March 31, 1936. C. M. PETERSEN 2,035,505

ELECTRICAL DEVICE

Filed July 12, 1933 2 Sheets-Sheet 1

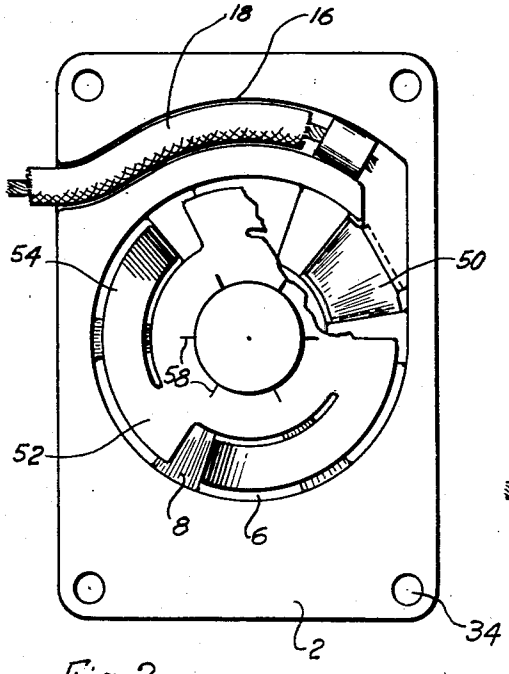


Fig. 3

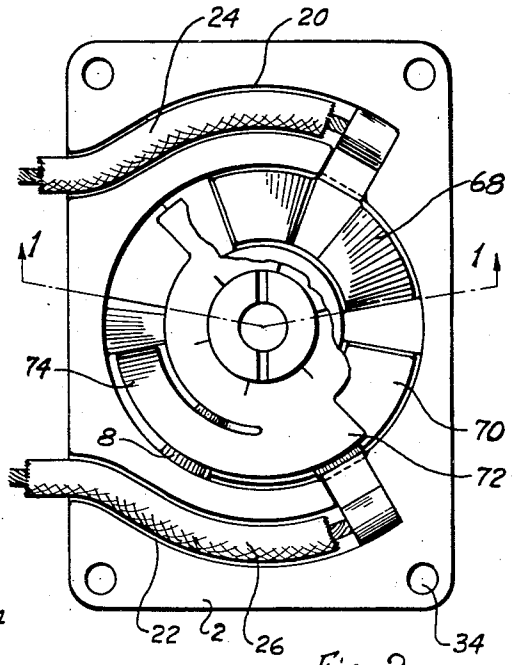


Fig. 2

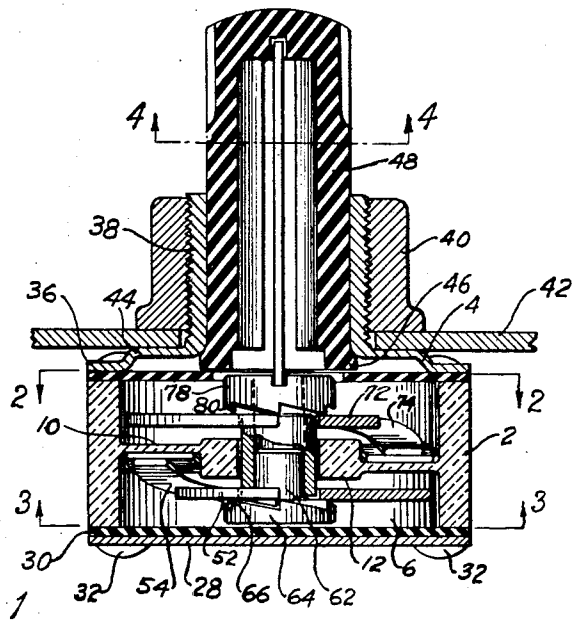


Fig. 1

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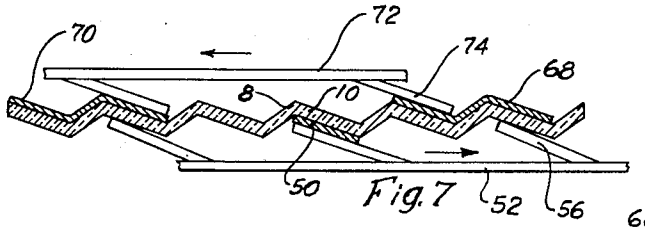


