Feb. 14, 1956 W. D. JENKINS ET AL 2,734,953

CONTROL SWITCHES

Filed April 30, 1953 2 Sheets-Sheet 1

Fig. 1.

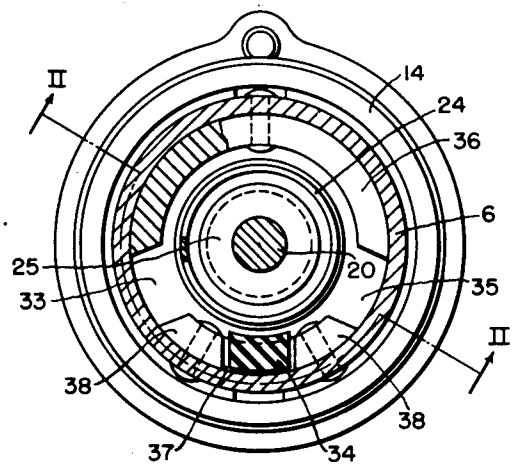
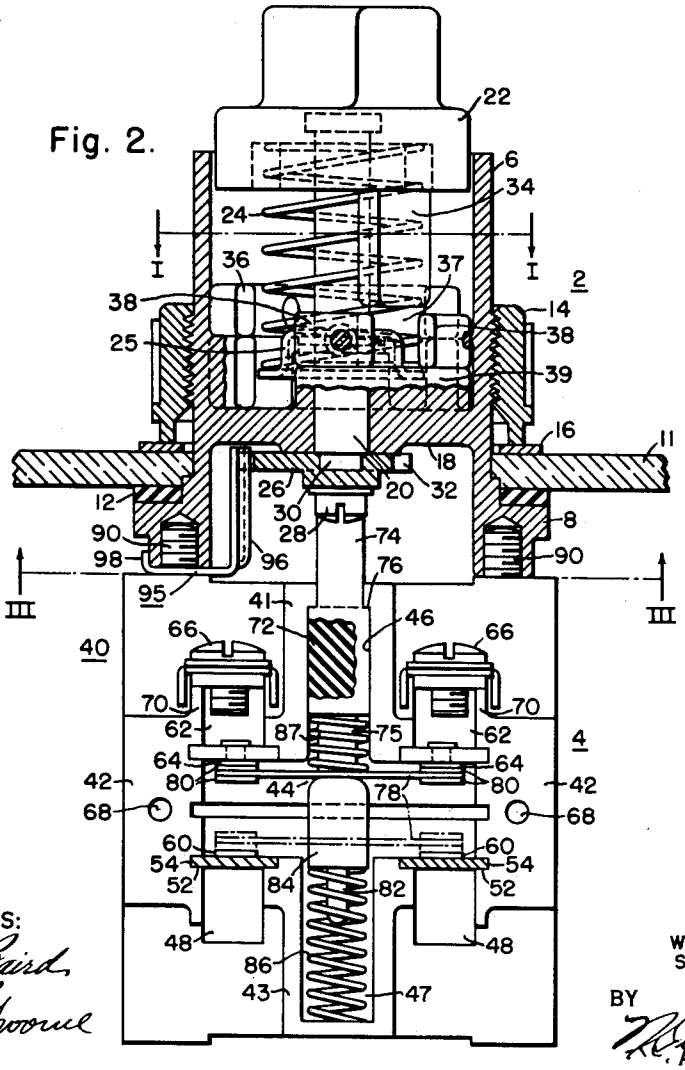


Fig. 2.



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Fig. 3.

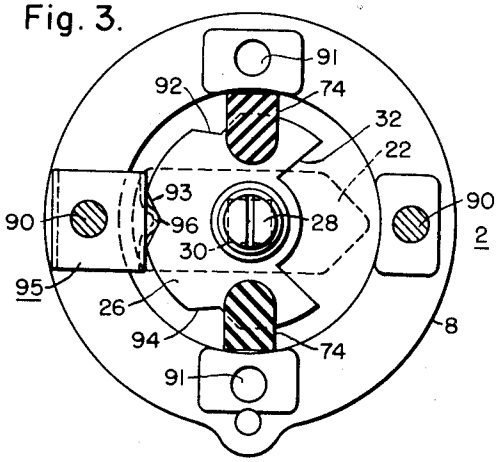


Fig. 4.

