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PRESELECTION SWITCH

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Fig. 1.

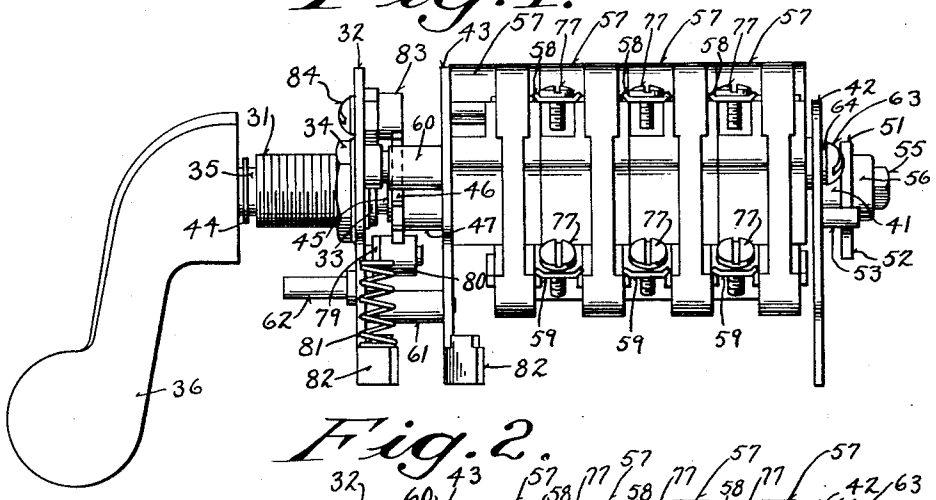


Fig. 2.

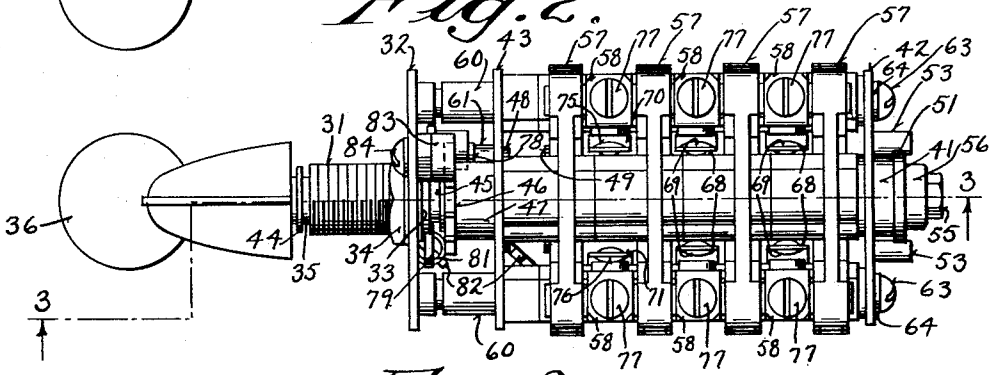
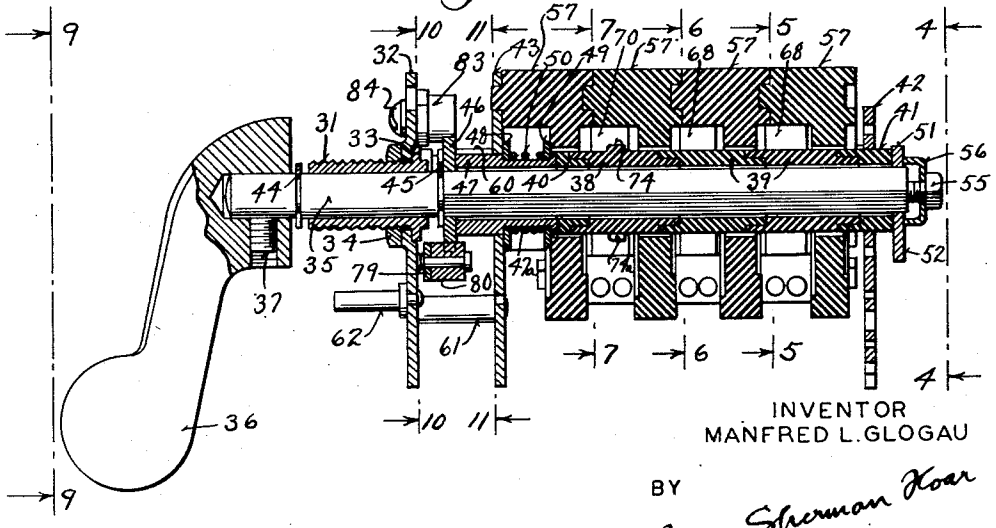


Fig. 3.



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Fig. 4.

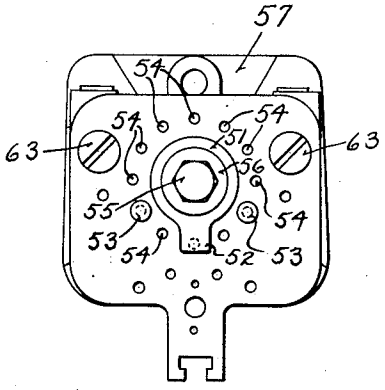


Fig. 5.

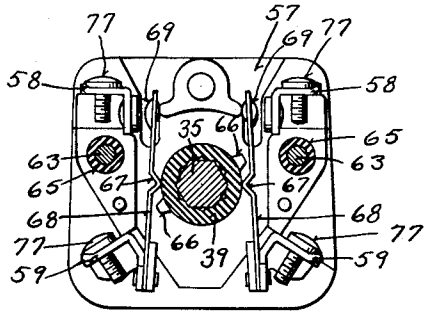


Fig. 6.

