

No. 656,933.

Patented Aug. 28, 1900.

C. M. BROWN.

PROJECTILE.

(Application filed Aug. 31, 1899.)

(No Model.)

Fig. 1.

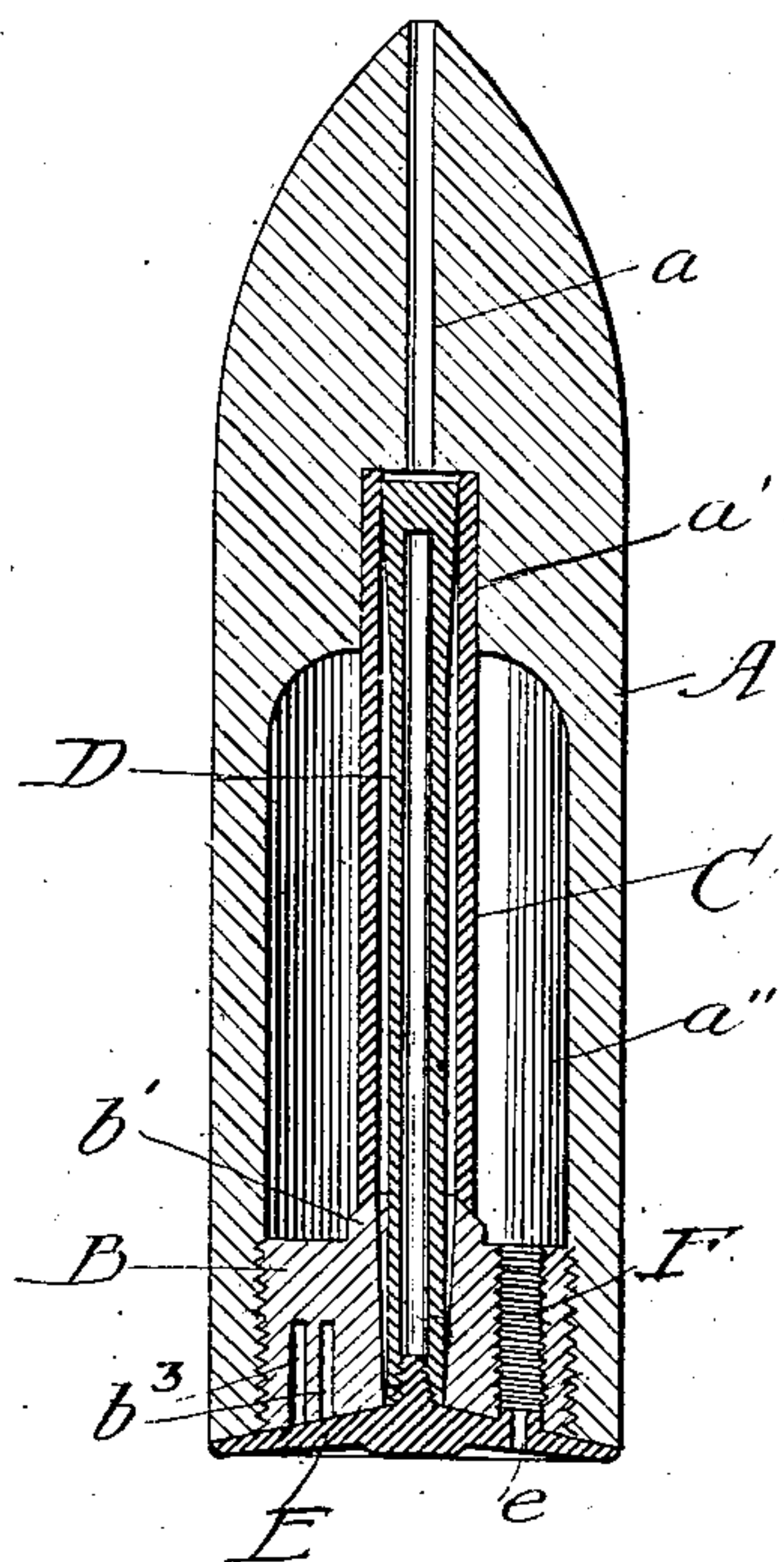


Fig. 2.

