

No. 646,886.

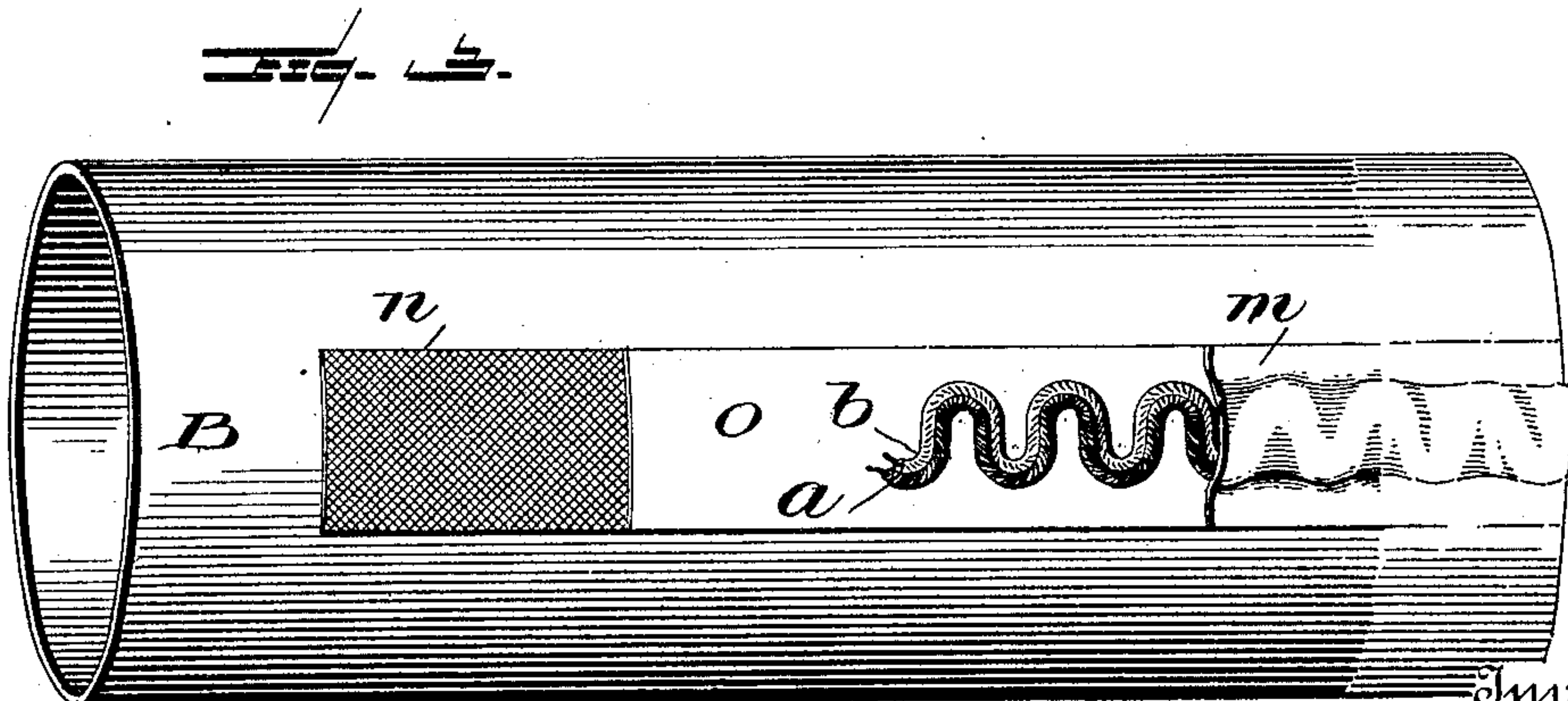
