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(54) **Improved water stop device**

Verbesserte Wasserstoppvorrichtung

Dispositif de colmateur amélioré

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Description

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

[0002] In more detail, a water stop device comprises: a solenoid valve having a body, an inlet pipe and an outlet pipe, a flexible inner water flow tube having a proximal end associated with the outlet pipe and a flexible outer safety tube arranged around the inner tube so as to define, between the aforesaid inner and outer tubes, an annular air gap.

[0003] In case of necessity, the water stop device makes it possible, as a result of closure of the solenoid valve, to interrupt the water supply to the domestic electrical appliance. Moreover, in the event of breakage of the inner tube, the outer tube may in any case contain the outgoing flow of water and convey it inside the domestic electrical appliance, avoiding flooding of the surroundings.

[0004] According to the prior art (see eg. EP 1 085 119 A2), the inner water flow tube is a tube of crosslinked PVC or rubber with walls having a linear profile, while the outer tube is of a different type. The structure and the materials conventionally used for the inner tube mean that the cross-section of this latter tends to become blocked when the tube is bent. Moreover, providing two different types for the inner tube and the outer tube complicates the logistical operations of supply and disposal.

[0005] On the other hand, DE-203 14 718 U1 discloses a water supply device for a dishwasher with an inner tube of the corrugated type.

[0006] EP-1 798 326 A1 - which is a European patent application falling within the terms of Art. 54(3) EPC - discloses a water stop device with an inner water flow tube externally surrounded by an outer tube, wherein both tubes are of the corrugated type and define between them an annular air gap.

[0007] For the purpose of remedying such drawbacks, the subject of the present invention is a water stop device of the type indicated in claim 1 which follows.

[0008] The use of a single type of tube simplifies the logistical supply and disposal operations. In addition, the corrugated tubes have flexibility properties generally better than those of the tubes of crosslinked PVC or rubber, and have the advantage that their cross-section is not liable to become blocked when they are bent. Moreover, they are more economical and more easily disposable than the tubes of crosslinked PVC or rubber.

[0009] A material typically used for making the corrugated tubes is polypropylene, the use of which provides a further advantage. Polypropylene is in fact one of the plastics materials regarded as being most suitable for avoiding the release of contaminating substances into the water with which the tubes of the water stop devices typically come into contact.

Other advantages and features of the present invention will become clear from the following detailed description, provided by way of non-limiting example with reference to the appended drawings, in which:

Figure 1 is a view in longitudinal section of a water stop device according to the invention,

Figure 2 is a perspective view of some components of the water stop device of Figure 1, and

Figure 3 is a perspective view in section along the line III-III of Figure 2.

[0010] A water stop device for a domestic electrical appliance comprises a solenoid valve having a body 10, an inlet pipe 12 and an outlet pipe 14. A flexible inner water flow tube 16 has a proximal end 18 facing a distal end 26 of the outlet pipe 14. A flexible outer safety tube 20 is arranged around the inner tube 16 so as to define, between the tubes 16, 20, an annular air gap 22, in which may be housed an electric cable (not shown in the drawings) for supplying power to the solenoid valve.

[0011] Both the inner tube 16 and the outer tube 20 are of corrugated type and are preferably made of polypropylene.

[0012] The longitudinal axes 24 of the inner tube 16 and of the outlet pipe 14 coincide and the proximal end 18 of the inner tube 16 and the distal end 26 of the outlet pipe 14 are associated with one another by means of a tubular sleeve 28 arranged, sealed, coaxially on their exterior.

[0013] The sleeve 28 is made of polymeric material and is preferably produced by means of a co-moulding technique which is known *per se.* According to this technique, the opposed ends 18, 26 of the inner tube 16 and of the outlet pipe 14 are placed in a mould cavity into which there is then injected the molten polymeric material which, once solidified, assumes the shape of the sleeve 28 and encloses the ends 18, 26 from the outside.

[0014] Protruding radially from the proximal end of the sleeve 28 is an annular flange 30, within a portion of which an axial hole 32 is provided for the passage of an electric cable for supplying power to the solenoid valve. In this way it is possible to avoid having to use a further component functioning as a cable fairlead gasket, further reducing the cost of the water stop device. On the radially outermost circumferential surface of the flange 30 the proximal end 34 of the corrugated outer tube 20 is further fitted.

[0015] A resilient band 36 clamps an intermediate circumferential portion of the sleeve 28 against the portion of outlet pipe 14 arranged radially inside it, so as to minimise the risk of the inner tube 16 and the sleeve 28 becoming forcibly separated from the outlet pipe 14 as a result of a pulling action.

