J. H. SWAN.

COMBINATION ALL WAYS IMPACT AND TIME FUSE.

APPLICATION FILED JULY 25, 1919.

1,374,121. Patented Apr. 5, 1921.

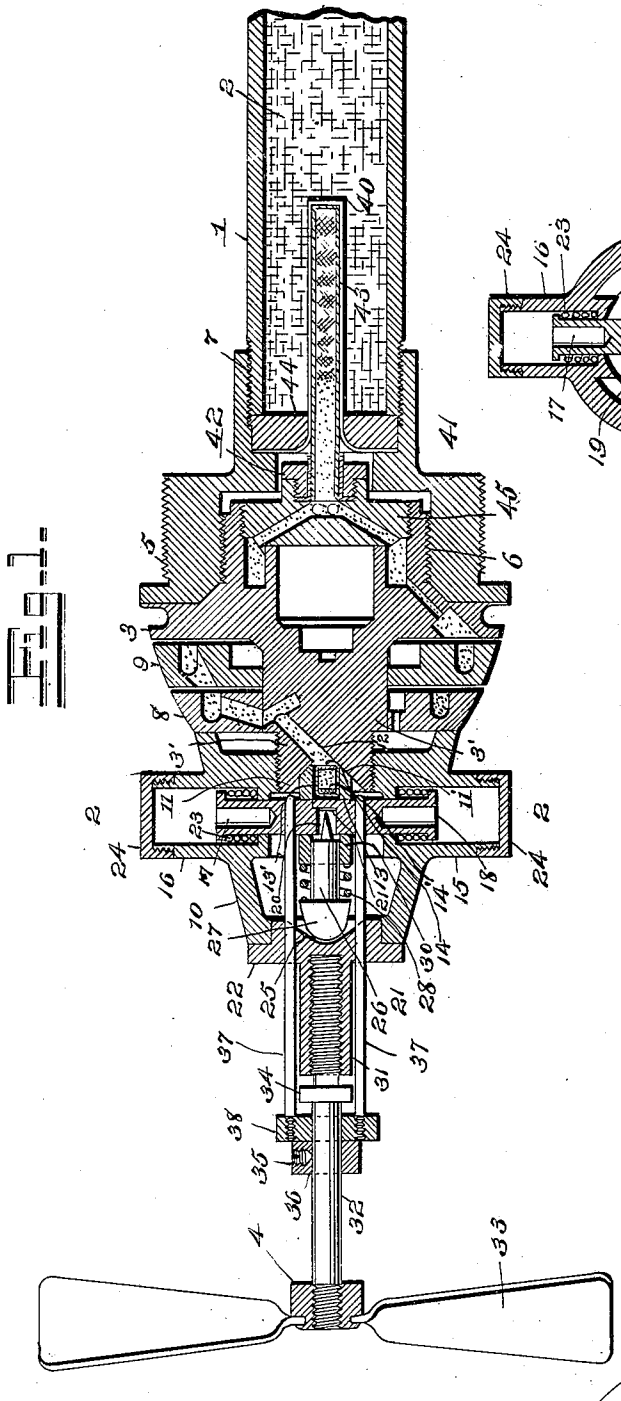


Fig. 1.

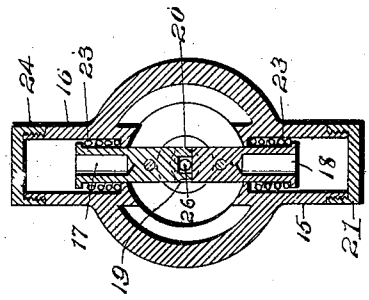


Fig. 2.

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COMBINATION ALL-WAYS IMPACT AND TIME FUSE.

1,374,121. Specification of Letters Patent. Patented Apr. 5, 1921.

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To all whom it may concern:

Be it known that I, JOHN H. SWAN, Lieut. Ordnance Department, U. S. Army, a citizen of the United States, stationed at Washington, D. C., have invented an Improvement in Combination All-Ways Impact and Time Fuses, of which the following is a specification.

