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(54) **An improved waterstop device**

(57) A waterstop device for a domestic electrical appliance includes: a solenoid valve with a body (10), an intake duct (12) and an outlet duct (14), an inner hose (16) for water to flow through, having a proximal end (18) fitted onto the outlet duct (14), and an outer hose (20) arranged so as to envelope the inner hose (16) and form an annular space (22) between the inner hose (16) and

outer hose (20) with at least one electric cable (24) housed therein, leading to the body (10) of the solenoid valve. In addition, a covering of plastics material envelops the body (10) of the solenoid valve and the proximal end (18) of the inner hose (16), thereby ensuring that the inner hose (16) is secured to the outlet duct (14) of the solenoid valve.

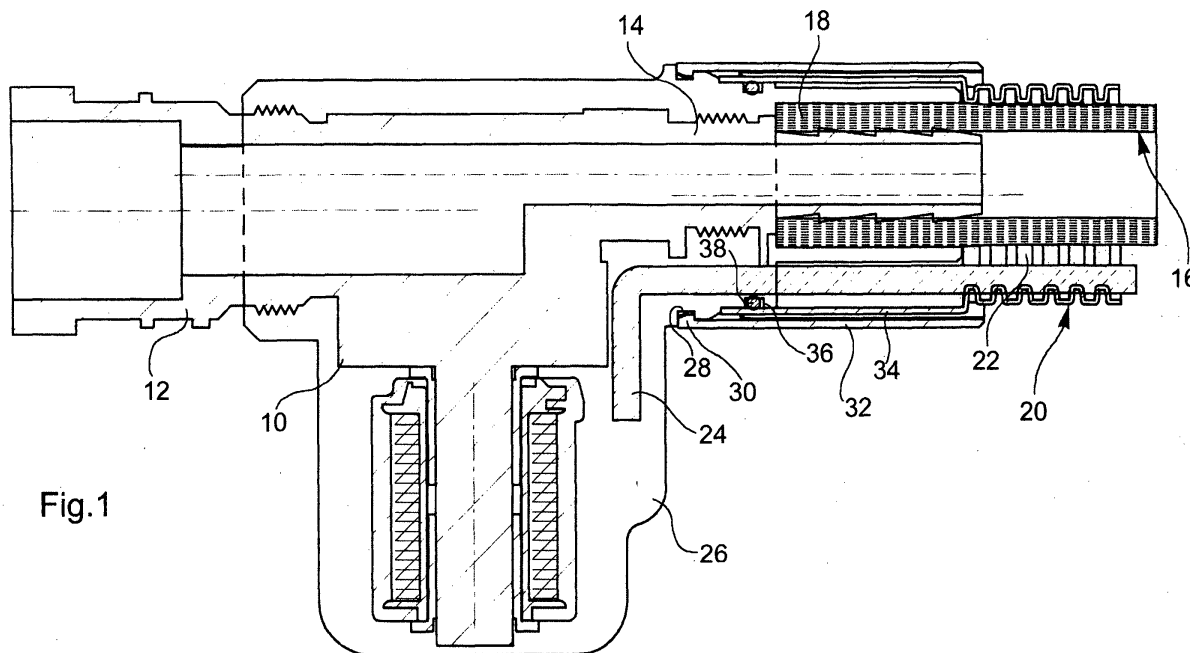


Fig.1

Description

[0001] The present invention relates to a waterstop device for a domestic electric appliance, such as a dishwasher or a washing machine.

[0002] In more detail, an waterstop device includes: a solenoid valve with a body, an intake duct and an outlet duct, an inner hose for water to flow through, having a proximal end fitted onto the said outlet duct and an outer hose arranged around the inner hose, thereby defining an annular space between the said inner and outer hoses, with at least one electric cable housed therein and leading into the body of the valve.

[0003] If this should be necessary, the solenoid valve closes and the waterstop device makes it possible to stop the flow of water to the domestic appliance. In addition, should the inner hose rupture, the outer hose is in any case able to contain the outgoing flow of water, thereby preventing any flooding of the environment where the appliance is positioned.

[0004] In the prior art, the body of the solenoid valve is covered with a layer of electrically insulating resin and the proximal end of the inner hose is secured to the outlet duct of the solenoid valve by mechanical means, such as a retaining band.

[0005] The object of the present invention is to provide a waterstop device which is of a simpler structure than those known in the prior art.

