

Sept. 27, 1927.

T. LAFITTE

1,643,385

AEROPLANE BOMB WITH SAFETY DEVICE

Filed March 3, 1927

3 Sheets-Sheet 1

Fig. 1

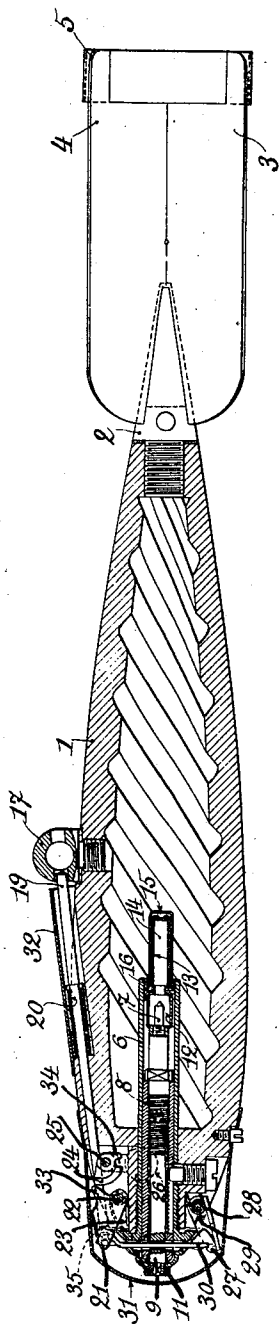
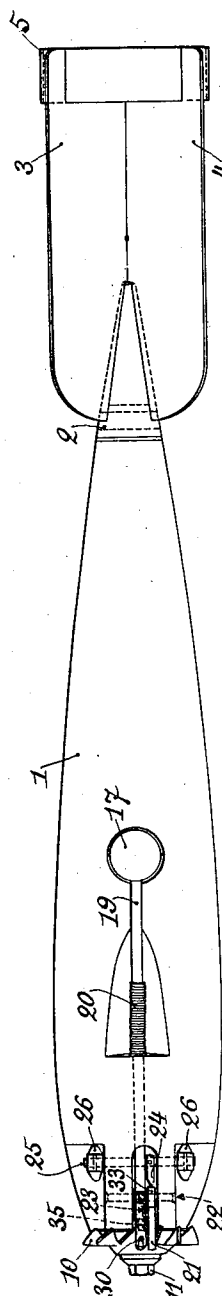


