

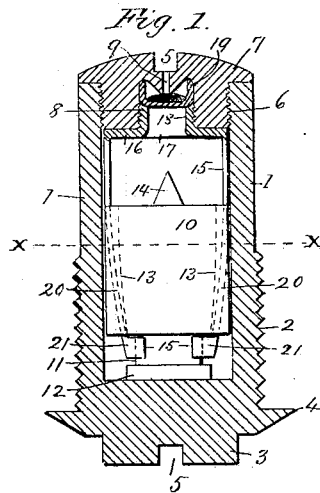
(No Model.)

2 Sheets—Sheet 1.

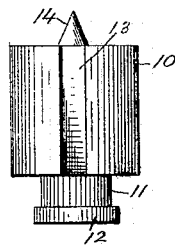
W. H. DRIGGS.  
PERCUSSION FUSE FOR PROJECTILES.

No. 419,143.

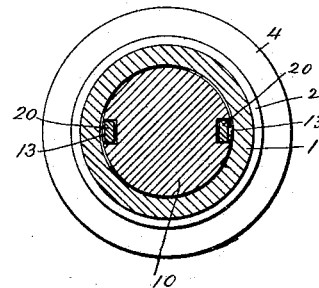
Patented Jan. 7, 1890.



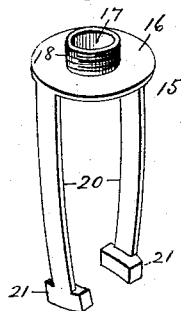
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



Witnesses:

J. H. Stuart,

Larker & Sweet, Jr.

Inventor:

William H. Driggs.

By Marble & Mason,  
Attorneys.

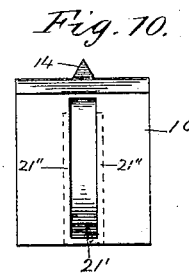
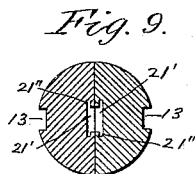
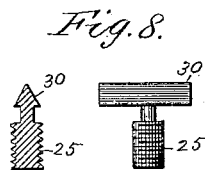
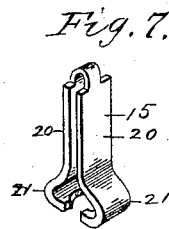
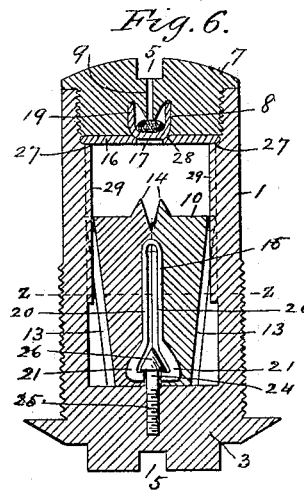
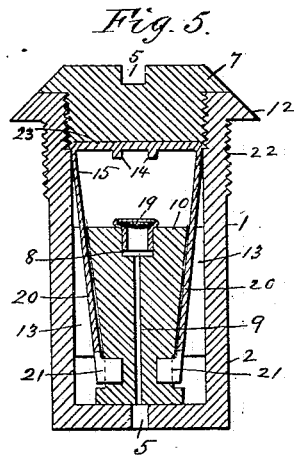
(No Model.)

2 Sheets—Sheet 2.

W. H. DRIGGS.  
PERCUSSION FUSE FOR PROJECTILES.

No. 419,143.

Patented Jan. 7, 1890.



Witnesses:  
T. R. Stuart.  
Barker & Sweet.

Inventor:  
William H. Driggs.  
By Marble & Mason,  
Attorneys.

# UNITED STATES PATENT OFFICE.

WILLIAM H. DRIGGS, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR  
OF ONE-HALF TO MARY EDDY DRIGGS AND ELIZABETH HALE DRIGGS,  
OF SAME PLACE.

## PERCUSSION-FUSE FOR PROJECTILES.

SPECIFICATION forming part of Letters Patent No. 419,143, dated January 7, 1890.

Application filed September 21, 1889. Serial No. 324,645. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. DRIGGS, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Percussion-Fuses for Projectiles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates, generally, to fuses for explosive projectiles, and particularly to improvements in that class thereof which is known as "percussion-fuses," in which the hammers or plungers contained within the stocks or casings thereof have hitherto generally been held in place by frictional spring action or force until the sudden stoppage of the flight of the projectiles released and permitted them to move forward and strike against and explode the caps or fulminates, the fire or sparks therefrom being transmitted to the interiors of said projectiles and causing explosion of their charges; and it consists of the novel constructions and arrangements or combinations of parts hereinafter fully disclosed in the description, drawings, and claims.

