

963,879.

Patented July 12, 1910.

2 SHEETS—SHEET 1.

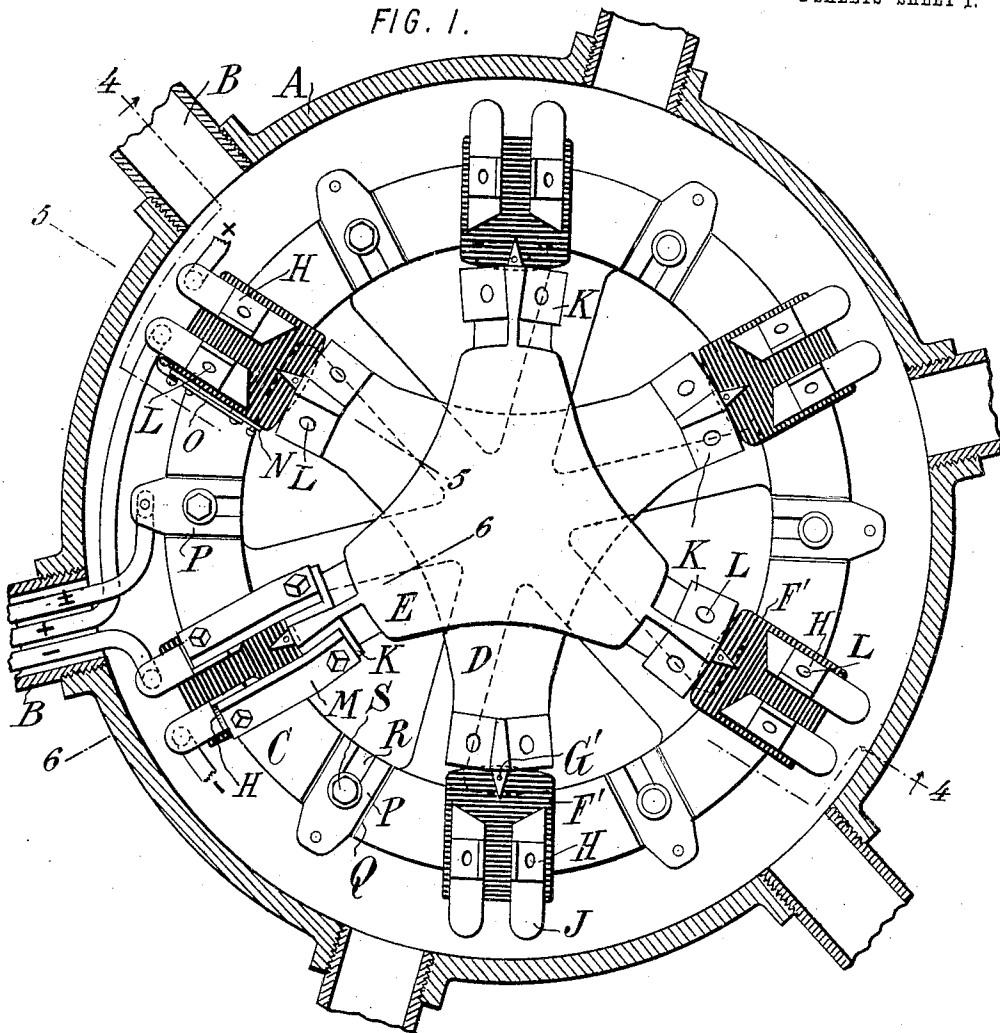


FIG. 2.

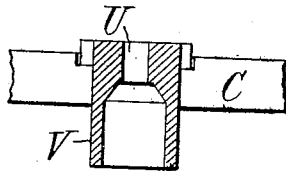
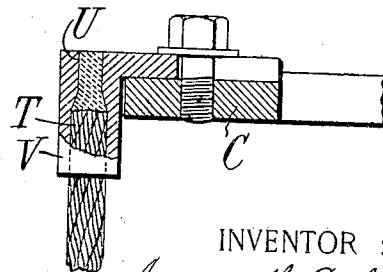


FIG. 3.



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2 SHEETS—SHEET 2.

FIG. 4.

