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(54) Title: ELECTRIC WASHING MACHINE WITH MULTI-ROTATABLE BASKETS

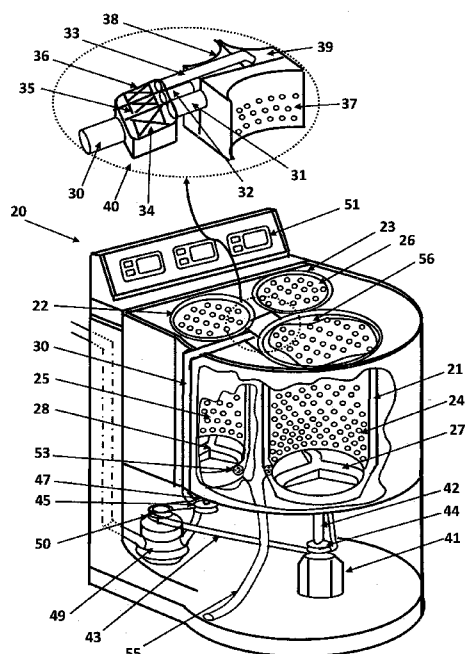


FIG. 1

(57) Abstract: To provide a time saving washing machine (20) with multi-rotatable baskets to handle practically, efficiently, and economically a one-time process of washing/drying multi types of laundry (colored, white clothes and towels). The basin is divided into three (21, 22, 23), containing three baskets (24, 25, 26), one big (24) and two secondary (25, 26), the big basket is to be used for the biggest quantity of laundry. The baskets (24, 25, 26) agitators (27, 28, 29) are driven by one motor (41), the motor's output shaft drives the main agitator (27) directly, while it is driving the shafts of the secondary agitators (28, 29) through a drive belt connected to their pulleys. A centralized water feed line (30) and multi-cleaner compartments are installed to distribute the water and cleaner to the baskets (24, 25, 26). The baskets side walls have a wavy surface (56), to flex fabrics to move and turn in multi-directions, and to be exposed and penetrated repeatedly from all sides by the pumping water force and detergent solution.



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ELECTRIC WASHING MACHINE WITH MULTI-ROTATABLE BASKETS

Description of the Invention

Technical Field of Invention

Laundry of multi-colored and multi-types fabrics, such as clothing, towels,
5 underwear and sheets, are washed with water using top-loaded or front loaded electric-motor driven washing machines, these are divided into groups, and washed one after the other in one basin in conventional washing machines.

Background Art

The idea behind the washing machine is to fill the basin (tub) with water, and
10 to spin this water using a fan (finned water-pumping agitator in the center of the bottom of the basin) in top loaded types, connected to an electric motor. While the inventor of the electric washing machine remains unknown, Electric washing machine Woodrow's US patent 921195 is one of the oldest issued patents in the field.

15 Washing machines was improved during 1930s. The mechanism was enclosed within a cabinet. Bendix introduced the first automatic machine in 1937, then an improved one in 1947, while general electric introduced the first top loading automatic model in 1947, this machine had many features that are incorporated into modern machines.

20 As the conventional washing process in the washing machines, requires dividing the laundry into groups, mainly three: colored, white and towels, these groups are washed separately, each one is filled in the washing machine, the machine will carry out a complete washing process, consuming a full cycle time, water, energy and cleaners, the user then have to remove the 1st group
25 and fill the next one to start another washing cycle and so on, as each washing cycle requires filling the washing machine by the user with the laundry repeatedly for three times, using three quantities of water filling the basin to a minimum level, consuming energy three times, consuming cleaners for three times to cooperate with the minimum quantity of water, this means a washing
30 machine handling these laundry at one time during one cycle is a necessity.

None of the prior art is showing a domestic washing machine that can handle this need, wherein it is combining the three washing cycles into one, a promising innovative solution for this need, can guarantee an energy saving, time, labor, and cleaners in a ratio ranging variably between 30 – 60 %.

