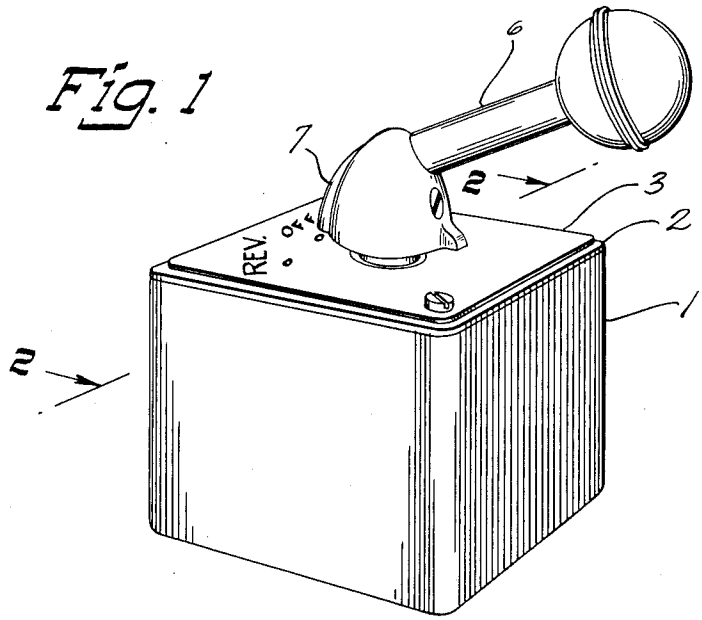
Sept. 11, 1956 M. L. GLOGAU ET AL 2,762,876

DRUM SWITCH

Filed Feb. 23, 1954

4 Sheets-Sheet 1

Fig. 1



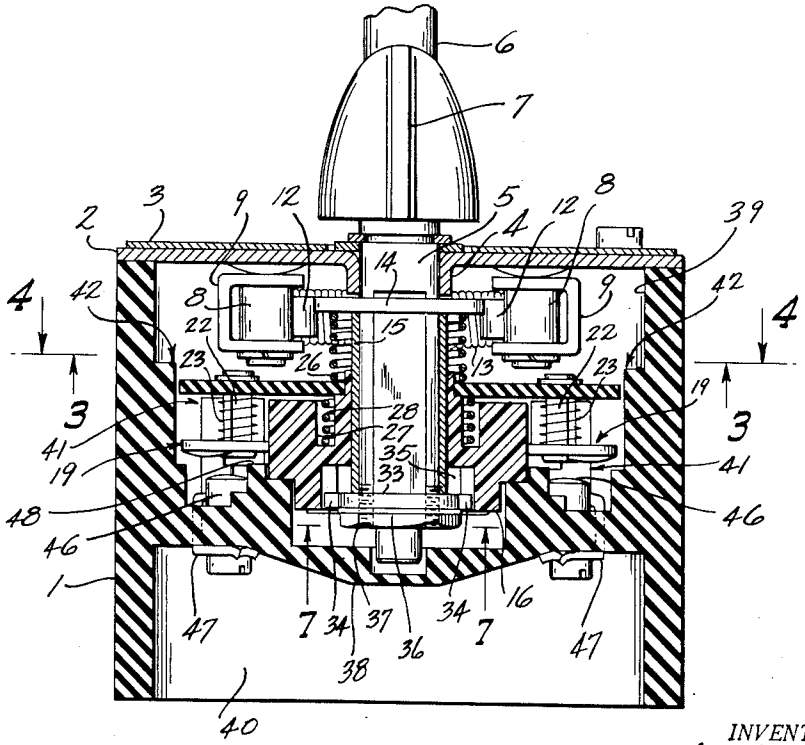


Fig. 2

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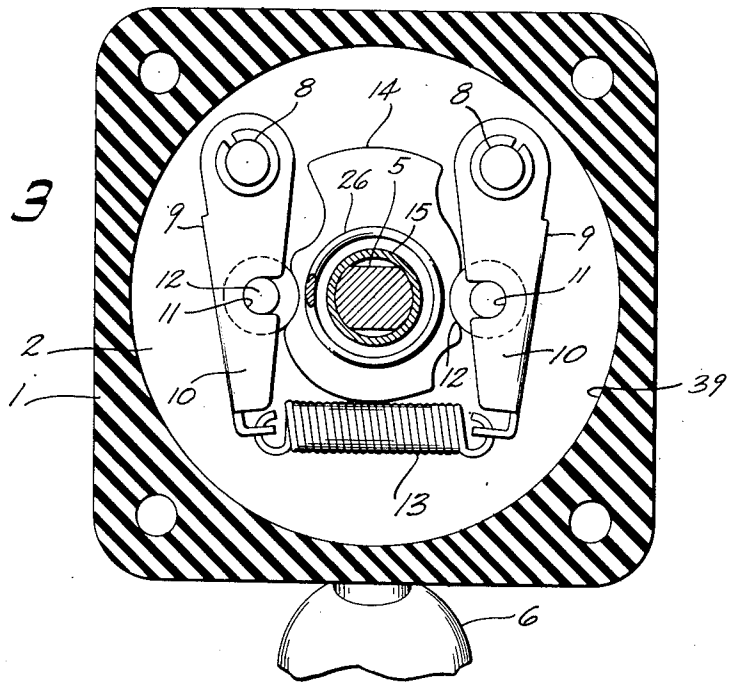
Fig. 3



