E. W. COLEMAN.

PERCUSSION MECHANISM FOR EXPLOSIVE PROJECTILES.

APPLICATION FILED AUG. 21, 1916.

1,216,078.

Patented Feb. 13, 1917.

3 SHEETS—SHEET 1.

FIG. 1.

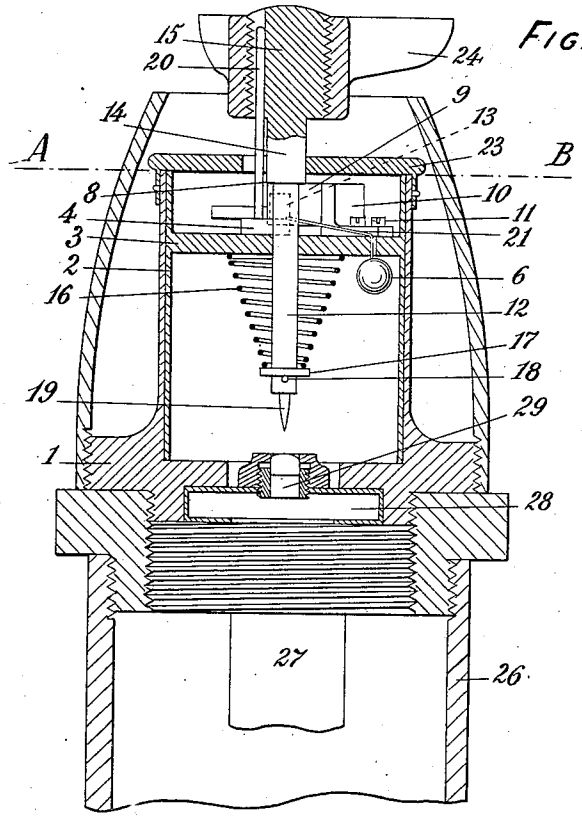


FIG. 2.

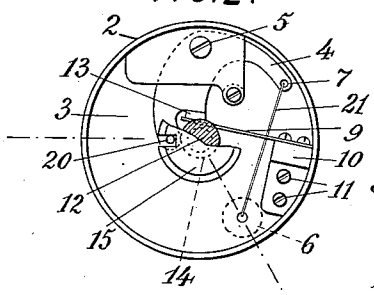


FIG. 3.

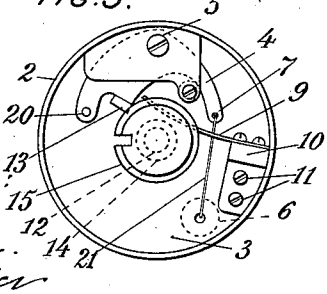
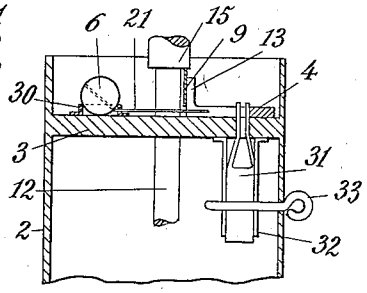


FIG. 4.



Witnesses:

M. E. McKade.

C. D. Fessler

Inventor

Edward W. Coleman

by James L. Norris,

Attorney.

E. W. COLEMAN.

PERCUSSION MECHANISM FOR EXPLOSIVE PROJECTILES.

APPLICATION FILED AUG. 21, 1916.

1,216,078.

Patented Feb. 13, 1917.

3 SHEETS—SHEET 2.

FIG. 5.

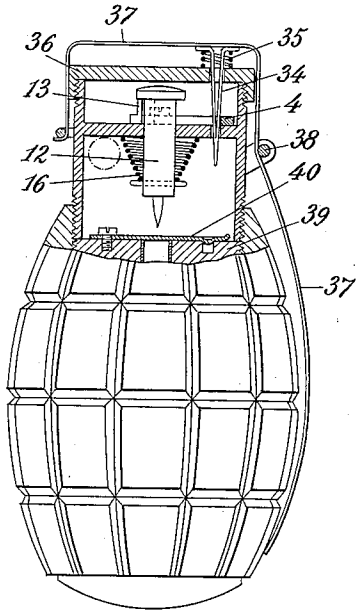


FIG. 10.

