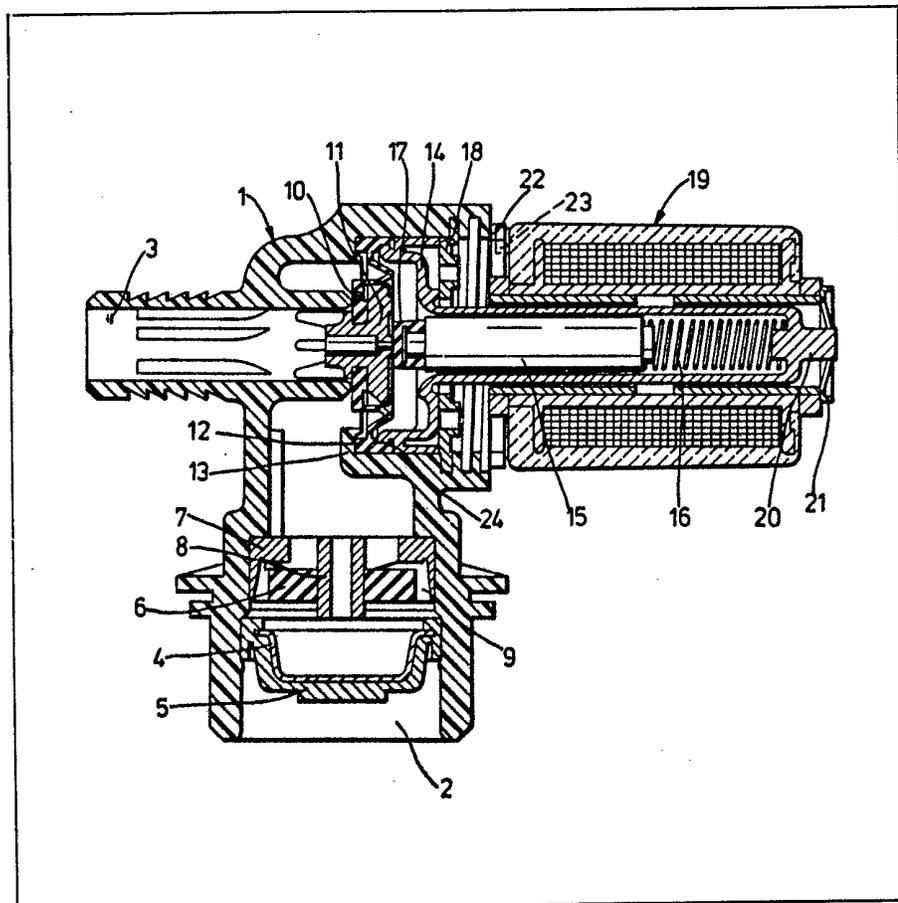


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(54) **Electrically operated valve**

(57) An electrically operated valve for clothes washing and dish washing machines comprises a body 1 which is provided with water intake and discharge connections 2, 3 and a seat for a diaphragm closure member 10, and a solenoid 19 capable of controlling the closure member by means of a movable system, the

