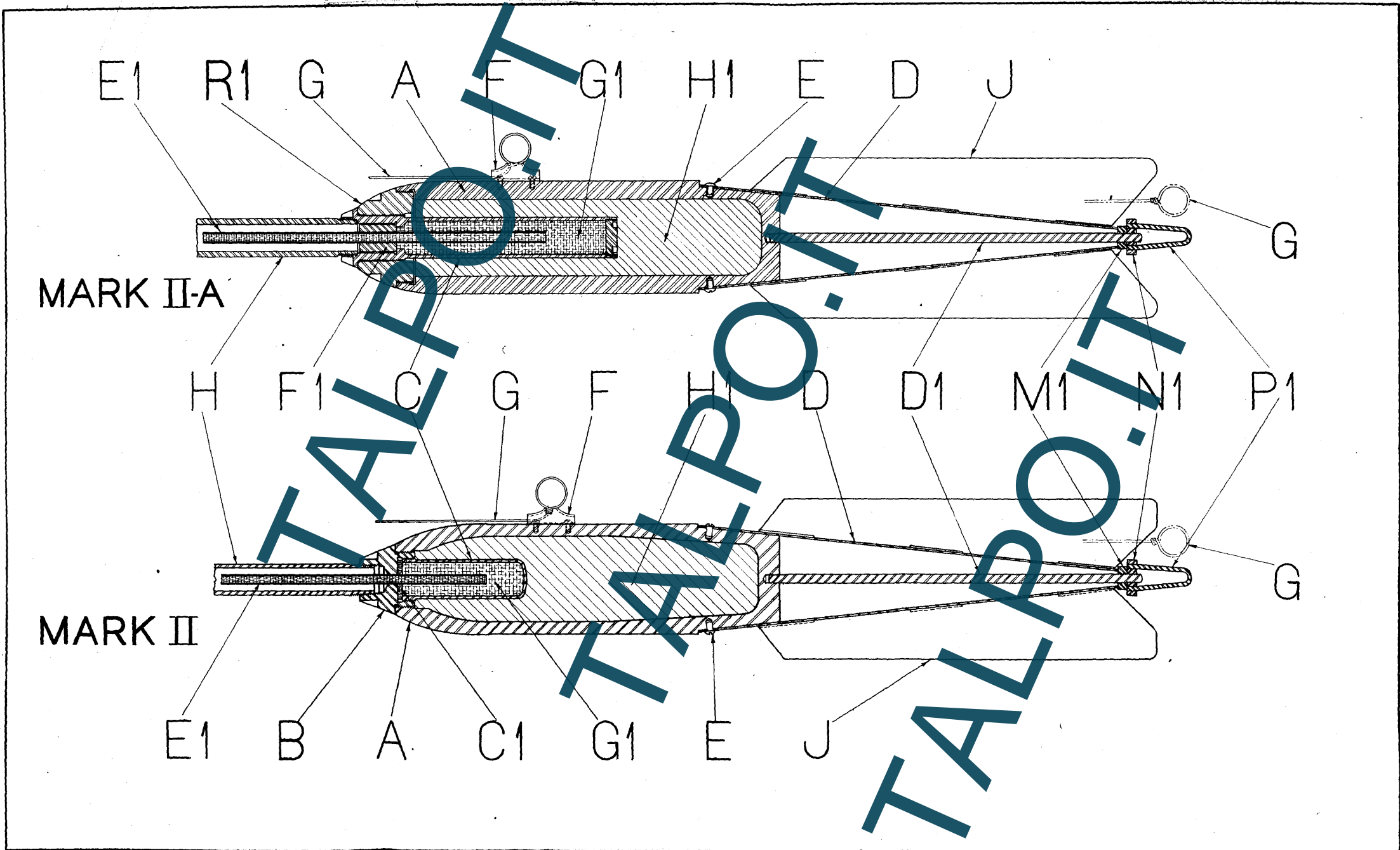
In the manufacture of this bomb, use has been made of 3 inch common steel shells, which have been rejected by army inspectors as unsuited for use in cannon. The standard combination booster cup adapter is likewise employed.

