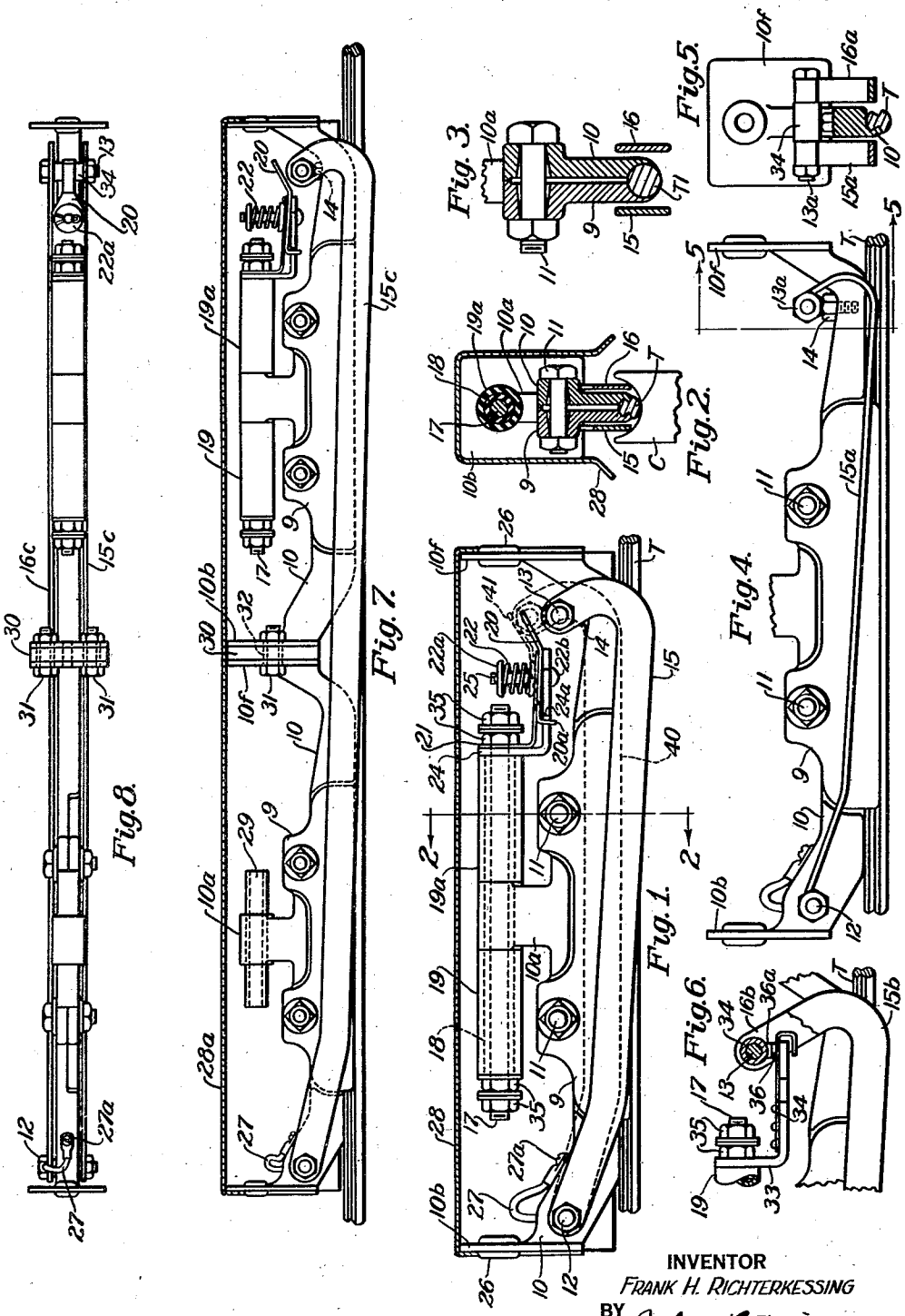
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TROLLEY CONTACTOR

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TROLLEY CONTACTOR

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My invention relates to a trolley contactor or contact device adapted to be attached to or installed adjacent a trolley wire, which contact device may be employed to control the operation of electrically-operated overhead trolley-switches, track switches, signals and recorders, etc., when the same is actuated by a current collector of a trolley vehicle.