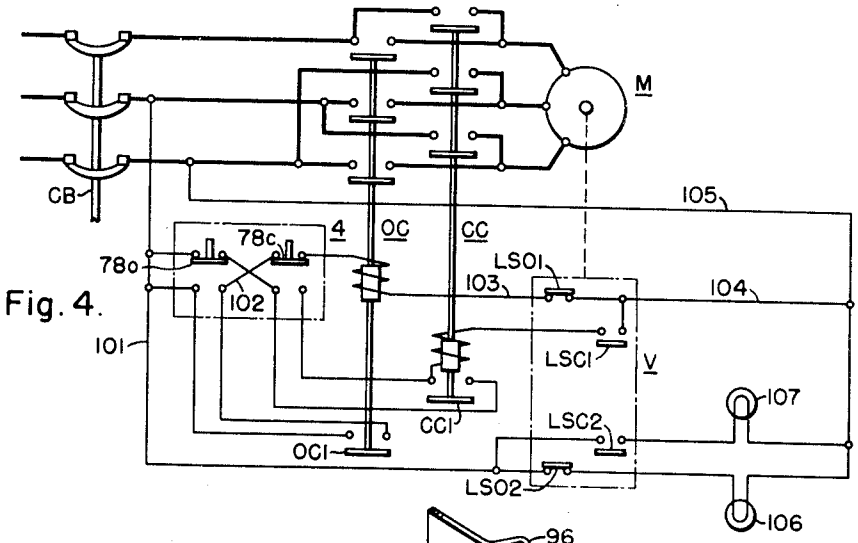
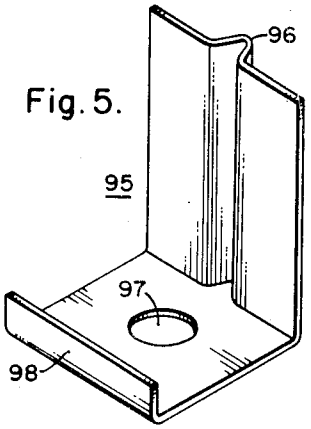


Fig. 5.



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2,734,953

CONTROL SWITCHES

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Application April 30, 1953, Serial No. 352,094

10 Claims. (Cl. 200—16)

Our invention relates, generally, to control switches and, more particularly, to switches of the push-button and rotary selector type, such as are described in the copending application of S. L. Frank, Serial No. 348,985, filed April 15, 1953, now Patent No. 2,722,573, issued November 1, 1955.

In the aforesaid copending application, there is described and claimed a single push-button switch assembly having two independently operable switch elements disposed for operation selectively by one operating head which may be rotated to make the desired selection and then depressed to actuate the selected movable contact members of the switch throughout their full range of travel between fixed contact members of the switch. The operating head is biased to its uppermost position when released, but remains in the position to which it was last rotated, thereby providing an indication of the last operation of the switch.

The aforesaid switch was suitable for controlling the operation of reversing contactors for an electric motor which operates a valve in a pipeline, the motor being stopped by limit switches actuated at the end of the valve travel in either direction. The prior switch did not provide for stopping the motor before the end of the valve travel in order to set the valve in any intermediate position and it was necessary to provide a seperate push-button switch in the control system to stop the motor before the operation of a limit switch.

An object of our invention is to provide a single push-button switch assembly capable of controlling the stopping as well as the reversing of an electric motor.

Another object of our invention is to provide a three-position push-button and rotary selector switch.

A further object of our invention is to provide a position locater for a push-button and rotary selector switch.

Other objects of our invention will be explained fully hereinafter or will be apparent to those skilled in the art.

In accordance with one embodiment of our invention, either one of two independently operable switch members in a single switch assembly may be operated by first rotating the operating head of the switch to select the desired switch member and then depressing the head to actuate the selected member throughout its full range of travel between fixed contact members. Both of the switch members may be operated simultaneously by first rotating the operating head to a position substantially midway between its extreme rotative positions and then depressing the head. The travel of the switch member is limited to substantially one-half of its full travel by spacing means which prevents the head from being fully depressed when it is in the midposition.

