OVERHEAD TROLLEY SYSTEM

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This application relates to overhead trolley systems and in its more specific aspects is directed to an electrical means for shifting the frog tongues controlled by collector operated switches whose opening or closing sequence determines the tongue position.

The object of this invention is to construct a trolley frog whose tongue position is controlled by switches operated by contactors pivoted to said frogs engageable by the current collectors and wherein the opening and closing sequence is determined by the order in which the trolley current collectors engage the contactors.

A further object of the invention is to provide an overhead trolley system in which pivoted contactors on the frog pans operate switches for determining the energizing and de-energizing of the tongue shifting coils.

Another and still further object of the invention is to provide in an overhead trolley system a frog pan having a shiftable tongue movable by coils whose energization is controlled by switches on said pan that are opened and closed in the same sequence in which the current collectors on the vehicle engage the contactors.

Other and further objects of the invention will occur to those skilled in the arts to which this invention pertains as the description proceeds which taken in connection with the accompanying drawing sets forth a preferred embodiment of the invention and selected modifications thereof, but such disclosures are not to be construed as a limitation of the invention which is limited only by the appended claims and any and all modifications, alterations and variations of structure coming within the spirit and scope thereof are deemed to be included herein.

In the drawing:

Fig. 1 shows a schematic plan view of a preferred embodiment of the invention.

Fig. 2 shows a side elevational view of the contactor mechanism employed in the invention.

Fig. 3 shows a detail sectional view along the line 3—3 of Fig. 2.

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The objects set forth above are embodied in the structure generally disclosed in Fig. 1 in which 26 and 27 designate conventional frog elements to which trolley wires 28, 28 are secured and from which wires 31, 31 are led in a straight-through direction and 29, 30 branch off as turn-off or curve wires. A tongue element 32 is arranged on each of the frog pans 26 and 27, pivoted thereto at 33, which selectively connects the wires to either 30, 30 or 31, 31 depending upon the adjusted position of the tongue elements 32, 32.

The moving vehicle (not shown) has the usual current collectors 9, 9a arranged thereon in the conventional manner that are adapted to engage the respective trolley wires 28, 28 and as indicated above, tongue elements 32, 32 direct the current collectors 9, 9a selectively on to the branch or curve trolley wires 30, 30 or the straight-through wires 31, 31. In order to maintain the frog pans 26 and 27 in proper spaced relationship a pair of strain or insulator elements 28, 29 is arranged therebetween to maintain the said spaced relationship which is coincident with the spacing of the current collectors 9, 9a.

Means have been provided for the shifting of the tongue elements 32, 32 to line up with either of the wires 30, 30 and 31, 31 as indicated above, which means is embodied in a pair of actuating coils 34, 34, each of which has a plunger 37 that is mechanically linked to the tongue elements 32, 32 by a bar or linkage schematically shown at 56, 56. A latching means is shown at 40, 43 pivotally supported at 33, 33 by means of bar elements 40a, 40c which are kept in a retracted position by means of springs 35, 35; each of the latch elements 40, 43 receive the bar linkage 55 on one side of it when the switch is set for curve. The particular illustration discloses a conventional re-set type of mechanism which originates in a pair of pivoted elements 35, 35 that are mechanically linked to the plungers 37, 37 of actuating coils 34, 34 by means of the linkage 36. Re-set mechanisms 35, 35 are engaged by the current collectors 9, 9a to restore the tongue elements 32, 32 to the straight-through position following each passage of the vehicle to the turn-off position.

Attention is invited to the fact that in this embodiment, the control coils, switch and resistance employed in the parent application have been replaced by simple make and break switches 41 and 42, that are actuated by tiltable or pivoted contactor elements 45 and 47. Attention is further invited to the fact that each of these contactors 46 and 47 is of varying lengths, as indicated by the distance A' which is determined in a manner similar to the distance A described and shown in the application identified above. Any vehicle approaching the trolley frogs and desiring to go on the branch trolleys 30, 30 will be positioned underneath the trolley...
frogs such that collector 9a will be considerably advanced ahead of the collector 9 and will, as a result, engage the contactor 46 before collector 9 engages contactor 47. Upon collector 9a engaging contactor 46, it will elevate it and simultaneously close switch 41. The closing of switch 41 establishes a circuit through the actuating coils 34, 34 by means of conductor 43, coil 33, conductor 44 and a second coil 34 and conductor 45 through switch 42 and thence to the opposite trolley wire 28. This action will shift the tongue elements 32, 32 to the turn-off position and permit the collectors 9 and 9a to follow the path of trolley wires 30, 30. As soon as the collector 9 engages its corresponding contactor 47, it will break the circuit by reason of it opening switch 42 thereby de-energizing coils 34, 34 and when the collectors 9, 9a engage the re-set mechanisms 35, 35 the tongue elements 32, 32 will be restored to their straight through position. Attention is invited to the fact that switch 41 is normally open and switch 42 is normally closed.

Distance B in Fig. 1 shows the distance contactor 46 is pivoted ahead of contactor 47. The reason for this displacement is that if collector 9 should disengage contactor 47 before 9a disengages 46 there would be a shifting of the tongue elements causing a false or undesired operation of the frog. By advancing the pivot 50 of contactor 46 switch 41 will open before switch 42 is closed and thereby prevent an undesired operation.

