

Sept. 1, 1942.

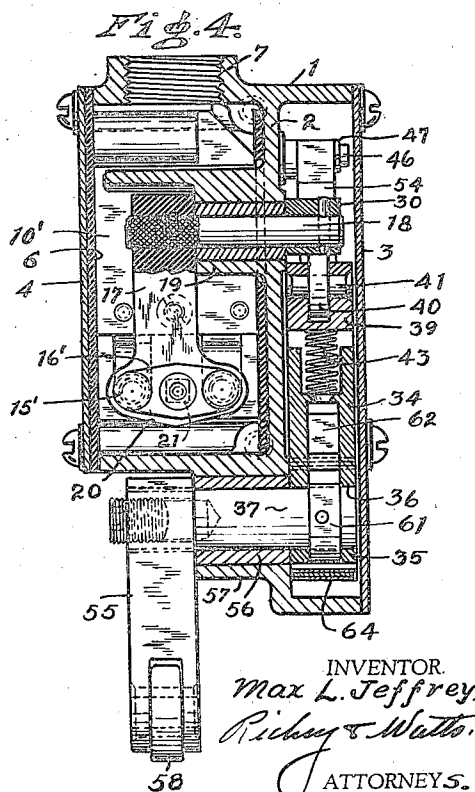
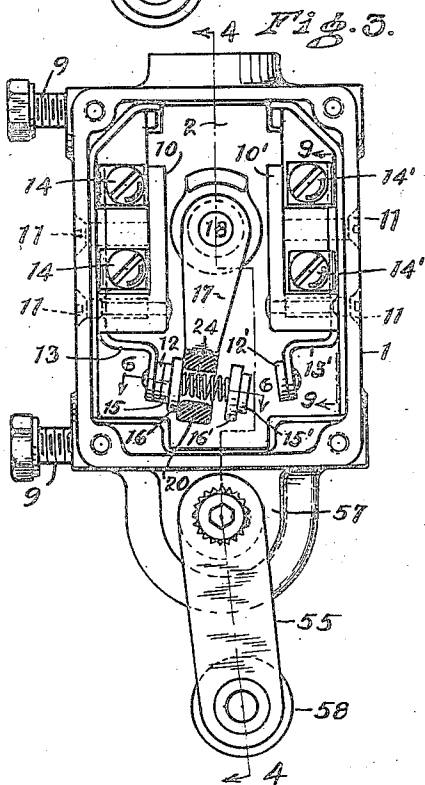
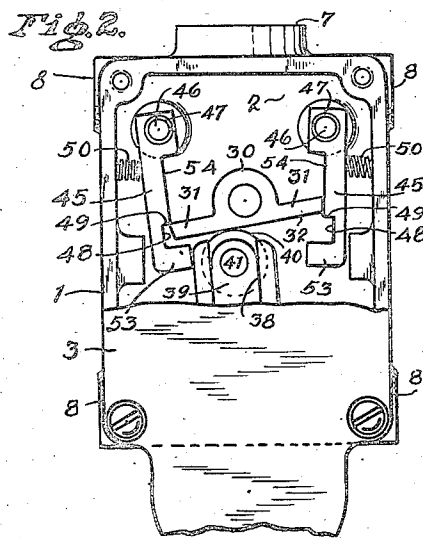
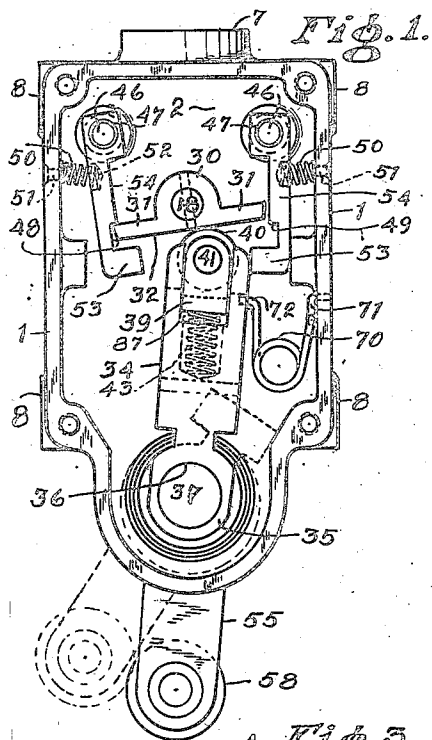
M. L. JEFFREY

2,294,559

SWITCH

Filed July 26, 1938

2 Sheets-Sheet 1



INVENTOR.
Max L. Jeffrey.
Richey & Watts.
ATTORNEYS.