Fig. 2



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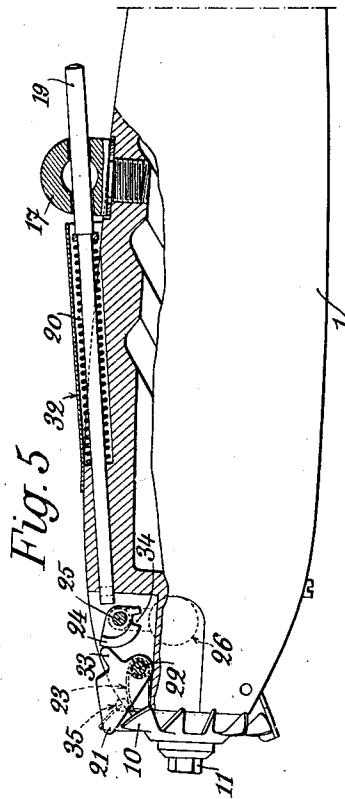
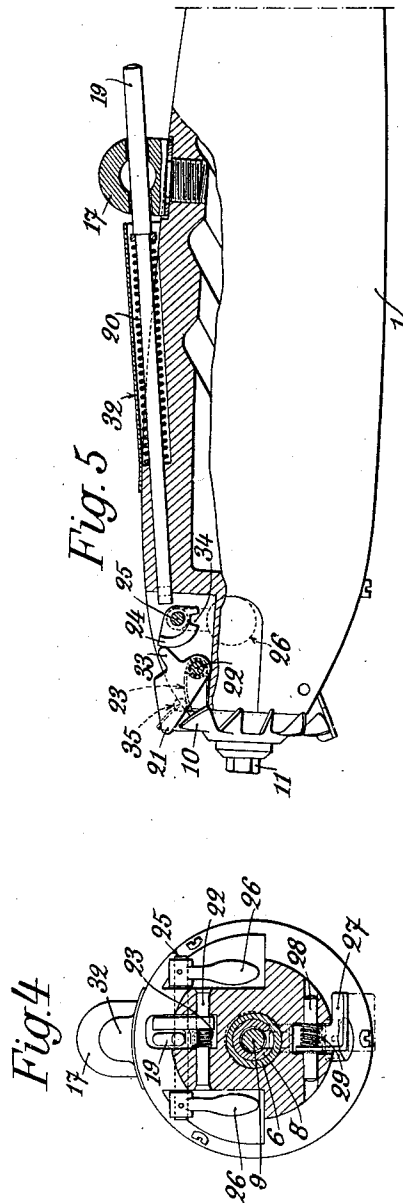
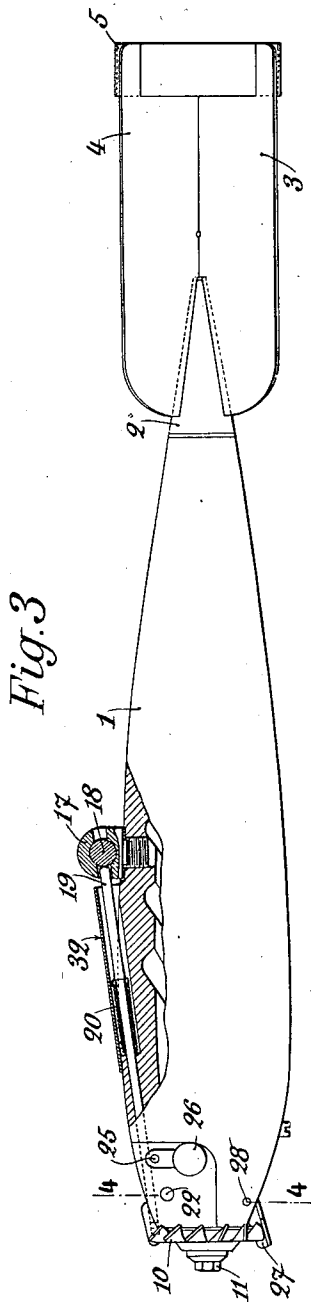
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3 Sheets-Sheet 2



