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(54) **Braking device particularly for roller curtains, blinds, mosquito screens and the like**

(57) A braking device for slowing the winding velocity of movable curtains with spring winding, such as mosquito screens and the like, which comprises a rotor housing (5) within which a rotor pin (4) is coupled, the space existing between rotor pin (4) and rotor housing (5) being

filled by a viscous fluid (6) adapted to generate friction in case of rotation of the rotor pin (4) within the rotor housing (5), for the generation of a torque resisting the rotation of the rotor pin, a gasket seal (3) being provided between the rotor pin and the rotor housing (5).

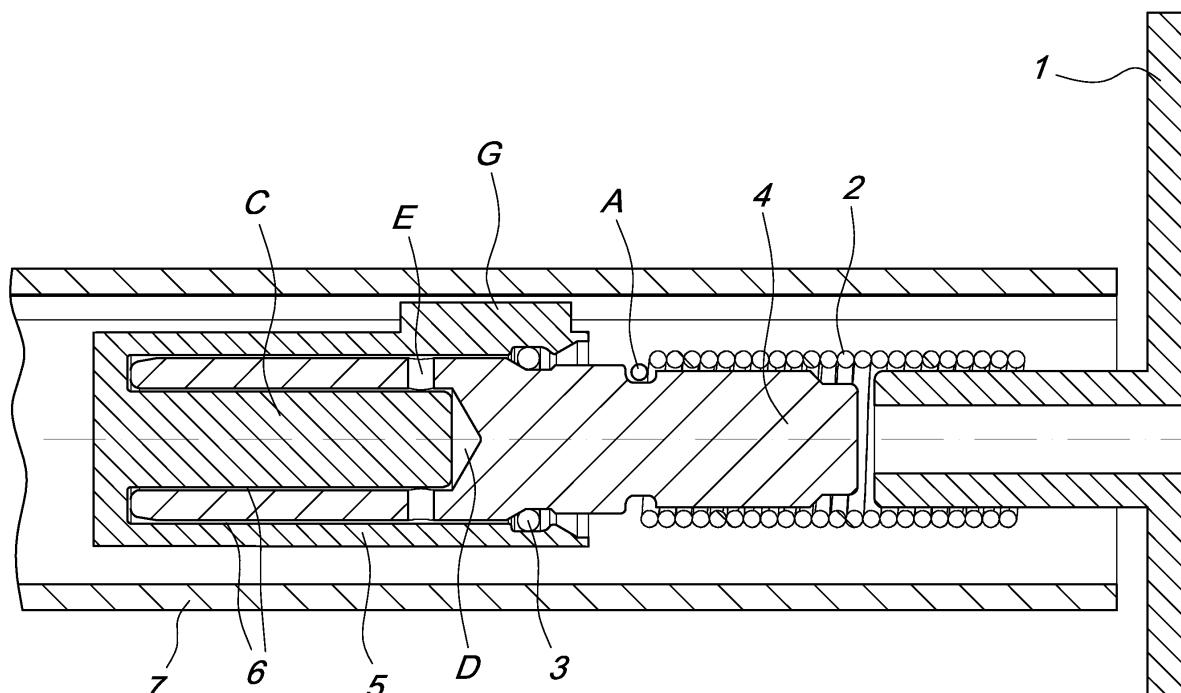


Fig. 2

Description

[0001] The present invention relates to a braking device, particularly for roller curtains, blinds, mosquito screens and the like. More specifically the invention relates to a braking device that acts as a velocity decelerator for springloaded winding mechanisms such as roller curtains, blinds, mosquito screens and the like.

[0002] Many systems are known for slowing the winding speed of movable curtains, blinds, mosquito screens and the like. Generally such devices are made with an outer enclosure, predominantly cylindrical, in which a cylindrical coaxial seat is provided which contains a rotor constituted by a cylindrical pin provided with fixed tabs that extend radially on the circumference. The pin is immersed with one end in a fluid, contained in the coaxial seat of the housing, which is variable in density, such as oil, grease or the like; the other end of the pin is connected to the main tube where the movable curtains or mosquito screens are wound, by way of a device that is generally unidirectional in rotation.

