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ELECTRIC SWITCH

Filed Nov. 20, 1923

2 Sheets-Sheet 1

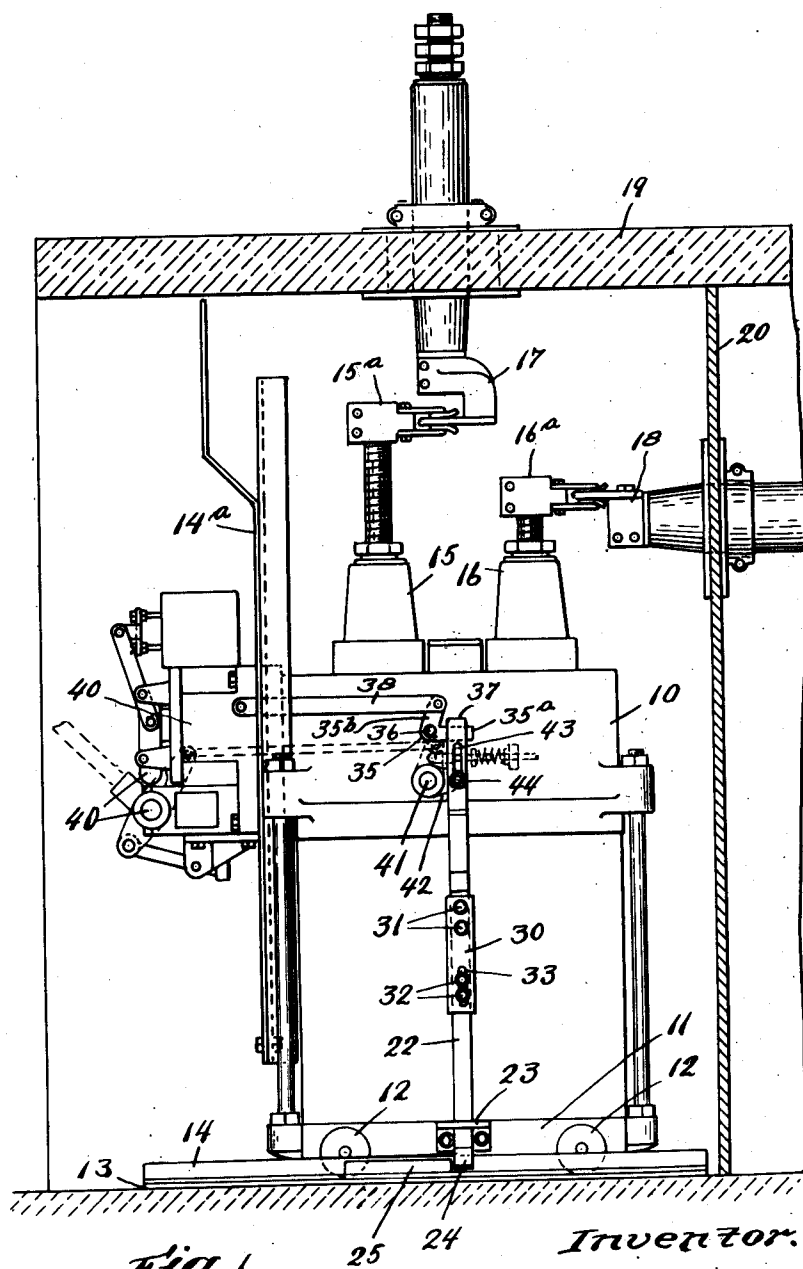


Fig. 1.

