T. COOPER.

EXPLOSIVE BOMB.

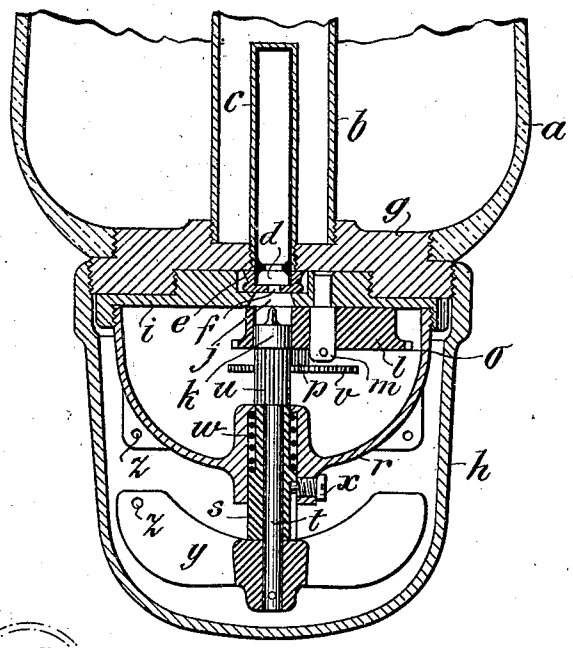
APPLICATION FILED DEC. 30, 1916.

1,228,748.

Patented June 5, 1917.

2 SHEETS—SHEET 1.

FIG. 1.



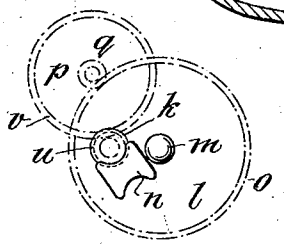


FIG. 3.

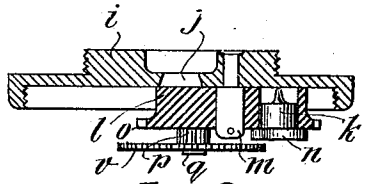


FIG. 2.

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2 SHEETS—SHEET 2.

FIG. 6.

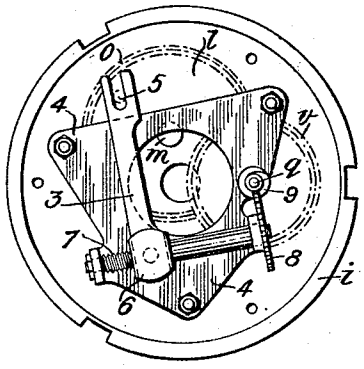


FIG. 7.

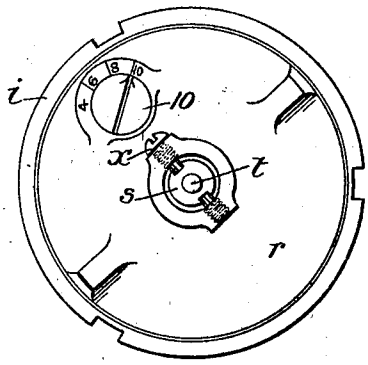


FIG. 4.

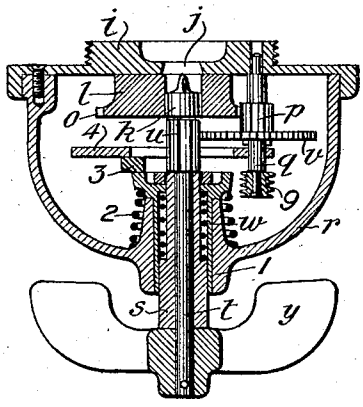
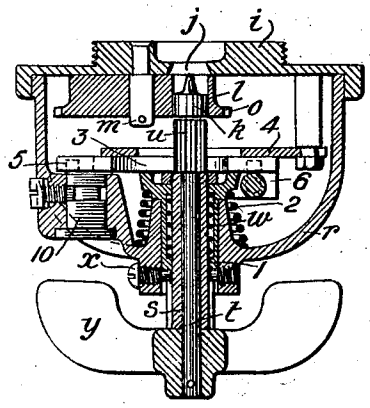


FIG. 5.