5 A washing machine that can wash such three types of laundry at once, with carrying out a relative drying for it, should have three rotatable basins built-in inside the conventional washing machine replacing the single basin, but this would require further modifications on the whole machine to cooperate with the new created basins, these required modifications, and extra ones to make the
10 washing process more efficient, are carried out in this invention.

Disclosure of Invention

Brief Description

15 As the process of washing multi types of laundry (colored clothes, white clothes and towels, adult females cloths, adults males cloths, kids cloth, underwear) requires washing these in multi separate washing cycles with their complete water, energy, cleaners and labor time requirements, a washing machine with multi-rotatable basins is developed here.

20 The original basin is divided into three, one big washing compartment (basin) with in-basket, and two secondary washing compartments (basins) with in-baskets, the big basin is normally used for the bigger quantity of laundry (normally the colored clothes).

25 Each basin will have at its bottom center a separate agitator, in total the three agitators will be driven by one motor, the motor will drive the main agitator directly by its output shaft, while it is driving the shafts of the secondary agitators by a drive belt connected to their pulleys. Wherein while drying the laundry the motor spins with a gearbox locking the agitator and basket so that the basket and agitator spin together.

A centralized water feed line and multi-cleaner compartment are installed to distribute the water and cleaner to the baskets.

The baskets side walls are to have a wavy surface, in order flex the weaves of the fabrics, and to move the laundry in a way to be exposed and penetrated repeatedly from all sides by the water force and detergent solution.

Brief Description of the Drawings:

- FIG. 1: Illustrates an inner view of a 3-dimensional view of the assembled internal parts of the electric washing machine with multi-rotatable baskets.
- FIG. 2: Illustrates a three dimensional view of a washed fabric model side movements inside the basket.

Best Mode for Carrying out the Invention:

In order to make it easy to carry out the invention, a detailed description of the parts of the invention supported with figures is provided here, wherein the figures of the main parts are arranged sequentially according to the importance of the part, each part has many features, since in the case here there are interfering parts drawings, we made it easy to read, by referring to each feature with a number included in the parts description text and in the parts numbering list, the numbering of parts features is indicated here by starting it sequentially from number 20, whenever a part feature appears in a text, it will be directly assigned its required serial number. As example in FIG. 1, the parts' features are arranged sequentially from number 20 to 21, 22, 23...

- 1- Electric washing machine with multi-rotatable baskets FIG. 1: The washing machine 20 inner parts are drawn here assembled for simplicity, it is showing how the parts are installed together in their suitable locations to carry out their required functions. The original basin is divided into three: the main (big) basin 21, the secondary (small) basins 22, 23, these basins include the main (big) basket 24, tow secondary (small) baskets 25, 26 sequentially. The main basket 24 is bigger than the other two secondary baskets 25, 26, in order to handle the biggest

quantity of similar type laundry, which is normally the colored group of laundry, as each of the towels and white clothes size are normally less than that of the colored one, the two baskets 25, 26 used to clean these groups (towels, white laundry) are of similar size, hence they are called secondary baskets 25, 26.

As each basket 24, 25, or 26 is byitself a fully separate washing system, each one requires to have separately all the technical features provided for a normal basket in conventional washing machines, and so each basket will have side walls, main agitator 27, or secondary agitators 28, 29, the water feed line 30 is divided into main supply pipe 31, and secondary supply pipes 32, 33, these pipes are provided with three solenoid valves, main valve 34, secondary valves 35, 36, and each basket has a cleaner (detergent|) compartment, main compartment 37, and secondary compartments 38, 39. The water feed line 30 can be designed such that it is introduced towards the upper center point in-between the basins (21, 22, 23), where it branches from a pipes collecting box (40) into three pipes (31, 32, 33), each one is going towards one cleaner pocket (compartment) (37, 38, 39).

The main basket's 24 water pipe 31 diameter will be bigger than that of the secondary baskets 25, 26 secondary water pipes 32, 33 as well as the main basket's 24 cleaner compartment 37 should be bigger than that of the secondary basket's 25, 26 cleaners compartments 38, 39, in cooperation with each basket size.

A most important separate technical feature of the baskets (24, 25, 26) is the water spinning agitators (27, 28, 29) the main basket 24 will have its own main spinning agitator 27, which will be bigger than each one of the secondary baskets' 25, 26 secondary spinning agitators 28, 29.