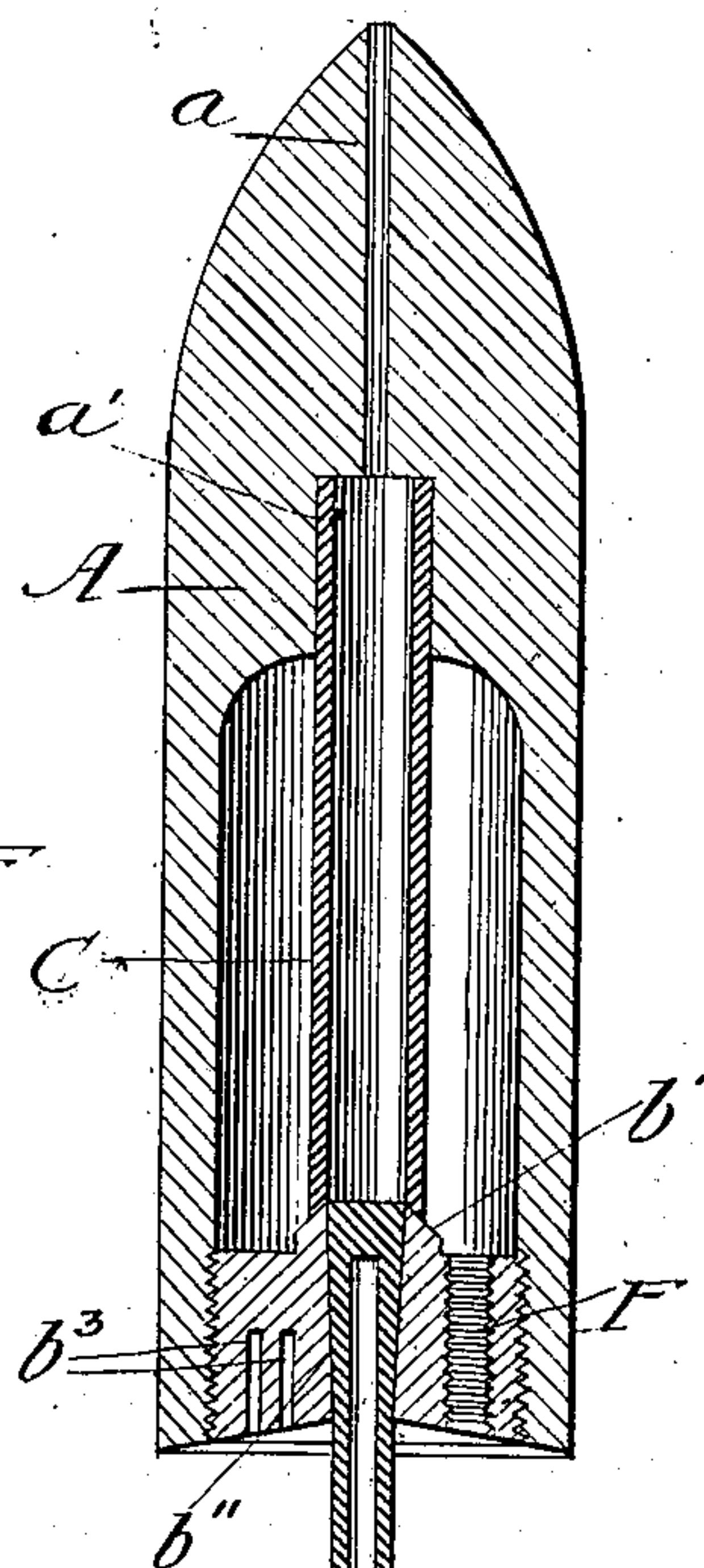


Fig. 3.

