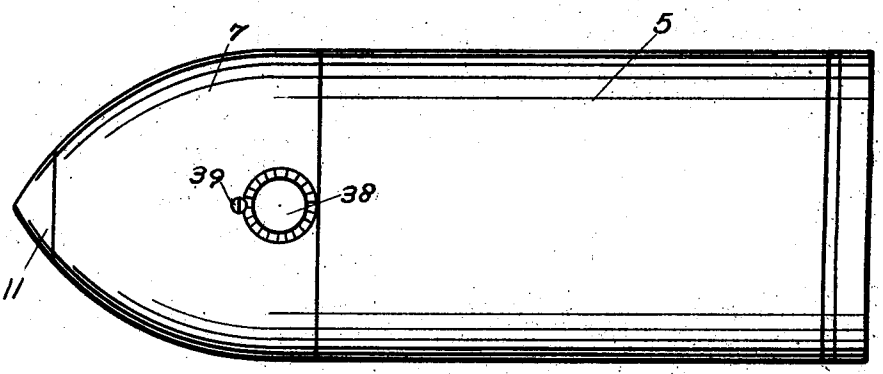
T. W. R. McCABE.

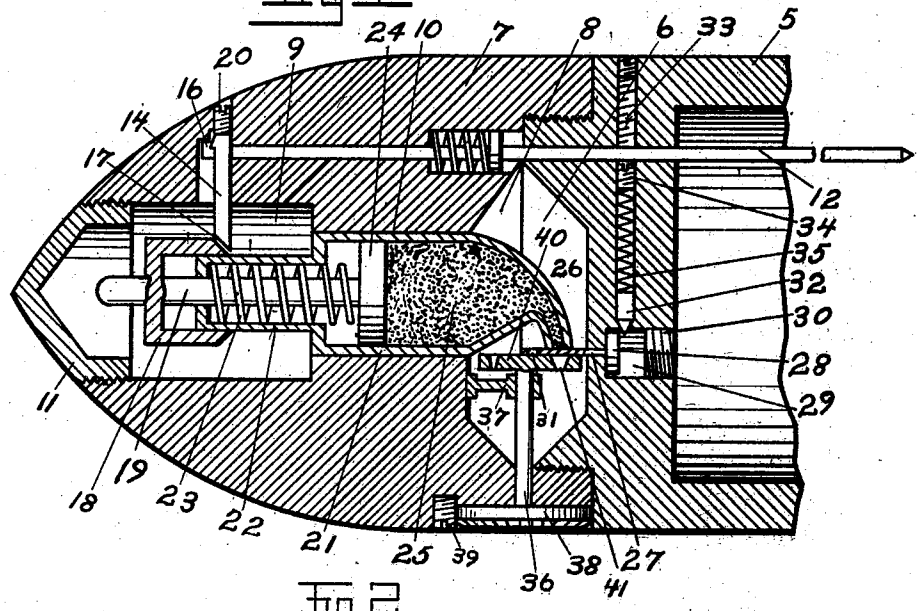
TIME FUSE MECHANISM.

APPLICATION FILED JUNE 4, 1917.

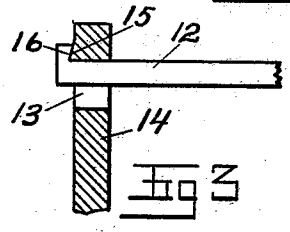
1,333,667. **Patented Mar. 16, 1920.**



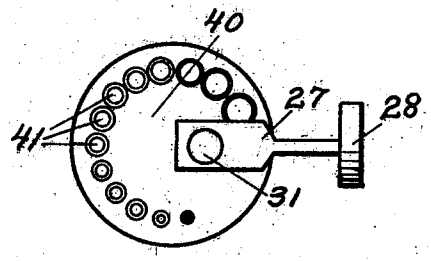
五g 1



五g 2



五g 3



五g 4

Witnesses

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TIME-FUSE MECHANISM.

1,333,667. Specification of Letters Patent. Patented Mar. 16, 1920.

Application filed June 4, 1917. Serial No. 172,774.

