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(54) **TUBULAR DRIVE FOR ROLLER SHUTTER**

(57) An actuator for a rolling shutter such as awnings or blinds structured to be installed inside a rolling shutter winding drum is described. The actuator comprises a tubular body and an axial cavity, obtained in the tubular body, which is equipped with electrical terminals to electrically power the motor and configured to receive and house an external electrical connector. The external electrical connector is equipped with a head comprising electrical terminals couplable to those in the cavity, and a movable member capable of engaging a corresponding portion of the cavity to lock the head into place by interference within the cavity.

To ease the unlocking operations, the connector comprises an actuating member configured to be manually moved relative to the head in order to mechanically act, as a result of its displacement, upon the movable member and displace the latter disengaging it from the cavity.

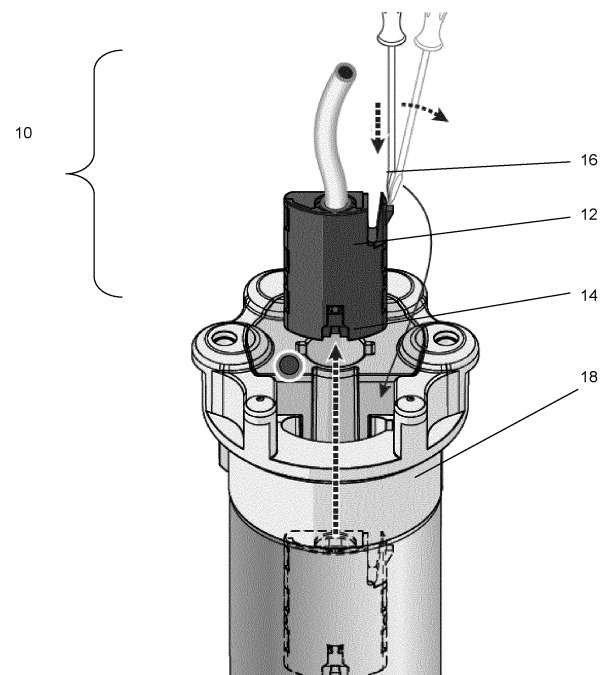


Fig. 1

Description

[0001] The invention relates generally to a tubular actuator for a roller shutter (e.g., such as awnings or blinds), in particular to a actuator equipped with a device to facilitate the connection between an electrical connector and the gearmotor.

[0002] To operate rolling shutters, such as roller blinds or awnings, tubular gearmotors are used which are equipped with an electric motor and installed inside the tube around which the shutter is wound,. See, for example, EP 2 397 647 B1.

[0003] For the electrical connection between the gearmotor and the power supply (see Fig. 1), an external connector 10, equipped with a head 12 to be inserted inside an axial cavity 14 made in the tubular body 18 of the gearmotor, is used.

[0004] The head 12 has a tab 16 with a protrusion that snaps into an undercut of the cavity 14 to lock the head 12 in place inside the gearmotor.

[0005] In most gearmotors, the cavity 14 is very deep, due to construction issues, which leads to obvious inconvenience when connecting the head 12 and especially during release, when one wants to disconnect the connector 10 from the gearmotor. The operation is basically done blindly, levering the protrusion by using a screwdriver, see Figure 1, to undo the engagement between the protrusion and the undercut.

[0006] The main object of the present invention is to improve the state of the art.

[0007] Another object is to avoid the above inconveniences by facilitating the connection and disconnection of the connector 10.

[0008] These objects are achieved by a roller shutter actuator (e.g. such as blinds or awnings) structured to be installed inside a roller shutter winding drum, comprising:

a tubular body

an electric motor mounted in the tubular body to rotate the drum and move the roller shutter,

an axial cavity, obtained in the tubular body (in particular at one end of the tubular body), which is equipped with electrical terminals (in particular located at the bottom of the cavity) to electrically power the gearmotor and configured to receive and house an external electrical connector,

the external connector being equipped with

a head that comprises electrical terminals couplable with those in the cavity, and

a movable member capable of engaging a corresponding portion of the cavity to lock the head in place by interference inside the cavity, wherein

the connector also comprises an actuating member, e.g. separate from the head, that is configured to be moved manually relative to the

head in order to mechanically act, as a result of its movement, upon the movable member and move the latter disengaging it from the cavity; in particular, the connector also comprises a pressing member, e.g. separate from the head, configured to be pushed manually against the head in order to abut against the movable member and move the latter disengaging it from the cavity.

