Nov. 15, 1938. P. LIÉGEOIS 2,137,056

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FIG. 1.

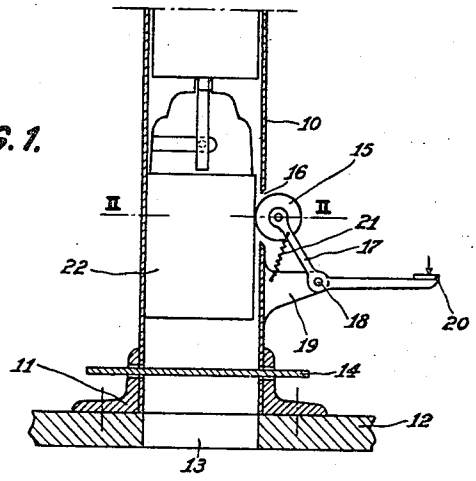


FIG. 2.

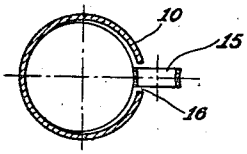
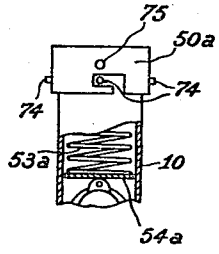


FIG. 5.



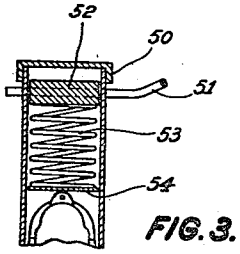
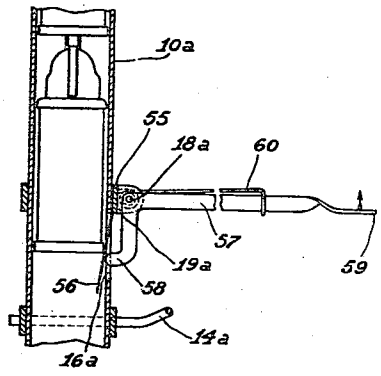


FIG. 3.



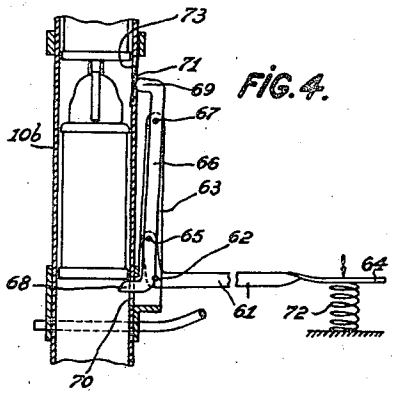


FIG. 4.

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FIG. 6.

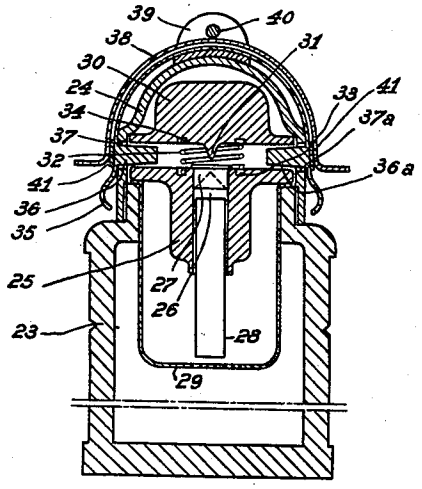


FIG. 10.

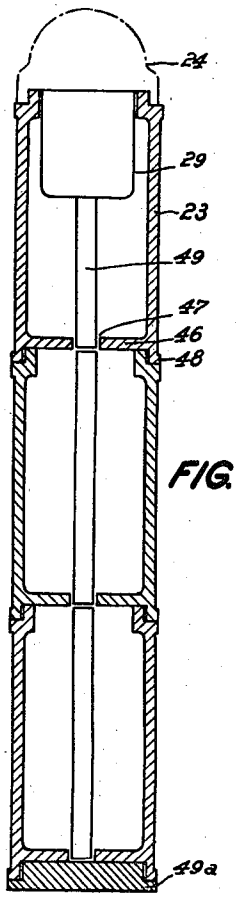


FIG. 7.

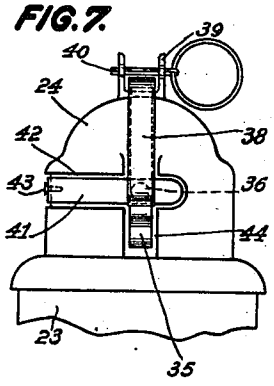


FIG. 8.

