Oct. 29, 1957 J. F. STOWELL 2,811,615

DOUBLE THROW SWITCH

Filed Oct. 29, 1954

Fig. 1.

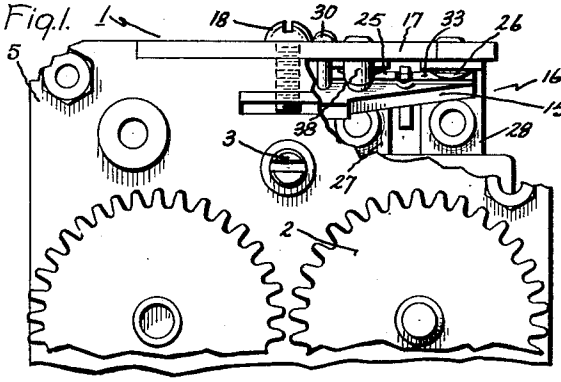


Fig. 2.

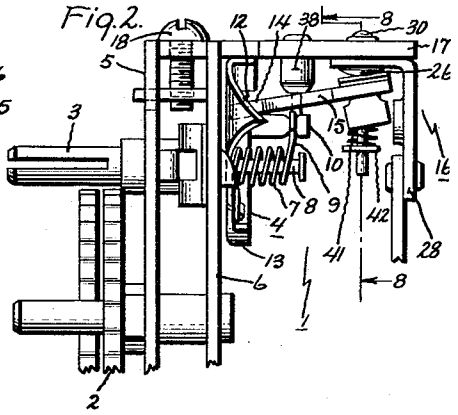


Fig. 3.

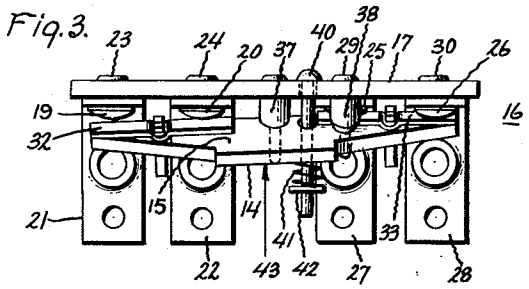


Fig. 4.

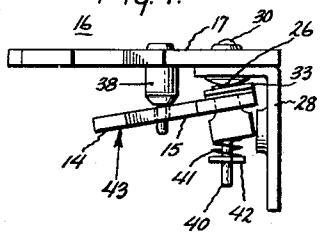


Fig. 5.

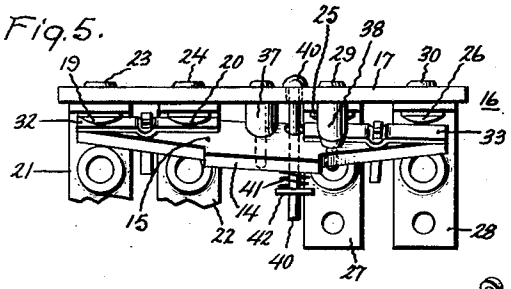


Fig. 6.

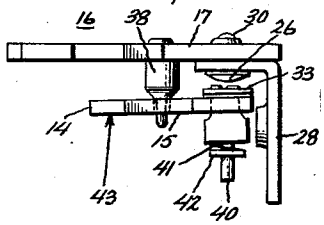


Fig. 7.

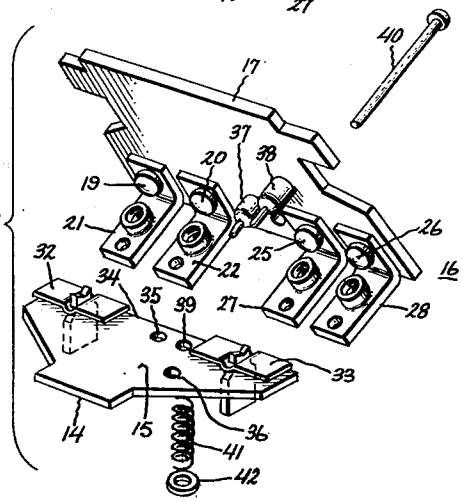
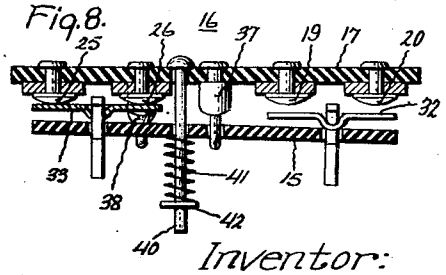


Fig. 8.



