

No. 630,620.

Patented Aug. 8, 1899.

H. P. MERRIAM.

FUSE.

(Application filed July 7, 1897.)

(No Model.)

Fig. 1.

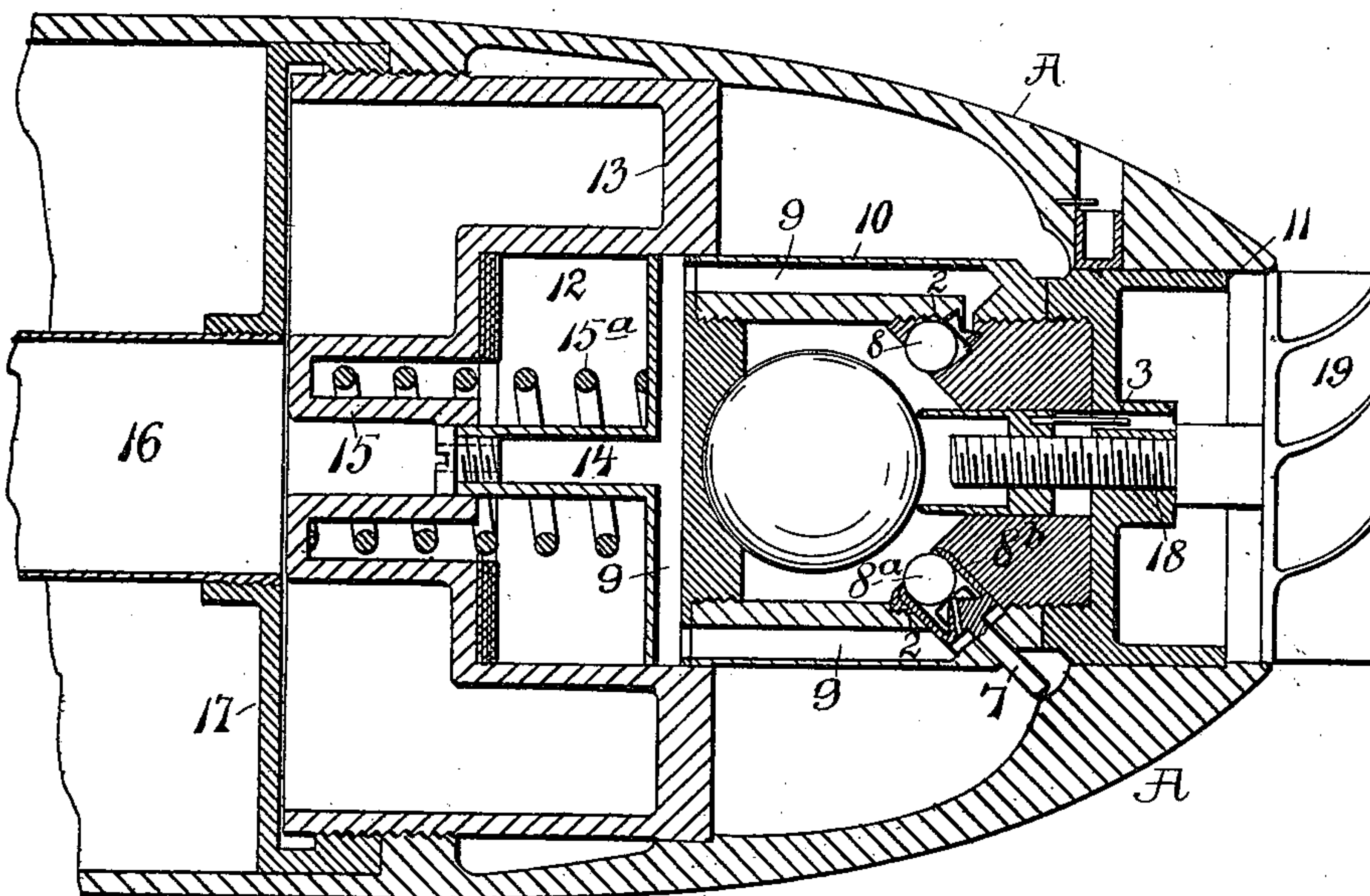


Fig. 2.