[0006] This object is achieved according to the invention by providing a waterstop device of the type described at the start of the present description and characterised in that it includes a covering of a plastics material which envelops the body of the said solenoid valve and the said proximal end of the inner hose, thereby ensuring that the inner hose is secured to the outlet duct of the solenoid valve.

[0007] In the waterstop device of the invention, the covering of a plastics material thus fulfils the dual purpose of insulating the body of the solenoid valve and securing the proximal end of the inner hose to the outlet duct of the solenoid valve. It thereby makes it possible to eliminate one part, that is the retaining band, making the structure of the device of the invention simpler than those of the prior art.

[0008] An additional object of the present invention is to provide a method for producing a waterstop device of the type described above, which includes the steps of:

arranging an end of an electric cable in a position parallel to the outlet duct of a solenoid valve and connecting it to the body of the valve,
fitting a proximal end of an inner water supply hose onto the outlet duct of the solenoid valve,
covering the body of the solenoid valve and the proximal end of said hose with a layer of a plastics material which acts to insulate the said body and at the same time ensures that the inner hose is secured to the outlet duct, and

fitting the proximal end of an outer hose onto the portion of cover enveloping the proximal end of the inner hose.

[0009] Further advantages and characteristics of the present invention will become apparent from the detailed description which follows, provided purely by way of non-limitative example with reference to the appended drawings, in which:

Figure 1 is a longitudinally sectioned view of a waterstop device of the invention, and

Figures 2 to 4 illustrate successive steps in the production of the waterstop device of Figure 1.

[0010] A waterstop device for a domestic appliance includes (see Figure 1) a solenoid valve with a body 10, an inlet duct 12 and an outlet duct 14. An inner hose 16 for water to flow through has a proximal end 18 fitted onto the outlet duct 14. An outer hose 20 is arranged to envelop the inner hose 16, thereby defining an annular space 22 between the hoses 16, 20 with an electric cable 24 housed therein and leading to the body 10 of the solenoid valve.

[0011] A covering 26 of a plastics material, polyamide 6 or 6,6 for example, covers the body 10 of the solenoid valve and also the proximal end 18 of the inner hose 16. In this manner, the covering 26 electrically insulates the body 10 of the solenoid valve while, at the same time, ensuring that the inner hose 16 is secured to the outlet duct 14.

[0012] A first circumferential groove 28 is formed in the outer surface of the portion of the covering 26 adjacent that which covers the proximal end 18 of the inner hose 16, with a terminal projection 30 of a fixing sleeve 32 secured to a proximal end 34 of the outer hose 20 resiliently snap engaged in the groove. In addition, a second circumferential groove 36, with a sealing ring 38, such as an O-ring, arranged therein, is also formed in the outer surface of the portion of covering 26 adjacent that covering the proximal end 18 of the inner hose 16, axially outwards relative to the first groove 28. In variants of the invention, which are not illustrated, the seal could be provided by coupling the outer hose 20 to the covering 26 by interference, thereby doing away with the sealing ring 38.

[0013] A method for producing the waterstop device just described first includes (see Figure 2) a step of arranging one end of the electric cable 24 in a position parallel to the outlet duct 14 of the solenoid valve and connecting it to the body 10 of this latter. Next (see Figure 3) the proximal end 18 of the inner water flow hose 16 is fitted onto the outlet duct 14. The body 10 of the solenoid valve and the proximal end 18 of the hose 16 are then enveloped (see Figure 4) in a covering layer 26 of a plastics material by injection moulding. The injection mould is such that it brings about the process includes the formation of the circumferential grooves 28,

36 in the outer surface of the portion 26 of covering layer adjacent the proximal end 18 of the inner hose 16.

[0014] Finally, the proximal end 34 of the outer hose 20 is fitted onto the covering portion 26 enveloping the proximal end 18 of the inner hose 16, taking care to engage the terminal projection 30 of the sleeve 32 secured to the outer hose 20 into the first groove 28 and the sealing ring 38 into the second groove 36. This produces a finished waterstop device as described earlier and illustrated in Figure 1.

[0015] Naturally, the principle of the invention remaining unchanged, manufacturing details and embodiments can vary widely from those described purely by way of non-limitative example, without departing therefrom from the scope of the invention.