[0016] Overall, owing to the use of the two tubes of corrugated type 16, 20, the water stop device of the invention proves economical and suitable for ensuring a constant flow cross-section even if the tubes 16, 20 were to be subjected to very severe bending.

[0017] Naturally, the principle of the invention remain-

ing the same, the details of construction and forms of embodiment may be varied widely with respect to those described purely by way of example, without thereby departing from the scope claimed.

Claims

1. A water stop device for a domestic electrical appliance, comprising: a solenoid valve having a body (10), an inlet pipe (12) and an outlet pipe (14), a flexible inner water flow tube (16) having a proximal end (18) associated with said outlet pipe (14) and a flexible outer safety tube (20) arranged around the inner tube (16) so as to defme, between said inner tube (16) and outer tube (20), an annular air gap (22), wherein:

   - both the inner tube (16) and the outer tube (20) are of corrugated type,
   - the proximal end (18) of said inner tube (16) faces the distal end (26) of the outlet pipe (14) in such a way that the respective longitudinal axes (24) coincide, and said ends (18, 26) are associated with one another by means of a tubular sleeve (28) arranged, sealed, coaxially on their exterior,
   - protruding radially from the proximal end of said sleeve (28) is an annular flange (30), within a portion of which an axial hole (32) is provided for the passage of an electric cable for supplying power to the solenoid valve, and
   - the proximal end (34) of said outer tube (20) is fitted onto the radially outermost circumferential surface of said flange (30) of the sleeve (28).

2. A device according to claim 1, wherein said corrugated inner tube (16) and outer tube (20) are made of polypropylene.

3. A device according to claim 1, wherein said sleeve (28) is made of polymeric material and is produced by a co-moulding technique, by placing said opposed ends (18, 26) in a mould cavity and injecting therein the molten polymeric material which, once solidified, assumes the shape of the sleeve (28) and encloses said ends (18, 26) from the outside,

4. A device according to any one of the preceding claims, wherein a resilient band (36) clamps an intermediate circumferential portion of said sleeve (28) against the portion of outlet pipe (14) arranged radially inside it.

Patentansprüche

1. Wasserstoppvorrichtung für eine häusliche elektrische Einrichtung mit: einem Magnetventil, das einen Körper (10), ein Einlassrohr (12), und ein Auslassrohr (14) aufweist, einer flexiblen inneren Wasserflussröhre (16), die ein proximales Ende (18) aufweist, das mit besagtem Auslassrohr (14) verbunden ist, und einer flexiblen äußeren Sicherheitsröhre (20), die um die innere Röhre (16) herum angeordnet ist, so dass zwischen besagter innerer Röhre (16) und äußerer Röhre (20) ein ringförmiger Luftspalt (22) definiert ist, bei der:

   - sowohl die innere Röhre (16) als auch die äußere Röhre (20) von gewellter Art sind,
   - das proximale Ende (18) besagter innerer Röhre (16) dem distalen Ende (26) des Auslassrohrs (14) derart gegenüberliegt, dass die jeweiligen longitudinalen Achsen (24) zusammenfallen, und besagte Enden (18, 26) miteinander durch eine röhrenförmige Hülse (28) verbunden sind, die dichtend koaxial auf deren Außenseite angeordnet ist,
   - radial von dem proximalen Ende besagter Hülse (28) ein ringförmiger Flansch (30) vorsteht, innerhalb eines Abschnitts dessen ein axiales Loch (32) für den Durchlass eines elektrischen Kabels zum Zuführen von Strom zu dem Magnetventil vorgesehen ist, und
   - das proximale Ende (34) besagter äußerer Röhre (20) auf die radial äußerste Umfangsoberfläche besagten Flansches (30) der Hülse (28) aufgesetzt ist.

2. Vorrichtung gemäß Anspruch 1, bei der besagte gewellte innere Röhre (16) und äußere Röhre (20) aus Polypropylen ausgebildet sind.

3. Vorrichtung gemäß Anspruch 1, bei der besagte Hülse (28) aus Polymermaterial ausgebildet ist und durch ein Co-Spritzgussverfahren herstellt ist, bei dem besagte gegenüberliegende Enden (18, 26) in einer Spritzgussform platziert werden und geschmolzenes Polymermaterial in diese eingespritzt wird, das, einmal festgeworden, die Form der Hülse (28) annimmt und besagte Enden (18, 26) von der Außenseite einschließt.

