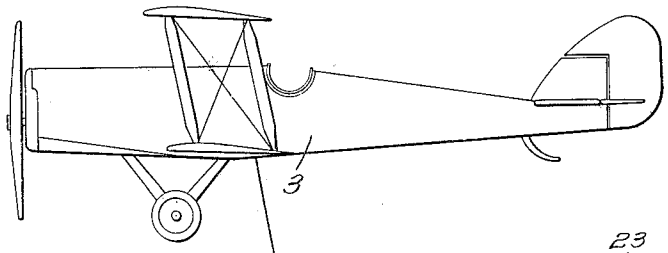
April 3, 1934. C. W. BURGER 1,953,071

AIRCRAFT ANTENNA WEIGHT

Filed Aug. 28, 1931 2 Sheets-Sheet 1

Fig. 1.



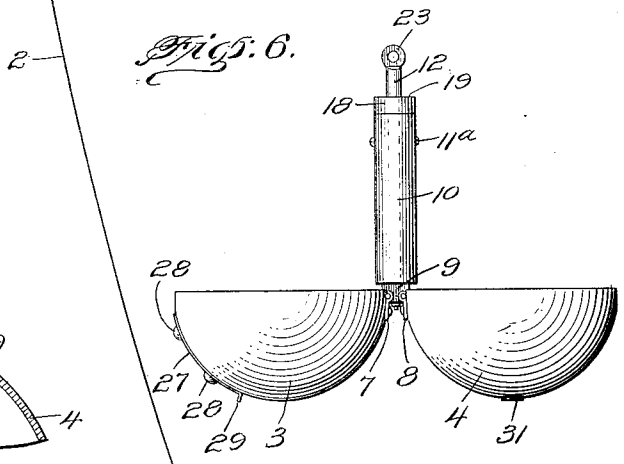


Fig. 7.

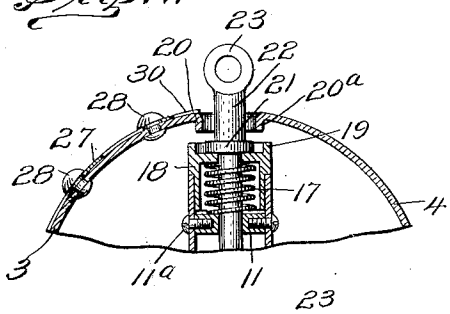


Fig. 2.

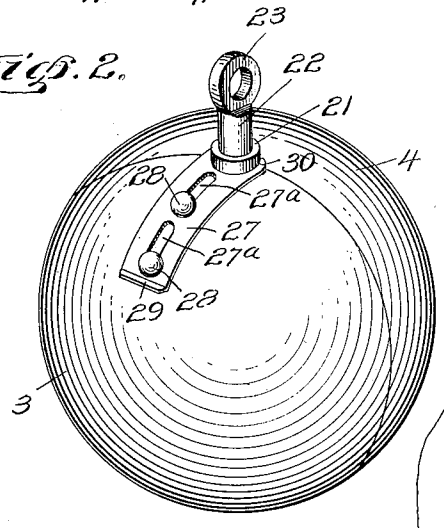
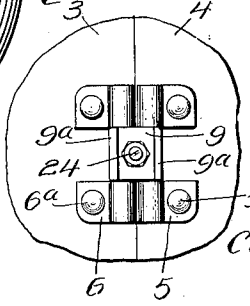
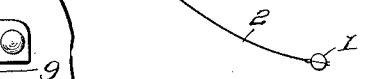


Fig. 8.





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April 3, 1934. C. W. BURGER 1,953,071

AIRCRAFT ANTENNA WEIGHT

Filed Aug. 28, 1931 2 Sheets-Sheet 2

Fig. 3.

