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F. X. TAAFFE & C. H. KOYL.

UNDERGROUND LINE.

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Fig. 4.

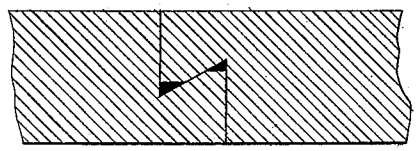


Fig. 2.

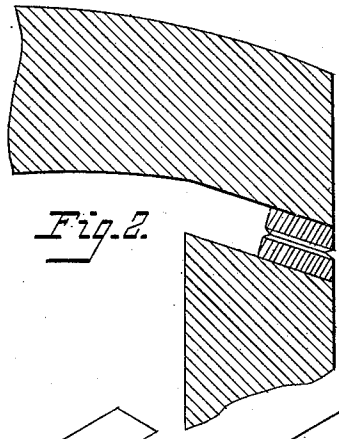


Fig. 1.

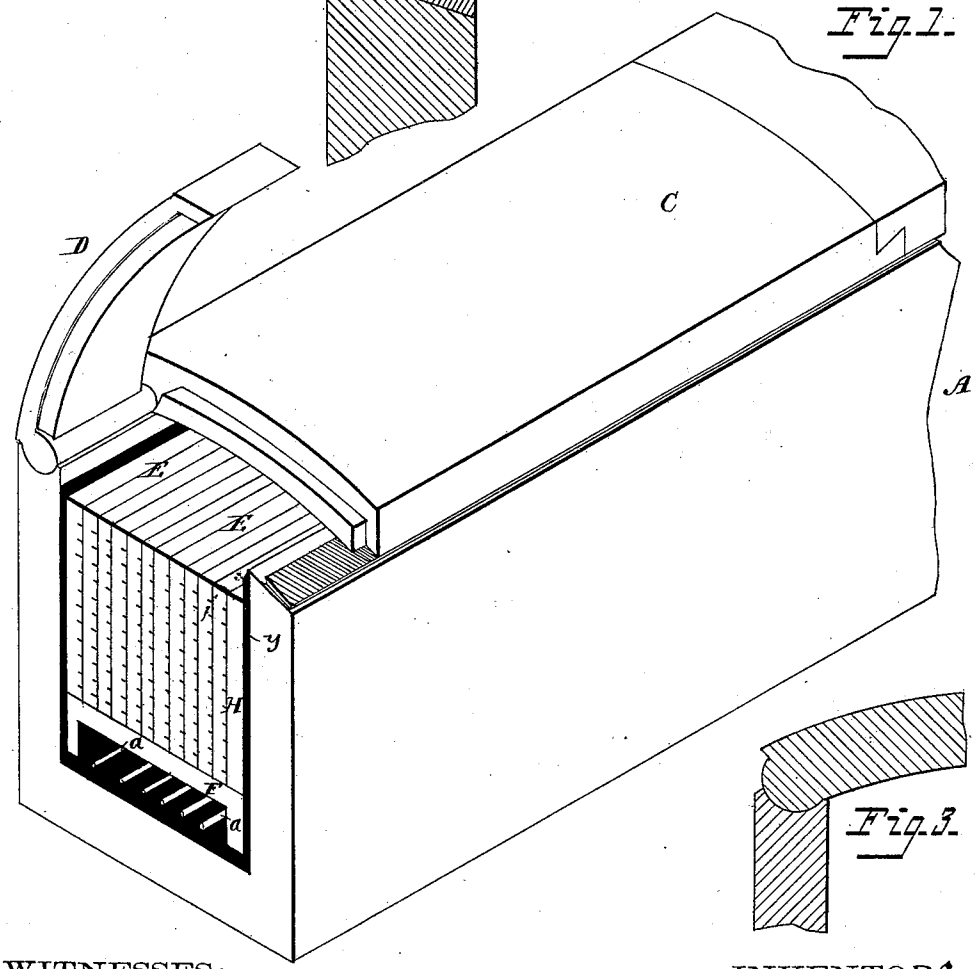


Fig. 3.