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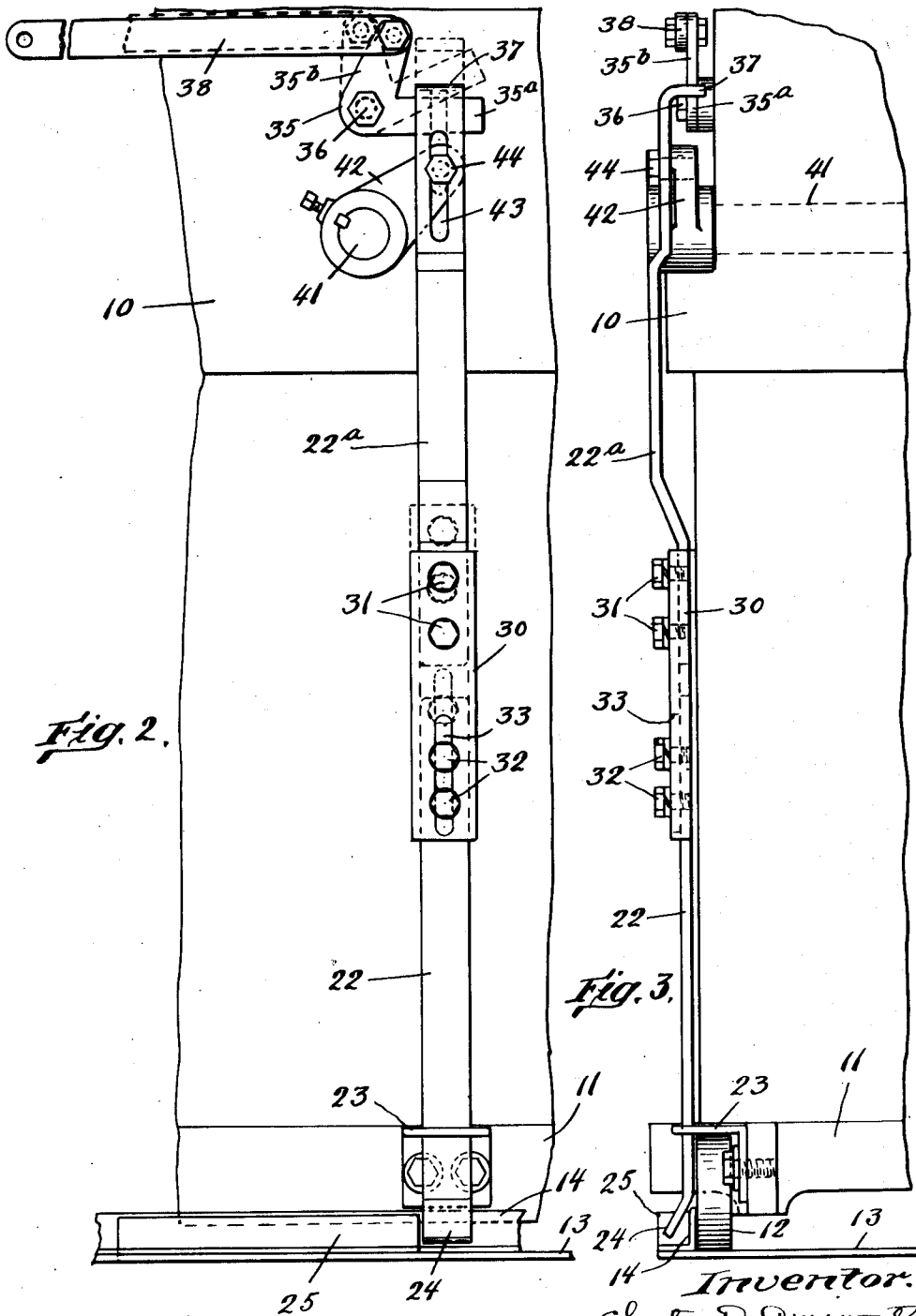
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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ELECTRIC SWITCH

Application filed November 30, 1923. Serial No. 675,950.

This invention relates to portable electric switches and has particular reference to a so-called "truck-type" switch.

A switch of the truck type is or may be mounted on wheels or the equivalent in order that it may be readily moved into position to be connected with circuit leads and moved from such position for inspection or for other purposes.