Claims

1. A waterstop device for a domestic appliance, which includes a solenoid valve having a body (10), an intake duct (12) and an outlet duct (14), an inner hose (16) for water to flow through with a proximal end (18) fitted onto the said outlet duct (14) and an outer hose (20) arranged so as to envelop the inner hose (16), thereby forming an annular space (22) between the said inner hose (16) and outer hose (20), with at least one electric cable (24) housed therein and leading to the body (10) of the solenoid valve, the said device being **characterised in that** it includes a covering (26) of a plastics material which envelops the body (10) of the said solenoid valve and the said proximal end (18) of the inner hose (16), thereby ensuring that the inner hose (16) is secured to the outlet duct (14) of the solenoid valve.
2. A device according to Claim 1, **characterised in that** the said plastics material is a polyamide.
3. A device according to either of the preceding Claims, **characterised in that** at least a first circumferential groove (28) is formed in the outer surface of the portion of covering (26) adjacent that which envelops the proximal end (18) of the inner hose (16), with a terminal projection (30) of a fixing sleeve (32) secured to a proximal end (34) of the outer hose (20) resiliently snap engaged therein.
4. A device according to Claim 3, **characterised in that** a second circumferential groove (36), axially outwards of the first groove (28), is also formed in the outer surface of the portion of covering (26) adjacent that which envelops the proximal end (18) of the inner hose (16), with a sealing ring (38) arranged therein.
5. A method for producing a waterstop device accord-

ing to any of the preceding Claims, which includes the steps of:

- arranging an end of an electric cable (24) in a position parallel to the outlet duct (14) of a solenoid valve and connecting it to the body (10) of the valve,
- fitting a proximal end (18) of an inner hose (16) for water to flow through onto the outlet duct (14) of the solenoid valve,
- covering the body (10) of the solenoid valve and the proximal end (18) of the said inner hose (16) with a layer (26) of a plastics material which acts to insulate the body (10) and at the same time to ensure that the inner hose (16) is secured to the outlet duct (14), and
- fitting the proximal end (34) of an outer hose (20) onto the portion (26) of covering which envelops the proximal end (18) of the inner hose (16).
6. A method according to Claim 5, in which the said covering layer (26) is applied by injection moulding.

