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(54) Containers for containing liquid detergents and for collecting a washing liquid in a washing machine.

(57) A laundry washer, preferably of the domestic type, provided with at least one container for containing liquid products to be used during successive phases of a laundering program, and with an additional container for collecting the liquid used in the rinsing phases, particularly in the last ones of these phases.

The machine is characterized in that the liquid containers are accommodated in a vertically extending space located, in the case of a front-loading washer, between the rear wall of the tub and the rear wall of the housing, and in the case of a top-loading laundry washer, between one of the walls of the tub and the corresponding wall of the housing.

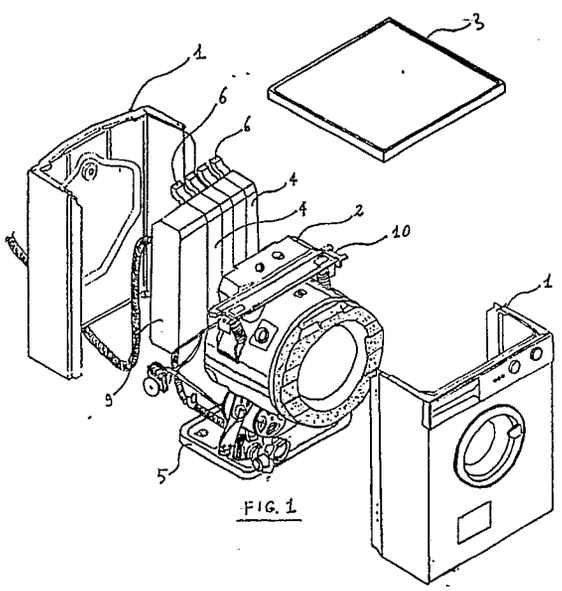

FIG. 1

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The invention relates to a container-distributor for liquid detergents in a washing machine, particularly a laundry washer, adapted to contain determined amounts of liquid detergents to be supplied to the tub of the machine for the execution of the laundry washing cycles, and to a receptacle for collecting the rinsin liquid for use in the preliminary and main laundering phases of the following cycle.

A tendency manifesting itself on the international market goes towards the employ of domestic laundry washers of compact dimensions, in view of the limited space available in modern homes, and at the same time of steadily improved performance and an optimum performance to cost relationship.

This tendency has led to the availability of products capable of performing additional functions, for instance a laundry-drying function performed by a laundry washer without the need of additional equipment, the possibility of saving and recycling a considerable amount of water (an always more precious resource) and the protection of the environment by the use of liquid detergents (less polluting).

A logical consequence of these tendencies is the construction of laundry washers of reduced capacity as compared to that of earlier machines, the producers of such laundry washers, particularly of the front-loading type, competing in the production of laundry washers of reduced depth of the housing, and thus of the tub, while maintaining the front-face dimensions unchanged.

The reason for this decision is obvious to anybody skilled in the art and derives from the necessity of minimizing the investment costs for new production equipment for making the "shorter" product.

Conventional laundry washers are designed for the supply of granular and/or liquid detergents to the laundering tub by means of a traditional detergent distributor connected to the tub and subdivided into a number of separate compartments for containing different detergents. The various compartments of the detergent distributor are initially filled with metered amounts of the different granular and/or liquid detergents, and the detergents are then supplied to the tub by selectively directing the water for the various laundering phases through respective ones of the compartments.

These detergent distributors are satisfactory and reliable in operation, they are however of limited capacity and thus not capable of storing greater amounts of detergents for use in successive laundering cycles.

There are also certain laundry washers designed for storing greater amounts of detergents, particularly liquid ones, these machines being equipped with a number of rigid containers of increased capacity for containing liquid detergents or component products of detergents, the containers being connected to the tub by way of respective conduits provided with metering pumps for supplying the detergents or component products to the tub.

These laundry washers are additionally provided with conventional control components acting on the metering pumps so as to ensure the supply of proper amounts of the liquid detergents or component products to the tub, in accordance with the amount of water supplied there to in the course of the laundering cycle.

While the employ of the described rigid containers permits the supply of liquid detergents or component products to the tub in a satisfactory manner, there is the disadvantage that the containers cannot be accommodated within the limited space available within the housing of the laundry washer and have therefore to be mounted outside of the machine.

