(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 899 359 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
29.07.2015 Bulletin 2015/31

(21) Application number: **15152459.2**

(22) Date of filing: **26.01.2015**

(51) Int Cl.:
E06B 9/50 *(2006.01)* ***E06B 9/42*** *(2006.01)*
E06B 9/62 *(2006.01)* ***E06B 9/60*** *(2006.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **27.01.2014 IT RM20140039**

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(54) A device for pre-loading a spring of a rolling curtain

(57) A device (D) for pre-loading a pre-loading spring (MP) of a rolling curtain that can be installed between said curtain and a lateral end piece (11) for fixing the curtain to a load-bearing structure, characterized in that it can be installed coaxially at at least one end of a screen tube (TR) on which a rolling curtain or a rolling mosquito screen is rolled and in that it comprises, in combination: an external support (1) on which there can be fitted the screen tube (TR), having a toothed inner area with a substantially saw-tooth profile; a spring pin (6) fitted at the end of the pre-loading spring (MP); a snap-action spring (5) that is substantially constituted by a bushing with one or more saw-tooth external teeth, designed to undergo elastic deformation in a radial direction and cooperate with said internal toothed area of the external support (1); an engagement pin (2); and an internal bushing (4); wherein said elements are positioned coaxially with respect to one another and share the axis of the rolling curtain.

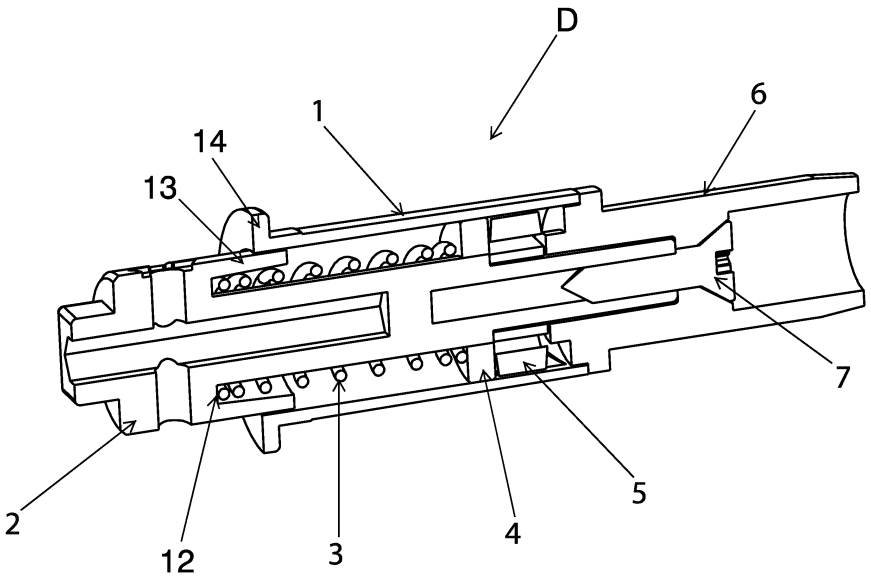

FIG.1A

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Description

[0001] The present invention relates to the sector of door and window frames, and in particular to curtains of the rolling type.

[0002] It is known that rolling curtains are equipped with an actuating spring that must be pre-loaded at the moment of installation.

[0003] The present invention regards an innovative pre-loading device that is particularly convenient and safe to install, in so far as it does not require particular equipment or arrangements for mounting and installation.

[0004] Known from WO 2009/128108 is a spring-winding device that envisages a bushing provided with front-engagement teeth (i.e., ones engaging in an axial direction), wherein the element that rigidly connects the winding spring to the lateral support is divided into two parts that can slide axially with respect to one another, one of which has a series of teeth once again of the front-engagement type. According to the position of axial sliding, the teeth do or do not engage: if the teeth engage, the winding spring has its ends blocked, whereas, if the teeth do not engage, the spring exerts its own force on the tube via the end engaged in the latter. The teeth do not engage when the spring is located in its seat since installation determines sliding of the two parts with front teeth in the sense of releasing the teeth from engagement. The teeth of said two axially slidable parts are rigid and are unable to undergo any elastic deformation.

[0005] A disadvantage of the above known device is represented by the fact that, in the device described in WO 2009/128108, there is always necessary a force that keeps the teeth of the two axially sliding components constantly in front engagement in order to enable rotation only in the loading direction.

[0006] One of the purposes of the present invention is to overcome the above drawbacks by providing a device equipped with an element that is not present in WO 2009/128108 and is provided with engagement teeth that are elastically deformable in a radial, and not axial, direction, thus rendering unnecessary the constant presence of an axial force that constantly keeps in front engagement the front teeth of the two axially slidable components that, together, connect the winding spring to the lateral support.

[0007] A better understanding of the invention will be obtained from the ensuing detailed description with reference to the figures listed below, which illustrate a preferred embodiment of the invention.

[0008] In the drawings:

Figure 1A is a 3D view of the device according to the invention assembled and sectioned according to the longitudinal axis;

Figure 1B is a cross-sectional view corresponding to that of Figure 1A;

Figures 2 and 3 show the device as a whole from two opposite viewpoints;

Figure 4 shows the details of the engagement teeth of the snap-action spring that engage with the ones inside the tube support;

Figures 5 and 6 show the device in two exploded views from two opposite viewpoints;

Figure 7 shows the device as a whole in a position of loading of the pre-loading spring, with the teeth of the snap-action spring engaged with those of the tube support;

Figure 8 shows the device as a whole in the working position, with the teeth of the snap-action spring released from those of the tube support;

Figure 9 is a 3D view that shows a detail of installation of the device;

Figure 10 is an exploded view corresponding to that of Figure 9;

Figure 11 is a 3D view that shows a detail of the installation of the device in the box of the rolling curtain; and

Figure 12 is an exploded view corresponding to that of Figure 11.

[0009] In what follows reference will be made to the case of rolling mosquito screens, but the teachings may be applied - without modifications - to any type of rolling curtain.

[0010] The device D illustrated in Figure 1 is designed for carrying out pre-loading of the spring that enables winding and unwinding of the screen on the tube in rolling mosquito screens.

[0011] In particular, loading of the spring occurs without any possibility of it unwinding dangerously during installation on account of a wrong manoeuvre on the part of the installer.

[0012] A peculiar characteristic of the invention lies in the fact that, unlike what occurs for traditional devices, loading of the spring can be carried out prior to installation, i.e., during assembly of the components in the box of the rolling curtain, and not, as usually occurs, directly at the moment of installation when the box is mounted on the door or window frame.

[0013] Furthermore, in the event of deterioration or failure of the mesh of the mosquito screen, dismantling and replacement thereof can be carried out in a faster way.

[0014] With reference to the figures listed above, the device D comprises a plurality of elements coaxial to one another and sharing the axis of the rolling mosquito screen, namely: an external support 1; an engagement pin 2; a retaining spring 3; an internal bushing 4; a snap-action spring 5; and a spring pin 6. All these elements are described hereinafter.

[0015] As regards the external support 1, inserted therein is the tube TR on which the mosquito screen is rolled. Assembled coaxially to the support 1 are the components that constitute the device D, and the support itself is moreover provided with a toothed inner area with a substantially saw-tooth profile that is of primary impor-

tance for operation thereof.

[0016] On the outer surface of said support 1, a projection 10 is provided that projects in a radial direction and has a body with longitudinal development, like a spline, having the purpose of constraining in rotation the tube TR of the mosquito screen on the support 1. Accordingly, this tube TR envisages one or more internal longitudinal grooves designed to co-operate with said projection 10.

[0017] Furthermore, the proximal end of the support 1 has a perimetral shoulder 14 designed to provide a valid resting contrast for the screen tube TR on which the mosquito screen is rolled.