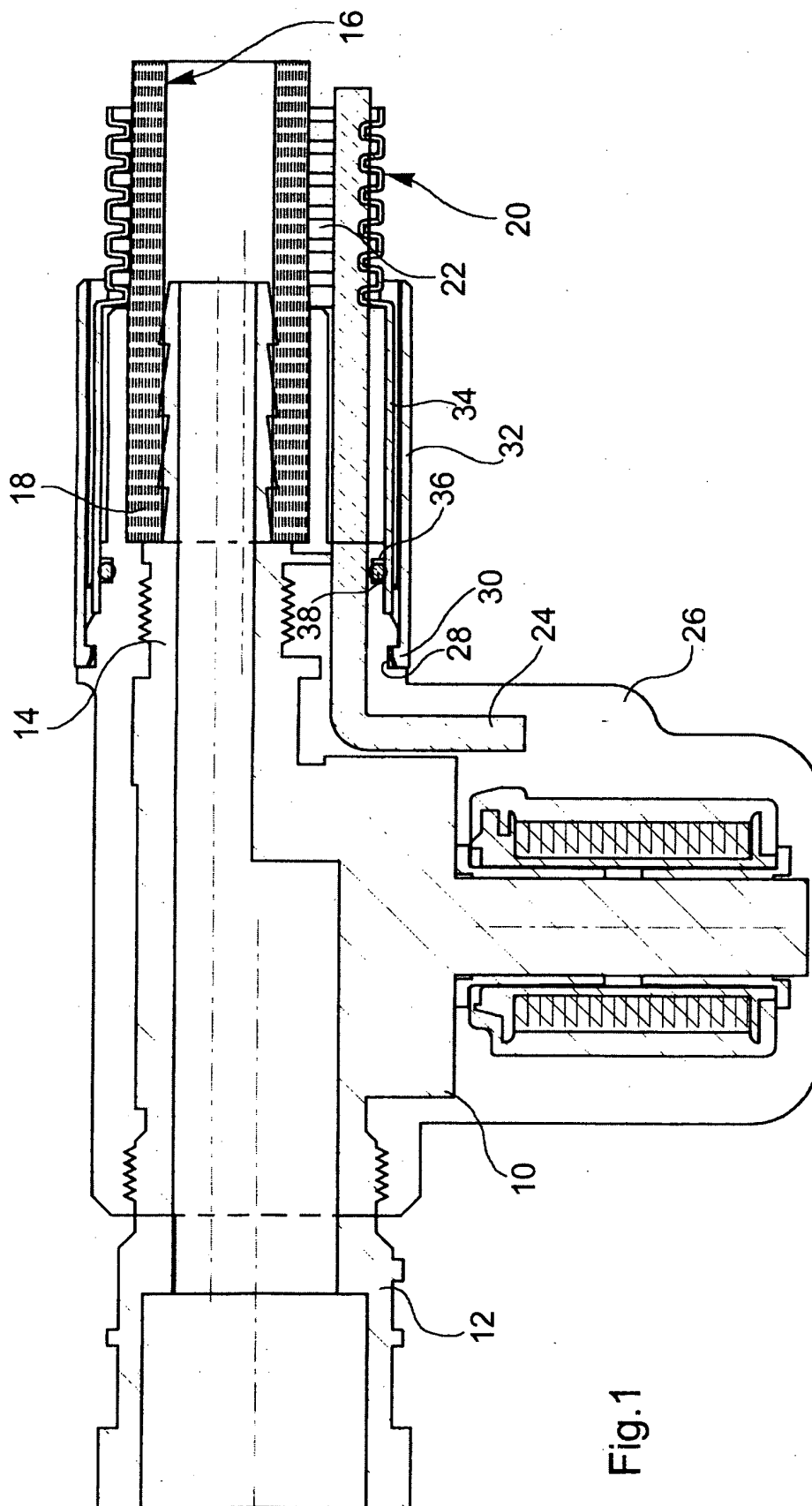
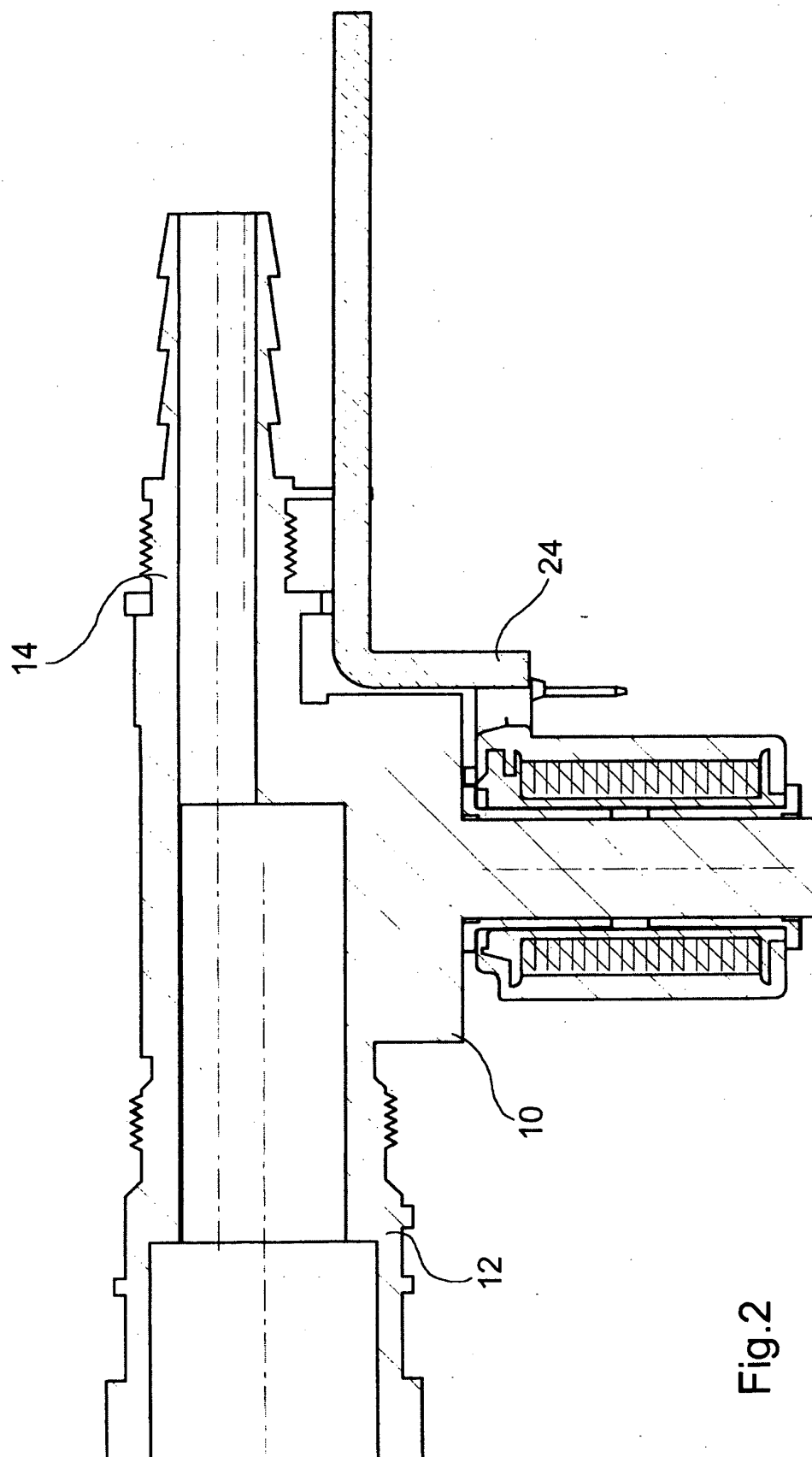