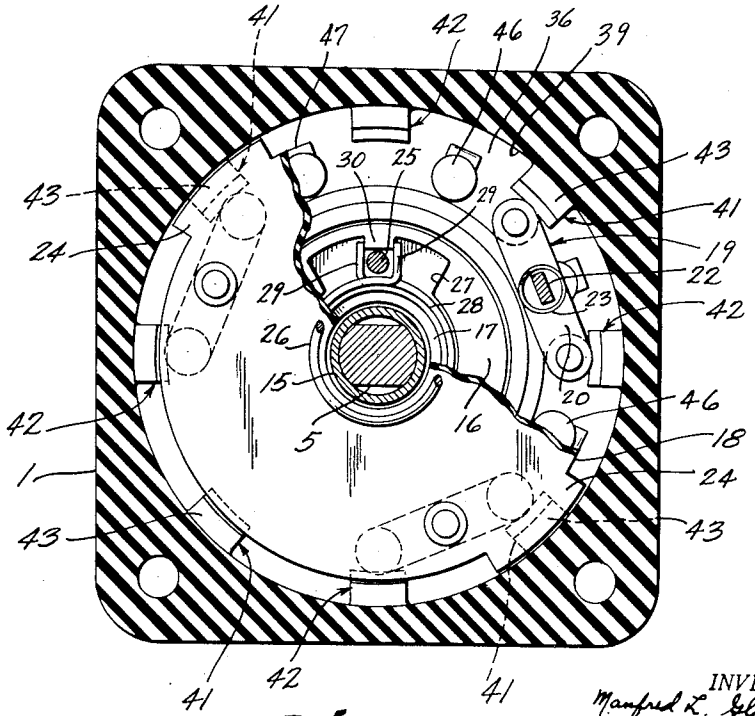


Fig. 4

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DRUM SWITCH

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Fig. 5

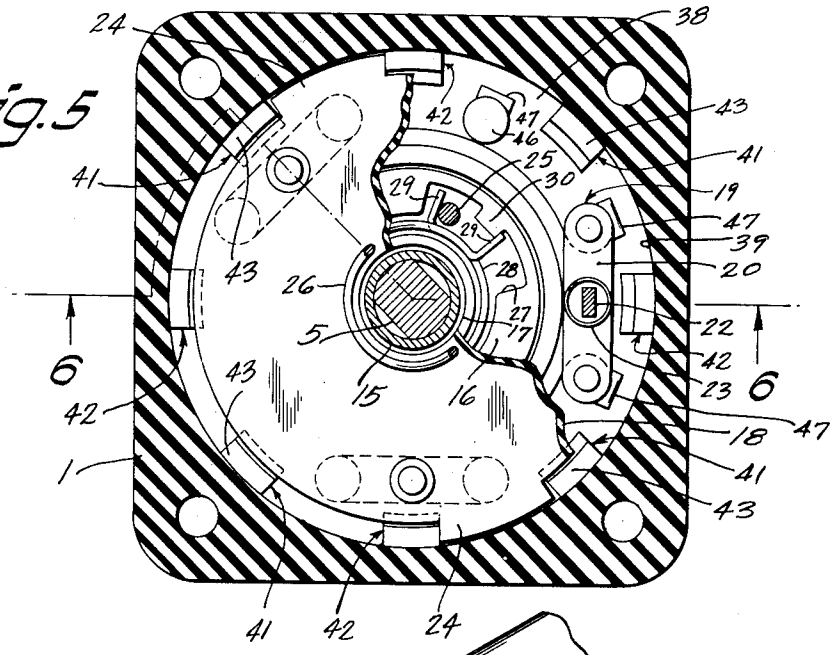
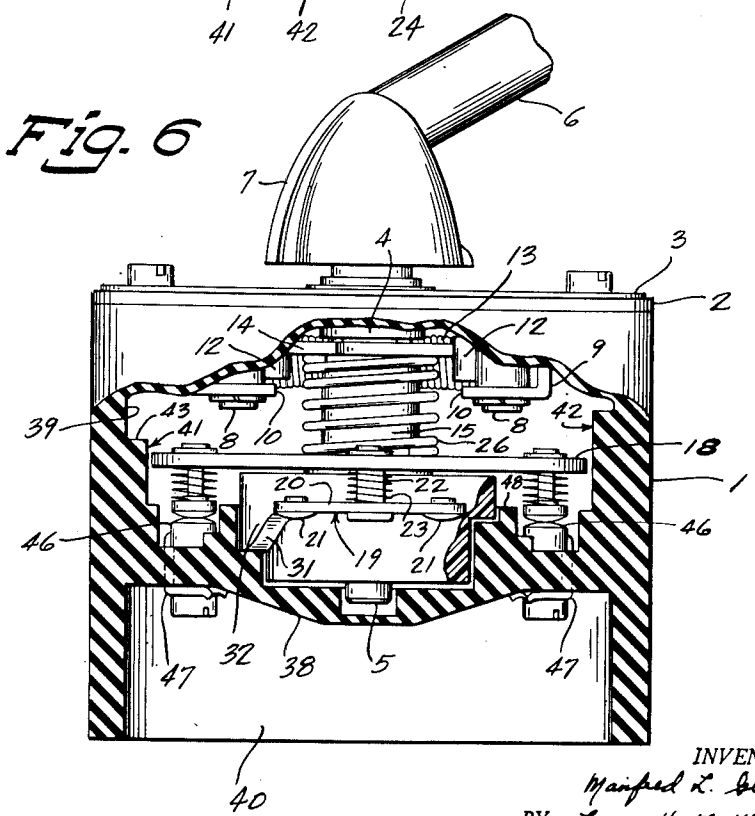