Sept. 1, 1942.

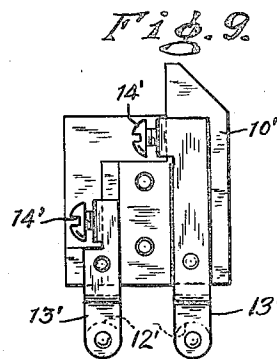
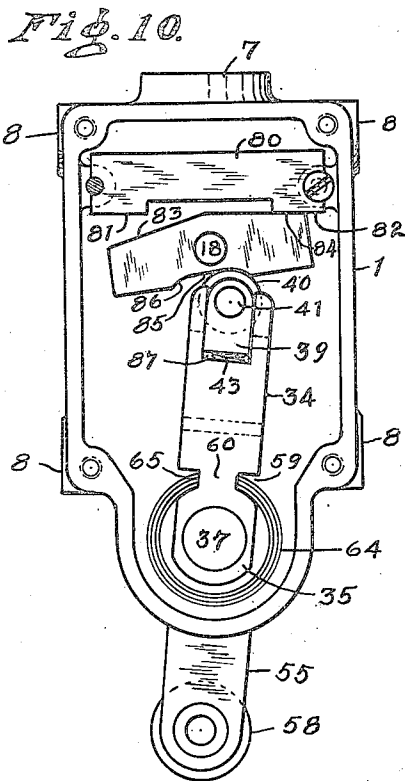
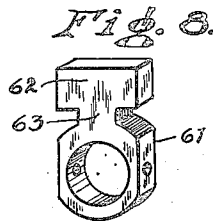
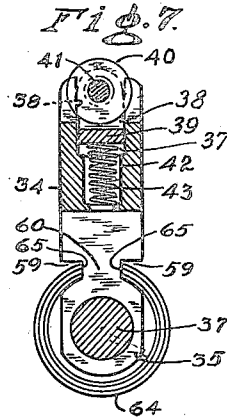
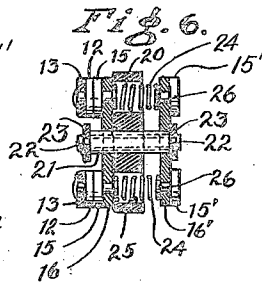
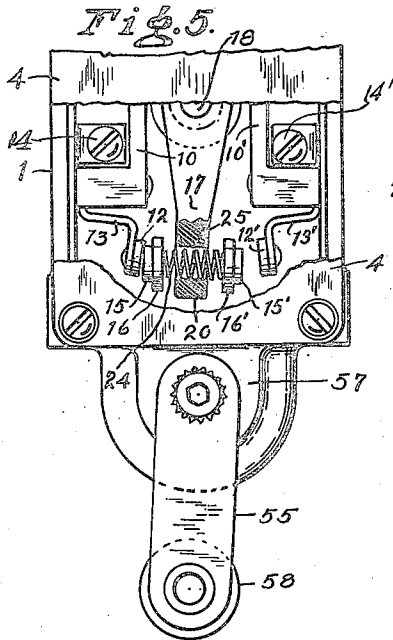
M. L. JEFFREY

2,294,559

SWITCH

Filed July 26, 1938

2 Sheets-Sheet 2



INVENTOR.
Max L. Jeffrey.
BY *Richy & Watts.*
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,294,559

SWITCH

Max L. Jeffrey, Shaker Heights, Ohio, assignor,
by mesne assignments, to The M. L. Jeffrey
Corporation, Cleveland, Ohio, a corporation of
Ohio

Application July 26, 1938, Serial No. 221,274

4 Claims. (Cl. 200—67)

This invention relates to switches, and more particularly to an improved switch mechanism of the snap-action type wherein the contacts are opened and/or closed quickly.

