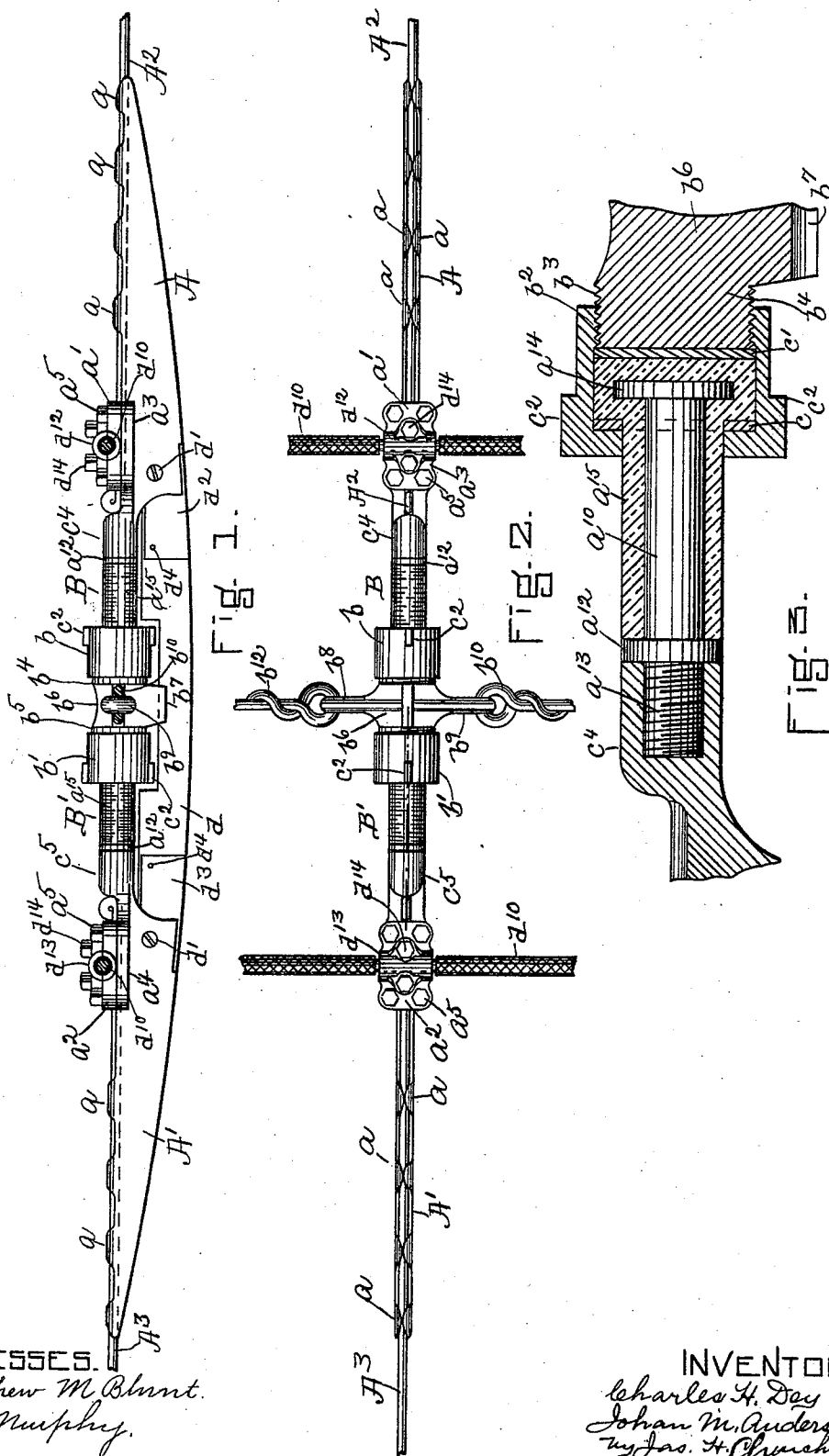


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UNITED STATES PATENT OFFICE.

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TROLLEY-LINE BREAKER.

SPECIFICATION forming part of Letters Patent No. 528,767, dated November 6, 1894.

Application filed February 16, 1894. Serial No. 500,419. (No model.)

To all whom it may concern:

Be it known that we, CHARLES H. DEY and JOHAN M. ANDERSON, both residing in Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Trolley-Line Breakers, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 This invention is an improvement in the line equipment for the overhead or trolley system of electric railways, and relates more particularly to a trolley line breaker or insulating joint by which the continuity of the
15 trolley line is broken or interrupted and formed into sections.

This invention has for its object to provide a trolley line breaker or insulating joint of superior insulating capacity and of a construction capable of being replaced in part,
20 while the electric current is on the trolley line or wire.