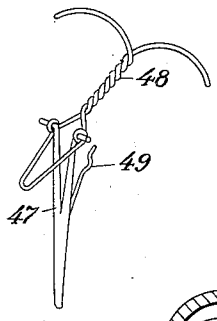


FIG. 8.

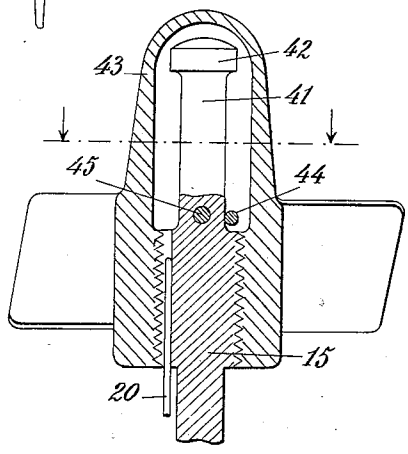


FIG. 6.

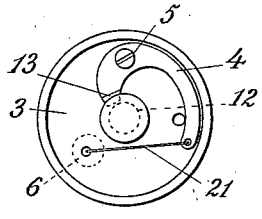


FIG. 7.

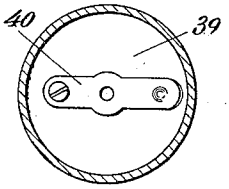
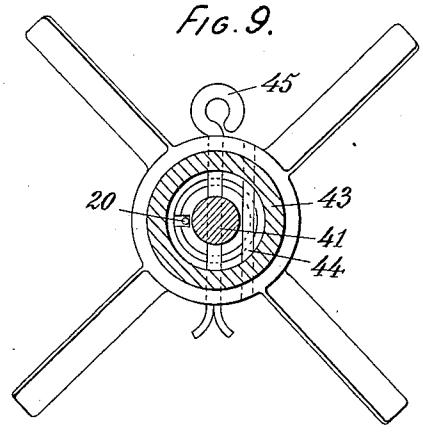


FIG. 9.



Witnesses,

M. E. McDade

C. P. Kesler

Inventor

Edward W. Coleman

by James L. Norris,

Attorney

E. W. COLEMAN.

PERCUSSION MECHANISM FOR EXPLOSIVE PROJECTILES.

APPLICATION FILED AUG. 21, 1916.

1,216,078.

Patented Feb. 13, 1917.

3 SHEETS—SHEET 3.

FIG. 11.

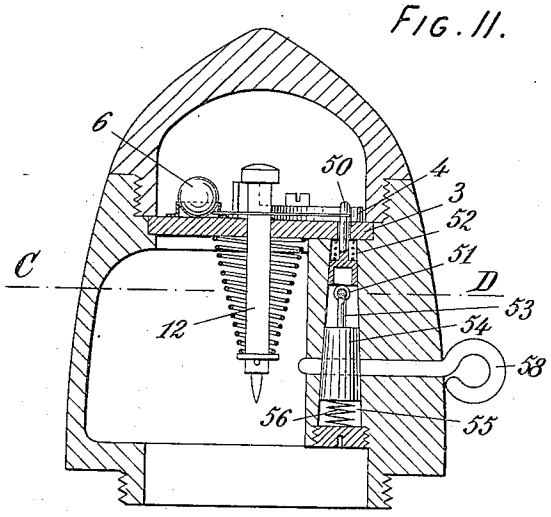


FIG. 12.

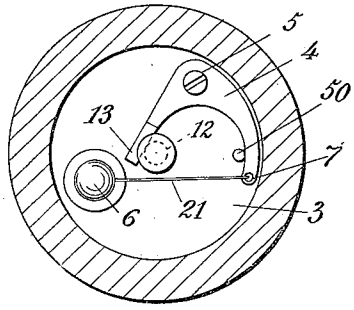
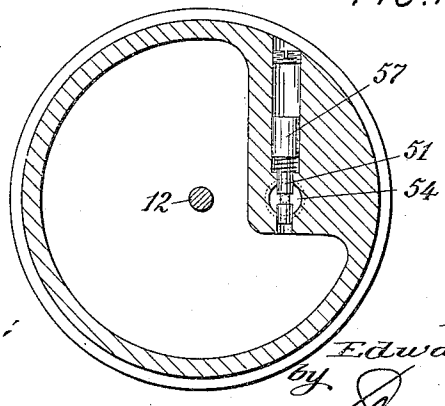


FIG. 13.



