May 27, 1958 W. SHOFI 2,836,143

DISTRESS SIGNAL DISCHARGE DEVICE

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Fig. 1

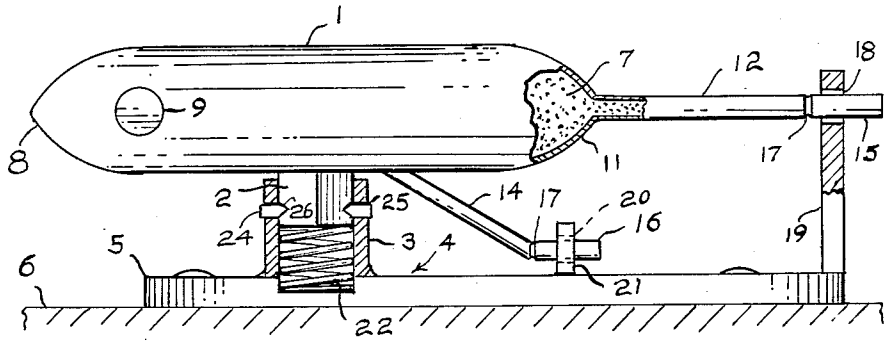


Fig. 2

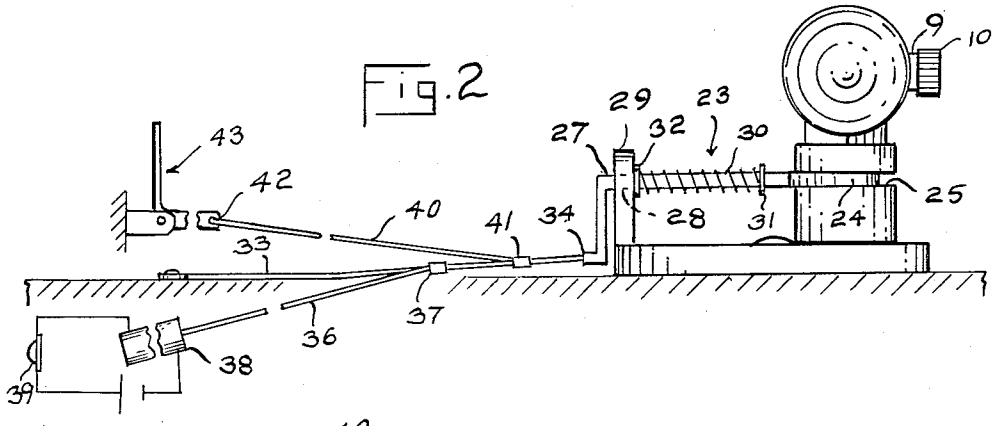
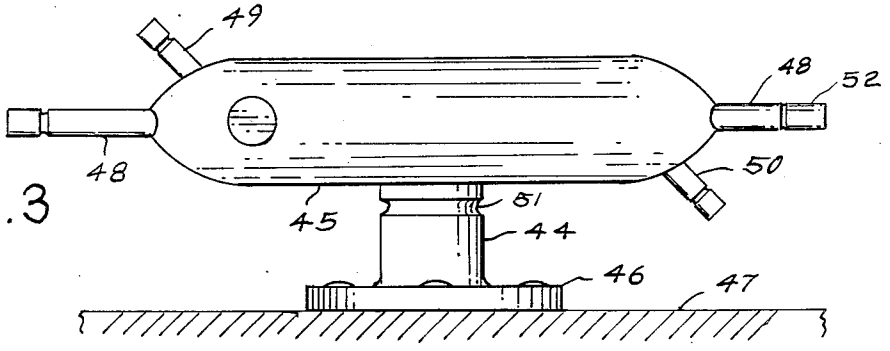


Fig. 3



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DISTRESS SIGNAL DISCHARGE DEVICE

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11 Claims. (Cl. 116—124)

This invention relates to new and useful improvements in distress signal discharge devices; and it has for its general object the provision of an improved and practical device of this nature that is particularly suited for use with aircraft.

Another object of this invention is to provide a distress signal discharge device which is adapted to be carried upon the surface of a plane, and which may be caused either at the will of the pilot when a crash is imminent, or automatically when a crash occurs to discharge and spread about the area of the wreckage a bright and long lasting signal which will be visible from the ground and sky. This signal will be visible whether the plane has fallen in dense growth, a deep ravine, or in mountainous area.

