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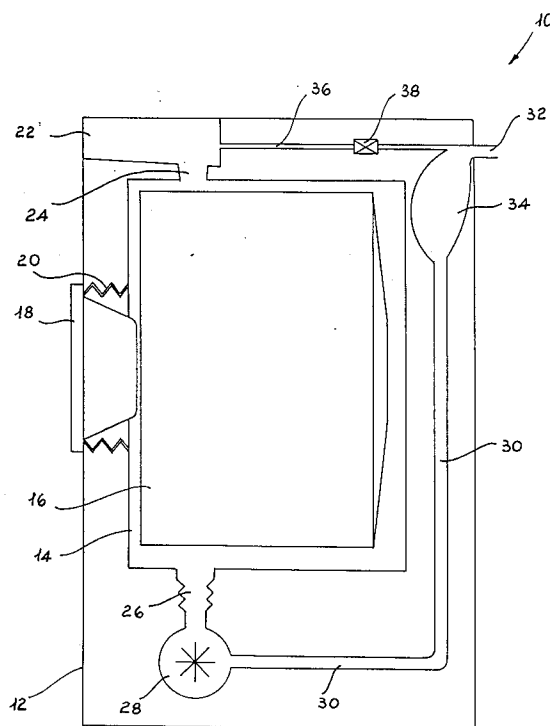
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I-20123 Milano (IT)(54) **Improved washing machine.**

(57) Improved washing machine (10) comprising: a wash-tub (14), a drilled basket (16); a detergent holding cup (22), communicating with said wash-tub (14) through a delivery hole (24); a discharge pump (28) connected to said wash-tub (14) through a mouthpiece (26) and to the discharge pipe (30); and an hydraulic air vessel (34) provided along the discharge pipe (30) and connected on one side to the discharge manifold (32) and on the other side to the detergent-holding cup (22) through a valve or electro-valve (38).

Pump (28) is pulse-activated and pushes the washing solution into the hydraulic air vessel (34) from which it runs back during the pause of the pump.

The washing solution runs out from manifold (32) only during the discharge stage and not during the stages when pump (28) is pulse-activated.

fig. 1**EP 0 610 877 A1**

This invention relates to an improved washing machine. More in particular, this invention relates to an improved washing machine provided with devices suitable to rapidly dissolve the detergent, utilizing it without any dispersal.

As is known, washing machines for domestic use are provided with an horizontal axis, substantially cylindric wash-tub, where the washing fluid is caused to run into.

Within such wash-tub a rotatory basket is located, having a wall peripherally provided with a plurality of holes, in which basket the linen to be washed is placed.

In these machines, the washing cycle takes place according to different methods, in the presence of a certain amount of water in the wash-tub.

There are basically three types of washing methods, which consist respectively in washing by repeated immersion of the linen, which is made to rotate in the basket, or by aspersion, caused by the systematic fall of the fluid on the linen, or by means of water jets, sent against the drilled basket and starting in general from the bottom of the wash-tub.

In all these washing methods, detergent substances are added to the washing water, said substances being placed prior to the start of the cycle in a special cup provided in the washing machine.

The water delivery tube debouches into the aforementioned cup, whose opposite end is provided with an opening communicating with the wash-tub. The water which runs into the washing machine impregnates the detergent contained in the cup and drags it towards the bottom of the wash-tub, where the granular or powdery detergent progressively dissolves, under the effect of the water movement caused by the rotation of the basket.

This system of detergent feed has a main drawback.

The detergent contained in the cup, whose specific weight is generally higher than the one of water, is dragged by the latter towards the bottom of the wash-tub where the fluid discharge hole is generally provided. Therefore, a great amount of detergent is lost, being conveyed through said hole and settling in the portion of the discharge tube between the wash-tub and the pump.

This happens, even though to a lesser extent, also with detergents having a specific weight equal or lower than the specific weight of water.

