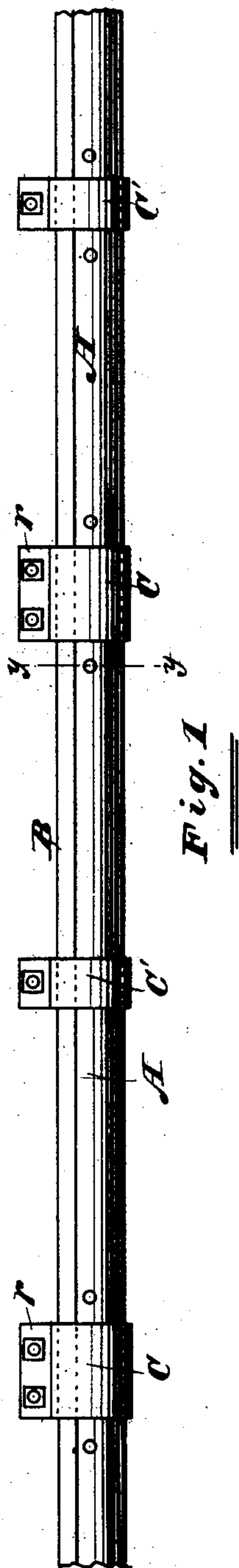


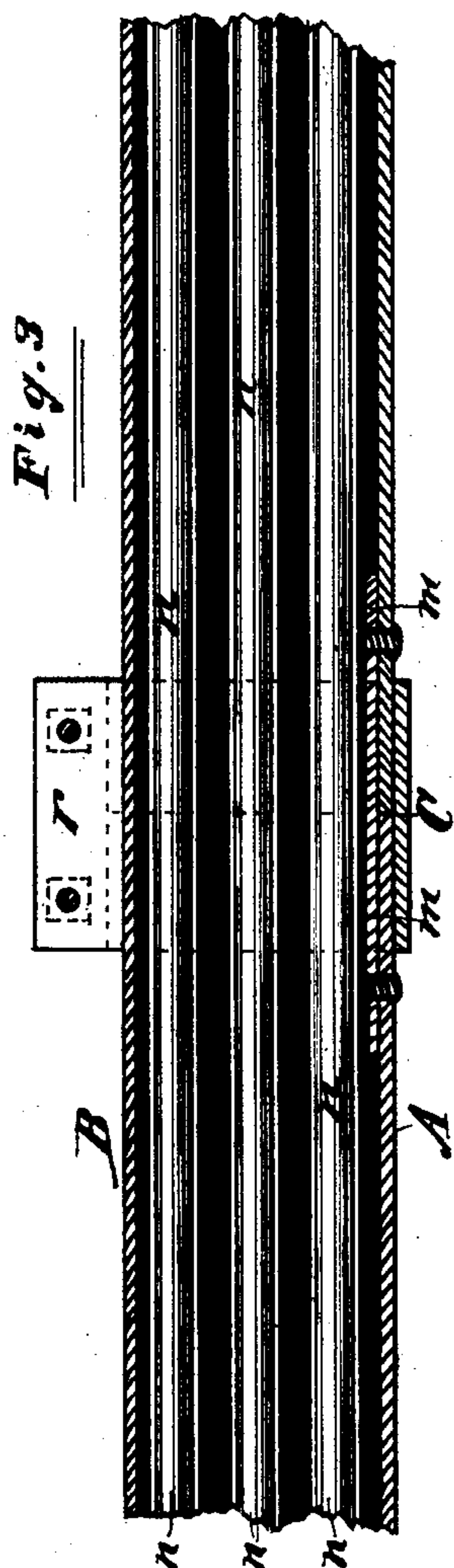
A. T. BOONE.  
Underground Electric-Conductors.

No. 225,268.