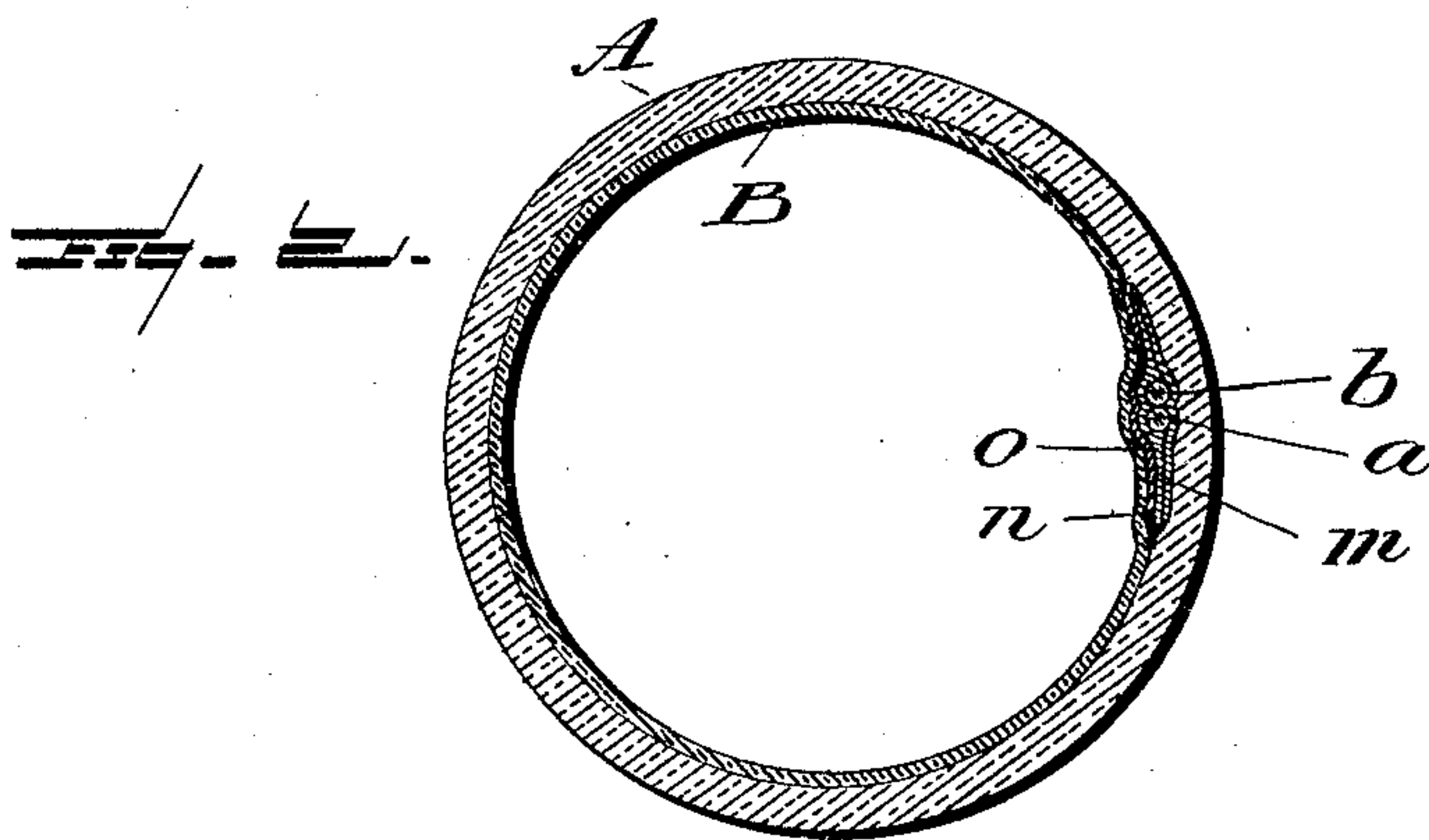