The objects of my invention are, first, to provide percussion-fuses with novel and improved springs by which the hammers or plungers of said fuses are held normally stationary in their stocks or casings and released during the flight of the projectiles by centrifugal force; second, to provide percussion-fuses with novel and improved springs by which the peculiarly-constructed hammers or plungers of said fuses are held normally stationary in their stocks or casings or away from the caps or fulminates until they are set free by the expansion of said springs by centrifugal force, which is due to the rapid twisting or spinning motion of projectiles when discharged from rifled guns or ordnance, this expansion of the springs permitting the plungers to move forward and come into contact with and explode the caps or fulminates when the projectiles come into forcible impact with the resisting objects or mediums at which

they are directed; third, to provide percussion-fuses with novel and improved devices for normally holding their plungers stationary in their casings or out of contact with their caps or fulminates, so that they will be safe for handling and transportation or not liable to explosion from ordinary degrees of concussion; fourth, to provide improvements in percussion-fuses which will enable them to act with equal efficiency when they are placed either in the front or rear ends of shells or projectiles; fifth, to provide improvements in the parts of fuses which are capable of being or adapted to be applied to some of the fuses now in use, and, sixth, to provide certain other novel constructions and arrangements or combinations of parts, as hereinafter fully described and claimed. These objects are accomplished by the mechanism illustrated in the accompanying drawings, forming part of this specification, in which the same reference-numerals indicate the same or corresponding parts, and in which—

Figure 1 represents a longitudinal central section of my preferred form of percussion-fuse; Fig. 2, a detail side elevation of the hammer or plunger; Fig. 3, a transverse sectional view of this fuse, the section being taken on the line  $x x$  of Fig. 1, looking toward the base or rear end of the casing; Fig. 4, a detail perspective view of the spring used in this fuse; Fig. 5, a longitudinal central section of a slightly-modified form of my improved fuse, the same being adapted for use in the front end of a shell or projectile; Fig. 6, a similar view of another modified form of my improved fuse; Fig. 7, a detail perspective view of the spring employed in connection therewith; Fig. 8, a sectional view and side elevation of a modified form of safety pin or plate for this form of fuse; Fig. 9, a transverse sectional view of the plunger, the section being taken on the line  $z z$  of Fig. 6, looking toward the rear end thereof; and Fig. 10, an inner face view of one of the halves of the two-part plunger.

In the drawings, the numeral 1 indicates the stock or casing of the fuse, which is screw-threaded along its rear portion 2 and closed at its rear end by a solid base-piece 3, from

which projects the annular rib or flange 4; also, in the rear surface of this base-piece is formed a square or other polygonally-shaped recess 5, into which a wrench-pin or other suitable instrument of corresponding shape is to be introduced for inserting said stock or casing into and removing the same from the rear end of the projectile, which, as usual, is formed with a screw-threaded opening.

The front end of the stock or casing of the fuse is open and formed with screw-threads 6, for receiving and removably retaining the correspondingly screw-threaded anvil 7, as usual, which, as shown, is also formed with a square or similarly-shaped recess 5 in its front or outer face for receiving a wrench-pin or similar device for operating said anvil and conveniently securing the same to and removing it from the front end of said stock or casing. If desired, the rear end of the stock or casing and the front end of the anvil may be cut away or made to form polygonally-shaped surfaces for the application of suitable wrenches, as usual, for the same purposes. The inner face of the anvil is formed with a screw-threaded central circular recess 8, which communicates with a small duct 9, leading out through the front face of said anvil, all for the purposes hereinafter stated.

Within the stock or casing is arranged the hammer or plunger 10, which, as shown in Figs. 1 and 2, is formed cylindrical in shape and of reduced diameter along its rear portion, where it is provided with an annular groove 11, and also with an annular flange 12, which normally rests against the rear wall of the opening in said casing. In the periphery of this plunger, at directly-opposite points, are formed longitudinal rearwardly-convergent grooves 13, and its front end is provided with one or more contact-points 14, the purposes and functions of these features being hereinafter fully explained.

To the inner face of the anvil 7 the plunger holding and releasing spring 15 is secured in any suitable manner. As shown in Figs. 1 and 4, this spring is provided at its front end with an annular plate or disk 16, which is formed with a central opening 17 and with a central forwardly-projecting tubular neck 18, which is exteriorly screw-threaded, secured in the correspondingly screw-threaded recess 8, formed in the inner face of the anvil, and adapted to hold the cap or fulminate 19 in place after it has been inserted in said recess.

