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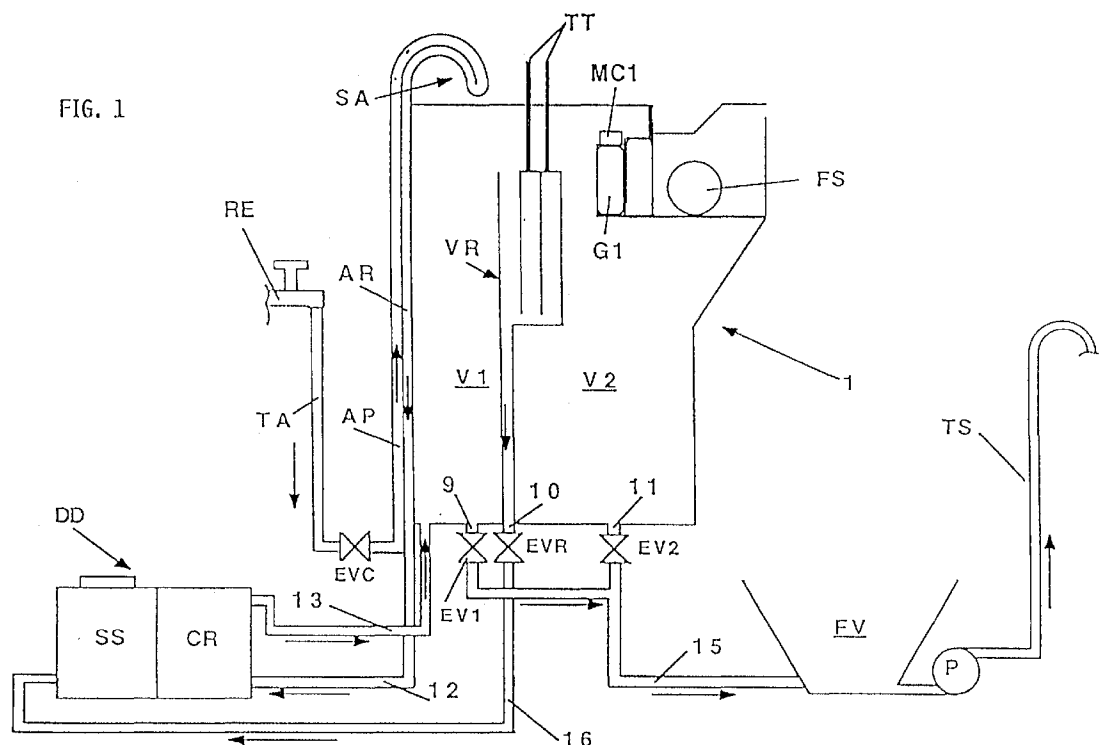
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AL LT LV MK RO SI(30) Priority: **18.02.1997 IT TO970133**(71) Applicant: **T & P S.p.A.****21049 Tradate (Varese) (IT)**(72) Inventor: **Premoli, Marcello****10122 Torino (IT)**(74) Representative: **Dini, Roberto, Dr. Ing.****Via Castagnole, 59****10060 None (Torino) (IT)**(54) **Washing machine with improved device for the liquid supply and dosage, and dosage method thereof**

(57) A washing machine is described, comprising a metering device (1) for the liquid required to perform at least a washing phase, said device comprising at least a first metering chamber (V1) and a second metering chamber (V2). Each chamber (V1,V2) has a relevant discharge solenoid valve (EV1,EV2) and the liquid metering is performed by supplying the liquid to said chambers (V1,V2) and the subsequent discharge of the liquid

contained in at least one of said chambers (V1,V2) into the washing tub (FV) of the machine; said supply and discharge are repeated in the frame of one same liquid metering phase and said chambers (V1,V2) can be discharged independently from each other. In a possible embodiment of the invention, the control of the operation of the metering device (1) is obtained through a programmer of the electromechanical cam type.



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Description

The present invention refers to a washing machine having a device for the supply and the dosage of liquid, and a relevant dosage method.

It is known that dishwashing machines comprise a washing tub, on whose bottom the water from the mains, being required to wash the crockery, is collected. To this purpose the machine is equipped with a recycling pump, for supplying one or more spraying elements with the above liquid collected on the tub bottom.

It is also known that the dosage of the washing water is mostly obtained through an electropneumatic pressure switch, which detects the water level directly within the washing tub and controls an inlet solenoid valve for the water supplied from the mains. However, this system requires an extremely precise calibration for the pressure switch; in fact, considering that the washing tub has a rather extended section, even a change of a few millimeters of the water level in the tub may cause a metering error of several liters of water.

Considering that the supply of a higher water quantity than that actually needed does not agree with the requirements of lower consumptions (water has also to be heated), such a system based on a pressure switch is gradually leaving the place to other solutions, where water metering occurs from outside the washing tub, by using a container with a volumetrically defined capacity. Such a container is repeatedly filled and discharged into the tub, till the water level required for washing is reached. It is obvious that in such solutions, the volume of water discharged into the tub equals a multiple of the metering tank capacity.

Such a solution may also prove suitable to perform the so-called reduced or differentiated washing cycles, which are executed when only one of the machine baskets is used to contain a reduced quantity of crockery. In such instances, it will be enough to feed a reduced volume of water to the machine, so as to minimize consumptions. To this purpose, it will be appreciated that the volume of water fed during the steps of such 'reduced' washings is not necessarily equal to half the one usually supplied for a complete load. Just for indicative sake, the volume of water for a reduced washing may be in the order of $2/3$ - $3/4$ of the volume required for a standard washing (this in view of ensuring anyway a good washing performance, avoiding cavitation phenomena of the washing pump and keeping a sufficient dilution of soil residues).

The idea at the basis of the present invention is that of providing a more flexible water metering for a washing machine operation with respect to the known solutions, by using to this purpose a plurality of metering containers having different capacities, which according to the washing requirements can be repeatedly filled and discharged, independently from one another, within the frame of one same metering phase. As it can be understood, this implies particular supply and discharge se-

quences for the containers themselves.

Such sequences can be managed in a relatively simple way through a programmer or timer of the electronic type, i.e. based on the use of a microprocessor; said sequences, however, could be difficult to be realized in the instance of machines being equipped with common electromechanical timers.

Electromechanical timers are well known and do not need deep description here. For the purposes of the present invention, it should be remembered, anyway, that electromechanical timers are usually equipped with an electric motor which, once electrically supplied, rotates some cams through proper gear-reductions and/or ratchet gears. Said cams usually consist of plastic disks, whose external profile is designed for opening/closing electric contacts, which in their turn will enable/disable the various internal devices of the machine and, consequently, their relevant functions.

Usually, the cams for actuating said devices have a step-by-step advancement, obtained through known kinematic arrangements, and for this reasons they are normally called 'slow' cams. Therefore, said cams advance by tripping or by steps and usually the number of steps provided is the one required to perform a full washing cycle during a complete cam rotation (for example, one timer step may last 60 seconds and a complete rotation of the slow cams pack may consist of 60 steps).