Fig.1



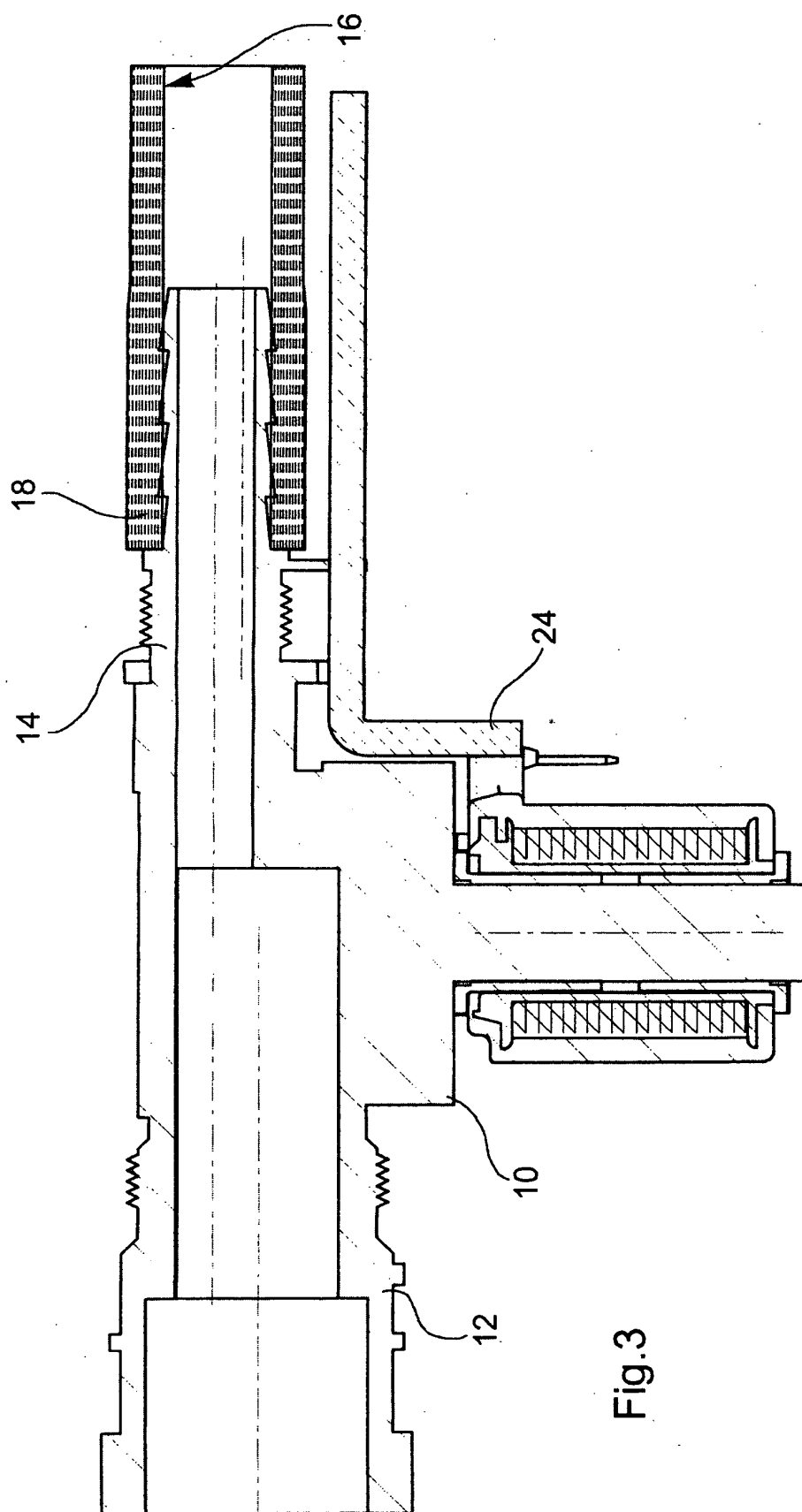


