June 28, 1949. R. L. KINION 2,474,256

AERIAL BOMB

Filed March 30, 1945 2 Sheets-Sheet 1

Fig. 1.

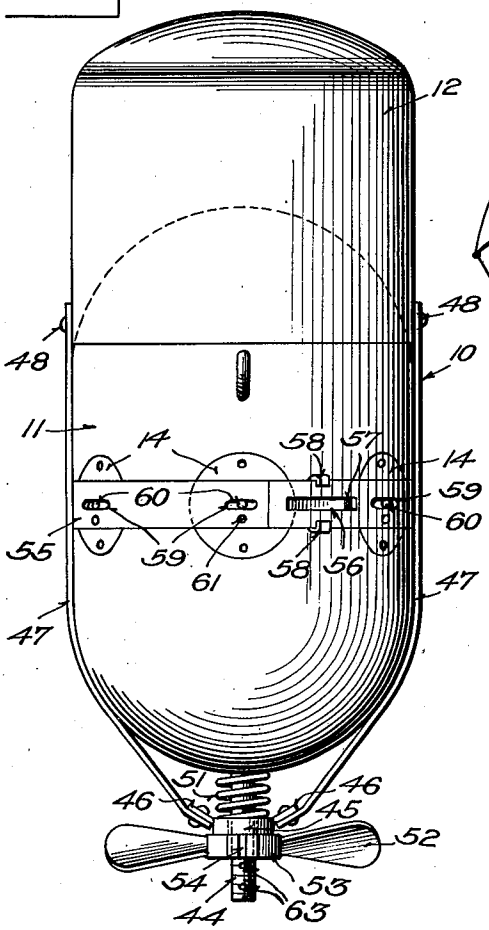


Fig. 2.

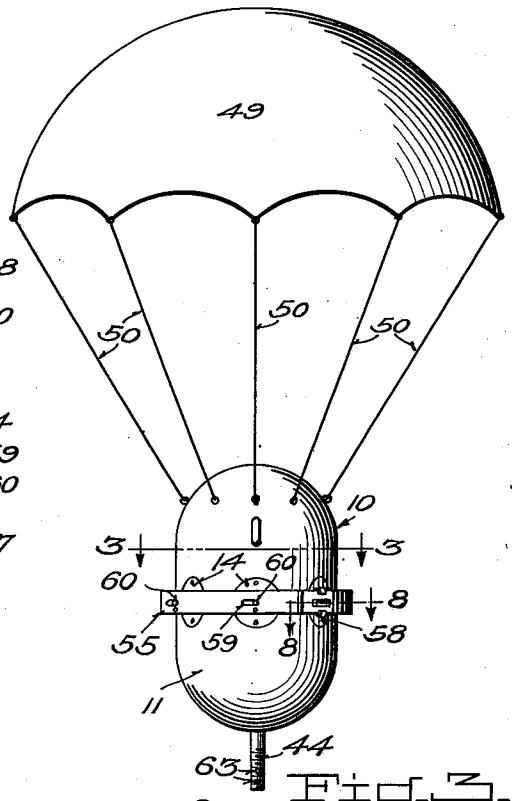


Fig. 3.

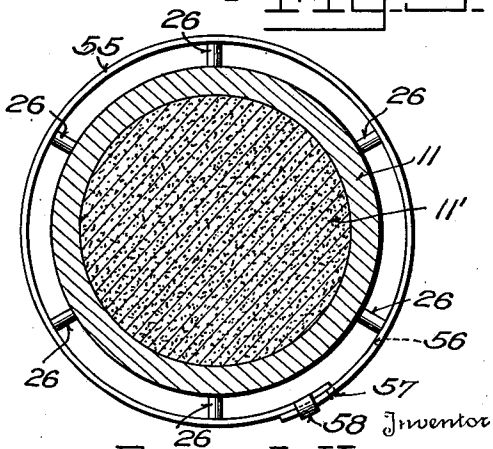


Fig. 4.

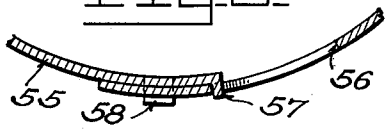
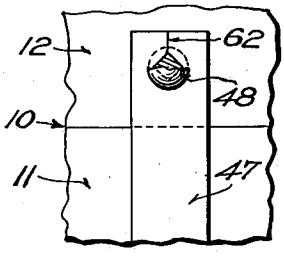


Fig. 5.



Inventor
RICHARD L. KINION,

By C. E. Karlstrom & H. E. Thibodeau
Attorneys

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Fig. 4.

