July 10, 1934. D. C. LARSON 1,966,249

SWITCHING MECHANISM

Original Filed July 31, 1930

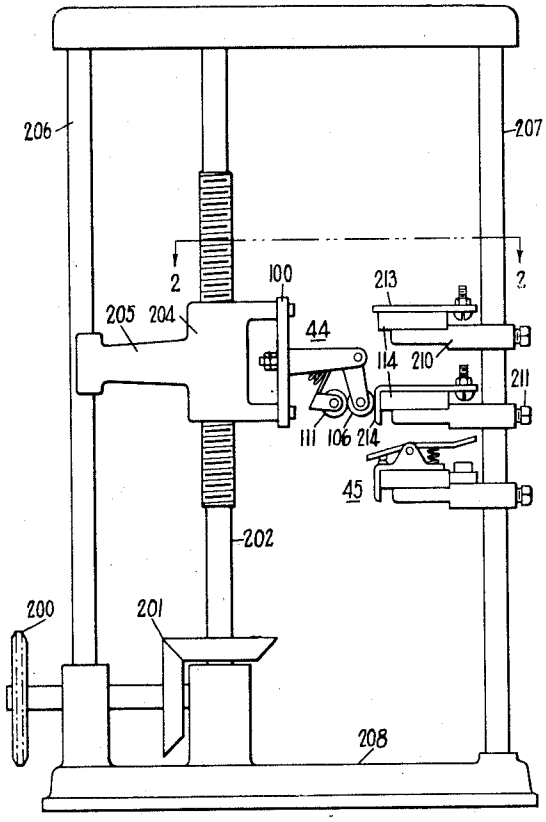

FIG. 1

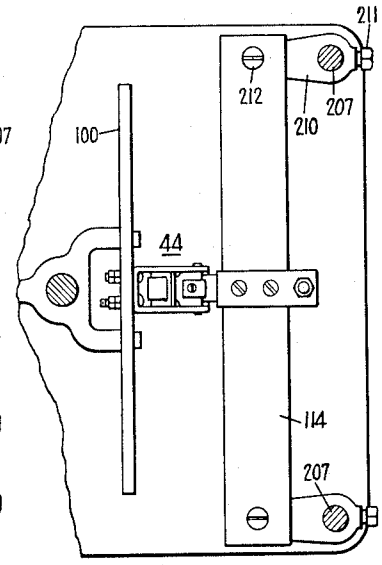

FIG. 2

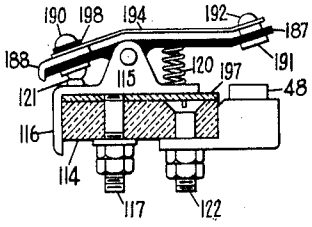

FIG. 5

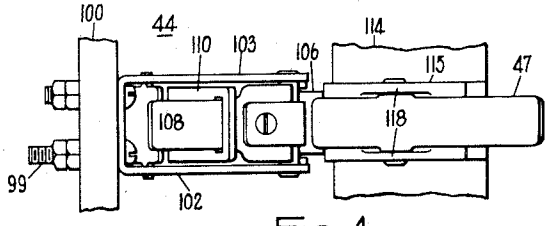

FIG. 4

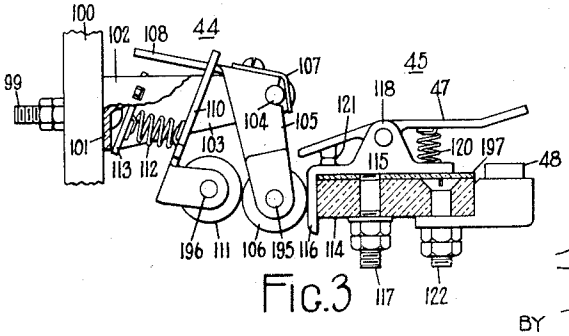

FIG. 3

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UNITED STATES PATENT OFFICE

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SWITCHING MECHANISM

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Original application July 31, 1930, Serial No. 471,926. Divided and this application September 2, 1931, Serial No. 560,769

3 Claims. (Cl. 177—336)

This application is a division of application Serial No. 471,926, filed July 31, 1930.

The invention of this application relates to switching mechanisms, and particularly to switching mechanisms useful in elevator systems.