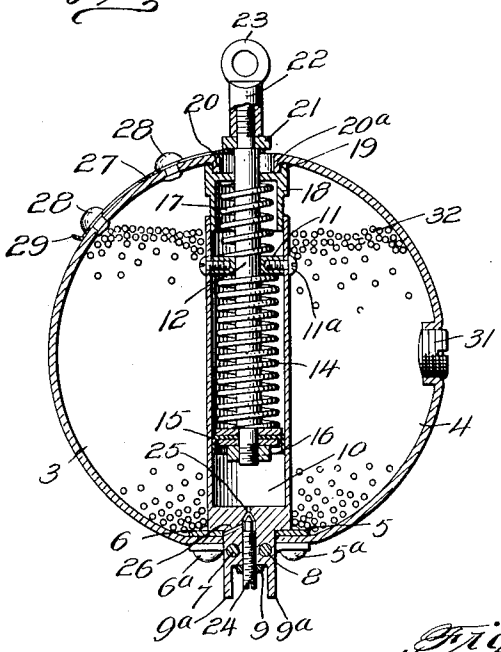


Fig. 4.

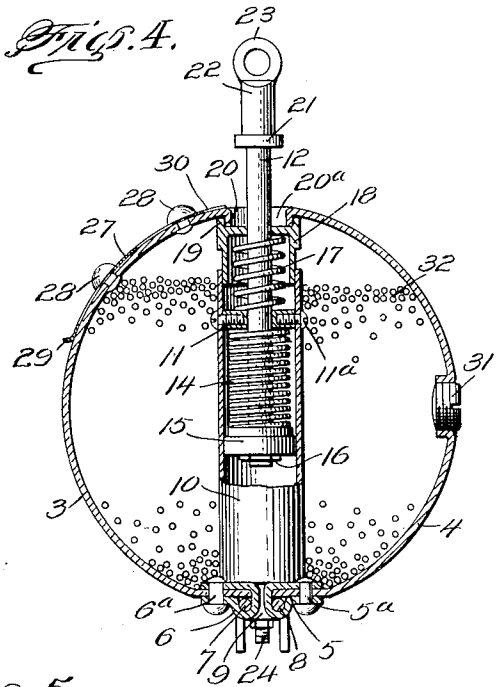
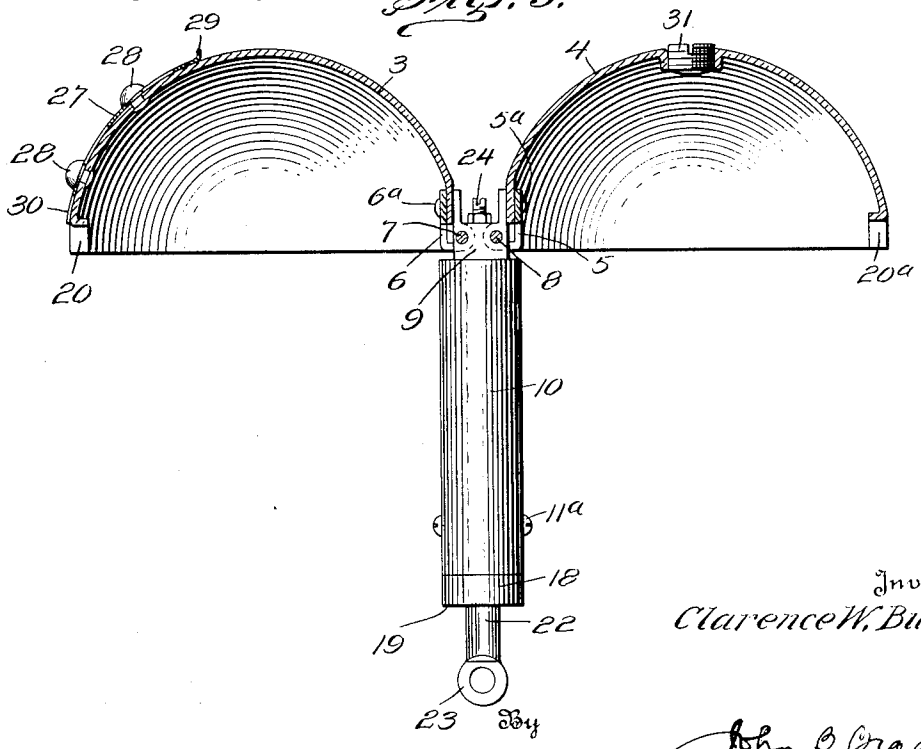


Fig. 5.