Switches for the opening and/or closing of electric circuits, particularly in those circuits where the current conducted is relatively heavy, should be so designed that the contacts open and close quickly to eliminate arcing. Although snap-action switches are old in the art, there have been many disadvantages present in the prior devices, both in construction and operation, which it is the purpose of the present invention to overcome. For instance, those made heavy enough to carry high current values were relatively slow in operation as well as cumbersome in construction. Furthermore, they were so large that there were many places where they could not be easily or readily installed.

It is, therefore, one of the objects of my present invention to provide a switch which is versatile in its application, being readily adapted for operation in connection with various types of machinery, and where the switch, although relatively small and compact, is capable of carrying relatively large currents.

Another of the objects is to provide an operating mechanism for actuating the switch which is capable of a considerable amount of over-travel which thus makes it possible to more readily operate the switch without injury to the switch itself.

Another object of the invention is to provide an over-travel mechanism for the switch which is capable of extended action without wearing out and wherein the operating parts are few and simple and require little or no service or attention.

Another object of the invention is to provide a mechanism for imparting a snap-action to open and/or close the contacts, which mechanism is quick and positive.

Another object of the invention is to provide a switch mechanism wherein the contacts are so arranged and cooperate with each other during the make-and-break that they are automatically kept clean, and wear due to corrosion and the so-called pitting is eliminated; and a large electrical surface contact is had between the contacts throughout a long period of service.

Another object of the invention is to provide a switch including an operating mechanism therefore wherein the contact chamber is segregated from the chamber carrying the operating mechanism which thus prevents the metal from

the contacts which is vaporized due to arcing between the contacts from coming in contact with the operating mechanism and where the operating mechanism may be freely lubricated without such lubrication fouling the contacts. This segregation of the two components of the device also prevents the accumulation of corrosion on the snap-action initiating parts which I have found is prone to be formed where all the elements are disposed in a single chamber. The provision of the two chambers also makes the task of insulating the same more simple and eliminates the possibility of fire hazards.

Another object of the invention is to provide a switch where the contacts, when worn, may be readily replaced with new contacts.

Still other objects of the invention and the invention itself will become more apparent from the following description of some embodiments thereof, which description is illustrated by the accompanying drawings and forms part of the specification.

In the drawings:

Fig. 1 is an elevational view of the switch with the cover plate removed and showing the rocker arm for rocking the contactor and the rocking mechanism for rocking the rocker arm, certain alternate positions of the parts being shown by dotted lines;

Fig. 2 is a view similar in nature to Fig. 1 except that a portion of the cover plate is shown in position and the other parts are in a different operative position;

Fig. 3 is a view from the opposite side of the switch, cover removed, showing the contacts and contactor lever;

Fig. 4 is a section taken on the line 4—4 of Fig. 3, certain parts being shown in elevation;

Fig. 5 is a fragmentary section showing the contacts about to make contact;

Fig. 6 is a section through the contacts and contactor taken on the line 6—6 of Fig. 3;

Fig. 7 is a view, partly in section and partly in elevation, of the rocker lever for rocking the rocker arm;

Fig. 8 is a perspective view of the lever used to move the rocker lever;

Fig. 9 is a view of one of the junction blocks removed from the switch; and

Fig. 10 is a view similar to Fig. 1 of a modified form of the invention.

Generally, the device illustrated is particularly adapted for opening and closing a circuit which may comprise two subsidiary sections of the main circuit which it is desired to alternately open and

close. However, as it will hereinafter appear, the switch is adaptable to open or close a circuit having only one section if desirable. The switch includes pairs or sets of the contacts each of which is opened or closed by a contactor which bridges the contacts, the contactor being adapted to be reciprocated with a snap-action between the pairs of contacts. The contactors which close the contacts are carried on a lever which in turn is operated by a rock shaft, the rock shaft being rocked by a rocker arm. The rocker arm is in turn rocked by the cam action of a lever which carries a roller which traverses the rocker arm, means being provided for holding the rocker arm against movement until a predetermined moving pressure is built up by the rocking lever. Movement to the rocking lever is transmitted from a lever disposed outside of the housing which is connected to the rocking lever by an over-travel mechanism which permits the lever outside of the housing to be moved a greater distance than is actually necessary to cause the rocking lever to function, thus preventing injury to the parts of the switch because of such over-movement. The lever which is disposed outside of the housing is adapted to be operated by any desired specific part of the machine in connection with which the switch is operated. The lever shown in the drawings is merely exemplary of one type that may be used and may be replaced with any particular type desired the design of which will depend upon that part of the machine which is to operate the same.