Fig. 6



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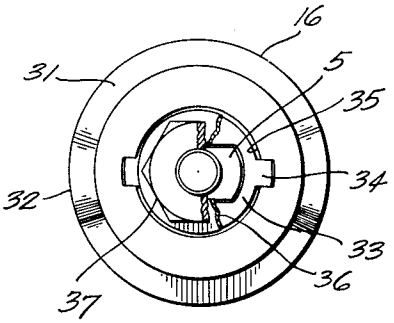

Fig. 7

Fig. 8

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United States Patent Office 2,762,876 Patented Sept. 11, 1956

2,762,876

DRUM SWITCH

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Application February 23, 1954, Serial No. 411,978

13 Claims. (Cl. 200—11)

This invention relates to electrical switches and resides more specifically in a drum switch having a drum which is rotatable and movable in a direction substantially normal to the plane of rotation which drum has mounted thereon angularly spaced movable contacts facing axially with respect thereto, which contacts are brought axially without wiping into engagement with terminal contacts mounted upon the switch body upon rotation of the drum to a position which aligns the respective contacts to be engaged and which contacts may be disengaged by an initial axial separation without wiping by an axial displacement of the drum prior to angular displacement thereof to a predetermined open position.

It is an object of this invention to provide a cam operated drum type control switch which minimizes wiping motion between the contacts upon the closure and opening thereof.

It is another object of this invention to provide, for the opening of the switch, a direct path of transmission of forces, exerted upon the operating handle by an operator, to the contacts so as to render more certain the separation of contacts which may have become welded to one another.

It is still a further object of this invention to provide for the use of double break bridging type contacts in a drum switch so as to make available in such a switch the higher interrupting capacity of double break contacts.

These and other objects will appear in the description to follow. In the description reference is made to the accompanying drawings which form a part hereof and in which there is shown by way of illustration and not of limitation one specific form in which this invention may be embodied.

In the drawings:

Fig. 1 is a view in perspective of a switch embodying this invention with the handle thereof shown in contact disengagement position,

Fig. 2 is a section view in elevation of the switch shown in Fig. 1 viewed through the plane 2—2,

Fig. 3 is a view in section of the switch shown in Figs. 1 and 2 viewed through the plane 3—3,

Fig. 4 is a plan view in section with parts broken away of the switch shown in Figs. 1 and 2 viewed through the plane 4—4,

Fig. 5 is a plan view in section with parts broken away of the switch when placed in contact engaged position and viewed through the plane 4—4,

Fig. 6 is a view in elevation of the switch with parts broken away and in section when placed in contact engaged position as shown in Fig. 5 and viewed through the plane 6—6,

Fig. 7 is a bottom view with parts broken away of the assembly of the drum cam and operating shaft upon which it is mounted, and

Fig. 8 is an exploded view in perspective of the switch with the parts thereof aligned axially with respect to one another.

Referring now to the drawings, there is shown in Fig. 1

a reversing drum switch having a housing or mounting 1 formed of insulating material to which is attached at the top a cover plate 2 and a name plate 3 carrying appropriate markings that refer to switch position. The markings for the switch shown appear in Figs. 1 and 8 and are "Reverse," "Off" and "Forward." As shown in Fig. 2 a bearing 4 formed at the center of and as a part of the cover plate 2 extends downwardly within the housing 1 and is centrally disposed with respect thereto. Received by the bearing 4 is a rotatable operating shaft 5 having mounted on the end projecting above the plates 2 and 3 an operating handle 6. Movement of the handle 6 rotates the shaft 5 and a marker 7 formed as a part of the handle 6 indicates in conjunction with the name plate 3 the various switch positions of "Reverse," "Off" and "Forward."

