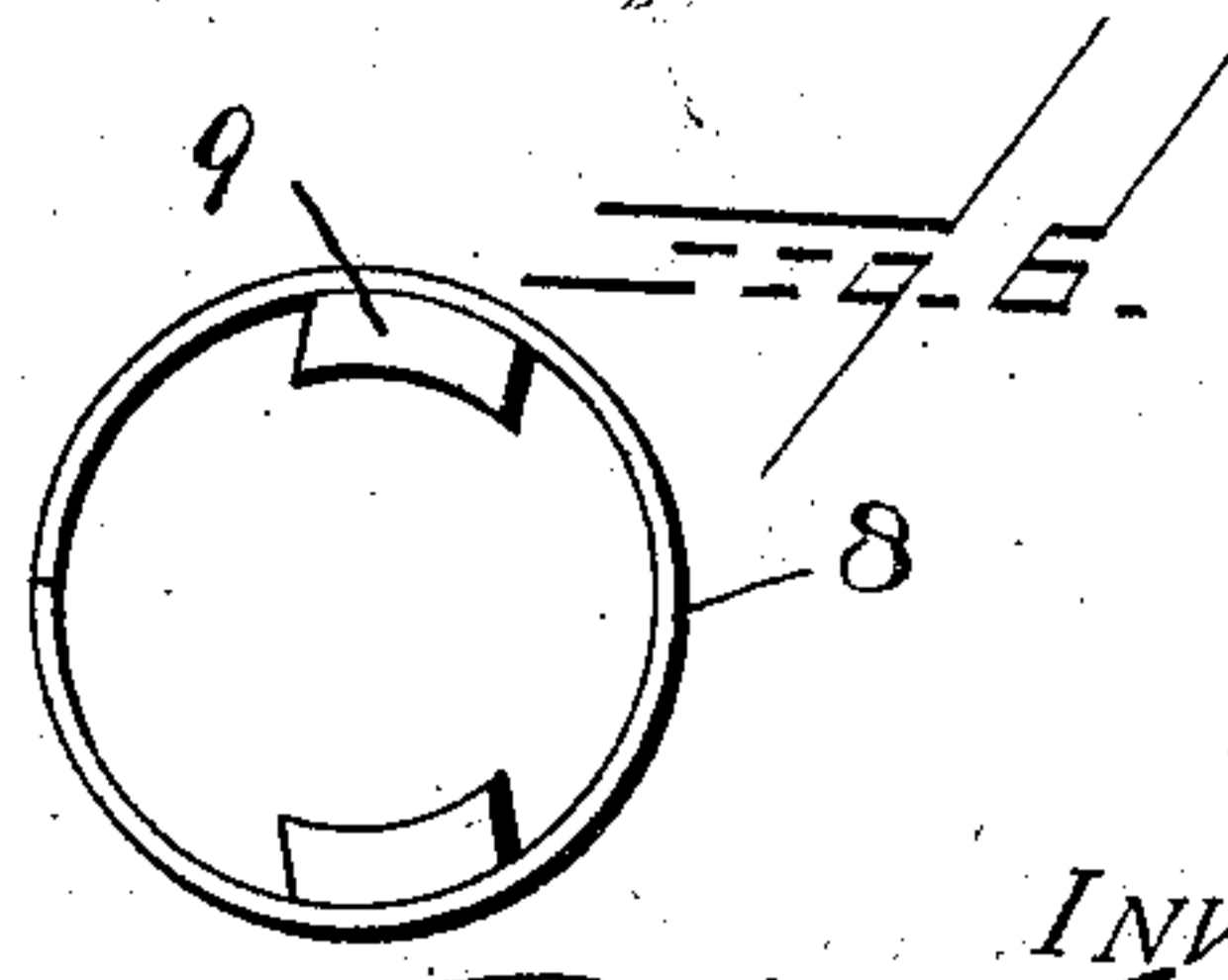