[0003] The pin, being immersed in a fluid, encounters a force in opposition to the rotation force generally generated by the spring, thus achieving a winding at a controlled velocity.

[0004] When the curtain is being unwound, the unidirectional rotation device allows the free unwinding of the main shaft on which the curtains or mosquito screens are rolled.

[0005] The various systems are all fixed to the side headers that make up the box and are inserted into the main shaft on which the curtains or mosquito screens are rolled. Such systems are equivalent in operation, all generally having a rotor pin provided with fixed tabs, immersed in a fluid, while the differences can arise in the unidirectional rotation device. For example, some manufacturers use a system with a helical spring, connected at one end to the rotor pin, and at the other end, by way of a support, to the main shaft on which the movable curtain is wound. The helical spring, subjected to the direction of rotation of its winding, closes on the rotor pin thus generating a transmission torque sufficient to make the rotor pin rotate; the pin then undergoes a deceleration in rotation thanks to the fluid contained in the housing which offers a certain resistance against the tabs which are caused to rotate.

[0006] Other manufacturers generate the unidirectional rotation transmission using other systems, for example by providing one end of the rotor pin with oriented elastic teeth, which engage with corresponding teeth provided on a bushing which is commanded by the main shaft on which the movable curtain is wound.

[0007] The teeth are provided on one side of their surface with a face that is perpendicular to the corresponding teeth arranged on the tubular element, and they transmit motion via pairings that are obviously limited, and on the surface opposite to the perpendicular face they have an inclined plane that allows, in the event of inversion of the

direction of rotation, the tubular element to slip.

[0008] These systems however exhibit a number of drawbacks.

[0009] First they are constituted by a large number of parts and thus they are expensive.

[0010] A second drawback of conventional braking devices consists in the fact that the braking force can vary in effectiveness depending on the operating temperature.

[0011] It is known in fact that generally fluids change their density depending on the operating temperature, and a curtain that is generally located outside a dwelling will be considerably affected by thermal variations, which are quantifiable in several dozens of degrees, depending on whether it is used in summer or in winter.

[0012] Another drawback moreover can arise with the device that is used for the transmission of motion, especially when it is implemented by way of elastic teeth that lock together in one direction of rotation whereas in the other direction they slip over their respective surfaces. It is known in fact that surfaces that operate by mutual friction are subject to wear, thus compromising the reliability of the device over time.

[0013] The aim of the present invention is to provide a braking device for roller curtains, generally for blinds, mosquito screens and the like, which is more effective and reliable than the braking devices generally used.

[0014] Within this aim, an object of the invention is to provide a braking device that is minimally affected by the thermal variations that develop in the different seasons.

[0015] Another object of the invention is to provide a braking device that offers optimal reliability and lifetime.

[0016] A further object of the invention is to provide a device that is composed of a reduced number of component parts and thus is low-cost.

[0017] This aim and these and other objects which will become more apparent hereinafter are all achieved by a braking device for slowing the winding velocity of movable curtains with spring winding, such as mosquito screens and the like, **characterized in that** it comprises a rotor housing within which a rotor pin is coupled, the space existing between rotor pin and rotor housing being filled by a viscous fluid adapted to generate friction in case of rotation of said rotor pin within said rotor housing, for the generation of a torque resisting the rotation of said rotor pin, a gasket seal being provided between said rotor pin and said rotor housing.

[0018] More specifically, the housing functions as a rotor and from its outer surface one or more tabs extend that engage in grooves that are present in the curtain-rolling shaft and the function of which is to entrain the rotor housing.

[0019] In the housing there is a cylindrical hole which extends along the main axis thereof, and also on this axis at the center of the hole a cylindrical shaft of almost the same length as the inner hole extends.