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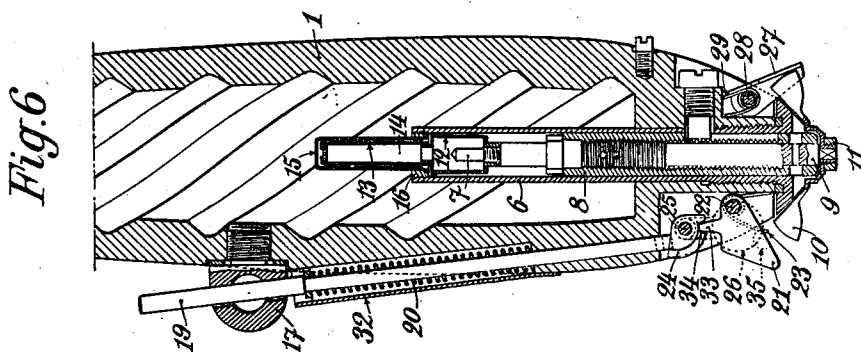
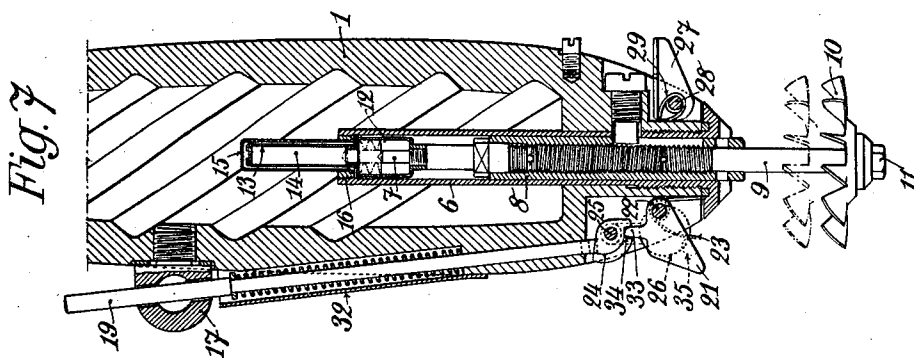
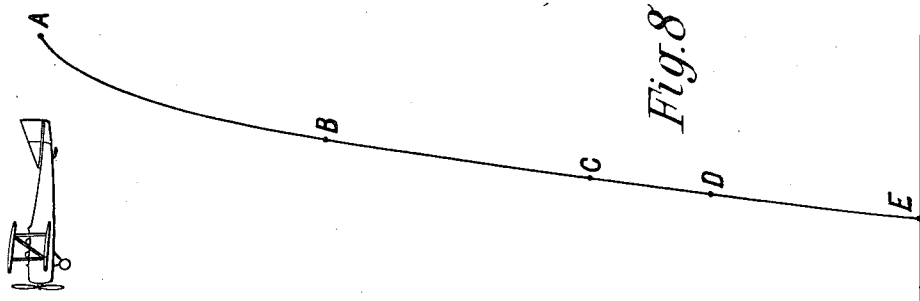
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AEROPLANE BOMB WITH SAFETY DEVICE

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3 Sheets-Sheet 3



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Patented Sept. 27, 1927.

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UNITED STATES PATENT OFFICE.

THEODORE LAFITTE, OF GENNEVILLIERS, FRANCE.

AEROPLANE BOMB WITH SAFETY DEVICE.

Application filed March 3, 1927, Serial No. 172,417, and in France March 3, 1926.

The present invention relates to an aeroplane bomb of the wing type which is provided with safety devices such that the percussion can take place only when the following four conditions are complied with in the order indicated:

- 1.—The bomb must be released from the aeroplane;
- 2.—The bomb must remain for a few seconds in the vertical position or nearly so;
- 3.—Its speed must exceed a minimum speed as determined by the manufacturer;
- 4.—The bomb must cover a relatively long distance in the air, for instance some fifty meters.

A constructional form of the apparatus in accordance with the invention is shown by way of example in the appended drawings.

Fig. 1 is a lengthwise section of the bomb which is cocked and is provided with its protecting cap.

Fig. 2 is a corresponding plan view, with the cap removed.

Fig. 3 is an elevational view, partly in section, of the bomb secured below the aeroplane.

Fig. 4 is a cross section on the line 4—4 of Fig. 3.

Fig. 5 is a partial lengthwise section of the bomb after it has been unfastened.

Figs. 6 and 7 are like views corresponding to the vertical position of the bomb and showing the successive action of the safety devices.

Fig. 8 is a diagrammatic view showing various positions of the bomb when descending.

The bomb essentially comprises a main body 1 consisting of cast iron, steel or the like. To the rear end of the said body is screwed a tail piece 2 made of steel, provided with wings or flanges of the normal type 3 and 4 which are connected together by the ring 5. To the front end of the main body is screwed a plug 6 carrying the percussion device, which consists of the striker 7 mounted on a socket 8 provided with an internal screw thread, into which is screwed a propeller axle 9 to which a multiple-blade propeller 10 is riveted and is secured by the screw 11.

To the end of the striker is screwed a cap 12 to which is soldered a member 13 carrying the detonator, into which is inserted the detonator 14 which is held in place by a slight upsetting or crimping. The device consist-

ing of the striker and the detonator is protected from the powder and from the incendiary or explosive material normally contained in the bomb, by a cap 15 screwed to the plug 16.