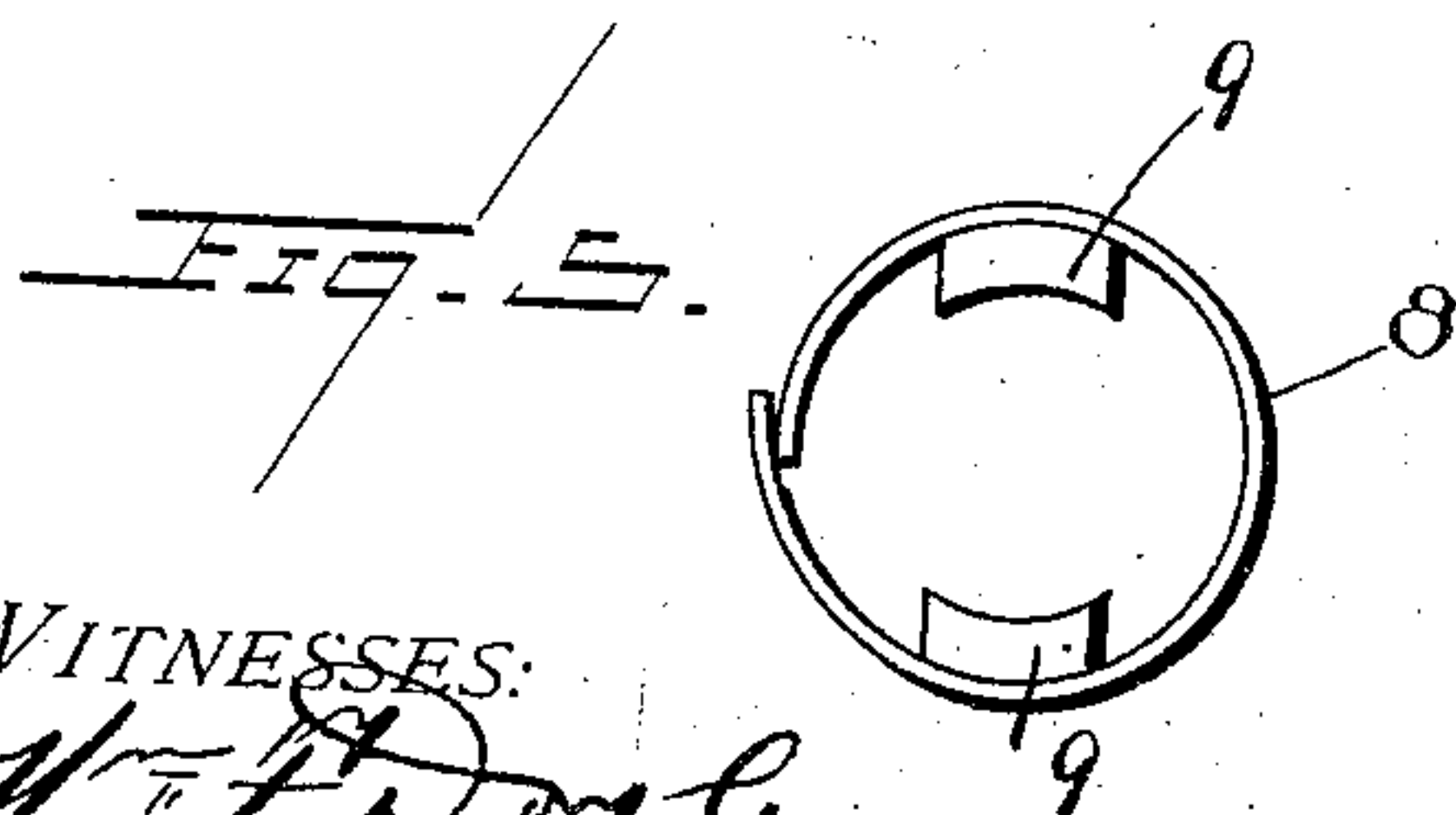
