

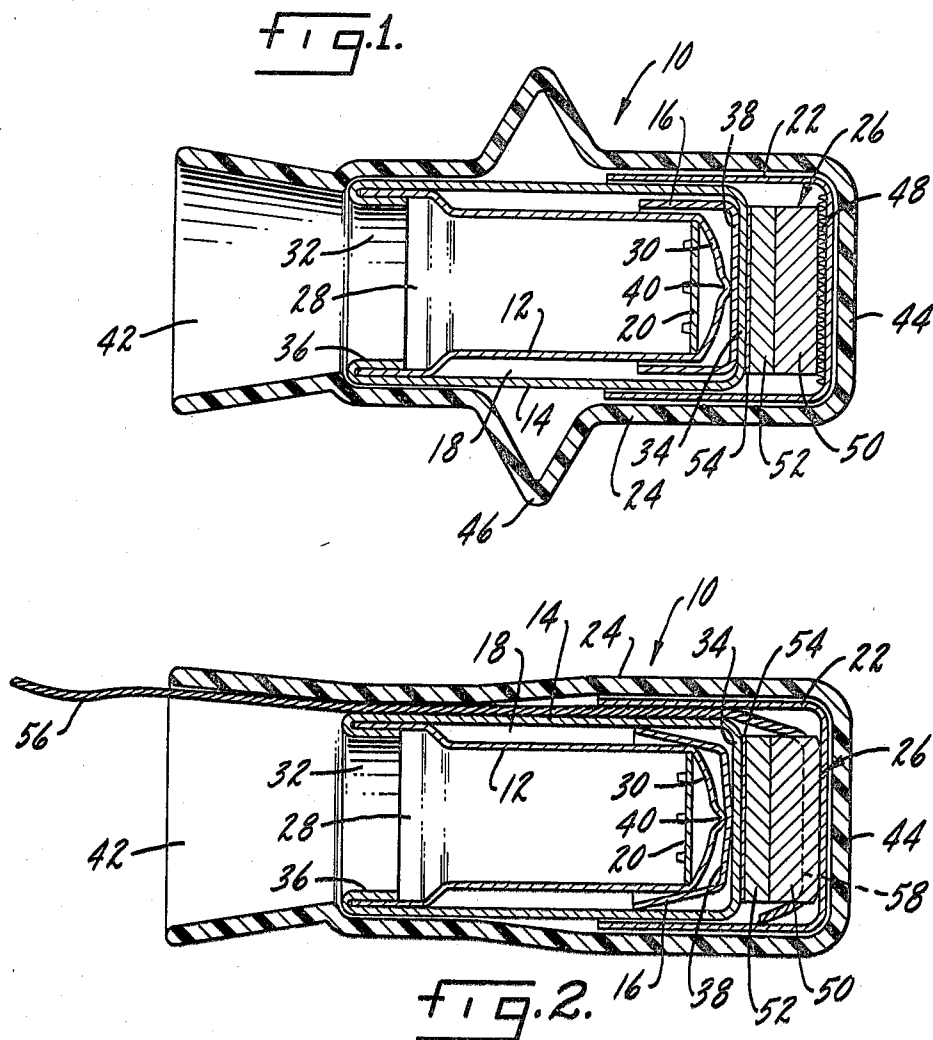
Dec. 9, 1969

H. M. McDONALD ET AL.

3,483,312

EXPLOSION CONNECTOR WITH IMPROVED IGNITION MEANS

Filed Dec. 24, 1968



INVENTORS.
HARRISON M. McDONALD
ERNEST D. HARFST
BY Parker, Carter & Markey
Attorneys.

1

2

3,483,312

EXPLOSION CONNECTOR WITH IMPROVED IGNITION MEANS

Harrison M. McDonald, De Kalb, and Ernest D. Harfst, Sycamore, Ill., assignors to Ideal Industries, Inc., Sycamore, Ill., a corporation of Delaware

Filed Dec. 24, 1968, Ser. No. 786,725

Int. Cl. H02g 15/08

U.S. Cl. 174-87

11 Claims

ABSTRACT OF THE DISCLOSURE

A connector for joining together wires, cables or the like including a deformable shell, an aligned non-deformable shell positioned around and spaced from at least a portion of the deformable shell to form an annular chamber therebetween, an aligned outer insulating jacket, a heat sensitive explosive located within the annular chamber to cause the deformable shell to deform into crimping contact with the wires, cables or the like when exploded, and an ignitor mechanism for producing sufficient heat upon burning to bring about the ignition of the heat sensitive explosive.

SUMMARY OF THE INVENTION

This invention relates to an explosion connector with improved ignition means and more particularly, to an explosive actuated connector for wires, cables or the like having a self-contained ignition means.

Accordingly, a primary object of this invention is an explosive operated connector having an inner shell and an outer shell sealed together with an explosive in the annular chamber therebetween.