From directly opposite points of the periphery of the disk 16 extend two elastic or spring fingers 20, which project rearwardly and slightly converge toward each other along their rear portions. At their rear or free ends these spring-fingers are provided with the enlarged and curved flanges 21, which are heavier than the body portions of said spring-fingers and extend at right angles thereto. The object of making these curved flanges of greater relative thickness and weight than the body portions of said spring-

fingers is that when they are under the influence of centrifugal force, due to the rapid whirling or spinning motion of the projectile during its flight from a rifled piece of ordnance, they will more readily move outward from the annular groove 11 and straighten said spring-fingers in the side grooves 13 of the plunger, and thus permit the latter to move forward and by means of the contact-point or points 14 explode the cap or fulminate when the projectile comes into contact with an opposing medium. The object I have in view in using one or more of these contact-points is to provide for the employment of either center or rim fire caps or fulminates.

It will be obvious that this form of my improved percussion-fuse, constructed as shown and described, will be entirely free from accidental explosion both before and after its application to a projectile, as the plunger 10 is normally held securely away from the cap 19 by the curved flanges 21 of the spring-fingers resting within the annular groove 11 at the rear end of said plunger; that the spring-fingers 20 fit snugly within the grooves 13 in the opposite sides of said plunger, prevent the same from revolving independently of the casing, and guide the same and its contact-point or points 14, when released, directly forward against said cap; that said plunger is set free or released to move forward by the expansion of the spring-fingers to points on a direct line with the inner surface of the casing, this expansion being effected by the centrifugal force imparted to said spring-fingers through the rapid whirling or spinning motion imparted to the projectile by its discharge from a rifled piece of ordnance; that the plunger, after having been released by the centrifugal force imparted to the spring-fingers and their heavy curved flanges, does not move forward to strike and explode the cap until the advancing projectile comes into contact with an opposing medium or object, and that as soon as the contact point or points of the plunger strike the cap the fire or sparks therefrom will pass through the small duct in the center of the anvil, ignite the charge contained in the shell or projectile, and explode the latter.

In Fig. 5 of the drawings is illustrated an embodiment of my invention which is applicable to percussion-fuses designed to be employed in the front ends or points of projectiles. In this construction of my invention the rear portion 2 of the stock or casing 1 is made plain and formed in its rear end with the central recess 5, while the forward portion thereof 22 is screw-threaded and provided with the annular flange 12; also, the opening at the front end of said casing is screw-threaded for a short distance rearward for the purpose of receiving and holding the correspondingly-screw-threaded anvil 7, which is made solid and formed with the square or similarly-shaped recess 5 in its outer or front

face, for the purpose hereinbefore explained. In this modification of my invention the inner face of the anvil is formed with a transverse groove 23, within which is fitted and suitably secured the transverse portion of the plunger holding and releasing spring 15, the rearwardly-extending fingers 20 and the curved flanges 21 thereof operating to normally hold the plunger 10 stationary, but to quickly release the same on the occurrence of centrifugal force, as also hereinbefore explained. The outer or front face of this plunger is formed with the central circular recess 8 for receiving the cap or fulminate 19. Also communicating with this recess is the small central duct 9, which extends entirely through the rear portion of said plunger, registers with the recess 5 in the rear end of the casing, and conveys the fire or sparks from the cap or fulminate to the explosive charge within the projectile. In this form of my invention I preferably employ a rim-fire cap or fulminate, and for this reason two contact-points 14 are arranged opposite the closed end of the rim of said cap and are preferably formed as parts of the transverse portion of the spring 15; but, as is obvious, a single contact-point is all that need be used for center-fire caps.

In Fig. 6 of the drawings is illustrated another embodiment or modification of my invention, in which the principle or mode of operation is the same as that incident to the forms of fuses shown in Figs. 1 and 5, and in which the casing 1, the anvil 7, and the plunger 10 are arranged in the same manner as in the preferred form of my fuse, (shown in Fig. 1,) but in which there are the following differences in the construction of the parts forming the same: The plunger is of the shape of a truncated cone and has its smaller end projecting rearwardly and normally supported against the solid base 3 of the casing. It is formed in two parts and provided at its front end with the two-part contact-point 14 and with the longitudinal grooves 13 at opposite points in its periphery. Intermediate the two parts of this plunger is arranged the peculiarly-shaped spring 15, as shown in Figs. 6 and 7, having the rearwardly-extending fingers 20 and the heavy curved flanges 21, which are fitted in correspondingly-shaped grooves 21', as shown in Figs. 9 and 10, formed in the inner faces of the two parts of said plunger. Over the edges of these grooves for a portion of their length project the flanges 21'', which operate to hold the spring-fingers 20 slightly loose within said grooves, so as to permit them to move back and forth therein to a limited extent and to bend slightly at their point of junction. This plunger is normally held from forward movement by a bolt or pin 24, provided with a screw-threaded shank 25, which is secured in a corresponding hole formed in the base-piece 3 of the casing, and with a conically-shaped barbed head 26 at its