As in conventional washing machines a minimum sufficient water quantity (water level) is required to be filled in each washing cycle to fully immerse and suspend the clothing freely in the basket, in order to achieve a successful washing process, and as that quantity size increases as the diameter of the basket increases, here in the multi-

rotatable baskets electric washing machine 20, the division of the original basket into smaller baskets (24, 25, 26) will reduce the cross sectional area of each basket, this will mean: as the:

min. required water quantity size = cross sectional area of basket multiplied by the height of min. required water level

; then as the cross sectional area of a basket division is less than for the original basket, a less water quantity amount will achieve the minimum required water level (height) necessary for suspending and immersing the laundry, this result will create an economical washing cycle in regard of water consumption, it also did not force the user to use the minimum big amount of water required for a washing cycle even when the laundry quantity is small as in conventional big basket washing machines.

Anyway, the three spinning agitators (27, 28, 29) are to be rotating either at once or when their selected basket is occupied for use, in one embodiment in this invention, one motor 41 is used to drive these three agitators (27, 28, 29) the motor 41 is installed in a place to have its output-shaft 42 fixed in-line with the main basin's 24 main spinning agitator 27, while a drive belt 43 is installed on a pulley 44 installed on the motor's 41 output-shaft 42, this drive belt 43 will transfer the rotation of the motor's 41 main pulley 44, to two secondary pulleys 45, 46 installed on the secondary agitators' 28, 29 input shafts 47, 48, and also transfer the movement to the water pump's 49 pulley 50, so, when the whole machine's 20 baskets (24, 25, 26) are on work, the motor 41 will be driving the three agitators (27, 28, 29) at once, a conventional program can be used via a control unit to control a clutch mechanisms which may be installed on the shafts' (42, 47, 48) pulleys (44, 45, 46) where the control unit receives the orders from the user via a control panel (screen) 51, who can select the required baskets (24, 25, 26) agitators (27, 28, 29) to be set for work, in cooperation with other washing cycle requirements. Still the three baskets (24, 25, 26) one time work on, is the most economical choice for the user.

All baskets (24, 25, 26) water drainage exits (52, 53, 54) will be located at the lower center collection point where all baskets (24, 25, 26) meet, and so all baskets three drainage exits (52, 53, 54) will pour the drained water to inside one drainage pipe 55.

5 Finally, Drying the laundry can be operated depending on the motor rotation and via the same conventional mechanisms used for engaging the basket to rotate after water drainage, and hence the centrifugal force will throw the water out of the laundry towards the fully punched walls of the baskets (24, 25, 26) and down the basins (21, 22, 23) to the drainage
10 exits (52, 53, 54) and then to the drainage pipe 55.

2- Fabric side movements inside the basket (Fig. 2): In conventional top loaded washing machines, the spinning water circulates primarily along the poloidal axis during the wash cycle, that will push the fabrics to the
15 edges (inner side walls) of the basket around its center in a movement in one direction, while the raise of the water outwards towards the sides of the basin, and then downwards towards the agitator in the bottom center, is creating another movement, where both will form a circulation pattern similar to the shape of a torus.

20 But as this type of combined movement continuously in one direction would just lead to the water spinning around the basin with the agitator, rather than the water being pumped in the torus-shaped motion, so as to expose the fabric to a pressure and friction force from the water, rather than only carrying it around and around, the conventional solution was
25 making the agitator direction to be periodically reversed, some other solutions were to supplement the water pumping action of the agitator with a large rotating screw on the shaft above the agitator, to help water move downwards in the center of the basket.