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UNITED STATES PATENT OFFICE

1,953,071

AIRCRAFT ANTENNA WEIGHT

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Application August 28, 1931, Serial No. 560,040

15 Claims. (Cl. 250—33)

My invention relates broadly to radio signaling and more particularly to a construction of antenna weight for the trailing wire antenna of an aircraft.

One of the objects of my invention is to provide a construction of antenna weight which is compact in construction and which includes means for predetermining the time of operation of the parts of the antenna weight in the event of accidental breakage of the antenna wire and the release of the antenna weight from the trailing wire antenna.

Another object of my invention is to provide an antenna weight for a trailing wire antenna having a construction of shell which is adapted to automatically open after a predetermined time interval subsequent to the severance of the antenna wire for forming a parachute and controlling the gravitation of parts of the weight.

A still further object of my invention is to provide an improved construction of antenna weight for the trailing wire antenna for aircraft having a pair of separable parts arranged to enclose a latching mechanism for normally maintaining the separable parts in closed position for enclosing a separable load within the parts of the casing, the latching mechanism having time delay means associated therewith for predetermining the time of operation of the device in the event of release of the trailing wire antenna to which it is connected for enabling the device to gravitate in a position permitting the parts thereof to separate for discharge of the load and enabling the subsequent gravitation of the device with the parts thereof serving as a parachute.

Other and further objects of my invention reside in the arrangement of safety locking means for the parts of the antenna weight for maintaining the parts in locked position until the device is placed into actual service preparatory to the lowering of the trailing wire antenna as will be set forth more fully in the specification hereinafter following by reference to the accompanying drawings wherein:

Figure 1 is a schematic view showing an aircraft equipped with an antenna weight on the end of a trailing wire antenna in accordance with my invention; Fig. 2 is a perspective view of the antenna weight of my invention with the safety lock applied thereto; Fig. 3 is a cross-sectional view taken through the antenna weight of my invention and illustrating the time delay means therein for controlling the time of opening of the separable parts forming the casing for the antenna weight; Fig. 4 is a cross-sectional view taken through the antenna weight and showing the separable parts of the casing for the weight locked under the tension exerted by the trailing wire antenna; Fig. 5 is a view showing the parts of the casing of the antenna weight open for the discharge of the load therein with the parts of the casing serving as a parachute for controlling the descent of the parts of the antenna weight; Fig. 6 is a view showing the position of the separable parts of the casing immediately after the release of the latching mechanism and at the time of discharge of the load from the parts of the casing and just prior to the gravitation of the device into the position illustrated in Fig. 5 for controlling the descent of the device by the parachute effect of the separable parts of the casing; Fig. 7 is a fragmentary cross-sectional view of the latching mechanism illustrating the position thereof at the time of severance of the trailing wire antenna preparatory to the opening of the parts of the casing; and Fig. 8 is a detail view of the hinged connection between the parts of the casing illustrating the adjusting valve for controlling the time of operation of the unlatching mechanism.

My invention is directed to an improved antenna weight or fish which is connected to the end of a trailing wire antenna used in aircraft radio communication. The casing constituting the weight is constructed of separable parts which are normally maintained in closed position under action of the tension which is exerted by the trailing wire antenna suspended from the aircraft. The casing is formed by two semispherical closure members which are hingedly connected at their lower edges. A cylinder extends diametrically through the interior of the casing and is divided into a pair of axially aligned sections. A piston is arranged for longitudinal operation in the cylinder under tension of a spring device in one of the sections of the cylinder. The end of the cylinder serves as a guide for an annular locking device which is spring pressed with respect to the other section of the cylinder. The separable parts of the casing are each provided with inwardly directed flanged edges which may be locked adjacent each other by the movement of the annular locking device into engagement with the flanges formed on the separable parts of the casing. The parts of the casing when engaged in position form a hollow ball which receives a mass of shot or other weighted material which is filled in around the diametrically extending cylinder within the casing. So long as the tension on the trailing wire antenna exists due to the pull of the trailing antenna as it depends from the aircraft, the annular locking device engages the flanges formed on the separable parts of the casing and maintains the parts in closed position. Upon release of the tension exerted by the trailing wire antenna which may occur due to the accidental severing of the antenna wire, the annular locking device is drawn inwardly under action of the resilient means within the diametrically extending cylinder, thereby releasing