front end, which fits in a space of the same shape between the curved flanges of the spring-fingers. Interiorly of the casing, near its front end, is formed an annular ledge 27, against which is placed the disk 16, having the central opening 17, leading to the circular recess 8 in the inner face of the anvil, which contains the cap or fulminate 19 and communicates with the small duct 9, leading to the interior of the projectile. The disk 16 is held rigidly in place against the ledge 27 by the anvil 7 when the latter is fully screwed into the front end of the casing. The opening 17 with which this disk is formed has its surrounding wall slightly inwardly dished, as at 28, for conforming to the shape of the cap or fulminate 19 and firmly holding the same in place. This disk is also formed or provided with rearwardly-extending arms or guides 29, which are arranged to fit within the grooves 13 in the periphery of the two-part plunger, and thus cause the same to positively rotate with the casing during the flight of the projectile, in the same manner as when the spring-fingers are fitted within said grooves, as in the other forms of my invention. However, I only employ these ribs or guides 29 when the conical barb-headed pin 26 is used for normally securing the two-part plunger to the casing, as I sometimes prefer to dispense with them, and also with said conical barb-headed pin, and employ in lieu of the latter a barbed knife-edged plate 30 of the form shown in transverse section and in side elevation in Fig. 8 of the drawings, and which may be provided with either a polygonal or screw-threaded shank 25, for securing it to the base-piece of the casing. Under the employment of this plate the proximate surfaces of the two-part plunger are placed over its barbed knife-edge, which will cause said plunger to positively rotate with the casing the same as when the guides or spring-fingers are employed. In this manner, whether the barbed pin or the barbed plate be employed, the two-part plunger will be compelled to rotate with the casing and projectile, and as it does the centrifugal force will cause the spring-fingers to expand and release said plunger. Then the moment the projectile strikes the opposing object the plunger will fly suddenly forward and cause its two-part contact-pin to explode the cap or fulminate, and also the charge within the shell or projectile, in the same manner in which the same results are effected in the other forms of my invention.

I am aware that percussion-fuses exist in which the plungers are normally held by the frictional contact of springs and spring-fingers; but they are not safe for handling or transportation, as they are liable to explosion and damage from ordinary degrees of concussion; but I am not aware that prior to my invention plungers have ever been held by springs or spring-fingers which were capable

of being expanded and released from said plungers by centrifugal force; and, therefore,

Having thus fully described the construction and arrangement or combination of the several parts of my invention, the operation, and advantages of the same, what I claim as new is—

1. In a percussion-fuse, the combination, with a casing and a plunger, of a spring located within said casing and constructed and arranged to act directly upon and hold said plunger and release the same by the action of centrifugal force, substantially as described.

2. In a percussion-fuse, the combination, with a casing and a plunger, of a spring located within said casing and constructed and arranged to normally hold said plunger at or near its rear end by direct contact therewith and to expand and release the same by the action of centrifugal force, substantially as described.

3. In a percussion-fuse, the combination, with a casing and a movable plunger formed with longitudinal peripheral grooves, of a spring arranged to rest in said grooves or be released therefrom, and constructed and adapted to expand and directly release said plunger by the action of centrifugal force, substantially as described.

4. In a percussion-fuse, the combination, with a casing and a movable plunger formed with longitudinal peripheral grooves, of a stationary spring located within said casing and constructed and adapted to expand and directly release said plunger by the action of centrifugal force, substantially as described.

5. In a percussion-fuse, the combination, with a casing and a movable plunger formed with longitudinal peripheral grooves, an anvil, a cap or fulminate, one or more contact-points for exploding the same, and means for conveying the fire from said cap or fulminate to the charge within a shell or projectile, of a spring located within said casing and constructed and adapted to expand and directly release said plunger by the action of centrifugal force, substantially as described.

6. In a percussion-fuse, the combination, with a casing and a movable plunger formed with longitudinal peripheral grooves, of a spring located within said casing and provided with rearwardly-projecting fingers adapted to enter said groove and constructed and adapted to expand and directly release said plunger by the action of centrifugal force, substantially as described.

