

Sept. 19, 1933.

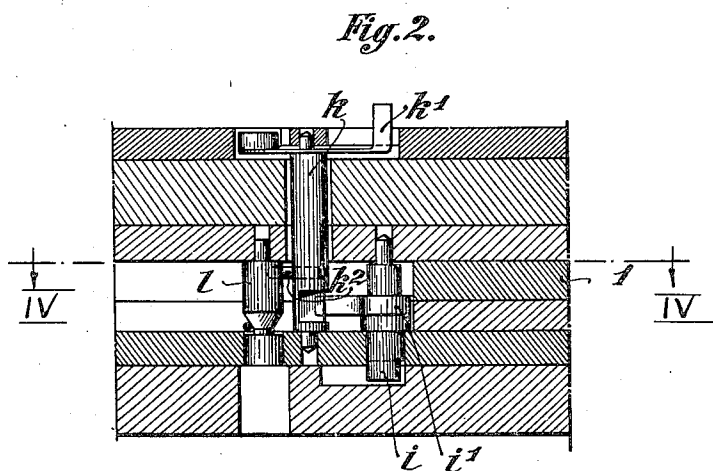
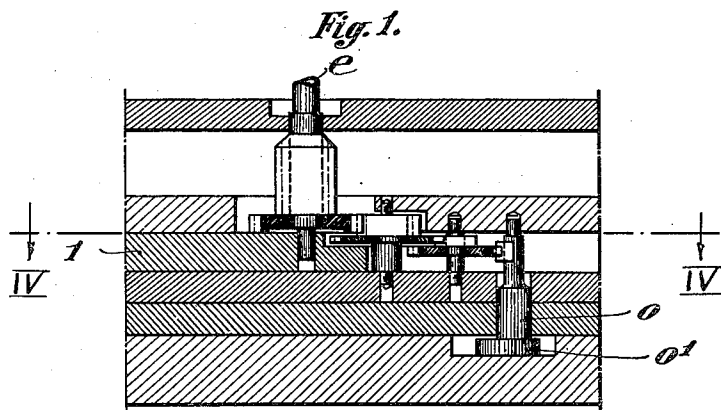
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1,927,746

MECHANICAL TIME FUSE

Filed July 30, 1931

2 Sheets-Sheet 1



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Fig. 3.

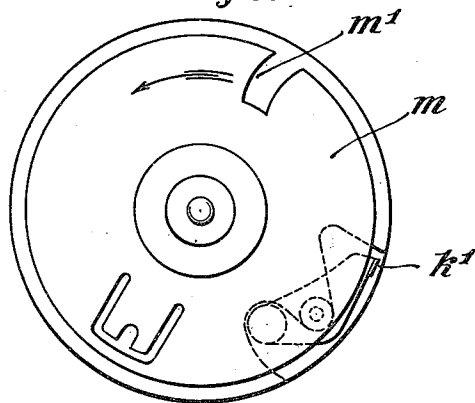


Fig. 4.

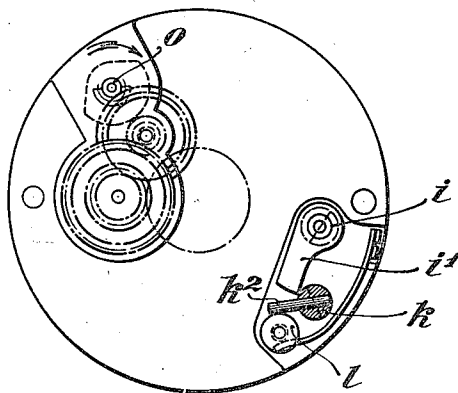
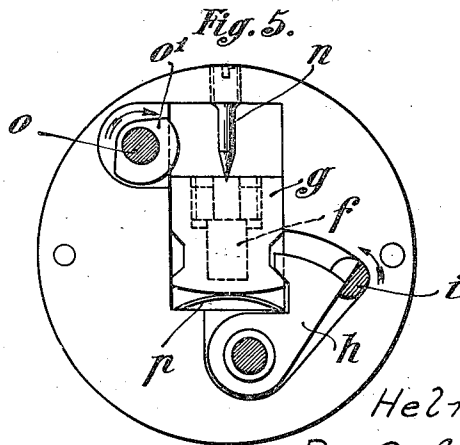


Fig. 5.



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UNITED STATES PATENT OFFICE

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MECHANICAL TIME FUSE

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2 Claims. (Cl. 102—36)

The present invention relates to mechanical time fuses and more particularly to the igniting or detonating mechanism thereof.

