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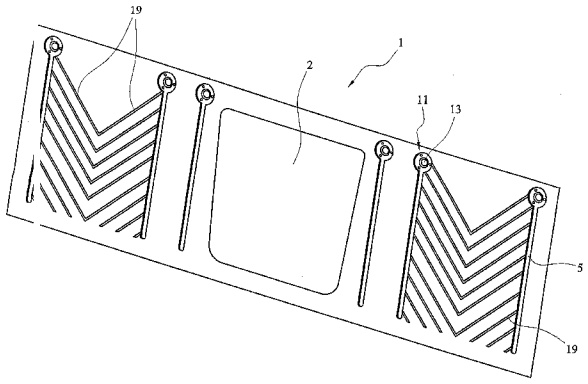
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(54) Title: WASHING APPLIANCE



(57) Abstract: The present invention relates to a washing appliance and more specifically a laundry appliance. The first aspect of the present invention relates to a drum for a washing machine that allows increased capacity without the need to increase the size of the overall appliance. The drum comprises a receptacle having a solid outer wall with at least one aperture and means for guiding liquid purged from laundry toward the aperture such that the liquid is expelled. The present application further extends to a water supply system for a washing machine having a reservoir enabling water to flow between the drum and the reservoir, such that water is retained in the reservoir between wash cycles. The present application further extends to a programming system for an aperture that is simple to control accurately. The programming system comprises a single manual control means, a display means and a plurality of actionable events, these events being represented graphically on the display means and the control means being able to select in combination a plurality of actionable events. The present application further extends to a drive linkage that is suitable for a washing appliance, that enables longitudinal relative movement between two or more components, m particular, the drive linkage links at least one rotatable input means and one rotatably mounted output means such that rotation of one causes rotation of the other via the drive linkage, the drive linkage comprising at least one linkage member configured to enable longitudinal relative movement between the input and output means. The fifth aspect of present invention relates to a dispensing apparatus for dispensing a suitable amount of washing substance to a wash. The system comprises a reservoir for holding a number of doses of wash substance, regulating means to release a pre-determined quantity of substance in response to a control signal, where the control signal causes the regulating means to open the reservoir for a sufficient period of time to release the substance.

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Washing Appliance

The present invention generally relates to a washing apparatus, and more specifically a laundry appliance.

The first aspect of the present invention relates generally to a drum for a laundry appliance, and more specifically to an improved drainage system for a laundry appliance.

In general, a washing machine follows a sequence of pre-set actions depending on a program selected by a user. Typically, a washing machine comprises a drum into which laundry is placed. During a wash program the drum fills with water and is then caused to rotate so as to cause an agitating fin therein to 'agitate' the laundry. Next, the dirty water (and detergent) is drained and the drum spins to remove most of the water. The drum then refills with clean water and is again caused to rotate so as to agitate the laundry and ensure it is thoroughly rinsed. Finally, the drum is again drained and caused to spin at high speed so as to remove as much water as possible from the laundry at the end of the cycle.

In conventional washing machines, a drum generally comprises two main parts, the first being an inner perforated cylinder, into which the laundry is placed, housed within a larger water-tight cylinder, arranged such that the inner cylinder can rotate therein. Clearly the usable capacity of such a drum is limited by the need for co-axial cylinders with a gap therebetween.

It is therefore an object of the invention to provide a washing machine drum of increased capacity, without proportionately increasing the overall size of the appliance.

In accordance with a first aspect of the present invention there is provided a drum for a washing machine, the drum comprising:

a generally cylindrical receptacle which is rotatably mounted within a washing machine housing and has an opening for loading and unloading laundry, wherein said receptacle is

guiding liquid purged from said laundry upon rotation of said drum towards said at least one aperture such that said liquid is expelled from said receptacle via said at least one aperture.

Preferably, the means for guiding liquid purged from the laundry upon rotation of the drum towards said at least one aperture comprises a channel, preferably having a proximal deep end and a distal shallower end, relative to said at least one aperture, such that rotation of the drum forces the liquid from the shallower end to the deep end and said liquid is expelled from the receptacle via said at least one aperture.

Beneficially, a plurality of said channels are provided in respect of said at least one aperture. Beneficially, said drum is provided with a plurality of apertures and one of more respective channels are preferably provided to guide said liquid purged from said laundry upon rotation of said drum towards each of said plurality of apertures. Preferably, a plurality of said channels guide said liquid purged from said laundry upon rotation of said drum towards said plurality of apertures. A plurality of said channels may be provided in a herringbone configuration.

Preferably, a valve is provided within said at least one aperture to control the flow of said liquid through said aperture and in the case where said drum comprises a plurality of apertures, each said aperture is beneficially provided with a valve. The valve(s) may be actuated by mains water pressure or by a centrifugal force generated by the rotation of said generally cylindrical receptacle, providing the significant benefit of being able to release water from the drum when stationary and/or when spinning. This enables improved control of the evacuation of water from the drum, such that evacuation may be actuated both when the drum is rotating and when the drum is stationary.

Beneficially, said opening comprises a hatch, said hatch being liquid light when in a closed position and permitting the loading and unloading of laundry when in an open position.

Thus the above mentioned object is achieved by providing a drum consisting of a single cylinder that is generally substantially water-tight under normal conditions, yet can purge water therefrom both during a 'spin cycle' and when the drum is stationary, thereby removing the need for co-axial cylinders as described with reference to the prior art and as such increasing

the usable capacity of the drum, although co-axial cylinders may still be used under some circumstances.

The present invention extends to a washing machine comprising a drum according to any one of the preceding claims, rotatably mounted in a housing, drive means for rotating said drum during a wash cycle, and control means for controlling one or more parameters of a wash cycle, wherein said control means comprises means for interrupting a wash cycle and permitting access to said opening in said drum.

Preferably, said opening is provided in a side wall of said drum and said control means is arranged and configured to halt rotation of said drum so as to interrupt a wash cycle when said opening is at or close to top dead centre (TDC) of said drum, such that access to said opening can be permitted whilst retaining liquid within said drum.

Thus, the configuration of an exemplary embodiment of the invention enables a user to pause a wash cycle and open the drum, which is not possible with conventional designs.

A second aspect of the present invention relates generally to laundry appliances and more specifically to a means for supplying water for use in a wash cycle of a laundry appliance.

In general, when a wash cycle is initiated in a washing machine, cold water is drawn into the rotational drum and heated therein to the required temperature prior to commencing the wash cycle. Hot, dirty water that has been used during the wash cycle is then drained out of the drum, to be replaced by a further quantity of cold water from the mains supply. Not only is this process wasteful of water, but it also requires a significant amount of energy to heat the very cold water being pumped directly from the mains supply in respect of every wash cycle. Furthermore, because the cold water is heated in the drum (with the laundry) the choice of heating means is limited to means that can be provided in the drum and can be used in close proximity to the laundry without damage to either the laundry or the heating means. Thus, it has not always been possible to use the most energy efficient water heating means in conventional laundry appliances.

It is an object of the second aspect of the present invention to provide a water supply system for a laundry appliance which overcomes at least some of the problems outlined above, and can significantly improve the energy efficiency of a laundry appliance relative to the prior art.

In accordance with a second aspect of the present invention there is provided a water supply system for a washing machine having a rotational drum for receiving laundry, the water supply system comprising a reservoir having means for permitting water to flow between said reservoir and said drum, the reservoir further comprising an inlet for enabling said reservoir to be filled with water and an outlet for enabling water to be drained from said reservoir, the system further comprising means for filling said reservoir and maintaining said reservoir substantially full of water between washing cycles of said washing machine, and means for transferring water from said reservoir into said drum for use in a wash cycle.

Thus the above-mentioned object is achieved by providing a reservoir, separate from the washing machine drum, that is filled with cold water (from the mains supply) between wash cycles. The water, which is held in the reservoir between washes will often have time to be heated to a temperature approaching the ambient temperature of the surroundings, so that it requires less energy to heat the water up to the correct temperature for the selected wash cycle. In one exemplary embodiment, means may be provided for delaying commencement of a wash cycle until the water in the reservoir is at least a predetermined temperature. Preferably, heating means are provided for heating the water in the reservoir prior to transfer thereof to said drum. Because the water is heated in the reservoir and not in the drum, any energy efficient heating means can be used, e.g. microwave heating means. Such heating means may be provided in the flow path between said reservoir and said washing machine drum, or said reservoir may contain heating means, to heat water held therein. In the latter case, said reservoir may be divided into a plurality of sub-reservoirs, wherein one or more of said sub-reservoirs beneficially contain a heating means to heat water held therein.

Beneficially, pumping means are provided for pumping water between said reservoir and the drum of said washing machine.

In a preferred embodiment, the weight of the reservoir when it is substantially full of water acts to counter balance vibrations generated by rotation of said drum during a wash cycle. Thus, the water supply system can conveniently double up as a ballast system for the washing machine. The water supply system is beneficially controlled by the control program of the washing machine.

Beneficially, the reservoir is mounted on or adjacent the outer wall of said drum, such that heat from the water therein during the wash cycle is transferred to the water in the reservoir, to aid in raising the temperature thereof.

A second aspect of the present invention extends to a washing machine having a drum and a water supply system as defined above.

A second aspect of the present invention further extends to a laundry appliance having a rotatable drum and a ballast system comprising a reservoir having an inlet for enabling said reservoir to be filled with water such that the weight thereof acts to counter-balance vibrations generated by rotation of said drum during a laundry cycle and an outlet to enable water to be drained from said reservoir, said laundry appliance further comprising transport members extending from the base thereof and resting on a support surface when said reservoir is empty, said transport members being mounted via compressible means relative to respective recesses in said base of said laundry appliance such that when said reservoir is filled with water , the weight thereof acts to compress said compressible means and cause said base of said laundry appliance to be lowered towards said support surface such that at least said compressible means enters said respective recesses and the base of said laundry appliance rests on said support surface.

Thus, by mounting a washing machine on a set of selectively contractible and extendable transport members, such as rollers, the rollers will protrude from the base of the machine when the weight of the ballast is below that required to counter-balance the rotation of the drum, in use, thereby allowing the machine to be moved easily on the rollers. When the weight of the ballast is increased to counterbalance rotation of the drum during use, a large downward force is created in respect of the washing machine, and the machine is lowered towards the ground,

for stability during use. The washing machine is pushed down over the rollers so that they are retracted into respective recesses in the base of the machine.

Beneficially, said roller means comprises at least one castor wheel, and more preferably a plurality of castor wheels.

Preferably, said compressible means comprises at least one spring.

Beneficially, a set of pads or the like are provided on the base of the machine to increase friction between said machine and said support surface.

These and other aspects of the present invention will be apparent from, and elucidated with reference to, the embodiment described herein.

A third aspect of the present invention generally relates to consumer appliances and more specifically to a programming system suitable for such appliances.

Consumer appliances have evolved in recent years from simple machines into feature-rich complex products. For example, current washing machines have several user-selectable options to tailor a wash to an individual's needs, including numerous temperature settings, material types, spin speed, in addition to a large number of special functions such as easy iron, extra rinse and even a child lock facility.

With such a wide range of functions and features, everyday use of modern appliances has become somewhat arduous, and it is therefore an object of the present invention to provide a programming system, for an appliance, that is simpler to control accurately.

In accordance with a third aspect of the the present invention there is provided a programming system for controlling an appliance comprising:

a single manual control means;

display means;

a plurality of actionable events;

wherein, said actionable events are represented graphically on said display means, said manual control means providing a means of selecting in combination a plurality of said plurality of actionable events.

Preferably, said plurality of actionable events are divided into executing events, master events and sub events, said master events defining a number of said sub events and said executing events executing said master event and said master events may be configured, using said manual control means, to contain any number of non mutually exclusive said sub events.

Beneficially, said programming system remembers a plurality of previously selected configurations of said actionable events.

Preferably, said single manual control means comprises a multi-functional button.

Beneficially, said display means comprises a single LCD array, and/or an array of LEDs, each of said LEDs in said array of LEDs being identifiable as to associating with a respective said actionable event and said array of LEDs is configured as two concentric ovals, an inner oval and an outer oval, with textual annotation identifying a respective said actionable event for each LED in said outer oval, said inner oval proving a cursor function to identify which LED of said outer oval is currently selected, said cursor function being manipulated by said manual control means or said array of LEDs is configured as two concentric ovals, an inner oval and an outer oval, with textual annotation identifying a respective said actionable event for each LED in said inner oval, said outer oval proving a cursor function to identify which LED of said inner oval is currently selected, said cursor function being manipulated by said manual control means.

A third aspect of the present invention further extends to a washing machine, being controllable by a programming system according to a system as described. Preferably, said washing machine comprises a recess and said programming system is provided in a module arranged and configured to be retained within said recess and selectively retracted therefrom for use.

Thus the above mentioned object is achieved by utilising one button operation for selecting features by way of a cursor to control the state of the appliance.

A fourth aspect of the present invention relates generally to a rotating drive linkage, suitable for a variety of applications including washing machines.

Many machines include parts or components that rotate about an axis, these parts often being driven by motorised means. In many cases, the component to be rotated is directly driven by a motor, via some gearing, but this is only feasible when there is a capacity for the motor and the component to be situated adjacent to one another. If there is a distance between the motor and the point of contact of the component then an intermediate linkage, or drive linkage, is used to span the gap and ensure that the force generated by one is applied to the other, and this can be in the form of a belt, shaft, chain or the like.

The constraints imposed by drive linkage are that they generally are not designed to accommodate relative movement between the components they link. Figure 12 of the accompanying drawings shows a belt system 300 utilised to link two components 302, 304 laterally. Such a system generally uses a tensioning pulley 306 to ensure there is no slack in the system. This allows a certain amount of relative movement between the input 302 and output 304 components, as demonstrated by moving the output 304b and accordingly moving the position of the tensioning pulley 306b. However, this certainly cannot be done during operation. Referring now to Figure 13, a shaft orientated drive linkage 310 is shown, commonly used to link components longitudinally. An example is a prop shaft in a four-wheel drive car. Here there is the possibility for a small degree of elliptical movement between the two 312, 314, providing either one or the other is not fixed in space and further providing either end of the shaft 316 has a connection 318 allowing for multiple degrees of freedom. This movement is however primarily lateral and there is no provision for pure longitudinal separation.

It is an object of the fourth aspect of the present invention to provide a drive linkage in respect of two or more components that allows for longitudinal relative movement between the components.

In accordance with the fourth aspect of the present invention there is provided a drive linkage for linking at least one rotatable input means and at least one rotatably mounted output means, such that rotation of said input means causes corresponding rotation of said output means via said drive linkage, wherein said drive linkage comprises at least one linkage member configured to enable longitudinal relative movement between said at least one input means and said at least one output means.

It will be understood that the longitudinal relative movement is in a direction substantially parallel to the axis of rotation of said input and said output means.

In one exemplary embodiment of the fourth aspect of the present invention, the linkage member may comprise an extendable and retractable linkage member for enabling said longitudinal movement. Alternatively, the linkage member may comprise means for selectively decoupling and recouping said at least one input means and said at least one output means. Preferably, in this case, the linkage member comprises means for selectively disconnecting and reconnecting said input means (i.e. the drive) relative to the output means.

Preferably, the drive linkage comprises at least one linkage arm pivotally connected at one end to said input means and at the other end to said output means, the linkage arm comprising a pair of substantially rigid, elongate bars, rotatably connected together. The drive linkage may comprise a plurality of said linkage arms. The linkage arm is beneficially configured such that in its contracted position it fits against or within the contours of a face of the input and/or output means.

Alternatively, said resiliently flexible linkage means may, for example, comprise a spring or one or more telescopic members.

Preferably, said at least one input means comprises a rotatably mounted shaft.

Preferably, said at least one output means comprises a rotatably mounted drum of an appliance such as a washing machine. In fact, the present invention extends to a laundry appliance

having a rotatably mounted drum linked to a rotatable shaft via a drive linkage as defined above, and means for rotating said shaft so as to rotate said drum via said drive linkage.

Thus the above mentioned object is achieved by providing a linkage, such as a resiliently flexible linkage, connecting at least one input means to at least one output means, that efficiently communicates a rotational force therebetween, yet permits a degree of longitudinal movement relative to one another in the allowed plane.

A fifth aspect of the present invention relates generally to dispensing apparatus for a washing appliance, and more particularly, to an automatic dispensing apparatus for liquid substances, such as detergent and fabric softener, used in washing appliances including washing machines and dishwashers.

The drawer of a washing appliance, such as a washing machine, is designed to accept consumable substances such as washing powder, tablets or liquid detergent, as well as liquid fabric softener. When pouring liquid or particulate substances into the above-mentioned draw, it is possible to dispense too much or too little or to spill the substance and mix detergent and softener. When using a consumable in a form other than tablet, such that the user has to gauge a dosage of the substance to be introduced to the wash, it is often difficult to determine the correct amount that is required relative to the amount and type of laundry being performed, which can lead to an inadequate wash, or unnecessary wastage.

It is therefore an object of the fifth aspect of the present invention to provide a dispensing apparatus for automatically dispensing a suitable quantity of a washing substance so as to alleviate at least some of the problems outlined above.

In accordance with the fifth aspect of the present invention there is provided, a dispensing system for use in a washing apparatus, the system comprising at least one reservoir for holding a number of doses of a washing substance, regulating means for selectively opening said reservoir to release a pre-determined quantity of said washing substance held therein in response to a control signal, said control signal defining said predetermined quantity and

causing said regulating means to open said reservoir for a period of time sufficient to release said predetermined quantity of said washing substance.