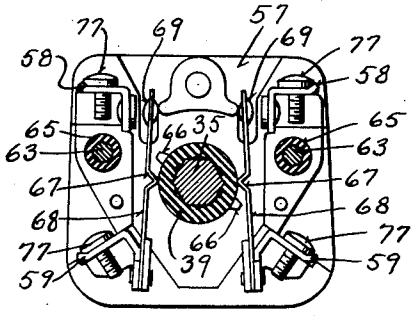
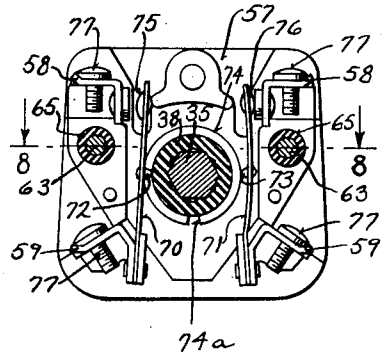


Fig. 7.



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Fig. 8.

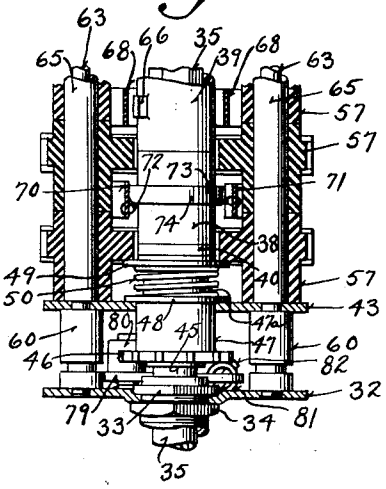


Fig. 9.

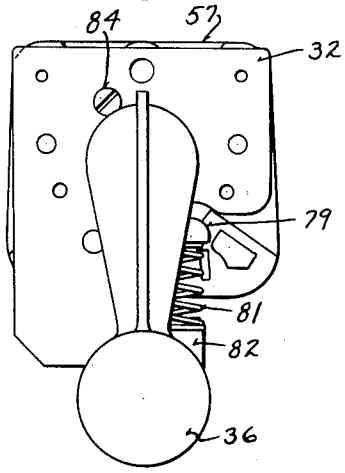


Fig. 10.

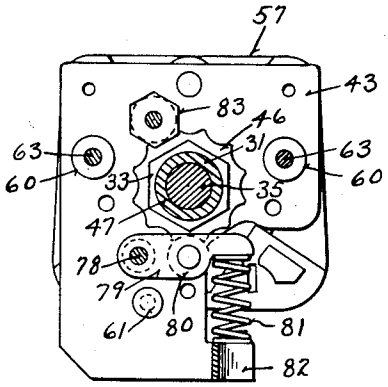
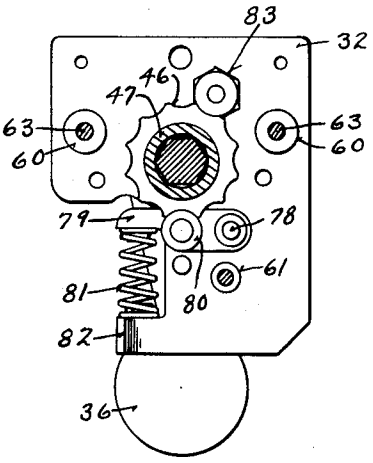


Fig. 11.



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Fig. 12.

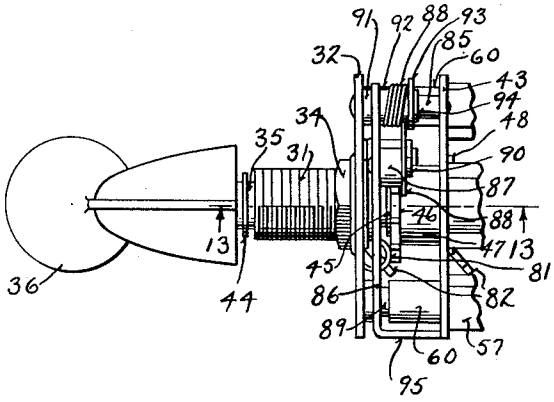


Fig. 13.

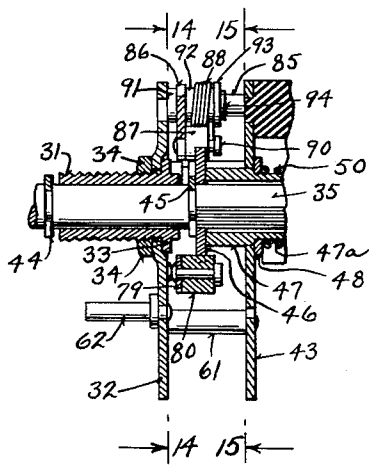


Fig. 14.