[0018] The engagement pin 2 has the dual function of connection between the device and the lateral end piece for fixing the mosquito screen to the door or window frame and between the device D and the pre-loading spring through the spring pin 6. It has a distal-end area having a square cross section, located on which is the snap-action spring 5. Provided in the outer part of the proximal end is an area that has, preferably, both a slot with a hexagonal cross section and a protrusion having a square (or hexagonal) shape that enables loading of the spring using appropriate wrenches of an Allen-wrench type or of a fixed-wrench type. Adjacent to the proximal end a shoulder 12 is provided on which the retaining spring 3 comes to bear. In order to prevent any sticking during the relative axial movement between the pin 2 and the support 1, provided on the outside of the retaining spring 3 and adjacent to the shoulder 12 is a tubular sleeve 13 designed to slide freely within the support 1.

[0019] The retaining spring 3, with axial thrust, keeps the components of the ensemble in the correct working position. Prior to installation, the retaining spring 3 is not compressed or is only slightly compressed and enables engagement for loading in so far as the spring pin 6 bears upon the distal end of the tube support 1 and keeps the snap-action spring 5 in a position such that it can mesh with the internal toothing of the tube support 1. After installation, the retaining spring 3 tends (as will be seen more clearly from what follows) to bring the parts back into the position of engagement of the snap-action spring 5 with the toothed part of the tube support 1.

[0020] The internal bushing 4, preferably made of brass, during operation, has the function of a thrust bearing between the retaining spring 3 and the snap-action spring 5, as well as that of longitudinal-guide bearing between the cylindrical body of the engagement pin and the tube support 1. It is only the latter, in fact, that turns during winding-unwinding of the pre-loading spring (i.e., closing-opening of the mosquito screen).

[0021] The snap-action spring 5, thanks to the particular nature of its geometry and of the material of which it is made, constitutes the true novelty of the device. It is substantially constituted by a bushing with one or more saw-tooth external teeth, designed to undergo elastic deformation in a radial direction. It is made of plastic material containing elastomer that enables it to bend elastically its own teeth in a radial direction to engage by snap action the teeth present inside the tube support 1 and simultaneously to be able to turn and thus load the pre-loading spring MP of the mosquito screen.

[0022] On the spring pin 6 the end part of the pre-loading spring MP is fixed. Assembly of said spring pin 6 with the engagement pin 2 is obtained via a self-tapping screw 7.

OPERATION OF THE DEVICE

[0023] The pre-loading device D according to the present invention is designed to be mounted in the tube TR with round section, on which the mesh of the mosquito screen is rolled and, more precisely, at the end of said round tube and simultaneously at the end of the pre-loading spring MP that brings about rolling and unrolling of the mosquito screen itself (see Figure 9) and that is protected by the spring tube TM.

[0024] By holding stationary the tube TR on which the screen is placed, it is sufficient to turn the engagement pin 2 (for example, with a hexagonal Allen wrench or with a spanner) so as to get also the snap-action spring 5 and the spring pin 6, which are fixed in rotation with respect thereto, to turn.

[0025] The aforesaid snap-action spring 5 can turn, with respect to the tube support 1, only in the loading direction (clockwise according to the arrow of Figure 2) thanks to the elastic teeth DM having a saw-tooth profile with which it is equipped, but cannot turn in the opposite direction given the geometry of said teeth.

[0026] The above teeth DM of the snap-action spring 5, which according to the invention are flexible and undergo deformation in a radial direction, during rotation engage the rigid teeth DS present within the tube support 1 so as to enable loading of the pre-loading spring MP. The greater the number of turns made, the more the spring MP will be loaded (see Figures 4, 7).

[0027] Once the desired loading has been achieved for the spring MP by actuating the pre-loading device D installed on the tube TR of the mosquito screen, it is sufficient to insert the square head of the engagement pin 2 in the seat purposely provided on the lateral end piece 11 for fixing of the mosquito screen to the door or window frame (see Figures 9-10).

[0028] According to a peculiar characteristic of the present invention, when this operation of positioning *in situ* of the end of the device D in the lateral fixing end piece 11 is performed, the engagement pin 2 is displaced axially with respect to the tube support 1 towards the centre of the mosquito screen, and this displacement advantageously exerts a thrust on the snap-action spring 5, which translates together with the spring pin 6 until it disengages from the toothed area inside the tube support 1 (see Figure 8). In this way, the mechanism according to the present invention is in the working position; namely, it is free to turn in both directions of rotation (either clockwise or counterclockwise), which is equivalent to saying

that the mosquito screen can be opened and closed normally.

[0029] It is should be noted that the above axial displacement of the engagement pin 2 with respect to the support 1 of the tube TR of the mosquito screen causes exertion of a thrust on the retaining spring 3, which, undergoing axial compression, applies a force of contrast on the bushing 4 that, with its external circumference, bears upon the internal toothing of the tube support 1. This compression of the retaining spring 3 enables the device D to be brought back into the pre-loading configuration as soon as it is removed from the lateral fixing end piece 11.

ASSEMBLY OF THE COMPONENTS

[0030] From the operating standpoint, there should be noted the simplicity of installation. In fact, assembly of the device simply requires the following operations:

A - inserting the retaining spring 3 and the bushing 4 made of brass on the part with round section of the engagement pin 2;
B - resting the tube support 1 and the snap-action spring 5, inserting it in the part with square section of the engagement pin 2;
C - inserting the spring pin 6 until it is brought to bear upon the engagement pin 2 and upon the tube support 1; and
D - inserting the fixing screw 7, preferably a self-tapping screw, and screwing it until all the components are brought to bear properly on one another.

[0031] The device is thus assembled with the aid of a single fixing screw 7.

Claims

1. A device (D) for pre-loading a pre-loading spring (MP) of a rolling curtain that can be installed between said curtain and a lateral end piece (11) for fixing the curtain to a load-bearing structure, said device being **characterized in that** it can be installed coaxially at at least one end of a screen tube (TR) on which a rolling curtain or mosquito screen is rolled and **in that** it comprises, in combination:

- an external support (1) on which the screen tube (TR) can be fitted, having a toothed inner area with a substantially saw-tooth profile;
- a spring pin (6) fitted at the end of the pre-loading spring (MP);
- a snap-action spring (5) that is substantially constituted by a bushing with one or more saw-tooth external teeth, designed to undergo elastic deformation in a radial direction and co-operate with said internal toothed area of the external support (1), where the teeth of said snap-action spring (5) are elastically deformable and project in a radial, and not axial, direction;
- an engagement pin (2) that has the dual function of connection between the device (D) and the lateral end piece (11) for fixing the mosquito screen, as well as between the device (D) and the pre-loading spring (MP) through said spring pin (6); wherein said engagement pin has a distal-end area having a square or polygonal cross section, located on which is the snap-action spring (5);
- an internal bushing (4) that during operation has the function of bearing between the sealing spring (3) and the snap-action spring (5), as well as the function of longitudinal-guide bearing between the cylindrical body of the engagement pin (2) and the tube support (1), which is the only element that turns during winding-unwinding of the pre-loading spring, i.e., during closing-opening of the mosquito screen;

wherein said elements are positioned coaxially to one another and so as to share the axis of the rolling curtain.

2. The device (D) according to Claim 1, **characterized in that** it further comprises a retaining spring (3), with axial thrust, which holds the components of the ensemble in the correct working position: prior to installation, said retaining spring (3) is not compressed or is slightly compressed and enables engagement for loading in so far as the spring pin (6) bears upon the distal end of the tube support (1) and keeps the snap-action spring (5) in a position such that it can mesh with the internal toothing of the tube support (1); after installation, the retaining spring (3) tends to bring the parts of the device back into the configuration of engagement of said snap-action spring (5) with the toothed part of the tube support (1) itself.

3. The device (D) according to either Claim 1 or Claim 2, **characterized in that** provided on the outer surface of said support (1) is a projection (10) that projects in a radial direction and has a body with longitudinal development, like a spline, having the purpose of constraining in rotation the screen tube (TR) of the mosquito screen on the support (1) itself; said screen tube (TR) accordingly envisaging one or more internal longitudinal grooves designed to co-operate with said projection (10).

4. The device (D) according to Claim 3, **characterized in that** the proximal end of the support (1) has a perimetral shoulder (14) designed to provide a valid resting contrast element for the screen tube (TR) on which the mosquito screen is rolled.