[0020] The inner surfaces of the hole and of the shaft in the rotor housing are completely smooth.

[0021] One end of the pin is positioned between the central shaft and the inner diameter in the rotor housing, and the space that remains acts as a container of a certain quantity of viscous fluid (oil, grease or the like) which is kept in place by way of an adapted gasket arranged at the end of the rotor housing.

[0022] On the bottom of the hole in the pin one or more holes radiate transversely toward the outer diameter, and serve to allow the air to vent during the step of filling with viscous liquid.

[0023] The surfaces of the pin which are in contact with the viscous liquid are also completely smooth.

[0024] The other end of the pin is fitted into a spring which has a threefold function:

- it maintains the whole device in position;
- it blocks the pin when it is subjected to turning in the direction opposite to that of the coils of the spring;
- it leaves the pin, and thus the whole device, to turn freely when it is caused to turn in the direction of winding of the coils of the spring, i.e. when the operator unrolls (closes) the curtain or mosquito screen from the shaft.

[0025] For preventing the device from slipping out of the spring when it turns freely within the spring, one or more protruding bulges are provided in the inner diameter of the spring. With the spring fitted over the pin, the bulges are arranged in an adapted circular groove that is present in the pin.

[0026] The other end of the spring is forced to fit over the header of the box, which contains the curtain-rolling or mosquito screen-rolling shaft on its inside.

[0027] The right-handed or left-handed braking function of the braking device is ensured by the direction of winding of the helix of this portion of spring.

[0028] The use of the spring with the aforementioned threefold function makes it possible to simplify the braking device, by eliminating all the components that made up the various pawls provided in order to achieve braking in one direction of rotation only.

[0029] In an additional, different embodiment, the spring can be eliminated by fitting, on the header, an automatic fastener, provided with elastic teeth, which allow the pin to turn freely in one direction, i.e. when the operator closes the curtain, but at the same time allow the blocking of its rotary movement if it is forced to turn in the other direction, i.e. when the curtain is opened again, thus enabling the rotor housing to undergo the deceleration thanks to the friction that develops internally and as a consequence transmitting this deceleration to the curtain-rolling shaft.

[0030] Further characteristics and advantages of the invention will become more apparent from the description of a preferred, but not exclusive, embodiment of the device according to the invention, which is illustrated by way of non-limiting example in the accompanying drawings wherein:

Figure 1 is an exploded view of the braking device according to the invention;

Figure 2 is a sectional side view of the braking device according to the invention;

Figure 3 is a sectional front view of the braking device according to the invention;

Figure 4 is a view of the spring with associated inner bulges which serve to keep the device in position even when it turns freely within the spring;

Figure 5 is a view of the pin with a seat for retaining the spring on the pin; this figure also shows the transverse holes which serve to vent the air during the step of filling with the viscous fluid;

Figure 6 is a view of the pin with a seat according to a variation with respect to Figure 5, with a through slit toward the outer diameter, longitudinal with respect to the hole;

Figure 7 is a view of the pin with an automatic system for fastening the device to the header.

[0031] With reference to the figures, the device according to the invention comprises a spring 2 that serves to keep the device in position, leave it to turn freely when the braking function is not used, and on the other hand block a rotor pin 4 when the curtain is rolled up and the braking function is required. The spring 2 is fitted at one end over a header 1, and at the other end over the pin 4 until bulges A, which are provided on the inner diameter thereof, enter a groove B of the pin 4.

[0032] The pin 4 is inserted in a seat defined between a central shaft C and a hole of the rotor housing 5. The housing 5 also acts as a container of a certain quantity of viscous fluid 6, which is kept in place by an adapted gasket 3. On the bottom of a central hole D provided in the pin 4 there are, in a transverse direction, one or more holes E, which serve to vent the air during the step of filling with the viscous liquid.

[0033] The holes E can be substituted by a through slit F, which is longitudinal with respect to the central hole D.