As is shown in Figs. 2 and 3, two pins 8 are riveted to the underside of the cover plate 2. Mounted on each of the pins 8 is a channel arm 9 that is free to swing about its respective pin 8. The arms 9 have horizontal flange portions 10 with a recessed bearing surface 11 in each of the inwardly facing edges thereof. Journaled within the bearing surfaces 11 are a pair of rollers 12 and a tension spring 13 joins the ends of the channel arms 9 opposite the pins 8 to urge the rollers 12 toward one another.

The portion of the shaft 5 extending below the bearing 4 is partially flattened and an index cam plate 14 disposed between the rollers 12 is fitted over this flattened portion so as to rotate with the shaft 5. The resilient urging of the spring 13 maintains bearing contact between the rollers 12 and the undulant cam surfaces of the cam plate 14.

This part of the apparatus provides an indexing arrangement for retaining the switch in the respective positions indicated by the name plate 3, as chosen by the operator, and as will be hereinafter explained these positions correspond to contact engagement and disengagement conditions. As the switch is shown in Figs. 2 and 3 it is retained in "Off" position and the contacts are in disengagement. Counter-clockwise rotation of the shaft 5, as viewed in Fig. 3, will spread the rollers 12 as undulant radially extending portions of the cam 14 pass therebetween. As the radially extending portions pass beyond the rollers 12 radially receding portions align with the rollers 12 and the apparatus is resiliently retained in this second position of angular alignment. The marker 7 of the handle 6 will now indicate "Forward" position.

A rotation of the handle clockwise from the position shown in Fig. 3 will bring the marker 7 into registry with the name plate designation "Reverse." Here, however, the undulant cam 14 has no radially receding cam surfaces to align with the rollers 12 and removal of hand pressure by the operator will permit the rollers 12 acting under the influence of spring 13 to return the cam plate 14 and shaft 5 to the position shown in Fig. 3. It is to be understood that the undulant cam surface of cam plate 14 may be altered so as to retain the switch in any desired position such as that labeled "Reverse" and to accommodate angular positions other than depicted in the accompanying drawings.

A bushing 15 encircling the shaft 5 abuts at its upper end, the under surface of the cam 14. Concentric with and slidably carried on the bushing 15 is a drum cam 16 having a centrally disposed stepped collar 17. Resting upon the collar 17 is a substantially circular contact carrying drum plate 18. The drum plate 18 is of thin cross section and is composed of an insulating material that acts to insulate from one another the contacts 19 carried thereby. The contacts 19 are composed of bridging arms 20 with downwardly facing contact faces 21 disposed at the ends thereof. The contacts 19 are suspended on vertical retaining guides 22 for vertical movement in re-

spect to the drum plate 18 and small helical springs 23 are interposed between the drum plate 18 and the contacts 19 to resiliently urge the contacts 19 downward so as to provide contact pressure upon contact engagement. Two diametrically opposed detent ears 24 extend radially from the drum 18 and are an integral portion thereof. Completing the drum plate 18 is a pin 25 rigidly secured thereto and extending downward therefrom.

A compression spring 26 is interposed between the cam plate 14 and the drum plate 18 to urge the drum assembly composed of the plate 18 and the drum cam 16 downwardly.

A circular trough 27 within the top of the drum cam 16 forms a recess adapted to receive a coil spring 28. As shown in Fig. 4, a portion of the trough 27 is radially enlarged to receive tongues 29 formed by the ends of the spring 28 and this enlarged portion is divided by a tooth ridge 30. Ridge 30 engages the tongues 29 to tension the spring 28. The downwardly extending pin 25 of the drum plate 18 is positioned between the tongues 29, as is also shown in Fig. 4, and is urged into alignment with the ridge 30 by the spring 28. With this arrangement the drum elements 16 and 18 are free to rotate with respect to one another to the extent that the pin 25 may be angularly displaced within the recess 27 subject to the resilient restraint of the spring 28 which is increased as the pin 25 is angularly displaced from the ridge 30. Fig. 5 shows the drum plate 18 and drum cam 16 so disposed that the pin 25 is removed from alignment with the ridge 30. In absence of a restraining force acting upon the drum elements 16 and 18 the spring 28 will rotate the drum elements 16 and 18 into the aligned position shown in Fig. 4.

The drum cam 16 is skirted by a downwardly facing surface 31, see Fig. 6, that is concentric with the shaft 5. The surface 31 forms a part of the drum cam 16 and lies in a horizontal plane with the exception of two diametrically opposed downwardly protruding portions or cam track followers 32. The cam track followers 32 are also an integral portion of the drum cam 16.