Another feature of this invention consists in providing the trolley line breaker with a
25 removable insulating piece or section capable of being readily replaced when worn out or destroyed as by the formation of arcs between the trolley wheel and the terminal pieces of the trolley line breaker.

30 The invention further consists in auxiliary or supplemental pieces or terminals detachably secured to the main terminals and which act to save the more expensive main terminals from being burned off by the arcs formed
35 when the trolley wheel or contact leaves one of the auxiliary terminals.

Another feature consists in a novel construction of fastening device by which a feeder wire may be electrically connected to
40 the trolley wire in a superior manner.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1, is a side elevation of a trolley line
45 breaker or insulating joint embodying this invention, the span wires and the feed wires shown in Fig. 2, being shown in section; Fig. 2, a top or plan view of the trolley line breaker shown in Fig. 1, and Fig. 3, a sectional detail
50 on an enlarged scale to more clearly show the construction of insulator preferred.

In the present embodiment of this inven-

tion, the trolley line breaker or insulating joint is composed essentially of line terminals or end pieces A A', which are herein
55 shown as made substantially straight on their upper surface and curved or tapering from substantially a point at one end to substantially a wide or deep portion at the other end.

The line terminals A A' may and preferably
60 will be provided on their upper surface with a substantially semi-circular groove to receive the ends of adjacent trolley wire sections A², A³, which may be firmly fastened to the terminals A A' respectively by ears *a* on
65 opposite sides of the said terminals being bent over the trolley wire sections, and also by means of clamping plates or pieces *a'* *a*² secured to widened portions *a*³ *a*⁴ of the terminals as by threaded bolts *a*⁵. The clamp-
70 ing plates *a'* *a*² are preferably provided on their under side with a substantially semi-circular, longitudinal groove, to embrace the upper part or half of the trolley wire sections, the extreme ends of which are preferably ex-
75 tended beyond the clamping plates *a'* *a*² and curled or twisted to assist in preventing the wire sections being pulled off from the terminals.

The terminals A A' are for the best results
80 separated from each other by a double insulation, preferably constructed as herein shown and consisting of two insulators B B' detachably coupled together as will be described. Each insulator is preferably made as herein
85 shown and consists of a metal shank stem, or rod *a*¹⁰ (see Fig. 3) provided at one end with a collar *a*¹² and threaded extension *a*¹³, and at its opposite end with a head *a*¹⁴.

The metal stem or rod *a*¹⁰ and its head *a*¹⁴
90 are incased in insulating material *a*¹⁵ of any suitable composition. The insulated stems or rods *a*¹⁰ of the insulators B B' are extended through openings in metal caps or bonnets *b* *b'* provided on their inner circumference for
95 a portion of their length with screw threads *b*² to engage screw threads *b*³ on arms or bosses *b*⁴ *b*⁵ of a coupling piece *b*⁶ preferably of metal and made as herein shown, it being provided on its under side with lugs or ears *b*⁷ for a
100 purpose as will be described, and on its sides with eyes *b*⁸ *b*⁹ to which the parts *b*¹⁰ *b*¹² of the span or other supporting wire, are secured.

The metal sleeves or bonnets *b* *b'* preferably

contain within them washers $c\ c'$ of packing or other suitable material to protect the insulating material enveloping the head a^{14} from injury, as by crushing, when the bonnets $b\ b'$ are secured lightly upon the bosses of the coupling piece b^6 .

The bonnets $b\ b'$ may and preferably will be provided on their periphery with lugs c^2 , by which they may be turned with a suitable spanner or tool when in operative position.

The double insulation may and preferably will be secured to the terminals $A\ A'$ by providing the said terminals with internally threaded hollow bosses $c^4\ c^5$, into which the threaded extension a^{13} on the stems or rods a^{10} are inserted and screwed therein as clearly shown in Fig. 3.

The terminals $A\ A'$ are connected by a piece d of wood or other material, non-conducting or of very high resistance, which, for the best results, is inserted into slots in the wider end of the said terminals and is detachably secured to said terminals by screws d' , and in order to avoid the burning away of the wider ends of the more expensive terminals $A\ A'$, the ends of the non-conducting piece d are provided with metal clips, shields or pieces $d^2\ d^3$, which are preferably bent around the under side or lower edge of the piece d at the ends thereof, and which may be fastened thereto in any suitable manner, as by the pins d^4 .

The metal pieces $d^2\ d^3$ may be made materially less expensive than the terminals, as for instance, the said pieces may be made of sheet iron, while the terminals $A\ A'$ are and may be made of brass.