Fig. 7



Fig. 4

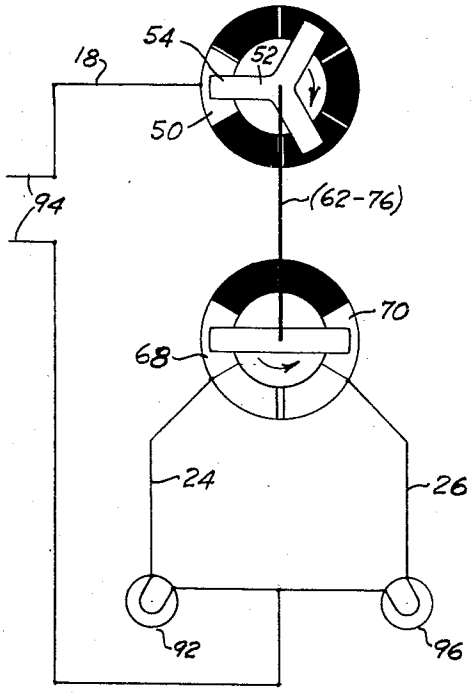


Fig. 6

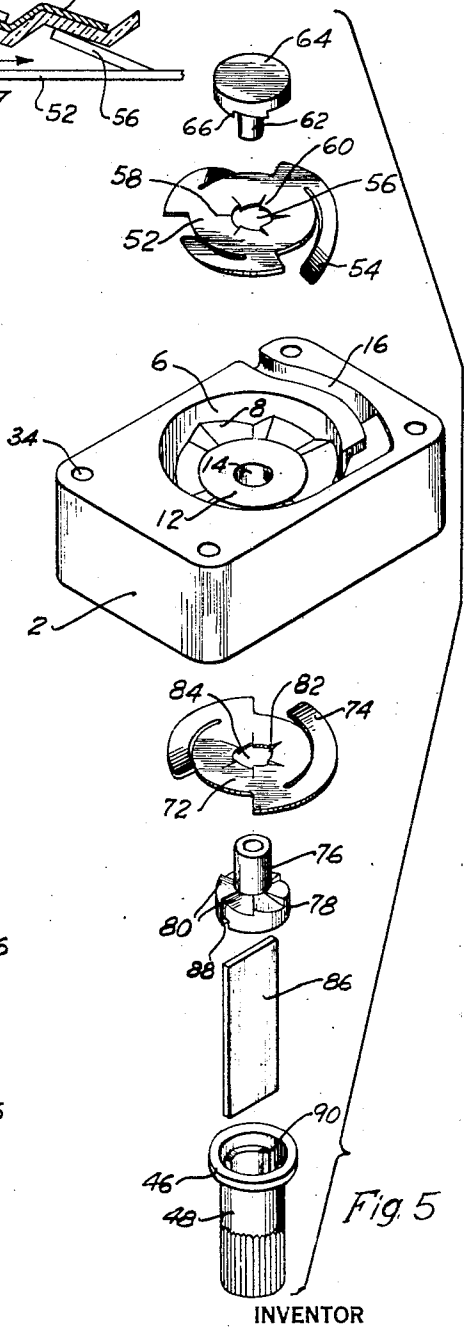


Fig. 5

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UNITED STATES PATENT OFFICE

2,035,505

ELECTRICAL DEVICE

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Application July 12, 1933, Serial No. 680,004

9 Claims. (Cl. 200—18)

My invention relates to devices for controlling electrical circuits and particularly to means adapted selectively to control the flow of current in alternative circuit arrangements and to make and break the circuit selected.

Heretofore when a circuit has been variable to control two or more electrical devices such as electric lights, heating elements or the like or when the electrical devices have had two stages of operation such as bright and dim, series and parallel, or have been adjustable in other respects, it has been necessary to provide one controlling means as a selector for effecting the desired variations in the circuits or circuit adjustment and to provide a separate switch for making and breaking the circuit.

In order to avoid the use of two separate means, one of which acts as a selector and the other of which serves as a switch, it has been common practice to employ means constructed for successive movement through such stages as "low", "high" and "off" positions but these have had to be moved through "high" or some intermediate position before breaking the circuit. This feature is often objectionable and limits the possible variations and flexibility of operation of the circuit.

In order to overcome the disadvantage and objections inherent in the use of two separate control elements or a single element of a progressive nature as referred to above, I have devised unitary means operable to vary one or more electrical circuits through any desired number of stages or adjustments and which at the same time is operable to make and break the circuit in any of its positions of adjustment without passing through intermediate stages or positions.