30 A further inventive solution for this matter is disclosed here, wherein the surface of the inner walls of each basket (24, 25, 26) can be made wavy, smoothly curved with around three wavy shapes 56 along its perimeter, this geometrical shape will have a great effect on the washing

efficiency, wherein instead of reversing the direction of the spinning water and detergent solution 57 via an extra mechanisms installed, stopping and reversing the agitators (27, 28, 29) motion direction periodically, the moving fabric model 58 after pushed by the circulating water and detergent solution 57 (Fig. 2-A) towards the edge of the baskets (24, 25, 26) will follow the curve of the wavy surface 56, this will make it changes its direction gradually, as the fabric model 58 gets out from the curved edge area, it will be rotated around its center by 90° - 180° (Fig 2-B) is resembling a fabric model 58 turn over inside the basket, as each fabric model 58 when it is suspended horizontally, will have four non-geometrical faces, facing four horizontal directions, the prior mentioned 90° - 180° rotation will lead to:

a- Exposing one to four sides (facing horizontally) of the fabric 58 to the push, force, or pressure of the incoming faster spinning water and detergent solution 57 that is coming from behind it, as soon as it gets out from the curved surface 56, that is to say: inside the curved area 56, the water and detergent solution 57 will be expanded due to crossing a longer distance, and so its speed will slow down, while the spinning water out of the curved areas, will spin faster, and so this fast spinning water 57, once the fabric model 58 gets out of the curved area 56, it will expose it to an extra pressure, which will cause more friction between the water and detergent solution 57 from one side, and the fabric 58 from another side, in another way leading to a more pumping of water and detergent solution 57 through the fabric 58, which will be washed thoroughly during every second of the wash cycle's full time.

b- As the fabric 58, while getting out from the curved area 56 also will move from a higher water and detergent solution 57 level at the edges of the baskets (24, 25, 26) towards a lower water and detergent solution 57 level at the center, the fabric 58 will rotate down towards the agitator (27, 28, 29) then up again to the side walls edge of the baskets (24, 25, 26) completing the cycle of rotation, wherein during it,

its upper and lower surfaces will also be at this time facing the water and detergent solution's 57 pumping effect, the turbulence of the water and detergent solution 57 specially near the agitators (27, 28, 29) will lead to rotating the fabric 58 around its vertical axis, the systematic and non systematic motions of the fabric 58, will change its 3-directional motion, and hence what can be called 3-dimensional all faces full time washing will result.

c- While the in conventional top-washing machines, the reversed agitator motion will create only the pumping effect on the fabric piece for only the first three seconds of the reversed rotation cycle, and during the remaining 5-7 seconds of the spinning rotation time, the fabric piece will be carried with the water just to rotate around and around without a noticeable water pumping effect on it, which means the pumping effect will take place for only 30 – 40 % of each washing period, from another side, the invented wavy wall 56 pumping effect in this invention, will be permanent for a full time period, this means compared to conventional washing machines, the invented machine hereby with the wavy side walls 56 can carry out each full water and detergent solution 57 pumping effect washing cycle during a time less by 60 % to 70 % of the washing time required in conventional washing machines, such a result when added to the other benefits of the multi-compartments, the energy, water and time saving figures will be duplicated.

d- Saving the need for agitator revering mechanism, which costs money and requires maintenance.

e- The 3-dimensional movements directions of the laundry which will cause its up, down, right, left, turning around, and upside down movements is in general creating a dropping and a folding action of the laundry that can easily produce a large amounts of foam, such a result helps in decreasing the used cleaner quantity.

Still a further development in the wavy surface 56 is carried out by making the wavy surface 56 width at the top side of each basket (24,

25, 26) wider at the top than at the bottom, that is to say: the wavy shape is tilting toward the basket walls in the downward direction, this feature will help in the followings:

a- Decreasing the size of the wavy surfaces 56.

b- Helping in directing the fabric movement downwards after leaving the curved surfaces 56.

c- As the occupied size by the water and detergent solution 57 at the top half of the baskets (24, 24, 25) is larger than that at the bottom half, this will create a gradual natural rotation speed difference between the baskets (24, 24, 25) lower sides and top sides, as a result a higher rotation speed of the water and detergent solution 57 will be created at the top half more than at the lower half, this will make the fabric be exposed to a higher pumping effect while moving upwards, with a contraction in its size following the contraction of the water and detergent solution 57 size upwards, this will help in pressurizing the fabric to expel out some water and detergent solution 57 for sure with dirt to cooperate with its contraction, while when moving back downwards, it will expand due to the expansion of the basket size downwards, and so the fabric will absorb more water and detergent solution, the higher spinning of the water and detergent solution at the bottom near the agitator will push it to the side walls and up, to repeat the process again and again. So this easy cheap shape that does not contain any mechanisms, will create a non preceded full time full rinsing, washing, cleaning than any conventional washing machine mechanisms, and so the washing time can be shortened effectively, the result which may save more energy and mechanism using a natural shape and natural movements.

