W. MILLS.

GRENADE AND THE LIKE.

APPLICATION FILED MAY 8, 1916.

1,223,600.

Patented Apr. 24, 1917.

Fig. 1.

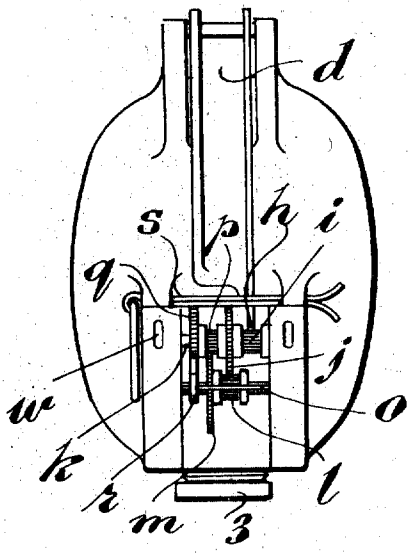
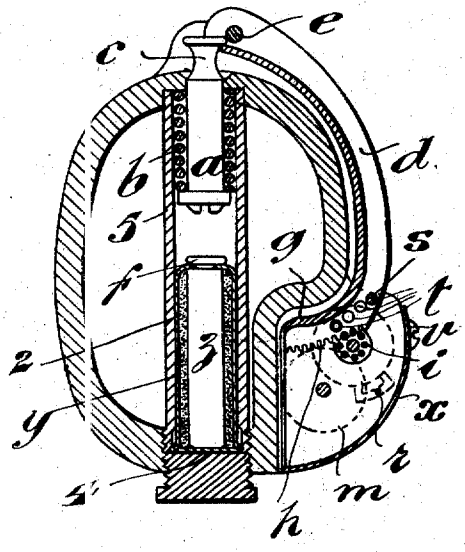


Fig. 2.



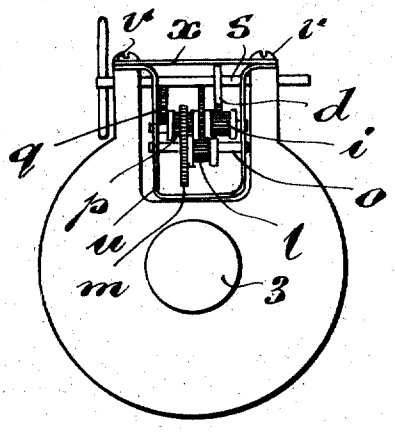


Fig. 3.

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UNITED STATES PATENT OFFICE.

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GRENADE AND THE LIKE.

1,223,600. Specification of Letters Patent. Patented Apr. 24, 1917.

Application filed May 8, 1916. Serial No. 96,137.

To all whom it may concern:

Be it known that I, WILLIAM MILLS, a subject of the Kingdom of Great Britain, residing at Atlas Aluminium Works, Grove street, Birmingham, in the county of Warwick, England, engineer, have invented certain new and useful Improvements in or Relating to Grenades and the like, of which the following is a specification.

This invention relates to grenades or the like, of the type having a spring impelled hammer or striker which is controlled by a lever or member disposed externally of the grenade, and which lever or member is adapted to be retained in relation to the grenade by the hand or device grasping or supporting the grenade so that when the latter is thrown or impelled, the external lever or member is automatically released to thereby release the striker. According to the present invention in this type of grenade clockwork or like timing mechanism is so incorporated as to provide that a period of time elapses before the external lever or member is fully released.

The present invention further comprises a grenade or the like having a spring impelled hammer or striker which is directly controlled by a lever or member disposed externally of the grenade, and adapted to be released by the hand or projecting appliance in the act of throwing the grenade, and in which clockwork or like timing mechanism is so incorporated as to provide that a period of time elapses before the hammer or striker operates.

The clockwork mechanism may be operated by the spring employed to operate the striker or hammer of the grenade.

The striker may be adapted to operate upon a percussion cap which may be adapted to immediately fire a detonator adapted to explode the grenade, so that the latter is exploded practically instantaneously upon the striking of the cap by the striker, or alternatively, a time fuse may be incorporated between the percussion cap and the detonator. This last-mentioned time fuse might, for instance, provide for the intervention of a period of two seconds between the act of striking the cap and the act of exploding the grenade, and to this timing the timing associated with the striker may be added so that the striker may be delayed, for instance, for one, two, or three seconds according to the setting of the timing mechanism pertaining to the striker.

In order that this invention may be clearly understood and readily carried into practice, reference may be had to the appended explanatory sheet of drawings, upon which:—

Figure 1 is an elevation of one form of grenade according to the present invention, a cover-plate being omitted to show the clockwork timing mechanism.

Fig. 2 is a sectional side elevation of the grenade shown in Fig. 1.

Fig. 3 is an inverted plan of the grenade shown in Figs. 1 and 2.

