Aug. 10, 1965 R. E. LOCHER 3,200,228

DUAL SWITCH UNIT

Original Filed Sept. 22, 1959 2 Sheets-Sheet 1

FIG. 1.

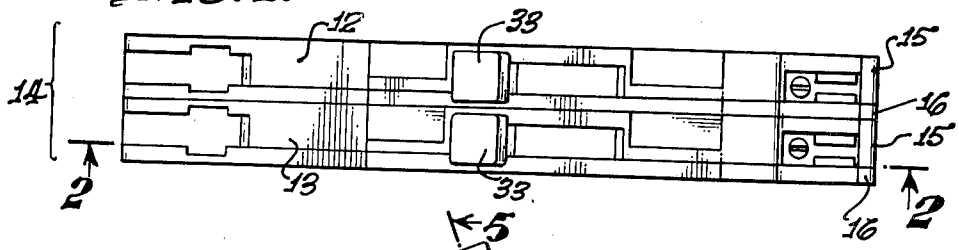


FIG. 2.

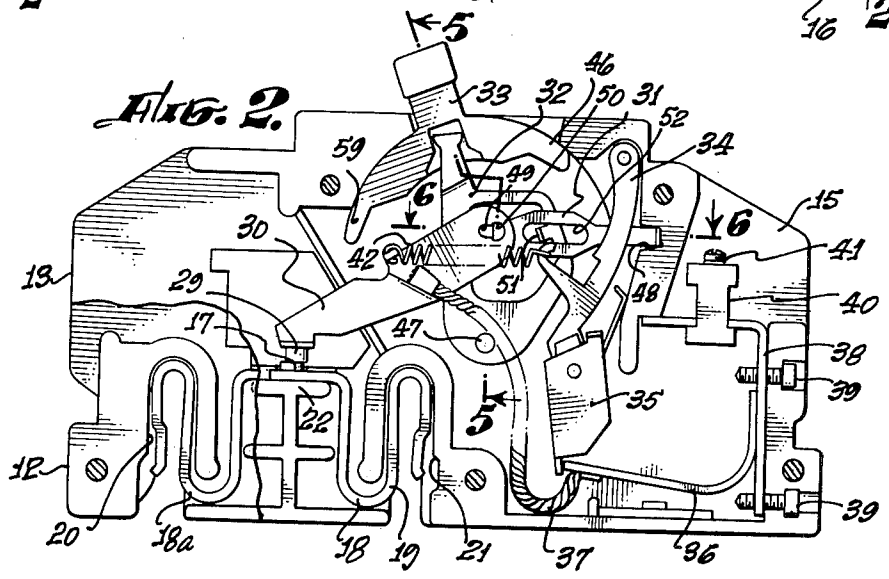
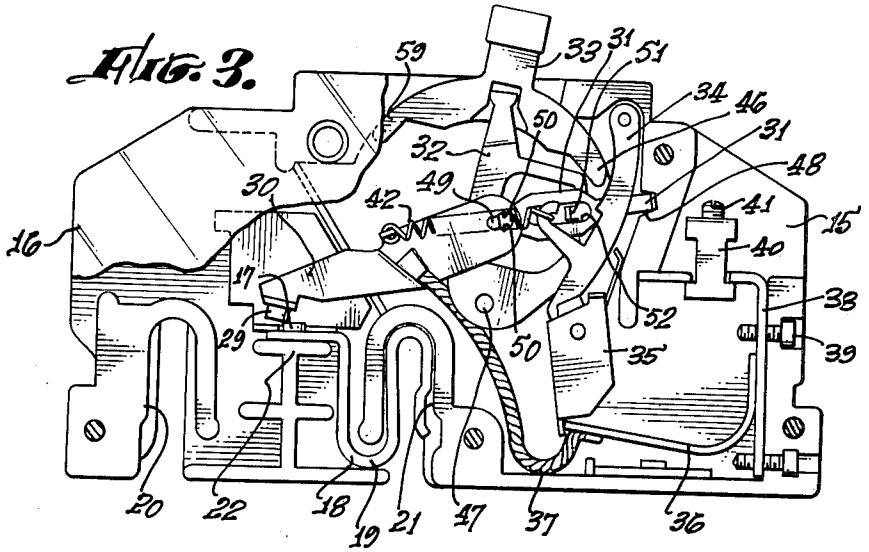


FIG. 3.



ROSS E. LOCHER,
INVENTOR.

BY HIS ATTORNEYS
HARRIS, KIECH, RUSSELL & KERN

Aug. 10, 1965 R. E. LOCHER 3,200,228

DUAL SWITCH UNIT

Original Filed Sept. 22, 1959 2 Sheets-Sheet 2

FIG. 4.