The timer may also have one or more fast cams, which are directly entrained by the timer motor through a gear-reduction. Fast cams have a forward speed which is by far higher than the speed of the slow cams (usually a complete rotation of a fast cam occurs within 60 seconds, according to the requirements determined at design stage).

The step-by-step entraining device for the slow cams, which includes the fast cams, causes the advancement of the slow cams pack at such a rate that each rotation of the fast cam will correspond to an advancement step of the slow cams (with reference to the above example, the slow cams will advance at intervals of 60 seconds from each other, i.e. the time required for a complete rotation of a fast cam).

At any rate, if the motor speed is known, a given advancement speed can be determined for the various cams. Therefore, the activation of the above mentioned electric contacts can be controlled through a proper configuration of the external profile of the cams, and consequently of the relevant dishwasher devices, at a given time during the washing cycle.

The above stated, it is obvious that electromechanical timers are characterized by substantially fixed operating times, dictated by the motor speed, by the cams angular speed and by the profile of the latter.

Such a characteristic may entail some practical problems in the event of dishwashing machines where water supply and metering occurs with the use of containers being repeatedly filled and discharged independently from each other.

Let us assume, for instance, that a system like the one described above is fitted with two containers and that one single water metering phase requires the filling of such containers, their discharge into the tub, a new filling of both containers and a subsequent discharge of one container into the tub.

According to this solution, should control occur through slow cams of an electromechanical timer, said two fillings and two discharges of one or more containers would have to be performed using four steps of the timer.

Now, let us consider that a standard washing cycle comprises at least a prewashing phase, a washing phase, a hot rinse phase and a cold rinse phase; moreover, let us also consider that for each one of these phases, a water metering is necessary (and consequently the filling of the containers and their discharge into the tub).

Therefore, if for each water inlet four steps of the timer have to be planned, it is obvious that the cycle according to the above example would need sixteen steps for the water metering and supply phases alone. In this instance, therefore, the number of steps required for water metering and supply would subtract a significant number of the steps required to perform the other phases of the washing program, and also cause a rather complex planning for a washing cycle within sixty steps only (above all if a quick washing program should be added to the basic washing program).

Based on the above considerations it is the object of the present invention to provide a washing machine equipped with a most flexible water metering control system, which is obtained through an independent and/or repeated supply and discharge of at least two external containers.

Within this general frame, it is also an aim of the present invention to indicate how an independent and/or repeated supply and discharge of at least two water metering containers can be performed in just one advancing step of an electromechanical timer.

The above aims are achieved according to the present invention by a washing machine and a relevant control method incorporating the characteristics of the annexed claims.

Further characteristics and advantages of the present invention will become more apparent from the following detailed description and annexed drawings, which are only supplied by way of a non limiting example, wherein:

- Fig. 1 shows schematically a portion of the hydraulic circuit of a dishwashing machine according to the present invention;
- Figs. 2-8 show schematically the electric circuit of the machine represented in Fig. 1, restricted to the portion of interest related to the present invention;
- Fig. 9 shows, by a view being similar to the one represented in Fig. 1, a possible variant embodiment

of the present invention.

Figure 1 shows schematically the hydraulic circuit of a washing machine, specifically a dishwasher, according to the present invention. In this figure, number 1 indicates a water dosage or metering device, consisting essentially of a plastic container, which is located in use in a cavity being present between a wall of the washing tub and a wall of the cabinet of the dishwasher.

The device 1 comprises internally a water inlet conduit AP from the water mains and a conduit AR for supplying the same water to a softening device, which will be described in the following; between the conduits AP and AR a so-called 'air-break' is located, indicated with SA, of the type and operation already known.

Within the device 1, proper separating walls define a chamber V1, a chamber V2 and a chamber VR. Chambers V1 and V2 are used to meter the water for the washing of the crockery, whereas chamber VR is used to meter the water required for resin regeneration of a softening device.

By way of example, capacity of V1 may be equal to 700 cc, capacity of V2 equal to 1400 cc and the total capacity of VR equal to 250 cc.

As it can be seen, chamber VR is split in three half-chambers, one of which fully open upwards, and the other two communicating outside the device 1 only through vent pipes TT; such pipes TT let the air in the relevant half-chambers flow upwards through the thrust of the water column rising in them during the water inlet step. Therefore, said tubes TT may be open or closed according to the position of a selector (not represented), and change the water volume available for resin regeneration as a function of the hardness degree of the water supplied from the mains. It is clear, in fact, that when pipes TT are closed, water can only enter the first half-chamber, i.e. the one opened upwards.

Chambers V1, VR and V2 have on their bottom relevant outlet connectors, indicated with 9, 10, 11; such connectors are fitted with respective control solenoid valves EV1, EVR e EV2.

In the upper portion of the chamber V2 a float G1, of the type already known, for causing the commutation of a microswitch MC1, which controls a water supply solenoid valve (EVC). In the upper portion of the chamber V2, screened by it in a known manner, a hole FS is provided, communicating with the inside of the washing tub, for allowing the steams that form in the tub during the washing cycle to let off.

RE indicates a mains connector (e.g. a water tap), to which a pipe TA is connected for supplying the machine with water from the mains; on said pipe TA the solenoid valve EVC is located, which controls the mains water supply to the dishwasher; downstream of the solenoid valve EVC, the pipe TA is connected with the conduit AP of the container 1. FV schematically indicates the washing tub of the dishwasher, while P indicates its discharge pump and TS a relevant drain pipe.

The softening device mentioned above is indicated with DD; such a device and its operation are already known as such, requiring no further detailed description. It should only be remarked that it comprises a container CR for the water softening resins and of a container SS for the regeneration salt of said resins; 12 indicates a conduit for connecting conduit AR of the container 1 to an inlet of the resin container CR; 13 indicates a conduit which connects an outlet of the resin container CR with the bottom of the chamber V1.

A conduit indicated with 15 connects the outlet connectors 9 and 11 with the tub FV; it should be noticed that solenoid valves EV1 and EV2 are located between connectors 9, 11 and the conduit 15, for controlling the discharge of chambers V1 and V2.

16 indicates a conduit which connects the outlet connector 10 with an inlet of the salt container SS; solenoid valve EVR is located between the connector 10 and the conduit 16.

The dishwasher is equipped with a programmer device or timer of the electromechanical type, comprising an electric motor which once enabled, rotates a cam pack. Said cams have an external profile being configured to open/close some electric contacts, which in their turn enable/disable various internal devices and functions of the machine, as described at the beginning of the present description.

The operation of the dishwashing machine shown in Fig. 1 is as follows.

When starting a washing cycle, the timer controls the opening of the solenoid valve EVC; the mains water from the connector RE can reach the conduit AP through the pipe TA.

During this phase, solenoid valves EV1, EV2, EVR and the discharge pump P are not supplied and the microswitch MC 1 is on its position of empty container.

Water in the conduit AP runs to the top portion of the container 1 and, after having overcome the air break SA, enters the conduit AR; it will be appreciated that a small volume of water unable to overcome the air break SA may fall on the bottom of chamber V1, where it is collected. From the conduit AR, water enters the conduit 12 and reaches the resin container CR; after flowing across the resins, the water now softened can reach chamber V1 from the bottom.

