(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 077 463**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: 82108366.4

(22) Date of filing: 10.09.82

(51) Int. Cl.³: D 06 F 39/02

(30) Priority: 15.10.81 IT 4573081

(43) Date of publication of application:
27.04.83 Bulletin 83/17

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI NL SE

(71) Applicant: INDUSTRIE ZANUSSI S.p.A.
Viale Treviso 15
I-33170 Pordenone(IT)

(72) Inventor: Cargnel, Giuseppe
Via Fontego 6
I-31040 Chiarano (Treviso)(IT)

(74) Representative: Patentanwälte Grünecker, Dr. Kinkeldey, Dr. Stockmair, Dr. Schumann, Jakob, Dr. Bezold, Meister, Hilgers, Dr. Meyer-Plath
Maximilianstrasse 43
D-8000 München 22(DE)

(54) Liquids distributor for a washing machine.

(57) Liquid detergent distributor for a washing machine, disposed in a lower portion of the machine below the washing tub thereof and comprising a container for storing the liquid detergents, communicating with a metering chamber disposed therebelow via an automatic valve. Said metering chamber is divided into two hermetically separated chambers by means of a flexible diaphragm. One of said compartments is connected to the washing tub, while the other compartment is connected to the washing tub and to a water supply. The latter compartment is adapted to be intermittently supplied with water so as to transfer metered amounts of the liquid detergents to the tub.

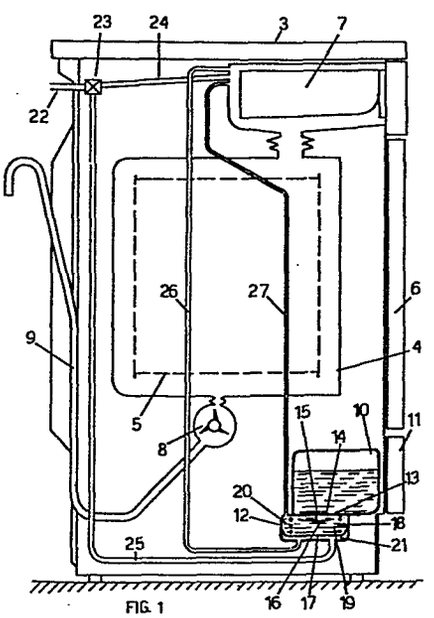

FIG. 1

EP 0 077 463 A2

Liquids Distributor for a Washing Machine

Description

This invention relates to a liquid detergent distributor for a washing machine, particularly for a domestic washing machine. Washing machines of a conventional design may be provided with a distributor for liquid detergents and/or other additives, comprising a container of adequate capacity for containing such additives, located in a lower part of the machine below the washing tub thereof and communicating with at least one subjacent metering chamber through valve means adapted to control the gravity flow of the liquid additives from said container towards said metering chamber.

Two separate tubes connect the metering chamber to said washing tub and to a compressed air source, respectively, via a control element adapted to be controlled manually or automatically by means of the program control unit of the machine (cf. FR-PS 1,269,281 and US-PS 3,021,702). In a distributor of this type, the liquid detergent enclosed in said container is adapted to actuate said valve means by its own weight so as to fill said metering chamber up to a predetermined level. The control element is actuated in such a manner that the metering chamber communicates with said compressed air source solely during predetermined phases of the operating cycle of the machine, during which the introduction of the liquid detergent or additive into the tub is required.

Under these conditions, the pneumatic pressure is effective to displace said valve means so as to interrupt the communication between said chamber and said container and to expell said detergent or additive from said metering chamber towards said washing tub.

On completion of this operation the control element is returned to its original position so as to interrupt the communication with the pressurized air source and to permit replenishment of said metering chamber with a further charge of the detergent for consumption in a further phase of the operating cycle.

Satisfactory operation of a washing machine of the above described type always requires the employ of a pressurized air source such as a conventional compressor actuated by the motor of the machine. The employ of the additional compressor results in a complicated construction of the washing machine and in an increased energy consumption with the inherent economic disadvantages.