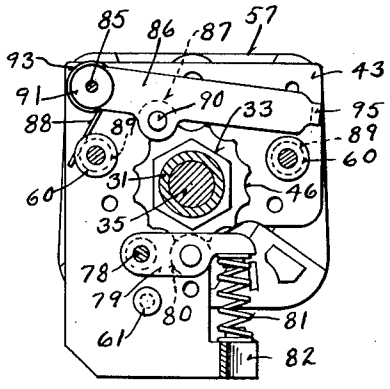
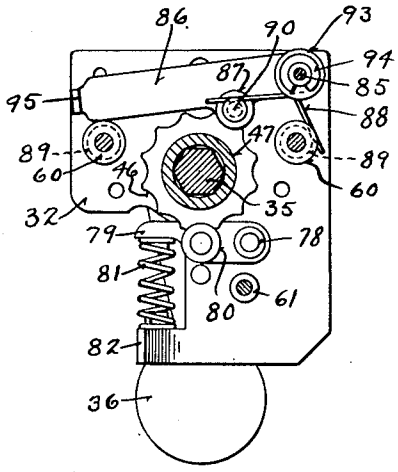


Fig. 15.



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Fig. 16.

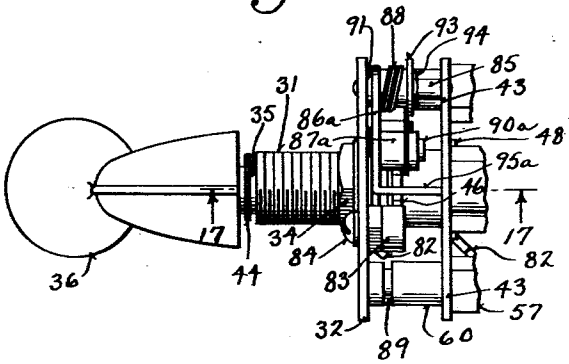


Fig. 17.

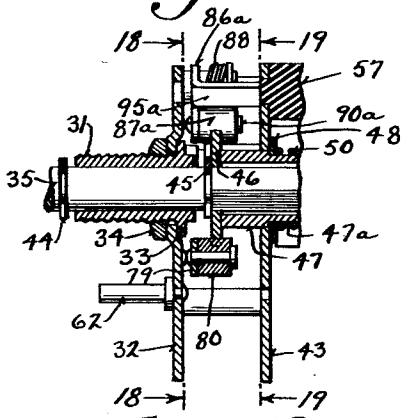


Fig. 18.

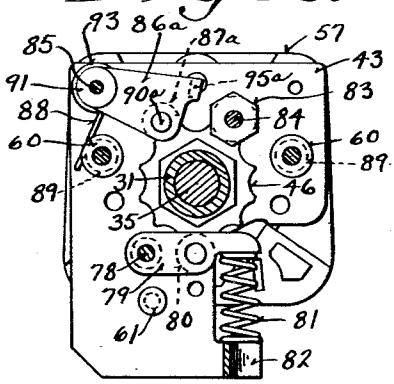


Fig. 19.

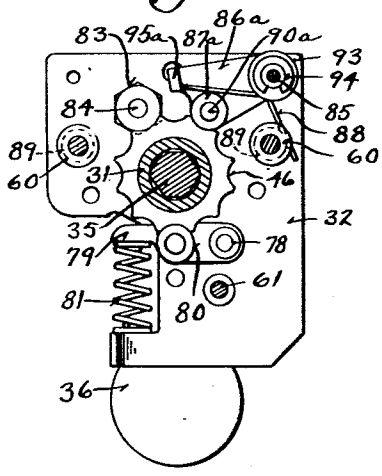
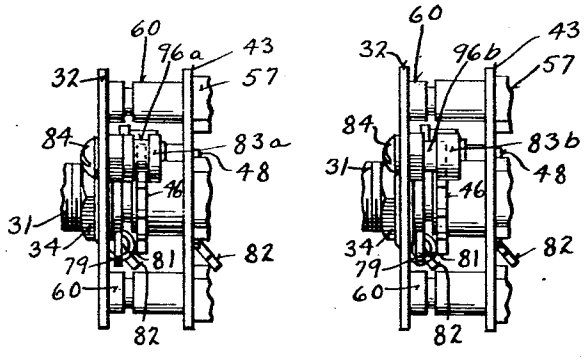


Fig. 20. Fig. 21.



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United States Patent Office 2,796,474 Patented June 18, 1957

2,796,474

PRESELECTION SWITCH

Manfred L. Glogau, Shorewood, Wis., assignor to Allen-Bradley Company, Milwaukee, Wis., a corporation of Wisconsin

Application June 6, 1955, Serial No. 513,467

13 Claims. (Cl. 200—17)

This invention relates to certain features of preselection switches, that is to say rotary multiposition electrical switches of the type in which the switch may be preset from one to another of its many alternative combinations of electrical contacts, with the current automatically turned-off during such presetting, and the circuits may then be energized and remain energized until the next presetting or until the current is otherwise turned off.

More particularly the present invention relates to certain features of preselection switches of the particular sort which have a control shaft capable of rotation to a plurality of selective positions, and of axial shift to a plurality of selective positions (preferably three). In such switches, there is usually spring means biasing the shaft to assume a mid axial position. One of the extreme axial positions, known as the "stop" position, turns-off the current from some or all of the controlled circuits. This is the position in which it is usual to rotate the shaft to change the settings of the switch. The shaft is then shifted to the other extreme axial position, known as the "start" position, which turns on the current. The mid position maintains the current either on or off, according which extreme axial position preceded it.

The inventive features, which will be hereinafter described, are especially but not necessarily adapted to be employed in multisection built-up switches, such as those portrayed in two prior patents of the present inventor, namely No. 2,319,503, issued May 18, 1945, and No. 2,438,970, issued April 6, 1948, to which two patents reference may be made for any collateral details not directly involved in the present invention.