Water from the conduit 13 fills therefore chambers V1, VR, V2. When approaching the preset filling level of the chamber V2, the water level causes the float G1 to rise; this rise is detected by the microswitch MC 1, which controls the closure of the solenoid valve EVC of the mains water; therefore, the float G1 and the microswitch MC1 realize the principal level sensor of the device according to the present invention.

When the solenoid valve EVC is closed, the three chambers V1, V2, VR are therefore filled each one with a preset volume of water; the microswitch MC 1 is on its "full" position.

It will be appreciated that, in the above described

way, a very precise level control is obtained, since detection through the microswitch MC1 occurs over an extremely reduced surface; therefore, it is clear how a likely displacement error of the float G1 will lead to a rather irrelevant metering error of the water in the chamber V2.

As mentioned, when the supply to the solenoid valve EVC is stopped, the three chambers V1, V2, VR result in being filled with a defined water volume (the volume of water collected in VR depending as said on the condition of pipes TT).

Thereafter, solenoid valves EV1 and EV2 can be supplied; in this way, the water volume contained in the chambers V1 and V2 can reach the washing tub FV, through the conduit 15 and the microswitch MC1 returns to its "empty" position.

As a consequence of the discharge of chambers V1 and V2, the solenoid valve EVC is supplied again. New softened water flows therefore to the container 1, till chambers V1 and V2 are filled again as previously described, and the microswitch MC1 goes to its full state position.

This supply time is shorter than the previous one, since during this phase the chamber VR is already filled with water.

Finally, the timer supply the solenoid valve EV2, which opens so allowing the water volume contained in the chamber V2 to flow into the tub FV.

Thus, 700+1400+1400 cc of water have been supplied to the washing tub.

Washing of the crockery can now start, in the usual manner; during all the water supply phases (prewashing, washing, rinsing) as provided by a complete washing cycle, the machine will perform as described above, in order to deliver to the washing tub volumetrically defined volumes of water.

In the event of a reduced crockery load, the machine will operate in the same way as described above, however with the substantial difference that during the first one of the two water discharges from the device 1, the solenoid valve EV1 is not fed and remains closed; therefore, during this phase, only the water volume contained in the chamber V2 flows to the washing tub FV.

As it can be seen, to perform a reduced washing program, the supply stage provides the delivery of a reduced volume of water to the washing tub, which in the example is equal to 1400+1400 cc of water.

As to resin regeneration, the timer controls the opening of the solenoid valves EVR and EV1. In this way, the water contained in the chamber VR can flow through the conduit 16 to the salt container SS. As a consequence, a corresponding passage of brine (i.e. a water-salt solution) is obtained from the container SS to the container CR, so that the resins of the softening device can be reactivated, during the resin regeneration stage.

Water contained in the chamber VR can flow to the salt container SS through the conduit 16 with a consequent brine flow from the container SS to the container

CR.

The corresponding water volume exiting the container CR flows through the conduit 13 and enters the chamber V1; during this phase, the solenoid valve EV1 is open, and therefore such a water volume can flow to the tub FV, through the conduit 15.

According to the above, it is clear how water supply phases are managed by the timer as a function of the state of the microswitch MC 1, for the washing of both a complete and reduced load of crockery.

According to the embodiment described above, it is therefore possible to manage the supply of different water volumes, as a function of the washing program selected by the user (either complete crockery load or reduced crockery load), in an extremely precise manner.

Figures 2-5 represent schematically the electric control circuit of the machine according to the present invention, restricted to the portion being relevant for the supply and discharge of chambers V1 and V2, which relates to the present invention.

It should be appreciated to this purpose, that the regeneration and washing of the resins can be obtained through control modes being known to those skilled in the art, that therefore will not be described herein.

In Figs. 2-8, references MC1, EVC, EV2, EV1 indicate the elements already shown in Fig. 1. T indicates the timer electric motor, R indicates a key to select the reduced washing cycle and I indicates the main switch of the machine.

In Figs. 2-8, the hatched rectangles represent some of the electric contacts actuated by the cams of the timer; said contacts are indicated with the same references used for the devices they control, with the addition of the index 'i'; moreover, CT indicates a control contact of the timer motor (T), whose function will become clear in the following.

The cited contacts are capable of taking two positions (open or closed), with the exception of contacts CV1 and CV2, which can take three positions, one of which (the central one, being not shown in the figures) is a rest position.

According to the invention, contacts CV1 and CV2 are controlled by a respective 'fast' cam of the timer, i.e. a cam capable of a complete rotation within the time the other cams, i.e. the slow cams, advance by one step, i.e. one timer step.

Lets us assume, by way of example, that in the instance described above fast cams CV1 and CV2 execute a complete rotation every 60 seconds and consequently the advancement time of the slow cam steps is 60 seconds.

As it will be appreciated, according to the invention, the contacts associated with the slow cams for the control of the solenoid valves managing the water supply and discharge from the container 1, i.e. contacts EVC', EV1' and EV2', are connected in series with the contacts associated with fast cams, i.e. contacts CV1 and CV2.

Such a solution, according to the invention, allows

to realize the supply and discharge, even repeated and independent, of the chambers V1 and V2 in one timer step alone, i.e. within the time required for the slow cams to advance by one step.

The electric circuit of Figs. 2-8 operates as follows.

Before starting a washing, the user makes sure that the usual timer knob is on the cycle start position (this position being obviously shown by proper silk-screen printings on the machine control panel).

In such a position, the various cams are on their start position, i.e. the one represented in Fig. 2.

As it can be seen, the microswitch MC1 is on its empty position.

Then the user starts the washing cycle, by actuating the main switch I and the electric circuit is electrically supplied.

The machine therefore carries out the supply of water being required for prewashing, which comprises the following phases.

PHASE 1 (Fig. 2)

In this phase, the solenoid valve EVC is fed through MC1, which is on the empty position V, by means of CV2, which is in the position C, and by means of EVC', which is closed. Thus water can enter chambers V1, V2 and VR (in the example shown in Fig. 2, the contact CV1 is closed in A, for the control of a specific function of the machine - i.e. an initial discharge - which is excluded from the purposes of the present invention and will not be described here).

PHASE 2 (Fig. 3)

When chambers V1 and V2 are filled, MC1 goes on to full position P and the timer motor T is therefore enabled.

The rotation of motor T causes the rotation of the fast cams which control contacts CV 1 and CV2.

PHASE 3 (Fig. 4)

After about 10 seconds from the start of motor T, CV2 passes on D, and maintains this condition for about 20 seconds; in this way the solenoid valve EV2 is fed and chamber V2 can discharge into the tub.

Similarly, after about 10 seconds from the start of motor T, CV1 passes on B, and maintains this condition for about 20 seconds; in this way the solenoid valve EV1 is fed and chamber V1 discharged (following the discharge of chambers V1 and V2, MC1 goes back to the empty position V - as represented in the following Fig. 5 - and the motor of the timer T is still fed through EV2, which is closed).