THE SHELL—(A) measures 11.43 inches from the base to the top of the head (R1) and 2.98 inches at the point of maximum diameter. From the upper shoulder of the rotating band recess, 2.187 inches from the bottom, the base of the shell is tapered down from a diameter of 2.37 inches, at a 6 degree angle, to receive the rear cap (D). Two holes, diametrically opposite each other and .312 of an inch below the shoulder, are drilled to a depth of .25 of an inch, and tapped to receive the 10 x 32 round head machine screw (E), which serves to secure the rear cap to the shell.

THE REAR CAP—(D) is a truncated cone of sheet steel .037 of an inch thick, measuring 11.25 inches in length with a diameter of 2.812 inches at the base. It carries the four stabilizers (J). Two holes .203 of an inch in diameter are drilled diametrically opposite each other and .312 of an inch from the base of the cone, to receive the screws (E) by means of which the cap is secured to the shell. The top of the cone is pierced by a hole .3125 of an inch in diameter through which the threaded portion of the suspension rod protrudes.

THE STABILIZERS—(J) are irregularly shaped steel plates .037 of an inch thick, 11 inches long and 3 inches wide. Three lugs, 1.5 inches long and .25 of an inch wide, are provided on the inner edge of each stabilizer and bent at right angles to it, by means of which the stabilizer is spot-welded to the rear cap (D).

In order that the bomb may be carried in the British release mechanism for the Cooper bomb, a means is provided whereby it may be suspended vertically from the tail. A 10 inch length of $\frac{1}{4}$ inch steel ROD is screwed into the center of the shell base for a distance of .375 of an inch. The opposite end of the rod is threaded for a distance of .75 of an inch, to receive a standard hexagon NUT (M1) which



Assembly Drawings of Fragmentation Drop Bombs, Mark IIA and II.

CHART I.

Nomenclature of Fragmentation Bombs, Mark II and IIA.

A	Shell	Forged Steel	Artillery shell. Contains bursting charge (H1).
B	Adapter	Cold drawn steel	Screws into nose of shell (A). Supports firing tube (H) and booster cup (C). (In Mark IIA, integral with booster cup).
C	Booster cup	Cold drawn steel	Screws into base of adapter (B). Carries booster charge (G1).
D	Rear cap	Sheet steel	Fitted on base of shell (A). Carries stabilizers (J).
E	Rear cap screws (2)	Steel	Screws into base of shell (A). Secures rear cap (D) in place.
F	Safety wire guide	Sheet steel	Fastened in shell body (A). Guides and supports safety wire (G).
G	Safety wire	Music wire	Extends from release pin (Y) to release mechanism. Keeps release pin (Y) in body (K) until withdrawn.
H	Firing tube	Wrought iron or steel	Connects firing mechanism to shell (A). Protects fuse (E1).
J	Stabilizers (4)	Sheet steel	Welded to rear cap (D). Steady bomb in flight.
C1	Gasket	Felt	Between adapter (B) and booster cup (C). Supports fuse (E1) (In Mark II only).
D1	Rod	Steel	Protrudes from base of shell (A). Part of suspending device.
E1	Fuse	Cordeau-Bickford	Extends from detonator recess into booster cup (C). Detonates booster charge (G1).
F1	Fuse Support	C. R. Steel	Secured between end of firing tube (H) and shoulder of booster cup (C). Supports fuse (E1) (Mark II only).
G1	Booster charge	T.N.T.—Tetryl	In booster cup (C). Detonates main charge (H1).
H1	Main charge	High explosive	In body of shell (A). Causes fragmentation of shell.
M1	Hexagon nut	C. R. steel	Screws on rod (D1) over rear cap (D). Locates and locks disc (N1).
N1	Disc	C. R. steel	Screws on rod (D1) over nut (M1). Carries staple (P1).
P1	Staple	Steel wire	Riveted to disc (N1). Provides means of suspension.
R1	Head	C. D. steel	Screws into nose of shell (A). Part of shell supporting booster cup adapter (B) (Mark IIA only).

