

No. 616,317.

Patented Dec. 20, 1898.

F. M. HALE, J. DEAS & J. B. REAVIL.
PERCUSSION FUSE FOR EXPLOSIVE PROJECTILES OR SHELLS.

(Application filed July 8, 1898.)

(No Model.)

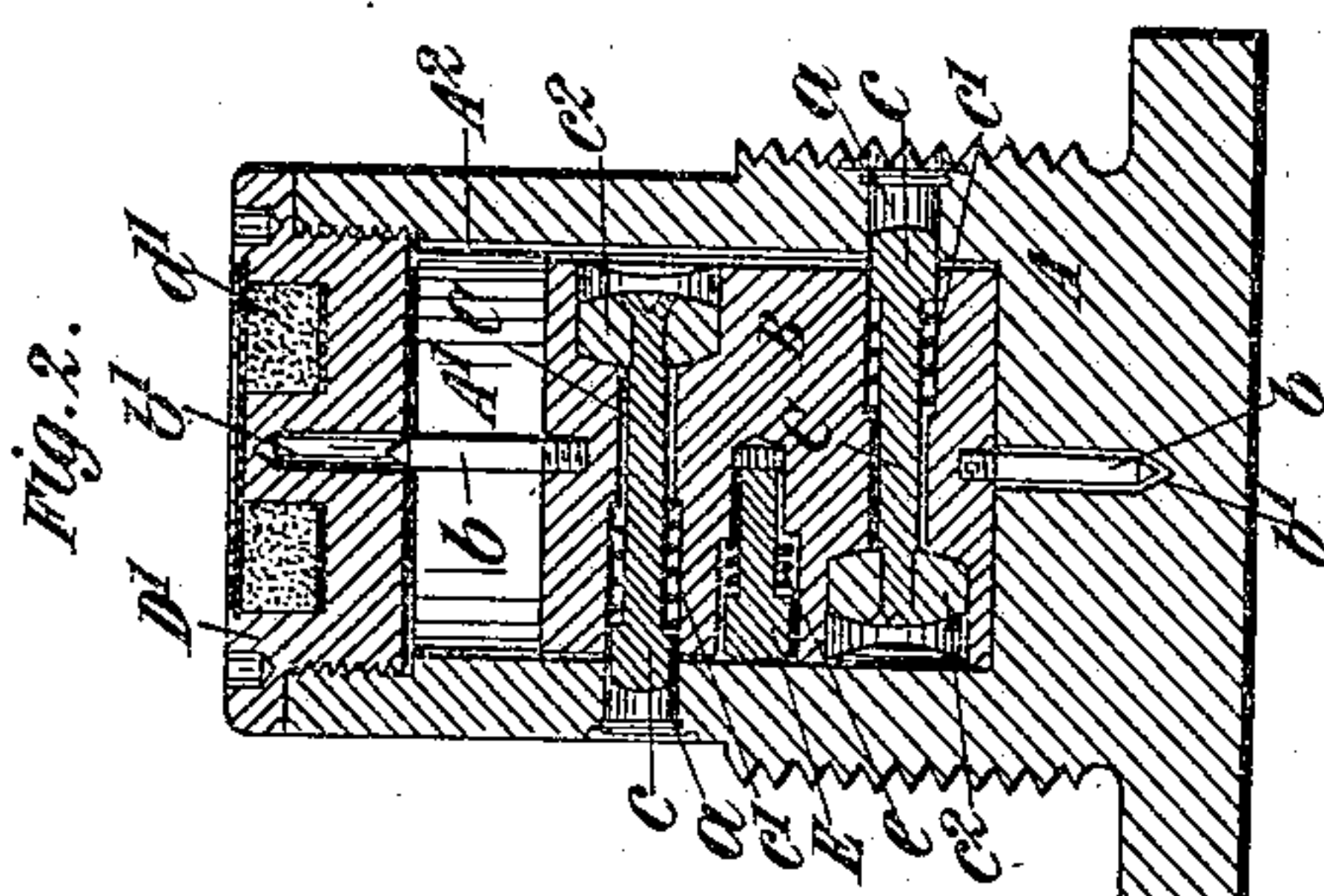
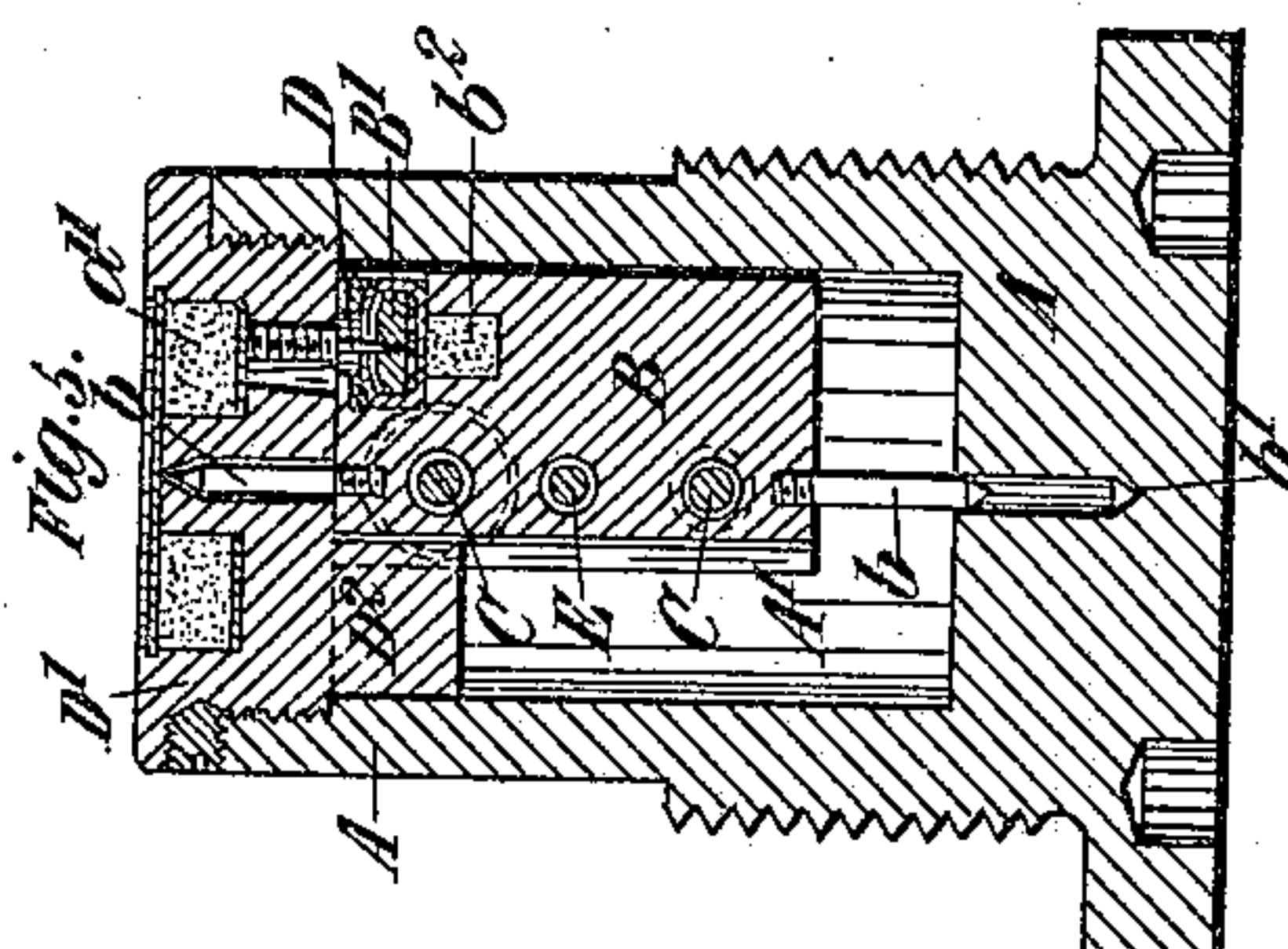
