

(No Model.)

T. NORDENFELT.

4 Sheets—Sheet 1.

SHELL FUSE.

No. 379,716.

Patented Mar. 20, 1888.

Fig. 3.

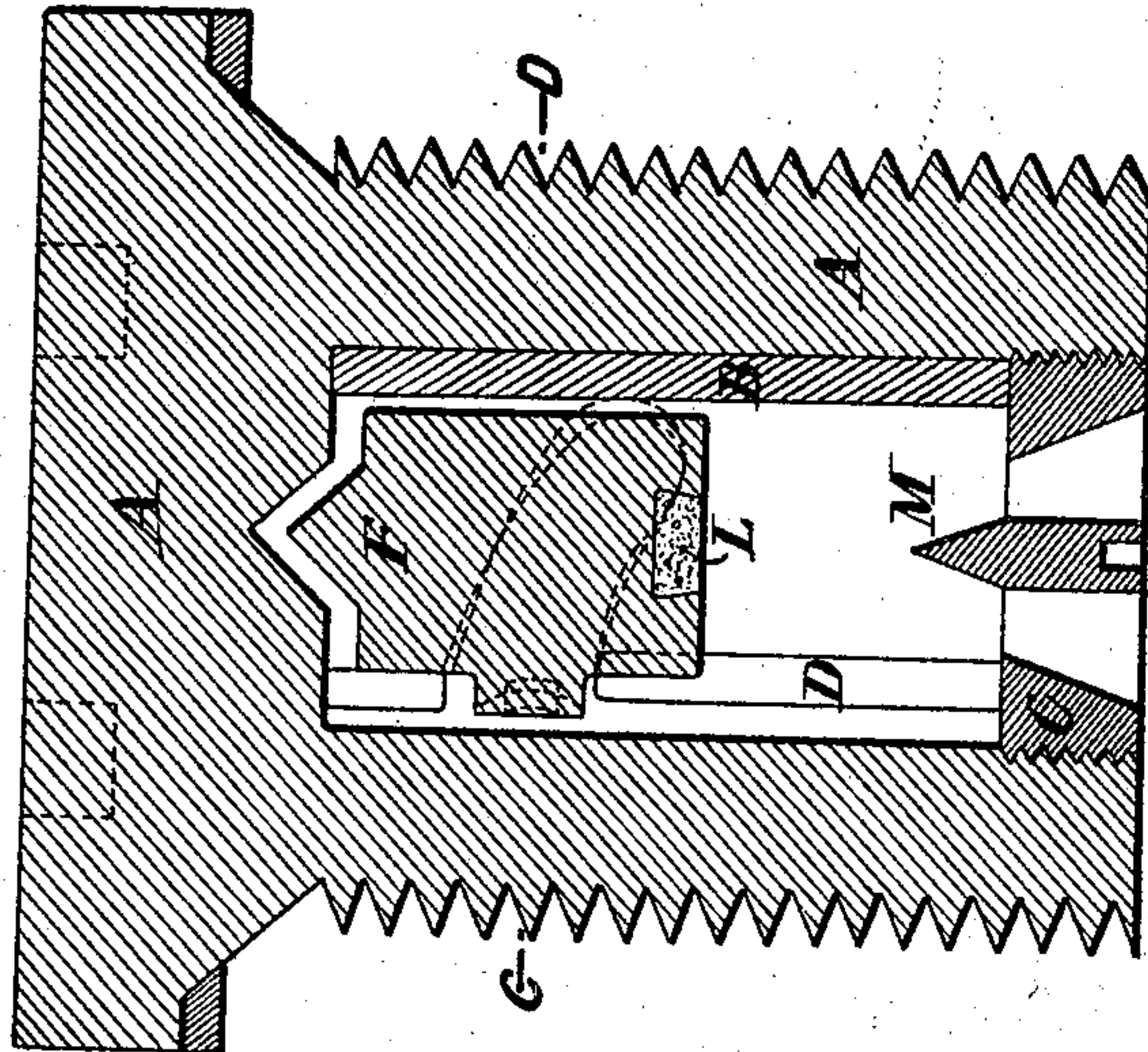


Fig. 2.