In accordance with my invention the circuit controlling mechanism embodies the features of both a selector and a switch. The selecting elements of the device are adapted to be moved to various positions to connect or adjust any one or more circuits or circuit elements so as to obtain the desired flow of current in the circuit and the switching elements of the device are operable independently of the selecting elements so that the circuit completed by the selector may be made or broken at any time and when in any of its positions or adjustments. Preferably the device is so constructed that a single operating handle may be used and this handle when moved in one direction actuates the selector and when moved in the opposite direction actuates the switch.

One of the principal objects of my invention is to provide a device for controlling electrical circuits movable either to turn the circuit "on" or "off" or to effect various adjustments in the circuit.

Another object of my invention is to provide a unitary structure embodying elements having both selecting and switching action.

A further object of my invention is to provide a device in which an operating handle is movable in one direction to vary an electrical circuit and is movable in another direction to make and break the circuit.

A further object of my invention is to provide a unitary structure having rotatable elements therein for effecting variation in the circuit and for turning the circuit "on" and "off", together with a conventional operating handle rotatable in one direction to effect one operation and rotatable in the opposite direction to effect the other operation.

Another object of my invention is to provide a device which is simple and inexpensive to construct and which is compact and easily manufactured and installed.

A further object of my invention is to provide novel means for connecting the handle and operating members of a switch or other device.

These and other objects and features of my invention will appear from the following description thereof in which reference is made to the preferred form of my invention illustrated in the figures of the drawings.

In the drawings:

Fig. 1 is a vertical sectional view of one form of device embodying my invention,

Fig. 2 is a horizontal sectional view of the form of my invention shown in Fig. 1 taken on the line 2—2 looking downward,

Fig. 3 is a horizontal sectional view taken on the line 3—3 of Fig. 1, looking upward,

Fig. 4 is a sectional view through the handle of the device taken on the line 4—4,

Fig. 5 is a perspective of certain parts of the switch shown in separated position,

Fig. 6 is a diagrammatic illustration showing one manner in which the device may be employed for controlling a typical electrical circuit, and

Fig. 7 is a diagrammatic illustration of a typical arrangement of the stationary contacts of the selector and switch.

In the form of my invention illustrated in the figures of the drawings, the selector and switch are mounted in a body of moulded insulated material 2, formed with a recess 4 in the upper face thereof for receiving the selector and with a recess 6 formed in the lower face of the insulating body for receiving the switch. The recesses 4 and 6 are circular in shape and are each formed with a circularly arranged series of ratchet faces 8 in the bottom thereof. Each series in the construction shown comprises six of the faces 8 and these are so arranged that only a thin wall of insulating material 10 separates the two recesses. A boss 12 extends upwardly from the bottom of each recess so that the ratchet faces are located

in an annular depression in each recess. A hole 14 extends through the boss 12 in axial alignment with the recesses 4 and 6 and provides an opening through which operating means for the selector and switch may extend.

The upper and lower faces of the body 2 are parallel and formed with suitable channels for receiving electrical conductors for connection with the switch and selector. The lower face of the body 2 is formed with a channel 16 through which a lead 18 may pass whereas the upper face of the body member is provided with two oppositely located channels 20 and 22 in which suitable electrical connections 24 and 26 connected to the selector are positioned. The bottom of the housing is provided with a cover plate 28 and insulating material 30 secured to the insulating body by pins 32 extending through apertures 34. The housing cover 36 is formed with an upwardly extending threaded neck 38 to which a nut 40 is secured for fastening the device to a suitable support 42. That portion of the cover adjacent the neck 38 is provided with an enlarged portion 44 forming an in-turned shoulder beneath which an annular flange 46 of the operating handle 48 may engage to prevent separation of the handle from the device. The handle extends beyond the end of the neck 38 so as to be easily grasped and may be knurled or otherwise formed on the end as desired.

The handle 48 is positioned axially of the recesses 4 and 6 in the insulating body and in alignment with the hole 14 so that rotation of the handle will effect rotation of contact members of the switch and selector located in the recesses 4 and 6.

The construction of the insulating body and associated parts described above present a compact housing within which the electrical elements of the device may be located in a convenient manner. However, it will be apparent that the form and construction of the housing and the arrangement of the parts therein may be varied at will and in any case their form will depend in large measure on the particular use for which the device is employed. In the form of my invention illustrated, the device is adapted for use as a canopy switch by means of which two or more lights may be connected to a source of current so that either one or the other may be connected to the current source in series or both may be connected in parallel thereto. As hereinafter described, the lights may be turned on or off in any position of adjustment of the lighting circuit and for this purpose the device is provided with a selector having relatively movable contacts adapted to vary the flow of current in the circuit and is provided with a switch for turning the circuit on and off.