is screwed down against the end of the rear cap (D) and a steel DISC (N1), .875 of an inch in diameter and .25 of an inch thick, which is screwed securely against the nut. The disc (N1) is pierced by two holes, .56 of an inch apart, to receive the two ends of the STAPLE (P1), which are riveted in place; the staple is made of No. 11 gauge steel wire and when bent is 1.75 inches long.

THE SAFETY WIRE—(G) is a piece of .031 music wire, with a rounded corners, measuring .92x1.31 inches; it has a raised portion .25 of an inch high and .187 of an inch wide running lengthwise through its center to form a channel for the passage of the SAFETY WIRE (G). The bottom is curved to fit the shell (A), to which it is fastened, at a point 4.25 inches from the top of the adapter (B), by means of four 5x32 round head machine screws .25 of an inch long. The raised portion fits into the channel of the release mechanism and serves to steady the bomb in flight. In the center of the upper surface a hole is punched to permit the passage of the safety wire (G) in such a manner that the upturned edge act as a support for the loop of the safety wire, when the horizontal release mechanism is employed.

THE SAFETY WIRE—(G) is a piece of .031 music wire, with a loop .75 of an inch in diameter at one end and measures 33.75 inches below the loop. When the vertical method of suspension is employed, the safety wire (G) is passed through the channel of the safety wire guide (F) and extends from the staple (P1) to the release pin (Y). If the bomb is to be carried in the horizontal release mechanism the wire is cut a length of 11.5 inches below the loop; the straight end is passed through the punched hole and into the channel of the safety wire guide (F).

(b) *THE FIRING MECHANISM*

(Plate II)

The firing mechanism consists of the BODY (K), the FIRING PIN (L), the FIRING PIN RETAINER (M), the DETONATOR CASING (N), the DETONATOR RETAINER (P), the DETONATOR SPRING (W), the SPRING RETAINER (V), the SPRING CAP (X), the DETONATOR PLUG (S), the DETONATOR PAD (T), the PLUG (U), the RELEASE PIN (Y), the RELEASE PIN SPRING (Z), the RELEASE PIN SPRING HEAT (A1) and the FIRING TUBE (H).

THE BODY—(K) is irregular in shape, measuring 4 inches overall, 2.75 inches in width and 1.4375 inches thick. The forward end tapers to a diameter of 1.5 inches. Here a hole 1.25 inches in diameter is bored to a depth of .875 of an inch at a point .93 of an inch from the forward end a recess is turned in the inner surface to a diameter of 1.343 inches and .156 of an inch long, to receive the firing pin retainer (M).

An axially drilled hole .375 of an inch in diameter leads from the larger recess to the detonator recess and is intended to receive the firing pin (L). The detonator recess, .453 of an inch in diameter, is drilled at right angles to the long axis of the body and through the section of greatest width, at a point 2.25 inches from the forward end. For a distance of 1.25 inches from the lower edge the recess is

enlarged to a diameter of .578 of an inch, to receive the flanged portion of the detonator casing (N). At a point .968 of an inch from the lower edge this section is traversed at right angles by a .218 of an inch hole, intended to receive the release pin (Y). The upper end of the detonator recess is bored out and tapped to a diameter of .687 of an inch to receive the spring retainer. (V).

THE SPRING RETAINER—(V) is a hollow brass plug, .625 of an inch long, threaded for .25 of an inch at the lower end to fit into the detonator recess and turned down to a diameter of .593 of an inch above the threaded portion. A recess, .453 of an inch in diameter and .5 of an inch deep, is intended to receive the detonator spring (W). A .062 of an inch slot traverses its surface to provide a grip for a screw driver.