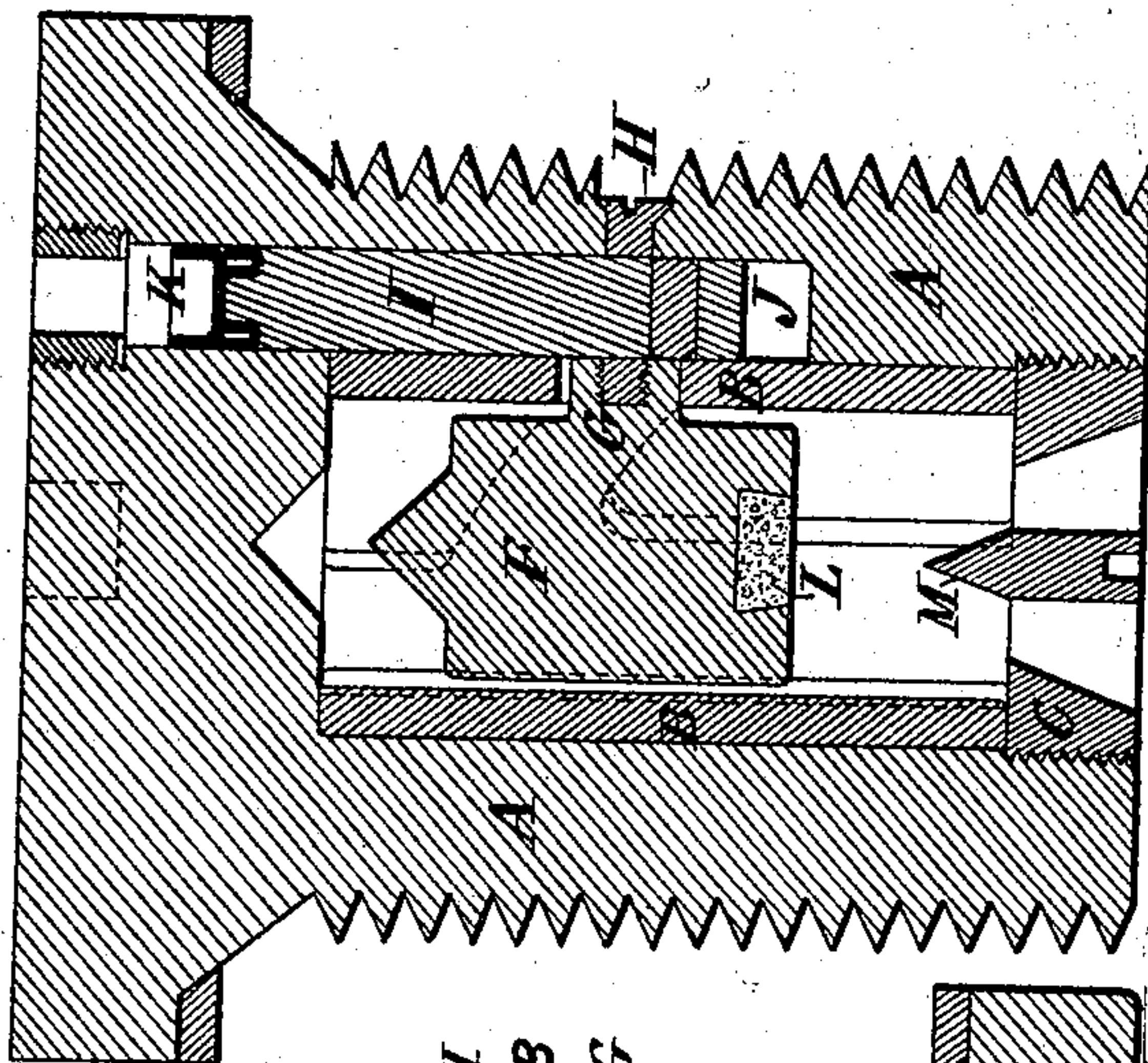
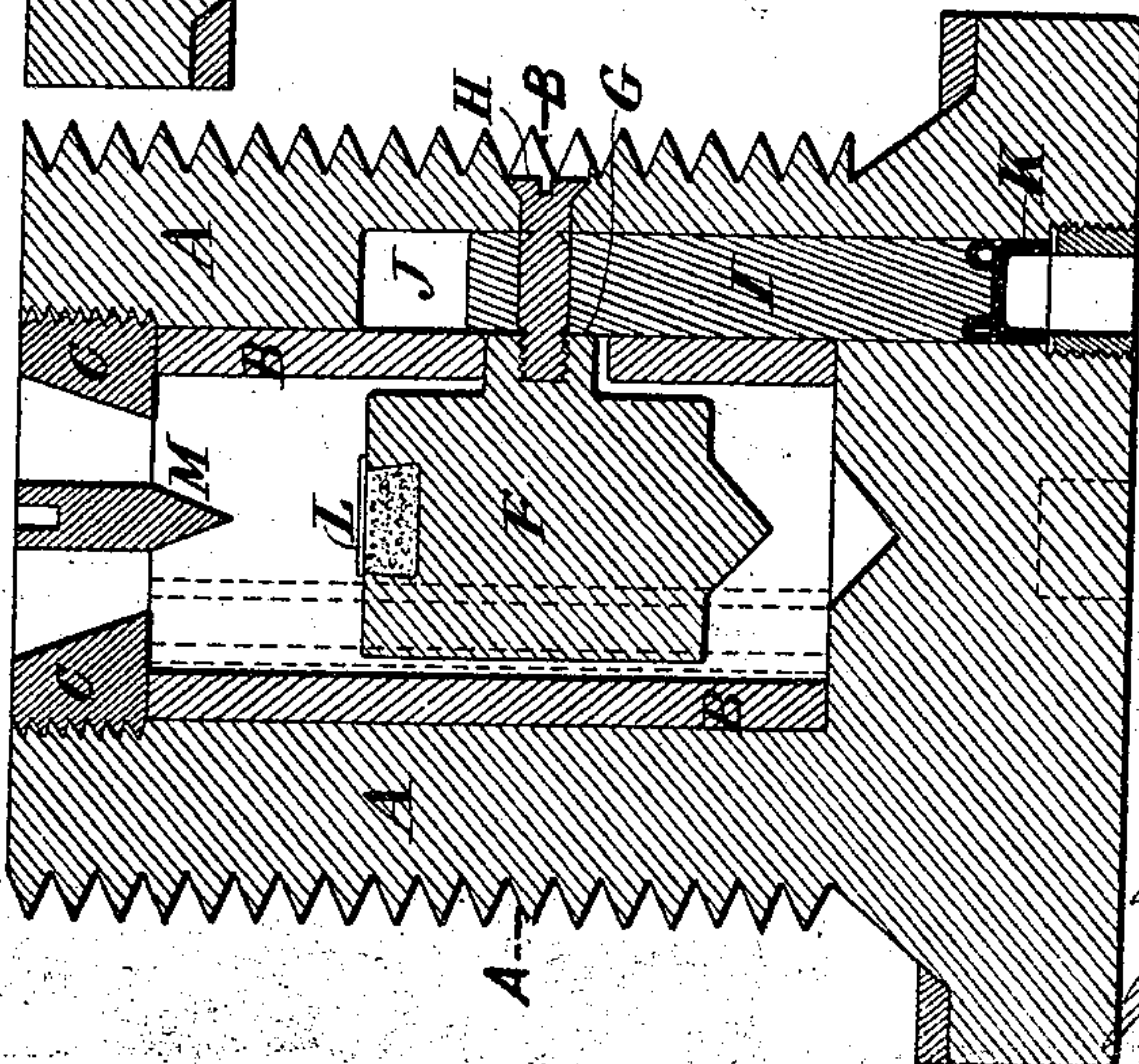


Fig. 1.



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Fig. 5.