To all whom it may concern:

Be it known that I, THOMAS W. R. McCABE, a citizen of the United States, residing at Waterbury, in the county of New Haven, State of Connecticut, have invented certain new and useful Improvements in Time-Fuse Mechanism; 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.

This invention is an improvement in projectiles and has particular reference to a time fuse mechanism for explosive shells and the like.

An object of the invention is to provide an improved mechanism which will insure the accurate timing of the explosion of the shell and which will be arranged within the body and cap of the shell in compact form.

Another object is to so arrange the time fuse within the cap of the shell that said fuse will be operated to explode the shell by impact thereof against an object in the event that the fuse fails to perform its function in the usual manner.

A further object is to provide a time fuse of this character which is simple in construction, easy to manufacture and effective in carrying out the purpose for which it is designed.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawing; but it is to be expressly understood that the construction shown in said drawing is used only to illustrate the invention as a whole and not to define the limits thereof, reference being had to the claims for this purpose.

In the drawing;

Figure 1 is a side elevation of an explosive shell constructed in accordance with the invention.

Fig. 2 is an enlarged fragmentary longitudinal section showing the time fuse in position therein.

Fig. 3 is an enlarged section of a detail.

Fig. 4 is a plan view of a release valve and rotary regulating device employed in connection with the invention.

The projectile or explosive shell embodying the present invention preferably comprises a body portion 5 provided with a recess 6 in one end and having mounted on said end the cap or nose 7. This cap is provided in its inner end with a recess 8 similar to the recess 6 and forming therewith a chamber the purpose of which will appear in the course of the description. Adjacent the outer end of the cap 7 the same is provided with a second chamber 9 which communicates with the first named chamber through an opening or passage 10, the outer end of said chamber 9 being closed by a plug 11. Mounted to slide longitudinally of the body portion 5 and cap 7 is the spring pressed firing pin or hammer 12 the forward end of which preferably extends through a longitudinal slot 13 in the outer end of a transverse locking pin 14 provided with a shoulder 15 for normally engaging the lateral extension 16 of said firing pin whereby to prevent actuation thereof. The inner end of the locking pin is beveled as indicated at 17 and projects into the chamber 9 and is arranged in the path of movement of the beveled head 18 of the plunger 19, the longitudinal axis of which is preferably coincident with that of the projectile so that when said plunger moves, as will later appear, the beveled head 18 will contact with the beveled end 17 of the locking pin at a predetermined time and adjust the same transversely so as to release the firing pin. The locking pin 14 is normally retained in its locked position by a set screw 20 engaging the outer end thereof so as to prevent any accidental outward movement and this set screw must be removed before the projectile is fired.

A cylindrical casing or receptacle 21 is preferably mounted longitudinally of the opening or passage 10 and is provided at one end with a reduced portion 22 extending into the chamber 9 and encircling the plunger 19 which has a coil spring 23 mounted thereon the inner end of which engages the piston 24 of said plunger which moves longitudinally of the casing 21. Retarding means, preferably in the form of a granular material 25 of any desired kind is placed within the casing 21 between the piston 24 and the inner end of said casing which is tapered or reduced and made to terminate in a restricted neck or spout 26 forming an outlet for said casing and offset or inclined from the longitudinal axis thereof. This outlet is so arranged in order to permit of the release of the material 25 from the casing by the centrifugal force due

to the rotary movement of the projectile while traversing its trajectory and said material will empty into the chamber 6. It will be apparent that as the material is released from the casing the spring 23 will force the piston 24 inwardly and cause the head 18 to approach and eventually contact with the locking pin 14 with the result already described.

Means are provided in connection with the outlet 26 for controlling the passage of the material 25 therethrough and said means preferably comprises a valve 27 slidably mounted in the head 5 and provided upon one end with an enlargement 28 operable in a recess 29 in said head, said recess being closed by a screw 30, which forms a stop whereby to limit the rearward movement of said valve when the same is operated. The end of the valve 27 opposite the enlargement 28 is provided with a valve opening 31 which is normally out of registration with the outlet end of the neck 26 whereby to prevent the material 25 from escaping from the casing. The valve 27 is yieldably retained in its normal position by a spring pressed pin 32 slidably mounted in a transverse screw threaded opening 33 formed in the body 5, the pressure of said pin being regulated by a screw 34 adjustable in said opening and bearing against the spring 35. The actuation of the releasing valve 27 is caused by its relative inertia when the projectile is fired and the shock of said firing will cause said valve to overcome the pressure of the pin 32 thereagainst and the same will move rearwardly until the enlargement 28 contacts with the stop screw 30 whereupon the opening 31 will register with the outlet end of the neck 26 and the valve will then be in a position to permit of the passage of the material 25 from the casing into the chamber 6.