[0009] The pressing/actuating member makes it possible to detach the connector from the gearmotor without the use of any tools, being enough for the purpose to simply push the pressing member toward the head from the outside of the gearmotor. Through the pressing/actuating member, there is the advantage of greatly speeding up maintenance or installation of the gearmotor.

[0010] In variants of the invention in which the actuating member is detached from the head, the pressing/actuating member is particularly advantageous because, as it does not require permanent connections to the head, it is easy to apply and a displacement of the pressing/actuating member relative to the head is sufficient to move the movable member. In other variations of the invention, the actuating member is connected to the head and/or the movable member, e.g. simply with a cable or a rigid arm.

[0011] The tubular body has a longitudinal axis parallel or coincident, when installation is completed, with the rotation axis of the drum.

[0012] In a variation, said cavity is a blind tunnel.

[0013] In a variation, the axial cavity or the blind tunnel has a depth that develops parallel to the longitudinal axis of the tubular body.

[0014] To facilitate the mounting of the pressing/actuating member on the head, it is preferable to take advantage of the electric cable that ordinarily extends from the head to the mains. To this aim, the pressing/actuating member is conformed to contain or embrace the electrical cable while remaining free to slide relatively to the cable along the direction of the cable length. It should be noted that another advantage of this configuration is the reduction of overall dimensions, because the volume of the cable is "absorbed" into the pressing/actuating member. Another advantage of this configuration is that the cable acts as a guide for the pressing/actuating member. According to a more preferred variant, the pressing/actuating member comprises a superficial concavity or channel for containing or embracing the electrical cable, the superficial concavity or channel extending linearly between two opposite ends of the pressing/actuating member, wherein one of such ends is configured to abut - in use - against the head.

[0015] In particular, it is the central portion of the pressing/actuating member that is conformed to contain or embrace the electrical cable, for greater stability and symmetry.

[0016] An additional advantage of the pressing/actu-

ating member anchored to the cable and abutting against the connector head is that the pressing/actuating member remains always available to the operator for the operations of replacement and/or maintenance of the tubular motor. For example, the operator does not always have at hand the screwdriver.

[0017] According to a preferred variant, of construction simplicity, the pressing member comprises a protruding tooth and/or an inclined plane, configured to contact and push the movable member of the head as a result of a displacement of the pressing member toward the head. In particular, the protruding tooth and/or inclined plane is placed at the end of the pressing member which is configured to abut - in use - against the head.

[0018] According to a preferred variant, the movable member is a flexible tab protruding cantilevered from the head, but it could be something else, e.g. a retractable pin.

[0019] According to a preferred variant, the pressing/actuating member is configured to move the movable member along a direction orthogonal to the axis of the cavity or tunnel, either toward the center of the head or toward the outside of the head.

[0020] According to a preferred variant, the pressing/actuating member and the head are configured to be applied next to each other along a common axis, so the pressing/actuating member and the head can be mounted in a row behind each other (simplicity of mutual application and to the tubular body). According to a more preferred variation, the common axis is parallel to the longitudinal axis of the tubular body.

[0021] According to a preferred variant, one end of the pressing/actuating member, the end opposite to the end destined for abutting against the head, comprises two cross-section expansions, which in particular are placed on opposite sides of the linear concavity, respectively. The cross-section expansions are configured to snugly plug the inlet of the cavity into the tubular body. This prevents the entry of dirt, and mechanical play between the parts is nulled.

[0022] According to a preferred variation, the pressing/actuating member is configured to be attached to the cable and abutting against the head, so that the assembly of the pressing/actuating member and the head are insertable inside the axial cavity. In particular, the relative dimensions of the cavity, the head, and the pressing/actuating member are such that the two cross-section expansions go flush with the outer profile of the tubular body when the pressing/actuating member and head assembly are inserted. Then the cross-section expansions remain accessible on the outer surface of the tubular body, and an operator can conveniently push them in to activate the pressing member and detach the head from the axial cavity.

