Aug. 25, 1936. J. M. DAYTON 2,052,083

CIRCUIT CONTROLLING DEVICE

Filed April 29, 1933 3 Sheets-Sheet 1

Fig. 1.

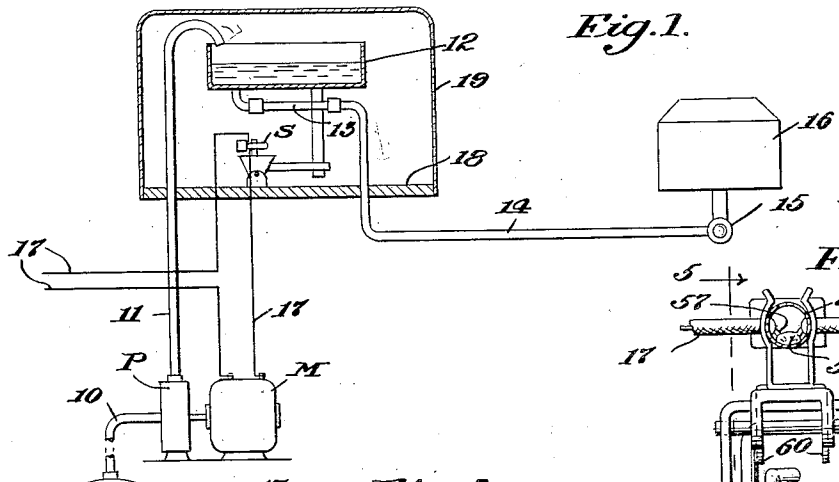


Fig. 4.

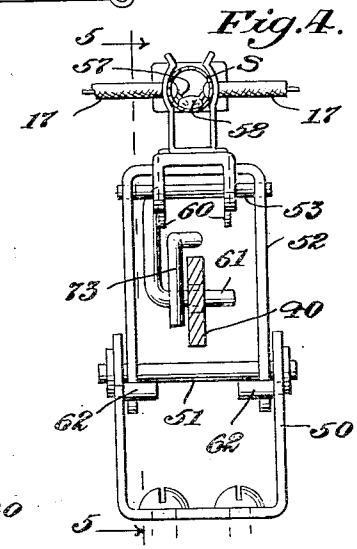


Fig. 5.

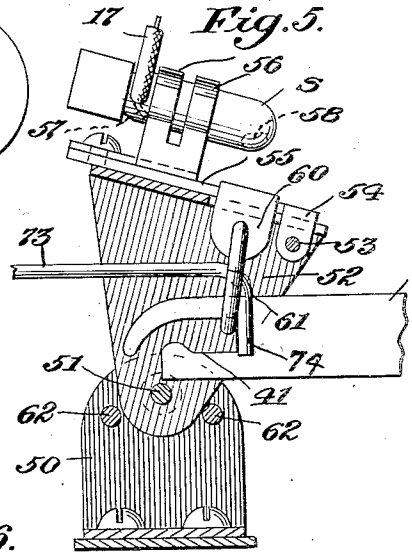


Fig. 7.

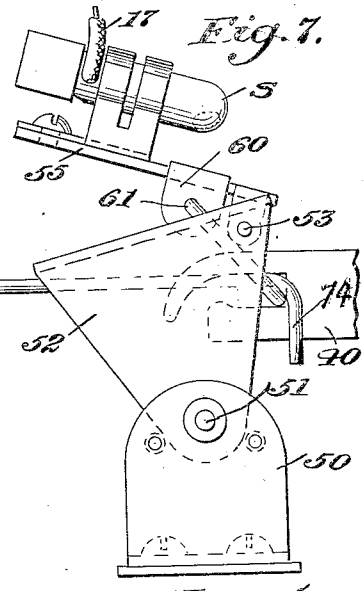
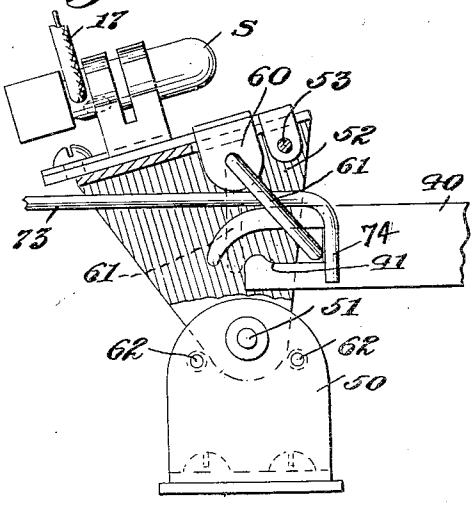