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DOUBLE THROW SWITCH

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Application October 29, 1954, Serial No. 465,490

12 Claims. (Cl. 200—153)

This invention relates to double throw switches and more particularly to a small double throw switch adapted for use interchangeably with a single throw switch in time switch apparatus.

Time switches generally comprise clock mechanism, usually electrically driven, which actuates a switch at one or more preselected times. A common variety of time switch is a range timer extensively used on domestic electric and gas ranges for timing the oven, i. e., turning the oven on and off. Many ranges are also equipped with a convenience outlet electrically connected through the range timer so that small appliances may also be timed. In a conventional electric range, the range timer is provided with a switch having contacts connected in circuit with the oven heating elements and also in circuit with the convenience outlet. Thus, when the range timer is set, the contacts are open and at a predetermined time, the clock mechanism actuates the switch to close the contacts thereby to energize the oven and the convenience outlet. After a further predetermined interval, the clock mechanism again actuates the switch to open the contacts. It is thus seen that for a conventional electric range having a convenience outlet, a single throw double pole switch is needed for use in connection with the range timer.

In a gas range however, a solenoid operated valve is arranged in the gas line to the oven. In such ranges, it is desirable that in the event of electric power failure, the range may still be utilized. It is therefore a common practice to so arrange the solenoid valve that it is opened when de-energized and closed when energized. In addition, gas ranges are also frequently provided with a convenience outlet for operating small appliances. It is thus seen that a range timer for a gas range must be provided with a switch in which the contacts are closed when it is desired that the oven not be operated in order to close the solenoid valve and conversely open when it is desired to operate the oven in order to open the solenoid valve. On the other hand, the contacts for the convenience outlet must be closed in order to effect the timing operation. It is thus seen that a range timer for a gas range having a convenience outlet is preferably provided with a double throw switch arranged with one set of contacts normally open in order to de-energize the solenoid valve to open the oven gas line and the other set of contacts normally closed and connected in the circuit of the convenience outlet. Setting the timer actuates the switch to close the contacts in the circuit of the solenoid valve thus closing the gas line, and open the contacts in the circuit of the convenience outlet. When the desired time at which the oven and convenience outlet are to be turned on is reached, the timer will actuate the switch to open the contacts in the circuit of the solenoid valve thus opening the gas line to the oven, and at the same time close the contacts in the circuit of the convenience outlet thus energizing the same. When the desired time interval has passed, the timing mechanism

will again actuate the switch to close the contacts for the solenoid valve thus again closing the gas line to the oven and opening the contacts in the circuit of the convenience outlet in order to de-energize the appliance connected thereto.

It is, of course, desirable that the same fundamental range timer be adaptable for use with either an electric or gas range. It is therefore desirable that the single throw switch for electric ranges and the double throw switch for gas ranges be interchangeable and both operable by the same range timer. It is further desirable that the double throw switch be simple and inexpensive and in general assembled from the same component parts as a single throw switch.

It is therefore an object of this invention to provide an improved double throw switch incorporating the desirable features set forth above.

Further objects and advantages of this invention will become apparent by reference to the following description and the accompanying drawing, and the features of novelty which characterize this invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

This invention in its broadest aspects provides a double throw switch having a base member and a movable contact member. Pivot means are provided for the contact member mounted on the base member and disposed to one side of the transverse center line of the contact member. Movable contact means are mounted on the contact member respectively on either side of the pivot means and stationary contact means are provided respectively cooperating with the movable contact means. Means are provided normally to bias the portion of the movable contact member on one side of the pivot means toward the base member thereby closing one pair of stationary and movable contacts and opening the other pair. The movable contact member is adapted to be actuated, as by a range timer, to pivot the portion thereof on the other side of the pivot means toward the base member thereby closing the other pair of stationary movable contact means and opening the first pair.

