Sept. 12, 1950 J. R. CALDWELL ET AL 2,521,826

ELECTRIC SWITCH

Filed July 10, 1947 2 Sheets-Sheet 1

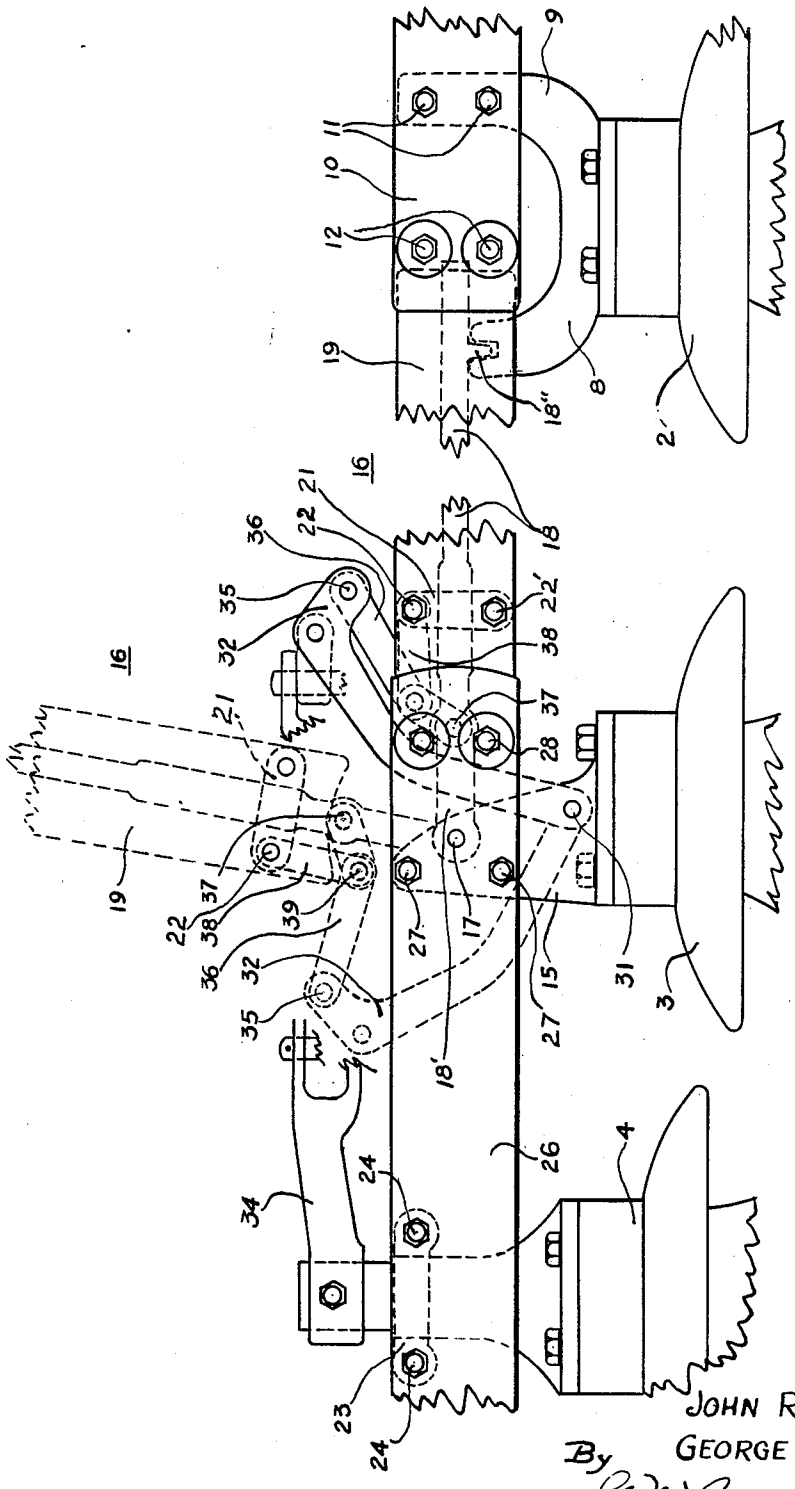


FIG. 1

INVENTORS
JOHN R. CALDWELL
GEORGE N. LEMMON
By G. N. Lemmon AGENT

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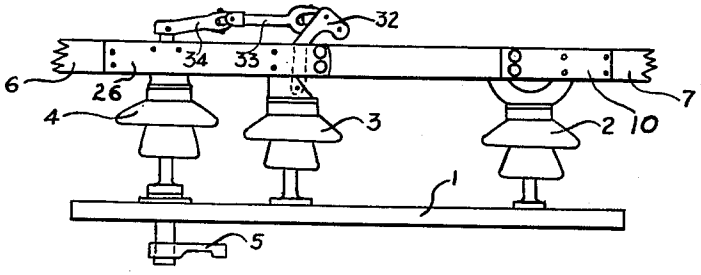