In total, if we were knowing that the conventional top-loaded washing machines consumes three times of water quantity and double energy value compared to that of front-loaded washing machines, the developments carried out in this invention over the top-loaded machines,

will make it not only more economical than the conventional front loaded-machines, but it will be more practical and time saving, so the negative points of the top loaded washing machines mostly will be ended, while other positive ones are created and added.

Industrial applicability

In addition to all of the mentioned reasons before about the important needs for an electric washing machine with multi-rotatable baskets and the modes of carrying out it using conventional available parts with little modifications, the subject invention has the following benefits:

1- Body inner shape and abbreviated mechanical modifications which costs little extra parts and parts costs.

2- Three washing cycles are abbreviated into one, wherein the baskets size remain nearly equal the original one, the height / diameter ratio for each basket will increase; decreasing the value of the min. quantity of water required to rinse the laundry fully and spinning it, as the water quantity remains nearly the same, the following benefits are achieved:

a- Water saving: the used water quantity will be 35 % - 50 % of the original three cycles required amount.

b- As the water quantity is less than the one used in three cycles, and as the energy consumption time is shortened to 33 %; the energy consumption will be 50 % at maximum of that of the three cycles process.

c- As the steps of filling and removing laundry inside the machine are abbreviated from three into one, labor time is saved by around 60 %.

3- The wavy shape of the baskets inner walls surfaces, expose the laundry pieces to a better and faster washing quality within a shorter time, creating a more foam; which means abbreviating the required time of washing, that would save more energy, cleaner; as a result the value in point (2-b) can decrease to 1/3- 1/2.

4- Rotatable baskets that can help in a relative drying of the laundry after water is drained.

Parts Drawing Index:

- 20 Electrical washing machine with multi-rotatablebasins.
- 21 Main (big) basin.
- 5 22 Secondary (small) basin.
- 23 Secondary (small) basin.
- 24 Main (big) basket.
- 25 Secondary (small) basket.
- 26 Secondary (small) basket.
- 10 27 Main (big) agitator.
- 28 Secondary (small) agitator.
- 29 Secondary (small) agitator.
- 30 Water feed line.
- 31 Water main supply pipe.
- 15 32 Water secondary supply pipe
- 33 Water secondary supply pipe.
- 34 Main pipe solenoid valve.
- 35 Secondary pipe solenoid valve.
- 36 Secondary pipe solenoid valve.
- 20 37 Main cleaner (detergent) compartment.
- 38 Secondary cleaner compartment.
- 39 Secondary cleaner compartment.

- 40 Pipes collecting box.
- 41 Motor.
- 42 Motor's output shaft.
- 43 Drive belt.
- 5 44 Motor's main pulley.
- 45 Secondary pulley.
- 46 Secondary pulley.
- 47 Secondary agitator input shaft.
- 48 Secondary agitator input shaft.
- 10 49 Water pump.
- 50 Water pump pulley.
- 51 Control panel (screen).
- 52 Main water drainage exit.
- 53 Secondary water drainage exit.
- 15 54 Secondary water drainage exit.
- 55 Water drainage pipe.
- 56 Wavy wall surface.
- 57 Water and detergent solution.
- 58 Fabric model.

