No. 766,022. PATENTED JULY 26, 1904.

A. T. DAWSON & L. SILVERMAN.

PERCUSSION FUSE.

APPLICATION FILED JAN. 7, 1904.

NO MODEL.

Fig. 1.

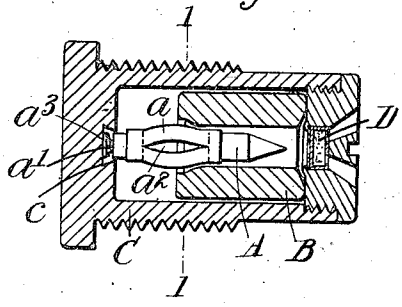


Fig. 2.

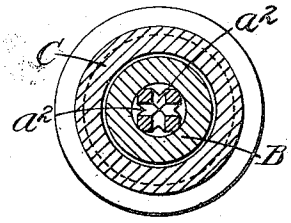


Fig. 3.

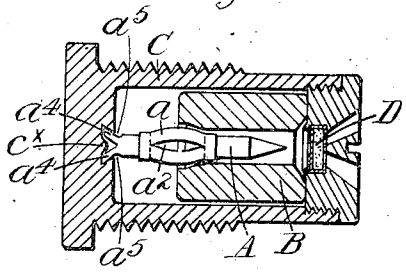


Fig. 4.

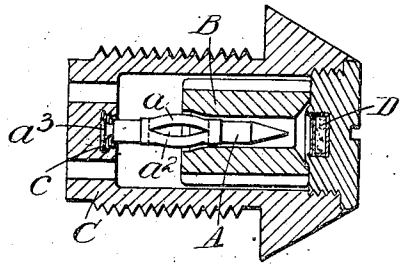
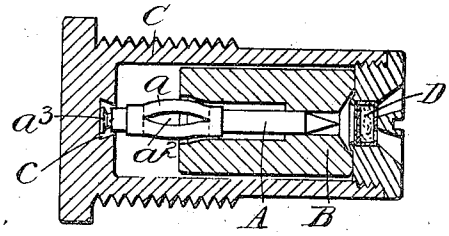


Fig. 5



Witnesses:

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UNITED STATES PATENT OFFICE.

ARTHUR TREVOR DAWSON AND LOUIS SILVERMAN, OF WESTMINSTER, ENGLAND, ASSIGNORS TO VICKERS SONS & MAXIM, LIMITED, OF WESTMINSTER, ENGLAND.

PERCUSSION-FUSE.

SPECIFICATION forming part of Letters Patent No. 766,022, dated July 26, 1904.

Application filed January 7, 1904. Serial No. 188,096. (No model.)

To all whom it may concern:

Be it known that we, ARTHUR TREVOR DAWSON, lieutenant of the Royal Navy, director and superintendent of Ordnance Works, and LOUIS SILVERMAN, engineer, both subjects of the King of Great Britain, residing at 32 Victoria street, Westminster, in the county of London, England, have invented certain new and useful Improvements Relating to Percussion-Fuses, of which the following is a specification.

This invention relates to percussion-fuses, and has special reference to those of the kind in which the pellet is mounted on a firing-pin having a protuberance or swelling which is adapted to yield under the lateral compression due to the longitudinal movement or "setting back" of the pellet on shock of discharge. The said firing-pin has heretofore consisted of a cylindrical wire pointed at one end and recessed at the other end. The protuberance or swelling has been formed by longitudinally slitting said pin at the desired part and laterally expanding the metal by opening the slit, and the recessed end of the pin has been loosely received in a cavity in the base of the fuse-body. The object of having the recessed end on the pin is to enable said end to expand by the stress resulting from the setting back of the pellet on shock of discharge, so as to temporarily lock the said pin to the fuse-body with sufficient firmness to prevent it and the pellet from changing their position after the setting back, but not so firmly as to prevent the pin and pellet from advancing by their momentum to fire the detonator and explosive charge on impact of the projectile. With fuses of this construction it is necessary that the aforesaid firing-pin shall be very carefully made and that proper regard shall be had to the resistance offered by the protuberance to compression and the recessed end to expansion when the pellet sets back—that is to say, a particular ratio should exist between this compression and expansion in order that the expansion shall take place prior to the completion of the compression; otherwise it might happen that the setting back of the pellet would occur without locking the firing-pin to the fuse or that it would lock the firing-pin without effectually compressing the protuberance. In either of these cases unsatisfactory results would be likely to arise in connection with the action of the fuse.

