

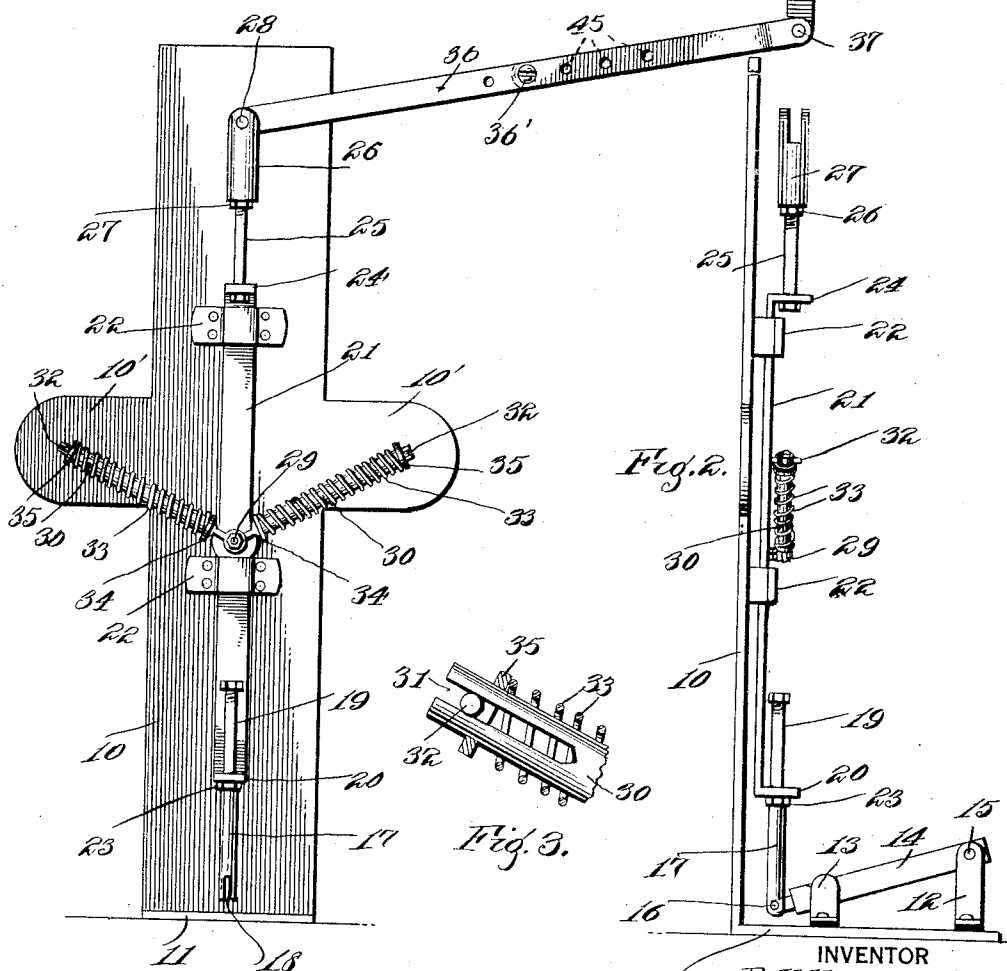
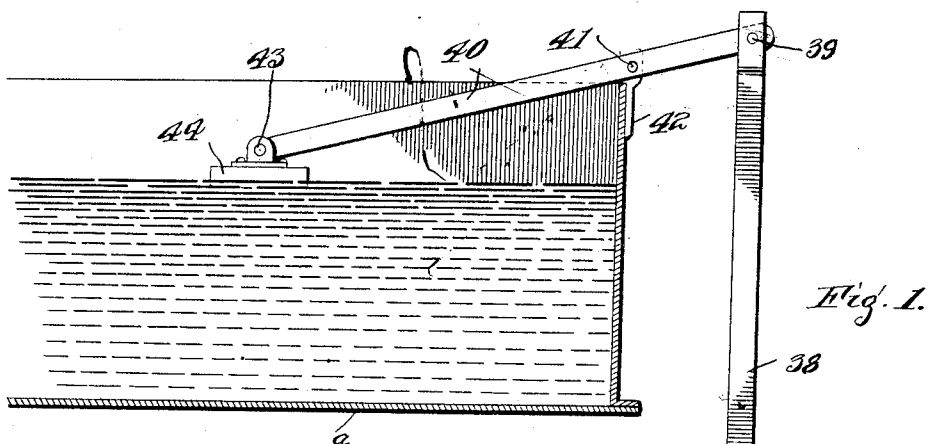
July 7, 1931.

