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(54) **TELESCOPIC FASTENER AND SYSTEM**

(57) Fastener, for positioning a movable panel with respect to a frame, comprising an elongated tubular holder (1) having a telescopically adjustable arm (2), a first mounting part (3) which is pivotally connected to a proximal section of the holder (1), a second mounting part (4) which is pivotally connected to a distal section of the arm (2), and an operable clamping device (5) for releasingly locking the arm (2) to the holder (1).

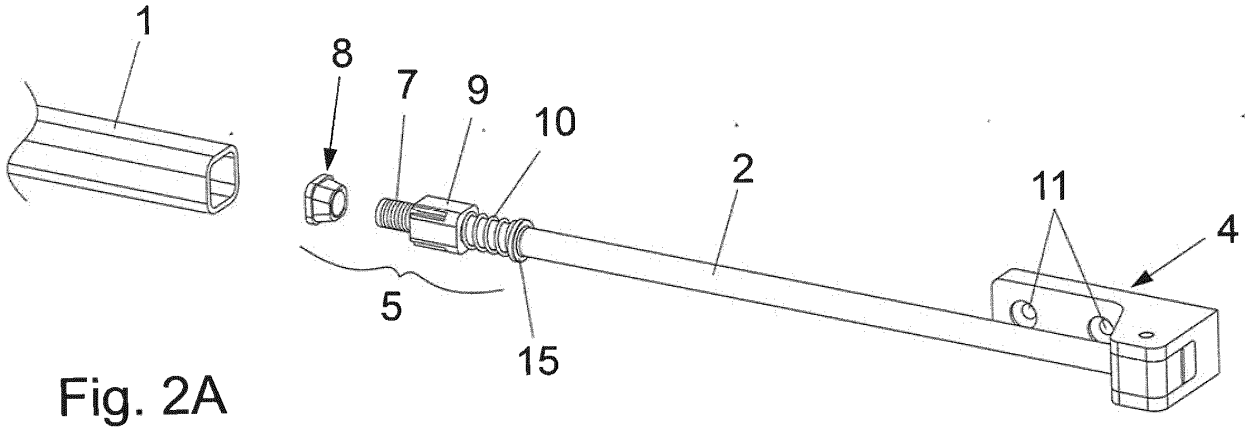

Fig. 2A

EP 3 118 403 A1

Description

[0001] The invention relates to a fastener, for positioning a movable panel with respect to a frame, comprising an elongated tubular holder having a telescopically adjustable arm, a first mounting part which is pivotally connected to a proximal section of the holder, a second mounting part which is pivotally connected to a distal section of the arm, and an operable clamping device for releasingly locking the arm to the holder.

[0002] Such a fastener is generally known, and has previously been developed by, among others, the applicant, see for example in the patent NL 1030690. The fastener is provided with a substantially cylindrical holder holding a telescopic, substantially cylindrical arm, as well as with operating means to operate blocking means. These operating means include a substantially cylindrical part, which is concentric with respect to the holder, and rotatable to adjust a force of the blocking means. An advantage of a telescopic fastener over other fasteners is that the telescopic arm can be fastened with regard to the holder over a continuous range of positions. At the same time, the fastener needs not to be released to change the position of a movable panel with respect to a frame.

[0003] A problem of the prior art system is that the fastener is relatively bulky, complex and can have a relatively unattractive appearance. Besides, reduced reliability of the operating means can be a problem.

[0004] It is an aim of the present invention to solve or alleviate one or more of the above-mentioned problems. Particularly, the invention aims at providing a fastener which is relatively easy to operate efficiently. It is also an aim of the present invention to provide a fastener having a nice appearance.

[0005] To this aim, according to an aspect of the present invention, there is provided a fastener characterized by the features of claim 1.

[0006] The tubular holder is configured to operate the clamping device, particularly such that the holder can be manually repositioned in order to adjust a clamping force achieved by the clamping device.