A further object is an explosion connector with improved means for inwardly deforming a deformable member into crimping contact with the wires, cables or the like.

Another object is an improved means for igniting the explosive by transferring heat through the outer shell of the connector.

Another object is an explosion connector that leaves the interior of the connector free from any contaminating combustion deposits after the explosive has been ignited.

Another object is an improved structure that provides an excellent heat transferring relationship between the heat-generating means and the explosive.

Another object is a heat producing ignitor which may be friction actuated and renders the explosion connector safer to use.

Other objects and advantages will be apparent from the following specification, claims and drawings for this invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a longitudinal cross-sectional view through the explosion connector showing the improved ignition means, and

FIGURE 2 is a similar longitudinal cross-sectional view through another embodiment of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings in more detail it will be seen that the explosion connector 10 with improved ignition means includes an inner shell 12 and an outer shell 14 sealed together with an explosive 16 in the annular chamber 18 therebetween. A plate 20 contacts the wires, cables or the like, which are inserted in the connector 10 and a heat insulating shield 22 protects an outer jacket 24 from excessive heat. An ignitor mechanism 26 located between the end wall of the outer shell 14 and the end wall of the outer jacket 24 provides the ignition for the explosive 16 which when set off deforms the inner shell 12 into crimping contact with the wires, cables or the like.

The inner shell 12 is a deformable member with an opening 28 at one end and closed by an end wall 30 at the opposite end. Surrounding the deformable inner shell 12 is the non-deformable outer shell 14 having an opening 32 and end wall 34 aligned with the corresponding opening and end wall of the inner shell. The non-deformable shell 14 is spaced from at least a portion of the deformable shell 12 to form the annular chamber 18. The open end of the outer shell 14 may be folded around the open end of the inner shell 12 as at 36 to form a seal for the chamber 18.

Located within the annular chamber 18 is the heat sensitive explosive 16 which may be a sheet or tube of nitrated paper in the form of a cup-shaped concavity. The base 38 of the explosive fits snugly against the outer shell 14 and must be held in good heat transferring relationship with this shell. An adhesive or nitrocellulose lacquer or an indent 40 in the inner shell 12 helps provide the heat transferring relationship.

The insulating shield 22 protects the outer jackets 24 from excessive heat and the plate 20 is provided so that the wires or cables can bite into it and gain a mechanical grip to facilitate turning or twisting of the outer jacket. The outer jacket 24 preferably is made from plastic and is fitted over the insulating shield 22 and outer shell 16. The outer jacket 24 has an opening 42 aligned with the respective openings of the inner shell 12 and outer shell 14 and an end wall 44 in spaced relationship with the end wall 34 of the outer shell. The outer jacket 24 may include a flared portion 46 as shown in FIGURE 1 to allow the jacket to be turned or twisted relative to the contents within the connector 10.

An ignitor mechanism 26 is located between the end wall 44 of the outer jacket 24 and the end wall 34 of the outer shell 14 closely adjacent the explosive 16. The ignitor mechanism 26 as shown in FIGURE 1 includes a friction producing member in the form of a striking or ignition surface 48, an ignitor or match member 50 and a heat-generating means in the form of a pellet 52.

The striking or ignition surface 48 may be mounted on the interior surface of the insulating shield 22 which fits against the end wall and side wall of the outer jacket 24 and extends a short distance along the outside of the outer shell 14. Although the striking surface 48 is shown in FIGURE 1 as embossed barbs it may consist of other types of friction producing means. For instance, the interior surface of the insulating shield 22 may be covered with a frictional material consisting of sand cemented in place with a lacquer, or coated with a phosphorous material bonded to the interior of the shield by a lacquer. The sand material may be used when the match member 50 is made from a strike anywhere material and the phosphorous material is essentially the same material used on the striking strips of books or boxes of safety matches.

The ignitor or match member 50 is a combustible substance highly sensitive to heat. It contains oxidizers and fuels made from a mixture of materials from which match heads are made and preferably includes entrained air.

The heat generating pellet 52 is mounted on the end wall 34 of the outer shell 14 by an adhesive 54 as shown in FIGURES 1 and 2 and provides sufficient heat upon burning to heat the outer shell and ignite the explosive 16. The pellet 52 may be made from a mixture of zinc powder, fine cuprous oxide powder and antimony trioxide.

The match member 50 and heat generating pellet 52

may be made separately and are fastened together mechanically or adhesively or they may be cast or pressed in a suitable mold or press. In addition the components of the ignitor mechanism 26 may have a different composition than those given here. For example, the striking surface 48 may contain other friction sensitive materials such as calcium silicide. The match member 50 may be either pressed or cast from a wet slurry and may contain oxidizers and fuels such as corn starch or cellulose and perchlorates or permanganates. The heat generating pellet 52 may be made from combinations of aluminum and iron oxides, or zirconium and barium chromate or other metal and metal oxides.