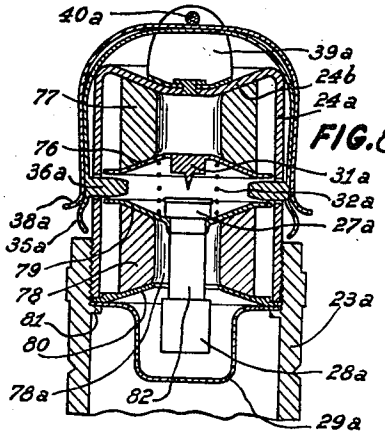
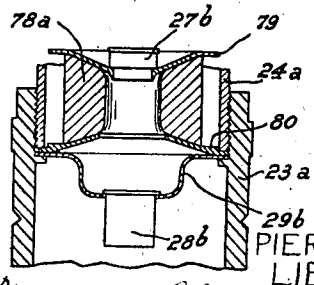


FIG. 9.



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UNITED STATES PATENT OFFICE

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BOMB

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Application February 4, 1936, Serial No. 62,313
In Belgium February 13, 1935

5 Claims. (Cl. 102—2)

The launching of bombs from an aeroplane or other craft was hitherto a relatively slow and intricate matter, due to the fact that the operator had to actuate a separate controlling means for the launching of each bomb. Furthermore, the manner in which the bombs were fixed on the craft involved a strict limitation of the number of projectiles which could be transported by the said craft.

The main object of my invention is to provide a bomb releasing device allowing for a very quick and convenient launching of the bombs, either separately or by groups or again for launching all of the bombs contained in the device at a time, said device further allowing for the storing of a great number of bombs, whilst being compact.

To this end, my invention provides a bomb releasing device constituted by one or more storing tubes in which the bombs are piled, each tube having associated with it a mechanism permitting to release the bombs piled in the tube, either in sequence or at a time and preferably each of the said storing tubes is also provided with a safety lock.

My invention further relates to a bomb specially intended to be launched by a device of the aforesaid type and comprising locking means for the firing system of the bomb, which means automatically release said system at the instant when the bomb leaves the launching tube.

Simply by way of example, certain embodiments of the object of my invention will be hereinafter described more in detail with reference to the accompanying drawings, in which:

Fig. 1 is a fragmentary sectional view of a bomb launching device;

Fig. 2 is a sectional view along the line II—II of Fig. 1;

Figs. 3 and 4 are fragmentary sectional views of two modifications of the launching device;

Fig. 5 is a view, partly in section, of a modification of the upper part of the bomb launching device;

Fig. 6 is a sectional view of a bomb prior to being inserted into the bomb launching device;

Fig. 7 is a fragmentary side elevation of the bomb shown in Fig. 6;

Fig. 8 is a sectional view of a further modification of the bomb according to my invention;

Fig. 9 is a fragmentary sectional view of a modification of said bomb, and

Fig. 10 shows an assembly of three bombs provided with a common firing device.

As shown in Figs. 1 and 2, the bomb launching device according to my invention may be constructed from a simple light tube 10, such as made from thin sheet metal, which is fixed, by means of a base 11, e. g. to the floor 12 of the cockpit or at any other suitable place of the aeroplane. The said floor is provided with an opening 13 having a diameter corresponding to the inner diameter of the tube. The bombs are piled in a desired number inside the said tube and the ill-timed fall of the bombs is prevented by a retaining member or safety lock 14 projecting across the base 11 and adapted to be removed when it is desired to launch the bombs. Besides, the lowermost bomb of the pile is withheld in the tube by a resilient device which backs said bomb against the wall of the tube, and which, when operated, will determine the launching of one or more bombs. The said device may be formed of a roller 15 having a groove lined with a material resistant to friction, such as rubber, said roller being arranged to project partly into the tube through an opening 16 provided near the lower end of the latter. The said roller is mounted on the end 17a of a bell crank lever 17 pivoted at 18 to a bracket or bearing 19 integral with the tube, the other end 17b of the lever being provided with a pedal 20. The said lever is further connected to the said bracket by a return spring 21. Owing to the action of the said spring and to the fact that the groove of the roller 15 is preferably made to fit the cylindrical form of the bomb, the latter is suitably jammed against the inner wall of the tube 10.

When the operator depresses the pedal 20 for a very short period, the bomb 22 leaves the tube. On the other hand, the roller 15 which is immediately returned by the spring 21 towards the inside of the tube, encounters the outer shell of the next bomb 22a and withholds the latter in the tube 10. The number of launched bombs depends upon the time the pedal has been depressed. It will easily be understood that by means of the described device all of the bombs contained in the tube may be launched in an extremely short time. This results in a considerable advantage, inasmuch as all the bombs will touch the ground at points close to each other, the distances between said points depending upon the speed of the aircraft, upon the wind and the will of the operator, so that when a series of bombs are launched along the axis of the aimed object there is a maximum of chance to hit the mark.