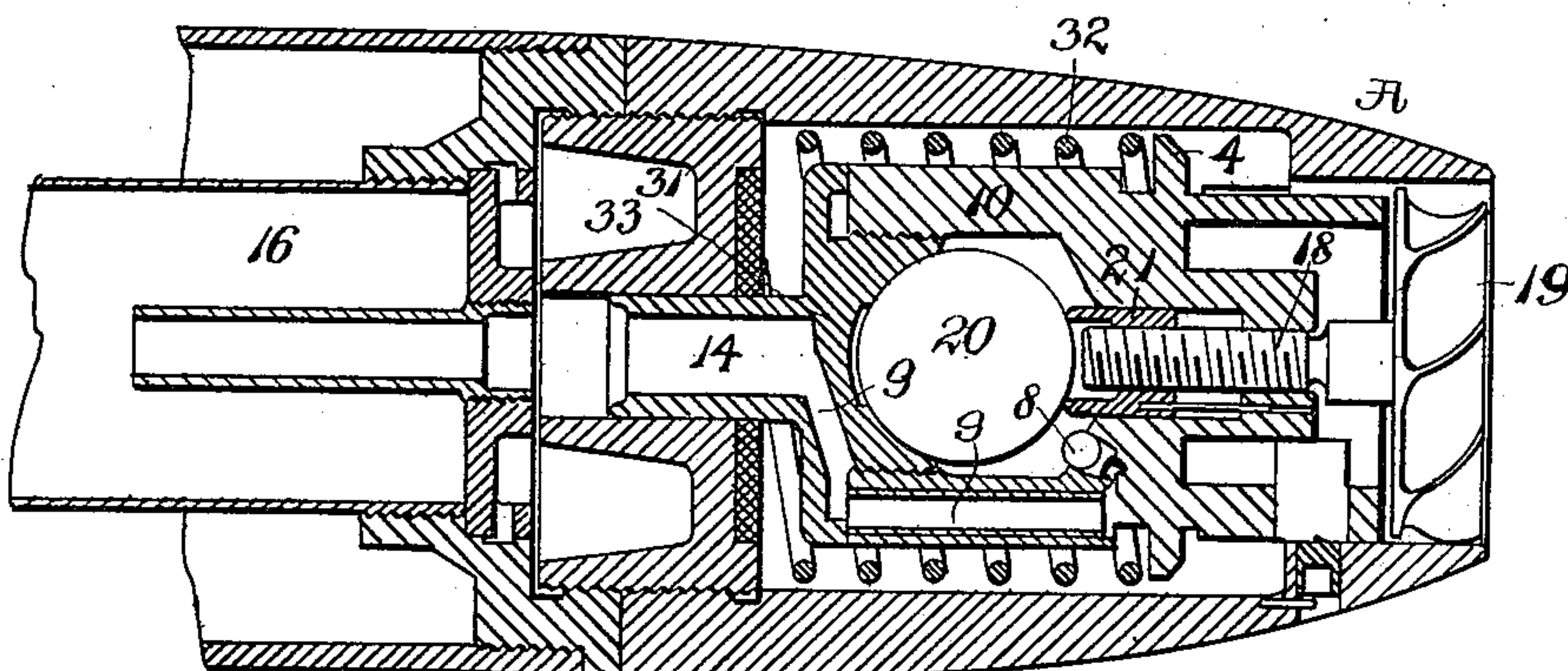
