(No Model.) 3 Sheets—Sheet 1.

# W. R. PATTERSON.

## UNDERGROUND ELECTRIC CABLE.

No. 430,297. Patented June 17, 1890.

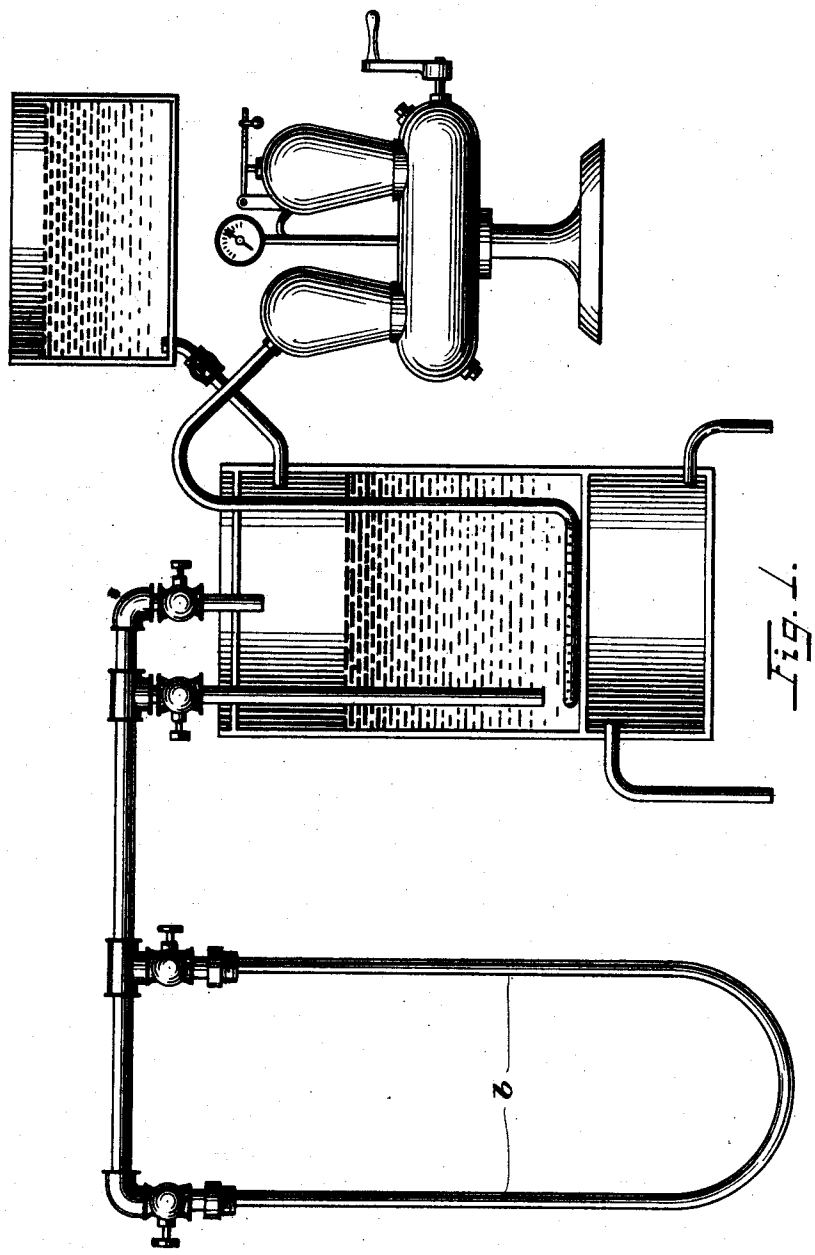


Fig. 1.

Witnesses.
C. G. Hawley.
Geo. R. Parker.

Inventor.
William R. Patterson

(No Model.) 3 Sheets—Sheet 2.

