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(54) **Laundry washing machine with improved washing process**

Waschmaschine mit verbessertem Waschverfahren

Machine à laver utilisant un procédé de lavage amélioré

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Description

[0001] The present invention refers to an improved laundry washing machine.

[0002] It is known how electric appliance manufacturers have made efforts to make laundry washing machines that afford a modest consumption of energy, water and detergents.

[0003] As far as the containment of detergent consumption is concerned, a source of waste of the same is to be attributed to the fact that, at the moment of loading the detergent, a part of it, not dissolved, deposits in the discharge tube or in the filter of the washing machine; in this zone the detergent cannot be utilized, hence it is wasted.

[0004] There are known on the market washing machines designed to reduce the consumption of detergents, exploiting systems that can be substantially broken down into three categories.

[0005] A first category of said systems includes a pump for the forced recirculation of the washing liquid during the operative cycle of the washing machine.

[0006] A second category provides for the addition of a shut-off valve on the discharge tube of the wash tank.

[0007] A third category provides for the addition of a supplementary tube for the recirculation of the washing liquid, recirculation that is determined by the movement of the basket during washing.

[0008] As can be inferred, all the known systems for saving detergent require an addition of components besides the ones normally provided.

[0009] From GB-A-1 020.085 a laundry washing machine is also known, having the features listed in the preamble of annexed claim 1; in this known machine, a water supply pipe to a detergent container is provided with a change-over valve, adapted to by-pass water for the washing process through a feed pipe into the washing tank, said pipe being preferably arranged for leading directly into the outlet of the tank itself. In this way, detergent being subsequently conveyed with water from the container to the tank cannot enter the drain outlet of the latter, which results in being already filled with water.

[0010] In view of the state of the technique described, the object of the present invention is to provide a laundry washing machine that permits to keep down the consumption of detergents without requiring the installation of further components in the machine.

[0011] In accordance with the present invention, such an object has been achieved by a laundry washing machine having the characterizing features of the annexed claim 1.

[0012] Thanks to the present invention a detergent savings is achieved, due to the fact that in the pre-filling step of (clean) water only the discharge tube is filled, and during the successive water and detergent loading step - given that the basket is kept in rotation, preferably in one direction - the detergent is kept as far away from the discharge tube as possible, so as to prevent the de-

tergent itself, not yet dissolved in the water, from precipitating into the discharge tube.

[0013] These and other features of the present invention will be rendered more evident by the following detailed description of an embodiment thereof, illustrated as a non-limiting example in the attached drawings, in which:

Figure 1 is a section view according to a vertical plane of a washing machine in accordance with the invention, during a first operative step of a washing process.

Figure 2 is a section view analogous to the one in Figure 1, but it refers to a second operative step of said washing process.

[0014] In Figure 1 a washing machine is schematically shown in section view according to a vertical plane. The washing machine comprises a washing tank 1, inside which a rotatable basket 2 is lodged, rotated by a motor 3. Tank 1 has an inlet tube 4 with an upper part connected to a detergent dispenser 5, and an outlet tube 6 connected, at one end, with the bottom of the tank 1 and, at the other end, to a discharge pump 7.

[0015] The inside of the detergent dispenser comprises a number of compartments 8A, 8B, 8C separated from each other. To each compartment is associated a respective derivation 9A, 9B, 9C of a clean water supply duct 9. Between each of the derivations 9A, 9B, 9C and the duct 9 is interposed a respective intercepting valve 10A, 10B, 10C individually controlled by a control unit 11, for example composed of a timer normally included in the known washing machines. Timer 11 also controls the activation of motor 3.

[0016] As is visible in the Figures, the first compartment 8A of the detergent dispenser 5 is empty, while in the second compartment 8B the detergent (typically in powder form) is loaded. The third compartment 8C can, for example, contain a softener to be employed during the rinsing step.

