

(No Model.)

N. M. RITTENHOUSE & M. W. LOCKE.

UNDERGROUND TELEGRAPH LINE.

No. 276,472.

Patented Apr. 24, 1883.

Fig. 1.

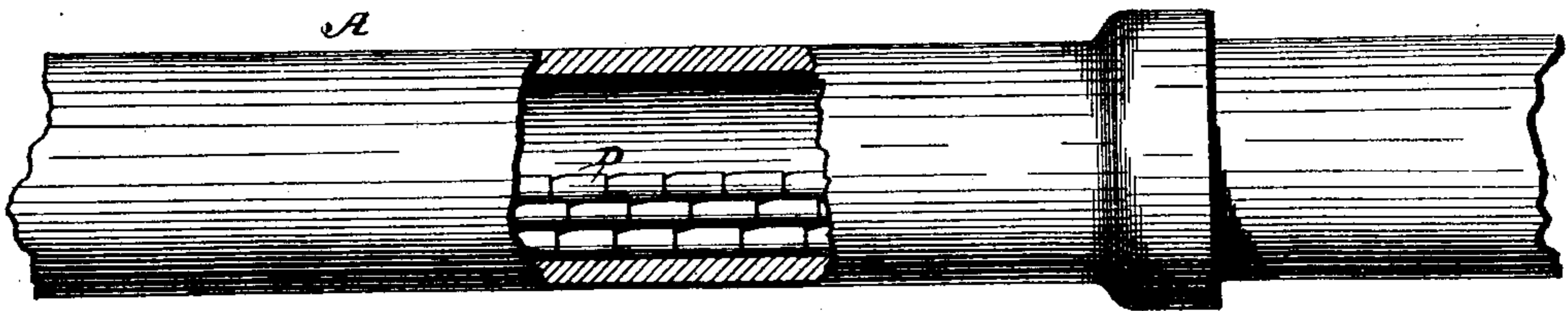


Fig. 5.

