June 5, 1945. J. H. STRONG 2,377,587

LOW ALTITUDE BOMB

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Fig. 1.

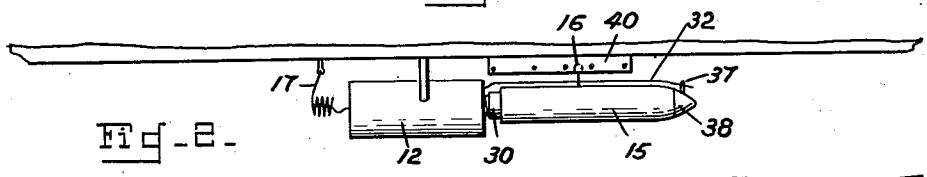


Fig. 2.

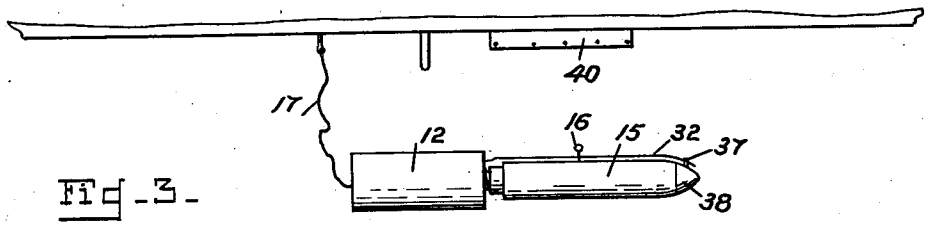


Fig. 3.

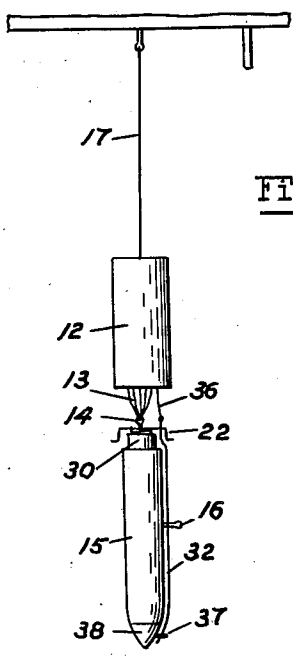


Fig. 4.

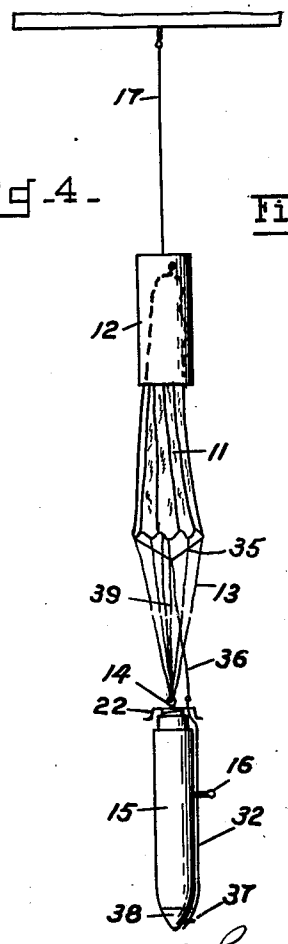
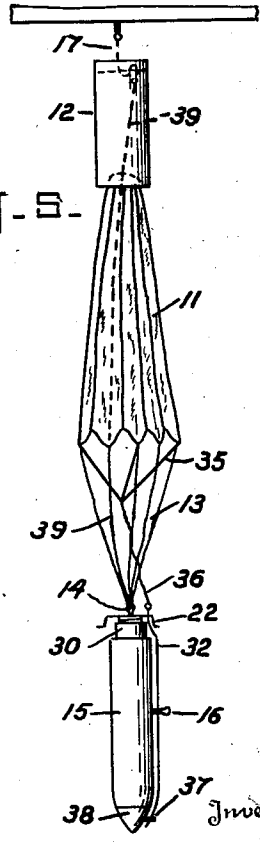


Fig. 5.