Assuming that the vehicle with collectors 9 and 9a desires to continue in the straight ahead position on to wires 31, 31, it should be observed that collectors 9, 9a will approach and practically, substantially, simultaneously engage the respective contactors 46 and 47, and whereas collector 9a in its movement will close switch 41 thereby normally closing the shifting circuit, yet before the coils 34, 34 can be energized the circuit will have been broken by collector 9 engaging contactor 47 thereby breaking the shifting circuit. It should be apparent from this description that the functioning of the actuating coils 34, 34 is not dependent upon the opening or closing of any switch by a coil or upon a potential being imposed across an arbitrary resistance and even if any arcs are formed between the collectors 9, 9a and their respective contactors, they will not influence in any way the functioning of the device. Furthermore, since the engagement of contactors 46 and 47 with collectors 9 and 9a, is a strictly mechanical function the possibility of arcing will, as a natural result, be prevented and the shifting of the tongue elements will be entirely dependent, therefore, upon the mechanical action of the contactors and the respective collectors. As previously indicated, the space or distance A', which represents the difference in effective length of the respective contactors subtracted from the lag of collector 9a behind 9a, affords the space-time interval in which coils 34, 34 can shift the respective tongue elements 32, 32 to the turn-off position before contactor 47 is shifted by collector 9 thereby breaking the circuit at switch 42.

Figs. 2 and 3 disclose in a little greater detail the functioning and construction of the switches 41, 42 and their relationship to the contactors 46, 47. It has been observed as previously indicated that the two contactors are of different lengths. Each of the contactors 46 and 47 com-
that the respective lengths of contactors 46 and 41 be proportioned such that irrespective of the angle of the turn-off, the coils 11, 14 and 34, 34 will have ample time to become energized so as to thereby permit the shifting of the tongue elements to the turn-off position. It is thought apparent, therefore, that a trolley shifting mechanism has been provided that is positive in its action and will prevent any unintentional shifting of the tongue elements and that is simple and economical in its construction and maintenance.

That which is regarded new, novel and useful and which is sought to be protected by Letters Patent of the United States is as follows:

1. In an overhead trolley system; a pair of frog pans; a shiftable tongue element associated with each pan; a trolley wire connected to each pan; a contactor pivoted mounted on each pan and movable relative to said trolley wire by engagement with passing current collectors; a solenoid coil actuated plunger means to shift the tongue elements from one to another position; a switch associated with and operated by movement of each contactor; a circuit including a source of current said switches and said coil connected in series; one of said switches being normally open and the other normally closed; said circuit closed when said contactor associated with said normally open switch is moved prior to the other; said circuit remaining open when said contactors are substantially simultaneously engaged and means to reset said tongue elements after each shifting thereof, said reset means operable through said plunger means.

2. In an overhead trolley system; a pair of trolley frog pans; a shiftable tongue associated with each pan; a trolley wire connected to one end of each of said frog pans; a current collector engaging each wire, a contactor pivoted to each pan and movable at right angles with respect to said trolley wires said contactors pivoted when engaged by said collectors; electromagnetic means to shift said tongues from one to another position; a switch associated with and operable by the movement of each of said contactors; a circuit to connect said means in which one side of said switches is connected to said trolley wires as a source of current supply and the other side of said switches connected to said electromagnetic means; said circuit energized when one of said contactors is lifted prior to the other, but remaining unenergized when both contactors are substantially simultaneously lifted.

3. In an overhead trolley system; a pair of frog pans maintained in a spaced relationship; a pivoted tongue element on each of said pans; a pair of trolley wires fixed to one end of each of said pans; a single trolley wire fixed to the other end of each of said pans; a coil and plunger means associated with each of said pans, said plunger connected to said pivoted tongue to shift said tongue from one to the other of each of said pairs of trolley wires; a switch on each of said pan elements; pivoted contactor disposed adjacent each said single trolley wire and adapted to actuate the switch on each of said pan elements; means supporting said switches on said pans for opening and closing same by said pivoted contactors; current collectors engaging said trolley wires; a pivotable tongue element on each of said pans; a pair of trolley wires including said coils and said switches; and said tongues shiftable when one said collector engages its corresponding contactor ahead of the other collector and when both collectors substantially simultaneously engage both said contactors keeping said circuits open thereby preventing shifting said tongue elements.

4. In an overhead trolley system; a pair of spaced apart pan elements; a pivoted tongue on each of said pan elements; a coil and plunger associated with each pan, each said plunger connected respectively with one of said tongues; a trolley wire fixed to one end of each of said pans; a contactor pivoted to each pan and adapted to move with respect to each said pan and its associated trolley wire; a switch operatively associated with each contactor; means supporting said switches on said pans; said opening and closing by said pivoted contactors; current collectors in engagement with each of said trolley wires; a circuit connectable across said trolley wires which includes said switches and said coils; one of said switches normally open and the other normally closed; said circuit closing when one of said collectors engages the respective contactor before the other collector engages its respective contactor and said circuit remaining open when both of said collectors substantially simultaneously engage their respective collectors.

5. An overhead trolley system to guide a pair of current collectors on a vehicle comprising a pair of main conductors and a pair of branch conductors, therefor, a trolley frog at the intersection of each branch and main conductors, each frog provided with a movable tongue, electrically operated mechanism associated with each frog to actuate the tongues to guide the passing collectors either along the main conductors or on to the branch conductors, means to control the energization of the electrically operated mechanism, the said means comprising a contactor pivoted mounted on each frog and projecting longitudinally from one end thereof and engageable by the current collectors in advance of passing onto the frogs to actuate the collectors about their pivotal axes, a switch associated with each frog in actuating with the closed and opened positions by the said operation of the said contactors, the switch being normally open and the other switch being normally closed, the switches being connected in series with the electrically operated mechanisms and the said mechanisms and associated switches being electrically connected to the trolley wires for energization, the said contactors being so disposed relative to each other as to be simultaneously or sequentially engaged by the current collectors for determining the movement of the frog tongues, the said engagement being effected by the angularity of the switches with respect to the main conductor as the collectors are passing the contactors.

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