A satisfactory operation of the washing machine would not either be obtainable by connecting a metering chamber of the above described type to a pressurized liquid source, particularly to the pressurized water supply source of the washing machine. Although in this case the pressurized liquid introduced into the metering chamber containing the liquid detergent or additive would effectively displace such detergent towards the washing tub disposed above the metering chamber, it would be difficult to discharge the introduced liquid from the metering chamber. This would in effect require the employ of an additional discharge pump, whereby the construction of the liquid distributor would be further complicated.

It is therefore an object of the present invention to avoid the above noted disadvantages and to provide a liquid detergent distributor for a washing machine which is of simple construction and reliably operable by connection to the water supply source of the washing machine.

In accordance with the invention, a liquid distributor of this type generally comprises a storage container located in the lower part of the machine and associated with a

metering chamber disposed therebelow, communication of said container with said chamber being adapted to be controlled by automatic resilient valve means, said chamber being connected to a water supply source and to the washing tub of said machine.

A distributor of the above defined type is characterized according to the invention in that said metering chamber contains a resiliently biased diaphragm dividing said chamber into two hermetically separated compartments each of which is connected to said washing tub of said machine.

Further characteristics of the invention will become evident from the following description of a preferred embodiment with reference to the accompanying drawings, wherein:

fig. 1 shows a sectional view of a conventional washing machine provided with a distributor according to the invention, said distributor being shown in a first operating state, and

fig. 2 shows a sectional view corresponding to fig. 1, with the distributor in a second operating state.

Shown in fig. 1 is a conventional washing machine 3 comprising a washing tub 4 surrounding a rotatable drum 5 for containing clothes and the like to be washed and accessible through a hinged door 6 at the forward portion of the machine.

The upper portion of tub 4 is connected to a detergent distributor 7 which is divided into several compartments for containing various detergents and the like required for successive phases of the washing program. The bottom portion of tub 4 is connected to a discharge outlet via a pump 8 and a flexible discharge hose 9.

Located in a lower part of the machine, i.e. below the water level A in tub 4, is a distributor according to the invention, comprising a large-capacity container 10 accessible through a forward facing door 11 and/or a charging opening (not shown) for the introduction of a liquid additive, and a metering chamber 12 disposed below container 10 of smaller capacity than the latter and separated therefrom by a partition 13.

Partition 13 is formed with a through-opening 14 adapted to contain a poppet valve 15 having a limited vertical stroke. Poppet valve 15 has an enlarged head portion 16 of a resilient material adapted to open and close opening 14 in the lowered and raised positions of poppet valve 15, respectively for permitting and interrupting, respectively, the gravity flow of the liquid additive contained in container 10 into metering chamber 12.

A flexible diaphragm 17 contained in metering chamber 12 is biased downwards by a spring 18 acting between diaphragm 17 and partition 13. Diaphragm 17 is addapted to cooperate with poppet valve 15 in a manner to be described below, and has its peripheral rim portion fixedly attached to the interior wall surface 19 of chamber 12, so as to divide the latter into two hermetically separated compartments 20 and 21.

The washing machine is connected to a water supply by means of a conduit 22 provided with a double-acting magnetic valve 23 for selective communication with distributor 7 via a conduit 24 and with compartment 21 of metering chamber 12 via a further conduit 25.

There are further provided two conduits 26 and 27, both of which have one end connected to detergent distributor 7, and the other end to compartments 20 and 21, respectively. Conduits 26 and 27 serve to transfer to tub 4 the liquid additives and water, respectively, previously introduced

into compartments 20 and 21, respectively, in the manner to be described.

Fig. 1 shows the above described washing machine with the present liquids distributor in its rest position. Diaphragm 17 is maintained in its lower end position by spring 18, and poppet valve 15 assumes its lowered position, permitting gravity flow of the liquid additive contained in container 10 through opening 14 into compartment 20 until the latter is filled and static equilibrium attained.