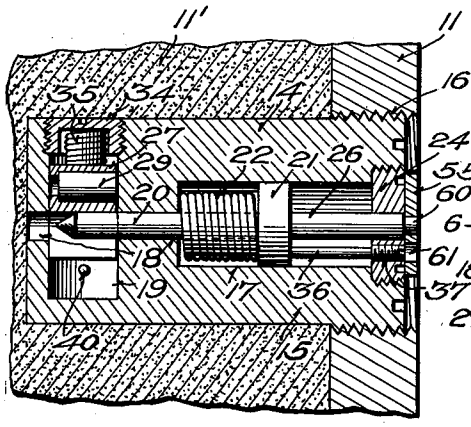


Fig. 5.

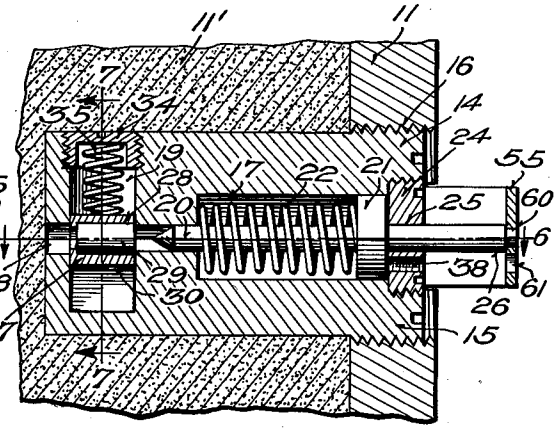


Fig. 7.

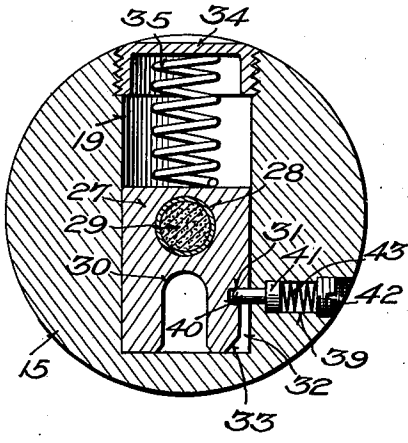
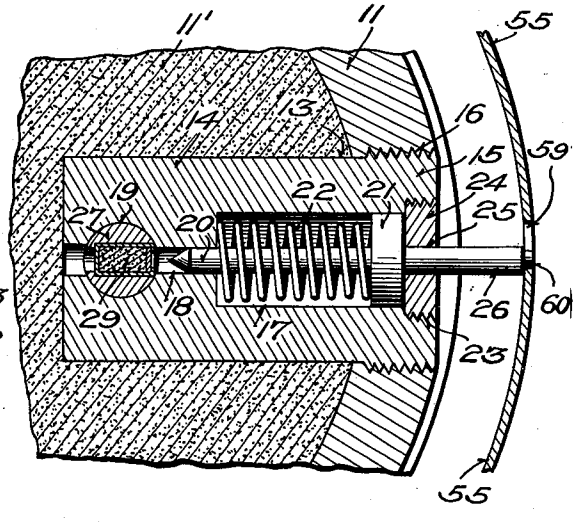


Fig. 6.



Inventor

RICHARD L. KINION,

By C. C. Herrstrom & C. C. Thibodeau

Attorneys

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AERIAL BOMB

Richard L. Kinion, Denver, Colo.

Application March 30, 1945, Serial No. 585,760

6 Claims. (Cl. 102—4)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to an improved bomb to be released from aircraft and which is intended to function against enemy aircraft and to be detonated while in flight and by contact with an enemy airplane.

More particularly, it is an aim of the invention to provide a novel construction of bomb intended to be released at a higher altitude than the altitude of the airplanes against which the bomb is to function, and which is provided with means to partially arrest the descent of the bomb, when it reaches the altitude of the enemy airplanes, against which it is to function, to thereby materially increase the likelihood of the bomb being struck by one of the enemy airplanes.

Another object of the invention is to provide a bomb of the above described character equipped with safety means to prevent arming of the bomb until its descent has been arrested and when it has reached the zone of the enemy airplanes against which it is to function.

A further aim of the invention is to provide a very simple arrangement whereby the distance that the bomb descends before its flight is arrested can be accurately predetermined and varied as required.

Still another object of the invention is to provide a common means for releasing a parachute, with which the bomb is equipped, and for arming a number of fuses by a common means which is actuated by the descent of the bomb.

