

Oct. 17, 1939.

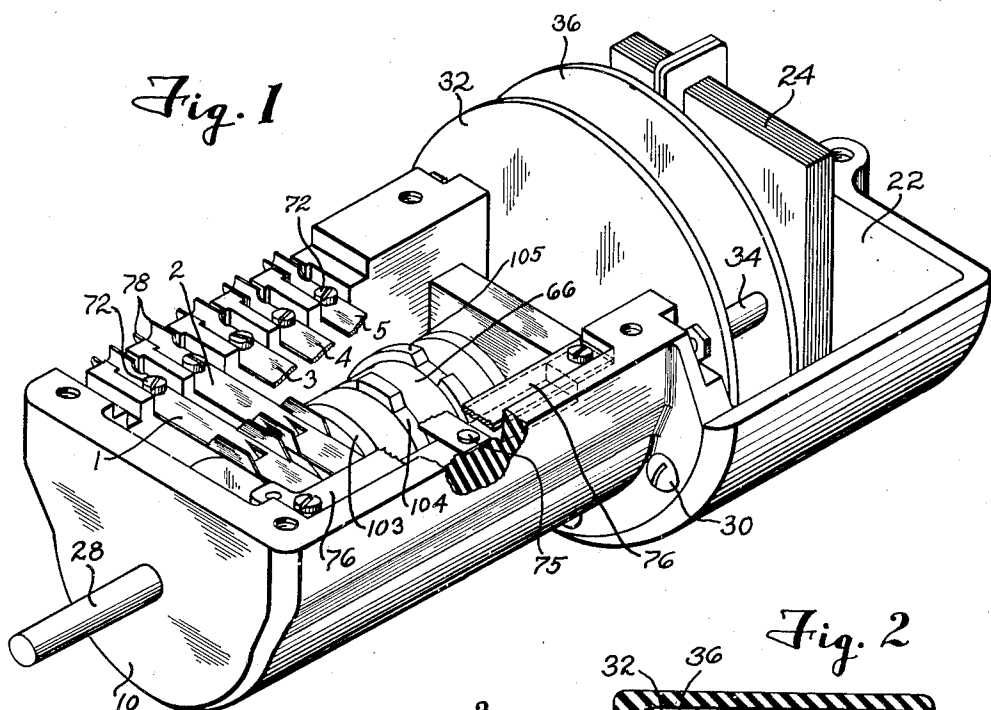
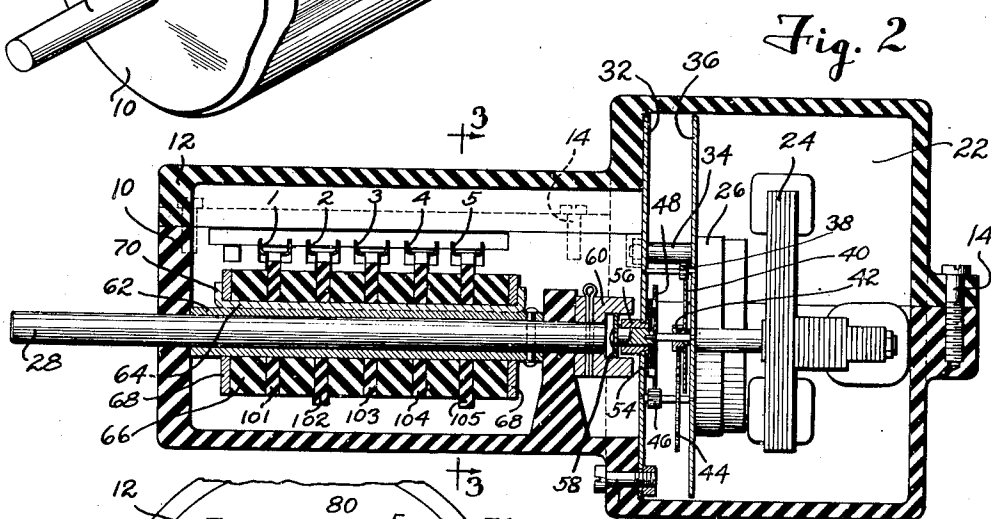
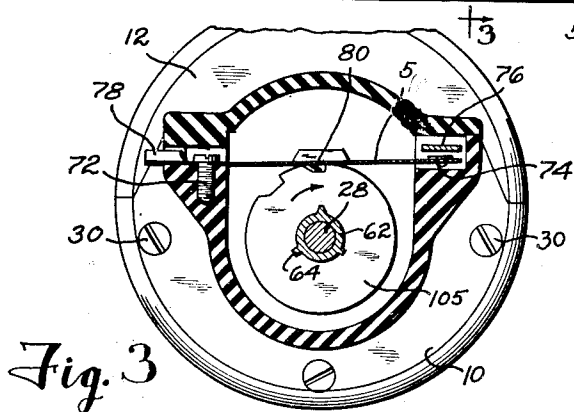
R. E. BASSETT, JR

