

(No Model.)

H. P. MERRIAM.
PERCUSSION FUSE.

No. 469,887.

Patented Mar. 1, 1892.

Fig. 1.

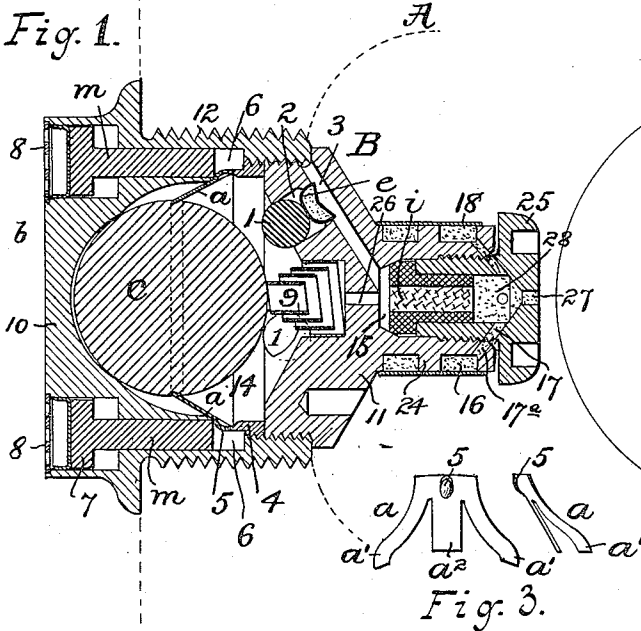


Fig. 2.

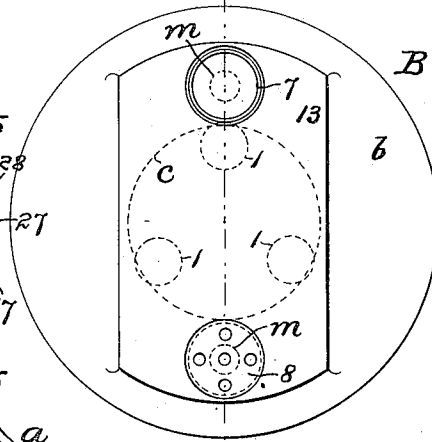


Fig. 3.

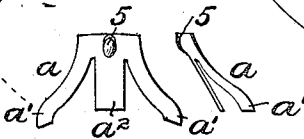


Fig. 5.

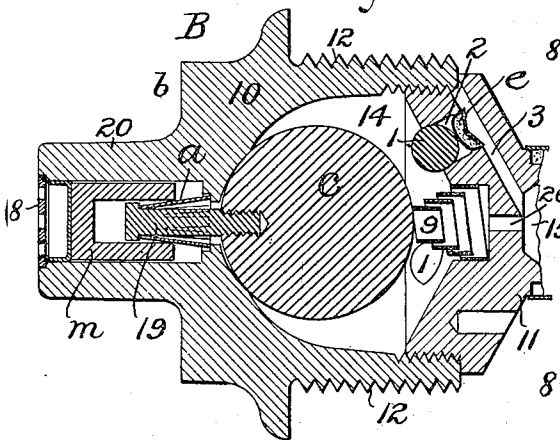
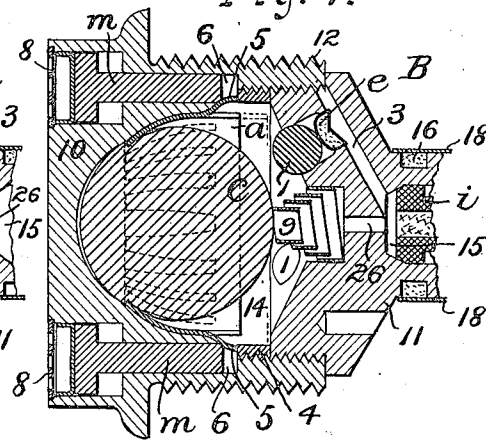


Fig. 4.



Witnesses
Chas. Hanemann
N. Martin.

Inventor
Henry P. Merriam,
By his Attorney
Ras. H. Forbes.

UNITED STATES PATENT OFFICE.

HENRY P. MERRIAM, OF NEW YORK, N. Y.

PERCUSSION-FUSE.

SPECIFICATION forming part of Letters Patent No. 469,887, dated March 1, 1892.