Other objects and advantages of the invention will hereafter become more fully apparent from the following description of the drawings, which illustrate a preferred embodiment thereof, and wherein:

Figure 1 is a side elevational view of the assembled bomb;

Figure 2 is a similar view, on a reduced scale, showing the parachute in an open position and the impact receiving ring in an armed position;

Figure 3 is an enlarged cross sectional view taken substantially along the plane of the line 3—3 of the Figure 2;

Figure 4 is an enlarged, fragmentary vertical sectional view showing one of the fuses of the bomb in a disarmed position;

Figure 5 is a view similar to Figure 4 but showing the fuse in an armed position;

Figure 6 is a horizontal sectional view of the fuse in an armed position and taken substantially

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along a plane as indicated by the line 6—6 of Figure 5;

Figure 7 is a cross sectional view of the fuse in an armed position and taken substantially along a plane as indicated by a line 7—7 of Figure 5;

Figure 8 is an enlarged horizontal sectional view taken substantially along the plane of the line 8—8 of Figure 2, and

Figure 9 is a fragmentary side elevational view of a portion of the bomb.

Referring more particularly to the drawings, wherein like reference characters designate like or corresponding parts throughout the different views, 10 designates generally the improved bomb in its entirety and which includes a bomb body 11 and a cover 12 which is disposed in telescoping engagement with one end of the casing or body 11. Casing 11 may be of any desired shape but is preferably cylindrical in cross section and provided with rounded ends, as illustrated. Bomb casing 11 is substantially filled with a high explosive 11' and is provided around its intermediate portion with a plurality of outwardly opening fuse wells 13 each adapted to contain a fuse, designated generally 14.

The fuses 14 each comprises a substantially cylindrical housing 15 which is threadedly connected as seen at 16 to the bomb casing 11 for detachably mounting the fuse 14 therein. Each housing 15 is provided with a longitudinally disposed outwardly opening bore 17, which terminates intermediate of the ends of the housing 15 and which communicates at its inner end with a smaller longitudinally disposed bore 18 which extends through and opens outwardly of the inner end of the housing 15. Housing 15, adjacent its inner end, is also provided with a transverse bore 19 one end of which opens outwardly of the side wall of the housing 15 and the other end of which is closed. The bore 18 intersects bore 19. A firing pin 20 is slidably mounted in the bore 18 and is provided with a piston-like head 21 which is slidably disposed in the bore 17. An expansion coil spring 22 is carried by the firing pin 20 and has one end bearing against the inner end of the bore 17 and its opposite end bearing against piston 21 for urging the firing pin 20 and piston 21 outwardly of the housing 15. The outer end of the bore 17 is enlarged and internally threaded to provide a seat 23 for a threaded plug 24 which is disposed therein and which is provided with an opening 25 for slidably engaging a stem 26 which projects from the outer side of the piston head 21. A percussion cap carrier 27 is slidably mounted in the bore 19 and is pro-

vided with a transverse opening 28 for containing a percussion cap 29. As best seen in Figure 7, the inner end of the carrier 27 is provided with an arched shaped recess 30 and one side thereof is provided with a recess or notch 31 which communicates with a longitudinally disposed groove 32, in said side, which extends from the recess 31 to the inner end of the carrier 27. Carrier 27 is also provided with a beveled portion 33 at its inner end contiguous with the groove 32, for a purpose which will hereafter be described. The outer end of the bore 19 is internally threaded to receive a threaded plug 34 which provides a seat for one end of an expansion spring 35, the opposite end of which bears against the outer end of the carrier 27 for urging the carrier inwardly of the bore 19. The forward end of the firing pin 20 normally extends into the bore 19, as seen in Figure 4, and into the recess 30 of the carrier 27 to hold said carrier in a retracted position, against the action of the spring 35, to thereby retain percussion cap 29 out of alignment with the firing pin 20 to thus retain the fuse 14 in a disarmed position. The firing pin 20 is retained in a forward, disarmed position, against the action of the spring 22, by means of a safety pin 36 which bears against the outer side of the piston head 21 and which is provided with an enlarged threaded head 37 which engages a threaded opening 38, in plug 24, for detachably retaining the safety pin 36 in its operative position of Figure 4. Housing 15, as seen in Fig. 7, is provided with a transverse bore 39 having a restricted inner end which opens into the bore 19 and which slidably receives a pin 40, the inner end of which is adapted to extend into the bore 19. Pin 40 is provided with an enlarged head 41 that slidably engages the enlarged intermediate portion of the bore 39. The outer end of bore 39 is internally threaded to receive a threaded plug 42 which provides a seat or abutment for one end of an expansion coil spring 43, the opposite end of which bears against the head 41, for urging the pin 40 inwardly of the bore 19. When the carrier 27 is in its projected position of Fig. 7, pin 40 is held in the recess 31 by its spring 43 to thereby latch and retain the carrier 27 in its operative position.

