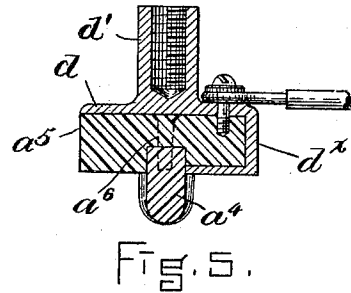
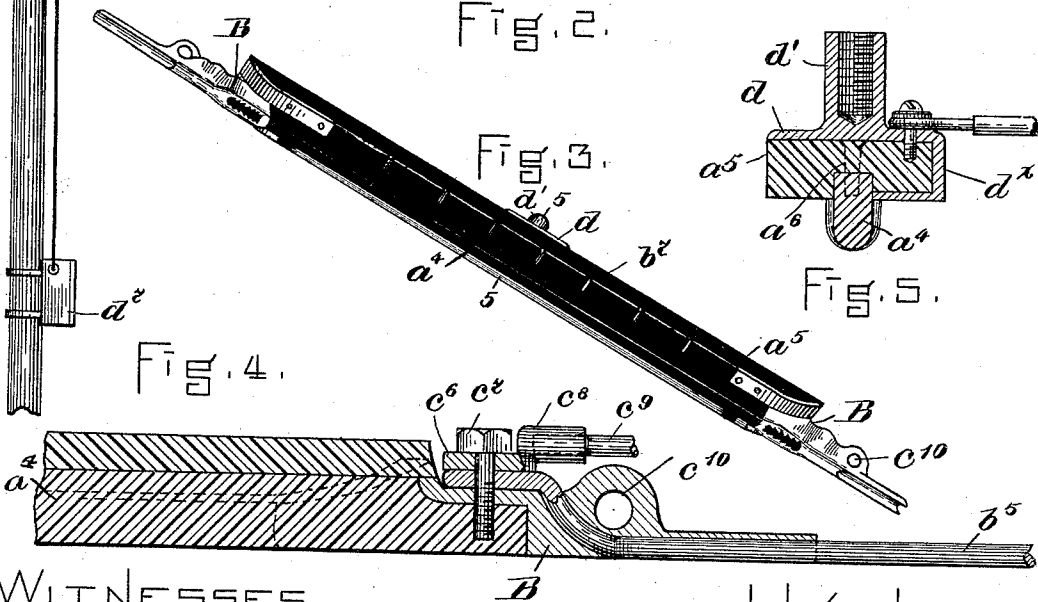
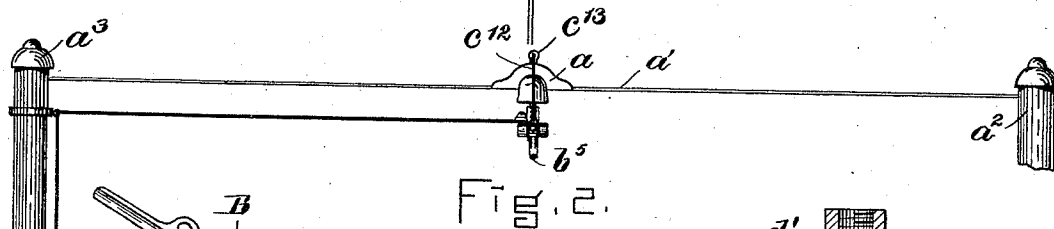
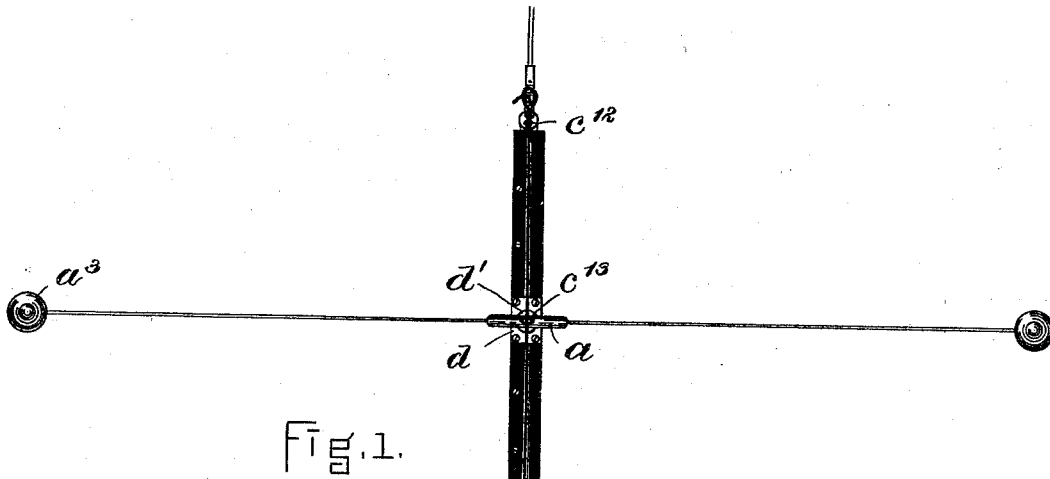