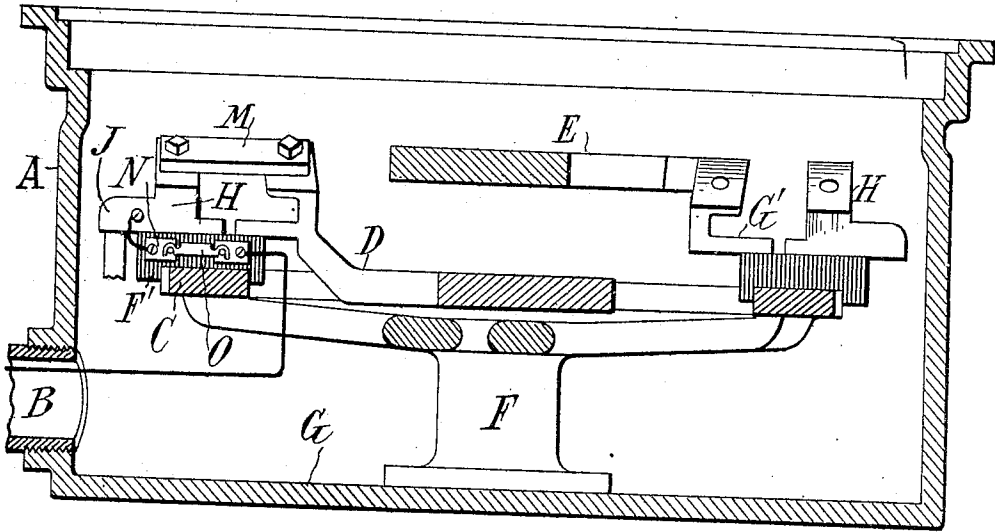


FIG. 5.

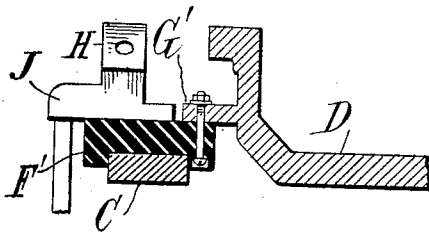


FIG. 6.

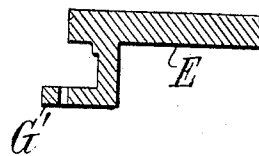


FIG. 8.

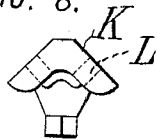


FIG. 7.

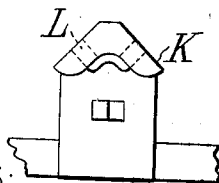
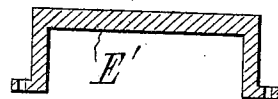


FIG. 9.



FIG. 10.



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UNITED STATES PATENT OFFICE.

JENESSE R. DUFF, OF NEW YORK, N. Y., ASSIGNOR TO GENERAL ELECTRIC COMPANY,
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JUNCTION-BOX.

963,879.

Specification of Letters Patent.

Patented July 12, 1910.

Application filed November 13, 1906. Serial No. 343,224.

To all whom it may concern:

Be it known that I, JENESSE R. DUFF, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Junction-Boxes, of which the following is a specification.

This invention aims to provide certain improvements in junction boxes which are placed at distributing points of electric circuits to facilitate the connection of feeders to mains branching out therefrom, or the connection of other conductors.

The junction box of this invention is especially advantageous on account of the accessibility of the various contacts, which facilitates the work of making connections, so that they may be accomplished more quickly and with less danger of burning the hands by accidental short-circuits than has been the case with constructions now in use. Furthermore the parts are so arranged as to minimize the danger of blow-outs such as have occurred frequently through the deterioration of the insulation in junction boxes previously in use. Other advantages are referred to in detail hereinafter.

The accompanying drawings illustrate an embodiment of the invention.

Figure 1 is a horizontal section through a box showing the principal parts of the apparatus in plan; Figs. 2 and 3 are respectively tangential and radial sections through the neutral terminal; Fig. 4 is a vertical section approximately on the line 4—4 of Fig. 1, with parts omitted; Figs. 5 and 6 are similar sections along the lines 5—5 and 6—6 of Fig. 1; Figs. 7 and 8 are respectively end elevations of the parts shown in Figs. 5 and 6; Figs. 9 and 10 are respectively a plan and a longitudinal vertical section of a bar suitable for a "4-stub" box.