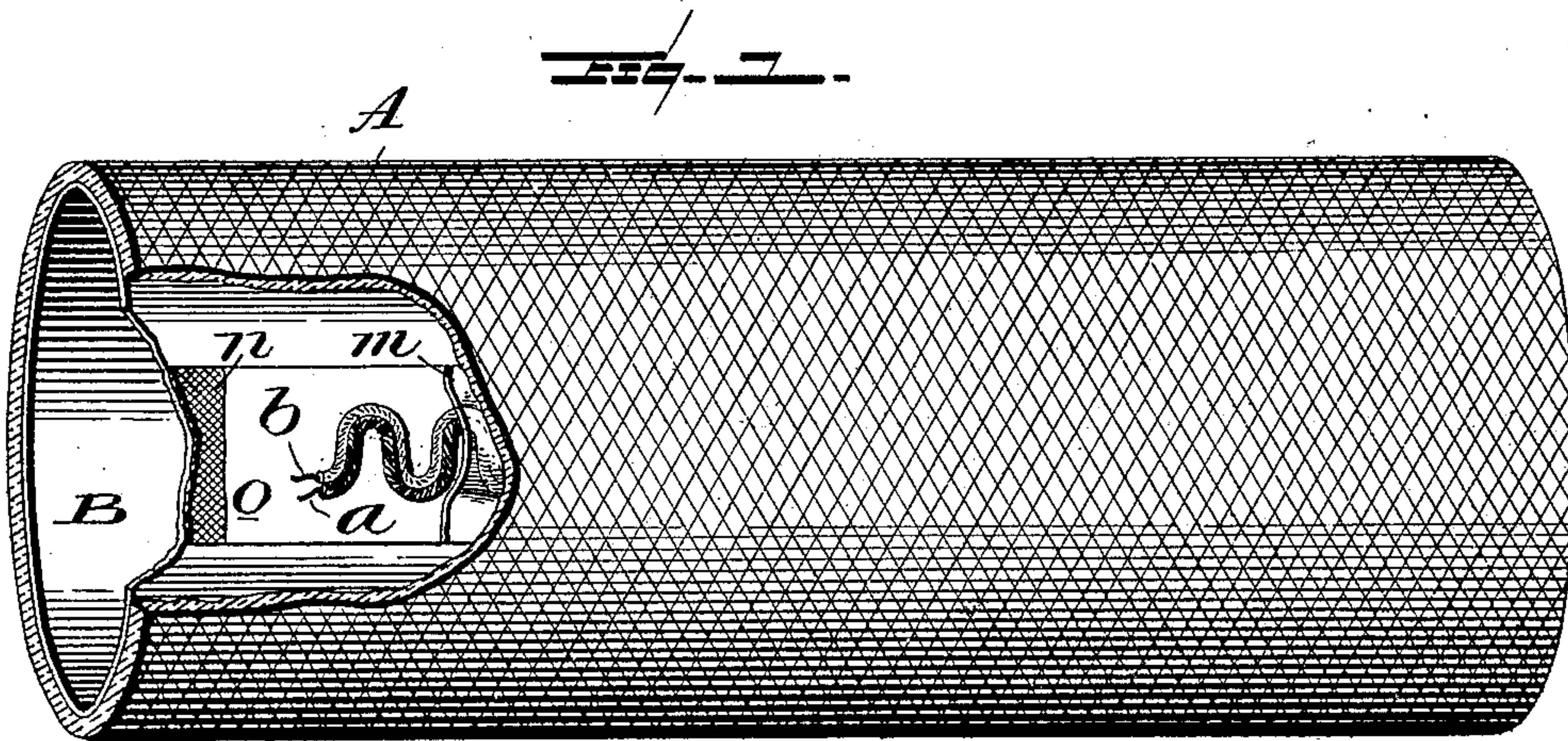
Patented Apr. 3, 1900.