In preselection switches of the general type to which the present invention is adapted, it is usually highly advisable that the switch-setting be not changed when the current is on. Accordingly the principal object of the present invention is to provide means for automatically preventing rotation of the control-shaft except when in the "stop" position. For reasons (which include relieving the switch of torsional strains, and assuring that the stop positions coincide with the indexing positions) it is preferable that this means be located adjacent the control-handle end of the shaft, and be combined or associated with certain other of the control mechanism, namely the star-wheel and associated spring-biased indexing roller, the main purpose of which elements are to assure that the rotation of the shaft will always come to rest at the center of one of its settings.

Also it is advisable in preselection switches for certain uses, to provide means either in addition to or in substitution for the rotation-preventing means, this additional or substituted means being for the purpose of limiting the rotation of the shaft to one direction only, when in at least one of its axial positions.

From all the foregoing it will be seen that the present invention more particularly resides in a rotary multiposition preselection electrical switch (preferably of modular construction) which switch includes: a main frame; a shaft; means mounting the shaft on the main

frame for axial shift into a plurality of selective positions, and for rotation about its axis into a plurality of selective angular positions; means, preferably manually actuable, located adjacent one end of the shaft, for axially shifting and rotating the shaft; a plurality of pairs of electrical contacts carried by the main frame adjacent the shaft; a plurality of cams mounted on the shaft for causing respective pairs of contacts to open and close, responsive to various angular positions of the shaft; at least one cam mounted on the shaft, for causing at least one corresponding pair of contacts to open and close, responsive to various axial positions of the shaft; a serrated indexing wheel, carried by the shaft for rotation and axial shift therewith; a detent carried by the main frame biased to engage the indexing wheel to cause the shaft to come to rest in each of its selective angular positions; and one or both of the following kinds of stop means carried by the main frame for engaging the indexing wheel, namely: (1) stop means to prevent both clockwise and counter-clockwise rotation of the shaft, when the shaft is in at least one (preferably two) of its axial positions (preferably its mid axial position and the position of the shifting and rotating means); and (2) stop means to prevent rotation of the shaft in one direction, but not in the other, when the shaft is in at least one of its axial positions; the indexing wheel, the detent, and the stop means being preferably located adjacent the shifting and rotating means.

The principal object of this present invention has already been stated earlier herein. That and other objects and advantages are readily evident from the foregoing general description of the invention, and/or 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 are shown, by way of illustration but not of limitation, five specific forms in which this invention may be embodied.

In the drawings:

Fig. 1 is a side elevation of a switch, embodying the first variant of the present invention.

Fig. 2 is a top view of the same first variant.

Fig. 3 is a vertical longitudinal section of the same first variant, viewed as though cut along the line **3—3** of Fig. 2.

Fig. 4 is a right-hand end elevation of the same first variant, viewed from the line **4—4** of Fig. 3.

Fig. 5 is a vertical transverse section of the same first variant, viewed from the left as though cut along the line **5—5** of Fig. 3.

Fig. 6 is a vertical transverse section of the same first variant, viewed from the left as though cut along the line **6—6** of Fig. 3.

Fig. 7 is a vertical transverse section of the same first variant, viewed from the left as though cut along the line 7—7 of Fig. 3. It will be noted that the contact carriers and cam of Fig. 7, being actuable by axial movement, differ from those of Figs. 5 and 6, which are actuable by rotary motion.

Fig. 8 is a horizontal section of the left-hand portion of the same first variant, viewed as though cut along the line **8—8** of Fig. 7.

Fig. 9 is the left-hand end elevation of the same first variant, viewed from the line **9—9** of Fig. 3.

Fig. 10 is a vertical transverse section of the same first variant, viewed from the left as though cut along the line **10—10** of Fig. 3.

Fig. 11 is a vertical transverse section of the same first variant, viewed from the right as though cut along the line **11—11** of Fig. 3.

Fig. 12 is the top view of the left-hand portion of the second variant. This view corresponds to a portion of Fig. 2.

Fig. 13 is a vertical longitudinal section of the same portion of the second variant, viewed as though cut along the line **13—13** of Fig. 12. It corresponds to a portion of Fig. 3.

Fig. 14 is a vertical transverse section of the same second variant, viewed from the left as though cut along the line **14—14** of Fig. 13. It corresponds to Fig. 10.

Fig. 15 is a vertical transverse section of the same second variant, viewed from the right as though cut along the line **15—15** of Fig. 13. It corresponds to Fig. 11.

Fig. 16 is the top view of the third variant. It corresponds to a portion of Fig. 2, and to Fig. 12.

Fig. 17 is a vertical longitudinal section of the same portion of the third variant, viewed as though cut along the line **17—17** of Fig. 16. It corresponds to a portion of Fig. 3, and to Fig. 13.

Fig. 18 is a vertical transverse section of the same third variant, viewed from the left as though cut along the line **18—18** of Fig. 17. It corresponds to Figs. 10 and 14.

Fig. 19 is a vertical transverse section of the same third variant, viewed from the right as though cut along the line **19—19** of Fig. 17. It corresponds to Figs. 11 and 15.

Fig. 20 is the top view of the left-hand portion of the fourth variant, and illustrates the point of difference between the fourth variant and the first variant. Compare Fig. 2.

Fig. 21 is the top view of the left-hand portion of the fifth variant, and illustrates the point of difference between the fifth variant and the first variant. Compare Fig. 2.