The switch illustrated is located in the downwardly facing recess 6 of the insulating body 2 and is provided with a stationary contact 50 located on one of the inclined faces of the ratchet 8. Each of the ratchet faces extends through an arc of approximately 60 degrees and the contact 50 is located on that face adjacent the inner end of the channel 16 in which is located the lead 18 to which contact 50 is connected. The remaining faces of the ratchet may be bare although if preferred every alternate ratchet face may be provided with a similar contact 50 electrically connected to the lead 18. The operation of the switch will be the same in either case and therefore only one stationary contact is necessary.

A rotatable contact 52 is adapted to cooperate with the stationary contact 50 and, as shown, is in the form of a disc of conducting material having three upwardly inclined spring contact fingers 54 spaced approximately 120 degrees apart adjacent the periphery of the disc in position to move over the ratchet faces 8. The contact fingers tend to urge the rotatable contact downwardly so that the center thereof is spaced a short distance from the boss 12 but is yieldably movable axially of the switch.

The rotatable contact 52 of the switch is actuated to move one or another of the contact fingers 54 alternately into and out of engagement with the stationary contact 50 by suitable means serving to rotate the contact 52 in one direction only and to permit free rotation of the actuating means in the reverse direction without moving the rotatable contact therewith. For this purpose the contact disc 52 is provided with a centrally located aperture 56 from which extend radial cuts 58. One end of the material of the disc adjacent each cut is raised so as to form a series of inclined ratchet teeth 60 on the lower face of the disc with the teeth inclined oppositely to the inclined contact fingers 54. A headed member 62 formed of conducting material extends through the aperture 56 and into the hole 14 of the boss 12 so as to hold the contact 52 in position for rotation thereof. The upper face of the head 64 of the member 62 is formed with a complementary series of ratchet teeth 66 which are positioned to engage teeth 60 of the rotatable contact and move the spring contacts thereof over the ratchet faces 8 when rotated in one direction (clockwise as shown in Fig. 1). Rotation of the member 62 in the opposite direction causes the teeth 66 thereof to pass idly over the teeth 60 of the contact 52 without rotating the same. The yielding character of spring contact fingers 54 permits the central portion of the disc to move axially sufficiently to enable the teeth on the disc and headed member to ride over each other easily when moved in a counterclockwise direction and insures proper engagement of the ratchet teeth when rotating the member 62 to move the contacts over the ratchet faces 8.

The selector for varying the flow of current through the circuit is located in the upwardly facing recess 6 and is provided with two stationary contacts 68 and 70 each of which extends through an arc of approximately 120 degrees and covers two faces of the ratchet. These contacts are separated from each other at their adjacent ends by the vertical spacing of the ratchet faces and are separated at their opposite ends by the space of two ratchet faces which have no contacts thereon. The contact 68 is connected to a lead 24 in the channel 20 whereas contact 70 is connected to a lead 26 in the channel 22. The rotatable contact 72 of the selector is in the form of a disc similar to contact 52 of the switch but formed with two spring contact fingers 74 located 180 degrees apart and inclined downwardly to engage the stationary contacts 68 and 70 mounted upon the upwardly facing ratchet faces in the bottom of the recess 6. Upon rotation of the contact 72 the fingers 74 are selectively moved into positions in which a circuit is completed through either the contact 68 alone, the contact 70 alone or through both contacts 68 and 70, as desired. The rotatable contact thus serves as a selecting member movable to vary the flow of current in the electrical circuit as desired.