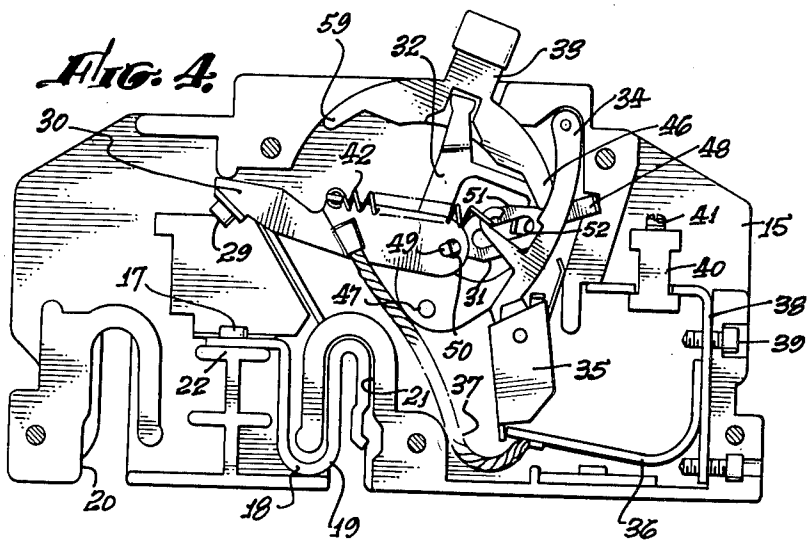


FIG. 6.

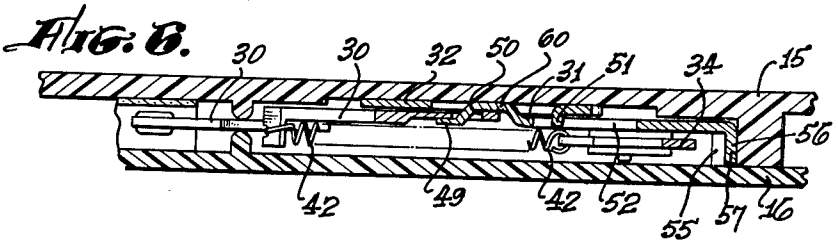


FIG. 5.

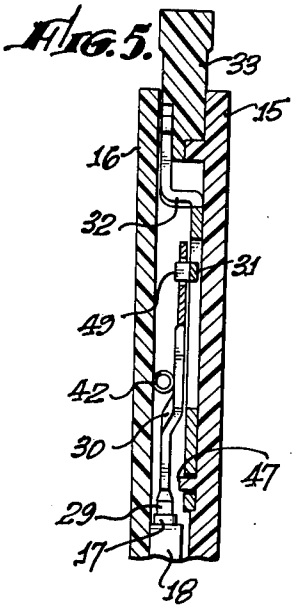


FIG. 7.

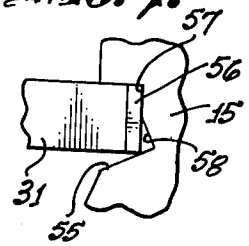
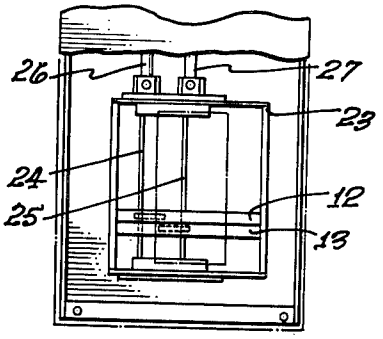


FIG. 8.



ROSS E. LOCHER,
INVENTOR.

By His Attorneys

HARRIS, KIECH, RUSSELL & KERN

United States Patent Office 3,200,228 Patented Aug. 10, 1965

3,200,228

DUAL SWITCH UNIT

Ross E. Locher, South Pasadena, Calif., assignor to Zinsco Electrical Products, Los Angeles, Calif., a corporation of California

Original application Sept. 22, 1959, Ser. No. 841,497, now Patent No. 3,114,023, dated Dec. 10, 1963. Divided and this application Jan. 28, 1963, Ser. No. 254,187

1 Claim. (Cl. 200—168)

This application is a division of my copending application entitled, "Electrical Switch," Serial No. 841,497, filed September 22, 1959, now Patent No. 3,114,023, issued December 10, 1963.

This invention relates to electrical switches and, in particular, to manually operable switches suitable for use in distribution panels and the like.

In a distribution panel, a number of switches are mounted side by side for connecting the incoming lines to the various devices requiring electrical power. Usually, the switch will include automatic overload protection in the form of a thermal type circuit breaker and the present invention is adapted for use in circuit breaker type switches.

