

(No Model.)

B. H. WESSLAU & G. TRAUTWEIN.  
JOINT FOR COUPLING UNDERGROUND CABLES.

No. 415,751.

Patented Nov. 26, 1889.

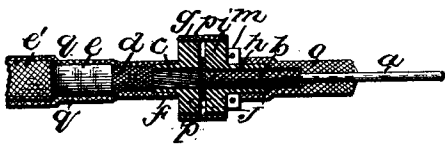


Fig. 1.

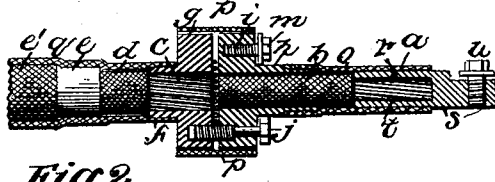


Fig. 2.

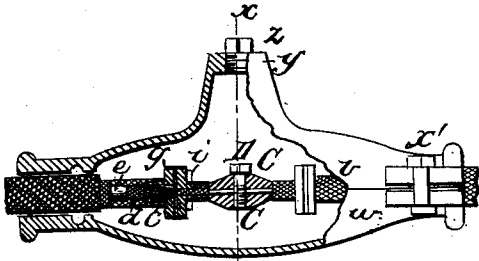


Fig. 3.

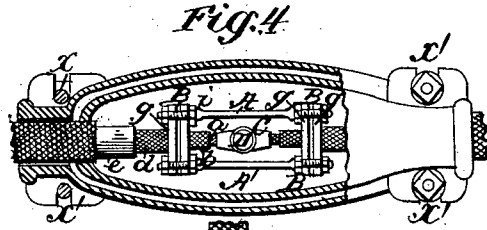


Fig. 4.

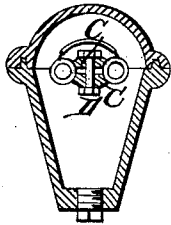


Fig. 5.

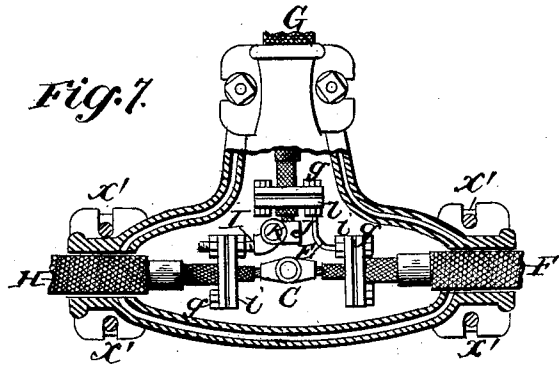
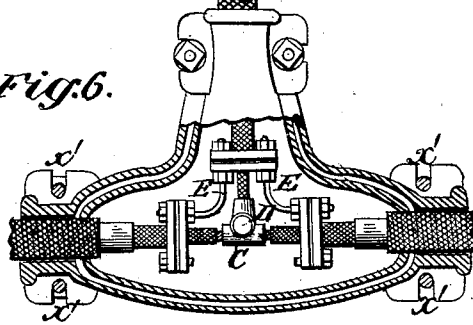


Fig. 7.

WITNESSES

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# UNITED STATES PATENT OFFICE.

BROR HEMMING WESSLAU AND GEORG TRAUTWEIN, OF CHARLOTTENBURG, PRUSSIA, ASSIGNORS TO SIEMENS & HALSKE, OF BERLIN, GERMANY.

## JOINT FOR COUPLING UNDERGROUND CABLES.

SPECIFICATION forming part of Letters Patent No. 415,751, dated November 26, 1889.

Application filed February 4, 1887. Serial No. 226,568. (No model.) Patented in Germany April 27, 1887, No. 42,256 and No. 43,673; in England September 2, 1887, No. 11,932; in France December 20, 1887, No. 187,711, and in Austria-Hungary February 18, 1888, No. 44,641 and No. 5,213.