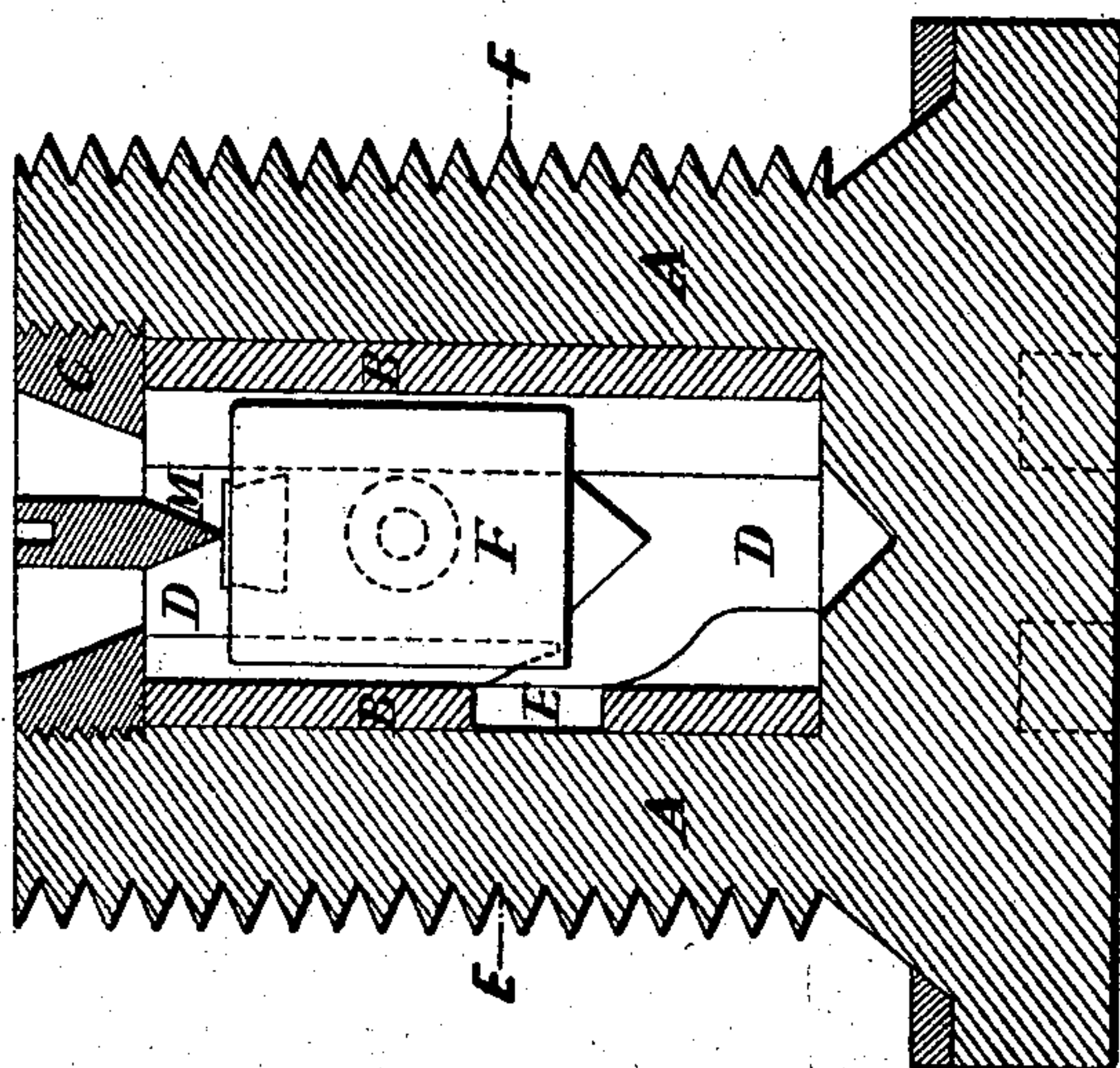
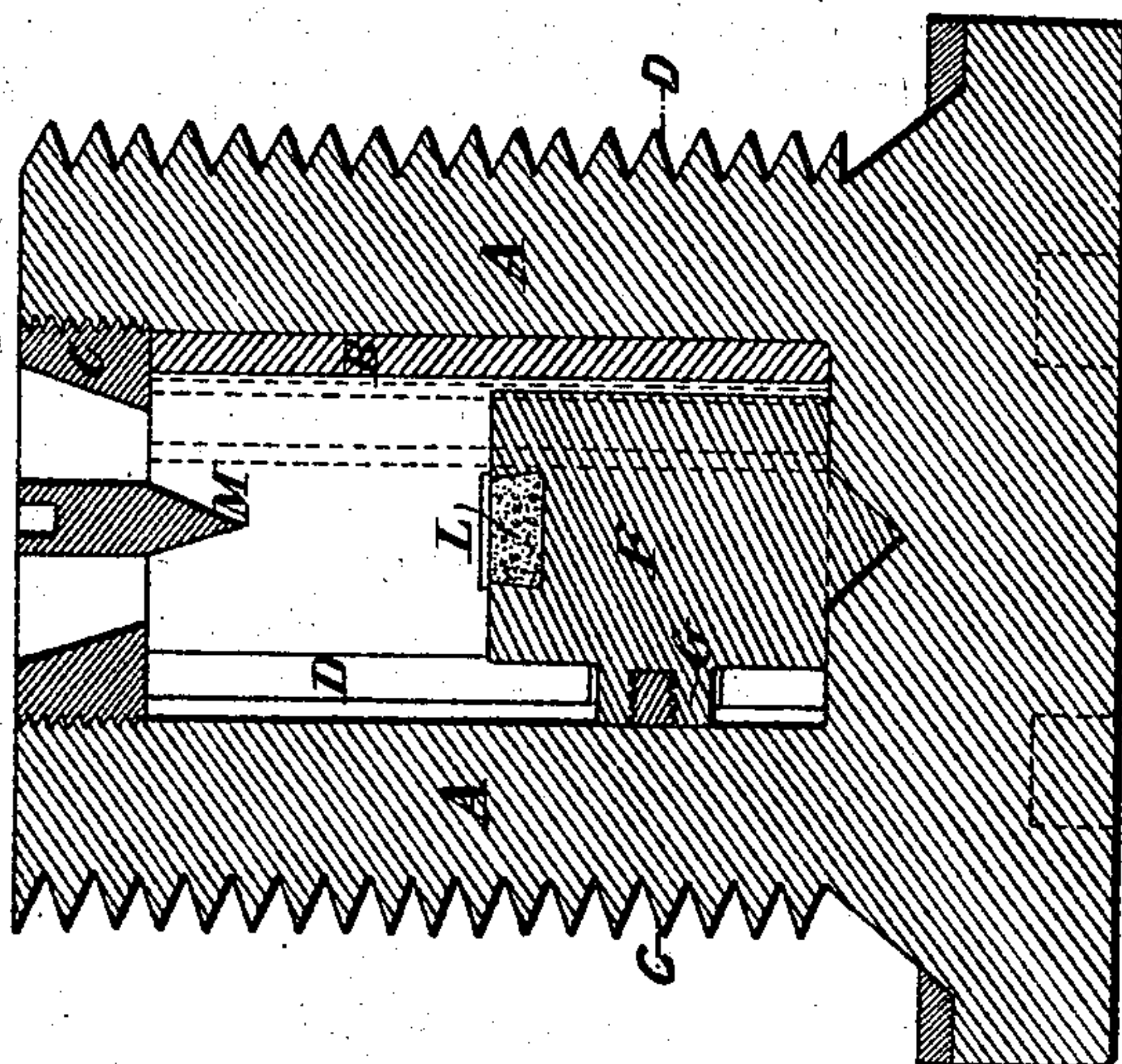