The primary object of my invention is to provide a simple contact device for controlling an electric circuit independently of the electrical engagement between a current collector and the trolley wire or between the current collector and the contact device per se.

A further object of my invention is to provide a contact device that may be adapted to control normally-open or normally-closed circuits.

Another object of my invention is to provide a contact device having telescoping tubular members of insulating material, such as phenol-aldehyde condensation product, placed longitudinally in alignment with and above the trolley wire for supporting and insulating a stationary contact member.

A further object of my invention is to provide a contact device having a metallic member extending longitudinally through the inner tube of the said telescoping tubular members for securing the members one to the other and to a supporting frame, and for providing a terminal connection to the stationary contact member at each end of the telescoping tubular assembly.

Another object of my invention is to provide a supporting frame that may be easily and quickly secured to a trolley wire and one that is constructed and arranged so that two or more frames may be placed end to end and longitudinally in alignment one with the other to provide a frame member for a relatively longer contact device.

A further object of my invention is to provide a supporting frame for a relatively long contact device composed of a plurality of rigid supporting frames, each rigidly secured to the trolley wire and yieldingly secured one to the other to provide for the flexing of the trolley wire throughout the length of the contact device.

These and other objects will be apparent to those skilled in the art as the following description is read in connection with the accompanying drawing in which:

Figure 1 is a side elevation of my contactor arranged to control a normally open circuit and shown mounted on a grooved trolley wire with the protective cover shown in section;

Figure 2 is a vertical section taken along lines 2—2 of Fig. 1 showing the groove of a current collector C in engagement with and raising the longitudinal runners 15 and 16;

Figure 3 is a partial vertical section, shown on an enlarged scale, and taken along lines 2—2 of Fig. 1, and illustrating a modification in the construction of the frame members 9 and 10 for mounting the same on a round trolley wire;

Figure 4 is a partial side elevation of another embodiment of the contactor shown in Fig. 1, with the protective cover removed, and illustrating a modification in the construction of the longitudinal runners 15a and 16a for engagement with the flanges of a current collector;

Figure 5 is a sectional view taken along lines 5—5 of Fig. 4;

Figure 6 is a partial side elevation of the contact end of my contactor illustrating a modification in the construction of the longitudinal runners 15b and 16b and the stationary contact assembly for controlling a normally closed circuit;

Figure 7 is a side elevation of a modified form of the contactor shown in Fig. 1, comprising two frame members 10 mounted end to end and yieldingly secured one to the other via a rubber pad 30 and spacer bolts 31, and which modified contactor is shown mounted on a grooved trolley wire with the protective covering shown in section;

Figure 8 is a top plan view of Fig. 7 showing the protective covering removed.

Referring to Figures 1 and 2, it will be observed that my trolley contactor comprehends the use of a frame member 10 preferably made of a cast aluminum alloy, which frame member is provided with a suitable groove extending longitudinally along its lower edge for engaging the groove of a grooved trolley wire T. The thickness of the body of the frame is slightly greater than the diameter of the trolley wire T, and the central portion of the frame adjacent the trolley wire groove is reduced in thickness to provide a recess within which a suitable clamp 9 is located for securing the frame member 10 to the trolley wire T. The clamp 9 is likewise provided with a suitable groove extending longitudinally along its lower edge for engaging the groove of the grooved trolley wire T. Thus, as illustrated in Fig. 2, the combined thickness of the clamp 9 and the central portion of the frame 10 is substantially equal to that of the body of the frame, when the same are secured to the trolley wire. Bolts 11 are provided for securing the clamp 9 and frame 10 to the trolley wire. At each end of the frame 10, suitable end plates 10b and 10f are cast integral therewith, and these provide a suitable support

for the protective covering 26, which covering is preferably made from thin gauge sheet metal.