This drawback takes place even when fluid detergents are used. In fact, the amount of detergent which is lost is quite remarkable, as said, as the first flow of water run into the machine drags with itself, starting from the cup, a great deal of detergent.

But this detergent finds on the bottom of the wash-tub an amount of water which is not sufficient

to solve it entirely, which causes its being easily conveyed into the discharge hole wherefrom its recovery is unlikely.

5 Taking into account that the detergent affects the total cost of a linen washing cycle by about 50%, one understands that the aforementioned drawback has a non negligible relevance. One also understand that, because of this drawback, each washing cycle requires much more detergent than would be theoretically needed, with the ensuing problems associated to pollution.

10 A further drawback which is found in the known washing machines which utilize this system for introducing the detergent into the wash-tub lies in that detergents, especially the powdery or granular ones, require several tens minutes to completely dissolve and to be therefore capable of developing an efficacious activity on the linen. This latter drawback is especially noticeable in case of cold water washing or pre-washing cycles.

15 The washing of linen requires therefore much more time that would be necessary if the detergent should be immediately dissolved in the wash-tub; this causes also an increase in energy consumption.

20 An object of this invention is to obviate the aforementioned drawbacks.

25 More in particular, an object of this invention is to provide an improved washing machine equipped with devices suitable in the first place to prevent the dispersal through the discharge hole of part of the detergent introduced into the wash-tub.

30 A further object of this invention is to provide an improved washing machine in which the dissolution of the detergent introduced into the wash-tub takes place in a very short time, even when washing or prewashing is made by cold water.

35 According to this invention, these and still further objects are achieved by an improved washing machine comprising: a casing; a wash-tub housed in said casing; a rotatory drilled basket located in said wash-tub; a door for the introduction of linen into said basket; a cup for holding the detergent; a device for the delivery into said cup of the water flow coming from the waterworks; a device for feeding water from the cup to the wash-tub, a pump suitable for at least the discharge of the water, connected to the bottom of the tub by means of a mouthpiece, and a discharge tube connected at one end to said pump; wherein an hydraulic air vessel is connected to the opposite end of said discharge tube and is placed in correspondence of the upper part of the tub, and wherein the pump is pulse-driven to alternatively run into the vessel the water containing the detergent, which water runs back to the tub once the pump is disactivated.

40 The structural and functional characteristics of the improved washing machine subject matter of

this invention shall be more clearly disclosed by the following description, wherein reference is made to Fig. 1, which shows a schematic view of one preferred non limitative embodiment.

With reference to said figure, the improved washing machine subject matter of this invention, indicated as a whole by 10, comprises basically a casing (12), an horizontal axis wash-tub (14) housed inside said structure and a drilled basket (16) which rotates in said wash-tub (14). The linen to be washed is introduced in said basket (16) in the usual manner, for instance through the front round door (18), or porthole, perimetally circumscribed by a bellows-tight-sheath (20) of a known type. The washing machine is also equipped with a traditional cup (22), of a known type, wherein the detergent is introduced before starting the washing and/or prewashing cycle. Cup (22) is provided in its lower part with a delivery hole (24) which communicates with wash-tub (14).

Wash-tub (14) is provided in its lower part, opposite to that where the cup is located, with a mouthpiece (26) which connects said wash-tub with a discharge pipe (30).

Cup (22) is preferably dislocated on machine (10), so as to have its detergent delivery hole (24) substantially aligned with the axis of mouthpiece (26) of the underlying discharge pipe (30), integral with the tub bottom (14).

A centrifugal pump or a lift and force type pump (28) fastened with known means to the frame of the machine (10) in the inside of casing (12), is provided between mouthpiece (26) and the discharge pipe (30).

At the end of each washing cycle, the water is discharged through pipe (30) whose free end is provided with a manifold (32), which shall be illustrated later on, located on the upper part of casing (12), in correspondence with cup (12).