The system preferably further comprises means to determine the weight of the contents of the drum, such that said predetermined quantity of washing substance is calculated based on the weight of the contents of the drum. The predetermined quantity of washing substance is preferably additionally dependent on the washing program selected.

Preferably, the dispensing system comprises a plurality of reservoirs, for holding respective different types of washing substance.

Beneficially, said regulating means comprises a valve, or more preferably, a plurality of valves, the state of which are actuated by a control signal.

Preferably, said control signal is generated by a control program.

Said at least one reservoir may be supplied with a pump for pumping a washing substance from within said reservoir to said regulating means, said pump preferably being controlled by a control program. The control program is preferably arranged and configured to control the parameters of a cycle of said washing apparatus, said parameters being at least partially definitive of said predetermined quantity of said washing substance. Alternatively, a gravity-controlled feed system may be used instead of a pump.

Preferably, said at least one reservoir has a re-sealable hatch, for allowing the ingress of liquid, said at least one reservoir which may be of a transparent or translucent material, and preferably being removable and replaceable, to allow for cleaning of said reservoir, possibly by hand or in a dishwasher, for example. In a different embodiment, said at least one reservoir may be disposable and may be removed and discarded for bio-degrading, to be replaced by a further disposable reservoir. There is preferably further provided a receptacle for receiving a washing substance, said receptacle being in fluidic communication with said reservoir and said pump. This feature provides the benefit that the pump will not empty of washing substance thereby preventing the pump having to be purged every time the reservoir is emptied.

The fifth aspect of the present invention further extends to a washing apparatus having a receptacle for receiving a load of laundry and a dispensing system as defined above, wherein means are provided for causing said predetermined quantity of said washing substance released from said reservoir to be introduced into said receptacle.

Thus, the above mentioned object is achieved by providing at least one, and more preferably two reservoirs for disposal in or on a washing apparatus, wherein electronic dosage regulation means, beneficially linked into the main control program of a washing apparatus and the laundry weight determining means, determines a quantity of liquid or particulate detergent and/or liquid fabric softener required for a particular size and/or type of laundry load, and automatically administers the substance accordingly during a laundry cycle. In addition, this arrangement eliminates the need for a user to manually administer detergent(s) in respect of every laundry cycle.

These and other aspects of the present inventions will be apparent from, and elucidated with reference to, the embodiment described herein.

Embodiments of the aspects of the present inventions will now be described, by way of example only, and with reference to the accompanying drawings, in which:

Figure 1 is a representation of a flat, unassembled drum according to an exemplary embodiment of the first aspect of the present invention;

Figure 2a shows a cross-sectional representation of the sum gradient of the channels;

Figure 2b is a schematic representation of the drum from Figure 1 as assembled;

Figure 3 is a schematic drawing of a first exemplary dump valve for use in an arrangement according to an exemplary embodiment of the first aspect of the present invention; and

Figures 4a and 4b are schematic front and cross-sectional views respectively of a second exemplary dump valve for use in an arrangement according to an exemplary embodiment of

the first aspect of the present invention.

Figure 5 is a perspective view of a drum and ballast tank of a washing machine according to a first exemplary embodiment of the second aspect of the present invention;

Figure 6 is a schematic diagram of a divided ballast chamber according to a second exemplary embodiment of the second aspect of the present invention; and

Figures 7a and 7b are schematic diagrams illustrating a set of spring-loaded castor wheels that operate in relation to the ballast tanks in an exemplary embodiment of the second aspect of the present invention.

Figure 8 is a diagram of a menu arrangement of a programming system according to a first exemplary embodiment of the third aspect of the present invention;

Figure 9 is a diagram of a pull-out programming module according to a first exemplary embodiment of the third aspect of the present invention, including a display carrying the menu of Figure 8;

Figure 10 is a diagram of a programming system according to a second embodiment of the third aspect of the present invention;

Figure 11 is a flow diagram of the information that may be displayed on a screen according to first and/or second embodiment of the third aspect of the present invention.

Figure 12 is a schematic diagram illustrative of a drive linkage according to the prior art comprising a belt;

Figure 13 is a schematic diagram illustrative of a drive linkage according to the prior art comprising a shaft;

Figure 14 is a schematic side view illustrating a variable drive linkage according to an

exemplary embodiment of the fourth aspect of the present invention, shown in its closed configuration;

Figure 15 is a schematic side view of the drive linkage of Figure 14 shown in its open configuration; and

Figure 16 is a schematic cross-sectional view of the drive linkage of Figure 14 shown in its open configuration.

Figure 17 is a representation of the system according to a first exemplary embodiment of the fifth aspect of the present invention;

Figure 18 is a representation of the system according to a second exemplary embodiment of the fifth aspect of the present invention; and

Figure 19 is a representation of the system according to a third embodiment of the fifth aspect of the present invention, being characterised by removable pods.

Figure 20 is a representation of the system of the third embodiment of the fifth aspect of the present invention including further beneficial features.

Referring to Figure 1 of the accompanying drawings, a drum 1 according to an exemplary embodiment of the invention is formed of an elongate rectangular piece of metal, which is bent round and the ends joined together to form an open cylinder. There is a suitably sized, possibly, but not necessarily, substantially rectangular aperture 2 located approximately centrally in terms of the length and width of the metal piece forming the drum 1, that provides an opening for placing laundry into and removing laundry from, the drum 1 when assembled 3. A plurality of elongate drain channels 5 are provided in the piece of metal 1, which channels 5 run laterally across the piece of metal.

Referring to Figure 2a of the drawings, the drain channels 5, when viewed cross-sectionally all slope in the same direction from a shallow start point 7 to a distal deep end point 9. Each

deep end point 9 defines a valve housing 8 comprising a circular purging aperture 13 located centrally in an offset circular recess 15, such that if the piece of metal were to be held in a substantially horizontal orientation and a quantity of liquid were introduced to a drain channel 5 at the shallow start point 7 (or indeed at any intermediate point along its length), it would flow due to gravity from the point of introduction to the deep end point 9 and through the circular purging aperture 13 located centrally in an offset circular recess 15. In Figure 2a, the sum gradient that is defined by the configuration of all the drain channels 5 can clearly be seen. A tapered portion 17 of the drain channel 5, located behind the purging aperture 13 (relative to the shallow start point 7), provides a reverse gradient that ensures that most liquid that is directed towards the purging aperture 13 exits at that point.

Referring back to Figure 1, the elongate drain channels 5 are each fed by a respective plurality of elongate, parallel guide channels 19, arranged in banks and having substantially the same sum gradient as the drain channels 5. The guide channels 19 run into a respective drain channel 5 at an angle of substantially say, 45° and any two adjacent banks of guide channels 19 are arranged in a herring-bone configuration as shown. Such a herring-bone configuration provides increased performance over an arrangement whereby water is directed in an opposing direction to a purging aperture 13 located within the spine of the herring-bone. Utilising a channel along the spine of the herring-bone directing water to an outlet at the point at the tip of the chevron or herring-bone would also provide reasonable water purging, however, through the angle and increasing depth of the guide channels 19 and drain channels 5 directed towards apertures 13 provides increased water purging efficiency. For the available surface area with which to direct water from the drum 1, the use of such a herring-bone arrangement directing water to a cornermost purging aperture 13 leads to significant water purging of the drum 1, in particular along the spin cycle.

Referring now to Figure 2b, the drum 1 is shown, in its assembled form, i.e. a cylindrical drum 3. As the drum 3 rotates about its central axis 21 with an angular velocity 23, a centrifugal force 25 (F) is created, as shown. It will be apparent from Figure 2b that this force 25 acts perpendicular to a plane on the circumference of the cylinder 3 and will cause any liquid inside the drum to move to the inner walls thereof and into the guide channels 19. The water then flows from the guide channels 19 into the respective drain channels 5 and then the valve

housing 11. Thus, water inside the drum 3 is directed, during a spin cycle, to specific points, i.e. the valve housings 11 provided at the wall thereof, and as such, means such as a dump valve can be provided at these points to expel the directed liquid as a by-product of the spin-cycle.

Referring now to Figures 3 and 4 of the accompanying drawings, a cross-sectional perspective representation of two respective exemplary embodiments of a dump valve 27 are shown. The dump valve 27 comprises an upper section and a lower section separated by a cylinder separator within which is provided a stem seal 29a, through which passes a valve stem 31. In the upper half of the valve, the piston head 33 is provided with a piston head seal 33a that provides a liquid-tight seal between itself and the surrounding inner face of the wall 35 of the upper section. The cylinder separator 29 may be formed integrally with the wall 35, as shown in Figure 4 of the drawings. A fluid inlet/outlet port 37 is provided in the cylinder wall 41, as shown in Figure 4a of the drawings. At the top of the upper section there is provided a lid 39 that substantially follows the contours of a side wall 41 and further provides a limit point for how far the piston 43, 45, 47 may travel in that direction. An aperture 49 is provided in the side wall 51, which provides an external connection to the mains water supply. A compressible spring 53 provided in cooperation with the piston which acts to return the piston to its equilibrium position when the valve is closed.

The valve piston stem 45 extends downwardly into the lower section of the valve and terminates in a plug 55, the lower outer edges of which are tapered inwardly to provide a seal between the piston and the drum wall when the valve is closed. The seal may be broken and the valve opened by raising the piston. As shown in Figure 3, a concentric collar 57 may be provided around the lower end of the valve, the collar 57 surrounding the piston head 59 and being connected to the underside of the piston stem seal 29a at the top and connected to the inner face of the drum 3 at the bottom. A plurality of generally arch shaped apertures 61 are formed around the bottom of the collar 57 to allow ingress of water from the drum 3 when the piston 43, 45, 63 is raised and the valve is therefore open. This opening action is facilitated by mains water pressure entering the upper section of the valve through the aperture 49, thereby exerting pressure on the lower face of the piston head seal 33a that provides a liquid-tight seal between itself and the surrounding inner face of the wall 51 of the upper section so

as to force the piston 43, 45, 63 upwards towards its limit at the lid 39. Whilst in this position water may pass from inside the drum 3, through the plurality of arch shaped apertures 61 and be purged from the drum 3 through the purging aperture 13. When the mains pressure is no longer present the spring 53 causes the piston to return to its closed position. A dump valve 27 as described is particularly beneficial as may be actively controlled, rather than functioning passively, and may be activated when the drum is stationary as well as when the drum is spinning. This provides an increased amount of control of the washing machine. When the drum is rotating at a critical speed, during a spin cycle, for example, the valve opens by the piston 43, 45, 47 lifting upwards (in relation to the diagram of Figure 3) such that arch shaped apertures 61 formed around the bottom of the collar enable water therethrough. Additionally, when the drum is stationary, the valve can be opened through the application of water pressure through aperture 49.

Referring to Figure 5 of the drawings, a washing machine according to an exemplary embodiment of the present invention comprises a drum 101 anchored to a base 103 via four separate damping means. As the drum 101 is actuated round its axis of rotation 105 it causes lateral vibrations that would, if anchored to the base 103 alone, cause the washing machine to fall over. A heater unit 107 is provided under the drum 101 for heating cold water for use during a wash cycle. Ballasting means 109 are provided comprising one or more interconnected hollow containers of a strong yet light material, such as a high density polymer. The ballasting means 109 is connected to the cold water source at its inlet point and further connected to the drum at its outlet point, such that cold water enters via the inlet, fills the ballasting means 109 to a desirable level and may further overflow into the drum itself or be pumped there. There is a facility for the outlet of the ballasting means 109 to pass directly to the heater 107 prior to entering the drum 101, or alternatively the heater 107 may be provided within the ballasting means 109.

The heater unit 107 could comprise standard resistance elements, or possibly microwave heating means.

Referring now to Figure 6, a divided ballast tank according to a further exemplary embodiment of the present invention comprises a ballast tank 111 divided into three chambers 111a, 111b,

111c, each chamber being separate from one another, with the exception of a valve 113 that provides a connection between adjacent chambers. Each chamber 111a, 111b, 111c has an independent energy source 115a, 115b, 115c as well as an outlet pipe 117a, 117b, 117c through which water may pass to the drum. There is also provided a water input means 119a, 119b, 119c to each chamber 111a, 111b, 111c, so that cold water from the mains can be introduced to the chambers. Alternatively, there could be one water input per cluster of three chambers 111a, 111b, 111c and the internal valves 113 could be used to distribute the water therebetween. In this embodiment, the water contained in each chamber 111a, 111b, 111c can be heated independently from one another, such that if a wash cycle is chosen by a user that only requires a small quantity of water, a single chamber, say 111a, could be heated and pumped (not shown) to the drum by way of the outlet pipe 117a, rather than heating an equivalent chamber three times its volume and then only using a third of it. The programming system 210 of the washing machine controls when the energy sources 115a, 115b, 115c are turned on and off as well as the outlet functions 117a, 117b, 117c, in relation to a chosen input by a user. This presents obvious energy saving benefits as only the water required for an imminent wash is heated, thereby saving the energy necessary to heat the unused water.

The internal valves 113 help to maintain the stability of the machine by letting water flow between the ballast chambers 111a, 111b, 111c, such that there is no uneven weight distribution that could cause the machine to fall over as it operates. Ensuring the tanks are symmetrically drawn down also helps in this regard.

The chambers 111a, 111b, 111c may be of equal size or may be provided in different sizes to suit different wash cycles chosen by the user.

Referring now to Figure 7, in a further aspect of the present invention a set of four spring-loaded castor wheel arrangements are incorporated into the base of the washing machine body 125, being arranged with one in each corner. The spring loaded castor wheel arrangements each comprise a castor wheel 127, the top end of which is connected to a strong compressible spring 129 that sits within, and may be fixed to, the top inner face of a substantially vertical hole, recessed in the base of the washing machine body 125. Castor wheels are stated by way of example and may be replaced by any transport means that are not directionally fixed, to

increase the manoeuverability of the washing machine.

The strength of each spring is such that when the ballast of the machine is empty the castor wheels 127 protrude from the base of the washing machine body 125 and are in communication with the floor 131, allowing the machine to be easily movable across the floor 131 (as shown in Figure 3a). When the ballast within the machine is filled with liquid, the extra weight compresses the springs 129 such that the machine drops downwardly towards the floor 131 and engages the floor 131 with four protruding rubber studs 133 (see Figure 3b). Although springs 129 are stated for use in the system, it should be noted that any means that provides a similar action may be used alternatively or in combination. A set of rubber, (or any material with a reasonable coefficient of friction), studs 133 are provided on the base of the machine, to provide friction that opposes any lateral movement generated when the machine is in use.

When it is required to move the washing machine, the ballast may be drained, thereby reducing the overall weight acting on the springs 129 and as such the wheels 127 deploy from the base of the washing machine body 125 causing the washing machine body to raise from the floor 131 (and with it the rubber studs 133) so that the machine may be freely 'wheeled' to its desired position.

Because each castor wheel 127 is independently spring-loaded, it allows for any uneven areas in the floor to be compensated for, both when moving the machine and when it is stationary. The system described could be replaced by having a common connection between the four castor wheels 127 that is itself spring loaded, but this would require a stronger spring and reduce the ability to compensate for uneven surfaces.

Referring to Figure 8, a schematic drawing of a menu arrangement 200 is shown. It comprises essentially three concentric ovals, the inner two being formed by a plurality of Light Emitting Diodes (LEDs) 201, 203, or Organic Light Emitting Drodes (OLEDs) with an equal number in each oval. The outer oval takes the form of textual annotations relating to respective pairs of LEDs 201, 203 such that for each inner LED 201, there is an intermediate LED 203 and an associated outer sentence of text 205 representative of a function.

The inner oval of LEDs represents a 'selection cursor' 203 that can be shifted, ideally in either direction, in accordance with the manual rotation of a multi-functional button. The cursor aspect is achieved by lighting only one of the LEDs at a time, so manually rotating the button will cause the lighted LED to appear to move around the oval accordingly.

The intermediate oval of LED's provide a 'selected indicator' 201, corresponding to which of the functions have been selected by moving the cursor 203 such that it is as close to the indicator 201 as can be, then selecting that function by pressing the same multi-functional button. This will illuminate the indicator 201, and subsequently ensure that when the selection process is complete and the appliance is started the function associated with the text 205 corresponding to the indicator 201 will run. Unlike the cursor 203 level, the indicator 201 level is not limited to a single LED being lit at any one time, but is constrained in that only one 201 may light within mutually exclusive sub-groups (for example temperature).

Once all the required functions have been indicated 201 by the cursor 203 the start function may be initiated to begin the appliance cycle in the same way that functions are selected.

At the end of a complete operation the appliance stores details of the completed operation in an internal task memory. The task memory always contains the details of the last 3 operations, such that if it is desired to repeat the last operation again, or the third from last for that matter, it could be achieved by simply selecting a single command rather than having to indicate 201 each separate function again. It is very simple to 'tweak' an operation from task memory should it be desirable to complete an almost identical operation with some adjustment.

Some of the functions contain inherent data for some other functions, that is automatically applied when they themselves are selected. An example would be if selecting the function "wool" from within the materials sub-group. This would automatically select a low temperature to stop the wool shrinking during the wash. The arrangement of the menu system is such that the most often used functions are nearest to the cursor starting point and the least often used the furthest away, contributing to a simple selection.

The appliance may also be paused during operation, turned on and turned off by pressing the

multi-functional button 207.