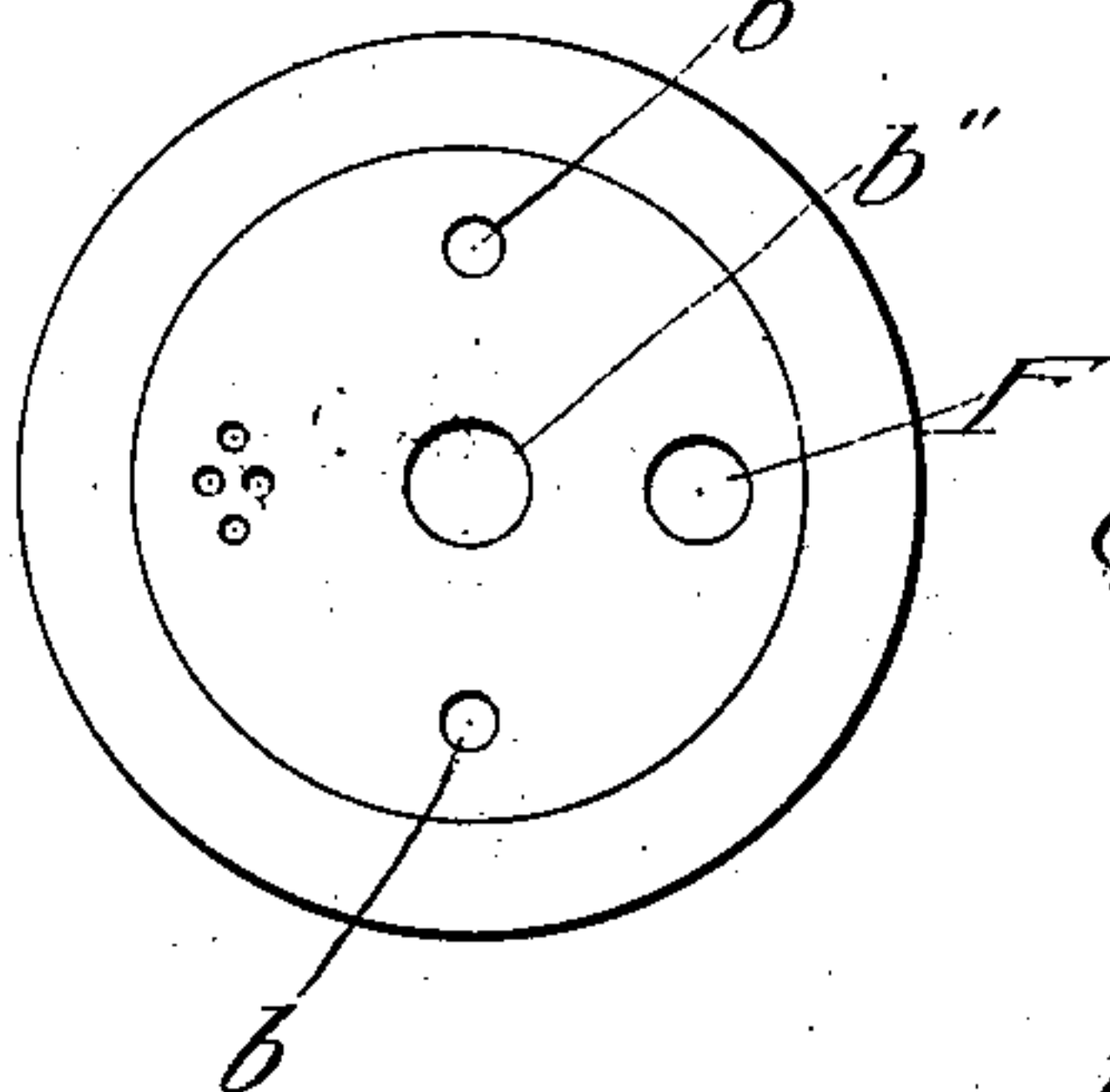


Fig. 4.