According to this invention, an hydraulic air vessel (34) is provided between the end of the discharge pipe (30) and manifold (32).

Said hydraulic air vessel (34), which may be of any shape and/or size, has preferably a capacity of between 0.5 and 2 liters.

According to an advantageous embodiment, said hydraulic air vessel (34) is constituted by a body from plastic material whose lower end is provided with a tang or the like for clutching pipe (30). Alternatively, the hydraulic air vessel (34) may be integral with the aforementioned pipe (30), whose end is bagshaped during the moulding stage.

Two opposite tubes branch from the upper end of said hydraulic air vessel (34), which end is substantially opposite to the one connected to the discharge pipe (30). One of the tubes which extends towards the outside of casing (12) is con-

stituted by the aforementioned discharge manifold (32), to which a generic pipe from rubber or other suitable material (not shown) for the discharge of the washing water is connected. The second tube (36), opposite relatively to the first one, extends within casing (12) of the washing machine (10) and debouches in the detergent holding cup (22) to which it is connected through known means. A generic valve or an electro-valve (38), which is activated when the washing water is discharged through manifold (32), is provided along tube (36).

The improved washing machine subject matter of this invention works as follows:

The linen to be washed is placed in the drilled basket (16), while the detergent is introduced, prior to the start up, in cup (22). Once the machine is on, the water runs, through a generic not shown delivery tube, into cup (22), from which it runs out through the bottom hole (24), dragging the detergent with itself.

The latter dissolves partly in the water and falls partly to the bottom of tub (14), collecting in mouthpiece (26) communicating with pump (28). The pulse-activated pump (28) sucks the fluid containing the detergent, conveying it, through pipe (30), to the hydraulic air vessel (34). In this way, a complete and rapid dissolution of the detergent is achieved.

In the following pause stage of the pump, the fluid flows again from said hydraulic air vessel (34) to tub (14) through pipe (30) and mouthpiece (26). If a lift and force type pump (28) should be used, the fluid flow would be further accelerated and would return pressurized to tub (14). Already inside pump (28), under the action of the impeller provided on said pump, the detergent dissolves in the water and such action is completed in cup (34) wherein water gurgling debouches.

During these stages of delivery of the washing water in the machine and of pulse-activation of the pump, valve (38), located along tube (36), remains open, to allow an adequate bleed of the hydraulic air vessel (34).

The operation of rapid mixing and dissolution of the detergent when loading water is repeated several times, for instance 5 to 40 times.

Pump (28) is preferably activated by short-duration pulses (for instance 1 to 10 Sec.), to prevent water from running out of manifold (32); to this aim, the duration of pulses and the capacity of the hydraulic air vessel (34) should be suitably gauged.

Once the complete dissolution of the detergent has been reached, which may require a different number of interventions of pump (28), according to the amount of water contained in the tub (14), the valve or electro-valve (38) closes and pump (28) is continuously activated for some minutes.

The washing solution, once the cycle has ended, can in this way flow down through manifold (32) without running back into tub (14).

As can be inferred from the aforementioned disclosure, the many advantages achieved by this invention are obvious.

The improved washing machine subject matter of this invention allows in the first place to avoid detergent losses, as the detergent is conveyed into mouthpiece (26) of the discharge, mixed in pump (28) and in the hydraulic air vessel (34), and therefore recovered in full. One understands that with the washing machine subject matter of this invention, the amount of detergent to be used for every washing or prewashing cycle can be greatly reduced compared to the amounts usually required by the known washing machines, with ensuing remarkable reduction in working costs.

Thanks to the rapid dissolution, achieved by the washing machine subject matter of this invention, the detergent is immediately activated; as a consequence, the duration of each individual washing or prewashing cycle can be greatly reduced.

Moreover, analogous advantages are achieved when substances other than detergents, such as for instance softeners, bleaches and the like, are added in the washing machine subject matter of this invention.