Fig. 6.



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CIRCUIT CONTROLLING DEVICE

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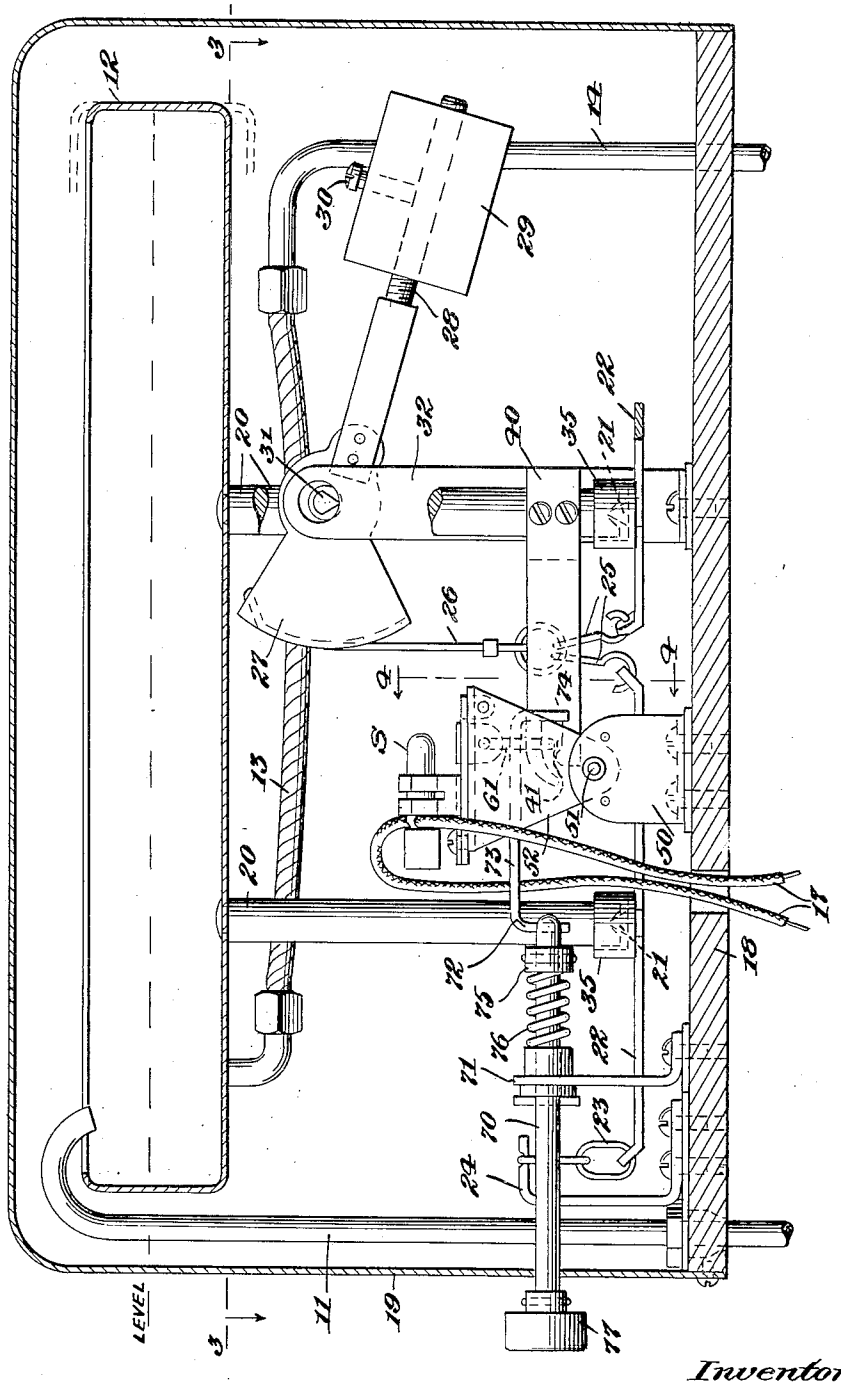


