No. 646,887. Patented Apr. 3, 1900.

B. L. STOWE & J. J. VOORHEES.

ELECTRIC SIGNALING DEVICE FOR HYDRAULIC HOSE.

(Application filed Nov. 15, 1899.)

(No Model.)

Fig. 1.

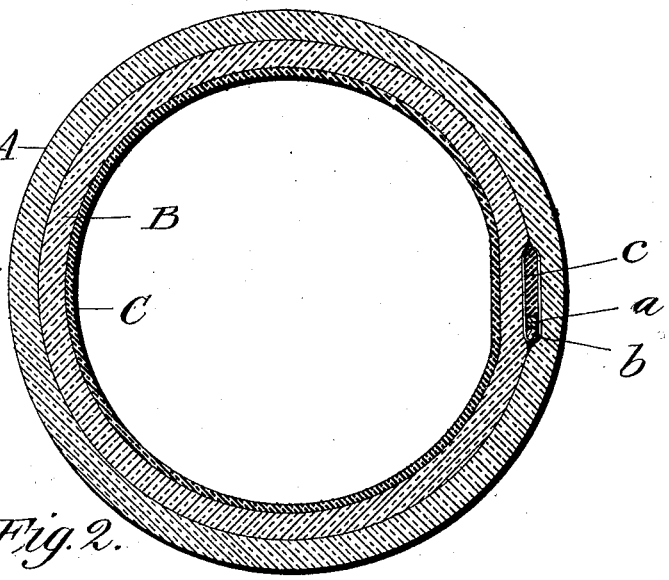


Fig. 2.

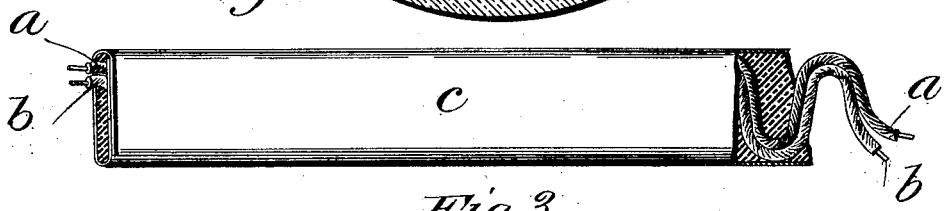


Fig. 3.

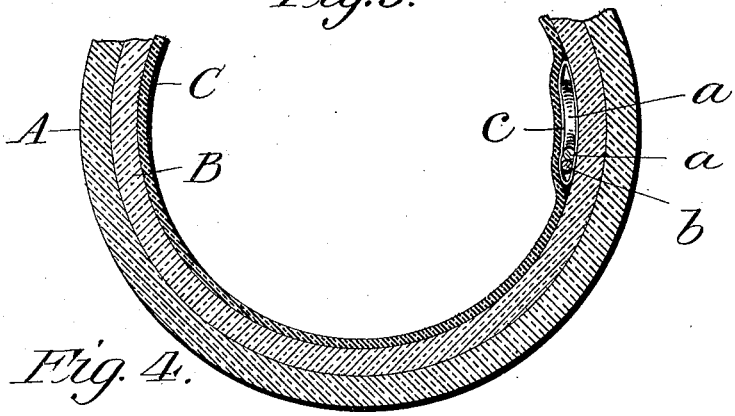
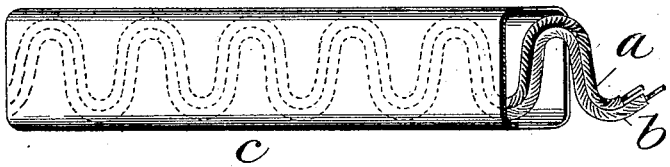


Fig. 4.



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UNITED STATES PATENT OFFICE.

BENJAMIN L. STOWE AND JOHN J. VOORHEES, OF JERSEY CITY, NEW JERSEY.

ELECTRIC SIGNALING DEVICE FOR HYDRAULIC HOSE.

SPECIFICATION forming part of Letters Patent No. 646,887, dated April 3, 1900.

Application filed November 15, 1899. Serial No. 737,032. (No model.)

To all whom it may concern:

Be it known that we, BENJAMIN L. STOWE and JOHN J. VOORHEES, citizens of the United States, and residents of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Electric Signaling Devices for Hydraulic Hose, of which the following is a specification.

Our invention consists in a novel way of incorporating into hydraulic or fire hose electrical conductors or line-wires which are now in use to some extent for the purpose of permitting electrical signals to be interchanged between the engineer at the fire-engine and the hoseman or pipeman at the other end of the line of hose. We interpose wires between any two of the plies of which the hose may be formed—as, for example, between the outer jacket and inner jacket of what is known as "double-jacket" fabric hose or between the fabric body of the hose and the rubber lining thereof, which lining may be considered as one of the plies for the purpose of defining our invention. In thus locating them we place them in an inclosing and protecting sleeve, and we crimp or bend the wires, which are thus located and protected and covered, so as to provide the necessary slack to compensate for the elongation or bending of the hose when in service. The sleeve can be made of fabric (which preferably is cut on the bias) and be coated or covered with uncured rubber or rubber cement. Thus prepared and containing the conducting wire or wires the sleeve preferably should be vulcanized and cured under flattening pressure, so as to solidify all parts of the device before it is inserted into the hose. This is when the device is to be inserted between two fabric plies; but when it is located between the rubber lining and the fabric then it can be vulcanized and cured during the operation of vulcanizing the lining into place in the hose, as described in another application in our names for Letters Patent, Serial No. 736,427, filed November 9, 1899. If, however, it be desired to leave the wires free within the sleeve, so as to allow some slight freedom of movement of the wires within the confines of the sleeve, no cement or other adhesive material should be on the inside of the sleeve.