Fig. 4.



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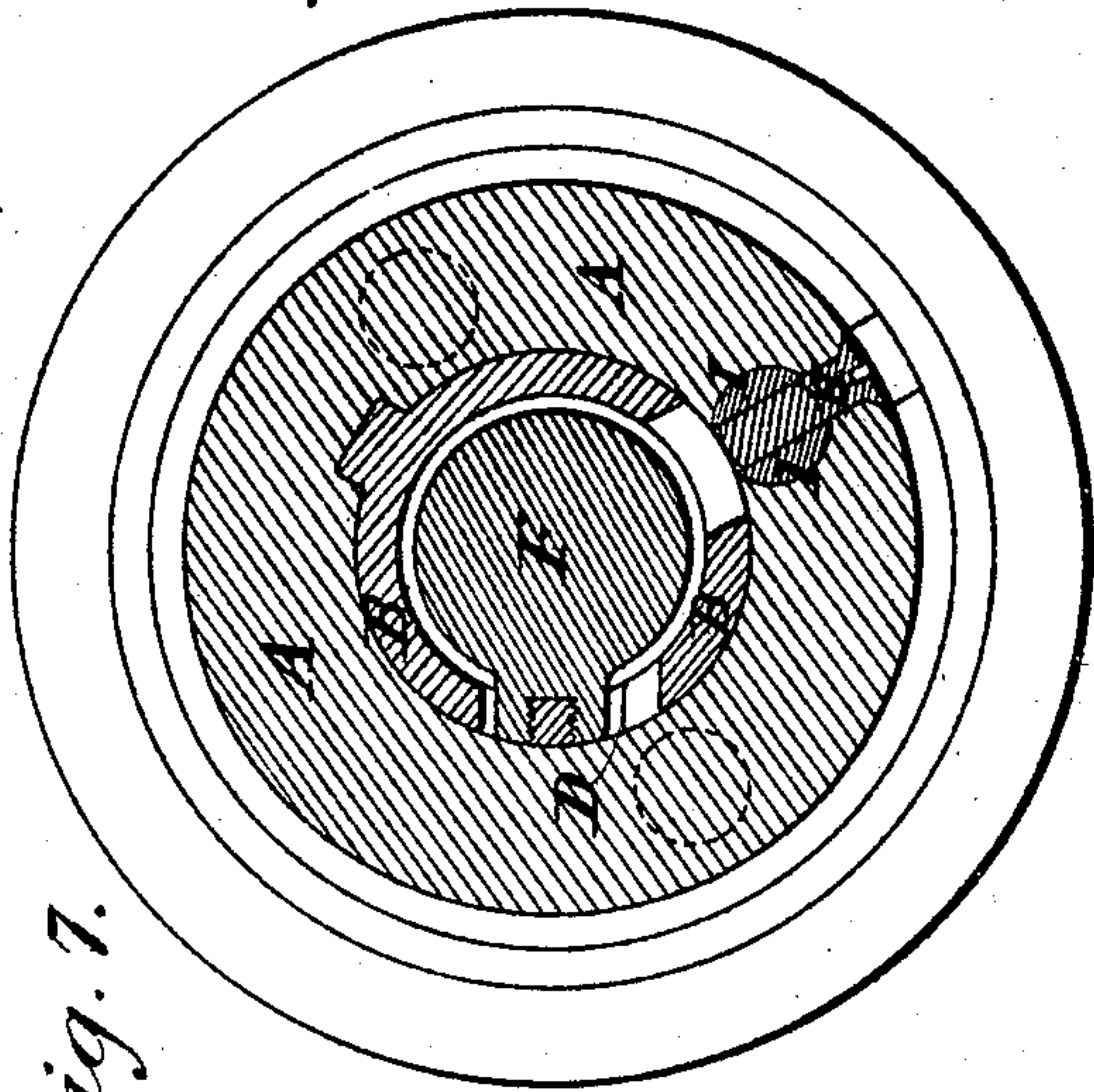


Fig. 7.