4. Vorrichtung gemäß einem der vorhergehenden Ansprüche, bei der ein elastisches Band (36) einen Zwischenumfangsabschnitt besagter Hülse (28) gegen den Abschnitt des Auslassrohrs (14) klemmt, der radial innerhalb derselben angeordnet ist.

Revendications

1. Dispositif d'arrêt d'eau pour appareil électrique domestique, comprenant : une électrovanne comportant un corps (10), un tuyau d'entrée (12) et un tuyau

de sortie (14), un tube d'écoulement d'eau intérieur souple (16) ayant une extrémité proximale (18) associée audit tuyau de sortie (14) et un tube de sécurité extérieur souple (20) placé autour du tube intérieur (16) de façon à définir, entre lesdits tube intérieur (16) et tube extérieur (20), un espace d'air annulaire (22), dans lequel :

- le tube intérieur (16) et le tube extérieur (20) sont de type annelé, l'extrémité proximale (18) dudit tube intérieur (16) est située en face de l'extrémité distale (26) du tuyau de sortie (14) de telle manière que les axes longitudinaux respectifs (24) coïncident, et lesdites extrémités (18, 26) sont associées l'une à l'autre au moyen d'un manchon tubulaire (28) agencé de façon scellée et coaxiale sur leur partie extérieure,
- une bride annulaire (30) fait saillie radialement depuis l'extrémité proximale dudit manchon (28), un trou axial (32) étant prévu dans une partie de ladite bride pour permettre le passage d'un câble électrique pour fournir de l'électricité à l'électrovanne, et
- l'extrémité proximale (34) dudit tube extérieur (20) est montée sur la surface périphérique radialement la plus extérieure de ladite bride (30) du manchon (28).

2. Dispositif selon la revendication 1, dans lequel lesdits tube intérieur (16) et tube extérieur (20) annelés sont en polypropylène.

3. Dispositif selon la revendication 1, dans lequel ledit manchon (28) est fait d'un matériau polymère et est produit au moyen d'une technique de moulage conjoint, en plaçant lesdites extrémités opposées (18, 26) dans une cavité de moule et en y injectant le matériau polymère fondu qui, une fois solidifié, prend la forme du manchon (28) et enferme lesdites extrémités (18, 26) depuis l'extérieur.

4. Dispositif selon l'une quelconque des revendications précédentes, dans lequel une bande résiliente (36) serre une partie périphérique intermédiaire dudit manchon (28) contre la partie du tuyau de sortie (14) placée radialement à l'intérieur de celui-ci.

