

Aug. 5, 1941.

C. W. WADE ET AL

2,251,385

MERCURY SWITCH ACTUATING MEANS

Filed Aug. 14, 1940

2 Sheets-Sheet 1

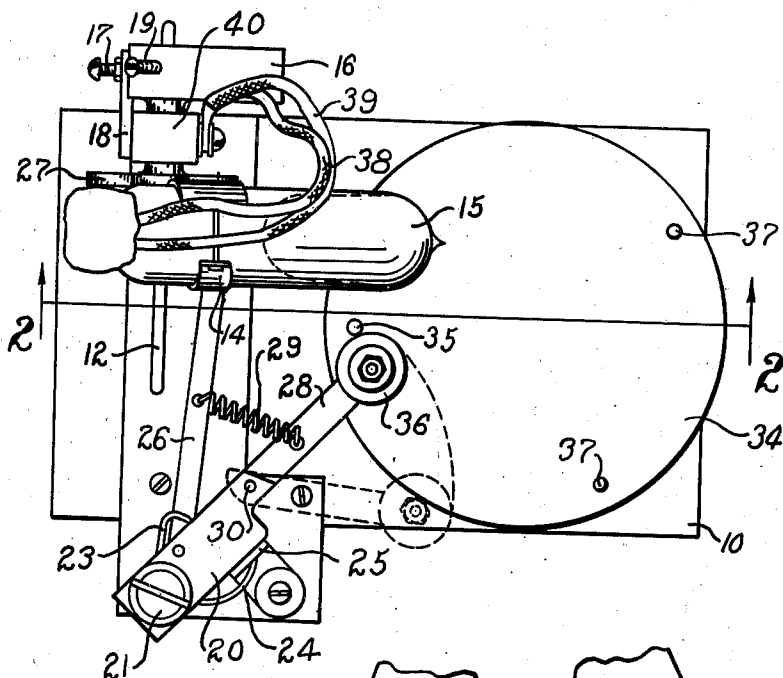


Fig. 1

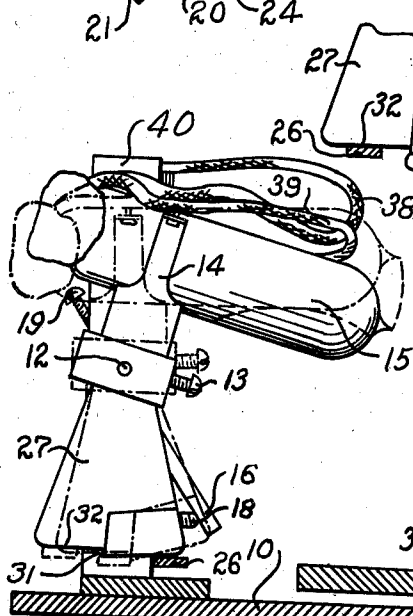


Fig. 2

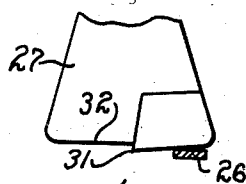
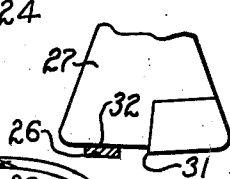