In known examples of laundry washers of this type, the containers for liquid products are thus in fact disposed outside of the machine itself, and preferably accommodated in a suitable casing placed on one side of the machine and usually having the same height and depth as the latter, so as to at least partially comply with the existing dimensional standards.

The generally recognized necessity to reduce the consuption of water has led to the following proposal:

The operating cycle of known laundry washers usually includes the following phases in succession: an (optional) preliminary laundering phase, a main laundering phase, and at least two rinsing phases with the optional addition of softening agents, perfumes and the like.

Each of these phases requires a charge of water to be supplied to the tub and to be discharged therefrom at the end of the respective phase.

Since it is generally known that the water discharged after the last rinsing phases, particularly after the very last rinsing phase, is relatively clean, at least as regards residual detergent contents, and as it is also known that the preliminary and main washing phases do not require the water employed there for to be absolutely clean in the sense of "potable" as guaranteed for the mains water supply, it is only logical to collect the water from the last rinsing phases for use in the preliminary and/or main laundering phases of a subsequent cycle.

It is therefore known to collect the liquid discharged from a laundry washer at the end of the last rinsing phases in a suitable container and to return the collected water to the tub for the preliminary or main laundering phase of the next cycle.

In this case there is of course also the problem of finding a space for accommodating this container, this problem being aggravated by the fact that a single charge of water to be collected may have up to twenty litres.

As in the case discussed above, this problem has found a partial solution in the employ of an external container.

Even when the height and depth of the container conform to the respective dimensions of the associated laundry washer, the resulting washer-container combination will be excessively bulky and above all of more than standard width.

The seriousness of these problems, which need not be disccussed further, is well known to one skilled in the art. The thus designed product is practically unsaleable and extremely dificult to install in view of the internationally accepted dimensional standards for household furniture and appliances.

It is the object of the present invention to eliminate the described shortcomings by the provision of a number of containers for liquid products to be used in the laundering operation, and of a receptacle for the collection of water discharged at the end of rinsing phases, particularly of the two last rinsing phases, said containers and receptacle to be mounted within the housing of the machine, particularly in a vertical position adjacent the laundering tub.

The characteristics of the invention will become more clearly evident from the following description, given by way of example with reference to the accompanying drawings, wherein:

- fig. 1 shows an exploded view of a laundry washer provided with a plurality of containers according to a first embodiment of the invention,
- fig. 2 shows a diagrammatic rearside view of parts of the machine of fig. 1, with the containers and receptacle according to the invention accommodated therein,
- fig. 3 shows a sectional sideview of the machine depicted in the preceding figures,
- fig. 4 shows a view similar to fig. 1 of a modified embodiment of the invention, and
- fig. 5 shows a sectional sideview of the machine depicted in fig. 4.

The characteristics of the invention are defined in the attached claims.

With reference to the drawings, the following elements are shown:

1) housing of the laundry washer,
2) laundering assembly,
3) worktable top
4) containers for liquids
5) housing bottom
6) rearwards directed filler spouts of containers 4
7) upwards directed filler spouts of containers 4,
8) hinged flap for covering spouts 7
9) rear-mounted collector receptacle
10) top cross member interconnecting half-shells of housing 1.

In order to facilitate the description of the invention, reference is made by way of example to a laundry washer of the front-loading type, although without restricting the scope of the invention to this construction, inasmuch as one skilled in the art may readily apply the teachings of the invention to other constructions and different appliances.

From viewing the embodiment depicted in figs. 1, 2 and 3 it will be understood that the containers 4 for products to be used in the course of the laundering cycle, and the collecting receptacle 9 are of box-shaped configuration similar to one another and disposed closely to one another along the upper rear rim of the machine within the housing.

This permits containers 4 to be filled directly from above with the respective liquid products by way of filler spouts 6 projecting from their upper rear corners.

For reasons of structural opportunity, receptacle 9 is shown to be positioned at one end of the row of containers 4. It is of course also possible to provide a construction in which containers 4 are disposed in the space available adjacent the rear upper rim of the machine, and the collector receptacle is disposed below the containers and attached to a lower part of the rear wall, in which case it may extend over the full width of the housing.