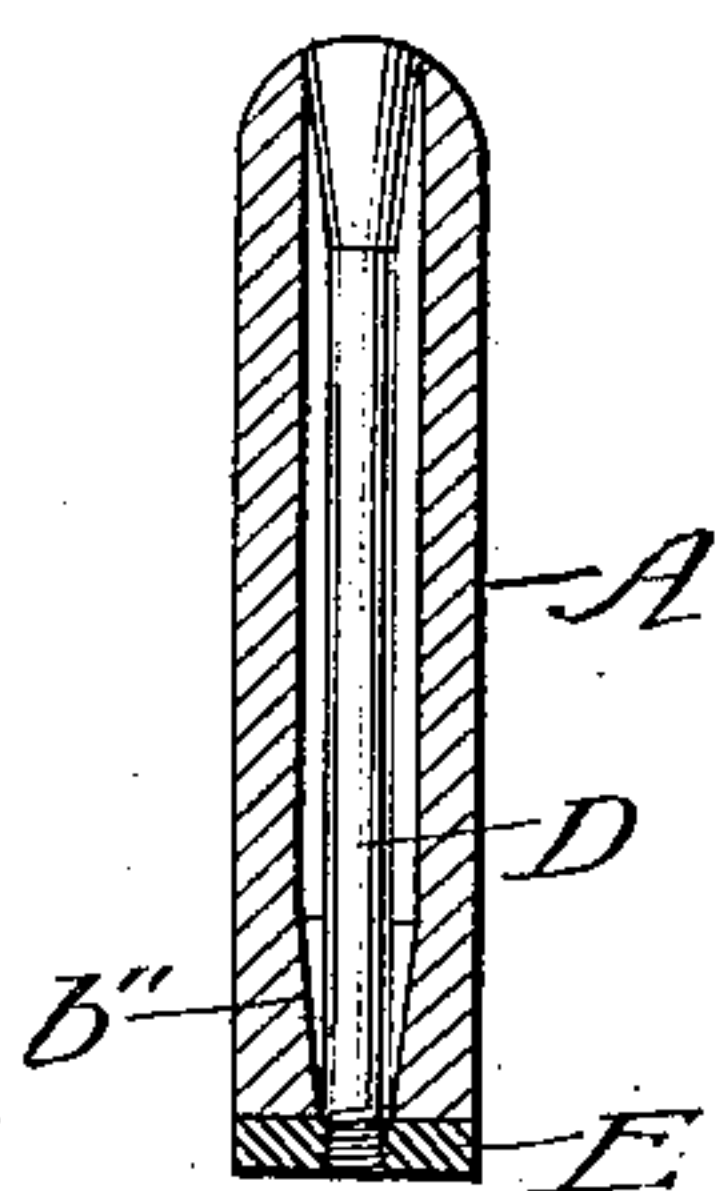
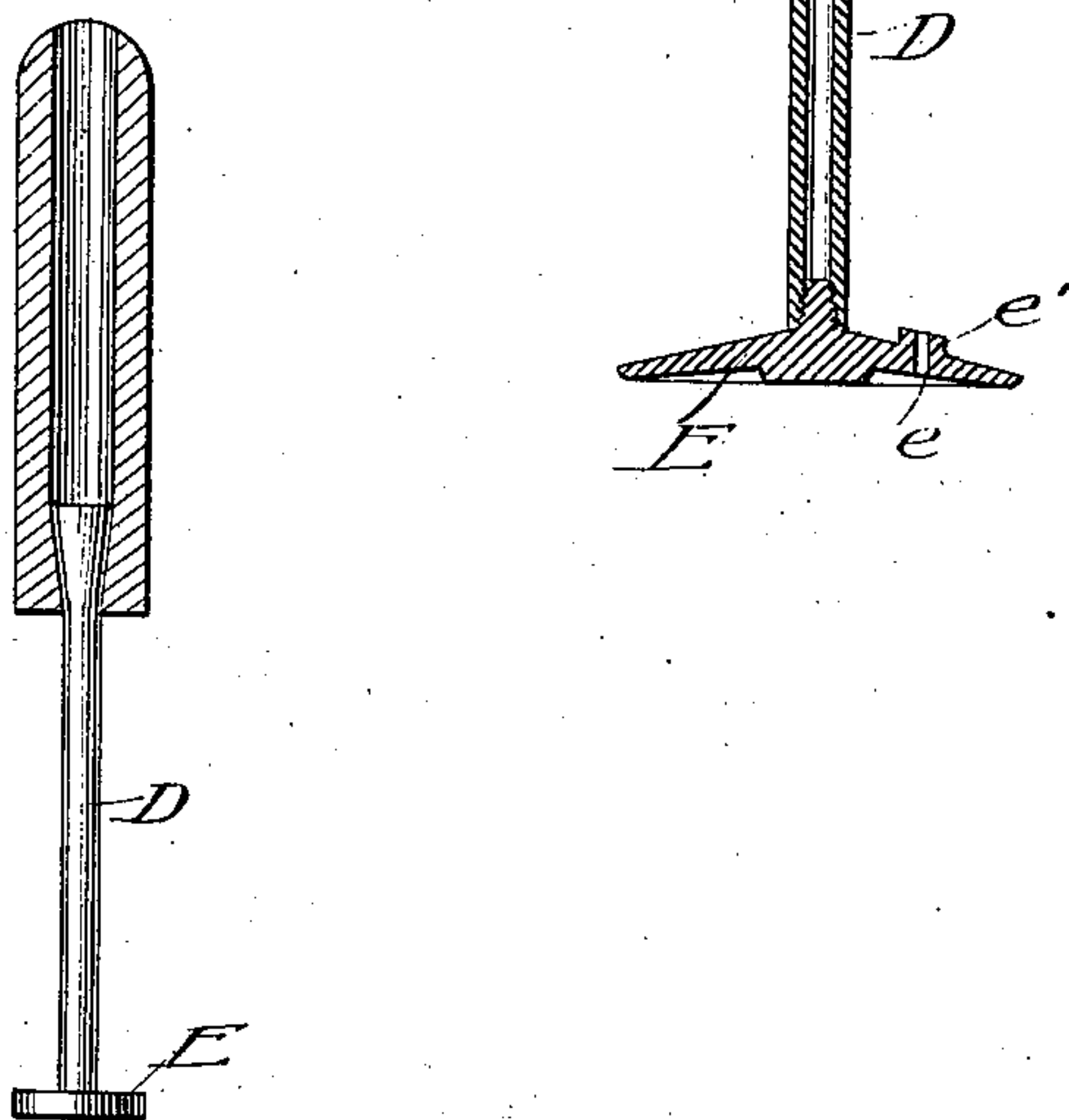