# W. R. PATTERSON.

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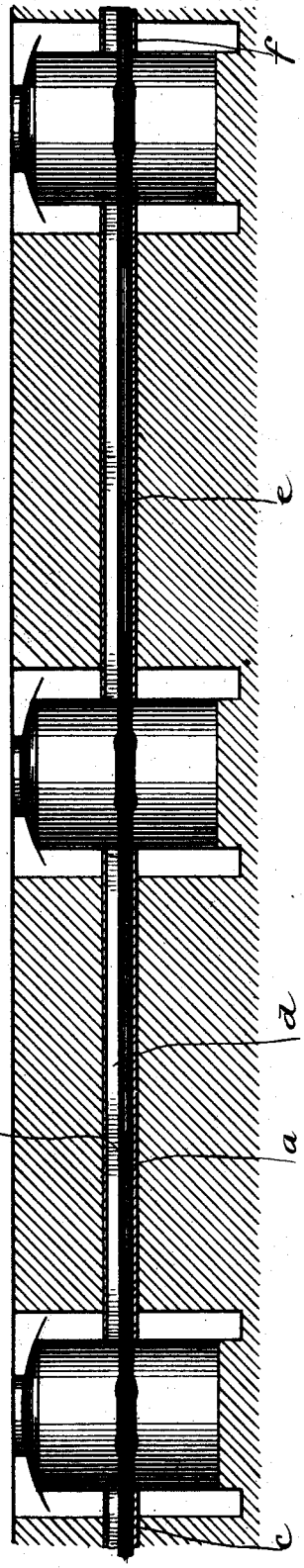


Fig. 2.

Witnesses.
C. G. Hawley.
Geo. R. Parker.

Inventor.
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(No Model.) 3 Sheets—Sheet 3.

# W. R. PATTERSON.

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No. 430,297. Patented June 17, 1890.

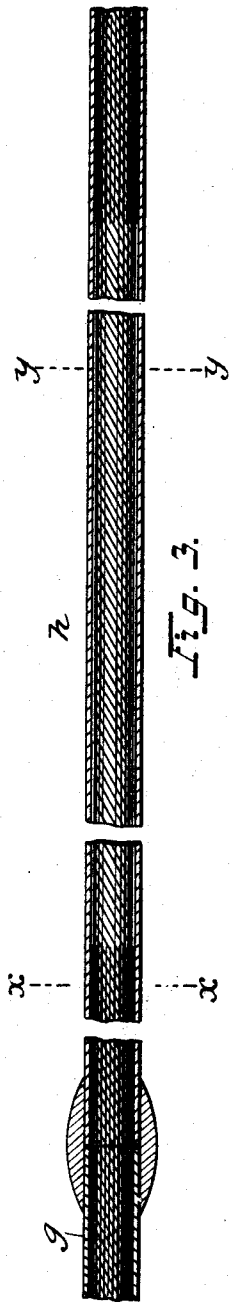


Fig. 3.

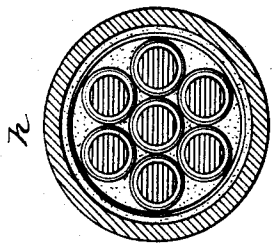


Fig. 5.

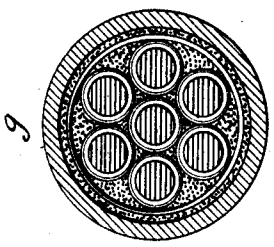


Fig. 4.

Witnesses.
Charles G. Hawley.
F. A. Boynton.

Inventor.
William R. Patterson.
By Serg. P. Barton
Attorney.

# UNITED STATES PATENT OFFICE.

WILLIAM R. PATTERSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

## UNDERGROUND ELECTRIC CABLE.

SPECIFICATION forming part of Letters Patent No. 430,297, dated June 17, 1890.

Application filed May 14, 1889. Serial No. 310,752. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM R. PATTERSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Underground Electric Cables, (Case 81,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to electric cables; and its object is to reduce the static capacity of such cables and make it possible or convenient to remove the core or the greater portion thereof whenever such removal may be desired. Portions of the cable, as those nearest the man-holes, are filled with an insulating substance to form a dam to prevent water from penetrating longitudinally. The central portions of each section—that is to say, the portions between the man-holes—except the portions in close proximity to the man-holes, are left with a dry core—that is to say, without insulating-filling—simply inclosed in the lead pipe. It will be understood that the pipe is not liable to mechanical injury, except in the man-holes, and therefore it is only necessary to guard against the absorption of moisture by the core near the man-holes.