Application filed June 4, 1891. Serial No. 395,081. (No model.)

To all whom it may concern:

Be it known that I, HENRY P. MERRIAM, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Percussion-Fuses, of which the following is a specification.

This invention relates generally to fuses for shells, but more particularly to that class known as "percussion-fuses" for powder-shells, and while designed more especially as a base-fuse may with slight modification be used as a head-fuse.

The invention has for its object, among other things, to provide a simple and effective percussion-fuse, that is perfectly safe against premature explosion, but which upon the firing of the shell is certain in its action.

To this end the improvement consists in combining with the percussion-hammer a retainer or removable abutment therefor, holding it to its seat or normally preventing it from moving and a trip for the retainer or abutment movable at the time of firing, either when used in a base-fuse by the pressure of the firing-charge or when used as a head-fuse by the pressure of the atmosphere at the moment of flight.

It also consists in certain details and combinations of parts hereinafter fully set forth.

As a better understanding of the improvement may be had by a detailed description thereof, such description will now be given, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation of a base-fuse provided with the invention. Fig. 2 is a rear elevation thereof. Fig. 3 represents by a face and side elevation one of the retainers. Figs. 4 and 5 are views similar to Fig. 1, illustrating modified forms of the invention.

Referring to said drawings, it will be understood that the fuse is represented as arranged at the base of a shell A, (partially indicated by dotted lines, Fig. 1,) and that the fuse B in the main consists in a fuse-case b, which contains a percussion-hammer c, a seat or seats for a cap e, and an igniting-charge i.

The fuse-case is composed, essentially, of two portions 10 11, united by screw-threads, the portion 10 having exterior threads 12 for securing into the opening in the base of the shell and its rear or head 13 squared, as in Fig. 2, to facilitate the use of a wrench in screwing the fuse in place. The portion 10 is centrally recessed from the front to provide a chamber 14 for the percussion-hammer, and the rear wall of the chamber is shaped to conform with and receive a portion of the hammer which will confine the hammer to a central position in the chamber independent of any similar function of the retainer or retainers, to be hereinafter explained, and also in aid of their proper action. The hammer-chamber is closed by the other portion 11 of the fuse-case, which is formed with one or more radial openings 2, in which is seated the cap e, each opening being in communication by an inclined passage 3 with a central front recess 15, containing the igniting-charge. The openings 2 to the cap-seats (which otherwise might be formed by nipples extending into the hammer-chamber) each preferably contain a firing-pin 1 in the form of a sphere, which, projecting partially into the hammer-chamber, are readily struck by the hammer in its percussion movement. The hammer c is held to its seat or against the rear wall of the chamber by one or more retainers a, shown in Fig. 1 and in detail in Fig. 3 as consisting of a strip adapted to be interposed between a shoulder on the fuse-case and a shoulder 2 on the percussion-hammer. The retainer-strip in the form shown in Fig. 1 is duplicated one on each side of the hammer, and is formed with two diverging spring-fingers a' and a central finger a². The fingers lie in a circumferential recess in the hammer and against the shoulder formed thereby and act as separated struts, the two spring-fingers a' having sufficient elasticity to secure and guard the retainer against accidental displacement when the fuse is subjected to jar in ordinary handling. The shoulder on the fuse-case may be formed by a projection from either the portions 10 or 11 thereof, but is preferably provided by an adjustable annulus 4, screwed into

the other portion 10 immediately ahead of the portion 11. Each of the retainer-strips *a* is provided with a teat or projection 5, that extends partially into a perforation 6, thereby holding the retainer from slipping out of place, and also extends in the path of a movable trip *m* and tends to oppose its movement, for a purpose to be described. The movable trips *m* are arranged at diametrically-opposite points and longitudinally in the portion 10 of the fuse-case, and each consists, as shown in Fig. 1, of a pin having an enlarged head 7, fitting an enlargement of the perforation, said enlargement opening outward to the rear of the fuse-case. The head of the trip is provided with a packing-disk to prevent the escape of pressure past the head, and to protect the trip and prevent it from accidentally falling out of place the rear opening of the perforation is guarded by a perforated disk 8.

