Dec. 20, 1949 E. W. LANDMEIER 2,492,101

ELECTRIC SWITCH

Filed Nov. 29, 1944 3 Sheets-Sheet 1

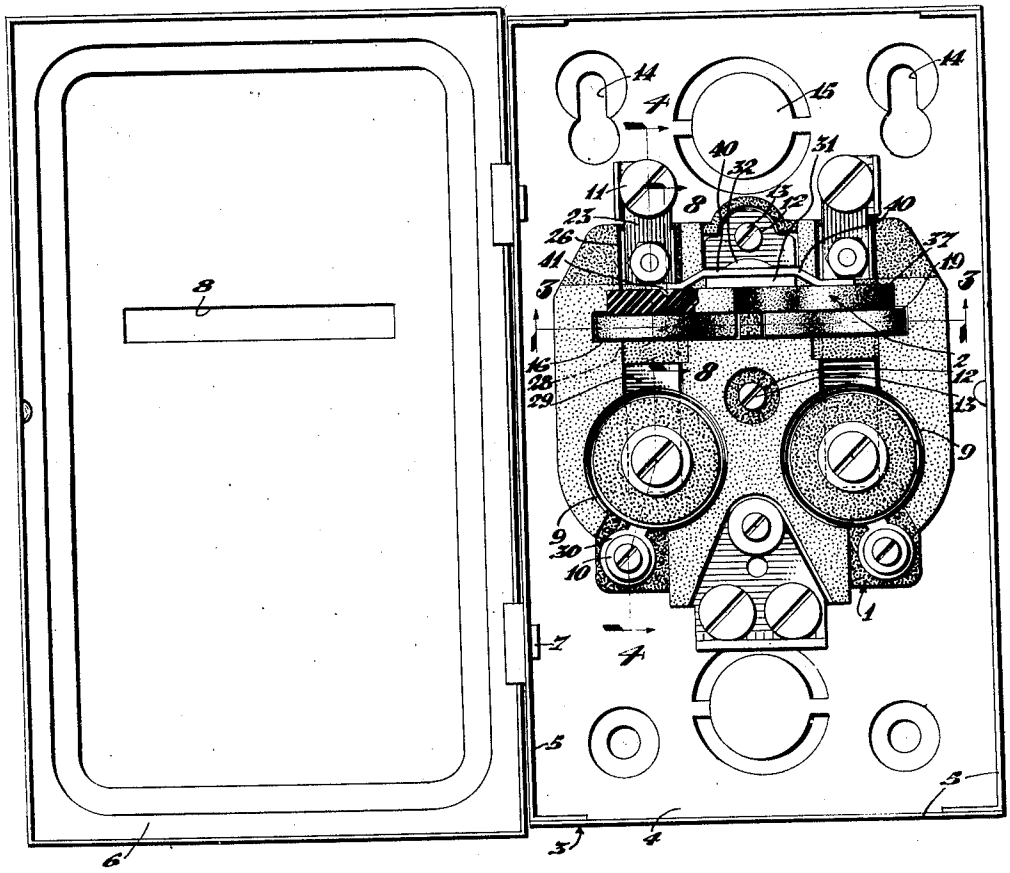


Fig. 1

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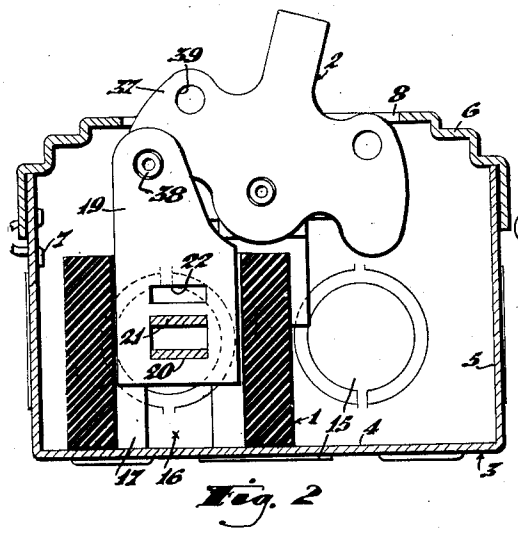