The invention described herein may be used by the Government, or any of its officers or employees in prosecution of work for the Government, or by any other person in the United States, without payment of any royalty thereon.

My invention relates to drop bombs such as are used in connection with aeroplanes, dirigibles and the like.

It has for its object to provide an improved type of firing mechanism with special reference to the safety device employed in connection with the fuse.

In the type of drop bomb in common use, it is necessary for the operator to remove a retaining pin or the like, in order that the firing mechanism can be placed in operative or armed position. According to my invention, the firing mechanism is rendered operative after the bomb is released and while it is in flight, thus minimizing the danger to the operator due to defective construction or deterioration of the charge of the bomb.

Another object is to provide a firing mechanism which will function properly although the contact made by the bomb may be at an angle to its longitudinal axis.

Like reference numerals refer to corresponding parts in both views of the accompanying drawings, in which:

Figure 1 is a longitudinal section of my invention; and

Fig. 2 is a section on the line 2—2 of Fig. 1, looking in the direction indicated by the arrows.

The device illustrated by the accompanying drawings in which is shown the preferred form of my invention, comprises a booster cup 1 which carries the booster charge 2, a time fuse indicated as a whole at 3 and an unlocking device indicated as an entirety at 4.

The rear body of the bomb, not shown, is fixed in position with relation to the fuse by means of the screw threads on head 5 engaging corresponding threads in the nose of the rear body. The rear body may be equipped with the usual type of stabilizers (not shown).

The forward portion of the head 5 has a central recess which is threaded at 6 and it also has a central upwardly projecting hollow boss internally threaded at 7 for the reception of a threaded booster cup 1. Engaging the threads 6 are corresponding threads on the body of the time fuse 3 having the annular members 8, 9 of usual construction which are held in position by a nut indicated as a whole at 10. The body 3 of the time fuse is formed with a stem-like projecting portion 3′ serving in the usual manner as a support for the annular members 8, 9. The forward end of the stem 3′, however, is formed with a conical-shaped opening bounded by the slanting surface 11 which communicates at its apex with an internal passage 12 filled with fuse composition leading to the time train of the fuse.

Seated on the conical surface 11 is the primer casing 13 having at its rear portion slanting surface 11′ formed with the same angularity as surface 11. Within the primer casing 13 is the retaining bushing 13′ and upper and lower diaphragms 14, 14′ of thin, easily perforated material which retain the fulminate primer composition within the casing 13.

The hollow nut 10 is formed with opposing cylindrical projections 15, 16, forming chambers for housing the safety or unarming plungers 17, 18. The plungers 17, 18 are slidably mounted in the bottom of projections 15, 16 and the member 17 is formed with forked extensions 19, 20 on its inner end, shown in Fig. 2, while the plunger 18 is formed with a solid extension 21 on its inner end which is immediately below primer casing 13. In normal or locked position, the forks 19 and 20 embrace the conical point of firing pin 26, while the extension 21 is in the path of the firing pin and also prevents its upward movement. The safety

plungers 17, 18 are constantly urged to outward position by means of springs 23 surrounding said members and acting between the heads of said members and the base of projections 15, 16.

The lower part of the nut 10 is closed by cap 22 secured by means of screw threads or other suitable fastening means and the hollow projecting members 15, 16 are closed by screw caps 24. In the top surface of cap 22, is formed cone-shaped depression 25, having its apex rounded, and adapted to cooperate with the conical surface of this depression is the firing pin 26 having a rounded head 27, a cylindrical body and a point tapering from a shoulder of the cylindrical body. The firing pin is normally held in retracted position by a spring 28 surrounding its body portion and compressed between the head 27 and a sleeve 30 which is integral with the primer casing 13 and is apertured so as to engage the slidable plungers 17, 18. The cap 22 also has an integral extension 31 which is internally threaded to engage threads on shaft 32 having propelling blades 33 secured thereto at its lower end. A collar 34 is integral with shaft 32, and is located slightly below the lower terminal of the screw threads on shaft 32. Adjustably secured on said rod by means of set screw 35, is another collar 36. Located between these two collars and mounted loosely on shaft 32 is a spider to which is secured the upwardly extending rods 37 which are longitudinally movable through alining openings in caps 22 and safety plungers 17, 18, respectively, when said plungers are in closed or locked position.