Witnesses:

W. E. McKade.

C. E. Kealer

Inventor

Edward W. Coleman

by James L. Norris,

Attorney

UNITED STATES PATENT OFFICE.

EDWARD WILLIAM COLEMAN, OF LONDON, ENGLAND.

PERCUSSION MECHANISM FOR EXPLOSIVE PROJECTILES.

1,216,078. Specification of Letters Patent. Patented Feb. 13, 1917.

Application filed August 21, 1916. Serial No. 116,137.

To all whom it may concern:

Be it known that I, EDWARD WILLIAM COLEMAN, a subject of the King of the British Dominions, residing at London, England, have invented certain new and useful Improvements in Percussion Mechanism for Explosive Projectiles, of which the following is a specification.

This invention relates to a safety percussion mechanism for hand grenades, bombs and the like, and has for its object, to provide a device for firing the caps or detonators with certainty on impact at any angle, thus obviating the necessity of a time fuse.

The said safety percussion mechanism chiefly comprises a sear or similar device adapted to lock the striking pin in its cocked position and to release the same in consequence of the impact of the bomb with a resisting body, a safety pin which normally secures the sear in its locking position and releases it when the projectile is launched, such releasing action being produced automatically, for instance by means of a vane caused to revolve by the flight of the projectile through the air, or by the shock of the discharge of the shell in a firearm, or by the launching of a hand grenade or of a bomb, and a ball weight connected with the sear by a flexible cord or other flexible member, so that the pull on the cord produced by the inertia of the ball, when the projectile strikes a resisting body, will disengage the sear from the striking pin and allow the latter to strike the percussion cap or detonator.

In the following description reference will be made to the accompanying drawings, of which—

Figure 1 is a partial section of a three inch shell or trench-mortar shell fitted with a safety catch percussion mechanism embodying my invention and showing an example of construction;

Fig. 2 is a transverse section along line A—B of Fig. 1 showing the mechanism ready for action, and

Fig. 3 shows the same after the mechanism has operated.

Figs. 4 to 13 represent modifications.

In Figs. 1 to 3, 1 indicates a casing or sleeve which is secured to the shell-body and serves to hold an inner casing 2 to which the mechanism is fitted; 3 is a bedplate or partition formed in the casing 2 and supporting the mechanism.

4 indicates a crank lever mounted on a pivot 5 and shaped at one end, so as to form a sear 13, adapted to support or hold up the striking pin 12, when the mechanism is set ready for action. 6 indicates a gravity ball connected with the other end 7 of the crank lever 4 by means of a cord or flexible member 21, guided through an opening in the partition 3. 8 indicates a shoulder formed on the striking pin 12 and adapted to rest on the sear 13 or on the spring 9; 9 indicates an upright flat spring which is forced by the sear 13 under the shoulder 8, when the mechanism is set. The said spring is fixed at one end to a bracket 10, mounted on the partition 3 by screws 11; 12 indicates the striking pin, which is guided through an axial opening in the closing cap 23 and an axial opening in the partition 3, and is subject to the downward pressure of a coiled spring 16, through the intermediary of a washer 17 and a pin 18.

The part 14 of the striking pin, which extends from the shoulder upward and is guided in the closing cap 23, has flat sides, to prevent the pin from turning on its axis.

The upper end or boss 15 of the striking pin, which adjoins the flat part 14 is provided with a screw thread and carries the internally threaded boss of the helically inclined vanes or wings 24.

The threaded portion of the boss 15 has a longitudinal groove adapted to receive a safety pin 20 fixed at its lower end to the extremity of the crank lever 4 in an upright position.

If the safety pin 20 has been introduced sidewise into the longitudinal groove by the motion of the crank lever 4, and then the wing-body 24 screwed on the boss 15 into the position shown by Fig. 1, any lateral motion of the pin 20 is prevented by the wing body 24.

If the mechanism is set, and then the projectile launched through the air, the latter will cause the wing body 24 to turn on its axis, and at the same time to recede upward, thereby automatically releasing the pin 20, so that the latter is allowed to follow the

motion of the crank lever 4, for which purpose the pin 20 is guided in the closing cap 23 by means of a slot.

The coiled spring 16, which operates the striking pin 12, is held under compression until the striking pin has been set free by the operation of the mechanism, so that the needle end 19 may move forward and strike the percussion cap or detonator.

