(No Model.)

J. C. THOMPSON.

FUSE FOR EXPLOSIVE PROJECTILES OR SHELLS.

No. 565,524. Patented Aug. 11, 1896.

Fig. 1.

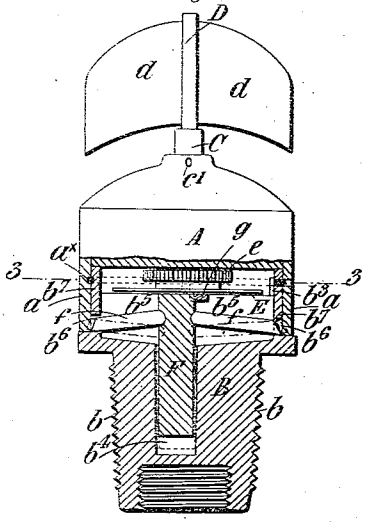


Fig. 2.

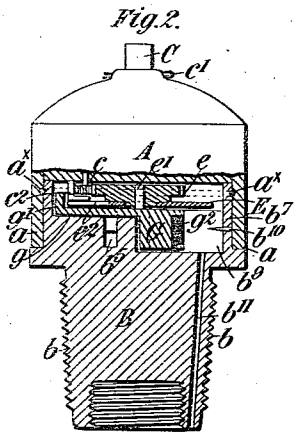


Fig. 3.

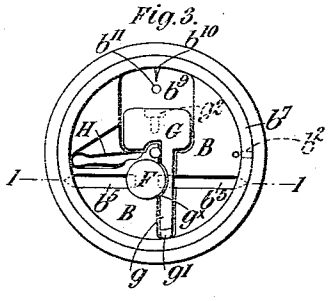


Fig. 5.

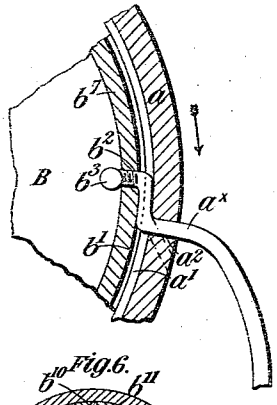


Fig. 4.

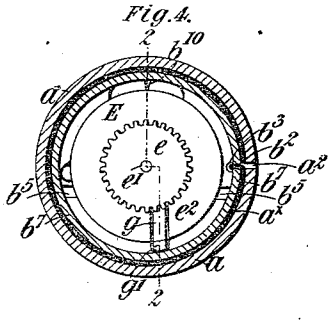
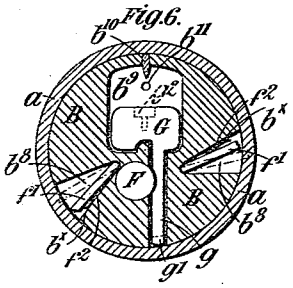


Fig. 6.



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UNITED STATES PATENT OFFICE.

JAMES COULTHRED THOMPSON, OF LONDON, ENGLAND.

FUSE FOR EXPLOSIVE PROJECTILES OR SHELLS.

SPECIFICATION forming part of Letters Patent No. 565,524, dated August 11, 1896.

Application filed May 7, 1896. Serial No. 590,642. (No model.)

To all whom it may concern:

Be it known that I, JAMES COULTHRED THOMPSON, gentleman, a subject of the Queen of Great Britain, residing at Hazeldean, Crescent Road, Brockley, London, in the county of Kent, England, have invented certain new and useful Improvements in Fuses for Explosive Projectiles or Shells, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in fuses for explosive projectiles or shells.

According to my present improvements I form the dome or movable portion of the fuse and the body portion thereof with circumferential grooves which coincide when the dome is in place on the body, and into these coinciding grooves I insert a copper or other wire whose length is approximately equal to the circumference of the grooves. By these means the dome, while being perfectly free to be rotated or set to adjust the fuse, cannot be detached. The manner of inserting the wire into the grooves is an important feature in my invention. I also provide the fuse with improved means for insuring that the dome or other movable part employed for setting the fuse shall not alter its position during the flight of the shell. For this purpose I employ chisel-pointed or other suitable pins of hard metal, which on shock of discharge, or when the shell commences to spin, embed themselves in the metal composing the dome and thereby prevent its shifting.

The flash for exploding the shell is effected by a pellet or weight which acts partly or wholly under the influence of centrifugal force, and which is so arranged that it remains incapable of acting until after shock of discharge. This pellet or weight carries a detonator which strikes a pin when the weight is released by certain mechanism that is controlled by a train of wheels within the fuse.

In order that my said invention may be clearly understood and readily carried into effect, I will proceed to describe the same more fully with reference to the accompanying drawings, which illustrate the application of my improvements to a distance-fuse.

