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 [33] **France**
 [31] **179,259**

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[54] **PYROTECHNIC DEVICE FOR RELEASE OF PARACHUTE CENTRAL SHROUD**
 9 Claims, 3 Drawing Figs.

[52] U.S. Cl. 244/152
 [51] Int. Cl. B64d 17/38
 [50] Field of Search 244/152,
 149, 142

ABSTRACT: A pyrotechnic device for releasing the central shroud of parachutes. The central shroud is soldered to a knockoff ring held in place by a low-tensile retaining pin. The solder also supports a pronged firing pin in front of which is a priming compound, preferably slightly gaseous, which ignites through impact and friction and is able to melt the solder. The priming compound may be composed of a mixture of zirconium and lead chromate.

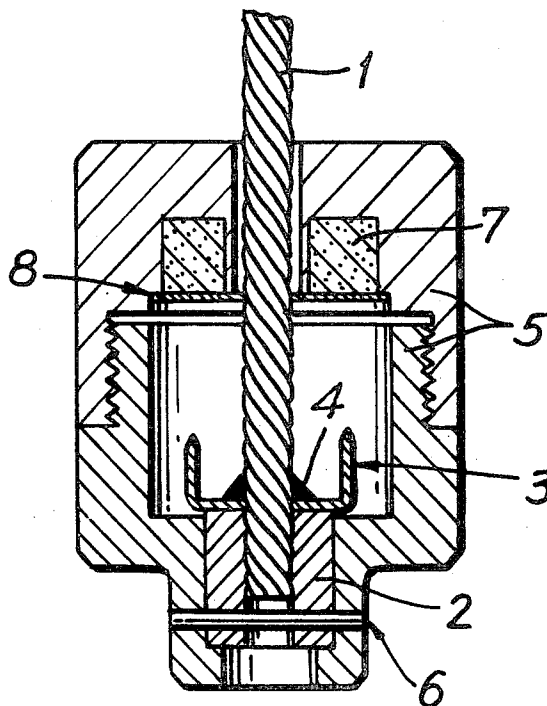


FIG. 1

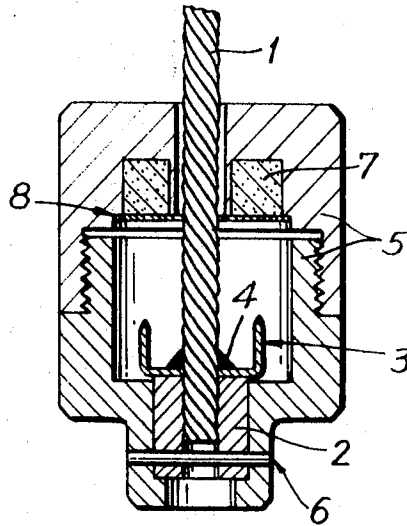


FIG. 2

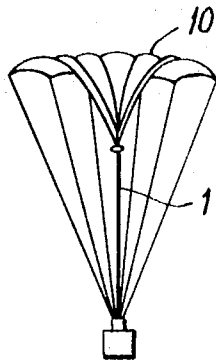
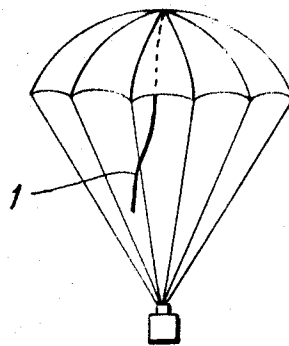


FIG. 3



PYROTECHNIC DEVICE FOR RELEASE OF PARACHUTE CENTRAL SHROUD

BACKGROUND

Parachutes are in wide use in the distribution of military supplies and for slowing the descent of flares and smoke generators.

Generally, parachute efficiency is a compromise between the required falling velocity and the resistance of the parachute. The greater its resistance the less the falling velocity, everything else being equal. However, the larger the parachute the greater the forces acting on it, particularly at the instant of unfurling.

It is known that the force on the parachute is proportional to the square of its velocity. In the special case of missiles, the residual velocity on discharge is always extremely high, and therefore a considerable force is exerted on the parachute. It is usually sought, therefore, to delay the opening of the parachute until the residual velocity has become consistent with the parachute braking strength.

PRIOR ART

Sometimes a double pull out is resorted to. This is an efficient but expensive solution and, because of its complexity, increases the risks of faulty operation. Moreover, this approach is not always feasible because of the space occupied by the arms carried.