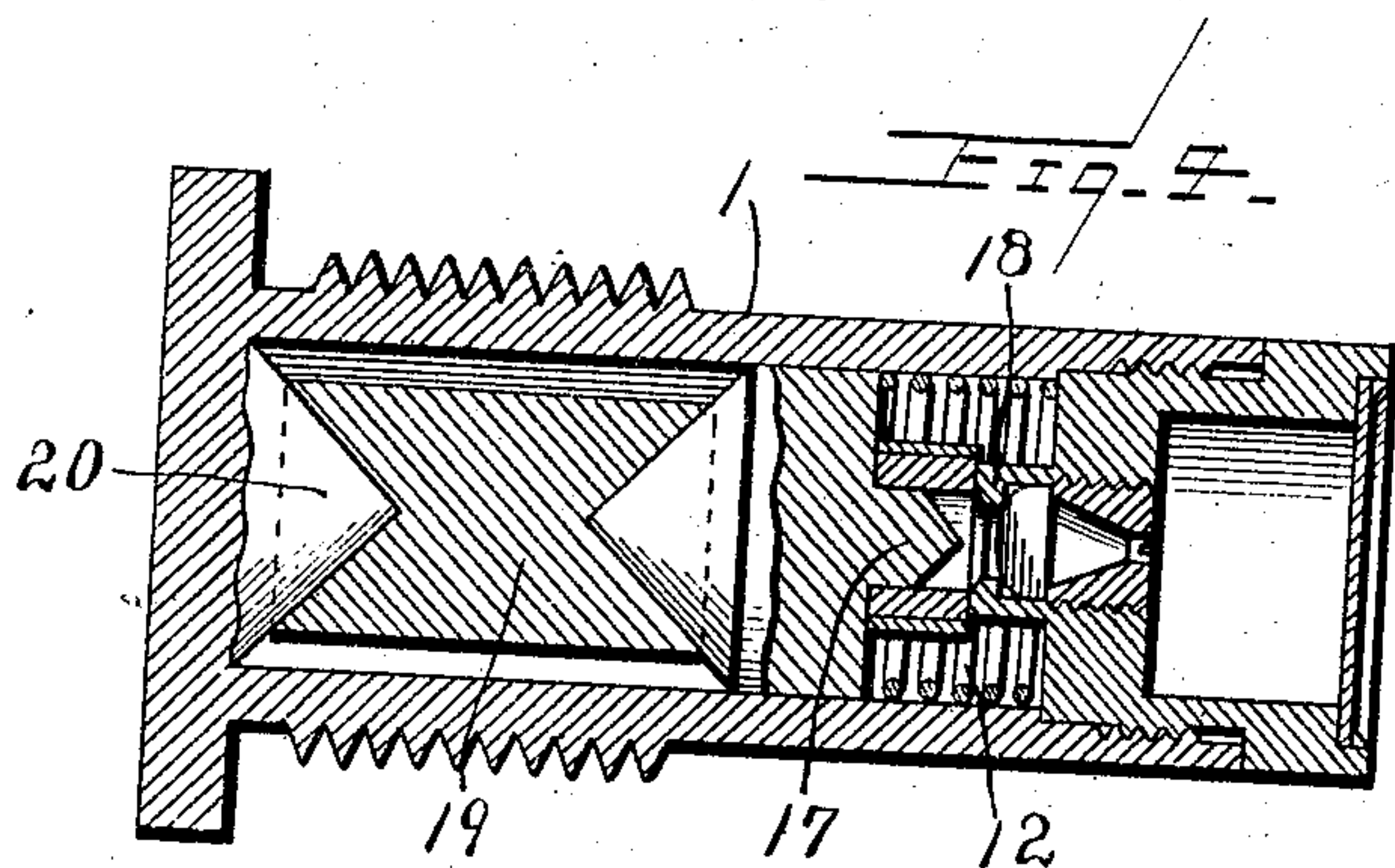
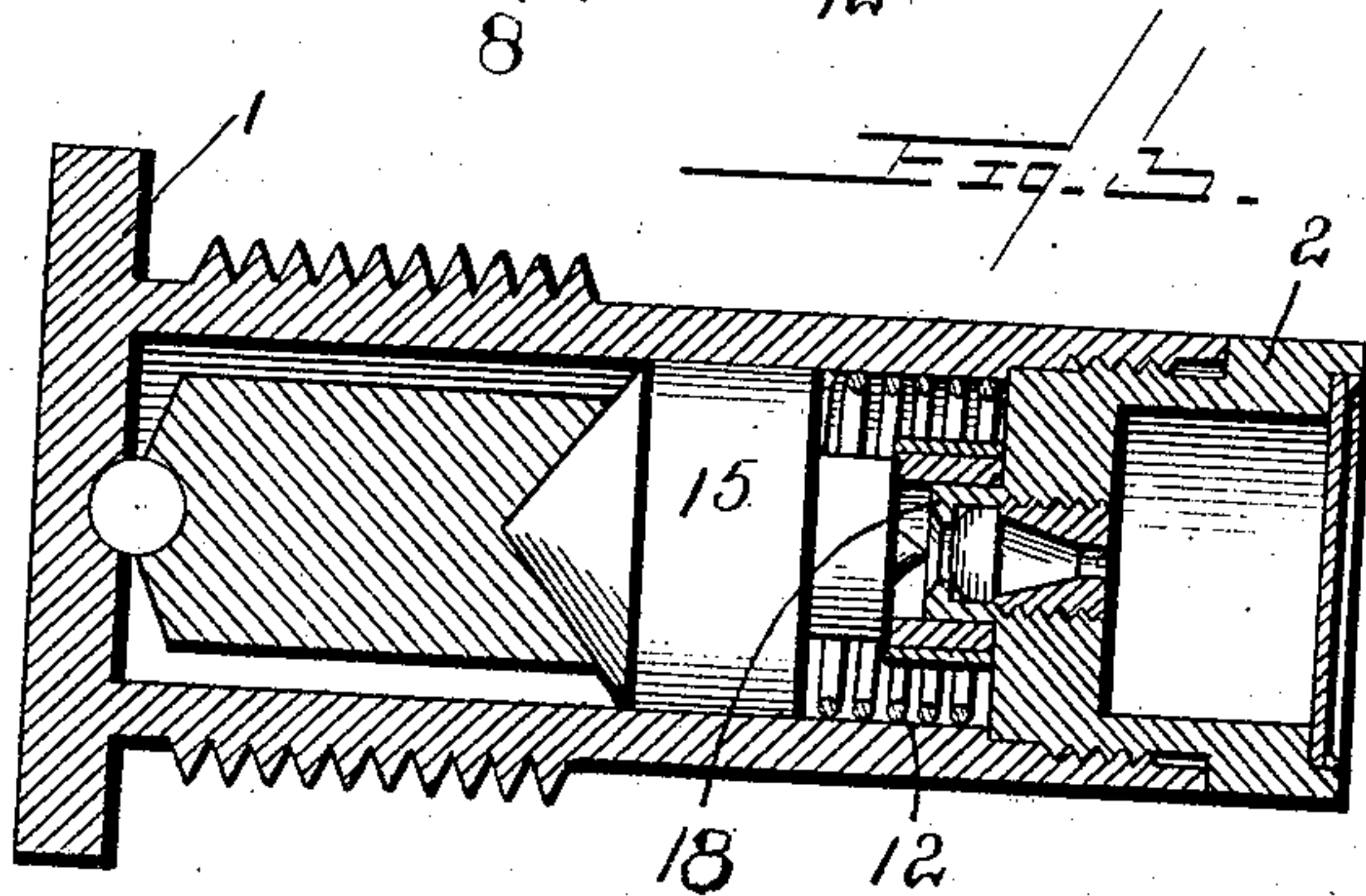