Throughout the description, the same reference-number is applied to the same member or to similar members.

Referring now to the drawings, more particularly to Figs. 1 to 11, and still more particularly Figs. 1 to 3, there will now be described the first variant of the present invention.

The case or housing for this switch is not shown.

Threaded bushing **31** extends leftwardly through a hole in front end-plate **32**. A hexagonal flange **33**, integral with this bushing, fits into a hexagonal recess surrounding this hole. A nut **34**, screwed onto the threads of bushing **31** secures this bushing rigidly to plate **32**.

In this bushing **31**, there is mounted for axial shift and for rotation about its axis, a shaft **35**. An operating handle **36** is secured to this shaft by a set-screw **37**.

All of shaft **35**, except a limited portion on its left-hand end is hexagonal in shape. The line of demarcation is clearly shown in Fig. 3. Onto this hexagonal portion there can be slid a succession of interengaging cam-sleeves, made of insulating material. These sleeves are of two general sorts, **38** and **39**, which will be more particularly described hereinafter.

The bore of these cam-sleeves has the configuration of a star made up of two superimposed hexagons. See Figs. 5, 6, and 7. This enables each sleeve to be secured on the shaft in any one of twelve selective angular positions, for purposes to be hereinafter explained.

At the left end of this succession of cam-sleeves there is a front collar **40**, and at the right end there is a rear collar **41**, the latter extending through a hole in rear end plate **42**.

There is also an intermediate plate **43**.

Adjacent each end of threaded bushing **31** in an annular groove in shaft **35**, there is a C-washer **44**, **45**. These serve to limit the axial shifting of shaft **35** by contacting the respective ends of threaded bushing **31**. C-washer **45** is located at the juncture of the cylindrical and hexagonal portions of shaft **35**.

Against C-washer **45**, and keyed to shaft **35** by having a hexagonal hole, there is a serrated indexing wheel **46**, the functions of which play an important part in the present invention, as will be hereinafter described.

Between this indexing wheel and front end collar **40**, and preferably not keyed to the shaft, there is spring-seat sleeve **47**, having a constricted portion **47***a* on which two washers **48**, **49**, held apart by a spiral spring **50**, are free to slide. The unconstricted portion of this sleeve **47** projects through a hole in intermediate plate **43**.

When shaft **35** is pulled to the left, the flange on the right-hand end of spring-seat sleeve **47** engages washer **49**, pushing it to the left and thus compressing spring **50** against washer **48**, which is kept from moving by butting against intermediate plate **43**. When the shaft **35** is pushed to the right, the shoulder on spring-seat sleeve **47** engages washer **48**, pushing it to the right and thus compressing spring **50** against washer **49**, which is kept from moving by butting against adjacent segment **57**. Thus the assemblage thus described constitutes means for biasing the shaft to assume and remain in its mid axial position.

At the rear (right) end of shaft **35**, keyed thereto by a hexagonal hole, there is a rotation-stop washer **51**, having a projecting finger **52**. See Fig. 4. When the shaft is rotated, this finger contacts one or the other of two stops **53** (which can be screwed into any two of the twelve holes **54** in rear end plate **42**), to limit the rotation of the shaft.

The T-slot at the bottom of plate **42** is to engage the head of a stud (not shown) in the switch housing to maintain the switch properly oriented with respect to the housing.

When indexing wheel **46**, spring-seat sleeve **47**, front end collar **40**, one or more of cam sleeves **38**, one or more of cam sleeves **39**, rear end collar **41**, and rotation stop washer **51** have all been successively assembled on shaft **35**, they are clamped together to the left against C-washer **45**, by bolt **55** screwed into a hole in the rear end of the shaft, and thus forcing stop washer to the left.

Surrounding shaft **35** and the elements strung on it, as just explained above, between intermediate plate **43** and rear end plate **42** there are a succession of interlocking segments **57** of insulating material, preferably identical to simplify manufacture.

Between each pair of successive segments **57** there can be embraced and securely held by socketed engagement two stationary contacts **58** and two mountings **59** for movable contacts. See Figs. 5, 6 and 7. Herein the phrase "pair of electrical contacts" or "pair of contacts" will be used to signify two contacts which are brought together to close a circuit and are separated to break the circuit. The operation of the contacts will be explained hereinafter.

Front end-plate **32** and intermediate plate **43** are held apart by spacer sleeves **60** and by stand-off rivet **61** on plate **43**. There is also a stand-off rivet **62** on plate **32**, which serves to space the switch from the switch-housing.

The main frame of the switch, which consists of front end-plate **32**, spacer sleeves **60**, segments **57**, and rear end-plate **42**, is held firmly together by two long screws **63**, each of which extends from the rear through a lock-washer **64**, and then through aligned holes in each of the above mentioned elements, end up in a threaded seat in front end-plate **32**. If desired each of these screws **63** can be bushed by a long tube of insulating material **65**, as shown in Figs. 5, 6, and 7.

Consider now, in conjunction with Fig. 2, Fig. 5. The particular cam-sleeve **39** of that section of the switch has cam-points **66**. When shaft **35**, carrying with it cam-sleeve **39**, is rotated 30° clockwise, these points **66** engage transverse corrugation **67** of contact-carrying spring **68**, forcing movable contacts **69** into electrical contact with fixed contacts **58**.

A similar result occurs in the switch-section shown in Fig. 6, when shaft **35** is rotated 30° counterclockwise.