In the drawing:

Fig. 1 is a fragmentary side elevation view, partly broken away, showing a range timer incorporating the improved double throw switch of this invention;

Fig. 2 is a fragmentary end view of the range timer and switch of Fig. 1;

Fig. 3 is a side view of the improved double throw switch of this invention in the normal position;

Fig. 4 is an end view of the improved double throw switch of this invention in the position of Fig. 3;

Fig. 5 is a side view of the switch in its actuated position;

Fig. 6 is an end view showing the switch in the position of Fig. 5;

Fig. 7 is an exploded view of the improved double throw switch of this invention; and

Fig. 8 is a cross-sectional view taken along the line 8—8 of Fig. 2.

Referring now to Figs. 1 and 2, there is shown a range timer, generally identified as 1, having suitable gearing 2 adapted to be driven in any suitable manner, as by a synchronous timing motor (not shown) and further having a setting shaft 3. Setting shaft 3 has a trigger member 4 secured thereto and is rotatable and axially movable in suitable openings formed in frame portions 5 and 6. A suitable coil spring 7 is positioned around extension 8 of setting shaft 3 and has end 9 secured to post 10 preferably formed from frame member 6. Spring 7 thus biases setting shaft 3 axially left to the position shown. Trigger member 4 has a stop portion 11 adapted

to be engaged by suitable holding pawls on the clock work gearing in various positions thereof. A curved portion 12 cams trigger member 4 axially to the right into engagement with the above mentioned pawls to permit initial setting of the device. Trigger member 4 is provided with a cam surface 13 which engages operating extension 14 of contact member 15 of the improved single pole, double throw switch 16 now to be described.

Referring now to the remaining figures of drawing in addition to Figs. 1 and 2, the improved single pole, double throw switch assembly 16 of this invention includes a base member 17, preferably formed of suitable insulating material. It is readily seen in Figs. 1 and 2 that switch assembly 16 is attached to the range timer 1 by means of base member 17 and a suitable screw 18.

A first pair of spaced apart stationary contacts 19 and 20 are respectively formed on external terminals 21 and 22 and are respectively secured to base member 17 by portions 23 and 24 which extend through the base portion 17 and are crimped thereto. A second pair of spaced apart stationary contacts 25 and 26 are likewise respectively formed on external terminals 27 and 28 and are secured to base member 17 by crimped portions 29 and 30 respectively. It will be seen that terminals 19 and 20, and 25 and 26, are arranged along an axis of base number 17 parallel to its lower edge. Contacts 19 and 20 and external terminals 21 and 22 are adapted to be connected in one circuit to be controlled, such as the convenience outlet on a gas range, and contacts 25 and 26 and terminals 27 and 28 are adapted to be connected in another circuit to be controlled, such as the solenoid valve in the gas line of the range.

Movable contact member 15 is likewise preferably a plate member formed of insulating material and has contact bridging members 32 and 33 flexibly mounted thereon adjacent its edge 34. It will be seen that movable contact bridging members 32 and 33 are respectively adapted to cooperate with and bridge stationary contacts 19 and 20, and 25 and 26 to thereby respectively complete the circuits to which these contacts are connected.

Movable contact member 15 is provided with a pair of openings 35 and 36 formed therein, opening 35 being adjacent edge 34 and being preferably disposed along the transverse center line of contact member 15. Opening 36 on the other hand is disposed to one side of the transfer center line of movable contact member 15 and the two openings 35 and 36 are respectively disposed along a line at an angle with the edge 34 and the axis of stationary contacts 19 and 20, 25 and 26. A pair of post pivot members 37 and 38 are provided mounted on base member 17 and having their extremities respectively seated in openings 35 and 36 in movable contact member 15. It is thus seen that post pivot members 37 and 38 are disposed along a line at an angle to the axis of stationary contact members 19 and 20, 25 and 26. Furthermore, post pivot member 37 which cooperates with opening 35 in movable contact member 15 is shorter than post pivot member 38 which cooperates with opening 36 in movable contact member 15 so that the line of the engaging surfaces of post pivot members 37 and 38 is at an angle to the plane of base member 17.

Movable contact member 15 has a third opening 39 formed therein and a post 40 is arranged therein. A suitable coil spring 41 is arranged around post 40 and has one end engaging post 40 by means of a washer 42 and its other end engaging the surface of movable contact member 15 remote from the base member 17.