the parts of the casing during a time interval determined by the movement of the operating piston in the diametrically extending cylinder allowing the load or weighted mass to be scattered from the casing as the parts of the casing separate, and enabling the parts of the casing to gravitationally assume a position of descent in which they serve as a parachute for controlling the rate of descent of the parts of the casing. I provide a safety latch mechanism for preventing opening of the parts of the casing until the device is placed into service. The casing may be filled with shot through a port in one side of the casing when the parts of the casing have been locked in closed position. The rate of opening of the parts of the casing after release may be controlled by adjustment of an air valve from the exterior of the casing.

Referring to the drawings in detail the manner of connecting the weighted ball of my invention to the trailing wire antenna on an aircraft is illustrated in Fig. 1 wherein the weighted ball is shown by reference character 1 connected to the end of trailing wire antenna 2 suspended from aircraft 3. As represented in Fig. 2 the weighted ball comprises separable semispherical sections 3 and 4. The separable sections have hinge members 5 and 6 interconnecting adjacent edges of the semispherical casings. The hinge members 5 and 6 are riveted at 5*a* and 6*a* to the parts of the casing. The diametrically extending cylinder is shown at 10 terminating in an end portion 9 which serves to receive pin members 7 and 8 which extend through the end portion 9 of the cylinder for establishing the hinged connection with separable parts 3 and 4. The end portion of the cylinder 10 is provided with air passages 25 and 26 extending therethrough, the rate of passage of the air through the air passages being controlled by means of needle valve 24. The end of the needle valve is adjustable from the exterior of the weighted ball for determining the rate of passage of air through the ports 25 and 26. The end of the needle valve 24 is protected by means of side portions 9[a] on the end 9 of the cylinder 10.

The cylinder 10 is divided into a pair of axially aligned sections by means of partition member 11 secured in position by screws 11*a*. The piston rod 12 extends axially through the cylinder 10 and through the partition plate 11 and has a piston 15 secured on the end thereof by means of nut 16. An expansion spring 14 of coiled form is centrally arranged around the piston rod 12 between lateral partition 11 and the rear of the piston 15 and tends to continuously thrust the piston 15 toward the lower end of the cylinder 10. The upper portion of cylinder 10 on the other side of partition 11 serves as a housing for coil spring 17 which acts against partition 11 and tends to continuously thrust the annular locking head 18 upwardly. The annular locking head 18 has an upstanding annular peripheral edge 19 thereon which serves to interlock the depending flange portions 20 and 20*a* of the separable parts 3 and 4 as shown for maintaining the ball in closed position.