As to the state of the art prior to my invention, reference is made to my patent, No. 378,175, granted February 21, 1888.

My invention will be readily understood by reference to the accompanying drawings, in which—

Figure 1 is a view showing the preferable manner of filling the two ends of a section with insulating-filling, the gas or air between the filled ends being compressed in the operation. Fig. 2 is a view showing four sections of such cable spliced together, the splices being so arranged as to come each at a different man-hole of the conduit. Fig. 3 is a longitudinal sectional view of my cable, showing the core saturated and unsaturated or dry at alternate sections thereof. Fig. 4 is a transverse sectional view upon line $x$ $x$, showing the core saturated. Fig. 5 is a sectional view upon line $y$ $y$, showing the core unsaturated.

It will be understood that the core $a$ is first deprived of moisture and drawn into the lead pipe $b$. The section may be, say, four hundred feet long. Insulating-filling, preferably paraffine, is then forced into the two ends of the section in any suitable manner. The apparatus shown in Fig. 1 is adapted to do this work, though I do not wish to limit this patent to any particular method or particular apparatus for forcing the insulating-filling into the ends of the section. The sections of the desired length are thus made and filled at each end with an insulating-filling as far as may be thought necessary. I prefer to fill each end of the section for a distance of about twenty-five feet, in order that there may be plenty of margin for splicing and plenty of length through which the moisture must penetrate slowly, so as to give due notice of the fault in case of mechanical injury to the pipe at a man-hole. Thus, as shown in Fig. 2, the sections $c$ $d$ $e$ $f$ are spliced together to form a single cable of insulated conductors. This cable, as a whole, is made up of the portions between the man-holes containing the dry core and gas or air under pressure. The sections at the man-holes are filled with insulating material like paraffine, in order that moisture may not penetrate longitudinally in case of mechanical injury to the pipe at the man-holes. The vertical scale of the drawings, Fig. 2, is much greater than the longitudinal. It may be assumed that the depth of the man-holes is six feet and the longitudinal distance between them, respectively, four hundred feet. Of course the length and depth may be varied as circumstances may require—as, for example, the length of the blocks and the grade—a man-hole being usually required at each street intersection. As shown in Fig. 3, the portions $g$ of the cable are shown with the core saturated. The intermediate portions $h$ $h$ are left unsaturated. Thus a transverse section through any saturated portion $g$ would appear, as shown in Fig. 4, while a section through the unsaturated portion $h$ would appear, as in Fig. 5.

My cable as thus made will be of very low capacity since the greater portion of the core will be left dry, the gas or air being of lower specific inductive capacity than liquid or solid insulating substances of any kind. In case of injury to the pipe necessitating the re-

moval of a section of the cable, the core being for the greater part of its length loose in the pipe, may be readily removed. The core can thus be more readily utilized for electrical purposes.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A cable consisting of a lead pipe and a core of insulated conductors inclosed therein, said core being left dry in alternate sections, the portions of the cable between the dry sections being filled with solid insulating material and the dry sections containing gas or air under pressure.

2. The combination, with a telegraph-cable consisting of a core of insulated conductors contained in a lead pipe, of a conduit in which said cable is laid, said conduit being provided with man-holes, the cable at the man-holes being filled with an insulating substance which saturates the core, the intermediate portions of the cable being left with the core loose in the pipe, and gas or air under pressure being contained therein, substantially as and for the purpose specified.

3. A section of telegraph-cable filled at each end with an insulating substance, the portion of the cable between said filled ends containing air or gas held under pressure by the insulating-filling, substantially as described.

In witness whereof I hereunto subscribe my name this 11th day of May, A. D. 1889.

WILLIAM R. PATTERSON.

Witnesses:
GEORGE P. BARTON,
C. G. HAWLEY.