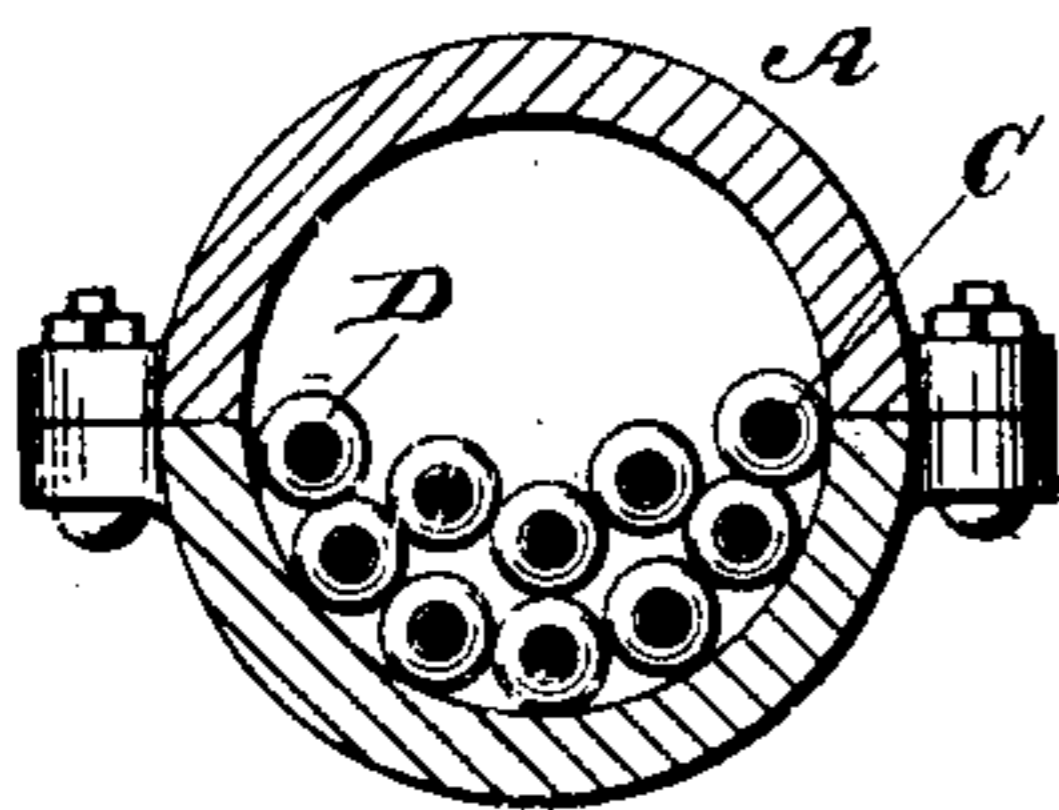


Fig. 2.

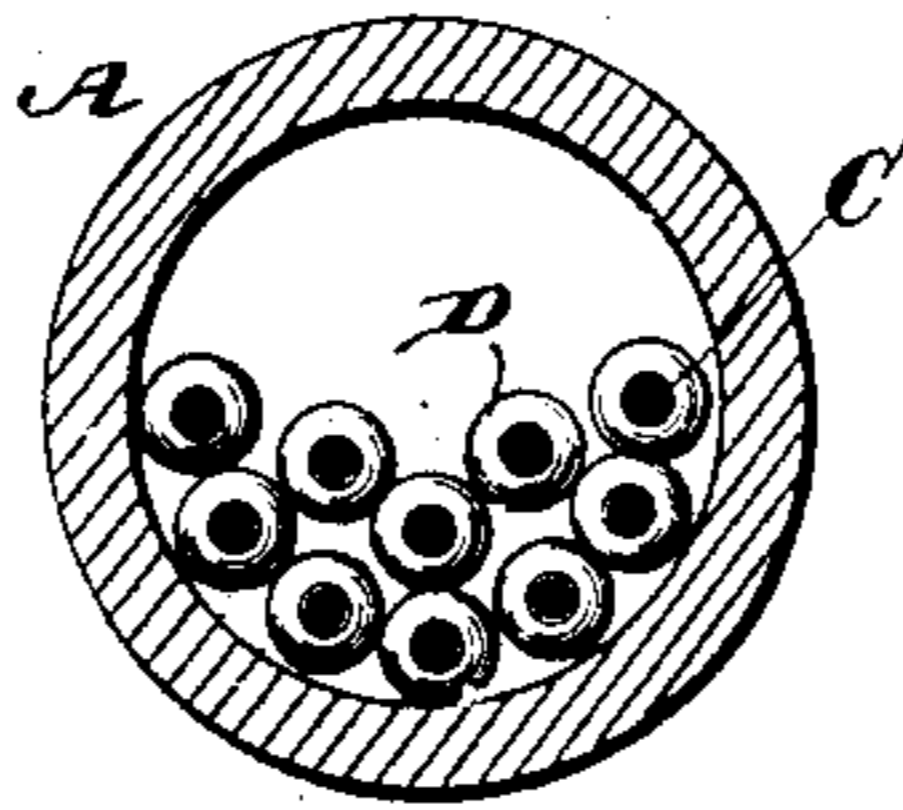


Fig. 6.