Actuation of the selector is effected independently of the switch by rotation of the movable contact or selecting member 72 in one direction

only, oppositely to the direction of rotation of the rotatable contact of the switch. Rotation is preferably effected by means of a member 76 formed of conducting material and secured to the member 62 of the switch to rotate therewith. The member 76 is provided with a head 78 provided with ratchet teeth 80 inclined oppositely to the teeth 60 of the member 62. These teeth cooperate with complementary teeth 82 formed on the rotatable contact 72 about the centrally located aperture 84 in said member. The teeth 82 may be formed in the same manner as the teeth on the rotatable contact 52 but are oppositely inclined. Thus rotation of the member 76 in one direction (counter-clockwise as shown in Fig. 1) causes the spring contact fingers 74 of the selecting member to be moved selectively into and out of engagement with the stationary contacts 68 and 70. The movement of the selecting member is independent of the switch and is unaffected by the position of the contacts of the switch so that variations of adjustments of the circuit may be made when the current is either on or off. When the switch is actuated and the members 62 and 76 are rotated in the opposite direction the ratchet teeth 80 ride over the teeth 82 on the selecting member without rotating the same. The spring contact fingers 74 permit the rotatable contact 72 to move axially as in the switch elements so that the member 76 may rotate freely when idling and proper engagement of the ratchet teeth is insured when member 76 is moved to actuate the selector.

While the elements of the switch and selector may be operated by any suitable means, I have shown in Figs. 1 and 4 a preferred form of operating handle and connecting means by which a yielding connection is made which tends to cause the contacts of the device to snap quickly from one position to another thus insuring rapid make and break of the contacts. For this purpose a handle 48 is provided which is hollow in the center and formed with a flap strip of yieldable material 86 such as spring steel, which has one end thereof secured to the handle and the other end engaging in a slot 88 in top of the head 78 of the member 76 of the selector. In order to prevent dislocation of the strip 86 from the slot 88 when the strip is flexed upon rotation of the handle, the inner surface thereof is provided with shoulders 90 spaced from the strip 86 as shown in Fig. 4. These shoulders serve to permit limited rotation of the strip before being brought into engagement therewith. Upon engagement of one of the shoulders 90 with the flexible strip it moves the strip positively until the rotatable contact has been carried over the end of the ratchet face engaged thereby. The strip being subject at that time to a large twist or torque tends to snap back into its normal position midway between the shoulders 90. The rotatable contact thus moves rapidly away from the contact or face previously engaged and is brought quickly into engagement with the next face or contact.

In using the form of my invention described above in a typical circuit arrangement the stationary contact 68 of the selector is connected by the lead 24 through an electrical device such as an incandescent lamp 92 to one pole of a source of current 94. The contact 70 of the selector is connected by lead 26 through a different electrical device such as incandescent lamp 96 to the same pole of the source of current. The stationary contact 50 of the switch is connected through the lead 18 to the opposite pole of the source of current 94 and the rotatable contacts 52 and 72 of the switch and selector respectively are electrically connected by the members 62 and 76.

Rotation of the operating handle 48 in a counter-clockwise direction causes the selecting member 72 of the selector to bring the spring contact 74 into any desired position for completing a selected circuit. If it is desired to have only lamp 92 turned on the handle 48 is rotated to bring one spring contact 74 into engagement with stationary contact 68 while the other engages one of the blank ratchet faces 8. A circuit is then completed from one pole of the source of current through lamp 92, lead 24, stationary contact 68, selecting member 72, switch contacts 50 and 52 and back through lead 18 to the opposite pole of current source 94. When in this position the lamp 92 may be turned on and off as desired by clockwise rotation of the operating handle 48 without disturbing the setting of the selector contacts.

If it should be desired to use the lamp 96 instead of light 92 selecting member 72 is rotated in a counterclockwise direction to bring one spring finger 74 into engagement with stationary contact 70 while the other engages a blank ratchet face. A circuit is then completed through lamp 96 but not through light 92. In this position of the selecting member, as in all others, the switch may be operated independently of the selecting member to turn the light on and off without altering the circuit adjustment.

If both lamps 92 and 96 are to be used they may be connected in parallel to the source of current by rotation of the selecting member to bring one contact finger 74 into engagement with stationary contact 68 and the other into engagement with stationary contact 70. Both lights are then connected in parallel to the current source 94 and as before the switch may be independently operated to turn the lights on and off. The usual and natural manner of operating switches to turn circuits on and off is by rotation in a clockwise direction and I have therefore illustrated and described an arrangement in which the switch elements of the device are so operated. However, it is apparent that the elements may each be operated in the reverse direction if preferred.

The circuit arrangement shown has been chosen for purposes of illustration because it is one which is easily understood and in common use. However, the device may be used in any other circuit arrangement wherein it is desired to effect variations in the flow of current in one circuit or a plurality of separate circuits and to permit the circuit to be made or broken at will without change in the circuit adjustment. A typical alternative use of the switch would be for combined selection and control in radio circuits where it is desirable to provide the minimum number of controlling knobs. The type of handle and connection shown and described are not essential to the operation of the switch as any desired form of handle or other type of operating means or mechanism may be used as desired.