THE DETONATOR SPRING—(W) consists of about eight coils of .031 of an inch music wire, with an outside diameter of .406 of an inch and a length of 1.5 inches before compression. One end rests in the spring retainer (V) and the other in the spring cap (X), above the detonator casing.

THE SPRING CAP—(X) is a copper thimble, .02 of an inch thick and .187 of an inch long. It is placed over the lower end of the spring to prevent the end of the wire from catching between the detonator and the wall of the recess.

At the opposite end of the detonator recess, a brass **DETONATOR PLUG**—(S) .25 of an inch thick and .687 of an inch in diameter, is screwed into the body to seal the hole. A .062 of an inch slot is cut in the face of the plug to provide a grip for a screw driver.

THE DETONATOR PAD—(T) is a felt disc .562 of an inch in diameter and .062 of an inch thick, which is glued to the inner side of the plug (S); it is intended to cushion the striking of the detonator assembly, when the safety pin is removed.

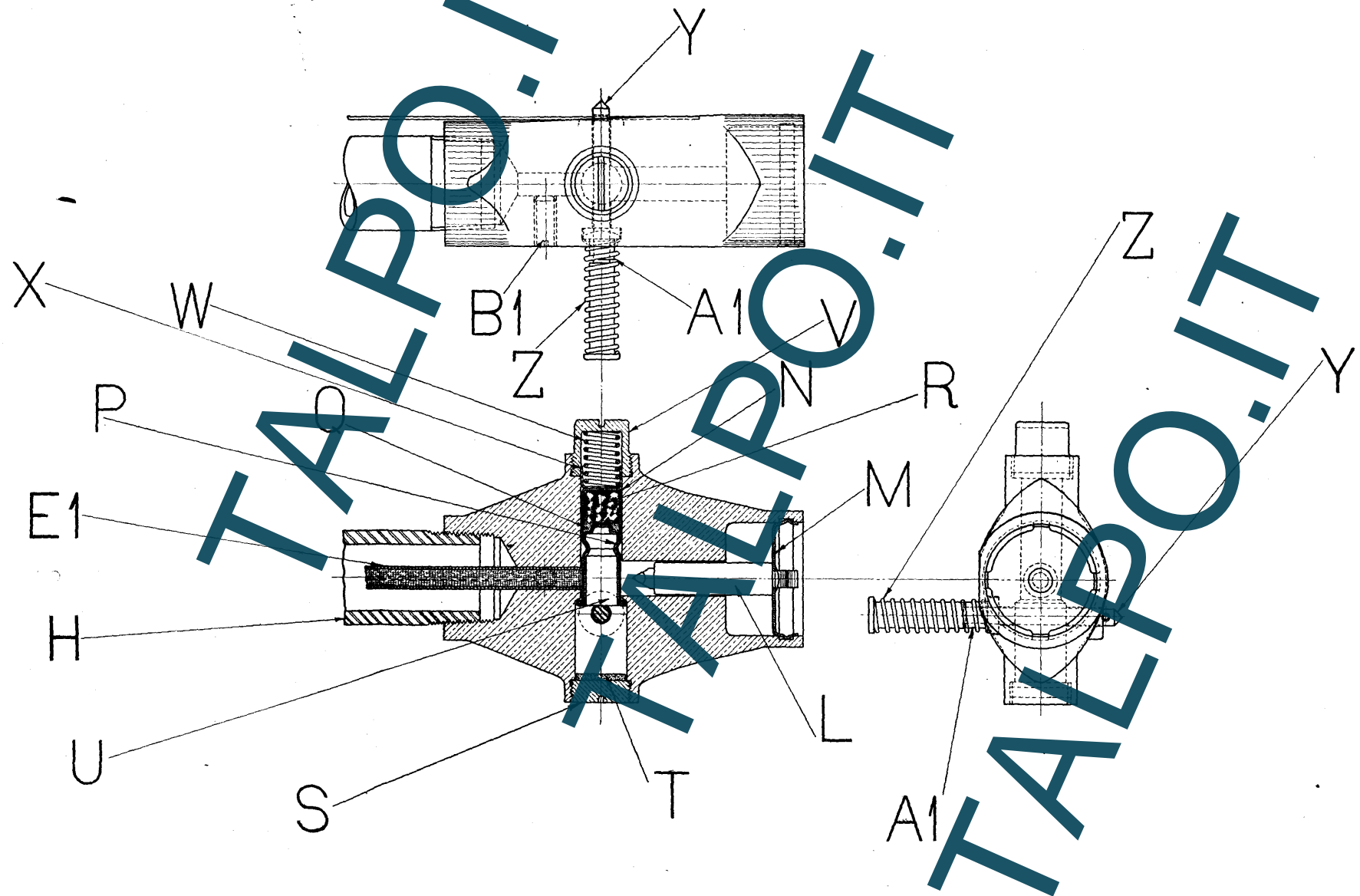
The detonator assembly is the same as that used in the French type artillery fuses, Mark III and Mark V. This consists of a detonator casing, a detonator retainer, a detonator casing washer and a fulminate charge.