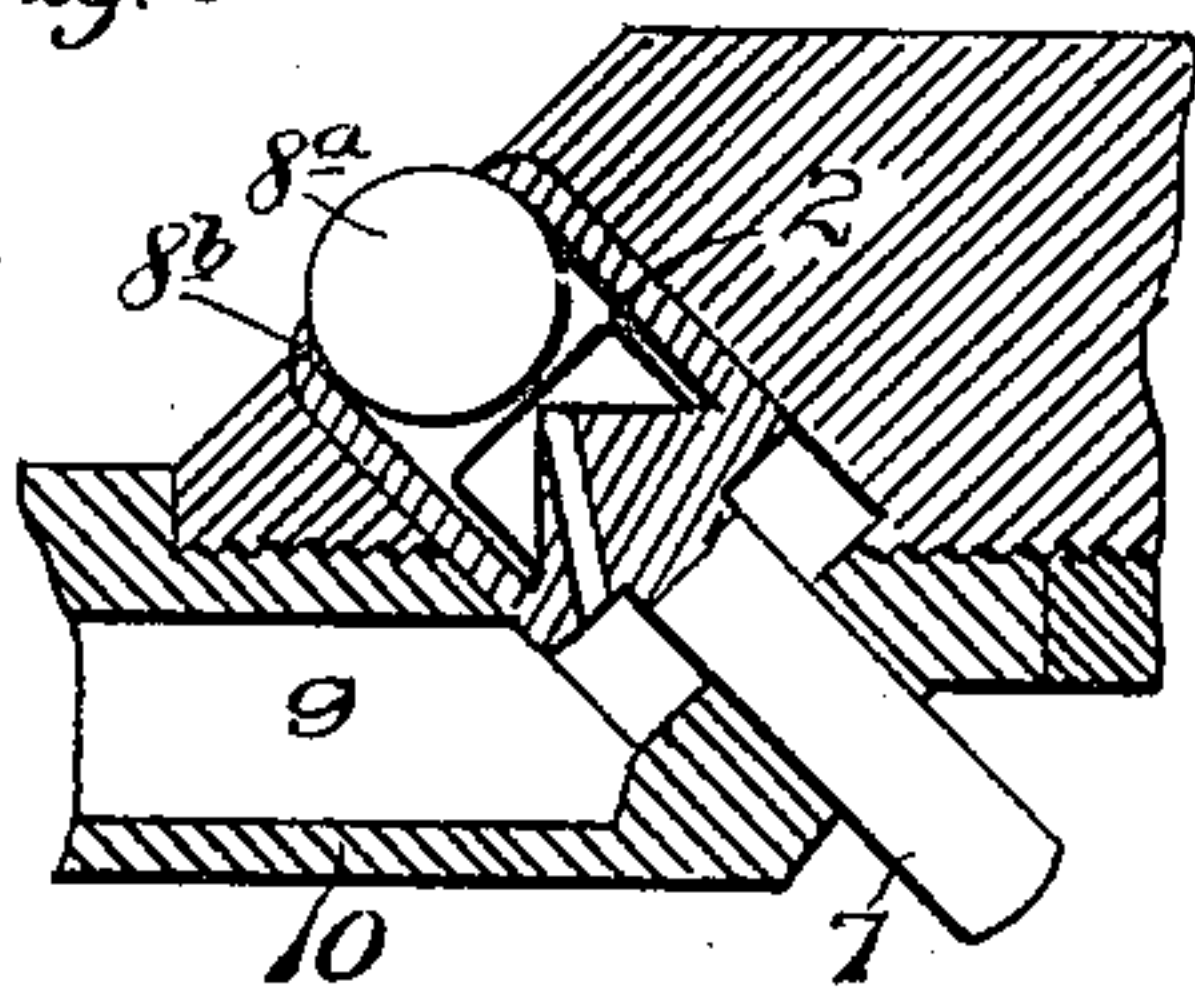