PHASE 4 (Fig. 5)

At the end of the 20 seconds interval, CV1 passes

to its central rest position, till a complete rotation of the relevant fast cam is accomplished; CV2 goes back to C and the motor T stops (this different behaviour of contacts CV1 and CV2 depends on the different profile of the two relevant fast cams).

IN this way, therefore, the filling of chambers V1 and V2 is repeated, according to the procedures previously described concerning phases 1 and 2 (also in this instance, following the filling, MC1 goes to the full position P - represented in the subsequent Fig. 6 - and the supply to motor T is restored).

PHASE 5 (Fig. 6)

About 10 seconds after the new start of motor T, CV2 goes to D, and maintains this condition for about 20 seconds; in this way, the solenoid valve EV2 is fed again and the contents of chamber V2 is discharged into the tub.

As stated above, during this phase CV1 maintains its own rest position, so that the solenoid valve EV1 is not fed and therefore no discharge of the container V1 is obtained.

As it will be appreciated, in the above described way, it is possible to obtain in just one timer step a filling of V1, V2, VR, a discharge of V1 and V2, a new filling of V1 and V2 and a new discharge of V2.

When the fast cams have accomplished their complete rotation (i.e. at the end of the required 60 seconds), advancement of the slow cams pack can take place.

As shown in Fig. 7, such an advancement causes the opening of contacts EVC', EV1' and EV2', so making the position of contacts CV1 and CV2 irrelevant and hindering subsequent fillings/discharges of V1 and V2. In such a phase, the closure of contact CT is also obtained, which allows to supply the motor of the timer T for the prosecution of the washing cycle, according to already known procedures, thus excluding subjection to the microswitch MC1.

For instance, the machine performs the prewashing phase, which may last for example three timer steps, i.e. 180 seconds. A water discharge from the washing tub will take place after the prewashing, which may last one timer step.

After the interval of 60 seconds required to discharge the water used for the prewashing from the tub, contacts CV1, CV2, EVC', EV1', EV2' and CT will be returned by the respective control cams to the condition of Fig. 2, and a new water supply to the machine washing tub will take place again.

This water supply will take place according to the same procedures described above, for phases 1-5, and be followed by the actual washing phase.

Then the program will perform the other phases as programmed (i.e. rinses), whose water supplies will take place according to the same procedures described above. Then, regeneration and washing phases of the resins will be obviously performed which, as said, are

controlled by the timer according to known procedures and within appropriate times.

To perform a washing cycle with a reduced crockery load, it will be enough to open the contact associated with the key R.

The metering and supply sequence will practically be the same as described above with reference to steps 1-5, but in this instance the solenoid valve EV1 is excluded from the electric circuit and maintained closed for the whole washing cycle time, as it can be seen for example from Fig. 8, representing a discharge phase of chambers V1 and V2; as shown, the opening of the contact associated with the key R makes it impossible in this instance to feed the solenoid valve EV1, and consequently perform a discharge of the contents of the chamber V1.

Therefore, in view of a reduced washing cycle, only the contents of the chamber V2 will be discharged repeatedly into the wash tub (twice, in the specific case).

As described above, it is apparent how the use of two fast cams in series with the slow cams for the control of the supply solenoid valve EVC and of solenoid valves EV1 and EV2 for the control of chambers V1 and V2 will allow the required water dosage and supply sequence within a reduced time, comprising either repeated and/or independent supply and discharge of several metering chambers, using just one timer step for each water supply to the washing machine.

From the given description the characteristics and the advantages of the present invention are clear.

Obviously, many modifications are possible for those skilled in the art to the washing machine described by way of example, without departing from the novelty principles of the innovative idea.

For example, as previously mentioned, it is easy during the design stage to provide supply/discharge sequences for the chambers V1 and V2 being different from the ones described above, such as:

- filling of V1 and V2 (and VR), discharge of V1 and V2, filling of V1 and V2, discharge of V1 and V2; or:
- filling of V1 and V2 (and VR), discharge of V2, filling of V2, discharge of V1 and V2.

As it can be understood, such sequences can be obtained by merely changing the profiles of the cams which activates the control contacts of solenoid valves EVC, EV1 and EV2, without departing from the basic idea of this invention.

The embodiment of the invention as previously described by way of example does not allow a single discharge of the chamber V1, as this operation cannot be detected by the float G1 and the relevant microswitch MC1.

However, according to a further possible embodiment of the invention, the device 1 could have a modified geometrical configuration, for defining a common volume with chambers V1 and V1 above them; an example

of such an embodiment of the device 1 is represented schematically in Fig. 9, where the same references of Fig. 1 are used.

As it can be seen, the overflow between chambers V1 and V2, represented in the specific case by the separating walls which define the chamber VR, is to be found at a lower level with respect to the actuation level of the float G1.

In this way, in a portion of the device 1 a water volume common with both chambers V1 and V2 can also be filled, indicated with V3, which can be discharged jointly with one of them. Therefore, according to this modification, the float G1 is capable of detecting both a single discharge from the chamber V1 and a single discharge from the chamber V2, without any more constraints in the discharging sequence of the metering chambers.

Claims

1. Washing machine, comprising:

- a device (1) for metering the liquid required to perform at least a washing phase, said device comprising at least a first metering chamber (V1) and a second metering chamber (V2), each chamber (V1,V2) having a relevant discharge solenoid valve (EV1,EV2), the liquid metering being performed through the supply of liquid to at least one of said chambers (V1,V2) and its subsequent discharge into the washing tub (FV) of the machine,
- a supply solenoid valve (EVC) for the control of the liquid supply to said device (1),
- an electromechanical programmer for controlling said metering device (1) and said supply solenoid valve (EVC), comprising a plurality of electric contacts (EVC',EV1',EV2'; CV1,CV2) actuated by means of a plurality of cams,

where said cams comprise slow rotating cams and fast rotating cams and said programmer controls each discharge solenoid valve (EV1,EV2) through a first electric contact (EV1',EV2') and a second electric contact (CV1,CV2) in series between themselves, where said first electric contact (EV1',EV2') is enabled by a slow rotating cam and said second electric contact (CV1,CV2) is enabled by a fast rotating cam.

2. Washing machine, according to claim 1, characterized in that said programmer is apt to control, in the frame of one same liquid metering phase, the repeated filling and discharge of at least one of said chambers (V1,V2).

3. Washing machine, according to claim 1, character-

ized in that said programmer is apt to control said discharge solenoid valves (EV1,EV2) so that said chambers (V1,V2) can be discharged independently from each other.

4. Washing machine, according to claim 1, characterized in that said supply solenoid valve (EVC) is controlled through a first electric contact (EVC') and a second electric contact (CV2) in series between themselves, said first electric contact (EVC') being actuated by a slow rotating cam and said second electric contact (CV2) being actuated by a fast rotating cam.

5. Washing machine, according to claim 4, characterized in that said second electric contact (CV2) for controlling said supply solenoid valve (EVC) is actuated by the same fast rotating cam which actuates the second electric contact (CV2) for controlling one of said discharge solenoid valves (EV1,EV2).