The switch is or may be contained in an enclosing cell. The switch also is or may be so arranged that its terminals are caused automatically to be connected electrically with the fixed circuit leads when the switch is in proper position and automatically disconnected from the circuit leads when the switch is withdrawn from the cell.

It is an object of this invention to provide means to lock the portable switch in a predetermined position against unintentional displacement; manually-controlled means to release the lock on the switch, whereby to permit it to be removed from such position; means governed by the closing movement of the switch mechanisms to lock the switch automatically in position and hold the lock on the switch against manual release while the switch is closed; means to prevent the closing of the switch until it has been placed in proper position; and means to prevent movement of the switch into engaging relation with the fixed circuit leads when the switch is closed.

A further object is generally to improve the construction and operation of electric switches.

Fig. 1 is a side elevation of a switch embodying the invention.

Fig. 2 is an enlarged side elevation in detail of the switch lock embodying the invention.

Fig. 3 is an end elevation of Fig. 2.

As here shown, the electric switch 10 with which the invention is associated may be mounted upon a platform or truck 11 and said truck may be provided with wheels 12 upon which the switch is adapted to roll.

The switch is adapted to be contained removably within an enclosing cell and the wheels 12 thereof are adapted to roll upon a

track 13, which track is disposed on the bottom wall of the cell. Said track 13 may be formed or provided with parallel guide rails 14, one of which is shown in the figures, and said guide rails are adapted to engage the wheels 12 and guide the switch into suitable position within the cell. A plate 14^a may be carried by the switch and form the front wall or cover for the cell. The switch terminals 15 and 16 are formed or provided with exposed terminal members 15^a and 16^a. Said terminal members are adapted to engage fixed terminal members 17 and 18, which fixed members may be carried respectively by the top wall 19 and rear wall 20 of the enclosing cell and are adapted to be connected with leads of the circuit to be controlled by the switch.

The arrangement of the terminal members is or may be such that when the switch is moved into position within the cell, the switch terminal members are adapted automatically to become connected with the fixed terminal members 17 and 18 and when the switch is removed from the cell, the switch terminal members are adapted automatically to be disconnected from said fixed terminal members whereby automatically to disconnect the switch from its circuit.

The switch lock embodying the invention may include the locking bar 22. Said locking bar is or may be vertically extended along the side wall of the switch and the lower end of said locking bar may be vertically slidably received in a guide bracket 23, which bracket may be secured to the carriage 11 of the switch and arranged to guide said locking bar 22 for approximately vertical movement therein and support it against lateral displacement. The lower end of said locking bar 22 is or may be provided with an outwardly reflexed portion 24 which is adapted to lie outwardly beyond one of said guide rails 14. Said guide rail 14 is or may be formed or provided with an abutment as the block 25, which block may be secured to said guide rail in such a position that when the switch is in proper position within the cell, and properly connected with the fixed terminal members 17 and 18, the reflexed end

24 of said locking bar is in a position just behind said abutment 25 and the relation of said locking bar and abutment is adapted to be such that the switch can not be withdrawn when the locking bar is in its lowermost position, as illustrated in the figures. When said locking bar is raised into a position to clear said abutment 25, the switch may be withdrawn from the cell. Said locking bar 22 is or may be provided with an upper extension 22^a which extension is adapted to be engaged by suitable means to raise said bar 22 and thereby release the lock on the switch. Said bar 22 and the extension 22^a may be adjustably connected together whereby to provide for an extension of the effective length of both bars. For this purpose, said bars 22 and 22^a may be received in a channeled member 30. One of said bars, as the extension 22^a, may be rigidly secured to said channel member 30 by suitable means as the bolts 31. Said other bar, as the bar 22, may be adjustably secured to the channel member 30 and for this purpose bolts 32 may be screw-threaded in the upper end of said bar 22 and said bolts may be received in a vertically-extended slots 33 formed in said channel member and secured adjustably to said channel member in any desired adjusted relation in said slot.