An upstanding arm 10a extends vertically upwardly from the central portion of the frame member 10, which arm terminates in a cylindrical portion extending substantially longitudinally in alignment with the trolley wire.

The cylindrical portion of arm 10a has an aperture extending longitudinally therethrough and this aperture receives a tube 18 made of insulating material. Outer tubes 19 and 19a, also made of insulating material, are telescoped over the respective ends of the tube 18. In the commercial embodiment of my invention I have employed tubular insulation of phenol-aldehyde condensation product, by reason of its extremely low moisture absorption and relatively high insulating characteristics.

A threaded metallic rod 17 extends through the inner tube 18, and receives at one end a metallic angle bracket 24. Nuts 35 serve to secure the rod 17, bracket 24 and tubular insulation 18, 19 and 19a, one to the other and to the cylindrical portion of the arm 10a, which nuts also provide a suitable terminal connection at each end of the rod 17.

The bracket 24 has transverse notches 24a formed in the opposite edges of its horizontal leg, and these notches receive depending legs 20a of a metallic contact member 20 mounted upon the horizontal leg of the bracket, thus providing a fulcrum connection between the contact member and the bracket.

A pin 22b extends upwardly through suitable apertures in bracket 24 and the contact member 20, which pin has mounted thereupon a compression spring 22 and spring cups 22a. The head of the pin 22b abuts the lower face of the bracket, and this, together with a cotter pin 25 placed at the opposite end of the pin, serves to retain the spring 22 in compression for resiliently mounting the contact member 20 upon the bracket 24.

In the preferred embodiment of my invention, two upwardly movable runners 15 and 16 are pivotally secured to the frame 10 adjacent the end plate 10b, and these extend longitudinally along opposite faces of the frame and adjacent the trolley wire, so that the runners are engaged by the groove portion of a passing current collector and moved upwardly about their pivotal connection, as illustrated in Fig. 2.

The pivotal connection of the runners 15 and 16 consists of a through bolt 12 having a spacing sleeve mounted thereon and placed between the runners, which sleeve is journaled in the frame member 10.

As illustrated in Fig. 1, the runners 15 and 16 extend longitudinally along the frame 10 adjacent the trolley wire T1, and have their free ends terminating beneath the stationary contact member 20. The free ends of the runners 15 and 16 are connected by a through bolt 13 having a suitable contact sleeve 34 mounted thereon and placed between the runners.

At the pivoted end of the runners a flexible connection 27 is provided, which connection has one end connected to the through bolt 12, and its other end to the frame 10 via screw 27a.

Accordingly, it will be obvious that, when a current collector C engages the runners 15 and 16, the runners are moved upwardly about their pivotal connection, and the contact sleeve 34 electrically engages contact member 20, thereby closing the normally-open electrical connection between the contact sleeve 34 and contact member 20. Likewise, when the current collector C disengages the runners 15 and 16, the runners restore by gravity to their normal positions, and thereby open the previously affected connection between the contact sleeve 34 and contact member 20.

In Fig. 1 the dotted lines 40 indicate the raised position for the runners 15 and 16, and the dotted lines 41 indicate the raised position of the contact member 20, when the same is engaged by the contact sleeve 34.

It is important to observe that the electrical circuit including the contact sleeve 34 and contact member 20 is completed from the trolley wire T1 through the metallic frame 10, flexible connection 27 to the runners 15 and 16 via bolt 12, contact sleeve 34 via bolt 13, contact member 20, through a flexible connection 22a to the metallic rod 17, thence to an external electrical circuit via the affected electrical connections to the terminal nuts 35.

In the preferred embodiment, the aforesaid flexible connection 22a comprises a plurality of thin metallic strips fixedly secured to the contact member 20, and attached to the rod 17 via nuts 35.