Referring now to Figure 9, a pull out module or "drawer" 209 is shown that is housed at the front of the machine in a convenient and easily accessible position. The lit menu arrangement 201 is shown as situated on the upper face 211 of the drawer, such that when the drawer 209 is retracted from the machine the lit menu arrangement 201 becomes visible to the user. A multi-functional button 207 is provided on the front face 213 of the draw to control the programming system. As well as using the lit menu arrangement 200 to view selections when controlling the appliance, there is further provided a display panel in the form of an LCD screen 215 situated on the front face 213 of the drawer 209. The screen 215 is normally visible, regardless of the position of the drawer 209, and can display a limited quantity of information (e.g. the last one or more programs selected by the user) such that it is not always necessary to retract the draw 209 in order to select a wash function. This can save the menu arrangement 201 and module 209 from getting as dirty as they might otherwise get.

The system delivers two key benefits - simplicity and ease of use through one button operation and task memory as well as the ability to easily customise operations to the exact need of the user. The dual display means can for example, be configured to help the user to view and easily select the last three washes they used (and/or most popular washes), the stage of the wash cycle while in operation and easily customise any element of it in terms of temperature, spin speed, start time and so on. Additionally for example, a user can over-ride the system such that the wash can be paused at any time.

Referring now to Figure 10 of the accompanying drawings, a diagram of a programming system according to a second embodiment of the present invention is shown, embodied as a washing machine. The system comprises a front screen 220 that is built in to the front face of the washing machine, at a convenient height to be viewed by a user, that displays a program code that can be changed and manipulated by use of a multi-functional button 222. The front screen may comprise an LCD array, OLED display or any other means capable of displaying text and numbers in relation to an electrical signal. A program menu 224 is provided on the top of the washing machine's drum (although it may be provided anywhere that is easily accessible to the user), providing a comprehensive list of all the user-definable program

choices available to the user. The program menu 224 is either printed on the top of the drum 226 or may be a liquid-resistant sticker or sheet of a material that is adhered to its location. The multi-functional button 222 is utilised by rotation to scroll through the available program menu 224 options as its elements are displayed in sequence on the front screen 220. Pressing the button 222 will result in a 'select' function that chooses whatever program is represented by the text appearing on the front screen 220 at the time it is pressed. Depending on which program is itself 'selected', further options may be available to be either selected or not and so on. In this way all the possible programs and their associated sub-options may be scrolled-through and selected as desired to initiate a wash. Figure 11 indicates an exemplary embodiment of the display on the front screen utilising a layered menu suitable for manipulation by the multi-functional button 222.

Referring now to Figure 11 in detail, pressing the button 222 for the first time turns the front screen 220 on and activates the first display 230. Rotation of the button 222 causes scrolling through the pre-set program menu 220. The first screen also provides an indication, for example, of the levels of detergent and/or conditioner. Options for highlighting deficiencies in these levels can be achieved by displaying the respective text highlighted with the appropriate information, or providing flashing LEDs for example.

Depressing the button 222, once the required program is selected, takes the user to the next selection menu 232, through which further options are provided. Scrolling to "back" and depressing the button 222 takes the user to first (or previous) display 230, "start" takes the user to further display 234, and scrolling to "options" then pressing button 222 takes the user to another display 236. Display 232 indicates the details of the program. If "start" is selected on the display 232 by scrolling to "start" and pressing button 222, display 234 appears indicating the time left, the details of the program selected, and options for cancelling and/or pausing the program. If "pause" is selected by scrolling to this option, pressing button 222 pauses the program and display 238 appears.

Depressing button 222 when the "options" choice is scrolled to on display 232 activates a further display 236 providing more detailed options for the program. Examples are control of detergent, conditioner, energysave, rinsehold, prewash, spin speed and delay. If button 222

is scrolled to "delay", and pressed, scrolling of button 222 can then vary the delay time period.

A user can again choose to replicate any of a finite number (say three) of his/her last defined wash programs with a single action using program memory as is described above.

Referring to Figures 14 to 16 of the accompanying drawings, a drive linkage 330 according to an exemplary embodiment of the present invention is illustrated in which the input and output components are a rotating shaft 332 and a washing machine drum 333 respectively. The rotating shaft 332 passes through a bearing 334, contained in a bearing housing 334a, to a hub 336 having a door closing mechanism 338 formed integrally therewith. The input linkage arms 340a are generally in the form of a back to front 'S' shape when viewed at a plane parallel to the back face of the drum 333, the 'S' having an elongated start and finish line and the two angles defining the middle section being inwardly angled at substantially 90 degrees. When viewed from a plane parallel to the side of the drum 333 the input linkage arms 340a again have a generally 'chicane' shape, to follow the surface contours of the circular depression formed centrally at the rear of the drum. At either end of the input-end linkage arms 340a there is formed a lateral circular aperture for receiving a linkage shaft that ultimately forms a hinge-joint when mated with corresponding output-end linkage arms 340b.

The input-end linkage arms 340a, in use, sit adjacent to a equal plurality of output-end linkage arms 340a, of substantially similar shape such that they fit side by side allowing a single common linkage shaft to pass through one of the concentric lateral circular apertures 342a, 342b of a pair such that they may rotate in this permitted plane relative to one another and as such form a hinge 344. As stated above the distal end of each input-end linkage arm 340a is connected to the hub 336. The distal end of an output-end linkage arms 340a is mounted to the rear face of the drum 333, therefore giving a configuration such that the rotating shaft 302 and the drum 310 are in rotatable communication in accordance with the input, yet the two are permitted to move longitudinally relative to one another.

It is the manner in which the arms 340a, 340b interact that enables the movement of the drum 333 relative to the drive arrangement, i.e. the hinge 344 permits the longitudinal displacement. The manner in which the arms 340a, 340b are configured means also that there is no permitted

relative movement (bar play) in terms of rotation and this is essential to the invention. Similarly, in another exemplary embodiment, the linkage arms 340a, 340b could be replaced by a rotatably-rigid spring, that permitted separation between its two ends but was rigid enough to translate any applied rotation at one end to the other. In a further embodiment the linkage arms 340a, 340b could be replaced by a number of strong telescopic members, that would allow for longitudinal separation but contemporaneously were strong enough to provide the rotational translation.

Referring in particular to Figures 15 and 16, the drive linkage is shown in its open configuration 350, where the drive shaft 332 and the drum 333 are no longer immediately proximal. Whereas in the configuration of Figure 14, the two sets of linkage arms 340a, 340b are adjacent along their length, in the illustrated configuration, they are now only so at the point where the common linkage shaft passes through one of the concentric lateral circular apertures 342a, 342b of a pair. The distal ends 352, 354 of the linkage arms 340a, 340b are thus separated through longitudinal movement of the drum 333, thereby providing a permanent linkage that allows a longitudinal separation between the input and output components.

In an alternative embodiment, the drive may be coupled directly to the drum by means of a coupling that can be selectively disconnected and reconnected to enable the required longitudinal movement of the drum relative to the drive.

Referring to Figure 17 of the accompanying drawings, a dispensing system 400 according to a first exemplary embodiment of the fifth aspect of the present invention, comprises a detergent pod 402 containing liquid detergent 404 and a liquid fabric softener pod 406 containing liquid fabric softener 108. The two pods 402, 406 may be made of a rigid, light weight polymer, however any similar material, resistant to the intended contents would be suitable and the present invention is not necessarily intended to be limited in this regard. The pods 402, 406 are mounted in or on a washing machine at a suitable location. The size of the pods 402, 406 are limited by the free space available, but beneficially, each pod 402, 406 might be large enough to hold enough of the respective substance for several washes. The two pods 402, 406 are commonly connected to a regulating means 410 by way of a detergent transfer pipe 412 and a softener transfer pipe 414 respectively. A respective motor 416, 418

(in communication with an internal pump (not shown)) at the back of each reservoir 402, 406 enables the contents of each to be introduced to the drum 420 in accordance with a control signal generated by the regulating means 410.

The regulating means 410 is a valve that is, by default, closed such that neither the detergent 404 or the softener 408 flow. The regulating means 410 has a first input to which the detergent transfer pipe is connected and a second input to which the softener transfer pipe 414 is connected, as well as an outlet channel 422 leading into the drum 420 of the washing machine. The regulating means 410 may be an actuated valve or any other means for ensuring that the respective substances 404, 408 do not enter the drum 420 when it is not desired. The regulating means 410, in the case of it being an actuated valve, is connected to and controlled by the programming system 424 that signals when and for how long the valve 410 should be open and accordingly, how long the motors 416, 418 should be driven to dispense a desired quantity of consumable 404, 408, based on the specific size and/or type of load to be washed (as indicated by the program selected by the user and/or any additional information input by the user and/or the weight of the load to be washed). In a preferred embodiment, information provided on the weight of the laundry and program selected are used by the system 424 to determine the optimum quantity of detergent and/or conditioner required. Voice recognition means may be provided for this purpose, so that a user who may be visually impaired or otherwise disabled may provide the required information to the programming system controlling the regulating means 410.

Feedback means is present both at a software and hardware level, with an integral computer program that checks the state of components, such as the valve 410 and motors 416, 418 to ensure compliance with the program states, and buoyant means may be provided inside the pods 402, 406 that can register a decrease in the level of the respective substances 404, 408, as well as signal the programming system 424 when a pod is nearly empty, so that a warning signal, such as an indicator light visible to the user, can be switched on.

The system 400 dispenses the correct quantity of liquid detergent 404 and/or liquid softener 408 directly into the wash at the correct times in accordance with the programming system 424 that operates the underlying components 416, 418, 410. Means are provided 425 to measure

or otherwise input the weight of the load to be washed, and it is this weight that the programming system uses to determine the quantity of laundry substance to be dispensed.

The weight of the washing may be determined by a variety of means 425, such as displacement of the damper (not shown) which provides support to the drum, or alternatively displacement of the drum itself. The weight of the contents of the drum may then be calculated. Without such a measurement and calculation, the system cannot be fully automatic and as such would require an additional input value, most commonly at a user interface. This measurement and the value derived dictates the volume of water (and inadvertently the quantity of energy required to heat the water), the volume of detergent, the volume of conditioner and the amount of any other washing substances required to be added to the wash. It will therefore be appreciated that efficiency is optimised, whilst additionally the optimum quantities of additives to be wash may be used, increasing economy and improving the quality of the wash. Information received from the measuring device by the programming system 424 is then fed to the regulating means 410 (for example the internal pump (not shown)) to administer the correct quantities. Information embedded in the system 400 at manufacture stage, or at least before sale to an end user, and selectable during a special "set up" program allows for the quantities to be manipulated depending on geographical location regarding hardening of the water.

Referring now to Figure 18, as second exemplary embodiment of the present invention shows a similar system 400 to that described in Figure 1. The system 400 again comprises two pods 402, 406, containing consumable substances 404, 408 as in the previous embodiment. In this embodiment, however, no motors are used to convey the respective substances 404, 408 into the drum 420. The detergent transfer pipe 412 and a softener transfer pipe 414 each terminate in an actuated valve 430, 432 , controlled by a signal generated by the programming system 424 that signals when they should open and for how long. Both valves 430, 432 are closed by default, therefore allowing no substance 404, 408 to pass into the drum 420. When a signal is sent by the programming system 424, in relation to an input derived from the weighing means 425, the relevant valves 430, 432 will open, resulting in a quantity of substance 404, 408 flowing, by way of gravity, through the open valve and into the drum. The quantity dispensed is determined by the viscosity of the substance and the duration that the valve is

open. The programming system 424 will have information relating to the viscosity of the substances 404, 408, and thereby stipulates the correct time for the valve(s) to remain in an open state again dependent on the program cycle, weight of the laundry etc. The programming system may have a range of such values so that different types of substance 404, 408 can be used and the user is not restricted in this regard to one particular type/brand. The user may manually identify the type of substance 404, 408 is being used to fill the pods 402, 406 at the time of doing so.

Feedback means is again included, both at a software and hardware level, with an integral computer program that checks the state of the valves 430, 432 to ensure compliance with the program states, and buoyant means may be provided inside the pods 402, 406 that can register a decrease in the level of the respective substances 404, 408, as well as signal the programming system 424 when a pod is nearly empty, so that a warning signal, such as an indicator light visible to the user, can be switched on. As there are no motors included in this embodiment, the integral computer program receives signals from the buoyant means as a check that the levels are indeed decreasing as the valves 430, 432 are open to ensure an alarm is sounded if 'no flow' is detected.

Referring now to Figure 19 of the drawings, a system is shown according to a third embodiment of the fifth aspect of the present invention. The system in this embodiment is essentially the same as that of embodiment 1 (and also applicable to embodiment 2) with the exception that the pods 406, 402, in this instance, are not fixed within the machine. The pods 406, 402 here are designed to be removable from the washing machine with a view to allowing them to be washed out before refilling to prevent the substance within congealing and hindering the dispensing capability. The pods 406, 402 are accepted into an orifice in the body of the washing machine (not shown) which is of similar dimension to the circumference, or general outer dimensions, of the pods 406, 402, such that they are comfortably accepted therein. The orifice in the body of the washing machine is located on the front face of the machine in a preferred embodiment. This enables the machine to be either free-standing or located under worktops. A dispensing nozzle at one end of the pod 406, 402 interfaces with a housing 440 (within the orifice in the exterior of the washing machine) that has a further

smart orifice 442 within that clamps the nozzle and may act as an interlock, enabling power

to be supplied to the system pumps 416, 418 and valve 410 as well as signalling the programming system 424 that a pod is in place. An alternative embodiment of this specific arrangement is described with reference to figure 4. The nozzle at one end of the pod 406, 402 may incorporate a special valve arranged and configured such that free flow of washing substances are enabled when installed, however washing substances do not leak out on removal and installation. The pods 406, 402 can be of different shape to one another so that there is no confusion when filling them with substance, as it is known that when liquid detergent and fabric softener are mixed it provides a solution extremely habitable for bacterial growth. If this is the case then the respective orifices in the washing machine body for accepting the pods 406, 402 will be of corresponding shape. It is preferable that the pods 406, 402 comprise of a clear or transparent material to aid a user to see the colour of the substance inside, to further reduce the chance of confusion when re-filling. To additionally avoid confusion, these pods also reside on different sides of the machine. In a preferred alternative embodiment, the system pumps 416, 418 may be metering pumps that actually meter the amount of respective substance being dispensed. In this case, the valve could be omitted and there may be two dispensing tubes to avoid cross-contamination between laundry substances, or a separating valve may be provided for the same purpose, thereby reducing bacterial growth, dirt and congealing. Additionally, after the washing substance is administered through the valve 410 and into the system, water which may or may not be heated is flushed through under pressure to wash the substance into the drum.

Referring to Figure 20, a fourth embodiment of the fifth aspect of the present invention is described which may be utilised in conjunction with or excluding features of the first to third embodiment, and in particular provides additional beneficial features to the third embodiment of the present invention.

Water enters the drum through hot and cold water channels 450, 452, and inlets to channels 450, 452 are provided to enable detergent and/or conditioner to pass therethrough. It will be appreciated that alternatively a single channel may be utilised. The pump 416, 418 pumps the required volume of detergent or conditioner into the channel 450, 452 dependent on the information received from the programming system 424, which in turn receives information including the weight of laundry in the drum thereby ensuring the correct volume of detergent and/or conditioner is administered. In this embodiment of the present invention, an additional

docking module 454 is provided between the pods 406, 402 and pump 416, 418. This docking module 454 is a fixed reservoir located at the rear of the washing apparatus behind, and in communication with, pods 406, 402. The docking module 454 contains a female mating valve 456 having an automatic opening and closing device when linked to pods 406, 402. When in use, the docking module 454 always contains a quantity of washing fluid (detergent/conditioner) when the pods 406, 402 are empty. This enables pods 406, 402 to be removed and cleared by a user, and also ensures that the pump 416, 418 never dries out thereby preventing the pump having to be purged every time the pod 406, 402 is empty. This therefore removes the mismatch of quantity of laundry substance delivered compared to the quantity required based on the program selected and weight of laundry. The docking module 454 can further detect when the pod 406, 402 is out of laundry substance and provides and indication of this fact to a user, and additionally allows for a fully automated operation.

The pods may be off the shelf items that are disposable once empty, removing the need for any cleaning and also reducing the probability of cross-contamination. Again, these pods may be of a different shape to one another to further reduce the possibility of confusion between them, and are sealed after filling on production to avoid drying out. These may be disposed of to be biodegraded.

Although the above-described embodiments include two pods, it will be appreciated that any number of pods may be provided, depending on the type and number of substances, required to be administered during a laundry cycle. In conclusion, each of the embodiments described may optionally provide the significant benefit that the optimum amount of washing substances such as detergent and softener at the correct time are provided in the wash cycle according to the weight of the clothes and the wash program selected. This enables optimal amount of detergent and softener to be used at the optimal time, thereby maximising wash performance minimising waste, and negating the need to fill the washing apparatus with liquids each time a program is run.

It should be noted that the above-mentioned embodiments of the various aspects of the present invention illustrates rather than limits the invention, and that those skilled in the art will be capable of designing many alternative embodiments without departing from the scope of the invention as defined by the appended claims. In the claims, any reference signs placed in

parentheses shall not be construed as limiting the claims. The word "comprising" and "comprises", and the like, does not exclude the presence of elements or steps other than those listed in any claim or the specification as a whole. The singular reference of an element does not exclude the plural reference of such elements and vice-versa. The invention may be implemented by means of hardware comprising several distinct elements. In a device claim enumerating several means, several of these means may be embodied by one and the same item of hardware. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

CLAIMS:

1. A drum for a washing machine, the drum comprising a generally cylindrical receptacle which is rotatably mounted within a washing machine housing and has an opening for loading and unloading laundry, wherein said receptacle is defined by a substantially solid outer wall having at least one aperture therein, and means for guiding liquid purged from said laundry upon rotation of said drum towards said at least one aperture such that said liquid is expelled from said receptacle via said at least one aperture.