The axially movable drum cam 16 is maintained in angular alignment with the shaft 5 by a retainer 33 having radially extending keys 34 secured to the lower end of the flattened portion of shaft 5 by a lock washer 36 and nut 37. Retainer 33 is received within a conformed recess 35 in the base of the drum cam 16, as shown in Fig. 7.

The interior of the housing 1 is divided by a horizontal partition 38 into an upper chamber 39 closed at the top by plate 2 and a lower chamber 40 opening at the bottom of the housing 1. As is shown in Fig. 8 the cylindrical vertical wall of the chamber 39 has extending inwardly therefrom a plurality of short pilasters 41 and taller pilasters 42 that are alternately spaced with respect to one another. The short pilasters 41 have upper caps 43 of a height such that the detent ears 24 of the cam plate 18 will be disposed at a level above the caps 43 to permit rotation free from interference of the pilasters 41 upon raising the drum plate 18 into its uppermost position. Vertical sides 44 of pilasters 41 and 45 of the pilasters 42 act in cooperation with the ears 24 of the drum plate 18 as detents in a manner to be hereinafter described.

Positioned in a ring that surrounds the shaft 5 are a plurality of upwardly facing terminal contacts 46. Each of the contacts 46 is mounted on a terminal 47 secured in the partition 38 and extending from the cavity 39 into the cavity 40 where suitable connection may be made with the device or devices to be controlled by the switch. An open boss 48 concentric with the shaft 5 is joined with and rises upwardly from the partition 38. The drum cam 16 is received within the boss 48 so that a cam track surface 49 formed as a part of the boss 48 is disposed in facing relationship to the surface 21 and the cam track followers 32 of the drum cam 16. The cam track surface 49 extends upwardly at two diametrically opposed points to form the upper faces of cam rises 50 that cooperate with the cam followers 32 to provide axial displacement of the drum elements 16 and 18.

As previously stated, Figs. 2, 3 and 4 show the switch in the position indicated as "Off" on the name plate 3, which position maintains the contacts disengaged. In this position the cam track followers 32 rest on the peaks of the cam rises 50 to dispose the drum elements 16 and 18 at their upper limit of axial travel where the axial biasing spring 26 receives its maximum compression between the upper surface of the drum plate 18 and the lower surface of the cam 14. The peaks of the cam rises 50 and the lower extent of the cam track followers 32 are each formed with a flat of substantial circumferential extent whereby the drum elements 16 and 18 are held in elevated position through a substantial arc of rotation to either side of the "Off" position.

The drum plate 18 is aligned with the drum cam 16 by the action of the spring 28 upon the pin 25 and the ridge 30. This alignment of the drum plate 18 disposes the bridging arms 20 of the contacts 19 midway between a closing relation with respective pairs of terminal contacts 46. The downwardly facing contact faces 21 are then medially disposed between terminal contacts 46, as shown in Fig. 4, and are also raised upwardly from the terminal contacts 46, as shown in Fig. 2. Also, in "Off" position the drum plate 18 is raised to a height sufficient to permit the detent ears 24 to clear the caps 43 of the shorter pilasters 41 and each of the ears 24 is disposed directly above one of the caps 43.

Moving the handle 6 and shaft 5 in clockwise direction, as shown in Figs. 1 and 4, brings the switch into a position designated as "Forward" on the name plate 3, in which position each of the movable bridging contacts 19 will engage with a pair of terminal contacts 46. Initial movement of the shaft 5 in this clockwise direction rotates the drum cam 16 to move the cam followers 32 across the peaks of the cam rises 50. The helical spring 28 will carry the cam plate 18 with the drum cam 16 to move the detent ears 24 out of angular alignment with the short pilasters 41. As has been noted the cam followers 32 will ride on the peaks of the cam rises 50 for a substantial arc of rotation from the "Off" position, thus the detent ears 24 will remain at a level above the pilaster caps 43, and the contacts 19 will be rotated toward a position of alignment with sets of terminal contacts 46 before the cam followers descend the slopes of the cam rises 50.

Continued rotation of the shaft 5 will carry each of the detent ears 24 past the respective pilaster caps 43 and into angular alignment with a vertical channel formed by a side 44 of a shorter pilaster 41 and a side 45 of a taller pilaster 42. The ears 24 are dimensioned to fit between the sides 44 and 45 of the respective pilasters 41 and 42 to ensure that vertical displacement of the drum plate 18 will occur without any substantial accompanying angular displacement when the drum plate 18 is lowered beneath the upper extent of the pilaster caps 43. As the detent ears 24 are moved into alignment with the vertical channels formed by the respective pilasters 41, 42 the cam followers 32 begin to ride down the sloping faces of the cam rises 50. Contact closing movement is thus initiated, since the drum plate 18 will follow the descent of the drum cam 16 under the influence of the compression spring 26, and the detent ears 24 will be to the side of the pilaster caps 43 to permit such descent.