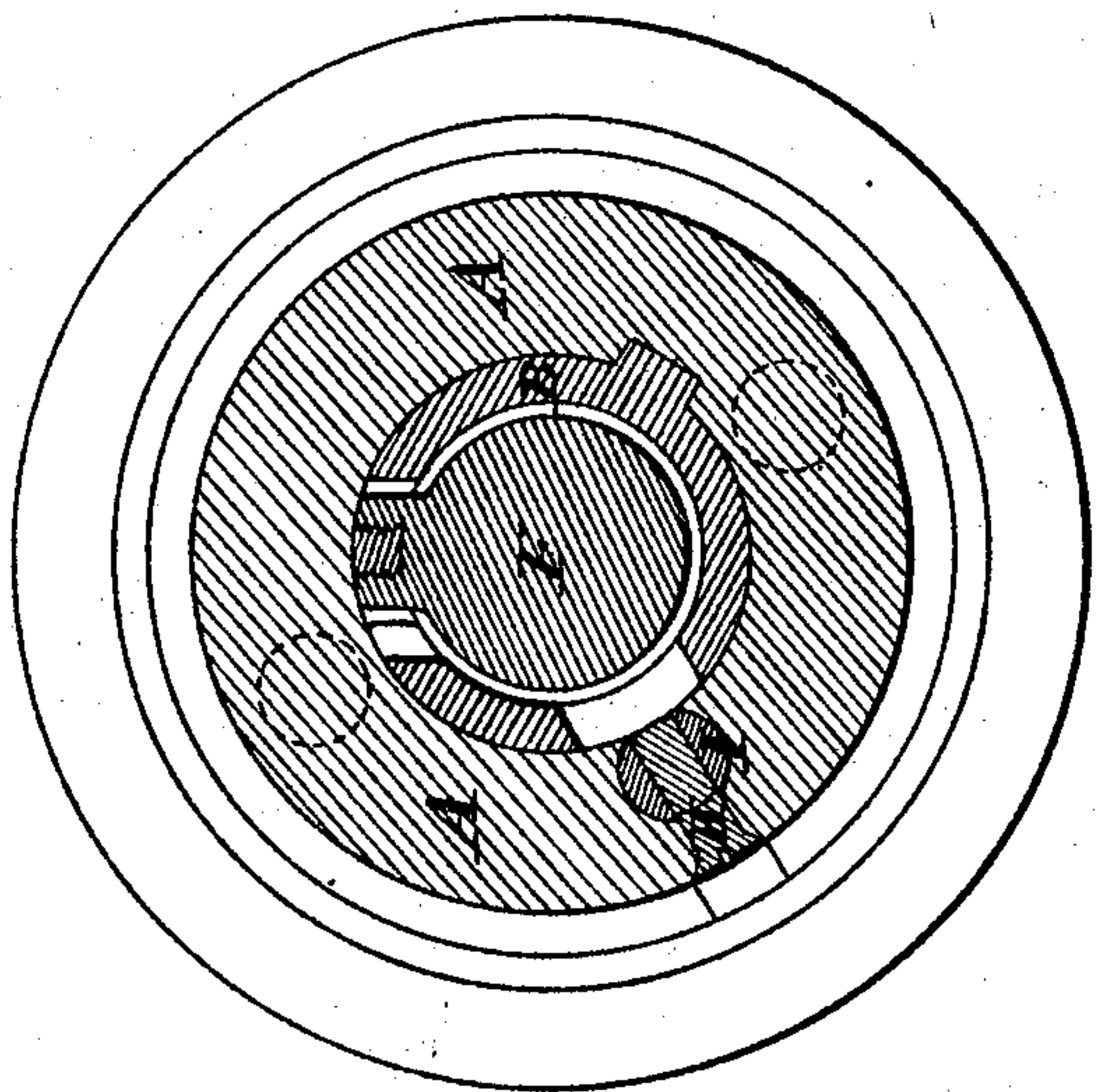


Fig. 8.