[0017] The washing process carried out by the laundry machine according to the present invention comprises a first step during which valve 10A associated with the first compartment 8A of the detergent dispenser (the empty one) is opened so as to load a pre-established quantity of clean water, which determines a pre-filling of the discharge duct 6 and also, partially, of tank 1. In this first step, the basket can be left still. The duration of this step depends on the quantity of water that one may want to pre-load into the washing tank.

[0018] In the second step of the washing cycle, valve 10A is shut off and valve 10B associated with the second compartment 8B of dispenser 5 (the one containing powdered detergent) is opened. Moreover, in this step, timer 11 commands the activation of motor 3 to bring about the rotation of the basket 2 (in the example, clockwise). The water coming from derivation 9B of the duct 9 passes into compartment 8B, draws out the detergent

and carries it into tank 1 where the water with the detergent can pass into basket 2 through holes normally provided in the walls of the same. In this step, the detergent is not completely dissolved yet. Nevertheless, thanks to the fact that the discharge tube 6 was pre-filled before and that the basket rotates, it is possible to avoid that the particles of detergent still in a solid state can precipitate into the discharge tube 6, where it would remain useless and wasted.

[0019] It is to be pointed out that the quantity of water that is loaded in the pre-filling step of the tank, the position of inlet tube 4, the position of discharge tube 6, and the direction of rotation of the basket during the water loading step (with detergent added) must be determined in such a way that the solid detergent which descends into the tank together with the water remains substantially all inside the tank itself and is not allowed to descend into the dead zones (discharge tube) connected to the tank.

Claims

1. Laundry washing machine comprising

- a washing tank (1), having an inlet tube (4) and an outlet tube (6),
- a basket (2) rotatably lodged in said tank (1),
- motor means (3) for rotating said basket (2),
- a detergent dispenser (5) being connected to said tank (1) by means of said inlet tube (4),
- a water supply duct (9), being connected to said detergent dispenser (5),
- valve means (10A,10B,10C) for controlling the admission of clean water from said supply duct (9) to said detergent dispenser (5),
- control means (11), controlling said motor means (3) and said valve means (10A,10B,10C),

the operation of the machine providing a step of loading water and detergent into said washing tank (1) being preceded by a step of pre-filling of the washing tank (1) with water only,

characterized in that said valve means comprises a plurality of intercepting valves (10A,10B,10C), each one of them being interposed between said supply duct (9) and a respective derivation (9A,9B,9C) being defined at one end of the water supply duct (9), each derivation (9A,9B,9C) being associated to a respective detergent compartment (8A,8B,8C) of said dispenser (5), said intercepting valves (10A,10B,10C) being individually controllable by said control means (11), said control means (11) being provided for

- actuating a first one (10A) of said intercepting valves (10A, 10B, 10C) for allowing clean water

from said supply duct (9) to reach, through a first one (9A) of said derivations (9A,9B,9C), a first one (8A) of said compartments (8A,8B,8C) being empty from detergent, and thereafter reach through said inlet tube (4) said washing tank (1), in order to load within the latter a first quantity of water,

- actuating a second one (10B) of said intercepting valves (10A,10B,10C) for allowing clean water from said supply duct (9) to reach, through a second one (9B) of said derivations (9A,9B,9C), a second one (8B) of said compartments (8A,8B,8C) containing a solid detergent, and thereafter reach through said inlet tube (4) said washing tank (1), in order to load within the latter a second quantity of water being mixed with detergent,
- actuating said motor means (3) to rotate said basket (2) while said second quantity of water is being loaded within said tank (1).

2. Laundry washing machine, according to claim 1, **characterized in that** at least a third detergent compartment (8C) is defined within said dispenser (5), to which a respective derivation (9C) is associated, bearing a respective intercepting valve (10C).

3. Laundry washing machine, according to claim 2, **characterized in that** said second compartment (8B) is provided for containing a detergent in powder form and said third compartment (8C) is provided for containing a softener.

4. Laundry washing machine, according to claim 1, **characterized in that** said control means (11) provides for keeping constant the direction of rotation of said basket (2) while said second quantity of water is being loaded within said tank (1).