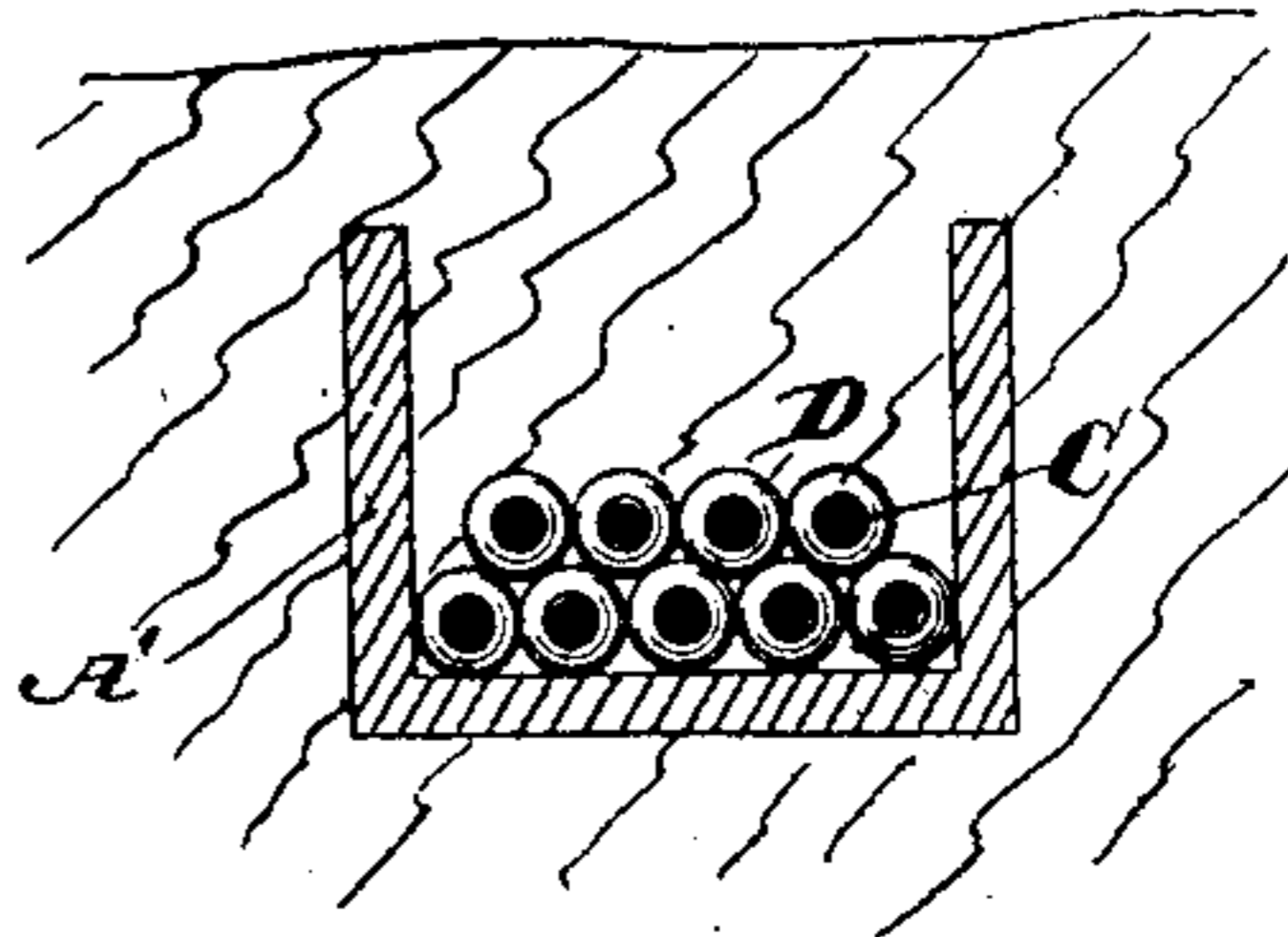


Fig. 3.

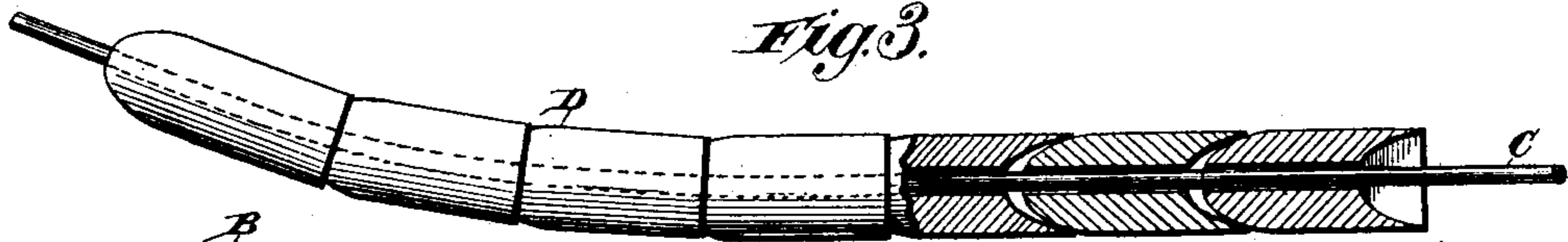


Fig. 7.