The switch-section of Figs. 7 and 8 is, however, considerably different. In this switch-section, springs **70** and **71** correspond to springs **68** of the switch-sections of

Figs. 5 and 6. But instead of the corrugations of springs **68**, springs **70**, and **71** carry conical points **72** and **73** respectively. And instead of the cam-points **66** of cam-sleeves **39**, cam-sleeve **38** carries an annular boss **74**. In the specific embodiment now under consideration, when shaft **35** is in its spring-biased mid-axial position, cone **73** has ridden up onto boss **74**, thus forcing movable contact **76** into electrical contact with its fixed contact **58**. But cone **72** is now toward the front of the switch from boss **74**, and hence movable contact **75** is out of touch with its fixed contact **58**.

When handle **36** is pulled out (i. e. toward the observer in Fig. 7) cone **73** still remains up on boss **74**, cone **72** rides up onto the boss. Thus both pairs of contacts are now closed. But when handle **36** is pushed in, cone **73** slides off boss **74**. Thus both pairs of contacts are now open.

Each of stationary contacts **58**, and each of mountings **59** for the movable contacts has a screw **77** for the attachment of electrical conduits.

A three-angular-position three-axial position three-section switch, having its contacts and cams arranged as just described is primarily adapted to the use, which is merely illustrative, namely to turn some reversible electric mechanism off and on.

The circuits for such use are well known in the art. See for example Fig. 14 of U. S. Patent No. 2,438,970 mentioned earlier herein. In connection with the present showing, it is contemplated that the closing of the contacts of Fig. 5 by clockwise motion of handle **36** closes the circuits for forward motion of the actuated mechanism; and that the closing of contacts of Fig. 6 by counter-clockwise motion of the handle closes the circuits for reverse motion of the actuated mechanism. But this is merely a presetting or preselection. For current to pass through either of the above circuits it is necessary that contacts **75** (normally open) be closed, in addition to contact **76** (normally closed) remaining closed. This is accomplished by pulling out on handle **36**, as already described. The closing of both these contacts, in addition to activating the preset circuit, closes a solenoid-switch (not shown) which by-passes contact **75**, so that when the handle snaps back into neutral, axially, the opening of contact **75** does not interrupt the current. When it is desired to stop the mechanism, the handle is pushed in, thus opening contact **76**. This permits the solenoid switch to open, thus deenergizing all circuits until the handle is pulled out again.

The foregoing is just an example of one use of the switch of the present invention and being well-known in the art is not illustrated.

There could be added many more segments and switch-sections, similar to those of Figs. 5 and 6, each with one or two pairs of contacts. Cam points could be added, subtracted, and arranged at different angular positions about their cam-sleeves, all to suit almost any use to which a drum-switch could be put. As for the switch-section of Fig. 7, for some uses there might be only one pair of contacts; and, if it were desired to release one of the cones which ride upon annular boss **74** in some angular position or positions, a gap or gaps such as **74***a* could be provided in this boss. There could even be a plurality of sections like that of Fig. 7. As for the other sort of sections, as shown in Figs. 5 and 6, for some uses there might be only one pair of contacts. Many other changes or additions, similar to those just suggested, could be provided without departing from the present invention.

It is desirable that there be means to automatically bias shaft **35** to come to rest in each of its twelve selective angular positions. This means is as follows. See Figs. 1, 2, 3, 10, and 11. Serrated indexing wheel **46** has already been mentioned as secured to shaft **35**, against rotation or axial movement with respect thereto. This wheel has twelve peripheral indentations, preferably circular arcs,

Pivoted on front end plate **32**, as at **78**, is a lever **79**, which carries a detent in the form of indexing roller **80**. This roller is long enough so that it engages wheel **46** in all axial positions of shaft **35**, and preferably has the same or slightly larger radius of curvature as the indentations of wheel **46**. Compression spring **81**, interposed between lever **79** and a rearwardly bent ear **82** on front end plate **32**, serves to press roller **80** against wheel **46**, thus biasing the wheel to always come to rest at the mid point of each switch setting. The relative positions of the axis of wheel **46**, pivot **78**, and the axis of roller **80**, are such that the roller opposes approximately equally, but does not prevent, the rotation of the wheel in each direction.

There is shown on intermediate plate **43** an ear **83** identical to ear **82**, but this ear **83** serves no purpose except uniformity of manufacture of the two plates.

It is desirable to deactivate all circuits by pushing in on handle **36** before rotating it to change the presetting. To ensure this the following mechanism may be employed. See Figs. 1, 2, 3, 10, and 11. A stop **83** is secured to the rear face of front end plate **32**, as by screw **84**. This stop is preferably cylindrical, of the same radius of curvature as the indentations of serrated indexing wheel **46**. It is long enough so as to engage the wheel **46** in all axial positions of shaft **35** except the rearmost. Thus it prevents rotation of the shaft, and hence prevents changing the presettings of the switch, except when handle **36** is pushed in.

Figs. 12 to 15 portray so much of a second variant of the invention as differs from the first variant thus far described.

In place of the fixed stop **83** of the first variant, which stop means prevented rotation in both directions in certain axial positions of the shaft; there is provided in the second variant stop means which prevents rotation of the shaft in only one direction in certain axial positions of the shaft.

