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(54) Title: ELECTRIC WASHING MACHINE WITH MULTIPLE-REMOVABLE BASINS

(57) Abstract: To provide a time saving washing machine (20) with multi-removable basins to handle practically, efficiently, and economically a onetime process of washing multi types of laundry (colored, white clothes and towels). A removable and instal-lable barrier (21, 62) is used to divide the original basin into three basins, either equal or variable size, The basins (22, 23, 24) agi-tators (31, 32, 33) are driven by one motor (46), the motor's output shaft drives the main agitator (31) directly, while it is driving the shafts of the secondary agitators (32, 33) through a drive belt connected to their pulleys. A centralized water feed line (34) and multi-cleaner compartments are installed to distribute the water and cleaner to the basins (22, 23, 24). The basins side walls have a wavy surface (64), 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-REMOVEABLE BASINS

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 up-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, should have barriers in-between these laundry types inside the basin, but this would require further modifications on the whole machine to cooperate with the new basin divisions, these required modifications, and extra ones to make the washing process more efficient, are carried out in this invention.

10

Disclosure of Invention

Brief Description

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

- The original washing machine can have two options, either to be functioning with its original basin only, or its basin is divided by a removable and installable 20 one piece barriers into three, to create variable basins sizes, e.g. one big washing compartment (basin) and two secondary washing compartments (basins), the big basin can be used for the bigger quantity of laundry (colored clothes) while the secondary basins are used for little quantities of laundries. The original basin still can be used as whole by removing the barriers.

- 25 Each created 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.

The basins barriers are one removable and installable piece having a centralized water feed line, and multi-cleaner compartments, installed to distribute the water and cleaner to the created basins.

5 The created basins 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:

- 10 • FIG. 1: Illustrates a 3-dimensional view of the barriers (removed) and the internal parts of the electric washing machine without the barriers installed.
- FIG. 2: Illustrates a 3-dimensional view of another embodiment of the barriers (removed) and the internal parts of the electric washing machine without the barriers installed.
- 15 • FIG. 3: Illustrates a three dimensional view of a washed fabric model side movements inside a basin with wavy inner side walls.

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- Electrical washing machine with multi-removable basins barriers FIG. 1:
The washing machine 20 internal basins barriers 21 are drawn here while removed from the machine for simplicity, it is showing also how the other

parts of the mechanism are installed in their suitable locations to carry out their required functions. The original basin is divided into three: the main (big) basin 22, the secondary (small) basins 23, 24. The main basin 22 is bigger than the other two secondary basins 23, 24, 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 is normally less than that of the colored one, the two basins 23, 24 used to clean these groups (towels, white laundry) are smaller, hence they are called secondary basins 23, 24.

The barriers 21 has a T-end edges 25 along their edges vertical length, while the original basin inner walls should have a three T-grooves 26 are extending vertically from the top to the bottom of the inner walls, and they are facing the T-end 25 edges of the barriers 21, the size of the T-grooves 26 are a little bit larger than that of the T-end edges 25, that is to provide a space to slide the whole T-end edges 25 inside the T-grooves 26 from top to bottom.

At the bottom surface of the original basin, female grooves 27 are also done, so as to make the bottom male edges 28 of the barriers 21 fit inside these female grooves 27, the female grooves 27 as well as the T-grooves 26 both have a rubber seals tapes 29 at both of their outer edges, so as to prevent any water and detergent solution 30 leakage in-between the basins (22, 23, 24).

As each basin 22, 23, or 24 is by itself a fully separate washing system, each one requires to have separately all the technical features provided for a normal basin in conventional washing machines, and so the barriers 21 will create for each basin side walls, while main agitator 31, or secondary agitators 32, 33 are installed as well as the water feed line 34 which is divided into main supply pipe 35, secondary supply pipes 36, 37, these pipes are provided with three solenoid valves, main valve 38, secondary valves 39, 40, and each basin has a cleaner (detergent) compartment, main compartment 41, secondary compartments 42, 43. For compactability, the side walls (barrier) 21 can be shared, the water feed

line 34 can be designed such that it is introduced towards the upper center point of the sidewalls (barriers) 21 crossing area, where it branches into three pipes, each one is going towards its cleaner pocket (compartment).