This solution is absolutely possible due to the fact that the collector receptacle does not have to be accessible to the user, or at least not accessible from above.

A modification of the described embodiment is shown in figs. 4 and 5. In this embodiment the filler spouts 7 project vertically at the top of containers 4 and are protected from above by a cover flap 8 hinged to the worktable top and adapted to be swung upwards for giving access to spouts 7.

The teachings of the present invention are readily applicable by manufacturers having at theor disposal housings of "standard" dimensions and laundering assemblies of reduced capacity, i.e. of the "short" type, by simply mounting the latter in the standard housings to thereby obtain between the tub and the rear wall an empty space substantially of the width and height of the housing, and thus of a considerable volume, which may be fully used for the accommodation of the liquid contain-

ers 4 and the collector receptacle 9 described above.

The invention is applicable with particular advantage to machines the housing of which is composed of separate parts which are joined only on final assembly of the machine, as described for instance in Italian Patent No. 34036/B/86.

This patent teaches the production of housings by joining two upstanding half-shells of extended U-shape in horizontal section.

This construction lends itself with particular advantage to the application of the present invention by permitting containers 4 and receptacle 9 to be placed in a simple manner in the space enclosed by the rear wall and the sidewalls of the rear half-shell, and the resulting subassembly to be joined in a likewise simple manner to the second subassembly composed of the housing bottom 5, the laundering assembly 2 and the front half-shell to thereby finish the assembly operation on the machine substantially without altering the sequence of the assembly steps and details of the overall construction.

For one skilled in the art it will otherwise be a matter of course to resort to suitable structural modifications for adapting the teachings of the present invention to a laundry washer of the top-loading type, as has been mentioned in the introduction to this description.

Claims

1. A washing machine, preferably a laundry washer of the domestic type, comprising a housing (1) and a laundering assembly (2) suspended within said housing, characterized in that between said laundering assembly (2) and said housing (1) there is provided a preferably vertically extending space for the accommodation therein of a receptacle for collecting the liquid from at least one rinsing operation, and/or at least one container (4) for containing liquid products to be used in the course of a laundering cycle.

2. A laundry washer according to claim 1, characterized in that said containers (4) and receptacle (9) are disposed in alignment along the top surface of said housing (1).

3. A laundry washer according to claim 1, characterized in that said containers (4) are disposed in alignment along the top surface of said housing (1), and said receptacle (9) is disposed at a location below said containers (4).

4. A laundry washer according to claim 2 or 3, characterized in that it is of the front-loading type and in that said containers (4) are disposed along the rear top edge of said housing (1).

5. A laundry washer according to claim 2 or 3, characterized in that it is of the top-loading type and in that said containers (4) are disposed along one of the lateral top edges of said housing (1).

6. A laundry washer according to any of the preceding claims, characterized in that said housing (1) is composed of at least a first and a second shell portion adapted to be joined to one another, and a housing bottom (5) adapted to have said housing shell portions mounted thereon, a cross member (10) being removably secured in a per se known manner to upper parts of said shell portions for connecting them to one anothert, said laundering assembly (2) being supported from below by shock absorbers, springs or the like mounted on said housing bottom (5).