More specifically the invention contemplates a generally rectangular housing 1, which is divided into two compartments by a wall 2; one compartment houses the switch contacts and contactor as well as the contactor carrying lever, while the other compartment houses the rocker arm, rocking lever and over-travel mechanism. Both sides of the housing are closed by plates 3 and 4 secured to the housing by screws 5; the plate 4 which covers the switch contact compartment is furnished with a sheet of insulating material 6, as best shown in Fig. 4.

A bored and threaded boss 7 is provided at the upper end of the housing, the opening of which communicates with the interior of the switch compartment. The boss being threaded is adapted for connection to an electrical conduit pipe, not shown. Threaded bosses 8 are also provided adapted to receive cap screws 9 for mounting the switch, such as for securing it in any desired position on a machine in connection with which it is to be operated.

A pair of junction blocks 10 and 10' are secured to the sides of the housing by screws 11. Contacts 12 and 12' are suspended below the blocks on the ends of bus bars 13 and 13', as best shown in Figs. 3 and 9. Screws 14 and 14' are provided for securing conductor wires to the bus bars. As previously stated, each pair of contacts is suspended below the blocks 10 and 10' and are disposed in spaced parallel relation to each other with their contact faces on a common plane and in opposite relation to the other pair. It will be understood that the bus bars 13 and 13' and their contacts are to be connected into a circuit or circuits which is to be opened and/or closed.

Each pair of contacts is adapted to be closed by bridging the same with a contactor bar which carries complementary contacts. The contactor bar assemblies comprise contacts 15 and 15' riveted to bars 16 and 16', which bars support the contacts in spaced and aligned relation with the

contacts 12 and 12'. The contactor bars are in turn carried by a lever 17 secured to a rock shaft 18. The rock shaft 18 is rotatably journaled in a bushing 19 through the partition wall 2. The rock shaft supporting on its other end in the other compartment a rocker arm as will hereinafter more clearly appear.

The lever 17 is provided with substantially T-shaped end 20 and carries rigidly at its mid-section a straight guide bar 21 of square cross section which extends at right angles from the lever in the direction of travel of the lever. The contactor bars 16 and 16' are provided with square apertures at their mid-section and are loosely journaled on the guide bar 21, the fit between the guide bar and the contact bars being sufficiently close to maintain the contacts in predetermined alignment and still permit easy sliding movement of the contacts on the guide bars. The contactor bars are held on the guide bar by a rivet 22 which extends through a longitudinal bore in the guide bar and is headed over at its ends to hold washers 23 against the ends of the guide bar. The contactor bars are resiliently held against the washers 23 of the guide bar by helical springs 24 which extend between the contactor bars through apertures 25 in the end 20 of the lever 17, the springs being held in position by being seated over the headed ends 26 of the contacts which extend through the bars 16 and are headed over to provide heads for that purpose. The apertures in the lever provide sufficient clearance space for the springs so that the springs are not restricted in their operation. Inasmuch as the springs extend between the contactor bars and through the lever rather than from the lever to the bars, it necessitates only two springs where there otherwise would be four, and the springs are longer and hence may be made more resilient with ultimate longer life.

As previously stated, the contactor bars are held against the heads 23. When the lever 17, however, is reciprocated between the contacts 12 and 12' to engage the contacts 15 with the contacts 12, (or 15' with 12') the contactor bar 16 is slid on the guide bar away from the head 22 compressing the springs 24. This movement is best shown in Fig. 5 where the lever 17 is illustrated as being moved toward the left as viewed in the figure to bring the contacts 15 into contact with the contacts 12. It should be noted that at the moment of contact the contacts 15 on the contactor bar are slightly dis-aligned from the contacts 12. The upper edge of the contacts on the contactor bar first engage the contacts 12, the conductor bar being loosely journaled on the shaft 21, tilts slightly immediately after contact, allowing the contacts to seat but still off center. As the lever progresses toward contacts 12 the contacts having been tilted into flat but still dis-aligned engagement, further movement of the lever 17 toward the contacts 12, causes the contactor bar to slide on the guide 21 compressing the springs 24. The guide 21 being straight it will be noted that the radius from the center of the shaft 18 to the center of the contacts 15 when the contactor bar is in engagement with the end of the guide shaft 21, is greater than the radius between the center of the shaft 18 and the center of the contacts when the contactor bar and contacts are slid along the guide bar 22 toward the face on the end 20 of the lever 17. The lever 17 continuing in its movements toward the contacts 12 and the contactor bars being slid along the guide 21, the springs 24 compressing, the