2. A drum according to claim 1, wherein said means for guiding liquid purged from the laundry upon rotation of the drum towards said at least one aperture comprises a channel, preferably having a proximal deep end and a distal shallower end, relative to said at least one aperture, such that rotation of the drum forces the liquid from the shallower end to the deep end and said liquid is expelled from the receptacle via said at least one aperture

3. A drum according to claim 2, wherein a plurality of said channels are provided for guiding said liquid purged from said laundry upon rotation of said drum towards said at least one aperture.

4. A drum according to any preceding claim, wherein said drum is provided with a plurality of apertures and one of more respective channels are provided to guide said liquid purged from said laundry upon rotation of said drum towards each of said plurality of apertures.

5. A drum according to claim 4, wherein a plurality of said channels guide said liquid purged from said laundry upon rotation of said drum towards said plurality of apertures.

6. A drum according to either of claims 3 to 5, wherein said plurality of said channels are provided in a herringbone configuration.

7. A drum according to any preceding claim, wherein a valve is provided within said at least one aperture to control the flow of said liquid through said aperture.

8. A drum according to claim 7, wherein each said aperture in said drum is provided with said valve.

9. A drum according to either or claims 7 or 8, wherein said valve is actuated by mains water pressure.

10. A drum according to either of claims 7 or 8, wherein said valve is actuated by a centrifugal force generated by the rotation of said generally cylindrical receptacle.

11. A drum according to any preceding claim wherein said opening comprises a hatch, said hatch being liquid light when in a closed position and permitting the loading and unloading of laundry when in an open position.

12. A drum as herein before described with reference to the accompanying drawings.

13. A washing machine comprising a drum according to any one of the preceding claims, rotatably mounted in a housing, drive means for rotating said drum during a wash cycle, and control means for controlling one or more parameters of a wash cycle, wherein said control means comprises means for interrupting a wash cycle and permitting access to said opening in said drum.

14. A washing machine according to claim 13, wherein said opening is provided in a side wall of said drum and said control means is arranged and configured to halt rotation of said drum so as to interrupt a wash cycle when said opening is at or close to top dead centre (TDC) of said drum, such that access to said opening can be permitted whilst retaining liquid within said drum.

15. A ballast system for a washing machine, the ballast system comprising a reservoir having means for permitting water to flow between said reservoir and the washing machine drum, the reservoir further comprising an inlet for enabling said reservoir

to be filled with water and an outlet for enabling water to be drained from said reservoir, the system further comprising means for filling said reservoir and maintaining said reservoir substantially full of water between washing cycles of said washing machine, wherein the weight of said reservoir when it is substantially full of water acts to counter balance vibrations generated by rotation of said washing machine drum during a washing cycle.

16. A ballast system according to claim 15, wherein said water is pumped, by a pumping means, between said reservoir and the drum of said washing machine.

17. A ballast system according to either of claims 15 or 16, wherein said ballast system is controlled by the control program of said washing machine.

18. A washing machine having a drum and a ballast system according to claim 15.

19. A washing machine according to claim 18, wherein said washing machine further comprises heating means for heating water from said reservoir for use in said washing machine drum.

20. A washing machine according to claim 19, wherein said heating means is provided in the flow path between said reservoir and said washing machine drum.

21. A washing machine according to claim 19, wherein said reservoir contains heating means, to heat water held therein.

22. A washing machine according to claim 21, wherein said reservoir may be divided into a plurality of sub-reservoirs.

23. A washing machine according to claim 22, wherein one or more of said sub-reservoirs contain a heating means to heat water held therein.

24. A washing machine according to any of claims 19 to 23, wherein said heating means comprises at least one heat generating resistance element.

25. A washing machine according to any of claims 19 to 23, wherein said heating means comprises at least one microwave heating means.

26. A laundry appliance having a rotatable drum and a ballast system comprising a reservoir having an inlet for enabling said reservoir to be filled with water such that the weight thereof acts to counter-balance vibrations generated by rotation of said drum during a laundry cycle and an outlet to enable water to be drained from said reservoir, said laundry appliance further comprising transport members extending from the base thereof and resting on a support surface when said reservoir is empty, said transport members being mounted via compressible means relative to respective recesses in said base of said laundry appliance such that when said reservoir is filled with water , the weight thereof acts to compress said compressible means and cause said base of said laundry appliance to be lowered towards said support surface such that at least said compressible means enters said respective recesses and the base of said laundry appliance rests on said support surface.

27. A laundry appliance according to claim 26, wherein said transport means comprises at least one castor wheel.

28. A laundry appliance according to claim 27, wherein said transport means comprises a plurality of castor wheels, being mounted via a respective plurality of compressible means relative to said respective recesses in said base of said laundry appliance.

29. A laundry appliance according to any of claims 26 to 28, wherein said compressible means comprises at least one spring.

30. A laundry appliance according to any of claims 26 to 29, wherein a set of pads are provided on the base of the machine to increase friction between said machine and said support surface.

31. A programming system for controlling an appliance comprising:
a single manual control means;
display means;

a plurality of actionable events;

wherein, said actionable events are represented graphically on said display means, said manual control means providing a means of selecting in combination a plurality of said plurality of actionable events.

32. A system according to claim 31, wherein said plurality of actionable events are divided into executing events, master events and sub events, said master events defining a number of said sub events and said executing events executing said master event.

33. A system according to claim 32, wherein said master events may be configured, using said manual control means, to contain any number of non mutually exclusive said sub events.

34. A system according to any of claims 31 to 33 wherein said programming system remembers a plurality of previously selected configurations of said actionable events.

35. A system according to any of claims 31 to 34, wherein said manual control means comprises a multi-functional button.

36. A system according to any of claims 31to 35, wherein said display means comprises a single LCD array.

37. A system according to any of claims 31 to 36, wherein said display means comprises an array of LEDs, each of LEDs in said array of LEDs being identifiable as to associating with a respective said actionable event.

38. A system according to claim 37, wherein said display means further comprises a separate LCD array.

39. A system according to claims 37 or 38, wherein said array of LEDs is configured as two concentric ovals, an inner oval and an outer oval, with textual annotation identifying a respective said actionable event for each LED in said outer oval, said

inner oval proving a cursor function to identify which LED of said outer oval is currently selected, said cursor function being manipulated by said manual control means.

40. A system according to claim 37 or 38, wherein said array of LEDs is configured as two concentric ovals, an inner oval and an outer oval, with textual annotation identifying a respective said actionable event for each LED in said inner oval, said outer oval proving a cursor function to identify which LED of said inner oval is currently selected, said cursor function being manipulated by said manual control means.

41. A system according to any of claims 31 to 40 as substantially as herein described, with reference to the accompanying drawings.

42. A washing machine, being controllable by a programming system according to any of claims 31 to 40.

43. A washing machine according to claim 42, wherein said washing machine comprises a recess and said programming system is provided in a module arranged and configured to be retained within said recess and selectively retracted therefrom for use.

44. A drive linkage for linking at least one rotatable input means and at least one rotatably mounted output means, such that rotation of said input means causes corresponding rotation of said output means via said drive linkage, wherein said drive linkage comprises at least one linkage member configured to enable longitudinal relative movement between said at least one input means and said at least one output means.

45. A drive linkage according to claim 44, wherein said at least one linkage member comprises an extendable and retractable linkage member configured to enable said longitudinal relative movement.

46. A drive linkage according to claim 44, wherein said at least one linkage member comprises means for decoupling and recoupling said at least one input means and said at least one output means.

47. A drive linkage according to claim 46, wherein said at least one linkage member comprises means for selectively disconnecting and reconnecting said input means relative to said output means.

48. A drive linkage according to claim 45, wherein said drive linkage comprises at least one linkage arm pivotally connected at one end to said input means and at the other end to said output means, the linkage arm comprising a pair of substantially rigid, elongate bars, rotatably connected together.

49. A drive linkage according to claim 48, wherein said drive linkage comprises a plurality of said linkage arms.

50. A drive linkage according to claim 49, wherein said linkage arm is beneficially configured such that in its contracted position it fits against or within the contours of a face of the input and/or output means.

51. A drive linkage according to claim 45, wherein said at least one linkage member comprises a spring.

52. A drive linkage according to claim 45, wherein said at least one linkage member comprises a telescopic member.

53. A drive linkage according to claim 52, wherein said drive linkage comprises a plurality of said telescopic members.

54. A drive linkage according to any of claims 44 to 53, wherein said at least one input means comprises a rotatably mounted shaft.

55. A drive linkage according to any of claims 44 to 54, wherein said at least one output

means comprises a rotatably mounted drum of an appliance such as a washing machine.

56. A laundry appliance having a rotatably mounted drum linked to a rotatable shaft via a drive linkage according to any one of claims 44 to 55, and means for rotating said shaft so as to rotate said drum via said drive linkage.

57. A dispensing system for use in a washing apparatus, the system comprising at least one reservoir for holding a number of doses of a washing substance, regulating means for selectively opening said reservoir to release a pre-determined quantity of said washing substance held therein in response to a control signal, said control signal defining said predetermined quantity and causing said regulating means to open said reservoir for a period of time sufficient to release said predetermined quantity of said washing substance.

58. A dispensing system according to claim 57, further comprising means to determine the weight of the contents of the drum, such that said predetermined quantity of washing substance is calculated based on said weight of the contents of the drum.

59. A dispensing system according to either of claim 57 or claim 58, comprising a plurality of reservoirs, for holding respective different types of washing substance.

60. A dispensing system according to any of claims 57 to 59, wherein said regulating means comprises a valve, the state of which is actuated by a control signal.

61. A dispensing system according to claim 59, wherein said regulating means comprises a plurality of valves, the state of which are actuated by a control signal.

62. A dispensing system according to any of claims 57 to 61, wherein said control signal is generated by a control program.

63. A dispensing system according to any of claims 57 to 61, wherein said at least one reservoir is supplied with a pump for pumping a washing substance from within said

reservoir to said regulating means.

64. A dispensing system according to claim 63, wherein said pump is controlled by a control program.

65. A dispensing system according to claim 64, wherein said control program arranged and configured to control the parameters of a cycle of said washing apparatus, said parameters being at least partially definitive of said predetermined quantity of said washing substance.

66. A dispensing system according to any of claims 57 to 65, wherein said at least one reservoir has a re-sealable hatch, for allowing the ingress of liquid.

67. A dispensing system according to any of claims 57 to 65, wherein said at least one reservoir is removable and/or replaceable, to allow for cleaning of said reservoir.

68. A dispensing system according to claim 67, wherein said at least one reservoir comprises a valve arranged and configured to prevent release of washing substance when remote from said system.

69. A dispensing system according to any of claims 57 to 64, wherein said at least one reservoir is disposable and may be removed and discarded, to be replaced by a further disposable reservoir.

70. A dispensing system according to any of claims 67 to 69, wherein said at least one reservoir may be removed from a receiving aperture on the face of a washing machine defining an aperture for receiving laundry.

71. A dispensing system according to any of claims 62 or 63 further comprising a receptacle for receiving a washing substance, said receptacle being in fluidic communication with said reservoir and said pump.

72. A washing machine having a receptacle for receiving a load of laundry and a

dispensing system as defined in any of claims 57 to 71, wherein means are provided for causing said predetermined quantity of said washing substance released from said reservoir to be introduced into said receptacle.