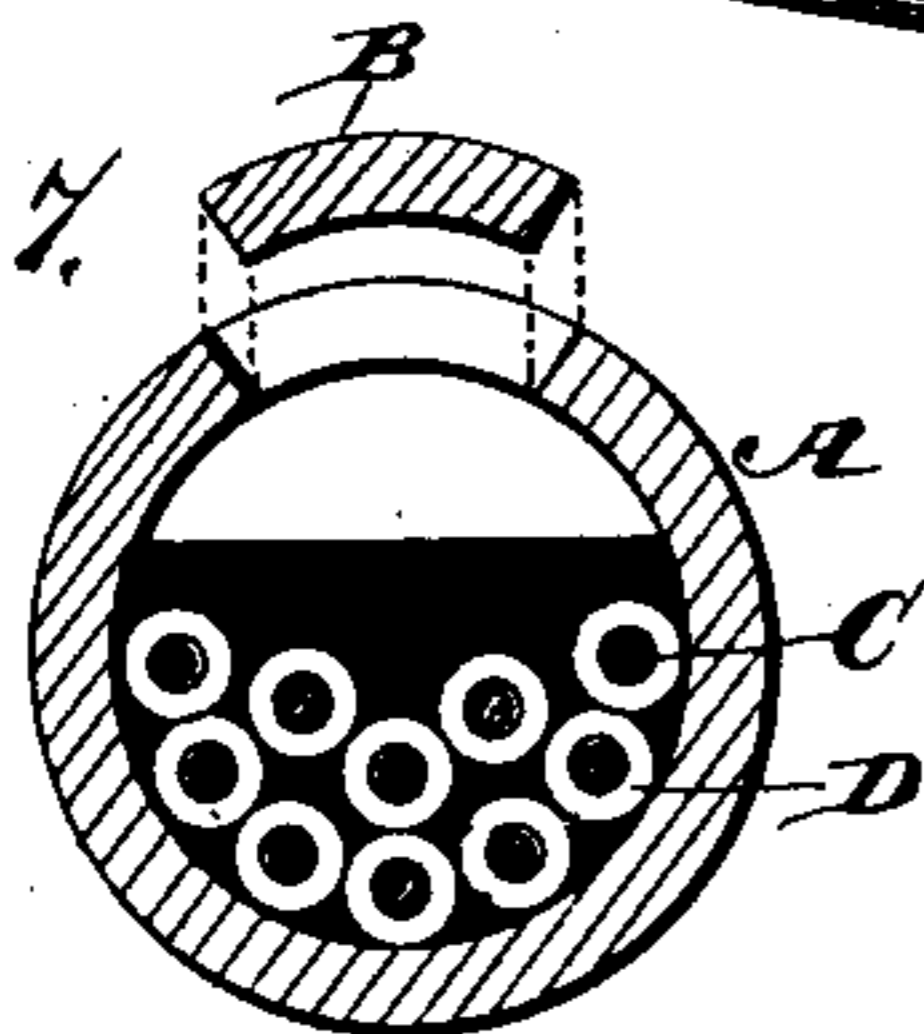


Fig. 4.