J. M. ANDERSEN.

TROLLEY WIRE CIRCUIT BREAKER.

No. 474,037.

Patented May 3, 1892.



WITNESSES,
C. Henry Marsh.
L. C. Fearing.

INVENTOR,
Johan M. Andersen.
By *Jas. H. Churchill*
Atty.

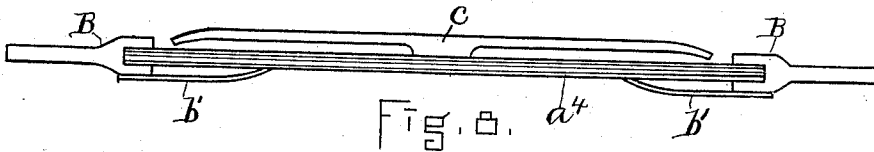
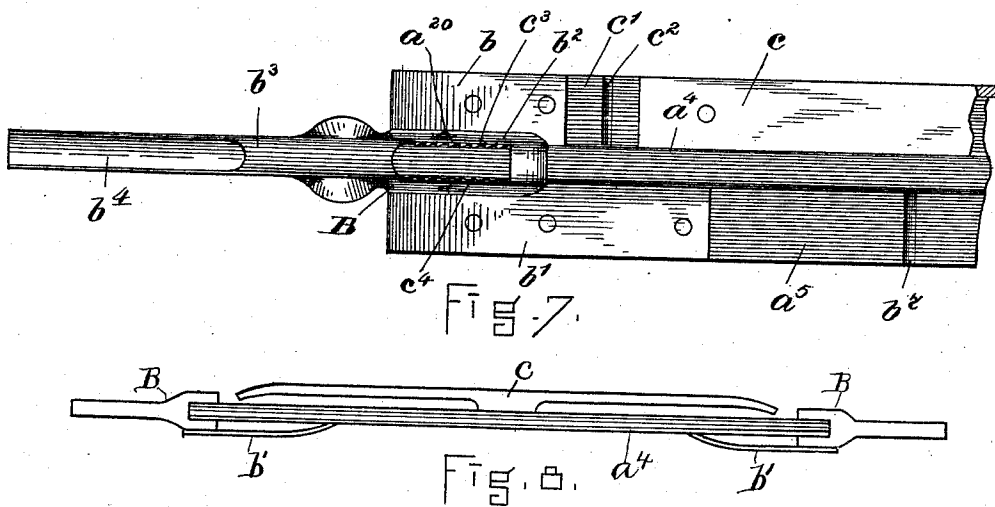
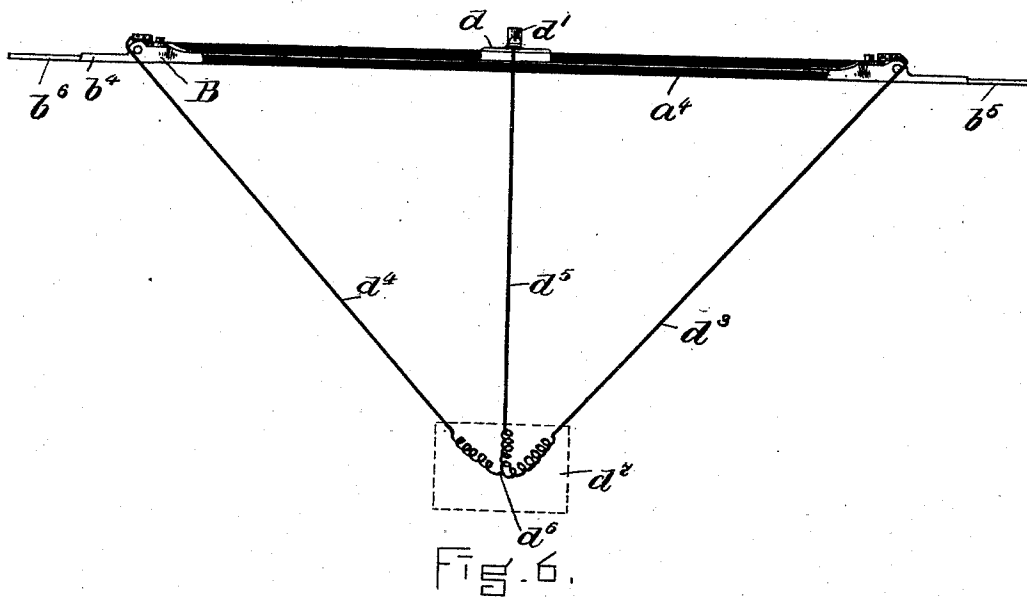
(No Model.)