[0007] In this way, it is relatively easy to operate the clamping device, as the act is not limited to a relatively small part of the operating means, but can be carried out at any part of the holder. At the same time, as there is no need anymore for a separate (e.g. external) operating means, the fastener can be made slim, more attractive, more reliable, less complex and with few parts, compared to prior art systems.

[0008] In a preferred embodiment a proximal section of said telescopically adjustable arm comprises an external screw thread for cooperation with the clamping device. Preferably, said clamping device comprises a nut having an internal screw thread arranged to cooperate with said external screw thread. In this way, the screwing of a nut on an external screw thread on said proximal section of the arm makes it possible to adjust the clamping force of the clamping device. The nut may have various external shapes, for example a conical shape, tapered shape or different shape.

[0009] Preferably, the fastener includes an expandable clamping part located within the holder. This configuration may provide a slim fastener.

[0010] Said clamping device further advantageously comprises an expandable clamping part arranged to be engaged by said nut, and wherein through said engagement, said expandable clamping part expands and frictionally engages an inner side of the holder.

[0011] The friction which is built up between said expandable clamping part and an inner side of the holder can be set to cause a resistance when the arm is moved with respect to the holder, or can even block this movement if desired. For example, the expandable part can be radially or laterally expandable (viewed from a centre line of the part).

[0012] In a more preferred embodiment the expandable clamping part is movable along the arm. Also, preferably, such movement can be counteracted using a spring force. For example, said clamping device can comprise a spring arranged to apply a spring force on said expandable clamping part towards the conically shaped nut. The spring force can achieve that friction/resistance between the clamping device and an inner side of the holder is built up or diminished smoothly/continuously.

[0013] In a preferred, durable and relatively strong configuration, the expandable clamping part can include at least one angle profile. In particular, it has been found that an angle profile as clamping member can provide a relatively high clamping force, for example when engaging a nut and an inner side of the holder. As an example, the expandable clamping part may include two angle profiles located opposite each other, for engaging the nut there-between.

[0014] Advantageously, the holder is rotatable, particularly with respect to a longitudinal centre line. For example, the holder can be rotatable to adjust the clamping force. According to an embodiment the configuration can be such that rotation of the holder adjusts an axial position of a said nut, for adjusting expansion of the expandable clamping part. The entire holder thus becomes a manually rotatable operating means of a relatively slim fastener, providing ease of use and an elegant design.

[0015] In a preferred embodiment, friction between said expandable clamping part and an inner side of the holder is adjustable to a friction state, for example by rotating the holder around its longitudinal axis, such that movement of the arm into and out of the holder can remain possible. This has as a major advantage that a user does not need to entirely loosen the fastener when he wants to change a position of the arm with respect to the holder, corresponding to a change in position of a movable panel with respect to a frame, for example closing or opening a window or a door equipped with a fastener. This simplifies and speeds up the use of the fastener.

[0016] Advantageously, a cross-sectional shape perpendicular to the longitudinal axis of said expandable clamping part substantially has the same shape as a cross-section perpendicular to the longitudinal axis of the holder, for example polygonal, in particular quadrangular. This ensures a good grip of the radially expandable clamping part on the inner side of the holder improving friction.

[0017] In an advantageous embodiment, the holder's length is at least 50%, for example 80% of the arm's length, for example 90% or more. The longer the holder, the longer is a maximal length of the fastener in an extended position, the further a panel can be opened or moved with respect to a frame to which the fastener is attached. Also, the longer the holder, the more grip a user has to operate the fastener via the holder. And the longer the holder, the more the arm is protected in a non-extended, withdrawn position, corresponding to a closed panel in a frame, which is useful to protect a user against possible lubricants on the telescopically adjustable arm.

[0018] Preferably, a cross-sectional shape perpendicular to the longitudinal axis of the holder is substantially different from circular, for example polygonal, in particular quadrangular. This improves the grip of a user on the holder, preventing his hands from slipping, when rotating the holder during operation of the fastener.

[0019] In a preferred embodiment, said first mounting part and said second mounting part each contain at least one aperture for receiving a fixing means, for example a screw. Mounting the fastener with the help of fixing means, for example screws, through at least one aperture in each mounting part is a relatively easy, yet solid way of fixing the fastener to a movable panel and a frame.