In effecting control of an elevator car and of the various adjuncts associated with it, a miniature reproduction of the elevator system is frequently employed. Such a miniature reproduction, commonly termed a "selector" or "selector machine", may comprise a travelling block or crosshead, representing the elevator car, arranged for movement, relative to a stationary framework, proportional to the movement of the elevator car in the hatchway. Switching mechanisms may be mounted upon such a selector machine so that they are operated in accordance with the position of the elevator car in the hatchway. A familiar arrangement of a switching merhanism thus employed is that of a brush or contactor, mounted upon the travelling crosshead, arranged to engage successively with one or more stationary contacts, mounted upon the framework of the selector machine, during the movement of the crosshead from its position representing the lower limit of travel of the car to its position representing the upper limit of travel of the car. The mounting arrangements for the stationary contacts are preferably adjustable so that the engagement of the travelling brush with each stationary contact may be made to occur at the desired position of the elevator car in the hatchway.

One feature of the present invention is the provision of a brush for selector machines in which the circuit-completing action of the brush with the stationary contacts is positive, while the wear of the contacting body of the brush is a minimum.

Another feature of the invention is the provision of a stationary selector contact the effectiveness of which is dependent upon the direction in which the selector brush passes over such stationary contact.

Other features and advantages will become apparent from the specification taken in connection with the accompanying drawing wherein one embodiment of the invention is illustrated.

In the embodiment of the invention to be described, the selector brush is formed of two conducting rollers, one of which may be termed the "contact" roller and the other, the "back" roller. The contact roller is rotatably mounted upon the end of an arm which is pivotally secured to the travelling crosshead of the selector machine. The back roller is rotatably mounted upon a movable arm against which acts a spring so as to cause the back roller to bear against the contact roller in such manner as to maintain the contact roller in engagement with the stationary contacts when the contact roller is opposite them. A stop is provided for limiting the movement of the two rollers caused by such spring when the contact roller is in engagement with no stationary contact. As a result of such construction for the selector brush, a positive, non-wearing contact is assured from the contact roller to the stationary contacts, and a circuit always assured between the rotating contact roller and the selector brush terminal on the travelling crosshead.

The selector brush outlined above may be employed to contact with any of the recognized forms of stationary selector contacts. It is particularly adapted, however, to be used in conjunction with the herein described stationary selector contact designed for distinguishing between the directions in which the selector brush passes over such stationary contact. This stationary contact is provided with a pivoted lever arm, one end of which extends into the path of movement of the contact roller of the selector brush. The other end of the pivoted lever arm is adapted to engage with a suitable contact, for convenience termed an auxiliary contact. The lever arm is spring biased into a position against a stop, in which position the projecting end of the lever arm is merely an obstruction around which the contact roller rolls when the selector brush is travelling in the direction which tends to maintain the lever arm against the stop. When the selector brush is travelling in the other direction, the contact roller, after engaging the projecting end of the lever arm, causes the rotation of such lever arm until the other end thereof engages with the auxiliary contact, after which the contact roller rolls around the projecting end of the lever arm and then disengages therefrom. The lever arm is thereupon returned to its initial position by the action of the biasing spring. Accordingly, with this stationary selector contact, a circuit is completed from the travelling brush to the auxiliary contact when the travelling brush engages such selector contact while it, and thus the elevator car, is moving in one direction, but not when moving in the other direction.

In the drawing:

Figure 1 is a front elevation of a selector machine constructed in accordance with this invention;

Figure 2 is a sectional view of the selector

machine taken along the line 2—2 of Figure 1;

Figure 3 is a view, in elevation, of the travelling roller brush, shown in engagement with the direction-distinguishing selector contact;

Figure 4 is a plan view of the brush and contact illustrated in Figure 3; and

Figure 5 is a view of a modified form of direction-distinguishing selector contact in which the pivoted lever arm is formed of insulating material.

Referring to Figures 1 and 2, the selector machine there illustrated is provided with a gear 200 by which the selector machine may be driven in accordance with the movement of the elevator car. A vertical shaft 202, connected to gear 200 by means of gearing 201, is suitably threaded for a travelling crosshead 204. Crosshead 204 is provided with an extension 205 which engages vertical guide rod 206 to prevent rotation of the crosshead. To the crosshead 204 is secured an insulating member 100, upon which member is mounted a roller selector brush generally designated 44.

The selector machine is provided with two vertical upright rods 207 secured to base 208 and spaced as illustrated in Figure 2. Insulating floor bars 114 are adjustably mounted upon rods 207 by means of supports 210, one at each end of each bar 114. Each support 210 is secured to its associated rod 207 by means of the set screws 211. The floor bars 114 are secured to supports 210 by means of the screws 212. The stationary selector contacts are mounted upon the floor bars 114. For purposes of illustration, there are shown in Figure 1 two types of stationary selector contacts, 213 and 214, which may be used when a short or a long contact is desired, respectively. The illustrated direction-distinguishing-responsive selector contact is generally designated in Figure 1 as 45.