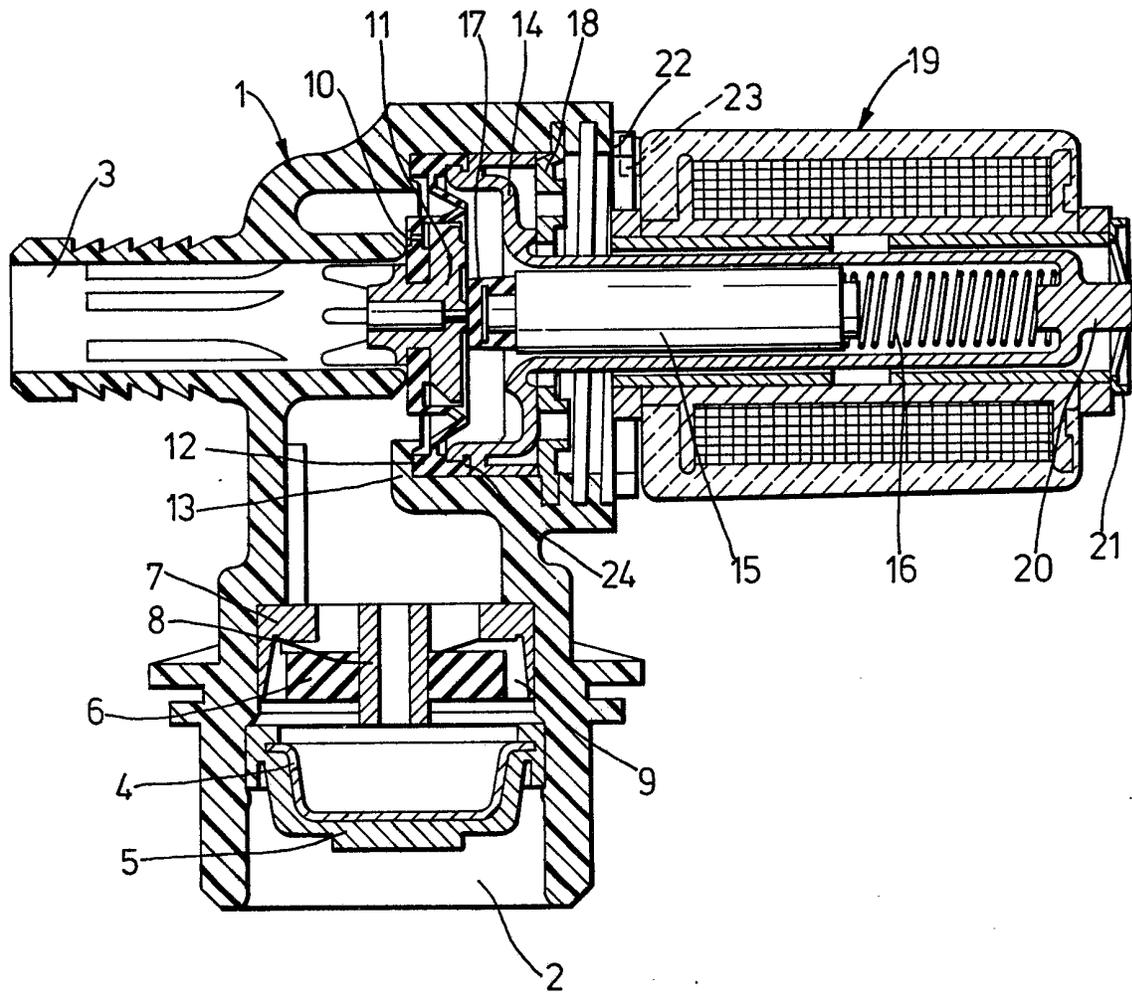
closure member being mounted on a hollow member (14) in a single functional unit which encloses the movable system (15, 16, 17), said functional unit being fixed to the body (1) of the valve by means of a ring (18) which is screwed in an internal screw-threaded portion of the body to clamp the peripheries of the member 14 and the diaphragm 10 against the valve body.



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SPECIFICATION

Electrically operated valve

The present invention relates to an improved electrically operated valve.

5 Electrically operated valves of known type for use in clothes washing and dish washing machines comprise a valve body which is provided with connections for the intake and discharge of water, a flow regulating member, and a solenoid which is controlled by the programmer of the machine, for actuating the flow regulating member, by way of a suitable movable member.

The flow regulating member comprises a diaphragm, generally of rubber, which opens and closes the passage for the water between the intake orifice and the discharge orifice of the electrically operated valve.

The technical problems of the electrically operated valves of this type are mainly those of ensuring reliable and sealed separation of the hydraulic part with respect to the electrical part, and facilitating assembly and dismantling of the components.

In a known electrically operated valve, the glass-shaped member which holds the diaphragm in position is welded to the body of the valve, with the disadvantage that this makes the diaphragm irrecoverable in the event of damage or rupture.

In another known electrically operated valve, the electrical part is fixed to the hydraulic part by means of screws, which suffers from the disadvantage of making assembly and dismantling difficult, while also increasing the transverse dimension of the valve.

35 According to the present invention, there is provided an electrically operated valve comprising a body which is provided with water intake and discharge connections and a seat for a diaphragm closure member, and a solenoid capable of controlling the closure member by means of a movable system wherein the closure member is mounted on a glass-shaped member in a single functional unit comprising the closure diaphragm with associated support means and the movable system, said functional unit being fixed to the body of the valve by means of a ring which is threadedly engaged with a portion of the body and is capable of pressing the diaphragm axially against said seat by way of the glass-shaped member against which the ring abuts.