As the contacts 19 are moved toward the stationary terminal contacts 46 the rotation of the drum cam 16 is no longer followed by the drum plate 18. The detent ears 24 bear against side walls 45 of adjacent tall pilasters 42 to restrain such a rotation. The angular displacement that then occurs between drum cam 16 and drum plate 18 moves the tooth 30 out of radical alignment with

the pin **25**, as shown in Fig. 5, and the helical spring **28** is tensioned. Each of the contacts **19** is brought into engagement with a pair of terminal contacts **46** without any wiping action and the descent of the cam followers **32** will be sufficient to permit a compression of the contact springs **23** to provide contact pressure. Rotation of the handle **6** and shaft **5** is concluded upon the indexing cam **14** seating the rollers **12** in retaining position, and the final position for contact engagement of the switch is shown in Figs. 5 and 6.

Upon rotation of the handle **6** and shaft **5** from contact engagement to contact disengagement or "Off" position the sequence of movement of the switch elements is reversed. The drum cam **16** will be rotated to move the cam followers **32** up the inclined faces of the cam rises **50**. The drum cam **16** then lifts the cam plate **18** to separate the contacts **19** from the terminal contacts **46** without a wiping motion. As the cam plate **18** is raised the tooth **30** is realigned with the pin **25**, and as the detent ears **24** are raised above the pilaster caps **43** the cam plate **18** will be rotated in unison with the drum cam **16** through action of the spring **28**. The cam followers **32** will ride across the peaks of the cam rises **50** to move the contacts **19** out of spanning relation with respect to the terminal contacts **46** and the switch is returned to the contact disengaged position shown in Figs. 1–4.

A rotation of handle **6** and operating shaft **5** from the position designated as "Off" to the position designated as "Reverse" on the name plate **3** will carry the bridging contacts **19** into engagement with sets of the terminal contacts **46** which differ from those engaged in the "Forward" designated position. The actions of the switch elements in moving to and from this "Reverse" position is similar to those described in reference to movement to and from the "Forward" position.

In a switch constructed in conformance with the foregoing description the force exerted by an operator on the handle **6** is transmitted directly to the movable contacts **19** upon opening or disengaging the contacts. The torque applied on the handle **6** passes through the shaft **5** and is applied by the drum cam **16**, that is keyed to the shaft **5**, upon the cam surfaces that transform the rotational forces to vertical forces which act upon the drum plate **18** and its associated movable contact structures. If the contacts are welded closed a sufficient force may be exerted to separate the contacts and open the electrical circuits.

It is to be understood that this invention is not limited to the form shown in the accompanying drawings and that the number of bridging contacts may be altered, as may the number of angular positions for the drum elements.

We claim:

1. In a switch the combination comprising a mounting, an actuating shaft mounted for rotation with respect to said mounting, a plurality of terminal contacts secured to said mounting, a movable contact carrier mounted on said shaft rotatable with respect thereto and axially movable with respect thereto between predetermined raised and lowered axial positions, said contact carrier including axially extending detent surface areas, movable contacts mounted on said carrier for movement therewith and spaced thereon to be moved angularly by said carrier into alignment with predetermined groups of said terminal contacts and to be moved axially with the said carrier into its lowered position and into contact with said terminal contacts when said movable contacts are aligned therewith, axial biasing means resiliently urging said carrier toward said lowered axial position, axially acting cam means having a portion attached to said mounting and a portion rotatable with said shaft cooperatively engageable with said contact carrier to axially displace the same from its lowered to its raised position upon rotation of said shaft in one direction and to permit said carrier to move into lowered position in response to said axial biasing means upon rotation in the opposite direction, a resilient coupling connection between said shaft and said contact carrier rotationally biasing said contact carrier toward a predetermined position of angular alignment with said shaft, and detent portions disposed to engage the axially extending detent surface areas of said contact carrier in rotation restraining relation thereto when said contact carrier is in said lowered axial position and said movable contacts are aligned with said terminal contacts.

2. A switch in accordance with claim 1 wherein said movable contacts mounted on said carrier for movement therewith are axially facing bridging contacts insulated from one another by said carrier each composing a conductor bar having a contact surface at each end thereof adapted to span a set of said terminal contacts when moved angularly by said carrier into alignment with predetermined groups of said terminal contacts.

3. A switch in accordance with claim 1 wherein said detent portions have a pair of spaced stationary axially extending retaining surfaces forming a part of said mounting disposed in relation to said terminal contacts to engage the axially extending detent surface areas of said carrier in rotation restraining relation thereto when said movable contacts are in alignment with said terminal contacts and in engagement therewith and when said carrier is in lowered axial position, one of the pair of the retaining surfaces of said detent portions having an axial extent less than the axial travel of said carrier from its lowered to its raised axial position to free said detent surfaces of said carrier to permit rotation of the latter under the influence of said resilient coupling connection after said axially acting cam means has raised said contact carrier from lowered to raised position.