The bomb is normally attached to the aeroplane by an eye 17 into which is inserted the bar 18 serving to secure the bomb. This eye is pierced with an oblique hole in which is engaged a rod 19 which is urged against the axle 18 by a spring 20; said rod traverses the bomb at the front part; the other end is engaged between two blades of the propeller of the striker, and is held in this position by the pin 30.

At each side of the head of the bomb and at the middle part are formed recesses in which are movable the devices affording safe operation; said devices comprise the rod 19 and an arm 21 which is mounted on an axle 22 and is urged in a rotary direction about the said axle by the spring 23 for the release of the propeller.

The shape of said arm is such that its rear stud 33 is in constant contact with a cam 24 which is pinned to the axle 25 which extends entirely through the body of the bomb. To each end of said axle is pinned a respective pendular mass 26 which is movable in the right and left hand recesses in the head of the bomb, respectively.

In a lower recess in the head, the vane 27 is rotatable on an axle 28; one side of said vane, which has the form of an angle piece, is constantly held between two blades of the propeller by a calibrated spring 29.

The pin 30 (Fig. 1) traverses the propeller and axle 9, the striker tube 8 and the plug 6, and its end engages in an aperture in the rod 19; the whole device is thus entirely held against rotation and straight motion with reference to the main body of the bomb. The whole is covered by the cap 31 (Fig. 1) for handling and transportation, and the rod 19 is also protected by a cover 32.

The operation is as follows:

The bomb is normally attached in the horizontal position below the wings or along the body of the aeroplane (Fig. 3) by the rod 18 inserted through the eye 17.

The operator has preliminarily removed the cap 31, and when the bomb has been secured in place he removes the pin 30, and this allows the rod 19 to make contact with the axle 18 under the action of the spring

20 (Fig. 3). When the bomb is released by withdrawing the axle 18, this latter is disengaged from the eye of the member 17, and the rod 19 will pass through the eye, being thus caused to disappear entirely from the front part of the bomb (Fig. 5). At this time, the bomb which has been released in the horizontal direction will assume its normal trajectory and will constantly approach the vertical position.

The pendular masses 26 will always remain vertical (with the masses at the bottom) under the effect of gravity, and the bomb will gradually tend to assume the vertical position, so that the axis of the said masses and the axis of the bomb will tend to become parallel; when they have assumed this position (Fig. 6), the nib 33 of the arm 21 will engage in the notch 34 in the cam 24 when urged by the spring 23. The depth of the notch is such that in this motion, the arm will be entirely released from the parts of the propeller, so that the propeller is enabled to rotate in the current of the air due to the travel of the bomb. However, at this time the propeller is not allowed to rotate, since it is held by the vane 27 which is still in the position shown in the full lines in Fig. 6.

The speed of the bomb increases by the acceleration of gravity, so that the air pressure on the vane 27 also increases. A speed will be attained for which the pressure on the vane 27 will exceed the tension of the spring 29. The vane then rotates, and when in the position shown in Fig. 7 it will release the propeller. Since the speed of the bomb increases, or at least remains the same, the vane 27 will remain in this position until it strikes the ground.

The propeller 10 is thus free to rotate only after the vane 27 is raised.

The propeller blades and the inclination of the screw threads of the members 8 and 9 are such that the propeller 10 and its axle 9 will extend outwardly of the front part of the bomb, and the axle 9 will make contact with the rear parts of the threads of the member 8, as shown in Fig. 7; the propeller can no longer rotate, and hence no change takes place until the bomb falls upon the ground, it having been entirely primed and ready to explode.

Due to the form employed, to the wings provided in the rear, and to the ring joining the wings, the bomb will always attain the ground with the point foremost.

The device which consists of the members 10, 11, 9, 8 and 7 and which now forms a rigid construction of constant length, will first come into contact with the ground; the kinetic energy of the bomb is such that the cap 12 will be crushed by the shock and will allow the point of the striker to strike against the priming of the detonator 14.