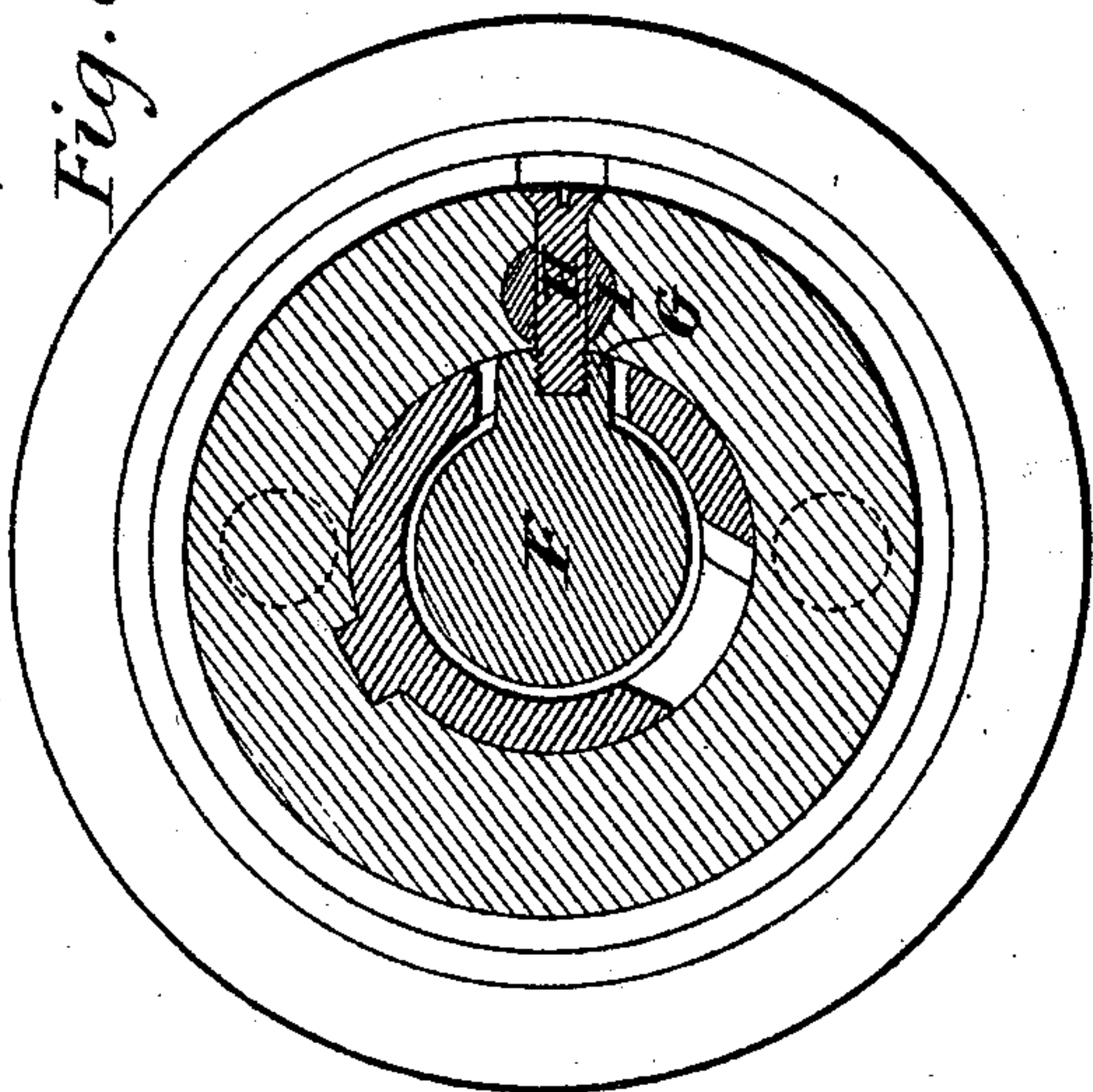


Fig. 6.

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4 Sheets—Sheet 4.

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No. 379,716.

Patented Mar. 20, 1888.

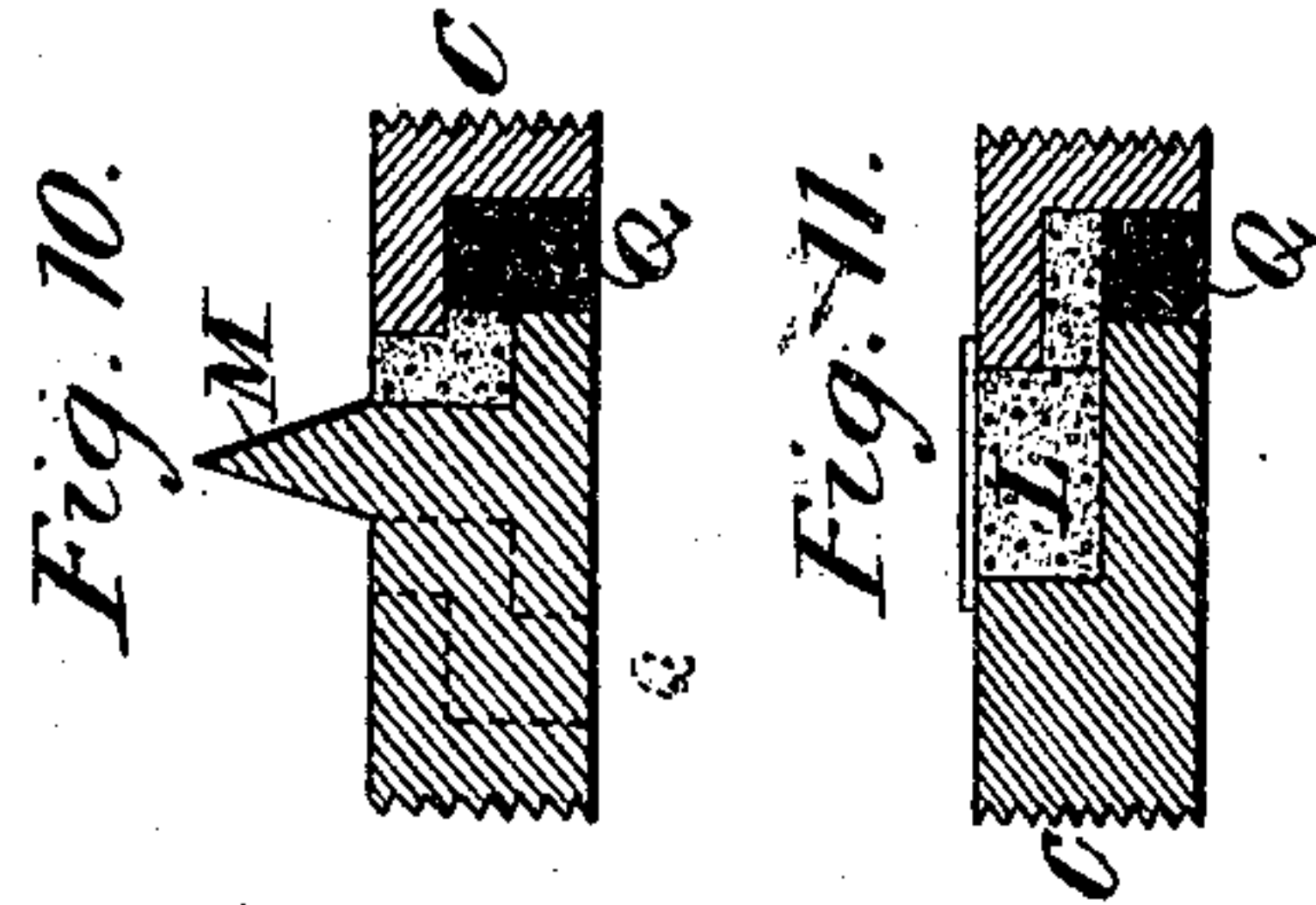
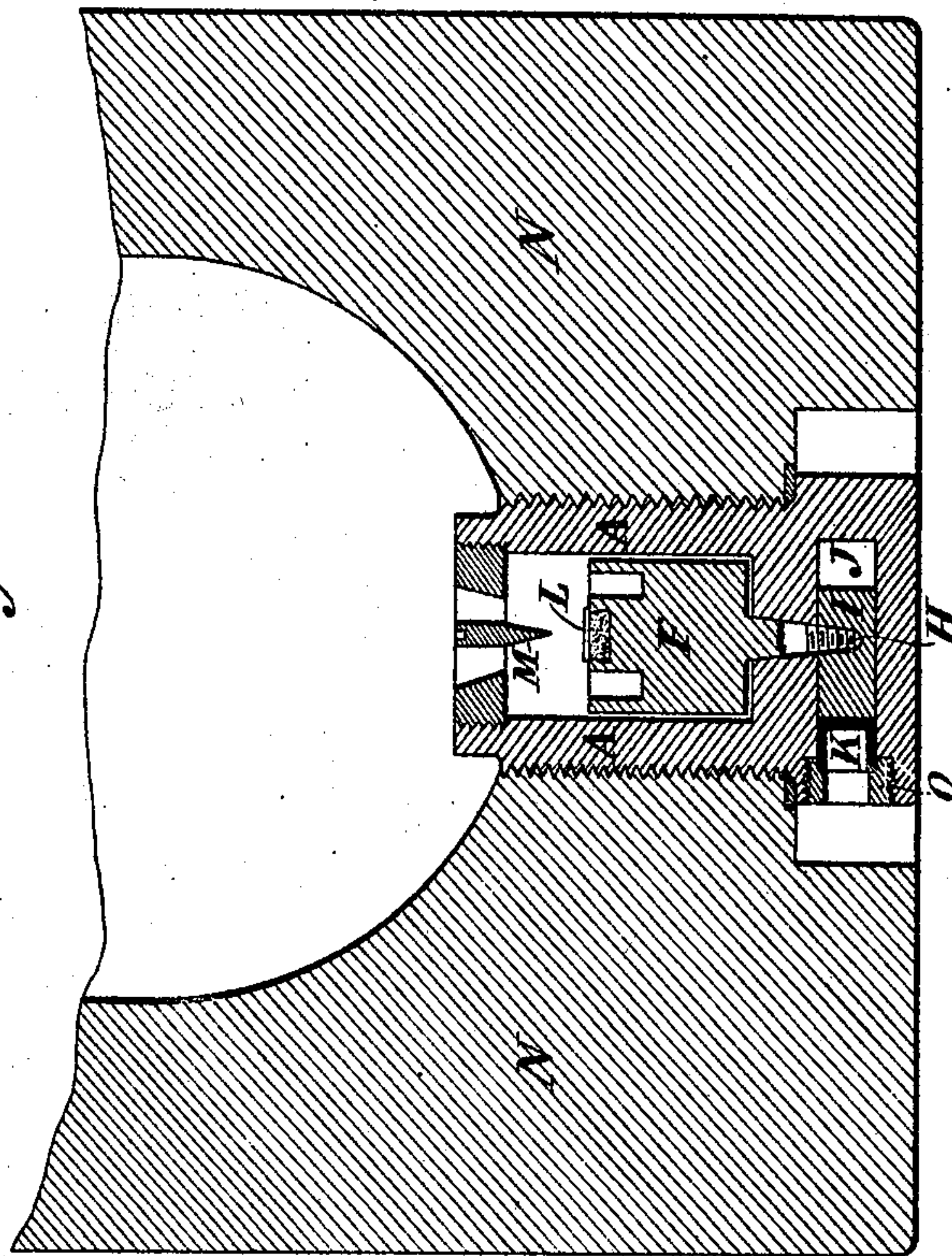