As will be apparent from the following description, the invention can thus provide an electrically operated valve which is more simple from the structural point of view, more efficient from the functional point of view and in particular more convenient to use.

The invention will be further described by way of non-limiting example with reference to the accompanying drawing which is a sectional view of an electrically operated valve according to the invention.

The electrically operated valve is formed by a body 1 of plastics material, which is provided with a water intake connection 2 and a water discharge

65 connection 3.

Housed in the intake connection 2 are a mesh-type filter 4 which is supported and fixed in position by means of a cross member 5, and a capacity regulator formed by a rubber shutter member 6 inserted in a support member 7. The latter has a central boss 8 provided with a through hole, and peripheral apertures 9 which can be closed by the shutter member 6 when an elevated pressure of the water supplied from the water main causes axial movement of the member 6 on the boss 8.

The closure member of the valve comprises a rubber diaphragm 10 which is fixed on a central support means 11 which can be inserted in the discharge connection 3, and provided with an enlarged edge portion 12 capable of sealing against an annular seat 13 within the body 1. The edge portion 12 of the diaphragm 10 is provided with a peripheral lip portion 24 by means of which the diaphragm is fixed to the orifice, which for this purpose is provided with a suitable undercut configuration, of a member 14 which is in the shape of a small glass. Preferably, the member 14 is made of plastics material and it is fixed to the diaphragm 10 before it is inserted in the body 1.

Disposed within the member 14 is a cylinder 15 which is engaged by a compression spring 16 to press against the support means 11 of the diaphragm 10 by way of a rubber plug member 17. The member 14 is secured to the body 1 by means of a metal ring 18 which can be screwed into a suitable screwthread preferably provided within the body 1. The ring 18 bears against the member 14 (being of enlarged section at the mouth opening), which presses axially against the edge portion 12 of the diaphragm 10 which is securely locked in the seat 13 which is suitable for this purpose.

A solenoid coil 19 is fitted on to the member 14 and locked to a stud portion 20 which is disposed on the outside end thereof, by means of a resilient rosette-type washer.

Another advantageous feature of the electrically operated valve according to the invention is that the body 1, on the edge portion which faces towards the coil 19, is provided with reference teeth 22 which permit positioning of the coil 19 (which in turn is provided with teeth 23 co-operating with the teeth 22) in different, precise angular positions, according to varying assembly requirements. This possibility is also facilitated by the construction of the electrically operated valve according to the invention, which eliminates the size and complication of the screws required in the previously known electrically operated valves.

The foregoing description shows how the illustrated electrically operated valve is simple and convenient to use.

Indeed, the valve may be easily assembled and dismantled by acting on only two components (the member 21 and the ring 18) without particular equipment or skills.

Disengagement of the resilient member 21 permits the coil 19 to be removed, for possible

replacement thereof, without touching the hydraulic part of the valve.

- Subsequent unscrewing of the ring 18, by simple axial pressure and rotation, permits removal of the assembly comprising the glass-shaped member 14 (with all the components contained therein) and the diaphragm 10 (with its support means 11). In practice therefore, the electrically operated valve is formed by only three components (body 1, coil 19 and the assembly comprising the member 14 and the diaphragm 10) with only two fixing components (ring 18 and resilient member 21).

CLAIMS

- 15 1. An electrically operated valve comprising a body which is provided with water intake and discharge connections and a seat for a diaphragm closure member, and a solenoid capable of controlling the closure member by means of a movable system wherein the closure member is mounted on a glass-shaped member in a single functional unit comprising the closure diaphragm with associated support means and the movable
- 25 system, said functional unit being fixed to the body of the valve by means of a ring which is threadedly engaged with a portion of the body and is capable of pressing the diaphragm axially against said seat by way of the glass-shaped member against which the ring abuts.
- 30 2. A valve according to Claim 1 wherein the diaphragm is provided with a lip co-operating with an undercut configuration of the glass-shaped member for fixing the diaphragm thereto, thereby to form said unitary functional unit before
- 35 insertion thereof into the body of the valve.
- 40 3. A valve according to Claim 1 or 2 wherein the body is provided with reference teeth capable of co-operating with associated teeth with which the solenoid is provided, thereby to permit
- 45 positioning of the solenoid in various, precise angular positions.
4. An electrically operated valve constructed and arranged to operate substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.
5. A clothes washing or dish washing machine incorporating a valve according to any one of the preceding claims.