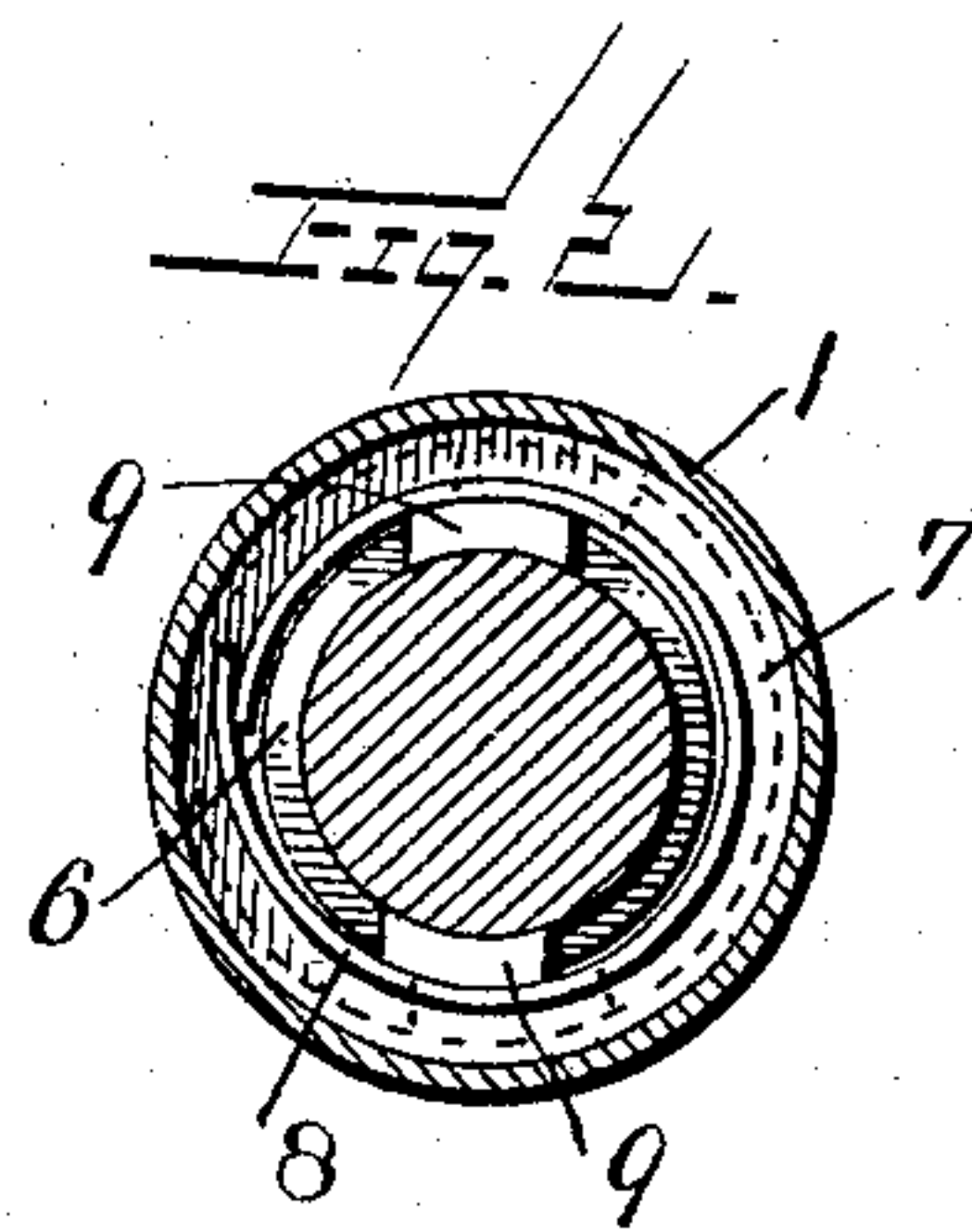