The depending flanges 20 and 20*a* are semicircular in shape and are arranged to be engaged by the annular rim 19 of the locking head 18 for maintaining the two semi-circular spherical portions 3 and 4 in locked position. The plunger rod 12 extends through coil spring 17 and through the central aperture in the top of the head 18 and is provided with an annular flange 21 disposed beneath the headed end 22. The headed end 22 is screw threaded over the end of plunger 12 and is provided with an eyelet 23 which is engaged by one end of the trailing wire antenna 2. When the trailing wire antenna is in use, the tension exerted upon rod member 12 is such that the headed end 18 engages the depending flange portions 20 and 20*a*. In order to lock the parts of the casing against separation I provide the shiftable strip member 27 on the semi-spherical side 3 of the casing. The strip member 27 is longitudinally slotted at 27*a* and is adapted to slide circumferentially of the casing 3 under the rivet heads 28 by a control force applied to the upstanding tongue 29. The extremity of strip 27 is forked as represented at 30 enabling the forked portion of the strip 27 to be slipped beneath flange 21, thereby maintaining the tension of spring 17 beneath annular locking member 18 and confining the depending flanges 20 and 20*a* in position. When the slidable strip 27 is moved into interlocking position the weighted ball may be readily packed for shipment and unpacked and installed on a plane without danger of the parts of the casing separating. As soon as the weighted ball has been installed on the aircraft the strip 27 is shifted downwardly, thus withdrawing the forked portion 30 from beneath the flange 21. As soon as the weighted ball is suspended under its own weight from the antenna wire and ready to be dropped down from the aircraft, the locking head 18 is subjected to continued tension for engaging beneath the annular flanges 20 and 20*a*. The casing is filled with shot or other weighted mass which I have designated generally at 32. The tension on the rod 12 is continuous as the antenna wire depends downwardly beneath the aircraft, thus compressing spring 14 and allowing spring 17 to be expanded under its own force between partition plate 11 and the under surface of the locking head 18 as shown in Fig. 4. However upon the accidental severance of the antenna wire 2 or the release of the weighted ball from the antenna wire 2, the spring 14 draws the rod 12 inwardly thereby enabling the flange 21 to contact with the upper portion of locking head 18 and shifting the locking head 18 out of engagement with the depending flanges 7, thus allowing the casings 3 and 4 to be opened as illustrated in Fig. 6 and the shot or load scattered therefrom. The arrangement of the central cylinder 10 is such as to shift the weight in its open position to the parachute position illustrated by Fig. 5 for controlling the descent of the parts of the weight when in open form. The spherical parts of the casing at 3 and 4 are limited in their open position by stops formed by the side extensions 9*a* on the end 9 of the cylinder 10. The spherical parts 3 and 4 are prevented from further movement beyond a horizontal position by the abutment of the side portions of the parts 3 and 4 against the side extensions 9*a*. This arrangement enables the parts of the casing, when opened, to be maintained in a horizontal position for facilitating the descent of the casing as a parachute.

The rate of opening of the parts of the weight is controlled by the adjustment of the needle valve 24 which is adjusted to control the size of the air port through the passage 25 and port 26. By adjusting the needle valve 24 toward the passage 25 the time of opening of the parts may be lengthened; by adjusting the needle valve 24 away from the passage 25 the time of opening of the parts may be enlarged.

The load or shot 32 is deposited into the ball through the port 31 having a removable plug therein. Inasmuch as the shot or load is scattered broadcast in the event of accident by severance of the antenna wire or loss of the antenna weight in mid-air, the effect of the falling weight as a dangerous missile is greatly reduced. The lighter weight parts constituted by the aluminum casing and the time controlled actuating mechanism may gravitate independent of the weighted filler which has scattered from the casing and thereby reduce the danger which would otherwise exist from the impact of the loaded weight falling from a great height. Inasmuch as the parts of the casing of the weight serve as a parachute, it is not necessary to provide a separate parachute which would normally occupy an undesirable amount of space within the casing.

I have found the construction of my invention very practical in its assembly, manufacture and operation, and while I have described one of the preferred embodiments of my invention I desire that it be understood that modifications may be made and that no limitations upon my invention are intended other than are imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. An antenna weight comprising a spherical casing having separable parts, means connecting said casing with a trailing wire aircraft antenna, means for effecting the separation of the parts of said casing upon release of said antenna weight from the trailing wire antenna, and means for predetermining the time of operation of said last mentioned means.

2. An antenna weight for aircraft antenna comprising a pair of semi-spherical separable casings, a pneumatic cylinder extending diametrically through said casings, a piston operative in said pneumatic cylinder, a piston rod connected with said piston, means for establishing connection between said piston rod and a trailing antenna wire on aircraft, means controlled by the tensioning of said piston rod under control of the antenna wire for effecting a locking of the separable parts of said casing under control of said pneumatic device, and means for unlocking said separable parts on release of tension on said piston rod.

3. An antenna weight comprising a pair of hinged parts constituting an enclosing casing, a cylinder extending diametrically through said casing coincident with the plane of division thereof, a piston operative in said cylinder, a piston rod connected with said piston, means for establishing connection with the projecting end of said piston rod and a trailing wire antenna, means actuated by the pull of said trailing wire antenna for tensioning said piston rod for maintaining the parts of said casing in closed relation, and means operative after the lapse of a predetermined time subsequent to the release of tension on said piston rod for effecting the opening of said parts and producing a parachute by the open interior thereof for floating said weight to earth.

