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(54) **Washing system for washing machines and dishwashers built to operate at low voltage.**

(57) Washing system comprising a transformer (1'), preferably of the controlled-reluctance type, which decouples the components (2',3',4',5',6') of the said system from the mains (10), supplying them at a low voltage, and a resistor (5') formed by tungsten wires

inserted inside a ceramic-fibre tube and placed inside a steel tube which is formed into a U and provided with suitable holes to allow the partial contact of the said resistor with the washing fluid.

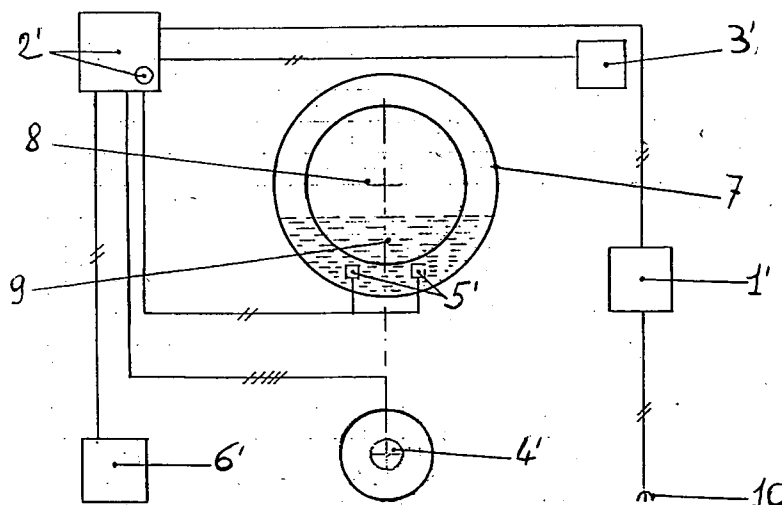


FIG. 3

The present invention relates to a washing system for washing machines and dishwashers whose components, such as the washing and spin-drying motor, discharge pump, high-pressure pump, timer motor and solenoid valves, are built to operate at a low voltage.

As is known, in washing machines and dishwashers currently on the market, the washing water is heated by the introduction of an electrical resistor, usually of 2,000/2,400 or more watts, and at 220/240 volts.

Also known are the disadvantages of the above system: these may be summarised as the high energy consumption which limits the simultaneous use of other household electricals, the heavy final consumption with a poor heating efficiency, and the danger to the user from the unreliability of the earthing means. Moreover the power of conventional resistors, expressed in a large number of calories per cm² causes dissociations, and the limescale produced is not only harmful to fabrics and tableware but also accumulates on the resistors themselves so that right from the earliest use the heating efficiency is limited, leading progressively either to longer washing cycles, with a consequent increase in consumption, or to a decline in the quality of the wash.

The object of the present invention is to provide a washing system for washing machines and dishwashers, whose components operate entirely at a low voltage of as little as 48/42 volts.

Another object is for the decoupling of the said appliances from the mains to be effected by means of a transformer, preferably of the "controlled reluctance" type, where the primary consists of two windings: these windings are connected in parallel with subtraction of potential difference and have an equal number of turns which are wound clockwise in the first primary and anticlockwise in the second primary.

Still another object is for the water to be heated and the detergent activated by an appropriate resistance that is also able to soften the water by ionisation and radiant magnetism with a variable scanning frequency, preventing the deposition of limescale.

Other objects and advantages will appear from the description which follows and from the appended plates which illustrate, diagrammatically and by way of example, one embodiment of the system of the present invention.

With reference to said plates

- Fig. 1 diagrammatically shows a transformer of the "controlled reluctance" type;
- Fig. 2 illustrates the particular shape of the resistor used in the present system;
- Fig. 3 shows a block diagram for a washing machine operating at a low voltage.

Fig. 1 shows the first primary winding X-Y, which is wound clockwise, the second primary winding Z-U, which is wound anticlockwise, the secondary winding S-S, and the core N. The transformer, of the controlled reluctance type, acts on the conducting materials in such a way as to cause them to transmit the energy they contain, and that from the apparent state of rest, for a normal natural configuration, they pass to a state of disturbance of the equilibrium which is not recovered for momentary loss of the initial configuration.