It will be understood that the construction of the operating mechanism for the roller is subject to several modifications. Thus, if the bracket or bearing 19 and the pivotal connection

18 for the lever 17 are provided above the aperture 16, the roller 15 may be operated by raising the end 17b of lever 17 by means of a cable or the like. According to a further modification, the bearing 19 may be fixed to the floor 12.

Further, the lock 14 may be provided with a remote control mechanism whereby said lock may be returned to its working position after the launching is done.

A modification of the bomb releasing tube is shown in Fig. 3. The tube 10a illustrated in this figure is provided with a removable U-shaped lock. The upper end of the tube is closed by a cap 50. A safety device such as a U shaped member 51 is fastened to the tube by means of pins or is sealed therein, said member bearing a disc 52 adapted to serve as a rest to a load spring 53. The latter acts through a disc 54 upon the uppermost bomb in the tube. The said spring acts to keep the bombs in place whilst the aircraft is manoeuvring and assists the releasing of the bombs, specially when the tube is in an inclined position.

Above the aperture 16a there is a bracket or bearing 19a fixed to the tube by a ring 55 which serves also as a fixing means for one end of a resilient blade 56 projecting into the aperture 16a. A bell crank lever 57 pivoted at 18a to the said bearing is provided at one of its ends with a bent finger 58, and, at its opposite end, with a handle 59. A spring 60 attached to the bearing 19a and to the lever 57 acts normally so as to cause the finger 59 to project into the aperture 16a, in order to press the spring 56 against the lowermost bomb, thus securing the latter against movement. All that must be done to free one or more bombs is to raise the handle 59 for the desired period.

The modification illustrated in Fig. 4 is specially designed for launching the bombs one by one. As shown, a bell crank lever 61 is pivoted at 62 to an elongate upright 63 fixed to the outer wall of the launching tube. One end of the said cranked lever forms a pedal 64, while the opposite end of the lever is pivoted at 65 to an oscillating lever 66 pivoted in turn at 67 to the upright or support 63. The ends of lever 66 are bent so as to form fingers 68, 69 facing apertures 70, 71, respectively of the tube 10b. The pressure spring 72 normally holds the pedal 64 in the raised position in such a manner that the finger 68 is engaged under the bottom of the lowermost bomb which is thus locked. In depressing the pedal 64 the finger 68 is retracted, so as to free one bomb while the finger 69 presses the spring 73 against the periphery of the next bomb. If the pedal is then released, the whole mechanism is reset to the position shown in Fig. 4, so that the said next bomb will be locked by the finger 68.

As shown in Fig. 5, the closure of the upper end of the tube 10, 10a, 10b, may be effected by means of a bayonet cap cooperating with pins 74 integral with the tube, said cap being locked as by a safety pin 75. One end of a pressure spring 53a bears against the said cap, while the other end of said spring bears, through a disc 54a, against the uppermost bomb in the tube.

It will be understood that an aircraft may be provided with several bomb launching tubes according to my invention, which may be disposed either vertically, or horizontally, or again inclined at any desired angle, and may be mounted either inside or outside the cockpit such as under the wings or within the latter, or again within the ties of the craft. The individual control means of all or part of the bomb launching devices may be interconnected in any suitable way, so as to allow for simultaneous actuation of said control means.

Further, it will be noticed that the actuation of the launching mechanism, as well as of the safety lock provided at the lower end of the tube may be effected through mechanical or electro-magnetical means. Preferably, use is made of a mixed control mechanism comprising the said two means in combination, the mechanical means being used when the electro-magnetical operating means are damaged.

My invention also relates to a bomb specially suitable for being launched by the launching device above described. As shown in Figs. 6 and 7, the barrel proper 23 of the bomb, which is filled with explosive, shrapnel, gas, incendiary material and the like is topped with a fitted on head or fuse 24 which may be screwed upon said body and contains the firing device which is constructed as follows: A boss 25 has its edge bearing upon an inwardly projecting lug of the barrel 23 and shows a central bore 26 for the percussion cap 27 which is followed by a detonator 28, with or without a retarding device interposed between them. The fuse is separated from the charge by a housing 29. A second body 30, carrying a striker 31, is held spaced apart from the boss 25 by a spring 32 bearing upon annular grooves provided in the bosses 25, 30. In order to prevent ill-timed firing, a resilient strip or blade 35 furnished with two stop pins 36, 36a, is placed over the head 24, so that the said pins project through apertures 37, 37a provided in the said head and are inserted between the bosses 25 and 30. The blade 35 is held in position by a hood made to fit exactly the head 24. According to a preferred embodiment, the blade 35 may be provided with a rigid hood 38 in U form.