5. The device (D) according to one or more of the preceding claims, **characterized in that** provided in the outer part of the proximal end of the engagement pin (2) is an area that has a slot with a hexagonal cross section and/or a protrusion having a square or hexagonal shape that enable/s loading of the spring via appropriate wrenches of an Allen-wrench type or of the fixed-wrench type.

6. The device (D) according to Claim 2, **characterized in that** provided adjacent to the proximal end of the engagement pin (2) is a shoulder (12) on which the retaining spring (3) comes to bear.

7. The device (D) according to Claim 6, **characterized in that** to prevent any sticking during the relative axial movement between the engagement pin (2) and the tube support (1), outside the retaining spring (3) and adjacent to said shoulder (12) a tubular sleeve (13) is provided designed to slide freely within the support (1) itself.

8. The device (D) according to one or more of the preceding claims, **characterized in that** said snap-action spring (5) is made of plastic material containing elastomer that enables it to bend elastically its own teeth in a radial direction so that they can engage by snap action the teeth present within the tube support (1) and simultaneously to turn and thus load the pre-loading spring (MP) of the rolling curtain or of the mosquito screen.

9. The device (D) according to one or more of the preceding claims, **characterized in that** assembly of said spring pin (6) with the engagement pin (2) is obtained via a coaxial self-tapping screw (7).

10. The device (D) according to one or more of the preceding claims, **characterized in that** it is designed to be mounted in the screen tube (TR) with round cross section on which the mosquito screen is rolled and, simultaneously, at the end of the pre-loading spring (MP) that causes the mosquito screen itself to be rolled and unrolled and that is protected by a spring tube (TM).

11. The device (D) according to one or more of the preceding claims, **characterized in that** to pre-load the pre-loading spring (MP), keeping the screen tube (TR) on which the screen is rolled stationary, it is sufficient to get the engagement pin (2) to turn so as to get also the snap-action spring (5) and the spring pin (6) fixed in rotation with respect thereto to turn.

12. The device (D) according to one or more of the preceding claims, **characterized in that** the teeth of the snap-action spring (5) are flexible and undergo deformation in a radial direction, and during rotation engage the rigid teeth present within the tube support (1) so as to enable loading of the pre-loading spring (MP).

13. The device (D) according to one or more of the preceding claims, **characterized in that**, once the desired loading has been reached for the spring (MP), the square head of the engagement pin (2) can be fitted in the seat purposely provided on the lateral end piece (11) for fixing the mosquito screen to the door or window frame; thus obtaining that the engagement pin (2) is displaced axially with respect to the tube support (1) towards the centre of the mosquito screen and said displacement brings about a thrust on the snap-action spring (5), which translates together with the spring pin (6) until it disengages from the toothed area internal to the tube support (1) itself, so that the device itself will be free to turn in both directions of rotation in such a way that the mosquito screen can be opened and closed normally.

14. The device (D) according to Claims 2 and 13, **characterized in that** said axial displacement of the engagement pin (2), with respect to the support (1) of the screen tube (TR) for the mosquito screen, causes a thrust on the retaining spring (3), which, undergoing axial compression, applies a force of contrast on the bushing (4), which, with its outer circumference, bears upon the internal toothing of the tube support (1); thus obtaining that said compression of the retaining spring (3) enables the device (D) to be brought back into the pre-loading configuration as soon as it is removed from the lateral fixing end piece (11).