Fig. 5.



Witnesses:

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# UNITED STATES PATENT OFFICE.

CHARLES M. BROWN, OF CHICAGO, ILLINOIS.

## PROJECTILE.

SPECIFICATION forming part of Letters Patent No. 656,933, dated August 28, 1900.

Application filed August 31, 1899. Serial No. 729,081. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES M. BROWN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Projectiles, of which the following is a specification.

The present invention relates to that class of projectiles that are provided with a vane or tailpiece adapted to control the position of the projectile during its flight and compel it to travel at all times point foremost.

The object of the invention is to provide an improved projectile of this class; and to this end the invention consists in the features of novelty that are hereinafter described with reference to the accompanying drawings, which are made a part hereof, and in which—

Figures 1 and 2 are longitudinal sections of a projectile adapted for use in large guns and embodying the invention, Fig. 1 showing the parts in the positions which they occupy at the instant the projectile is fired, and Fig. 2 showing them in the positions which they occupy during the flight of the projectile. Fig. 3 is an elevation of the rear end of the projectile with the vane or tailpiece and its stem omitted. Figs. 4 and 5 are longitudinal sections of a projectile adapted for use in small guns and embodying some features of the invention.

A represents the body of the projectile, which has a centrally-disposed air-passage extending through it longitudinally from end to end. As shown in Figs. 1 and 2, the body of the projectile has at its forward part a small bore *a*, immediately in rear of this a larger bore *a'*, and in rear of this and extending to the rear end of the body a still larger bore *a''*, the rear end of this larger bore being closed by a screw-plug B, having oppositely-located depressions or sockets *b* for receiving the spurs of a spanner, by which it is screwed in place. In the intermediate bore *a'* fits the forward end of a tube C, the rear end of which flares and seats upon a conical portion *b'* of the plug B, whereby the tube C is centered at its rear end and held in place. The plug B has a centrally-disposed opening *b''*, the forward end of which is equal in diameter to the internal diameter of the tube C, while its rear end is

contracted, thereby providing a flaring or tapering shoulder or seat.

D is an endwise-movable stem which occupies the tube C and carries at its rear end a disk or enlargement E, which is herein called the "vane" or "tailpiece." When the projectile is in readiness for firing, the vane or tailpiece rests against the rear end of the body portion of the projectile, as shown in Fig. 1, and in this position completely closes the air-passage through the projectile as against the projecting pressure; but after the projectile leaves the gun the pressure of the air against the forward end of the stem D will retard its movement and cause it to assume the position shown in Fig. 2, in which position the vane E acts as a drag and causes the projectile to travel point foremost. In order to prevent the stem D from being completely withdrawn from the air-passage, the stem is provided at its forward part with a tapering enlargement, which is complementary to the flaring shoulder or seat *b''*, so that when the tapering portion of the stem reaches said seat the further withdrawal of the stem is prevented and the stem, by reason of the complementary tapers, is held firmly in a central position with relation to the body of the projectile.

In order that the above-described results may be attained, it is necessary that for each unit of surface exposed to the pressure of the air the vane and its stem be lighter than the body of the projectile; otherwise the vane and its stem will travel as fast as the body of the projectile, and in this event the parts could not assume the relative positions shown in Fig. 2. This inequality in the weight of the parts may be the result of making them of material of different specific gravity or of making them of the same material and reducing the stem or making it hollow in rear of its forward end, which is exposed to the pressure of the air. In Figs. 1 and 2 I have shown the stem as being both reduced and hollow, while in Figs. 4 and 5 I have shown it as being reduced exteriorly.

