

(No Model.)

2 Sheets—Sheet 1.

H. P. MERRIAM.
PERCUSSION FUSE.

No. 469,886.

Patented Mar. 1, 1892.

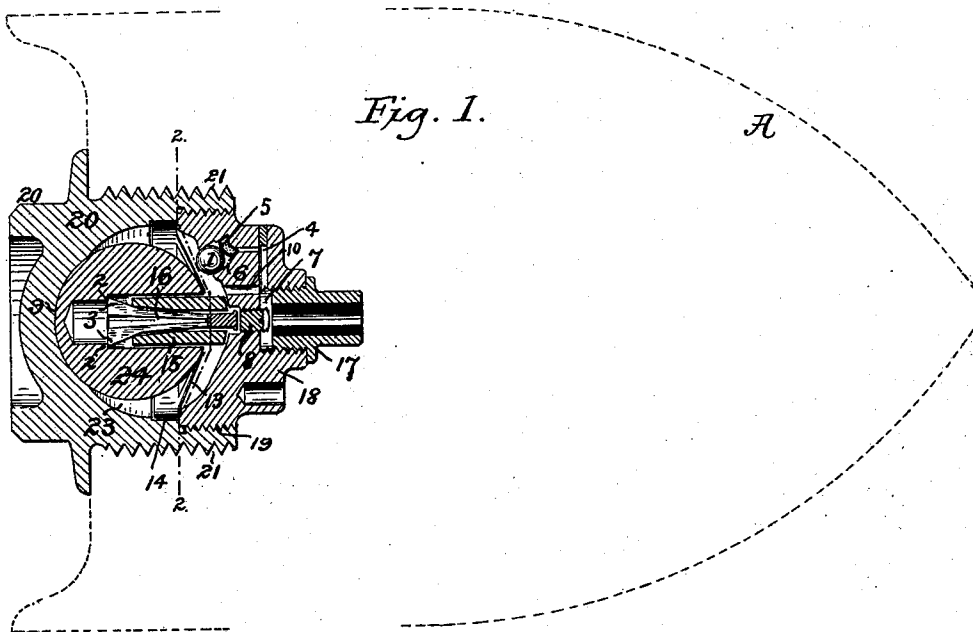


Fig. 2.

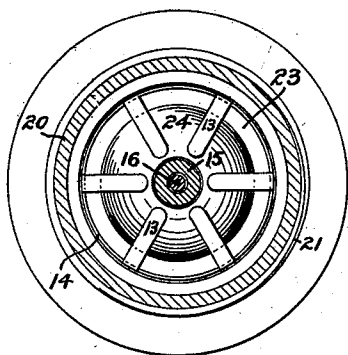


Fig. 3.

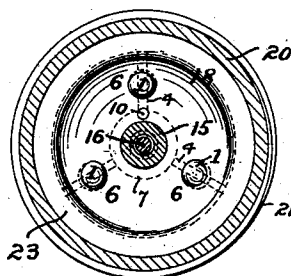
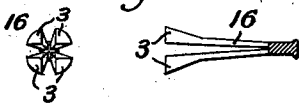


Fig. 4.