In a convenient embodiment of the present invention, I may employ a longitudinally moving hammer or striker *a* disposed internally within the grenade, such longitudinally moving striker or hammer being encircled by a coiled spring *b* by which it is operated, and one end *c* of the said striker or hammer being adapted to project out of the body of the grenade. This outer extremity is furnished with an enlargement, and below the enlargement the extremity of a lever *d* is adapted to be engaged, which lever is disposed externally of the grenade. The lever is furnished with trunnions *e* at a point near to its end in the vicinity of the striker, the said trunnions having bearings provided upon the body of the grenade, and the arrangement is such that when the lever *d* is retained in relation to the body of the grenade, the striker *a* is retained thereby, but if the lever is released, the striker *a* is allowed to operate upon the cap *f* or primary ignition device under the influence of the spring *b*.

The lever *d* is controlled by a clockwork mechanism. For this purpose it is inturned at *g*, the inturned part being furnished with a segmental rack *h*, the arc of which is concentric with the center *e* and which rack *h* is in mesh with a pinion *i* with which pinion *i* a wheel *j* rotates, the pinion *i* and wheel *j* being mounted upon a suitable spindle *k*. This wheel *j* is in mesh with a pinion *l* with which a wheel *m* rotates, the pinion *l* and wheel *m* being mounted upon a second suitably incorporated spindle *o*. The wheel *m* is in mesh with a pinion *p* with which a wheel *q* rotates, the pinion *p* and wheel *q* being mounted upon the same spindle *k* as that on which the pinion *i* and wheel *j* are mounted. The wheel *q* constitutes the

wheel part of an escapement, the pawl part *r* of which is mounted upon a suitable spindle and adapted to control the wheel *q* upon the principle of an ordinary escapement, the member *r* having, furthermore, the purpose of confining the rotation of the wheel *q* and therefore the train of gearing and movement of the member *d* to that in one direction only, *i. e.* the direction permitting of the movement of the member *d* away from the body of the grenade. The clockwork mechanism is operated by the effort of the spring *b*, by which the striker *a* is controlled, this effort being imparted successively through the striker, the lever *d*, and the rack *h* provided thereon, and being finally controlled or retarded by the escapement *q r*.

The external lever *d* is adapted, normally, *i. e.* before it is desired to use the grenade, to be retained in relation to the external surface thereof by a pin *s* or other securing device. This pin *s* is adapted to pass through perforations in suitable parts of the body of the grenade, and also through a perforation *t* in the member *d* or inturned part *g* thereof. When it is desired to throw or project the grenade, the latter is grasped in the hand or placed in a socket, ring or the like pertaining to, or provided in connection with, the throwing device, rifle, or the like; the pin or retaining device is then removed, so that the lever is retained in the same position as before by the hand grasping the grenade or by the ring or socket of the throwing device or rifle. When the grenade leaves the hand, throwing device, or rifle, the external lever is retained only by a clockwork or like mechanism. A series of the perforations *t* may be provided in the member *d* or inturned part *g* thereof, into any one of which the pin *s* may be inserted. As the pin *s* normally occupies the same position in relation to the body of the grenade, according to the particular perforation *t* in which the pin *s* is inserted, the lever *d* will either be in its position nearest to the body of the grenade, or else in a position removed in some degree from the body of the grenade, in which latter arrangement the rack *h* will have a smaller operative movement before it is released by the clockwork mechanism a degree of this movement varying according to the particular perforation *t* in which the pin *s* is inserted. As a result of this, according to the particular perforation *t* in which the pin *s* is inserted, so the time which is to elapse between the release of the lever *d* by the hand in the act of throwing, and the total release of the lever *d* by the clockwork mechanism is set, and the timing of the release of the striker *a* subsequently to the throwing or projecting of the grenade is likewise correspondingly set. By reason of the one-way character of the escapement *q*, *r*, the pressure of the hand in grasping the grenade and the member *d* cannot, after the pin *s* has been removed, force such member *d* inwardly toward the grenade if it has been set at a position away from the body of the grenade.

The clockwork mechanism is advantageously self-contained and incorporated in a frame or casing, which latter may be attached to the body of the grenade. In the arrangement shown, *u* indicates such a frame or casing which is adapted to be fastened by screws *v* to the body of the grenade, the shanks of which screws *v* may pass through elongated perforations *w* in the frame *u* so that in assembling the latter it may be adjusted in order to place the wheel *i* properly in mesh with the rack *h*. A cover-plate *x* may be provided to inclose or substantially inclose the clockwork without, however, obstructing the movement of the lever *d*; such member *x* may form part of the frame or member *u*, or may be separable therefrom.

The invention may if desired be so carried out that irrespective of the provision for varying the timing, the member *d* is under all circumstances in its position nearest to the body of the grenade, in which position it may be in actual contact with the said body or with a projection thereon, so that any extreme pressure of the hand or projecting appliance tending to force the member *d* toward the body will not be experienced by the clockwork mechanism. In one method of providing for the variation of the timing in such an arrangement, the entire clockwork mechanism may be adjustably mounted in relation to the body of the grenade so that the position of the pinion *i* meshing with the rack *h* may be adjusted in an arc concentric with such rack, provision being made for effectively fixing the clockwork mechanism in its adjusted position so that according to the positioning of the wheel *i* in relation to the rack *h*, so will the timing be set, upon the same principle as in the arrangement illustrated.