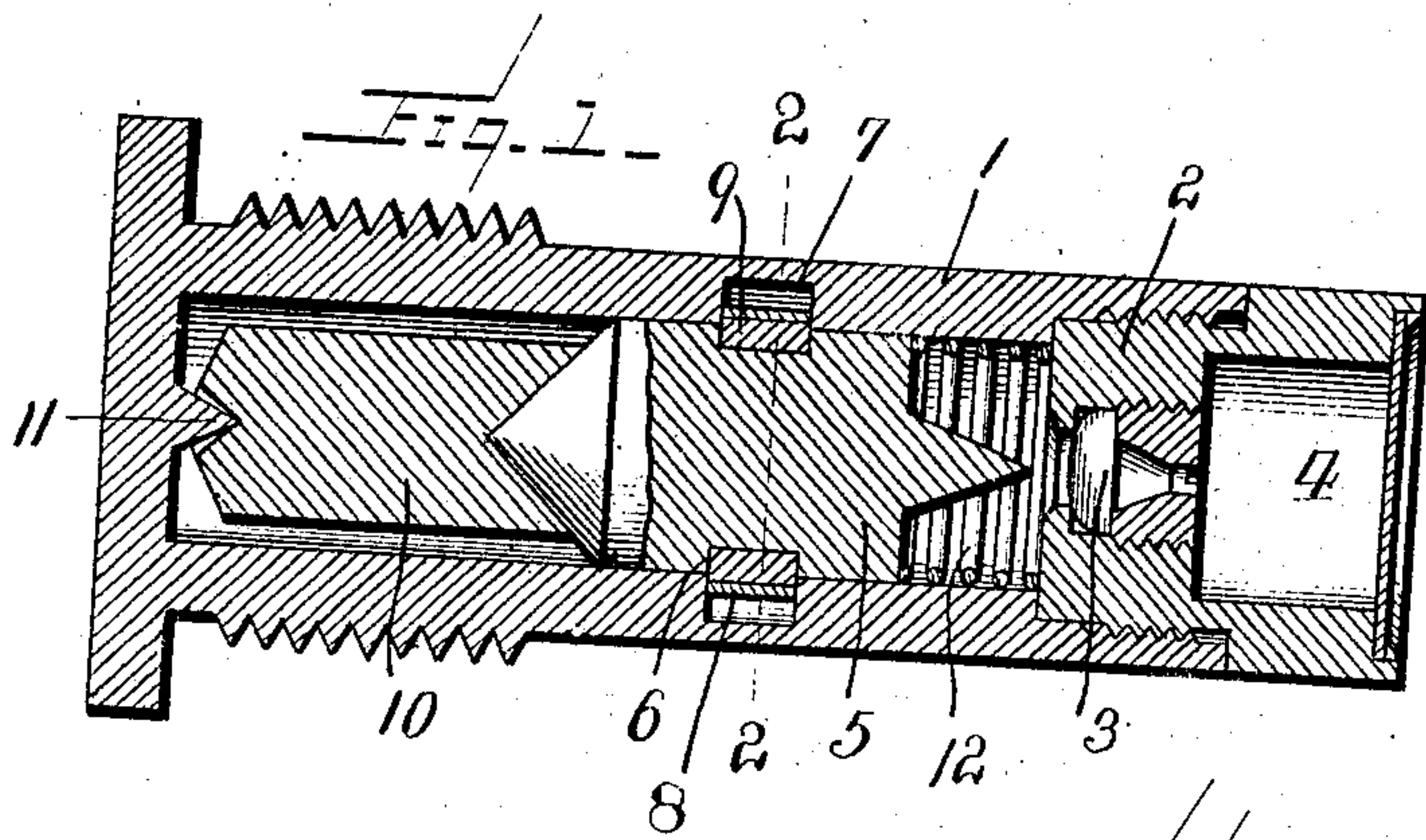