Fig. 2 shows the stainless steel tube 1 bent into a U and provided with the holes 2a, 2b and 3a, 3b, the diameters of which latter pair may be half those of the former pair; and three tungsten wires 7 twisted together and formed into a spiral as shown at 4. The distances between the said holes and the number of these may in some degree vary the final efficiency.

This gives a 1.7 ohm resistor which is connected to the controlled-reluctance transformer, which reduces the original voltage from a mains input of 220 volts to an output on the secondary of 48/42 volts.

The said spiral 4 is inserted inside two layers of ceramic-fibre tube 5, and this assembly is placed inside the said tube 1.

Fig. 3 shows the electrical connection 10 to the washing machine mains supply, which is at normal voltage; the controlled-reluctance transformer 1' which reduces the voltage to 42 volts, off which all the machine's components run, in particular the timer with motor 2', the solenoid valve 3', the washing and spin-drying motor 4', the discharge pump 6', the resistor 5' immersed in the washing water 9 in the washing drum 7 containing the rotating basket 8. Clearly, if the operating voltage is reduced, the number of turns of the windings must be reduced, with a consequent increase in the cross section of the conductors employed and with a consequent increase in the magnetic efficiency owing to the reduced resistance of the thinner conductors.

Through the holes 2a, 2b and 3a, 3b, the water enters the tube 1 and the amount thereof becomes isolated from that contained in the drum. As soon as the power is turned on the resistor 5' heats up the interior of the tube 1, raising the pressure sufficiently to overcome the outside pressure, but at this point the water contained inside the tube 1 has already turned to gas and, at great speed, rises to the top layers with little absorption of heat. This is because, owing to the effect of the electrical element's carrying current and its being immersed in, and in contact with, the water, and owing to the period of relaxation due to the two primaries of the controlled-reluctance transformer, a true half-wave rectification is produced inside the tube 1 and

smoothed out by the capacitor formed by the tungsten resistor and the steel tube by way of plates, and by the ceramic fibre by way of dielectric. This capacitance is variable since it is sensitive to the increase in temperature inside the tube, which produces the operating frequency with the cycles of expulsion down to very low levels of water introduced in each cycle.

This therefore gives a very fast constant progressive heating of a small amount of the water provided for the washing process.

The amount of active oxygen produced is equal to or greater than that chemically obtainable with outside additives that could be introduced and the softening of the water leads in consequence to a homogeneous and regular consumption of the detergent necessary for the washing process, without the need to increase the latter in proportion to the hardness of the water.

The present invention achieves the object set out, and in particular makes it possible to wash fabrics and tableware even at temperatures of less than 20/30 °C, with an energy saving of more than 60% and low manufacturing costs for the components of the system.

The present invention, as illustrated and described diagrammatically and by way of example, is to be understood as extending to those subsidiary variants which, as such, fall within its scope.

Thus, for example, in the practical embodiment, the dimensions and materials employed may vary according to requirements without thereby departing from the scope of protection of the following claims.

Claims

1. Washing system for washing machines and dishwashers built to operate at a low voltage, characterised in that it comprises in combination a transformer, preferably of the controlled-reluctance type, which supplies the components of the system by reducing the operating voltage, a resistor for heating the washing fluid and for activating the detergent, and devices for driving, adjusting and servicing operating at a low voltage.
2. Washing system according to Claim 1, characterised in that the said controlled-reluctance transformer, whose primaries consist of two windings connected in parallel and wound in opposite directions, decouples the components of the washing system from the mains and supplies them at a low voltage, preferably 48/42 volts.

3. Washing system according to Claim 1, characterised in that the said resistor is formed by tungsten wires twisted together, formed into a spiral and inserted into a ceramic-fibre tube, the assembly being placed inside a steel tube formed into a U.

4. Washing system according to Claim 3, characterised in that the said steel tube is provided with suitable holes to allow the partial contact of the said resistor with the washing fluid, a certain amount of which, by entering the interior of this tube, becomes isolated from the rest of the fluid contained in the drum.