It is the chief object of this invention to overcome the above-stated objections without requiring any more care in the manufacture of the fuse than has hitherto been requisite.

According to our invention we make the portion of the firing-pin that is to be formed with the aforesaid protuberance of rectangular cross-section, and this portion is slit in two directions at right angles to each other, each slit being longitudinal with respect to the firing-pin and opened or separated, as before. This formation renders the compression of the protuberance much more easy of accomplishment by the setting back of the pellet than would be the case if only one slit were provided. Moreover, the cross-section or shape of the pin at this part is symmetrical—that is to say, it is not wider in one direction than the other—so that the pellet cannot wabble on the pin, as it would be possible for it to do if said pin had only one slit to form the protuberance, because in the latter case the cross-sectional shape of the pin at the protuberance would be wider in one direction than in the other, so that there would not be an even support for the pellet falling around the pin. Then in order to avoid the contingency above stated with regard to the compression of the protuberance taking place prior to the locking of the firing-pin to the fuse-body it becomes necessary to facilitate the expansion of the rear end of the firing-pin or to insure that a less amount of expansion than heretofore shall be sufficient to lock the pin to the fuse-body. For this purpose we make the cavity in the fuse-body for the reception of the rear end of the firing-pin undercut or conical, and we preferably transversely split the rear end of the firing-pin where it enters said cavity, in which case the cavity has a convex projection at its bottom. In some cases we form the wall of the cavity with serrations or the like.

In the accompanying drawings we have

shown several forms of our improved fuse constructed in accordance with this invention.

Figure 1 is a longitudinal section, and Fig. 2 a cross-section, on the line 1 1 of one form of the said fuse. Figs. 3, 4, and 5 are longitudinal sections of the said fuse, showing modifications.

Like letters of reference indicate similar parts in all the figures.

A is the firing-pin; B, the pellet; C, the fuse-body, and D the detonator. The protuberance a of said firing-pin is in each case of square cross-section and has two longitudinal slots a^2 a^3 at right angles to each other, as shown best in Fig. 2. The forward part that bears the firing-point and the inner end that enters the cavity c in the fuse-body are both of circular cross-section. By reason of the aforesaid square cross-section of the protuberance it will be evident on inspection of Fig. 2 that the pellet is evenly supported thereby, which would not be the case if the cross-section of the protuberance were of the shape that would be produced by making it with only one slit.

In Figs. 1, 4, and 5 the said double-slotted firing-pin has its rear end channeled at a' to form a cup-shaped piece a^3 at the extreme end thereof. On shock of discharge and the consequent setting back of the pellet B the double-slotted protuberance a will be laterally compressed, and before the completion of such compression the said cup-shaped end will be crushed and will expand radially to fill up the undercut or conical cavity c in the fuse-body, thus temporarily locking the firing-pin to said fuse-body. On shock of impact the firing-pin and its pellet will advance by their momentum, whereby the firing-pin will disengage itself from the cavity c by laterally compressing its expanded end as it leaves the undercut cavity c under the influence of the momentum, and thus the point of the firing-pin will strike the detonator D and fire the charge.