Fig. 2.

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CIRCUIT CONTROLLING DEVICE

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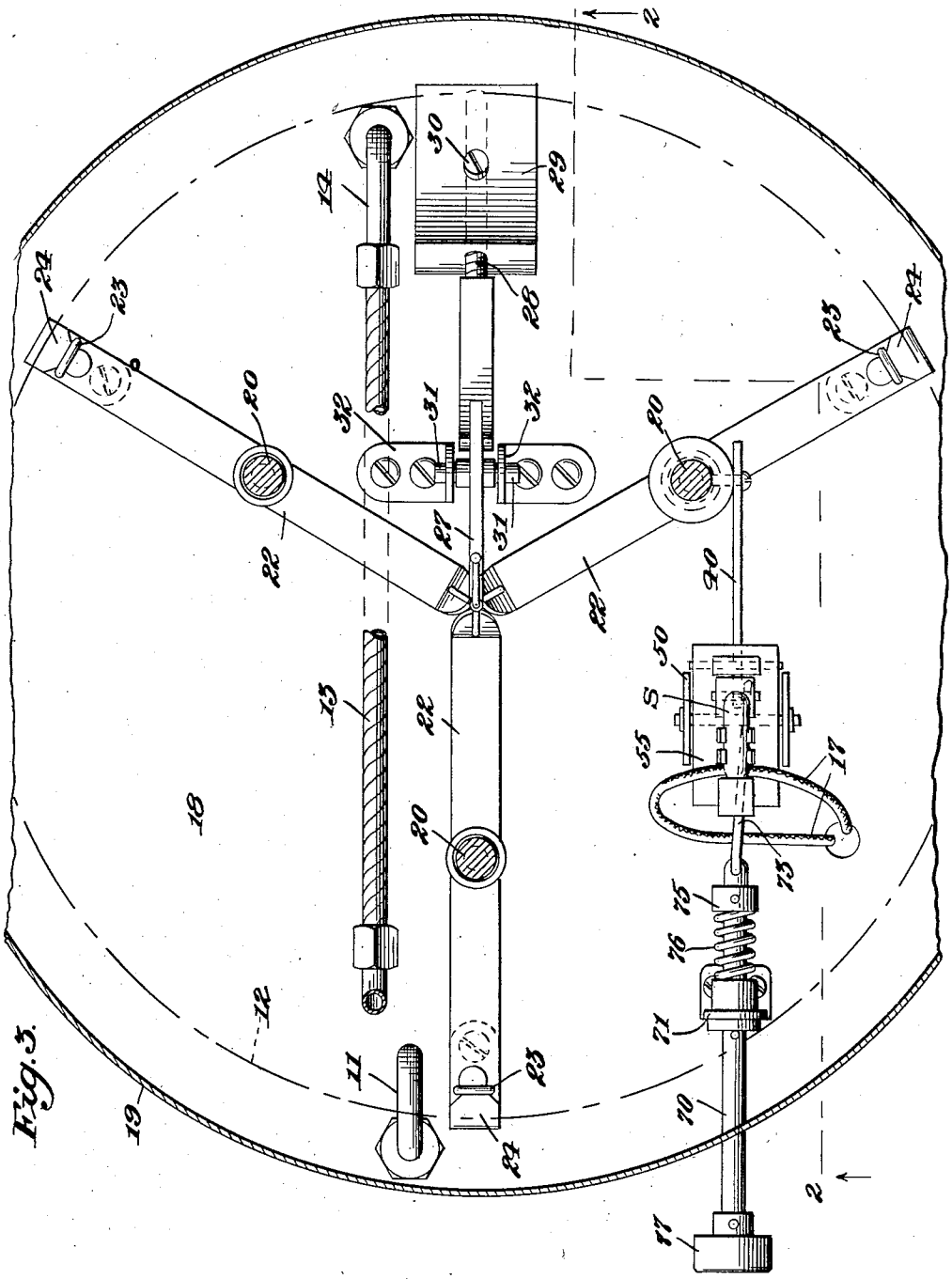