5. Washing system according to the preceding claims, characterised in that the said tungsten resistor and the said steel tube form the plates of a capacitor, the dielectric being represented by the ceramic fibre.

6. Washing system according to the preceding claims, characterised in that the said current-carrying resistor heats the washing fluid and softens it by ionisation and radiant magnetism with a variable scanning frequency, thus maintaining the limescale in suspension and producing active oxygen.

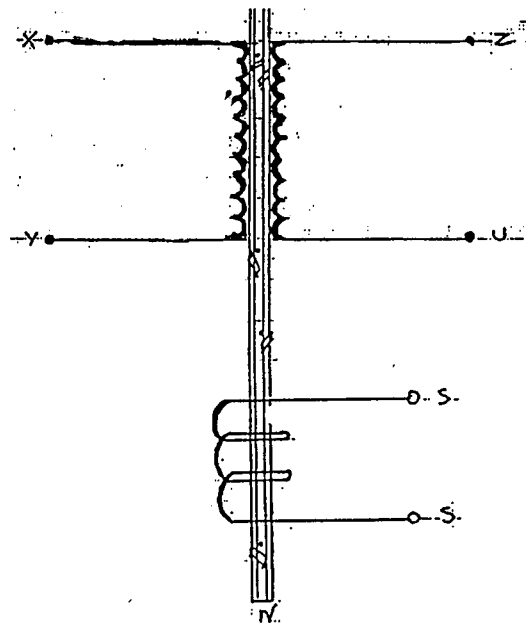


FIG 1

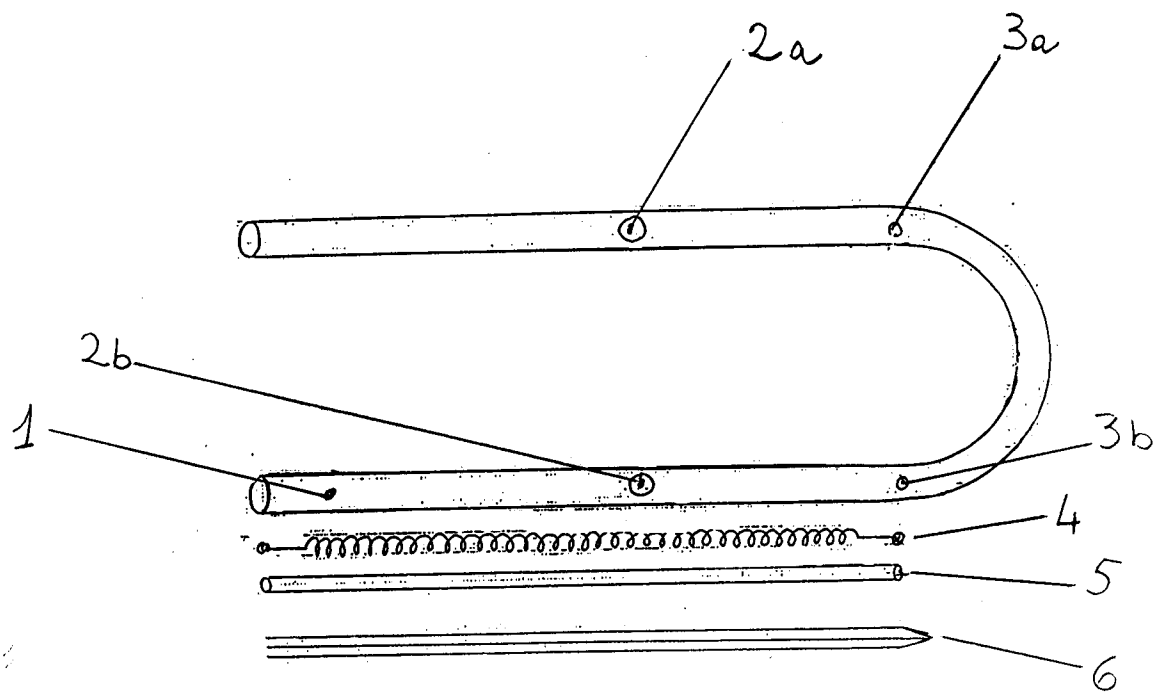


FIG. 2