Fig. 2

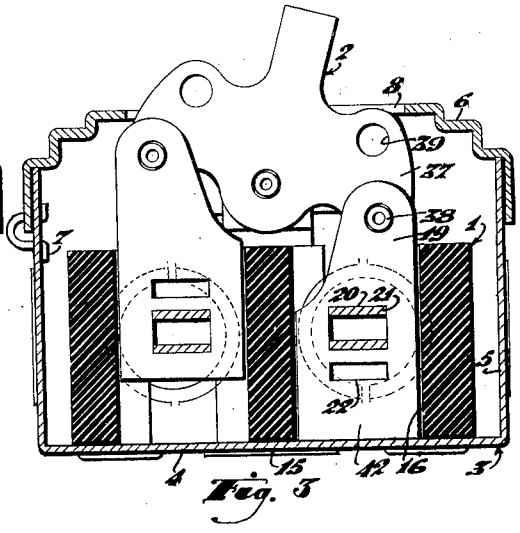


Fig. 3

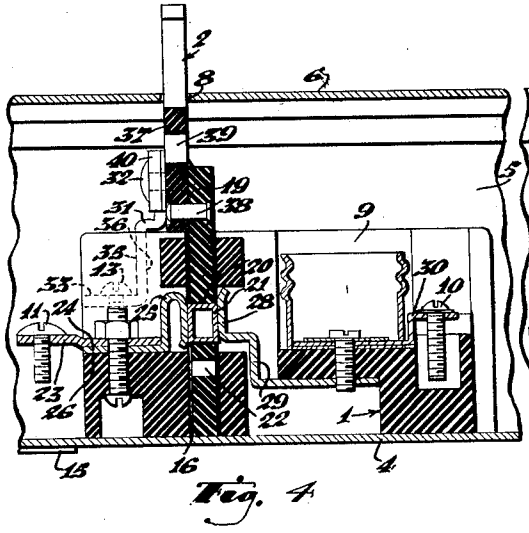


Fig. 4

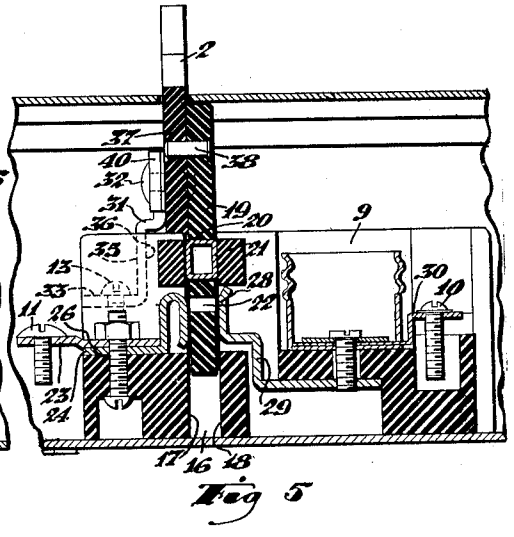


Fig 5

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ELECTRIC SWITCH

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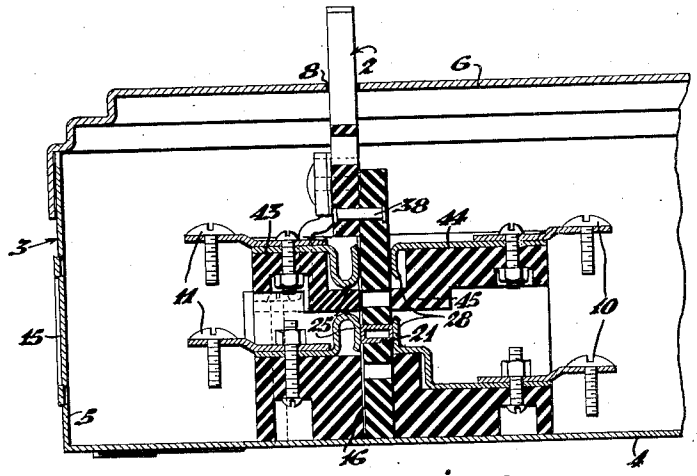