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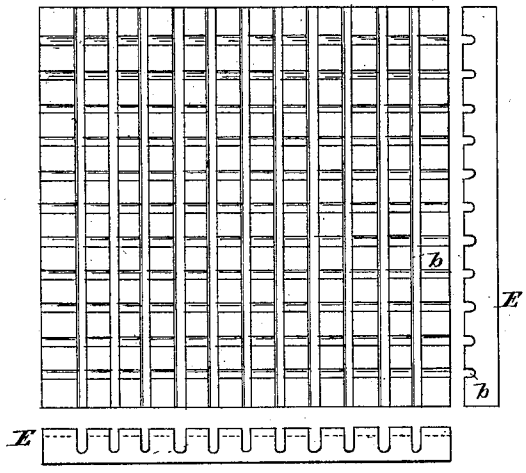


Fig. 6.

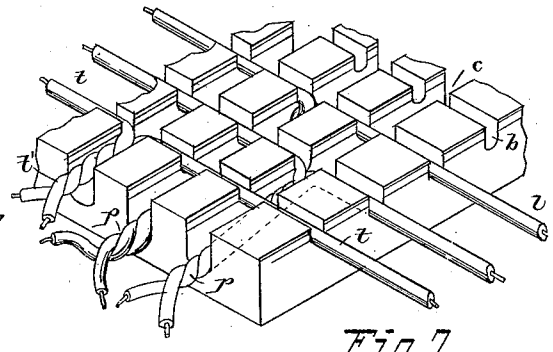
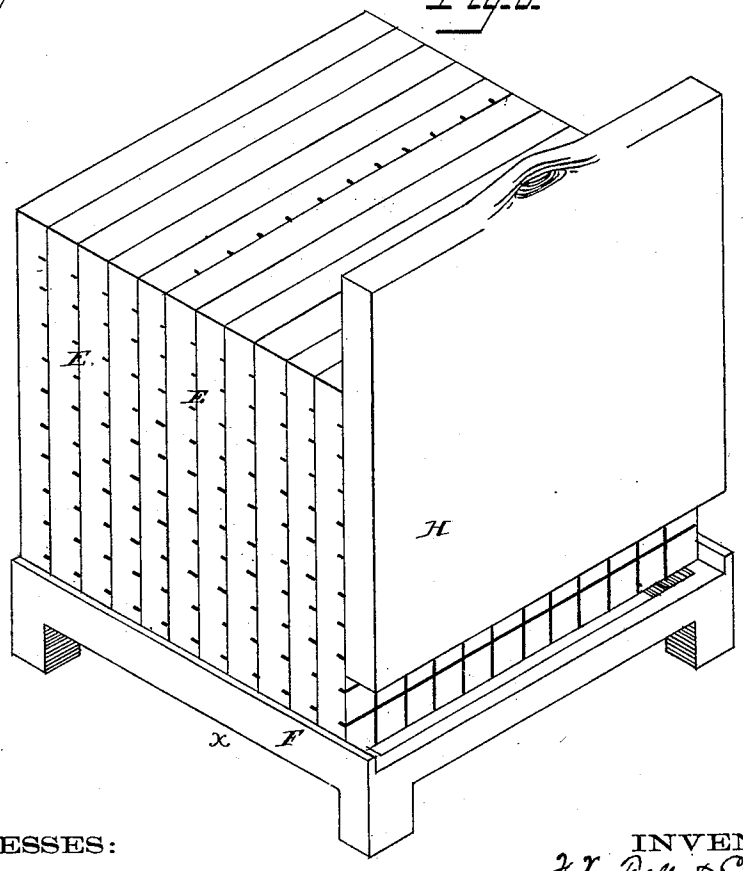


Fig. 7.

Fig. 5.