The structure so far described is such that at the moment of firing the shell with the improved fuse the pressure produced in firing enters the openings in the rear of the fuse-case and acts directly upon the heads of the trips *m* to force them longitudinally forward in the fuse-case, so that their ends strike the retainers or the projections thereon and forces them off the shoulder formed by the annulus 4, so that no longer supported they fall inwardly toward the hammer, thus entirely freeing the latter. During the flight of the shell the hammer remains in its position against the rear wall of the chamber until the moment of impact of the shell with its target, when the hammer under momentum suddenly moves forward and strikes one or more of the firing-pins 1 and explodes the caps. The hammer is thus released from the holding action of the retainers at the moment of firing by the pressure of the firing-charge acting against the heads of the trips to move them longitudinally inward against the retainers.

To aid in sustaining the hammer against the rear wall of its chamber, a spring 9 is preferably employed, interposed in a central recess in the portion 11 of the fuse-case and the hammer. This spring, while it may obviously be of any suitable form, is shown as formed by a volute strip or ribbon.

The igniting-charge is contained in the central recess of an elongation 24 of the portion 11 of the fuse-case, being also partially contained and held in place by a hollow plug 25, screwed into said elongation. This igniting-charge provides for the required delay in transmitting the flame from the cap to the bursting-charge of the shell; and it consists of a time-train of the usual composition, such as mealed powder or rocket composition firmly compressed in the plug 25. The circumference of the elongation is grooved to provide one or more circumferential pockets 16 for a supplementary igniting-charge, which through a number of ducts 17^a is in commu-

nication with the interior of the plug and the igniting-charge therein by ducts 17, the pocket or pockets for the supplementary charge being closed by a thin fragile sleeve 18. In front of this time-train there is placed a small quantity of quick-burning powder 28, which also fills the ducts 17, and the supplementary charge may also be formed of the same material, filling the pockets 16 and the ducts 17^a. With this arrangement of the igniting-charge the explosion of the cap *e* through the passage 13 and chamber 15 ignites the time-train, the gases therefrom escape rearward through the relief-vent 26 into the hammer-chamber, thus relieving the chamber 15 thereof, and as soon as the flame reaches the quick-burning charge 28 it flashes either directly outward through the central perforation 27 of the plug or by the ducts 17 and 17^a to the supplementary charge in the pockets 16. Should the gases accumulating in the hammer-chamber exceed a certain pressure, such pressure may act to force either one or both of the trips *m* rearward from the fuse-case, so that the gases may escape by the perforations 6 wholly therefrom, the said trips acting in this instance as relief plugs or valves opening outward. The head of the plug 25 (it might be the end of the elongation 24) is slightly greater in diameter than the elongation 24, so as to overhang or project beyond the latter and aid in preventing the bursting-charge of the shell from packing tightly around said elongation and in rear of the head of the plug. By this means should the flame fail to escape by the central perforation 27 by reason of this packing of the powder against it, due to the inertia of the powder at the time of firing the shell, it will pass by the ducts 17 to the rear of the head to the loosely-packed powder of the shell and by the other ducts 17^a to the supplementary charge, thus insuring the igniting of the bursting-charge.

In Fig. 4 the retainer *a* is illustrated as formed of a metal annulus with a number of spring-fingers projecting therefrom adapted to be compressed and lie against the wall of the hammer-chamber with their ends against the circumferential shoulder on the hammer. This retainer-annulus is likewise provided with projections 5, extending into the path of the trips *m*, which in this instance upon movement under the firing pressure bend said projections inwardly from resting against the annulus 4, thus freeing the retainer, which under the elasticity of its fingers against the wall of the hammer-chamber move it forward, so that the fingers are withdrawn from the shoulder of the hammer and occupy the position shown in dotted lines. The retainer remains in this position during the flight of the shell, and at the moment of impact the hammer moves forward and strikes one or more of the firing-pins, explodes the cap, and fires the charge contained by the shell.