6. Washing machine, according to claim 5, characterized in that said second electric contact (CV2) for controlling said supply solenoid valve (EVC) is alternatively connected in series with the first electric contact (EV2') for controlling the relevant discharge solenoid valves (EV2) or with the first electric contact (EVC1') for controlling said supply solenoid valve (EVC).

7. Washing machine, according to claim 1, characterized in that one of said second electric contacts (CV1, CV2), being actuated by a fast rotating cam, is connected in series with an electric contact (MC1) actuated by a water level sensing device (G1).

8. Washing machine, according to claim 7, characterized in that, in a first position (P), said electric contact (MC1) actuated by said level sensing device (G1) is directly connected with a motor actuating said programmer (T), whereas in a second position (V) it is connected in series with one of said second electric contacts (CV1,CV2) for controlling said discharge solenoid valves (EV1,EV2).

9. Washing machine, according to claim 1, characterized in that means (R) are provided to exclude from the circuit one of said discharge solenoid valves (EV1), so that the liquid metering is performed through a repeated filling and discharge into the wash tub (FV) of the contents of only one of said chambers (V1,V2).

10. Washing machine, according to claim 1, characterized in that said metering device (1) comprises a section (V3) being in common with said metering chambers (V1,V2), the filling and discharge of said section (V3) being obtained during the filling and

discharge of one of said chambers (V1,V2).

11. Washing machine, according to claim 10, characterized in that in said common section (V3) a level sensor (G1) is positioned, apt to control the filling level of said chambers (V1,V2) and of said section (V3). 5

12. Method for metering the liquid required to perform at least a washing phase in a washing machine, where the liquid supply to a first metering chamber (V2) is provided, and the subsequent discharge into the washing tub (FV) of the machine of the fluid contained in said first metering chamber (V2), said supply and discharge being in particular repeated during one same liquid metering phase, characterized in that the liquid supply to a second metering chamber (V1) is further provided, and the subsequent discharge into the washing tub (FV) of the machine of the fluid contained in said second metering chamber (V1), where the two metering chambers (V1,V2) can be discharged independently from each other, and where in particular, said supplies and discharges are controlled through an programmer of the electromechanical type. 10
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13. Method, according to claim 12, characterized in that in a first mode of use of the washing machine, the liquid contained in both said metering chambers (V1, V2) is discharged into said washing tub (FV), whereas in a second mode of use of the washing machine, the liquid contained in only one of said metering chambers (V1,V2) is discharged into said washing tub (FV). 30
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14. Method, according to claim 12, characterized in that the liquid supply is further provided to a section (V3) of said device (1), which is common to said metering chambers (V1,V2), the filling and discharge of said section (V3) being obtained during the filling and discharge of one of said chambers (V1,V2). 40

15. Method, according to at least one of the previous claims, characterized in that a level sensor (G1) provides for detecting the performed discharge of the fluid contained in each one of said chambers (V1,V2), said sensor being in particular positioned in said common section (V3) and able to control also the filling level of said chambers (V1,V2) and of said section (V3). 45
50