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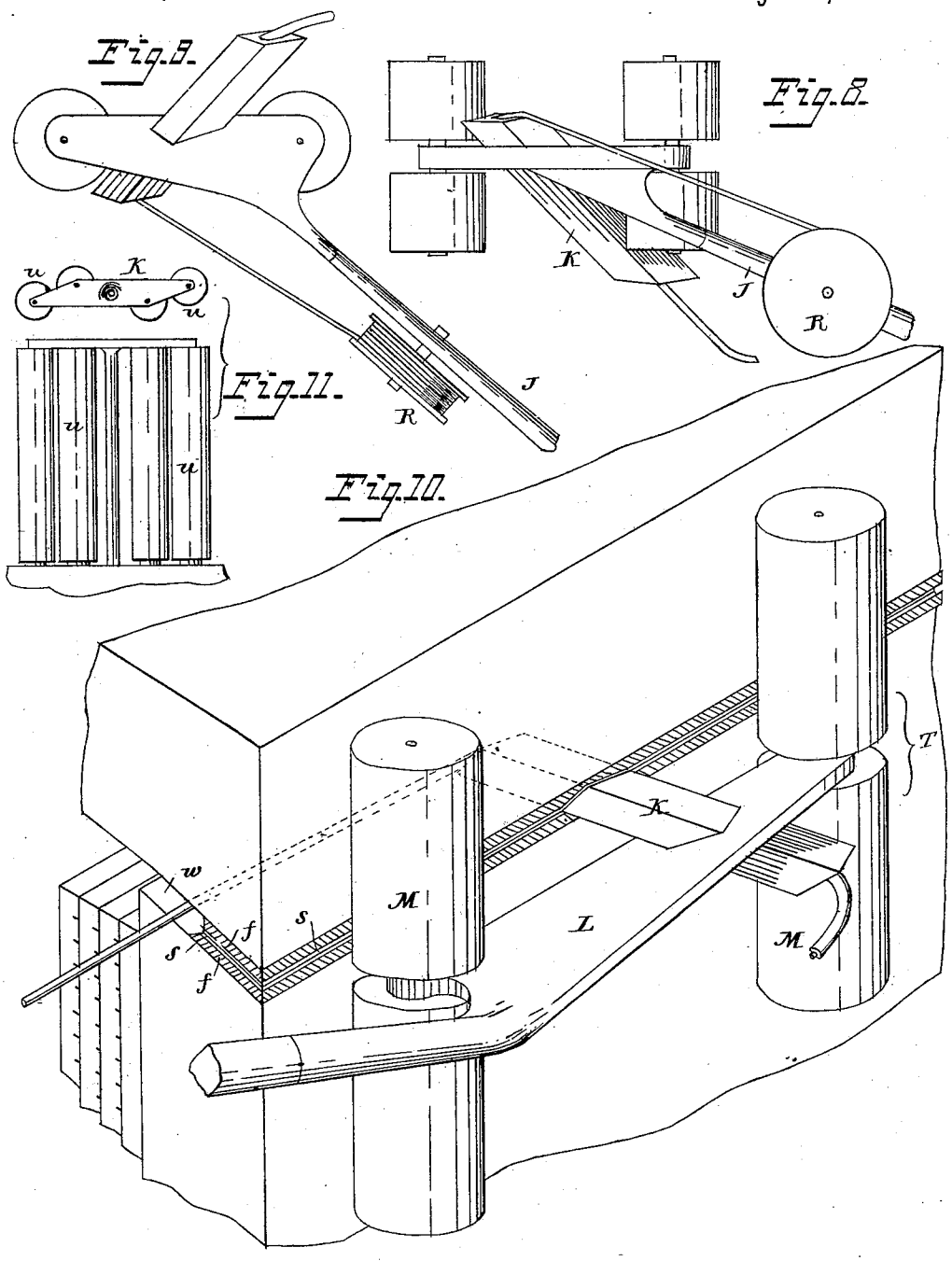
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UNITED STATES PATENT OFFICE.