Figure 1 is a vertical section of the fuse, the dome being indicated mainly in elevation. Fig. 2 is another vertical section of the fuse, taken approximately at right angles to the preceding section, the dome being likewise indicated mainly in elevation. Fig. 3 is a plan of the fuse-body. Fig. 4 is a horizontal section on the line 3 3 of Fig. 1. The aforesaid sectional views illustrated by Figs. 1 and 2 are taken, respectively, on the lines 1 1 of Fig. 3 and 2 2 of Fig. 4. Fig. 5 is a fragmentary sectional view showing a detail of the fuse on an enlarged scale. Fig. 6 is a horizontal section of a fuse, showing a modified arrangement of the pins for locking the dome to the body.

Like letters of reference indicate similar parts throughout the drawings.

A is the dome, and B is the body of the fuse. The latter is formed with the ordinary screw-threaded portion *b* for enabling it to be affixed to the shell.

C is an arbor whose upper end projects beyond the dome and is socketed to receive a spindle D, carrying vanes *d*. The inner end of this spindle terminates inside the dome, where it is provided with a toothed wheel forming part of the train of wheels within the dome. By means of the aforesaid vanes the spindle D is prevented from revolving during the flight and spin of the shell, by the resistance of the air, and the said train of wheels is driven by the revolution of the shell, as is well understood in connection with fuses of this kind, and thus motion is transmitted to the pinion *c*. This pinion gears with a toothed wheel *e*, which has connected to its lower face a disk E. The said disk is loosely mounted on a fixed axis *e'*, projecting from the body B, and is provided with a radial notch or slot e^2, whose purpose will be hereinafter described.

The interior surface of the rim *a* of the dome or movable portion of the fuse is formed with a circumferential groove *a'*, Fig. 5, preferably semicircular in cross-section, and the outer surface of the body B is formed near its upper or outer portion with a corresponding circumferential groove *b'*. The relative position of these grooves is such that, when the dome is in place on the body, they will come opposite each other and together form a groove of circular cross-section. In the groove *b'* I form a lateral hole b^2, and through the rim *a* I form another hole a^2,

which leads into the groove a'. These two holes can be caused to coincide by turning the dome about its axis, and I then pass through the hole a^2 in the dome the end of a copper or other suitable wire $a^\times$, which is of the same shape in cross-section as that of the grooves and of a length corresponding, approximately, to the circumference of the grooves. By then turning the dome about the body in the direction of the arrow in Fig. 5 the wire will be gradually drawn completely through the hole a^2 in the dome and be wound around the groove in the body, thereby filling up the space existing between the two circumferential grooves a' b'. The dome cannot now be detached from the body, although it is free to be revolved thereon.

It is evident that the shape of the grooves and of the wire in cross-section may be varied, and if desired the hole b^2 in the body may be screw-threaded or otherwise formed to insure that the inner end of the wire shall not escape during the turning of the dome in the act of drawing the wire into the said grooves. The hole a^2 may be made at an inclination, as shown by the dotted lines in Fig. 5, if found more advantageous.

b^3 is a pin or stop which is situated near the inner end of the hole b^2 in order to prevent the wire from entering too far into the fuse and interfering with the internal mechanism.

F is an elongated weight or plunger which is capable of moving freely lengthwise in a longitudinal cavity b^4 in the body of the fuse. The upper end of this plunger is formed with lateral notches which receive the inner ends of transversely-arranged pins or bars f f. These pins may be of hardened steel and are located in recesses b^5 b^5 in the body B. The said recesses are formed with openings b^6, which extend through the marginal wall b^7 of the body, and through these openings the outer pointed or chisel-shaped ends of the pins f can project. When the dome A is in place on the body B, as shown in Fig. 1, these pins are retained in the inclined position in which they are there represented by the full lines, and the plunger F is then supported in its raised position, as shown, by the outer ends of the said pins lightly resting against the inner circumference of the rim a of the dome. When the parts are in this position, the dome can be readily rotated around the body to set or adjust the fuse for exploding at the proper time. On shock of discharge, however, the plunger is forcibly driven inwardly toward the bottom of its longitudinal cavity b^4, whereby the pins f are caused to come into alinement or to assume a position somewhat beyond their alinement, as shown by the dotted lines in Fig. 1, and in assuming this position their chisel-shaped ends are driven into the metal of the rim a of the dome, thereby firmly locking the latter to the body B. No rotary movement or displacement can then take place between the dome and the body during the flight of the shell.