2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

JOHAN M. ANDERSEN, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO ALBERT ANDERSEN, OF SAME PLACE.

TROLLEY-WIRE-CIRCUIT BREAKER.

SPECIFICATION forming part of Letters Patent No. 474,037, dated May 3, 1892.

Application filed November 11, 1891. Serial No. 411,635. (No model.)

To all whom it may concern:

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

This invention has for its object to provide an efficient trolley-line breaker for use on the overhead system of electric railways.

In accordance with my invention a non-conducting body, preferably of considerable length, has secured to its ends circuit-terminals, to which the adjacent sections of the trolley-wire are fastened, and the continuity of the trolley-line circuit between the sections is maintained by an independent conductor separated from the circuit-terminals by insulation, but normally connected to said terminals through a suitable fuse or safety cut-out. The non-conducting body is for the best results made as a bar or strip, preferably secured to or forming part of a base or block of insulating material. The circuit-terminals are extended on one side of the insulating bar or strip a sufficient distance to overlap the ends of the independent conductor on the opposite side of the insulating-bar, so that in operation one flange of the trolley-wheel will make contact with the independent strip before the other flange of the said wheel leaves the circuit-terminal, thereby obviating any break in the trolley-line circuit while in normal condition. The circuit-terminals on one side of the insulating-bar are located such a distance apart that in case of a short circuit or ground on one section an arc which might be formed between the trolley-wheel and one circuit-terminal cannot be carried from the said terminal to the other terminal, and the said arc is prevented from jumping to the independent conductor by the insulating-bar, as will be described, the said independent conductor being at such time neutral or without current.

My invention therefore consists in the here-described trolley-line breaker, it consisting of a non-conducting body, circuit-terminals attached to the said body near its ends, and

an independent conductor attached to the non-conducting body and out of contact with the circuit-terminals, substantially as will be described.

Other features of my invention will be pointed out in the claims at the end of this specification.

Figure 1 is a plan view of a sufficient portion of an overhead electric-railway system to enable my invention to be understood. Fig. 2 is an end elevation of the railway shown in Fig. 1. Fig. 3 is an under side perspective view of my improved trolley-line breaker. Fig. 4 is a longitudinal sectional detail, on an enlarged scale, of one end of the breaker, showing one section of trolley-wire and a portion of a feed-wire. Fig. 5 is a transverse section through the center of the breaker on the line 5 5, Fig. 3. Fig. 6 is a side elevation of the breaker, to more clearly show the manner of connecting the parts of the fuse; Fig. 7, an under side view, on an enlarged scale, of the breaker, to more clearly show the construction of the same; and Fig. 8, a modification to be referred to.