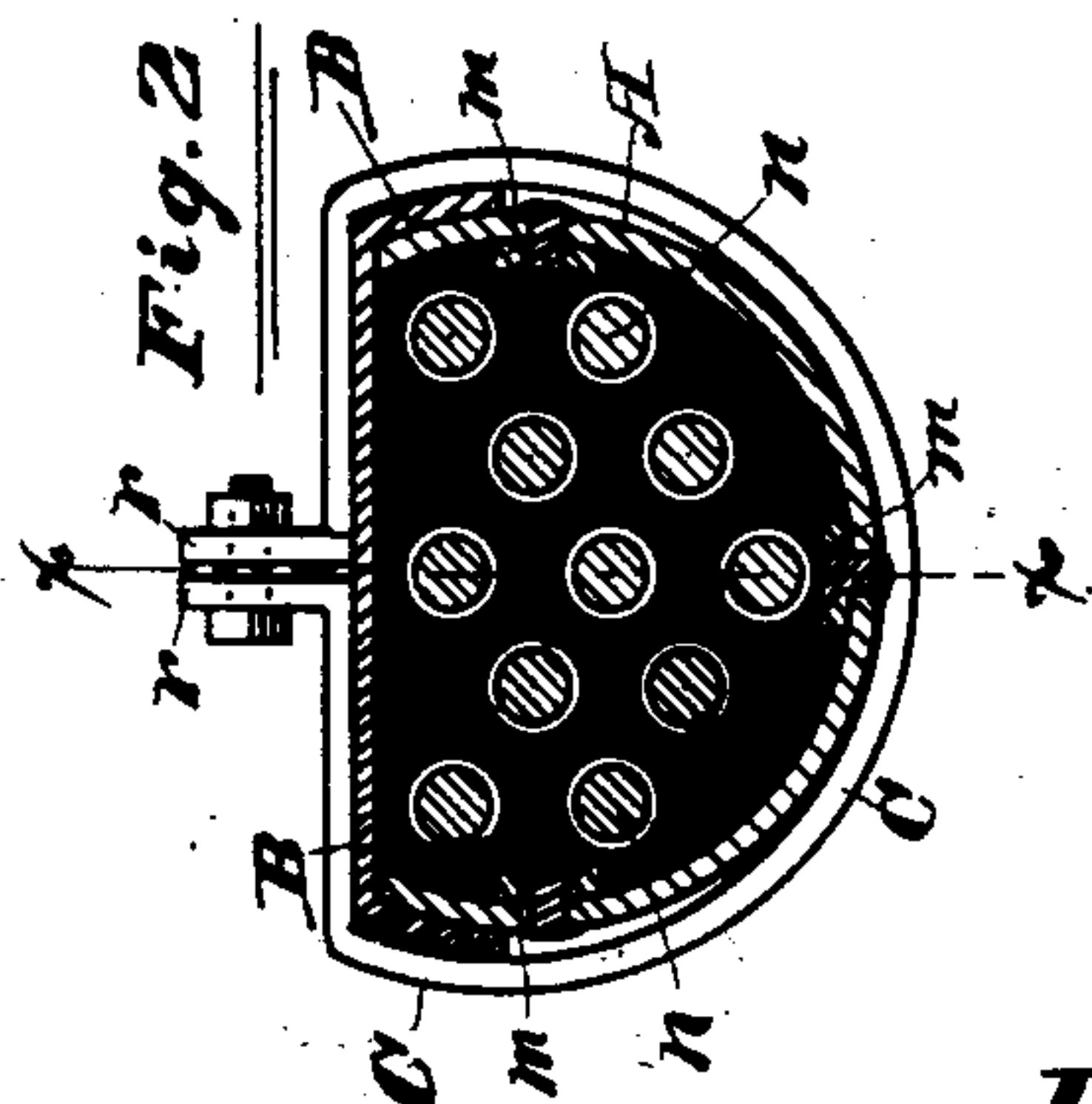
Patented Mar. 9, 1880.