Fig. 3

Fig. 4

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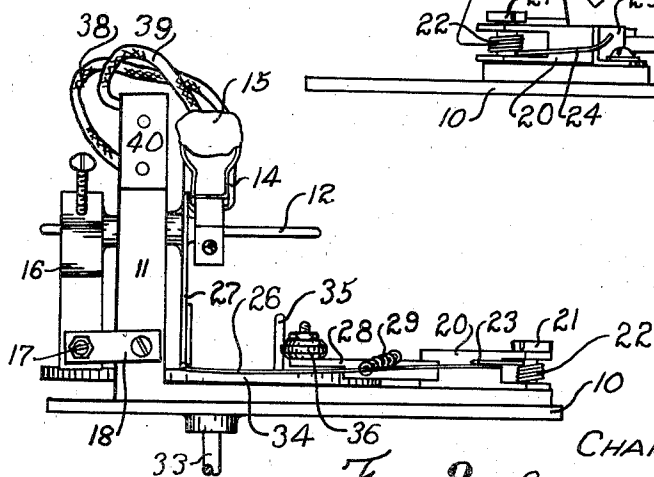
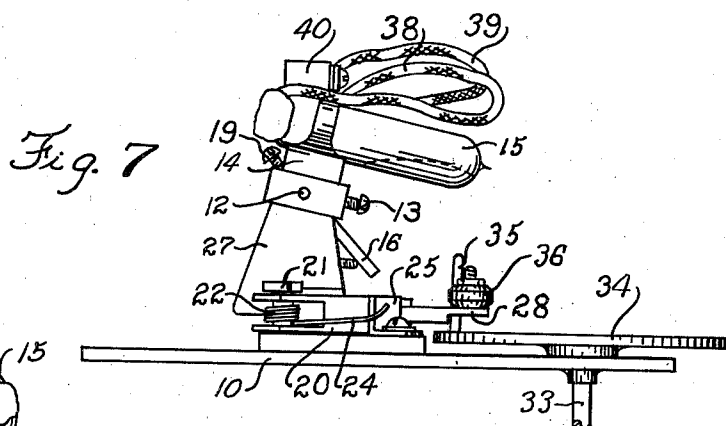
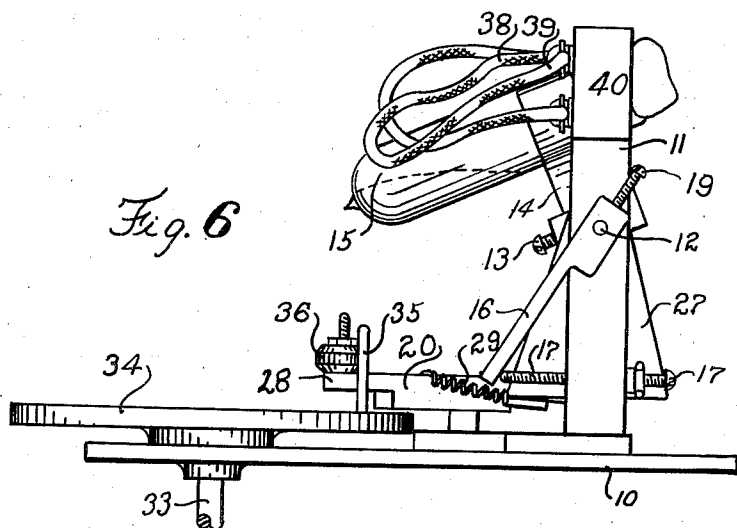
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MERCURY SWITCH ACTUATING MEANS

Filed Aug. 14, 1940

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,251,385

MERCURY SWITCH ACTUATING MEANS

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Application August 14, 1940, Serial No. 352,498

7 Claims. (Cl. 200—32)

This invention relates to means for rocking a mercury tube switch and particularly to such means as will actuate the switch where the circuit is to be closed or broken for a very short interval of time.

An important advantage of the invention is that by a very simple mechanism the switch may be actuated in a closely timed cycle as may be determined by a revolving member in such manner that the switch will not be actuated upon reverse travel of that revolving member. A further important advantage of the invention is that such means are embodied in a novel manner permitting very low cost of production and yet at the same time permitting accurate operation over a long period of time.

These and many other objects and advantages of the invention will become apparent to those versed in the art in the following description of one particular form of the invention as illustrated in the accompanying drawings, in which—

Fig. 1 is a top plan view of a structure embodying the invention;

Fig. 2, a vertical section on the line 2--2 in Fig. 1;

Fig. 3, a detail illustrating the actuating finger in the normal position;

Fig. 4, a like detail showing the finger shifted back of the switch actuated position;

Fig. 5, a similar detail showing the finger in its position immediately following actuation of the switch;

Fig. 6, a view in side elevation;

Fig. 7, a view in opposite side elevation; and

Fig. 8, a view in rear elevation.

Like characters of reference indicate like parts throughout the several views in the drawings.

Upon any suitable base, such as the plate 10, is mounted an upright post 11. This post 11 carries a transverse shaft 12 to which is adjustably fixed, by means of a set screw 13, a mercury tube switch holder 14 comprising in the usual manner a pair of spaced apart clips between which the switch 15 is compressively engaged. Also fixed to this shaft 12, herein shown as on the other side of the post 11, is a switch position biasing weight 16 normally dropping by its lower end against the end of the adjusting screw 17 that is carried by a bracket 18 extending from the post 11 near its base. The weight 16 is adjustably positioned on the shaft 12 and there secured by means of a set screw 19.

The purpose of the weight 16 is to rock the switch 15 to either the "on" or the "off" positions as may be desired, the switch herein being shown

as normally rocked by the weight to the "off" position, the final resting position of the switch 15 being determined by the adjustment of the screw 17.

To one side of the post 11 is mounted a rocker arm 20 by any suitable means, such as the screw 21, so that the arm 20 may swing horizontally. A torsion spring 22 surrounds the pivot screw 21 to have one end 23 bear against the back side of the arm 20 and the other end 24 bear against the front side of a stop 25 against which the arm 20 is urged and normally positioned by means of the spring 22.