FIG. 2

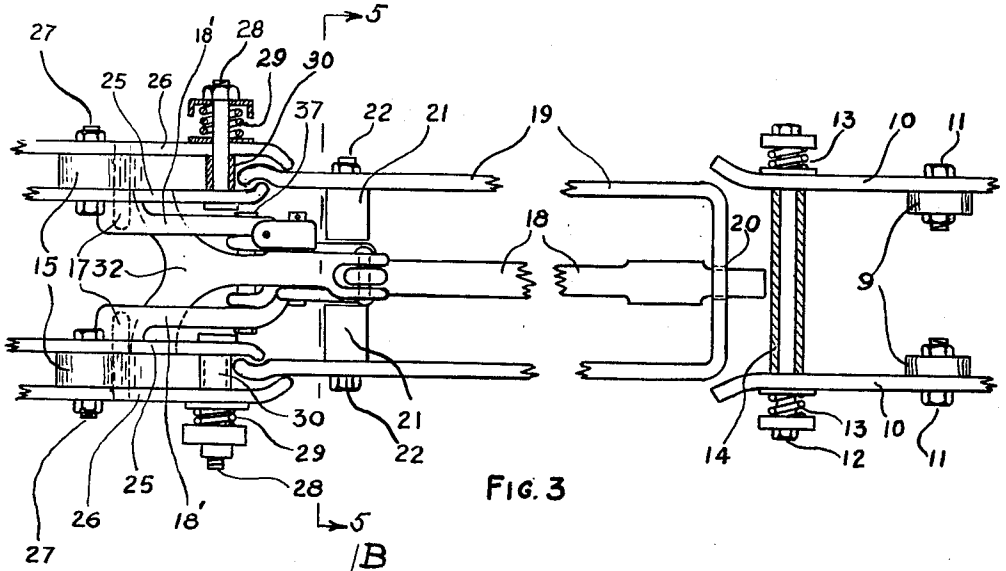


FIG. 3

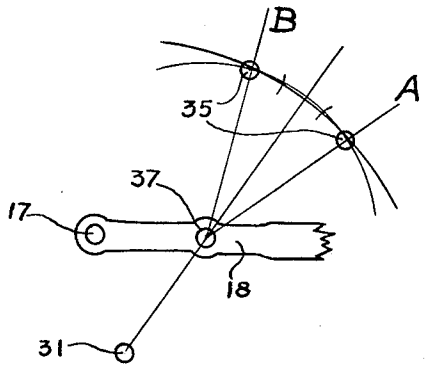


FIG. 4

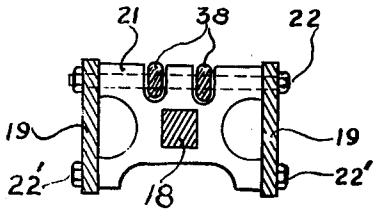


FIG. 5

INVENTORS
JOHN R. CALDWELL
GEORGE N LEMMON
BY G. N. Lemmon AGENT

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ELECTRIC SWITCH

John R. Caldwell, Hampton, Ga., and George N. Lemmon, Homewood, Ala., assignors to Southern States Equipment Corporation, a corporation of Georgia

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5 Claims. (Cl. 200—48)

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This invention relates to electric switches of the type in which a switch arm is moved into closed position with a minimum of friction and then heavy contact pressure is developed between the switch arm and the stationary contact members. One purpose is to provide a switch arm structure in which the conducting members of the switch arm move as a unit to apply or to release the heavy contact pressures. Another purpose is to develop the desired heavy contact pressures without imposing equally heavy strains upon the supporting insulator units. Another purpose is to accomplish the desired results by a smooth, even movement of the control member for the switch, and without the use of hooks, latches, catches, or similar complications. Other objects will be apparent from the specification and claims.

Referring to the drawings, Fig. 1 shows the operating members of the switch arm in closed position, and also indicates by dotted lines the open position of the switch arm; Fig. 2 is in smaller scale a side view of a single pole switch embodying this invention; Fig. 3 is in larger scale a top view of the operating members of the switch arm when it is in closed position; Fig. 4 explains the motions of some of the operating members; and Fig. 5 is a section on line 5—5 in Fig. 3 showing the slide member which spaces the two sides of the switch arm conductor.