Referring now to Figs. 3 and 8, it will be seen that movable contact member 15 pivots or rocks about post pivots 37 and 38 and is normally biased by means of spring 41 so that contact bridging element 33 bridges stationary contacts 25 and 26. Post pivot 37 is preferably shorter than post pivot 38 in order to tilt movable contact member 15 transversely so that its edge 34 is closer

to base member 17 than its operating portion 14. It will now be further seen that a force exerted on operation portion 14 of movable contact member 15 in the direction of the arrow 43, as seen in Figs. 3 and 4, for example by the cam surface 13 of trigger member 4 attached to setting shaft 3 of range timer 1, will pivot or rock movable contact member 15 about post pivots 37 and 38 against the force of spring 41 thereby to cause contact bridging element 32 to bridge stationary contact 19 and 20 and to cause contact bridging element 33 to break the connection between stationary contacts 25 and 26, as seen in Figs. 5 and 6.

It will now be readily apparent that external terminals 21 and 22 to which contacts 19 and 20 are connected may be connected in circuit with a solenoid valve in the gas line of the oven of a gas range while terminals 27 and 28 to which stationary contacts 25 and 26 are connected may be connected in circuit with the convenience outlet of the range. Normally, the switch is in the position seen in Figs. 1 to 4 inclusive in which contacts 19 and 20 are not bridged by bridging element 32 thus de-energizing the solenoid valve to open the same so that the oven may be used. In addition, contacts 25 and 26 in circuit with the convenience outlet are normally closed. If setting knob 3 of range timer 1 is turned, it will be seen that the cam surface 13 of trigger device 4 will act on operating portion 14 of movable contact member 15 in the direction of arrow 43 thus pivoting contact member 15 about pivots 37 and 38 to cause bridging element 33 to unbridge stationary contacts 25 and 26 thereby de-energizing the convenience outlet and at the same time making the connection between stationary contacts 19 and 20 to energize the solenoid valve thus interrupting gas to the oven. When the range timer has at some later predetermined time caused trigger member 4 to release its pressure applied to operating portion 14 of movable contact member 15, spring 41 will return movable contact 15 to normal position making the connection between stationary contacts 25 and 26 to thereby energize the convenience outlet and again break the connection between stationary contacts 19 and 20 to de-energize and open the solenoid valve in the gas line to the oven. After completion of the desired timing interval, the timer will again cause trigger member 4 to actuate movable contact member 15 to open contacts 25 and 26 to thereby de-energize the convenience outlet and to close contacts 19 and 20 to energize and close the solenoid valve.

It is now seen that this invention provides an improved and extremely simple double throw switch which is actuated by pressure in a single direction and which is readily interchangeable with a single throw switch as desired. While a single pole double throw switch has been shown, it will be readily understood that additional contacts may be provided and that further, the range timer assembly 1 including the setting shaft 3 and trigger mechanism 4 is by way of illustration only and that any suitably actuating means may be employed within the spirit of this invention.

While I have shown and described a particular embodiment of this invention, further modifications and improvements will occur to those skilled in the art. I desire that it be understood therefor that this invention is not limited to the form as shown and I intend in the appended claims to cover all modifications which do not depart from the spirit and scope of this invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A double throw switch comprising a base member, a movable contact member, pivot means for said contact member mounted on said base member and disposed to one side of the transverse center line of said contact member, movable contact means mounted on said contact member respectively on either side of said pivot means, stationary contact means respectively cooperating with said movable contact means, and means normally

biasing the portion of said contact member on one side of said pivot means toward said base member thereby closing one pair of stationary and movable contact means and opening the other pair of stationary removable contact means, said contact member having a portion in the region of its transverse center line adapted to be actuated to pivot the portion thereof on the other side of said pivot means toward said base member thereby closing said other pair of stationary and movable contact means and opening said one pair of stationary and movable contact means.

2. A double throw switch comprising a base member, a movable contact member, pivot means for said contact member mounted on said base member and disposed at an angle to the transverse center line of said contact member, movable contact means mounted on said contact member respectively on either side of said pivot means, stationary contact means respectively cooperating with said movable contact means, and means normally biasing the portion of said contact member on one side of said pivot means toward said base member thereby closing one pair of stationary and movable contact means and opening the other pair of stationary and movable contact means, said contact member being adapted to be actuated in the region of its transverse center line to pivot the portion thereof on the other side of said pivot means toward said base member thereby closing said other pair of stationary and movable contact means and opening said one pair of stationary and movable contact means.