contacts 15 therefore move upward due to the shortening radius bringing the contacts 15 into alignment with the contacts 12, their ultimate position being shown in Fig. 3 where they have full aligned and contacting engagement with each other. This results in the contacts having a wiping action with each other when they make contact.

It will thus be seen that the contacts 12 are now bridged by the contactor bars and their complementary contacts 15. When the lever 17 is moved in the opposite direction the contacts are retained in contact with each other by the spring 17, the contactor sliding along the guide bar and moving the contacts off center, the movement being the reversal of that just explained. The contacts maintain contact until the head 23 of the guide bar engaged the contactor bar. The lever 17 may be moved in the opposite direction to bring the contactor bar 16' and the contacts 15' into connection with the contacts 12' in the manner exactly as described for the other pair of contacts. The lost motion connection of the lever with the contacts allows the lever 17 to gain momentum on the "break" increasing the suddenness of the break between the contacts and also allows greater latitude or tolerance in the construction. The construction also reduces mechanical shock due to the contact lever opening mechanism. Furthermore, by the arrangement shown, the contacts are also maintained in good electrical contact in spite of their decrease in thickness due to wear, the springs being relatively long, maintaining substantially the same pressure between the contacts. Furthermore, the pressure of the contactor bar and its contacts against the contacts 12 is independent of the position of the lever 17, unless the lever swings over far enough so that the contactor bar is engaged by the face of the lever, in which event the contact pressure is merely increased. It should be noted that the contacts on the contactor bar and the contacts on the buss bars establish contact at substantially the same time with no tendency for one of the contacts to make or break ahead of the other, thus reducing the tendency to arc.

As previously stated, the lever 17 is secured to the rock shaft 18, which shaft is journaled in a bearing in the wall 2; the other end of the shaft extends into the compartment of the housing and carries on its end a rocker member which comprises a hub 30 provided with laterally extending arms 31, as best shown in Figs. 1 and 2. The rocker is also provided with a flat cam face 32.

Means for rocking the rocker is provided and includes a rock lever 34 which is provided with a bifurcated end 35 having axially aligned apertures 36 permitting the same to be rotatably journaled on a shaft 37. The body of the lever 34, the free end of which extends toward the rocker, is provided with a slideway 38 in which is reciprocally journaled a yoke 39 that rotatably supports a roller 40 on a pin 41 journaled in the arms of the yoke. The bottom of the slideway is provided with a counterbore 42 which extends from the bottom into the lever and which receives a helical spring 43. The spring 43 engages the end of the yoke 39, urging the yoke and roller toward the end of the slideway and holding the roller in contact with the cam face 32 of the rocker. The rock lever 34 is adapted to be rotated on the shaft 37 so that the end of the lever is reciprocated below the rocker and

the roller 40 is traversed over the cam face 32. It will thus be seen that as the roller traverses the face of the rocker, pressure is exerted on the rocker arms alternately tending to rock the rocker and rotate the shaft 18.

Movement of the rocker is restricted; that is means is provided for holding the rocker against rocking movement until the pressure roller 40 has reached a predetermined position toward one of the ends of the rocker arms 31 when the holding means is suddenly released, at which time the spring 42, yoke 39 and roller 40 suddenly pivot the rocker arm.

One such means includes a pair of latches as best shown in Figs. 1 and 2 adapted to engage and hold the ends of the rocker. Each latch includes a downwardly extending body 45 pivotally supported on a pin 46 at its end, being held against displacement from the pin by a split ring 47 which snaps in a groove in the pin 46 in a well known manner. The body 45 extends downwardly and is provided with a notch 48, the upper edge 49 of which provides a keeper face. The notch is sufficiently large so that the end 31 of the arm may extend therein with the upper face engaging the keeper face 49. A spring 50 is interposed between the body and the wall of the housing, being retained by a pin 51 on the housing and extending into a recess 52 in the latch. The end of the body is provided with an angular extension 53 adapted to be contacted by the end of the lever 34. The inner surface 54 of the latch body provides a bearing surface against which the end of the latch may slide.