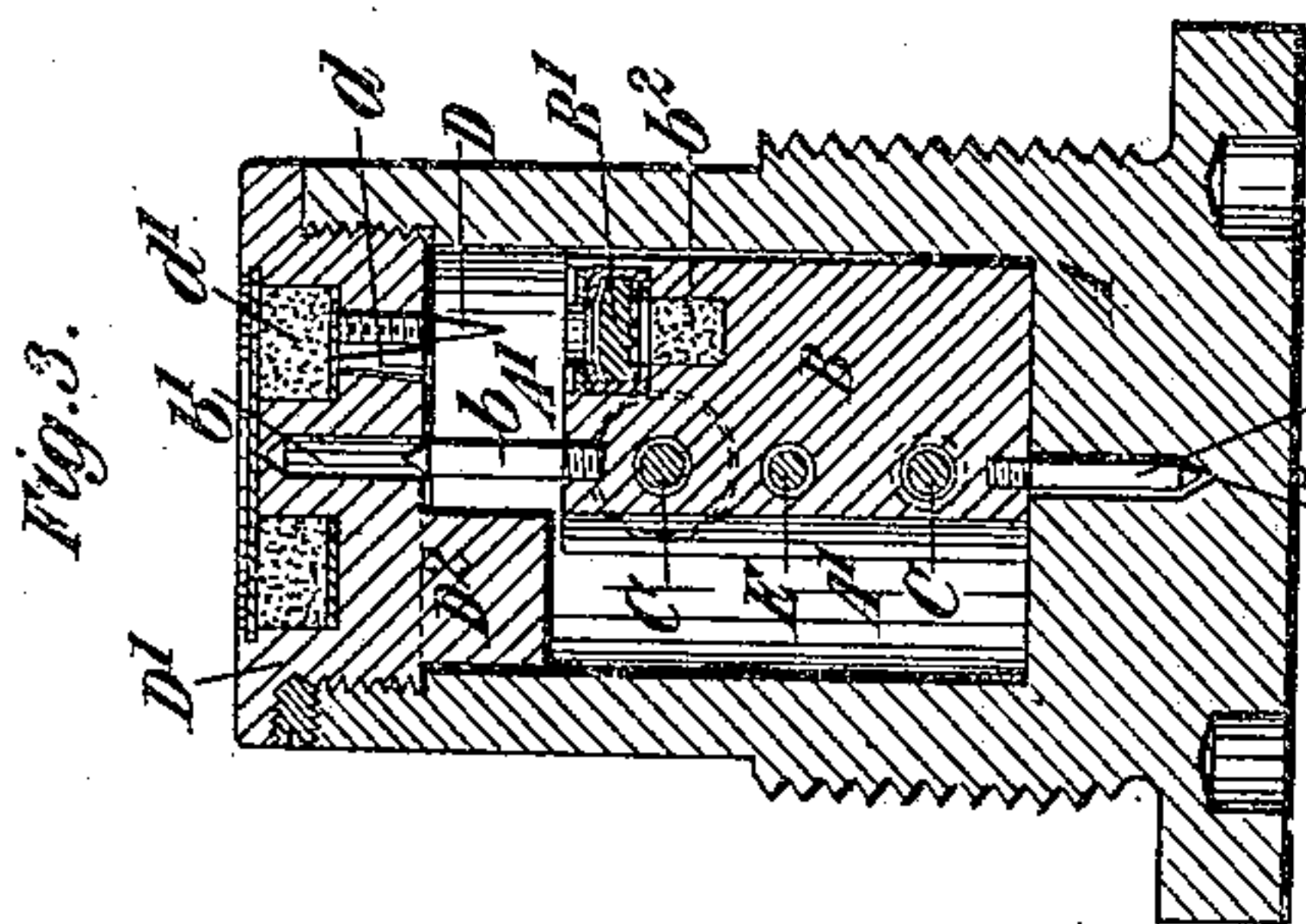
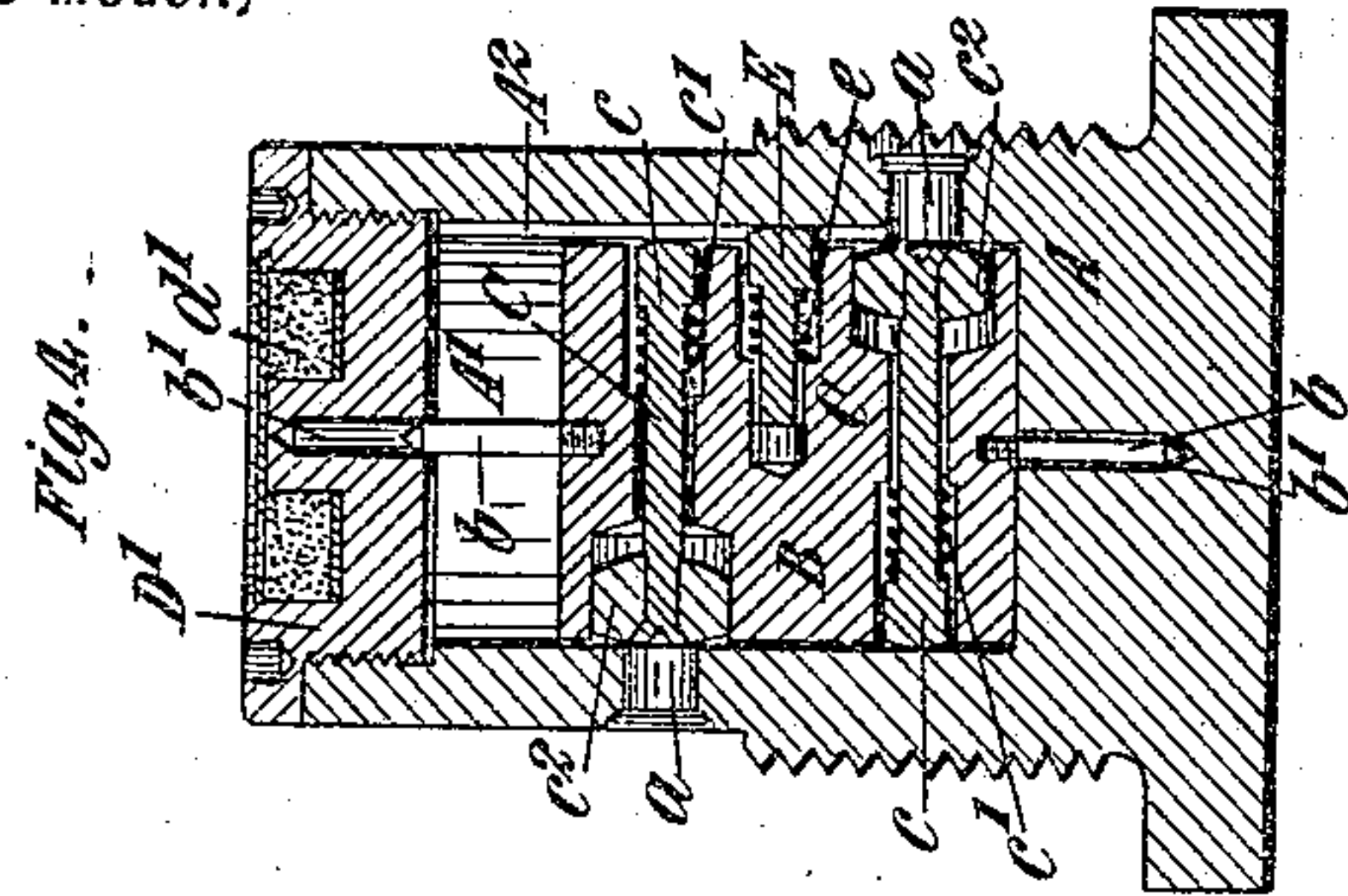