5 The main basin's 22 water pipe 35 diameter will be bigger than that of the secondary basins 23, 24 water pipes 36, 37 as well as the main basin 22 cleaner compartment 41 should be bigger than that of the secondary basins 23, 24 cleaners compartments 42, 43, in cooperation with each basin size.

10 A most important separate technical feature of the basins (22, 23, 24) is the water spinning agitators 31, 32, 33, the main basin 21 will have its own main spinning agitator 31, which will be bigger than each one of the secondary basins 23, 24 secondary spinning agitators 32, 33.

15 The remaining requirement after fitting the barrier 21 inside the washing machine 20, is installing the water feed line 34, as the feed line 34 need to enter from a basin top side wall, to be passing towards the detergent compartments (41, 42, 43) which are built-in inside the barriers 21 body upper crossing area, and as this water feed line 34 should have three pipes (35, 36, 37) with their solenoid valves (38, 39, 40) to provide
20 only the specified detergent compartments (41, 42, 43) and basins with water, so, in one embodiment the water feed line 34 from inside the washing machine 20 wall should already include the solenoid valves (38, 39, 40) and water pipes divisions (35, 36, 37) inside a collection box made before its exit 44 from the washing machine 20 inner wall, so that the
25 major parts of the water feed line 34 system will not be removed or installed repeatedly with the barriers 21, and so only after the water feed line exit 44 we can use a water pipe 45 divided from inside into three tubes, this pipe can be removed and installed at each time the barrier 21 is removed, this pipe 45 can have a two conventional fittings to install it
30 from one side to the water feed line 34, and from another side to the detergent compartments (41, 42, 43).

When this pipe 45 and the barriers 21 are not used, and hence the washing machine 20 is used as the original conventional one basin washing machine, the control unit can control the function of the three solenoid valves (38, 39, 40) to be set at closed position, and so the water passage will be guided toward the original detergent compartment.

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 basin, in order to achieve a successful washing process, and as that quantity size increases as the diameter of the basin increases, here in the multi-removable basin electric washing machine 20, the division of the basin into smaller basins (22, 23, 24) will reduce the cross sectional area of each basin, this will mean as the:

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

; then as the cross sectional area of a basin division is less than for the original basin, 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 does not force the user to use the minimum big amount of water required for a washing cycle even when the laundry quantity is small, like in conventional big basin washing machines.

Anyway, the three spinning agitators 31, 32, 33 are to be rotating either at once or when their selected basin is occupied for use, in one embodiment in this invention, one motor 46 is used to drive these three agitators (31, 32, 33) the motor 46 is installed in a place to have its output-shaft 47 fixed in-line with the main basin's 22 main spinning agitator 31, while a drive belt 48 is installed on a pulley 49 installed on the motor's 46 output-shaft 47, this drive belt 48 will transfer the rotation of the motor's 46 main pulley 49, to two secondary pulleys 50, 51 installed on the secondary agitators' 32, 33 input shafts 52, 53, and also transfer the

movement to the water pump's 54 pulley 55, so, when the whole machine's 20 basins (22, 23, 24) are on work, the motor 46 will be driving the three agitators (31, 32, 33) at once, a conventional program can be used via a control unit to control clutch mechanisms which may be installed on the shafts' (47, 52, 53) pulleys (49, 50, 51) to activate only the engagement of specific agitators in cooperation with the activated basins, where the control unit receives the orders from the user via a control panel (screen) 56, who can select the required basins (22, 23, 24) agitators (31, 32, 33) to be set for work, in cooperation with other washing cycle requirements. Still the three basins (22, 23, 24) one time work on, is the most economical choice for the user, but when the user one type laundry quantity is more than the main basin 22 can handle, the user can remove the barriers 21 and operate the washing machine as a conventional washing machine with one basin.

All basins (22, 23, 24) water drainage exits (57, 58, 59) will be located at the bottom center collection point where all basins (22, 23, 24) meet, and so all basins three drainage exits (57, 58, 59) will pour the drained water to inside one drainage pipe 60.

2- In another embodiment of the barriers (removed) and the internal parts of the electric washing machine without the barriers installed (FIG. 2): to create an equal size basins 61, a barrier 62 with three connected plates at center and 120 ° angles apart can be used, a three female grooves 63 with 120 ° angles apart, will pass from the original basin inner lower perimeter, toward the bottom center, these grooves 63 will be the location where the barrier's 21 bottom edge will set (will be installed).