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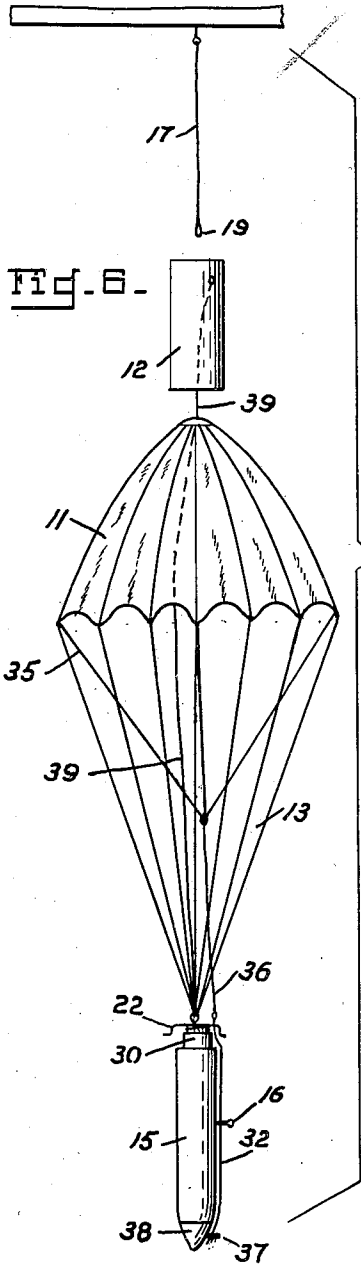


Fig. 6.

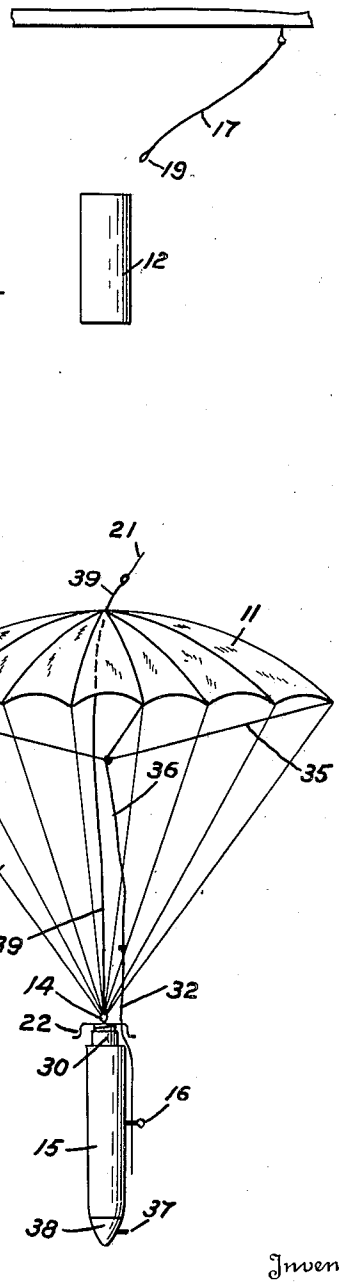


Fig. 7.

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Fig. 8.

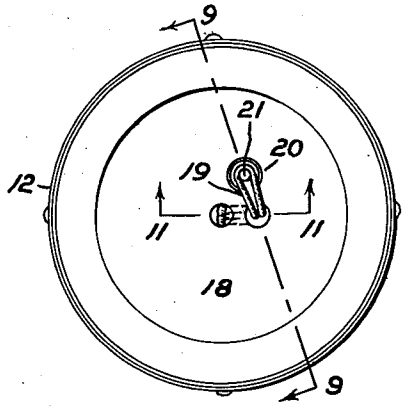


Fig. 9.

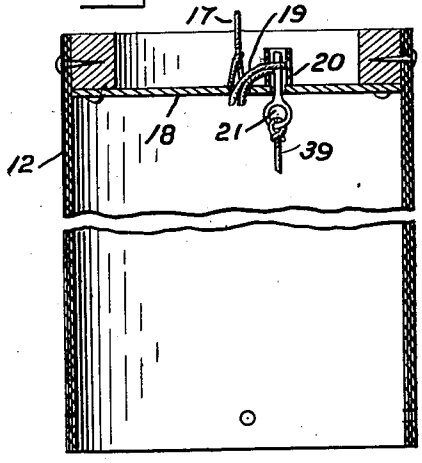


Fig. 10.