26 indicates the body of a trench mortar shell; 27 the detonator holder, 28 the powder chamber and 29 the percussion cap holder.

For setting the mechanism described above, the striking pin 12 is pulled up, a setting pin (not shown) is introduced through an opening in the side of the sleeve 1 and casing 2, for pressing the spring 9 against the striking pin 12 below the shoulder 8 of the same, when the safety pin 20, attached to the crank lever which also carries the sear, is pressed by hand sidewise into the longitudinal groove of the threaded portion of the striking pin, thereby placing the sear underneath the shoulder 8 of the striking pin and compressing the spring 9. Afterward the vane body 24 is screwed on to the boss 15, so as to occupy the position shown by Fig. 1, in which it prevents the pin 20 and consequently the sear 13 and gravity ball 6 from moving.

The motion of the bomb or shell through the air unscrews the vane body until it gets clear of the safety pin 20, and renders the latter free to move sidewise when the gravity ball comes into operation in consequence of the impact of the shell with a resisting body. The motion of the said ball then pulls the crank lever carrying the sear from under the shoulder of the striking pin, the tension of the spring 2 helps to force the sear free of the said shoulder, and the striking pin is now free to move forward under the pressure of the coiled firing spring 16.

The modification represented by Fig. 4 has for its object to dispense with the use of vanes or wings. The gravity ball 6 is held in a cup-shaped seating 30, fixed to the partition or bed-plate 3, and is connected with the crank lever 4 by a cord 21 passing through a hole of the cup 30. The crank lever 4 is normally held in position by a spring attached to a slidable weight 31, guided in a sleeve 32, fixed to the underside of the partition 3.

A ball weight supported by a cup mounted on the partition 3 may also be used in the mechanism according to Fig. 1, instead of a suspended ball. In both cases the ball is connected with the crank lever 4 by a flexible cord.

The mechanism shown in Fig. 4 is used by first withdrawing a locking pin 33, so as to release the weight, after which the shock of discharge of the shell causes the weight 31 to slide within the sleeve 32, and to release the crank lever, which is now free to turn when the shell strikes a resistance. This impact causes the ball 6 to move, so as to pull the cord 21, and thereby to draw the sear from under the head of the firing pin.

Fig. 5 represents a hand grenade, embodying a modified form of my invention.

Figs. 6 and 7 represent details of construction of the same. 4 indicates again the crank lever, 34 a spring operated safety pin for releasing the crank lever 4, the said pin being inserted through the closing cap 36 and having a spring 35 attached to the prongs at the head of the split pin 34, while the lower end of the said spring 35 rests on the cap.

A spring band 37 is hooked at one end to the side of the casing of the mechanism, it passes over the cap 36, and extends down the side of the hand grenade, and is secured to the side of the casing of the mechanism by a cotter or split pin 38 provided with a ring (not shown) to facilitate its withdrawal. The object of the said band is to compress the spring 35 of the safety releasing pin 34.

When the cotter pin 38 is withdrawn, the spring band, being under tension, turns over on its hooked extremity, thus releasing the safety pin 34, which is now forced upward by the spring 35, thus leaving the mechanism free to work on impact.

Fig. 6 is a horizontal section through the casing above the striking pin, and Fig. 7 a horizontal section below the striking pin, showing a device for securing the detonator or firing cap in position. A metal disk 39 is secured to the upper part of the hand grenade, and is provided with a hinged cover 40 for securing the cap or detonator in its position.

Fig. 8 shows a modification of the vane or wing-body for freeing the mechanism when fitted to an aeroplane bomb.

41 is an upward extension of the striking pin at the end of the screwed boss, to limit the upward motion of the vane-body by means of an enlarged head 42 formed on the extension 41. The boss of the vanes has a hollow extension 43 to cover and protect the end of the striking pin. A pin 44 is inserted through the side of the boss of the vane, to limit the upward motion of the same by abutting against the head of the striking pin.

45 indicates the usual locking pin.

Fig. 9 is a horizontal section of the striking pin and vane-body shown in Fig. 8. It shows the vertical groove for the upright safety pin attached to the crank lever, and also the perforation for the pin and the ordinary releasing pin 45. Fig. 10 shows a modification of the device shown in Fig. 5.

It represents a locking or freeing safety swiveling pin for hand grenades, and comprises a spring pin 47, to be inserted instead of the pin 34 for locking the crank lever.