Patentansprüche

1. Wäschewaschmaschine, enthaltend:

- einen Waschbottich (1), der ein Einlassrohr (4) und ein Auslassrohr (6) aufweist,
- eine Trommel (2), die drehbar in dem Bottich (1) angeordnet ist,
- Motormittel (3) zum Drehen der Trommel (2),
- eine Waschmittelspendeeinrichtung (5), die über das Einlassrohr (4) mit dem Bottich (1) verbunden ist,
- eine Wasserzuführleitung (9), welche mit der Waschmittelspendeeinrichtung (5) verbunden ist,
- ein Ventilmittel (10A, 10B, 10C) zum Steuern des Zulaufes an sauberen Wasser aus der Zuführleitung (9) zu der Waschmittelspendeein-

- richtung (5),
- Steuermittel (11), die die Motormittel (3) und die Ventilmittel (10A, 10B, 10C) steuern,

wobei der Betrieb der Maschine einen Schritt des Zuführens von Wasser und Waschmittel in den Waschbottich (1) vorsieht, dem ein Schritt des Vorfüllens des Waschbottichs (1) nur mit Wasser voraus geht,

dadurch gekennzeichnet, dass das Ventilmittel mehrere Absperrventile (10A, 10B, 10C) enthält, von denen jedes zwischen der Zuführleitung (9) und einer entsprechenden Abzweigung (9A, 9B, 9C) angeordnet ist, die an einem Ende der Wasserzuführleitung (9) vorgesehen sind und von denen jede zu einem entsprechenden Waschmittelabteil (8A, 8B, 8C) der Spendeinrichtung (5) gehört, wobei die Absperrventile (10A, 10B, 10C) durch die Steuermittel (11) einzeln steuerbar sind, wobei die Steuermittel (11) vorgesehen sind für:

- Betätigen eines ersten Absperrventils (10A) aus der Reihe der Absperrventile (10A, 10B, 10C), um sauberem Wasser aus der Zuführleitung (9) zu ermöglichen, über eine erste Abzweigung (9A) aus der Reihe der Abzweigungen (9A, 9B, 9C) in ein erstes Abteil (8A) aus der Reihe der Abteile (8A, 8B, 8C) zu gelangen, um dieses von dem Waschmittel zu entleeren, und um anschließend durch das Einlassrohr (4) den Waschbottich (1) zu erreichen, wodurch letzterer mit einer ersten Wassermenge gefüllt wird,
- Betätigen eines zweiten Absperrventils (10B) aus der Reihe der Absperrventile (10A, 10B, 10C), um sauberem Wasser aus der Zuführleitung (9) über eine zweite Abzweigung (9B) aus der Reihe der Abzweigungen (9A, 9B, 9C) zu ermöglichen, ein zweites Abteil (8B) aus der Reihe der Abteile (8A, 8B, 8C), welches ein festes Waschmittel enthält, und anschließend über das Einlassrohr (4) den Waschbottich (1) zu erreichen, wodurch letzterer mit einer zweiten Wassermenge, die mit Waschmittel gemischt ist, gefüllt wird,
- Betätigen der Motormittel (3), um die Trommel (2) zu drehen, während die zweite Wassermenge in den Bottichen (1) eingefüllt wird.

2. Wäschewaschmaschine nach Anspruch 1, **dadurch gekennzeichnet, dass** zumindest ein drittes Waschmittelabteil (8C) innerhalb der Spendeinrichtung (5) vorgesehen ist, zu dem eine entsprechende Abzweigung (9C) gehört, welche ein entsprechende Absperrventil (10C) aufnimmt.
3. Wäschewaschmaschine nach Anspruch 2, **dadurch gekennzeichnet, dass** das zweite Abteil

(8B) zum Aufnehmen eines Waschmittels in Pulverform vorgesehen ist und dass das dritte Abteil (8C) zum Aufnehmen eines Weichspülmittels vorgesehen ist.