This one-way stop means of the second variant is as follows. Pivoted on a pivot **85**, which extends from front end plate **32** to intermediate plate **43**, is a lever **86**, which carries a movable stop or detent in the form of roller **87**. This roller as shown is just long enough to engage serrated indexing wheel **46** in all axial positions of shaft **35** except the rearmost position, and preferably has the same radius of curvature as the indentations of wheel **46**. A helical spring **88**, wrapped around pivot **85**, has its ends extended tangentially, respectively to engage an annular groove **89** in adjacent spacer sleeve **60**, and to fit between roller **87** and the head of pivot **90** which secures roller **87** pivotally to lever **86**.

For uniformity of manufacture, it is convenient to have all spacer sleeves **60** possess this groove **89**, even when not used in conjunction with spring **88**.

Lever **86** is positioned on its shaft **85** between a washer **91** and a sleeve **92**. The spring **88** is positioned on sleeve **92** between the lever and a washer **93**. And all is held in place by a C-washer **94** in an annular groove on shaft **85**. Note also the angled end **95** of lever **86**, which by contacting plate **43** serves to maintain roller **87** properly spaced axially.

The relative positions of the axis of wheel **46**, pivot **85**, and pivot **90** are such that the rotation of serrated wheel **46** counter-clockwise as seen in Fig. 14 (clockwise in Fig. 15) forces roller **87** toward, rather than away from the wheel, thus locking the wheel against rotation; but the mechanism just described does not prevent rotation of the wheel in the opposite direction.

Due to the limited rearward extension of roller **87**, already mentioned, this one-way prevention of rotation does not function when the handle is pushed in. Thus, with the circuits activated, the switch can be set only by rotation in one direction, but it can be preset by rotation in either direction.

The stop mechanism just described could, with the

indexing mechanism omitted, perform also the indexing function, except in the pushed in position.

Figs. 16 to 19 portray so much of a third variant as necessary to illustrate how this third variant combines the distinguishing features of the other two. Thus it will be noted that this third variant retains the indexing mechanism of the other two, and combines the positive stop means of the first variant with the one-way stop means of the second variant. As shown, lever **86***a* differs from corresponding lever **86** by being shorter. Roller **87***a* differs from corresponding roller **87** by being longer, thus functioning to limit rotation to one direction in all axial positions. And spring **88** bears against roller **87***a*, instead of between roller **87** and the head of its pivot **90** as in the second variant.

In the third variant, roller **87***a* could perform the indexing function in all axial positions, if the centering mechanism were omitted, but the presence of both mechanisms is preferred.

Fig. 20 illustrates how fixed stop **83** of the first and third variants, which stop extends so far and only so far rearwardly as to prevent shaft-rotation in the pulled-out and mid axial positions, but not in the pushed-in position, can be modified into longer fixed stop **83***a*, with annular groove **96***a*, thus permitting shaft rotation only in mid axial position.

Fig. 21 similarly illustrates how this fixed stop can be modified into fixed stop **83***b* with a differently located annular groove **96***b*, thus permitting shaft rotation only in pulled-out position.

Now that five embodiments of the invention have been shown and described, and several variations therefrom have been suggested, it is to be understood that the invention is not to be limited to the specific forms or arrangements of parts herein shown and described.

By virtue of the modular construction of the segments, and contacts, and contact-carrying springs, and cam-sleeves; and by further virtue of the varying forms, and possible permutations and combinations of the indexing means, the fixed-stop means and the one-way stop means, associated with indexing wheel **46**; the switch of the present invention is readily adaptable to practically every use for which a drum-switch could be designed.

What is claimed is:

1. In a rotary multiposition preselection electrical switch, the combination comprising: a main frame; a shaft; means mounting the shaft on the main frame for axial shift into a plurality of selective positions, and for rotation about its axis into a plurality of selective angular positions; means for axially shifting and rotating the shaft; a plurality of pairs of electrical contacts, carried by the main frame adjacent the shaft; a plurality of cams mounted on and rotatable with the shaft for causing respective pairs of contacts to open and close, responsive to various angular positions of the shaft; at least one cam mounted on the shaft, for causing at least one corresponding pair of contacts to open and close, responsive to various axial positions of the shaft; a serrated indexing wheel, carried by the shaft for rotation and axial shift therewith; a detent carried by the main frame for engaging successive serrations of the indexing wheel to bias the shaft to come to rest in each of its selective angular positions; and stop means carried by the main frame for engaging serrations of the indexing wheel to prevent rotation thereof, and hence of the shaft, in at least one direction, in at least one of the axial positions of the shaft.

2. A switch according to claim 1, wherein the means for axially shifting and rotating the shaft is manually operable and is located adjacent one end of the shaft, and wherein the indexing wheel, the detent, and the stop means are located adjacent that end of the shaft which is adjacent the manual means.

3. A switch according to claim 1, wherein there is spring means for biasing the detent to bear against the indexing wheel.

4. In a rotary multiposition preselection electrical switch, the combination comprising: a main frame; a shaft; means mounting the shaft on the main frame for axial shift into a plurality of selective positions, and for rotation about its axis into a plurality of selective angular positions; means for axially shifting and rotating the shaft; a plurality of pairs of electrical contacts, carried by the main frame adjacent the shaft; a plurality of cams mounted on and rotatable with the shaft for causing respective pairs of contacts to open and close, responsive to various angular positions of the shaft; at least one cam mounted on the shaft, for causing at least one corresponding pair of contacts to open and close, responsive to various axial positions of the shaft; a serrated indexing wheel, carried by the shaft for rotation and axial shift therewith; a detent carried by the main frame for engaging successive serrations of the indexing wheel to bias the shaft to come to rest in each of its selective angular positions; and stop means carried by the main frame for engaging the indexing wheel to prevent rotation thereof, and hence of the shaft, in at least one of the axial positions of the shaft; wherein the stop means prevents rotation in only one direction.