The several terminals within the box are laterally separated from each other. For example supposing the ordinary three-wire system to be used, the neutral, positive and negative conductors coming in at any stub would be connected to three terminals in the box, of which at least one is laterally separated from the others, and preferably each one is so laterally separated. In order to effect the connection of the several wires of a given sign or polarity entering the box with each other, suitable terminals are ar-

anged preferably in a circular line, and the connecting members between these terminals extend within this circular line. For example they may extend radially so as to form a spider where there are three or more arms necessary. The terminals for conductors of different polarities being arranged to alternate with each other, the radial connecting members referred to will also be alternated, and these arms may be made small enough to leave ample space between them for the hand of a workman. They may also be arranged with the arms of one set of terminals above the arms of the opposite set, the arms being supported only at their ends so as to avoid any possible short-circuit directly between the arms, and to avoid the use of solid insulation for such purpose. The ends of the arms may be supported, with insulation, from a ring which carries the several neutral conductors and forms a connecting member therefor, and at the same time forms a support for said arms.

Referring now to the drawings, Figs. 1 to 8 represent a 6-stub box. The box A receives a number of composite cables or tubes B carrying three conductors which are respectively positive (+), negative (—), and neutral ($\pm$). All the positive wires which enter the box are to be connected to each other, and similarly all the negative wires and all the neutral wires, each set, however, being carefully insulated from the others. There are therefore three principal connecting members in the box, and while any one of these connecting members may be made to serve for any set of conductors, yet for the sake of convenience I designate them respectively as the neutral member C, the positive member D, and the negative member E. In the arrangement shown, C must always be used as the neutral connecting member, since it is a ring of conducting material grounded by means of its metal support F running to the bottom G of the box. Each of the members D and E comprises substantially radial arms connected at the center, the number of arms depending upon the number of conductors entering the box and the number of terminals which each arm may carry. In Fig. 1 there are six conductors entering the box and each of the arms carries two terminals; so that the connecting members are three-armed spiders. Members

operating in the same way for a box having four stubs, are shown at E' (Figs. 9 and 10) and are substantially straight bars. The connecting members D and E are supported with the least possible danger of contact with each other by means of independent blocks F' of slate or other durable insulating material, each bar being provided with a small point G' resting upon the edge of the insulating block and bolted thereto. These same blocks F' carry lugs or terminals H provided with extensions J extending over their outer edges and adapted to be soldered or otherwise connected with one of the cables. A separable connection is provided between the terminal blocks H and the arms D or E. For this purpose the arms are provided with faces K K sloping from the center downward so as to economize horizontal space, each of the inclined portions K of a bar being provided with a screw-hole L, and a similar hole being provided in the side of each terminal lug H. The connection is effected by means of an ordinary "catch" consisting of a copper bar apertured so as to permit its being readily screwed upon the preferably inclined side of the terminal lug H and the inclined portion K of one of the arms. A pair of such catches is shown in position at M (Fig. 1). The ends of the arms D and E are in approximately the same plane (above but within the circle of the ring-shaped neutral member) and therefore very conveniently accessible, but the intermediate portions of these arms are in different planes, one of them, as D, being depressed below the supporting point G', as indicated in Fig. 5, while the other, as E, is elevated above the corresponding point as shown in Fig. 6. The insulating blocks F' provide also a very convenient means for the support of a fuse for the pressure wire which is ordinarily run from the positive or negative circuit in a box to the volt-meter at the station. For example a pair of small fixed terminals N may be mounted upon a vertical side of this insulating block, with catches to receive the ends of a fuse such as the inclosed fuse O indicated in Fig. 4. In this position water runs off from the connections freely. I provide also a very convenient terminal lug for connecting the neutral cable with the ring C. This terminal lug has an arm P fitting in a radial recess Q in the top face of the ring, and has a slot R through which passes a bolt S for fastening the arm upon the ring. The terminal is readily withdrawn by merely loosening the bolt S and drawing the terminal out radially. The outer end of the terminal forms a downwardly extending lug T having a small opening U at the top, which is enlarged to a considerably larger oblong opening V at the lower end adapted to receive the end of

a cable, so that solder may be very conveniently poured into the small hole at the top to make a good and permanent connection between the cable and the terminal. The making of the opening V oblong economizes space, of which there is very little to spare in junction boxes. Being flattened in the direction of the radius of the box, a further outward movement of the terminal is permitted than if the socket V were perfectly circular. The end of the cable may be flattened and spread out in a tangential direction before introducing it into the socket V. The functions of these several parts being explained in detail, it is only necessary to refer briefly to the manner of use.