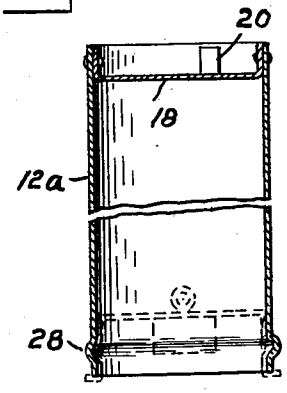


Fig. 11

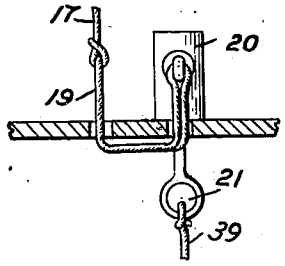


Fig. 12.

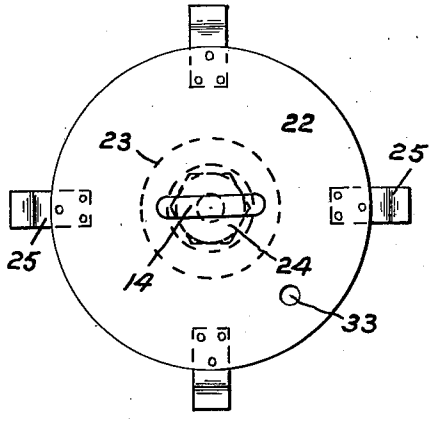
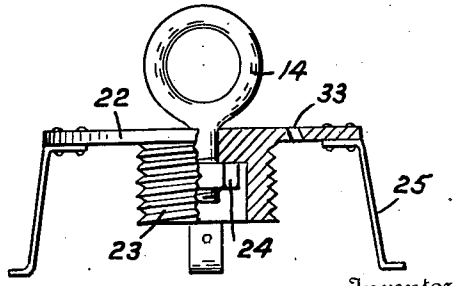


Fig. 13.



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Fig. 14.

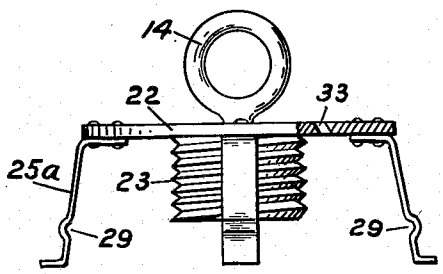


Fig. 15.

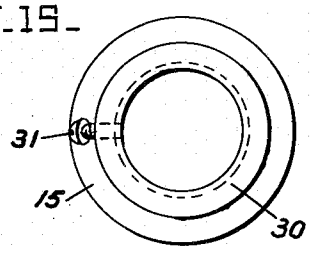


Fig. 16.

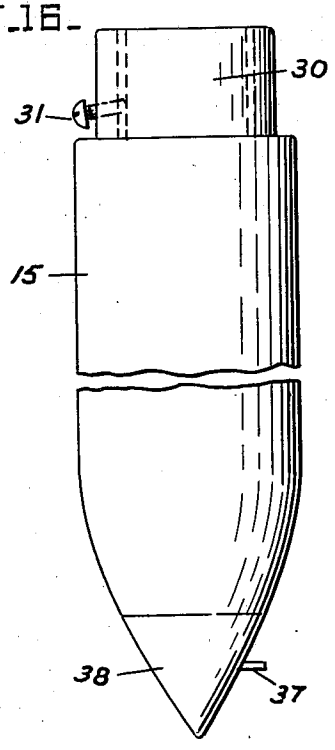
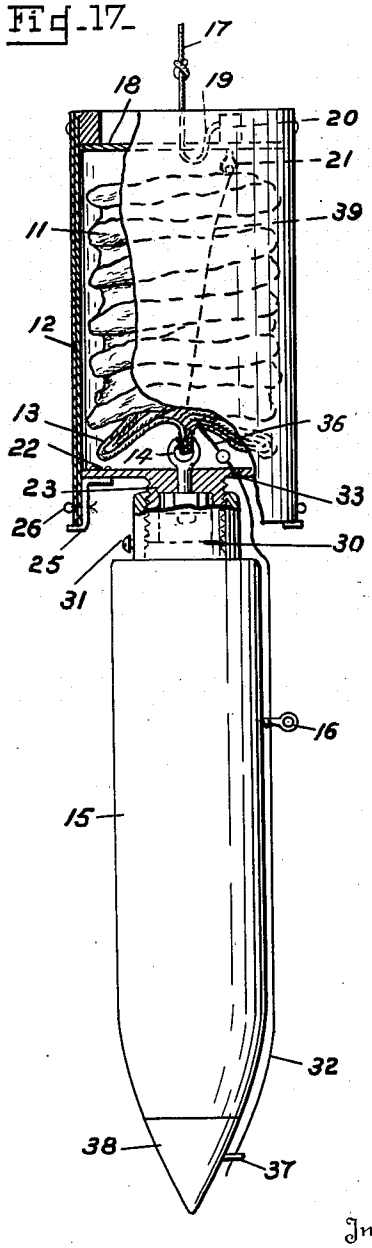


Fig. 17.