No. 785,540.

PATENTED MAR. 21, 1905.

D. J. CARTWRIGHT.  
PERCUSSION FUSE.

APPLICATION FILED AUG. 19, 1903.



WITNESSES:

*W. F. Doyle*  
*A. C. Sullivan*

INVENTOR

*David J. Cartwright*

BY

*Henry C. Carter*  
Attorney



# UNITED STATES PATENT OFFICE.

DAVID J. CARTWRIGHT, OF HULL, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO WALTER S. WAIT, OF NEWTON, MASSACHUSETTS.

## PERCUSSION-FUSE.

SPECIFICATION forming part of Letters Patent No. 785,540, dated March 21, 1905.

Application filed August 19, 1903. Serial No. 170,082.

*To all whom it may concern:*

Be it known that I, DAVID J. CARTWRIGHT, a citizen of the United States, residing at Hull, in the county of Plymouth and State of Massachusetts, have invented certain new and useful Improvements in Percussion-Fuses, of which the following is a specification, reference being had therein to the accompanying drawings.

The present invention has for its object to provide a safety-fuse for explosive projectiles, which while it will not be sensibly affected by shocks or blows incident to handling or transportation of the projectiles, so that premature or accidental discharges of the same are entirely eliminated, yet will automatically be "armed" or placed in condition for exploding or detonating the primer-cap upon the discharge of the projectile from a gun, the fuse, furthermore, being so constructed that it will operate to effect the explosion of the primer or percussion cap and the ignition of the projectile charge in whatever position or at whatever angle the projectile may strike.

The fuse which I have invented comprises as its essential features a detonating-plunger which is longitudinally movable within the fuse-case and provided with a firing-pin to strike the percussion-cap, a locking device which normally holds the detonating-plunger in its inactive or "safe" position, securing it against all accidental or premature movement, and means for imparting to said detonating-plunger after the locking device has released it a longitudinal striking movement, no matter at what angle the projectile may strike.

In order that the invention may be clearly understood by those skilled in the art, I have illustrated in the accompanying drawings, to which reference will be made hereinafter, several embodiments of my invention.

In said drawings, Figure 1 is a longitudinal sectional view of a fuse made in accordance with my invention. Fig. 2 is a transverse sectional view of the fuse on line 2-2, Fig. 1. Figs. 3 and 4 are views illustrating modifications of the fuse shown in Fig. 1.

Figs. 5 and 6 are detail views of the plunger-locking device, to which reference will be made hereinafter.

Referring to the drawings by numerals, 1 designates the fuse-case, which may be of any suitable size and construction to adapt it for insertion in the projectile. Said casing is chambered, as shown, and has the fuse-magazine 2 with the usual detonating-charge chamber 4 and percussion member 3 screw-threaded within the bore of the fuse-case.

Mounted within the fuse-case in rear of the fuse-magazine 2 is the detonating-plunger 5, having the usual firing-point and being provided with a groove or recess 6, which when the parts are in the position shown in Fig. 1 registers with a groove or recess 7 in the inner wall of the fuse-case.

Seated within the groove 7 of the fuse-case is an annular strip or divided ring 8, having inwardly-projecting lugs 9, which engage the groove 6 in the plunger and normally hold it, in the position shown in Fig. 1, locked to the fuse-case against longitudinal movement. Said strip 8 is made of steel or other suitable material and is "set" in making, so that its normal position is the contracted position (shown in full lines in Fig. 2 and in Fig. 5,) with one end lapped upon the other. In this position the annular strip 8 is not under tension, but is in normal condition, and, as shown in Figs. 1 and 2, it is of less diameter than the diameter of the groove 7 in the inner wall of the fuse-body, so that room is provided for expansion of the annular strip 8.

The rear end of the plunger 5 is made conical, as shown, and is seated in a conical pocket formed in the forward end of a hammer-block 10, preferably cylindrical in cross-section, interposed between the plunger 5 and the rear wall of the fuse-case 1, the rear end of the hammer-block 10 being preferably seated against a bearing-point 11, projecting from the rear wall of the fuse-case. This construction of hammer-block and its manner of mounting within the fuse-case is preferable for the reason that a greater transverse movement of the cylindrical hammer-block



and a correspondingly increased longitudinal movement of the detonating-plunger is secured without having to so reduce the weight of the hammer-block as to destroy the effectiveness of its blow. It will be apparent, also, that the conical connection between the detonating-plunger and the hammer will have the effect of transmitting the blow of the hammer toward the center or longitudinal axis of the detonating-plunger and give a direct longitudinal movement to the plunger, so that danger of tilting and binding of the plunger within the fuse-case under the blow of the hammer-block, which tilting and binding is likely to occur when the blow of the hammer is delivered away from the center or near the periphery of the plunger, is entirely obviated. With the parts in the position shown in Fig. 1 it will be seen that the plunger is securely locked by the normally contracted strip 8 against movement longitudinally of the fuse-chamber and that ordinary handling or transportation of the explosive projectile or shocks incidental to falling from a height will not affect the locking device which secures the plunger in safe position or cause longitudinal movement of the plunger. When the projectile is discharged from the gun, however, the rapid centrifugal motion of the same will cause the annular strip 8 to expand to the position shown in Fig. 6 and there be held, the normally lapped ends of the locking-ring being thrown to the position shown in Fig. 6, with their ends abutting and the strip under tension. The abutting ends will, it is apparent, hold the tensioned strip locked in its expanded position. This expansion of the annular strip 8, due to centrifugal force, is of course aided by the relatively heavy lugs on the inner surface of the strip, and when brought to the position shown in Fig. 2 in dotted lines and in Fig. 6 the said lugs will be completely withdrawn from the groove or recess 6 in the plunger 5, thus "arming" the fuse.