73. A washing substance reservoir according to any of claims 67 to 70 for use in a washing machine.

74. A washing substance reservoir according to any of claims 67 to 70 for use in a dishwasher.

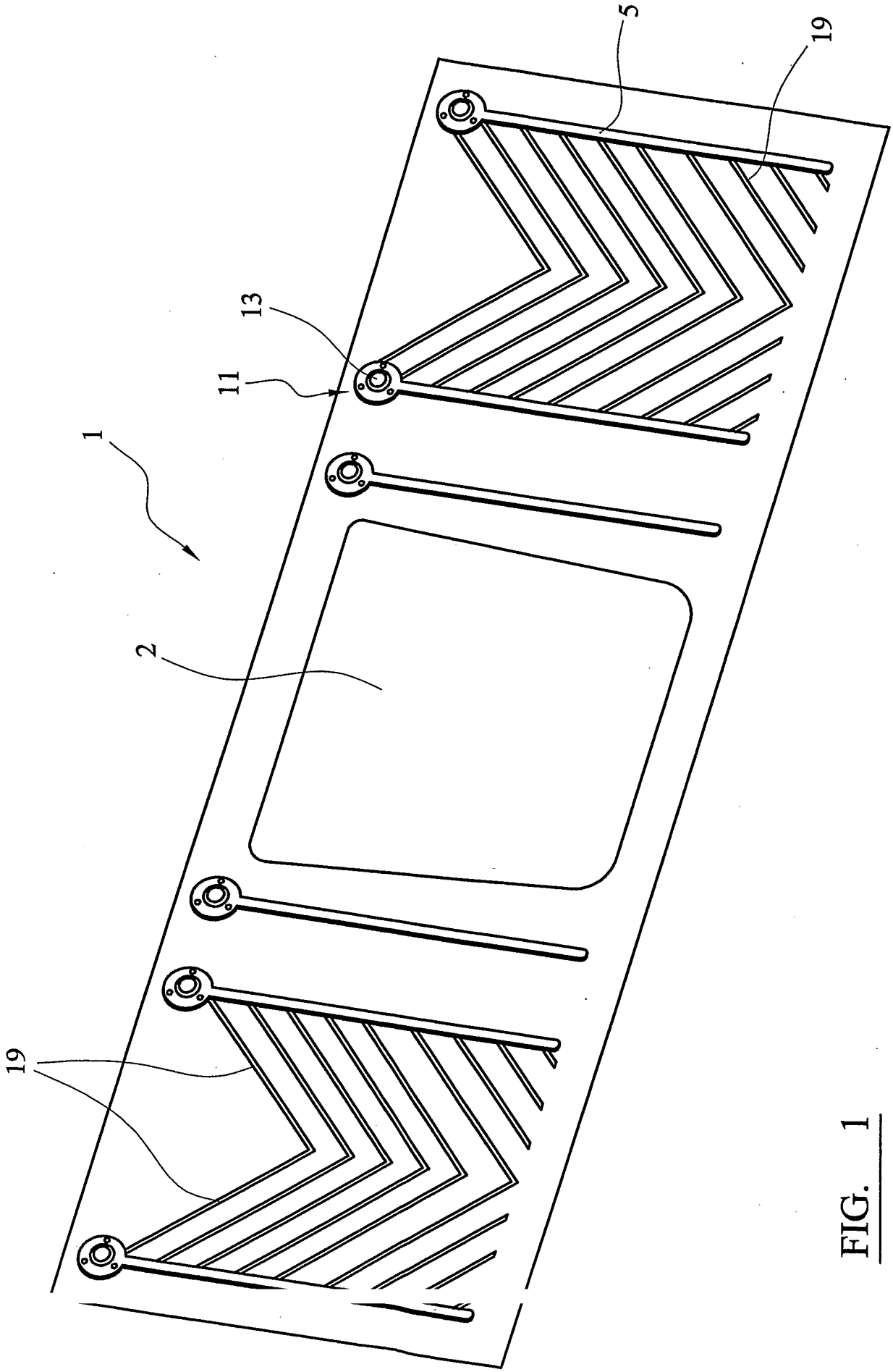


FIG. 1

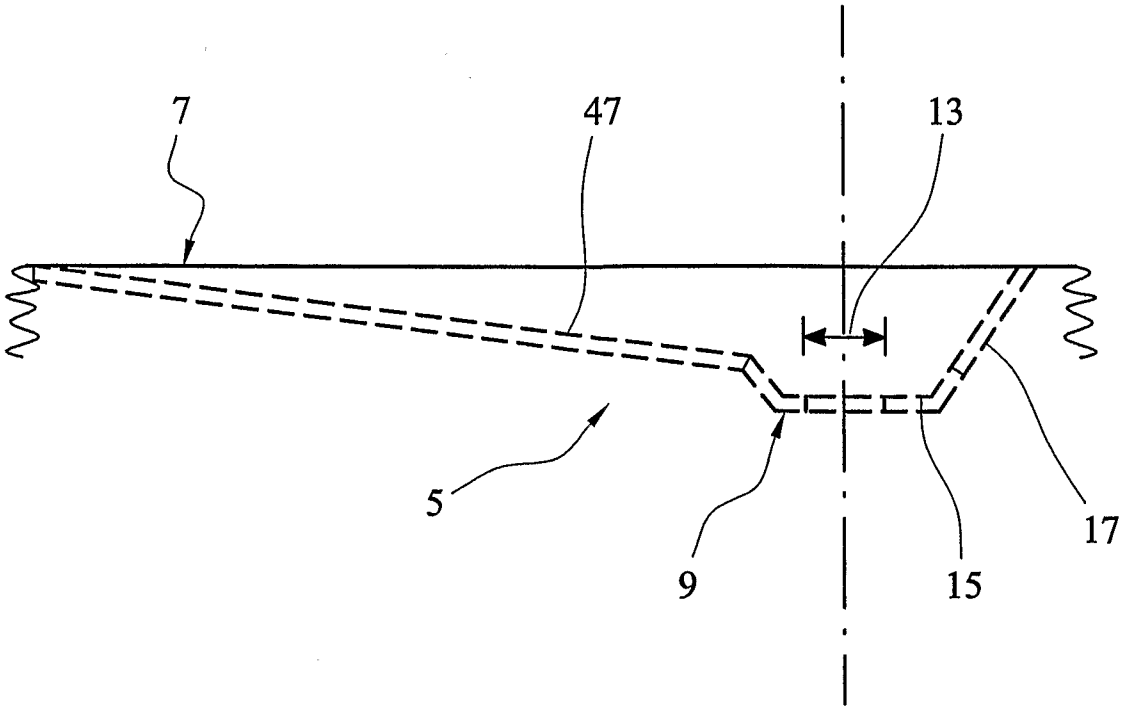


FIG. 2a

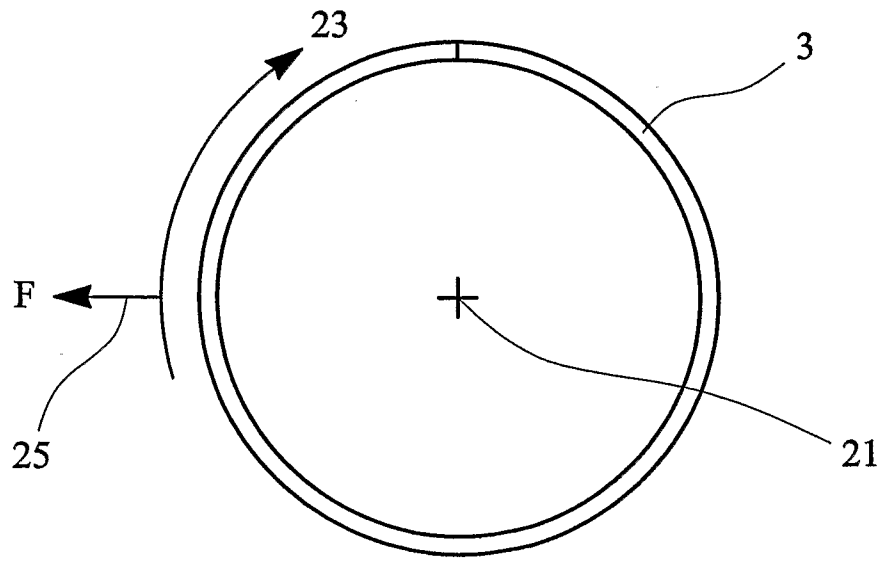


FIG. 2b

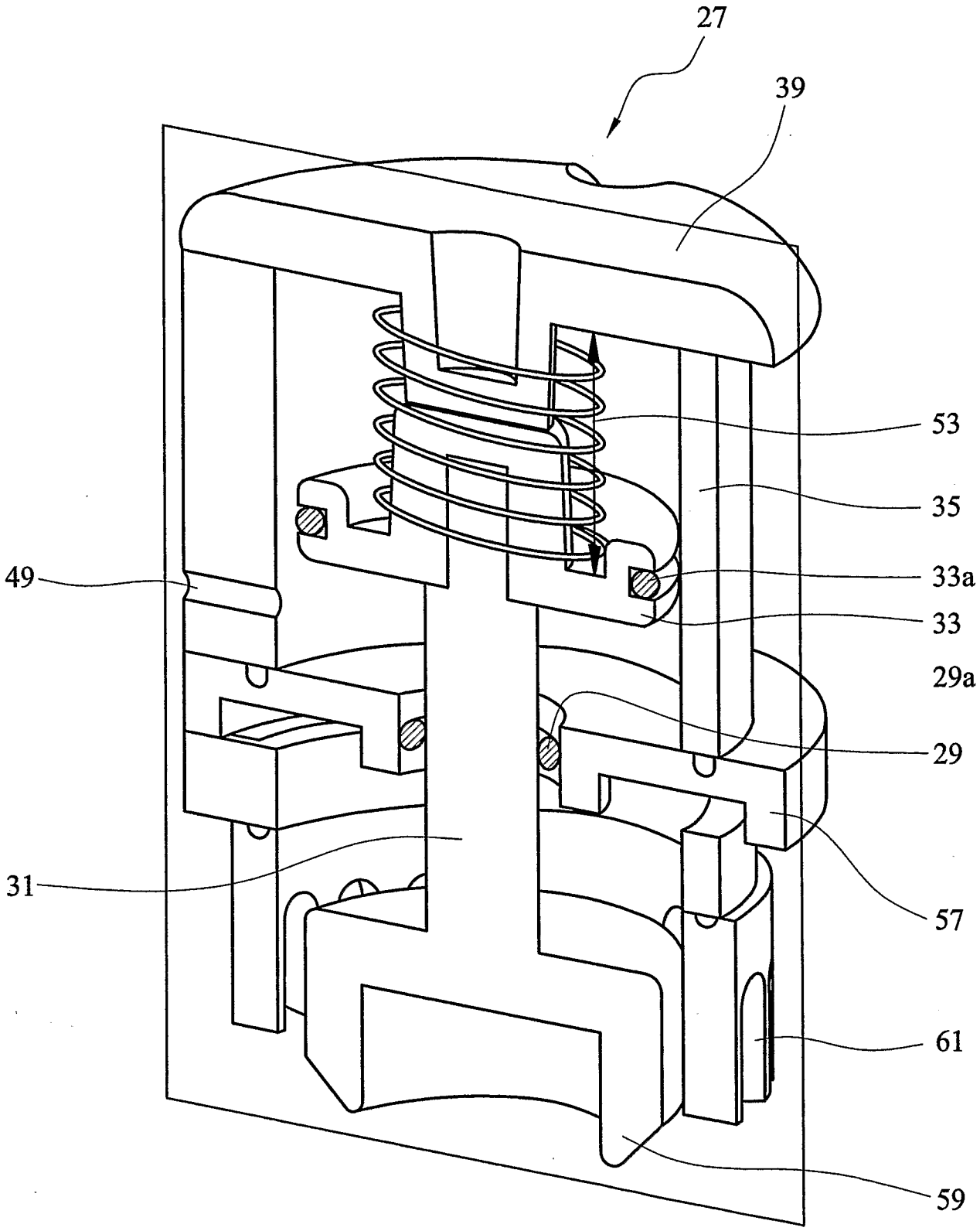


FIG. 3

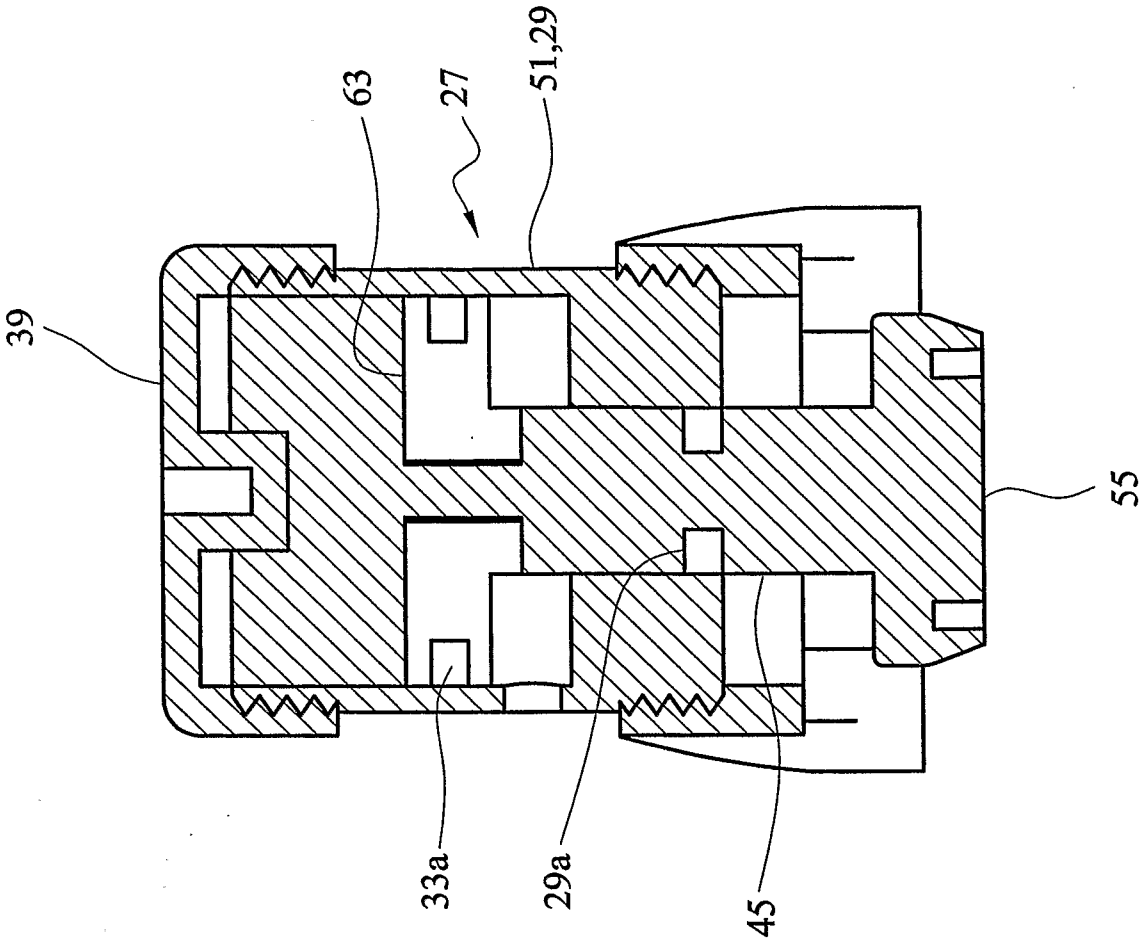


FIG. 4b

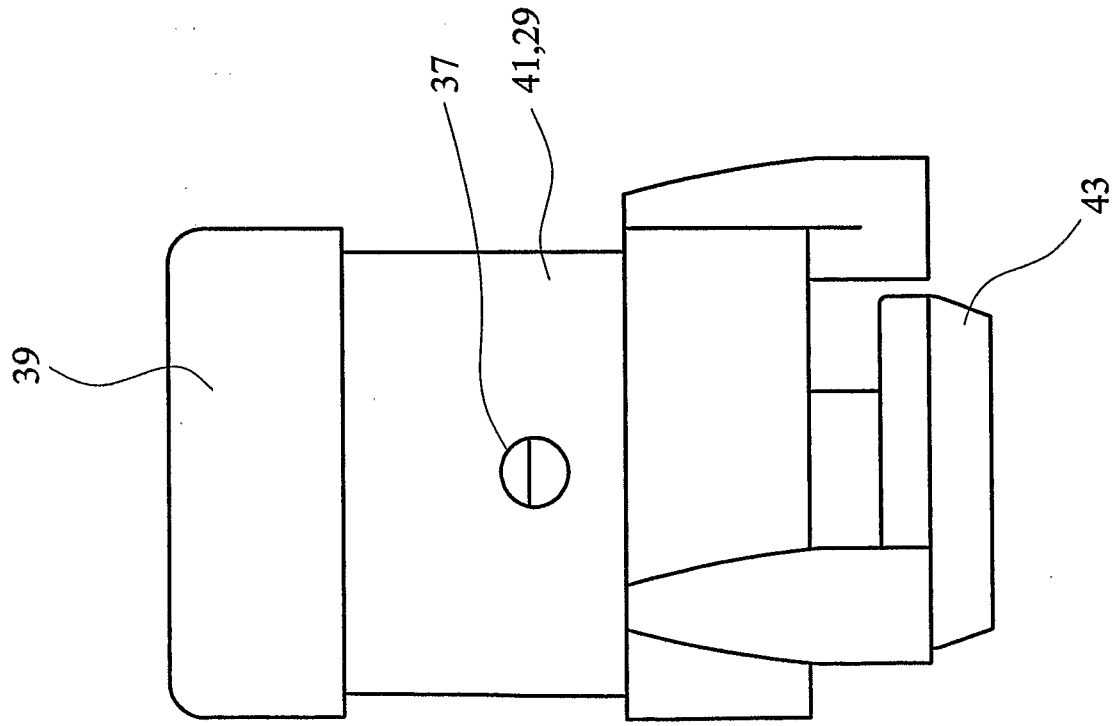


FIG. 4a

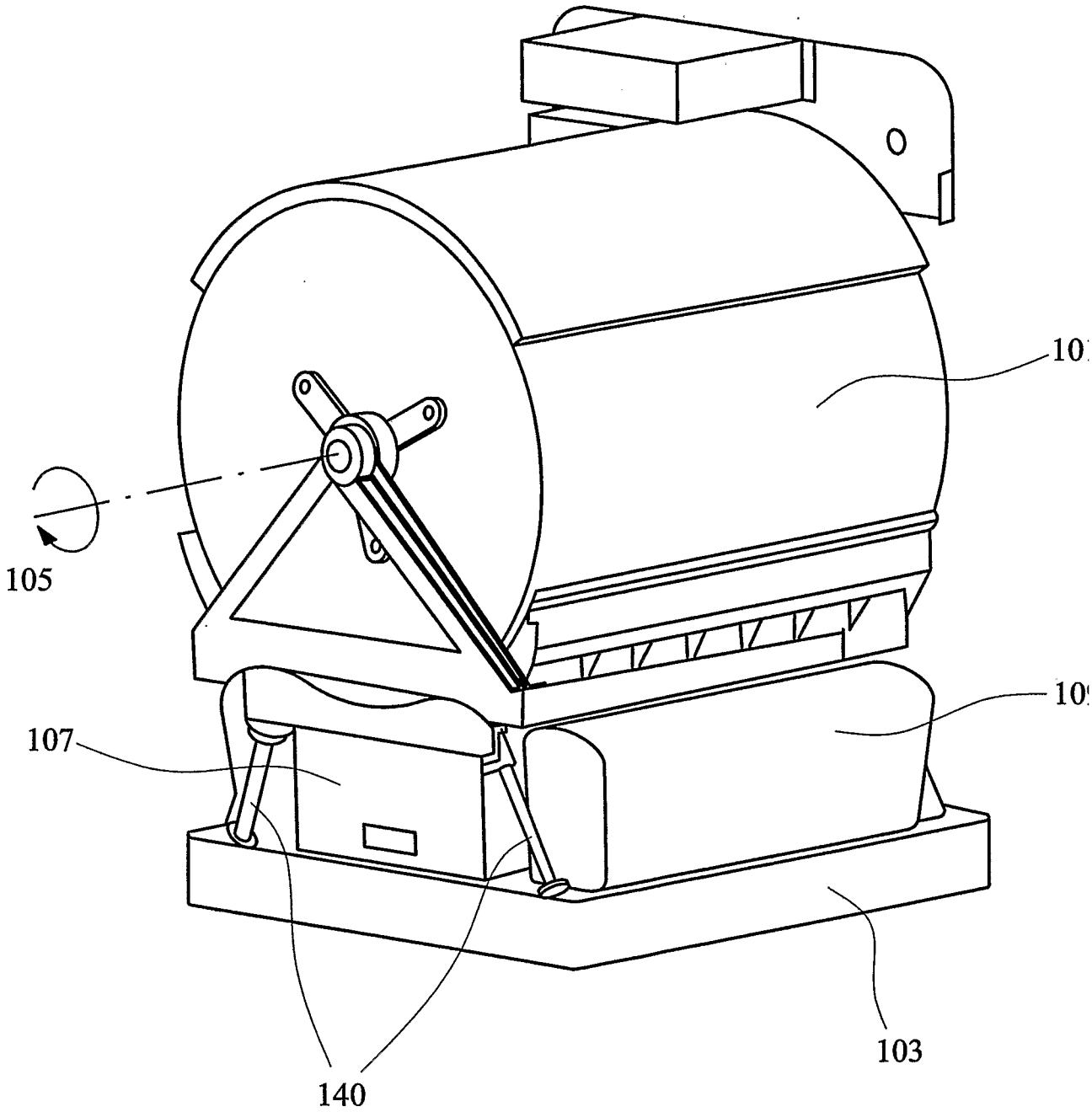


