United States Patent

Willard et al.

[15] **3,706,277**

[45] **Dec. 19, 1972**

[54] DESTRUCT SYSTEM IMPROVEMENT

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[73] Assignee: **The United States of America as represented by the Secretary of the Navy**

[22] Filed: **Oct. 28, 1970**

[21] Appl. No.: **84,680**

[52] **U.S. Cl.** .....**102/27 R,** 102/70 R

[51] **Int. Cl.**.....**F42b 19/08**

[58] **Field of Search**.....102/27 R

[56] **References Cited**

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FOREIGN PATENTS OR APPLICATIONS

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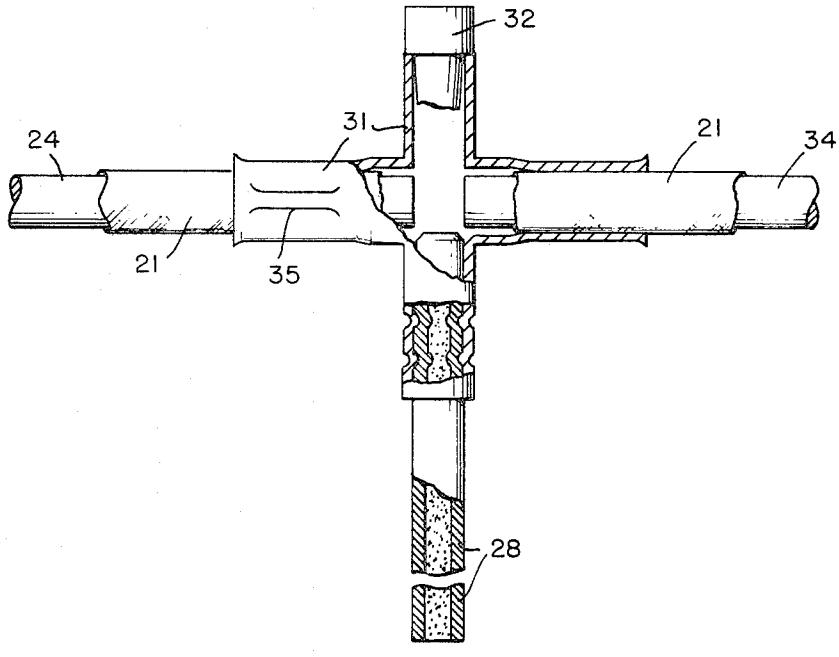
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[57] **ABSTRACT**

A pyrotechnic cord assembly is provided with voids for safety in handling and storage. The voids are filled with bridging pyrotechnic material at the time of final assembly.

2 Claims, 6 Drawing Figures



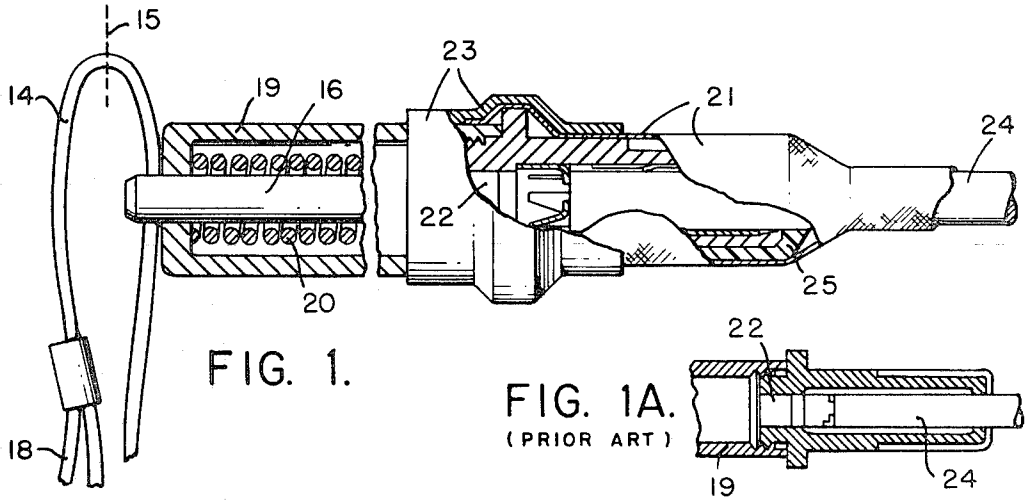


FIG. 1.