55

FIG. 1

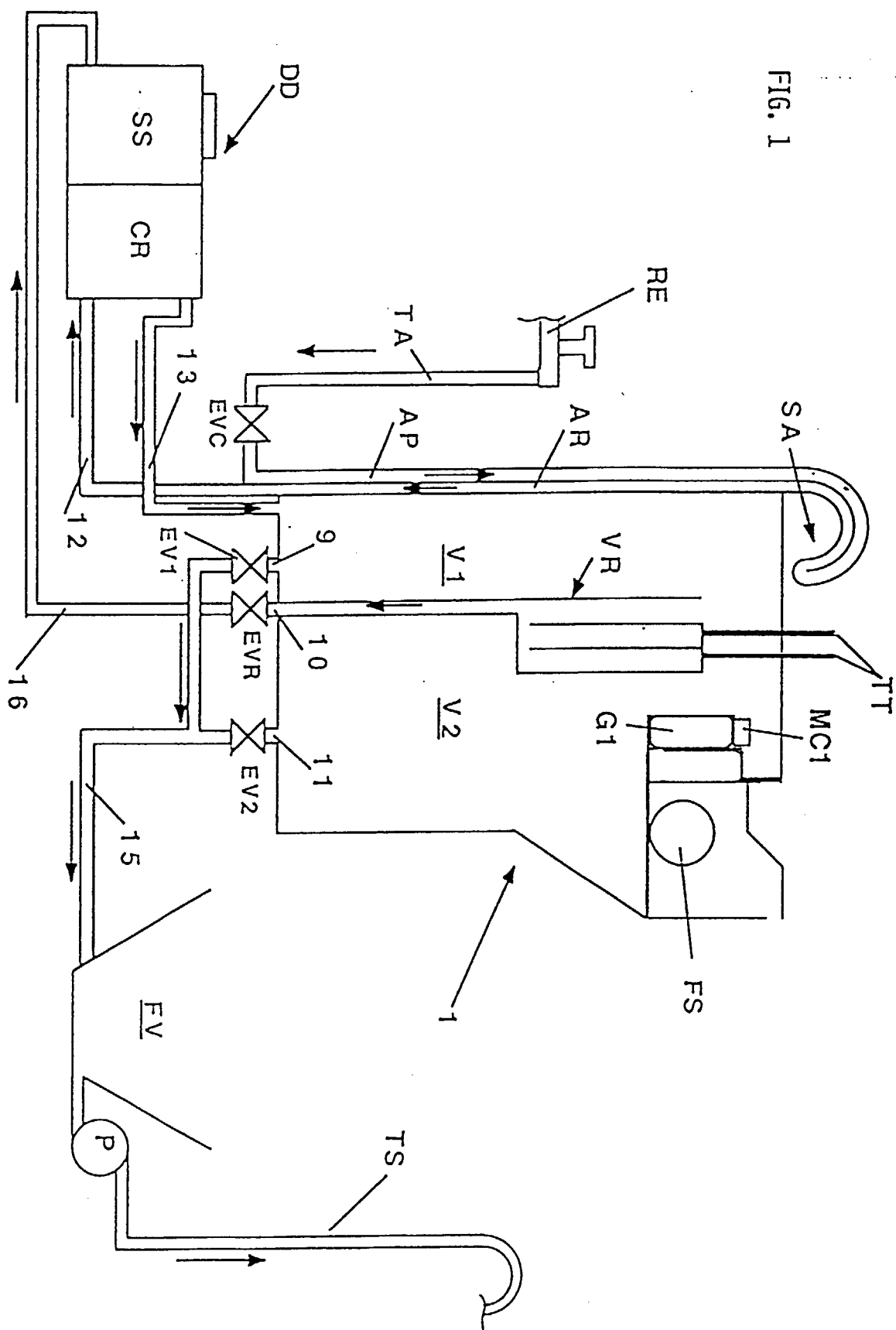


Fig. 2

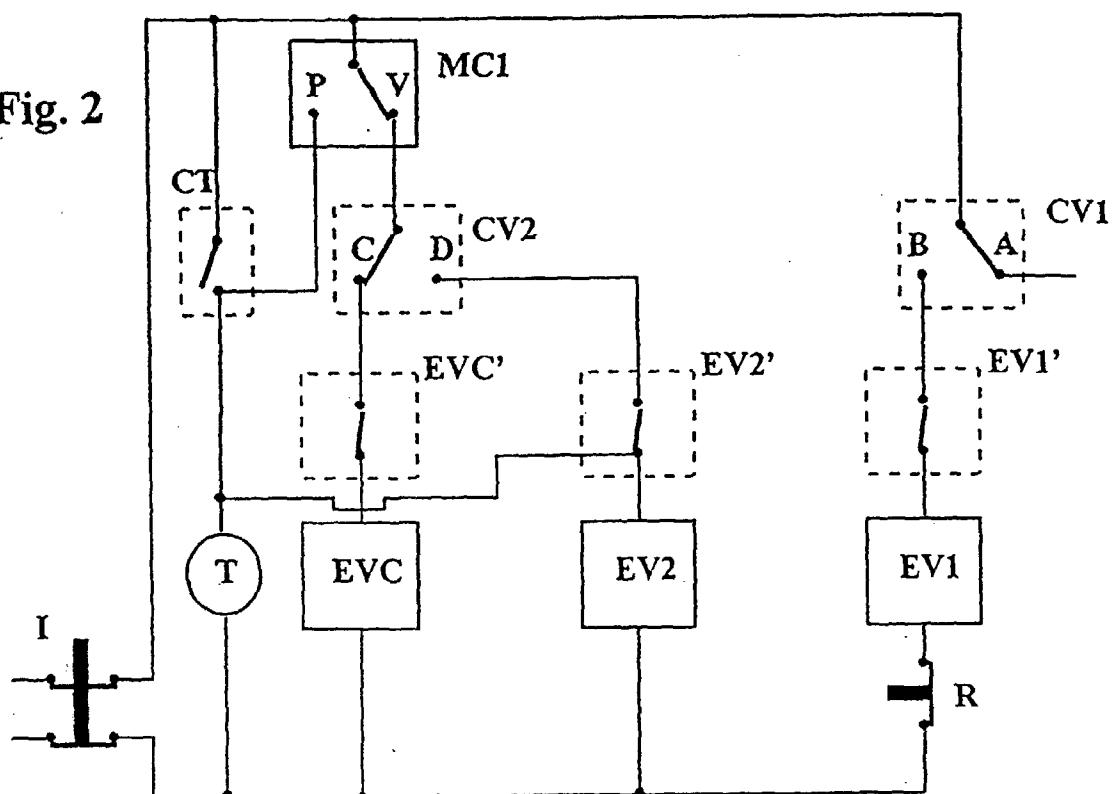


Fig. 3

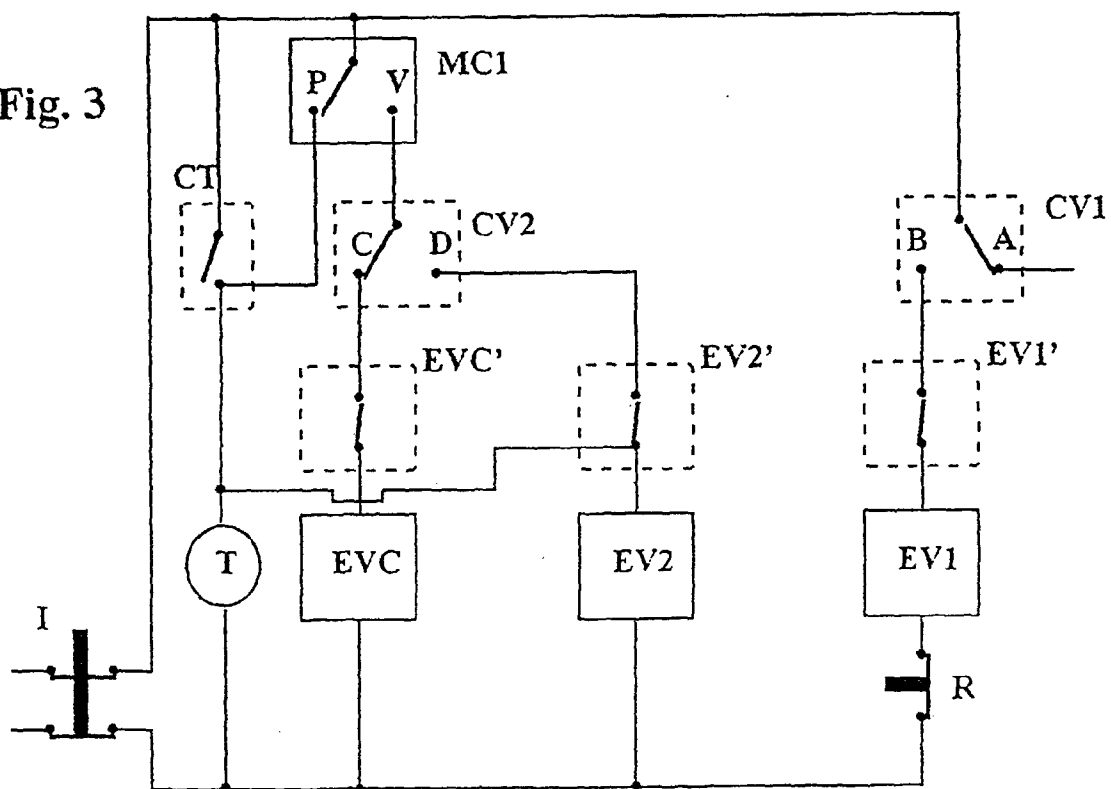