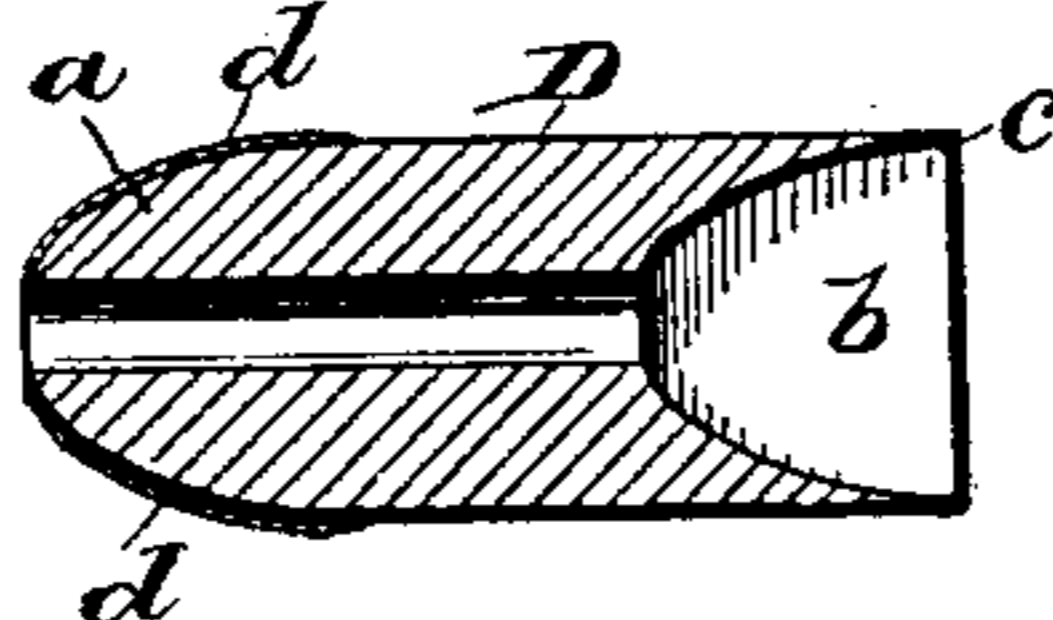
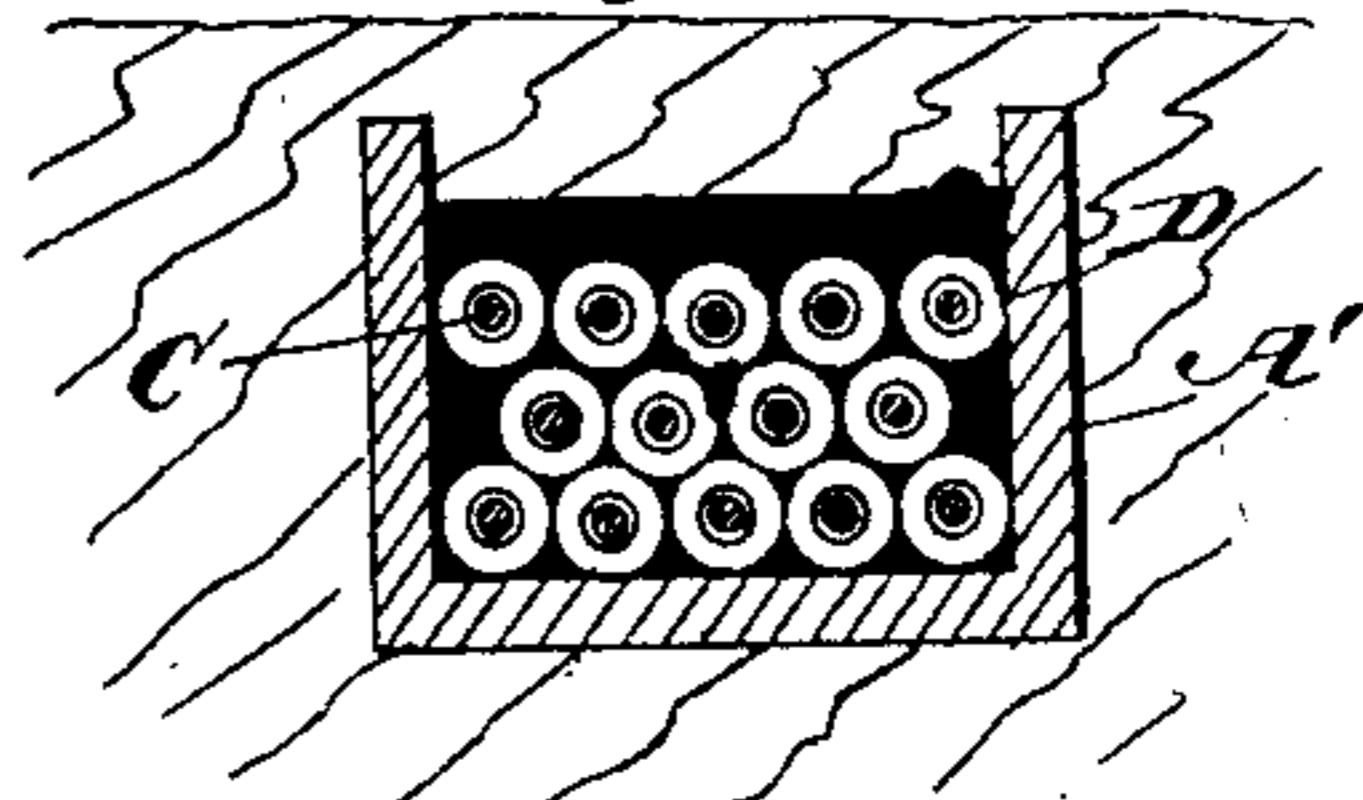