The springs 50 rotate and hold the latches in engagement with the ends of the rocker. When the rocker is tilted to the position shown in Fig. 1, the end of the rocker snaps into the notch 48. When the rock lever is reciprocated toward the left as viewed in Fig. 1, the pressure upon the rocker tends to rotate the same clockwise, pushing the upper face of the rocker against the keeper face 49 until such a time as the end of the lever 34 engages the contact end 53 of the latch, which lever end disengages the latch from its holding engagement with the end of the rocker. Upon disengagement the rocker is rotated clockwise as shown, the right hand end of the lever being urged downwardly where it is engaged in the notch of the opposite latch and held until disengagement by the rock lever, being moved in the opposite direction in a manner similar to that just described.

Means for moving the rock lever is provided and includes an operating lever 55 secured to the end of the shaft 37, which shaft is rotatably journaled in a bearing 56 in a downwardly depending boss 57 of the housing and extends from the rock mechanism chamber to the exterior of the housing. The lever illustrated in the drawings is provided with a roller 58 adapted for engagement by a moving part of the particular machine to which the device may be attached. It is to be understood, however, that the mechanism may be operated by other types of levers, that shown being for the purpose of illustration. For instance, it might be desirable to use such a switch with a hand lever, in which event any kind of a lever could be secured to the shafts 7.

As previously stated, the rock lever 34 was rotatably journaled on the shaft 37, and the point of connection of the lever to the shaft is bifurcated or clevis shape. As best shown in Fig. 7, the rock lever is provided with a pair of oppo-

sitely disposed inwardly extending notches 59 which provide a neck 60 spaced from the axis of the shaft 37. Interposed between the bifurcated ends of the rock lever 35 and secured to the shaft 37, is a lever 61 as best shown in Fig. 8, which is provided with a T-shaped end comprising a head 62 and a neck 63 of the same contour as the bifurcated end of the lever 34. Inasmuch as the lever 34 is rotatable on the end of the shaft 37, and the lever 61 is reciprocable between the ends of the lever 34, the lever 61 may be reciprocated or rotated by the shaft 37 between the ends of the lever 34 without transmitting movement to the lever 34. Movement is transmitted from the lever 61 to the lever 34 by a C-shaped spring 64 of a width sufficient to bridge the bifurcated end of the lever 34 transversely, the ends 65 of the spring being seated in the notches on the necks 60 and 63 of the levers 61 and 34 respectively. Rotation of the shaft 37 is therefore transmitted from the lever 61 by way of the neck 63 of the lever contacting the end 65 of the spring 64 and thence to the neck 60 of the lever 34. With this type of connection the levers 61 and 34 may be moved relative to each other if the lever 34 is held against movement and providing the force exerted is sufficient to spring apart the ends of the spring 64. This movement is best illustrated by Fig. 1, where the rock lever is shown reciprocated by the right hand position engaging the latch on the right hand side, the operating lever 55 has been rotated a matter of some twenty-nine degrees farther than the rock lever 34, the lever 61 having been rotated from juxtaposition between the bifurcated end of the rock lever, the ends 15 of the spring 64 in this instance will be forced apart. In the drawings the spring 64 is shown as comprising three leaves superimposed one upon the other. One leaf, however, may be sufficient and the number may be increased should it be desired. Increasing the number of leaves, increases increment of safety since two of the leaves will still hold should one of them become broken.