For a better understanding of the nature and objects of the invention, reference may be had to the following detailed description, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a view, in section, taken along the line I—I in Fig. 2 of a control switch assembly embodying the principal features of the invention;

Fig. 2 is a view, partly in section and partly in elevation, the section being taken along the line II—II in Fig. 1;

Fig. 3 is a view, in section, taken along the line III—III in Fig. 2;

Fig. 4 is a diagrammatic view of a control system utilizing the control switch; and,

Fig. 5 is an enlarged view, in perspective, of a spring utilized in the control switch.

Referring to the drawings, and particularly to Figs. 1 and 2, the switch structure shown therein comprises an operating unit **2** and a switch unit **4**. The operating unit **2** includes a tubular supporting sleeve **6**, preferably of a cast metal, and having a flange **8** on the inner end thereof adapted to engage the inner side of a supporting panel **11**. A sealing disc **12**, composed of any desirable sealing material, such as rubber, may be interposed between the flange **8** and the inner surface of the panel **11**.

A portion of the sleeve **6** is threaded for receiving a clamping ring **14**, which is adapted to secure the sleeve **6** to the panel **11** when the clamping ring is drawn up tightly. A washer **16** may be provided between the clamping ring **14** and the panel **11**. The washer **16** may carry suitable indicia for proper identification of the switch and for indicating operative positions of the switch.

The supporting sleeve **6** of the switch operating unit has a transversely extending web **18** having a central opening therein for slidably receiving an operating shaft **20**. A combined push-button and rotary selector operating head **22**, composed of an insulating material, is secured to the outer end of the operating shaft **20**, preferably by being molded thereon. A compression spring **24** is disposed between the operating head **22** and a retainer disc **25** seated on web **18** to normally bias the operating head **22** to the outer limit of its movement.

The outer movement of the operating head **22** is limited by an actuating member or disc **26** which is secured to the lower end of the shaft **20** by a screw **28**. The disc **26** has a square opening therein for receiving a square projection **30** on the lower end of the shaft **20** thereby causing the disc **26** to rotate with the shaft **20**. As shown most clearly in Fig. 3, the disc **26** has a notch or opening **32** therein for a purpose which will be described hereinafter.

The operating head **22** has an integral projection **34** thereon for determining certain rotative positions of the operating head and for guiding the head in its reciprocating movement. The projection **34** also functions to prevent reciprocating movement of the head while it is being rotated and to prevent rotation of the head while it is being reciprocated. The sides of the projection **34** are disposed to engage opposite ends of an arcuate abutment **36** in the sleeve **6** to limit rotative movement of the head **22**.

The end of the projection **34** is disposed to engage the top of an arcuate abutment **38** to prevent reciprocating the head **22** while it is being rotated. As shown most clearly in Fig. 1, spaces **33** and **35** are provided between the ends of the abutments **36** and **38** for receiving the projection **34**, thereby permitting reciprocation of the head **22** at its extreme positions of rotative movement for a purpose which will be explained more fully hereinafter.

As shown most clearly in Fig. 2, the abutment **38** is divided into two sections and a space **37** is provided between the two sections for receiving the projection **34** of the operating head **22**. A raised portion **39** of the web **18**, upon which the abutment **38** rests, limits the downward movement of the head **22** when the projection **34** is in the recess **37**. Thus, full-stroke movement of the head **22** is permitted when the projection **34** is in the spaces **33** and **35**, but only partial-stroke movement of the head **22** is permitted when the projection **34** is in the space **37**.

The switch unit 4 comprises a base 40, preferably of an insulating material which is suitable for molding. The base 40 is provided with opposed recessed projections 41 and 43 on two sides thereof and has on the same sides another pair of opposed projections 42. All of the projections 41, 42 and 43 are spaced apart so as to provide in effect a recessed space 44 between the inner ends of the several projections.

The projection 41 has a recess 46 extending throughout the length of the projection and having an outer reduced portion forming an internal shoulder. The projection 43 has a recess 47, the outer end of which is closed. Projections 42 are spaced from opposite sides of projections 41 and 43 to form spaces 48 therebetween.

Straight contact strips 54 are disposed in suitable slots 52 provided at the inner side of each projection 42 for receiving one edge of the contact strip with the opposite edge being received by a slot provided by a recessed projection 43. Each contact strip 54 is provided with a contact button 60 disposed within the space 48.