R. H. HAYNES

1,813,801

ELECTRIC SWITCH

Filed March 30, 1928



INVENTOR
11 *R.H. Hoynes.*
BY *M. Leo*
ATTORNEY

UNITED STATES PATENT OFFICE

RICHARD H. HAYNES, OF SEALY, TEXAS

ELECTRIC SWITCH

Application filed March 30, 1928. Serial No. 266,006.

This invention appertains to improvements in electric switches generally, and more particularly to automatically operated types of such switches.

5 An object of the invention is to provide a switch of the class set forth, wherein the make and break between the fixed and movable contacts of the same will be effected quickly, so that "arcing" of the current at the contacts will be avoided, with the result
10 that the usual burning, or other injurious effects on the contacts will be prevented and the life of the switch thereby prolonged.

Another object of the invention is to provide a switching device as hereinbefore
15 characterized, which, in a special or particular adaptation of the same, will be employed for controlling the operation of an electrically driven pump of a water supply system or the like, and wherein the
20 operation of the switch for accomplishing the starting and stopping of the pump will be automatically controlled by the falling and rising movements of a float operating
25 in a body of fluid at the low and high levels thereof.

A further object of the invention is to provide for a switching mechanism of the character mentioned, which will, in its automatic operation as aforesaid, be unaffected by the intermediate moments of movement of a float in its falling and rising travel in a body of confined liquid or water, and between points of minimum low and maximum high levels of the liquid or water, in the discharge of the liquid or water from
35 or into the confining body or tank in which the float is mounted.

With the foregoing and other equally
40 important objects and advantages in view, the invention resides in the certain new and useful combination, construction and arrangement of parts as will be hereinafter
45 more fully described, set forth in the appended claim, and illustrated in the accompanying drawings, in which:

Figure 1 is a vertical section through a water tank or the like, and showing a practical embodiment of the switching mechanism

in its operative relation in respect thereto,

Figure 2 is a side elevation of the switching mechanism per se, and

Figure 3 is an enlarged sectional detail
55 of one of the tensioning devices for effecting the quick make and break movements of the movable contact member of the switch at the limits of the falling and rising movements of the float.
60

Referring to the drawings, wherein like characters of reference designate corresponding parts throughout the several views thereof, the embodiment of the invention, as shown therein by way of example, comprises a bracket or support 10, which is preferably in the form of an elongated strip of metal or the like, having one end, as for instance its lower end, angularly bent to provide an offset portion 11 on the inner or
65 upper side of which the switch proper is to be supported.
70

The switch, in the present instance, comprises an outer member or post 12, and an inner member or contact 13, which is preferably shorter than the member or post 12.
75 These members 12 and 13 are preferably spaced apart on the longitudinal center of the upper side of the angled portion 11, of the bracket or support 10, and one end of a movable member or blade 14 is pivoted, as at 15, to the upper end of the longer member or post 12, and is to be swung on the pivot 15 to and from contacting engagement with the member or contact 13. These
80 members 12 and 13 will preferably be of usual bifurcated construction to receive the movable member or plate 14 between the same, substantially as shown. These members or contacts 12 and 13 are, of course, insulated from the bracket or support 11 and from each other.
85

The inner or free end of the movable member or blade 14 is pivoted, as at 16, to one or the lower end of a short section of rod or tube 17, the engaged end of the latter being preferably bifurcated, as at 18, to receive the blade end within the same. The member 17 is provided with a longitudinal bore opening through its upper end
90
100

to have threaded into the same one or the lower end of an adjusting member or screw 19. This member or screw 19 is passed downwardly through an aperture formed in an angular portion 20, bent from the lower end of an intermediate member or bar 21, which is mounted for sliding movements in guide members or the like 22 spaced apart on the longitudinal center of the major portion of the bracket or support 10, and into the bore of the rod or tube 17. A lock nut 23 is provided on the adjustable member or screw 19 immediately below the angled portion 20 to sustain the same in any position of adjustment.