[0020] Preferably, at least one of a first mounting part and a second mounting part has an L-shaped profile, wherein a first, for example longer, arm of the L-shaped profile is arranged to be fixed on one of a frame and a movable panel, for example a window or a door, and wherein a second, for example shorter, arm of the L-shaped profile is arranged to be pivotally connected to one of a proximal section of a holder and a distal section of a telescopically adjustable arm. An L-shaped mounting part allows a relatively easy access to for example a bore for a fixing means.

[0021] An aspect of the invention also provides a system as defined by the features of claim 15. This system can provide the above-mentioned advantages.

[0022] Another aspect of the invention provides a use of a fastener, wherein a clamping force of the fastener is adjusted by repositioning the holder. This use can provide the above-mentioned advantages.

[0023] The present invention will be further elucidated with reference to figures of exemplary embodiments. Corresponding elements are designated with corresponding reference signs.

Figure 1 shows a perspective view of an advantageous embodiment of a fastener according to the present invention;

Figure 2a shows a perspective view of some partly detached parts of the fastener of Figure 1;

Figure 2b shows a perspective and enlarged view of a clamping device of the fastener of Figures 1 and 2a;

Figure 2c schematically shows a transversal cross-section of an embodiment of an expandable clamping part of the fastener of Figure 2b; and

Figure 2d is similar to Figure 2c and depicts an alternative embodiment of the expandable clamping part.

[0024] Figure 1 shows a perspective view of an advantageous embodiment of a fastener according to the present invention. The fastener, for positioning a movable (in this case swivable) panel, in particular an outwardly turning panel, with respect to a frame, comprises an elongated tubular holder 1 having a telescopically adjustable arm 2, a first mounting part 3 which is pivotally connected to a proximal section of the holder 1, a second mounting part 4 which is pivotally connected to a distal section (i.e. remote from the holder 1) of the arm 2, and an operable clamping device 5 (invisible in Figure 1) for releasingly locking the arm 2 to the holder 1. Pivot axis X1 of the pivot connection between the holder 1 and the first mounting part 3 and pivot axis X2 of the pivot connection between the arm 2 and the second mounting part 4 extend in parallel. The holder 1 can be made out of metal or an alloy, or out of solid plastic, or out of a combination of these or other materials. The panel and the frame are not depicted in the drawings. Said frame can be a window frame or a door frame, and said panel may be a window or a door, movably mounted to (e.g. hinged to or guidable with respect to) the frame, in particular a window or door.

[0025] After mounting, the first mounting part 3 can e. g. be fixed to the frame, and the second mounting part 4 can be mounted to a movable panel. Alternatively, the first mounting part 3 can be fixed to the movable panel, and the second mounting part 4 can be mounted on the respective frame. In the advantageous embodiment of Figure 1, the first and the second mounting part 3, 4 each have an L-shaped profile. The mounting parts 3, 4 can have various different shapes and configurations, as will be clear to the skilled person. In the example, a first, for example longer, arm of the profile is arranged to be fixed on one of the frame and the panel, and a second, for example shorter, arm of the profile is arranged to be pivotally connected to one of a proximal section of a holder 1 and a distal section of the arm 2. In this embodiment, the longer arm of the L-shaped profile of both the first and the second mounting part 3, 4 are oriented towards the middle of the fastener in a longitudinal direction, but other orientations are possible, for example with a longer arm extending the length of the fastener, or still otherwise.

[0026] In the advantageous embodiment of Figure 1, the first and the second mounting part 3, 4 each contain at least one aperture 11, for example two apertures 11

as in Figure 1, for receiving a fixing means, for example a screw. The fastener can also be fixed otherwise, for example by glueing the mounting parts 3, 4 to a frame or a panel.