[0034] The rotor housing 5 has on its outer diameter one or more tabs G which engage in the grooves of a curtain-rolling shaft 7, and the function of which is to make the rotor housing turn.

[0035] The braking force is exerted by the friction that is released between the surfaces of the pin 4 in contact with the viscous grease or oil 6 and the inner surfaces of the rotor housing 5. With the addition of the central shaft C arranged inside the rotor housing, the braking surface has been greatly increased and thus the dimensions and encumbrances of the braking device have been appreciably reduced.

[0036] An additional feature of the invention lies in the fact that all the braking surfaces in contact with the viscous liquid are circular, smooth, totally free from protuberances, fins and the like, and the play between them is minimal. This has made it possible to reduce the quantity of viscous liquid and thus obtain a greater stability with respect to the changes in temperature that occur

over the year.

[0037] Figure 6 shows the pin 4 with an automatic system of fastening to the header 1, provided by way of elastic teeth H, which with their orientation allow the pin to turn freely in one direction, but at the same time block it if it is induced to turn in the other direction, thus making it possible for the rotor housing 5 (not shown in Figure 6) to be slowed thanks to the friction that the viscous oil causes.

[0038] In practice it has been found that the braking device according to the invention fully achieves the set aim and objects.

[0039] The device, thus conceived, is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0040] Moreover, all the details may be substituted by other, technically equivalent elements.

[0041] In practice the materials employed, and the contingent shapes and dimensions, may be any according to requirements and to the state of the art.

[0042] The disclosures in Italian Patent Application No. BG2012A000029 from which this application claims priority are incorporated herein by reference.

[0043] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A braking device for slowing the winding velocity of movable curtains with spring winding, such as mosquito screens and the like, **characterized in that** it comprises a rotor housing (5) within which a rotor pin (4) is coupled, the space existing between rotor pin (4) and rotor housing (5) being filled by a viscous fluid (6) adapted to generate friction on the rotation of said rotor pin (4) within said rotor housing (5), for the generation of a torque resisting the rotation of said rotor pin, a gasket seal (3) being provided between said rotor pin and said rotor housing (5).
2. The device according to claim 1, **characterized in that** said rotor housing (5) accommodates on its inside a shaft (C) which is integral with said rotor housing.
3. The device according to claim 3, **characterized in that** said rotor housing comprises on its outer surface at least one tab (G) which is adapted to engage grooves defined in the inner surface of a curtain take-up shaft (7).
4. The device according to one or more of the preceding

claims, **characterized in that** it comprises a spring (2) which at one end is fitted over an end of said rotor pin (4) and at the other end is fitted over a header element that is adapted to be arranged at one end of said curtain take-up shaft (7).

5. The device according to one or more of the preceding claims, **characterized in that** said rotor pin (4) has a slit (B) that is adapted to accommodate the end of said spring (2).
6. The device according to one or more of the preceding claims, **characterized in that** said rotor pin (4) is provided with means of venting (E, F).
7. The device according to claim 6, **characterized in that** said venting means comprise at least one hole (E) which is formed in the surface of said rotor pin (4).
8. The device according to claim 6 or 7, **characterized in that** said venting means comprise a groove (F) which is formed in the surface of said rotor pin (4).
9. The device according to one or more of the preceding claims, **characterized in that** said rotor pin (4) has elastic teeth (H) which are adapted to allow the mating with said header element (1).
10. The device according to one or more of the preceding claims, **characterized in that** the outer surface of the rotor pin (4) and the inner surface of the rotor housing are smooth, free from protuberances and the like.
11. A curtain take-up shaft, **characterized in that** it comprises on the inside a braking device according to one or more of the preceding claims.