Fig. 6

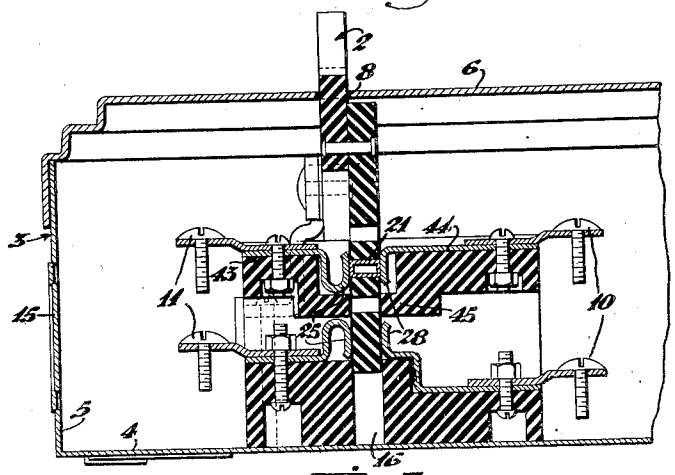


Fig. 7

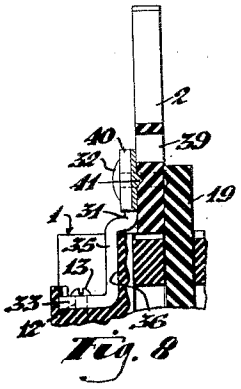


Fig. 8

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UNITED STATES PATENT OFFICE

2,492,101

ELECTRIC SWITCH

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Application November 29, 1944, Serial No. 565,650

10 Claims. (Cl. 200—163)

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This invention relates to electric switches and is directed particularly to switches of the toggle type wherein a handle is thrown from one position to another for switch actuation.

The principal purpose of this invention has been to provide a simplified switch apparatus embodying at least one pair of stationary contacts spaced apart from one another, a movable barrier interposed between the spaced stationary contacts and carrying a movable contact for bridging engagement with them, and a handle or actuator for the barrier which is pivotally mounted for movement through a plane parallel to a plane passing through the spaced contacts.

In the preferred form of apparatus the stationary contacts are exposed within a cavity formed in a base block. The barrier is a plate-like member of insulation material and it has an opening therein within which a bridging contact is confined. This contact, when moved intermediate the stationary contacts, interconnects the two for completion of an electric circuit, or opens the circuit when it is moved by the barrier to a position beyond the stationary contacts. A handle is mounted pivotally upon the base for facial or straddling engagement with the plate-like barrier member whereby the handle is disposed for movement in the same plane or in a plane parallel to the plane of configuration of the barrier.

Conventional toggle switches usually are mounted in a metal housing of rectangular shape and the housing is placed upon the wall or on a switchboard, with its greatest dimension extending in a vertical direction. The switches of this invention provide handles which are operable in a direction transversely of the casing, that is, movable in a horizontal direction when the casings are mounted in the usual way. Heretofore toggle switches have been available embodying handles rotatable for such actuation, or movable in or out of the casing, or handles movable in a direction longitudinally of the casing, that is, vertically when the casing is mounted conventionally. In many instances movement in such direction is awkward to accomplish because of the fact that the handles are inaccessible or inconveniently disposed; nor is it commercially practicable because of space considerations to mount such switches crosswise in their casings to obtain the desired result. Switches having handles operable in horizontal directions have been known in the past but the purpose of this invention has been to provide switches operable in such manner which are of simple construction, ample capacity, but free of springs and so constructed that the

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mechanical elements are not exposed to sparks or arcing.

The structures of the present invention are a practical improvement by virtue of the fact that they facilitate the disposition of the handles through the casing for movement in a direction transversely thereof and may be operated by the normal sidewise swinging movement of the arm.