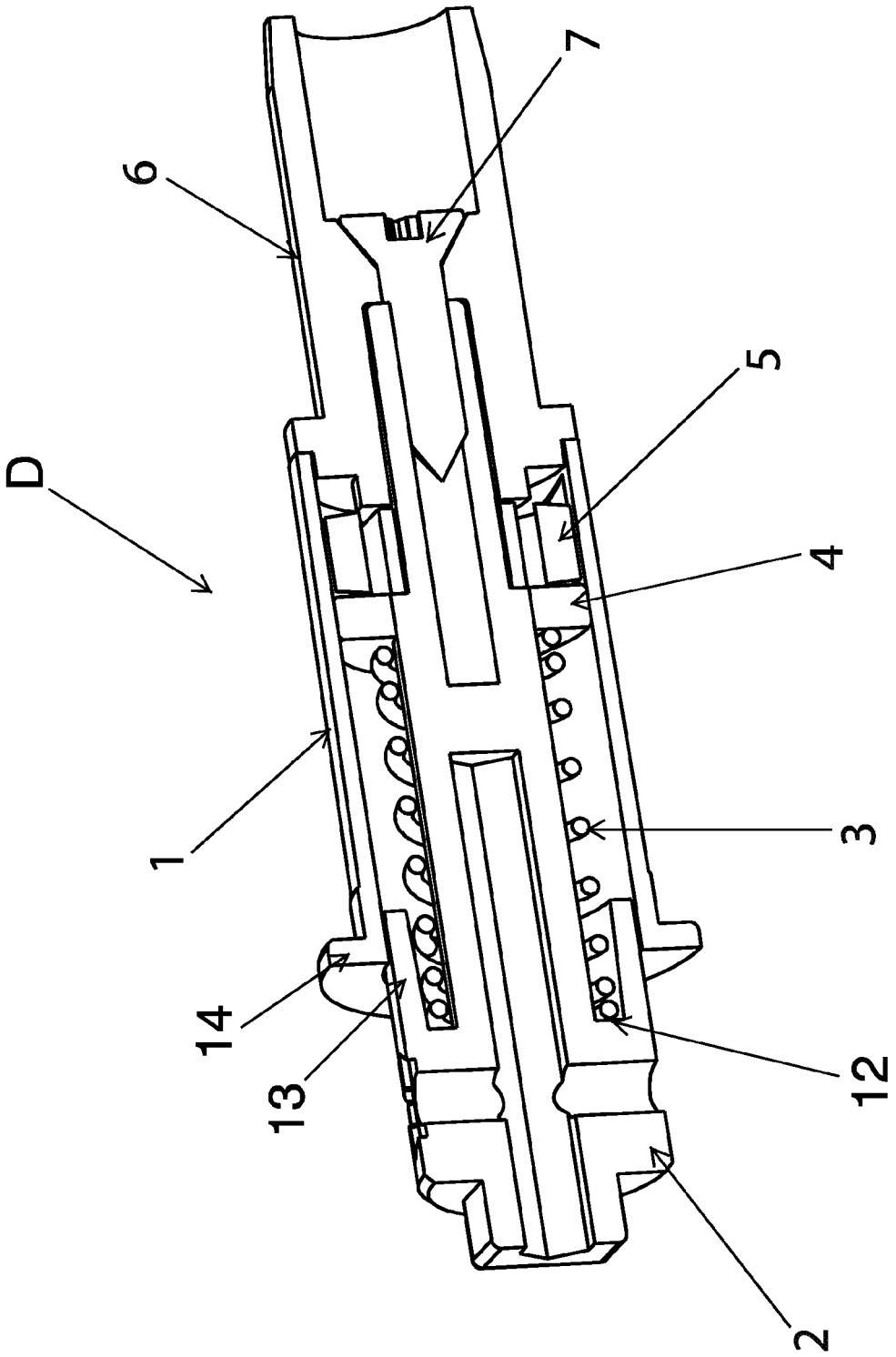


FIG.1A

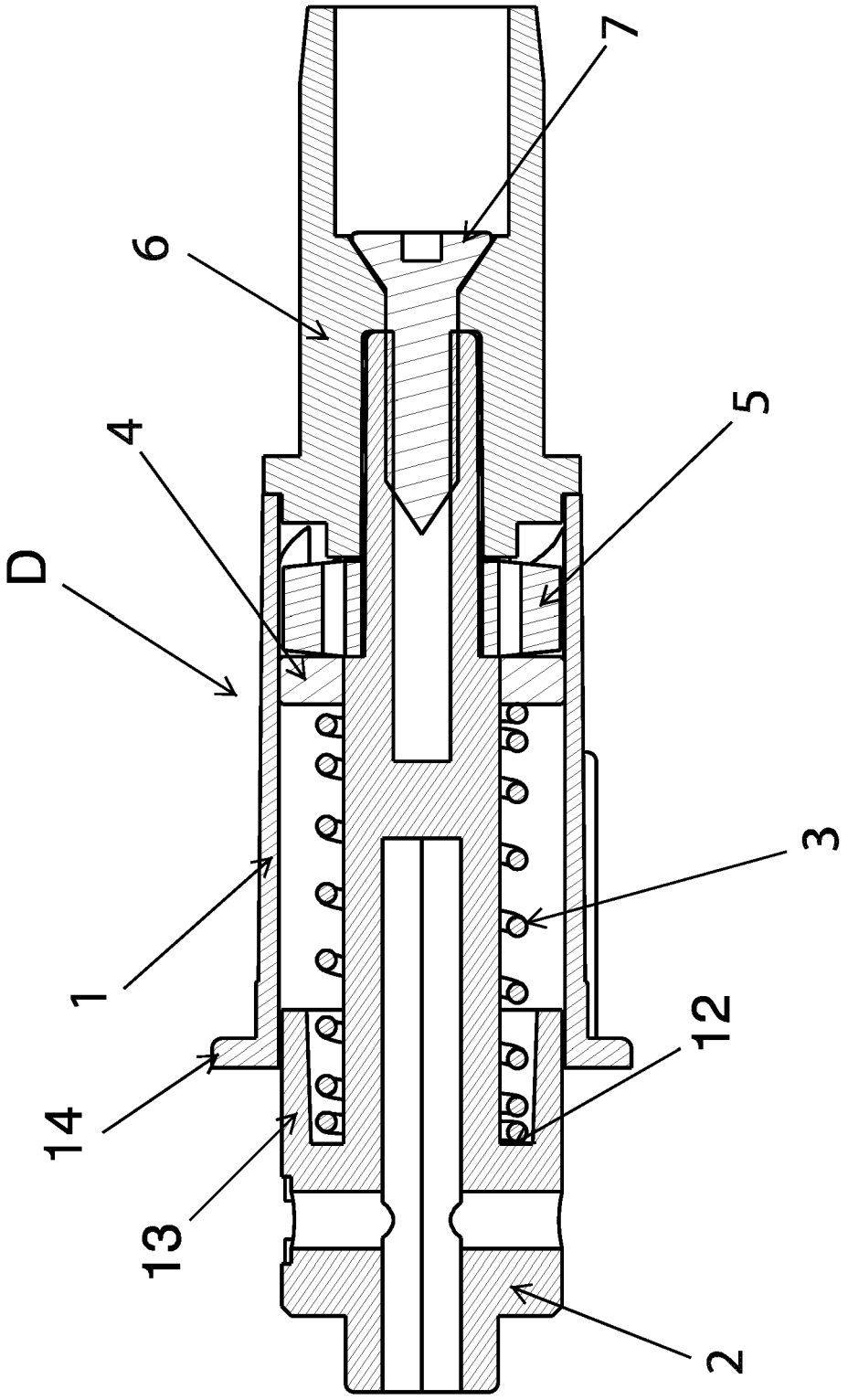