While the invention has herein been illustrated and described by way of a detailed embodiment, it will be appreciated that various substitutions of equivalents may be made without departing from the spirit and scope of this invention.

For instance, the dislocation in the washing machine of the various components which constitute the device for the full recovery and rapid dissolution of the detergent can be different from the one described and schematized by way of example. The same device for the full recovery and rapid dissolution of the detergent could be mounted on machines loaded from above, of either domestic or industrial type.

Besides, the system for the full recovery and rapid dissolution of the detergent, though being preferably suitable for washing machines, can be mounted also on other washing apparatuses, such as for instance dishwashers and the like.

Claims

1. Improved washing machine, comprising a casing (12); a wash-tub (14) housed in said casing; a drilled basket (16) rotating in said wash-tub (14); a door (18) for the introduction of the linen in said basket (16); a cup (22) for holding the detergent; a device for the delivery of a water flow coming from the waterworks into said cup (22); a device to feed water from cup

(22) to wash-tub (14); and a discharge pipe (30) connected to an end of said pump (28), characterized in that said washing machine is provided with an hydraulic air vessel (34) connected to the free end of said discharge pipe (30) opposite to the one connected to pump (28), and located in correspondence of the upper part of the wash-tub; and in that pump (28) is pulse-activated to alternatively run into the hydraulic air vessel (34) the water containing the detergent which runs back into wash-tub (14), once the pump is disactivated.

2. Washing machine according to claim 1, characterized in that the hydraulic air vessel (34) is connected to the detergent holding cup (22) through a pipe (36); a valve or electro-valve (38) being provided along said pipe.

3. Washing machine according to claim 1 or 2, characterized in that cup (22) is provided with a hole (24) for the delivery of the detergent communicating with wash-tub (14) and in that the latter is provided in its lower part with a mouthpiece (26) communicating with pump (28); said delivery hole (24) being substantially aligned with mouthpiece (26).

4. Washing machine according to any of the preceding claims, characterized in that valve or electro-valve (38) is open during the stage when pump (28) is pulse-activated.

5. Washing machine according to any of the preceding claims, characterized in that the hydraulic air vessel (34) is constituted by a container from plastic material, provided with a bottom tang for clutching the corresponding pipe end (30).

6. Washing machine according to any of the preceding claims 1 to 4, characterized in that the hydraulic air vessel (34) is integral with pipe (30), whose upper end is bag-shaped during the moulding stage.

7. Washing machine according to any of the preceding claims, characterized in that the hydraulic air vessel (34) has a capacity of between 0.5 and 2 litres.

8. Washing machine according to any of the preceding claims, characterized in that the hydraulic air vessel (34) is provided, at the opposite end relatively to the end connected to the discharge pipe (30), with a first tube which extends towards the outside of the casing and which forms a discharge manifold (32) and a

second tube (36), opposed to the first one, connected to the detergent holding cup (22); a valve or electro-valve (38) being provided along said second tube (36).

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9. Washing machine according to any of the preceding claims, characterized in that pump (28) is activated by pulses having each an overall duration of between 1 and 10 seconds.

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10. Washing machine according to any of the preceding claims, wherein, once the detergent has dissolved, the valve or electrovalve (38) closes and pump (28) is continuously activated for the discharge of the washing water.