FIG. 5

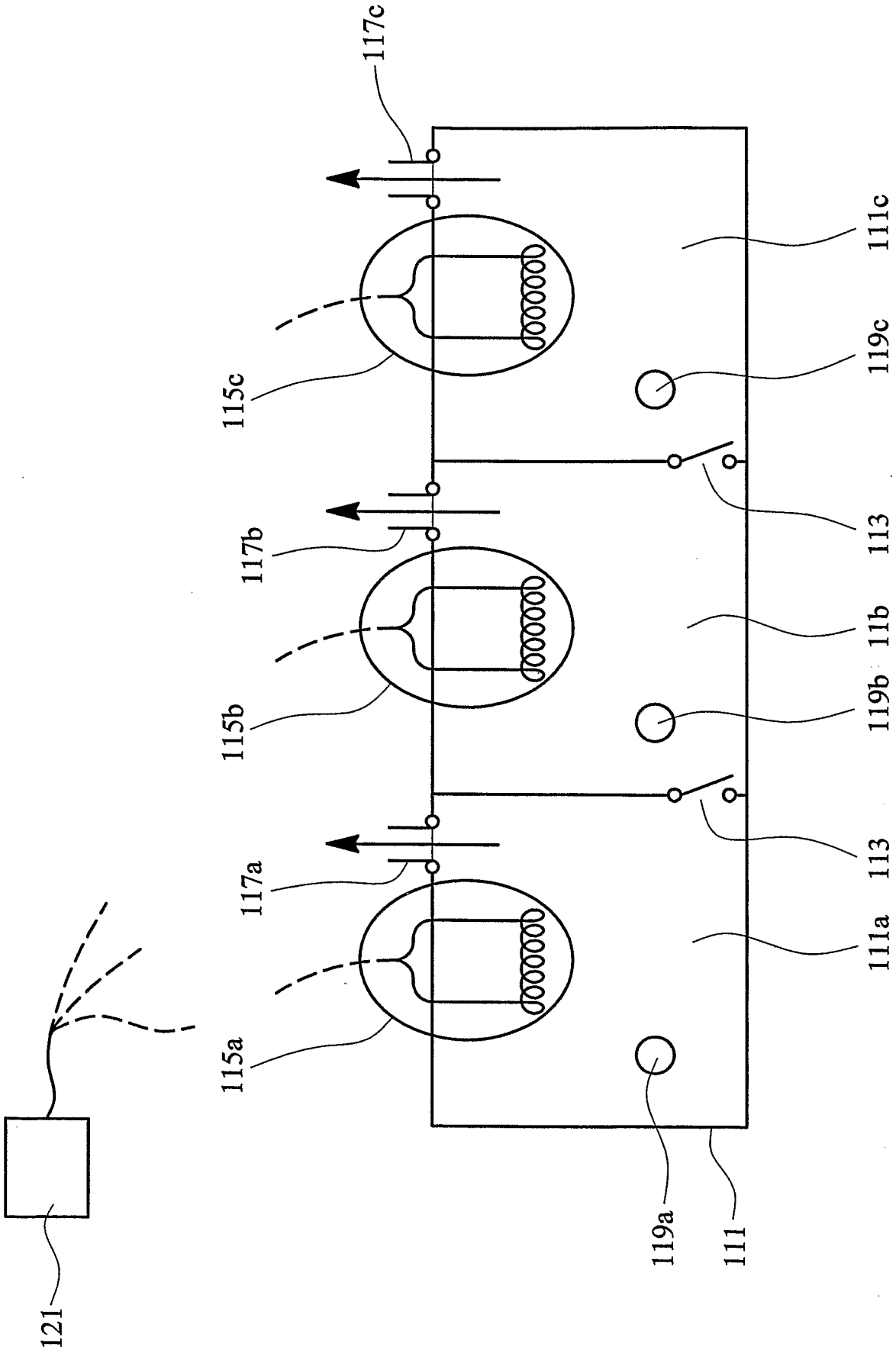

117c
115c
111c
119c
113
117b
115b
11b
119b
113
117a
111a
115a
119a
111
121

FIG. 6

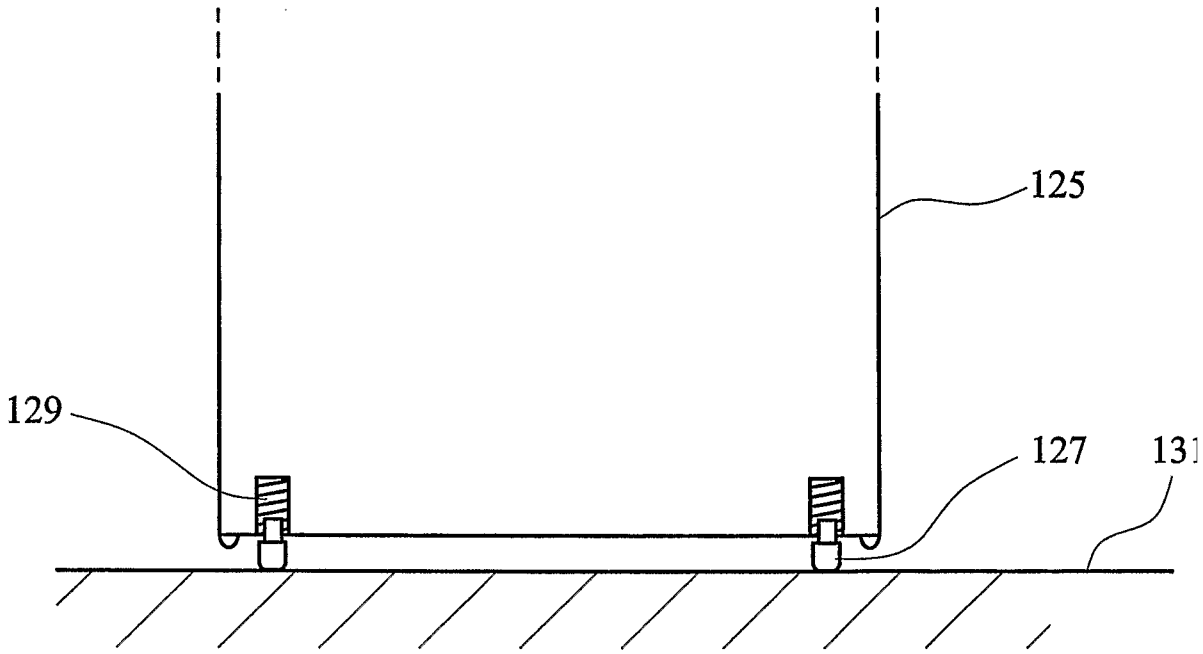


FIG. 7a

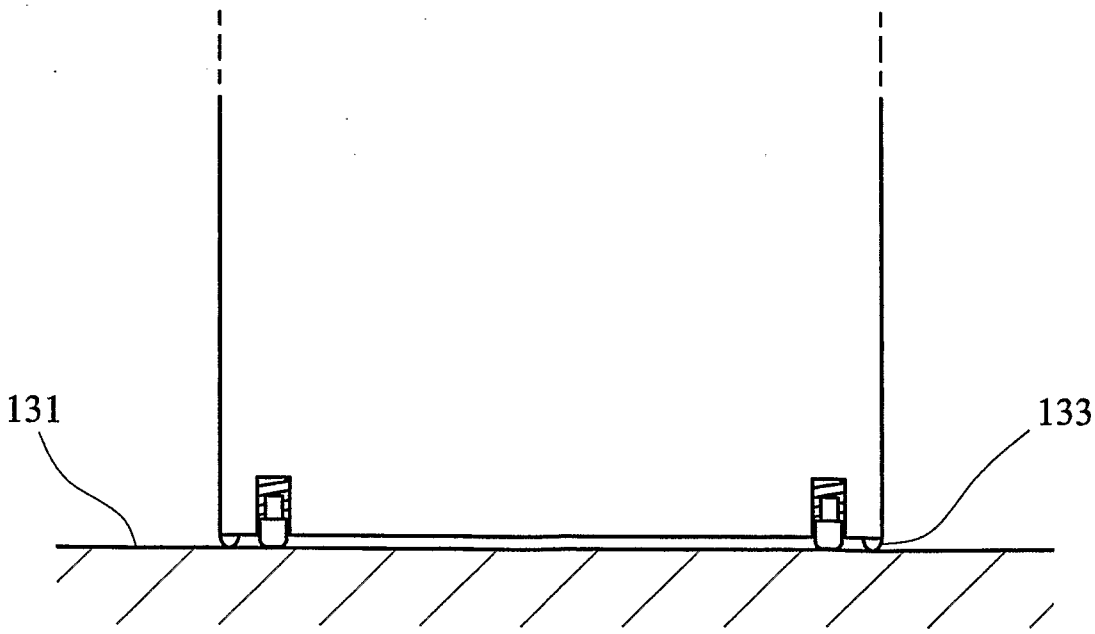


FIG. 7b

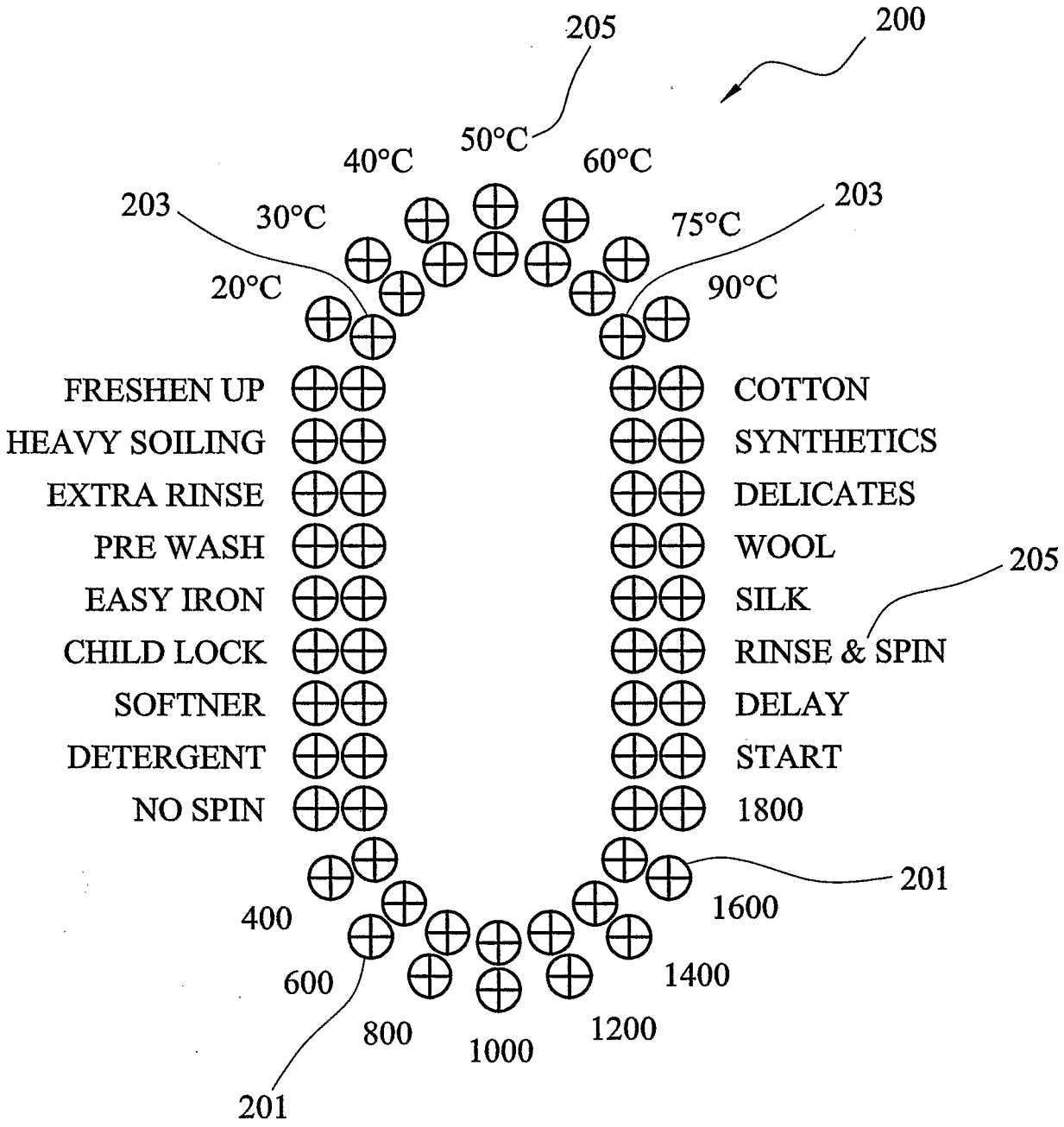

205
200
50°C
40°C
60°C
203
30°C
75°C
203
20°C
90°C
FRESHEN UP
HEAVY SOILING
EXTRA RINSE
PRE WASH
EASY IRON
CHILD LOCK
SOFTNER
DETERGENT
NO SPIN
COTTON
SYNTHETICS
DELICATES
WOOL
SILK
RINSE & SPIN
DELAY
START
1800
205
201
1600
400
600
1400
800
1000
1200
201