According to one method of providing for this adjustment, the casing containing the clockwork mechanism is of appropriate size to permit of its adjustment within the recess provided for its reception in the grenade body, and washers (not shown) are provided around the stem of the screws *v*, and between the flanges of the casing and the parts of the grenade to which such flanges are secured. These washers may be of varying thicknesses and adapted to be interchanged, one, two, or more washers of equal thickness may be used according to the degree of adjustment required, the elongated slot *w* providing for the adjustment of the pinion *i* in relation to the rack *h* as in the embodiment shown.

y is a self-contained waterproof cartridge containing the percussion cap *f* and detonator *z*, and which may also contain gun-cotton or other suitable material 2, and which upon the percussion cap *f* being struck, is itself fired and adapted to explode the grenade. This cartridge may be transported separately from the grenade and may be readily inserted and appropriately retained in position within the grenade, as for instance by a closure plug 3. The percussion cap *f* may be supported by the casing of the cartridge, which latter is sufficiently rigid to constitute a resistive anvil or support which will permit of the effective exploding of the percussion cap by the striker *a*, the cartridge being rigidly retained in position on the one hand by the plug 3 and on the other hand by engagement of the rib or flange around its extremity 4 with the end of, or with a shoulder provided within, the tube 5 which is suitably incorporated within the body of the grenade to contain the said cartridge, the striker *a* and the spring *b*.

In the cartridge shown the percussion cap *f* is adapted to directly fire the detonator *z* but in an alternative arrangement the cartridge or other firing unit of the grenade may involve a Bickford cord or other time fuse between the percussion cap *f* and detonator *z*.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A grenade or the like comprising in combination a spring impelled striker, a lever disposed externally of the grenade for controlling said striker, said lever being arranged to be retained in position to hold said striker by the means for propelling the grenade, and to be automatically released when the grenade is thrown, and timing means for retarding the movement of said lever for a material period of time following immediately after the release of the lever from the propelling means.

2. A grenade or the like comprising in combination, a spring impelled striker, a lever disposed externally of the grenade and directly controlling said striker, said lever being arranged to be held by the means for propelling the grenade in position to hold said striker, and timing mechanism coöperating with said striker and lever for providing a period of time intermediate the release of said lever by said propelling means before the striker operates.

3. A grenade or the like comprising in combination, a spring impelled striker, a lever disposed externally of the grenade and directly controlling said striker, said lever being arranged to hold said striker, and timing mechanism coöperating with said striker and lever for providing a period of time intermediate the release of said lever by said propelling means before the striker operates, said timing mechanism being operated by the spring employed to impel said striker.

4. A grenade or the like comprising in combination, a spring impelled striker, a lever disposed externally of the grenade and directly controlling said striker, said lever being arranged to hold said striker and timing mechanism coöperating with said striker and lever for providing a period of time intermediate the release of the lever by said propelling means before the striker operates said timing mechanism being capable of adjustment whereby the period between the commencement of operation of the timing mechanism and exploding of the grenade may be varied.

5. A grenade or the like comprising in combination a spring impelled striker, a lever disposed externally of the grenade and directly controlling said striker, said lever being arranged to be held by the means for propelling the grenade in position to hold said striker, and timing mechanism arranged to provide a period of time intermediate the release of said lever by said propelling means before the striker operates.

6. A grenade or the like comprising in combination a spring impelled striker, a lever disposed externally of the grenade and directly controlling said striker, said lever being arranged to hold said striker and timing mechanism coöperating with said striker and lever for providing a period of time intermediate the release of the lever by said propelling means before the striker operates, said timing mechanism being capable of adjustment whereby the period between the commencement of operation of the timing mechanism and exploding of the grenade may be varied, said external lever being under all circumstances in its position nearest to the body of the grenade when the grenade is about to be propelled, whereby the timing mechanism is relieved from the inward pressure exerted by said external lever due to its coöperation with the propelling means.

7. A grenade or the like comprising in combination a spring impelled striker, a lever disposed externally of the grenade and directly controlling said striker, said lever being arranged to hold said striker, and timing mechanism coöperating with said striker and lever for providing a period of time intermediate the release of said lever by said propelling means before the striker operates, said timing mechanism being operated by the spring employed to impel said striker, said lever and said timing mechanism having an interengaging rack and pinion respectively.

8. A grenade or the like comprising in combination a spring impelled striker, a lever disposed externally of the grenade and directly controlling the striker, said lever

being arranged to be held by the means for propelling the grenade in position to hold said striker, timing mechanism coöperating with said striker and lever for providing a period of time intermediate the release of said lever by said propelling means before the striker operates, said timing mechanism being self-contained, and a casing for said mechanism adapted to be adjustably secured in relation to the body of the grenade.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

WILLIAM MILLS.

Witnesses:
ARTHUR H. BROWN,
HOLLIS BROWN.