As long as container 10 is charged with a sufficiently great quantity of the liquid additives, compartment 20 may be filled several times before container 10 is empty and has to be filled with a further charge of the liquid additive.

In this state, conduit 25 is closed, so that no water flows into compartment 21 to actuate diaphragm 17 for pumping the liquid additive from compartment 20 into tub 4.

After the machine has been started the preliminary and main washing phases are carried out under the control of its program unit, controlling the flow of water into tub 4 via conduit 24 and distributor 7, together with granular or liquid detergents contained therein.

During certain phases of the operating cycle, during which the introduction of liquid additives into tub 4 is required, the program unit permits the flow of water through conduit 25, as shown in fig. 2. Under these conditions, water entering compartment 21 displaces diaphragm 17 upwards against the bias of spring 18, whereby the liquid additive contained in compartment 20 is displaced towards tub 4 via conduit 27.

Due to the pressure generated in this manner in compart-

ment 20, poppet valve 15 is raised until its head portion 16 engages partition 13, closing opening 14 and thus preventing the return of the liquid additive into container 10.

The program unit maintains valve 23 in the actuated state for a predetermined period, so that the liquid additive is automatically transferred to tub 4 in the manner described.

Subsequently, the program unit deactivates valve 23, whereupon diaphragm 17 is returned to its lowered rest position by spring 18, displacing the water contained in compartment 21 towards tub 4 via conduit 26.

At the same time, compartment 20 is filled with a further charge of the liquid additive in preparation for a further operating cycle of the machine. By suitably setting the program unit at the start of the operating cycle, the magnetic valve 23 may thus be activated once or several times for predetermined periods, depending on the amount of liquid additives to be introduced into tub 4.

According to the invention it is also possible to charge container 10 with various liquid additives to be fed to the washing tub.

In this case container 10 may be divided into separate chambers for receiving therein the various liquid additives. Each of these chambers would have to be provided with a separate poppet valve and diaphragm located therebelow and operating in the above described manner for separately introducing the various liquid additives into the tub as required.

The described washing machine with the liquid additive distributor according to the invention is thus cappable of reliable and simple operation without the employ of

an additional compressor or pressure source as required for this purpose in known washing machines, resulting in a reduced energy consumption and a simplified construction of the machine.

The described distributor is moreover capable of automatically introducing into the washing tub accurately metered amounts of liquid additives, irrespective of the specific gravity and viscosity of the additives.

GRUNECKER, KINKELDEY, STOCKMAIR & PARTNER

PATENTANWALTE

A GRUNECKER
DR H KINKELDEY
DR W STOCKMAIR
DR K SCHUMANN
P H JAKOB
DR G BEZOLD
W MEISTER
H HILGERS
DR H MEYER-PLATH

EP 757

8000 MÜNCHEN 22
MAXIMILIANSTRASSE 43

Liquids Distributor for a Washing Machine

Patent Claims

1. A liquid detergent distributor for a washing machine, comprising a storage container located in the lower part of the machine and associated with a metering chamber disposed therebelow, communication of said container with said chamber being adapted to be controlled by automatic resilient valve means, said chamber being connected to a water supply source and to the washing tub of said machine, characterized in that said metering chamber (12) contains a resiliently biased diaphragm (17) dividing said chamber into two hermetically separated compartments (20, 21) each of which is connected to said washing tub (4) of said machine.

2. A distributor according to claim 1, characterized in that the compartment (20) of said chamber (12) communicating directly with said container (10) is adapted to contain said liquid detergent and has a smaller capacity than said container.

3. A distributor according to claims 1 and/or 2, characterized in that the other compartment (21) of said chamber (12) is adapted to be intermittently filled with water provenient from said supply source for displacing said liquid detergent towards said tub (4) by a pumping action.