2,176,195

SWITCH

Filed April 19, 1937

2 Sheets-Sheet 1



Oct. 17, 1939.

R. E. BASSETT, JR

2,176,195

SWITCH

Filed April 19, 1937

2 Sheets-Sheet 2

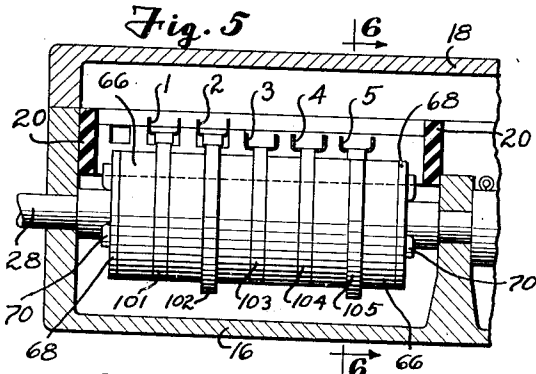
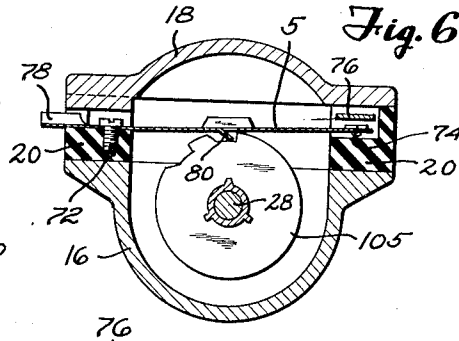
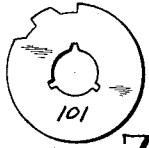
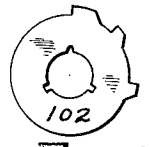
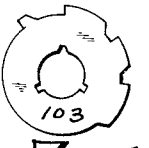
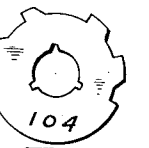
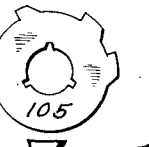


Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12

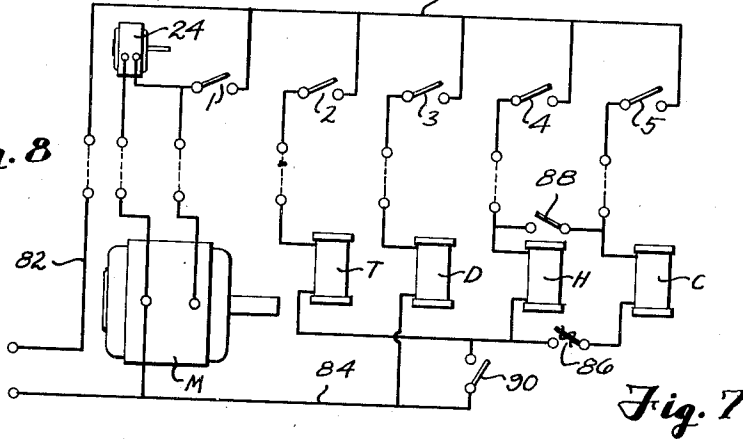


Fig. 7

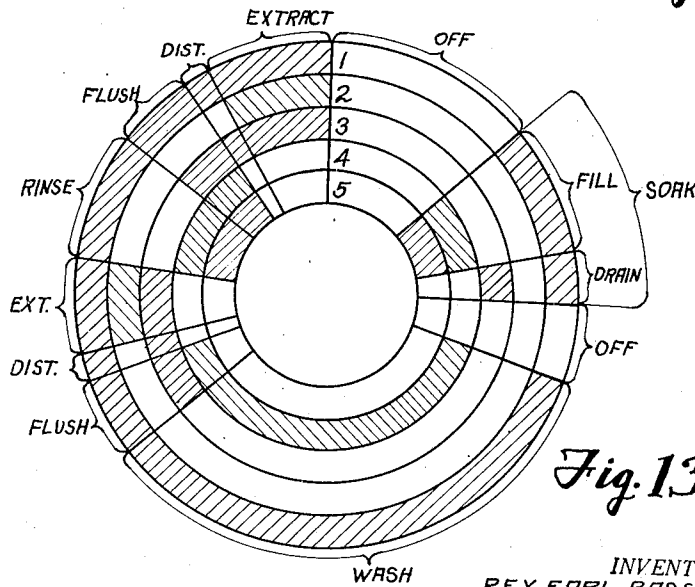


Fig. 13

INVENTOR.
REX EARL BASSETT, JR.
BY *McConkey & Booth*
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,176,195

SWITCH

Rex Earl Bassett, Jr., South Bend, Ind., assignor
to Bendix Home Appliances, Inc., Detroit, Mich.,
a corporation of Delaware

Application April 19, 1937, Serial No. 137,661

5 Claims. (Cl. 200—27)

This invention relates to controls such as switches, and is illustrated as embodied in the control switch assembly of an automatic washing machine.

An object of the invention is to provide a simple cyclic switch which can be economically built in large quantities, and the parts of which are readily accessible for repair and adjustment. Various features of novelty relate to the mounting of an electric motor or other drive means having reduction gearing associated therewith, to drive through a novel one-way drive device a shaft carrying the cams which operate the switch contacts, to the mounting of the cams as a unit with a sleeve adapted to be pressed onto the drive shaft, to the arrangement and mounting of the cam-operated contacts, and to the construction and arrangement of the casing in which these parts are housed.

The above and other objects and features of the invention, including various other novel arrangements and combinations of the various parts of the switch assembly, will be apparent from the following description of the illustrative embodiments shown in the accompanying drawings, in which:

Figure 1 is a view of the bottom section of the casing (the cover section being removed), in perspective;

Figure 2 is a longitudinal central vertical section through the entire assembly;

Figure 3 is a transverse section therethrough, on the line 3—3 of Figure 2;

Figure 4 is an exploded perspective view of a ratchet device through which the motor drives the cams;

Figure 5 is a partial section, corresponding to the lefthand portion of Figure 2, showing an embodiment in which a diecast casing is used;

Figure 6 is a transverse section on the line 6—6 of Figure 5;

Figure 7 is a wiring diagram showing the assembly used to control an automatic washing machine;

Figures 8, 9, 10, 11, and 12 are elevations of the five cams used in the device when used as in Figure 7; and

Figure 13 is an operation diagram of a washing machine controlled in accordance with Figure 7.

The switch assembly of Figures 1—3 includes a casing made up of a lower section 10 in which the switch mechanism is mounted, and a cover section 12 detachably secured thereto by suitable fastenings 14. These sections are made of

molded phenolic condensation material, as for example brown woodflour-filled "Bakelite".