4. A switch in accordance with claim 1 wherein the rotatable portion of said axially acting cam means is mounted on said shaft for axial displacement independent thereof to engage said contact carrier and cause axial displacement thereof.

5. In a switch the combination comprising an insulating mounting, an actuating shaft mounted for rotation in said mounting, a plurality of angularly spaced terminal contact sets secured to said mounting and surrounding said shaft having contact faces exposed axially with respect to the run of said shaft, a movable contact drum mounted on said shaft rotatable with respect thereto and axially movable with respect thereto between predetermined raised and lowered axial positions having axially extending detent surfaces, axially facing movable bridging contacts mounted on and insulated from one another by said drum axially displaceable therewith and angularly spaced thereon to span predetermined sets of said terminal contacts when said drum is disposed in predetermined angular positions and to engage said terminal contacts upon disposing said drum in such a predetermined angular position and in said lowered axial position, axially acting cam means including a stationary member secured to said mounting and a rotatable member cooperating therewith mounted on said shaft to rotate therewith, said rotatable cam means member being axially displaceable by said stationary cam means member during rotation of said shaft and including means engaging said drum to axially displace the same from its lowered to its raised position, axial biasing means resiliently urging said drum toward said lowered axial position, a resilient connection interposed between and cooperatively engaging the rotatable member of said axial acting cam means and said drum resiliently urging the same toward a predetermined position of angular alignment with one another adapted to permit independent rotation of said rotatable cam means with storage of energy while said drum is restrained from rotation, and stationary drum rotation restraining detent members secured to said mounting having axially extending retain-

ing surfaces disposed in relation to said terminal contact sets to engage the axially extending movable detent surfaces of said drum in rotation restraining relation thereto when said movable bridging contacts are in spanning relation to said terminal contacts and in engagement therewith and when said drum is in lowered axial position, said stationary detent members having an axial extent less than the axial travel of said drum from its lowered to its raised axial position to free said movable detent surfaces of said drum to permit rotation of the latter with the rotatable member of said axially acting cam means through said resilient connection after said axial cam means has raised said drum from lowered to raised position.

6. In a switch the combination comprising an insulating mounting, an actuating shaft mounted for rotation in said mounting, a plurality of angularly spaced terminal contacts disposed about said shaft having contact faces exposed axially with respect to the run of said shaft, a movable contact drum mounted on said shaft rotatable with respect thereto and axially movable with respect thereto between predetermined raised and lowered axial positions having a circumferentially extending detent member, axially facing contacts mounted on said drum axially displaceable therewith and angularly spaced thereon to align with said terminal contacts when said drum is disposed in predetermined angular position and to engage said terminal contacts upon disposing said drum in such a predetermined angular position and in said lowered axial position, axially acting cam means including a stationary member secured to said mounting and a rotatable member cooperating therewith mounted on said shaft to rotate therewith, said rotatable cam means member being axially displaceable by said stationary cam means member during rotation of said shaft and including means engaging said drum to axially displace the same from its lowered to its raised position, axial biasing means resiliently urging said drum toward said lowered axial position, a resilient coupling interposed between and cooperatively engaging the rotatable member of said axially acting cam means and said drum resiliently urging the same toward a predetermined position of angular alignment with one another adapted to permit rotation of said rotatable cam means independent of said drum with storage of energy to urge said drum and cam means into alignment, and a stationary detent guide secured to said mounting disposed to block the detent member of said drum from axial displacement when said drum is in raised position and in other than said predetermined angular position placing said contacts in alignment with said terminal contacts.

7. In a switch the combination comprising an insulating mounting, an actuating shaft mounted for rotation by said mounting, a plurality of terminal contacts angularly spaced with respect to said shaft having contact faces exposed axially with respect to the run of said shaft, a movable contact drum mounted on said shaft rotatable with respect thereto and axially movable with respect thereto between predetermined raised and lowered axial positions having a detent member with axially extending detent surfaces, axially facing movable contacts mounted on said drum axially displaceable therewith and angularly spaced thereon for angular alignment with said terminal contacts when said drum is disposed in predetermined angular position and to engage said terminal contacts upon disposing said drum in such predetermined angular position and in said lowered axial position, axially acting cam means including a stationary member secured to said mounting and a rotatable member cooperating therewith mounted on said shaft to rotate therewith, said rotatable cam means member being axially displaceable by said stationary cam means member during rotation of said shaft and including means engaging said drum to axially displace the same from its lowered to its raised position, axial biasing means resiliently urging said drum toward said lowered axial position, a resilient coupling interposed between and cooperatively engaging the rotatable member of said axially acting cam means and said drum resiliently urging the same toward a predetermined position of angular alignment with one another adapted to permit independent rotation of said rotatable cam means and drum with storage of energy to urge the drum and cam means into alignment, and drum rotation restraining detent portions disposed to engage the axially extending detent surface areas of the detent member of said drum in rotation restraining relation thereto when said movable contacts are in engagement with said terminal contacts and when said drum is in lowered axial position, said detent portions being disposed to block the detent member of said drum from axial displacement when said drum is in other than said predetermined angular position placing said movable contacts in angular alignment with said terminal contacts.