In Figs. 1 and 2 the stem is made slightly shorter than the chamber which it occupies, thereby leaving a slight space between the forward end of the stem and the forward end



of the chamber, to which space the air-pressure is communicated through the restricted passage *a*. In large projectiles I prefer to make the air-passage quite small at its forward part in order not to impair the strength of the point of the projectile, and this necessitates an enlargement of the passage in order to enable the use of a stem having at its forward end a sufficient superficial area for the air to act against. With this arrangement the result will of course be the same as if the air-passage forward of the front end of the stem were of the same size as the stem, excepting that the action of the air upon the stem will be somewhat slower, because of the necessity for passing through the restricted passage.

*F* is a fuse-opening formed through the plug *B* and located eccentrically with relation thereto, and *e* is a corresponding opening formed through the vane *E*. In order to maintain the perfect balance of the parts, a short flange *e'* is formed around the opening *e*, the weight of the metal of which the flange is formed being precisely equal to that displaced in order to form the opening *e*. This flange is so disposed that when the vane is in place against the rear end of the body of the projectile the flange enters the fuse-opening. For a like reason a small quantity of metal is removed from the plug *B* at a point diametrically opposite the fuse-opening *F*, as shown at *b*<sup>3</sup>. This is rendered necessary by reason of the fact that the fuse will not weigh as much as the metal displaced to form the opening *F*.

It will be observed that the rear end of the body of the projectile is depressed and that the vane fits within this depression. The advantage of this is that it prevents side displacement of the vane when the projectile is fired and relieves the stem of the vane of the lateral strain that such displacement would put upon it.

In Figs. 1 and 2 of the drawings I have shown the stem *D* of the vane as being considerably shorter than the body of the projectile, while in Figs. 4 and 5 it is shown as being about equal in length with the body. Its length may be varied to a considerable extent without departing from the spirit of the invention, so long as it does not exceed the length of the body of the projectile, so that it will project beyond the point of the projectile when the vane is in position against the rear end of the body of the projectile.

What I claim as new, and desire to secure by Letters Patent, is—

1. A projectile having a body portion, a vane located in rear thereof and adapted to move relatively thereto, and a longitudinally-movable stem carrying the vane and having at its forward portion a tapering enlargement, the body of the projectile being pro-

vided with a socket occupied by the stem, the rear portion of the socket being contracted upon a taper corresponding with that of the stem, whereby when the tapering surfaces are in engagement the stem will be rigidly held against lateral movement relatively to the body of the projectile, substantially as set forth.

2. A projectile having a body portion provided with a contracted bore *a* at the point thereof, a larger bore *a'*, and a still larger bore *a''* in rear of the point, a plug closing the rear end of the bore *a''* having a tapering opening, a tube fitting the bore *a'*, and extending through the bore *a''* to the plug, a vane adapted to seat against the rear end of said body portion, a longitudinally-movable stem carrying the vane and occupying the central opening of the plug *B* and the tube *C*, the forward portion of the stem being provided with a tapering enlargement adapted to engage the seat formed by the tapering opening of the plug, substantially as set forth.

3. A projectile having a body portion provided with a charge-chamber, a plug closing the rear end of said chamber and having a fuse-opening disposed eccentrically with relation thereto, a vane adapted to seat against the rear end of the body portion and adapted also to move away therefrom, said vane having an eccentrically-located opening corresponding with the fuse-opening, and means for limiting the movement of the vane away from the rear end of the projectile, the vane being balanced, substantially as set forth.

4. A projectile having a body portion provided with a charge-chamber, and a fuse-opening located at the rear end of the body portion and to one side of the center thereof, a vane consisting of a disk adapted to seat against and practically cover the rear end of the body portion and adapted also to move away therefrom, said vane having an opening corresponding with the fuse-opening, and a flange surrounding said opening and adapted to enter the fuse-opening, said flange being of the same weight as the metal displaced to form the opening which it surrounds, and means for limiting the movement of the vane away from the rear end of the projectile, substantially as set forth.

5. A projectile having a body portion provided with a charge-chamber, and a plug closing the rear end of said chamber and having a fuse-opening, a portion of the metal of the plug being removed at a point diametrically opposite the fuse-opening for the purpose of balancing the plug, substantially as set forth.

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