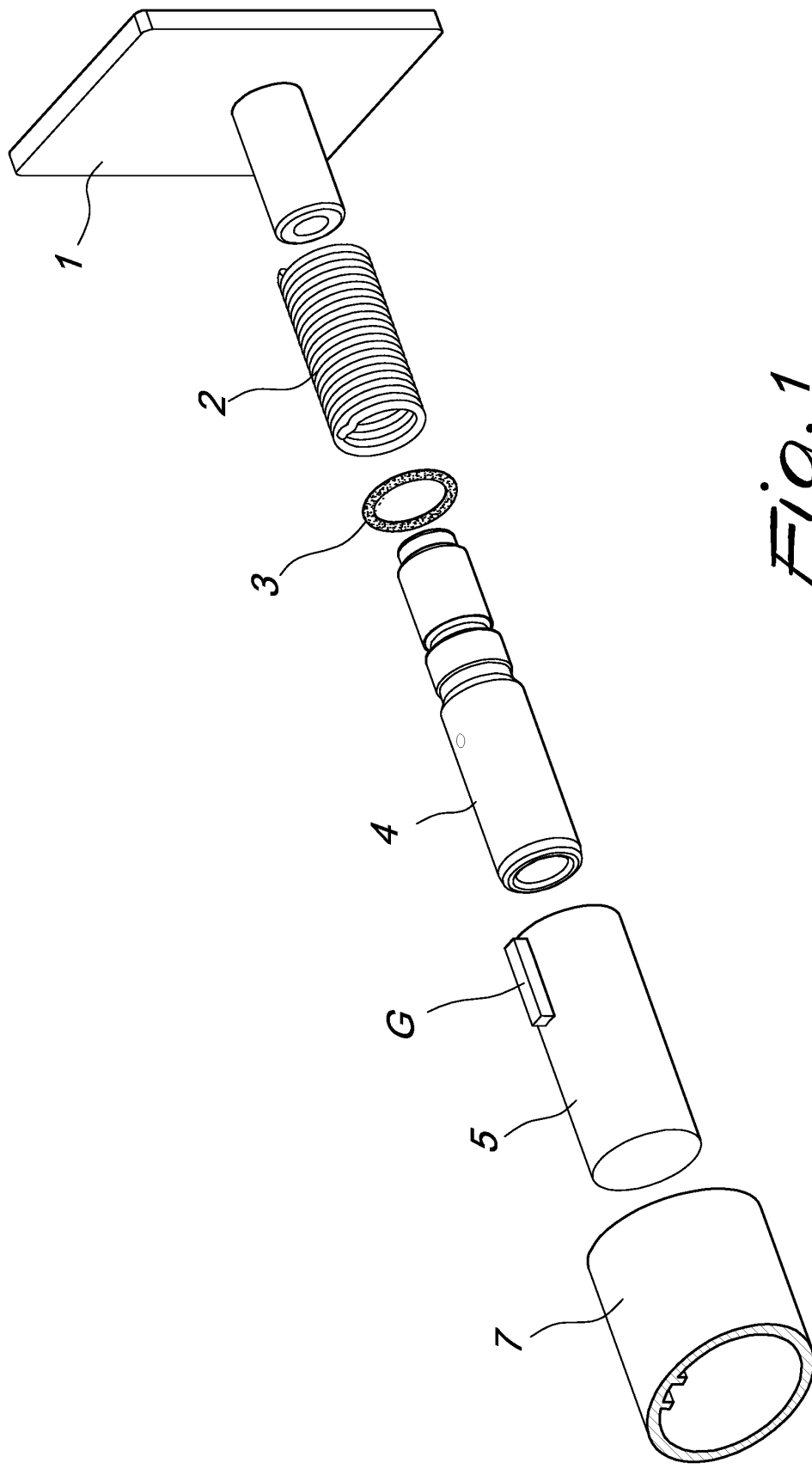


Fig. 1

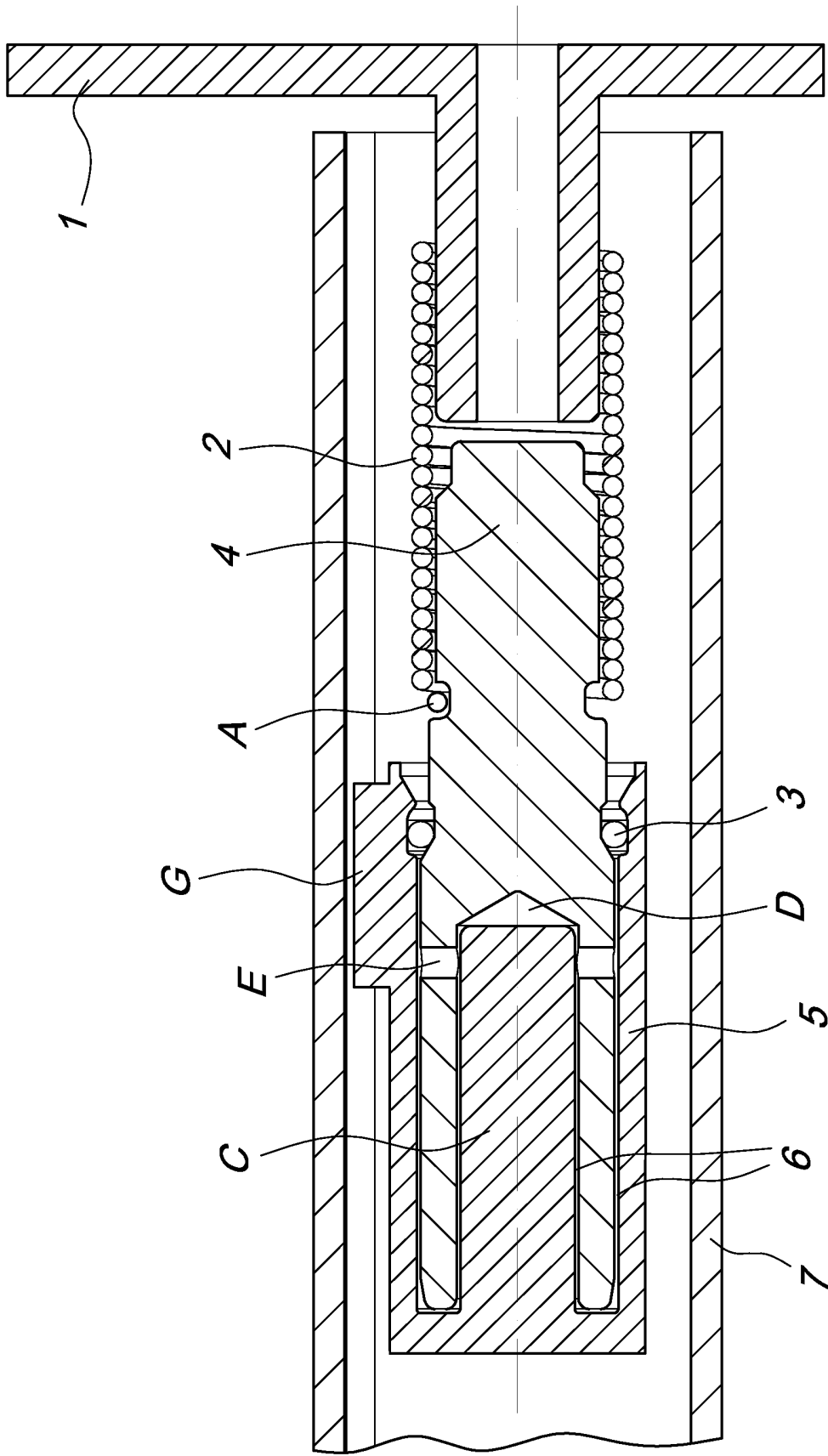


Fig. 2