B. L. STOWE & J. J. VOORHEES.  
ELECTRIC SIGNALING DEVICE FOR HYDRAULIC HOSE.

(Application filed Nov. 9, 1899.)

(No Model.)

2 Sheets—Sheet 1.



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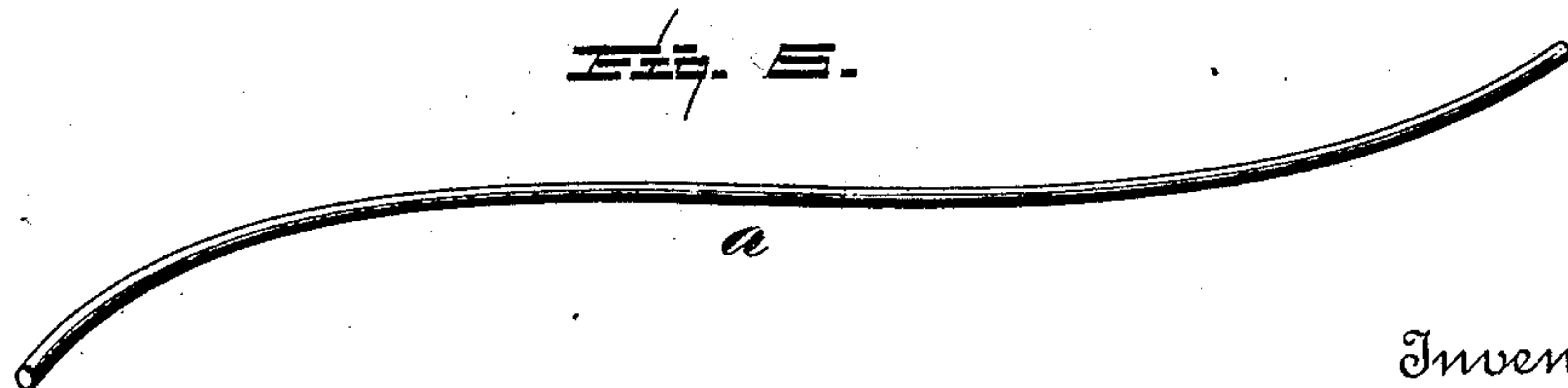
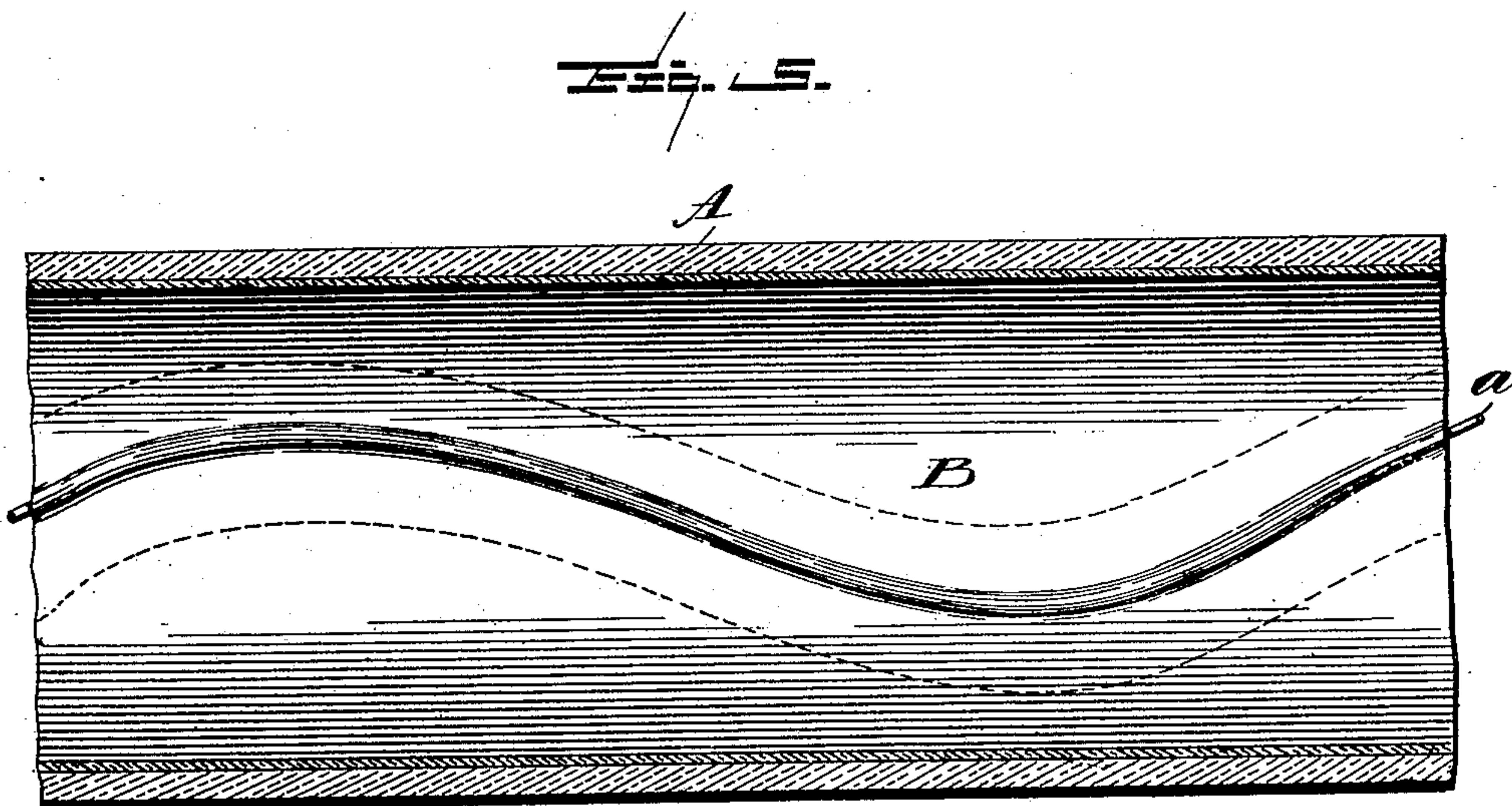
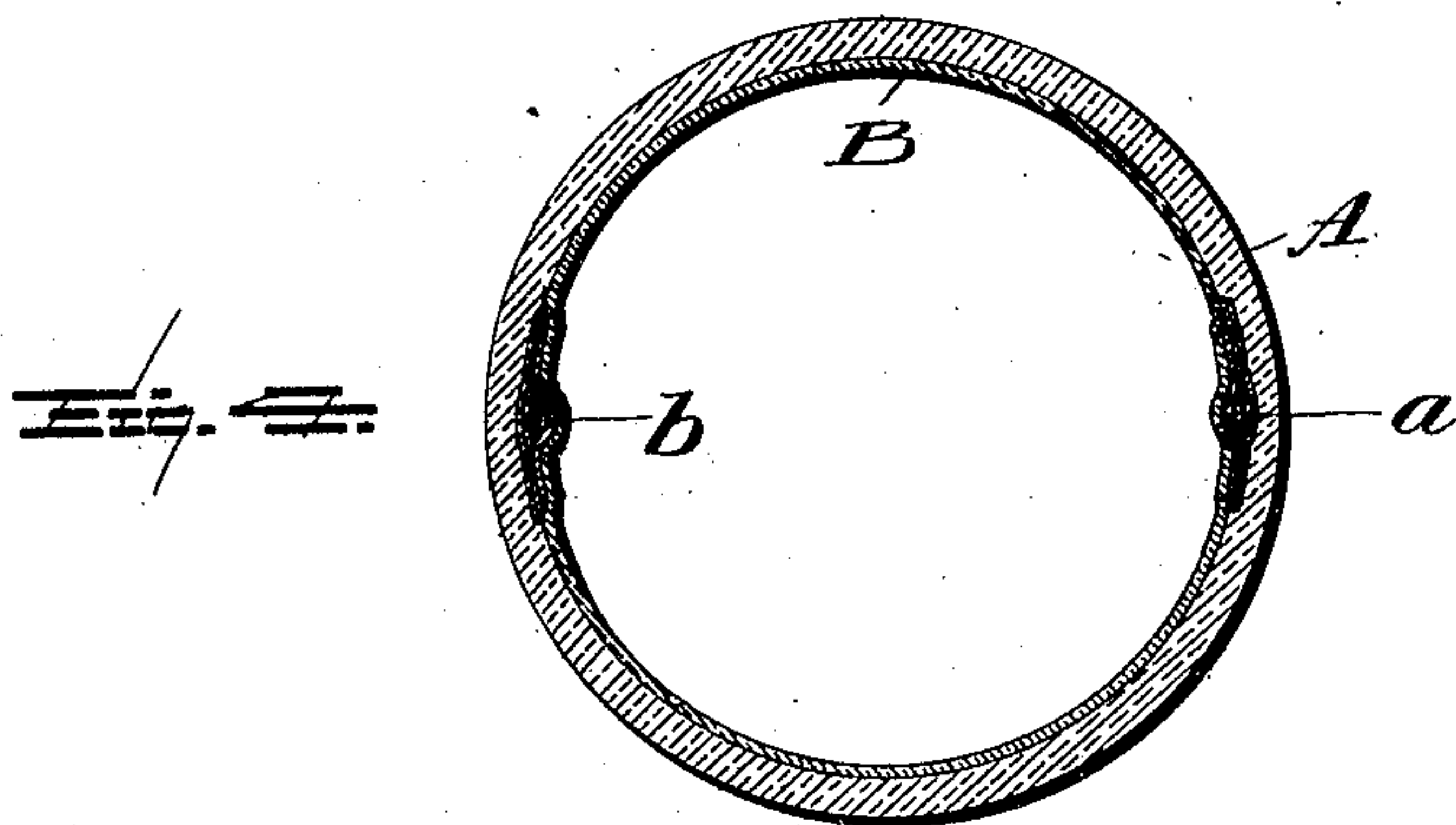
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2 Sheets—Sheet 2.