4. Wäschewaschmaschine nach Anspruch 1, **dadurch gekennzeichnet, dass** die Steuermittel (11) vorgesehen sind, um die Drehrichtung der Trommel (2) konstant zu halten, während die zweite Wassermenge in den Bottich (1) eingeführt wird.

Revendications

1. Machine à laver le linge comportant

- une cuve de lavage (1), ayant un tube d'entrée (4) et un tube de sortie (6),
- un panier (2) logé de façon rotative dans ladite cuve (1),
- des moyens de moteur (3) destinés à entraîner en rotation ledit panier (2),
- un distributeur de détergent (5) qui est relié à ladite cuve (1) au moyen dudit tube d'entrée (4),
- un conduit d'alimentation en eau (9), qui est relié audit distributeur de détergent (5),
- des moyens de soupape (10A, 10B, 10C) destinés à commander l'admission de l'eau propre dudit conduit d'alimentation (9) vers ledit distributeur de détergent (5),
- des moyens de commande (11), qui commandent lesdits moyens de moteur (3) et lesdits moyens de soupape (10A, 10B, 10C),

le fonctionnement de la machine prévoyant une étape de chargement d'eau et de détergent dans ladite cuve de lavage (1) précédée par une étape de préremplissage de la cuve de lavage (1) avec de l'eau seulement,

caractérisée en ce que lesdits moyens de soupape comportent plusieurs soupapes d'interception (10A, 10B, 10C), chacune d'elles étant interposée entre ledit conduit d'alimentation (9) et une dérivation respective (9A, 9B, 9C) qui est définie à une extrémité du conduit d'alimentation en eau (9), chaque dérivation (9A, 9B, 9C) étant associée à un compartiment de détergent respectif (8A, 8B, 8C) dudit distributeur (5), lesdites soupapes d'interception (10A, 10B, 10C) pouvant être commandées individuellement par lesdits moyens de commande (11), lesdits moyens de commande (11) étant prévus pour

- actionner une première (10A) desdites soupapes d'interception (10A, 10B, 10C) afin de permettre à de l'eau propre provenant dudit conduit d'alimentation (9) d'atteindre, par l'intermédiaire d'une première (9A) desdites dérivation

(9A, 9B, 9C), un premier (8A) desdits compartiments (8A, 8B, 8C) qui est vide de détergent, et d'atteindre ensuite par l'intermédiaire dudit tube d'entrée (4) ladite cuve de lavage (1), afin de charger dans cette dernière une première quantité d'eau, 5

- actionner une deuxième (10B) desdites soupapes d'interception (10A, 10B, 10C) afin de permettre à de l'eau propre provenant dudit conduit d'alimentation (9) d'atteindre, par l'intermédiaire d'une deuxième (9B) desdites dériva- 10
tions (9A, 9B, 9C), un deuxième (8B) desdits compartiments (8A, 8B, 8C) contenant du détergent solide, et d'atteindre ensuite par l'intermédiaire dudit tube d'entrée (4) ladite cuve de lavage (1), afin de charger dans cette dernière 15
une deuxième quantité d'eau qui est mélangée au détergent,
- actionner lesdits moyens de moteur (3) afin d'entraîner en rotation ledit panier (2) alors que 20
ladite deuxième quantité d'eau est chargée dans ladite cuve (1).

2. Machine à laver le linge selon la revendication 1, **caractérisée en ce qu'**au moins un troisième com- 25
partiment de détergent (8C) est défini dans ledit distributeur (5), auquel est associée une dérivation respective (9C), portant une soupape d'interception respective (10C).

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3. Machine à laver le linge selon la revendication 2, **caractérisée en ce que** ledit deuxième compartiment (8B) est prévu pour contenir un détergent sous forme de poudre et ledit troisième compartiment (8C) est prévu pour contenir un assouplissant. 35

4. Machine à laver le linge selon la revendication 1, **caractérisée en ce que** lesdits moyens de commande (11) prévoient de maintenir constant le sens de rotation dudit panier (2) tandis que ladite deuxième 40
quantité d'eau est chargée dans ladite cuve (1).