[0023] Another aspect of the invention is a method for disconnecting an actuator for a roller shutter (e.g. such as blinds or awnings) from an external electrical connector, the actuator being structured to be installed inside a

winding drum for the shutter, and comprising:

a tubular body

an electric motor mounted in the tubular body to rotate the drum and move the shutter,
an axial cavity (in particular a blind tunnel), obtained in the tubular body (in particular at one end of the tubular body), which is equipped with electrical terminals (in particular located at the bottom of the cavity) to electrically power the gearmotor and configured to receive and house an external connector, the external connector being equipped with

a head that comprises electrical terminals couplable to those in the cavity, and
a movable member capable of engaging with a corresponding portion of the cavity to lock in place by interference the head inside the cavity,

with the steps of

moving manually relatively to the head
an actuating member applied on the head and separated from the head,
so that the actuating member, as a result of its displacement, acts mechanically on the movable member and displaces, e.g. pushes, the latter disengaging it from the cavity.

[0024] Particularly in the method all the variants described above for the actuator are possible.

[0025] The following description concerns a preferred embodiment of actuator and will highlight further its advantages, referring to the attached drawings in which:

- Fig. 1 shows a three-dimensional view of a known actuator;
- Fig. 2 shows a three-dimensional view of an actuator according to the invention;
- Fig. 3 shows a piece of the actuator of Fig. 2.

[0026] The context of the invention is that already described for Fig. 1.

[0027] A gearmotor 30 for roller shutters comprises a tubular body 32 that has a longitudinal X axis and at one end 36 is equipped with a blind tunnel 34 whose depth develops parallel to the X axis.

[0028] An electric motor (not shown) is installed in the tubular body 32 to rotate about the X axis a drum on which the roller shutter is wound.

[0029] The bottom of the tunnel 34 has electrical terminals (not shown) to electrically power the gearmotor.

[0030] The power supply is carried by an external connector 40 equipped with a head 42 that comprises electrical terminals that can be coupled to those inside the tunnel 34. An electrical cable 38 extends from the head 42 to the power supply mains.

[0031] The head 42 also comprises a movable member 44 (like a flexible tab) that can engage its tooth 46 in a

corresponding cavity or inner undercut of the tunnel 34, so that the head 42 can be locked in place by interference inside the tunnel 34.

[0032] The connector 40 also comprises a pressing member 50 separate from the head 42 but approachable to it.

[0033] The pressing member 50 is conformed to contain or embrace the electrical cable 38 thanks to a central surface concavity 52 (fig. 3) that extends linearly between two opposite ends 54, 56 of the pressing member 50: one end 54 is configured to abut - in use - against the head 42, the other end 56 remains free.

[0034] The pressing member 50 comprises at the end 54 a protruding tooth 58, which is configured, e.g. via an inclined plane converging toward the center of the member 50, to contact and push the movable member 44. Then, when the pressing member 50 and the head 42 are applied to each other along a common axis by making the end 54 abut against one side of the head 42, the displacement of the tooth 58 toward the head 42 (arrow F1) causes the movable member 44 to flex toward the center of the head 42 (arrow F2).

[0035] Preferably, the end 56 of the pressing member 50 comprises two cross-section expansions 60 placed on opposite sides of the linear concavity 52, respectively. The cross-section expansions are configured to snugly plug the entrance of the tunnel 34.

OPERATION

[0036] The pressing member 50 is applied to the cable 38 and abutted to the head 42, so that the tooth 58 rests on the free end of the movable member 44. The resulting assembly is insertable - and inserted - inside the tunnel 34. After such insertion, the electrical contacts of the head 42 are connected to those inside the tunnel 34, and the two cross-section expansions 60 are brought flush with the outer profile of tubular body 32. Thus, the cross-section expansions 60 remain accessible on the outer surface of the tubular body 32.

[0037] An operator can push the cross-section expansions 60 to activate the pressing member 50: the tooth 58 moves along the F1 direction, pushes the movable member 44 along the F2 direction, the tooth 44 disengages from the walls of the tunnel 34, and the head 42 (and the pressing member 50) can then be extracted from the tunnel 34.