Preferably, the head 24 is provided with an ear 39 across which both the resilient strip 35 and the hood 38 are positioned in a superimposed relation. The hood is held in position by a safety pin 40 projecting across the ear 39 and effective in preventing accidents during the storing of the bombs.

When the bomb is about to be charged into the launching tube 10, the safety pin 40 is to be removed. During the insertion of the bomb, the hood 38 is prevented from entering the tube by the lug 38a of the hood encountering the upper edge of the tube 10, the resilient blade being hence held in place by the inner walls of the launching tube. As soon as the bomb leaves the tube as a result of the actuation of the release device, the resilient blade 35 is straightened, thus disengaging the lugs 36 from between the bosses 25 and 30 which are hence spaced apart merely by the action of the spring 32. When the bomb hits an obstacle, the inertia of the said bosses causes compression of the spring 32, so that the striker 31 contacts the percussion cap 27, thus causing firing and, consequently, explosion of the projectile to occur. It is to be noticed that that extremity of the bomb which encounters the obstacle determines that of the two bosses 25, 30 which has to move towards the other by inertia, thus causing the firing to occur. However if a lateral portion of the bomb hits the obstacle, the two bosses 25, 30 will move towards each other in performing an angular displacement having as a fulcrum that point of the periphery of the said bosses, which is nearest to that point of the bomb that has hit the obstacle, so that firing is secured in every case.

Inasmuch as the disengagement of the stop pins

36, 36a leaves the holes 37, 37a in the head of the bomb uncovered, such matters as earth may enter through said holes at the moment the bomb hits a mark, and oppose such inward displacement of the bosses 25, 30 as is necessary to bring about the firing of the cap.

To avoid this inconvenience, my invention provides a light resilient blade or strip 41 in U form located in a suitable groove 42 provided in the head 24. The blade 41 is fixed by its centre to the said head, such as by means of a screw 43, while the free ends of the blade 41 are interposed between the blade 35 and the hood 38. When the blade 35 opens out it lifts the free ends of the strip 41, which ends snap back onto the holes 37, 37a which they mask entirely, as soon as the blade 35 is removed.

It is to be noted that, in order to secure a perfect contact between the blade 41 and the edges of the apertures 37, 37a, it is preferred to make the head 24 with two grooves 44 adapted to lodge the ends of the blade 35.

According to my invention, the sensitiveness of the firing mechanism may be considerably improved by using the construction illustrated in Fig. 8. In the latter embodiment, the head 24a of the bomb 23a has a tapered depression 24b. The striker 31a is made integral with a tapered disc 76. Between the latter and the depression 24b there is interposed a movable boss 77 showing upper and lower inwardly bevelled faces fitting the tapered faces of the said depression and disc. A second boss 78 of a form similar to that of the boss 77 is located between a tapered disc 79 carrying a percussion cap 27a, and a likewise tapered disc 80. The latter, as well as the housing 29a, are held in position by clamping their rims between the lower edge of the head 24a and an inner lug 81 provided on the barrel 23a of the bomb. A light pressure spring 32a keeps the two discs 76 and 79 in a spaced apart position. A retarding fuse cord 82 extends with suitable freedom of movement across the central bore 78a of the boss 78, said fuse cord carrying the detonator 28a. Ill-timed firing is avoided by stop pins 36a which prevent the discs 76 and 79 from moving closer to each other and are integral with a resilient blade or strip 35a held in position by a rigid hood 38a which is locked by means of a removable pin 40a traversing an ear 39a across which the said strip and hood are laid.

As soon as—the bomb being launched and, consequently, the stop pins 36a disengaged from their respective holes—the bomb hits an obstacle, the bosses 77 and 78, under the effect of their inertia, will be displaced a certain distance and cause the discs 76 and 79 to move closer to each other, thus producing an instantaneous firing of the percussion cap 27a. If the point of hit is in the axis of the bomb, one of the bosses 77, 78 will move parallelly to said axis. Alternately, if that point of the bomb which has hit the mark first is not situated in the axis of the bomb, but is at any angle thereto, the bosses 77 and 78, under the effect of their inertia, will slide upon the tapered surfaces of the depression 24b and the disc 80 upon which the said bosses are bearing, and, at the same time, will slide upon the tapered faces of the discs 76 and 79, which will thus move closer to each other.