Instead of a spring band 37, a specially shaped handle 48 is used, which is pivoted to the upper end of the pin 47 and held by the fingers, when the grenade is thrown, thereby pulling the safety pin 47 and allowing the crank lever to move, when the grenade strikes a resisting body.

49 indicates a spring fixed to the end of the safety pin 47 and adapted to lock the handle 48 to the said pin, until the projectile is to be thrown.

Fig. 11 is an axial section of the nose of a shell provided with a percussion device, which is made ready for action by a special device, which normally locks the sear and is operated by the shock of the discharge in a gun.

Fig. 12 is a plan of the firing pin and sear, and

Fig. 13 a transverse section along line C—D of Fig. 11.

In its normal position the sear lever 4 is locked by a pin 50 which extends through the partition 3 and is caused to rest with its widened base upon a transverse pin 51 by a spring 52.

The pin 51 has a circular groove, into which projects the extremity of a pin 53 attached to a weight 54 which is guided in a conical recess 55 and rests on a spring 56. The said pin 51 extends across the recess 55 and has a piston-shaped base 57, pressed outward by a spring.

The piston-shaped weight 54 is locked in its position by a key 58.

Immediately before loading the gun the key 58 is withdrawn, and when subsequently the propelling charge is fired the inertia of the weight 54 causes the same to lag behind, so as to compress the spring 56 and to withdraw the pin 53 from the groove of the pin 57. The latter is now drawn out of the recess 55 by the pressure of the spring on the piston 57 and allows the locking pin 50 to move downward under the pressure of the spring 52, thereby releasing the sear lever 4, so that the latter is only held by the cord or flexible member 21, which acts when the projectile strikes.

What I claim is:—

1. A safety percussion mechanism for explosive projectiles, comprising in its construction a striking pin adapted to fire the igniting charge, a device adapted to lock the striking pin in its cocked position, a ball-weight adapted to move relatively to the shell-body in consequence of its inertia, when the projectile is stopped by a resisting body, and a flexible member connecting the ball-weight with the said locking device and adapted to set the latter in motion, so as to release the striking pin, substantially as described.

2. A safety percussion mechanism for explosive projectiles, comprising in its construction a device adapted to retain the striking pin in its cocked position, a safety device adapted to secure the said retaining device in its locking position and to be set out of action, when the projectile is launched, a ball-weight adapted to move relatively to the shell-body in consequence of its inertia, when the projectile is stopped by a resisting body, and a flexible member connecting the ball-weight with the said retaining device, so as to release the striking pin, when the ball-weight is set in motion, substantially as described.

3. A safety percussion mechanism for explosive projectiles, comprising in its construction a striking pin adapted to fire the igniting charge, a sear spring and sear adapted to lock the firing pin in its cocked position, a crank-lever carrying the sear, a ball-weight adapted to move relatively to the shell-body in consequence of the impact of the projectile, and a flexible member connecting the ball-weight with the crank lever and adapted to set the latter in motion, so as to release the firing pin, substantially as described.

4. A safety percussion mechanism for explosive projectiles, comprising in its construction a striking pin adapted to fire the igniting charge, a device adapted to lock the striking pin in its cocked position, a ball-weight adapted to move relatively to the shell-body in consequence of its inertia, when the projectile strikes a resisting body, a cup-like support for the ball-weight, and a flexible member connecting the ball-weight with the said locking device and adapted to set the latter in motion for releasing the striking pin, substantially as described.

5. In a percussion mechanism for explosive projectiles having a firing pin movable in the axis of the projectile, the combination of a firing pin with a sear forming part of a lever movable in a plane at right angles to the axis of the projectile, a vane-body mounted on a prolongation of the firing pin by a screw-thread, and a locking pin fixed at one end to the sear lever and extending outward from the same parallel to the axis, the said prolongation having in its circumference an axial recess adapted to receive the said locking pin, substantially as described.

6. In a percussion mechanism for explosive projectiles having a firing pin movable in the axis of the projectile, the combination of a firing pin having an outward extension provided with a screw-thread having a longitudinal groove, with a sear forming part of a lever movable in a plane

at right angles to the axis, a vane-body mounted on the said screw-thread and made hollow to form a cap over the said extension, and a locking pin fixed at one end to the sear-lever and extending outward into the said groove, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

EDWARD WILLIAM COLEMAN.

Witnesses:
J. WETTER,
P. R. KNIGHT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."