It is apparent that if the shell or projectile strikes upon its nose the plunger 5 will slide forward and fire the primer 3 to ignite the detonating charge 2; but if the projectile strike at right angles to the line of movement of the plunger no longitudinal movement of the plunger would ordinarily occur. The hammer-block 10, with which my fuse is provided, will, however, move the plunger 5 forward no matter at what angle the projectile may strike, for it is apparent that upon the striking of the projectile no matter at what angle the hammer-block 10 will be thrown to one side and, owing to the conical engagement of the hammer-block 10 and the plunger 5, transverse movement of the hammer-block will be converted into longitudinal firing movement of the plunger 5.

In order to guard against all possibility of premature longitudinal movement of the freed

plunger 5 after the locking-strip 8 has expanded, the fuse has been armed and before striking of the projectile a light spring 12 may be inserted between the fuse-magazine 2 and the forward end of the plunger 5, this spring 12 being of sufficient strength to hold the plunger 5 away from the primer 3 by counteracting the tendency of the plunger to creep forward during the flight of the shell, but yielding under the force imparted to the plunger upon impact of the projectile.

In the form of the invention shown in Fig. 3 the grooves in the fuse-body and in the plunger are dispensed with and the locking-strip is supported on a nipple 18, carried by the fuse-magazine, the plunger 15 being reduced at its forward end to give clearance for the lugs of the locking-strip when it is expanded and permit longitudinal movement of the plunger. In this construction of the fuse a ball-thrust-bearing engagement is made between the rear of the hammer-block and the rear wall of the fuse-case in place of the conical bearing shown in Fig. 1, the effect of both of these constructions being to permit a greater movement of the forward end of the hammer-block than of the rear end, this engagement being, in effect, a hinged-joint engagement, but one which will not jam or interfere with the movement of the hammer-block.

In the form illustrated in Fig. 4 the locking-strip instead of being mounted upon a nipple on the primer-disk, as in Fig. 3, is supported directly upon the elongated firing-pin 17 of the plunger and in its normal position bears against the end of the nipple 18, projecting rearwardly from the primer-disk, the annular strip when expanded by centrifugal action spreading beyond the circumference of the nipple 18, withdrawing the lugs and freeing the plunger.

In the construction last described, Fig. 4, the hammer-block 19 has coned pockets at each end, which engage, respectively, the coned rear end of the plunger and a coned stud 20, projecting inwardly from the rear wall of the fuse-case. With this construction the hammer-block 19 moves bodily across the longitudinal axis of the plunger when the projectile strikes instead of swinging on a joint or hinge, as in the constructions hereinbefore described, in which the knife-edge or ball-connection thrust-bearing is used.

While I have shown and described particular constructions of my invention and those the best known to me, it is apparent that these constructions are capable of considerable variation within the skill of the mechanic without departing from the spirit of my invention, and I do not, therefore, limit my invention to any of the details shown and described, except in so far as I am restricted by the terms of the appended claims.

I claim as my invention—

1. A fuse for explosive projectiles compris-



ing a fuse-case; a percussion member; means for detonating said percussion member; and a weighted, annular, locking-strip to lock said detonating means in safe position, said strip being expansible under centrifugal action to release said detonating means.

2. A fuse for explosive projectiles, comprising a fuse-case; a percussion member; means longitudinally movable within said fuse-case for detonating said percussion member; and a weighted, annular, locking-strip to lock said detonating means against longitudinal movement, said strip being expansible under centrifugal action to release said detonating means.

3. A fuse for explosive projectiles comprising a fuse-case; a percussion member; means for detonating said percussion member; and a one-piece annular locking-strip to lock said detonating means in safe position, said strip being expansible under centrifugal action to release said detonating means.

4. A fuse for explosive projectiles comprising a fuse-case; a percussion member; longitudinally-movable means for detonating said percussion member; and a one-piece annular locking-strip to lock said detonating means against longitudinal movement, said strip being expansible under centrifugal action to release said detonating means.

5. A fuse for explosive projectiles comprising a fuse-case; a percussion member; means for detonating said percussion member; and a one-piece annular locking-strip to lock said detonating means in safe position, said strip being expansible under centrifugal action to distended position to release said detonating means, and in which distended position it is itself locked against contraction.

6. A fuse for explosive projectiles comprising a fuse-case; a percussion member; longitudinally-movable means for detonating said percussion member; and a one-piece annular locking-strip to lock said detonating means against longitudinal movement, said strip being expansible, under centrifugal action, to distended position to release said detonating means, and in which distended position it is itself locked against contraction.