The raising means for said locking bar may include the bell crank lever 35, which lever may be disposed on the upper part of the switch casing and pivotally supported in position by suitable means as the bolt 36. The lower arm 35^a of said bell crank lever is adapted to extend between the upper end of the locking bar and the switch frame and the upper end of said locking bar is or may be provided with a reflexed end portion 37 which is adapted to extend over and above said arm 35^a and in a position to be engaged by said arm.

The upper arm 35^b of said bell crank lever may have an operating rod 38 pivoted thereto and said rod 38 may extend forwardly of the switch and through the cover plate 14^a and outwardly beyond the enclosing cell and in a position to be engaged by the hand or by some suitable operating device whereby to rotate said bell crank lever. As thus arranged, it is apparent that when said operating rod 38 is pulled outward, it serves to raise the locking bar and cause the lower end thereof to be withdrawn from an engaging position with the abutment 25 and thereby to permit the switch to be withdrawn from the cell.

In accordance with this invention, means are provided also to prevent the unlocking of the switch when the switch is closed, in order to prevent the accidental formation of an arc at the fixed circuit terminals 17 and 18 which might otherwise occur when the

switch is withdrawn in closed condition and carrying current.

The switch operating mechanism may include the electrically controlled closing and opening mechanism 40, which mechanism may be carried by the switch casing externally of the cell. The switch mechanism also may include an operating shaft 41, one end of which may extend through the side wall of the casing adjacent the upper end of said locking bar or, more specifically, the upper extension 22^a thereof. Said shaft is adapted to be rotated in one direction, as counterclockwise, when the switch is opened and rotated in the opposite direction when the switch is closed. An arm 42 is fixed by suitable means to the extended end of said shaft 41 whereby to rotate with said shaft and said arm is or may be disposed between the switch casing and the extension 22^a of said locking bar. The upper end of said extension is or may be formed or provided with an elongated slot 43 therein. A suitable pin 44 is extended through and slidably received in said slot and is or may be fixed to the free end of said arm 42.

The arrangement and relation of the various parts is or may be such that when the switch is in proper position within the cell and is in engagement with the fixed terminals 17 and 18 and the switch is closed, said pin 44 of said arm 42 is disposed in the bottom of said slot 43 and thereby serves to retain said locking bar in depressed position and against being raised by the bell crank lever 35 and the operating rod 38, the lock on the switch mechanism maintaining the bar in such depressed position against the action of the bell-crank lever. When the switch is opened, said pin 44 of the arm 42 is moved into the upper portion of said slot 43 and said locking bar may then be raised by a suitable movement of the bell crank lever 35. The arrangement of the parts is also such that if the switch is not in complete engagement with the fixed contacts 17 and 18, the lower end of said locking bar 22 may be disposed above the abutment 25 and may thereby prevent the closing of the switch; and the inability to close the switch will indicate to the operative the fact that the switch is not in its proper position within the cell. The arrangement is also such that the operation of the switch mechanism to close the switch also operates automatically to move the locking bar to lock the switch in position. The arrangement also is or may be such that if the switch contacts are closed when the switch is moved into its cell the locking bar 22 may be depressed and engage the forward face of the abutment 25, whereby to prevent further forward movement of the switch until the switch contacts are opened.

The structure may be otherwise modified

without departing from the spirit of the invention.

I claim:

1. A portable electric switch having switch-operating mechanism and a track on which the switch is movable, cooperating means carried by said switch and track operable independently of the switch-operating mechanism to lock the switch to said track in a predetermined position on said track, and means governed by the switch-operating mechanism arranged to govern the operation of said locking means.

2. A portable electric switch having switch-operating mechanism and a track on which the switch is movable, cooperating locking means carried by said switch and track operable to lock the switch to said track in a predetermined position on said track irrespective of the position of said switch-operating mechanism, and means governed by the switch-operating mechanism arranged to hold said locking means in switch-locking condition while the switch is in closed condition.

