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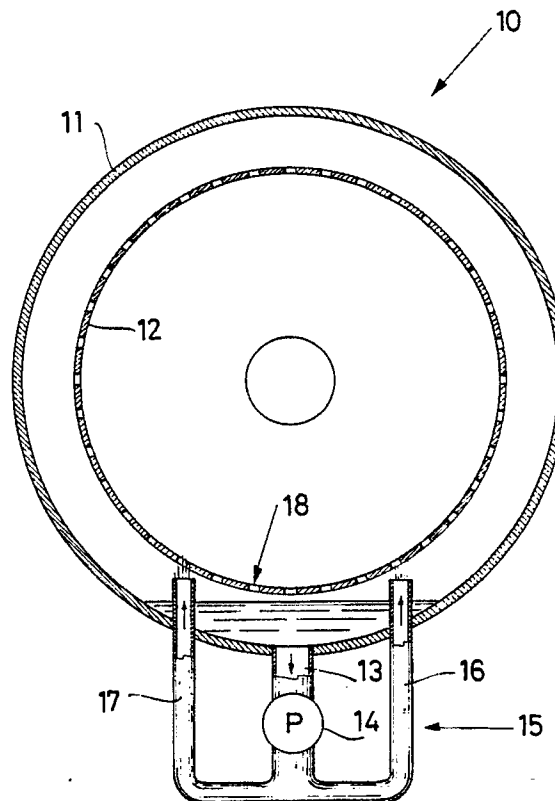
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I-20123 Milano(IT)(54) **Improved washing machine.**

(57) A washing machine (10) with a substantially cylindrical horizontal tub (11) containing the washing liquid, within which rotates a peripherally perforated drum (12) containing the washing, comprises an aperture in the lower portion of the lateral wall of the tub 11, to which is tightly secured an intake duct (13) of a pump (14) whose delivery is conveyed to at least one duct (16, 17) which passes tightly through a substantially lower portion of the tub 11 in order to send jets of washing liquid, sucked up from the tub (11), against the perforated wall of the drum (12), when the pump (14) is actuated, so as to create water pressure against the washing contained in the drum (12).



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IMPROVED WASHING MACHINE

In the known technique, substantially two methods are used for carrying out washing cycles in rotary drum type washing machines.

In the first method, the rotary drum is partially submerged in the washing liquid and its rotation consequently causes the washing to be rhythmically submerged with a highly satisfactory mechanical soaking and cleansing action, similar to that which occurs when washing by hand. This method, however, has the disadvantage of calling for relatively large quantities of water and, consequently, of electric power for heating it, as well as detergent.

In the second washing method, the washing liquid is sprayed inside the rotary drum, so that the soaking and washing action is achieved by the washing liquid falling onto the washing. This method makes it possible to save a substantial amount of water and electric power, but does not have the advantage of the mechanical washing action on the washing, due to its continual immersion and emersion, which is characteristic of the first washing method mentioned.

The general scope of this invention is to obviate the aforementioned problems by providing a washing machine which operates with relatively small quantities of water, but at the same time has the advantages of washing by immersion.

This scope is achieved according to the invention by providing a washing machine of the type comprising a substantially cylindrical horizontal tub, containing the washing liquid, within which rotates a drum with a peripherally perforated wall, containing the washing, which is characterized by the fact that the lower portion of the lateral wall of the tub is provided with an aperture to which is tightly secured an intake duct of a pump whose delivery is conveyed to at least one duct which passes tightly through a substantially lower portion of the drum in order to wash the washing by directing jets of washing liquid contained in the tub, against the perforated wall, when the pump is actuated.

The innovatory principles of this invention and its advantages with respect to the known technique will be more clearly evident from the following description of a possible exemplificative embodiment applying such principles, with reference to the one accompanying schematic drawing.

With reference to the figure, a washing machine 10 (the rest of which is known and therefore not shown) comprises a tub 11 in which rotates a horizontal cylindrical and peripherally perforated drum 12 containing the washing. According to the invention, the machine comprises a device 15 with a first duct 13 tightly connected to the bottom of

the tub which constitutes the intake of an electric pump 14 of known technique with delivery to outlet ducts 16 and 17 which are also tightly connected to the bottom of the tub so as to direct the water expelled by the pump against a substantially lower portion of the drum.

The ducts 13, 16 and 17 and the pump 14 are advantageously made in one rigid piece, so that the device 15 can be easily fitted by securing the ducts to the tub, for example by means of flanges and interposed seals, so as to enable it to be removed whenever necessary.

During operation, the level of the washing liquid in the tub (said liquid being of different composition according to the washing phase; for example, water and detergent or clean rinsing water) can be kept below the drum and, by operating the pump of the device 15, jets of washing liquid are directed against the drum through the ducts 16 and 17 whose ends are substantially above the level of the liquid in the tub. It is thus possible to obtain a pressure of liquid on the washing contained in it due to kinetic energy, with an effect substantially similar to what would occur if the quantity of liquid in the tub were to be very much higher and consequently reached the contents of the drum with a certain hydrostatic pressure, thereby achieving a mechanical washing action with a satisfactory detergent effect.

By using a smaller quantity of water it is possible to economize on detergent and on the amount of electric power used by the washing machine since it has to heat a more limited amount of water as compared to washing machines of known technique with partially submerged drums.