FIGURE 2 shows another embodiment of the explosion connector with improved ignition means. In this embodiment a pull-tab device frictionally actuates the ignitor or match member 50. The pull-tab device may be in the form of a phosphorous coated string 56 which fits into a groove 58 in the match member 50 and heat generating pellet 52. The friction created by pulling the phosphorous coated string 56 out of the outer jacket 24 ignites the match member 50 which in turn eventually sets off the explosive 16. The side wall of the outer jacket 24 may be straight in this embodiment as it is not necessary to turn the jacket and striking surface in relation to the match member. As in FIGURE 1 the insulating shield 22 protects the outer jacket 24 from high temperature generated within the connector 10.

The use, operation and function of this invention are as follows:

The explosion connector with improved ignition means is for joining together wires, cables or the like. The ignition means is intended to ignite a heat sensitive explosive 16 which inwardly deforms the inner shell 12 into crimping contact with the wires, cables or the like.

The ignitor mechanism includes a friction producing member, a match member and a heat generating means. The friction producing member may be either the striking surface 48 of embossed barbs as shown in FIGURE 1 or the phosphorous pull-tab string 56 as shown in FIGURE 2. In addition of the friction producing member may consist of coating the interior of the insulating shield 22 with a phosphorous material or coating the interior of the shield with a sand material.

Heat is produced by the friction producing member by either turning the outer jacket 24 and striking surface 48 in relation to the match member 40 as in FIGURE 1 or by pulling the phosphorous coated string 56 out of the jacket as in FIGURE 2. The heat produced by engagement with the friction producing member ignites the highly combustible match member 50. The burning match member transfers heat to the heat generating pellet 52 which in turn provides sufficient heat to pass through the outer shell 14 and ignite the nitrocellulose explosive 16. Burning of the explosive produces gases which are sufficient to deform the inner shell 12 into crimping contact with the wires, cables or the like.

In addition it is important to note that safety is provided since there is a delay of several seconds from the time of actuation of the match member 50 to explosion of the heat sensitive explosive 16.

We claim:

1. An explosion connector with improved ignition means including:

- a deformable shell open at least at one end for receiving wires, cables or the like;
- an aligned, non-deformable shell positioned around and spaced from at least a portion of the deformable shell to form an annular chamber therebetween;
- an aligned, outer insulating jacket;
- a heat sensitive explosive located within said annular

chamber to cause the deformable shell to deform into crimping contact with the wires, cables or the like when exploded; and

an ignitor mechanism located between the outer jacket and the non-deformable shell for producing sufficient heat upon burning to bring about the ignition of the heat sensitive explosive.

2. The structure of claim 1 further characterized in that the shells and jacket are closed at one end with the closed end of the deformable shell having an indent for holding the heat sensitive explosive in heat transferring relationship with the ignitor mechanism.

3. The structure of claim 1 further characterized in that the outer insulating jacket includes a flared portion to facilitate turning of the jacket relative to the ignitor mechanism.

4. The structure of claim 1 further characterized in that the shells and jacket are closed at one end, and the heat sensitive explosive is a sheet of nitrated paper in the form of a cup-shaped concavity having a base which fits snugly against the closed end of the non-deformable shell.

5. The structure of claim 1 further characterized by a plate positioned within the deformable shell to be engaged by the wires, cables or the like for gaining a mechanical grip to facilitate turning of the outer jacket.

6. The structure of claim 1 further characterized in that the shells and jacket are closed at one end, and an insulating shield is positioned within the outer jacket against the closed end and extends a short distance along the outside of the non-deformable shell.

7. The structure of claim 1 further characterized in that the ignitor mechanism includes a friction producing means, a highly combustible substance and a heat generating means.

8. The structure of claim 7 further characterized in that the friction producing means is a striking surface in the form of embossed barbs located adjacent the highly combustible substance.

9. The structure of claim 7 further characterized in that the friction producing means is a pull-tab device in the form of a phosphorous coated string which fits into a groove in the highly combustible substance which is ignited by the friction created when the phosphorous coated string is pulled out of the connector.

10. The structure of claim 7 further characterized in that the highly combustible substance contains oxidizers and fuels made from a mixture of materials from which match heads are made.

11. The structure of claim 7 further characterized in that the shells and jacket are closed at one end, and the heat generating means is in the form of a pellet mounted at the closed end of the non-deformable shell by an adhesive to provide sufficient heat upon burning to heat the non-deformable shell and ignite the heat sensitive explosive.

References Cited

UNITED STATES PATENTS

2,083,842	6/1937	Henning.	
3,364,304	1/1968	Modrex	174—94

FOREIGN PATENTS

815,044	6/1959	Great Britain.
---------	--------	----------------

DARRELL L. CLAY, Primary Examiner

U.S. Cl. X.R.

29—421, 628, 517; 102—28