Fig. 3.

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2,052,083

CIRCUIT CONTROLLING DEVICE

James M. Dayton, Torrington, Conn.

Application April 29, 1933, Serial No. 668,669

5 Claims. (Cl. 200—85)

This invention relates to a circuit controlling system, and is particularly concerned with a circuit maker and breaker which is selectively operated according to certain conditions of the system to be controlled.

One of the features of the present invention is the provision of a circuit controlling device which is selectively operated for making and breaking a circuit at certain limiting positions of the apparatus under control, in conjunction with means for obtaining a safety circuit control upon the happening of a non-normal condition of the apparatus to be controlled.

Another feature of the present invention is the provision of a circuit maker and breaker which is actuated by the apparatus under control to produce the making and breaking at opposite limits of position of the apparatus, together with means for accomplishing a further breaking of the circuit when one end limit is exceeded, together with means for re-positioning the parts for further normal operations.

Other features of the invention relate to the details of assembly and construction as will appear hereinafter. One form of construction of the system and its parts is illustrated on the accompanying drawings.

In the drawings,—

Figure 1 is a conventionalized diagrammatic view showing the connection of the system for withdrawing a liquid from a primary storage tank and delivering it to a consuming device under a maintained constancy of head of pressure.

Figure 2 is an upright sectional view of the control apparatus substantially on line 2—2 of Figure 3.

Figure 3 is a horizontal sectional view substantially on line 3—3 of Figure 2.

Figure 4 is a detail sectional view, on a larger scale, substantially on line 4—4 of Figure 2.

Figures 5 and 6 are diagrammatic views representing successive positions of moving structures substantially on line 5—5 of Figure 4.

Figure 7 is a corresponding side elevational view, showing diagrammatically the position of the parts at another condition of operation.

In the drawings, the main storage tank T is connected by a suction pipe 10 with a pump P and thence by a supply pipe 11 for delivering the pumped liquid into the basin or receptacle 12, from which the liquid may flow through a conduit including a flexible section 13 and a rigid section 14, to the control valve 15 by which it may be passed to a consuming device 16. In these conventional drawings, it is assumed that the consuming device 16 is an oil burner and that oil is the fluid being delivered.

Dependent upon the position in height of the receptacle 12, attained by the construction described hereinafter, a switch S is moved to open or closed position. When the basin 12 is full to the predetermined maximum, it is at its lowest position in height, and the switch S is then operated to open the supply circuit comprising the conductors 17 to the motor M which has been driving the pump P. The pump comes to a standstill, and thereafter the receptacle 12 continues its delivery of liquid through the conduit 13, 14 to the consuming device 16, from time to time and at such rates as may be controlled by the valve 15. As the liquid leaves the receptacle 12, the receptacle rises until finally the switch S is closed again, the motor M energized, and the pump P delivers a further quantity of replacement liquid into the receptacle 12.

The operating parts comprising the receptacle, its support and the switch mechanism, are on a floor 18 and enclosed in a housing 19.