At each of the openings in the box three cables enter, as shown at the left of Fig. 1. The neutral cable is carried to the nearest of the terminals P upon the neutral ring. The positive cable is carried to one of the terminal lugs H of the group which are attachable to the lower spider D. The negative cable is carried to a terminal block H of the group which is connected to the upper spider E. A main or feeder entering at any of the other points in the circumference of the box, is similarly connected with its neutral wire to the ring C, its positive wire to one of the group of terminals belonging to one spider D, and its negative wire to one of the group of terminals belonging to the spider E. Whenever connections are to be made or unmade, the catches M are applied or removed. It will be seen that this arrangement provides for a free circulation of air between the various parts so as to keep them cool, as well as to insulate them from each other. The ready accessibility of the parts is a great advantage in permitting cleaning and painting without removing any catches or any of the bars or rings. The spaces within the ring and between the arms of the spiders are large enough to admit a man's hand easily, and so access is provided not only to the connecting members, but to the bottom of the box, which can be bailed out and cleaned with comparative ease.

The form of terminal lug shown in Fig. 3 is especially useful where the new style of connecting members is to be introduced into an old box already in place with the conductors running into it. Where new boxes are laid the conductors may be drawn through their stubs a sufficient distance to make connection with the terminal lugs outside of the box, the conductors being afterward drawn back through the stubs. Where the conductors are already in place, however, the connection between the conductors and the lug must be made within the box. In the construction shown I have so proportioned the parts that the positive and negative conductors and lugs may be the same

as in the old box and will satisfactorily fit upon the insulating blocks. But the position of the neutral ring is such as to require a considerable shortening of the neutral wire, and therefore the lug with the hole U at the top for conveniently applying the solder is shown only in connection with the neutral conductor. If a similar change were necessary with the positive or negative conductors, the lugs therefor might be similarly designed.

It is to be understood that the invention applies not only to boxes which are buried beneath or at the surface of the earth, but to boxes arranged in any situation; and the term "junction box" is used to describe the complete apparatus independently of the style of casing surrounding the various connecting members and whether or not a casing of any sort is used.

Though I have described with great particularity of detail certain specific embodiments of the invention, yet it is not to be understood therefrom that the invention is restricted to the particular embodiments disclosed. Various modifications thereof in detail and in the arrangement and combination of the parts, may be made by those skilled in the art, without departure from the invention.

What I claim is:—

1. A junction box having a ring-shaped electric-terminal-connecting member, and star-shaped connecting members having arms supported at their ends on said ring-shaped member.

2. A junction box having a ring-shaped electric-terminal-connecting member, and another connecting member lying within and carried by and insulated from said ring, and terminal lugs carried by and insulated from said ring-shaped member and adapted for connection to said inner connecting member.

3. A junction box having a ring-shaped connecting member, and other connecting members crossing each other and supported at their ends by said ring-shaped member.

4. A junction box having a neutral ring,

and having positive and negative connecting members crossing each other and supported at their ends upon said ring.

5. A junction box having a ring C and terminal lugs P adapted to be fastened thereon, said lugs having at their ends sockets V to receive the ends of cables, and an opening U above said socket for applying solder.

6. A junction box having a ring C and terminal lugs P adapted to be fastened thereon, said lugs having at their ends sockets V to receive the ends of cables, and an opening U above said socket for applying solder, each of said lugs being separable from said ring by radial movement, and its socket V being flattened in a radial direction.

7. A junction box having a neutral ring, and having positive and negative connecting members crossing each other and supported at their ends upon said ring, insulating blocks between said ring and the ends of said positive and negative members and exposed at their vertical sides, and having on an exposed vertical side means for supporting a fuse for a pressure wire.

8. A junction box having a ring-shaped connecting member, insulating blocks F' carried thereby, a terminal lug carried by each of said blocks, and another connecting member lying within said ring and supported by said blocks and adapted to be connected to said terminal lug.

9. A junction box having a series of insulating blocks each carrying a pair of terminals, and having a connecting member with arms, each arm resting upon one of said insulating blocks and adapted to be connected to the two terminals carried thereby.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

JENESSE R. DUFF.

Witnesses:

DOMINGO A. USINA,
FRED WHITE.