

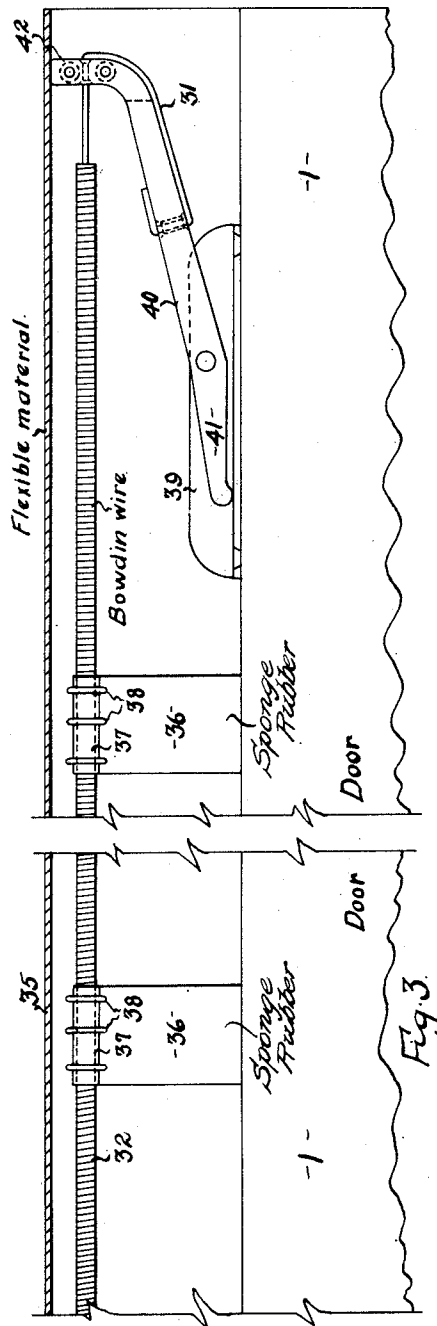
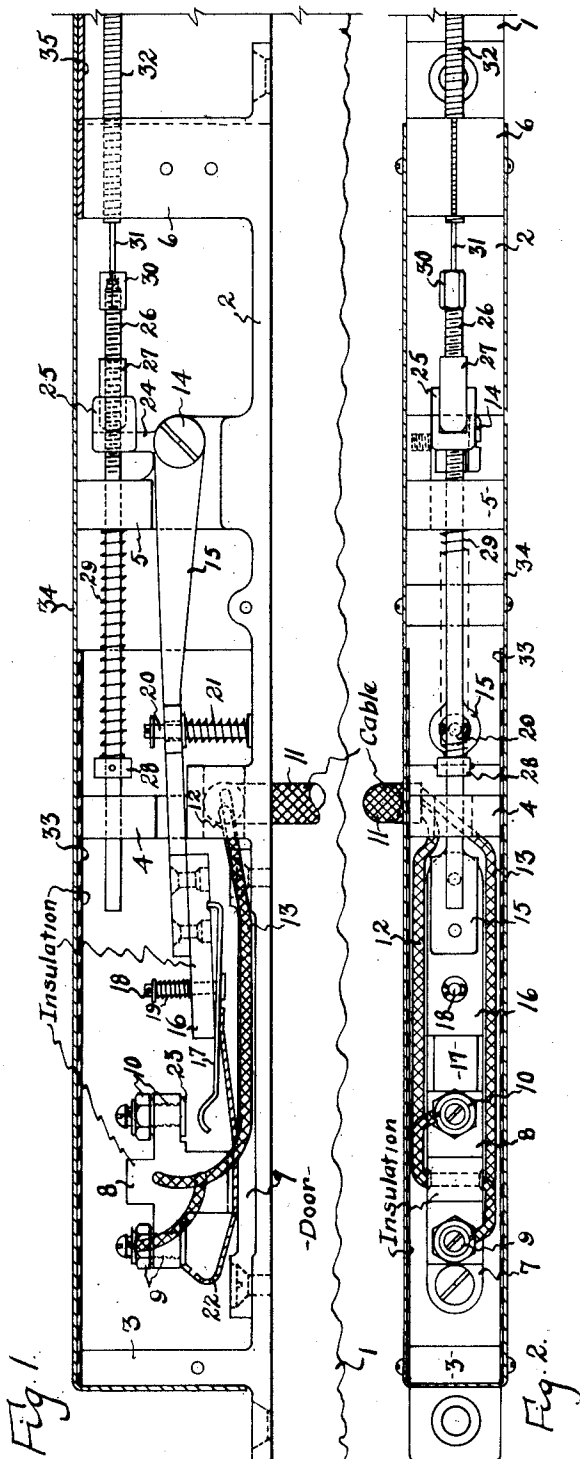
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SWITCH MECHANISM

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SWITCH MECHANISM

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5 Claims. (Cl. 200—54)

This invention relates to improvements in switch mechanism particularly of the type required in connection with vehicle doors for controlling the operation of the door moving motors to effect reversal of the movement of the door should it meet an obstruction in closing.