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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. 646,886, dated April 3, 1900.

Application filed November 9, 1899. Serial No. 736,427. (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 has to do with electrical devices, which to some extent are now in use, for the purpose of permitting communication between the pipeman who is in charge of the nozzle at one end of a line of fire-hose and the engineer at the engine at the other end of the line; and it relates particularly to the manner of combining the conductors or line-wires with the hose. In all cases, so far as we are aware, in which the circuit or line wires have been incorporated in the hose they have been placed between the plies of the hose or between the outer jacket and the inner jacket—as, for example, in the case of what is known as “double-jacket fabric hose”—that is, a hose made of two separate and distinct fabric tubes, the outer one being pulled over the inner one. In order to prevent the wires from being injured or broken by the stretching of the hose, as well as the constant bending to which it has been subjected, it has been customary to wind the wires spirally around the inner hose-jacket, and for the same purpose it has also been proposed to form each conductor as a flattened spiral or to crimp or corrugate it. What we propose is to introduce the conductors between the fabric body of the hose and the rubber lining with which said hose is provided, the arrangement being such that said conductors are, in effect, incorporated into the rubber lining. In this way there is not that liability of the wires becoming misplaced which arises when they are merely placed between two plies or fabric bodies, and they are also much more effectually insulated, shielded, and protected from extraneous influences, besides which they can be most readily applied to and incorporated in the hose, being, in effect, secured and seated into place by and during the operation of steaming or vulcanizing the lining into permanent union with

the body of the hose. This and other features of our improvement will be readily understood in connection with the accompanying drawings, to which we will now refer.

In said drawings, Figure 1 is a view of a piece of rubber-lined fabric hose embodying our improvements in their preferred form, a portion of the exterior of the hose being broken away. Fig. 2 is a cross-section of the same. Fig. 3 is a view of the lining as prepared with the conductors for insertion into the fabric body of the hose. Figs. 4, 5, and 6 are views of modifications which will be hereinafter more specifically referred to.

Like letters of reference indicate like parts in all the figures.

A is the fabric body of the hose, which may be of any suitable kind, preferably, however, a multiply-woven fabric made in two or more plies solidified or fastened together by tying-strands during the weaving operation.

B is the rubber lining.

The wires preferably are attached to the rubber lining before the latter is inserted into the fabric body of the hose. We attach them in any suitable way to the exterior of the lining by cement or otherwise and cover them with rubber, so that when the rubber lining is subsequently inserted into the fabric tube and subjected to the steaming or vulcanizing operation, which unites it solidly with the fabric, the wires will be secured in place by and during that operation and will, in effect, be incorporated into the lining. The wires are crimped, corrugated, or otherwise bent or curved in order to provide the necessary slack to compensate for the elongation or bending of the hose when in service. Each should be provided with an insulating-covering when they are laid in contact with or in near proximity to each other; but when they are laid where there is no liability of their contacting with each other—as, for example, when they are laid on opposite sides of the hose—a special insulating-covering is not needed, inasmuch as by our plan the rubber furnishes ample insulation.