The time train communicates with the booster charge 2 through a fulminate charge inclosed in casing 40 which is held in place by booster cup 1. Within the casing 40 is a cup 43 containing the fulminate charge, and this cup is held within the casing 40 by means of bushing 44 and nut 42 which threads into a recess in the upper closure cap 45 of the time fuse.

In operation the bomb is released from a high altitude due to the position of the carrying aeroplane, dirigible or the like, with the end having the propeller blades pointing downward. As the bomb drops through the air, the force of the air against blades 33 will turn shaft 32 in such a direction as to unscrew it from cap 22. As the shaft unscrews, the integral collar 34 comes into contact with spider 38 and forces the spider and rods 37 downward until these rods become disengaged from safety plungers 17, 18. When this occurs, the springs 23 force safety plungers 17, 18 outward into the hollow projections 15, 16. The sleeve 30 is forced upward by spring 28 and maintains primer casing 13 in contact with its seat. The firing pin is now in released or armed position. During the flight of the bomb, shaft 32 becomes entirely unscrewed and the unlocking device 4 drops independently of the rest of the bomb.

When the bomb contacts or strikes any object, the impact upon head 22 is transmitted to firing pin 26 which is driven upward against the tension of spring 28 into the fulminate of the primer which explodes. This detonates the fuse composition in passage 12 which communicates the combustion to the remainder of the time train.

The time train transmits the detonating wave to the booster charge 2 which detonates the main charge, not shown. The shape of the depression in the interior of the cap 22 assures that the firing pin will be driven upward, although the contact is other than perpendicular to the axis of the bomb. Assume, for instance, such an angle of contact: The slanting side of the depression in cap 22 will strike the head 27 and drive the firing pin upward and the primer casing 13 will be moved by the force of contact to adjust itself on slanting surface 11 so as to be in alinement with and moved toward the firing pin 26 and the explosion will be started and transmitted in the same manner as described above.

The function of the collar 36 is to prevent shaft 32 from being screwed into cap 22 far enough to bind or make it difficult for the shaft to unscrew.

In case it is desired to drop the bomb in "safe" or unarmed condition (as when driven by hostile planes over the lines of friendly troops) it is only necessary to unscrew the propeller blades from shaft 32. In this connection, it will be noted that the safety member 17 and 18 will be held in unarmed position by means of rods 37 and the firing pin will, therefore, be unable to reach the primer cup 13. It will be understood that the pitch of the threads which secure the propeller to the shaft is in such a direction as will tend to tighten the propeller blades on the shaft while the bomb is dropping through the air.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a drop bomb, a firing mechanism comprising a firing pin, safety plungers cooperating therewith, means for locking the safety member in unarmed position, a shaft, and propeller blades secured to said shaft for automatically releasing said safety plungers while the bomb is in flight.

2. In a drop bomb, a firing mechansm comprising a firing pin, safety plungers cooperating therewith and normally urged toward armed position, means for locking said plungers in unarmed position and means operated by air resistance for withdrawing said locking means and releasing

said safety plungers during the flight of the bomb.

3. In a drop bomb a firing mechanism including a firing pin and safety plungers having interengaging fingers to obstruct the active movement of said firing pin, means urging said plungers toward armed position, rods for normally locking the safety plungers in unarmed position and movable longitudinally for releasing said plungers, a shaft and propeller blades secured to said shaft for withdrawing the rods and releasing the safety plungers while the bomb is in flight.

JOHN H. SWAN.