Generally U-shaped contact strips 62 are disposed above the contact strips 54. The U-shaped contact strips 62 each have one leg carrying a contact button 64. The bight portion of each contact 62 engages the base 40 with the other leg of each contact strip 62 extending beyond projections 42 and resting against a flange 70 formed integrally with each projection 42. Such other legs of each contact strip 62, as well as the outer ends of contact strips 64, are provided with terminal screws 66 for the purpose of securing conductors thereto. The contact strips 54 and 62 are maintained against withdrawal from slots 52 by a cover (not shown) which may be attached to the base 40 by screws disposed in openings 68 provided on opposite sides of the base 40.

The switch unit includes a pair of operating members 72 preferably molded from an insulating material and disposed in the recess 46 of base projections 41. Each operating member has a reduced operating extension 74 extending through the reduced recess opening at the outer end of projections 41 to provide a shoulder 76 around three sides of operating member 72 which is engageable with the shoulder adjacent the outer end of recess 46 to limit the extent of outer movement of the operating member.

A contact supporting strip 75 is secured to the inner end of operating member 72 and has a bridging contact bar 78 slidably mounted thereon. The bridging contact bar 78 is provided with contact buttons 80 on opposite sides thereof at each end of the bar for making contact with the respective contact buttons of contact strips 54 and 62.

The contact supporting strip 75 has a reduced extension 82 on which is slipped a spring supporting sleeve 84, also preferably composed of insulating material. A coil compression spring 86 is disposed in recess 47 at base projection 43 to react between the closed end of this recess and sleeve 84 to normally bias operating member 72 to its outermost position where the contact buttons of bridging contact bar 78 engage the upper contacts 62 on the base. A coil compression spring 87, which is weak relative to spring 86, is provided on contact supporting strip 75 and reacts between operating member 72 and the contact bridging bar 78.

It will be apparent that each operating member 72 for the switch unit may be depressed by exerting pressure on the outer end of its operating extension 74 to be moved from the outer position illustrated in the drawings, wherein the contact buttons of bridging bar 78 engage the upper set of stationary contact strips, to a position shown by broken lines where they engage the lower set of stationary contact strips. Furthermore, the extension 74 may be moved beyond this position because of the slidable mounting of the bridging contact bar on contact supporting strip 75, with such movement acting to compress spring 87 as well as spring 86. When the operating extension 74 is released, the spring 86 will return the parts to the position illustrated in the drawings, wherein bridging contact bar 78 has its contacts in engagement with the upper set of stationary contact members.

The switch unit 4 and the operating unit 2 may be assembled in operative relation by screws 90 extending through openings provided at opposite ends of base 40 of the switch unit 4. The switch unit may be so positioned that the screws 90 may engage in either pair of opposed pairs of threaded sockets 91 as provided in the flange 8 of the operating unit sleeve 6.

The switch unit 4 is a double unit in that the base is provided with contact strips 54 and 62 in recesses at opposite sides with a movable contact assembly for each set of stationary contact members. Each movable contact assembly is actuated independently by separate operating extensions 74. Upon depression of the operating head 22 when it is at one of its extreme positions of rotation, the actuating disc 26 will engage one or the other of the separate exensions 74 depending upon the rotative position of the operating head. The other operating extension 74 will pass through the notch 32 in the disc 26, thereby preventing the depressing of that member 74.

As previously explained, the projection 34 on the operating head 22 can enter one or the other of the spaces 33 or 35 between the abutments 36 and 38 to permit depressing the head 22. Thus, if it is desired to actuate the bridging contact bar for one set of stationary contact members, the head 22 is rotated to a position in which the projection 34 can enter the space 33, and the head is then depressed to actuate the selected bridging contact bar.

Likewise, if it is desired to actuate the bridging bar for the other set of contact members, the head is rotated to a position in which the projection 34 can enter the space 35 after which the head is depressed to actuate the bridging contact bar. Thus, full-stroke operation of the selected bridging contact bar from its uppermost position to the lowermost position is obtained by the reciprocating movement of the operating head 22, which movement is limited by the lower end of projection 34 engaging the top surface of the web 18 in one or the other of the spaces 33 or 35.