Another procedure is to use a central shroud which reduces the parachute unfurling coefficient during its first few yards of travel. By this technique, the force on the parachute when it opens can be cut down as much as 50 percent. Thereafter, when residual velocity has decreased slightly, the central shroud must be released by a suitable procedure so that the parachute may assume its full contour to secure the required rate of descent.

Two known systems for releasing the central shroud are to be noted:

- a. melting of a retaining ring through combustion of the firing compound of the flare or smoke generator;
- b. delayed-action pyrotechnic shearing, the pyrotechnic lag being initiated by a pullout charge or by the firing compound of the flare or smoke generator.

In both cases, a pyrotechnic process is employed which requires a flare or smoke generator and a tube passing through its container. However, it has been proved that the presence of such tube in the center of the container appreciably diminishes the flare brilliance. In addition, it increases the weight of the unit.

SUMMARY OF THE INVENTION

The central shroud release system of the present invention aims at avoiding the aforesaid disadvantages and allows:

- a. avoiding the use of a tube at the center of the structure so that the flare or smoke generator is lighter;
- b. improving the brilliance in the case of a flare;
- c. recovering the whole of the parachute load other than a flare or smoke generator.

In according with the invention, there is proposed releasing the central shroud a split second after the commencement of its pull, due to the melting of the solder which was holding it fixed to a knockoff collar. Melting is achieved through combustion of a thermal compound sensitive to impact or friction. Firing of the compound is accomplished by a striker or friction device, impelled by the initial pull of the central shroud after destruction of a safety device.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a sectional view through a diameter of a device

provided in accordance with one embodiment of the invention; and

FIGS. 2 and 3 diagrammatically illustrate the unfurling of a parachute.

DETAILED DESCRIPTION

A central shroud 1 is made fast to a knockoff ring 2 and a pronged striker 3 by solder 4. The whole is held against case 5 by a safety device such as, for example, a keeper 6 which yields to a specific force of small magnitude.

In the first stage of the unfurling of the parachute 10 as shown in FIG. 2, the pull exerted on the central shroud 1 shears the keeper pin 6. The striker 3 fires through impact or friction a thermal compound 7 which melts the solder thus freeing the central shroud. The parachute then assumes its normal unfurled form shown in FIG. 3.

There is advantage in using a slightly gaseous thermal compound as the compound 7. By way of nonrestrictive example, a zirconium-lead chromate mixture is sufficiently sensitive to mechanical action. The thermal compound can be protected by an antifriction mat 8, by varnish or by any other means.

The central shroud release system described above is a pyrotechnic device having the advantage of being independent of the residual velocity discussed above, in contrast to mechanical devices which are too sensitive to high residual velocity and too resistant to low residual velocity. Furthermore, the pyrotechnic arrangement of this invention allows the release of the central shroud with a slight lag due to the firing time of the thermal compound and the time required for inducing the melting of the solder.

The method according to the invention can be employed for any high-speed parachute release, especially with flares or smoke generators, and parachute missiles for probe recovery after acceleration test.

WHAT I CLAIM IS:

1. A delayed release device comprising a support, a combustible substance on said support, first means normally spaced from but adapted to engage said substance and ignite the same, second means to apply a displacement force to said first means to bring the latter into engagement with said combustible substance, and a fusible substance connecting said first and second means and displaceable with the same and to a position adjacent the combustible substance to be melted by the combustible substance when the latter has been ignited whereby the second means is separated from the first means.

2. A device as claimed in claim 1 comprising a first member attached to said second means, and a second member, adapted for being broken by application of a force thereto, fixing the first said member to the support and adapted for being broken by said force to release said first member and thereby said second means for movement relative to said support and combustible substance.

3. A device as claimed in claim 2 wherein said second means is a central shroud in a parachute.

4. A device as claimed in claim 3 wherein said first member is a ring encircling said shroud and the second member is a shear pin holding the ring to said support.

5. A device as claimed in claim 3 wherein said first means is a pronged striker.

6. A device as claimed in claim 3 wherein said fusible substance is solder.

7. A device as claimed in claim 3 comprising an antifriction mat on and protecting said combustible substance.

8. A device as claimed in claim 3 wherein the combustible substance is a zirconium-lead chromate mixture.

9. Apparatus comprising the release device as claimed in claim 2 comprising a parachute including peripheral shrouds connected to said support and a central shroud constituting said second means, and a parachute load connected to said support.