Fig. 8.



Witnesses,

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UNITED STATES PATENT OFFICE.

NICHOLAS M. RITTENHOUSE AND MILO W. LOCKE, OF BALTIMORE, MD.

UNDERGROUND TELEGRAPH LINE.

SPECIFICATION forming part of Letters Patent No. 276,472, dated April 24, 1883.

Application filed March 27, 1883. (No model.)

To all whom it may concern:

Be it known that we, NICHOLAS M. RITTENHOUSE and MILO W. LOCKE, both citizens of the United States, residing at Baltimore, Maryland, have invented new and useful Improvements in Underground Telegraph Lines, of which the following is a specification.

The object of our invention is to provide means whereby underground electric conductors—such as the wires of a multiple cable, as well as telephone and electric-light wires—may be insulated from each other in the most simple, perfect, and economical manner, whereby the several wires or cables are not deprived of their flexibility, but may be quickly and easily laid under ground, either in an inclosing-pipe, with or without a filling of liquefied insulating material, or in an open trough covered with earth.

To this end our invention consists in an insulating-bead, of any suitable non-conducting material, of conoidal form, and having its base cupped, a central longitudinal perforation being formed to permit the passage of the wire.

Our invention consists, also, in an insulating-bead adapted to be strung in a continuous series upon the wire, said bead having a cylindrical body and a conoidal point coated with a film of insulating material.

Our invention consists, finally, in the combination, with an electric conductor, of a series of insulating-beads, forming a continuous covering, each bead having a cylindrical body, a conoidal head covered with a film of insulating-gum, and having its base cupped to receive the conoidal point or head of the following bead, the edges of the cup resting upon the coated conoidal head, and forming a tight but flexible joint, practically impervious to moisture.

Referring to the drawings, Figure 1 is an elevation of an underground closed pipe, part of the wall being broken away, showing several electric conductors contained therein and insulated by our invention. Fig. 2 is a cross-section of Fig. 1. Fig. 3 is a view, partly in elevation and partly in section, of a wire insulated by our invention. Fig. 4 is a central longitudinal section of a single insulating-bead detached. Fig. 5 is a cross-section of a pipe for underground wires, formed in two parts and united by bolts engaging with bosses

formed upon the half-sections of the pipe. Fig. 6 is a cross-section representing the several conductors insulated by our invention, laid in an open trough and covered with earth. Fig. 7 is a cross-section illustrating a closed pipe having man-holes at suitable intervals, with the insulated conductors laid therein, and embedded in any suitable insulating material or compound liquefied by heat. Fig. 8 is a cross-section of an open trough with insulated wires laid therein and embedded in asphaltum or other suitable insulating material.

A in said drawings indicates the tube or pipe within which the wires or cable are laid. It may be constructed of any suitable material, such as earthenware, porcelain, wood, or metal, or of any vitreous substance, or entirely of asphalt or other non-conducting material, the former being in some instances preferred because of its cheapness, durability, and insulating properties. The closed pipe may be made in any one of the forms shown in Figs. 1, 2, 5, and 7, man-holes B being provided at suitable intervals, whereby access may be obtained to the interior for the purpose of laying additional cables or forming new connections. Instead, however, of the latter construction, the tube may be made in two longitudinal sections, which are fastened together by bolts engaging with lugs or bosses formed upon each. Instead of the closed pipe, an open rectangular trough, A', may be used, as shown in Figs. 6 and 8, the conductors laid therein being either covered with earth or embedded in any suitable insulating material which is liquefied by heat.