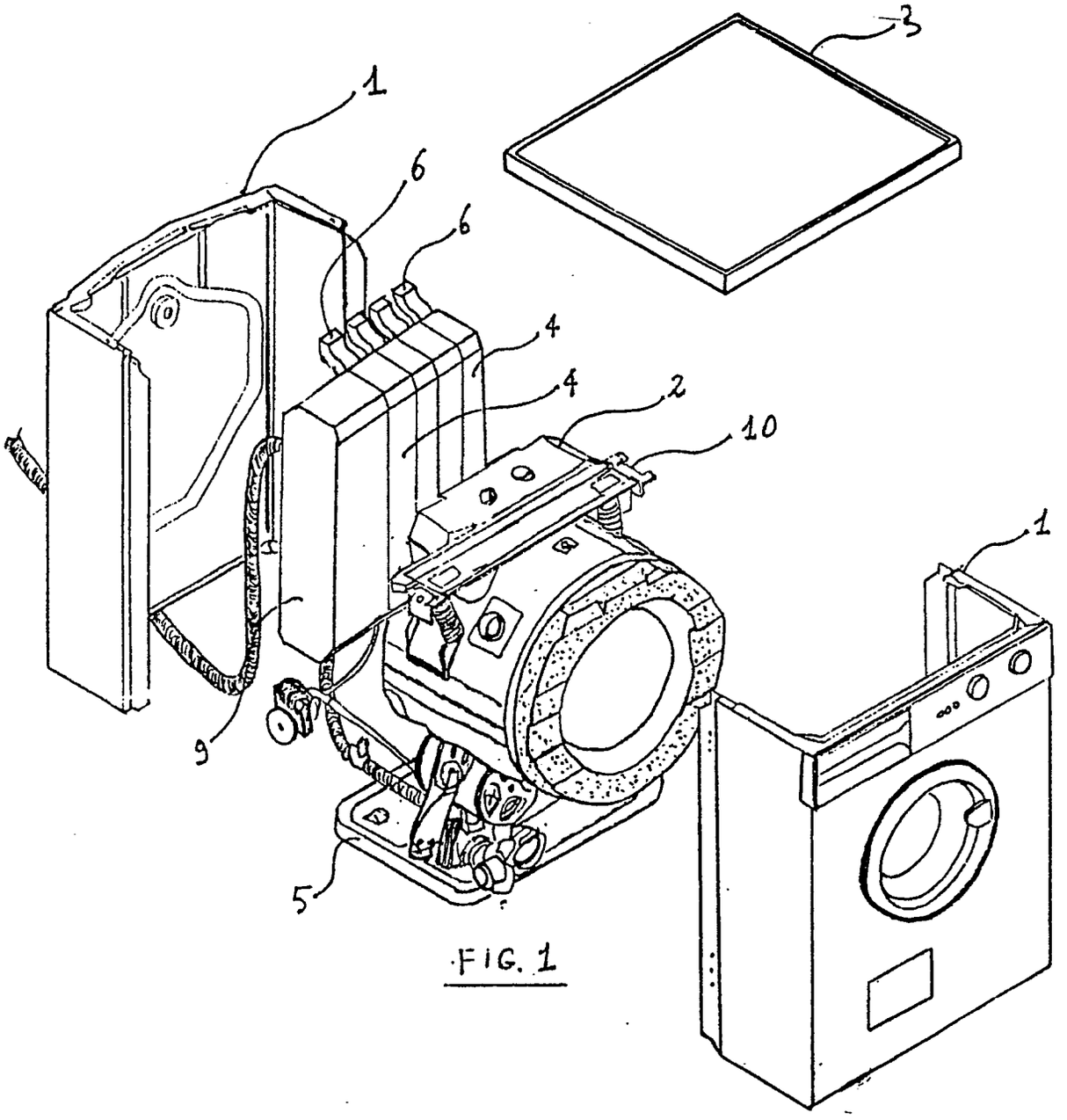

FIG. 1

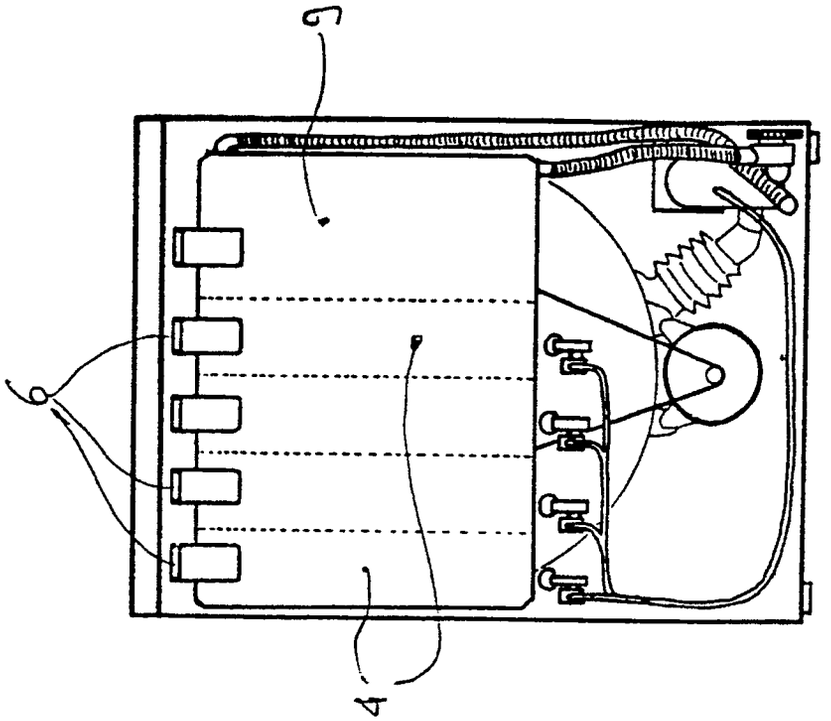