The switches may embody one or several pairs of opposed stationary contacts arranged in alignment in a single cavity so as to be serviced or bridged by a single contact confined within a carrier, and the switches also may embody several carriers, arranged in individual cavities or arranged side by side in a common cavity, and a handle common to the carriers. In these ways devices are built as desired to provide single or double throw switching and single or double pole switching facilities through minor variations of a simplified basic arrangement with a maximum duplication of the parts.

Further objectives of the invention and other advantages of the structure are disclosed in the following detailed description of the drawings in which a typical embodiment of the improvement has been illustrated.

In the drawings:

Figure 1 is an elevation according to which the switch is mounted within a casing having its cover shown in open position.

Figure 2 is a sectional view taken on the line 2—2 of Figure 1. This view shows a single pole, single throw type of switch constructed in accordance with the present improvement.

Figure 3 is a sectional view similar to Figure 2 but showing a double pole, single throw type of switch.

Figure 4 is a sectional view taken on the line 4—4 of Figure 1 showing the movable contact in position bridging the stationary contacts as when the switch is "closed."

Figure 5 is a view similar to Figure 4 but showing the movable contact out of engagement with the stationary contacts, as when the switch is "open."

Figure 6 is a view showing a double pole, single throw switch.

Figure 7 is a view similar to Figure 6 showing the switch in an opposite position.

Figure 8 is a sectional view taken on the line 8—8 of Figure 4 showing the detent arrangement for frictionally restraining the switch handle from unintentional or inadvertent movement, and to give momentum to the operation whereby a quick snap action is obtained.

The structure shown in the drawings comprises a switch block or base indicated generally at 1, an operating handle 2, and a casing 3 within which the structure is mounted and housed.

The casing is of the usual type, in the form of a sheet metal box having a back or bottom wall 4, side and end walls 5 and a cover 6 which is hinged to the box as at 7. The cover 6 has a slot 8 cut within it through which the handle 2 projects so as to be accessible from the exterior of the box when the cover is closed.

The base 1 of the apparatus is made of suitable plastic or ceramic material having electrical insulating properties. It is in the form of an elongated block and has the usual cavities 9 within which fuse receptacles are disposed (these may be omitted if desirable) and the usual electric terminals 10 and 11. Openings 12 extend through the block 1 transversely for the reception of fastening screws 13 which extend into threaded or bolted connection with the back wall 4 of the casing. The casing has keyhole openings 14 through which it may be mounted upon a wall or panelboard and knockouts 15 are provided through which wires may be taken to the switch terminals.

The base block, intermediate its ends, has a space 16 which extends into or through the block. In the device shown, this is delineated by the faces 17 and 18 which are spaced apart from one another for the reception therebetween of a contact carrier 19.

The space 16 in the preferred structure, though not necessarily, is substantially rectangular in shape, or in the general form of an elongated slot, and a contact carrier 19 fits relatively snugly within it, whereby it may be guided therein. The contact carrier is an insulation member, plate-like or substantially flat in form which has an opening extending therethrough transversely as at 20 for the reception of a bridging contact 21. This piece is rectangular in shape, of electrically conductive material, and has its opposite faces exposed at the opposite sides of the carrier 19. The contact preferably fits somewhat loosely in its cavity so that it may align itself easily in making contact. The carrier has another opening 22 aligned with the contact 21, with respect to its direction of movement, which functions to snuff out arcs following opening of the contacts and to prevent carbonization of the carrier over a substantial area.

At one end of the base block the terminal 11, a screw as shown in the drawings, is threaded into a connector 23 which, in turn, is seated upon a portion 24 of one stationary contact 25, the stationary contact, in turn, resing upon a ledge 26 provided by the base block. The contact 25 passes through a suitable opening in the base block toward the cavity 16 where it is bent up in the form of an inverted U, and the inner face of the U is exposed within the space 16 for engagement with one face of the contact 21.