4. An antenna weight comprising a pair of enclosing casings adapted to support a weighted mass when closed and to operate as a parachute when open, a cylinder extending diametrically through said casings, a piston movable within said cylinder, a piston rod connected with said piston and projecting beyond the limits of said casings for establishing connection with a trailing wire antenna, spring means surrounding said piston rod, and means operative under control of said spring means for interlocking said casings in closed position while said piston rod is subjected to tension under control of said trailing wire antenna and effecting disengagement of said casings for discharging the weighted mass therefrom and gravitating said casings as a parachute when the tension of said trailing wire antenna is removed from said piston rod.

5. An antenna weight comprising a pair of enclosing casings adapted to support a load and to operate as a parachute, tensioning means interconnecting said weight with a trailing wire antenna for maintaining said pair of casings in engagement for supporting the load so long as said trailing wire antenna maintains said means under tension, and a timing device for predetemining the time of separation of said casings for discharging the load and floating the casings downwardly as a parachute upon severance of the antenna wire.

6. An antenna weight comprising a pair of enclosing casings adapted to support a load when the antenna weight is normally connected to the trailing wire antenna of an aircraft and to operate as a parachute when the antenna wire is severed and the load discharged from said casings, a cylindrical member extending diametrically through said casings, a piston rod operative through said cylindrical member and connected with the trailing wire antenna, a locking device operated by said piston rod for normally maintaining said pair of casings in locked engagement, and spring means in said cylindrical member for disengaging said locking means from said pair of casings when the tension on said trailing wire antenna is removed for effecting an opening of said casings for discharging the load and floating the parts of said casings downward under the action of gravity.

7. An antenna weight connected to the trailing wire antenna of an aircraft comprising a pair of separable casings, said casings being hinged at one edge and having inwardly projecting aligned flanges at their adjacent edges, a spring device disposed within said casings, an actuator controlled by said spring device and normally pressed into engagement with said inwardly projecting aligned flanges for locking said casings when said spring device is subjected to the normal tensioning existing under the strain of the weight when trailing on the end of the antenna wire, and means for opposing the operation of said spring device for a predetermined time interval after the tensioning of the antenna wire is removed from said weight.

8. An antenna weight comprising a pair of hingedly connected enclosing casings, each having an aligned semicircular aperture in adjacent abutting edges, inwardly directed aligned flanges adjacent the apertures in said casings, a locking device extending diametrically of said casings and including a spring pressed member engageable with the inwardly directed flanges on said casings, means for maintaining said spring pressed member in engagement with the parts of said casings while said weight is connected with a trailing wire aircraft antenna, spring means for shifting said locking device out of engagement with the flanges on said casings after severance of the trailing wire antenna, and pneumatic means for adjusting the period of operation of said spring means for effecting the opening of said casings.

9. An antenna weight comprising a pair of hingedly connected enclosing casings, each hav-

ing an aligned semicircular aperture in adjacent abutting edges, inwardly directed flanges adjacent the apertures in said casings, a locking device extending diametrically of said casings and including a spring pressed member engageable with the inwardly directed flanges on said casings, means for maintaining said spring pressed member in engagement with the parts of said casings while said weight is connected with a trailing wire aircraft antenna, and time delay means operative at a given time interval subsequent to the severance of the trailing wire antenna for disengaging said spring pressed member from said casings, for effecting opening of said casings, for scattering the weighted mass therein and allowing the parts of said casings to assume the position of a parachute for gravitating the parts to ground.