Fig. 3.



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UNITED STATES PATENT OFFICE.

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

FUSE.

SPECIFICATION forming part of Letters Patent No. 630,620, dated August 8, 1899.

Application filed July 7, 1897. Serial No. 643,776. (No model.)

To all whom it may concern:

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

The present invention relates generally to fuses adapted, for instance, to detonate high explosives contained by the shell carrying the fuse.

The improvements more particularly relate to that class of fuses wherein is employed a spherical detonator normally held against movement by a removable stop and when released arranged upon impact or retardation of the shell to explode a percussion-cap to fire a charge.

As a more full understanding of the invention will be had by a detailed description of the improvement, such description will now be given, with reference to the accompanying drawings, in which—

Figure 1 is a central section of the head of a shell with its contained fuse. Fig. 2 is a like view of a modified form thereof. Fig. 3 is a detail sectional view of the movable firing-pin or igniter.

Referring now particularly to Fig. 1, the head of the shell A is chambered to receive a fuse-case 10, preferably of cylindrical form, capable of longitudinal movement in the head and adapted to rest at its front against a shoulder 11 in the head of the shell and at its rear to enter a like-shaped recess 12 in a cup-shaped diaphragm 13, with a spring 15^a interposed between the diaphragm and the end of the fuse-case to yieldingly seat the latter in the shell. The rear end of the diaphragm and the hollow end of its sleeved portion are coincident with the front end of a guncotton-case 16, screwed into another diaphragm 17 of the shell, so that the fire of the charge contained by the hollow stem and other channels 9, provided in the fuse-case, will be communicated to the guncotton charge in the case 16.

The fuse-case is hollow and contains a spherical detonator or hammer 20, normally seated in a concaved recess in the rear wall of the fuse-case, and opposed to said detonator is arranged one or more firing-pins in the

form of balls 8, supported by the fuse-case in position to be struck (or either of them) by the forward impulse of the detonator. The firing-pins are seated above percussion-caps 2, seated upon anvils, which when exploded fire the flash or time charge in the channel or channels 9.

Instead of depending wholly upon the momentum of the hammer 20 in striking the ball 8 to explode the cap there may be an additional arrangement of firing pins or balls 8^a, held in a slidable case 8^b, having an outwardly-projecting pin 7, as best seen in Fig. 3, extending through the fuse-case to within a short distance of the head of the shell, the percussion-cap being seated on an anvil in the slidable case in immediate proximity to the ball 8^a. In this arrangement should the shell strike the target on its side the inwardly-crushing movement of the side of the shell in striking the end of the pin 7, together with the momentum of the detonator or hammer 20 in striking the ball 8^a, will cause a movement of the pin and its slidable case and the ball with respect to each other, so as to forcibly pinch the cap between the ball and anvil and cause its explosion, and thus fire the charge in the channel or channels 9. While only one ball 8 and ball 8^a are shown, it is proposed in practice to employ a plurality of such balls, it being obvious that the fuse may be used, if desired, with either form without affecting the scope of this invention. The two forms are, however, preferably employed.

The detonator or hammer 20 is normally held against movement by a screw-threaded stem or rod 18, tapped into the head of the fuse-case and having at its front end a spirally-bladed wheel or propeller 19, capable of being rotated with the stem by the air during the flight of the shell to remove the rear end of the stem a distance from the detonator. Instead of depending, as heretofore, upon the withdrawal of the end of the stem from physical contact with the detonator or hammer to release the latter, which in practice occurs immediately after the shell leaves the gun on its flight, to the danger of premature explosion by the forward movement of the hammer, the present improvements provide a secondary nut or removable stop 21, engaged by the

screw-threaded stem or rod 18 with its end, instead of the stem, normally in direct contact with the detonator to form a stop therefor holding it against movement. This secondary nut 21 is arranged when freed from the stem 18 to freely slide forward in a central opening in the head of the fuse-case upon the impact or retardation of the shell and the consequent forward movement of the detonator toward the firing-pins 8 8^a. So long as any portion of the screw-threaded stem 18 is engaged with this secondary nut or stop the detonator is prevented from having any movement; but as soon as said stem is freed from said stop or secondary nut and has moved a short distance therefrom the nut is free to move forward whenever the detonator has such tendency. The forward or detonating movement of the detonator is thus delayed a sufficient extent to insure its movement only at the proper time, and so long as the said stem is in engagement with the nut or stop no movement of the detonator can possibly take place. This secondary or movable stop-forming nut 25 is held from rotation by a pin 3 entering loosely a hole in the front wall of the fuse-case. The distance to which the shell may be propelled before the stem is clear of the stop or nut 21 will of course depend upon the inclination of the vanes of the propeller and upon the length of stem screwed into the nut, its length or the distance to which it is screwed into the nut being obviously capable of being regulated according to the time at which it is desired the detonator shall be actually free to operate.