The preferred arrangement of the wires is shown in Figs. 1 to 3. These wires, (designated by the reference-letters *a b*,) each having a proper insulated covering, are crimped



in easy curves in such manner that they will conform to each other and nest closely together, as indicated more particularly in Fig. 3. In this way we are enabled to economize space  
 5 and material and to apply the wires quickly and to hold them in place on the lining by one and the same set of attaching and covering devices. The wires are attached to the lining by cement or otherwise and are covered  
 10 by a rubber strip *m*, which is cemented over them. It is preferred to place between the wires and the lining *B* a strip of fabric *n*, cut on the bias, in order to prevent the wires from unduly pressing into the lining, and  
 15 this fabric strip is overlaid by a rubber strip *o*. This, however, while advantageous in several respects, is not indispensable, and is a nicety rather than a necessity. After the lining has been thus prepared and provided with the  
 20 wires it is inserted into the fabric hose *A* and is secured to the same by the usual steaming operation, whereby it is expanded and vulcanized to the body of the hose. Apparatus for this purpose is well known and will be  
 25 found described, for example, in Letters Patent No. 553,877, of February 4, 1896. By and during this operation the wires are secured and are effectually sealed and insulated from extraneous injurious influences.  
 30 Instead of nesting the crimped wires together and using for both one and the same set of attaching and covering devices we can apply them separately and on opposite sides of the hose, as indicated in Fig. 4, which is a  
 35 cross-section of hose with the two wires placed on opposite sides of the exterior of the rubber lining. In this event the two wires need not be crimped with conforming curves, or in lieu of crimping the wires they may be laid  
 40 in slightly-curved lines, as indicated in Fig. 5, Fig. 6 being a detached view of a piece of one of such wires. These curved wires may be laid separately or side by side, as preferred.  
 45 The rubber lining before it is put into the fabric hose is only partly cured, the process of vulcanization being perfected and completed at the time of its union with the body of the hose by and during the steaming operation, and thus we may draw the wires into  
 50 the fabric hose before the rubber lining is inserted and hold them there in place until after the rubber lining has been inserted and

expanded, the result then being that the wires will be, in effect, embedded and held, as in the other instance. In this case the wires  
 55 can, if desired, be laid in between layers or strips of rubber, as already described, and in this connection we desire to say that the rubber strips for covering the wires are not vulcanized, but are made of an adhesive  
 60 quality of uncured rubber soft enough to allow of the wires being embedded in the material during the after steaming and curing process. These strips or layers of rubber form, in effect, a pocket to hold the wire or wires.  
 65

Hose of this kind, like other hose, is made in sections, which sections of course must be provided with couplings having devices whereby when any two sections are coupled together their appropriate wires will be electrically connected. Such devices, however, are known and in use and form no part of our present invention.

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

1. Hydraulic hose consisting of a rubber lining, an exterior fabric body into which said  
 80 lining is vulcanized and interposed insulated electric conductors or line-wires laid upon and secured to the exterior of the rubber lining substantially as hereinbefore set forth.

2. In combination with the exterior fabric  
 85 hose-body, a rubber lining vulcanized into place in said fabric body and having on its exterior conducting-wires, a fabric strip or strips interposed between it and said wires, and a rubber covering strip or strips for said  
 90 wires, substantially as and for the purposes hereinbefore set forth.

3. Hydraulic hose having incorporated within its body longitudinal insulated conductors crimped or bent into conforming curves and  
 95 nested together, substantially as and for the purposes hereinbefore set forth.

In testimony whereof we have hereunto set our hands this 4th day of November, 1899.

BENJAMIN L. STOWE.  
 JOHN J. VOORHEES.

Witnesses:

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 WARREN W. AINSWORTH.