Fig. 9.



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UNITED STATES PATENT OFFICE.

THORSTEN NORDENFELT, OF WESTMINSTER, ENGLAND.

SHELL-FUSE.

SPECIFICATION forming part of Letters Patent No. 379,716, dated March 20, 1888.

Application filed July 12, 1887. Serial No. 244,085. (No model.) Patented in Belgium March 19, 1887, No. 76,756, and in Italy March 31, 1887, No. 21,486.

To all whom it may concern:

Be it known that I, THORSTEN NORDENFELT, a subject of the King of Sweden, residing at 53 Parliament Street, in the city of Westminster, England, civil engineer, have invented certain new and useful Improvements in Fuses for Projectiles, (for which I have received Letters Patent in Belgium, No. 76,756, dated March 19, 1887, and in Italy, No. 21,486, dated March 31, 1887,) of which the following is a specification.

The invention relates to fuses to be applied to the base of a projectile.

The improvements have mainly for their object to make an efficient fuse possessing the following qualities: first, that it shall be perfectly safe in handling, so that no concussion or shaking can set it into action; second, that the pellet shall be set free by the pressure of the gases in the bore of the gun; third, that the pellet, although set free, shall be unable to come forward and burst the shell until the shell has left the muzzle of the gun; fourth, that the fuse may readily be changed from a direct-action to a delayed fuse, or vice versa. I obtain these results in the following manner: I liberate the pellet at the time when the projectile is fired from a gun by causing the pressure of the powder-gases to thrust forward a bolt and shear off a pin by which the pellet was previously held fast. In addition I render it impossible for the pellet when so liberated to fly forward while the projectile is within the gun by forming the pellet with a side lug or projection to lie in a groove which is at right angles or inclined to the longitudinal axis of the projectile. As the projectile rotates, the lug passes along this groove, and when the projectile has left the gun it enters a groove formed lengthwise of the body of the fuse, and is then free to fly forward whenever the forward movement of the projectile is arrested or checked.

The means used for liberating the pellet may be employed separately without making provision for preventing the pellet from at once flying forward.

Figures 1 to 8 of the drawings hereunto annexed show various views of a percussion-

fuse formed as above described. Fig. 1 is a longitudinal section of the fuse ready for use. Fig. 2 is a similar section of the fuse at the time when the bolt has been forced forward by the pressure of the powder-gases, leaving the pellet free to turn, but not to fly forward. Figs. 3 and 4 show the fuse at the time when the projectile has left the gun and the pellet is free to fly forward. Fig. 5 shows the fuse at the time when the flight of the projectile has been arrested and the pellet thrown forward and about to fire the charge of the shell. Fig. 6 is a transverse section through the line A B, Fig. 1. Fig. 7 is a transverse section through the line C D, Figs. 3 and 4; and Fig. 8, a transverse section through the line E F, Fig. 5. Fig. 9 is a longitudinal section of a fuse in which a bolt thrust forward by the action of the powder-gases is used, but in which no provision is made for preventing the pellet from flying forward. Fig. 10 is a longitudinal section of a modified form of the ring C, to allow of either of the fuses being readily converted into a delayed fuse. Fig. 11 shows another modified form by which the same end may be attained.