As explained hereinbefore, the head 22 may also be depressed when the projection 34 is so disposed that it can enter the space 37 between the two sections of the abutment 38. As shown most clearly in Fig. 3, both operating members 74 will be depressed by the disc 26 when the projection 34 enters the space 37. Thus, both bridging contact members 78 are simultaneously actuated out of engagement with the upper stationary contact member 62. However, since the downward movement of the head 22 is limited by the end of the projection 34 engaging a raised portion of the web 18 at the bottom of the space 37, the bridging contact bars 78 are not actuated into engagement with the lower sets of stationary contact members 54. Therefore, only partial-stroke operation of the bridging contact members 78 is obtained when the projection 34 is depressed into the space 37. Accordingly, three rotative positions of the switch are provided, namely, the two extreme rotative positions and an intermediate position which is located substantially midway between the two extreme positions.

In order to define the three rotative positions, notches 92, 93 and 94 are provided in the edge of the disc 26 as shown in Fig. 3. A generally L-shaped spring 95 having a ridge 96 on one leg of the L is so disposed in the operating unit 2 that the ridge 96 enters one of the notches 92, 93 or 94 at the respective rotative position of the operating head.

Since the ridge 96 extends the full length of the vertical leg of the L-shaped spring 95, the spring retains the operating head in its selected rotative position while the

head is being depressed to actuate the selected bridging contact member. The resiliency of the L-shaped spring member **95** permits rotation of the operating head from one rotative position to the other with the ridge **96** entering the proper notch **92**, **93** or **94** to define the rotative position of the head.

The spring **95** may be secured in position by one of the bolts **90** which passes through an opening **97** in the horizontal leg of the L-shaped spring. A flange **98** may be provided on the horizontal leg to assist in retaining the spring in position. As shown in Fig. 2, the spring **95** is disposed at the bottom of the sleeve **6** between the lower end of the sleeve and the top of the base **40** of the switch unit.

The operation of the switch may be understood by referring to Fig. 4 which is a diagram for a typical control unit for controlling the operation of a motor operated valve V. As shown in Fig. 4, power for a motor M may be supplied from any suitable source through a circuit breaker CB. The direction of operation of the motor M is controlled by contactors OC and CC. The operation of the contactors OC and CC is, in turn, controlled by the switch unit **4** having bridging contact members **78***o* and **78***c*, which, as explained hereinbefore, are operated by the operating unit of the switch. The valve mechanism V is provided with limit switches having contact members LSO1 and LSO2 which are opened only when the valve is fully open and contact members LSC1 and LSC2 which are opened only when the valve is fully closed. The valve is shown in the closed position.

If it is desired to open the valve, the push-button switch is rotated to the open position and then depressed to operate the contact member **78***o*. When the contact member **78***o* is in its lowermost position, a circuit is established from a conductor **101** through the contact member **78***o*, conductor **102**, contact member **78***c*, which is in its uppermost position, the coil of the contactor OC, conductor **103**, limit switch LSO1, conductor **104** to a line conductor **105**. In this manner, the contactor OC is closed to operate the motor M in a direction to open the valve. The push-button switch **4** may be released as soon as the contactor OC is closed, as a holding circuit for the contactor OC is established through auxiliary contacts OC1 on the contactor.

When the valve is fully opened, the limit switch LSO1 is opened to cause the opening of the contactor OC, thereby stopping the motor M. The limit switch LSO2 is also opened to deenergize an indicating light **106**. At this time, the contacts for the limit switches LSC1 and LSC2 are closed. An indicating light **107** is energized through the switch LSC2. The switch LSC1 is closed to permit the closing of the contactor CC when the contact member **78***c* is operated in the manner previously described. Thus, the motor M may be controlled to operate the valve V in either direction.

As explained hereinbefore, it is sometimes desirable to stop the motor M before the valve is fully opened or fully closed in order to hold the valve V at any desired intermediate position between its fully opened and fully closed positions. Heretofore, this has required a separate push-button or other switch which could be opened to interrupt the holding circuit for the contactors OC and CC. With the present switch, the operating head may be rotated to the intermediate rotative position and the head depressed in the manner previously described. The depressing of the head opens both bridging contact members **78***o* and **78***c*, thereby interrupting the holding circuits for the contactors OC and CC which are maintained through auxiliary contacts OC1 and CC1 respectively, and stopping the motor M.

Since the bridging contact members **78***o* and **78***c* cannot be actuated through their entire range of travel when the operating head is in the intermediate rotative position, there is no danger of plugging the motor M as neither one of the bridging contact members can engage the lower set of stationary contact members at this time. Thus, the motor M may be stopped at any time during the operation of the valve to hold the valve at any desired intermediate position.