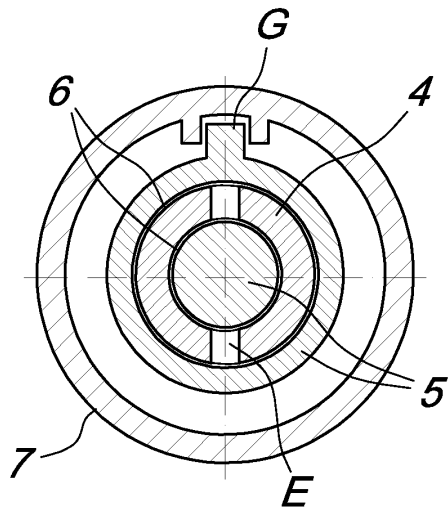


Fig. 3

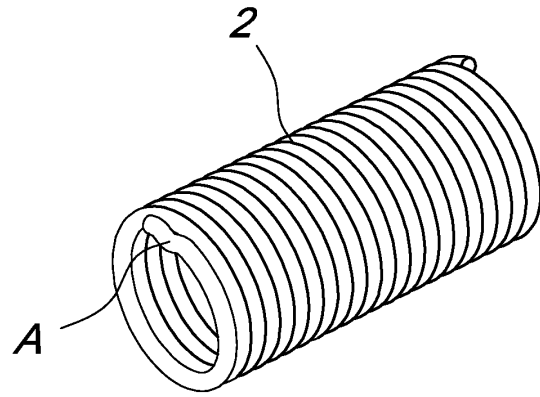


Fig. 4

