In connection with clothes washing machines and the like, there is provided in some instances electric switch means attached to the bottom of the machine tub actuated by means responsive to a condition of the water in the tub which may be a part of the control mechanism for the machine. My invention relates to switch means of this type and has for its object to provide an improved construction and arrangement which is simple in structure, capable of being quickly attached to and detached from the tub of the machine, and which when attached to the machine is well sealed so as to prevent leakage.

For a consideration of what I believe to be novel and my invention, attention is directed to the following specification and to the claims appended thereto.

In the drawing, Fig. 1 is a sectional view of a portion of a washing machine tub showing the improved switch mechanism mounted therein; Fig. 2 is a top plan view of the mechanism; Fig. 3 is a sectional view taken on line 3—3, Fig. 2, the mechanism being shown not attached to a tub bottom; Fig. 4 is a sectional view taken on line 4—4, Fig. 2, the mechanism being here shown attached to a tub bottom; Fig. 5 is a perspective view partly broken away, of a base ring; Fig. 6 is a bottom plan view showing the mechanism mounted in a tub; Fig. 7 is a top plan view of a modified construction; Fig. 8 is a sectional view taken on line 8—8, Fig. 7, and Fig. 9 is a sectional view taken on line 9—9, Fig. 7.

Referring to Figs. 1 to 9, I indicates a portion of the bottom wall of the tub of a domestic clothes washing machine provided with an opening 2 over which the switch mechanism is mounted.

The switch mechanism comprises a base which may be in the form of a ring 3 having upstanding ears 4, 5 and 6 provided with openings in which are fixed shafts 7 and 8. Pivotcd on shaft 7 is a lever 9 of generally triangular shape having spaced eyes 10 through which shaft 7 extends. Pivotcd on shaft 8 is a similar lever 11 having spaced eyes 12 through which shaft 8 extends. The openings in ear 4 in which shafts 7 and 8 are positioned extend entirely through the ear so that the shafts may be inserted longitudinally through such openings and into the openings in ears 5 and 6 respectively which do not extend entirely through ears 5 and 6. The shafts are held in the ears by a cotter pin 13 positioned in an opening in ring 3 adjacent to the ends of the two shafts. Lever 9 is provided with a nose 14 adjacent shaft 7 adapted to engage the actuating button 15 of an electric switch 16 and lever 11 is provided with a similar nose 17 adapted to engage the actuating button 18 of an electric switch 19. Switches 16 and 19 are shown as being rectangular in outline and as having terminals 20 to which electric conductors may be connected. The buttons are biased to their outer positions by spring means which form parts of the switches and are adapted to be moved inward to actuate the switches by turning movement of levers 9 and 11 on their pivot shafts. The switches may be of any suitable construction and may function to open and close electric circuits forming part of a washing machine control mechanism.

Within ring 3 on opposite sides thereof are walls 21 (Figs. 5 and 6) which at their ends are spaced to provide notches 22 and 23. On their edge faces walls 21 are provided with upper and lower projections 24 and 25, the adjacent faces of which are spaced to provide in substance a longitudinally extending groove 26 in each face (see Fig. 3) to which access may be had through spaces 27 and 28. Switches 16 and 19 are mounted in and held together to form a unitary switch structure by a surrounding metal band 29, Figs. 2 and 3. At opposite ends band 29 is provided with projecting tongues 30 two at each end, which are located in grooves 26. The band ends are provided also with struck out spring fingers 31, the free ends of which fit behind projections 25. Tongues 30 are of a width such that they will pass through notches 27 and 28. With this arrangement, the unitary switch structure may be positioned in the ring from the underside of the tub by passing the tongues 30 through notches 27 and 28 until the tongues strike projections 24 and thus sliding the structure sidewise to bring the tongues into the grooves 26 between projections 24 and 25. Projections 24 and 25 thus form ledges for removably supporting the switches. The sidewise movement is arrested by the switch structure engaging the wall edges 32. Spring fingers 31 are in line with projections 25. They slide along the ends of the projections and when the structure reaches its final position, they spring back of the projections to lock the structure in place. The switch structure may be removed by pushing the spring fingers 31 from behind projections 25, and sliding the structure sidewise until tongues 30 are in line notches 27 and 28.

Levers 9 and 11 are moved by arms 33 and 34 which are fixed to the levers at one end and have operating means at their other ends. In the present instance, the operating means for arm 33 is a float 35 which will effect actuation of switch 16.
in response to water level in the tub; and the operating means for arm 34 is a cup 38 which will effect actuation of switch 19 in response to the water level in the cup. Movement of cup 38 is opposed by a coiled spring 37, Fig. 4, positioned between a shelf 39 cast as a part of ring 3 and the underside of lever 11. Movement of levers 9 and 11 is limited by heads 40 engaging the under surfaces of the levers engaging the top surfaces of walls 21 as shown at the left hand side of Fig. 4 in connection with lever 9, and upward movement is limited by heads 40 engaging the under surfaces of walls 21 as shown at the right hand side of Fig. 4 in connection with lever 11.