FIG.1B

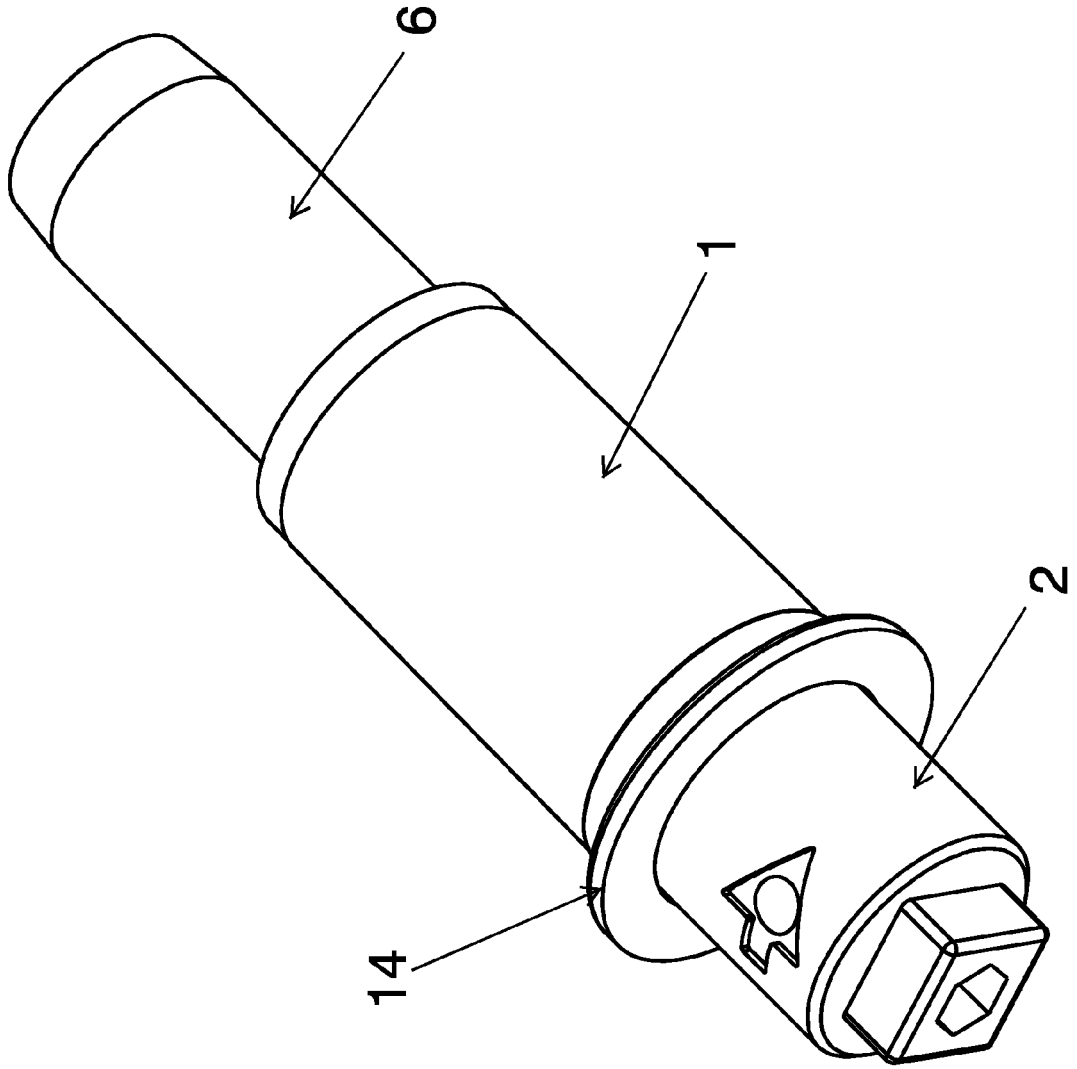
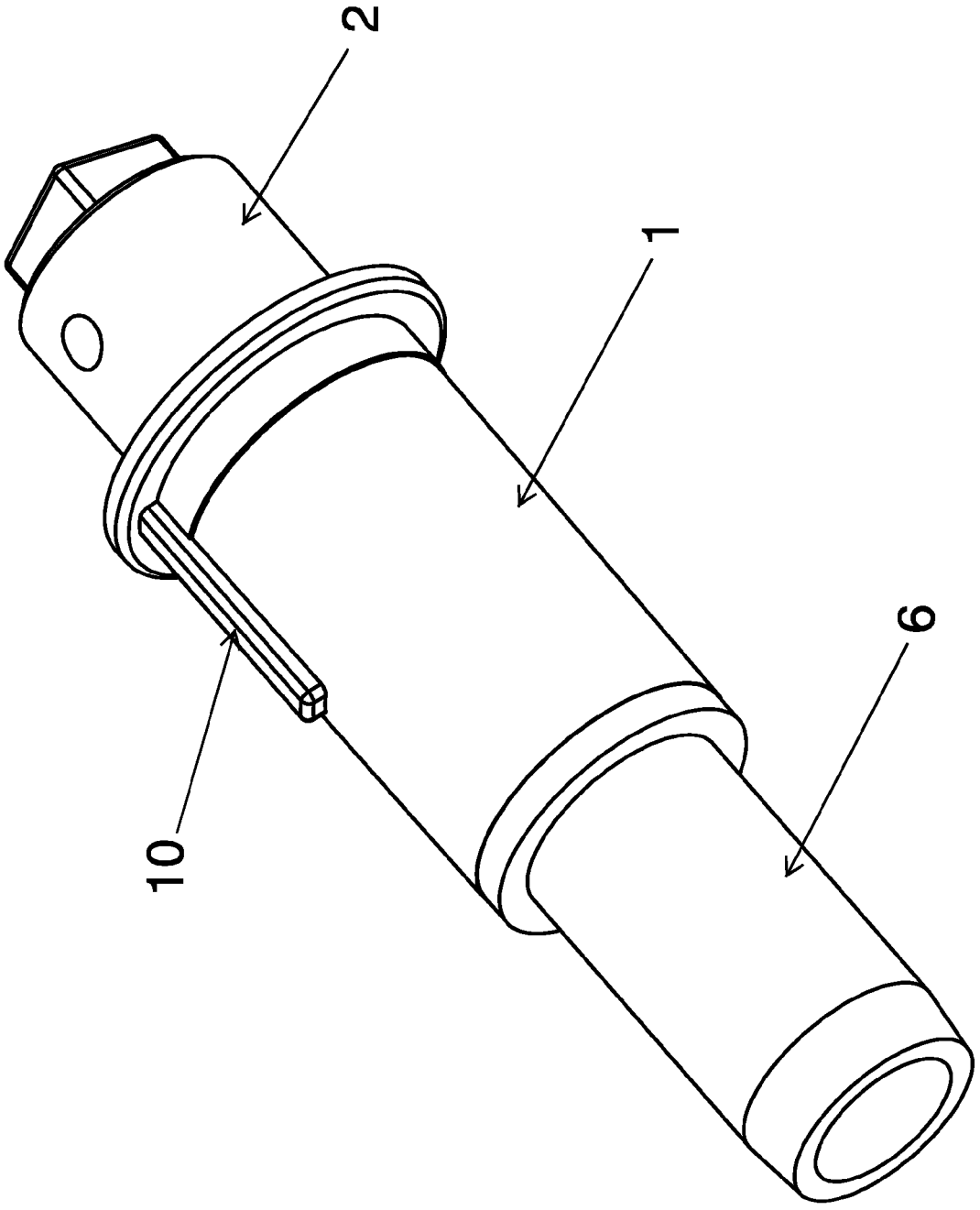