Fig. 1.

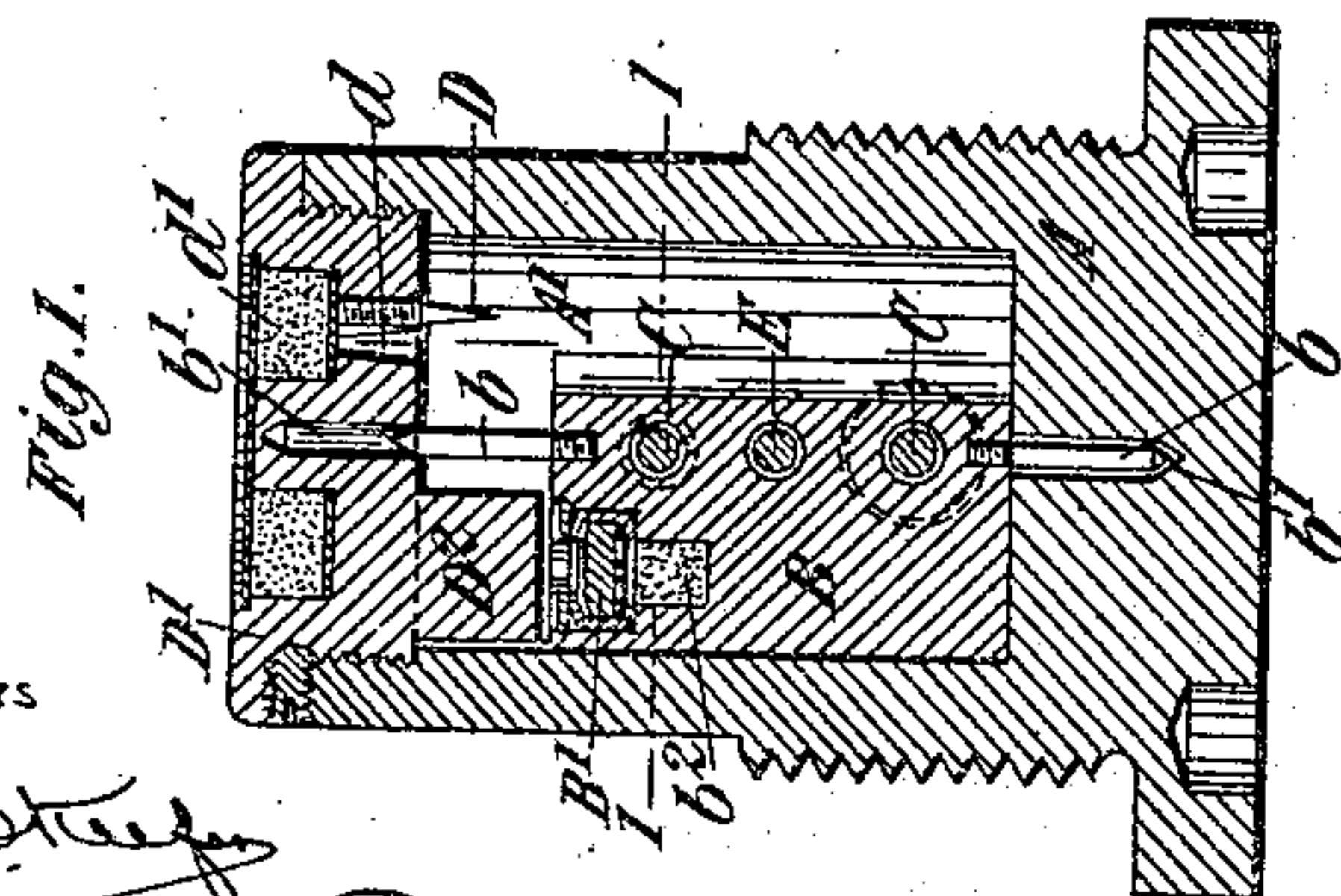