FRANCIS X. TAAFFE, OF BALTIMORE, MARYLAND, AND CHARLES H. KOYL, OF COBOURG, ONTARIO, CANADA.

UNDERGROUND LINE.

SPECIFICATION forming part of Letters Patent No. 278,627, dated May 29, 1883.

Application filed May 3, 1883. (No model.)

To all whom it may concern:

Be it known that we, FRANCIS X. TAAFFE, of Baltimore, Maryland, and CHARLES H. KOYL, of Cobourg, Ontario, Canada, temporarily residing at Baltimore, Maryland, have invented certain new and useful Improvements in Underground Lines, of which the following is a full, clear, and exact specification.

Our invention relates to underground conduits for electrical conductors, and has for its object to provide means whereby the conductors may be easily and readily inserted into the conduit and manipulated for the purpose of making intermediate connections, and whereby the main and lateral wires, at the points of connection, are firmly supported in their relative positions without liability of contact.

To this end the invention consists of a conduit provided with line-supporting blocks or wire-carriers having longitudinal main-line grooves and transverse loop-line grooves, the latter being of a greater depth than the former.

It also consists in arranging the wire-carriers at proper intervals along the conduit, and securing them, by means of a suitable device, in such a manner that they may be easily separated for the purpose of gaining access to the conductors.

It further consists in the means whereby wires may be introduced with great rapidity laterally into the conduit without removing the cover or practically opening the conduit.

Referring to the drawings forming part of this specification, Figure 1 is a longitudinal elevation of part of the conduit, showing the line-carriers in position. Figs. 2 and 3 are transverse sections of part of the conduit. Fig. 4 is a section showing the joint between the adjacent sections of the cover. Fig. 5 is a perspective view of the line-carriers and key. Fig. 6 represents face and edge views of one of the line-carriers. Fig. 7 is a perspective view of a part of one of the line-carriers, showing the lines in position. Fig. 8 is a plan view of a line-introducing device. Fig. 9 is a side view of the same. Fig. 10 is a perspective view illustrating the manner of using the device, and Fig. 11 are plan and side views representing a modification of the introducing-blade.

In carrying out our invention we prefer to make the conduit A in the form of a hollow curbstone for streets; but any other form or kind of conduit may be used. The conduit may be in sections of pipe; but we prefer to form it, in its position, of plastic materials that will harden or set, as artificial stone. This may be done by molds or any suitable means. The inside of the conduit has a lining, *y*, of asphaltum or similar material, and in the bottom thereof a thick layer of this insulting material is placed through longitudinal channels, in which the trunk lines *a* or main telegraph-wires may extend; or temporary cords may be inserted in these channels for the purpose of drawing through the conductors as needed.

The cover C is made in sections. At intervals between the sections are left spaces which are closed by caps D, that can be readily raised or removed to permit access to the interior of the conduit. A series of wire-carriers consisting of blocks E, of insulating material, each having grooves or recesses in one or both sides for holding the wires, is arranged within the conduit adjacent to each opening. These blocks E are placed face to face, so as to nearly fill the space between the opposite sides of the conduit, and are clamped together by suitable means—as, for instance, a key-block, H. This key consists in the present instance of a longitudinal strip, preferably slightly tapered, which holds the wire-carriers in close contact. It may be placed, as shown, between one of the carriers and the adjacent side of the conduit, or between any two of the carriers. The carriers are supported by a frame, F, so as to leave a space, *x*, at the bottom of the conduit, for the purpose hereinafter stated.