0077463

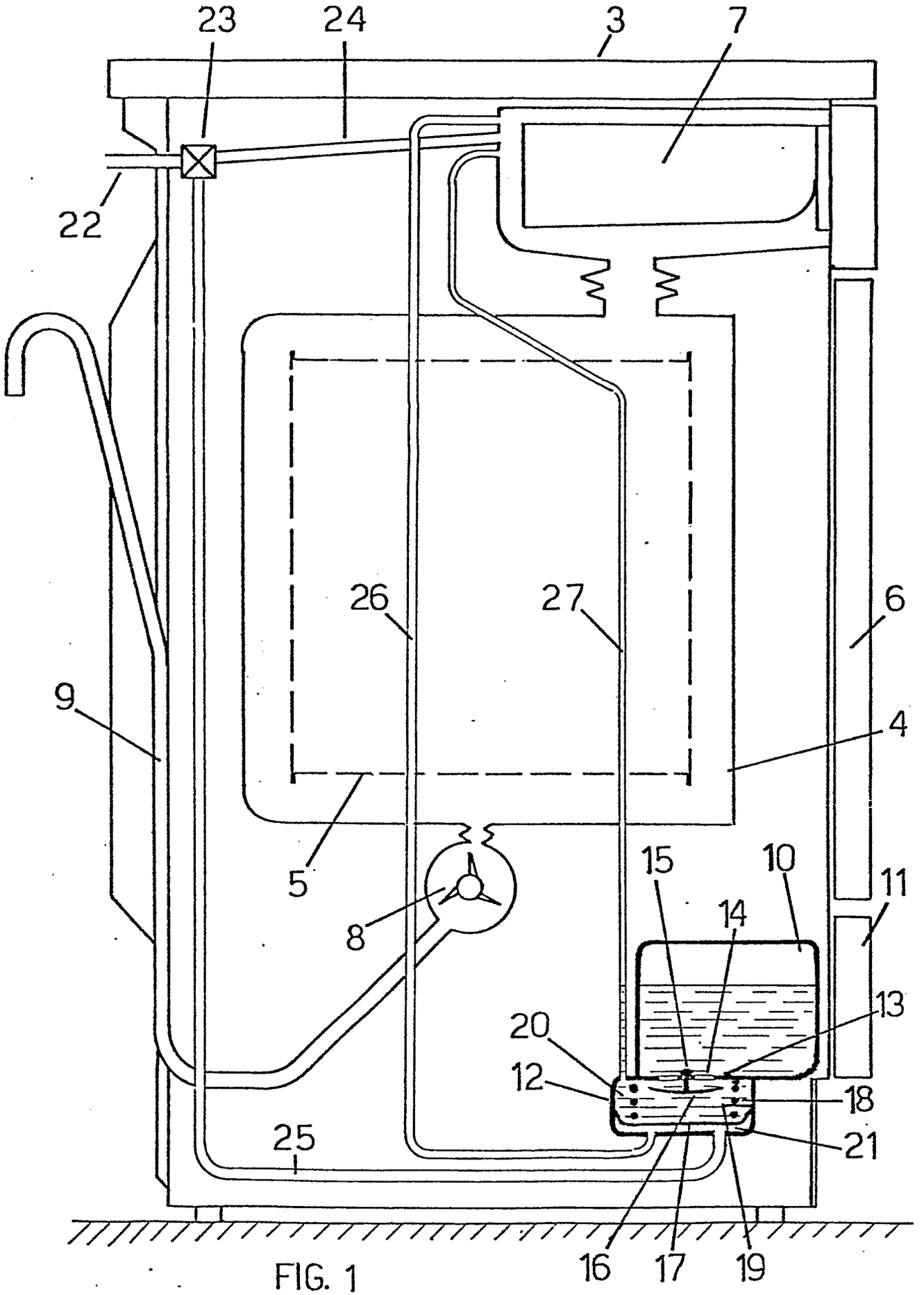

FIG. 1