As compared with the igniting mechanism hitherto designed or suggested in connection with time fuses and wherein ignition is effected by means of a spring or spring-controlled striker which must be kept in stressed condition during storage, the chief object of the present invention is to dispense with such springs, in order to thereby overcome certain disadvantages and objections concomitant with said springs. Accordingly, in my improved time fuse, ignition takes place merely by the action of centrifugal force and without the use of a spring-controlled striker, preferably a percussion cap or primer as usually provided in the fuse, being caused to strike upon a stationary detonating pin after the expiration of the time interval for which the fuse has been set.

Apart from the constructional simplicity of time fuses made in accordance with the present invention the main advantage of the latter, however, resides in the fact that spring-controlled striking bolts are entirely dispensed with and the disadvantages inherent in and especially due to the permanently tensioned condition of the springs during storage and transportation resulting in loss of strength or even fracture, are entirely avoided.

In a fuse constructed in accordance with the present invention the detonating cap is accommodated in a radially movable slide which is locked normally or while in condition of rest, during storage and transportation, and adapted to be unlocked by means of a recoiling or flying-back bolt and to be released by the agency of the setting disk for the igniting purpose. In order to prevent the projectile from explosion within the barrel of the ordnance, I provide a supplemental safety device in the form of a cam adapted to project into the path of the slide and to be rotated by the work of the fuse so as to clear the said path of the slide, a certain time after the projectile has left the ordnance.

The unlocking and releasing of the slide by means of the flying-back or recoiling bolt and the setting disk is accomplished or initiated by a pawl mounted on a pivot so as to be capable of turning thereabout and adapted to catch into a recess or dwell provided in the slide, the said pawl being preferably connected with the flying-back or recoiling bolt by means of intermediate members whereof one is disengaged from the recoiling bolt upon firing of the shot, and adapted

to engage, due to centrifugal action, in a recess of the setting disk so as to thereby cause the pawl to disengage from the dwell of the slide.

I will now proceed to describe my invention more in detail in connection with the embodiment thereof, illustrated on the accompanying drawings, it being intended and understood that the invention is illustrated by but not limited to the embodiment thereof so illustrated and described.

In the accompanying drawings forming a part of this specification and showing, for purposes of exemplification, a preferred form and manner in which the invention may be embodied, but without limiting the claims to such illustrative instance:

Figure 1 is a sectional view illustrating a part including the clock-work, of the regulating drive mechanism which is adapted at the same time to actuate the means for preventing premature detonation within the barrel of the ordnance; Figure 2 is a similar sectional view showing the igniting device viewed from the timing disk; Figure 3 is a view in top plan of the setting disk; Figure 4 is a view in section taken on the line IV—IV in Figures 1 and 2, showing in plan view, both the drive mechanism and the disengaging device; and Figure 5 is a view in top plan of the lowermost or innermost plate on which the igniting device is mounted.

In the preferred embodiment shown the detonating cap *f* is accommodated in a slide *g* adapted to move radially with relation to the axis of the projectile and provided with a lateral recess, catch or dwell for a pawl *h* to engage therein, the back of the pawl being adapted to fit in a recess of the shaft *i*. Keyed to the latter is a short lever *i*¹ of conventional construction adapted to permanently engage or rest on a shaft *k* as usual in fuses of the type to which my invention belongs. The upper or outer end of the shaft *k* is equipped with a dropping lever *k*¹, as usual, and a locking pin *k*² adapted to engage and lie in contact with the flying-back or recoiling bolt *l*, so that, normally or during storage and transportation, the said dropping or setting lever *k*¹ will not be in contact with the setting disk *m* and, therefore, will not be capable of dropping into the peripheral recess *m*¹ of the latter, see Figure 3.

The clock-work further is adapted, by means of suitable transmission members, to rotate a shaft *o* integrally formed or otherwise rigidly connected with a cam *o*¹ adapted to protrude in the path of the slide *g* and remain therein

during a certain predetermined interval of time after the firing of the shot, so that the slide will be locked and cannot move until or before the said interval of time has elapsed. For the rotation of the cam is calculated or controlled in such manner that upon firing and simultaneous operation or starting of the clock work, the cam does not and cannot move out of the path of the slide before or until the projectile has left the ordnance and is far off the muzzle thereof. A small flat spring *p* serves as a means for retaining the slide carrying the detonation cap *f* immovable in normal position during transportation.