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Patented June 5, 1945 2,377,587

UNITED STATES PATENT OFFICE

2,377,587

LOW ALTITUDE BOMB

James H. Strong, Windsor, N. J.

Application March 30, 1939, Serial No. 265,024

8 Claims. (Cl. 102—4)

This invention relates to bombs intended to be dropped from airplanes in flight, and aims to provide a bomb that can be dropped from a high speed plane at a very low altitude, as in attacking troops in the open.

In order to accomplish successfully the purpose for which the invention is designed, and avoid danger to the plane, the bomb must be temporarily delayed in its descent in order to permit the plane to get well clear of the danger zone when the bomb explodes. Otherwise the bomb would strike the ground and explode immediately beneath the plane, as its inertia will cause it to continue on at the same rate of speed as the plane while dropping through the short distance intervening between the plane and the ground if released at a very low altitude.

The invention consists in equipping the bomb with a parachute and means for insuring that the parachute opens quickly and positively upon releasing the bomb from the plane, and for delaying the arming of the impact fuse with which such bombs are equipped until the parachute has fully opened.

Other objects and advantages of the invention appear in connection with the following description of preferred forms of apparatus for illustrating its construction and operation, as shown in the drawings, wherein

Figs. 1 to 7, inclusive, represent schematically the functioning of the apparatus in use, as it passes through the progressive stages of operation from the time it is released from the plane until it is ready to explode upon striking the ground or other target;

Figs. 8 and 9 are a top view and cross-section on the line 9—9 in Fig. 8 of the bomb and parachute container;

Fig. 10 is a cross-section similar to Fig. 9, showing another type of container;

Fig. 11 is a detail cross-sectional view of a portion of the end wall of the container on the line 11—11 in Fig. 8, showing, the pin for holding the anchor cord;

Figs. 12 and 13 are a plan view and side view, respectively, the latter being partly in cross-section, of the bomb base plug;

Fig. 14 is a detail view of a modified form of base plug for use with a container having a metal wall;

Figs. 15 and 16 are an end view and side view, respectively, of a typical bomb for use with the invention, and

Fig. 17 is a side view of a container, parachute and bomb assembled as ready for use.

Referring to the drawings, particularly Fig. 17, the invention comprises a parachute 11 packed in a container 12 and attached by means of its shrouds 13 to a ring bolt 14 secured to the base of the projectile 15, which has a lug 16 on one side for engagement with the bomb rack or release mechanism on the airplane. A line 17 is also provided for attaching the container 12 to the plane, one end of the line being secured to the plane and the other end of the line being detachably connected to the bottom 18 of the container.

In the form of device illustrated, the line 17 is attached at one end to a fixed part of the plane and is provided with a loop 19 at its free end, which passes into the container through a hole in its bottom 18 and out through a second hole, the end of the loop being caught in a hollow stud 20, through a hole in the side of which it is inserted, by a pin 21, projecting through the bottom of the container from within, as shown in Figs. 8, 9 and 11.

The parachute canopy is packed firmly against the bottom 18 of the container, holding the pin 21 securely in position, and is retained in the container by the removable end plate 22 to which the base plug 23 of the projectile is secured by a nut 24 on the stem of the ring bolt 14. The end plate 22 is temporarily held in place in the open end of the container 12 by means of clips 25 riveted to the end plate, engaging the inner edge of the container and pinned in place by cotter pins 26 or other suitable means. The container is preferably made of two or three strips of cardboard rolled into a tube and is sufficiently strong to hold the parts in assembled position during handling, but too weak to resist the shock of dropping the bomb, which pulls the end plate loose, tearing the cotter pins through the end wall of the container.