At the opposite side of the cavity 16 a stationary contact 28 is located; it is in alignment with the other contact 25 of this pair and its face also is exposed within the cavity for engagement with the opposite face of the movable contact 21. The stationary contacts are sprung inwardly for engagement with the movable contact member.

Contact 28 has a lower portion thereof bent outwardly then downwardly as at 29 to extend through an opening in the base block to a point underneath the fuse receptacle. The fuse receptacle may be of the usual form and inasmuch as its construction or use forms no part of the present invention it is not described here in detail. A connector plate 30 is taken from the fuse cavity to the terminal 10.

Thus, through these connections an electric circuit is established from the terminal 10 through the fuse, to the stationary contact 28, the bridging contact 21, through the other stationary contact 25 to the other terminal 11, or vice versa, and the movement of the bridging contact into and out of position between the stationary contacts 25 and 28 controls circuit completion.

At one side of the carrier 19 there is a bracket or post 31 which extends upwardly from the base block to support a pivot 32, and comprises a piece of sheet metal having a foot 33 fastened at the base block 1 through screw 13 with an upright portion 35 of the bracket being supported by a web 36 of the base block. The upper portion of the bracket is offset to extend across the top of the web 36 and terminates in a face portion at which the pivot 32 is located.

Operating handle 2 is rockably mounted on the pivot 32, and the handle portion extends generally upwardly or outwardly from the assembly while an arm portion 37 projects laterally toward the contact carrier 19 for facial interconnection of the two through a pin 38 or other suitable fastener. To accommodate the shifting movement of the pivot which is necessary to permit the arm portion of the handle to swing through an arc while the contact carrier 19 is moved in a substantially linear direction, either the contact carrier 19 or the arm portion 37 of the handle has an opening or slot somewhat greater than the diameter of the fastener 38 for clearance purposes. In the alternative the ways provided by the slots 16 may be sufficiently wide to accommodate the lateral movement of the contact carrier.

The outer edge of the arm 37 of the handle has a boss containing an opening 39 which, when this portion of the arm is in its outermost position, just clears the cover of the housing 6. A lock may be passed through the opening 39 to prevent operation of the switch.

Detent means, as shown in Figure 8, is utilized to hold the switch handle frictionally in its set position. This arrangement comprises a yieldable detent member 40 preferably in the form of a leaf spring, which lies over the outer surface of the bracket 31 beyond which it is offset toward the face of the handle. Near its extremity it contains a boss or button 41 which fits within a complementary cavity in the handle. The spring presses the boss against the face of the handle and before the latter may be operated it is necessary for the boss to be unseated, after which it rises frictionally over the face of the handle. Through this arrangement a quick make and break action is obtained which minimizes arc formation.

The structure just described shows the apparatus in the simplest form, that is, as a single pole, single throw switch. An advantage of the basic structure arrangement is that double pole and single pole, double throw provisions may be incorporated in it with little structural change and many of the parts may be standardized for use in any of the various switching combinations to which the structure lends itself. Thus, in Figure 3 the base block has two spaces 16, separated but in the same or parallel planes, and a

second movable carrier, 42, is placed in the second opening for interconnection with and operation by the handle 2 at a portion thereof which extends from the pivot 32 opposite the first arm 37 previously described. The base block is extended sidewisely to accommodate the second cavity, and stationary contacts therein or a separate base block may be used to accommodate operation of the carriers 19 and 42 from a common handle.

It is to be noted that the relative locations of the cavities for the movable contacts in the right and left-hand contact carriers may be such that both switches are closed simultaneously, when one carrier is up and the other is down, or if single pole, double throw service is desired then the parts may be located relatively so that the pairs of contacts are bridged alternately. Assuming single pole switching, as shown, the handle is moved, for instance, to the left as shown in the drawings, to throw the left-hand carrier downwardly to let its bridging contact down below the corresponding stationary contacts while the same movement lifts the carrier at the right-hand side to raise its contact above the meeting stationary members at this side of the apparatus.