FIG. 2

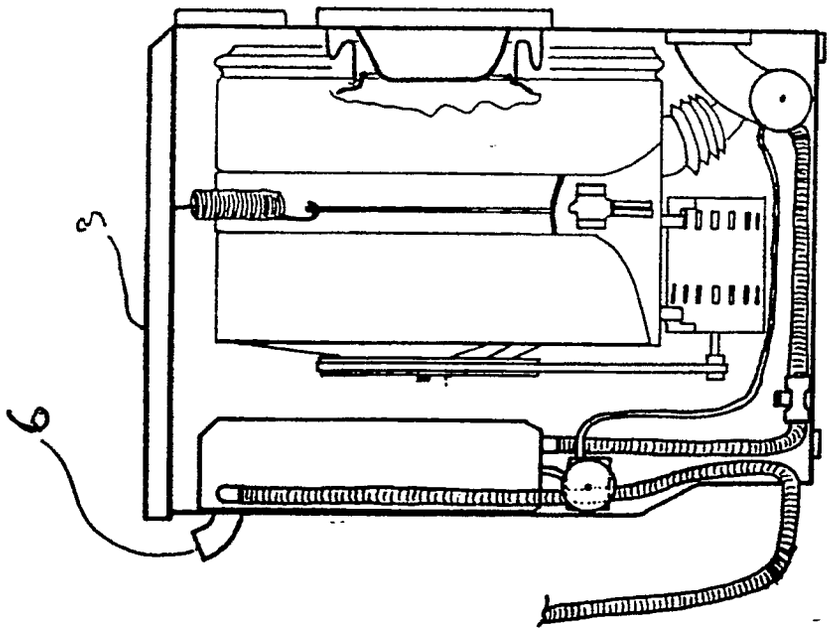

FIG. 3