A further object of this invention is to provide an improved, practical, and efficient device of the foregoing type.

A still further object is to provide a device which will discharge over a wide area and coat the area with a luminous distress signal that will be visible night and day from the ground and sky.

The invention further lies in the particular construction and arrangement of its various components and in their cooperative association with one another to effect the results intended herein.

The foregoing and other objects and advantages of the invention will appear more fully hereinafter from a consideration of the detailed description which follows, taken together with the accompanying drawings, wherein an embodiment of the invention is illustrated. It is to be expressly understood, however, that the drawings are for purposes of illustration and description and are not to be construed as defining the limits of the invention.

In the drawings:

Fig. 1 is a side elevational view of a distress signal discharge device embodying the invention, and illustrated as affixed to the surface of a wing of a plane;

Fig. 2 is a front elevational view of Fig. 1; and

Fig. 3 is a modified form of the invention in side elevation.

In describing the invention in further detail reference is directed to the several drawings, and now especially to Figs. 1 and 2. In the latter drawings there is shown a shell 1 having an integral male member 2 depending centrally from its underside and slidably received in an upright socket portion 3 of a mounting bracket 4. The socket portion is unitary with a mounting plate 5 which is fastened to a support 6, here illustrated as the wing surface of a plane, though it may well be mounted elsewhere on the plane's surface. The male member 2 is non-circular or square in cross section and the recess of the socket in which it is engaged is of complementary formation, so as to prevent turning of the shell relative to the mounting bracket.

The shell is filled with a pressurized mixture 7 of a quantity of brightly colored fluid matter and a gas. The shell is desirably cigar-like or streamlined, having an elongated cylindrical body which tapers conically at both ends. At the side of the shell, adjacent to the nose end 8 is a boss or neck 9 which opens to the outside and is fitted with a suitable check valve, not shown, enabling one way admission of the mixture 7 into the shell. After the shell has been filled, the neck 9 is closed over by a cap 10 which is hermetically sealed thereon.

Projecting axially from the tail end 11 of the shell is a tube 12 for discharging the contents of the shell. A similar tube 14 extends downwardly and rearwardly from the underside of the shell. The tubes are sealed at their outer ends and open out at their opposite ends into the shell. The tubes respectively have end portions 15 and 16 which extend beyond peripheral grooves or weak spots 17 and are adapted upon the application of pressure thereto to shear off at the weak spots. The end portion 15 extends freely through a hole 18 of slightly larger diameter formed in an upright standard 19 carried by the mounting bracket. The end portion 16 of tube 14 extends through a similar hole 20 formed in another standard 21 of the mounting bracket. It can be seen that when the male member 2 is removed from its socket and the shell is thrust upwards that the end portions 15 and 16 of the discharge tubes will be caught in the holes of their standards and will be sheared off, whereupon the contents of the shell will forcefully under its pressure escape through the tubes.

Compressed in the recess of the socket member 3 of the mounting bracket is a strong coil spring 22 below the end of the male element 2. A horizontally disposed yoke member 23 has a pair of arms 24 which extend about opposite sides of the socket portion 3. The arms are relatively broad and are slidably received in part in opposed circumferential slots 25 formed in the socket, and in part in opposed slots 26 of the male member brought into register with slots 25, whereby the male member is locked in its socket and prevented from being thrust outwardly by the coil spring pressed below. The yoke has an elongated stem 27 slidably extending through a hole 28 in an upright portion 29 of the mounting bracket. A coil spring 30 compressed between an abutment 31 on the stem 27 and a slide washer 32 urges the yoke so as to maintain its arms engaged in the slots 25, 26 and to prevent them from sliding free in response to normal vibrations of the plane.

The arms of the yoke member may be withdrawn or slid out of the slots 25, 26 so as to release the male element 2 and as a consequence the shell 1 from the mounting bracket, by simply pulling on the stem of the yoke in an outward direction. When this is effected, the coil spring 22 forcefully expands and violently tosses the shell into the air. As the latter occurs, the tail portions 15 and 16 of the discharge tubes shear off.