The means for regulating or controlling the flow of the material from the casing 21 and the consequent speed of movement of the plunger piston 24 in said casing preferably comprises a regulating device consisting of a shank 36 rotatably mounted transversely of the cap 7 and supported in a bearing 37 mounted in the chamber formed by the recesses 6 and 8. The outer end of the shank 36 is provided with a graduated disk 38 seated in said cap and rotatable to the desired position whereby the firing pin 12 will be released at a predetermined time after the firing of the projectile. The disk 38 is normally locked by a screw 39 engaging the same so as to prevent its rotation, said screw being removed prior to setting the device. The inner end of the shank 36 has formed thereon a disk or plate 40 between which and the outlet 26 is interposed the valve 27. The plate 40 is provided adjacent its periphery with a plurality of transverse tapered or conical openings 41 of various sizes each of which is adapted to be registered with the valve opening 31 and the outlet 26 when the valve 27 is in its releasing position. It will be understood, of course, that the speed at which the material 25 escapes from the casing 21 is controlled by the size of the opening 41 and the larger the opening the shorter will be the interval between the firing of the projectile and the explosion thereof.

The plunger 19 is so arranged in the cap 7 that should the mechanism fail to operate, through any defect in construction, in the usual manner the same will be actuated to release the firing pin by the impact, and consequent inward movement, of the plug 11 with an object.

It will be noted that the discharge of the material 25 is radially or at right angle to the axis of the projectile. The speed of rotation of the projectile varies in proportion to the speed of its flight from the gun. Thus, inasmuch as the discharge of the material 25 will be modified in its speed by centrifugal action, in proportion to the speed of rotation of the shell, its discharge will also be in proportion to its speed of flight. Thus, the more quickly the shell reaches the objective, the more quickly will the material 25 be discharged so that when the mechanism is properly set, the explosion will occur at the proper instant notwithstanding a variation in the time of its flight.

What is claimed is:—

1. In a time fuse mechanism for exploding projectiles, the combination of a firing pin, a lock therefor, a casing, a plunger movable in said casing and adapted, when moved, to contact with said lock to release the same, means releasably held within said casing to retard the movement of said plunger, and slidable means actuated by the firing of the projectile to release said retarding means.

2. In a time fuse mechanism for exploding projectiles, the combination of a firing pin, a lock therefor, a casing, a plunger movable in said casing and adapted, when moved, to contact with said lock to release the same, means releasably held within said casing to retard the movement of said plunger, slidable means actuated by the firing of the projectile to release said retarding means, and means regulating the release of said retarding means whereby to control the speed of movement of the plunger in said casing.

3. In a time fuse mechanism for exploding projectiles, the combination of a firing pin, a lock therefor, a casing, a plunger movable in said casing and adapted, when moved, to contact with said lock to release the same, means releasably held within said

casing to retard the movement of said plunger, slidable means actuated by the firing of the projectile to release said retarding means, and rotatable means adjustable from the exterior of the projectile for regulating the rate of release of said retarding means whereby to control the speed of movement of the plunger in said casing.

4. In a time fuse mechanism for exploding projectiles, the combination of a firing pin, a lock therefor, a casing, a plunger movable in said casing and adapted, when moved, to contact with said lock to release the same, means releasably held within said casing to retard the movement of said plunger, and a slide valve actuated by the firing of the projectile to release said retarding means.

5. In a time fuse mechanism for exploding projectiles, the combination of a firing pin, a lock therefor, a casing, a plunger movable in said casing and adapted, when moved, to contact with said lock to release the same, means releasably held within said casing to retard the movement of said plunger, means regulating the release of said retarding means whereby to control the speed of movement of the plunger in said casing, and means interposed between said casing and the last named means and actuated by the firing of the projectile to release said retarding means.