FIG. 1A.
(PRIOR ART)

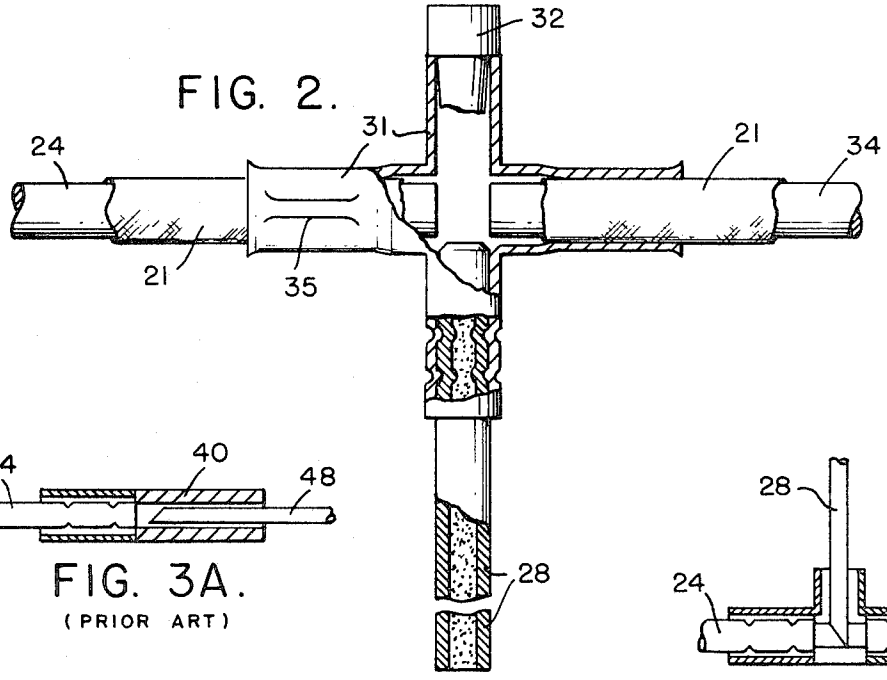


FIG. 2.

FIG. 3A.
(PRIOR ART)

FIG. 2A.
(PRIOR ART)

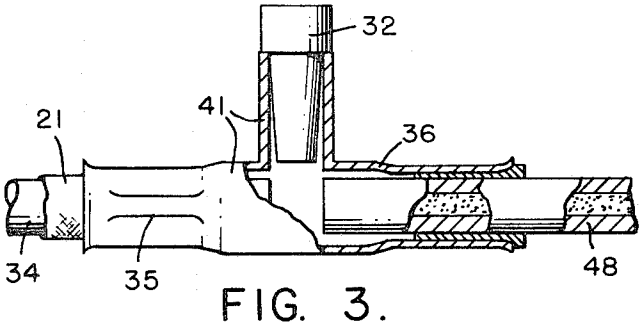


FIG. 3.

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DESTRUCT SYSTEM IMPROVEMENT

CROSS REFERENCE TO RELATED APPLICATIONS

The disclosed method and article of manufacture pertains to an improvement in the pyrotechnic train more fully disclosed in U. S. application Ser. No. 884,084 filed Dec. 11, 1969 and the flare system in which the pyrotechnic trains are presently utilized is more fully disclosed in U. S. application Ser. No. 683,095 filed Nov. 8, 1967 and now U. S. Pat. No. 3,478,687 issued Nov. 18, 1969. The subject matter of the patent is hereby incorporated herein by reference.

BACKGROUND OF THE INVENTION

In an effort to prolong the useful life of serial flares, a hot air balloon device has been substituted for the usual parachute. As the hot air balloon suspended flare burns, the ratio of flare weight to balloon lift decreases to a point where the system begins to rise. Since illumination varies inversely as the square of the distance, any appreciable rise of the system is undesirable. Also, after the flare has completely burned out, it is desirable to remove the balloon from the air for aircraft safety.