In Figures 3 and 4, the roller brush 44 is shown in engagement with a portion of the direction-distinguishing selector contact 45. To the insulating member 100, there is fastened, as by bolt 99, a U-shaped metallic bracket 101 having arms 102 and 103, the former designated arm being shown in Figure 3 as partly broken away. To the ends of these arms there is secured a metallic pin 104. This pin pivotally supports a metallic U-shaped member 105 having a conducting roller 106 rotatably mounted thereupon by a pin 195. A removable locking strip 107 is provided to prevent the dislodgment of the member 105 from the pin 104. The member 105 is also provided with an extending strip 108 that extends through a hole in one end of a metallic plate 110. To the other end of plate 110 is rotatably mounted a second conducting roller 111, as by means of pin 196. A compressed spring 112 is positioned between the arms 102 and 103 and arranged so that one of its ends engages the plate 110, and the other of its ends engages the travelling member 100 through the intermediary of an insert member 113. As a result of this construction the spring maintains the conducting roller 111 bearing against the conducting roller 106 and thus tends to rotate the member 105, which mounts the conducting roller 106, counterclockwise until the extending strip 108 engages with the insert member 113 as a stop. When the roller 106 is in engagement with a selector contact, as is shown in Figures 1 and 3, the member 105 is rotated clockwise to compress the spring 112 still further, and thus to insure, as a result of the bearing of roller 111 against roller 106, an excellent electrical circuit between the selector contact and the bolt 99.

The direction-distinguishing selector contact 45, as previously mentioned, is supported upon a stationary floor bar 114 made of suitable insulating material. The illustrated selector contact comprises metallic member 115, fastened to the insulating floor bar 114 by the bolt 117, having a lip 116 that is bent over the edge of the bar. This lip is the surface adapted to be engaged by the roller brush. A pair of lugs 118, provided on the member 115, pivotally support a metallic lever arm 47. A compressed spring 120 is positioned between the member and the lever arm to urge the arm against suitable stops 121. One end of the lever arm 47 projects a short distance outward from the plane of the contact lip 116. The other end of the lever arm is adapted, upon rotation thereof against the spring 120, to suitably engage a contact 48. This contact 48 is mounted upon the insulating bar 114 by a bolt 122 in such a manner that it is insulated from the metallic member 115. For this purpose, a mica or other insulating strip 197 may be employed between member 115 and bar 114 so as to insulate the head of bolt 122 from member 115.

As a result of this construction of the selector contact 45, it may be seen that when the selector brush moves away from engagement with the contact lip 116 in an upward direction as viewed in Figure 3, the brush engages the projecting end of the lever arm 47 and causes rotation of such lever arm until the other end thereof engages the contact 48. The brush then rides around the projecting end of the lever arm, whereupon the spring 120 restores the lever arm to its initial position. When the brush moves toward the contact lip 116 in a downward direction as viewed in Figure 3, the brush engages the projecting end of the lever arm, and, inasmuch as the arm already is urged against the stops 121, rides around the projecting end of the lever arm and then engages with contact lip 116.

The construction of the selector contact described above is such that, so long as the brush 44 is in engagement with the projecting end of lever arm 47 (that is to say, regardless of the direction of travel of the brush), there is a circuit from the brush to the terminal 117, in spite of the fact that the selector brush may not be in engagement with contact lip 116. This is due to the fact that the metallic lever arm 47 it not insulated from the contact member 115. It may therefore be seen that when the travelling brush is travelling in such a direction as to cause the engagement of lever arm 47 with contact 48, there are two circuits completed by the brush—one from brush 44 to terminal 122, and the other from brush 44 to terminal 117.