Cover 12 is cup shaped and its open end is disposed in telescoping engagement with one end of the casing 11. A threaded stub shaft 44 projects axially from the opposite end of the casing 11 and has a collar 45 loosely mounted thereon. Collar 45 is provided with outwardly projecting ears 46 which are oppositely disposed and to which are connected corresponding ends of retaining straps 47. The opposite ends of the straps 47 are fastened by means of studs 48 to the cover 12 for retaining the cover in its applied position on the casing 11, as seen in Figure 1. Cover 12 forms an inclosure for a parachute 49 which is contained therein and which is connected by shroud lines 50 to the end of the casing 11 which extends into the cover 12. An expansion coil spring 51 is mounted on the stub shaft 44 and has one end bearing against casing 11 and its opposite end bearing against the collar 45 for urging the collar 45 away from the casing 11. An arming vane 52 is provided with a threaded opening through its hub 53 for threaded engagement with the stub shaft 44 and functions as a retaining nut for the collar 45 by bearing thereagainst to prevent the collar from being forced outwardly by the spring 51. The hub 53 is preferably split, as seen at 54, to allow

said hub to be spread for applying it to the stub shaft 44 so as to provide a sufficient frictional engagement between the hub and stub shaft to prevent the arming vane 52 from being unscrewed from the stub shaft 44 by the pressure of the expansion spring 51.

An expansible ring or band 55 is disposed around the intermediate portion of the casing 11 and over the fuses 14, contained therein. One end of the band 55, as best seen in Figs. 1 and 8, is provided with an elongated longitudinal disposed slot 56 and the other end of said band 55 is provided with an outturned tongue 57 for slidably engaging the slot 56, to permit the ring or band 55 to be expanded and contracted, as limited by the length of the slot 56. The band 55, adjacent its last mentioned end, is provided with integral ears 58 which project from the longitudinal edges of said last mentioned end and which are bent and disposed to engage around the first mentioned end to form a sliding engagement therewith, to retain the tongue 57 in engagement with the slot 56. Ring 55 is also provided with circumferentially spaced, circumferentially elongated openings 59 which loosely engage restricted outer ends 60 of the stems 26. The straps 47 engage the cylindrical wall of the casing 11 and are disposed on the outer side of the ring 55 for holding the ring 55 in its retracted position, as seen in Figure 1. When thus disposed, the ring 55 will function as a retaining ring, by engagement with the stems 26 to hold the firing pins in retracted, disarmed positions, as seen in Fig. 4. The ring 55 is also provided with a plurality of openings 61, each of which is disposed to register with an opening 38, to provide access to the heads 37 of the safety pins 36, for removing said safety pins.

Assuming the bomb 10 to be assembled, as shown in Fig. 1, the bomb is adapted to be dropped or launched from an airplane in any conventional manner and due to the fact that the explosive containing end is considerably heavier than the opposite end, said end will be the leading end during its descent. The blades of the arming vane 52 are pitched so that the air impinging thereon, during the descent of the bomb 10, will rotate the propeller 52 in a direction to unscrew it from the stub shaft 44. This will permit spring 51 to expand against the collar 45 to thereby rupture the straps 47, which are formed of a frangible material or which are weakened, as indicated at 62, above the studs 48 as seen in Figure 9, so as to tear out and become detached from the studs 48. When this occurs, the cover 12 is released and will be forced off of the upper end of the case 11 by the pressure of the air impinging thereon, to thereby release the parachute 49, which will open to arrest the descent of the bomb. Likewise, the rupturing of the straps 47 will release the expansible ring 55 which will thereupon be expanded by the pressure of the springs 22 exerted thereon through the stems 26, to move the ring 55 to its position of Figs. 2, 3, 5, and 6, and to permit the firing pins 20 to move outwardly to their armed positions as seen in Figs. 5 and 6. The firing pins 20 upon moving out of engagement with the recesses 30 will release the carriers 27 to allow the springs 35 to project the carriers 27 from their retracted positions, as illustrated in Fig. 4 to their projected positions, as illustrated in Figs. 5 and 7. This will move the percussion caps 29 into alignment with the bores 18 and firing pins 20 contained therein. As the carriers 27 move in-