7. In a percussion-fuse, the combination, with a casing and a movable plunger formed with longitudinal peripheral grooves, of a spring located within said casing and provided with rearwardly-projecting fingers which are adapted to enter said grooves and constructed and arranged to normally hold said plunger at or near its rear end by direct contact therewith and to expand and release the same by

the action of centrifugal force, substantially as described.

8. In a percussion-fuse, the combination, with a casing and a movable plunger formed with longitudinal peripheral grooves, of a spring located within said casing and provided with rearwardly-projecting fingers having heavy curved flanges and constructed and arranged to normally hold said plunger at or near its rear end by direct contact therewith and to expand and release the same by the action of centrifugal force, substantially as described.

9. In a percussion-fuse, the combination of a casing and an anvil, the former being formed with a polygonal recess in its rear face and the latter with a recess of the same shape in its front face, substantially as and for the purpose described.

10. In a percussion-fuse, the combination, with a casing and an anvil containing a cap or fulminate, of a plunger having a contact-point and a spring located within said casing and provided with rearwardly-projecting fingers which are constructed and arranged to normally hold said plunger at or near its rear end by direct contact therewith and to expand and release the same by the action of centrifugal force, substantially as described.

11. In a percussion-fuse, the combination, with the casing, the anvil, and the spring-fingers secured thereto, of the plunger held between said spring-fingers and formed with longitudinal peripheral grooves and also with an annular groove at or near its rear end, substantially as described.

12. In a percussion-fuse, the combination, with the casing, the anvil formed with a central circular recess and a small duct communicating therewith, the cap or fulminate in said recess, and the plunger provided with a contact-point with longitudinal grooves and with an annular groove at or near its rear end, of the spring-fingers extending into said grooves and constructed and arranged to normally hold said plunger stationary and to expand and release the same by the action of centrifugal force, substantially as described.

13. In a percussion-fuse, the combination, with the casing, the anvil formed with a central circular recess and a small duct communicating therewith, the cap located in said recess, and the spring secured to said anvil and provided with rearwardly-extending fingers having heavy curved flanges at their rear ends, of the plunger formed with a contact-point on its front end, with longitudinal grooves and with an annular groove at or near its rear end, in which said curved flanges of the spring-fingers engage and hold said plunger normally stationary, and which are adapted to expand and release said plunger by the action of centrifugal force, substantially as described.

14. In a percussion-fuse, the combination, with the casing, the plunger formed with a

contact-point at its front end, with an annular groove at or near its rear end, and with longitudinal grooves in its periphery, and an anvil secured to said casing and formed with a circular recess and a small duct communicating therewith, and a cap or fulminate arranged within said recess, of a centrally-open disk secured to said anvil and provided with a central tubular neck fitting within the recess of said anvil and with rearwardly-projecting spring-fingers arranged within the longitudinal and annular grooves of said plunger and holding the same normally stationary, and which are adapted to expand and release said plunger by the action of centrifugal force, substantially as described.

15. In a percussion-fuse, the combination, with the casing, the plunger formed with a contact-point at its front end, with an annular groove at or near its rear end, and with rearwardly-converging longitudinal grooves in its periphery, and an anvil secured to said casing and formed with a circular recess and a small duct communicating therewith, and a cap or fulminate arranged within said recess, of a centrally-open disk secured to said anvil and provided with a central tubular neck fitting within the recess of said anvil and with rearwardly-projecting spring-fingers arranged within the longitudinal and annular grooves of said plunger and having heavy curved flanges at their rear ends for holding said plunger normally stationary, and which are adapted to expand and release the same by the action of centrifugal force, substantially as described.

16. In a percussion-fuse, the combination, with the casing, the plunger formed with a contact-point at its front end, with an annular groove at or near its rear end, and with rearwardly-converging longitudinal grooves in its periphery, and an anvil secured to said casing and formed with a central screw-threaded recess and a small duct communicating therewith, and a cap or fulminate arranged within said recess, of a centrally-open disk provided with a screw-threaded neck fitting within said recess and with rearwardly-projecting spring-fingers having heavy curved flanges, which are respectively arranged within the longitudinal rearwardly-converging and annular grooves of said plunger, and which are adapted for holding said plunger normally stationary and to expand and release the same by the action of centrifugal force, substantially as described.

17. In a percussion-fuse, a spring composed of a centrally-open disk provided with rearwardly-extending fingers having heavy curved flanges at their rear ends and constructed and adapted to directly hold a plunger and release the same by the action of centrifugal force, substantially as described.

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

WILLIAM H. DRIGGS.

Witnesses:

TOM R. STUART,  
PARKER H. SWEET, Jr.