The upper end of the intermediate member or bar 21, above the uppermost of the guides 22, is angularly bent to provide an opposite portion 24, corresponding to the lower angularly offset portion 20, which is apertured to have the upper threaded end of a second adjusting member 25 passed upwardly through the same, and into threaded engagement with the longitudinal bore in an upper member or rod 26. A lock nut 27 is used on the threaded upper end portion of this member or screw 25, and cooperates with the lower end of the member or rod 26 in the same manner as the other of these devices 23. The extreme upper end of the member or rod 26 is apertured to support a pivot member or pin 28, the purpose of which will be hereinafter more fully explained.

Pivoted, as at 29, to the intermediate member or bar 21, and preferably centrally thereof is a toggle device, which consists of a pair of oppositely directed or laterally arranged members or rods 30, the outer ends of each being bifurcated, as at 31, for engagement with members or pins 32 projecting from the front faces of laterally extended portions 10' of the major portion of the bracket or support 10. These extended portions 10' are preferably disposed in line one with the other at the opposite side edges of the major portion 10, and at the transverse center thereof.

Mounted on each of the toggle members or rods 30 are resilient members 33, preferably in the form of coiled springs, which have their inwardly directed ends bearing against an annular member or flange 34 fixed to the members or rods adjacent the commonly pivoted ends thereof, and their outer ends bearing against annular members or washers 35 loosely positioned on the bifurcated ends of the members or rods 30. These annular members or washers 35 are tensioned by the springs 33 against the pins 32 when the bifurcated ends of the members or rods 30 are engaged with the latter, which tensioning effect of the springs 33 against these members or washers 35 also acts to maintain the bifurcated ends of the

members or rods 30 in their engaged relation with the members or pins 32, as will be obvious.

In the general use of the device as thus constructed and arranged, the switch blade 14 will be tensioned to circuit closing engagement with the circuit contact member 13 by the action of the coiled springs 33, when the adjustable member or bar 21 is pushed toward the angled end portion 11, of the bracket or member 10, on which the switch is mounted. This position of the parts lessens the tensioning effect of the coiled springs 33, as will also be the case, when the member or rod 21 is pulled to the opposite limit of its movement to withdraw the switch blade 14 from engagement with the contact member 13. As the adjustable member or rod 21 is moved in either direction to open or close the switch blade 14, the movement of the toggle pivot 29 therewith reverses the angular relation of the toggle arms or rods 30 from one side or the other of the transverse center of the major portion of the bracket or support 10, and as the pivot 29 passes the dead center position, the toggle arms or rods 30 are shortened by reason of the bifurcated ends of the same moving outwardly of the fixed members or pins 32. As the arms or rod 30 shorten, the annular members or washers 35 at the outer ends thereof are forced inwardly and place the coiled springs 33 under compression, which compression is greatest when the toggle members or rod 30 move to alined relation in the plane of the transverse center of the bracket or support 10. As the pivot 29 passed from one side to the other of the dead center position of alinement of the members or rods 30, the coiled springs 33 immediately expand, and thereby quickly complete the proper directional movement of the member or bar 21, and causes the switch plate 14 to be snapped into or out of engagement, as the case may be, with the contact member 13.