FIG.2

FIG.3



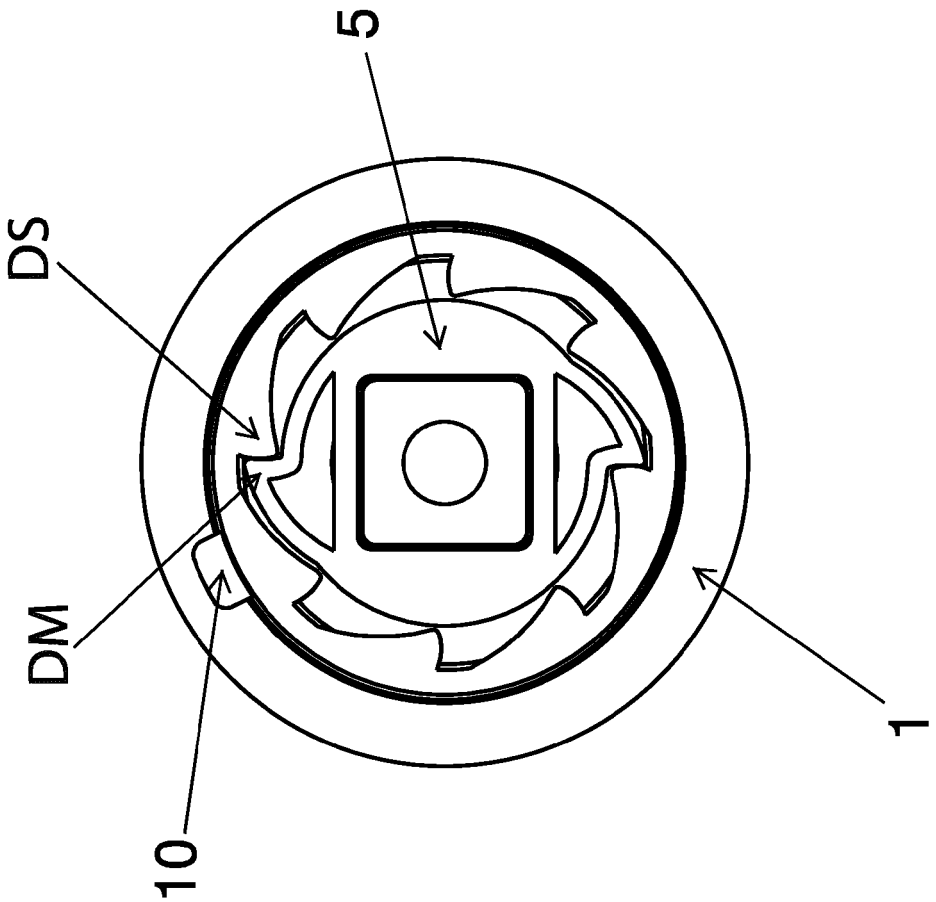


FIG.4

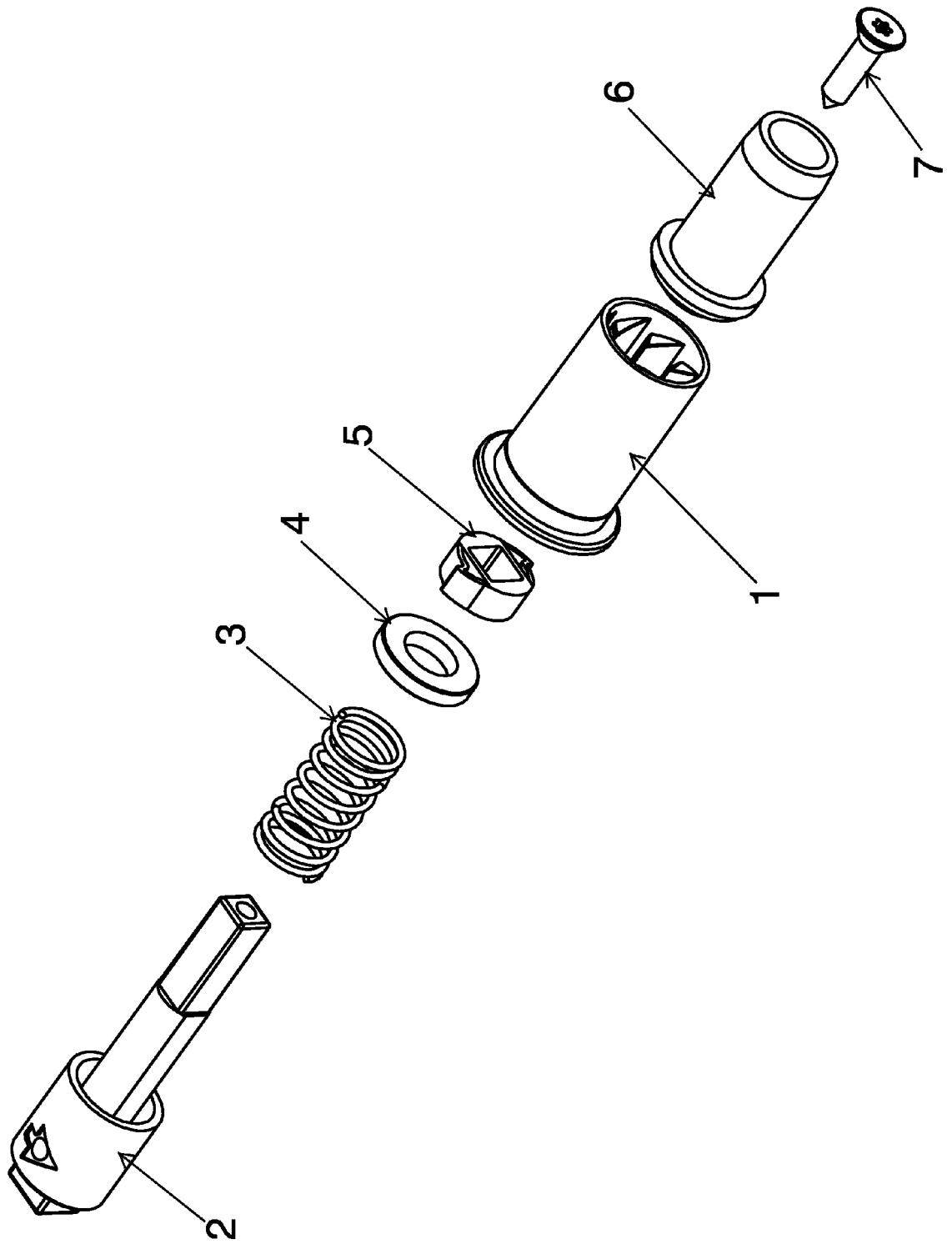


FIG.5

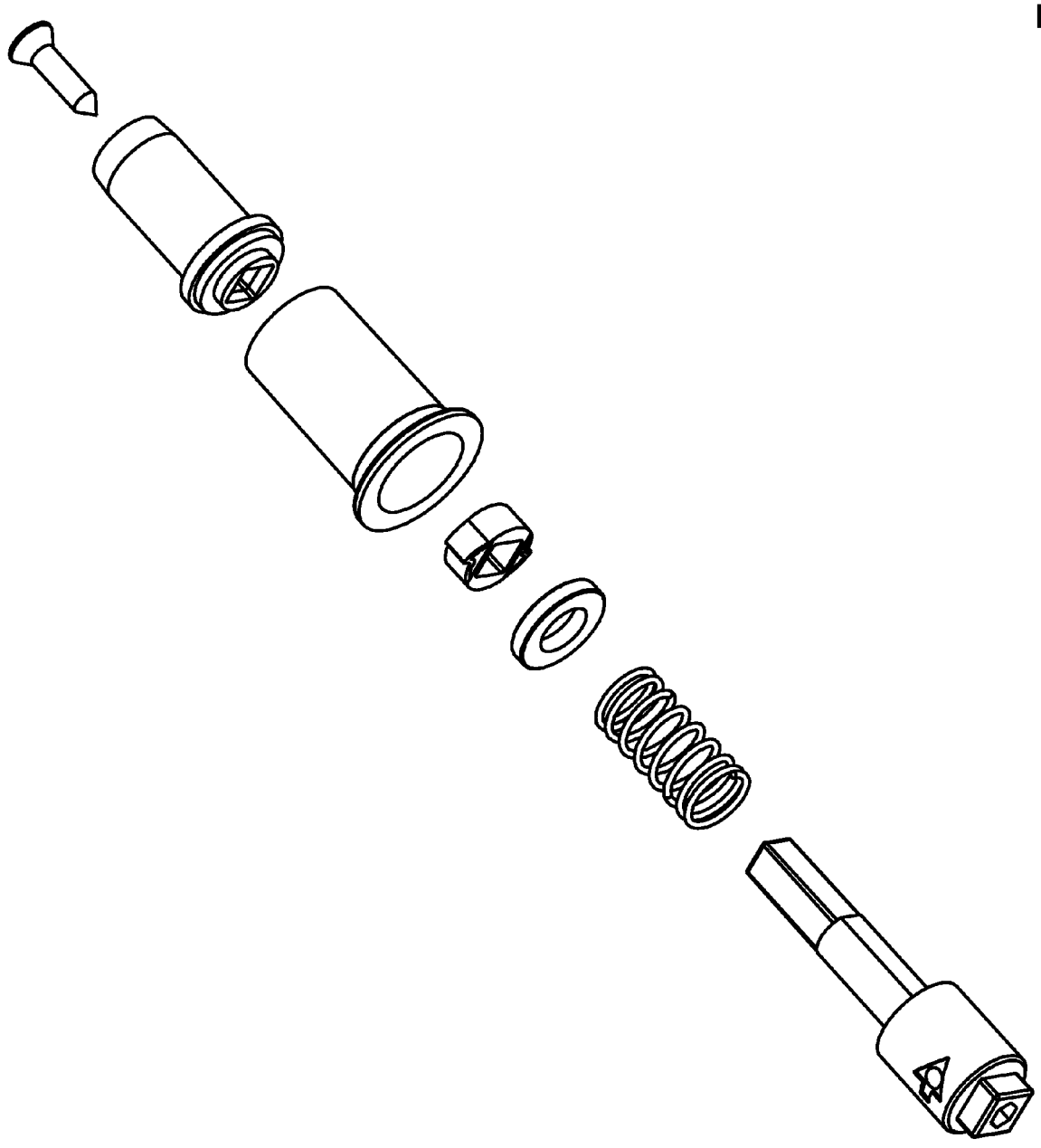


FIG.6

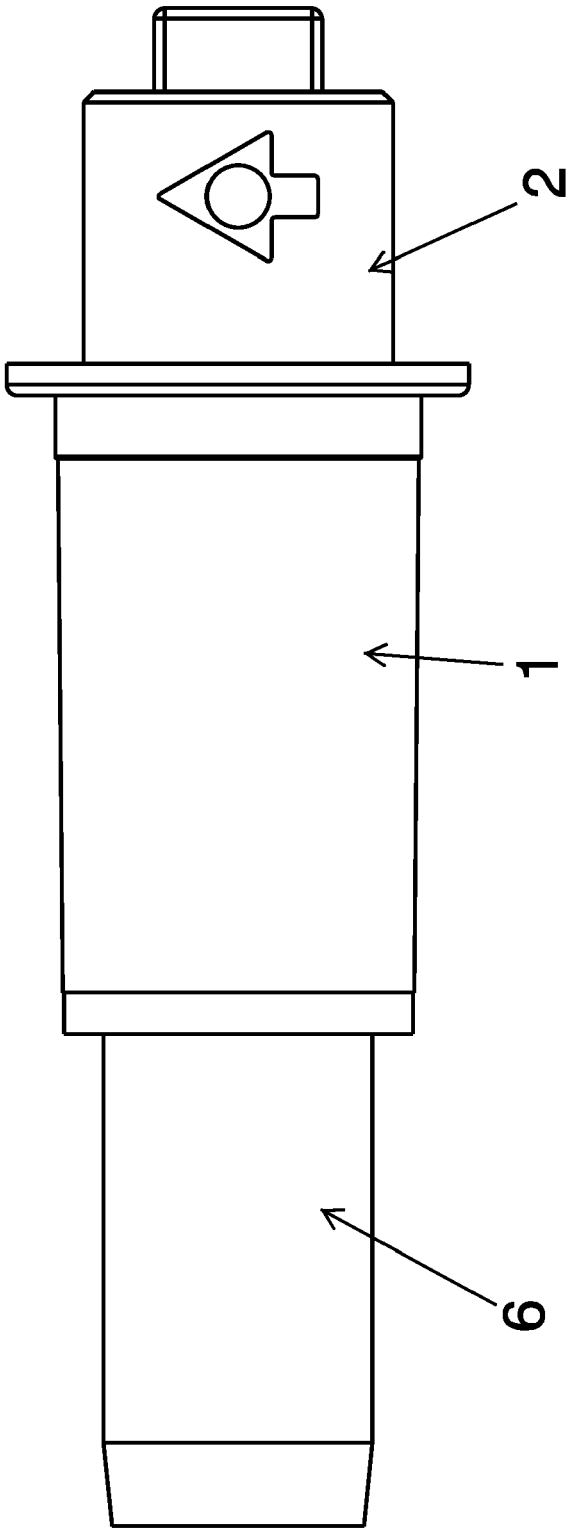


FIG.7

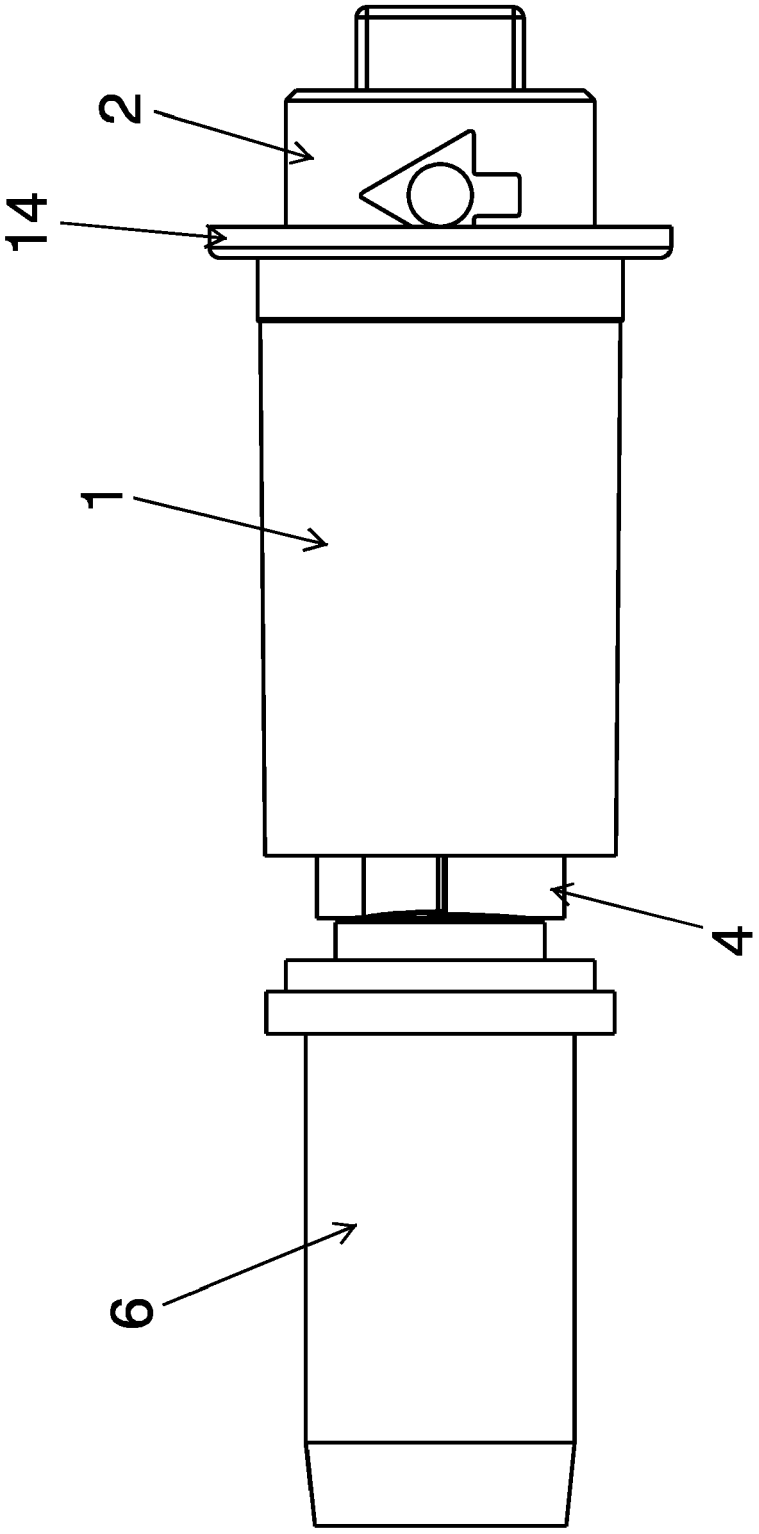


FIG.8

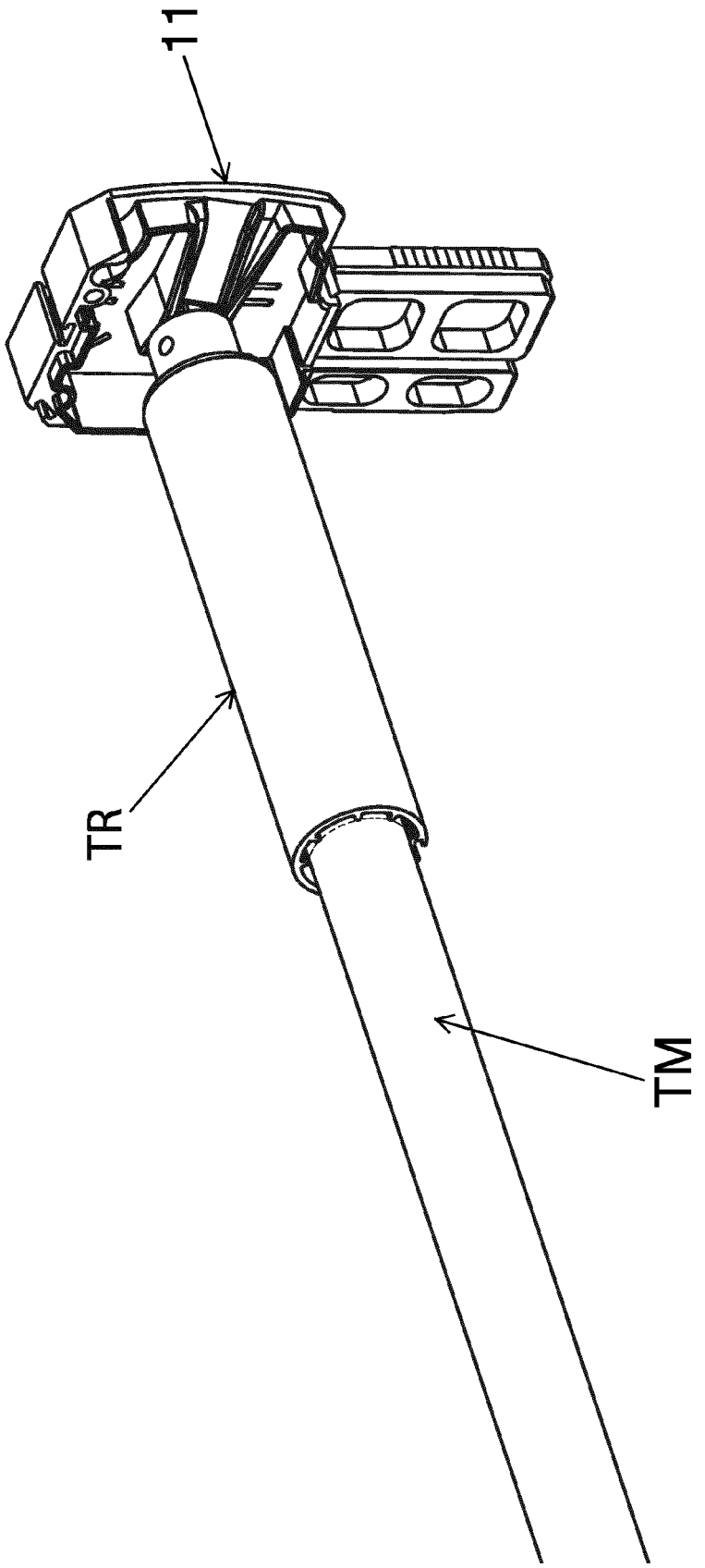


FIG.9

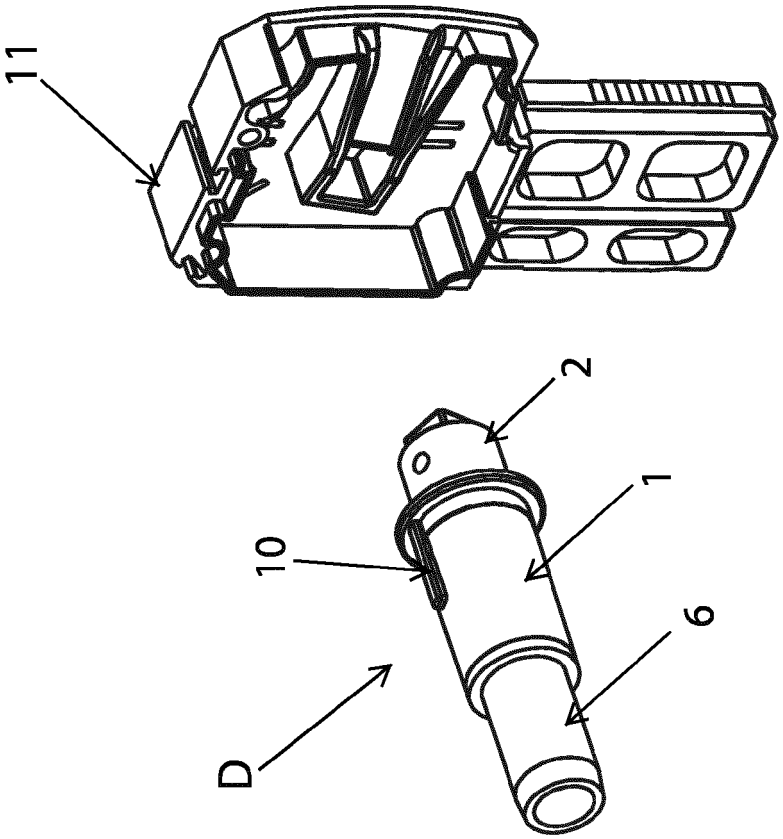


FIG.10

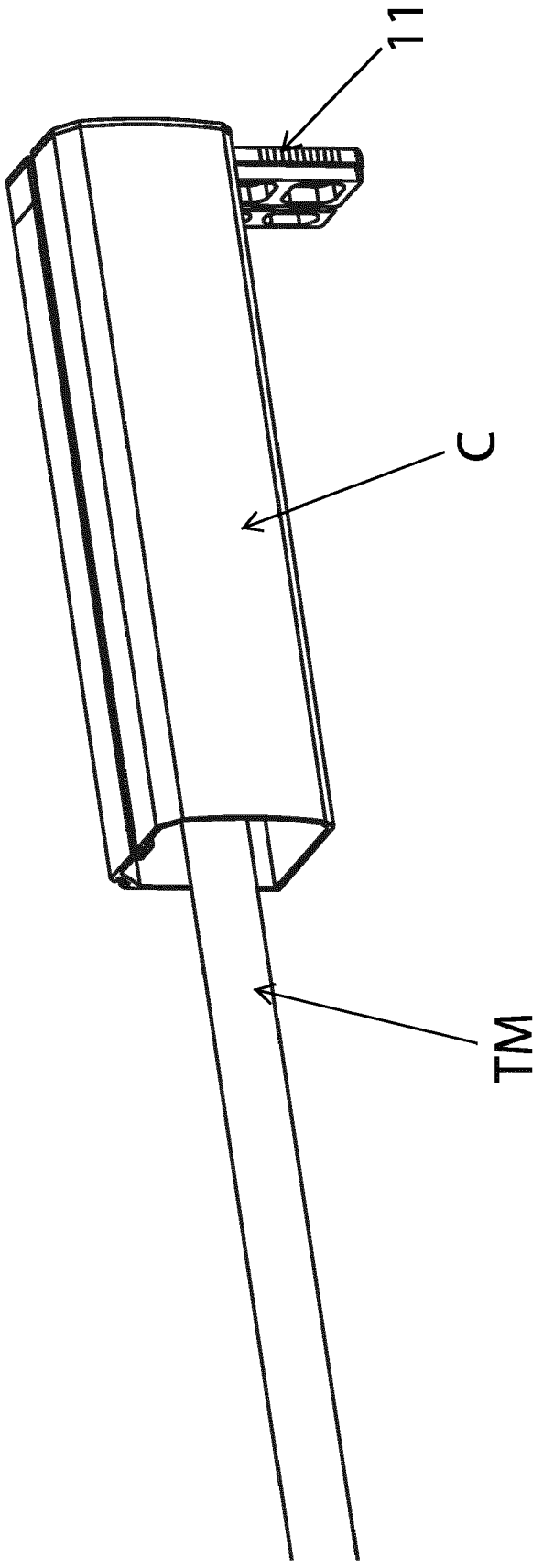


FIG.11

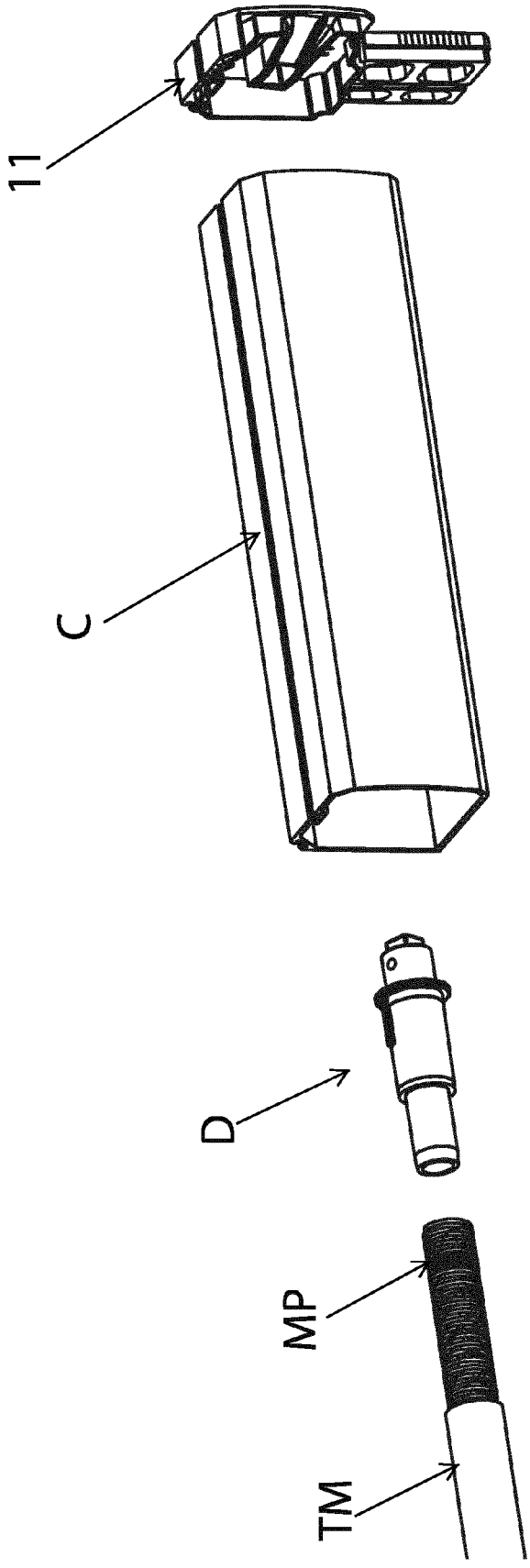


FIG.12

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EUROPEAN SEARCH REPORT

Application Number
EP 15 15 2459

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	WO 2009/128108 A2 (GIANUS S R L [IT]; ZANGIROLAMI MARCO [IT]) 22 October 2009 (2009-10-22) * page 4, paragraph 4 - page 7, paragraph 5; figures 2, 4, 6, 7 *	1-6,8-14 7	INV. E06B9/50 E06B9/42 E06B9/62 E06B9/60
A	WO 2012/064270 A1 (MARKISOL HOLDING AB [SE]; PERSSON BO [SE]) 18 May 2012 (2012-05-18) * page 3, line 20 - page 4, line 32; figures 1, 2 *	1-14	
A	US 2014/014281 A1 (MULLET WILLIS JAY [US] ET AL) 16 January 2014 (2014-01-16) * paragraph [0023] - paragraph [0026]; figures 3, 4 *	1-14	
A	DE 10 2011 050666 A1 (LIENERT ACHIM [DE]) 29 November 2012 (2012-11-29) * paragraph [0033] - paragraph [0036]; figures 2-4 *	1-14	
			TECHNICAL FIELDS SEARCHED (IPC)
			E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 May 2015	Weißbach, Mark

CATEGORY OF CITED DOCUMENTS

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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