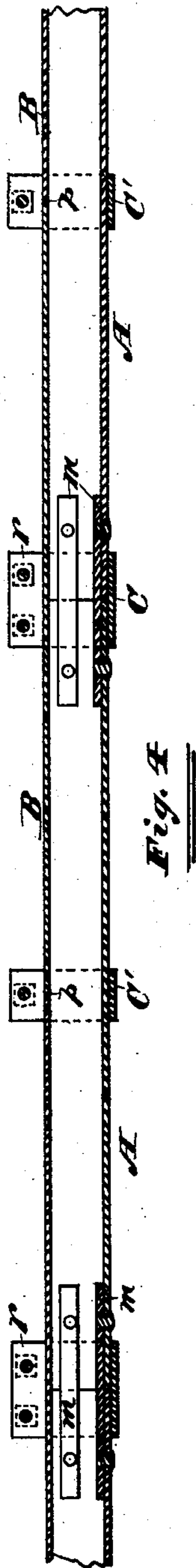
*Fig. 1*



*Fig. 3*



*Fig. 2*



*Fig. 4*

*Attest:*

*W. S. Baker*

*C. B. Baker*

**INVENTOR:**

*By Alonzo A. Boone*

*R. J. Dyrenforth*

*Attorney.*



# UNITED STATES PATENT OFFICE.

ALONZO T. BOONE, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF OF  
HIS RIGHT TO GEORGE G. BENEDICT, OF SAME PLACE.

## UNDERGROUND ELECTRIC CONDUCTOR.

SPECIFICATION forming part of Letters Patent No. 225,268, dated March 9, 1880.

Application filed July 11, 1879.

*To all whom it may concern:*

Be it known that I, ALONZO T. BOONE, of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new  
5 and useful Improvements in Laying and Insulating Electric Conducting-Wires; and I hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, of which—

10 Figure 1 is a side elevation of my sectional tubular case inclosing the wires and the insulating substance; Fig. 2, a transverse section on the line *yy*, Fig. 1; Fig. 3, a vertical longitudinal section on the line *xx*, Fig. 2; and  
15 Fig. 4, a vertical longitudinal central section of my tubular case, showing certain details of construction in the same.

My invention relates, chiefly, to the laying and insulating of underground wires for tele-  
20 graphs, telephones, electric lighting, and the like; but the same means will often be found equally advantageous for use above ground, and, moreover, no change whatsoever is required where the wires pass along the beds  
25 of streams, or otherwise through water, my method being as fully adapted for this situation as where the whole is embedded in dry soil.

Telegraph-wires have heretofore been in-  
30 closed within tubular casings and embedded in insulating substances; but in every instance the substance or compound employed has been either liquid or wholly solid, the latter being usually introduced in a molten state into the  
35 trough or tube containing the wires, and hardening upon becoming cool.

The respective merits of these methods are offset by very serious disadvantages. Among the objections to the liquid insulator are, first,  
40 its inability to sustain the wires, whereby the latter, unless otherwise supported, lie along the bottom of the tube; secondly, the tendency of the liquid to leak out of the tube at the joints unless the latter are made and  
45 maintained perfectly tight—a matter which, though perhaps possible, must always be attended with great difficulty and expense; and, thirdly, that since the tubes can never be level throughout they can never be opened for tap-  
50 ping or repairing the wires without causing a

considerable waste of fluid from the effects of hydrostatic pressure.

The chief objections, on the other hand, to a hard or solidified insulator are, first, the difficulty of removing it from around the wire  
55 when it becomes necessary to do so for tapping or other purposes; and, secondly, that when the substance has been so removed and the operation of tapping, or whatever it may be, completed, and fresh melted material poured  
60 in, it is impossible to produce a perfect union between the new and the old, the contraction of the former on cooling often serving to separate completely their adjacent ends.

I seek, by adopting a mean between the two  
65 methods above referred to, to obtain all the advantages of each with none of the disadvantages of either.

My invention accordingly consists in embedding the said wires in an insulating sub-  
70 stance of a permanently-plastic consistency; and it consists, further, in certain mechanical details relating to my tubular case for inclosing the wires and the insulating substance,  
75 and which distinguish it from other casings heretofore used for analogous purposes.