[0038] The convenience of maneuvering allowed by the pressure member 50 is evident. The connector 40 can be detached from the gearmotor without the aid of any tools and very quickly.

Claims

1. Actuator for a rolling shutter, such as awnings or blinds, structured to be installed inside a rolling shutter winding drum, comprising:

a tubular body (32),
an electric motor mounted inside the tubular body to rotate the drum and move the shutter,
an axial cavity (34), obtained in the tubular body, which is equipped with electrical terminals to electrically power the motor and configured to receive and house an external electrical connector,
the external electrical connector (40) being equipped with

a head (42) comprising electrical terminals couplable to those in the cavity, and
a movable member (44) capable of engaging a corresponding portion of the cavity to lock the head into place by interference within the cavity,

wherein
the connector further comprises an actuating member (50) configured to be manually moved relative to the head (42) in order to mechanically act, as a result of its displacement, upon the movable member (44) and displace the latter disengaging it from the cavity.

2. Actuator according to claim 1, wherein the actuating member is detached from the head.

3. Actuator according to claim 1 or 2, wherein the head (42) is connected to a power-supply cable (38) and the actuating member (50) is conformed to contain or embrace the power-supply cable (38) while remaining free to slide relative to the cable in the direction of the length of the cable.

4. Actuator according to claim 3, wherein the actuating member (50) comprises a superficial concavity or channel (52) for containing or embracing the power-supply cable (38), the superficial concavity or channel extending linearly between two opposite ends of the actuating member, wherein one of said ends is configured to abut - in use - against the head.

5. Actuator according to claim 4, wherein said superficial concavity or channel is located at the central portion of the actuating member.

6. Actuator according to any preceding claim, wherein the actuating member comprises a protruding tooth and/or an inclined plane (58) configured to contact and push the movable member of the head upon movement of the actuating member toward the head.

7. Actuator according to claim 6, wherein the protruding tooth and/or the inclined plane (58) is located at the end of the actuating member that is configured to

abut - in use - against the head.

8. Actuator according to any preceding claim, wherein the actuating member (50) is configured to move the movable member (44) along a direction orthogonal to the longitudinal axis of the cavity (X). 5
9. Actuator according to any preceding claim, wherein the actuating member and the head are configured to be applied one next to the other along a common axis (X). 10
10. Actuator according to any preceding claim, wherein one end of the actuating member, the end opposite the end destined for abutting against the head, comprises two cross-sectional expansions (60) configured to snugly plug the entrance of the axial cavity into the tubular body. 15