Fig. 4

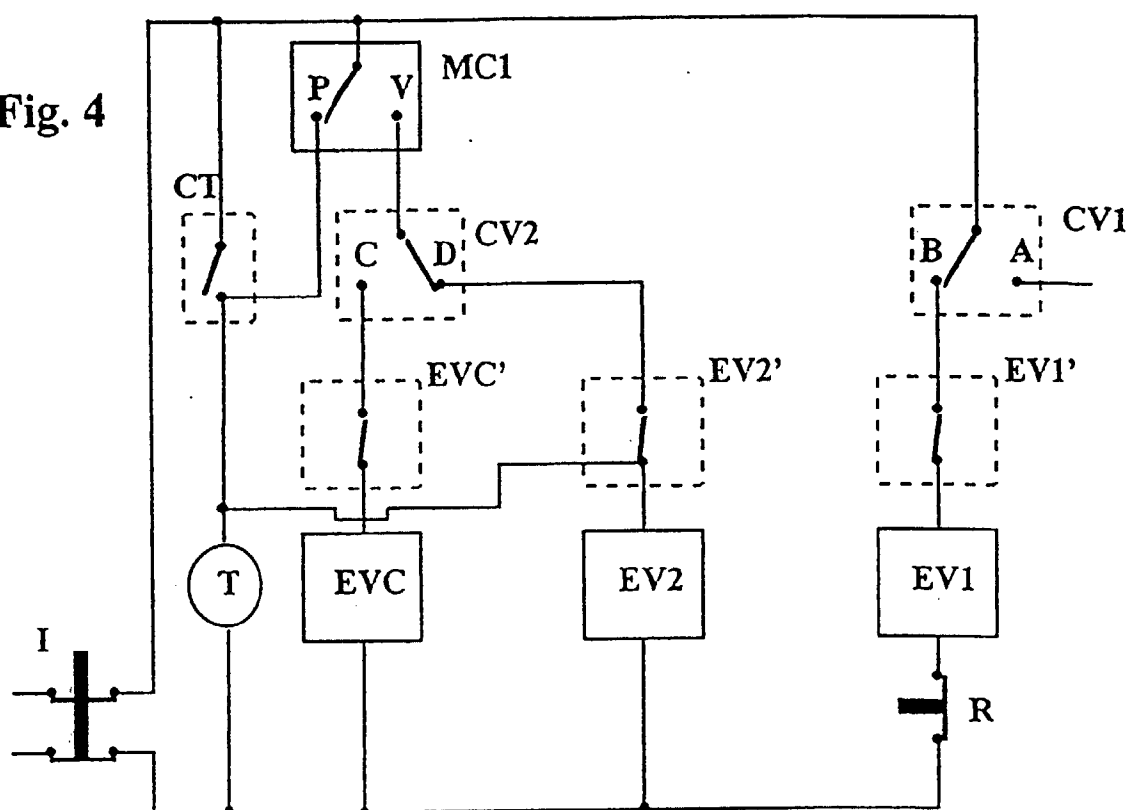


Fig. 5

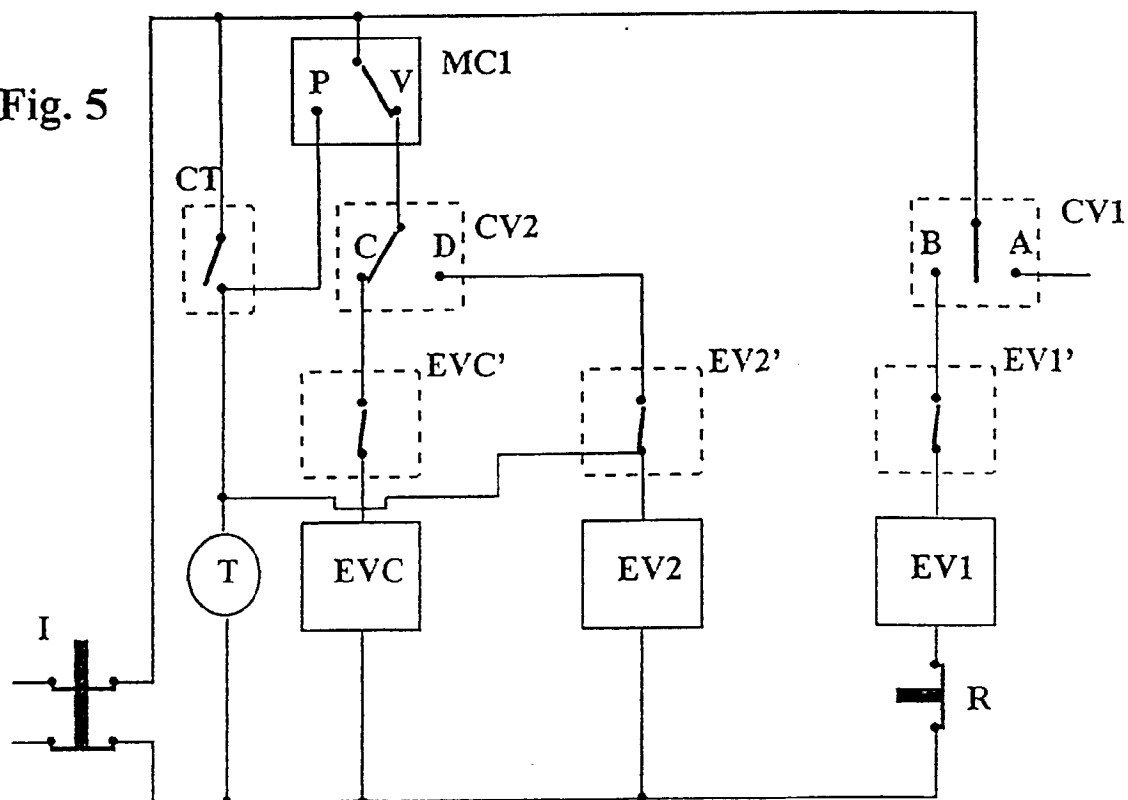


Fig. 6