The pieces $d^2\ d^3$ form practically a continuation of the terminals $A\ A'$ and may be designated as auxiliary or supplemental terminals, and it will readily be seen that the trolley wheel or contact bears upon the under side of the auxiliary terminals $d^2\ d^3$ after the said wheel has left the terminals $A\ A'$, so that when the trolley wheel leaves either auxiliary terminal and comes in contact with the non-conducting piece d , any are which might be formed when the trolley wheel leaves the metal pieces $d^2\ d^3$ will be formed between the trolley wheel and the auxiliary terminals, and these auxiliary terminals would be burned away and destroyed while the terminals $A\ A'$ would be uninjured and would remain intact. Furthermore, the auxiliary terminals when burned away or rendered practically useless may be readily replaced by new terminals, by merely removing the screws d' , and taking out the non-conducting piece and the auxiliary terminals which have been destroyed or rendered unfit for use by sparking. The non-conducting piece d may be renewed in the same manner, and when in operative position, the said non-conducting piece is prevented from buckling, breaking or bending at its center by the lugs or ears b^7 on the coupling piece b^6 , which fit over the top edge of the non-conducting piece as shown in Fig. 1.

In order to secure a more efficient and neater connection of a feeder wire d^{10} with a terminal of the insulating joint, the trolley line clamping plates $a'\ a^2$ have fastened to them feed wire clamping plates $d^{12}\ d^{13}$, which may be secured to the trolley line clamping plates by threaded bolts d^{14} . For the best results, the trolley line clamping plates are provided on their upper surfaces with transverse substantially semicircular grooves, and the feed wire clamping plates are provided on their under side with transverse substantially semicircular grooves co-operating with the grooves in the trolley line clamping plates. The feed wire clamping plates enable a neater and more reliable connection to be made between the said feed wire and the line terminal to which it is connected, and also permits the feed wire to be extended to a like terminal on a parallel line without removing any appreciable amount of the insulation on the feed wire, for by an inspection of Fig. 2, it will be seen that only an amount or length of insulation on the feed wire substantially equal to the width of the feed wire clamping plate need be removed, in order to obtain a good electrical connection between the said feed wire and the line terminal with which it co-operates.

It will be noticed that the double insulators $b\ b'$ are arranged so that the metallic shanks or rods a^{10} of the insulators are substantially in line with the trolley wire and the double insulation is in that part of the line breaker subjected to the severe strain.

The auxiliary terminals may be made of sheet iron as described, but we do not desire to limit our invention in this respect, as it is evident that substantially thin pieces of other metals may be used. For instance, the auxiliary terminals may be thin pieces of copper or brass or other metal.

We claim—

1. In a trolley line breaker or insulating joint, the combination with line terminals, of a double insulation separating the said terminals, and a non-conductor interposed between the said terminals and with which the trolley wheel engages when passing from one terminal to another, and auxiliary removable terminals co-operating with the line terminals for the purpose specified.

2. In a trolley line breaker or insulating joint, the combination with a trolley line terminal having a widened portion at one end, of a trolley line clamp provided on its under side with a substantially semi-circular longitudinal groove, and bolts to secure the said clamp to the widened portion of the said terminal, substantially as described.

3. In a trolley line breaker or insulating joint, the combination with a trolley line terminal having a widened portion at one end, of a trolley line clamp provided on its under side with a substantially semi-circular longitudinal groove, and on its upper surface with a transverse substantially semi-circular

groove, means to secure the said clamp to the said terminal, and a removable feed wire clamp provided on its under side with a transverse substantially semi-circular groove co-operating with the transverse groove on the upper side of the trolley wire clamp, and means to secure the feed wire clamp to the trolley wire clamp, substantially as described.

4. In a trolley line breaker or insulating joint, the combination with trolley line terminals, of a double insulation interposed between said terminals and consisting of two insulators secured to the said terminals and a coupling piece interposed between said insulators and to which the said insulators are secured, lugs or ears depending from said coupling piece and a non-conducting piece inserted between said lugs or ears and secured to the line terminals, substantially as described.

5. In a trolley line breaker or insulating joint, a double insulation consisting of two insulators provided with internally screw threaded bonnets or sleeves, a coupling piece provided with screw threaded arms with which said internally screw threaded bonnets or sleeves engage and a cushioning material interposed between the said arms and insu-

lator and between the said insulator and its bonnet, substantially as described.

6. In a trolley line breaker or insulating joint, the combination with line terminals, of an interposed non-conducting piece, and auxiliary terminals co-operating with the line terminals and with the non-conducting pieces for the purpose specified.

7. In a trolley line breaker or insulating joint, the combination with trolley line terminals provided with screw threaded bosses, of a double insulation interposed between said terminals and consisting of insulated metal shanks or rods provided with screw threads to engage the threaded bosses of the terminals, metal caps or bonnets having holes through which the said rods are extended, and a coupling piece having arms to engage the said metal bonnets, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

CHARLES H. DEY.

JOHAN M. ANDERSON.

Witnesses:

JAS. H. CHURCHILL,

J. MURPHY.