In the particular adaptation of the switching mechanism for use in opening and closing the power circuit of an electrically operated pump for supplying water or other fluid to a tank *a*, the pivot 28 carried by the upper of the adjustable rods or tubes 26, will connect one end of a lever 36, which is pivoted, as at 36', at a point intermediate its ends, and will have its other end, in turn pivoted, as at 37, to the lower end of a rod or link 35. This rod or link 38 is extended vertically at one side of the tank *a*, and has its upper end pivoted, as at 39, to the outer end of a float arm or lever 40, which is pivotally supported at an intermediate point, as at 41, to a bracket or the like projecting above the upper edge of the adjacent side of the tank *a*. The inner end of this float arm or lever 40 will be pivoted, as at 43,

to a suitable float device 44, which will be supported on the surface of the fluid or water within the tank at any level of the latter thereon. The lever 36 will preferably have a series of longitudinally spaced apertures 45, whereby the fulcrum or pivot 36' may be shifted from one aperture to another, as desired or necessary to change the ratio of pivotal movement of the lever 36, and consequently the length of vertical movement of the switch operating parts on the bracket or support 10, correspondingly with a given movement of the float lever 40.

In this instance of the invention, and with the tank *a* empty, the switch blade will have been closed on the contact 13 to start up the pump (not shown) for the filling of the tank. When the liquid in the tank has reached a predetermined point, the float 44 will have risen with the level of the liquid, and swung the inner end of the float arm or lever 40 upwardly on its pivot 41, while the outer end of the float arm or lever will have swung in a downward direction, and thereby forces the link or rod 38 also in a downward direction. This downward movement of the link 38 acts to depress the pivoted end 37, of the lever 36, and to elevate the pivoted end 28 thereof, which movement will effect an upward pull on the member or rod 26, and through it and the member or bolt 25, depending therefrom, to the intermediate member or bar 21, and until the toggle arms or rods 30 have passed their central position. During this entire initial movement, the lower adjustable member or screw 19, and the rod or tube section 17 connected thereto has not been effected or moved, and consequently the closed position of the switch plate 14 has not been disturbed. As soon, however, as the toggles have passed through center in their outward direction of movement, the coiled springs 33 will suddenly expand and immediately act to force the intermediate member or bar 21 rapidly to its upper limit of movement. Simultaneously with this sudden expansion of the coiled springs 33, the lower angled end 20 of the intermediate member or bar 21 will have engaged the upper headed end of the member or screw 19 and exert an upward pull thereon, and through it to the rod or tube 17, with the result that the switch blade is swung sharply in an upward direction and free of engagement of the switch contact 13, when the power will be cut off from the pump. When the liquid in the tank *a* has reached a predetermined low level mark, the above described operation of the mechanism is reversed, and the float arm or lever 40 will have been swung on its pivot 41 to exert an upward pull on the link 38 and the lever 36, so that the latter are swung in a direction to force the rod or tube member 26, pivoted thereto, as at 28, and the adjusting

member or screw 25 depending from the lower end thereof, in a downward direction. No movement will be imparted to the intermediate member or bar 21 until after the lock nut 27 has been lowered into contact with the upper face of the angled portion 24 of the member or rod 21, when this latter member or rod will be forced in a downward direction, and will carry with it the attached ends of the toggle arms or rods 30. As soon as the toggle arms or rods 30 pass their dead center position of alinement in the downward direction of the intermediate member or bar 21, the coiled springs 33 will be free to expand, and will quickly complete the downward movement of the intermediate member or rod 21 and the adjustable rod or tube member 17, by reason of the lower angled end 20 of the intermediate member or rod 21 contacting the lock nut 23 at the upper end of the rod or tube member 17 when these parts will also be moved in a downward direction, and move the switch blade 14 with the same and into engagement with the contact 13, when the pump will be again placed in operation.

Without further description, it is thought that the features and advantages of the invention will be readily apparent to those skilled in the art, and it will of course be understood that changes in the form, proportion and minor details of construction may be resorted to, without departing from the spirit of the invention or its scope as claimed.

Having thus fully described the invention, what is claimed is:

A snap mechanism comprising a base, spaced guides mounted on said base, an elongated member mounted for endwise movement in said guides, laterally extending rods disposed at opposite sides of said elongated member and having adjacent ends thereof apertured and overlapped, a single pivot engaged in the said apertures and connecting the overlapped ends of said rods to said elongated member, said pivot being carried by said elongated member at a point thereon substantially midway between said guides, pins rising from said base at opposite sides of said elongated member, bifurcations formed in the outer ends of said rods and engaged with said pins, and coiled springs carried on said rods between said pivot and said pins.

RICHARD H. HAYNES.