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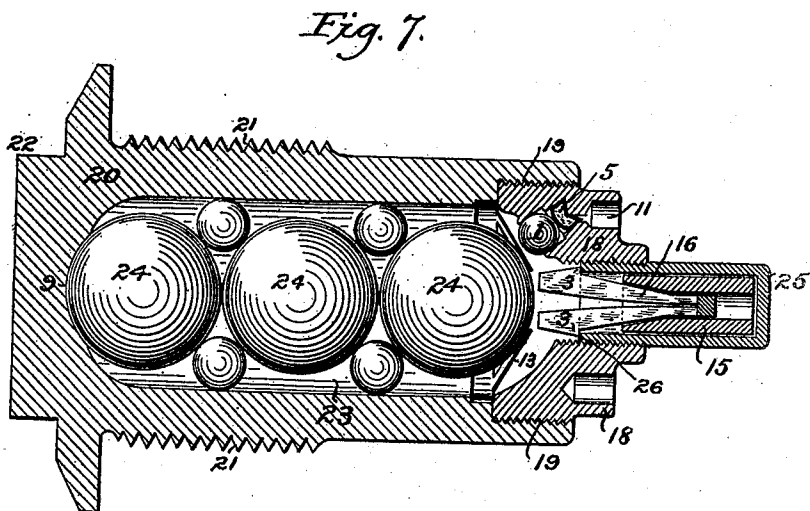
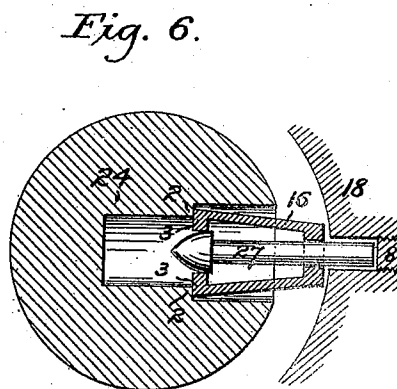
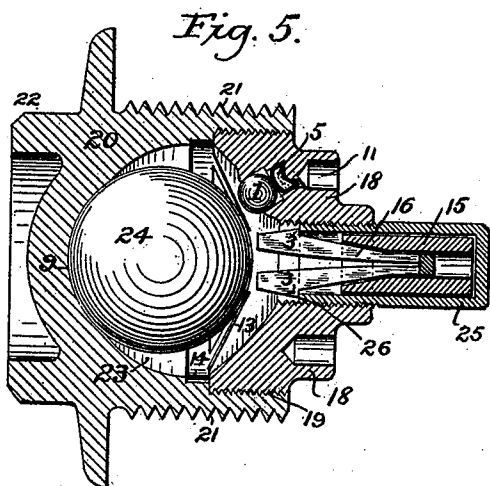
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2 Sheets—Sheet 2.

H. P. MERRIAM.
PERCUSSION FUSE.

No. 469,886.

Patented Mar. 1, 1892.



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UNITED STATES PATENT OFFICE.

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

PERCUSSION-FUSE.

SPECIFICATION forming part of Letters Patent No. 469,886, dated March 1, 1892.

Application filed November 22, 1890. Serial No. 372,282. (No model.)

To all whom it may concern:

Be it known that I, HENRY P. MERRIAM, a citizen of the United States, residing at 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 to a percussion-fuse for powder-shells, and is particularly designed for use at the base of such shells.

The improved percussion-fuse consists, essentially, of a ball or other form of weight or hammer mounted loosely in position to strike the cap by the impact of the shell against the target, a holding or stop bolt or stud normally holding the ball or hammer a distance from the cap, and a coacting tripping sleeve or pin, which, upon the firing of the shell, moves, withdraws, or releases the stop-bolt, so that the ball, weight, or hammer may strike the cap or caps at the moment of impact, as will be more fully hereinafter set forth.

Referring to the accompanying drawings, which illustrate a practical embodiment of the invention, Figure 1 is a central sectional elevation of the percussion-fuse, the shell with which it is used being indicated by dotted lines. Figs. 2 and 3 are cross-sections taken on the line 2 2 of Fig. 1 looking in opposite directions. Fig. 4 is a detailed view of the stop-bolt. Fig. 5 is a view similar to Fig. 1, illustrating a modified form. Fig. 6 is a detail of a further modification, and Fig. 7 a central section showing the employment of a plurality of impact-hammers.

Referring to said drawings, particularly to Figs. 1 to 4, it is to be understood that the shell A, with which the invention is shown as combined, may be of any approved form making use of a bursting-charge, usually of powder; but other explosive may be employed.

The improved fuse is contained by a hollow stud 20, having at one end an exterior-threaded portion 21 for screwing into the base of the shell and at the opposite end a polygonal head 22 for a wrench. The stud provides a centrally-arranged pocket 23 to receive and contain a ball 24 or other form of weight or hammer, which pocket at its outer end has a screw-threaded portion 19 for an annular head 18, which is thus removably connected with and carried by the stud. The hammer

is somewhat smaller than the pocket, and the rear wall 9 of the latter is shaped to fit a portion of the hammer's surface and thus aid in holding it centrally therein. The inner side of the head 18 is concaved or dished, and has a central perforation screw-threaded to receive a similarly-threaded adjusting-pin 8. In front of this perforation the head has an enlarged outer recess 7, that is also screw-threaded to receive a centrally-perforated nipple 17, the outer end of which projects inwardly toward the center of the shell.