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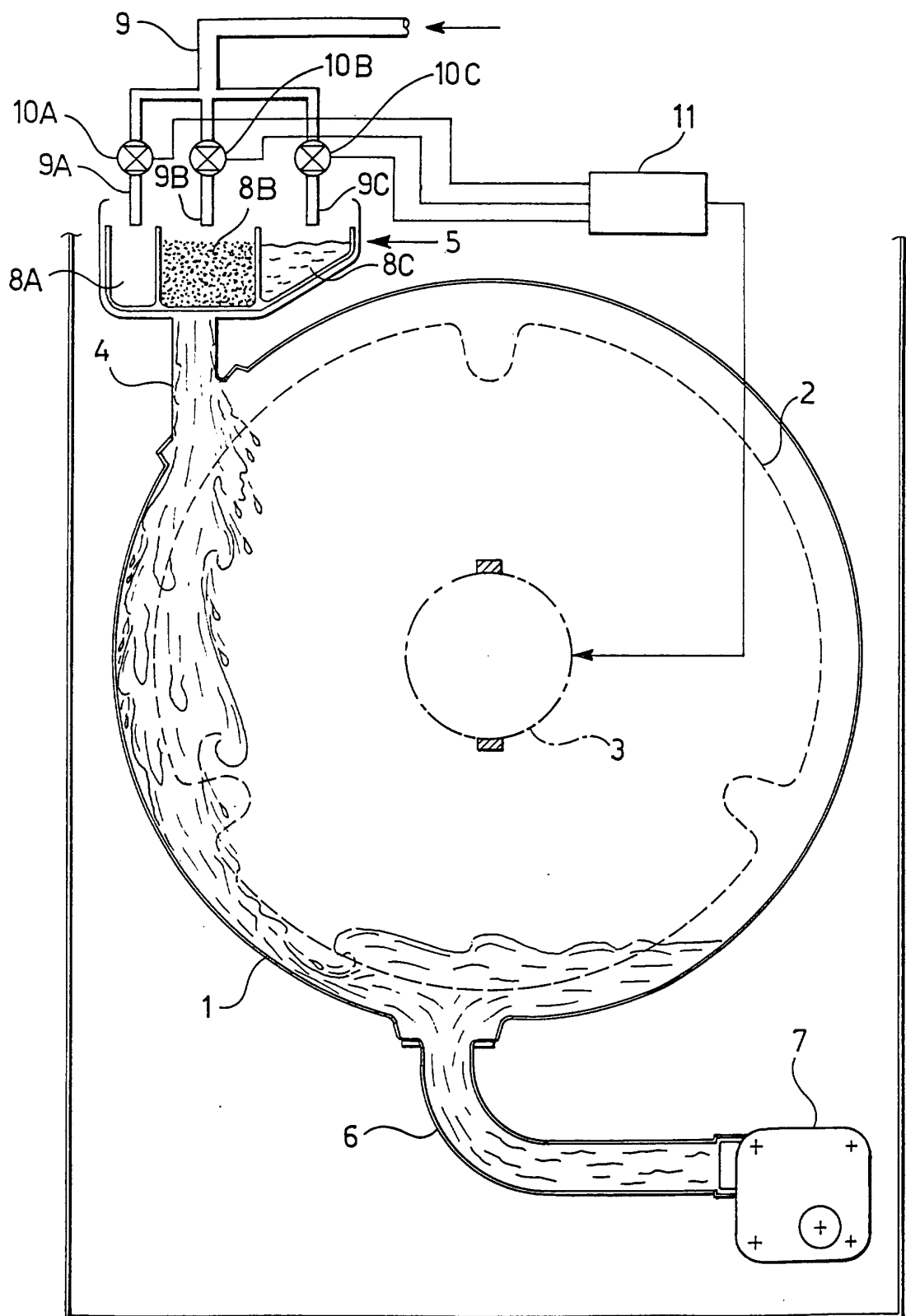