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UNITED STATES PATENT OFFICE.

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EXPLOSIVE BOMB.

1,228,748. Specification of Letters Patent. Patented June 5, 1917.

Application filed December 30, 1916. Serial No. 139,943.

To all whom it may concern:

Be it known that I, THOMAS COOPER, a subject of the King of Great Britain, and resident of The South House, Kings Lynn, Norfolk, England, engineer, have invented new and useful Improvements in Explosive Bombs, of which the following is a specification.

The present invention has reference more particularly to explosive bombs intended to be discharged from aircraft on to other aircraft and to be exploded by impact with the latter.

One of the objects of my invention is to render such explosive bombs more safe against accidental explosion which is liable to result from shocks if the air craft carrying the bombs meets with some obstruction when landing or otherwise.

Other incidental objects are to simplify and facilitate the construction with a view to efficiency and economy.

According to my invention I employ an arrangement wherein the striking mechanism comprises an operative part which is controlled by a fan or similar wind actuated device and is moved thereby into alinement with the detonating cap and with an actuating shaft permanently in alinement with the cap only after the bomb has been discharged and on its way toward the objective.

When the striker is brought into alinement with the cap and the actuating shaft, impact with the objective will bring about an explosion by driving the endway movable shaft against the interposed striker. If the proper objective is missed it is desirable to provide means for exploding the bomb without impact so as to avoid damage on impact with some object not intended. To this end therefore a spring mounting for the endway movable shaft may be furnished, which is released by the fan or wind actuated device, continuing to act under the influence of the air current caused by the fall of the bomb, after the detonating cap has been exposed to the action of the striker as above explained. When the spring mounting is released, the striker will be impelled by the endway movable shaft to strike the cap and the bomb will be exploded. The timing of the explosion may be adjusted by delaying the release of the spring more or less in the manner hereinafter explained.

In the accompanying drawings I have shown the firing mechanism of a bomb embodying my present improvements.

Fig. 1 is a vertical section showing the striker in alinement with the detonator cap.

Fig. 2 is a vertical section of a portion of the same mechanism showing the parts in the position of safety.

Fig. 3 is a diagram in plan view to illustrate a stop not to be seen with clearness in the other figures.

The arrangement shown above is intended to operate only on impact, no spring actuating device being shown.

Figs. 4 and 5 are vertical sections on different lines of an arrangement similar to that shown in Fig. 1 but with the addition of mechanism which will explode the bomb without impact if desired.

Figs. 6 and 7 are respectively underneath plan views inside the cover and outside the cover the fan or propeller blade being removed.

Referring to Fig. 1, *a* is the shell of the bomb containing the usual explosive. *b* is a tube within the shell *a* containing detonating material and *c* a tube within the tube *b* containing igniting material and a detonating cap *d* the latter being situated at the bottom of the tube *c* and retained therein by the metal cap *e* furnished with a small central hole *f*. The tubes *b* and *c* are supported on the base plate *g* which is screwed into the bottom of the shell *a*. The plate *g* also supports the cover *h* which is unscrewed and removed when the bomb is to be used. Screwed into the underside of the plate *g* is a plate *i* having a hole *j* immediately beneath the cap *e* for the passage of the firing pin *k*. The pin *k* is carried in a hole in a disk *l* mounted on a center *m* fixed in the plate *i* on the side of the hole *j*. The pin *k* moves freely in its hole X and is retained from falling out by the stop *n* (see Figs. 2 and 3). On the periphery of the disk *l* is a ring of teeth *o* meshing with the pinion *p* mounted to turn on the stud *q* fixed in the underside of the plate *i*. *v* is a toothed wheel mounted to turn with the pinion *p* on the same stud *q*. *r* is an inverted dome screwed to a flange on the under side of the plate *i* which dome provides a central bearing for the propeller or fan shaft *t* and its sleeve *s*. On the summit of the propeller shaft *t* is a pinion *u* which is in line with the hole *j* and engages the toothed wheel *v*.