As shown in Figures 2 and 3, the basin or receptacle 12 is supported by three posts 20 which are provided with conical cavities at their lower ends resting upon the conical points 21 carried by the three independent lever arms 22. These lever arms are each supported at their outer ends by independent links 23 carried by the independent brackets 24 secured to the floor 18. At their inner ends, the levers 22 are joined by links 25 to a common flexible tension member 26 which is secured to the upper end of a sector piece 27 constituting part of a counter-balancing lever having a threaded arm 28 upon which may be adjusted the counter-weight 29. A screw 30 permits maintaining the counter-weight 29 in adjusted position. The counter-weight lever 27, 28 is mounted by knife edges 31 on the standards 32 which likewise are secured to the floor 18.

For safety, the conical points 21 are surrounded by cups 35 which likewise are secured to the corresponding levers 22 but have their inner surfaces spaced from the posts 20 so that there is no interference to the relative movements of the parts.

One of the posts 20 has a control finger 40 secured rigidly thereto and extending in a substantial horizontal direction and having an open notch 41 at its free end. When the receptacle 12 is emptying, the counter-balance 29 causes a rocking of the counter-balance lever 27, 28 in a clockwise direction (Fig. 2), raising the tension member 26 and the inner ends of the levers 22 and

thus raising the posts 20 and the receptacle 12 thereon. When liquid is delivered through the supply pipe 11 at a greater rate than the withdrawal through conduit 13, 14, the weight of the receptacle and its contents causes a downward movement of the posts 20 and thus ultimately a counter-clockwise movement of the counterbalance lever 27, 28 in obvious manner. The control finger 40 takes part in these movements and its position is thus accurately determined by the prevailing position of the receptacle 12.

Rigidly mounted on the floor 18 below the free end of control finger 40 is a supporting stirrup 50 having a horizontal pivot 51 thereon for supporting the rocker piece 52. This rocker piece is illustrated as formed by bending a sheet of metal which is partly cut away at its bight. A pivot 53 on the rocker piece supports the down-turned ears 54 of a platform 55 to which are rigidly secured the clip fingers 56 which support the switch member S. In the illustrated form, this switch member S comprises a sealed glass tube having two terminals 57 therein at one end, and a drop 58 of mercury. The terminals are connected by conductors 17 to the supply and motor as described above.

The platform 55 is also provided with a pair of downwardly extending ears 60 which receive the upper leg of a U-shaped wire link 61 whose lower leg may engage in the open notch 41 of control finger 40.

Pins 62 on the supporting stirrup 50 limit the movement of the rocker 52.

A plunger 70 is guided in the side wall of the housing 19 and by a support 71 mounted on the floor 18, and has a transverse aperture at its inner end to receive the downwardly extending portion 72 of a resetting link 73 whose other end 74 is engaged to the right (Figs. 2, 5, 6 and 7) of the lower leg of the link 61. A collar 75 is secured to the plunger 70 to receive the thrust of the return spring 76 which normally holds the plunger in its righthand position. An external knob 77 on the plunger permits pulling it toward the left by hand.

The general operation of the system in supplying a fluid under a substantially constant head of pressure has already been set out. It is preferred to so construct and arrange the parts, and adjust the counter-weight 29, that the liquid level in the basin or receptacle 12 remains substantially constant with respect to a fixed point, regardless of the upward and downward movements of the basin or receptacle itself. In this way, a definite head of pressure is maintained on the consuming device 16, although obviously a very close approximation to this condition is attained in the operation of the system even without such exact counter-balancing. It has, for example, been found in practice, that a variation of about one-eighth of an inch of the receptacle 12 is sufficient to secure the operation of the control system, for starting and stopping the motor M.

While the receptacle is being supplied with liquid at a greater rate than the withdrawal thereof, the control finger 40 is being moved downwardly. Under such conditions, it drags downwardly on the U-shaped link 61 (Fig. 5) and therewith upon the ears 60 so that the rocker 52 is moved in a clockwise direction to the position shown in Figure 5. As soon as the switch S has passed the horizontal position of Figure 2, the mercury drop 58 leaves the terminals and the motor energizing circuit is opened.