FIG. 8

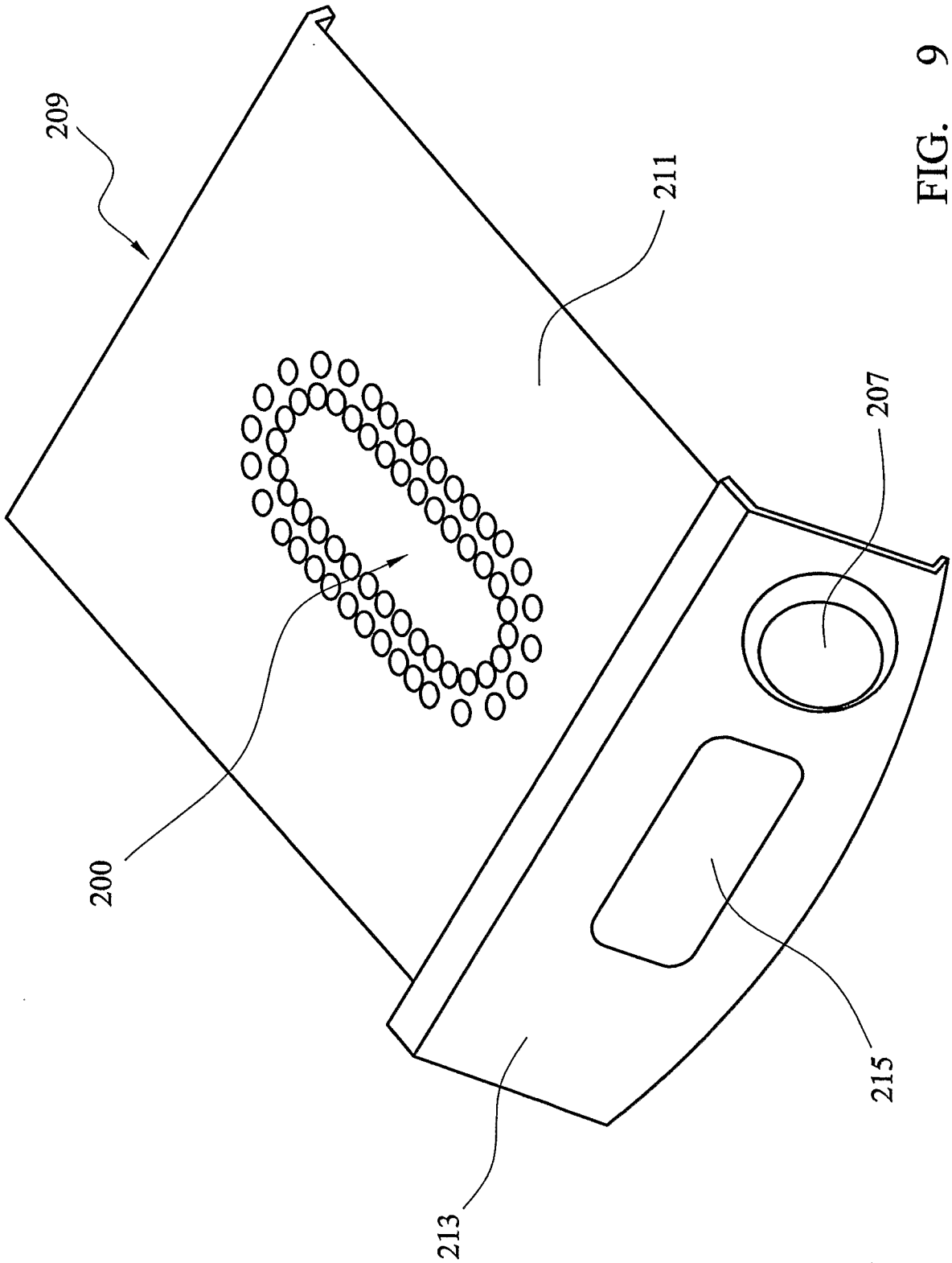


FIG. 9

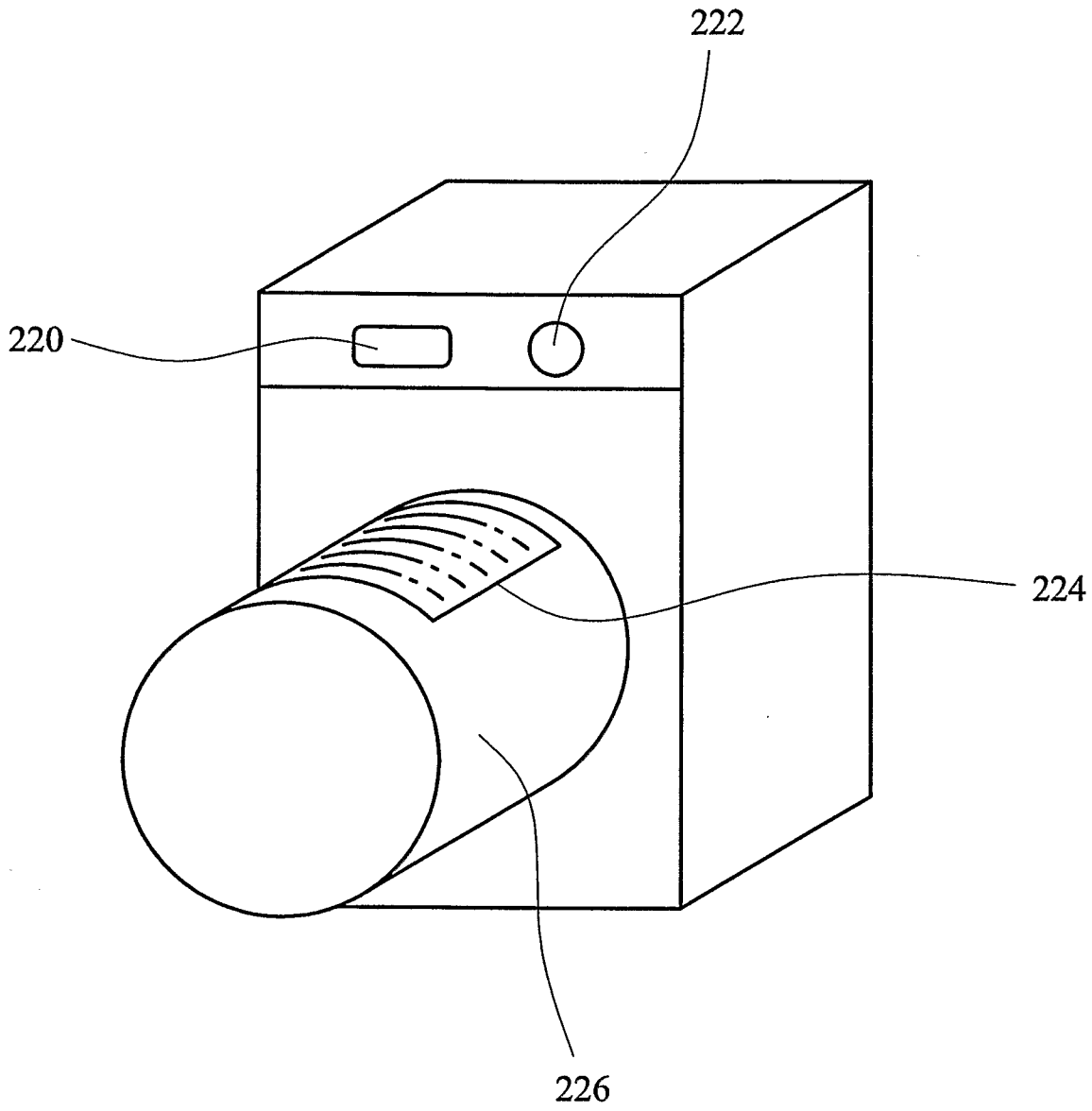


FIG. 10

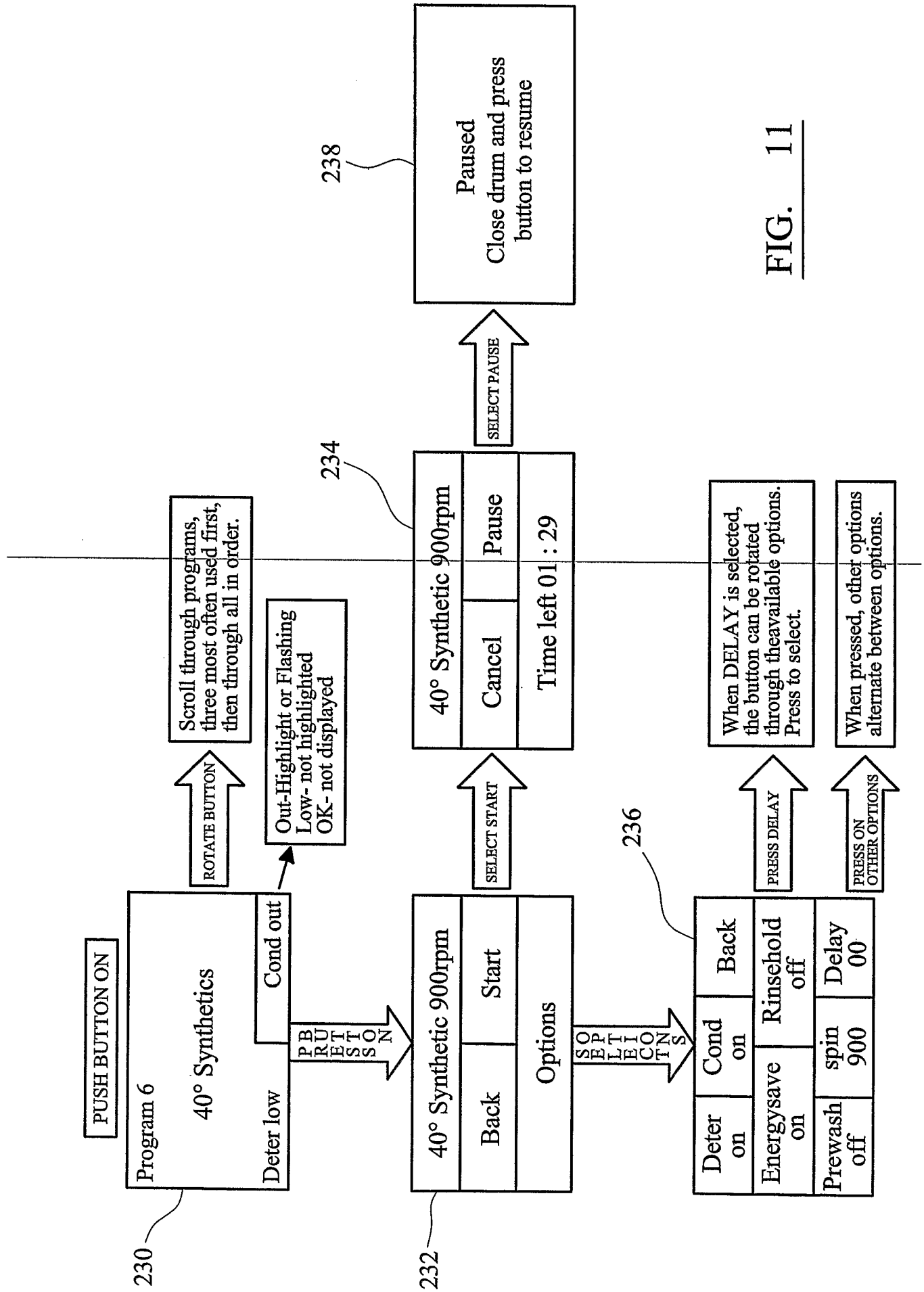

PUSH BUTTON ON
Program 6
40° Synthetics
Deter low
Cond out
230
ROTATE BUTTON
Scroll through programs, three most often used first, then through all in order.
Out-Highlight or Flashing
Low- not highlighted
OK- not displayed
PUSH BUTTON
40° Synthetic 900rpm
Back
Start
Options
232
SELECT START
234
40° Synthetic 900rpm
Cancel
Pause
Time left 01 : 29
SELECT PAUSE
238
Paused
Close drum and press button to resume
SELECTIONS
236
Deter on
Cond on
Back
Energysave on
Rinsehold off
Prewash off
spin 900
Delay 00
PRESS DELAY
When DELAY is selected, the button can be rotated through theavailable options. Press to select.
PRESS ON OTHER OPTIONS
When pressed, other options alternate between options.