In case a metal container 12a is preferred (see Fig. 10) the edge of its side wall is provided with a rib 28 into which fits a shallow notch or projection 29 in each spring metal clip 25a (as shown in Fig. 14) and retains the end plate 22 in place during the storage and handling of the drop bomb, but permits discharge of the parachute when the device is operated.

The base plug 23 (shown in Figs. 12 and 13) screws into a threaded flange or hub 30 on the base of the bomb 15 (shown in Figs. 15 and 16), and is secured therein by means of a set screw 31 with the safety pin wire 32 in alinement with the bottom plate opening 33, as shown in Fig. 17.

The parachute is provided with a bridle 35

connected at four opposite points to the skirt of the canopy and at its center to a line **36** connected to the ring on the upper end of the safety pin wire which projects through the hole **33** in the bottom plate, as shown in Figs. 6, 7 and 17. The lengths of the bridle and line **36** are such as to pull the safety pin wire from engagement with the safety pin **37** in the nose of the bomb fuse **38** when the parachute is fully extended.

A container releasing line **39** is also provided, which is secured at its lower end to the ring **14** in the base plug and at its upper end to the pin **21** that holds the loop **19** on the lower end of the anchor line **17**, as shown in Fig. 17, the length of this line **39** being sufficient to permit the bomb and base plug to fall far enough away from the container to pull the shrouds and parachute canopy clear of the container (as illustrated in Fig. 5) before withdrawing the pin **21** and releasing the container from the anchor line and airplane.

The parachute is proportioned in size to suit the weight of the bomb to be launched, and for a bomb weighing from fifteen to twenty pounds would have a canopy with a spread of about eight feet and provided with shrouds about twelve feet in length, the anchor line for suspending the container from the plane being about twelve feet long, so the entire assemblage will depend some thirty feet below the plane at the time the container is released from the anchor line by the anchor pin **21**, and the plane cannot approach the ground nearer than that before releasing the bomb from the rack and have it function properly. For safety reasons, forty feet is about the minimum height that the plane can approach the ground before releasing the bomb.

The operation of the apparatus is illustrated in Figs. 1 to 7, inclusive, wherein the successive stages are shown in chronological order. Fig. 1 shows the bomb **15** attached to the bomb rack **40**, and supporting the entire parachute assembly, the anchor line **17** being attached to the plane at its upper end and to the container **12** at its lower end, and the safety pin wire **32** being in engagement with the safety pin to hold it in unarmed position.

Fig. 2 shows the bomb assembly immediately after the release of the bomb from the rack by the usual releasing mechanism, the anchor line **17** being partly paid out from the depression in the head of the container **12** in which it is normally housed.

Fig. 3 shows the anchor line **17** paid out to its full extent supporting the container **12** with its bottom end up and the base plug and end plate **22** just being pulled clear of the open end of the container by the weight of the bomb **15**, the safety pin wire **32** still engaging the safety pin to hold the latter in unarmed position.

Figs. 4 and 5 show the parachute being pulled from the container by the fall of the bomb to which the shrouds **13** are attached, the container being supported from the plane during this interval, and the safety pin wire in safe position to prevent the fuse from arming.

Fig. 6 shows the partly open parachute clear of the container, and the latter freed from the anchor line by the pulling of the pin **21** as the trip line **39** straightens out with the fall of the bomb to which it is attached at its lower end, the safety pin wire still being in safe position.

Fig. 7 shows the parachute fully inflated, and the safety pin wire **32** withdrawn from the safety pin **37** to permit the latter to arm the fuse by the straightening out of the bridle **35** and consequent pull upwardly on the line **36** connecting it to the safety pin wire.

The entire operation occurs almost instantaneously as soon as the bomb and container can drop to the end of the anchor line **17**, because the rapid movement of the plane through the air drags the bomb assembly with it so fast that the air resistance to the movement of the parachute opens it fully the instant it is clear of the container. Experimental flights have demonstrated that the device functions so rapidly that it is safe to approach within forty feet of the ground when flying at a speed of over 150 M. P. H. before releasing the bomb, which is very much closer than it has been safe to approach with any type of drop bomb heretofore used for the same purpose.

The force necessary to separate the end plate and base plug from the container may be adjusted by making the clips **25** of spring metal more or less splayed as shown in Fig. 13, so as to press against the inside of the container with adequate frictional force to prevent ejecting the contents of the container under accidental shocks in handling the bomb assembly.