The concaved side of the head 18 is provided with one or more seats 6 (three are shown) radially disposed therein with respect to such concavity or to that of the ball, in each of which is seated a percussion-cap 5, the rear of each of the caps from the seats 6 being open by ducts 4 with the recess 7 and by the perforated nipple with the powder in the body of the shell.

The hammer 24 is held in its normal position against the rear wall 9 of the fuse-pocket by means of a withdrawing, removable, or releasable stop 3, formed in the present embodiment by the end of a bolt 16, said bolt being interposed between the hammer and the concaved end of the head 18, so as to normally prevent said ball from coming in contact therewith.

In the preferred form of the invention the bolt 16 is split longitudinally for the greater portion of its length to provide a plurality of spring or yielding arms, the tendency of which are to spring or yield outwardly. With this bolt and coacting therewith is provided a trip or tripping-sleeve 15, which surrounds the bolt for the greater portion of its length and in the normal position of the parts permitting the spring-arms to extend outwardly freely; but as the sleeve is slid rearwardly over the bolt compresses said arms together, so as to decrease the effective diameter of the rear end of the bolt, thereby withdrawing, removing, or releasing its stop 3, as will presently appear.

As shown in Fig. 1, the stop-bolt has its front end seated in the perforation of the center of the head 18 abutting against the adjusting-pin 8, and the ball is counterbored to provide a deep recess, which intermediate of its length is reduced in diameter to provide

an internal shoulder 2, against which the stop end of the bolt bears, whereby the hammer is held against the rear wall 9 of the pocket or is prevented from striking the caps. The sleeve 15 is interposed between the concave end of the head and the stop end of the bolt and projects with the bolt into the recess in the hammer. The construction and operation of these parts are such that at the moment of the firing of the shell the sleeve will slide along the bolt with sufficient force to compress its spring-arms to remove the stop 3, formed thereby from the shoulder 2 of the hammer and sliding, together with the bolt, farther into the hammer, so that the latter is thus free to move at the moment of impact by the force due to its inertia forward into forcible contact with one or the other of the caps, firing it, and through the ducts and perforations before referred to ignite the powder within the body of the shell.

The seats 6, sustaining the caps, are in the preferred construction, although not essential, recessed, preferably deep enough to receive a small ball or firing-pin 1, which is thus interposed between the cap and the impact-hammer and serves as a further means of insuring the explosion of the cap, and these balls are held in place by burnishing down the edge of the recess confining the balls against the cap. The impact-hammer 24 may, independent of the stop-bolt, be held to the rear wall of the pocket and otherwise steadied by means of a spring that consists of an annulus 14, fitting around the end of the pocket 23 and provided with a number of radially-extending spring-arms 13, extending slightly forward, so as to bear upon the forward surface of the hammer in proximity to the sleeve 15, and tending, also, to hold the hammer against the rear of the pocket after the withdrawal of the stop-pin.

The seats 6 for the caps are bored so as to present a central projection at its base, and thus present an edge to the inner side of the cap to better insure its being fired by the impact movement of the hammer, and the adjusting-pin 8 serves as a means of insuring the stop end of the bolt 16, resting snugly against the shoulder 2 within the hammer and with the hammer firmly seated against the rear wall of the pocket.

The nipple 17 is preferably a removable one, containing a slow or quick burning fuse of the ordinary form, the nipples being removable, so that one may be replaced by another of a different length or containing a different fuse. The ducts 4 and space 7 will also in practice contain some of the powder of the fuse, and in case the fuse is a slow-burning one the resulting gases may pass by a vent 10 through the head into the pocket 23.

It is obvious that modifications of the invention may be made without departing from its scope or essential features. Thus in Fig. 5 the impact-hammer 24 is shown solid, and the stop-pin and its co-operating sleeve are

contained by a thimble 25, screw-threaded into the front end of the head 18 and opening inwardly into the pocket 23. The rear end of the thimble 25 forms a shoulder 26, against which a stop formed on the stop-pin 16 abuts. The stop-pin is split as before to provide spring or yielding arms, and the stop 3, instead of being formed, as in Fig. 1, at the end of the spring-arms, is formed intermediate of their lengths, the rear end of the arms extending into the pocket 23 to form an abutment for the hammer, normally holding it to its seat against the rear wall of the pocket and preventing it from moving against the caps. The sleeve 15, as before, surrounds the stop-bolt 16 and normally lies against the closed end of the thimble 25 in position so that in its rearward movement it will, as before, compress the spring-arms of the bolt together, thereby withdrawing the stop formed by the bolt from the shoulder 26, and thus freeing the stop-bolt, and at the retardation of the shell at the moment of impact the hammer, continuing its motion unchecked for the instant, will strike the caps, or either of them, and explode the shell. The same force moving the hammer forward also simultaneously moves the bolt and sleeve forward farther into the thimble 25. In this construction, also, the cap-seats 6 open into a front recess 11 in the head 18, which may contain a fuse, if desired.