Alternatively, as shown in Figures 5 and 6, the casing may comprise diecast metal lower and cover sections 16 and 18, removably holding gripped between them a block or blocks 20 of the above-described insulating material, on which the contact parts described below are mounted. I prefer to mold the material 20 all in one piece, so that it, with the contacts, forms a convenient subassembly. Some of the fastenings 14 may if desired be arranged to aid in holding the material 20.

The casing, formed in sections as described above, has one end enlarged to form a space 22 for an electric motor 24, which may be of any desired type but preferably a self-starting constant-speed type. For example, it may be a self-starting shaded-pole synchronous motor, driving a reduction gear 26. The remainder of the casing is provided with openings forming a bearing for a shaft 28 which projects beyond the casing to receive a handle (not shown) by which it may be advanced manually when desired, or which may be provided with an indicator moving over a suitable dial.

Across the end of the portion 22 of the casing, i. e. between the two casing portions, is secured by suitable fastenings 30 a plate 32, to which is secured by posts 34 a second plate 36 on which the motor 24 and reduction gear 26 are mounted. The reduction gear 26 drives a small pinion 38 driving a relatively large gear 40 on a shaft carrying another small pinion 42 driving a second large gear 44.

The shaft of the gear 44 drives another small pinion 46 which meshes with a relatively large gear 48 shown as formed with an annular series of openings 50 (Figure 4) serving the function of ratchet teeth. These openings are engaged by resilient tongues or spring pawls 52 formed laterally from a disk 54 having a shaft journaled in a bearing 56 carried by the plate 32. This shaft has secured at its end a washer 58 pressed into a socket in a drive element 60 detachably pinned to the end of the shaft 28.

The above-described gear train forms a second reduction gear mounted between the plates 32 and 36 and driving the shaft 28 very slowly through the one-way clutch or ratchet 50—52. This ratchet permits shaft 28 readily to be turned forward independently of the motor 24.

On the shaft 28 there is pinned, or otherwise drivably secured, a sleeve 62, of brass or the like, formed with ribs or keys 64 drivably seated in

notches in a series of cams 101, 102, 103, 104, 105, shown separated by spacers 66. The spacers and cams are made of suitable insulating material, as for example the above-described phenolic material, and if desired each spacer may be integral with one of the cams. The cams and spacers, with two metal end washers 68, are held in place axially on the sleeve 62 by shearing the ends of the ribs 64 and bending them radially outward to form locking tongues 70 engaging the washers 68.

Associated with each of the cams is a spring contact member 1, 2, 3, 4, or 5, stamped from resilient sheet metal and secured at one end by a fastening 12 to one side of the lower section of the casing, and carrying at its other end a contact 74 engageable with and disengageable from fixed contact-means such as a contact bar 76. Each contact finger has formed thereon at its fixed end side flanges 78, forming a socket for ready connection to a lead wire, and has midway of its length an integral downwardly turned spring lug 80 engaging the corresponding cam.

Figure 7 is a wiring diagram showing my novel multiple switch used to control an automatic washing machine of the type fully described in application No. 129,429, filed March 6, 1937, by myself jointly with John W. Chamberlin, Figures 8 to 12 inclusive show the forms of the cams when so used, and Figure 8 shows the washing and drying operation sequence when the parts are connected up as in Figure 7 and the cams are as shown in Figures 8 to 12.

In this arrangement, the contacts 1, 2, 3, 4, and 5, connect respectively between line wires 82 and 84 the main driving motor M (in parallel with motor 24), a solenoid T which controls the gear-shift means of a two-speed transmission, a solenoid D which controls the drain valve of the machine, and solenoids H and C controlling respectively hot and cold water inlet valves. A thermostatic switch 86 is connected in series with the cold water solenoid C, so that cold water is injected into the machine only insofar as necessary to hold the water temperature down to a predetermined level, and it will be noticed, that by varying the cams 104 and 105 either mixed water or all hot water can be used at different parts of the cycle if desired. In the illustrative case this has been done.