Figures 6 and 7 show a double pole switch comprising spaced pairs of stationary contacts which are arranged in the cavity 16, one pair of the contacts being located above the other so that the stationary contacts are bridged alternately by the movable contact 21 as the contact carrier 19 is moved to raised and lowered positions. The base block has a ledge 43 similar to the ledge 26 upon which the upper stationary contact at the one side of the cavity is mounted and a similar ledge 44 at the other side to support the other stationary contact member. The metal parts are the same as those employed at the lower cavity but, to obtain compactness with adequate air gaps between the contacts, the upper members are installed in reversed position. In this structure the base block has portions 45 at opposite sides of the carrier which are disposed intermediate the stationary contacts, with the inner surfaces of the protrusion residing adjacent the faces of the carrier to prevent dislodgement of the movable contacts 21 from the carrier.

In the preferred structure of the invention the cavity or cavities within which the carriers are mounted serve as guides directing the carrier along a rectilinear path under the control of the pivotally mounted handle. The guiding surfaces may comprise the faces of the cavities or, if desirable, the apparatus may be constructed so that the opposite edgewise portions of the carriers ride within suitable slots.

Having described my invention, I claim:

1. A toggle switch comprising a base having a cavity therein, a pair of stationary contacts facing one another within said cavity, a carrier slidable longitudinally and transversely within said cavity intermediate said stationary contacts, a contact slidably sustained by said carrier and having portions exposed at opposite faces thereof for bridging engagement with said stationary contacts, a plate-like handle member pivotally mounted facially adjacent the contact carrier for movement in a plane parallel to a plane passing between said stationary contacts, and a pivotal connection between said handle member and said carrier member whereby pivotal movement of said handle actuates said carrier linearly to move its contact into and out of engagement with the stationary contact.

2. A toggle switch comprising a base having a cavity therein, at least one pair of contacts which are mounted respectively at opposite faces of said cavity in alignment with one another, a substantially flat contact carrier movable loosely within said cavity and having an opening therethrough an electrical contact slidably sustained in said opening and having portions exposed respectively at opposite faces of said carrier for bridging engagement with said stationary contacts, a substantially flat handle pivotally mounted on said base with a face of said handle adjacent a face of said contact carrier, said handle being movable in a plane parallel to a plane passing intermediate said stationary contacts, and said handle being pivotally interconnected with said contact carrier for effecting substantially linear movement of said carrier upon pivotal movement of said handle.

3. A toggle switch comprising a base having elongated slots therein in substantial alignment with one another, pairs of contacts having portions exposed respectively at the opposite faces of said cavities, substantially flat contact carriers slidable transversely and longitudinally in said slots, contacts slidably carried by said carriers for bridging engagement respectively with said stationary contacts and a substantially flat handle pivotally mounted on said base in parallelism with said contact carriers and facially adjacent thereto for movement in a plane parallel to a plane passing intermediate said pairs of contacts, said handle being mounted intermediate said carriers and being in common connection therewith for movement of the carriers in unison with one another.

4. A toggle switch comprising a base, a fixed and a yieldable contact supported by the base and spaced apart from one another, a plate-like contact carrier disposed between the pair of contacts and having a bridging contact in floating engagement therewith for interconnection of the stationary contacts one with another, a substantially flat handle pivotally mounted on the base in parallelism with said carrier for facial engagement therewith so as to be rockable in a plane parallel to a plane passing in-between said stationary contacts, said handle having an arm portion extending therefrom into connection with said carrier for effecting substantially rectilinear movement of the carrier upon rocking movement of the handle.

5. A switch comprising an elongated base having a slot forming a guide opening disposed laterally therein, a carrier of electrical insulating material slidably mounted in said slot, a contact slidably passing through said carrier and terminating adjacent the opposite faces of said slot, stationary contacts respectively disposed at opposite faces of said slot for engagement with the opposite faces of said contact, a handle pivotally mounted directly adjacent said carrier for rocking movement on an axis extending longitudinally of said base and disposed adjacent said carrier, a detent plate fixed relative to said axis and engaging said handle and means interconnecting said handle with said carrier whereby said carrier is moved in a substantially rectilinear direction in said slot upon pivotal movement of said handle.