It will therefore be observed that a definite electrical connection is provided between the contact sleeve 34 and contact member 20 independently of the nature of the electrical connection between the current collector C and runners 15—16 or the trolley wire T.

In the embodiments of my invention utilizing normally-open contacts, a stop screw 14 is provided upon which the contact sleeve 34 rests, when the runners 15 and 16 are in their normal positions. Accordingly, it will be apparent that the stop screw 14 may be removed to increase the opening between the contact sleeve 34 and the contact member 20, when operating conditions require a larger contact opening.

In Fig. 3, a modification of the longitudinal grooves in the frame 10 and clamp 9 is illustrated for attaching the contactor to a round trolley wire T1.

In Figs. 4 and 5 a modification in the construction of the runners 15a and 16a is illustrated for engaging the flanges of the current collector C instead of the groove as illustrated in Fig. 2.

Likewise, in Fig. 6, a modification in the construction of the stationary and movable contacts is illustrated for controlling a normally-closed circuit. With reference to Fig. 6 it will be observed that the length of the upturned ends of the runners 15b and 16b has been increased so that the contact sleeve 34 is above the metallic contact bracket 33, which bracket is secured to the telescoping tubular insulation via rod 17 and nuts 35. A flexible contact spring 34 is fixedly secured to the contact bracket 33, which spring has a hooked end for limiting the normal upwardly-biased action of the contact spring. A contact member 36 is secured to the free end of spring 34, which contact is engaged by a contact 36a secured to sleeve 34.

Accordingly, it will be apparent that, when the collector C engages the runners 15b and 16b, the contact 36a is raised out of electrical engagement with the contact 34. It will also be observed that by reason of spring 34, contact 36 follows contact 36a during its initial upward movement. The purpose of this arrangement is to eliminate accidental openings of the electrical

connection between contacts **36** and **36***a* by reason of vibration of the trolley wire, etc.

In Figs. 7 and 8, the embodiment illustrated in Fig. 1 is modified to provide for longer runways **15***c* and **16***c*. In this embodiment of my invention, two frame members **10** are mounted end to end and longitudinally in alignment one with the other. A rubber pad **30** is mounted between the adjacent end plates **10***f* and **10***b*, and a pair of through bolts **31**, having spacing sleeves **32** thereon, extend through suitable apertures in the end plates and rubber block for securing the same together. The spacing sleeves **32** limit the compression of the rubber pad **30** by the through bolts **31**, but permit the end plates **10***f* and **10***b* to compress the rubber pad and thus compensate for any flexing of the trolley wire T that may occur within the length of the contactor.

It will be apparent that the runways **15***c* and **16***c* are constructed similar to those illustrated in Fig. 1, and that the telescoping tubular insulation together with the contact sleeve **34** and contact member **20** are identical with those of Fig. 1.

In Fig. 7, the additional contact frame **10** is provided with an insulating bushing **29** in the upstanding arm **10***a*, which bushing provides a suitable support for the external wire connection.

In each of the embodiments a suitable insulating bushing **26** is provided in the end plates for receiving the external wire connection, and the cover **28** or **28***a* is supported by the respective end plates **10***f* and **10***b*.

Having thus described my invention, I claim:

1. A trolley contactor comprising, an elongated frame of metal having a groove extending longitudinally along and adjacent the lower edge of one face of the said frame and having the central portion of the said one face adjacent the said groove recessed; a clamp of metal disposed in the said recess having a groove extending longitudinally along one face thereof in operative relation with the groove in the said frame and cooperating with the latter for receiving and gripping a trolley wire; a plurality of bolts, operatively associated with the frame and clamp, for securing the same one to the other, and thereby to grip a trolley wire received within the said grooves; the said frame having an upstanding arm extending vertically upwardly from the central portion thereof, the upper end of the said arm having an aperture receiving a center tube of insulating material extending substantially parallel with the groove in the said frame; outer tubes of insulating material telescoped on the respective ends of the said center tube; a clamping bolt extending longitudinally through the said center tube securing the said outer and center tubes one to the other and to the said upstanding arm; an angled bracket of metal having a vertical leg thereof secured to one end of the said clamping bolt and a horizontal leg extending substantially longitudinally outwardly and parallel with the axis of the said center tube; a contact member yieldingly secured to the horizontal leg of the said bracket; and a pair of runways having a common pivotal connection to the said frame and extending longitudinally along opposite faces of the frame and having their free ends terminating beneath the said yielding contact member and joined by a contact bar adapted to engage the said yielding contact member, each of the said runways having portions thereof adapted to extend longitudinally along the trolley wire, and to be engaged by a passing current collector, for moving the said runways upwardly about their pivotal connection to bring the said contact bar into electrical engagement with the said yielding contact member.

2. A trolley contactor comprising, an elongated frame of metal having means for receiving and gripping a trolley wire, and having an upstanding arm extending substantially vertically upwardly from the central portion thereof, the upper end of the said arm having an aperture therein receiving a center tube of insulating material extending substantially parallel with the said frame; outer tubes of insulating material telescoped on the respective ends of the said center tube; a clamping bolt extending longitudinally through the said center tube and securing the said center and outer tubes one to the other and to the said upstanding arm; a stationary contact member scecured to one end of the said clamping bolt; and a pair of runways having a common pivotal connection to the said frame and extending longitudinally along opposite faces of the frame and having their free ends terminating beneath the said stationary contact member and joined by a contact bar adapted to engage the said stationary contact member, each of the said runways adapted to be engaged by a passing current collector for moving the said runways upwardly about their pivotal connection to bring the said contact bar into electrical engagement with the said stationary contact member.

3. A trolley contactor comprising, an elongated frame of metal; means for securing the said frame to a trolley wire; the said frame having an upstanding arm extending substantially vertically upwardly from the said frame, the upper end of the said arm having an aperture therein receiving a center tube of insulating material extending substantially parallel with the said frame; outer tubes of insulating material telescoped on the respective ends of the said center tube; a clamping bolt extending longitudinally through the said center tube and securing the said outer and center tubes one to the other and to the said upstanding arm; a pair of runways having a common pivotal connection to the said frame and extending longitudinally along opposite sides of the said frame, each of the said runways having portions thereof adapted to extend longitudinally along the said trolley wire, and to be engaged by a passing current collector, for moving the said runways upwardly about their pivotal connection; a stationary contact secured to one end of the said clamping bolt; and a movable contact fixedly secured to the said runways in operative relation with the said stationary contact.

4. A trolley contactor comprising, an elongated frame of metal having a groove extending longitudinally along and adjacent the lower edge of one side thereof for receiving and gripping a trolley wire, and having the central portion of the said one side adjacent the said groove recessed; a clamp of metal disposed in the said recess having a groove extending longitudinally along and adjacent the lower edge of the side thereof facing the groove in the said frame for receiving and gripping a trolley wire; a plurality of bolts, operatively associated with the said frame and clamp, for securing the same one to the other, and thereby to grip a trolley wire received within the said grooves; the said frame having an upstanding arm extending vertically

upwardly from the central portion thereof, the upper end of the said arm having an aperture receiving a center tube of insulating material extending substantially parallel with the groove in the said frame; outer tubes of insulating material telescoped on the respective ends of the said center tube; a clamping bolt extending longitudinally through the said center tube, and securing the said outer and center tubes one to the other and to the said upstanding arm; a pair of runways having a common pivotal connection to the said frame and extending longitudinally along opposite sides of the said frame, each of the said runways having portions thereof adapted to extend along the said trolley wire, and to be engaged by a passing current collector, for moving the said runways upwardly about their pivotal connection; a stationary contact secured to one end of the said clamping bolt; and a movable contact fixedly secured to the said runways in operative relation with the said stationary contact.