An object of this invention is to provide a simple and efficient form of switch operated by means of a flexible member supported under tension along the forward edge of the door.

These and other objects as will appear from the following disclosure are secured by means of this invention.

This invention resides substantially in the combination, construction, arrangement and relative location of parts in accordance with the following detailed description.

Referring to the drawing—

Figure 1 is an enlarged side elevational view of the portion of the mechanism mounted at the top forward edge of the door showing the protecting casing in cross-section;

Fig. 2 is a top plan view of this mechanism showing the protecting casing in cross-section; and

Fig. 3 is a side elevational view of the intermediate and bottom portions of the door showing the remainder of the switch operating mechanism.

It is common practice to employ on vehicles such as subway cars and the like, reversing mechanism for the power operated doors for causing the doors to open should they strike an obstruction while closing. The reversal of the operation of the motive devices which move the doors is effected through a control switch which is mounted on the forward edge of the door within a flexible protecting casing. When the door strikes an obstruction in closing, such as the body of a passenger, the flexible casing of the forward edge of the door is deformed and the switch mechanism therein is operated to effect a reversal of the motive devices. There are many forms of switch control mechanism, the most common of which employ a pair of electrodes insulated from each other and supported so as to be moved into contact when the casing is deformed. The structure of the present invention is distinguishable from such structures in that a switch is employed which is operated by a long flexible member within the casing, which member is normally held under tension.

Referring to the drawing the forward edge of the door is shown at 1. Figs. 1 and 3 taken together represent a side view of the complete mechanism with intermediate portions of the door

broken away, the mechanism of which portions is the same as that illustrated in Fig. 3. Mounted at the top on the forward edge of the door is a metal plate 2 having a series of spaced projecting brackets 3, 4, 5 and 6. Secured near the upper end of the plate between the brackets 3 and 4 is a smaller plate or bar 7 which supports a block of insulating material 8 in the form of a T. Secured to the arms of the block 8 are the bolts and nuts 9 and 10 to which are secured the conductors 12 and 13 respectively, of the cable 11. As will be clear conductor 12 passes through a hole in the block 8 and connects to the nut and bolt 9. Likewise conductor 13 passes through the block 8 in the opposite direction and is connected to the nut and bolt 10. Pivotally supported at 14 on the standard 5 is an arm 15 which has secured to its outer end a small block of insulating material 16. Pivotally and movably mounted on the block 16 is a contact finger 17 positioned to engage with the head 23 of the bolt 10, as is clear from the drawing. The contact finger 17 is fulcrumed at its righthand end on the insulating block 16. A pin 18 loosely passes through the spring finger 17 and the block 16 and is surrounded by a coil spring 19 positioned so as to resiliently hold the spring finger in the position shown. At 20 is a pin resting at one end on the plate 2 and passing through a hole in the arm 15. A spring 21 is positioned around this pin and is held under compression when the arm is in the position shown.

A short arm 24 integral with the arm 15 and forming a bell crank lever is provided at its upper end with a U-shaped socket 25. At 26 is a rod threaded at one end as shown, and slidably mounted in the passages of standards 4 and 5. At 27 is an internally threaded collar which is adjustably mounted on the threads of rod 26. The lefthand end of this rod is round and rests against the member 25, as is clearly shown. The rod 26 is provided with a collar 28 secured thereto and a spring 29 surrounds the rod and lies between the collar 28 and the standard 5. Secured to the righthand end of rod 26 is a nut 30 within which rests the enlarged end of the wire 31 so that the wire is firmly secured to the rod 26, as will be clear from the drawing. This wire is the central member of a Bowden wire 32. This wire extends from the rod 26 vertically downwardly along the entire forward edge of the door to the bottom and is secured to the portion 42 of an arm 40 pivotally mounted on a plate 39 secured near the bottom edge of the door. The

wire 31 passes through a hole in the arm 42 and is secured to the arm as shown. Arm 40 is provided with an extension 41 which rests against the plate 39 to hold the arm against further movement in a counter-clockwise direction. The Bowden wire is supported at spaced points on blocks 36 of resilient material such as sponge rubber. These blocks serve to support the Bowden wire at spaced points and to hold it in the proper position. The Bowden wire is wrapped or covered with a sheet of suitable material as indicated at 37 and is wired or otherwise secured to the ends of the blocks as shown at 38. In an actual installation the distance between blocks 36 will be sufficient so that the Bowden wire may be easily deflected under pressure. The spring finger 17 is connected by a flexible pigtail 22 to the bolt 9. The switch mechanism is enclosed within casing 33 of insulating material and casing 34 of metal, and the flexible casing which encloses the remainder of the mechanism is shown at 35.