The latter is thus set off, and it acts upon the explosive charge contained in the bomb, or it ignites an incendiary charge, according to the use which is to be made of the bomb.

The object in view in the construction of the bomb is to render it quite inoffensive as long as it is suspended from the aeroplane. It is an observed fact that aeroplane bombs of various types will prove very dangerous if for any reason they are not released from the aeroplane at the time when the operator proposes to drop them.

As a rule, the fuse of such bombs is started from the fact that the dropping operations have been performed, and the explosion may then take place at the least shock, and this is sure to happen when the aeroplane lands on the ground with bombs which have not been released. This accident is practically impossible with the bomb according to the invention. In fact, if the bomb is considered as normally mounted and primed, and attached below the wings of the aeroplane, it will be observed that if the hook 18 has not been removed from the eye 17, the rod 19 cannot be released from the blades of the propeller 10, so that the latter will not rotate, and any shocks brought upon it will not change its position.

Furthermore, since the bomb remains horizontal, the pendular masses will remain, due to the action of gravity, in the positions shown in Figs. 1 and 3, and the arm 21 is always engaged between two blades of the propeller 10 to hold it against rotation. The said arm is further held in position by the small nib 35 which abuts against the rod 19 and thus prevents the arm from rotating before the rod is released, i. e. before the bomb is disengaged.

If the bomb has not attained the speed determined by the manufacturer according to the calibrated spring 29, the vane 27 will not release the blades of the propeller 10, and this latter will still be held. The propeller will thus be entirely fastened in position when the bomb is not released from the aeroplane, or if it has not fallen through a sufficient vertical distance and has not attained a given speed which may be determined by the manufacturer.

These conditions can only be fulfilled when the bomb is released from the aeroplane and falls normally and without obstruction. It is only at this time that the propeller will commence to unscrew under the effect of the resistance of the air, and the percussion can take place when the propeller is entirely unscrewed.

If Fig. 8 represents the trajectory of the bomb and the points of the change in the relative positions of the parts of the fuse, it will be observed that:

1. At A, the rod 19 is released from the

propeller, and the bomb is separated from the apparatus;

2. At B, the arm 21 of the pendular masses is disengaged from the propeller;

5 3. At C, the arm of the fastening vane 27 is released from the propeller;

4. At D, the propeller is unscrewed and the striker is cocked. As far as the point D, which is at a great distance from the aeroplane, the bomb remains entirely inoffensive;

10 5. At E, the cap is crushed and the bomb explodes.

Having thus described my apparatus, what I claim as new therein, and my own invention, is:

1. In a bomb which is adapted to be transported upon and thrown by an aeroplane, the combination of a main body of a bomb, wings disposed on the rear part of said main body, a hollow plug screwed to the front part of said main body, a tapped socket slidable in said plug, a striker secured to said socket, a cap disposed upon said striker, a detonator carrier soldered to said cap, a detonator disposed in said carrier, a screw threaded axle engaged in the tapped part of said socket, a propeller mounted on the outer end of said axle, said propeller being adapted to make contact with said plug in the inoperative position and to issue from the said socket under the action of a current of air during the descent of the bomb, said axle and socket being adapted to slide inwardly and to crush the said cap, thereby causing the explosion of the detonator by the shock of the bomb upon the ground.

2. In a bomb which is adapted to be transported upon and thrown by an aeroplane, the combination of a main body of a bomb, wings disposed on the rear part of said main body, a hollow plug screwed to the front part of said main body, a tapped socket slidable in said plug, a striker secured to said socket, a cap disposed upon said striker, a detonator carrier soldered to said cap, a detonator disposed in said carrier, a screw threaded axle engaged in the tapped part of said socket, a propeller mounted on the outer end of said axle, said propeller being adapted to make contact with the said plug in the inoperative position and to issue from the said socket under the action of a current of air during the descent of the bomb, an eye disposed upon the said main body of the bomb, said eye being apertured and adapted for the insertion of the bar attaching the bomb to the aeroplane and further pierced with an oblique channel for the insertion, through the aperture of the eye, of a rod which is adapted to slide lengthwise in the external wall and to abut within the said channel against the said attaching bar of the aeroplane, a spring urging the said rod against the said attaching bar, said rod being

adapted for insertion between the blades of said propeller when said attaching bar is situated in the said eye, whereby the propeller blades will be released when the eye is disengaged from said bar and the bomb is separated from the aeroplane. 70