However, in the case of a washing machine for washing certain fabrics it is sometimes desirable to use mixed water in all parts of the cycle, so a manual switch 88 may be provided for cross-connecting the circuits of solenoids C and D whereby both solenoids are controlled in accordance with cam 104 and mixed water is injected at all times regardless of the form of the cam 105. A float-operated switch 90 is interposed in the connection for the transmission solenoid T, to insure that the transmission cannot be thrown into high speed unless the water is drained out of the machine, and to cut out the water supply solenoids H and C regardless of their cams 104 and 105 when the water reaches a predetermined level in the machine.

With the parts arranged as described, and as shown in detail in the above-identified Bassett and Chamberlin application, and with the cams shown in Figures 8 to 12, the machine will operate as charted in the operation diagram of Figure 13.

When the machine is ready for operation, shaft 20 and its cams are in the zone marked "off", and all five switches are open. The shaft is then

advanced manually, as permitted by ratchet 50—52, until switch 1 closes, whereupon motor 24 automatically advances the shaft with its set of cams to cause the machine to fill with water to soak the clothes, then to drain, and then to come to rest. The operator then again advances shaft 28 until contact 1 closes, whereupon the machine automatically washes, flushes, distributes the clothes uniformly about its drum, extracts centrifugally at high speed, rinses, flushes, again distributes, and finally again extracts at high speed, the machine then automatically coming to rest (with all switches open) as switch 1 opens.

While one particular embodiment has been described, and one use has been illustrated, it is not my intention thereby to limit the scope of the invention, which is defined for that purpose in the appended claims.

I claim:

1. A control switch assembly comprising a casing having therein a rotatably supported shaft and having driving means connected to one end of the shaft by means permitting the shaft to be turned forward independently of the driving means, a sleeve mounted on said shaft to be rotated therewith, a series of cams permanently mounted on said sleeve, contact means carried by one side of the casing, and a series of spring contacts secured to the other side of the casing and engaging said cams respectively and which are operated by the cams to engage and disengage the contact means, said casing comprising die-cast sections one of which has insulating blocks set into its side walls and on which the contact means and the spring contacts are mounted.

2. A control switch assembly comprising a casing divided into a lower section and a cover and one end of which is enlarged relatively to the remainder of the casing, an electric motor mounted in the enlarged end of the casing, a plate secured across the casing between the enlarged end and the remainder of the casing, reduction gearing carried by said plate and driven by said motor, a shaft rotatably mounted lengthwise of said remainder of the casing, a one-way drive connection between said shaft and said reduction gearing, a sleeve mounted on said shaft and on which are permanently mounted a series of cams, fixed contact means mounted on the upper edge of said lower section of the casing adjacent the shaft, and a series of spring contact fingers mounted on the other edge thereof and extending across said cams respectively for operation thereby to engage and disengage the contact means.

3. A control switch assembly comprising a casing, an electric motor in one end of the casing, a plate secured across the casing, reduction gearing carried by said plate and driven by said motor and having a final driven gear formed with openings, arranged in an annular series in its side, a shaft rotatably mounted in the casing and which has at one end a disk adjacent said final gear and which is provided with spring pawls engageable with said openings, cams mounted on said shaft, and contacts opened and closed by said cams as the shaft is turned.

4. A control switch having a series of cams mounted on a sleeve having longitudinal ribs forming keys securing the cams against turning, and the ends of which ribs are separate from said sleeve and upset against the end faces of

the cam series to secure them in place lengthwise of the sleeve.

5 5. A control switch assembly comprising a casing in a plurality of sections, contact means mounted on one edge of one section of the casing, a series of spring fingers each having at one end a contact engageable with and disengageable

from said contact means and each secured at its other end to another edge and each having a downwardly-turned spring lug at its center, and cyclic cams in said casing below the spring fingers and engaging said spring lugs.

REX EARL BASSETT, JR.