The pinion *u* is of a size to enter the socket of the striker *k*, when the shaft *t* and its sleeve *s* are made to slide longitudinally by a blow on the lower end but these are normally held back by the light spring *w* surrounding the said sleeve *s*. *x* is a set screw for keeping the shaft *t* and sleeve *s* within the bearing without preventing a limited endway movement therein. *y* is a propeller or fan fixed on the shaft *t*.

When the bomb is in a normal or safety condition the disk *l* is turned to bring the striker *k* out of alinement with the cap *d* (see Fig. 2) and a solid part of the said disk is brought opposite the orifice *j*. When the parts are in this position the cap *d* cannot be struck. To prevent the disk *l* working around accidentally the propeller *y* may be wired to the dome *r* by means of the holes *z z*. When the bomb is to be used the cover *h* is removed and the wiring just mentioned cut. On the bomb being launched the propeller or fan *y* will be rotated by the air and will, through the train of gearing *u*, *v*, *p*, *o*, rotate the disk *l* until the striker *k* is in alinement with the cap *d* as shown in Fig. 1 at which point the rotation of the disk will be arrested by the stop *n* coming into contact with the pinion *u* (see Fig. 3). If the bomb fall on its objective when the parts are in this position the impact on the end of the propeller shaft will drive the striker into the detonating cap and an explosion will take place.

To explode the bomb without impact, particularly if the proper objective has been missed, I provide the arrangement shown in Figs. 4, 5, 6 and 7. In this arrangement an outer sleeve 1 inclosing the sleeve *s* and propeller shaft *t* is employed and a firing spring 2 capable, when liberated, of advancing the propeller shaft and its inclosing sleeves with sufficient force to detonate the cap *d*. This spring 2 is normally held in compression by a latch 3 overlying the upper edge of the sleeve 1. It will be observed that this latch 3 consists of a bar underlying the plate 4 and held stationary at one end, which is forked, by means of the adjustable fixed pin 5. The opposite end of the latch 3 has an internally threaded collar 6 working on a screw 7. This screw 7 which is mounted to turn in bearings on the plate 4 has keyed on it a worm wheel 8 adapted to be driven by a worm 9 which is carried on the stud shaft *q* which carries also the pinion *p* and toothed wheel *v*. In this arrangement the pinion *p* must be only frictionally tight on the stud shaft *q* while the wheel *v* must be fast on it, so that when the disk *l* has been rotated sufficiently to bring the firing pin *k* into alinement with the cap and has been stopped, the wheel *v* must continue to be driven by the propeller shaft and must continue to rotate the screw 7 by means of the worm gearing 8, 9 before mentioned. The result of this will be eventually to rock the bar 3 on its fulcrum 5 until the said bar ceases to overlie the sleeve 1. Immediately the bar 3 is clear of the sleeve 1 the spring 2 will act and drive the pinion *u* on the end of the shaft *t* against the firing pin *k* and cause the latter to explode the detonator.

The release of the spring 2 may be timed by adjusting the position of the fulcrum pin 5. This may be readily effected by mounting the said pin 5 eccentrically on the end of the rotatable stud 10 (see Fig. 5) which may be set and fixed according to requirement.

Fig. 7 shows an arrow on the bottom of the stud 10 which will indicate by the aid of figures engraved on the underside of the dome *r* the timing in seconds for which the explosion may be adjusted.

What I claim and desire to secure by Letters Patent of the United States is:—

1. In a bomb to be exploded by a percussion device liberated by a fan or its equivalent, an endway movable shaft in permanent alinement with the detonator but out of reach thereof and a striker which is interposed between the end of the said shaft and the detonator by a transverse movement of the striker relative to the shaft, initiated by the fan, the arrangement being such that when an endway movement is imparted to the shaft after the striker has been moved into position, the latter will be driven against the detonator substantially as described.

2. In a bomb of the kind specified, a wind operated device, a detonator, an endway movable shaft in permanent alinement with the detonator but out of reach thereof, a striker capable of being interposed between the end of the said shaft and the detonator but normally out of alinement therewith, means for interposing the striker by giving it a movement transverse to the shaft, means for impelling the shaft endwise against the striker and time means for liberating the shaft impelling means substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS COOPER.

Witnesses:

ALFRED S. BISHOP,

HENRY GEORGE NICHOLLS.