A spring arm 26, herein shown as a leaf spring, is fixed to the arm 20 to extend from its rear side over and under the rocker 27 that is fixed to the shaft 12. The arm 20 carries a hinged extension 28 that is normally maintained in an extended position by means of a tension spring 29 inter-engaging the spring arm 26 and the extension arm 28, the extension arm 28 being secured to the arm 20 by the pivot pin 30, Fig. 1. The inner end of the extension arm 28 is brought into abutment with the arm 20 by the spring 29 to limit backward travel of the extension arm 28 toward the spring arm 26, but permitting reverse travel as indicated by the dash lines in Fig. 1.

The rocker 27 has an under surface against which the spring arm 26 yieldingly bears. As best indicated in Figs. 3-5, this under surface permits the spring arm 26 to bear normally against a rear portion, as in Fig. 3. This under surface of the rocker 27 is stepped to form a shoulder 31 against which the spring arm 26 may be shifted to rock the rocker 27 to a position as indicated in Fig. 4 where the straight cam portion 32 of the rocker 27 will push the spring arm 26 downwardly beyond the step or shoulder 31 to allow the rocker 27 to return rearwardly while the spring arm 26 moves on relatively to the position shown in Fig. 5, the combined mass of the switch tube 15 and the weight 16 causing the return movement of the rocker 27. Then the switch arm 26 may be moved rearwardly again to the position shown in Fig. 3 without imparting any movement to the rocker 27 by frictional drag of the spring arm 26 against the under side of the rocker, since the weight 16 is then bearing against the stop screw 17. The spring 22 normally holds the spring arm 26 and returns it to that position as indicated in Fig. 5.

To set up the travel of the spring arm 26 to shift the rocker 27 and in turn the switch 15, any suitable drive means may be employed to push the extension arm 28 rearwardly to carry the spring arm 26 to some such position as indicated in Fig.

3. In the present form, this driving means comprises a shaft 33 on the upper end of which is mounted a disc 34 that carries at least one upright pin 35. The pin 35 is located at the proper radial distance from the center of the disc 34 to be in the path of the outer end of the arm 28 so that, upon clockwise travel, Fig. 1, the pin 35 will strike that arm to push it back and consequently push the spring arm 26 back accordingly. In the present form of the invention, instead of striking the extension arm 28 directly, a roller 36 is mounted on the outer end of the extension arm 28 to be in the path of the pin 35 whereby the pin will strike that roller 36 to push the extension arm 28 back out of the way with a minimum amount of friction. It is understood, of course, that when the arm 28 is moved backwardly by the pin 35, the arm 20 is moved accordingly to in turn move the spring arm 26 likewise. The purpose of hinging the extension arm 28 to the arm 20 is to prevent damage to the various parts should the disc 34 and its pin 35 be moved in a counterclockwise direction. In that event, the extension arm 28 would be shifted to the dash line position without setting up any travel of the spring arm 26 or the arm 20 which is in abutment with the stop 25.

The number of operations per revolution of the disc 34 may, of course, be varied in accordance with the number of pins 35 carried by the disc 34. As indicated, holes 37 are provided in the disc 34 to receive additional pins 35 as may be desired.

The structure above described will cause an operation of the switch 15 once each revolution of the disc 34, this operation consisting of a closure of the switch following shifting of the spring arm 26 rearwardly of the step 31 on the rocker 27 and the return of that spring arm 26 to its normal position, Fig. 5, which causes the switch 15 to be rocked to its closed position and then dropped to its open position as the spring arm 26 leaves the position shown in Fig. 4. As above indicated, the shape of the under surface of the rocker 27 is such that the arm 26 is positively pushed downwardly for disengagement with the step 31 rather than relying upon a greater travel of the arm 26 which would be required in the absence of this construction. The terminal wires 38, 39 of the switch 15 are carried to any suitable location, such as the terminal block 40 which is herein shown as being mounted on the upper end of the post 11. Of course by reversely mounting the switch 15, the switch may be normally in the closed position and then actuated to an open circuit position by the structure above defined.

While we have herein shown and described our invention in the one particular form, it is obvious that structural variations may be employed without departing from the spirit of the invention and we, therefore, do not desire to be limited to that precise form beyond the limitations as may be imposed by the following claims.

We claim:

1. In a mercury tube switch actuating mechanism, a switch holder, a rock shaft on which the holder is mounted, means for biasing the holder to one end of the rocking limit thereof, a rocker attached to said shaft and having an outer surface interrupted by a shoulder, a rocker arm spring yieldingly pressing against said surface, and means for reciprocating said arm spring through an arc of travel to carry the arm spring initially across and back of said shoulder and allowing the arm spring to return against the

shoulder thereby to swing said rocker arm and consequently said switch from its biased position.