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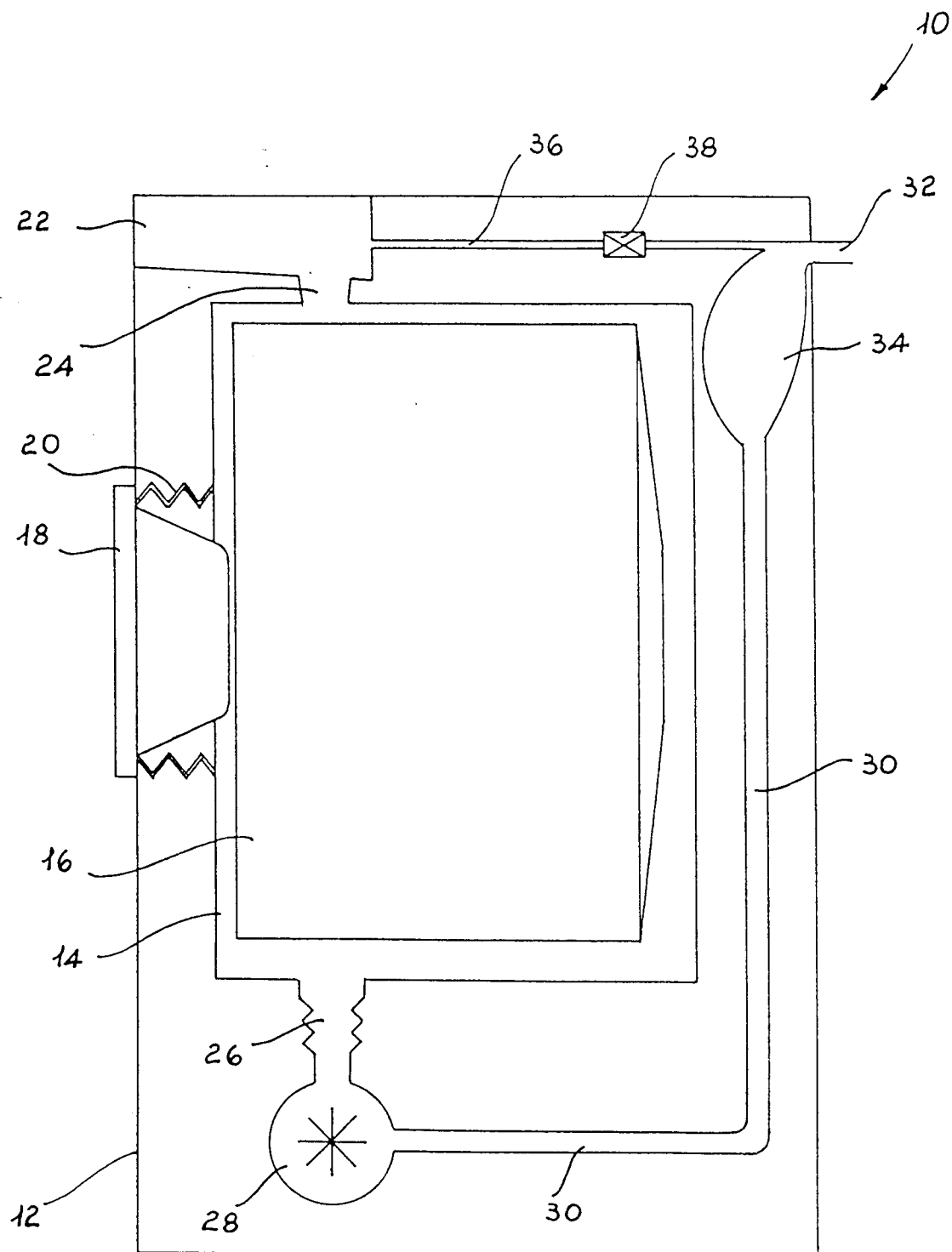
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fig. 1





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EUROPEAN SEARCH REPORT

Application Number
EP 94 10 1872

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)
X	GB-A-2 099 462 (PHILIPS GLOEILAMPENFABRIEKEN NV.)	1, 3, 5, 7, 9	D06F39/08
A	* the whole document * ---	8	
A	GB-A-2 166 163 (BOSCH-SIEMENS HAUSGERÄTE GMBH) * claims; figures * ---	1	
A	EP-A-0 332 893 (A. MERLONI S.P.A.) * claims; figures * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			D06F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20 May 1994	Examiner Courrier, G
CATEGORY OF CITED DOCUMENTS			
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