July 10, 1945. C. R. JOHNSON 2,380,312

DETONATING FUSE

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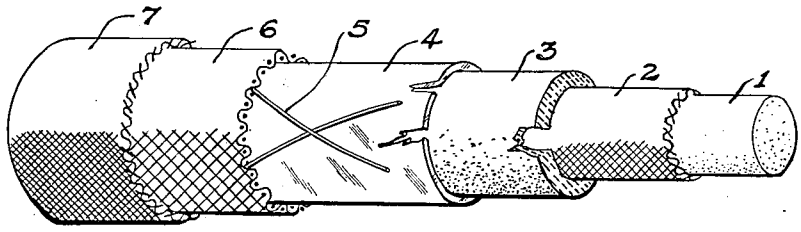


Fig. 1

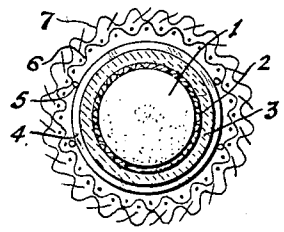


Fig. 2

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DETONATING FUSE

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2 Claims. (Cl. 102—27)

This invention relates to the art of detonating fuse manufacture.

As is well known, the original detonating fuse consisted of a core of trinitrotoluol enclosed in a lead covering. This fuse was characterized by several disadvantages, including its limited flexibility, low tensile strength, low water resistance, great weight, negligible resistance to shearing and frictional wear, and the fact that it was difficult to handle, especially in cold weather. Accordingly the manufacture of this original type has been discontinued in favor of a more flexible type of fuse which covers the same range of application and has many advantages. The trinitrotoluene core has been replaced by a core of pentaerythritoltetranitrate. The drawn metal covering has been eliminated. The first embodiment of the more flexible fuse to be developed was the plain type, including the explosive core provided with a cotton covering. Requirements of additional tensile strength and resistance to abrasion and shearing brought about the development of the wire-bound type wherein the cotton covered fuse is wrapped spirally with wire.

Although the wire-bound detonating fuse with a core of pentaerythritoltetranitrate has constituted quite an advance over the original detonating fuse with drawn metal covering, it is, nevertheless, subject to several disadvantages. Although the spiral-wound wire wrapping contributes greater tensile strength, the greatly increased weight and diameter of the fuse, due to the wire, are distinct disadvantages. Furthermore, the spiral-wound wire wrapping has a decided tendency to slip and slide over the core upon handling, causing a distortion commonly referred to as "the basketing effect."

The most serious defect of wire-bound fuse, however, lies in the fact that it is absolutely necessary to peel back or strip approximately eight inches of the wire countering from the core whenever making connections with the same. Unless this is done the propagation does not proceed beyond the connection, and hazardous, expensive misfires occur. This stripping operation must be done manually and with great care in order to avoid breaking the core or injuring the hands by contact with the sharp strands of wire. It will be seen by any worker in the art that this stripping is laborious, time-consuming, irksome, and inconvenient.

The object of the present invention is an improved detonating fuse free from the foregoing disadvantages. A further object is a completely flexible detonating fuse of high tensile strength and resistance to shearing and frictional wear, which need not be stripped to make a connection capable of propagating the detonation. Other objects will be noted in the following.

My invention is a detonating fuse provided with a braided wire covering. While any wire of satisfactory tensile strength may be employed, I prefer to use steel wire which has been coated to improved corrosion resistance. Any secondary detonating explosive may be used, but I prefer to employ pentaerythritol tetranitrate, tetryl, or trinitrotoluene. The explosive preferably should be in the form of a core wrapped in at least one layer of protective material.

The invention may be understood more readily by referring to the various figures of the drawing which depict preferred embodiments thereof.

Figure 1 is a view of the fuse of my invention depicted partly in perspective and partly in section. Figure 2 is a view of the same in cross-section.

In detail, Figure 1 shows the core 1 of pentaerythritol tetranitrate provided with the textile sheath 2, the asphalt coating 3, the layer of paper-like material 4 such as pliofilm, paper, or the equivalent, the cotton strands 5, the wire braid 6 and the cotton covering or layer of wax 7. The cross sectional view of the same elements, as shown in Figure 2, emphasizes their relationship in the completed fuse.

The asphalt layer serves to waterproof the textile sheath and the core of explosive, and acts as a binder to prevent sifting. The paper or pliofilm layer serves to waterproof the asphalt, textile, and powder elements, and aids in preventing sifting. It also enhances the flexibility of the fuses as a whole. The wax layer is to protect and hold the wire braid, and provide lubrication to prevent snagging.

Further details of manufacture are provided in the following example which set forth a preferred embodiment of the invention.

Example

A core of pentaerythritol tetranitrate was provided with a sheath of cotton and an asphalt coating. The asphalt in turn was wrapped in pliofilm. A plurality of cotton strands were then wrapped about the fuse in opposite directions at an angle approximating one turn per linear inch of fuse. The fuse was then provided with a braided wire jacket. Zinc-coated steel wire was employed.

As an alternative structure, the fuse may be prepared according to the example but with the

additional feature that an outer cotton covering is placed over the wire braid.

The wire braided detonating fuse of my invention presents many advantages over the fuse structures of the prior art. The outstanding advantage lies in the fact that a completely flexible fuse results, which is characterized by high resistance to shearing and frictional wear, with the elimination of the necessity for peeling back the wire covering to form a connection capable of propagating the detonation. In other words, the thinner and open structure of the braid as contrasted with the closely wrapped spiral wire structure of the prior art permits firing thru the wire covering. Another advantage is the complete elimination of the distortion or "basketing effect," which characterizes the wire wrapped fuse of the prior art. Furthermore, the same tensile strength can be achieved with a decreased weight of wire by means of the braid structure. Kinking of the fuse during handling is reduced. A decrease in the over-all diameter of the fuse can be achieved.

Whereas the foregoing description sets forth certain specific embodiments of my invention, it will be understood that I intend to include within the scope thereof those various alternative forms of the invention which will be suggested to those skilled in the art. Accordingly, I intend to be limited only by the following patent claims.

I claim:

1. A detonating fuse comprising a core of detonating explosive, a textile sheath surrounding said core to contain said explosive, an asphalt layer surrounding said textile sheath to waterproof said sheath and prevent said explosive from sifting, a pliofilm covering for said asphalt to provide for the waterproofing and flexibility, a layer of wire braid protecting said pliofilm, and a layer of wax to protect and hold the said wire braid.

2. A detonating fuse comprising a core of detonating explosive, a textile sheath surrounding said core to contain said explosive, an asphalt layer surrounding said textile sheath to waterproof said sheath and prevent said explosive from sifting, a paper covering for said asphalt to provide for the waterproofing and flexibility, a layer of wire braid protecting said paper, and a layer of wax to protect and hold said wire braid.

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