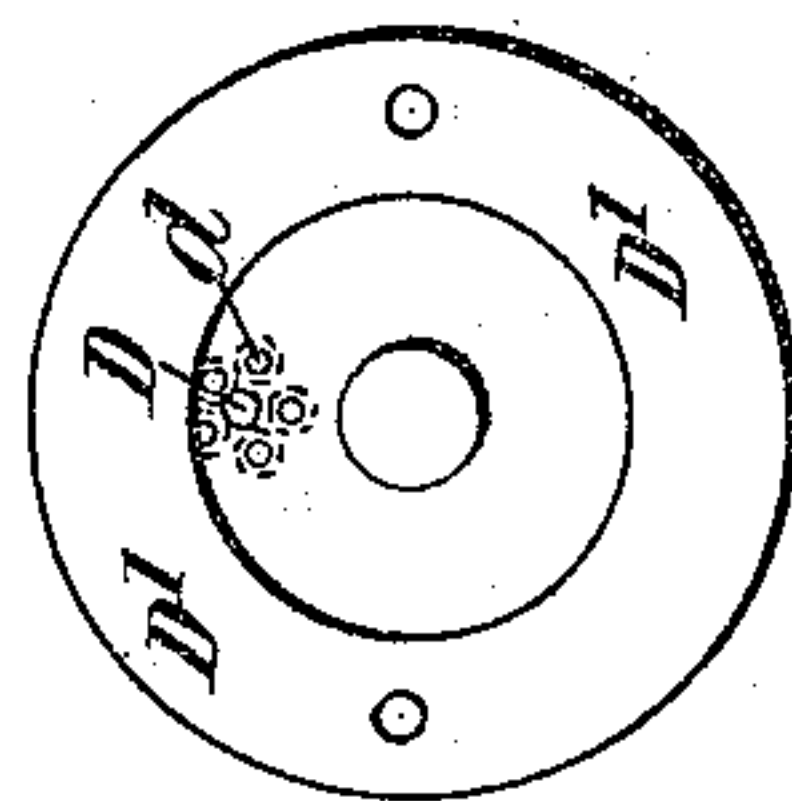
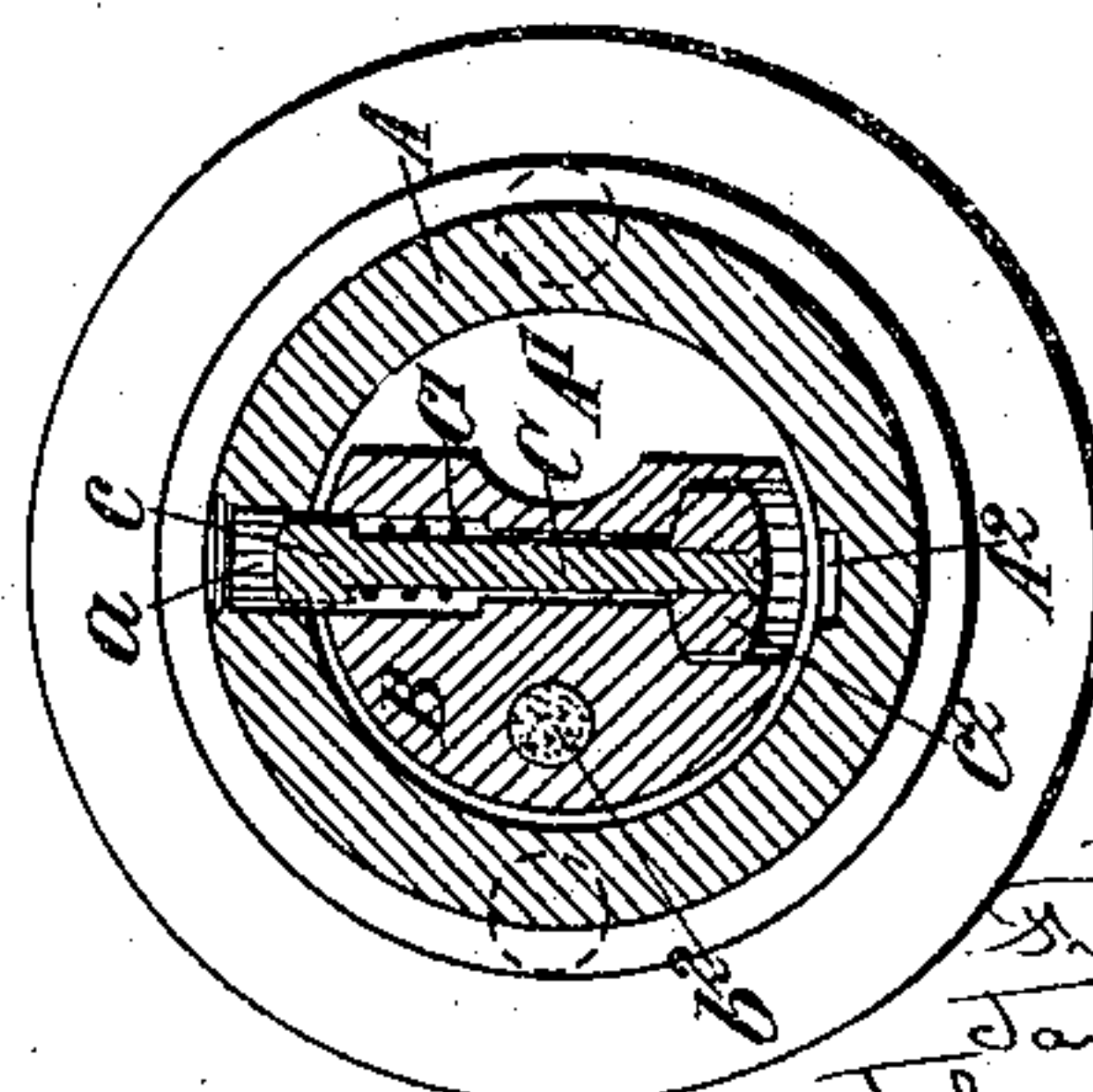