Claims

1. An electric washing machine (20) with multi-rotatable baskets comprising:
5 original basin divided into three (21, 22, 23).
three rotatable baskets (24, 25, 26).
a wavy surface (56) of baskets (24, 25, 26) inner side walls.
three agitators (27, 28, 29) based in the bottom center of each basket.
a motor (41) driving the main agitator (27), two secondary agitators
10 pulleys (45, 46), water pump (49).
centralized water feed line (30).
detergent compartment divided into three compartments (37, 38, 39).
a three way drainage outlets (52, 53, 54) gathering in one drainage pipe (55).
- 15 2. The electric washing machine (20) in claim 1, wherein the rotatable baskets (24, 25, 26) are installed inside the basins (21, 22, 23).
3. The three baskets (24, 25, 26) in claim 2, wherein one is a big size main basket (24), and two are small size secondary baskets (25, 26).
4. The three baskets (24, 25, 26) in claim 2, wherein the baskets are used
20 during one time operation for washing three sets of laundry e.g: (adult male cloths, adult female cloths and kids cloths), or (colored laundry, white laundry, towels)...
5. The electric washing machine (20) in claim 1, wherein the baskets (24, 25, 26) wavy inner side walls surfaces (56) are created to elongate the
25 washing rotation distance, create a three directional water and detergent solution (57) pumping through all sides of the fabric (58), an upside down turnover, reversed sides directions, and so a cancellation of the need of agitator reversed direction mechanism, but still rotatable baskets rotates via a conventional mechanism and
30 motor rotation for drying laundry relatively.
6. The baskets (24, 25, 26) wavy inner side walls surfaces (56) in claim 5, wherein the width of the wavy surface (56) at the top side of each

basket (24, 25, 26) is wider at the top than at the bottom, in another way: the perimeter of the upper wavy surface is less than the bottom (the perimeter increases while moving downwards)

- 5 7. The width gradual decrease from top to bottom of the wavy surface (56) in claim 6, wherein this shape will lower the size of the basket top side; contracting the fabric to expel water and detergent (57) and dirt, also increasing the water and detergent (57) rotation speed, increasing the pumping of water and detergent (57) through the fabric.
- 10 8. The width gradual decrease from top to bottom of the wavy surface (56) in claim 6, wherein this shape will increase the size of the basket towards the bottom side; expanding the fabric to absorb water and detergent (57).
- 15 9. The electric washing machine (20) in claim 1, wherein the three agitators sizes (27, 28, 29) are suitable for the size of each basket (24, 25, 26), one main big agitator (27) for the main basket (24), two secondary small agitators (28, 29) for the secondary baskets (25, 26).
- 20 10. The motor (41) in claim 1, wherein its output shaft (42) is connected directly to the main agitator (27), while connected via a drive belt (43) fixed from one side on a main driving pulley (44) fixed on its output shaft (42), and from another side to three driven pulleys (45, 46, 50).
- 25 11. The three driven pulleys (45, 46, 50) in claim 10, wherein two pulleys (45, 46) are installed on the secondary agitators (26, 27) input shafts (47, 48), and pulley (50) installed on the water pump (46) shaft.
- 30 12. The centralized water feed line (30) in claim 1, wherein it is directed from the machine (20) top side towards pipe collecting box (40) at the top center area in-between the baskets (24, 25, 26).
13. The centralized water feed line (30) in claim 1, wherein it is divided into three supply pipes (31, 32, 33) one main big size (31), and two smaller sizes pipes (32, 33) before the inlet of the cleaner (detergent) compartments (37, 38, 39).
14. The three water pipes (31, 32, 33) in claim 13, wherein each one has a solenoid valve (34, 35, 36) controlling the water feed or blocking it

according to a conventional programmed control unit orders receiving fed orders, set via a control panel (51) run by the user.

5 15. The detergent compartments (37, 38, 39) in claim 1, wherein they are located inside each basket (24, 25, 26) top side facing the supply pipes collecting box (40).

10 16. The detergent compartments (37, 38, 39) in claim 1, wherein it is arranged so that one main compartment (37) with detergent outlet located inside the big size basket (24), two small secondary compartments (38, 39) each with its detergent outlet located inside a secondary basket (25, 26) respectively.

17. The three water supply pipes (31, 32, 33) in claim 13, wherein the main pipe (31) is feeding the main detergent compartment (37), while the secondary pipes (32, 33) are feeding the secondary detergent compartments (38, 39) respectively.