If for any reason the parachute is not pulled clear of the container **12**, the fuse will not arm and the bomb and container will be trailed behind the plane at a high enough elevation to avoid entanglement in obstacles pending a landing, and may be either cut away or pulled back into the plane before attempting a landing.

The salient features of the invention are:

(1) Means for positively arresting the forward motion of the bomb to permit the plane to clear the danger zone.

(2) Adjustable means for releasing the bomb from the container preventing accidental release from shocks in handling the bomb assembly.

(3) Means for releasing the container from the anchor wire after the parachute has been fully withdrawn therefrom.

(4) Means for preventing withdrawal of the fuze pin safety wire prior to the opening of the parachute.

(5) Means for insuring alinement of the safety pin wire and the cord which connects it to the bridle of the parachute when the bomb is connected to the base plug.

(6) Means permitting easy access to the entire bomb assembly for repacking and inspection, and for disassembling the bomb.

The invention is not restricted to the details of construction shown in the drawings, but what I claim is the following:

1. A low altitude bomb assembly comprising a folded parachute canopy provided with shrouds and a bomb connected to said shrouds and having a fuse provided with a safety device for preventing it from arming, and a flexible connection to said safety device from said parachute canopy for arming said fuse immediately upon said parachute assuming its full open position after said shrouds have been extended fully by the weight of the bomb, said connection including a bridle connected to opposite margins of the parachute canopy.

2. A low altitude drop bomb assembly of the character described comprising a bomb and a parachute secured thereto, a container for the parachute in folded condition, an anchor line for connecting the parachute to a bombing plane, and means directly connected to the bomb for releasing the container from the anchor line after the parachute has been fully withdrawn therefrom.

3. A drop bomb assembly for low altitude airplane attack comprising a bomb provided with a fuze and a safety device for preventing premature arming of the fuze, said device including a withdrawable part normally preventing arming of the fuze, a parachute connected to said bomb, and an elongated container for said parachute having an open end and a closed end, a closure for the open end of said container secured to the rear end of said bomb, said closure being removable from said container with said bomb to release said parachute, means operable upon the dropping of said bomb assembly to arrest the movement of the container and permit said closure and bomb to separate therefrom simultaneously by operation of gravity, thereby positively withdrawing said parachute from the container, and means for effecting withdrawal of the fuze part simultaneously with the full opening of the parachute.

4. A device of the character described comprising a drop bomb having a removable base plug and a fuze provided with an arming device including a safety pin secured against action by a removable wire, a parachute canopy for suspending the bomb connected to said base plug by shrouds, a bridle attached to oppositely spaced edges of the parachute canopy, a cord for connecting the bridle to the safety pin wire, and cooperating means upon the bomb and base plug for insuring alinement of the safety pin wire and the cord which connects it to the bridle of the parachute canopy when the bomb is connected to the base plug.

5. A device of the character described in claim 2 comprising detachable means attached to the bomb normally forming part of the container and removable therefrom permitting easy access to the entire bomb assembly for repacking and inspection, and for disassembling the bomb.

6. A low altitude bomb assembly comprising a bomb body having a screw socket in its tail, a screw plug in said socket, a parachute having shrouds connected to said screw plug, a container for the parachute, said container having a severable connection to the bomb, and means for suspending the container from an airplane at a distance below it, said means including a separable connection to said container whereby separation of said container from said bomb and plane is effected upon said parachute clearing the container.

7. A low altitude bomb assembly comprising a bomb body, a parachute having shrouds and attached to the tail end of the bomb body, a container having an open end for receiving the parachute, said container having at its open end a severable connection to the bomb body and at its opposite end a severable connection for means for suspending said assembly from an airplane, said suspending means comprising a loop and locking pin engaging the container, whereby separation of said bomb from said container by gravity may occur, and means for withdrawing said pin to sever said suspending means upon the full removal of the parachute from the container.

8. A low altitude bomb assembly comprising a bomb body, a parachute having shrouds attached to the tail end of the bomb body, a container for the parachute, a closure means attached to the bomb body and removably attached to the lower portion of said container whereby the bomb body and its attached parachute may be withdrawn from the container, and means releasably attached to said container including a flexible element for suspending the entire bomb assembly from an airplane at a distance below it, said means operating by gravity to separate said container from said bomb body and from said plane upon said parachute clearing the container.

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