3. A double throw switch comprising a base member, a movable plate contact member, pivot means for said contact member mounted on said base member and disposed at an angle to the transverse center line of said contact member, said pivot means being further disposed at an angle to the plane of said base member, movable contact means mounted on said contact member respectively on either side of said pivot means, stationary contact means respectively cooperating with said movable contact means, and means normally biasing the portion of said contact member on one side of said pivot means toward said base member thereby closing one pair of stationary and movable contact means and opening the other pair of stationary and movable contact means, said contact member being adapted to be actuated to pivot the portion thereof on the other side of said pivot means toward said base member thereby closing said other pair of stationary and movable contact means and opening one pair of stationary and movable contact means.

4. A double throw switch comprising a base member, a movable plate contact member, pivot means for said contact member mounted on said base member and disposed at an angle to an axis of said base member, movable contact means mounted on said contact member respectively on either side of said pivot means, stationary contact means mounted on said base member along said axis respectively cooperating with said movable contact means, and means normally biasing the portion of said contact member on one side of said pivot means toward said base member thereby closing one pair of stationary and movable contact means, said contact member being adapted to be actuated to pivot the portion thereof on the other side of said pivot means toward said base member thereby closing said other pair of stationary and movable contact means and opening said one pair of stationary and movable contact means.

5. A double throw switch comprising a base member, a movable plate contact member, pivot means for said contact member mounted on said base member and disposed at an angle to the plane of said base member, movable contact means mounted on said contact member respectively on either side of said pivot means, stationary contact means mounted on said base member along said axis and respectively cooperating with said movable contact means, and means normally biasing the portion of said contact member on one side of said pivot means toward said base member thereby closing one pair of stationary and movable contact means and opening the other pair of stationary and movable contact means, said contact member being adapted to be actuated to pivot the portion thereof on the other side of said pivot means toward said base member thereby closing said other pair of stationary and movable contact means and opening said one pair of stationary and movable contact means.

6. A double throw switch comprising of base member, a movable plate contact member, pivot means for said contact member mounted on said base member, said pivot means being disposed to one side of the transverse center line of said contact member and remote from an axial edge thereof, movable contact means mounted on said contact member respectively on either side of said pivot means and adjacent said edge, stationary contact means mounted on said base member and respectively cooperating with said movable contact means, and spring means engaging said base member and said contact member adjacent said edge and normally biasing the portion of said contact member on one side of said pivot means toward said base member thereby closing one pair of stationary and movable contact means and opening the other pair of stationary and movable contact means, said contact member being adapted to be actuated to pivot the portion thereof on the other side of said pivot means toward said base member thereby closing said other pair of stationary and movable contact means and opening said one pair of stationary and movable contact means.

7. A double throw switch comprising a base member, a movable plate contact member, a post pivot member mounted on said base member and engaging said contact member on one side of the transverse center line thereof and remote from an axial edge thereof, movable contact means mounted on said contact member respectively on either side of said pivot member and adjacent said edge, stationary contact means mounted on said base member and respectively cooperating with said movable contact means, and spring means engaging said base member and said contact member adjacent said edge and normally biasing the portion of said contact member on one side of said pivot member toward said base member thereby closing one pair of stationary and movable contact means and opening the other pair of stationary and movable contact means, said contact member being adapted to be actuated to pivot the portion thereof on the other side of said pivot member toward said base member thereby closing said other pair of stationary and movable contact means and opening said one pair of stationary and movable contact means.

8. A double throw switch comprising a base member, a movable plate contact member, a post pivot member mounted on said base member and engaging said contact member at a point remote from an axial edge thereof, another post pivot member mounted on said base member normally engaging said contact member at a point adjacent said axial edge, said pivot members being disposed along a line forming an angle with an axis of said base member, movable contact means mounted on said contact member respectively on either side of said pivot members and adjacent said edge, stationary contact means mounted on said base member along said axis thereof and respectively cooperating with said movable contact means, and spring means engaging said base member and said contact member adjacent said edge and normally biasing the portion of said contact member on one side of said pivot member toward said base member thereby closing one pair of stationary and movable contact means and opening the other pair of stationary and movable contact means, said contact member being adapted to be actuated to pivot the portion thereof on the other side of said pivot member toward said base member thereby closing said other pair of stationary and movable contact means and opening said one pair of stationary and movable contact means.