wardly of the bores 19 the beveled surfaces 33 will engage and retract the pins 40 which will then move along grooves 32 and into recesses 31. It will therefore be obvious that an airplane striking any part of the ring 55 will force said part of the ring 55 toward the casing 11 to thereby force one or more of the firing pins 20 inwardly of its fuse housing 15 and against the action of its spring 22, to engage and explode its percussion cap 29. It will be obvious that the explosion of any one of the percussion caps 29 will be sufficient to detonate the charge 11' to thereby explode the bomb against the enemy airplane which strikes it. It will be understood that prior to launching the bomb 10, the safety pins 36 are removed so that the bomb will be armed at the predetermined time when the parachute 49 is released to partially arrest the descent of the bomb. The stub shaft 44 as seen in Fig. 1 can be suitably calibrated as indicated at 63 so that by varying the position of the arming vane 52, relatively thereto, the distance that the bomb 10 will drop before the arming vane 52 is unscrewed sufficiently to allow the strap 47 to be ruptured, may be varied, so that the bomb can be released at various elevations above the enemy aircraft, against which it is to function.

It will also be readily apparent that even though the bomb is not directly in the path of an enemy airplane the suction created by the propellers thereof will crease a sufficient pull on the parachute 49 to frequently pull the bomb 10 into engagement with some part of the airplane. The invention is especially adapted for use against concentrated attacks of enemy aircraft, such as a bombing attack on a city or strategic military objective where the airplanes, carrying out the bombing mission, are in great numbers and flying in close formation; and it will be apparent that a number of the bombs 10 released above such an attacking formation and adjusted to be armed at the elevation of the enemy airplanes, will be very effective in destroying a considerable number of the enemy aircraft and seriously interfering with the attack.

Various modifications and changes in the embodiments of the invention as disclosed are contemplated and may obviously be resorted to without departing from the spirit and scope of the invention as hereinafter defined by the appended claims.

I claim:

1. In an aerial bomb, a closed casing, a detachable cover adapted to form with said casing a closed chamber, a parachute in said chamber attached to said casing, an explosive charge in said casing, a plurality of fuzes within said casing, each operable to detonate said charge, each said fuze including a firing pin means projecting externally of said casing, an expansible ring member disposed about said casing and engaging all said firing pin means to retain the same in unarmed position when contracted and to permit movement of all said firing pin means to armed position when expanded, releasable means holding said casing and cover in assembled relation and said ring member in contracted position, and means responsive to motion of said bomb through the air to release said releasable means.

2. In an aerial bomb, a casing containing an explosive charge, a plurality of fuzes in said casing, each said fuze being operable to detonate said charge and comprising a firing pin means movable from a first unarmed position to a second armed position, means urging said firing pin means to said second position, expansible ring means carried by and externally of said casing and, when contracted, engaging all said firing pin means to hold the same in said first position, a parachute attached to said casing, releasable means simultaneously holding said ring means in contracted position and said parachute in collapsed condition, and means responsive to movement of said bomb through the air to release said releasable means.

3. In an aerial bomb, a casing, an explosive charge in said casing, a plurality of fuzes in said casing each said fuze including a firing pin accessible through the wall of said casing and movable from a first unarmed position to a second armed position, means urging each firing pin into second position, an expansible ring means carried by and encircling said casing externally thereof and, when contracted, engaging and holding all said firing pins in said first position, and means releasable in response to passage of said bomb through the air to permit expansion of said ring and consequent movement of said firing pins to second position.

4. An aerial bomb comprising a generally cylindrical casing, an explosive charge in said casing, a plurality of fuzes in said casing, each operable to detonate said charge, each fuze including a firing pin extending radially and exteriorly of said casing through the wall thereof, said firing pins being substantially equally angularly spaced about said casing in a plane normal to the axis of said casing, means urging each said pin radially outwardly from a first unarmed position to a second armed position, an expansible ring surrounding said casing and engaging the ends of said pins, and releasable means holding said ring in contracted condition to thereby maintain said pins in first position.

5. An aerial bomb as recited in claim 4, a cover fitting over one end of said casing and forming with said end a closed chamber, a parachute attached to said casing and housed within said chamber, said releasable means acting to releasably secure said cover in chamber-forming relation with said casing.

6. An aerial bomb as recited in claim 5, said releasable means comprising strap means securing said casing and cover in assembled relation, a propeller rotatably carried by said casing, and means responsive to a predetermined number of rotations of said propeller to release said strap means and thereby release said cover from said casing and permit said ring to expand and arm said fuzes.

RICHARD L. KINION.

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