It is important that the switch mechanism be capable of being quickly and easily attached to the bottom wall of the machine and that it be fastened with a water tight seal. To this end, I enclose the mechanism in a boot 41 of suitable water resistant, flexible material such as rubber having reinforced openings 42 through which arms 33 and 34 extend with a water-tight fit. Since the boot is flexible, it does not interfere with the movement of levers 9 and 11, deforming readily as shown in Fig. 4. The edge of the boot has an interlined flange 43 which extends under the bottom of ring 3,lapping over an annular groove 44 in the underside of ring 3 which groove defines an annular nose 45. The ring is fastened to the bottom wall i of the tub by a plurality of screws 45, two being shown in the present instance, which pass through openings in the wall i and draw the ring down tight against the top surface of wall i. Flange 43 is sufficiently thick so that normally it extends slightly beyond the under surface of ring 3 as shown in Fig. 4. When screws 45 are screwed up tight, the flange is squeezed between the annular nose 45 and the bottom of the tub as shown in Fig. 3 to form a tight seal between the ring and the tub. Nose 45 has in substance line contact with flange 43. Movement of the ring is forced into groove 44 as shown in Fig. 3. Preferably, I provide keyhole slots 47 in the tub bottom for screws 46. By employing keyhole slots I can position the screws 46 in their holes in ring 3 when the mechanism is assembled and before it is attached to the tub bottom. The mechanism as a unit can be then placed in the tub, the screw heads being passed through the large portions of the keyhole slots, and then turned to bond the screws into the small portions of the slots, and the screws tightened. This is an operation which one operator can perform quickly and expeditiously.

It is of substantial advantage to have the switch structure comprising switches 18 and 19 capable of being readily and easily attached to and removed from the ring 3 since by this arrangement the mechanism comprising the ring 3 and the parts other than the switches may be assembled and mounted in the machine. Later, the switches with the lead wires attached thereto may be attached to the ring from the underside of the machine. If the machine is to be dismantled for repairs or for other purpose, the switches may be removed from the ring 3 without detaching the lead wires after which the rest of the mechanism may be quickly removed from the machine by merely loosening screws 46.

In Figs. 7, 8 and 9, I have shown a modified construction wherein the switches instead of being carried in a frame, which is detachably mounted on the ring, are carried in a cradle 48 depending from and forming an integral part of the ring. Also, in this modification, the two levers 5 and 19 are pivoted on the same shaft 49 mounted in ears 80 on the ring. Otherwise, the structures are similar and corresponding reference numerals with the exponent a added have been applied to corresponding parts. The switches 18 and 19 can be positioned in the cradle by being inserted from the sides and are held by the end walls 51 of the cradle and spaced lugs 52 at the side edges of the cradle.

While I have illustrated and described base member 3 as being a ring, it will be understood that it need not be necessarily round as it may be of other contour. And it is to be understood that by the term ring as used in the claims, I intend to include a round base or other suitable shape.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A switch structure comprising a ring, shaft means carried by the ring, lever means carried by the shaft means, a flexible boot enclosing the ring through which the lever means projects, said boot having an interlined flange positioned beneath the ring, means for fastening the ring on the top surface of a supporting wall, and means for forming a part of the ring for detachably supporting switch means at the underside of the ring in a position to be actuated by said lever means.

2. A unitary structure adapted to be attached to a wall over an opening therein comprising a base ring, shaft means carried by the ring, a plurality of switch actuating levers pivoted on the shaft means and projecting from the top side of the ring, means for fastening the ring in sealing engagement over an opening in a wall, and means carried by the ring for supporting a plurality of switches from beneath the ring with their actuating buttons positioned to be operated by said levers.

3. A unitary structure adapted to be attached to a wall over an opening therein comprising a base ring, shaft means carried by the ring, a plurality of switch actuating levers pivoted on the shaft means and projecting from the top side of the ring, means for fastening the ring in sealing engagement over an opening in a wall, walls forming supporting ledges in the ring, and switches having means engaging said ledges for removably supporting said switches on said ledges.

4. A unitary structure adapted to be attached to a wall over an opening therein comprising a base ring, shaft means carried by the ring, a plurality of switch actuating levers pivoted on the shaft means and projecting from the top side of the ring, means for fastening the ring in sealing engagement over an opening in a wall, walls within the ring forming oppositely faceted longitudinal grooves, the walls of at least one groove having a side admission passage to the groove, a plurality of switches, and means forming projections on opposite ends of said switches adapted to be positioned in said grooves for holding the switches in the ring with their operating buttons positioned to be actuated by said levers, said projections forming means at one end being adapted to pass through said side admission passage.

5. The combination with a wall having an opening therein and keyhole slots adjacent to the
opening, of a switch structure comprising a ring, lever means pivotally mounted on the ring and projecting from the upper surface of the ring, screws carried by the lower side of the ring having heads cooperating with said slots for fastening the ring to the wall, a sealing boot enclosing the ring having an edge positioned between the ring and the wall to form a gasket, and supporting means carried by the ring to which switch means may be removably attached from beneath the ring and positioned for actuation by said lever means.

6. A unitary structure adapted to be attached to a wall over an opening therein comprising a base ring, a shaft carried by the ring, a switch actuating lever pivoted on the shaft, means for fastening the ring in sealing engagement over an opening in a wall, walls forming supporting ledges in the ring, and a switch having means for supporting it on said ledges in a position to be actuated by said lever and a spring tongue which engages a part of the ring to lock the switch in position on the ledge.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>517,528</td>
<td>Fawcett</td>
<td>Feb. 1, 1940</td>
</tr>
<tr>
<td>1,423,306</td>
<td>Catlin</td>
<td>July 18, 1922</td>
</tr>
<tr>
<td>1,986,891</td>
<td>Van Valkenburg</td>
<td>Apr. 9, 1935</td>
</tr>
<tr>
<td>1,997,873</td>
<td>Poplawski</td>
<td>Apr. 18, 1935</td>
</tr>
<tr>
<td>2,202,207</td>
<td>Johnson</td>
<td>May 28, 1940</td>
</tr>
<tr>
<td>2,343,060</td>
<td>Horning</td>
<td>Feb. 29, 1944</td>
</tr>
<tr>
<td>2,355,951</td>
<td>Coffeen et al.</td>
<td>Aug. 15, 1944</td>
</tr>
<tr>
<td>2,357,973</td>
<td>Robbins</td>
<td>Sept. 12, 1944</td>
</tr>
</tbody>
</table>