Release of the shell may be effected at will by the pilot, or automatically. To this end, a main draw wire 33 is anchored at one end to a terminous 34 of the yoke member and is anchored at the other end to the plane's surface, desirably several feet distant from the mounting bracket. When the draw wire is voluntarily pulled or acted upon so as to pull it in a direction away from the mounting bracket, the yoke member will be pulled free of the slots 25, 26. The draw wire may be acted upon so as to effect an automatic release of the yoke member as when the draw wire strikes a tree crosswise thereof, or when it encounters some other obstacle, or when the wing structure on which it is mounted ruptures during a plane crash.

In the event of an imminent crash, the pilot may voluntarily cause the release of the shell by pulling the main draw wire. He may do this either through elec-

trically operated means or through manually operated means.

With respect to the electrically operated means, a second draw wire **36** is anchored at one end intermediately of the main draw wire, as at **37**, and is attached at the other end to the slug of a solenoid device **38**. The circuit for energizing the solenoid so as to cause the slug thereof to pull the main draw wire through the second draw wire is controllable by a push button contact **39** which may be located in the cabin of the plane.

The manually operable control for effecting release of the shell from the mounting bracket is provided as a safety measure. It comprises a third draw wire **40** fixed at one end **41** intermediately of the main draw wire and connected at the other end **42** to manually operable leverage means **43** supported in the cabin of the plane.

By the foregoing arrangement it can be seen that the main draw wire **33** may be actuated to effect release of the shell either automatically as during a crash, electrically by means of the solenoid control, or manually by means of the leverage means.

The structure of the shell **1** including the discharge tubes **12** and **14**, as well as the male element **2** are formed of lightweight material, desirably plastics. The lightweight structure of these elements enables the shell to be tossed to a higher degree in the air upon release.

It is desired that the colored fluid matter pressurized by the gas within the shell have luminous or fluorescent characteristics. Here, it is a fluorescent paint of lightweight density and containing luminous ingredients, such as phosphor powders. It is preferably of a bright color, such as red or yellow. It is of course understood that the mixture is non-flammable.

The device described together with its particular structural arrangement has many desirable advantages. When the yoke member has been withdrawn and the coil spring **22** reacts in response thereto, the shell is projected upwards clear of the socket and the ends of the discharge tubes **12** and **14** are sheared off. Whereupon the pressurized contents **7** of the shell issues forecfully in a jet or stream from the tubes. The tail tube **12** discharge provides an axial thrust to the shell, the discharge from the tube **14** provides an upward thrust, and the imbalance provided by the laterally extending filler neck **9** of the shell tends in reaction to the foregoing thrusts to provide an angular movement of the shell. The result is that the shell moves or is driven by the discharges forcefully and erratically about, whereby the contents of the shell is discharged over a wide area about the wreckage of the plane. The fluid or paint portion of the contents of the shell adheres to and coats the wreckage, nearby leaves and foliage of trees and shrubs, rocks, and in general the terrain about the wrecked plane. The luminous characteristics of the discharged matter makes it visible far and wide from the ground and sky, day and night, and especially so under a bright sky.

While but two discharge tubes **12** and **14** have been provided, it is clear that their number and location may be varied as desired. It is also understood that other fluid matter may be used in lieu of the paint, for example, fine anhydrous or dry grains of luminous powders, such as the phosphor powders, and that such may be pressurized in the container in mixture with a suitable gas. It is also understood that a plurality of discharge devices as shown in Fig. 1 may be located at various points of advantage about the surface of the plane.

In Fig. 3 a modified form of the invention is shown. Here, a support **44** depending centrally and integrally from the underside of the shell **45** is unitary at its bottom end with a mounting plate **46** which is fastened to the wing structure **47** or other structure of the plane. Extending axially from opposite ends of the shell are discharge tubes **48**. Projecting forwardly from the upper portion of the nose end of the shell is a further discharge tube **49**, and extending in an opposite direction from the underside portion of the tail end of the shell is another discharge tube **50**. The entire structure is formed of lightweight material, preferably plastics. The depending support **44** has a weak or shear off point provided by a peripheral groove **51**, so that upon impact, such as may be provided by a crash, the shell will shear off from the support at this point. The discharge tubes are, like those in Fig. 1, provided with end portions **52** adapted to shear off when violently struck such as may occur upon impact with an obstacle during a crash. It is evident that during a plane crash that one or more of the terminal ends of the discharge tubes will shear off and the contents of the shell will issue therefrom to coat the surrounding area. It is understood that the number of discharge tubes to be carried by the shell may be varied and their location selected as desired.