6. A toggle switch comprising a base block, a pair of contact carriers mounted edgewisely adjacent one another in said base block for movement in substantially rectilinear and transverse directions relative to one another, contacts slidably mounted in said respective carriers, said con-

tacts having facial portions exposed at opposite sides of said carriers, stationary contacts mounted at the opposite sides of said carriers for engagement respectively by said contacts, a handle pivotally mounted on said base block facially adjacent said carriers at a point intermediate said carriers and on an axis extending transversely to the planes thereof, said handle having portions at opposite sides of its pivotal axis pivotally interconnected respectively with said carriers for moving the carriers rectilinearly upon pivotal movement of said handle.

7. A switch comprising; a base having a slot, a pair of contacts supported by the base and spaced apart from one another on opposite sides of said slot, a mounting bracket on said base, a handle pivotally mounted upon said bracket, a contact carrier pivotally secured to said handle and disposed between said pair of contacts, a yieldable detent plate mounted upon said bracket and associated with said handle, said handle having detent cavities for engagement with the ends of said plate to provide a toggle action and a screw securing said mounting bracket to said base whereby the handle, contact carrier and detent plate may be installed or removed as a unit.

8. A switch comprising; a base, a pair of contacts supported by the base and spaced apart from one another, a flat contact carrier disposed between said pair of contacts and having a bridge contact for interconnection of the stationary contacts one with another, a substantially flat handle, a mounting bracket having a pin for pivotally mounting said handle in parallelism with said carrier for facial engagement therewith so as to rock in the plane of said carrier, a yieldable detent plate secured to said bracket by said pin and in yieldable engagement with said handle, said handle having detent cavities for engagement with the ends of said plate to provide a toggle action, said handle having an arm portion extending into pivotal connection with said carrier for effecting substantially rectilinear movement of the carrier upon rocking movement of the handle.

9. A switch comprising; an elongated base having a slot forming a guide opening disposed laterally therein, a carrier formed of electrical insulating material slidably mounted in said slot, an electrical contact slidably passing through said carrier and terminating adjacent the opposite faces of said carrier, stationary contacts respectively disposed at opposite faces of said carrier for establishing an electrical contact with the opposite faces of said contact, a handle for actuating said carrier, a bracket having a pivot pin for mounting said handle, pivot means connecting said handle to said carrier, a flat detent spring mounted upon said bracket, said detent spring having a detent button yieldably engaged against said arm, said arm having detent cavities engageable by said detent button to cause said switch arm and contact carrier to operate in toggle fashion when the handle is actuated.

10. A toggle switch comprising; a base block having a pair of slots, a pair of contact carriers mounted adjacent one another in said slots for movement in substantially rectilinear directions relative to one another, contacts slidably mounted in said respective carriers, stationary contacts mounted at opposite sides of said carriers for engagement respectively by said contacts, a handle pivotally mounted upon said base block at a point intermediate said carriers, said handle having portions at opposite sides of its pivotal axis pivotally interconnected with said respective carriers for moving said carriers rectilinearly in opposite directions upon pivotal movement upon said handle, said respective slidable contacts located in off-set relationship one with another so as to be positioned in alignment with each other and with said stationary contacts when said switch is in closed position, said respective carriers each having an opening trailing said contacts to quench arcs following opening of the contacts.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
501,707	Dingle et al.	July 18, 1893
968,796	Platt	Aug. 30, 1910
1,629,158	Griswold	May 17, 1927
1,892,854	Sachs	Jan. 3, 1933
1,894,543	Rowe	Jan. 17, 1933
2,209,918	Hammerly	July 30, 1940
2,310,096	Landmeier	Feb. 2, 1943
2,312,634	Frank et al.	Mar. 2, 1943
2,389,220	Tredeau	Nov. 20, 1945
2,399,449	Prussack	Apr. 30, 1946