9. A double throw switch comprising a base member, a movable plate contact member, a post pivot member mounted on said base member and engaging said contact member at a point remote from an axial edge thereof, and another post pivot member mounted on said base member normally engaging said contact member at a point adjacent said axial edge, said pivot members being disposed along a line forming an angle with an axis of said base member, said other pivot member being shorter than said first-mentioned pivot member, movable contact means mounted on said contact member respectively on either side of said pivot member and adjacent said edge, stationary contact means mounted on said base member along said axis thereof and respectively cooperating with said movable contact means, and spring means engaging said base member and said contact member on one side of said pivot member toward said base member thereby closing one pair of stationary and movable contact means and opening the other pair of stationary and movable contact means, said contact member being adapted to be actuated to pivot the portion thereof on the other side of said pivot member toward said base member thereby closing said other pair of stationary and movable contact means.

10. A double throw switch comprising a base member, a movable plate contact member, a post pivot member mounted on said base member and engaging said contact member at a point remote from an axial edge thereof, another post pivot member mounted on said base member and normally engaging said contact member at a point adjacent said axial edge, said pivot members being disposed along a line forming an angle with an axis of said base member, said other pivot member being shorter than said first-mentioned pivot member, movable contact means mounted on said contact member respectively on either side of said line of said pivot members and adjacent said edge, stationary contact means mounted on said base member along said axis thereof and respectively cooperating with said movable contact means, and spring means engaging said base member and said contact member adjacent said edge and on the side of said line of said pivot members remote from the transverse center line of said contact member, said spring means normally biasing said side of said contact member toward said base member thereby closing one pair of said stationary and movable contact members, said contact member being adapted to be actuated to pivot the portion thereof on the other side of said pivot members toward said base member thereby closing the other pair of said stationary and movable contact means and opening said one pair of stationary and movable contact means.

11. A double throw switch comprising a base member formed of insulating material, a movable plate contact member formed of insulating material, a post pivot member mounted on said base member and engaging said contact member at a point remote from an axial edge thereof, another post pivot member mounted on said base member and normally engaging said contact member at a point adjacent said edge, said pivot members being disposed along a line forming an angle with an axis of said base member, said other pivot member being shorter than said first mentioned pivot member, movable contact bridging elements mounted on said contact member respectively on either side of said line of said pivot members and adjacent said edge, two pairs of stationary contacts mounted on said base member along said axis thereof and respectively cooperating with said movable contact bridging elements, and spring means engaging said base member and said contact member adjacent said edge on the side of said line of pivot members remote from the transverse center line of said contact member, said spring means normally biasing the adjacent portion of said contact member toward said base member thereby closing one pair of said stationary and movable contacts and opening the other pair of said stationary and movable contacts, said contact member being adapted to be actuated to pivot the portion thereof on the other side of said pivot members toward said base member thereby closing the other pair of said stationary movable contacts and opening said one pair of stationary and movable contacts.

12. A double throw switch comprising a base member formed of insulating material, a movable plate contact member formed of insulating material, said contact member having a first opening formed therein adjacent an axial edge thereof and along the transverse center line thereof, said contact member having a second opening therein remote from said edge and disposed to one side of said transverse center line, a first post pivot member mounted on said base member and seated in said first opening in said contact member, a second post pivot member mounted on said base member and seated in said second opening in said contact member, said pivot members being disposed along a line at an angle to an axis of said base member, said first pivot member being shorter than said second pivot member, a pair of movable contact bridging elements mounted on said contact member respectively on either side of said line of said pivot members, two pairs of stationary contacts mounted on said base member along said axis thereof and respectively cooperating with said movable contact bridging elements, said contact member having a third opening formed adjacent said edge thereof and on the side of said line of pivot members remote from said transverse center line, a post member mounted on said base member and projecting through said third opening, and a coil spring positioned around said post member engaging the engaging the extremity thereof and said contact member, said spring normally biasing the adjacent side of said contact member toward said base member thereby causing one of said contact bridging elements to bridge one pair of said stationary contacts and positioning the other of said contact bridging members away from its associated pair of stationary contacts, said contact member having an operating portion remote from said edge adapted to be actuated to pivot said contact member about said pivot members thereby moving the other side of said contact member toward said base member causing the other of said contact bridging elements to bridge its associated pair of stationary contacts and positioning said first contact bridging element away from its associated pair of stationary contacts.

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