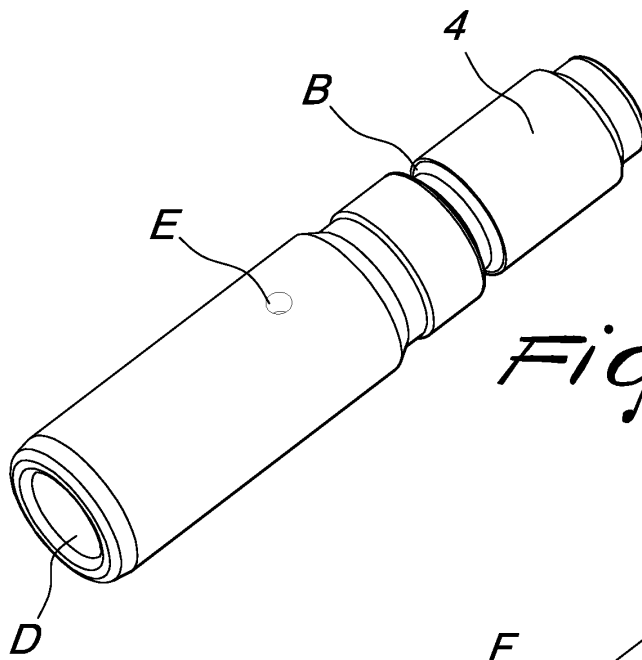


Fig. 5

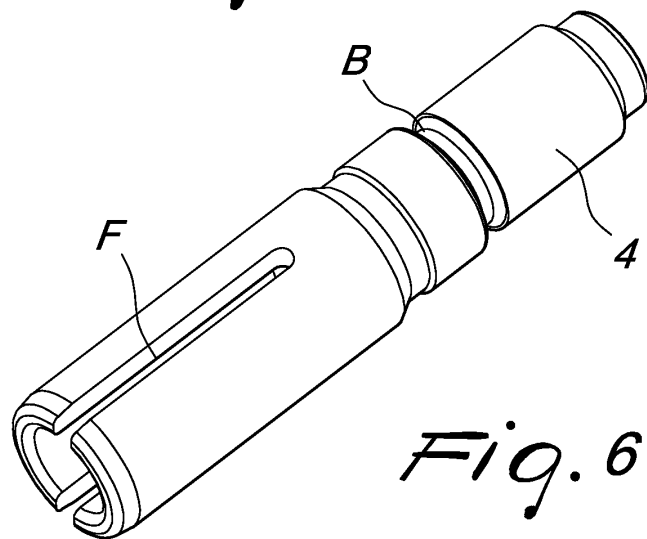
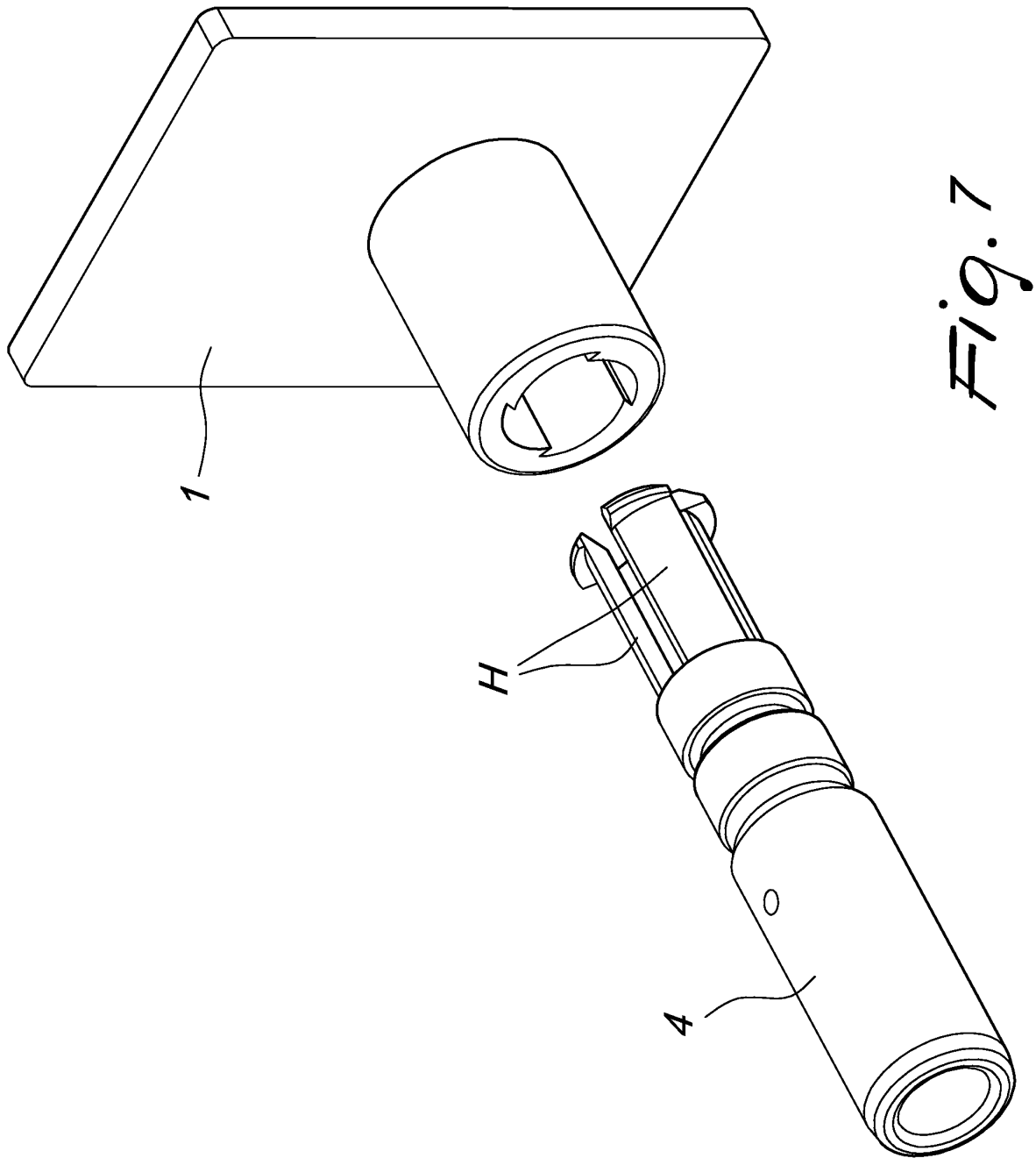


Fig. 6



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- IT BG20120029 A [0042]