When it is desired to place, remove, or otherwise manipulate any particular wire or wires in any of the supporting-blocks or carriers E, the key H is moved, releasing the blocks, and allowing them to separate a suitable distance without other displacement, when the desired wire can be reached by hand or tool. Each of the wire-carriers or blocks E has grooves *b* on one or both sides, at proper distances apart, in which are the line-wires *l*. Transversely to these is another series of grooves, *c*, which may each extend from one edge of the block to one of the grooves *b*. As shown, however, the grooves extend completely across the block,

These latter grooves, *c*, are deeper than the grooves *b*, and when it is desired to take off a loop-line, *p*, the particular line is slackened and the proper tool is introduced from above or below, and the desired line-wire *l* is caught and carried into the groove *c* in the form of a loop, passing under all the other lines in the supporting-block to the space above or below the line-carriers. Thence it may be carried along the side of the conduit, being pressed into the asphaltum, if necessary, to a service-pipe leading to the house or other connection. Instead of making the loop from the main line, it may be made separately in the form of a T, with a double shank and inclosed in the block, with the ends *t t* projecting beyond the edges of the block for attachment to the line, and the shank *t'* extending to the house-connection, as shown in Fig. 7. The loop may be cut and a connecting-wire joined to each end, if preferred, to save drawing too long a loop through the grooves. While the loops may be readily broken off, as above described, it will be seen that both the main wires and the loops are maintained in their proper position, the difference in the depths of the grooves permitting the transverse wires to be carried past the others without contact. The whole mass of line-wires is supported by the blocks E at proper intervals throughout the conduit, and the wires are maintained fixedly in their relative positions; yet ready access may be had to any of them at any time by simply unclamping the blocks between which they are confined, as above described.

It is difficult in the class of conduits that are practically closed throughout their lengths to introduce additional wires, and heretofore this has been done by introducing them longitudinally. We obviate this objection by providing the conduit with a longitudinal opening, *w*, which is closed by a flexible lip or lips, *f*, so that the wire may be introduced laterally, the lip or lips *f* yielding to permit of the introduction of the wires, and at the same time maintaining the conduit practically closed.

In order to facilitate the introduction of the wire, we make use of a special tool. A most effectual instrument is shown in the drawings, and consists of a perforated blade, K, through which the wire passes, and having thin edges, as shown, so as to permit it to slide easily between the flexible lips. The lips may be curved, with strips *s* of some material—such as thin metal or fabric—to prevent undue friction between the tool and faces of the lips. This blade is preferably mounted upon a carrier, T, consisting of a frame, L, and rollers M M, which serve to guide the device as it is pushed rapidly along the conduit, the wire being thus carried inside of the conduit and laid longitudinally, as shown in Fig. 10. The wire may then be placed in proper position in the wire-carrier, E, in the manner before described. If desired, the blade may be provided with small friction-rolls *u*, as shown in Fig. 11; but this is not necessary.

A suitable handle, J, may be attached to the carrier, upon which a reel, R, carrying the wire to be introduced into the conduit, may be supported.

Having thus described our invention, what we desire to claim is—

1. A carrier for electrical conductors, consisting of a block having two sets of grooves crossing each other, the grooves of one set being deeper than the other, substantially as described.

2. The combination, with a conduit, of wire-carriers or blocks arranged in series, each having two sets of grooves crossing each other, one set being deeper than the other, substantially as described.

3. The combination of the series of grooved blocks E, arranged within the conduit, and a clamping device for securing the same detachably together, substantially as described.

4. The combination, with a conduit for electrical conductors, of line-carriers arranged at intervals therein, and each consisting of a block having grooves crossing each other, and inclosing the line-wires and loops at their points of junction, substantially as described.

5. A conduit for electrical conductors, having a lateral opening and one or more flexible lips, as and for the purpose set forth.

6. A tool for introducing conductors into conduits, consisting of a blade, K, having a wire-passage supported by a portable frame, as and for the purpose set forth.

7. A tool for introducing conductors into conduits, consisting of a frame having friction-rolls, and provided with a channeled blade and a reel-support, substantially as described.

8. The combination of a conduit having a lateral opening, and a tool provided with a channeled blade extending through the opening, and serving to conduct the wire from the outside and lay it within the conduit, substantially as described.

In testimony whereof we have hereunto set our hands this 1st day of May, 1883.

FRANCIS X. TAAFFE.
CHARLES H. KOYL.

Witnesses:
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A. W. BRADFORD, Jr.