Nov. 13, 1962 W. HOLZER 3,064,092

REVERSAL OF ROTATION IN OPPOSITE DIRECTIONS WITH LOBES OF THE CAM

Filed April 17, 1959

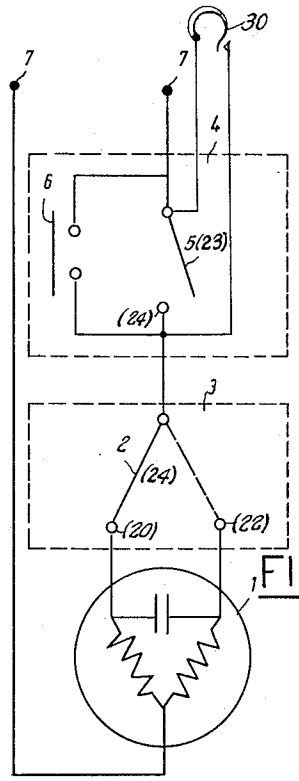


FIG. 1.

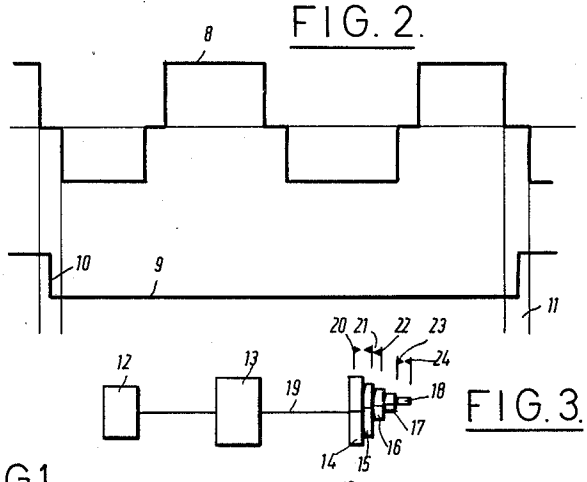


FIG. 2.

FIG. 3.

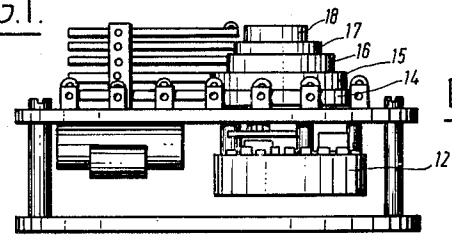


FIG. 4.

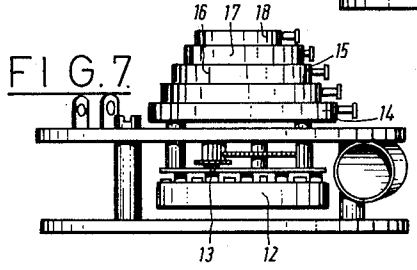
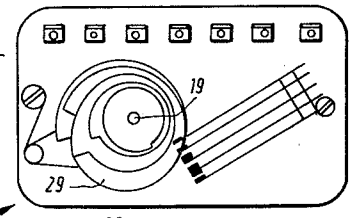


FIG. 7.



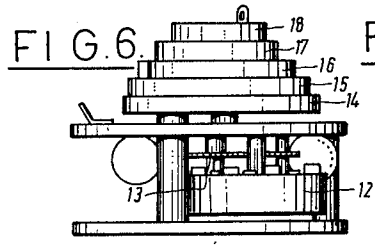


FIG. 6.

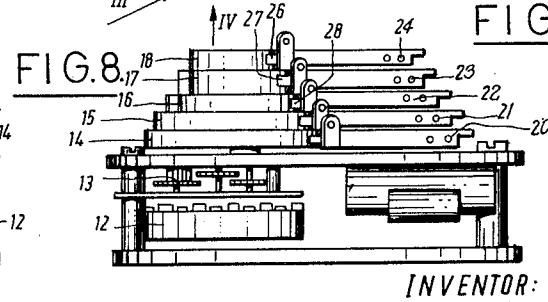


FIG. 8.