The venting and destruct system described in the above referenced application was designed to cut a vent in the balloon at a predetermined time after deployment to check the ascent of the system and thereafter to completely destroy the remaining lift of the system at a time closely coinciding with flare burnout.

In the manufacture of the pyrotechnic trains and the subsequent attachment of the pyrotechnic trains to the balloon it was soon learned that the pyrotechnic train as constituted was hazardous to handle and store.

The present invention involves a method of manufacture which results in a product which is much less hazardous in the assembly and storage thereof and in the final placement in the assembly in which it is to be used. This is accomplished by providing in each pyrotechnic cord connection a space between cord ends and access means in each connector so that the space may be filled with bridging pyrotechnic material in final assembly.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

FIG. 1 is a plan view partly in section of the initiating end of a pyrotechnic cord according to the invention illustrating changes over the prior art as shown in a similar view in FIG. 1A;

FIG. 2 is a plan view partly in cross section of a portion of the pyrotechnic train corresponding to the prior portion shown in FIG. 2A; and

FIG. 3 is a plan view of a fitting in a portion of the train which corresponds to the prior section shown in FIG. 3A.

DETAILED DESCRIPTION OF THE INVENTION

In the prior art device shown in FIG. 1A, as well as in the instant invention, a length of safety fuze **24** is ignited by an initiator **22** when struck by a firing pin **16**. Firing pin **16** is normally held against action of a spring **20** when safety wire **14** is in place. Safety wire **14** comprises a complete loop and remains intact until final assembly when a cut is made along dotted line **15**. In the final assembly the loop of safety wire **14** is also attached to a lanyard or other pull cable **18**. When safety wire **14** is pulled out, the spring **20** reacts against housing **19** to force firing pin **16** into the primer of ignition device **22**. In the prior device as shown in FIG. 1A, the safety fuze **24** was not shielded. In FIG. **1**, a Faraday shielding **21** is shown covering the safety fuze **24** and the shielding is held in place on the housing **19** by a resilient sleeve **23**.

Safety fuze **24** is designed to ignite a second length of safety fuze **34** as well as a measured length of propellant cord **28** after a predetermined time. For this purpose, in the prior art, a T fitting **30** (FIG. 2A) was provided which was crimped onto the length of safety fuze with the length of pyrotechnic cord **28** intimately connected within the T. According to the present invention this T fitting is replaced with a cross fitting **31** (FIG. 2) which is crimped to the cord **24** and cord **34** as well as the propellant cord **28**. The pyrotechnic cords, however, do not touch within the fitting but are so arranged that a void is left which will later receive a sized plug of pyrotechnic material. In the prior assembly, cord **34** was connected to a final length of propellant strand **48** by a simple straight connector FIG. 3A). FIG. **3** illustrates how a T fitting replaces the straight fitting as shown in FIG. 3A to provide another void between safety fuze **34** and a final length of propellant cord **48**.

At final assembly, plugs **32** are removed and replaced with similar plugs having pellets of pyrotechnic material fastened on the inner ends thereof. The material used in the connecting pellets is selected for low sensitivity to electrostatic charge, impact, and friction and the entire system is physically grounded during assembly handling and installation operations.

By this invention, therefore, a destruct assembly comprising pyrotechnic cords has been devised which is much less hazardous to manufacture and install than the prior devices without any sacrifice of efficiency.

What is claimed is:

1. In a pyrotechnic transfer train assembly, including a plurality of measured lengths of safety fuse, a plurality of lengths of propellant strand and connecting means between measured lengths of safety fuse and propellant strand, the improvement comprising:

said connecting means comprising a plurality of tubular fittings receiving and securing the ends of at least one of said lengths of fuse and at least one of said lengths of strand and providing one additional tubular passageway;

each said length of fuse and strand being secured in said fitting with the said ends in spaced relation in line with each other and said one additional tubular passageway whereby a space void of explosive material exists between said ends and whereby said space may be filled with explosive material through said additional passageway.

2. The transfer train of claim **1** including a first tubular fitting having four tubular openings and connecting a first and a second length of safety fuse as well as a length of propellant strand; and

a second tubular fitting connecting said second length of safety fuse with a second length of propellant strand.

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