3. In a bomb which is adapted to be transported upon and thrown by an aeroplane, the combination of a main body of a bomb, wings disposed on the rear part of said main body, a hollow plug screwed to the front part of said main body, a tapped socket slidable in said plug, a striker secured to said socket, a cap disposed upon said striker, a detonator carrier soldered to said cap, a detonator disposed in said carrier, a screw threaded axle engaged in the tapped part of said socket, a propeller mounted on the outer end of said axle, said propeller being adapted to make contact with the said plug in the inoperative position and to issue from the said socket under the action of a current of air during the descent of the bomb, an arm which is pivotally mounted in a recess formed in the front part of the said body of the bomb, and whose end is adapted for insertion between the propeller blades, a spring mounted on the said arm and adapted to release the arm from the propeller, a nib disposed upon the rear of the said arm, a cam pivotally mounted in said recess, said cam comprising a notch at the periphery for the engagement of the said nib when the said arm oscillates under the action of the said spring, an axle to which the said cam is pinned, pendular masses pinned to said axle, and adapted to pivot the said cam and to engage said nib in the said notch when the main body of the bomb is placed vertically with the point downwards, and to simultaneously release the said arm from the propeller blades. 85 90 95 100 105

4. In a bomb which is adapted to be transported upon and thrown by an aeroplane, the combination of a main body of a bomb, wings disposed on the rear part of said main body, a hollow plug screwed to the front part of said main body, a tapped socket slidable in said plug, a striker secured to said socket, a cap disposed upon said striker, a detonator carrier soldered to said cap, a detonator disposed in said carrier, a screw threaded axle engaged in the tapped part of said socket, a propeller mounted on the outer end of said axle, said propeller being adapted to make contact with said plug in the inoperative position and to issue from the said socket under the action of a current of air during the descent of the bomb, an eye disposed upon the said main body of the bomb, said eye being apertured and adapted for the insertion of the bar attaching the bomb to the aeroplane and further pierced with an oblique channel for the insertion, through the aperture of the eye, of a rod which is adapted to slide lengthwise in the external wall and to

abut within the said channel against the said attaching bar of the aeroplane, a spring urging the said rod against the said attaching bar, said rod being adapted for insertion between the blades of said propeller when said attaching bar is situated in the said eye, whereby the propeller blades will be released when the eye is disengaged from said bar, and the bomb is separated from the aeroplane, an arm pivotally mounted in a recess formed in the front part of the main body of the bomb, and whose end is adapted for insertion between the propeller blades, a spring mounted on the said arm and adapted to release the arm from the propeller, a stud mounted on said arm and adapted to make contact with said rod when the said arm is inserted between the propeller blades.

5. In a bomb which is adapted to be transported upon and thrown by an aeroplane, the combination of a main body of a bomb, wings disposed on the rear part of said main body, a hollow plug screwed to the front

part of said main body, a tapped socket slidable in said plug, a striker secured to said socket, a cap disposed upon said striker, a detonator carrier soldered to said cap, a det-onator disposed in said carrier, a screw-threaded axle engaged in the tapped part of said socket, a propeller mounted on the outer end of said axle, said propeller being adapted to make contact with said plug in the in-operative position and to issue from the said socket under the action of a current of air during the descent of the bomb, a vane pivotally mounted in a recess formed in the front part of the said body of the bomb, a spring adapted to drive the said vane between the propeller blades, said spring yielding to the force of the current of air during the descent of the bomb and at a predetermined speed of descent.

In testimony whereof I have hereunto affixed my signature.

THEODORE LAFITTE.