3. A portable electric switch having switch-operating mechanism, a track on which the switch is freely supported and is movable, switch terminals, and fixed circuit terminals adapted to be engaged by said switch terminals, said switch being movable on said track to a point remote from terminal engaging position, manual means operable independently of said switch operating mechanism when the switch is open to lock the switch releasably to said track in terminal-engaging position, and means governed by said switch-operating mechanism having an interconnection with and arranged to hold said locking means in switch-locking condition while the switch is in closed condition and to free said locking means for subsequent unlocking movement when the switch is open.

4. A portable electric switch including a casing having switch-mechanism and supporting wheels, a track on which the switch is movably supported, said track having an abutment, a locking bar approximately vertically extended along a side of the switch casing and supported for vertical movement into and also away from engaging position with said abutment, whereby to lock the switch against or release it for movement on said track, and manually-controlled means to operate said locking bar.

5. A portable electric switch including a casing having switch-mechanism and wheels on which the casing is movable, a track on which the switch is movable, said track having an abutment, a locking bar approximately vertically extended along a side of the switch casing and supported for vertical movement into and also away from engaging position with said abutment, whereby to lock

the switch against or release it for movement on said track and manually-controlled means to operate said locking bar including a bell-crank lever pivoted to the upper portion of the switch casing and having pivotal connection with the upper end of said locking bar, and an operating rod pivotally connected with said bell-crank lever.

6. A portable electric switch including a casing having switch mechanism and supporting wheels, a track on which the switch is movably supported, said track having an abutment, a locking bar approximately vertically extended along side of the switch casing and supported for vertical movement into and also away from engaging position with said abutment, whereby to lock the switch against or release it for movement on said track and manually-controlled means to operate said locking bar including a bell-crank lever pivoted to the upper portion of the switch casing and having pivotal connection with the upper end of said locking bar, an operating rod pivotally connected with said bell-crank lever, and means to vary the effective length of said locking bar.

7. A portable electric switch including a casing having switch-mechanism and supporting wheels, a track on which the switch is movably supported, said track having an abutment, a locking bar approximately vertically extended along side of the switch casing and supported for vertical movement into and also away from engaging position with said abutment, whereby to lock the switch against or release it for movement on said track, manually-controlled means to operate said locking bar and means governed by said switch mechanism arranged to control the operation of said locking bar.

8. A portable electric switch including a casing having switch-mechanism and supporting wheels, a track on which the switch is movably supported, said track having an abutment, a locking bar approximately vertically extended along side of the switch casing and supported for vertical movement into and also away from engaging position with said abutment, whereby to lock the switch against or release it for movement on said track, manually-controlled means to operate said locking bar and means governed by said switch mechanism arranged to control said locking bar, said controlling means including a reciprocating member associated with said switch mechanism and operating in a slot in the upper end of said locking bar and constructed and arranged to hold said locking bar in switch-locking position against manual release when the switch is closed and release said locking bar for manual control when the switch is open.

9. A portable electric switch including a casing having a switch mechanism and wheels on which the casing is supported, a track on

which the switch casing is movable, said track having an abutment, a locking bar approximately vertically disposed along side of said switch casing and arranged for vertical movement into and also away from engaging position with said abutment, whereby to lock said switch casing against or release it for movement on said tracks, said locking bar having a lateral extension at its upper end, a bell-crank lever pivoted to the upper portion of the switch casing and having an arm disposed beneath and arranged to engage said lateral extension, whereby to raise said locking bar and release the lock on the switch, a manually-controlled operating rod pivotally connected with said bell-crank lever arranged to actuate it, and a reciprocating arm associated with said switch-mechanism operable in a slot in said locking bar arranged to move said locking bar into and hold it in switch closed position while the switch is closed.

In testimony whereof, I have signed my name to this specification.

CHESTER D. AINSWORTH.

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