In Fig. 5 the same features of invention are

illustrated in a different form, the general structure of the fuse remaining the same. The hammer in this case carries a rearwardly-projecting pin 19, extending into a hollow rear extension 20 of the fuse-case, which opens out rearwardly and is guarded by the perforated plate 8, as in Fig. 1. The pin is formed with a head, and between this head and a shoulder in the case the retainer *a* is located. This retainer is of annular conical form, with its forward portion divided into a number of fingers (which form projections extending in the path of the trip) resting upon the shoulder in the fuse-case and holding the hammer firmly to its seat against the rear wall of its chamber. In rear of this retainer is placed the trip *m*, mounted to slide in the hollow extension 20. The trip is of plunger form, recessed to straddle the pin 19 and the retainer, and carries a packing-disk on its head, as before. At the moment of firing the pressure, acting against the head of the trip, moves it inwardly against the retainer, compresses its fingers, and removes their ends from the shoulder against which they rest, thus freeing the hammer, which at the moment of impact moves forward with the pin and retainer to strike one or more of the firing-pins, as before. The plug 25 is adapted to be readily removed from the fuse-case and replaced by others similar plugs containing different burning or igniting charges suited to the work to be done or the character of the target against which the shell is to be used. For instance, such charges should be varied according to the time at which it is desired the bursting of the shell should occur, varying, also, with the degree of penetration desired before bursting and the nature of the target, whether it be earth-works, a lightly-armored vessel, or an iron-clad.

No claim is herein made for the combination, with a hammer, of a stop normally preventing its movement and an independent trip for releasing said stop to allow the hammer to operate, nor to such combination when the arms of the stop yield, or wherein the stop is composed of a series of yielding arms, as the same forms the subject-matter of a companion application filed November 22, 1890, Serial No. 372,282, the trip in the present case being limited to one that is exposed to the firing-pressure of the charge which propels the projectile from the gun.

What is claimed is—

1. In a fuse, the combination, with the hammer and the cap, of an independent retainer interposed between the hammer and a shoulder on the fuse-case, and a trip exposed to the firing pressure, whereby it is moved at the time of firing to move the retainer from the shoulder and thus free the hammer, substantially as described.

2. In a fuse, the combination, with the hammer and the cap, of an independent retainer holding the hammer against movement, and

a trip exposed to the firing pressure, whereby it is moved at the time of firing and to meet a projection on the retainer to disengage the latter to free the hammer, substantially as described.

3. In a fuse, the combination, with the hammer and the cap, of a trip exposed to and moved by pressure at the time of firing, and an independent retainer holding the hammer against movement; having a projection extending into the path of movement of the trip to be struck thereby and tending to oppose such movement, substantially as described.

4. The combination, with the hammer and the cap, of an independent retainer for the hammer, supported at diametrically-opposite points, and a pair of trips exposed to and moved by pressure at the time of firing to strike the retainer to release the hammer, substantially as described.

5. The combination, with the hammer and the cap, of an independent retainer for the hammer, resting at one end against a shoulder on the fuse-case and at the other in a recess in the hammer, and a trip exposed to and moved by pressure at the time of firing against the retainer to move it from the shoulder to release the hammer, substantially as described.

6. The combination, with the hammer and the cap, of a retainer for the hammer, an adjustable annulus against which the retainer rests, and a trip for dislodging the retainer from the annulus and freeing the hammer, substantially as described.

7. The combination, with the hammer and the cap, of an independent retainer for the hammer, a trip for dislodging the retainer and freeing the hammer, and a spring tending to resist the movement of the hammer, substantially as described.

8. The combination, with the fuse-case containing a hammer and a cap, of an overhanging or projecting head extending from the front of the fuse-case and into the magazine-cavity, and a duct extending from the cap to the rear of said head, substantially as described.

9. The combination, with the fuse-case containing a hammer and a cap, of an elongation to said fuse-case projecting within the magazine-cavity and containing an igniting-charge in communication with the cap, and a supplementary igniting-charge exterior of said elongation of the fuse-case in connection with said igniting-charge, substantially as described.

10. The combination, with the fuse-case containing a hammer and a cap, of an igniting-charge within the case, a supplementary igniting-charge exterior of the case, and a protecting fragile sleeve, substantially as described.

11. The combination, with the fuse-case containing a hammer and a cap, of a removable plug holding the igniting-charge, said plug

having a head extending beyond the adjacent portion of the fuse-case and into the magazine-cavity, substantially as described.

5 12. The combination, with the fuse-case containing a hammer and a cap, of a chamber in the fuse-case for an igniting-charge in communication with the cap, a relief-vent from said chamber, and a trip adapted to open outward from the fuse-case, substantially as described.
10

In testimony whereof I have hereunto set my hand, this 3d day of June, A. D. 1891, in the presence of two witnesses.

HENRY P. MERRIAM.

Witnesses:

N. MARLER,
GEO. H. GRAHAM.