Fig.3

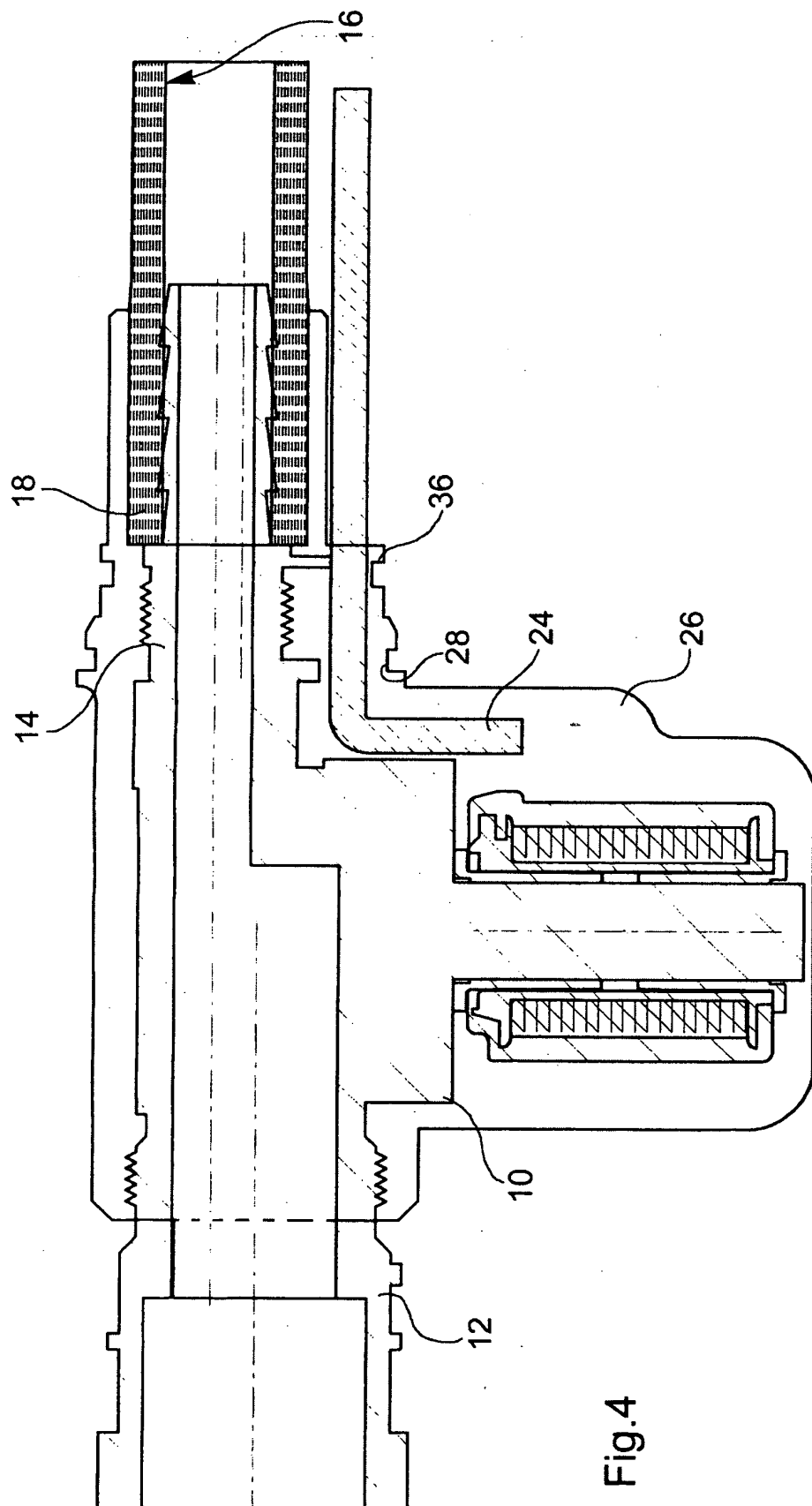


Fig.4