To enable others skilled in the art to understand and use our invention, we will now proceed to describe more particularly the manner in which it is or may be carried into effect by reference to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a cross-section of hydraulic hose of the kind known as "double-jacket" fabric hose embodying our invention, the conductors or line-wires and their inclosing sleeve being between the outer and inner fabric jackets of the hose. Fig. 2 is a view of the wire and sleeve detached, showing also a portion of the wires protruding beyond the sleeve. Fig. 3 is a cross-section of the hose in which the sleeve and the wires contained in the same are interposed between the rubber lining and the fabric body of the hose. Fig. 4 is a detached view of wires and sleeve represented in Fig. 3.

In Fig. 1, A is the outer fabric jacket, B is the inner fabric jacket, and C is the rubber lining for the latter. Hose thus made is old. The conductors or line-wires are shown at *a b*, each having the usual insulating cover or sheath. They are contained in the sleeve *c*, preferably made of fabric, although it may be made of other material, which is coated internally as well as externally with a vulcanizable rubber cement or other material, the sleeve thus prepared and containing the wires being cured or vulcanized under flattening pressure, so as to solidify and unify the device as a whole, as indicated in Fig. 2, before it is incorporated into the hose. The wires *a b* contained in the sleeve should be crimped, corrugated, or otherwise bent, so as to have a length sufficiently in excess of that of the piece or section of hose into which they are incorporated to permit them to accommodate themselves easily and without danger of breaking to the bending of the hose, as well as its elongation, which occurs when it is in service. For this purpose we prefer to crimp the wires in conforming curves, as indicated, so that they will nest compactly together. This particular feature, however,

is not here claimed, inasmuch as we have made it in part the subject of our application, Serial No. 736,427, above named. The sleeve, with its contained crimped or bent wires, is incorporated into the hose by introducing it between the outer and inner fabric jackets A and B. In order to assure it in place, it can, if desired, be cemented to either the outer or inner jacket, or to both of them.

The sleeve may have no cement or other adhesive material on its inside, in which event the wires *a b* will be left free within the sleeve, thus permitting them when incorporated into the hose a certain freedom of movement within the limits permitted by the sleeve, which may be found of advantage under some circumstances. This modification is illustrated in Figs. 3 and 4. We have hereinbefore indicated that the sleeve and its contained wires may be interposed between any two of the plies, including the rubber lining, which for present purposes may be taken and considered as one of the plies. Fig. 3 shows the wires and their inclosing sleeve interposed between the rubber lining C and the fabric body of the hose. When thus located, the sleeve need not be preliminarily cured, but can be vulcanized by and during the operation of vulcanizing the lining into place, this operation, as is well known, consisting in introducing the rubber lining (which previously has been partially cured) into the hose and then expanding it by steam into close communication with the body of the hose, the heat of the steam also serving to vulcanize the lining into place. The sleeve and its contained wires, prepared as already described, can be cemented to the exterior of the rubber lining prior to its introduction into the hose, and it (the sleeve) will be vulcanized and cured by and during the operation of expanding and vulcanizing the rubber lining and will, in effect, be incorporated in the lining. This particular feature, however, is not here claimed, but forms, in part, the subject-matter of our application, Serial No. 736,427, above named.

We do not restrict ourselves to any particular form or manner of crimping or bending the electrical conductors or line-wires, what is essential being that these wires should be sufficiently longer than the hose in which they are incorporated to furnish the slack needed to permit the bending of the hose and its elongation or stretching when in service without breaking or injuring the wire.

Having described our invention and the best way now known to us of carrying the same into effect, what we claim herein as new, and desire to secure by Letters Patent, is as follows:

1. In combination with a multiply hose, a pliable sleeve extending lengthwise of and interposed and held between two contiguous plies of said hose, and electrical conductors or line-wires in crimped or bent form contained in and inclosed by said sleeve, substantially as and for the purposes hereinbefore set forth.

2. In combination with a multiply hose, a pliable sleeve extending lengthwise of and interposed and held between two contiguous plies of said hose and electrical conductors or line-wires in crimped or bent form inclosed by and loosely contained in said sleeve, substantially as and for the purposes hereinbefore set forth.

In testimony whereof we have hereunto set our hands this 14th day of November, 1899.

BENJAMIN L. STOWE.
JOHN J. VOORHEES.

Witnesses:
WILLIAM HENRY SANFORD,
IGNATIUS JUDGE.