In the modified form of the invention shown in Fig. 2 a somewhat simpler form is shown, adapted for use with smaller shells and where it is advantageous the fuse shall take up the minimum of space. In this example of the invention the head of the fuse-case is provided with a flange 4, between which and the diaphragm 31 and encircling the case is interposed a spring 32 to yieldingly seat said fuse-case in the head of the shell. The bladed wheel or propeller 19 is provided, as before described, with a screw-threaded stem 18, tapped into the head of the fuse-case and engaging with the movable stop or nut 21, which normally is in direct stopping contact with the spherical detonator or hammer 20. The fuse-case also in this instance is made in two parts, the rear portion 33 screwed into the front or major portion and having a central hollow stem communicating with one or more flash-charge channels 9 and with the guncotton-case 16 for purposes like those previously described.

It will be noted that in the form shown in Fig. 1 (it might also be the case with the structure shown in Fig. 2) the detonation or firing of the fuse is subject to two conditions. Thus the channel 9 directly affected by the operation of the firing-pin 8 may be filled with a time-train, in which case a cer-

tain predetermined delay will occur after the firing-pin has been struck by the hammer 20 before the guncotton in the case 16 will be detonated, while the other channel 9, controlled by the movable firing-pin 8^a and 7, may be charged with a quick train, insuring a positive and instantaneous action upon the shell striking a substantially solid target sufficient to cause an indenting of the shell-head with the forward movement of the hammer.

What I claim is—

1. In a fuse, the combination of a detonator, an opposed firing-pin or igniter, as top for the detonator, and an independently-movable device, movable during the flight of the shell to disengage the stop to release it, as described.
2. In a fuse, the combination of a detonator, an opposed firing-pin or igniter, a stop for the detonator, and means engaging the stop movable during the flight of the shell to release the same, as described.
3. In a fuse, the combination of a detonator, an opposed firing-pin or igniter, a movable threaded stem, and a movable stop for the detonator released by the movement of the stem, as described.
4. In a fuse, the combination of a detonator, an opposed firing-pin or igniter, an automatically-movable threaded stem, and a movable stop for the detonator released by the movement of the stem, as described.
5. In a fuse, the combination of a detonator, an opposed firing-pin or igniter, a removable stop for the detonator and a screw-threaded stem engaging a relatively-fixed portion of the fuse and also the stop, as described.
6. In a fuse, the combination of a detonator, an opposed firing-pin or igniter, a longitudinally-yielding case carrying the same, a stop for the detonator, and a rotatable device independent of and movable to release the stop, as described.
7. In a fuse, the combination of a detonator, an opposed firing-pin or igniter, a relatively-fixed nut and a longitudinally-movable nut forming a stop for the detonator and a screw-threaded stem engaging both of said nuts and movable to release the movable nut, as described.
8. In a fuse, the combination of the shell, the detonator and a movable firing-pin interposed between the detonator and the side of the shell, whereby owing to the crushing of the shell and the momentum of the detonator the firing-pin is operated, as set forth.
9. In a fuse, the combination of the shell, the detonator, a quick train and a time-train, a firing-pin for the time-train, and another firing-pin for the quick train that is operated by the conjoint action of the momentum of the detonator and the indenting of the shell on striking a substantially solid target, as set forth.
10. In a fuse, the combination of the shell, the detonator, and means for exploding the

shell operated by the conjoint action upon one
and the same intermediary of the momentum
of the detonator and the indenting of the shell
on striking a substantially solid target, as set
5 forth.

11. In a fuse, the combination of the shell,
independent trains, an igniter for each train,
a detonator common to both igniters and op-
erable in the case of one of the igniters by its

conjoint action with that of the crushing in 10
of the shell.

In witness whereof I have hereunto set my
hand in the presence of two witnesses.

HENRY P. MERRIAM.

Witnesses:

GEO. H. GRAHAM,

FLORENCE ROSENSTEEL.