Fig. 6.



Witnesses

Subscribed and sworn to before me this 1st day of July 1898.
James L. Norring

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Frederick M. Hale
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By

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UNITED STATES PATENT OFFICE.

FREDERICK MARTEN HALE, JAMES DEAS, AND JOHN BRODIE REAVIL, OF
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PERCUSSION-FUSE FOR EXPLOSIVE PROJECTILES OR SHELLS.

SPECIFICATION forming part of Letters Patent No. 616,317, dated December 20, 1898.

Application filed July 8, 1898. Serial No. 685,456. (No model.)

To all whom it may concern:

Be it known that we, FREDERICK MARTEN HALE, general manager of the New Explosives Company, Limited, residing at 75 Queen Victoria street, in the city of London, JAMES DEAS, engineer, residing at 4 Vicarage Park, Plumstead, London, in the county of Kent, and JOHN BRODIE REAVIL, engineer, residing at 2 Limes Villas, Humber road West, Blackheath, London, in the county of Kent, England, subjects of the Queen of Great Britain, have invented certain new and useful Improvements in Percussion-Fuses for Explosive Projectiles or Shells, of which the following is a specification.

This invention relates to percussion-fuses of the kind in which a firing point or needle and a percussion-pellet having a detonator are so arranged that the said detonator at first lies out of alinement with the said firing point or needle and only comes into alinement therewith by the rotation of the shell during its flight from the gun.

According to our invention we so construct the fuse that a rotative detonator-pellet which is eccentrically disposed within the fuse-body will be normally retained out of alinement with the firing-needle until released by centrifugal force acting on locking-bolts during the flight of the shell, the said pellet by reason of its eccentricity then changing its position angularly until it brings its detonator in alinement with the firing-needle. In this position the pellet is restrained from further angular movement, but is free to shift longitudinally on impact and cause its detonator to strike the needle and explode the shell.

In order that our said invention may be clearly understood and readily carried into effect, we will proceed to describe the same more fully with reference to the accompanying drawings, in which we have illustrated our improved fuse in a form to be applied to the base of a shell.

Figure 1 is a central longitudinal section with the parts in an inactive position—that is to say, in the position they occupy before discharge of the shell from the gun. Fig. 2 is a similar section taken at right angles to

Fig. 1. Figs. 3 and 4 are sectional views corresponding to Figs. 1 and 2 and illustrating the parts in the position they occupy after discharge of the shell from the gun. Fig. 5 is a sectional view similar to Fig. 3, but showing the parts in the position they occupy immediately after impact. Fig. 6 is a transverse section on the line 1 1 of Fig. 1. Fig. 7 is a plan of a screw-plug forming part of the fuse, as hereinafter described.

In all the figures like letters of reference indicate similar parts.

A is the body of the fuse, within a cavity A' of which is located the pellet B, having pivots or axes *b b* coaxial with the longitudinal axis of the fuse. The shape of the said pellet is such that the center of gravity thereof is eccentric to the axis of the said pivots or axes. It is furnished with one or more laterally-disposed bolts C, the heads *c* of which are by means of springs *c'* kept in engagement with recesses *a*, formed for their reception in the body A of the fuse. The pellet is by means of such bolts held locked to the fuse-body and rendered incapable of performing any independent movement. In this position of the pellet the detonator B', which it carries, is out of alinement with the firing-needle D. The tails *c²* of the said bolts are weighted and occupy such a position relatively to the longitudinal axis of the fuse that during the flight and spin of the shell to which the fuse is applied the heads *c* of the said bolts are caused by centrifugal force acting on the said weighted tails *c²* to be withdrawn from their recesses in the fuse-body, and thereby release the pellet from its locked position. The rotation of the pellet about its pivot-pins *b b* then becomes independent of the rotation of the fuse, and by reason of the eccentric position of the center of gravity of the said pellet the speed of its rotation is diminished, while the speed of rotation of the fuse-body remains unchanged. The position of the detonator B' with respect to the firing-needle D is thereby altered and continues to alter until the said detonator comes into alinement with the firing-needle. Immediately this alinement occurs a catch-bolt E carried by the pellet is caused to be thrust into a

longitudinal slot A^2 in the fuse-body by a spring e , whereby the pellet is locked to the fuse-body in its new angular position, (see Figs. 3 and 4;) but the aforesaid longitudinal slot A^2 leaves the pellet free to move forward on impact of the shell, and consequently when such impact takes place the said pellet will by its own momentum fly forward and cause its detonator B' to strike the firing-needle D . The resulting "flash" explodes the shell, as is well understood. In order to permit of this longitudinal forward movement of the pellet, the pivots thereof and their bearings b b' are made so long that the pivots can slide longitudinally without any liability of the pellet to become disengaged from the said bearings.