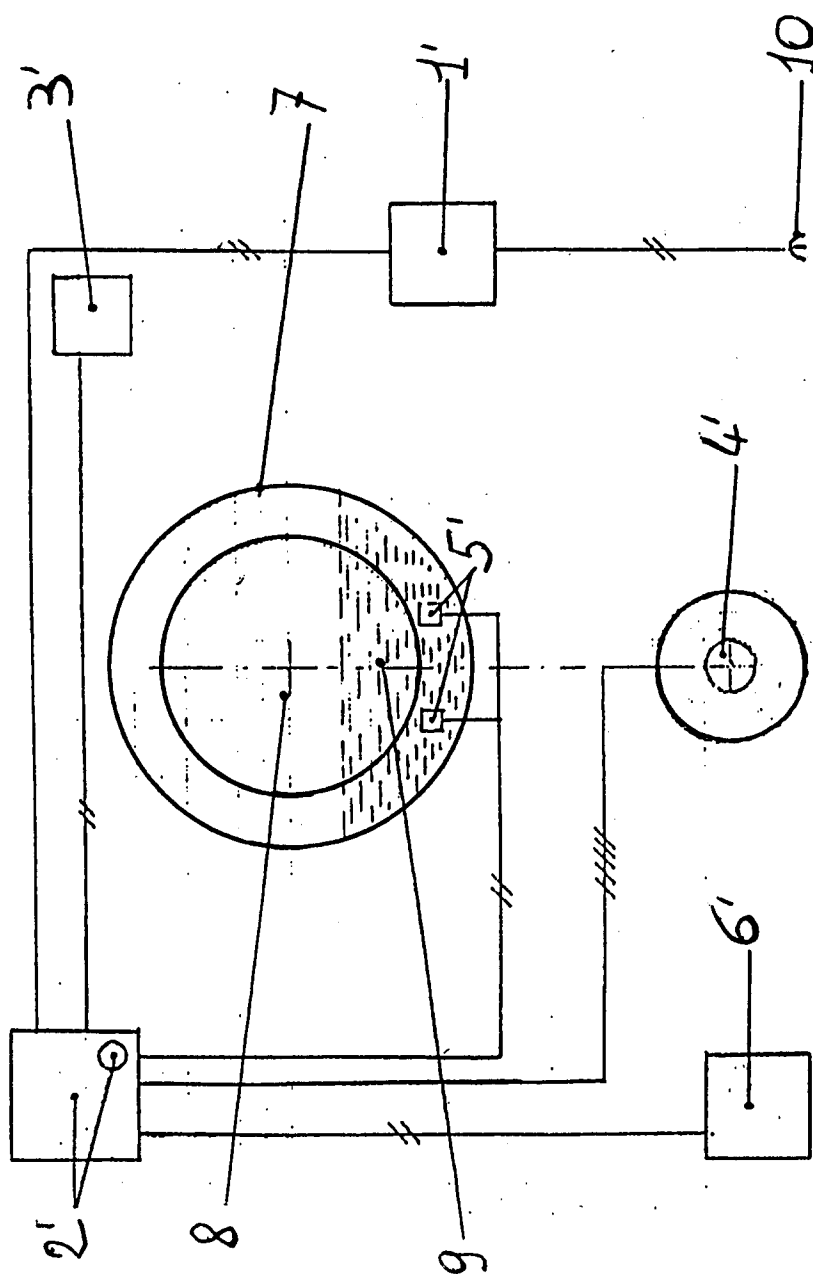


FIG. 3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 83 0412

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	EP-A-0 462 078 (S.M. PANDOLFO) * the whole document * ---	1,2,6	D06F39/04 A47L15/42 D06F33/02 D06F39/00
A	EP-A-0 287 772 (I.R.C.A. S.P.A.) * abstract; figures * ---	3,4,6	
A	DE-U-9 000 884 (INDUSTRIE ZANUSSI S.P.A.) * claim 1 * -----	6	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D06F A47L
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 24 MAY 1993	Examiner COURRIER G.L.A.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	