8. In a switch the combination comprising a rotatable operating shaft, a fixed contact, a movable contact support mounting a movable contact axially displaceable along said shaft to move the contact supported thereby toward and from closed position with said fixed contact and rotatable with respect to said shaft, axially acting movable contact support shifting means including a stationary first cam member and a second cam member engaged with said first cam member rotable with said shaft and axially displaceable therewith in response to camming engagement with said first cam member adapted to cause axial displacement of said movable contact support, detent means cooperatively engaged with said movable contact support restraining rotation thereof during an axial movement of said movable contact toward and away from closed position with said fixed contact in response to said axially acting shifting means and permitting rotation of said movable contact support upon a predetermined axial displacement of said movable contact away from said fixed contact, and resilient means interposed between said movable contact support and said second cam member to urge rotation of said movable contact support with a rotation of said second cam member whereby rotation of said movable contact support occurs upon completion of said predetermined axial displacement.

9. In a switch the combination comprising a rotatable operating shaft, fixed contacts, a drum supporting a set of movable contacts axially displaceable along said shaft to move the contacts supported thereby toward and away from closed position with said fixed contacts and rotatable toward and from a position of angular contact alignment, axially acting drum shifting means including a member rotatable with and axially movable along said shaft adapted to cause axial displacement of said drum, a coupling interposed between said drum and said drum shifting member for causing rotation of said drum with said drum shifting member and adapted to permit angular displacement between the drum and drum shifting member, and a detent member cooperatively engageable with said drum upon rotation of said drum in response to rotation of said shaft and drum shifting member into a position of substantial angular contact alignment to resist further rotation of said drum with a continued rotation of said shaft and drum shifting member.

10. A switch in accordance with claim 9 wherein said coupling normally maintains said drum and drum shifting member in a position of angular alignment and is resilient to cause storage of energy therein upon relative rotation of said drum and drum shifting member from said position of alignment to urge the same to return to said position of alignment.

11. In a switch the combination comprising a rotatable operating shaft, fixed contacts, a drum supporting a set of movable contacts axially displaceable along said shaft to move the contacts supported thereby toward and away from closed position with said fixed contacts and ro-

tatable toward and from position of angular contact alignment, axially acting drum shifting means including a member rotatable with and axially movable along said shaft adapted to cause axial displacement of said drum, a coupling interposed between said drum and said drum shifting member for causing rotation of said drum with said drum shifting member and adapted to permit angular displacement between the drum and drum shifting member, and detent means cooperatively engageable with said drum restraining rotation of said drum upon the occurrence of axial movement of the drum when said fixed and movable contacts are in a close vicinity for contact engagement and disengagement whereby said coupling will permit rotation of said drum shifting member without accompanying rotation of said drum.

12. In a switch the combination comprising a rotatable operating shaft, fixed contacts angularly spaced about said shaft, a drum supporting a set of movable contacts rotatably mounted for movement between a position of first angular contact alignment matching fixed and movable contacts into predetermined sets and a second position of angular contact alignment matching fixed and movable contacts into sets different than those of said position of first angular contact alignment, said drum being axially displaceable along said shaft to move the contacts supported thereby toward and away from contact closed positions, axially acting drum shifting means including a member rotatable with and axially movable along said shaft adapted to cause axial displacement of said drum, a coupling interposed between said drum and said drum shifting member for causing rotation of said drum with said drum shifting member and adapted to permit angular displacement between the drum and drum shifting member, and detent means cooperatively engageable with said drum to confine drum rotation to an arc extending between said first and second positions of angular contact alignment and to restrain rotation of said drum upon occurrence of axial movement thereof when said fixed and movable contacts are in close vicinity for contact engagement and disengagement whereby said coupling will permit rotation of said drum shifting member without accompanying rotation of said drum.

13. In a switch the combination comprising a rotatable operating shaft; a fixed contact; a movable contact support mounting a movable contact axially displaceable along said shaft between lowered positions in which said movable contact opens and closes with said fixed contact and raised positions in which said movable contact is remote from said fixed contact, and which is rotatable with respect to said shaft; axially acting contact support shifting means including a member rotatable with and axially movable along said shaft adapted to cause axial displacement of said contact support; a coupling interposed between said contact support and said member for urging rotation of said contact support with said member and permitting rotational displacement between the contact support and said member; and guides cooperatively engageable with said contact support restraining rotation thereof with said member when said contact support is in lowered positions.

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