In operation it may be assumed that the device is to be used to control a circuit having one or two subsidiary circuits, one of which is to be opened and the other closed alternately. As previously stated, this is obviously a matter of choice since it might be merely desirable to open one circuit and not close the other circuit, in which event the extra contacts would merely serve as a stop to limit the movement of the lever. Assuming for the purpose of explanation, however, that a main circuit having two subsidiary circuits to be controlled, is employed, and that such circuits are used in conjunction with machines having a reciprocating, oscillating or rotary movement, the switch and its housing are mounted in such a manner that the lever 55 is connected by the movement of a part of the machine. Contact with the lever 55 rotates the shaft 37 and the lever 61 which movement from the lever 61 is transmitted through the spring 64 to the rock lever 34. If this movement, referring to Fig. 1, should be such as to cause the rock lever 34 to travel counter-clockwise, the roller 40 traverses the face 32 of the rocker being spring-pressed into engagement therewith by the spring 43. The rocker is held against movement by engagement of the upper face of the arm 31 with the keeper face 49 of the latch, the latch being held in engagement with the rocker by the spring 50. As the rock lever moves

the roller 40 travels across the face 32 of the rocker, it eventually reaches the position where the end of the lever engages the end 53 of the latch. Continued movement of the rock lever moves the latch to the left, Fig. 2, causing the latch to be disengaged from the rocker. Immediately upon disengagement of the latch from the rocker, the spring 43 forces the roller 40 and its yoke upward rotating the rocker quickly until the opposite end is engaged with the latch on the opposite side. This quick rocking movement of the rocker is transmitted through the shaft 18 to the contactor lever 17. This causes the contactor bar and contacts 15 to bridge the contacts 12 in the manner previously described. Reciprocation of the lever 55 in the opposite direction will reverse the procedure.

In some instances it may be desired to use the device merely for momentary contact and in which event the rocker is to be returned to the starting position immediately after having been operated; in this instance, a spring 70 is provided as best shown in Fig. 1, having one end 71 attached to the housing and the other end 72 connected to the rocker lever. The lever 55 rotates or reciprocates the rock lever 34 against the resistance of the spring 70 and after the lever 55 is released, the spring 70 returned the rock lever 34 to its original position. It should be understood that the spring 70 is not essential to the normal operation and will be omitted in many of the devices.

In Fig. 10 I have shown a modified form of the invention wherein magnetic holding means is supplied in place of the mechanically operated latches. In this event a magnet 80 is carried by the housing and the rocker arm, which is of magnetic material, is disposed below the magnet so that either end will contact, upon rotation, alternately with the poles 81 or 82 of the magnet. The rocker arm in this instance may be somewhat larger to provide a better magnetic contact with the magnet and the upper faces 83 and 84 are so shaped that when rocked by the action of the roller 40 and the lever 34, they furnish relatively large contact with the poles of the magnet.

The lower face of the rocker comprises the flat cam face 85 over which the roller may travel, the ends of the cam face curve downward at 86 and provide a stop for the lever. The clearance space 87 between the yoke 39 for the roller 40 and the end of the slideway 38 prevents the roller and yoke from being telescoped in the slideway against the compression of the spring 43 sufficiently far to permit the roller from sliding off of the curved end 85 of the rocker arm.

Although I have shown a single magnet 80, it is quite within the purview of this invention to provide two simple horseshoe magnets each disposed at the points 81 and 82 instead of the one large magnet. In operation the roller 40 traverses the cam face 84 continuing across the cam face until the mechanical advantage gained is sufficient between the roller 40, spring and lever 34 on the rocker arm to overcome the flux of the magnet. This action causes a sudden release of the rocker from contact with the magnet and rotation of the rocker arm, which may be considered as an armature, into contact with the other pole or other magnet.

It will thus be seen that no matter what means is used to operate the lever 55, the over-travel which may be increased over that shown by slight changes obvious to those skilled in the

art, is sufficient so that considerable tolerance of adjustment is possible between the operating arm 55 and the part of the machine which causes the operation. It will also be seen that the mechanism which permits the over-travel comprising the lever 61, the spring 64 and lever 34, is extremely simple, easy to construct, and requires very little lubrication or maintenance. It will also be seen that the latch mechanism, both mechanical and magnetic is also simple and long-lived and permits a quick snap-action with relatively few parts.

The contacts, because of the ruggedness of the mechanism, may also be ruggedly constructed, which lends itself to long life and increased current-carrying capacity. The manner in which the contacts engage each other and slide across the face of each other, is such that any tendency to pit is automatically eliminated by this wiping action, and that by this wiping action they also maintain an automatic alignment as well as a more intimate contact which decreases the resistance and thus increases the life of the contacts to a material extent.