Fig.1

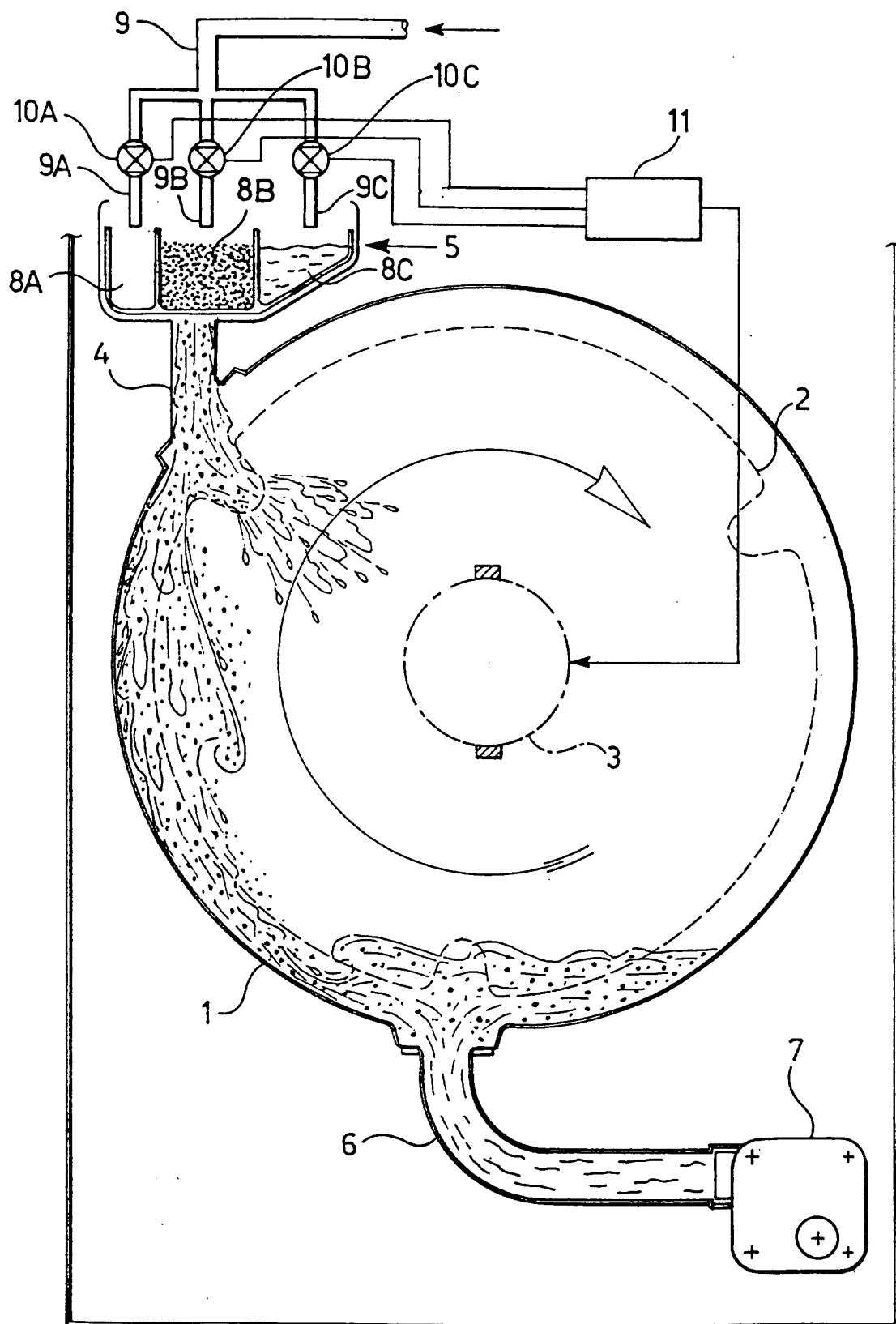


Fig. 2