It is an object of the invention to provide a relatively small switch which meets the standard electrical and safety requirements such that two of the switches can be installed in the space normally required for a single switch. A further object is to provide such a switch which can be combined with a similar switch to form a switch unit with the switch unit being directly substitutable for a conventional switch and with each switch of the unit having a distribution panel bus-engaging conductor that may take one of two symmetrical positions such that the two switches of a unit may engage alternate buses while utilizing identical parts.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. The drawings merely show and the description merely describes a preferred embodiment of the present invention which is given by way of illustration and example.

In the drawings:

FIG. 1 is a top view of two switches joined to form a switch unit;

FIG. 2 is a side view with the cover removed showing the switch in the closed position;

FIG. 3 is a view similar to that of FIG. 2 showing the switch part way through the opening cycle;

FIG. 4 is a view similar to that of FIG. 2 showing the switch in the open position;

FIG. 5 is an enlarged sectional view taken along the line 5—5 of FIG. 2;

FIG. 6 is an enlarged sectional view taken along the line 6—6 of FIG. 2;

FIG. 7 is an enlarged view of a portion of FIG. 2 showing a detail of the pivot arm mounting; and

FIG. 8 is a view of a distribution panel with the switch unit of the invention mounted therein.

The electrical switch of the present invention is ordinarily used in conjunction with a circuit breaker and will be shown thus in the following description. Circuit breaker switches of this general type are shown in United States Letters Patent Nos. 2,502,537 and 2,878,332, both assigned to the same assignee as the present application. The circuit breaker portion of the switch mechanism of the embodiment shown herein is essentially the same as that of these two patents and references may be made thereto for details of construction and operation.

The switch mechanism is mounted in a case consisting of a body 15 and a coverplate 16, the coverplate being

removed in FIGS. 2, 3 and 4. A fixed contact 17 is mounted on a conductor 18 having a U-shaped bus clip 19 at the other end. Housings 20, 21 are formed in the body 15 for receiving the bus clip 19, with the housings being symmetrically positioned with respect to a support boss 22 for the fixed contact. The conductor 18 may be positioned in the body with the fixed contact on the boss 22 and with the bus clip in either of the housings 20, 21. Two switches 12, 13 of the invention may be joined together to form a switch unit 14 as shown in FIG. 1, with the conductor 18 of one switch having the bus clip in the housing 21 and with the conductor, indicated as 18*a* in FIG. 2, of the other switch having the bus clip in the housing 20. This construction permits the switch unit to be mounted in a distribution panel 23 having parallel buses 24, 25 connected to two hot lines 26, 27 with one switch connected to the bus 24 and the other switch connected to the bus 25, providing the desired "phasing" of adjacent circuits (FIG. 8). Furthermore, the switch mechanism of the invention permits the switch to be manufactured in a case that is one-half the thickness of the normal case so that two switches forming a switch unit of the invention can be installed in the space normally required for a single switch. For example, switches of the type shown in the two aforesaid patents are three-quarters of an inch thick whereas the switch of the invention may be made with the same height and length but with only a three-eighths inch wide case, with one switch being directly substitutable for the other in electrical circuits.

The switch mechanism includes a moving contact 29 carried on a contact arm 30, a pivot arm 31, a switch actuator 32, a finger member 33, a trigger arm 34, a latch lever 35 and a thermal trip member 36. A flexible conductor 37 is connected between the contact arm 30 and the thermal trip member 36 with the trip member being spot-welded to a conductor 38 fixed in the body by screws 39. A terminal member 40 is fixed to the conductor 38 for receiving an external wire which is fixed in the terminal by a screw 41.

The operation of the trigger arm 34, the latch lever 35 and thermal trip member 36 is the same as in the aforesaid patents. When the current through the switch exceeds a predetermined value for a predetermined time, the thermal member, which is ordinarily a bimetal strip, rotates in a counterclockwise direction, freeing the latch lever 35 for counterclockwise rotation which in turn frees the trigger arm 34.

A toggle or overcenter spring 42 is connected between the contact arm 30 and the trigger arm 34, with the trigger arm serving as a fixed reference for the toggle spring during normal operation of the switch. However, when the trigger arm 34 is released by the latch lever 35 under overload conditions, the trigger arm is rotated clockwise by the spring 42, moving the switch to the tripped, open circuit position. The circuit breaker is reset by moving the finger member 33 to the extreme clockwise position as seen in FIG. 4, with an end portion 46 of the finger member engaging the trigger arm 34.