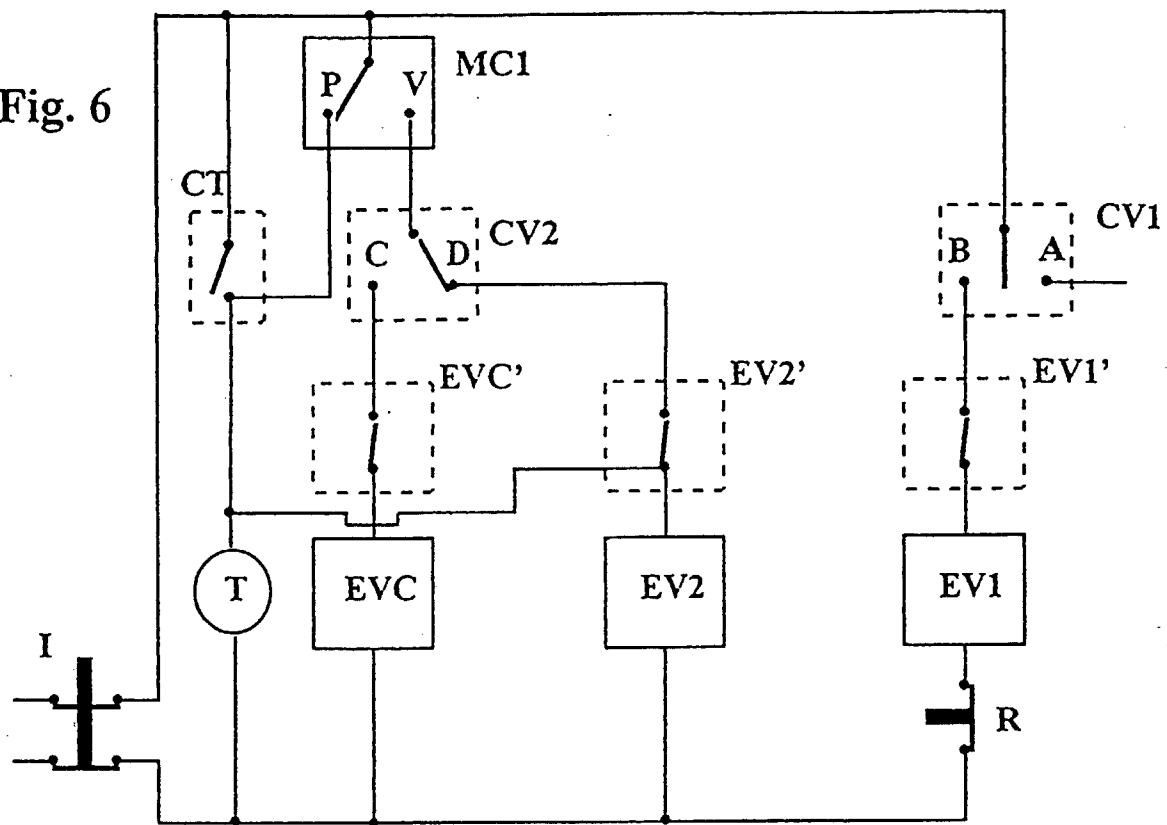


Fig. 7

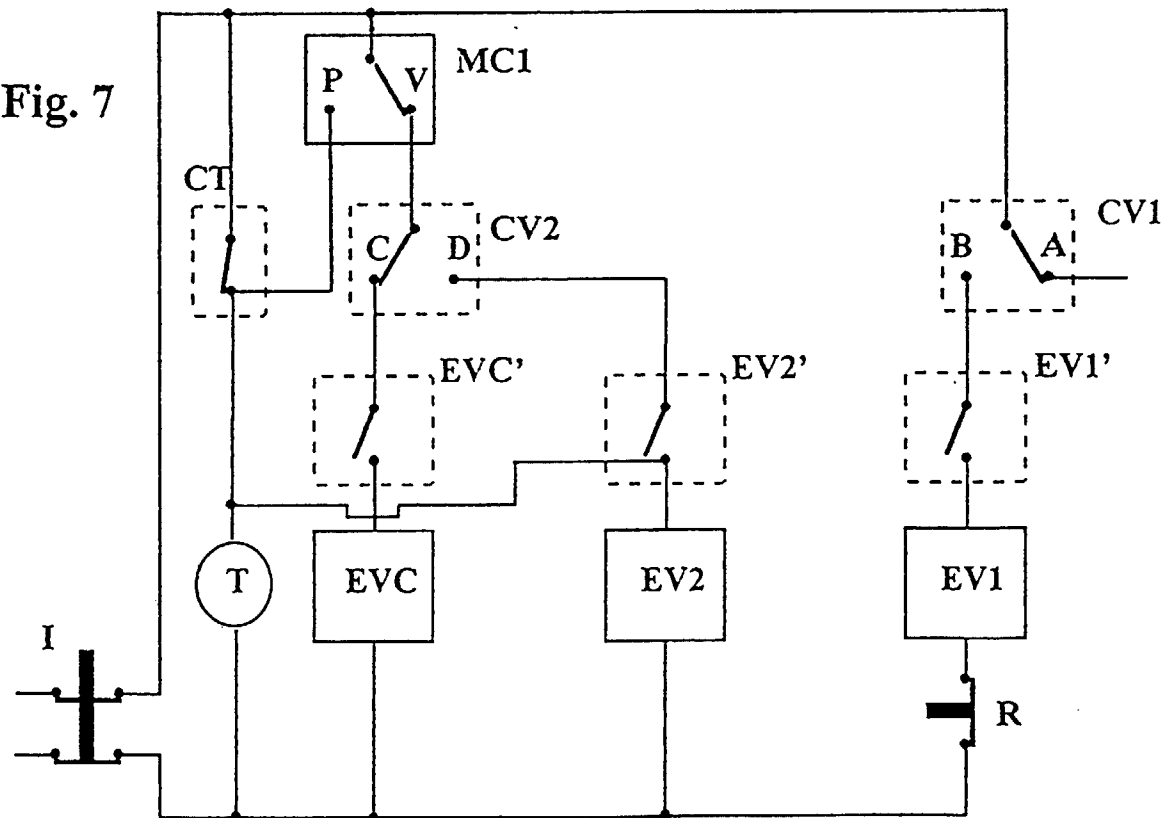


Fig. 8

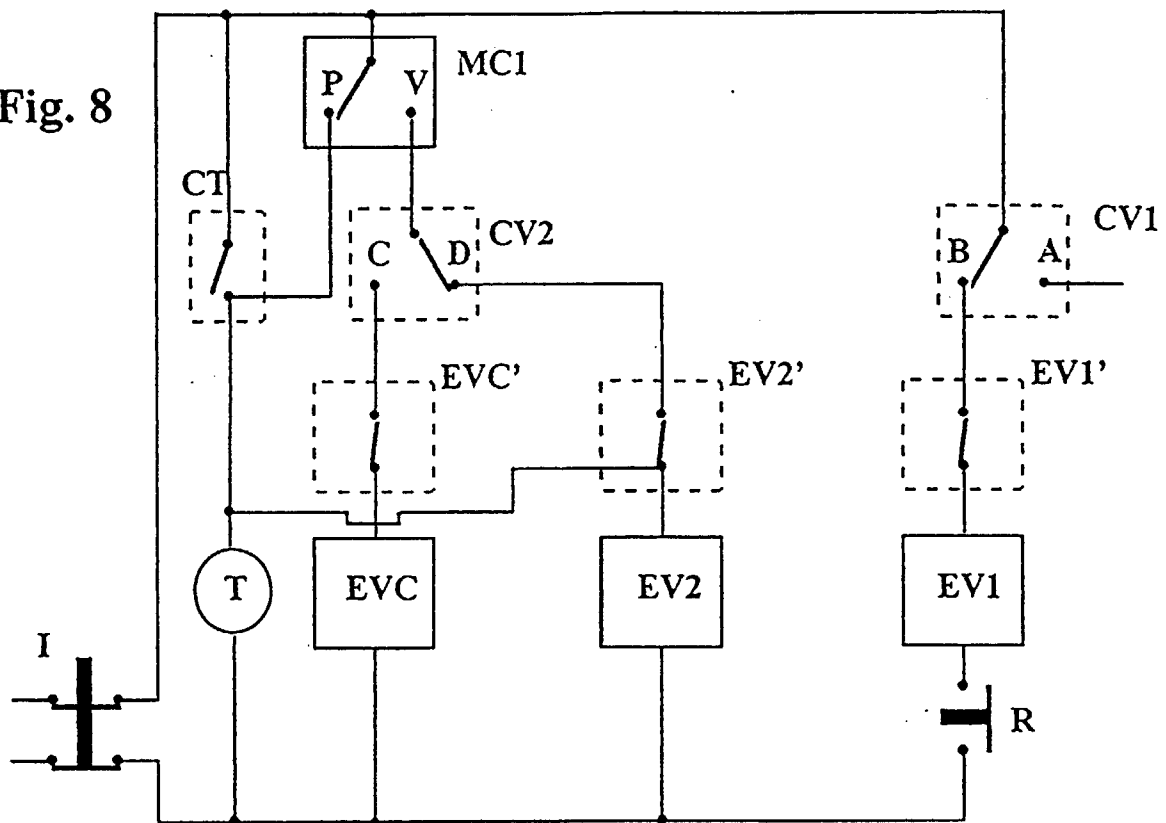


FIG. 9