### To all whom it may concern:

Be it known that we, BROR HEMMING WESSLAU and GEORG TRAUTWEIN, both of Charlottenburg, in the German Empire, have invented certain new and useful Improvements in Joints for Coupling Underground Cables, (which have been patented in the German Empire by Letters Patent No. 42,256 and No. 43,673, of April 27, 1887; in England by Letters Patent No. 11,932, of September 2, 1887; in France by Letters Patent No. 187,711, of December 20, 1887, and in Austria-Hungary by Letters Patent No. 44,641, Tom. 38, Fol. 351, and No. 5,213, Tom. XXII, Fol. 325, of February 18, 1888,) of which the following is a specification.

Our invention relates to means for coupling underground electrical cables having a central conductor and another conductor concentric thereto; and it consists in apparatus for joining the said conductors and for protecting the joint formed thereby, and in the combination and arrangement of the parts thereof, as will be hereinafter fully described, and pointed out in detail in the claims.

Couplings for underground cables have to fulfill two principal requirements. In the first place they must be safe mechanically and electrically, and, secondly, they must be so constructed as to prevent the permeation of moisture into the insulating-layers thereof. We obtain these objects by the use of the apparatus shown in the accompanying drawings, and in which corresponding parts are designated by similar letters.

Referring thereto, Figure 1 is a side view, partially sectional, of an end closure for a cable having its central conductor formed of a single wire and constructed according to our invention. Fig. 2 is a side view, partially sectional, of an end closure adapted for use with a cable, the central conductor of which consists of a number of wires twisted into a strand. Fig. 3 is a side view, partially sectional, of a coupling for connecting two cables, showing the side of the protective casing broken away. Fig. 4 is a top view of Fig. 3. Fig. 5 is a vertical section on line  $x x$  of Fig. 3. Fig. 6 is a top view, having a part of the protective casing broken away, of appa-

ratus used for connecting three cables meeting at a certain point. Fig. 7 is a top plan view, having the protective casing broken away, of apparatus used for connecting a branch cable in series with a throughgoing cable.

In order to connect a cable constructed in the manner described with other conductors, the several layers of the cable are cut off into steps, so that a part of the central conductor  $a$ , part of the insulating-layer  $b$  surrounding it, part of the concentric conductor  $c$  surrounding the said layer, part of the insulating  $d$  about the conductor  $c$ , and part of the lead covering  $e$ , surrounded by a wire covering  $e'$ , will be exposed. Upon the exposed end of the concentric conductor  $c$  is shoved a tube  $f$ , having a flange  $g$  on the rear end thereof. Upon the insulating-layer  $b$  is shoved a tube  $h$ , having a flange  $i$  upon the forward end thereof. Between the two flanges  $g$  and  $i$  the wires of the concentric conductor  $c$  are turned outward and held securely therebetween by means of the screws  $j$ , working in threaded holes in the flanges. The flange  $i$  receives another threaded hole for the reception of a screw  $m$ , by which a conductor may be attached, and thus an electrically and mechanically safe connection formed with the said concentric conductor. Upon the cable end thus prepared three bands  $o$ ,  $p$ , and  $q$  of insulating-tape are wound. The first band  $o$  surrounds a part of the central conductor, part of the insulating-layer  $b$ , and part of the tube  $h$ . The second band  $p$  surrounds the flanges  $g$  and  $i$ , while the third band  $q$  surrounds the tube  $f$ , part of the insulating-layer  $d$ , lead covering  $e$ , and part of the wire covering  $e'$ , thus preventing moisture from permeating the interior of the cable and destroying its insulation. It is evident that the conductor  $a$  may be connected to other conductors in the usual and known manner.

Fig. 2 illustrates an end closure for use with cables having a central conductor composed of a number of wires twisted up into a strand. In this case a metal tube  $r$ , terminating in a flat end piece  $s$  and having a female screw-thread  $t$  upon its interior, is screwed upon such central conductor. The

solid end piece *s* has a screw *u* for attaching a conductor thereto and connecting it with the said central conductor. Over this tube *r* is wound the band *o* of insulating-tape referred to in Fig. 1, and which also covers the insulating-layer *b* and tube *h*, while the remaining parts are similar to those shown in Fig. 1.