FIG. 5.

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REVERSAL OF ROTATION IN OPPOSITE DIRECTIONS WITH LOBES OF THE CAM

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1 Claim. (Cl. 200—38)

The invention is related to a cam operated switching device which is particularly useful for controlling a washing machine having a washing drum to be rotated alternately in opposite directions. The control unit described in the invention arranges for the period of rotation in each direction to be extended while the liquid in the washing machine is being heated to washing temperature (slow gear), and shortened when the washing temperature has been attained (washing gear), or extended or shortened at will.

The purpose of the invention is to render such a cam-operated control unit easier and cheaper to manufacture and adjust.

Cam operated switches are known in the art in which a plurality of cams are mounted on a common shaft in axially spaced relationship while every single cam operates upon a pair of contacts independent from each other. The adjustment of such cams is difficult and the manufacture thereof is expensive because they have to be of hard material, sufficient to withstand combined axial and radial pressure without becoming dislocated.

The purpose of this invention is to avoid the disadvantage of this known arrangement. The cam lobes are so designed that all the required cams can be combined into a unitary multi-lobe cam which can be pressed out in a single operation, thus avoiding waste of time and money on subsequent accurate adjustment of the lobes of the cam relative to each other.

Another object of this invention is to bring about more accurate and reliable operation of a cam operated switching control unit.

According to the present invention a cam-operated control unit is provided for washing machines with a washing drum alternately rotated in opposite directions, in which all the cams required for the actuation of contacts controlling rotation of the washing drum are formed into a unitary multi-lobe cam fixedly mounted on a single shaft and operating a plurality of contacts for reversing direction of rotation of the washing drum and controlling the length of time for which the washing drum is rotated in a given direction. The contacts are preferably provided with smoothing tongues bearing on the cams, and at least one of the contacts may be adapted to make contact with either of two contacts adjacent to it. Certain of the cam lobes and their associated contacts may control the reversal of rotation of the washing drum, while other cam lobes and contacts may control the length of time for which the washing drum is permitted to rotate in a given direction.

A reduction gear is no longer necessary for the actuation of the contacts controlling the selection of slow gear or washing gear, as such contacts are operated in the invention by cam lobes forming a unit with the cam lobes controlling the reversal of the rotation of the washing drum. The unitary multi-lobe cam which is made up of all these cam lobes is so designed that it can easily be manufactured in one piece by a die-casting or pressing process, thus avoiding the necessity for difficult and expensive fabrication of separate cam lobes which would have to be assembled with great care and accuracy to obtain the same result as that given by the said unitary multi-lobe cam.

It is necessary to provide smoothing tongues attached to the contact springs in order to ensure smooth and accurate operation of the contacts by the cam lobes, which are so shaped as to effect gradual closure and very abrupt opening of the contacts, thus avoiding arcing and erosion of the contacts.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a diagram of the electrical connections to a single phase washing machine motor;

FIG. 2 is a diagram of the electrical impulses for washing gear and slow gear;

FIG. 3 is a diagram of the arrangement of the cam-lobes and contacts, showing also the driving motor and gearing of the control unit;

FIG. 4 is a front view of the control unit, showing the stepped cam lobes and the contacts;

FIG. 5 is a top view of the control unit;

FIG. 6 is a side view of the control unit in the direction of the arrow II;

FIG. 7 is a side view of the control unit in the direction of the arrow III; and

FIG. 8 is a back view of the control unit.

FIG. 1 shows diagrammatically a motor **1** of a washing machine, which is provided with a two-way contact **2** for switching it in opposite directions of rotation. Such switching is effected by moving the contact from the position denoted on the drawing by continuous lines to that denoted by interrupted lines. That section of the control unit which controls the reversal of rotation is enclosed within a border **3**. A border **4** encloses that section of the control unit which controls the selection of washing gear or slow gear by means of a contact **5**, which may be bypassed by a hand switch **6**. The numeral **7** in FIG. 1 designates the main electrical supply.