In the modification shown in Fig. 6 the bolt 16, instead of its spring-arm extending to spring outwardly and being positively compressed together by the trip to remove the stop from the shoulder, is reversed—that is to say, its spring-arms have a tendency to spring inwardly and are forced and held normally outward by the head of an interior tripping-pin 27, which in the act of firing moves from between the inner end of the spring-arms of the bolt 16, thereby allowing said bolt to move inwardly, decreasing the effective diameter of the bolt and withdrawing its stop end 3 from the shoulder 2 of the hammer, thus freeing the ball and allowing it to move forward, as before.

In order to augment the effective force of the hammer upon the cap or caps or to render a fuse of smaller diameter more effective, the pocket 23 may be elongated, so as to contain two or more balls arranged in axial alignment with respect to the axis of the fuse, as shown in Fig. 7. In this instance the balls need not be so large in proportion as shown in the previous figures, but may be somewhat smaller and held together, with the rear hammer bearing against the rear wall of the pocket by the spring 13 and supported by a surrounding series of small balls arranged between their respective contiguous surfaces to prevent them normally from lying against the side walls of the pocket. Upon the impact of the shell against the target the combined inertia of the hammers, together with any lateral displacement, forces the forward hammer against the cap or caps. This construction is useful in fuses for smaller sizes of shells,

the plurality of small hammers giving the same effective force against the cap as the single large hammer, and by reason of the intermediate supporting-balls the forward movement of the forward small hammer will be the same in extent as the movement of the single large hammer, which would not be attained by the use of the plurality of small hammers alone without the supporting-balls.

10 Thus the forward small hammer will have as great a forward movement as a single large hammer to explode the cap.

While the invention is shown as embodied in a base-fuse, it is obvious that it may be used as a front or point fuse with but slight modification without departing from the scope of the invention, and it is obvious that so far as the seat or seats for the cap or caps are concerned they may be arranged in any convenient position, so that it or they are adapted to be exploded upon the impact movement of the hammer.

What is claimed is—

1. In a fuse, the combination, with a hammer and a seat for a cap, of a stop for the hammer normally preventing the movement thereof and an independent trip for releasing said stop and allowing the hammer to operate, substantially as described.

2. In a fuse, the combination, with a hammer and a seat for a cap, of a stop for the hammer and means, substantially as described, for compressing the stop to free the hammer, substantially as described.

3. In a fuse, the combination, with a hammer and a seat for a cap, of a stop composed of diametrically-yielding arms and an independent trip coacting therewith, upon the operation of which trip the arms of the stop yield and the hammer is free to operate, substantially as described.

4. In a fuse, the combination, with a ham-

mer and a seat for a cap, of a stop composed of a series of yielding arms adapted normally to hold the hammer against movement, and a coacting independent tripping-sleeve for crowding the arms together and freeing the hammer, substantially as described.

5. In a fuse, the combination, with a seat for the cap, of a plurality of impact-hammers arranged in axial alignment and a series of small intermediate supporting-balls, substantially as described.

6. The combination, with a stud and its head providing an interior pocket, of a hammer mounted in said pocket, a seat for the cap, a stop normally holding the hammer at one end of the pocket, and an independent trip for releasing the stop for freeing the hammer, substantially as described.

7. The combination, with a hollow stud, of a hammer mounted therein, a spring bearing upon the surface of the hammer, a seat for the cap, a stop normally holding the hammer against movement, and an independent trip for the stop, substantially as described.

8. The combination, with a hollow stud and its head, of a seat in the head for the cap, a removable fuse-containing nipple independent of and in communication with the cap-seat, and an impact-hammer within the stud, substantially as described.

9. The combination, with a hollow stud and its head providing a seat for the cap, of a fuse-containing nipple carried by the head and in communication with the cap-seat, a vent leading from one side of the nipple to the interior of the stud, and an impact-hammer within the stud, substantially as described.

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Witnesses:

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