Having thus described my invention in some embodiments thereof, I am aware that those skilled in the art will be able to make modifications but which come within the precepts of the invention, and it is not my intention to limit the invention to the particular embodiments shown or in any other manner other than by the claims which are appended to this specification, and which claims should be construed to a range of equivalents to which I may be entitled in view of the prior art.

I claim:

1. A switch of the class described including a support, a shaft rotatably journaled in the support, a switch breaker arm depending on one side of the support and contacts loosely carried thereby, fixed contacts adapted for electrical connection with said loose contacts, means for rotating said breaker arm comprising a rocker arm carried by said shaft on the other side of said support, a snap mechanism for moving the rocker arm comprising a lever pivotally carried by a support below said breaker arm and on the opposite side of the support, said lever having a slideway and a slide disposed therein with a roller carried thereby, said arm extending toward the rocker arm and spring means for urging the roller against the rocker arm, latch means for alternately engaging the ends of the rocker arm and operable to hold the rocker arm in predetermined rocked positions until alternately disengaged by contact with said lever.

2. A switch of the class described, a support, a rock shaft journaled in the support, a breaker arm connected to one end of the rock shaft on one side of the support and a rocker connected to said shaft on the other side of the support, fixed contacts adapted to be connected in a circuit, contactors for said breaker arm and a lost motion connection connecting said contacts thereto, said contacts adapted to close the circuit through the fixed contacts, means for rocking said rocker arm to open and close said contacts and hold certain contacts open and closed including a lever pivotally connected to said support below and on the opposite side of said breaker arm and contacts, said lever being formed

with a slideway, a slide reciprocally disposed in said slideway and including a yoke, a roller carried by the yoke and extending beyond the end of the lever, said lever extending toward the rocker and formed with a counter-bore, spring means enclosed in the counter-bore and engaging said yoke and holding said roller into contact with the rocker, means for holding said rocker against movement comprising a pair of latches pivotally carried by said support and adapted to alternately engage the free ends of said rocker arm, spring means interposed between the support and said latches and holding said latches toward the ends of the rocker, said latches being provided with recesses to hold and prevent the rocker from movement, and said latches having extensions extending below the rocker and under said rocker in the path of travel of the lever adapted for engagement with said lever, said lever arranged to disengage said latches from the rocker by engagement with said extensions, abutments on the support for limiting the movement of the latches away from the rocker and to cause said latches to limit the movement of said lever and hold the roller in engagement with the face of the rocker.

3. A switch of the class described including a support, a shaft rotatably journaled therein, a breaker arm affixed to the shaft on one side of said support and a rocker arm secured to the shaft on the other side of the support, contactors loosely carried by said breaker arm, fixed contacts adapted for electrical connection with said contactors, means for actuating said rocker arm to open and close said contacts comprising a lever pivotally connected to said support below said shaft having a slideway therein, a slide embodying a yoke reciprocally disposed in the slideway, a roller carried by the yoke and extending beyond the end of said lever, a spring engageable with the yoke for urging the roller into engagement with said rocker arm, spring pressed latches pivotally mounted on said support for alternately engaging the ends of said rocker arm and means on said support subjacent said rocker arm to limit the movement of said latches and lever.

4. A switch of the class described including a support, a shaft rotatably journaled on the support, a switch arm depending on one side of the support and having contacts movably supported thereby, fixed contacts carried by the support adapted for electrical connection with said movable contacts, means for rotating said switch arm comprising a rocker lever fixedly secured on said shaft and disposed on the other side of said support, a snap mechanism for moving the rocker lever comprising a second lever swingably supported by a support spaced from the rocker lever and on the opposite side from the switch arm, a roller carried by said second lever, said lever and roller extending toward the rocker arm, said lever having a counter-bore therein and spring means disposed therein for holding the roller under spring tension against the rocker arm, latch means for alternate engagement with the ends of the rocker arm and operable to hold the rocker arm in predetermined rocker positions until alternate disengagement by contact with said second lever.

MAX L. JEFFREY.

CERTIFICATE OF CORRECTION.

Patent No. 2,294,559.

September 1, 1942.

MAX L. JEFFREY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, first column, line 62, for the word "connected" read --contacted--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 27th day of October, A. D. 1942.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.