10. An antenna weight comprising a pair of hingedly connected separable casings adapted to enclose a weighted mass, a pneumatic cylinder extending diametrically through said casings, a piston operative within said pneumatic cylinder, a piston rod connected with said piston, a partition member in said cylinder through which said piston rod extends, a locking device slidably engaging the upper end of said cylinder on one side of said partition member, said locking device being adapted to engage said casings for maintaining said casings in closed position so long as said piston rod is tensioned by the connection of a trailing wire antenna thereto, a coil spring disposed between the rear of said piston and said partition member for opposing the tension of the trailing wire antenna on said piston rod, a coil spring between said partition and said locking device, said first mentioned coil spring operating to overcome the tension of said second mentioned coil spring for releasing said locking device a predetermined time interval after severance of the connection between the trailing wire antenna and said piston rod.

11. An antenna weight comprising a pair of separable casings, a pneumatic cylinder extending diametrically of said casings, means adjacent one end of said pneumatic cylinder for hingedly connecting said casings, means adjacent the other end of said cylinder for interlocking said casings in a position for enclosing a weighted mass, tension means extending through said pneumatic cylinder and projecting beyond the limits of said casings for establishing connection with a trailing wire antenna for an aircraft, means for actuating said tension means a predetermined time after severance of the trailing wire antenna for unlatching said casings and scattering the weighted mass therein and enabling the parts of said casings to gravitate to earth in the form of a parachute.

12. An antenna weight comprising a pair of separable casings adapted to enclose a weighted mass, a pneumatic cylinder extending diametrically through said casings, means on one end of said cylinder for establishing a hinged connection with said casings, a locking device on the other end of said cylinder for locking said casings in position, a piston operative in said pneumatic cylinder, a rod member connected with said piston and projecting beyond the limits of said casings for establishing a connection with a trailing wire antenna, spring means in said pneumatic cylinder for controlling said locking device and normally maintaining said casings in locked engagement so long as the tension on said trailing wire antenna is maintained, said piston operating in said pneumatic cylinder for shifting said locking device out of engagement with said casings a predetermined time interval after severance of said antenna wire for opening said casings, distributing the weighted mass therein and enabling the said casings to gravitate to earth as a parachute.

13. An antenna weight comprising a pair of separable casings adapted to enclose a weighted mass, a cylinder extending diametrically through said casings, means on one end of said cylinder for establishing a hinged connection with said casings, a locking device on the other end of said cylinder for locking said casings in position, a piston operative in said cylinder, a rod member connected with said piston and projecting beyond the limits of said casings for establishing a connection with a trailing wire antenna, spring means in said cylinder for normally maintaining said casings in locked engagement so long as the tension on said trailing wire antenna is maintained, and means in said cylinder for shifting said locking device out of engagement with said casings upon severance of said antenna wire for opening said casings, distributing the weighted mass therein, and means on the end of said cylinder to which said casings are hingedly connected for maintaining said casings in horizontal position for facilitating the descent thereof as a parachute.

14. An antenna weight comprising a pair of separable casings adapted to enclose a weighted mass, a cylinder extending diametrically through said casings, hinged connections between one end of said cylinder and said casings, a locking device carried by the other end of said cylinder for locking said casings in closed position, an air valve disposed in said first mentioned end of said cylinder, a piston movable in said cylinder over a predetermined time interval, a rod member connected with said piston and extending through said cylinder beyond the limits of said casings for establishing a connection with the trailing wire antenna of an aircraft, a partition member in said cylinder, a coil spring disposed on either side of said partition member, one of said coil springs exerting pressure on said piston opposing the tension of the trailing wire antenna and the other of said springs exerting pressure upon said locking device for maintaining said locking device in engagement with the parts of said casings so long as the trailing wire antenna exerts tension on said rod member, said first mentioned coil spring operating to shift said rod member for moving said locking device and releasing said casings at a predetermined time interval after the severance of said antenna wire controllable by the movement of said piston.

15. An antenna weight comprising a pair of hingedly connected separable casings, a cylinder extending diametrically through said casings, a rod member disposed axially of said cylinder, a locking device controlled by said rod member for engaging the said casings and maintaining said casing in closed position when the tensioning of a trailing wire antenna is maintained on said rod member, a latching device exterior of said casings for engaging said rod member and simulating the condition of tension which exists when said weight is connected with the trailing wire antenna, said latching member being shiftable out of position when said rod member is subjected to the tension of the trailing wire antenna.

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