It will be understood that, if desired, the percussion cap may be directly connected to the detonator, without the interposition of retarding means such as the cord 82. The detonator may be connected to the percussion cap or placed at a certain distance therefrom, as shown e. g. in Fig. 9. The bomb illustrated in Fig. 9 is substantially similar to that shown in Fig. 8. The only difference is that the detonator 28b of Fig. 9 is placed in a central opening provided in the casing 29b and that there is no connection between the percussion cap 27 and the detonator. The absence of a retarding cord makes it possible to reduce the diameter of the central bore of the boss 78b. The thus increased weight of the latter is effective in increasing the inertia thereof and, consequently, in improving the sensitiveness of the firing mechanism.

A modified construction of the bomb is shown in Fig. 10. The body or barrel 23 is provided at its lower end with a partition 46 having a central opening 47, and has an annular projection 48, which may be for instance tapped. Several bomb barrels of identical construction may be assembled by screwing, so as to form a cluster or chain of bombs. The bombs may also be interconnected in a different way, such as by a bayonet joint. One single firing head (not shown in the drawings) will suffice to secure explosion of the various bombs which will be ignited through a priming channel 49 provided longitudinally across the said bombs. The lower end of the channel 49 is closed by a fitted on disc 49a. The bombs assembled into a cluster or battery may be identical or of various character, e. g. explosive bombs, gas bombs, or flares.

While the bomb according to my invention is particularly adapted to be launched by means of the above described launching tube, it will be understood that the said bomb may also be launched by means of a mortar, rifle or the like, or again, by hand, as a grenade.

What I claim is:

1. A bomb intended to be launched from tubular launching means, comprising a bomb barrel and a head fitted onto said barrel, a firing mechanism arranged in said head and comprising a pair of movable masses capable of longitudinal and lateral displacement relative to the axis of the head and having each at least one tapered end surface portion, two tapered counter surface portions being retained against substantial lateral displacement relative to the head in order to cooperate each with a tapered end surface portion of one of the said masses, two movable discs freely mounted one against each of the opposed faces of the movable masses and spaced apart to form a chamber therebetween, said discs being arranged with little lateral play relative to the head and having a flat rim portion forming an angle with the inner wall of the head, a percussion cap carried by one of said discs, a firing pin carried by the other of said discs and projecting freely into said chamber opposite the percussion cap and spaced from the disc carrying said cap, spring means arranged between the two said discs to normally hold apart the firing pin and the percussion cap, and removable means for locking the firing mechanism.

2. A bomb comprising a bomb barrel, a head fitted onto said barrel, a firing mechanism arranged in said head and comprising a tapered depressed portion in the head of the bomb, a tapered disc at the lower end of the head and rigidly secured to the latter, two movable masses having upper and lower faces of inversed taper and capable of longitudinal and lateral displacement relative to the axis of the head, two movable tapered discs freely mounted one against each of the oposed faces of the movable masses

and spaced apart to form a chamber therebetween, said discs being arranged with little lateral play relative to the head and having a flat rim portion forming angles with the inner wall of the head, a percussion cap carried by the one and a firing pin carried by the other of said movable discs, the firing pin projecting freely into a chamber opposite the percussion cap and clear of the disc carrying said cap, spring means arranged between the movable discs to normally hold apart the firing pin and the percussion cap and to urge the movable masses against said tapered depression and said fixed disc respectively, and removable means for locking the firing mechanism.

3. A bomb according to claim 2, in which an interior shoulder is provided on the bomb barrel near the upper end of the latter, whereby the tapered disc cooperating with one of the movable masses is clamped at its rim between the lower end of the head and the said interior shoulder.

4. A bomb according to claim 1, there being no holes in opposite walls of the head, a resilient blade placed over said head to mask the said holes, stop pins integral with the said blade to engage said holes and lock the firing mechanism, a rigid removable hood placed over said blade, a light resilient strip of U form having its central portion fixed to the head of the bomb, said resilient strip being arranged transversely to said resilient blade, and having its free ends interposed between the said blade and hood and registering with the holes.

5. A bomb according to claim 1, wherein holes are provided in opposite walls of the head, a resilient blade placed over said head to mask the said holes, stop pins integral with the blade to engage said holes and lock the firing mechanism, a rigid removable hood placed over the blade, a transversely disposed ear provided on the head and across which the resilient blade and the hood are arranged in superimposed relation, a transverse bore in said ear, and a removable safety pin adapted to be engaged in the said bore to hold the hood in position.

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