C represents any electrical conductor, whether the same be one of the wires of a multiple cable, an electric-light or a telephone wire. Upon each conductor are strung a series of beads, D, made of any suitable non-conducting material, such as glass, porcelain, earthenware, wood, or of any vitreous substance, or entirely of asphalt. They may be formed of any desired diameter and, within practical limits, of any required length. Each of these beads being a counterpart in form and size of all the others, a single one is shown in section in Fig. 4 to clearly illustrate their construction. The body of the bead is cylindrical and the head or point *a* is of conoidal shape, while the base or end is cupped, as shown at *b*, to

such a degree that the point of the adjacent bead may enter but not entirely fill the cup. By this construction it will be seen that the edges *c* of the cupped end will rest upon the conoidal head of the bead next succeeding just above the cylindrical body, thereby forming a close joint, and also preserving a uniform and substantially unbroken exterior throughout the series, as shown in Fig. 3.

10 In order to form a practically tight joint between the beads, the conoidal head is dipped into or otherwise covered with a coating or film of some liquefied non-conducting material, of which asphaltum is an example. By this
15 means the point and a small portion of the cylindrical body are covered with a yielding adhesive coat, *d*, upon which the cupped end of the preceding bead sits, and by pressing the beads together when strung upon the wire a
20 tight joint will be formed, the edges *c* of the cupped end sinking slightly into the film *d*, thereby closing the joint, and rendering it not only impervious to moisture, but by the non-conducting properties of the gum rendering
25 the insulation more perfect. Where bends or elbows occur in the wire they are easily made without in any degree affecting the joints between the beads.

It will be seen that the cupped end and conoidal point, when united, form a species of
30 universal joint closely resembling the ball and socket used in other constructions.

Wires insulated in this manner may be laid in pipes or in open troughs in any of the methods shown in the drawings; or they may be
35 laid directly in the earth. For example, any number of cables may be laid in a closed tube, as in Figs. 1, 2, and 5, one resting upon another. This method is preferable because of
40 the ease with which any wire may be removed or new wires laid. They may, however, be laid either in a closed tube having an upper removable section or provided with man-holes at intervals, and then embedded in any non-
45 conducting substance which liquefies by heat, or an open trough may be employed, and after the liquefied protecting material has

cooled the earth may be filled in upon it. It should be noted, however, that the insulation of the wires by our invention is so perfect that
50 they may be laid in an open receptacle and simply covered with earth, as shown in Fig. 6, or simply laid in and covered by the earth.

When the wires are laid in the manner shown in Figs. 7 and 8, any suitable material
55 may be used which liquefies by heat and possesses the proper non-conducting qualities, such as asphaltum, cement, resin, or pitch mingled with silica, or any other non-conducting substance which may be rendered plastic by heat.
60

Having thus described our invention, what we claim is—

1. An insulating-bead for electric conductors, having a conoidal point and a cupped base or end, substantially as described.
65

2. An insulating-bead having a cylindrical body, a conoidal point, and a cupped base or end, substantially as described.

3. An insulating-bead having its conoidal point coated with a film of asphaltum or other
70 non-conducting gum, substantially as described.

4. The combination, with an electric conductor, of a series of insulating-beads, each having a conoidal point coated with a film of
75 non-conducting gum, and a cupped base or end, substantially as described.

5. The combination, with a pipe or tube for underground wires, of a series of separate
80 conductors insulated by a series of beads strung upon each, said beads being joined by the coated conoidal point of one entering the cupped base of the next, and a non-conducting substance capable of being liquefied by heat, and placed in said pipe upon and around the
85 several wires, substantially as described.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

NICHOLAS M. RITTENHOUSE.

MILO W. LOCKE.

Witnesses:

JAMES L. NORRIS,

JAMES A. RUTHERFORD.