7. A fuse for explosive projectiles, comprising a fuse-case; a percussion member; means for detonating said percussion member; and a one-piece annular locking-strip, normally contracted so that its ends overlap, to lock said detonating means in safe position, said strip being expansible under centrifugal action to a position with its ends abutting and in locked engagement to release said detonating means.

8. A fuse for explosive projectiles comprising a fuse-case; a percussion member; longitudinally-movable means for detonating said percussion member; and a one-piece annular locking-strip, normally contracted so that its ends overlap, to lock said detonating means

against longitudinal movement, said strip being expansible under centrifugal action to a position with its ends abutting and in locked engagement to release said detonating means.

9. A fuse for explosive projectiles comprising a fuse-case; a percussion member; a longitudinally-movable plunger to detonate said percussion member having a groove or recess formed therein; and a one-piece annular locking-strip engaging the groove in said plunger to lock the same normally against longitudinal movement, said strip being expansible under centrifugal action to release said plunger.

10. A fuse for explosive projectiles comprising a fuse-case having an annular groove or recess formed in its inner wall; a percussion member; a longitudinally-movable plunger to detonate said percussion member having an annular groove or recess formed therein and adapted to register with the groove or recess in the inner wall of the fuse-case; and an annular locking-strip engaging the groove in said plunger to lock the same normally against longitudinal movement, said strip being expansible under centrifugal action within the groove of the fuse-case to release said plunger.

11. A fuse for explosive projectiles comprising a fuse-case having an annular recess or groove formed in its inner wall; a percussion member; a longitudinally-movable plunger for detonating said percussion member having an annular groove or recess formed therein and adapted to register with the groove or recess in the inner wall of said fuse-case; and an annular locking-strip having inwardly-projecting lugs to engage the groove in said plunger and lock the same normally against longitudinal movement, said strip being expansible under centrifugal action within the groove in the fuse-case to withdraw said locking-lugs and release said plunger.

12. In a fuse for explosive projectiles, the combination with a fuse-case; of a percussion member; a longitudinally-movable plunger for detonating said percussion member; means for locking said detonating-plunger normally in safe position; and a hammer-block suspended between the rear end of said detonating-plunger and a hinged bearing at the rear end of the fuse-case, whereby the forward end of said hammer-block is free to move transversely of the fuse-chamber and impart a longitudinal movement to said detonating-plunger.

13. In a fuse for explosive projectiles; the combination with a fuse-case; of a percussion member; a longitudinally-movable plunger for detonating said percussion member having a coned rear end; means for locking said plunger normally in safe position; and a hammer-block engaging the coned end of said plunger and having a hinged bearing at the rear end of the fuse-case, whereby the forward end of said hammer-block is free to move transverse



of the fuse-case and impart longitudinal movements to said detonating-plunger.

14. Locking means for safety-fuses comprising a one-piece divided annular strip expansible under centrifugal action.

15. Locking means for safety-fuses comprising a one-piece divided annular strip normally contracted and having its ends lapped upon each other, but expansible under centrifugal action to distended position with its ends abutting and in locked engagement.

16. Locking means for safety-fuses comprising a one-piece divided annular strip expansible under centrifugal action and having radially-projecting locking-lugs.

17. Locking means for safety-fuses comprising a one-piece divided annular locking-strip normally contracted with its ends lapped upon each other, but expansible to distended position with its ends abutting and in locked engagement, said strip having radial locking-lugs.

18. In a fuse for explosive projectiles, the combination with a fuse-case; of a percussion member; a longitudinally-movable plunger for detonating said percussion member; a one-piece annular locking-strip for locking said plunger normally in safe position; and a cylindrical hammer-block suspended between the rear end of said detonating-plunger and the rear wall of the fuse-case, said hammer-block being transversely movable to impart a

longitudinal movement to the said detonating-plunger.

19. In a fuse for explosive projectiles, the combination with a fuse-case; of a percussion member; a longitudinally-movable plunger for detonating said percussion member having a coned rear end, a one-piece annular locking-strip for locking said detonating-plunger normally in safe position; and a hammer-block engaging the coned end of said plunger and movable transversely of the fuse-chamber, whereby transverse movements of said hammer-block will impart a longitudinal movement to said plunger.

20. In a fuse for explosive projectiles, the combination with a fuse-case; of a percussion member; a longitudinally-movable plunger for detonating said percussion member having a coned rear end; a one-piece annular locking-strip for locking said detonating-plunger normally in safe position; and a hammer-block suspended between the conical rear end of said plunger and the rear wall of the fuse-case, whereby transverse movements of said hammer-block will impart longitudinal movements to said detonating-plunger.

In testimony whereof I affix my signature in presence of two witnesses.

DAVID J. CARTWRIGHT.

Witnesses:

C. M. SWEENEY,  
A. V. CUSHMAN.