0077463

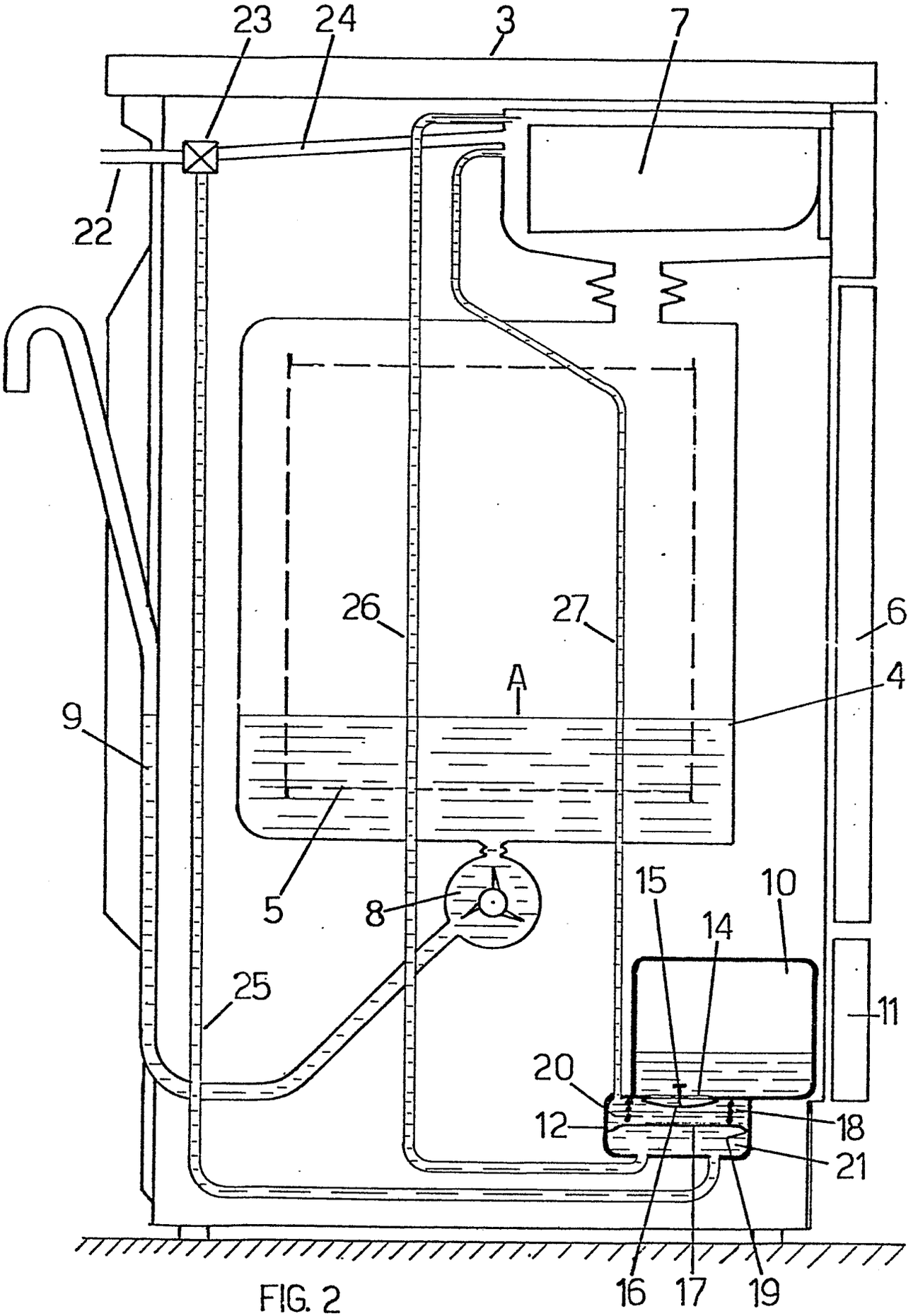

FIG. 2