In Fig. 3 the inner end of the double-slotted firing-pin is slotted in two directions at right angles to form prong-like pieces a^4, which at the point a^5, where they join the firing-pin, are weakened by slightly removing the metal to aid them in laterally expanding or moving outward with respect to each other. The bottom of the cavity c is made with the convex projection $c^\times$, which on shock of discharge and during the setting back of the pellet B will coöperate with the prong-like pieces a^4 to assist them to move outwardly and tightly fit the wall of the said undercut or conical cavity for temporarily locking the pin to the fuse-body, as aforesaid. On shock of impact the firing-pin and its pellet will advance by their momentum, thereby liberating the firing-pin from the cavity c by laterally compressing the prong-like pieces a^4 and enabling the firing-pin to collide with the detonator D to fire the charge, as explained in connection with Figs. 1 and 2.

In Fig. 4 the said inner end of the firing-pin is formed similarly to that in Fig. 1; but the cavity c instead of being plain, as in Figs. 1 and 3, is serrated, so as to impart to it an additional holding power on the firing-pin when the pellet B is set back on shock of discharge.

In Fig. 5 the firing-pin is like that in Fig. 1, but is made longer at its forward portion, so as to act in conjunction with the pellet as a guide to keep the firing-pin truly central with respect to the detonator D. In Fig. 4 we have shown the invention applied to a point-fuse instead of to a base-fuse, as in the forms illustrated by the other figures.

What we claim, and desire to secure by Letters Patent of the United States, is—

1. In a percussion-fuse, the combination with the fuse-body having an undercut cavity at its base, of a firing-pin adapted to loosely fit said cavity at its rear end, a rectangular protuberance on said firing-pin formed by a plurality of longitudinal and expanded slits situated at right angles to each other, a percussion-pellet normally surrounding the point of the firing-pin, and means whereby on shock of discharge and the consequent setting back of the pellet to arm the fuse, said rear end of the firing-pin will be laterally expanded and temporarily locked in said cavity but will become laterally compressed again to liberate the firing-pin on shock of impact substantially as and for the purpose described.

2. In a percussion-fuse, the combination with the fuse-body having an undercut cavity at its base, of a firing-pin adapted to loosely fit said cavity at its rear end, serrations on the wall of said cavity, a rectangular protuberance on said firing-pin formed by a plurality of longitudinal and expanded slits situated at right angles to each other, a percussion-pellet normally surrounding the point of the firing-pin, and means whereby on shock of discharge and the consequent setting back of the pellet to arm the fuse, said rear end of the firing-pin will be laterally expanded and temporarily locked in said cavity but will become laterally compressed again to liberate the firing-pin on shock of impact substantially as and for the purpose described.

3. In a percussion-fuse, the combination with the fuse-body having an undercut cavity at its base, of a firing-pin formed with prong-like pieces at its rear end which is adapted to loosely fit said cavity, a rectangular protuberance on said firing-pin formed by a plurality of longitudinal and expanded slits situated at right angles to each other, a percussion-pellet normally surrounding the point of the firing-pin, and means whereby on shock of discharge and the consequent setting back of the pellet to arm the fuse, said prong-like pieces of the firing-pin will laterally expand and be tempo-

rarily locked in said cavity but will become laterally compressed again to liberate the firing-pin on shock of impact substantially as and for the purpose described.

4. In a percussion-fuse, the combination with the fuse-body having an undercut cavity at its base, of a firing-pin transversely slit in two directions to form prong-like pieces at its rear end which is adapted to loosely fit said cavity, a rectangular protuberance on said firing-pin formed by a plurality of longitudinal and expanded slits situated at right angles to each other, a percussion-pellet normally surrounding the point of the firing-pin, a convex projection on the base of said cavity adapted to assist the prong-like pieces at the end of the firing-pin to laterally expand on shock of discharge for temporarily locking the firing-pin in said cavity from which it will become liberated again on shock of impact substantially as and for the purpose specified.

In testimony whereof we have hereunto set our hands, in presence of two subscribing witnesses, this 21st day of December, 1903.

ARTHUR TREVOR DAWSON.
LOUIS SILVERMAN.

Witnesses:
HENRY KING,
C. A. SEARLE.