To connect two cables of the kind described with each other, we use the arrangement shown in Figs. 3, 4, and 5, and to protect the joint the protective box or casing shown therein is used. This box consists of two flanged halves *v* and *w*, adapted to be fastened together by screws or bolts *x' x'*, the upper half *v* of the box having an upward extension *y*, in which is a plug *z*, provided with a screw-thread, and which may be removed to fill the box with insulating material. Into this box the cable ends, which have had the several layers thereof cut into steps, as described, and provided with the flanged tubes *f* and *h*, are introduced, the concentric conductors thereof being united by rods *A*, having screw-threads upon their ends adapted to receive two pairs of nuts *B B*, by which means the flanges *g* and *i* are drawn together, thus dispensing with the screws *j* and *m*.

To connect the central conductors of the cables with each other, two grooved metal blocks *C* are used, between which the uncovered end of the said conductor is placed and the blocks firmly drawn together by means of a screw *D*.

The cable ends may be introduced into the box in any manner that will make the introduction thereof hermetical, and the flanged halves of the box may be also provided with means for making their connection watertight.

For uniting three cables meeting at a certain point with one another and protecting their joint, the apparatus is used illustrated in Fig. 6. The protective casing is similar to that shown in Figs. 3, 4, and 5, except that it has a side or lateral extension to receive the extra cable.

Curved rods *E E* connect the flanges of the tubes on the cable with each other, while the blocks *C* receive an extra groove for the central cable.

When it is desired to connect in series a branch cable with a main throughgoing one, the flanges *g i* on one end *F* of the main cable are connected to the flanges *g i* on the branch cable *G* by means of the curved rod *E*, having nuts upon its ends, while the central conductors of the said throughgoing cable are united by the grooved blocks *C*. The central conductor of the branch cable is connected to the concentric conductor of the end *H* of the throughgoing cable by means of the flat-pointed screw-spindle *I*, connector *J*, and screw *K*.

Having now described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a coupling for cables having a concentric wire conductor wound around a layer of insulating material, the combination of two flanged tubes, one of the said tubes being shoved upon the said conductor and the other upon the insulating material, means for drawing the flanges thereon together, and a clamping-screw adapted to receive a conductor, as and for the purpose described.

2. In a coupler for cables having a central conductor separated from a conductor concentric therewith by a layer of insulating material, the combination of two tubes provided with flanges, one of the said tubes being shoved upon the concentric copper conductor and the other upon the insulating-layer, means for drawing the said flanges together, and a ribbon of insulating material wound around the said parts, as and for the purpose described.

3. In a coupling for the electrical connection of cables having concentric conductors, the combination of two flanged tubes upon each cable and conducting-rods having threads upon their ends for the reception of nuts, whereby the said tubes on each cable may be drawn together and the cables connected with each other, as and for the purpose described.

4. In a coupling for the electrical connection of cables having a central conductor insulated from conductors concentric therewith by a layer of insulating material, the combination of two grooved metal blocks, means for drawing the said blocks together, whereby the central conductors are connected with each other, two flanged tubes upon each cable, and conducting-rods having threads upon their ends for the reception of nuts, whereby the tubes on each cable may be drawn together and the cables connected with each other, as and for the purpose described.

5. In a coupling for the connection in series of a branch cable having a central conductor separated from a conductor concentric therewith by a layer of insulating material with a like main throughgoing cable, the combination of grooved metal blocks for the reception of the ends of the said central conductor of the main cable, two tubes provided with flanges upon each of the said cables, conducting-rods adapted to connect the said tubes upon one end of the main cable with the tubes upon the branch conductor, and means for connecting the central cable of the said branch cable with the tubes upon the other end of the main cable, as and for the purpose described.

In testimony that we claim the foregoing we have hereunto set our hands this 20th day of December, 1886.

BROR HEMMING WESSLAU.  
GEORG TRAUTWEIN.

Witnesses:

B. ROI,  
M. W. MOORE.