The other details related to fixing the barrier 62 inside the original basin, are the same like that mentioned in the first embodiment.

3- Fabric (model) side movements inside the basin (Fig. 3): 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 edge of the basin around its center in one movement, 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.

5 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
10 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.

A further inventive solution for this matter is disclosed here, wherein
15 the inner surface of the barriers 21 for each basin (22, 23, 24) can be made wavy, smoothly curved with around three wavy shapes 64 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 30 via an extra mechanisms installed,
20 stopping and reversing the agitators (31, 32, 33) motion direction periodically, the moving fabric 65 after pushed by the circulating water and detergent 30 (Fig. 3-A) towards the edge of the basin (22, 23, 24) will follow the curve of the wavy surface 64, this will make it changes its direction gradually, as the fabric 65 gets out from the curved edge area, it
25 will be rotated around its center by 90° - 180° (Fig 3-B) resembling a fabric model 65 turn over inside the basin), as each fabric 65 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 65 to the
30 push, force, or pressure of the incoming faster spinning water and detergent solution 30 that is coming from behind it, as soon as it gets out from the curved surface 64, that is to say: inside the curved area

5 64, the water and detergent solution 30 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 and detergent solution 30, once the fabric 65 gets out of the curved area 64, it will expose it to an extra pressure, which will cause more friction between the water and detergent solution 30 from one side, and the fabric 65 from another side, in another way leading to a more pumping of water and detergent solution 30 through the fabric 65, which will be washed thoroughly during every second of the wash cycle's full time.

10 b- Because while the fabric 65 is getting out from the curved area 64 also will move from a higher water 30 level from the edges of the basin (22, 23, 24) towards a lower water 30 level at the center, the fabric 65 will rotate down towards the agitator (31, 32, or 33) then up again to the side walls of the barriers 21 edge of the basins (22, 23, 24) 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 30 pumping force effect, the turbulence of the water and detergent solution 30 specially near the agitators (22, 23, 24) will lead to rotating the fabric 65 around its vertical axis, the systematic and non systematic motions of the fabric 65, will change its 3-directional motion, and hence what can be called 3-dimensional all faces full time washing will result.

15 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 only carried with the water just to rotate around and around, without a noticeable water pumping effect on it, that means the pumping effect will take place for only 30 – 40 % of each wash period, from another side, the invented wavy wall pumping effect in this invention, will be permanent for a full time period, this means

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compared to conventional washing machines, the invented machine hereby with the wavy side walls 64 can carry out each full water and detergent solution 30 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, detergent 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.

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.

Industrial applicability

In addition to all of the mentioned reasons before about the important needs for an electric washing machine with multi-removable basins and the modes for carrying out it using conventional available parts with little modifications, the

5 subject invention has the following benefits:

- 1- Body inner shape and limited mechanical modifications which costs little extra parts and parts costs.
- 2- Two options of usage, either like a conventional washing machine while the barriers are removed and the laundry quantity is big, or as a multi-
10 basin machine with the barriers installed.
- 3- Three washing cycles are abbreviated into one, wherein the basins size remain nearly equal the original one, the height / diameter ratio for each basin 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 also achieved:
15
 - 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
20 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 %.
- 4- The wavy shape of the basins inner surfaces, expose the laundry pieces
25 to a better and faster washing quality within a shorter time, which means abbreviating the required time of washing, that would save more energy, cleaner, the value in point (3-b) can decrease to 1/3- 1/2.

Parts Drawing Index:

- | | | |
|-----------|-----------|--|
| | 20 | Electrical washing machine with multi-removable basins. |
| | 21 | Basins Barriers. |
| | 22 | Main (big) basin. |
| 5 | 23 | Secondary (small) basin. |
| | 24 | Secondary (small) basin. |
| | 25 | T-end edges. |
| | 26 | T-grooves. |
| | 27 | Female grooves. |
| 10 | 28 | Male edges. |
| | 29 | Rubber seals tapes. |
| | 30 | Water & detergent solution. |
| | 31 | Main (big) agitator. |
| | 32 | Secondary (small) agitator. |
| 15 | 33 | Secondary (small) agitator. |
| | 34 | Water feed line. |
| | 35 | Water main supply pipe. |
| | 36 | Water secondary supply pipe |
| | 37 | Water secondary supply pipe. |
| 20 | 38 | Main pipe solenoid valve. |
| | 39 | Secondary pipe solenoid valve. |
| | 40 | Secondary pipe solenoid valve. |