The forward end of the fuse-body is provided with a screw-plug D' for closing the aforesaid cavity A' , and this plug is furnished with a projection D^2 , which is so arranged that it will lie contiguous to the end of the aforesaid pellet (see Fig. 1) and restrain the latter from longitudinal movement until the detonator has assumed its position of alignment with the firing-needle. This projection D^2 also reduces the transverse stress that would otherwise come upon the aforesaid lateral bolts C C carried by the pellet and enables them to readily shift when subjected to the action of centrifugal force during the flight of the shell. The said plug D' has a series of flash-holes d contiguous to the firing-needle D , such holes opening into a cavity d' , containing an explosive mixture which is fired by the flash on impact of the shell. In order to insure that the flash shall be effectually projected through the said holes d we prefer to provide a cavity b^2 , containing an explosive mixture, immediately at the rear of the detonator B' , so that on explosion of the detonator this explosive mixture will likewise be fired and give rise to a flame that will extend completely through the flash-holes. It will be obvious that the position of the firing-needle and the detonator may be reversed—that is to say, the firing-needle may be arranged on the pellet and the detonator on the plug D' . Likewise the bolts C and E may be arranged in the fuse-body instead of in the pellet.

If desired, the front pivot or axle of the pellet may be provided with a spring, which will offer sufficient resistance to the longitudinal movement of the pellet to prevent its shifting longitudinally forward toward the firing-needle before impact of the shell occurs.

What we claim is—

1. In a percussion-fuse provided with a detonator and a firing-needle, the combination of an eccentric pivotal pellet and of means for locking said pellet in an inactive position until released by the action of centrifugal force during the flight of the shell substantially as described.

2. In a percussion-fuse provided with a det-

onator and a firing-needle, the combination of an eccentric pivotal pellet having pivot-pins which are coaxial with the axis of the fuse and of bearings in which said pins are mounted so as to be capable of longitudinal as well as angular movement, substantially as and for the purpose specified.

3. In a percussion-fuse provided with a detonator and a firing-needle, the combination of an eccentric pivotal pellet capable of longitudinal movement, of locking-bolts which normally retain said pellet in an inactive position and of weights at the tail ends of such bolts for enabling centrifugal force to act upon the bolts and disengage them during the flight of the shell substantially as and for the purpose specified.

4. In a percussion-fuse provided with a detonator and a firing-needle, the combination of an eccentric pivotal pellet located in a cavity within the fuse-body, of weighted locking-bolts which are released by centrifugal force during the flight of the shell and permit the pellet to perform an independent angular movement to bring the detonator and firing-needle in alignment, and of means for restraining further angular movement of said pellet but rendering it free to move longitudinally to cause the detonator and firing-needle to strike on impact of the shell substantially as described.

5. In a percussion-fuse provided with a detonator and a firing-needle, the combination of an eccentric semicylindrical pellet pivotally mounted in a cavity within the fuse-body, of long pivot-pins carried by said pellet, of bearings coaxial with the axis of the fuse and within which the pivot-pins are capable of longitudinal as well as angular movement, of transverse locking-bolts carried by said pellet and adapted to normally engage with holes in the fuse-body under the influence of light springs, of weighted tailpieces on said locking-bolts to enable centrifugal force to withdraw the bolts from the holes and thereby release the pellet during the spin and flight of the shell, of a transverse catch-bolt carried by said pellet and adapted to engage with a longitudinal groove in the fuse-body when said pellet, after its release and independent angular movement about its pivot-pin, brings the detonator and firing-needle in alignment, all substantially as described and for the purpose specified.

6. In a percussion-fuse provided with a detonator and a firing-needle, the combination with the eccentric pivotal pellet, of a screw-plug for closing the mouth of the cavity in the fuse-body and of a projection on such plug, said projection serving to resist longitudinal movement of the pellet and avoid lateral stress on the locking-bolts while said pellet occupies its inactive position substantially as described and for the purposes specified.

7. In a percussion-fuse, the combination

5 with the eccentric pivotal pellet of a detonator carried by said pellet in a cavity containing an explosive mixture, of a firing-needle carried by the screw-plug closing the mouth of the cavity in which the pellet is located and of a series of holes extending through said plug into a recess formed therein to contain an explosive mixture, substantially as described and for the purpose specified.

In witness whereof we have hereunto set to our hands this 18th day of May, 1898.

FREDERICK MARTEN HALE.

JAMES DEAS.

JOHN BRODIE REAVIL.

Witnesses:

CHAS. B. BURDON,

F. W. McLELLAN.