The thrust of the jets against the drum also enables a certain amount of washing liquid to be distributed both by the simple rotation of the perforated drum itself, and by means of systems of known technique such as perforated cams (even though these elements do not touch the actual surface of the water in the tub), so as to also obtain a sprinkling action on the washing.

Means, of known technique and consequently not shown since they are easily imaginable by the technician (such as, for example, pressure switches connected to solenoid valves) can advantageously be provided to control the introduction of water into the tub in order to maintain the level in the latter substantially constant, so as to compensate the absorption of liquid by the washing.

The foregoing description of an embodiment according to the invention is obviously given by way of example in order to illustrate the innovatory principles thereof and should not therefore be un-

derstood as a limitation to the sphere of the invention claimed herein.

For example, the delivery ducts of the pump are shown as being two in number whereas they can obviously be higher or lower in number.

If necessary, the jet recycling phases can be used either in addition to or as an alternative to normal washing phases of known technique.

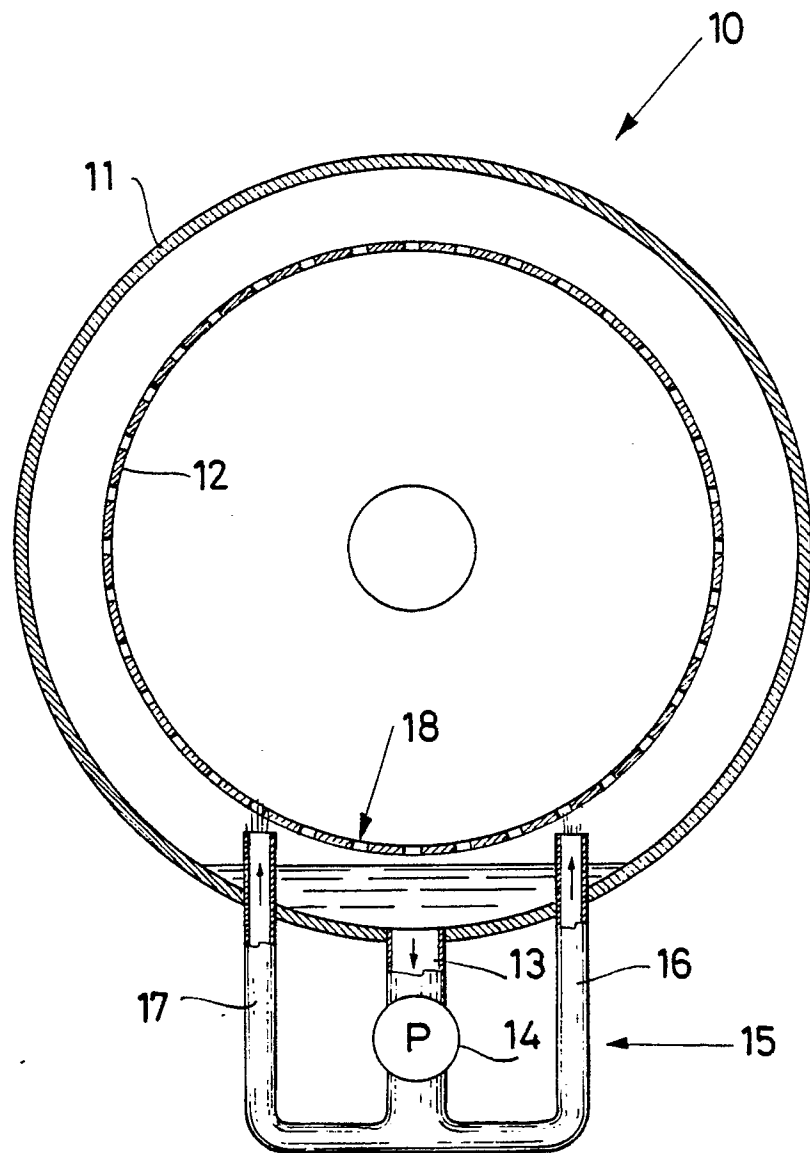
The pump device can moreover be advantageously integrated with other devices such as the water and detergent inlet, outlet, heating elements, connections for pressure switches and thermostats, etc., as described in a copending application on behalf of the same Applicant.

Claims

1. Washing machine of the type comprising a substantially cylindrical horizontal tub, containing the washing liquid, within which rotates a drum with a peripherally perforated wall, containing the washing, which is characterized by the fact that the lower portion of the lateral wall of the tub is provided with an aperture to which is tightly secured an intake duct of a pump whose delivery is conveyed to at least one duct which passes tightly through a substantially lower portion of the drum in order to wash the washing by directing jets of washing liquid contained in the tub, against the perforated wall, when the pump is actuated.

2. Washing machine as claimed in Claim 1, characterized by the fact that the intake and delivery ducts and the pump are made in one piece.

3. Washing machine as claimed in Claim 1, characterized by the fact that the intake and delivery ducts are removably connected to the wall of the tub by means of flanges and interposed seals.





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EUROPEAN SEARCH REPORT

Application Number

EP 90 20 1584

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	DE-A-3627732 (E.G.O. ITALIANA S.P.A.) ---		D06F39/08
A	EP-A-0222264 (INDUSTRIE ZANUSSI S.P.A.) ---		
A	DE-A-1588283 (HANNING ELEKTRO-WERKE) -----		
			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 14 AUGUST 1990	Examiner GOODALL C.J.
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 I : 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			