FIG. 2 represents diagrammatically the electrical impulses **8** of the washing gear, rotation of the motor in opposite directions being represented by the horizontal lines above and below the zero line. If the contact **5** is open, either the washing gear or the slow gear may be selected. The electrical impulse **9** of the slow gear shows that while the contact **5** is closed the electrical impulses of the washing gear between switching intervals **10** and **11** of the control unit become ineffective, and articles in the washing drum are turned over and over by rotation of the washing drum in opposite directions for longer periods in each direction than when washing temperature has been attained. When washing temperature is reached, the contact **5** is bridged by a thermocontact **30**, and washing gear is selected. The contacts **2** and **5** are operated by lobes on a multi-lobe cam, made according to the invention in stepped form, and driven by a motor **12** through a gear **13**. As can be seen from FIGS. 1 and 2, contact **2** (upper curve in FIG. 2) is more frequently operated upon than contact **5** (lower curve in FIG. 2). All the lobes or cams **14**, **15**, **16**, **17** and **18** of the multi-lobe cam are pressed out in one piece, and are fixed on a driving shaft **19**. Contacts **20**, **21**, **22** which control reversal of the washing drum, and contacts **23**, **24** which control selection of slow gear or washing gear, are all operated by lobes of the multi-lobe cam. The contacts **20**, **21**, **22** correspond to the contact **2** of FIG. 1, and the contacts **23**, **24** correspond to contact **5** of FIG. 1.

From FIG. 8 it can be seen that the contact **21** has adjacent contacts **20** and **22**, and that the contact springs bear on the cam lobes with tongues **26**, **27**, **28**. From FIGURE 5 it can be seen that the cam lobes operating the contacts have intermediate stages **29** so that, for instance, the contact **21** is slowly pressed by the projecting part of the cam lobe against the contact **20** which is above it, and then, by falling down on to the intermediate stage **29**, opens abruptly and from then on is again forced up into a closed position against the contact **21** which is over it.

It is then again separated abruptly from the contact 21, when the tongue falls once more on to the intermediate stage.

When the washing machine of this invention is switched on for operation, switch number 5 will be open and accordingly the washing machine motor 1 will be stopped while the water in the machine is being warmed. At the same time, the motor 12 for the control unit is rotating to rotate the shaft 19 with the cam lobes thereon. While the contacts which energize the reversal of the motor are actuated by the cam surfaces, these contacts will be ineffective to reverse the washing machine motor 1, since the switch 5 is open.

The switch 5 is overbridged by the thermocontact 30 to start the motor 1 when the water temperature reaches a desired level. At this time the contacts which control the reversal switch 3 will be effective to reverse the rotation of the motor 1, as shown.

The motor 1 may be started before the water reaches a pre-determined temperature by manually closing the bypass switch 6. Closing of the switch 6 will enable the reversal switch 2 to become effective to reverse the washing machine motor 1, as described above.

As the cam lobes rotate the contact 21 will be pushed to engage contact 22 and accordingly the motor 1 will rotate in one direction. As the cam lobe continues to rotate the contact 21 will be disengaged from contact 22 and the contact 21 will subsequently engage contact 20 so that the motor 1 will rotate in the other direction.

It will also be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions, and accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claim.

What I claim is:

A switching device, the combination comprising: a base

member; a first, second, third, fourth and fifth cam mounted for common rotation on said base member and axially decreasing in diameter with the first cam being the one having largest diameter and being positioned closest to said base member; a first, second, third, fourth and fifth resilient contact with tongues, engaging said first to fifth cam, respectively; means for mounting said arms on said base member in vertical, laterally staggered relationship so as to follow laterally and vertically the decreasing diameter of said cams; and a contact on each arm, said cams being so shaped that the contact of said second arm alternatingly making contact with the contact of said first and third arm, the contacts of said fourth and fifth arm alternatingly making and breaking contact less frequently than said alternating contact making of said second arm with contact.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,064,092 November 13, 1962

Walter Holzer

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, between lines 6 and 7, insert -- Claims priority, Germany Apr. 28, 1958 --.

Signed and sealed this 25th day of June 1963.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents

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