In the foregoing description of my invention I have referred only to that form thereof which is illustrated in the drawings. It will be seen, however, that the location of the switch and selector in the housing may be reversed or they may be arranged so that the switch and selector are both located in the same plane or on one face of the insulating body. It is also possible to change the form and arrangement of either the selector or the switch or the form and construction of the housing in many respects without departing from

the spirit and scope of my invention. It should therefore be understood that I do not intend my invention to be limited by the foregoing description thereof except as defined by the following claims.

I claim:

1. A circuit control device comprising an insulating body, two independently operable switches each embodying a contact member supported by said insulating body and a movable switch member for engaging a contact member, said switch and contact members being in the form of oppositely directed cooperating ratchet elements so arranged that the movable switch member of one switch is movable only in one direction and the movable switch member of the other switch is movable only in the opposite direction and manually operable means rotatable about a common axis for actuating said movable switch members independently.

2. A circuit control device comprising an insulating body, two independently operable switches each embodying a contact member supported by said insulated body and a movable switch member for engaging said contact member, said switch and contact members being in the form of oppositely directed cooperating ratchet elements so arranged that the movable switch member of one switch is movable only in one direction and the movable switch member of the other switch is movable only in the opposite direction, members rotatable about a common axis for operating said movable switch members and manually operable means for actuating said rotatable members.

3. A circuit control device comprising an insulating body having independently operable switches located on opposite sides thereof, said switches comprising contact members supported by said body and switch members rotatable about a common axis for engaging said contact member and manually operable means for actuating said switch members independently including an operating handle, a one-way connection between said handle and the movable switch member of one of said switches for rotating the same only in one direction and an oppositely directed one-way connection between said handle and the movable switch member of the other switch for rotating the same only in the opposite direction.

4. A circuit control device comprising an insulating body having independently operable switches located on opposite sides thereof, said switches comprising contact members supported by said body and switch members rotatable about a common axis for engaging said contact member, said switch and contact members being in the form of oppositely directed ratchet elements so arranged that the switch member of one switch is rotatable only in one direction and the switch member of the other switch is rotatable only in the opposite direction and manually operable means for actuating said switch members independently including an element extending thru said insulating body.

5. A fixture switch comprising a tubular mounting member, an insulating body carried by said mounting member, independently operable switches located on opposite sides of said body each of which includes a contact supported by said body, a movable switch member for engaging said contact, said switch and contact members being in the form of oppositely directed ratchet elements so arranged that the movable switch member of one switch is movable only in one direction and the movable switch member of the other switch is movable only in the opposite direction and means for actuating the movable switch member of each of said switches independently extending thru said tubular mounting member.

6. A fixture switch comprising a tubular mounting member, an insulating body carried by said mounting member, two independently operable switches each embodying a contact member supported by said insulating body and a movable switch member for engaging said contact member, said switch and contact members being in the form of oppositely directed cooperating ratchet elements so arranged that the movable switch member of one switch is movable in one direction only and the movable switch member of the other switch is movable only in the opposite direction and common means for actuating the movable switch member of each of said switches independently extending thru said tubular mounting member.

7. A fixture switch comprising a tubular mounting member, an insulating body carried by said mounting member, independently operable switches located on opposite sides of said insulating body, said switches comprising contact members supported by said body and switch members rotatable about a common axis for engaging said contact members and means for actuating each of said switches independently extending thru said tubular mounting member including an operating handle, a one-way connection between said handle and the rotatable switch member of one switch for rotating the same in one direction only and an oppositely directed one-way connection between said handle and the rotatable switch member of the other switch for rotating the same only in the opposite direction.

8. A fixture switch comprising a tubular mounting member, an insulating body carried by said mounting member, independently operable switches located in spaced relation with a partition between the same, said switches comprising contact members supported by said body and switch members rotatable about the common axis for engaging said contact members, said switch and contact members being in the form of oppositely directed ratchet elements so arranged that the movable switch member of one switch is rotatable only in one direction and the movable switch member of the other switch is rotatable only in the opposite direction and manually operable means for actuating said switches independently extending thru said tubular mounting member and including an element extending thru said partition.

9. A switch comprising relatively rotatable contacts, a rotatable operating handle for said switch located axially of said rotatable contacts and a strip of yieldable material engaging said switch and handle respectively and extending axially between the same.

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