Turning now to the mechanism by which the switch is moved between the off and on positions, the actuator 32 is pivotally mounted on a boss 47 and the pivot arm 31 is supported in a pivot socket 48. The pivot arm 31 and contact arm 30 are joined at a pivot point formed by a tab 49 of the pivot arm projecting through an opening 50 of the contact arm. A cam engagement is provided between the actuator 32 and the pivot arm 31 so that when the actuator 32 is rotated by means of the finger member 33, the pivot arm will also be rotated. In the preferred embodiment of the cam arrangement shown herein, an arm 51 projects laterally from the actuator 32 into a slot 52 in the pivot arm.

The switch is shown in the open position in FIG. 4,

in the closed position in FIG. 2, and in the dead center position moving from closed to open in FIG. 3. When in the closed position, the spring **42** is below the pivot point of the contact and pivot arms, urging the pivot point upward and the moving contact **29** downward into engagement with the fixed contact. Clockwise rotation of the actuator **32** produces counterclockwise rotation of the pivot arm **31** and causes the pivot point to move downward. This movement of the pivot point causes the contact arm **30** to translate to the left producing a very great wiping motion between the fixed and moving contacts, as seen in FIG. 3. When the pivot point moves past the dead center position, the spring **42** causes the contact arm to rotate clockwise, moving the pivot point further downward and moving the moving contact upward to the position shown in FIG. 4. The reverse operation occurs when the member **33** is moved counterclockwise with the pivot point moving upward producing translation of the contact arm to the left until the dead center position is reached, after which the contact arm is rotated counterclockwise bringing the contacts together.

This switch mechanism provides a very fast contact make action and a very fast contact break action while requiring only a very short movement of the switch actuator. Also, there is a very large amount of translation of the contact arm during the initial part of the opening and closing cycle which produces a large wiping action at the contacts for keeping the contacts clean.

The pivot arm **31** may be mounted for pivoting movement in the body **15** in a pivot socket **55**, best seen in FIGS. 6 and 7. A flat end section **56** of the pivot arm rests in the socket **55** and engages one of two contiguous flat surfaces **57, 58** when in the closed and open positions respectively. This socket support for the pivot arm provides a simple pivoting support which does not have a center position so that the pivoting mechanism does not tend to rest at dead center.

Another feature of the invention comprises the use of an end section **59** and/or the end section **46** of the finger member **33** for aiding the snap action of the switch. The end section **59** may be dimensioned so that as the switch is being moved toward the on position, the end section will engage the contact arm **30** just as the toggle mechanism arrives at dead center to push the mechanism past dead center to achieve maximum velocity for the quick make operation. Similarly, the section **46** may be dimensioned to engage the pivot arm **31** when the mechanism is at dead center moving from the on position to push the mechanism past dead center and achieve maximum velocity for quick break operation. Alternatively, the end section **59** could engage the spring **42** adjacent the contact arm **30**, rather than the arm itself, with the same operative result.

As indicated previously, the switch of the invention may be assembled in a very thin package and an important feature of this slender package is the layer assembly of the components of the mechanism. This is best seen in FIGS. 5 and 6 showing the spring **42** positioned on one side of the contact arm **30** with the actuator **32** positioned on the opposite side. The pivot arm **31** moves in substantially the same plane as the contact arm **30** and is provided with an offset section **60** permitting the tap **49** to enter the opening **50**. This novel construction permits manufacture of switches having the same mounting dimensions and the same mechanical and electrical characteristics while requiring only one-half the space width.

Although an exemplary embodiment of the invention has been disclosed and discussed, it will be understood that other applications of the invention are possible and that the embodiment disclosed may be subjected to various changes, modifications and substitutions without necessarily departing from the spirit of the invention.

I claim as my invention:

A switch unit for mounting in a single space of a distribution panel having two hot lines to provide independent outputs from each line, said switch unit including two electrical switches, each mounted in an insulating case, with said cases joined in side-by-side relation to form said unit, each of said switches having:

a fixed contact;

a moving contact for engagement with said fixed contact to close the circuit through the switch;

means for moving said moving contact into and out of engagement with said fixed contact;

a pair of bus clip housings symmetrically positioned in the case with respect to said fixed contact; and

a fixed contact conductor carrying said fixed contact adjacent one end and having a U-shaped bus clip adjacent the other end positionable in either of said housings for engaging a bus of said distribution panel when said switch unit is mounted in said panel, with the bus clip of one switch of said unit in one housing and the bus clip of the other switch of said unit in the other housing providing a predetermined and fixed phasing for the two switch outputs relative to the two hot lines.

References Cited by the Examiner

UNITED STATES PATENTS

2,530,548	11/50	Stanley	317—119
2,810,048	10/57	Christensen	200—168

BERNARD A. GILHEANY, *Primary Examiner.*