Instead of employing pins whose operation depends upon the longitudinal movement of the plunger F, as above described, I may construct the body B with pins or long teeth f', Fig. 6, which are located in recesses b^8 b^8 in the said body. Each of these recesses is of triangular form, the apex of the triangle projecting inwardly and one side $b^\times$ of each triangular recess being greater than the other. The length of the aforesaid pins or long teeth f' is approximately equal to the greater side of the triangle, and when these pins are in their normal position, as shown by the full lines in Fig. 6, they lie in proximity to the said greater side of the triangle. The said triangular recesses are open at their outer parts or bases where they are bounded by the surrounding portion or rim a of the dome, so that the pointed ends of the long teeth f' thus bear upon the inner circumference of the said rim. I may provide light springs f^2, tending to force the pins or teeth f' laterally away from the said greater side of the triangular recesses. By this construction the said pins or teeth will act in the manner of pawls, that is to say, they will permit the dome to be freely turned in one direction for setting the dome to the required position, but will prevent its movement in the opposite direction, which is the direction the dome tends to take during the flight and spin of the shell. Therefore when the sudden twist that the shell receives on discharge from a gun occurs the relative positions of the dome and the fuse-body will remain unchanged by reason of the entrance of the sharp outer ends of the pins into the metal of the rim a of the dome.

G is the pellet or weight, which is located within a cavity b^9 in the body B. This weight is provided with an arm g, having a projection g' at its free end, and with a recess g^2 to receive the primer. The weight G is situated eccentrically to the longitudinal axis of the shell, and the said arm g is of such a length that its projection g' bears against or is adjacent to the external periphery of the aforesaid disk E. As this disk rotates about its axis e' by the action of the revolving shell, as already mentioned, the radial notch or slot e^2 in its periphery eventually comes opposite the aforesaid projection g', and the centrifugal force to which the weight is subjected during the spin of the shell causes the said weight to immediately move forcibly toward the circumference of the fuse. The primer carried by the weight then strikes a fixed pointed pin b^{10}, and the flash thus produced passes along the passage b^{11}, Fig. 2, and thereby reaches the charge within the shell and effects its explosion.

When the fuses are made of comparatively small dimensions, I prefer to employ a small spring H for assisting the centrifugal force to drive the weight toward the pointed pin b^{10} when the said weight is released. This makes

the firing of the fuse independent of the centrifugal force, which in small fuses might be insufficient to insure the explosion of the detonator.

The aforesaid arbor C is furnished with a safety-pin c', which, while in position, prevents the said arbor from being accidentally revolved. In order to avoid any possibility of the weight G being released except during the flight and spin of the shell, I so arrange the cock c^2, in which the pinion c' is pivoted at its lower end, that this cock normally lies immediately above the radial notch e^2 in the disk E, and by coming in front of the projection g' prevents the latter from entering the said notch and releasing the weight, even if by any means the weight should otherwise become released. As a further means of preventing the pellet or weight C prematurely approaching the said pointed pin b^{10} prior to the discharge of the shell from a gun, and in the event of the aforesaid cock c^2 accidentally moving from its position over the radial notch e^2, I form the arm g with a recess $g^{\times}$, Fig. 3, with which the cylindrical surface of the plunger F engages so long as the said plunger is in the outward position. (Shown in Fig. 1.) By these means it will be seen that the said weight is incapable of shifting until the plunger has moved toward the end of its longitudinal cavity, and this can only happen on shock of discharge.

What I claim is—

1. In a fuse, means for locking the dome to the body on shock of discharge consisting of a weight which is located loosely in a cavity in the body and kept in an outward position by transverse pins having sharp outer ends which project through apertures in the body and rest against the inner surface of the dome, so that the movement of the weight causes the said pins to bite into the metal of the dome and thereby firmly lock it to the body substantially as described.

2. In a fuse, means for locking the dome to the body when the shell suddenly commences to revolve about its axis, on being fired from a gun, these means consisting of triangularly-shaped recesses in the body and pins located in such recesses with their sharp ends outward and their inner ends situated at the apices of the recesses whereby they can move as about a pivot and the dome is free to turn in one direction but is restrained from turning in the opposite direction by reason of the said pins biting into the metal of the dome substantially as described.

3. In a fuse wherein the detonator is carried by a weight, means for normally keeping the weight and detonator inactive, consisting of a weighted retaining-piece normally engaging with the said detonator-weight until the shock of discharge causes the removal of the weighted retaining-piece and the disengagement of the detonator substantially as described.

4. In a fuse, the combination with a weight carrying the detonator, of an arm extending from said weight and provided with a projection, and of a notched disk forming part of a train of wheels within the fuse, the said notch being kept normally covered by a portion of the mechanism substantially as described.

5. In a fuse, means for connecting the dome to the body, consisting of a wire which is inserted into an internal circumferential groove by revolving one portion of the fuse around the other substantially as described.

In testimony whereof I have hereunto set my hand this 9th day of April, 1896.

JAMES COULTHRED THOMPSON.

Witnesses:

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