Referring to Figs. 1 and 2, *a* represents a hanger of any usual or well-known construction, connected by a span-wire *a'* to the posts *a² a³*, located on opposite sides of the street or road bed, as now common in the overhead system of electric railways. The hanger *a* has secured to it my improved trolley-line breaker, consisting, essentially, of an insulating or non-conducting bar or strip *a⁴*, preferably secured to or forming part of a base or block *a⁵*, the said bar or strip being secured to the base *a⁵* by suitable means, as screws *a⁶*, represented by dotted lines in Fig. 5. The insulating or non-conducting bar *a⁴* is made rounding or semicircular on its underside to conform to the shape of the usual trolley-wheel. (Not herein shown.) The non-conducting bar *a⁴* has secured to its ends in any suitable or desired manner circuit-terminals, preferably made as castings B, each consisting, essentially, of metallic strips or plates *b b'*, and a housing or socket *b²*, provided with a tubular extension *b³*, cut away on its under side, as at *b⁴*, to receive the end of one of the trolley-wire sections *b⁵ b⁶*. The metallic strip or plate *b'* of each casting or circuit-terminal

is located on one side of the non-conducting bar a^4 , and the plate b is located on the opposite side of the said bar, the strip b' being made longer than the strip b . The long strips or plates b' of the castings or terminals B are located on the same side of the bar a^4 , as clearly shown in Fig. 3, which is an under side view in perspective of the trolley-line breaker, and the said strips or plates b' are separated from each other by a suitable length of the insulating base or block a^5 , to prevent an arc from being carried by the trolley-wheel from one circuit-terminal to the other, the under side of the base or frame a^5 between the said strips being preferably provided with transverse slots or grooves b^7 , for a purpose as will be described.

The continuity of the trolley-line circuit between the circuit-terminals B is maintained by an independent conductor c , shown in Figs. 3 and 7 as secured to the base or block a^5 and located on the other side of the bar a^4 from the strips b' of the circuit-terminals. The independent conductor c , preferably a metallic strip, is separated from the circuit-terminals by insulation c' , preferably provided with a groove or slot c^2 . The strips b' of the circuit-terminals are made of sufficient length to overlap or extend beyond the ends of the independent conductor c , so that one flange of the usual trolley-wheel (not shown) will come in contact with and bear upon the independent conductor before the other flange of the trolley-wheel leaves the strip b' of one of the circuit-terminals B. The conducting-castings or circuit-terminals B have their sockets b^2 fitted over the ends of the non-conducting-bar a^4 and secured thereto in any suitable manner, as by rivets a^{20} , and the said socket is preferably provided on its inner side with oppositely-inclined teeth c^3 c^4 , which bite into and engage the sides of the said bar, the said teeth being inclined outward, so as to increase their hold upon the bar, when the trolley-wire is placed under tension. The sections of the trolley-wire b^5 b^6 are preferably secured to the circuit-terminals of my improved breaker by means of a washer c^6 and a bolt c^7 , the said washer preferably having integral with it a hollow socket or sleeve c^8 to receive the feed-wire c^9 , such as now commonly employed on the overhead system of electric railways. The castings B are also preferably provided with eyes or loops c^{10} , to which are secured the ends of guy-wires c^{12} , preferably fastened to a suitable eye c^{13} in the top of the hanger a . The conducting strip c preferably has secured to or forming part of it the flange d^x of a plate d , secured to the top of the base or block a^5 and herein shown as provided with a tubular socket d' , adapted to receive a threaded projection or rod secured to the hanger a . The circuit-terminals B and the plate d are connected, as herein shown, by independent branch wires d^3 d^4 d^5 to a three-part fuse d^6 , which in practice will preferably be located within a

suitable box d^7 , secured to one of the posts, as a^3 , the wires d^3 d^4 d^5 being represented in diagram Fig. 6; but in practice the said wires will preferably run across from the breaker to the top of the post and thence down to the box d^7 , as represented in Fig. 2.