The base 1 carries two stationary insulators, 2, 3 and one rotative insulator unit 4, which is operable by means of crank 5. The line or bus connections 6, 7 are bolted respectively to hinge jaws 26 and switch jaws 10. Insulator 2 carries a slotted guide 8, and a forked support 9 to which switch jaws 10, 10 are secured by bolts 11—11. Bolts 12, 12 compression springs 13—13 and spacers 14, 14 hold jaws 10, 10 in fixed spaced relation but they can be slightly spread by pressures heavy enough to further compress springs 13, 13.

On insulator 3 is carried hinge support 15 to which the switch arm structure 16 is hinged by pivots 17, 17. Said switch arm includes the supporting arm 18 with its forked end 18'—18', the elongated U-shaped main conductor 19, 19 and the smaller parts connected thereto. The swing end of supporting arm 18 is machined and it fits movably into an opening 20 in main conductor 19. A slide 21 fits movably over the supporting arm 18 as shown in Fig. 5 and it is secured by bolts 22, 22' to the two sides of conductor 19. Supported by opening 20 and slide 21, main conductor 19 is capable of sliding, reciprocating motion upon supporting arm 18. When in closed position, the tooth 18'' of arm 18 fits into the slot in 8, thereby holding insulators 2 and 3 in their proper positions without undue strains.

Rotative insulator 4 is free to turn in bearing 23 which is held by bolts 24—24 to hinge jaw members 25, 25 and 26, 26. Jaw members 25, 25 and 26, 26 are secured by bolts 27—27 to support

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15 and they are formed as shown in Fig. 3 to engage the ends of main conductor 19, 19. Bolts 28—28, springs 29—29 and spacers 30—30 hold each pair of jaw members 25, 26 in minimum spaced relation to one another but capable of being separated by heavy pressure. As shown in Fig. 1, jaw 26, where it makes contact with conductor 19, has an end that is an arc about the pivot 17 as its center. The ends of 19 and 25 are made on corresponding arcs, and all these ends are formed as shown. Each end of main conductor 19 is bent first outwardly and then inwardly, the ends of 25, 25, 26, 26 are each bent towards the adjacent end of main conductor 19, but 25 is shorter than 26, and so when the conductor 19 is moved to the left, as shown in Fig. 3, there is no heavy pressure between main conductor 19 and any of the other conducting members. But when conductor 19 is moved to the right, it wedges between the two pairs of hinge jaws 25, 26 and 25, 26, and at the other end conductor 19 wedges between switch jaws 10, 10. As shown in Figs. 1, 2, and 3, the line or bus connections 6 and 7, the hinge jaws 26, 26 and 27, 27, the main conductor 19 of the switch arm structure and the jaws 10, 10, all are in the same horizontal plane above base 1. Also these members form two substantially straight lines of conductors which join together the two line connections 6 and 7. Thus the main conductor 19 is in effect and in appearance a removable portion of a continuous conductor of which 6 and 7 are parts

Pivoted to support 15 by a second pivot 31 is the curved rocker 32 whose swing end is connected by connecting rod 33 to crank 34, which in turn is secured to insulator unit 4. Connecting rod 33 includes a universal joint at each end. Rocker 32 carries a third pivot 35 about which moves link 36. The other end of link 36 is connected by a fourth pivot 37 to supporting arm 18. Links 38, 38 are connected by a fifth pivot, which is bolt 22, to slide 21, and they are also connected to link 36 by a sixth pivot 39 at a location between pivots 35 and 37.

It will be seen from Fig. 4 that pivot 35 moves always in an arc about its fixed center at 31. Link 36 is pivoted at 35 and also at 37, and when pivot 35 is moved through the space between lines A and B, the arcs about 31 and 37, respectively, coincide so closely that clearances about the various pivots permit pivot 35 to be moved in this space without link 36 causing pivot 37 to be moved.

Operation is as follows:

Assuming the switch to be fully closed, the members are as shown in Fig. 1, and pivot 35 will be in the position shown at A in Fig. 4. Also the switch arm main conductor 19 will be wedged tightly between the switch jaws 10, 10, and the springs 13, 13 will be further compressed. Each of the other ends of 19 will be wedged between one of the pairs of hinge jaws, thereby slightly spreading 25 from 26 and compressing springs 29

slightly. Thus heavy pressure contacts are made both at the hinge ends and at the swing end of the switch arm main conductor 19.

To open the switch, crank 5 is rotated, thereby moving crank 34, connecting rod 33, and moving rocker 32 counter-clockwise from line A towards line B. Link 36 is thereby moved counter-clockwise and so links 38, 38 are moved to the left and conductor 19 is thereby moved to the left. This releases the heavy pressures at all jaw members, and the parts are shown in Fig. 3 with main conductor 19 free to be raised from its horizontal position.