15 18. The three drainage outlets (52, 53, 54) in claim 1, wherein they are located inside the baskets (24, 25, 26) near the bottom center area in-between the basins (21, 22, 23), and drain the waste water inside one main drainage pipe (55) fixed in-between the basins (21, 22, 23).

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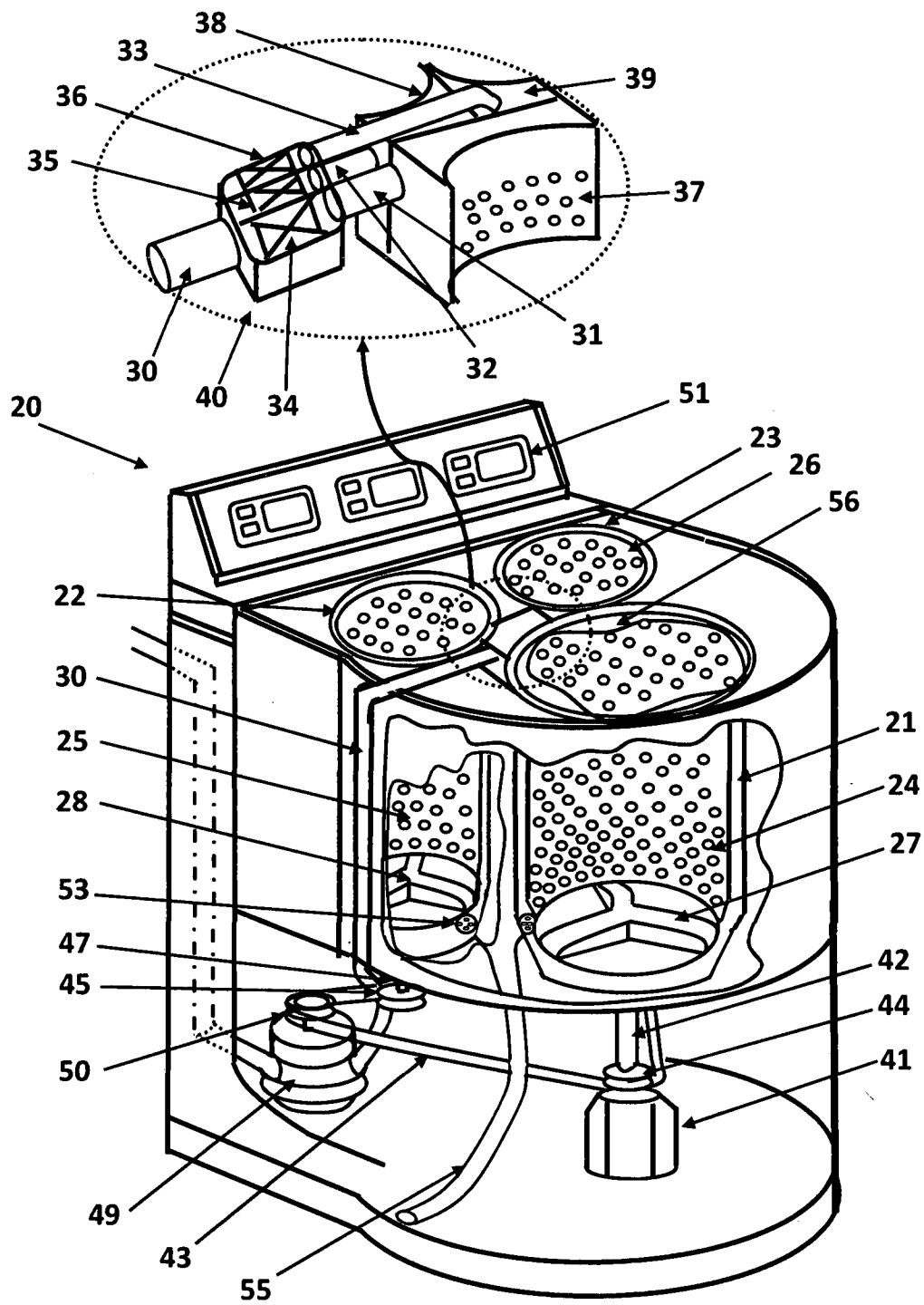