As withdrawal occurs from the receptacle 12, the receptacle moves upwardly with the control finger 40. For a while, there is no actuation of the link 61, but when the lower surface of the notch 41 encounters the link 61, it forces the latter upwardly and thus causes a counter-clockwise movement of the rocker 52 into the position shown in Figure 6, in which the switch S is closed again. The motor starts, and pumping is accomplished to replenish the receptacle 12.

This intermittent operation continues so long as liquid is present to a sufficient depth in the main storage tank T.

When the main storage tank T is exhausted, the pump P cannot deliver a sufficient quantity of liquid into receptacle 12 to bring the system to the position of Figure 5, for shutting off the motor M. Under such conditions, the motor M would continue to run indefinitely until the condition of the system was observed by the attendant.

The preferred form of construction, shown in the present illustration, is not subject to this defect. When the pump is unable to deliver liquid into the receptacle 12, but withdrawal therefrom occurs through conduit 13, 14, the receptacle 12 continues to move upwardly beyond the normal predetermined high position at which the motor is started. Ultimately, the upward thrust of control finger 40 through link 61 causes a rocking of the platform 55 about the pivot 53 into the position shown in Figure 7, in which the switch S is tilted for opening. The motor is thus brought to a standstill, and the entire system is quiescent except for the delivery of the remaining quantity of liquid in receptacle 12.

When it is desired to start the apparatus again, it is necessary to place further liquid in the main storage tank T, and to pull the knob 77 toward the left (Fig. 2) manually and immediately release it. The leftward movement of the link 73 causes it to engage the lower leg of the U-link 61 and pull the latter out of the open notch 41 into the position shown in dotted lines in Fig. 6. The platform 55 by gravity and the action of associated parts then moves back into the position thereof shown in full lines in Fig. 6. The motor circuit is closed, and the pump P again delivers liquid into the receptacle 12. As the receptacle 12 moves toward a lower position, the control finger 40 moves with it until ultimately the open notch 41 comes opposite the lower leg of link 61 so that the latter may enter and return to the former position.

It is obvious that the invention is not limited solely to the form of construction shown, but that it may be modified in many ways within the scope of the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a switch structure for operation by a reciprocable control member normally moving between end positions determined by devices energized by circuits controlled by the switch and abnormally moving beyond one said end position in which the switch is closed, a switch member, a holder for said member, a link pivoted on one of said members and normally engaged in a notch of the other said member for moving the holder in accordance with the movement of said control member to open and close the switch and to reopen the switch after movement of said control member beyond said one end position thereof, and a device for removing said link out of said notch whereby to effect a reclosure of the switch from reopened position.

2. A switch structure as in claim 1, in which the control member and link include devices operating automatically during the subsequent movement of said control member to restore the link into said notch.

3. In a switch structure for operation by a reciprocable control member normally moving between end positions determined by devices energized by circuits controlled by the switch and abnormally moving beyond one said end position at which the switches close, a circuit breaker which when angularly positioned with one end down operates to close a said circuit and when angularly positioned with the other end down operates to open said circuit, a rocker moving between end positions, a support for the circuit breaker pivotally mounted on said rocker and normally moving therewith to open and close said circuit breaker at the end positions of said rocker, and a connection between said control member and said support operative for moving said rocker during the normal movement of the control member between its said end positions, and operative during the abnormal movement of the control member to move said support about its pivotal mounting on said rocker to effect a reopening of the circuit breaker.

4. A switch structure as in claim 3, in which the control member has a notch in its end and the connection is a link pivoted to the support and normally resting in said notch, and in which means are provided for disengaging said connection from the notch to permit a reclosure of the circuit breaker after said support has been moved relative to said rocker.

5. A switch structure as in claim 3 in which the control member has a notch in its end and the connection is a link pivoted to the support and normally resting in said notch, and in which means are provided for disengaging said connection from the notch to permit a reclosure of the circuit breaker after said support has been moved relative to said rocker, and in which said control member includes a structure providing one wall of said notch and extending beyond the portion providing the other wall of said notch for engagement with said link after it has been removed from its normal engagement and operative thereupon to return said link to its normal engagement.

JAMES M. DAYTON.