5. A switch according to claim 4, wherein the stop means prevents such rotation in all axial positions of the shaft.

6. In a rotary multiposition preselection electrical switch, the combination comprising: a main frame; a shaft; means mounting the shaft on the main frame for axial shift into a plurality of selective positions, and for rotation about its axis into a plurality of selective angular positions; means for axially shifting and rotating the shaft; a plurality of pairs of electrical contacts, carried by the main frame adjacent the shaft; a plurality of cams mounted on and rotatable with the shaft for causing respective pairs of contacts to open and close, responsive to various angular positions of the shaft; at least one cam mounted on the shaft, for causing at least one corresponding pair of contacts to open and close, responsive to various axial positions of the shaft; a serrated indexing wheel, carried by the shaft for rotation and axial shift therewith; a detent carried by the main frame for engaging successive serrations of the indexing wheel to bias the shaft to come to rest in each of its selective angular positions; and stop means carried by the main frame for engaging the indexing wheel to prevent rotation thereof, and hence of the shaft, in at least one of the axial positions of the shaft; wherein the stop means prevents both clockwise and counterclockwise rotation; and wherein there is also stop means carried by the main frame for engaging the indexing wheel, to prevent rotation thereof, and hence of the shaft, in only one direction, in at least some of the axial positions thereof.

7. In a rotary multiposition preselection electrical switch, the combination comprising: a main frame; a shaft; means mounting the shaft on the main frame for axial shift into a plurality of selective positions, and for rotation about its axis into a plurality of selective angular positions; means for axially shifting and rotating the shaft; a plurality of pairs of electrical contacts, carried by the main frame adjacent the shaft; a plurality of cams mounted on and rotatable with the shaft for causing respective pairs of contacts to open and close, responsive to various angular positions of the shaft; at least one cam mounted on the shaft, for causing at least one corresponding pair of contacts to open and close, responsive to various axial positions of the shaft; a serrated indexing wheel, carried by the shaft for rotation and axial shift therewith; a detent carried by the main frame for engaging successive serrations of the indexing wheel to bias the shaft to come to rest in each of its selective angular positions; and stop means carried by the main frame for engaging the indexing wheel to prevent rotation thereof, and hence of the shaft, in at least one of the axial positions of the shaft; wherein there are three selective axial positions of the shaft, and wherein the stop means prevents

both clockwise and counterclockwise rotation, but does this in only two of the three axial positions.

8. A switch according to claim 7, wherein the stop means prevents rotation in the mid axial position and in one of the extreme axial positions.

9. A switch according to claim 8, wherein there is spring means for biasing the shaft to assume and remain in its mid axial position.

10. A switch according to claim 9, wherein the means for axially shifting and rotating the shaft is manually operable and is located adjacent one end of the shaft, and wherein the stop means prevents rotation when the shaft is axially shifted in the direction towards the manual means.

11. In a rotary multiposition preselection electrical switch, the combination comprising: a main frame; a shaft; means mounting the shaft on the main frame for axial shift into a plurality of selective positions, and for rotation about its axis into a plurality of selective angular positions; means for axially shifting and rotating the shaft; a plurality of pairs of electrical contacts, carried by the main frame adjacent the shaft; a plurality of cams mounted on and rotatable with the shaft for causing respective pairs of contacts to open and close, responsive to various angular positions of the shaft; at least one cam mounted on the shaft, for causing at least one corresponding pair of contacts to open and close, responsive to various axial positions of the shaft; a serrated indexing wheel, carried by the shaft for rotation and axial shift therewith; a detent carried by the main frame for engaging successive serrations of the indexing wheel to bias the shaft to come to rest in each of its selective angular positions; and stop means carried by the main frame for engaging the indexing wheel to prevent rotation thereof, and hence of the shaft, in at least one of the axial positions of the shaft; wherein the stop means prevents rotation in at least one direction; and wherein there are three selective axial positions of the shaft, and wherein there is spring means for biasing the shaft to assume and remain in its mid axial position.

12. In a rotary multiposition preselection electrical switch, the combination comprising: a main frame; a shaft means mounting the shaft on the main frame for axial shift into a plurality of selective positions, and for rotation about its axis into a plurality of selective angular positions; means for axially shifting and rotating the shaft; a plurality of pairs of electrical contacts, carried by the main frame adjacent the shaft; a plurality of cams mounted on and rotatable with the shaft for causing respective pairs of contacts to open and close, responsive to various angular positions of the shaft; at least one cam mounted on the shaft, for causing at least one corresponding pair of contacts to open and close, responsive to various axial positions of the shaft; a serrated indexing wheel, carried by the shaft for rotation and axial shift therewith; and means comprising a lever pivoted on the main frame, a detent carried by the lever for engaging successive serrations of the indexing wheel, and a spring carried by the main frame biasing the detent to so engage the serrations, these means being for biasing the shaft to come to rest in each of its selective angular positions, and being so relatively placed that rotating the shaft in one direction will lock the shaft against further rotation in that direction.

13. A switch according to claim 1, wherein there are three selective axial positions of the shaft; and wherein the stop is effective in only two of these three positions.

References Cited in the file of this patent

UNITED STATES PATENTS

2,103,792	Peterson et al.	Dec. 28, 1937
2,319,503	Glogau	May 18, 1943