FIG. 1

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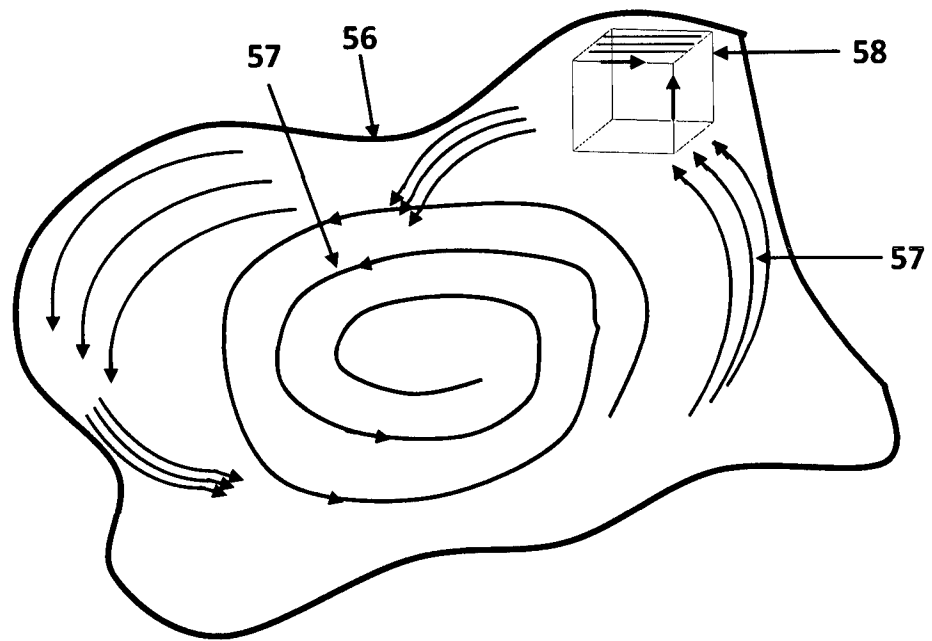


FIG. 2- A

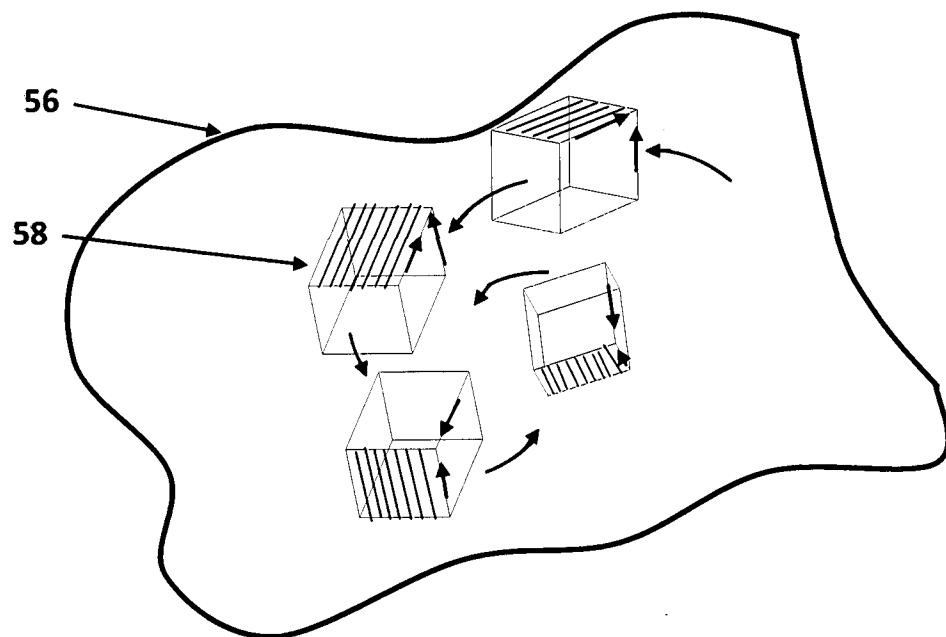


FIG. 2- B