6. In a time fuse mechanism for exploding projectiles, the combination of a firing pin, a lock therefor, a casing, a plunger movable in said casing and adapted, when moved, to contact with said lock to release the same, means releasably held within said casing to retard the movement of said plunger, means regulating the release of said retarding means whereby to control the speed of movement of the plunger in said casing, and a slide valve interposed between said casing and the last named means and actuated by the firing of the projectile to release said retarding means.

7. In a time fuse mechanism for exploding projectiles, the combination of a firing pin, a lock therefor, a casing, a plunger movable in said casing and adapted, when moved, to contact with said lock to release the same, means releasably held within said casing to retard the movement of said plunger, rotatable means adjustable from the exterior of the projectile for regulating the release of said retarding means whereby to control the speed of movement of the plunger in said casing, and means interposed between said casing and said rotatable means and actuated by the firing of the projectile to release said retarding means.

8. In a time fuse mechanism for exploding projectiles, the combination of a firing pin, a lock therefor, a casing having an outlet offset from the longitudinal axis of the body portion thereof, a granular retarding material normally held within said casing and released therefrom partly through centrifugal action due to the rotation of the projectile when moving through its trajectory, and means movable within said casing as the material is being released to actuate said lock whereby to permit of the operation of said firing pin.

9. In a time fuse mechanism for exploding projectiles, the combination of a firing pin, a lock therefor, a casing having an outlet offset from the longitudinal axis of the body portion thereof, a granular retarding material normally held within said casing and released therefrom partly through centrifugal action due to the rotation of the projectile when moving through its trajectory, means movable within said casing as the material is being released to actuate said lock whereby to permit of the operation of said firing pin, and means regulating the release of said material and the speed of movement of the last named means.

10. In a time fuse mechanism for exploding projectiles, the combination of a firing pin, a lock therefor, a casing having an outlet offset from the longitudinal axis of the body portion thereof, a granular retarding material normally held within said casing and released therefrom partly through centrifugal action due to the rotation of the projectile when moving through its trajectory, a valve device actuated by the firing of the projectile to permit of the release of said material from said casing, and means movable in said casing as the material is being released to actuate said lock whereby to permit of the operation of said firing pin.

11. In a time fuse mechanism for exploding projectiles, the combination of a firing pin, a lock therefor, a casing having an outlet offset from the longitudinal axis of the body portion thereof, a granular retarding material normally held within said casing and released therefrom partly through centrifugal action due to the rotation of the projectile when moving through its trajectory, a valve device actuated by the firing of the projectile to permit of the release of said material from said casing, means movable in said casing as the material is being released to actuate said lock whereby to permit of the operation of said firing pin, and regulating means operable from the exterior of the projectile for controlling the release of said material and the consequent speed of movement of said movable means.

12. In a time fuse mechanism for exploding projectiles, the combination of a firing pin, a lock therefor, a casing having an outlet offset from the longitudinal axis of the body portion thereof, a granular retarding material normally held within said casing and released therefrom partly through

centrifugal action due to the rotation of the projectile when moving through its trajectory, a slide valve actuated by the firing of the projectile to permit of the release of said material, and means movable in said casing as the material is being released to actuate said lock whereby to permit of the operation of said firing pin.

13. In a time fuse mechanism for exploding projectiles, the combination of a firing pin, a lock therefor, a casing having an outlet offset from the longitudinal axis of the body portion thereof, a granular retarding material normally held within said casing and released therefrom partly through centrifugal action due to the rotation of the projectile when moving through its trajectory, a slide valve actuated by the firing of the projectile to permit of the release of said material, means movable in said casing as the material is being released to actuate said lock whereby to permit of the operation of said firing pin, and rotary means mounted in the projectile and operable from the exterior thereof to regulate the release of said material and the consequent speed of movement of said movable means.

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

THOMAS W. R. McCABE.

Witnesses:
A. LOUISE BUTLER,
MARY E. MONAGAN,