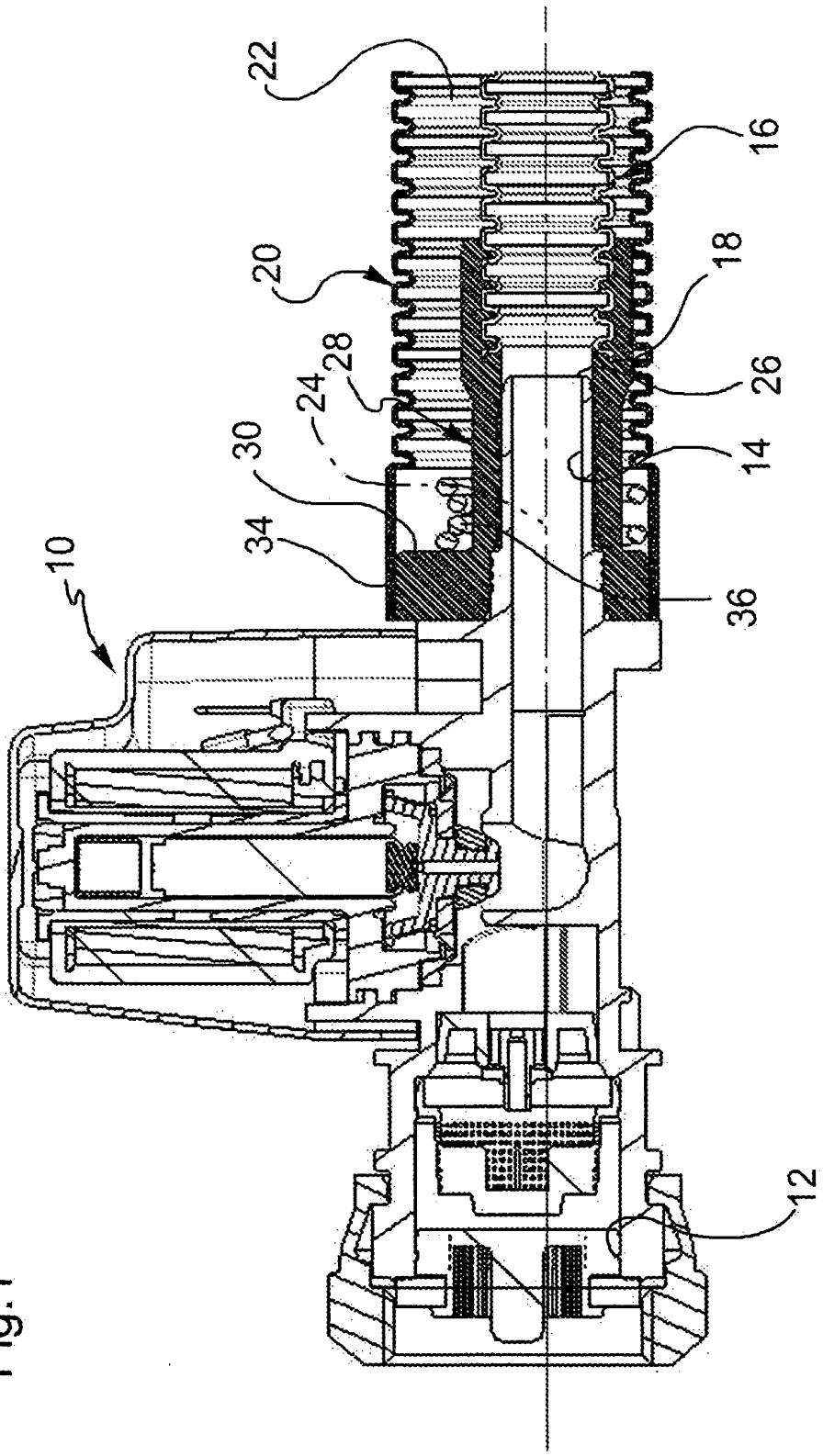


Fig.1

Fig.2

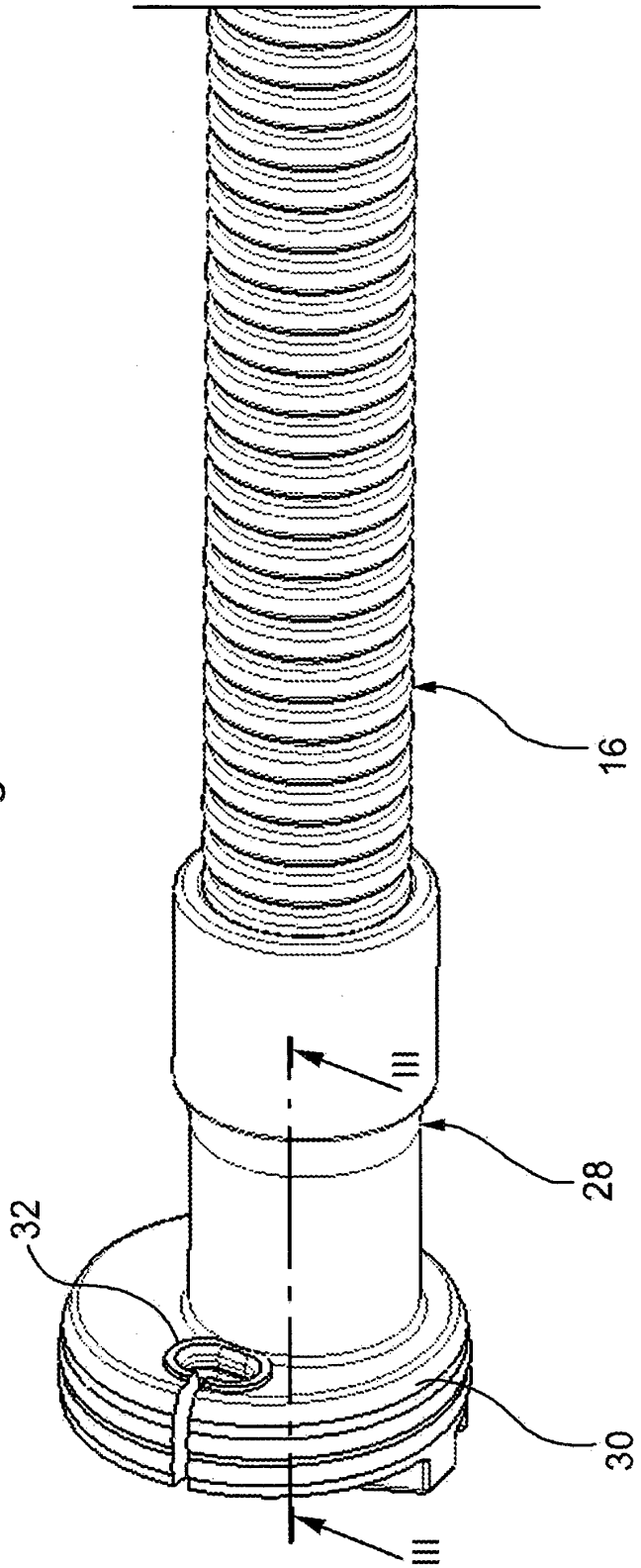
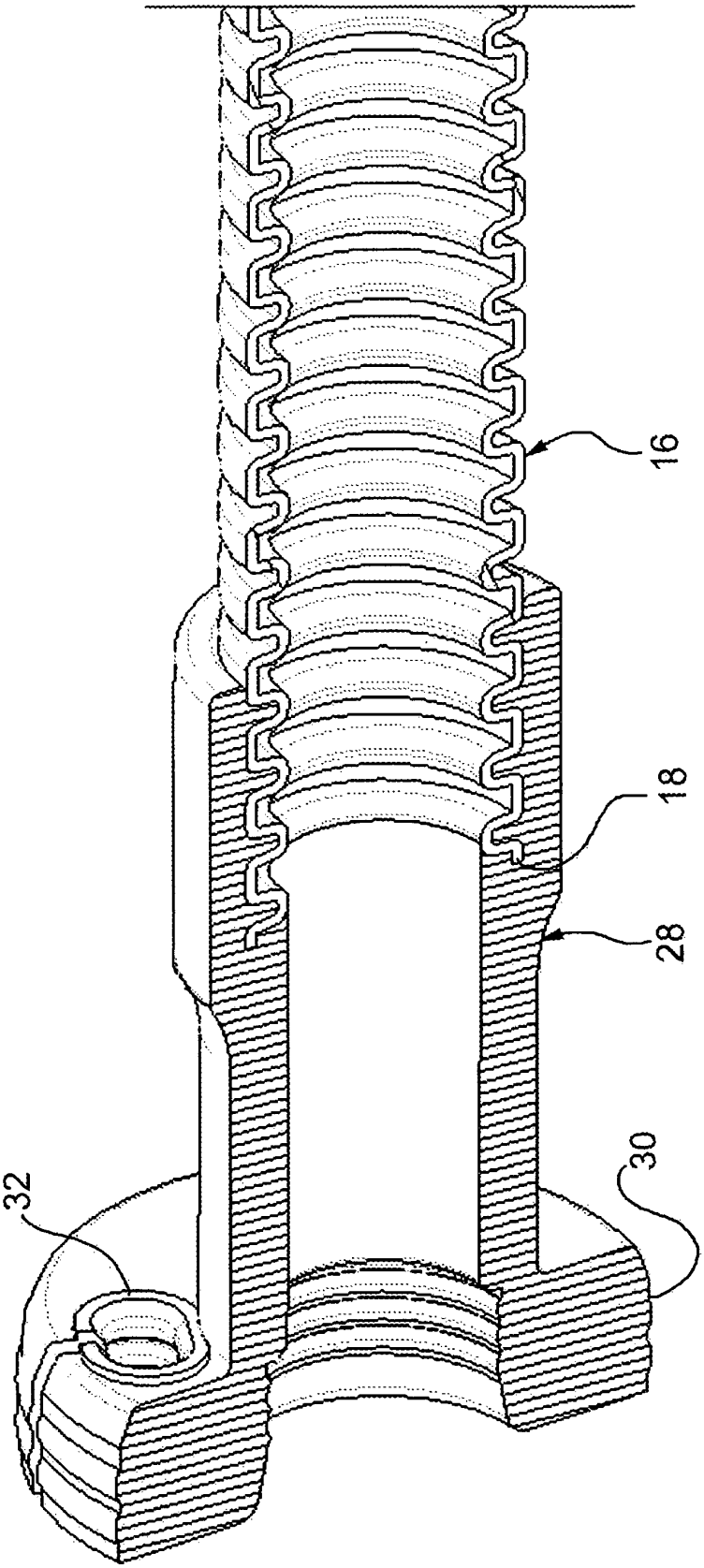


Fig.3



REFERENCES CITED IN THE DESCRIPTION

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