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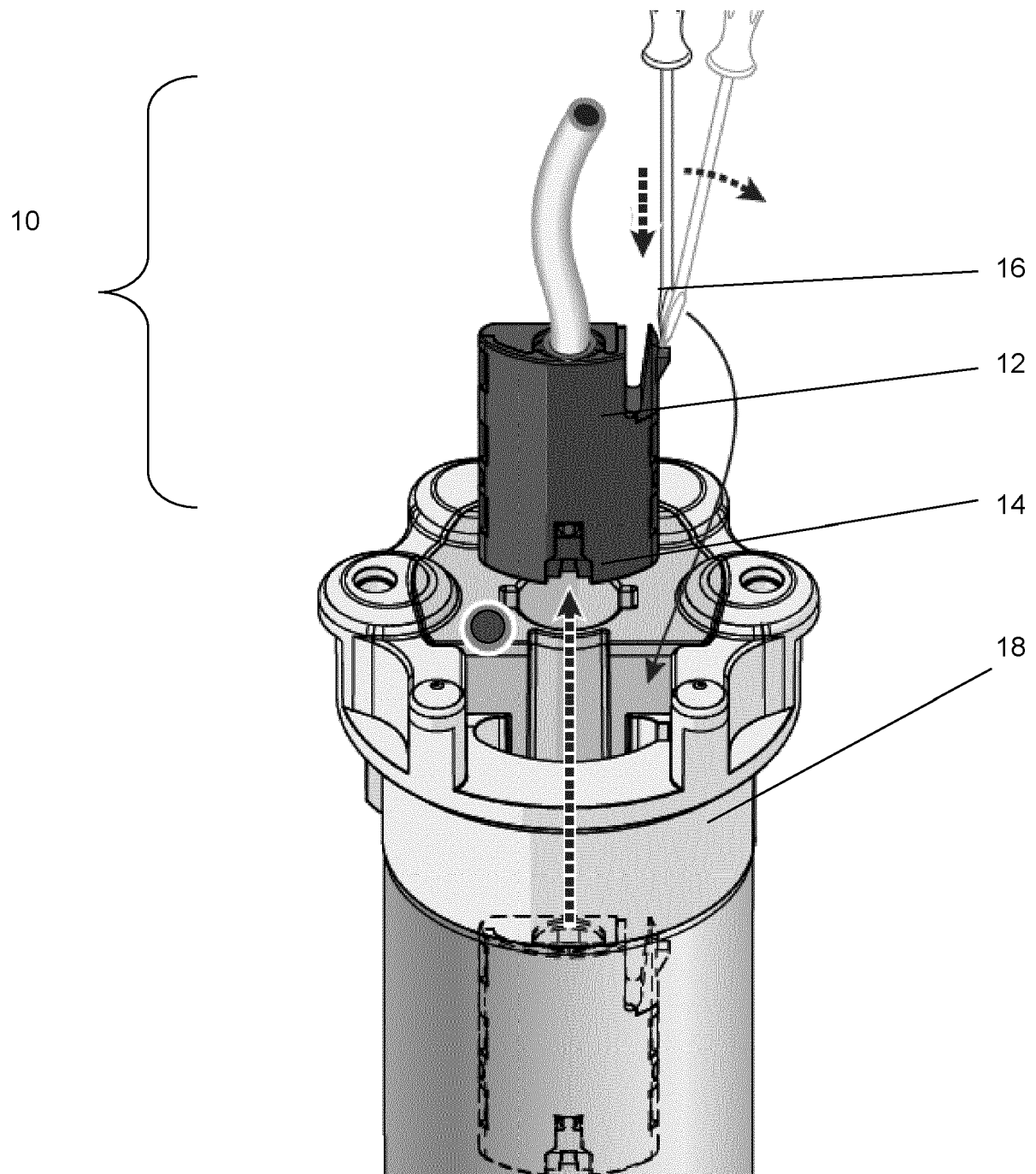
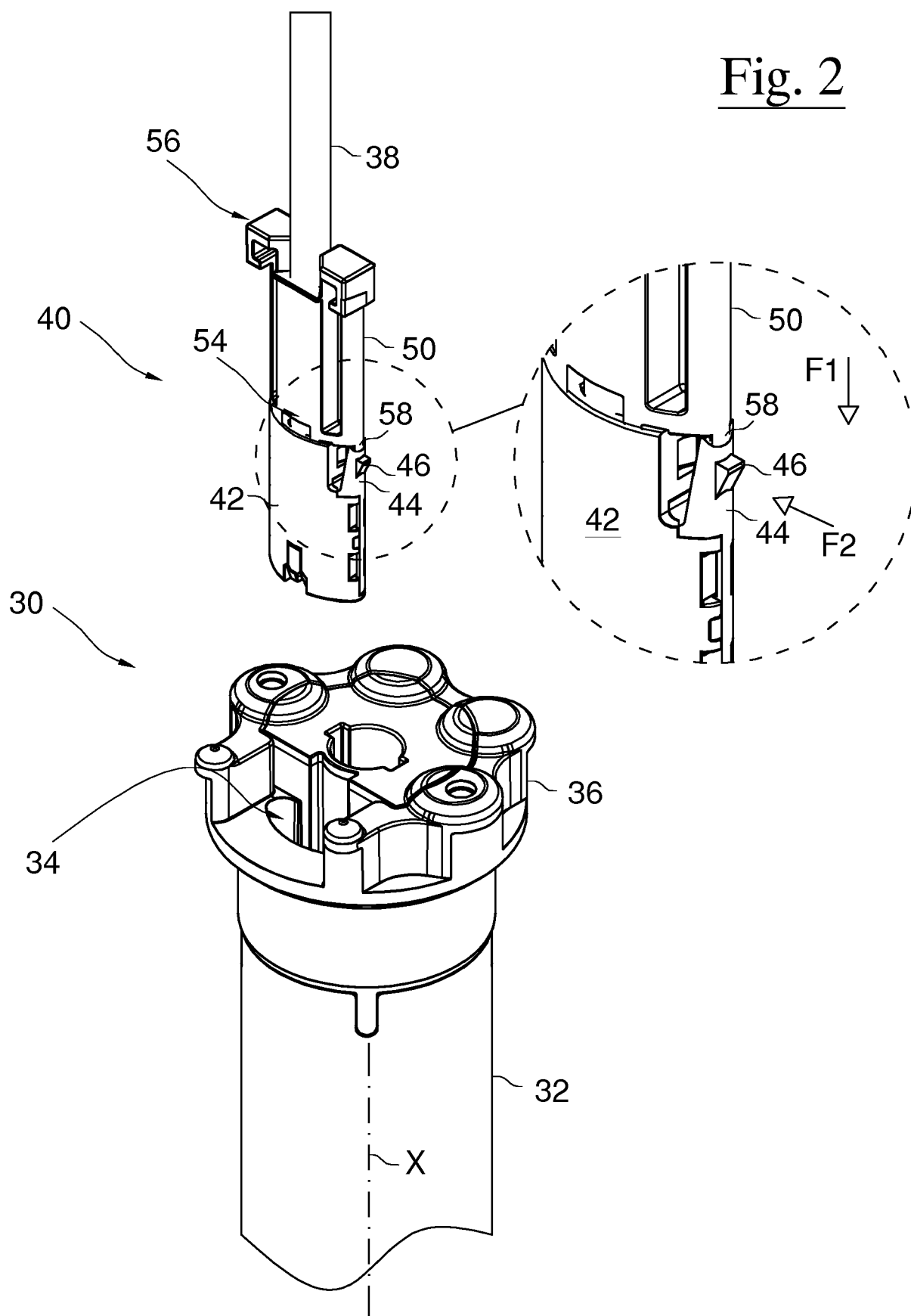