FIG. 11

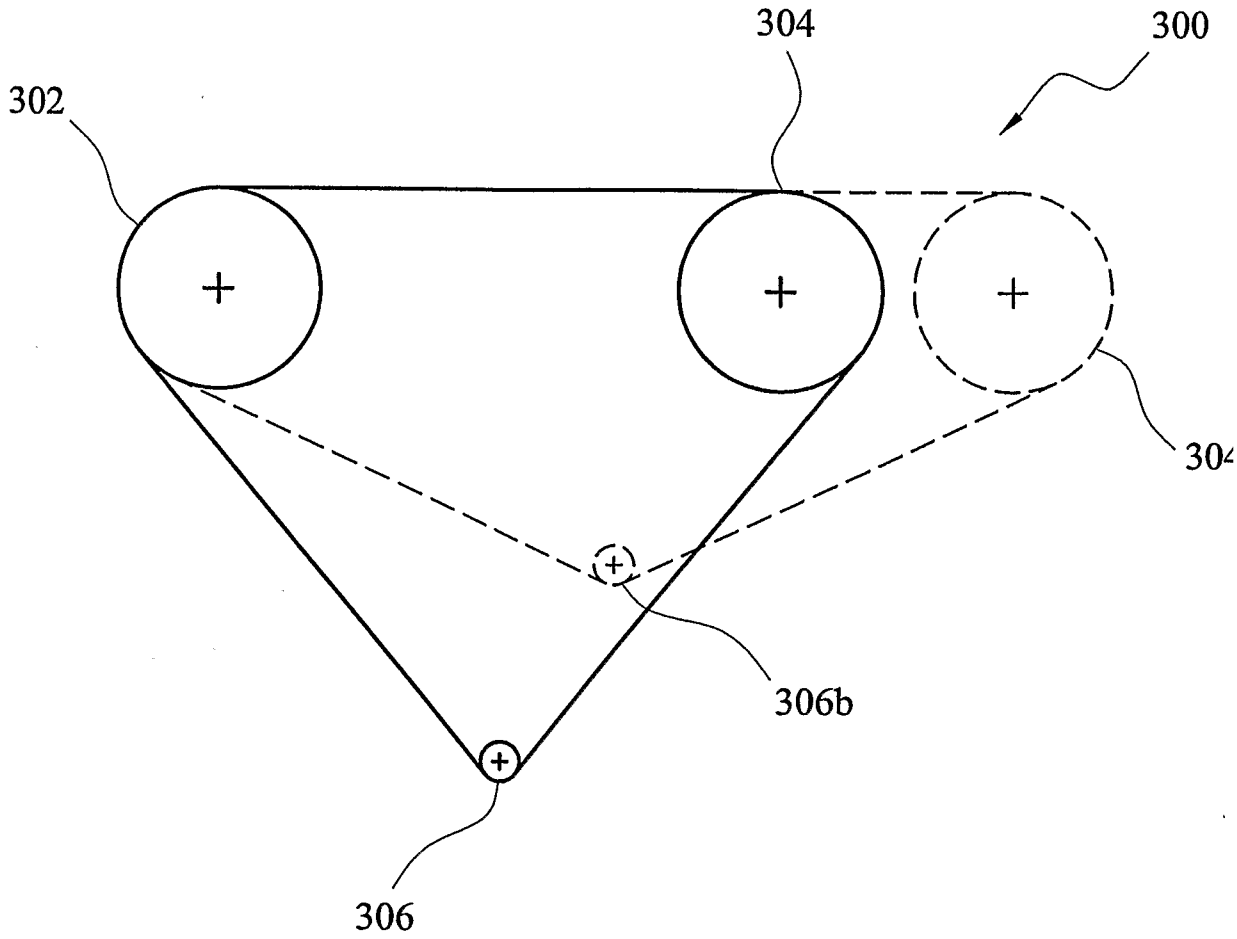


FIG. 12

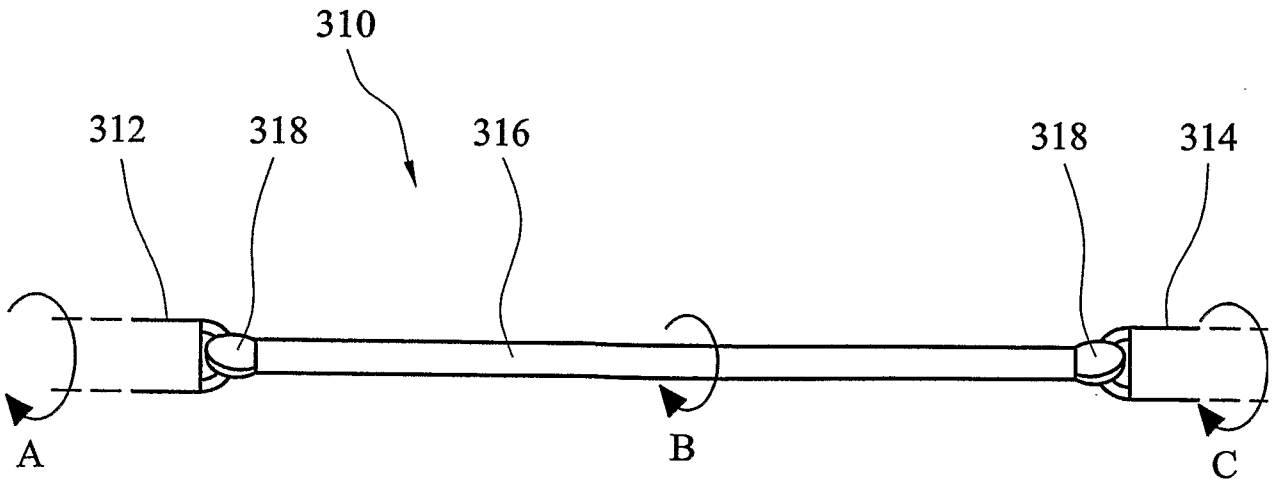


FIG. 13

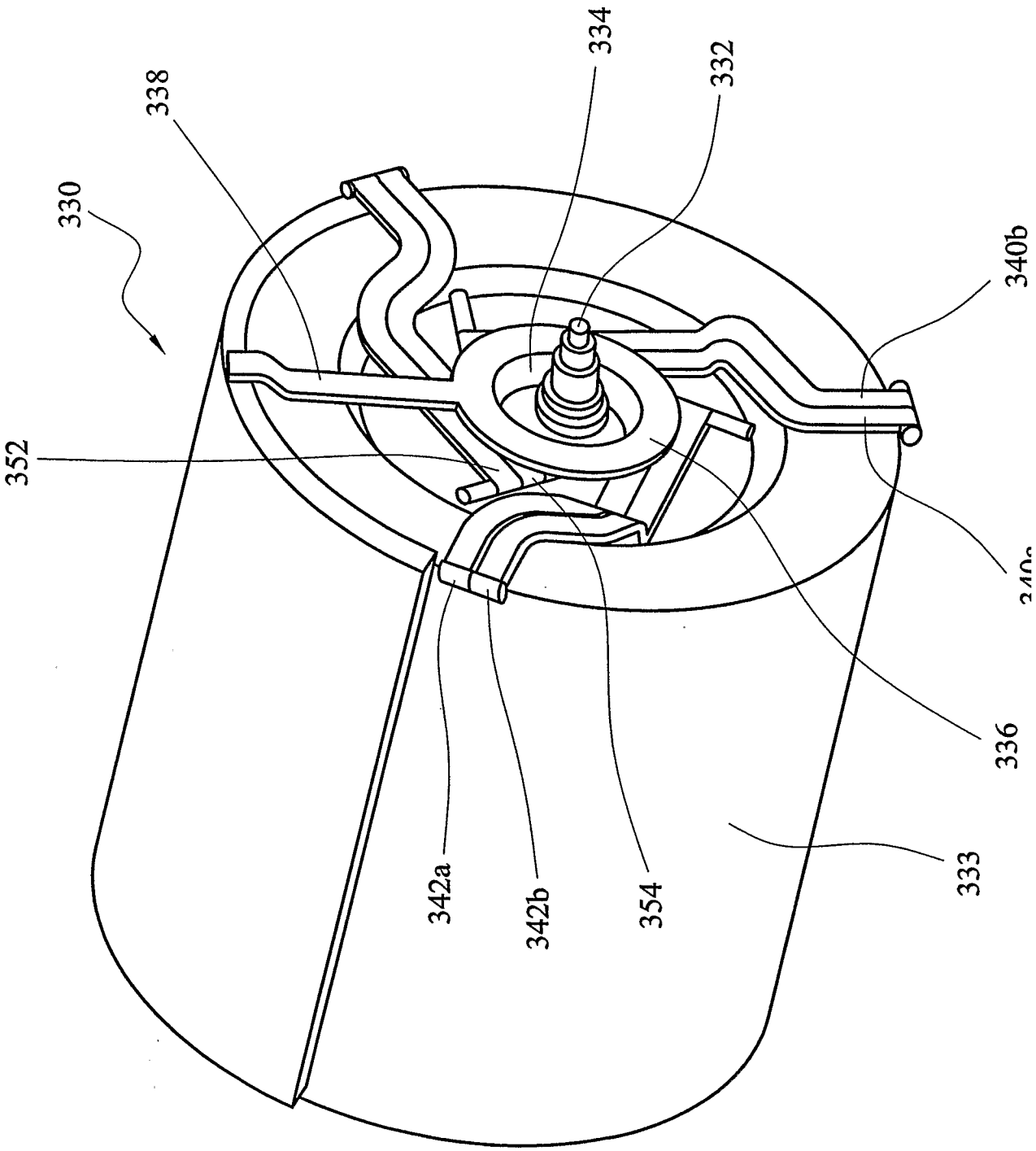


FIG. 14

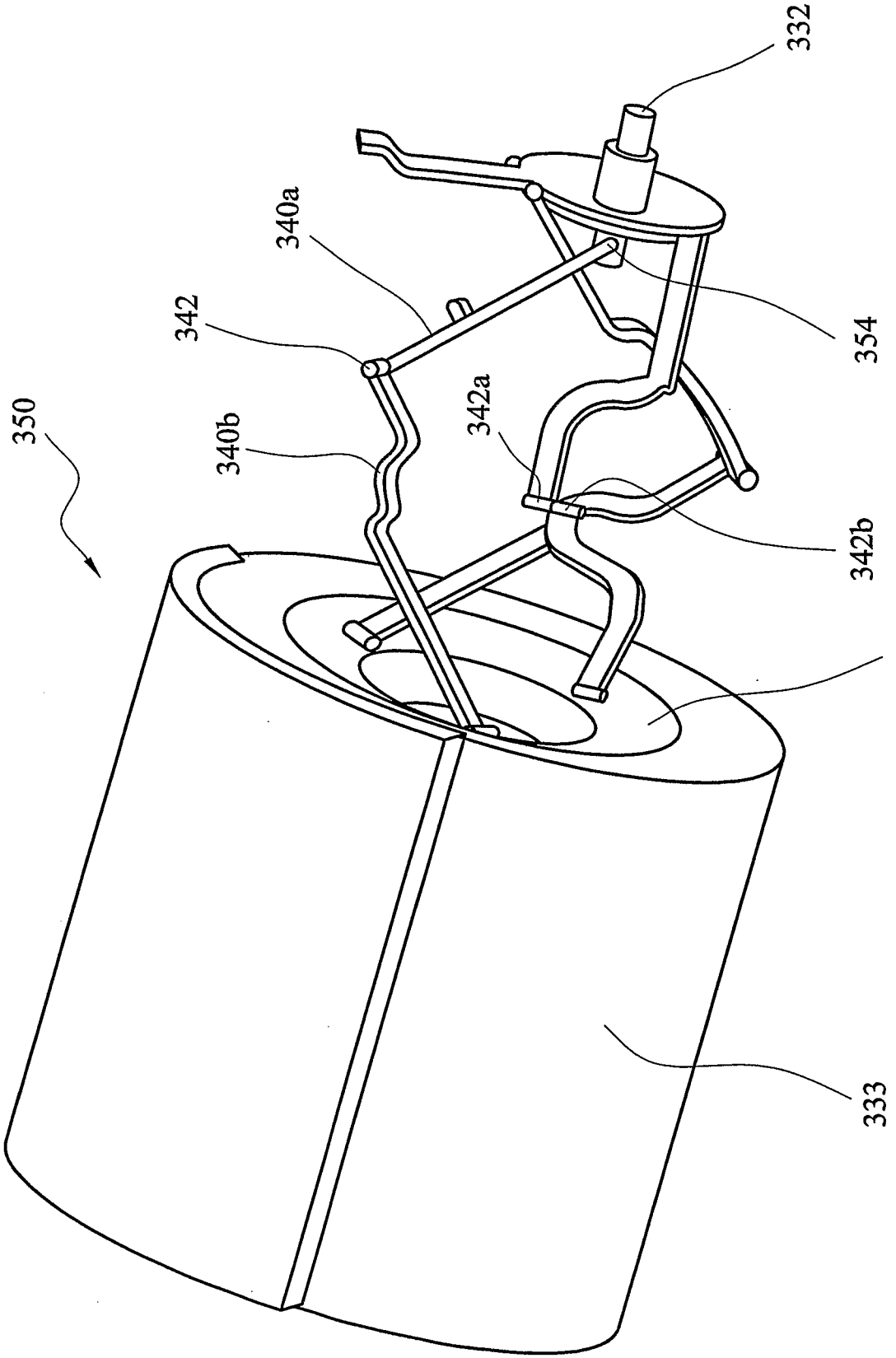


FIG. 15

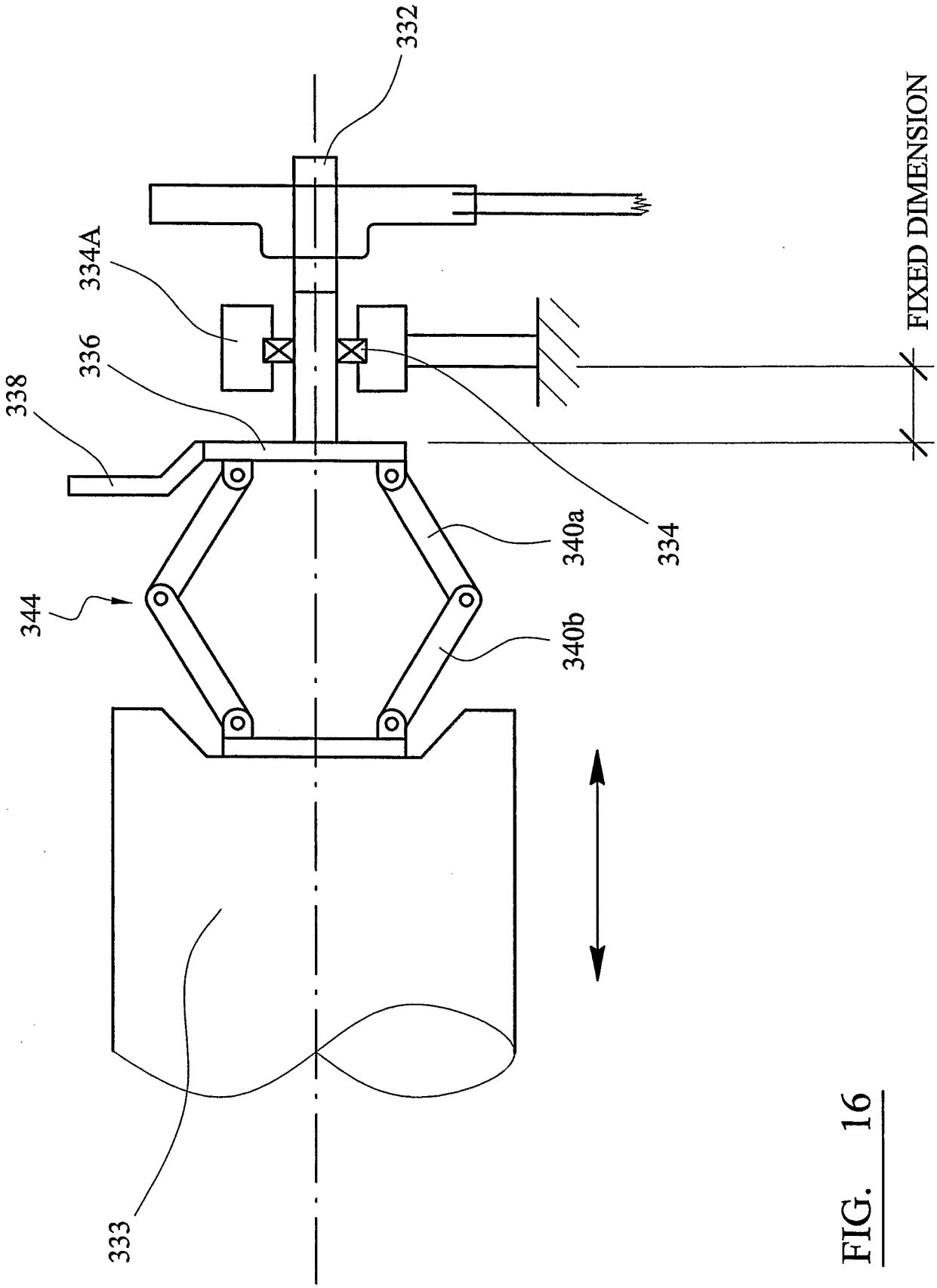


FIG. 16

FIG. 17

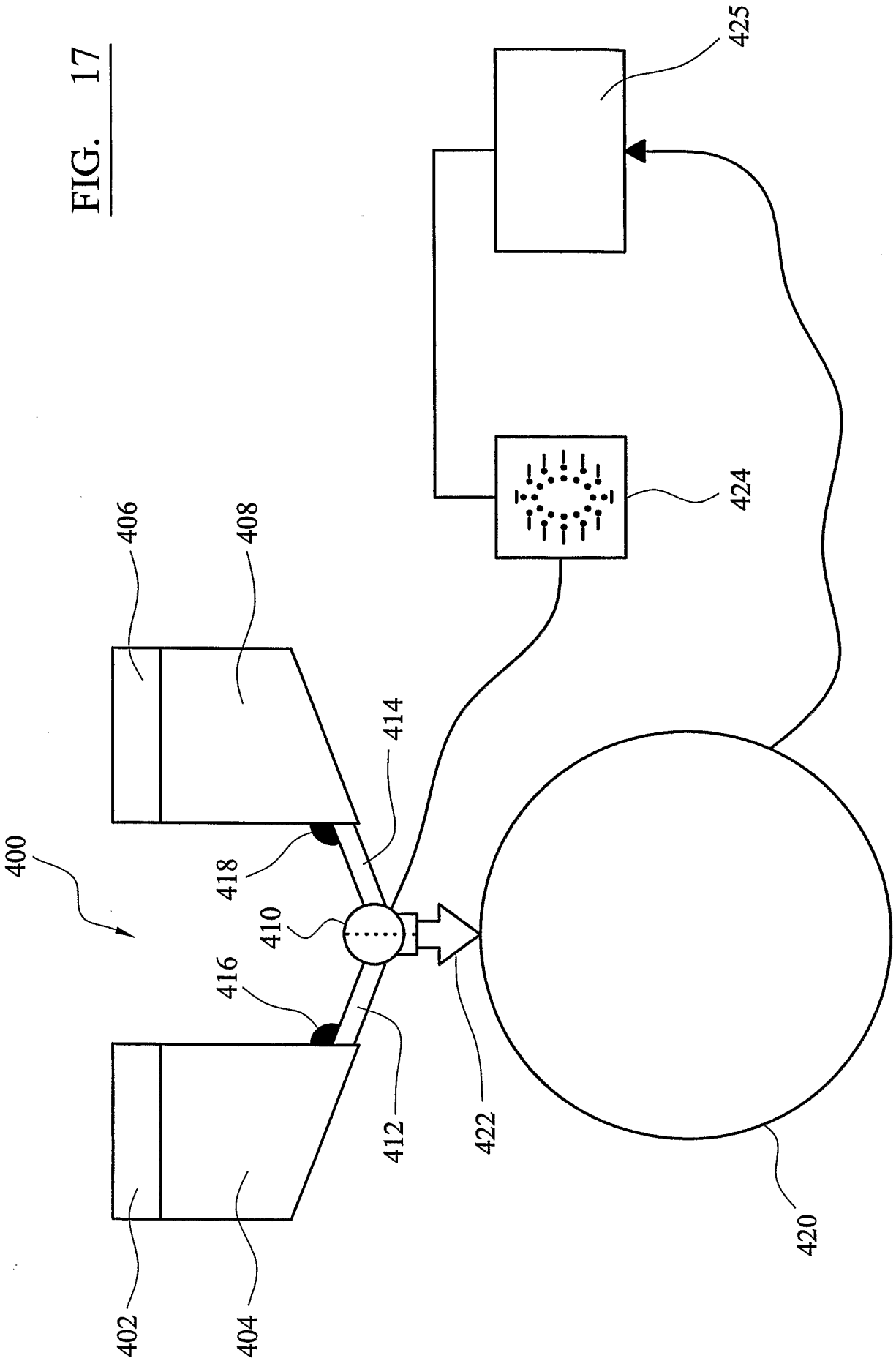


FIG. 18

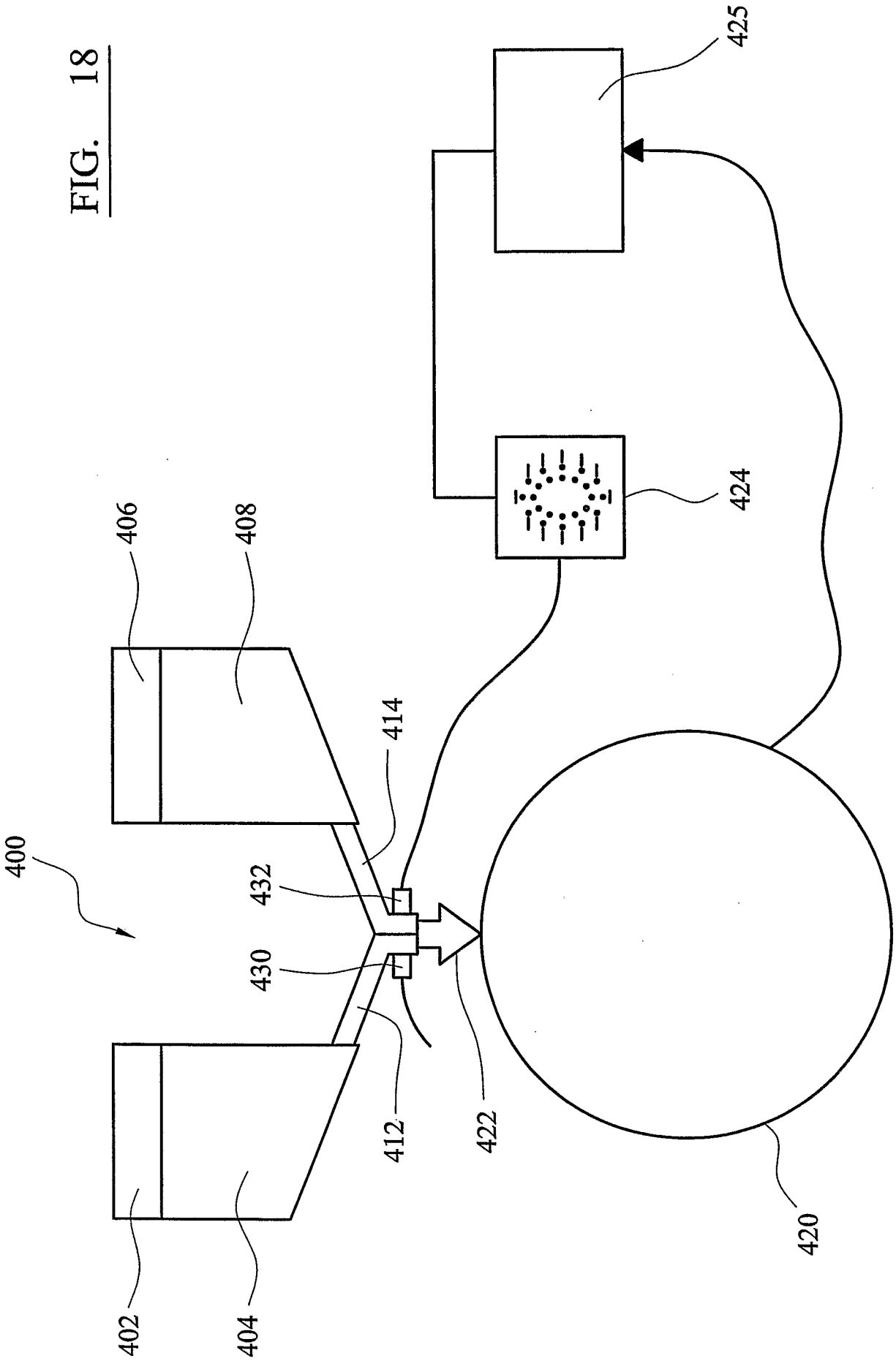


FIG. 19

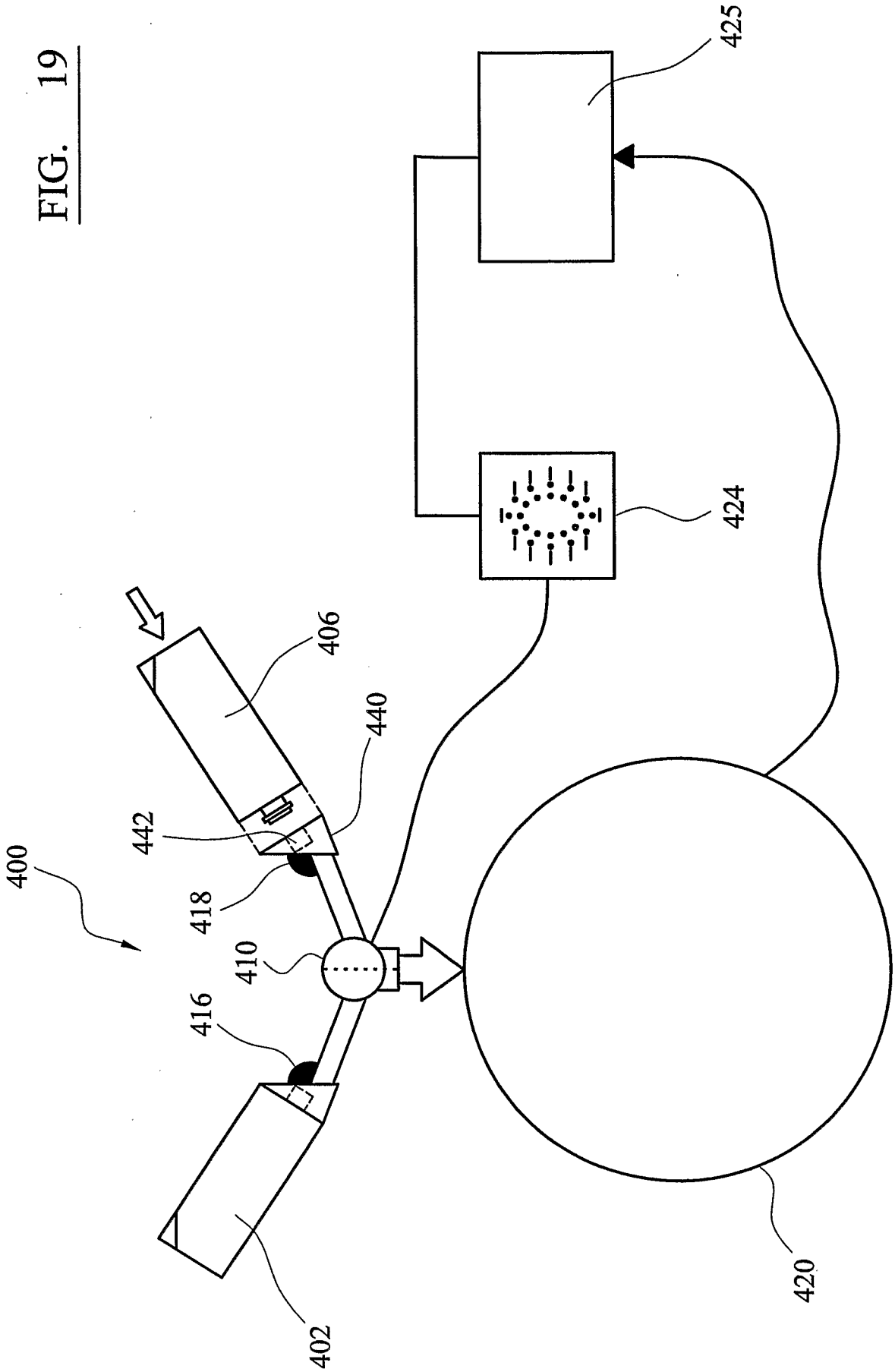


FIG. 20