In Figs. 1 to 8, A is the body of the fuse, in steel or brass or other suitable metal.

B is a cylindrical lining placed within the interior of the body and retained therein by a screw-ring, C. This cylindrical lining I, by preference, form of steel. Through the lining is formed a longitudinal slot, D, having a slot, E, branching from it. This branch slot is shown to be inclined to the longitudinal axis of the fuse.

F is the pellet, formed with a lug, G, projecting from its side to enter these slots.

H is a pin passed through the side of the body and screwed into the lug G. The pin H also passes through a steel bolt, I. This bolt lies within a hole or small cavity, J, formed longitudinally in the body A close to one side of its hollow central chamber. The rear end of the hole J is open, so that the pressure of the powder-gases may get to the rear end of the bolt and force it forward. Copper cups or lead washers, or any other forms of gas-checks, K, are used to prevent the powder-gases from

getting past the bolt. A single cup may be used, or a pair of cups, one in rear of the other, may be used, as preferred.

When the powder-gases force forward the bolt I, the bolt shears the pin H, as shown at Fig. 2. Afterward, as the projectile rotates, the lug G of the pellet passes along the inclined slot E and into the longitudinal slot D, as shown at Figs. 2 and 3, so that the pellet may be free to fly forward when the flight of the projectile is arrested.

The length and the disposition of the circular groove can be so regulated that the lug G on the pellet will not reach the end of the slot E until the projectile has left the muzzle of the gun. The pellet, as usual, carries a patch of fulminate, L, which detonates when it comes against the point M, or vice versa. The pellet can be made to carry a needle-point which will strike against a patch of fulminate carried by the cover of the fuse.

It will be seen that the pellet can be made of any weight, so that a shell of any size can be made as sensitive as may be desired without in any way making the fuse dangerous.

In the drawings, Figs. 1 to 8, I have only shown my improvements applied to percussion-fuses; but a time-fuse may be formed in a similar manner—that is to say, the lighting of the fuse may be effected by a pellet which is liberated by a bolt forced forward by the pressure of the powder-gases, and when liberated is restrained in the way described from flying back and lighting the fuse composition until the projectile leaves the gun. Such fuses could also be made to act both as a time-fuse and percussion-fuse, so that in case of the failure of the time-fuse or the flight of the projectile being arrested before the time-fuse has acted the shell may be exploded immediately on its encountering any obstacle.

The arrangement for releasing the pellet by the pressure of the powder-gases acting on a bolt which is forced endwise along a recess in the body of the fuse and made to shear off a pin by which the pellet was previously retained may, as previously stated, be used alone, if desired. In this case I prefer to form the recess transversely in the base of the fuse, as shown at Fig. 9; but it might be otherwise disposed. In this figure, N is the base of a projectile; A, the body of the fuse; J, a hole or small transverse cavity formed in the base of the fuse; I, a bolt lying in the cavity; K, a copper cup or gas-check for preventing the powder-gases from getting past the bolt and into the fuse; O, a ring screwed into the mouth of the cavity for retaining the cup K in place.

F is the pellet, with a pin, H, projecting from it, which at its end is screwed into a hole in the side of the bolt I. The pellet, as in the fuse shown at Figs. 1 to 8, carries a patch of fulminate, L, which detonates when it comes against the point M.

The action of the fuses in igniting the charge of the shell may be delayed, whenever it is desired that their action shall be comparatively slow, by filling part of the passage by which the flash from the patch of fulminate, L, passes to the charge in the shell with powder highly compressed and which will burn comparatively slowly. Two ways of effecting this are shown at Figs. 10 and 11. In Fig. 10 the point M is, as in the fuses shown in the other figures, carried by the ring C. In Fig. 11 the patch of fulminate, L, is carried by the ring and the point is carried by the pellet. In each figure the block of highly-compressed powder is marked Q. In this way the fuse can either be changed from a direct-action fuse to a delayed-action fuse, or vice versa, simply by changing from one form of ring C to the other.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The combination, substantially as set forth, of the body of the fuse having the central chamber and adapted to be fixed to the base of a projectile, the pellet secured within said chamber and adapted, when freed, to move lengthwise thereof to explode the fulminate, the endwise-movable bolt contained in a hole or small cavity in the fuse-body and exposed at the rear end of the body to the pressure of the powder-gases of the propelling-charge, and the pin projecting from the pellet laterally to the bolt and made fast thereto, whereby the pressure upon the bolt breaks the pin, and so frees the pellet from the bolt, for the purpose set forth.

2. The combination, substantially as set forth, of the body of the fuse having the central chamber and adapted to be fixed to the base of a projectile, the pellet secured within said chamber and adapted, when freed, to move lengthwise thereof to explode the fulminate, the endwise-movable bolt contained in a hole or small cavity in the fuse-body and exposed at the rear end of the body to the pressure of the powder-gases of the propelling-charge, the pin projecting from the pellet laterally to the bolt and made fast thereto, whereby movement of the pellet is prevented until pressure upon the bolt breaks the pin and frees the pellet, the ring or plug at the fore part of the chamber, by contact between which ring or plug and the pellet the fulminate is exploded when the flight of the projectile is retarded, and the slow-burning composition in the passages through the ring or plug, for the purpose set forth.

3. The combination, substantially as set forth, of the body of the fuse having the central chamber and adapted to be fixed to the base of a projectile, the slotted lining within the chamber, the pellet secured within the chamber and adapted, when freed, to move lengthwise thereof to explode the fulminate,

the lug of the pellet for engagement with the slots of the lining, the endwise-movable bolt contained in a hole or small cavity in the fuse-body and exposed at the rear end of the body
5 to the pressure of the powder-gases of the propelling-charge, and the pin projecting from the pellet laterally to the bolt and made fast

thereto, upon the breaking of which pin by the pressure on the bolt the pellet is freed therefrom, for the purpose set forth.

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Witnesses:

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