Further motion of crank 5 brings rocker 32 past line B, and since link 36 keeps pivot 37 a fixed distance from pivot 35, this causes pivot 37 to be raised, thereby raising supporting arm 18 about its fixed pivots 17, 17 and so carrying the whole switch arm structure 16 upwards. The ultimate fully open position is indicated by dotted lines in Fig. 1.

When closing the switch, the reverse motions occur. By the time pivot 35 has reached line B, the switch arm 16 is in horizontal position and tooth 18'' is resting securely in its slot in guide 8. Further clockwise motion of rocker 32 does not move pivot 37, but it does rotate link 36 in clockwise motion. The leverage applied through links 38, 38 to conductor 19 is favorable, and so very heavy pressure is developed as 19 is forced between 25, 26 and 25, 26, at the hinge end, and simultaneously between 19, 19 at the switch jaw end. The tooth 18'' and the pivots 17, 17 hold the members 8 and 15 in a fixed spacing and therefore the heavy pressure developed by 19 does not affect the insulators.

The structures as shown are one design of switch embodying this invention. Many changes or modifications could be made by one familiar with the art without departing from the purpose and spirit of the invention.

We claim:

1. In an electric switch a stationary jaw support and a jaw fixedly mounted thereon, a stationary hinge support and a supporting arm mounted thereon by a hinge pivot and engageable with the jaw support to maintain unchanged the spacing between the hinge support and the jaw support when the switch is in closed position, the said supporting arm supporting a main conductor movable axially of said supporting arm, a second fixed pivot also supported by the hinge support at a space from the hinge pivot, a rocker mounted on said second pivot, a movable third pivot near the swing end of the rocker, a movable fourth pivot in the switch arm structure at a fixed space from the hinge pivot, a link connecting the said third and fourth pivots, a movable fifth pivot supported by the said link in spaced relation to both the said third and fourth pivots, and a connection member from the said fifth pivot to the said main conductor, together with means to move the rocker and thereby to move the said main conductor axially of the supporting arm to increase or decrease its contact engagement with said jaw.

2. In an electric switch, two spaced insulated supports, a jaw mounted on one of said supports, a supporting arm hingedly mounted on the other said support and a hinge jaw also mounted thereon, a U-shaped main conductor mounted on said supporting arm and movable longitudinally into and out of high pressure engagements with both of said jaws, the free ends of said U-shaped conductor being deformed, the adjacent jaw members all being deformed and all said deformations

being cooperable to develop high pressure engagements between the free ends of the U-shaped member and the adjacent jaw members when the main conductor is moved longitudinally in one direction and being cooperable to release the said high pressure engagements when the U-shaped member is moved in the opposite direction.

3. In an electric switch, two spaced insulated supports, a jaw mounted on one of said supports and with its ends extending towards the other support, a supporting arm hingedly mounted on the other said support, a U-shaped conductor mounted upon the supporting arm and movable longitudinally thereon, the closed end of the U-shaped conductor being engageable with the ends of said jaws when the switch is in closed position, together with operating means to force the said closed end of the U-shaped conductor between the ends of said jaw.

4. In an electric switch, a hinge support and a switch arm structure mounted thereon, a jaw support including a rigid engagement member, a pair of jaws mounted on the jaw support; the said switch arm structure including a supporting arm directly mounted on a stationary pivot in the hinge support and with a second engagement member near its swing end cooperable with the first said engagement member to maintain unchanged the spacing between the said jaw support and the said hinge support when the switch is in closed position, and a single integral main conductor slidably supported upon said supporting arm and movable axially of the supporting arm, together with means operable in one continuous movement to swing the switch arm structure into closed switch position and thereupon to slide the main conductor axially upon the supporting arm into high pressure contact with the said jaws.

5. In an electric switch suitable for mounting between two spaced ends of aligned bus connectors, an insulated jaw support and mounted thereon a pair of jaws which are connected to and are in alignment with the bus connectors that are adjacent to the jaw support; an insulated hinge support spaced from the jaw support, and mounted on the hinge support a pair of hinge jaws that are connected to and are in alignment with the bus connectors that are adjacent to the hinge support; and mounted on the hinge support upon a stationary hinge pivot a switch arm structure that includes a supporting arm with a single main conductor movably mounted thereon, the said supporting arm being engageable with the jaw support to maintain fixed spacing between the jaw support and the hinge support when the switch arm structure is in closed switch location; together with means operable in one continuous motion to swing the switch arm structure into closed switch location and thereupon to move the main conductor axially upon the supporting arm and into high pressure contact with both pairs of jaws.

JOHN R. CALDWELL.
GEORGE N. LEMMON.

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