It is occasionally desirable that the direction-distinguishing portion of a selector contact for a floor complete a circuit after the circuit through the non-direction-distinguishing portion of the selector contact for that floor is broken. In such instances, a selector contact such as illustrated in Figure 5 may be employed. This selector contact is similar in construction to the selector contact shown in Figures 3 and 4 except for the lever arm 47. The lever arm of the selector contact shown in Figure 5, designated 187, is formed of insulating material. Its projecting end is provided with a metallic tip 188 secured thereto as by a rivet 190. The other end of the lever arm 187 is provided with a contact 191 arranged to engage with contact 48 when the lever arm 187

is rotated out of its normal position. The contact 191 is mounted upon the lever arm 187 by a rivet 192. An electrical connection 194 is provided to connect the metallic tip 188 with the contact 191. Insulating bushing 198 is provided for the rivet 190 so as to insulate it from the metallic tip 188 and the connection 194. As a result of this construction, the engagement of the selector brush 44 for a car with the metallic tip 188 on the lever arm 187 as such car travels downwardly, as viewed in Figure 5, is without effect, since the tip 188 is insulated from the member 115 and lip 116. When the selector brush disengages from contact lip 116 as the car travels upwardly, as viewed in Figure 5, the selector brush for such car causes the rotation of the lever arm 187 in the manner analogous to that effected for the lever arm 47 of the selector contact shown in Figure 3. However, before contact 191 upon the lever arm 187 engages with the contact 48, the selector brush completely disengages from the contact lip 116. As a result, at the time a circuit is completed from the selector brush 44, by way of tip 188, connector 194, contact 191, to contact 48 and terminal 122, there is no circuit from the selector brush 44 to member 115 and terminal 117.

It is to be understood that the selector machine herein illustrated is only for the purpose of showing generally the principles of construction of a selector machine, and that in actual, commercial elevator installations the selector machines, when provided, are usually more complex, and embody numerous brushes and many stationary contacts.

Attention is also directed to the fact that the roller selector brush shown in detail in Figure 3 is adaptable for use generally as a selector brush wherever it is desired to have but little wear of the contacting body and to insure a good contact being made.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In an elevator selector machine; a stationary contact strip having a lip portion adapted to be contacted by a selector brush and having a mounting portion at right angles to said lip portion by which said contact strip is adapted to be mounted upon a stationary element of the selector machine; a lever arm pivotally mounted upon said mounting portion so that one end of said lever arm projects beyond the plane of said lip portion, and thus is adapted to be engaged by the movable selector brush of said selector machine, and to be rotated thereby about its pivot, as said selector brush moves away from engagement with said lip portion; an auxiliary contact stationarily mounted upon said selector machine adapted to be engaged by the other end of said lever arm when said lever arm is rotated about its pivot by the movable selector brush; and means for normally maintaining said lever arm in a position so that said other end thereof is disengaged from said auxiliary contact.

2. In an elevator selector machine; a movable selector brush; a contact stationarily mounted upon said selector machine; and means for completing a circuit from said selector brush to said contact when said selector brush passes said stationary contact in one direction of travel but not when said selector brush passes said stationary contact in the other direction of travel, said means comprising, a lever arm, means for pivotally supporting said lever arm upon a stationary portion of said selector machine so that said lever arm engages with said stationary contact in establishing a limit to the movement of said lever arm in one direction, said pivotally supporting means being arranged to cause one end of said lever arm to project a short distance into the path of movement of said selector brush, a stop for limiting the movement of said lever arm in its other direction, and means biasing said lever arm into engagement with said stop, so that, when said selector brush engages the projecting end of said lever arm when travelling in the direction tending to urge said lever arm against said stop, the lever arm is not moved and no circuit is completed from said selector brush to said stationary contact, but when said selector brush engages the projecting end of said lever arm when travelling in the other direction, said selector brush causes rotation of said lever arm until it engages said stationary contact to establish a circuit from said selector brush to said stationary contact by way of said lever arm.

3. In an elevator selector machine; a stationary contact strip; an element movable relatively to said strip; and contact means mounted on said movable element adapted to engage with said contact strip during a portion of the movement of said element for completing a circuit between said stationary contact strip and a terminal carried by said movable element, said contact means comprising; an electrically conductive arm, electrically connected to the terminal carried by said movable element and pivotally supported upon said movable element; an electrically conductive roller; means, including an electrically conductive pin extending through the axis of said roller and secured to said arm, for rotatably mounting said roller upon said arm so that the cylindrical surface of said roller is adapted to roll upon said contact strip; a second electrically conductive roller; means, including an electrically conductive arm electrically connected to the terminal carried upon said movable element and also including an electrically conductive pin secured to said second arm and extending through the axis of said second roller, for rotatably mounting said second roller so that the cylindrical surface of said second roller engages the cylindrical surface of said first roller on the side thereof opposite which said first roller is adapted to engage said stationary contact strip; and means for causing said second roller to bear against said first roller.

DAVID CARL LARSON.