- 41 Main cleaner (detergent) compartment.
- 42 Secondary cleaner compartment.
- 43 Secondary cleaner compartment.
- 44 Water feed line exit.
- 5 45 Water pipe.
- 46 Motor.
- 47 Motor's output shaft.
- 48 Motor's main pulley.
- 49 Drive belt.
- 10 50 Secondary pulley.
- 51 Secondary pulley.
- 52 Secondary agitator input shaft.
- 53 Secondary agitator input shaft.
- 54 Water pump.
- 15 55 Water pump pulley.
- 56 Control panel (screen).
- 57 Main water drainage exit.
- 58 Secondary water drainage exit.
- 59 Secondary water drainage exit.
- 20 60 Water drainage pipe.
- 61 Equal size secondary basins.
- 62 Barrier (120 ° palates apart).

63 Three female grooves.

64 Wavy surface.

65 Fabric (3-D model).

Claims

1. An electric washing machine (20) with multi-removable basins comprising:
5 original basin divided into three.
a wavy surface (64) of basin side wall.
three agitators (31, 32, 33) based in the bottom center of each basin.
centralized water feed line (34).
detergent compartment divided into three compartments (41, 42, 43).
10 a three way drainage outlets (57, 58, 59) gathering in one drainage pipe (60).
a motor (46) driving the main agitator (31), two agitators pulleys (50, 51), water pump (54).
2. The electric washing machine (20) in claim 1, wherein the original
15 basin is divided by a removable plastic barriers (21, 62) into three fixed basins (22, 23, 24).
3. The three basins (22, 23, 24) in claim 2, wherein when the plastic barrier (21) is used, the created basins will be one big size main basin (22), and two small size secondary basins (23, 24).
- 20 4. The three basins (22, 23, 24) in claim 2, wherein when the plastic barrier (62) with its plates 120 ° apart is used, the created three basins will be equal size and similar shape secondary basins (61).
5. The three basins (22, 23, 24) or secondary basins (61) in claims 3 and 4, wherein the basins are used during one time operation for washing
25 three sets of laundry e.g: (adult male cloths, adult female cloths and kids cloths), or (colored laundry, white laundry, towels)...
6. The electric washing machine (20) in claim 1, wherein the wavy basins walls surfaces (64) are created to elongate the washing rotation distance, create a three directional water and detergent solution (30)
30 pumping through all sides of the fabric (65), an upside down turnover, reversed sides directions, and so a cancellation of the need of agitator reversed direction mechanism.

7. The electric washing machine (20) in claim 1, wherein the three agitators sizes (31, 32, 33) are suitable for the size of each basin, one main big agitator (31) for the main basin (22), two secondary small agitators (32, 33) for the secondary basins (23, 24).
- 5 8. The motor (46) in claim 1, wherein its output shaft (47) is connected directly to the main agitator (31), while connected through a drive belt (49) fixed from one side on a driving pulley (48) fixed on its output shaft (37), and from another side to three driven pulleys (50, 51, 55).
- 10 9. The three driven pulleys (50, 51, 55) in claim 8, wherein two pulleys (50, 51) are fixed to the secondary agitators (32, 33) input shafts (52, 53), and one pulley (55) fixed to the water pump (54) shaft.
10. The centralized water feed line (34) in claim 1, wherein it is directed from the water pump towards washing machine (20) wall top side to feed water to supply pipes in a collection box.
- 15 11. The centralized water feed line (34) in claims 1 and 10, wherein it is divided inside the collection box into three pipes (35, 36, 37) one main big size (35), and two smaller sizes pipes (36, 37) for the variable size basins (22, 23, 24) and to be equal size pipes for the equal size basins (61).
- 20 12. The three water pipes (35, 36, 37) in claim 11, wherein each one has a solenoid valve (38, 39, 40) controlling the water feed or blocking it according to a conventional programmed control unit orders receiving fed orders, set via a control panel (56) run by the user.
- 25 13. The detergent compartments (41, 42, 43) in claim 1, wherein it is located at the top crossing area between the basins (22, 23, 24) barriers, or the basins (61).
- 30 14. The detergent compartments (41, 42, 43) in claim 1, wherein with the variable size basin embodiment, the detergent compartments (41, 42, 43) are arranged so that one main compartment (41) with detergent outlet is facing the big size basin (22), two small secondary compartments (42, 43) each with its detergent outlet facing a secondary basin (23, 24).