The operation of the improved arrangement is as follows:—

Upon firing, the recoiling bolt 1 will fly back (or downwards in Figure 2) due to inertia so as to release the pin *k*² and thereby permit the lever *k*¹ to engage the periphery of the setting disk *m* due to the centrifugal action of a counter-weight attached to the one arm of the lever. As the clock work now is running the bent end or nose of the other arm of the lever *k*¹ will drop into the peripheral recess *m*¹ of the setting disk *m* after the expiration of the time for which the disk has been set, and consequently the shaft *k* will be turned for an angle sufficient to allow the lever *i*¹ to move and engage in a recess provided in the shaft *k*, mainly due to centrifugal action.

The shaft, moving in the direction of the arrow, shown in Figure 5, releases the pawl *h* which in turn disengages from the dwell of the slide *g*, so that the latter will fly outwards due to centrifugal action and the stationary pin or needle *n* will strike upon the fulminate at the bottom of the cap *f*. This, however, cannot occur except when the shaft *o* has been turned in the direction of the arrow shown in Figure 5, through an angle sufficient to move the cam *o*¹ out of the path of the slide. The pinion keyed to the shaft *o*, see Figure 4, and meshing with the toothed wheel of the next following shaft of the gearing, is in the form of a toothed segment only and as soon as the last tooth of this pinion or segment disengages from the said toothed wheel, which cannot occur except when the projectile has left the ordnance and is a considerable distance away from the muzzle thereof, as will be readily understood from the description of the operation, the cam *o*¹ will clear the path of the slide so that the latter can fly outwards or laterally due to centrifugal action. The cam *o*¹ is also retained in this releasing position by centrifugal action.

If for any reasons such as fracture of the pawl *h* or of any of the toothed wheels, the slide *g* should have been prematurely released by accident and be ready to fly forward in radial direction prior to the described rotation of the shaft *o* and cam *o*¹, the edge of the front or outer end of the slide *g* will abut against the cam *o*¹, so that the slide cannot fly outwards, thereby preventing the detonating cap from being struck by the needle *n*.

Moreover, safety against premature bursting of the projectile within the barrel of the ord-

nance is further warranted by the fact that in case of such accidents the shaft *o* will be braked by the frictional contact between the slide *g* and the cam *o*¹ to such a degree that the entire mechanism will be stopped and inoperative. The fuse will be blind in such a case.

I have herein described and shown one preferred and practical embodiment of my present improvements, but it will be apparent that the invention is susceptible of embodiment in other alternative forms and changes in the arrangement, construction and combination of the several parts shown and described. For instance I would have it understood that while in the embodiment described and illustrated the primer or detonating cap is moved to strike upon a stationary pin or needle, the parts may be arranged suchwise that a movable striking bolt or pin will be caused to strike and penetrate into a primer or detonating cap, when the projectile is fired off, without thereby departing from the spirit of the invention.

What I claim is:

1. A mechanical time fuse for projectiles wherein ignition is effected solely by centrifugal action, comprising a movable body having a detonating member, and adapted to be moved under centrifugal action after the expiration of the time interval for which the fuse has been set, said movable body being shaped to form a radially displaceable slide, means normally locking said slide during storage and transportation, a recoil bolt and a setting disk adapted to unlock and release said slide upon firing, after the expiration of the said set time interval, and means for preventing premature ignition after firing the projectile, while the projectile is still within the barrel of the gun, said means comprising a cam projecting normally into the path of the said slide, and mechanism to move the same, to release the slide completely, prior to the time that the same is released by the setting disc, but subsequent to the instant at which the projectile leaves the barrel of the gun.

2. A mechanical time fuse for projectiles wherein ignition is effected solely by centrifugal action, comprising a movable body having a detonating member, and adapted to be moved under centrifugal action after the expiration of the time interval for which the fuse has been set, said movable body being shaped to form a radially displaceable slide, means normally locking said slide during storage and transportation, a recoil bolt and a setting disk adapted to unlock and release said slide upon firing, after the expiration of the said set time interval, a pawl, means intermediate between and connecting the pawl and the recoil bolt, to engage and lock the said slide, one of said intermediate means being arranged to be released from the recoil bolt upon firing, and arranged to subsequently engage the periphery of the setting disk due solely to centrifugal action, said disk having a recess in its margin, whereby the said means will finally engage in said recess and thereby cause the pawl to become disengaged from the slide.

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