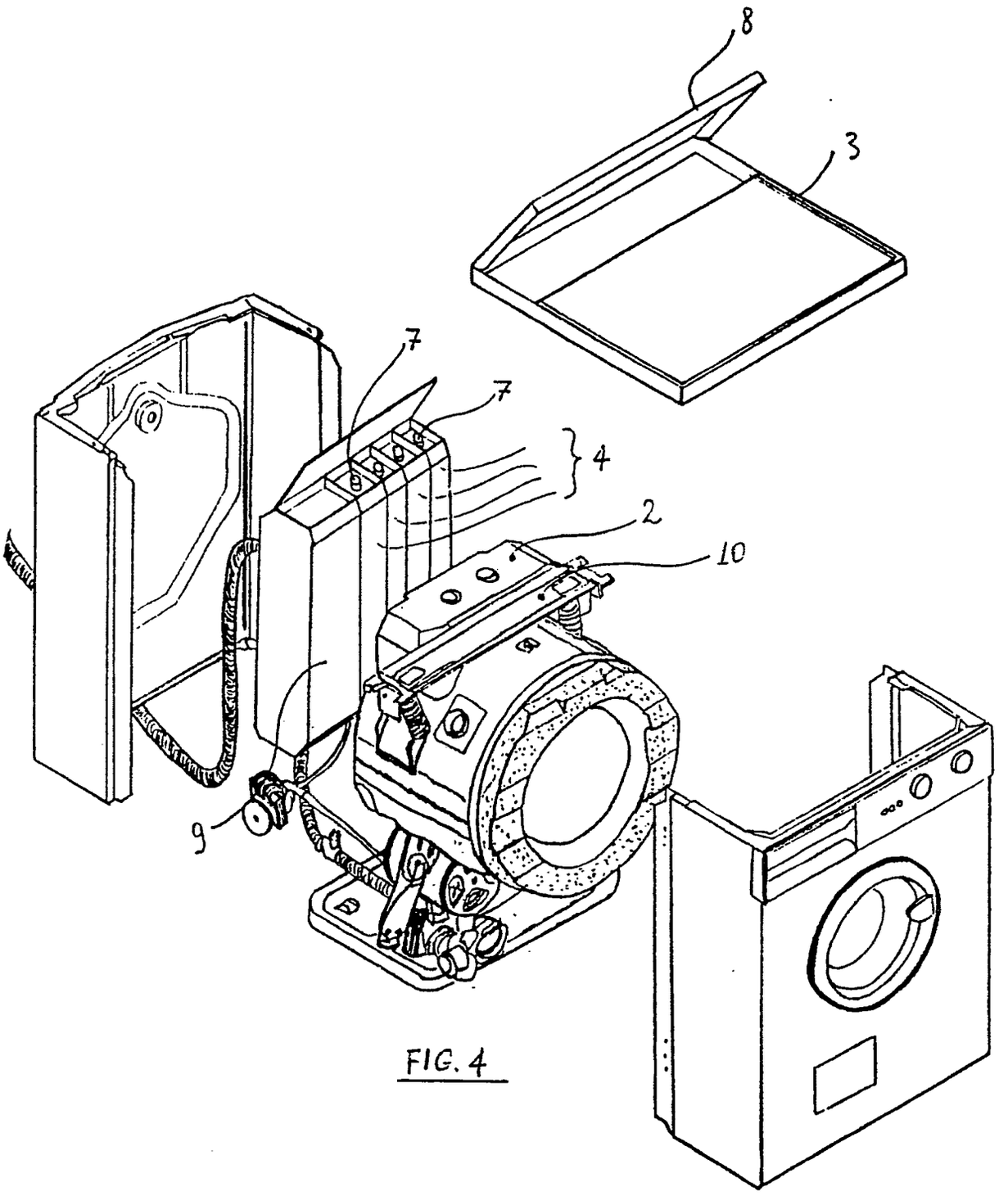

FIG. 4

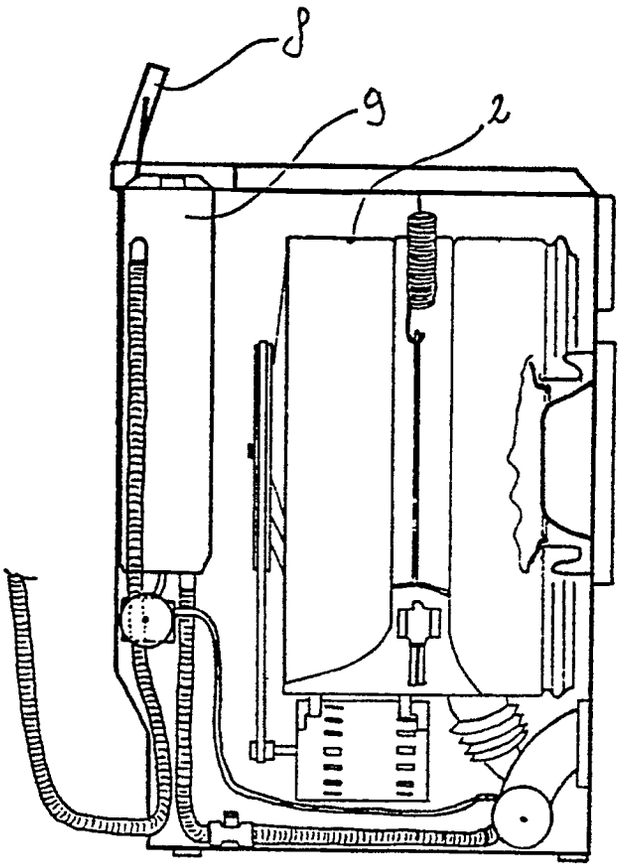

FIG. 5