My improved trolley-wire breaker is especially designed to prevent the carrying of the current from one section of the trolley-wire, as b^5 , to the other section of the trolley-wire, as b^6 , in case of accident to one of the said sections—as, for instance, in case of a ground or short circuit of the section b^6 . In the normal condition of the system the independent conducting-strip c and the trolley-sections are charged with a normal current, and as long as the trolley-wire circuit remains in its normal condition the current will be supplied to the trolley-wheel as it passes over the trolley-line breaker—as, for example, from the section b^5 to the section b^6 —in the following manner. One flange of the trolley-wheel bears upon the metal strip b and the other flange upon the strip b' , and the flange running upon the strip b' remains in contact with the said strip while the other flange of the trolley-wheel is passing from the metal strip b to the conducting-strip c . In this manner the circuit remains continuous and the formation of an arc is prevented. If the section b^6 should become short-circuited or grounded, the fuse d^6 would be burned out and the conducting-strip would become electrically disconnected from the trolley-wire sections and become neutral or wanting in current. With the trolley-wire circuit in the condition just described the trolley-wheel will receive current from the terminal B, connected to the section b^5 , and when the said wheel leaves the strip b' any arc which might be formed between the trolley-wheel and the strip b' would become broken or destroyed before the said wheel makes contact with the strip b' of the terminal B, to which the trolley-wire section b^6 is connected. Furthermore, the non-conducting bar a^4 prevents the arc from jumping to the strip c . In this manner the grounded or short-circuited section b^6 is entirely cut off from the current-supply and is rendered dead or harmless.

In order to prevent a circuit being established from the strip b' of one terminal to the strip b' of the other terminal by fine metallic dust, which might be carried along the insulating base or block a^5 by the trolley-wheel, the said base or block is provided with the transverse slots or grooves b^7 , forming air-spaces, which serve to break the continuity of the circuit formed.

I prefer to construct the trolley-line breaker substantially as shown in Figs. 1 to 7, inclusive, wherein the non-conducting bar a^4 is attached to the base a^5 and the independent conductor c secured to the said base; but I do not desire to limit myself to the precise construction shown, as it may be varied without departing from the spirit of my invention.

For instance, the base a^5 may be dispensed with and the independent strip c secured to one side of the non-conducting body or bar a^4 and the circuit-terminals B constructed so that their strips b' extend along the other side of the said bar, as clearly shown in Fig. 8.

I claim—

1. The herein-described trolley-line breaker, it consisting of a non-conducting body, circuit-terminals attached to the said body near its ends, and an independent conductor c , attached to the non-conducting body and out of contact with the circuit-terminals, substantially as described.

2. The herein-described trolley-line breaker, it consisting of a non-conducting body, circuit-terminals attached to the said body near its ends and having extended portions b' , and an independent conductor c , separated from the circuit-terminals by the non-conducting body and extending beyond the ends of the circuit-terminal strips to overlap the same, substantially as and for the purpose specified.

3. The herein-described trolley-line breaker, it consisting of the non-conducting bar a^4 , non-conducting base a^5 , to which the said bar is attached, circuit-terminals B, attached to the ends of the said bar and base and having the extended portions b' , and the independent conductor c , secured to the base a^5 on the opposite side of the bar a^4 and having its ends extended beyond the portions b' of the circuit-terminals, substantially as described.

4. The herein-described trolley-line breaker, it consisting of the non-conducting bar a^4 , non-conducting base a^5 , provided with the

transverse slots b^7 and to which the said bar is attached, circuit-terminals B, attached to the ends of the said bar and base and having the extended portions b' , and the independent conductor c , secured to the base a^5 on the opposite side of the bar a^4 and having its ends extended beyond the portions b' of the circuit-terminals, substantially as described.

5. The herein-described trolley-line breaker, it consisting of the non-conducting bar a^4 , non-conducting base a^5 , circuit-terminals B, provided with the extended portions or strips b' and having the sockets b^2 fitted over the bar a^4 , and the independent conductor c , secured to the base a^5 on the side of the bar a^4 opposite to the extended portions b' , substantially as described.

6. The combination, with a trolley-line composed of sections, of a trolley-line breaker consisting of a non-conducting bar, circuit-terminals secured to the non-conducting bar at its ends and to which the sections of the trolley-wire are connected, the independent conductor c , separated from the circuit-terminals by the non-conducting bar, but extended to overlap the said terminals, as described, and a fuse electrically connected to the independent conductor, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHAN M. ANDERSEN.

Witnesses:

JAS. H. CHURCHILL,
SADIE C. FEARING.