Fig. 1

Fig. 2



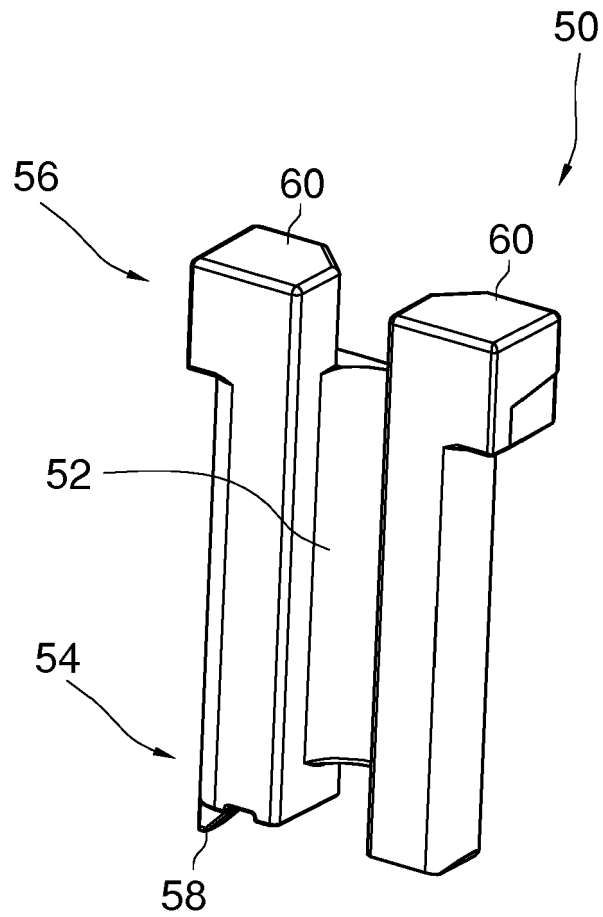


Fig. 3



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Application Number

EP 22 17 5056

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 8 September 2022	Examiner Morrish, Susan
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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