15. The detergent compartments (41, 42, 43) in claim 1, wherein with the equal size basin (61) embodiment, their size is equal and they are arranged so that each compartment exit faces one basin (61)
- 5 16. The three water pipes (35, 36, 37) in claim 11 wherein in-between the solenoid valves exit and the water and detergent compartments, they are forming a one removable and installable pipe (45) piece.
- 10 17. The three water pipes (35, 36, 37) in claims 11 and 16, wherein the main pipe (35) is feeding the main detergent compartment (41), while the secondary pipes (36, 37) are feeding the secondary detergent compartments (42, 43).
18. The three drainage outlets (57, 58, 59) in claim 1, wherein they are located near the lower crossing area of the basins (22, 23, 24) or (61) barriers, and drain the waste water inside one main drainage pipe (60) fixed under them.
- 15 19. The electric washing machine (20) in claim 1, wherein when the barriers (22) or (62) are removed, the washing machine (20) can be used as a conventional one big basin washing machine.

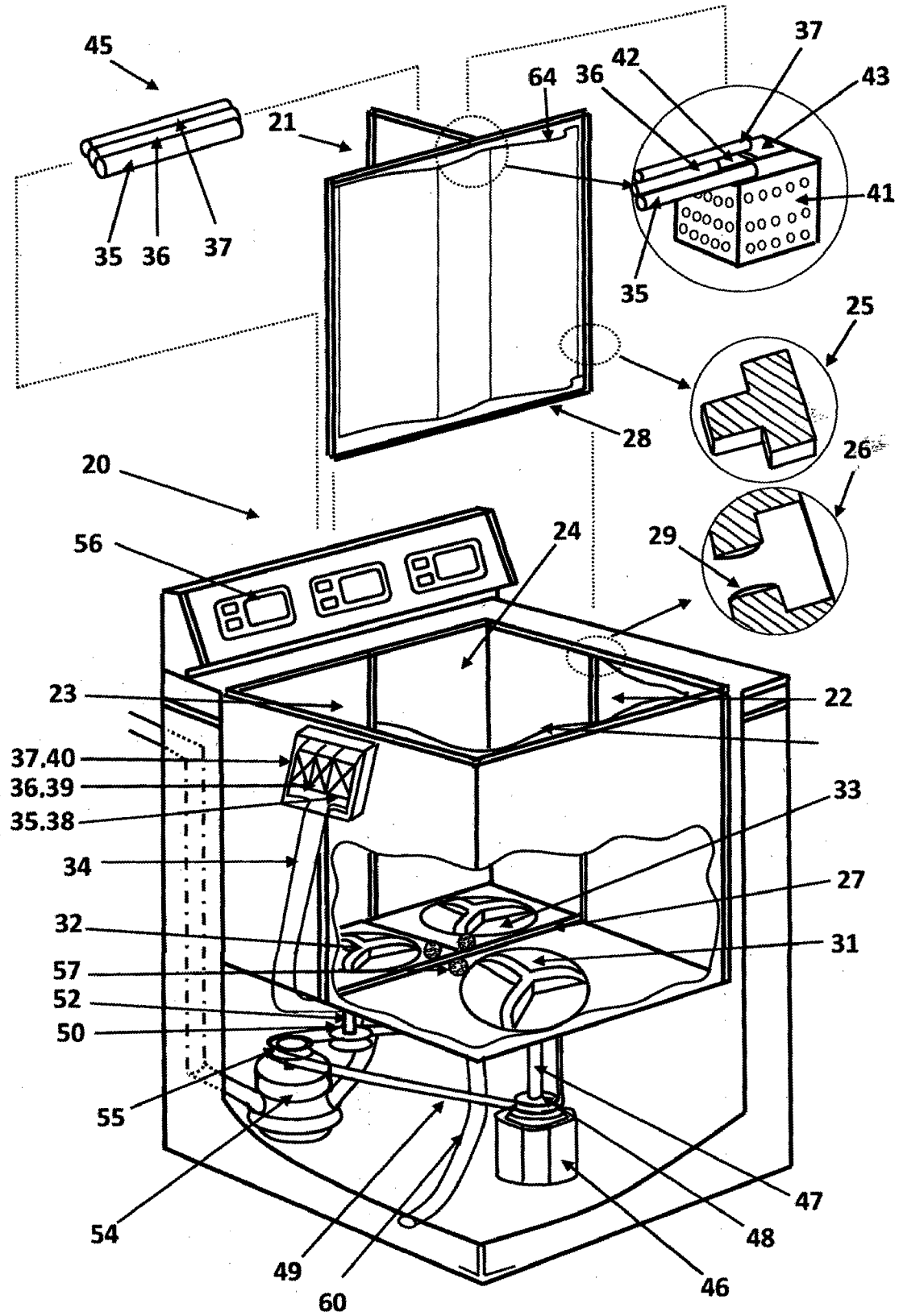


FIG. 1

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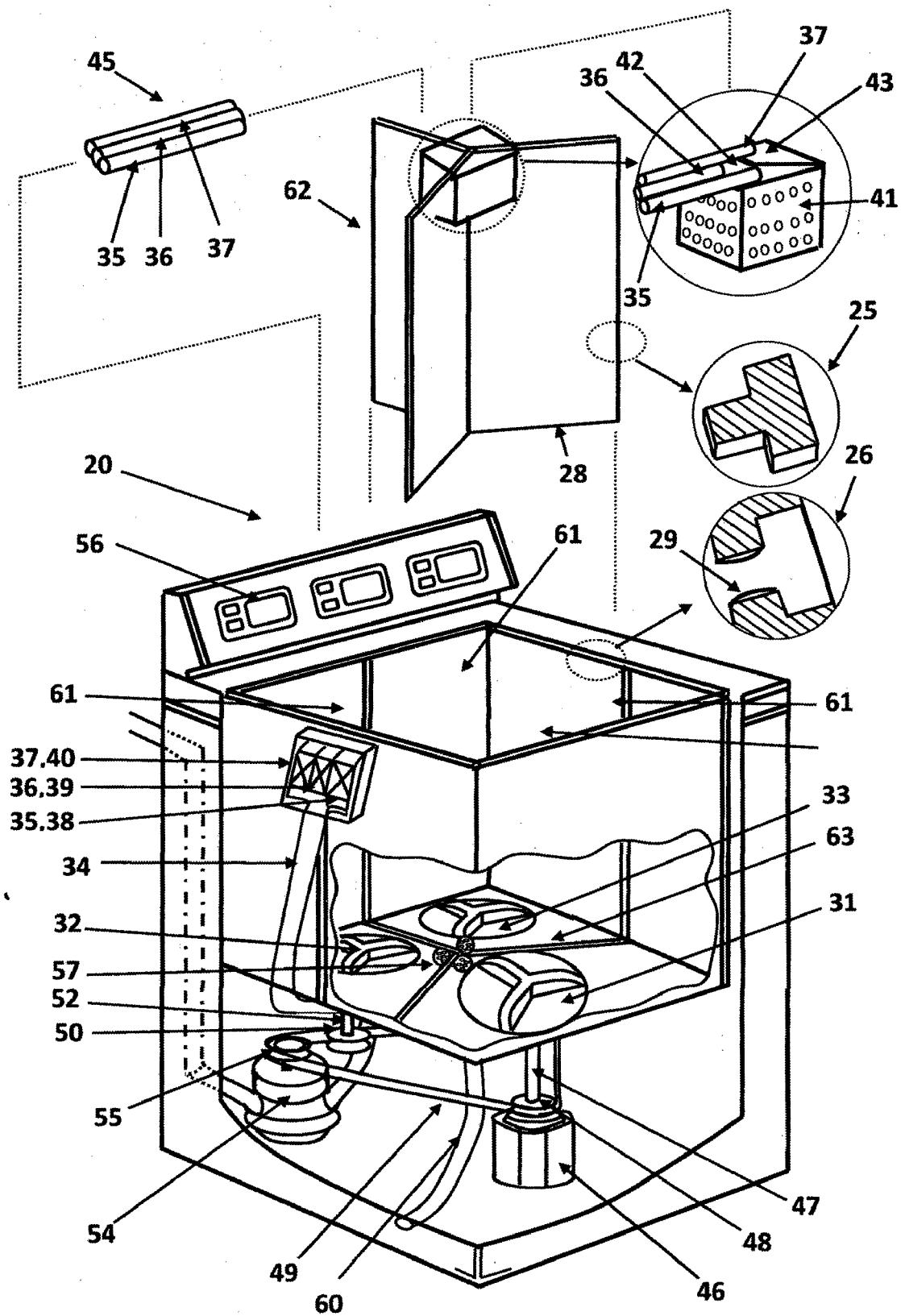