2. In a mercury tube switch actuating mechanism, a switch holder, a rock shaft on which the holder is mounted, means for biasing the holder to one end of the rocking limit thereof, a rocker attached to said shaft and having an outer surface interrupted by a shoulder, a rocker arm spring yieldingly pressing against said surface, and means for reciprocating said arm spring through an arc of travel to carry the arm spring initially across and back of said shoulder and allowing the arm spring to return against the shoulder thereby to swing said rocker arm and consequently said switch from its biased position, said surface being formed with a cam portion to push said arm spring off of said shoulder for release therefrom upon a predetermined swing of the rocker arm, whereby the switch holder is returned to control of said biasing means.

3. In a mercury tube switch actuating mechanism, a switch holder, a rock shaft on which the holder is mounted, means for biasing the holder to one end of the rocking limit thereof, a rocker attached to said shaft and having an outer surface interrupted by a shoulder, a rocker arm spring yieldingly pressing against said surface, and means for reciprocating said arm spring through an arc of travel to carry the arm spring initially across and back of said shoulder and allowing the arm spring to return against the shoulder thereby to swing said rocker arm and consequently said switch from its biased position, said surface being formed to push said arm spring off of said shoulder for release therefrom upon a predetermined swing of the rocker arm, whereby the switch holder is returned to control of said biasing means, and spring means returning said arm spring upon said release to a normal position ahead of said shoulder.

4. In a mercury tube switch actuating mechanism, a rock shaft, a switch actuated through rocking of the shaft, means biasing the shaft to one end of rocking thereof, a rocker arm carried by the shaft and having an offset in its peripheral surface, a rocker spring having a pivot to one side of said arm and compressibly bearing against said surface, means for rocking said spring across said surface in a direction in opposition to travel thereof induced by said biasing means, and a second biasing means normally returning said spring to a position forwardly of offset, whereby said spring rocking means carries the spring back of said offset for engagement therewith and said second spring biasing means swings said arm by spring abutment with the offset.

5. In a mercury tube switch actuating mechanism, a rock shaft, a switch actuated through rocking of the shaft, means biasing the shaft to one end of rocking thereof, a rocker arm carried by the shaft and having an offset in its peripheral surface, a rocker spring having a pivot to one side of said arm and compressibly bearing against said surface, means for rocking said spring across said surface in a direction in opposition to travel thereof induced by said biasing means, and biasing means normally returning said spring to a position forwardly of offset, whereby said spring rocking means carries the spring back of said offset for engagement therewith and said spring biasing means swings said arm by spring abutment with the offset, said surface being formed to press said spring downwardly out of engagement with the offset upon predetermined swing

of the arm to return the spring to a position forwardly of the offset.

6. In a mercury tube switch actuating mechanism, a rock shaft, a switch actuated through rocking of the shaft, means biasing the shaft to one end of rocking thereof, a rocker arm carried by the shaft and having an offset in its peripheral surface, a rocker spring having a pivot to one side of said arm and compressibly bearing against said surface, means for rocking said spring across said surface in a direction in opposition to travel thereof induced by said biasing means, and biasing means normally returning said spring to a position forwardly of offset, whereby said spring rocking means carries the spring back of said offset for engagement therewith and said spring biasing means swings said arm by spring abutment with the offset, a reciprocating arm carrying said spring, an extension from said last arm, a rotatable shaft, a crank pin carried off center of and rotatable with the shaft in the path of said extension, whereby rotation of the shaft will actuate said spring.

7. In a mercury tube switch actuating mechanism, a rock shaft, a switch actuated through rocking of the shaft, means biasing the shaft to one end of rocking thereof, a rocker arm carried

by the shaft and having an offset in its peripheral surface, a rocker spring having a pivot to one side of said arm and compressibly bearing against said surface, means for rocking said spring across said surface in a direction in opposition to travel thereof induced by said biasing means, and biasing means normally returning said spring to a position forwardly of offset, whereby said spring rocking means carries the spring back of said offset for engagement therewith and said spring biasing means swings said arm by spring abutment with the offset, a reciprocating arm carrying said spring, an extension from said last arm, a rotatable shaft, a crank pin carried off center of and rotatable with the shaft in the path of said extension, whereby rotation of the shaft will actuate said spring, said extension being hinged to said reciprocating arm to be rigid in effect therewith in one direction, and a spring retaining the extension in said rigid position allowing the extension to swing from its arm in the other direction to permit said crank pin to pass the extension in that other direction without shifting said reciprocating arm.

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