It is to be understood that a plane may carry on its surface several of the devices in Fig. 1, or several of those in Fig. 3, or several of each type.

While an embodiment of the invention has been illustrated and described in detail, it is to be expressly understood that the invention is not limited thereto. Various changes can be made in the design and arrangement of the parts without departing from the spirit of the invention as the same will now be understood by those skilled in the art, and it is my intent, therefore, to claim the invention not only as shown and described herein but also in all such forms and modifiaction thereof as may be reasonably construed to fall within the spirit of the invention and the scope of the appended claims.

What I claim is:

1. A distress signal discharge device in combination with a supporting outer surface of an aircraft, comprising a mount fixed to the said surface and having an upwardly extending portion, a shell engaged to the said portion, the shell containing a pressurized mixture of a gas and a brightly colored fluid material, and the shell having one or more rupturable discharge tubes projecting therefrom, whereby upon rupture thereof the pressurized contents of the shell is adapted to forcefully issue from the ruptured tubes, wherein the upwardly extending portion of the mount is a socket and the shell has a depending male portion releasably engaged in the socket.

2. A distress signal discharge device in combination with a supporting outer surface of an aircraft, comprising a mount fixed to the said surface and having an upwardly extending portion, a shell engaged to the said portion, the shell containing a pressurized mixture of a gas and a brightly colored fluid material, and the shell having one or more rupturable discharge tubes projecting therefrom, whereby upon rupture thereof the pressurized contents of the shell is adapted to forcefully issue from the ruptured tubes, wherein the upwardly extending portion of the mount is a socket, the shell has a depending male member slidably received in the socket, releasable means is provided locking the socket to the male member, and resilient means is compressed in the socket below the end of the male member, the resilient means being expandable upon release of the means locking the socket and male members to project the male member from the socket.

3. A device as defined in claim 2, wherein a standard extends upright from the mount and has a hole therethrough, one of the rupturable tubes has an end portion extending into this hole, the end portion having a shear-off weak spot located in the tube adjacent said standard, whereby upon projection of the male member from the socket by the resilient means the associated shell and tubes rise with the male member and said end portion of the said one tube is caused to shear off as it lifts relative to the standard.

4. A device as defined in claim 3, wherein a second one of said tubes has an end portion extending into a hole of a second standard, and the said end portion is

adapted to shear off upon lifting of the shell and the said second tube relative to this second standard.

5. A device as defined in claim 4, wherein the tube extending through the hole of the first standard projects axially from the tail end of the shell, and wherein the tube extending into the hole of the second standard projects downwardly and rearwardly from the underside of the shell, whereby upon shearing off of the ends of said tubes an axial and an upward thrust is given to the shell as the pressurized contents of the shell discharges through the latetr tubes.

6. A device as in claim 1, wherein the brightly colored fluid material of the pressurized mixture is fluorescent in its properties.

7. A device as defined in claim 2 wherein the male member has slots in its opposed sides registrable with slots formed in opposite sides of the socket, the releasable means comprises a yoke member having a pair of opposed arms slidably engaged in part in the slots of the male member and in part in the slots of the socket, whereby the socket and male member are locked together, and the said means being releasable upon sliding the arms of said yoke member out of said engagement.

8. A device as defined in claim 7, wherein the male member is non-circular in cross section and the socket in which it is received is of complementary cross section.

9. A device as defined in claim 2, wherein the said releasable means is releasable automatically, and comprises a slide means slidably engaging the male member and the socket, and a draw wire for sliding the slide means out of said engagement, the said draw wire being operable to effect such release upon being actuated so as to cause a pull action on the slide means.

10. A device as defined in claim 2, wherein the releasable means comprises a slide means slidably engaging the male member and the socket, a draw wire actuable for sliding the slide means out of said engagement, and means for actuating said draw wire.

11. A device as in claim 10, wherein said actuating means comprises a second draw wire affixed at one end to the first mentioned draw wire and attached at the other end to electrically operated solenoid means, and a third draw wire affixed at one end to the first mentioned draw wire and connected at the other end to manually operated leverage means.

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