From the foregoing description, it is apparent that we have provided in one assembly a push-button and rotary selector switch which is suitable for controlling the reversing of an electric motor, and which is also suitable for stopping the motor prior to the normal time of stopping the motor by means of limit switches actuated by the apparatus being driven by the motor. The present switch is particularly suitable for controlling the operation of pipeline valves, but it is not necessarily limited to such applications. We have also provided for determining the three rotative positions of the switch operating head, thereby facilitating the operation of the switch.

Since numerous changes may be made in the above described construction, and different embodiments of the invention may be made without departing from the spirit and scope thereof, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

We claim as our invention:

1. In a control switch, in combination, supporting means, two sets of stationary contact means, each set comprising at least two separate contact means, a movable contact member for each of said sets of contact means movable into and out of engagement with the contact means of its respective set of contact means, a reciprocable operating member for each movable contact member, actuating means for selectively actuating said operating members comprising an actuating shaft mounted in the supporting means for rotary movement and longitudinal sliding movement in a direction paralleling the direction of reciprocable movement of said operating members, an actuating disc secured to said shaft and having a notch therein, said operating members being biased toward said disc, an operating head secured to the outer end of the actuating shaft for rotating said disc to select a desired operating member and for reciprocating said disc to actuate said selected operating member and its associated movable contact member, said disc being rotatable by the shaft while the disc and the shaft remain in the same position longitudinally of the shaft, the notch in said disc permitting operation of the selected operating member without operating the non-selected operating member, stop means in the supporting means establishing two extreme positions of rotation for the operating head and permitting reciprocation of the head through its entire range of travel at said extreme positions to actuate a selected movable contact member from engagement with one stationary contact means into engagement with another stationary contact means, and spacing means in the supporting means permitting actuation of both movable contact members through only part of their range of travel when the operating head is at a rotative position intermediate said extreme positions.

2. In a control switch, in combination, supporting means, two sets of spaced pairs of stationary contact means, a bridging contact member for each of said sets of contact means movable into and out of engagement with the contact means of its respective set of contact means, a reciprocable operating member for each bridging contact member, actuating means for selectively actuating said operating members comprising an actuating shaft mounted in the supporting means for rotary movement and longitudinal sliding movement in a direction paralleling the direction of reciprocable movement of said operating members, an actuating member secured to one end of said shaft and having a notch therein, said operating members being biased toward said actuating member, an operating head secured to the other end

of the actuating shaft for rotating said actuating member without reciprocating the actuating member to select a desired operating member and for reciprocating said actuating member to actuate said selected operating member and its associated bridging contact member, the notch in said actuating member permitting operation of the selected operating member without operating the non-selected operating member, stop means in the supporting means establishing two extreme positions of rotation for the operating head and permitting reciprocation of the head through its entire range of travel at said extreme positions to actuate a selected bridging contact member from engagement with one pair of contact means into engagement with another pair of contact means, and spacing means in the supporting means permitting actuation of both bridging contact members through only part of their range of travel when the operating head is at a rotative position intermediate said extreme positions.

3. In a control switch, in combination, supporting means, two sets of spaced pairs of stationary contact means, a bridging contact member for each of said sets of contact means movable into and out of engagement with the contact means of its respective set of contact means, a reciprocable operating member for each bridging contact member, actuating means for selectively actuating said operating members comprising an actuating shaft mounted in the supporting means for rotary movement and longitudinal sliding movement in a direction paralleling the direction of reciprocable movement of said operating members, an actuating member secured to one end of said shaft and having an opening therein, said operating members being biased toward said actuating member, an operating head secured to the other end of the actuating shaft for rotating said actuating member without reciprocating the actuating member to select a desired operating member and for reciprocating said actuating member to actuate said selected operating member and its associated bridging contact member, the opening in said actuating member permitting operation of the selected operating member without operating the non-selected operating member, stop means in the supporting means establishing two extreme positions of rotation for the operating head and permitting reciprocation of the head through its entire range of travel at said extreme positions to actuate a selected bridging contact member from engagement with one pair of contact means into engagement with another pair of contact means, spacing means in the supporting means permitting actuation of both bridging contact members through only part of their range of travel when the operating head is at a rotative position intermediate said extreme positions, said actuating member having a plurality of notches therein, and spring means cooperating with said notches to releasably retain said operating head at said rotative positions.