THE DETONATOR CASING—(N) is a copper thimble designed to fit in the detonator recess. It carries a charge of 3 grains of fulminate (R) in its lower or closed end.

THE DETONATOR RETAINER—(P) is placed inside the casing (N), with its flanged shoulder seated on the shoulder of the casing (N). In this position the bottom of the retainer (P) rests on the felt

DETONATOR CASING WASHER—(Q) which secures the fulminate (R) in place. After insertion of the retainer (P) in the casing (N), the latter is crimped near the bottom to secure the former in its proper position.

A **STEEL PLUG**—(U) .625 of an inch long and .340 of an inch in diameter, tapered down at a 30 degree angle for a distance of .093 of an inch at the bottom, is pressed into the open end of the retainer



Assembly Drawing of Firing Mechanism.

CHART II.

Nomenclature of Firing Mechanism.

K	Body	Cast brass	Screwed into front end of firing tube (H). Contains firing mechanism.
L	Firing pin	C. R. steel	In front end of body (K). Pierces detonator on impact.
M	Firing pin retainer	Sheet steel	In front end of body (K). Supports firing pin (L).
N	Detonator casing	Copper	In detonator recess in body (K). Contains fulminate (R) and detonator retainer (P).
P	Detonator retainer	Copper	In detonator casing (N). Holds fulminate (R) in position and contains plug (U).
Q	Detonator casing washer	Felt	In detonator casing (N) over fulminate (R). Supports detonator retainer (P).
R	Fulminate charge	Fulminate of mercury	In base of detonator casing (N). Detonates fuse (E1).
S	Detonator plug	Brass rod	Screws into detonator recess in body (K). Carries detonator pad (T).
T	Detonator pad	Felt	Clued to detonator plug (S). Cushions seating of detonator assembly.
U	Plug	C. R. steel	Inside detonator retainer (P). Prevents functioning of fulminate (R) when bomb is dropped safe.
V	Spring retainer	Brass rod	Screws into body (K) of firing mechanism. Contains detonator spring (W).
W	Detonator spring	Music wire	In spring retainer (V). Moves detonator assembly into firing position when release pin (Y) is pulled.
X	Spring cap	Brass	On lower end of detonator spring (W). Insures smooth action of spring.
Y	Release pin	C. R. steel	Traverses detonator recess. Supports detonator in safe position until withdrawn.
Z	Release pin spring	Music wire	On release pin (Y). Forces pin out of body (K) when safety wire (G) is withdrawn.
A1	Release pin spring seat	Steel	On release pin (Y). Acts as lower bearing for release pin spring (Z).
B1	Anchor screw	Steel	Screws in body (K) over fuse (E1). Anchors fuse in position.