FIG. 2

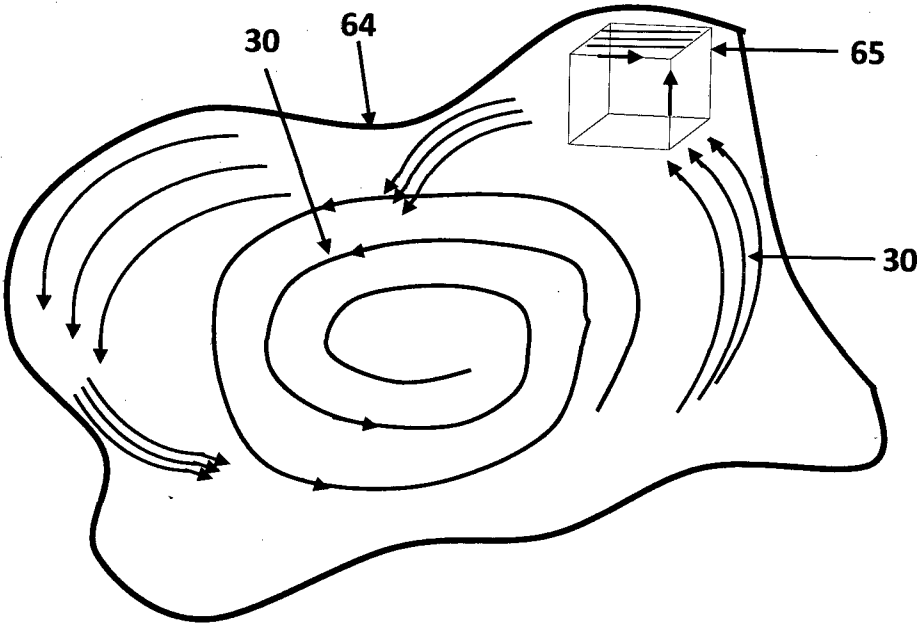


FIG. 3- A

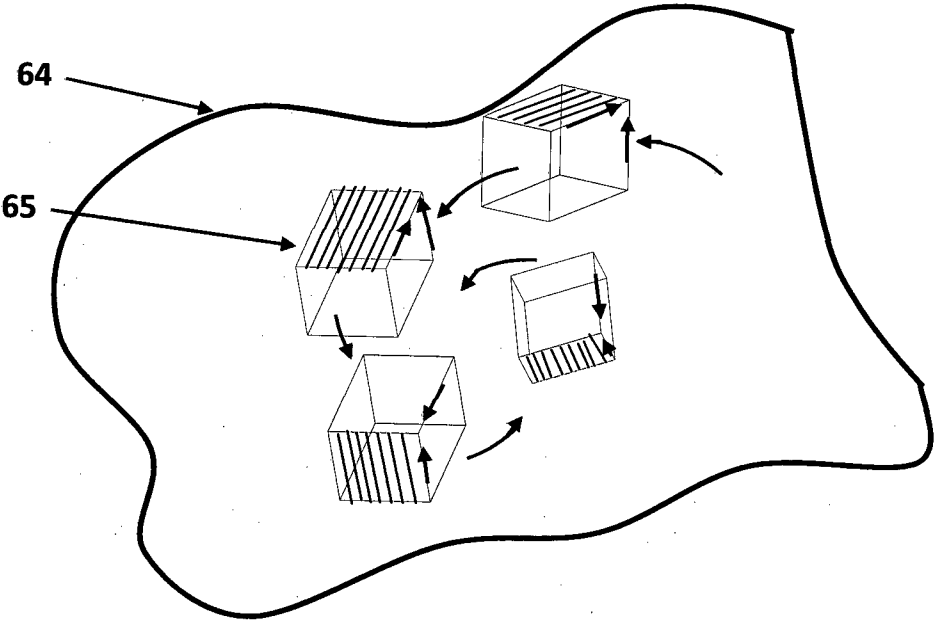


FIG. 3- B