4. In a control switch, in combination, supporting means, two sets of stationary contact means, each set comprising at least two separate contact means, a movable contact member for each of said sets of contact means movable into and out of engagement with the contact means of its respective set of contact means, a reciprocable operating member for each movable contact member, actuating means for selectively actuating said operating members comprising an actuating shaft mounted in the supporting means for rotary movement and longitudinal sliding movement in a direction paralleling the direction of reciprocable movement of said operating members, an actuating disc secured to said shaft and having a notch therein, said operating members being biased toward said disc, an operating head secured to the outer end of the actuating shaft for rotating said disc to select a desired operating member and for reciprocating said disc to actuate said selected operating member and its associated movable contact member, said disc being rotatable by the shaft while the disc and the shaft remain in the same position longitudinally of the shaft, the notch in said disc permitting operation of the selected operating member without operating the non-selected operating member, stop means in the supporting means establishing two extreme positions of rotation for the operating head and permitting reciprocation of the head through its entire range of travel at said extreme positions to actuate a selected movable contact member from engagement with one stationary contact means into engagement with another stationary contact means, spacing means in the supporting means permitting actuation of both movable contact members through only part of their range of travel when the operating head is at a rotative position intermediate said extreme positions, said actuating disc having additional notches therein, and spring means cooperating with said additional notches to releasably retain said operating head at said rotative positions.

5. In a control switch, in combination, supporting means, two sets of spaced pairs of stationary contact means, a bridging contact member for each of said sets of contact means movable into and out of engagement with the contact means of its respective set of contact means, a reciprocable operating member for each bridging contact member, actuating means for selectively actuating said operating members comprising an actuating shaft mounted in the supporting means for rotary movement and longitudinal sliding movement in a direction paralleling the direction of reciprocable movement of said operating members, an actuating disc secured to one end of said shaft and having a notch therein, said operating members being biased toward said disc, an operating head secured to the other end of the actuating shaft for rotating said disc without reciprocating the disc to select a desired operating member and for reciprocating said disc to actuate said selected operating member and its associated bridging contact member, the notch in said disc permitting operation of the selected operating member without operating the non-selected operating member, stop means in the supporting means establishing two extreme positions of rotation for the operating head and permitting reciprocation of the head through its entire range of travel at said extreme positions to actuate a selected bridging contact member from engagement with one pair of contact means into engagement with another pair of contact means, spacing means in the supporting means permitting actuation of both bridging contact members through only part of their range of travel when the operating head is at a rotative position intermediate said extreme positions, spaced notches on the edge of said actuating disc, and a spring having a ridge thereon disposed to enter said spaced notches to releasably retain said operating head at said rotative positions.

6. In a control switch, in combination, supporting means, two sets of stationary contact means, each set comprising at least two separate contact means, a movable contact member for each of said sets of contact means movable into and out of engagement with the contact means of its respective set of contact means, a reciprocable operating member for each movable contact member, actuating means for selectively actuating said operating members comprising an actuating shaft mounted in the supporting means for rotary movement and longitudinal sliding movement in a direction paralleling the direction of reciprocable movement of said operating members, an actuating disc secured to said shaft and having a notch therein, said operating members being biased toward said disc, an operating head secured to the other end of the actuating shaft for rotating said disc to select a desired operating member and for reciprocating said disc to actuate said selected operating member and its associated movable contact member, said disc being rotatable by the shaft while the disc and the shaft remain in the same position longitudinally of the shaft, the notch in said disc permitting operation of the selected operating member without operating the non-selected op-

erating member, stop means in the supporting means establishing two extreme positions of rotation for the operating head and permitting reciprocation of the head through its entire range of travel at said extreme positions to actuate a selected movable contact member from engagement with one stationary contact means into engagement with another stationary contact means, spacing means in the supporting means permitting actuation of both movable contact members through only part of their range of travel when the operating head is at a rotative position intermediate said extreme positions, spaced notches on the edge of said actuating disc, and an L-shaped spring having a ridge on one leg for entering said spaced notches to releasably retain said operating head at said rotative positions.