5. A trolley contactor comprising, an elongated frame of metal having an upstanding arm extending substantially vertically upwardly from the said frame; means for securing the said frame to a trolley wire; an elongated member of insulating material fixedly secured to the upper end of the said upstanding arm, and extending substantially parallel with the said frame; a pair of runways having a common pivotal connection to the said frame and extending longitudinally along opposite sides of the said frame, each of the said runways having portions thereof adapted to extend longitudinally along the said trolley wire, and to be engaged by a passing current collector, for moving the said runways upwardly about their pivotal connection; a stationary contact secured to the elongated beam of insulating material; and a movable contact fixedly secured to the said runways in operative relation with the said stationary contact.

6. A trolley contactor comprising, an elongated frame of metal having an upstanding arm extending substantially vertically upwardly from the central portion of the said frame, and laterally disposed end plates extending substantially vertically upwardly from the respective ends of the said frame; means for securing the said frame to a trolley wire; the upper end of the said upstanding arm having an aperture therein receiving a center tube of insulating material extending substantially parallel with the said frame; outer tubes of insulating material telescoped on the respective ends of the said center tube; a clamping bolt extending longitudinally through the said center tube and securing the said outer and center tubes one to the other and to the said upstanding arm; a runway pivotally secured to the said frame and extending longitudinally therealong, the said runway having a portion thereof adapted to extend longitudinally along the said trolley wire, and to be engaged by a passing current collector, for moving the said runway upwardly about its pivotal axis; a stationary contact secured to one end of the said clamping bolt; a movable contact fixedly secured to the said runway in operative relation with the said stationary contact; and a cover for the aforesaid parts of the contactor supported by the laterally disposed end plates of the said frame.

7. A trolley contactor comprising, a first elongated frame of metal having means for receiving and gripping a trolley wire, and having an upstanding arm extending substantially vertically upwardly from the central portion thereof, the upper end of the said arm having an aperture therein receiving a center tube of insulating material extending substantially parallel with the said frame; outer tubes of insulating material telescoped on the respective ends of the said center tube; a clamping bolt extending longitudinally through the said center tube and securing the said outer and center tubes one to the other and to the said upstanding arm; a stationary contact secured to one end of the said clamping bolt; a second elongated frame of metal yieldingly secured to the said first frame, and having means for receiving and gripping the trolley wire; a runway pivotally secured to the said second frame and extending longitudinally along the said first and second frames, the said runway having a portion thereof adapted to extend longitudinally along the said trolley wire and to be engaged by a passing current collector, for moving the said runway upwardly about its pivotal axis; and a movable contact secured to the said runway in operative relation with the said stationary contact.

8. A trolley contactor comprising, a first elongated frame of metal having means for receiving and gripping a trolley wire; a stationary contact insulated from and secured to the said first frame; a second elongated frame of metal disposed longitudinally in tandem relation with the said first frame, and having means for receiving and gripping the trolley wire; means operatively engaging the adjacent ends of the said frames and yieldingly securing the same one to the other; a runway pivotally secured to the said second frame and extending longitudinally along the said first and second frames, the said runway having a portion thereof adapted to extend longitudinally along the said trolley wire and to be engaged by a passing current collector, for moving the said runway upwardly about its pivotal axis; and a movable contact secured to the said runway in operative relation with the said stationary contact.

9. A trolley contactor comprising, a first elongated frame; means for securing the said first frame to a trolley wire; a stationary contact secured to the said first frame; a second elongated frame yieldingly secured to the said first frame; means for securing the said second frame to the trolley wire; means operatively engaging the adjacent ends of the said frames and yieldingly securing the same one to the other; a runway pivotally secured to said second frame and extending longitudinally along the said first and second frames, and having a portion thereof adapted to extend longitudinally along the said trolley wire and to be engaged by a passing current collector, for moving the said runway upwardly about its pivotal axis; and a movable contact secured to the said runway in operative relation with the said stationary contact.

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