The Bowden wire 32 is held under the necessary pressure by means of the spring 29. Collar 27 is adjusted on rod 26 so as to engage the arm 24 to hold it in the position shown against the action of spring 21. If the door in closing should strike an object the casing 35 will be pressed inwardly and Bowden wire 32 will likewise be bowed inwardly or in the direction of the force so as to pull rod 26 downwardly against the action of spring 29. This moves collar 27 downwardly freeing the bell crank lever so that spring 21 may move arm 15 outwardly about the pivot point 14. Spring finger 17 then engages the contact 23. Current then flows from one side of the control circuit through wire 12 of cable 11, nut and bolt 9, pigtail 22, spring finger 17, contact 23, nut and bolt 10 and wire 13 back to the other side of the control circuit. The spring finger being resiliently supported there is no danger of injury thereto if arm 15 should move excessively, although the arm will be limited in its movement by the standard 4, as will be clear from Fig. 1. In addition, the manner of supporting the spring finger 17 allows a wiping contact action. As soon as the pressure is removed from the Bowden wire spring 29 regains control and pulls it back into a straight line and, at the same time, the adjusted collar 27 engages arm 24 and moves the arm 15 back to the position shown against the resistance of spring 21. This breaks the circuit at the contact 23 and spring finger 17. The extension 41 of arm 40 limits the counter-clockwise rotation of the arm 40 to insure that the parts will be held in proper position so as to provide a rigid support for the wire under the tension of spring 29 and yet permit the arm 40 to move in a clockwise direction should a passenger's foot be caught in the door adjacent the portion 42 of the arm. If arm 40 was immovable the portion 42 might injure the passenger's foot.

From the above description it will be apparent that I have devised an exceedingly novel structure, the features of which may be embodied in other physical forms and I do not, therefore, desire to be strictly limited to the disclosure as given for purposes of illustration but rather to the scope of the appended claims.

What I seek to secure by United States Letters Patent is:

1. The combination with a door and a switch mounted on the forward edge thereof, a spring normally holding the switch open of a Bowden wire rigidly secured to the forward edge of the door near the bottom, means for slidably supporting the upper end of the wire so as to place the wire under tension, and means interconnecting the wire and switch whereby the switch is held open against the action of said spring and is closed thereby when pressure is applied to the wire. 85

2. The combination comprising a door, a switch arm pivotally mounted on the forward edge of the door, a fixed contact mounted on the forward edge of the door so as to be engaged by the switch arm, a spring normally urging the switch arm into engagement with the contact, a wire supported on the forward edge of the door under tension, and means on said wire and engaging said switch arm to normally hold it out of engagement with the contact against the reaction of the spring. 90 95

3. A combination comprising a door, a contact mounted on the forward edge of the door, a switch arm pivotally mounted on the forward edge of the door in a position to engage the contact, a spring normally urging the switch arm into engagement with the contact, a wire supported at one end on the lower edge of the door, a rod slidably mounted on the forward edge of the door and connected to the upper end of said wire, a spring cooperating with the rod to hold said wire under tension, an arm integral with the switch arm positioned adjacent said rod and an adjustable collar threadedly engaging said rod and contacting with said arm. 100 105 110

4. A combination comprising a movable door, a contact supported on the forward edge of the door, a switch arm pivotally mounted on the forward edge of the door so as to be movable to engage the contact, a spring normally urging the switch arm into engagement with the contact, a lever pivotally mounted near the bottom edge of the door, a wire secured to said lever, resilient means attached to the other end of the wire for holding the wire under tension, said lever having means for limiting its rotation under the pull of said wire, and means interconnecting said switch arm and wire for normally holding the switch arm out of engagement with the contact against the resistance of said spring. 115 120 125

5. A combination comprising a movable door, a contact supported on the forward edge of the door, a switch arm pivotally mounted on the forward edge of the door so as to be movable to engage the contact, a spring normally urging the switch arm into engagement with the contact, a lever pivotally mounted near the bottom edge of the door, a wire secured to said lever, resilient means attached to the other end of the wire for holding the wire under tension, said lever having means for limiting its rotation under the pull of said wire, means interconnecting said switch arm and wire for normally holding the switch arm out of engagement with the contact against the resistance of said spring, and a flexible enclosing casing for said wire. 130 135 140 145

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