7. In a control switch, in combination, supporting means having an integral tubular portion, two sets of spaced pairs of stationary contact means, a bridging contact member for each of said sets of contact means movable into and out of engagement with the contact means of its respective set of contact means, actuating means for selectively actuating said bridging contact members comprising an actuating shaft mounted in the supporting means for rotary movement and reciprocatory movement, an actuating member secured to one end of said shaft, an operating head secured to the other end of the shaft and partly disposed in said tubular portion, said head being both rotatable and reciprocable relative to the tubular portion for rotating said actuating member to select a desired bridging contact member and for reciprocating said member to actuate the selected bridging contact member, stop means in the supporting means establishing two extreme positions of rotation for the operating head and permitting reciprocation of the head at said extreme positions to actuate a selected bridging contact member through its full range of travel from engagement with one pair of contact means into engagement with another pair of contact means, and spacing means in the supporting means permitting simultaneous actuation of both bridging contact members by reciprocating the operating head when the operating head is at a rotative position intermediate said extreme positions.

8. In a control switch, in combination, supporting means having an integral tubular portion, two sets of spaced pairs of stationary contact means, a bridging contact member for each of said sets of contact means movable into and out of engagement with the contact means of its respective set of contact means, actuating means for selectively actuating said bridging contact members comprising an actuating shaft mounted in the supporting means for rotary movement and reciprocatory movement, an actuating member secured to one end of said shaft, an operating head secured to the other end of the shaft and partly disposed in said tubular portion, said head being both rotatable and reciprocable relative to the tubular portion for rotating said actuating member to select a desired bridging contact member and for reciprocating said member to actuate the selected bridging contact member, stop means in the supporting means establishing two extreme positions of rotation for the operating head and permitting reciprocation of the head at said extreme positions to actuate a selected bridging contact member through its full range of travel from engagement with one pair of contact means into engagement with another pair of contact means, additional stop means establishing a rotative position for the operating head intermediate said extreme positions, and said additional stop means being spaced to permit simultaneous actuation of both bridging contact members by reciprocating the operating head when the operating head is at said intermediate position.

9. In a control switch, in combination, supporting means having an integral tubular portion, two sets of spaced pairs of stationary contact means, a bridging contact member for each of said sets of contact means movable into and out of engagement with the contact means of its respective set of contact means, actuating means for selectively actuating said bridging contact members comprising an actuating shaft mounted in the supporting means for rotary movement and reciprocatory movement, an actuating member secured to one end of said shaft, an operating head secured to the other end of the shaft and partly disposed in said tubular portion, said head being both rotatable and reciprocable relative to the tubular portion for rotating said actuating member to select a desired bridging contact member and for reciprocating said member to actuate the selected bridging contact member, stop means in the supporting means establishing two extreme positions of rotation for the operating head and permitting reciprocation of the head at said extreme positions to actuate a selected bridging contact member through its full range of travel from engagement with one pair of contact means into engagement with another pair of contact means, additional stop means establishing a rotative position for the operating head intermediate said extreme positions, said additional stop means being spaced to permit simultaneous actuation of both bridging contact members by reciprocating the operating head when the operating head is at said intermediate position, and spring means cooperating with said actuating means to define said rotative positions and to releasably retain the operating head in said rotative positions.

10. In a control switch, in combination, supporting means having an integral tubular portion, two sets of spaced pairs of stationary contact means, a bridging contact member for each of said sets of contact means movable into and out of engagement with the contact means of its respective set of contact means, actuating means for selectively actuating said bridging contact members comprising an actuating shaft mounted in the supporting means for rotary movement and reciprocatory movement, an actuating member secured to one end of said shaft, an operating head secured to the other end of the shaft and partly disposed in said tubular portion, said head being both rotatable and reciprocable relative to the tubular portion for rotating said actuating member to select a desired bridging contact member and for reciprocating said member to actuate the selected bridging contact member, stop means in the supporting means establishing two extreme positions of rotation for the operating head and permitting reciprocation of the head at said extreme positions to actuate a selected bridging contact member through its full range of travel from engagement with one pair of contact means into engagement with another pair of contact means, additional stop means establishing a rotative position for the operating head intermediate said extreme positions, said additional stop means being spaced to permit simultaneous actuation of both bridging contact members by reciprocating the operating head when the operating head is at said intermediate position, and a generally L-shaped spring cooperating with said actuating member to define said rotative positions and to releasably retain the operating head in said rotative positions.

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