While I do not limit myself to any particular substance or compound for embedding the wires, provided only that the same is permanently plastic in its nature and an insulator,  
80 I have found that my invention may be successfully carried out by mixing powdered soapstone or chalk, or any similar insulating substance, with a non-drying oil (paraffine-oil, or crude petroleum of the heavier quality, for  
85 example) in quantity sufficient to give to the mixture a consistency approximating that of soft mortar. A mixture of this consistency will not run, and hence there is no leakage,  
90 and no gushing out when the tube is opened at any point, however low its level. On the other hand, none of the difficulty of removing the hard substances above referred to is encountered in its use, for the plastic sub-  
95 stance may be scooped from around the wires with the utmost ease, and without even abrading the cotton wrapping of the same, where such exists; and moreover, no part is wasted or lost, for when the required operation has  
100 been performed the same material that was



removed may be replaced, when it coalesces perfectly with the portions unremoved, forming one continuous mass, as before.

The plastic insulating substance may be used with any suitable incasing-tube, or even (though I do not recommend this mode) with no inclosure at all, without departing from my invention; but in order to carry out my invention in a thoroughly satisfactory manner, the tube or casing should be adapted to open and close along its upper side, both to permit the original laying and packing to be easily and thoroughly effected, and also to admit of ready access to the wires whenever and wherever necessary. I have accordingly contrived the device represented in the drawings, which, I believe, possesses every essential requisite, and of which the following is a description.

A is a trough, of wood, iron, terra-cotta, tile-clay, or other suitable material, in the form of U or V shaped sections, connected together at every joint by means of three strips, *s*, of any suitable material, one at the bottom and one at each side of the trough, each crossing the joint, and being bolted or riveted, as shown, or cemented, or otherwise secured at each end to the separate sections. Within this trough the wires *t*, preferably wound with cotton, are laid, and are embedded in the permanently-plastic insulating substance *o*.

B is a cap or cover, which may be of the same material as the trough, and which should be in sections corresponding in length with those of the said trough. The sections of the cover B cross the joints of the trough, and meet one another at intermediate points, *p*.

C C are clamping-collars, surrounding the case at each junction of the cross-sections, these collars having meeting-flanges *r*, as shown, bolted together, after the usual manner of such collars, and C' C' are similar collars surrounding the case at each junction of the cover-sections.

This construction permits the trough to be readily opened and closed in short lengths,

and also renders it fully as strong, and almost as close, as if it were formed in a single length instead of in sections, for all the parts are so placed and arranged as mutually to sustain one another, and the clamping-collars C and C' serve to seal the joints with amply-sufficient tightness even where the tube passes through water, the plastic insulating substance being nearly or quite insoluble.

I am well aware that permanently-plastic substances have heretofore been named as ingredients of insulating compounds; but it will be found that in every instance such substance has been mixed with another or with others, whereby the plasticity is overcome before being used for embedding the wire.

I am not aware that a permanently-plastic insulating substance has ever before been used as such, as above set forth, for embedding a conducting-wire.

What I claim as new, and desire to secure by Letters Patent, is—

1. An insulating substance of a permanently-plastic consistency for embedding an electric conducting-wire, substantially as and for the purpose set forth.

2. The method of insulating electric conducting-wires, and preventing rust and corrosion, and permitting ready access to the said wires for tapping and other purposes, and ready and perfect re-insulation, which consists in inclosing the said wires within a tubular case capable of being opened and closed, and embedding them in an insulating substance of a permanently-plastic consistency, substantially as described.

3. The combination of the sectional trough A, sectional cover B, connecting-strips *m*, and clamping-collars C and C', said parts being constructed and arranged substantially as described, for the purpose set forth.

ALONZO T. BOONE.

In presence of—

P. C. DYRENFORTH,  
JNO. T. CHUMASERO.