[0027] In a preferred embodiment, as in Figure 1, the holder's 1 length is at least 50 %, for example 80% of the arm's 2 length, for example 90% or even 100%, such that the holder can nearly entirely receive the arm 2 in the shortest position, corresponding to for example a closed position of the panel with respect to the frame after mounting, or such that the length of the fastener can nearly be doubled in the fastener's longest position corresponding to a most open position of the panel with respect to the frame. The fastener's holder 1 is preferably provided with a blocking means 12 which is configured to prevent the arm 2 to slip out of the holder 1, in this case via a stopping part 15 of the arm. The stopping part 15 is fixed onto the arm (e.g. it can be made in one piece with the arm, or firmly connected to the arm using mechanical or adhesive fixation means). In the example, stopping part 15 also defines a position of a clamping part 9 and spring means 10 (see here-below).

[0028] A typical length of a holder 1 and a arm 2 lies in a range of for example 20-50 cm. A cross-sectional shape perpendicular to the longitudinal axis of the holder 1 is preferably substantially different from circular, for example polygonal, in particular quadrangular, as in Figure 1, optionally with rounded-off corners. In particular, this holds both for an external shape and an interior shape of the holder 1 (i.e. both an outer shape and inner shape of the holder 1 can be polygonal when viewed in cross-section). Other shapes for this holder cross-section are possible, for example a triangular shape or a hexagonal shape. Polygonal cross-sections offer a user a better grip on the holder 1, but circular holder cross-sections are possible as well. The arm's 2 cross-section is circular in the present embodiment of Figure 1, but also can have different shapes.

[0029] The holder 1 of a fastener according to the present invention is configured to operate the clamping device 5, particularly such that the holder 1 can be manually repositioned in order to adjust a clamping force achieved by the clamping device. In particular, the holder 1 rotates around the arm 2 in order to adjust a clamping force achieved by the clamping device.

[0030] In the embodiment of Figures 1-2a, 2b, a proximal section (i.e. located within the holder 1) of said arm 2 comprises an external screw thread 7 for cooperation with the clamping device 5, which is covered by the holder 1 when the fastener is in use. The clamping device 5 comprises a nut 8 having an internal screw thread arranged to cooperate with said external screw thread 7, and (in this example) an outer rim 8a. The nut 8 can thus be screwed on a proximal section of the arm 2. In the embodiment of Figures 2a and 2b, the outside of the nut 8 is tapered including a rim on the largest side of the tapered nut 8. The shape of the rim can correspond to the cross-sectional shape perpendicular to the longitudinal axis of the holder 1, for example quadrangular with rounded corners, or octagonal, as in Figures 2a and 2b, so that the nut 8 can slide in the holder 1 and that a rotation of the holder 1 can be transmitted to the nut 8. The shape of the tapered part of the nut 8 can equally correspond to the cross-sectional shape perpendicular to the longitudinal axis of the holder 1. In this example, the tapered part of the nut 8 comprises four tapered sides, but other shapes are possible in analogy with the shapes for the holder cross-section.

[0031] The clamping device 5 further comprises a laterally/radially expandable clamping part 9 located within the holder 1 and arranged to be engaged by the nut 8, when this nut 8 is screwed on a proximal section of the arm 2. Through said engagement, the laterally expandable clamping part 9 expands and frictionally engages an inner side of the holder 1, thus building up frictional forces between the clamping device 5 and the inner side of the holder 1. These frictional forces cause a resistance against a change in position of the holder 1 with respect to the arm 2, a movement which becomes more difficult, but not impossible. When said frictional forces become very high, they can even block the position of the holder 1 with respect to the arm 2. Thus, friction between said laterally expandable clamping part 9 and an inner side of the holder 1 is adjustable to a friction state such that movement of the arm 2 into and out of the holder 1 can remain possible. Preferably, the clamping device 5 also comprises a spring 10 arranged to apply a spring force on said laterally expandable clamping part 9 towards the nut 8 such that the laterally expandable clamping part 9 is movable along the arm 2. This spring 10 provides a smooth adjustment of said frictional forces between the clamping device 5 and the inner side of the holder 1.

[0032] The expandable clamping part 9 can be configured in various ways. In a first embodiment, depicted in Figures 2A, 2B, 2C, the expandable clamping part 9 includes a plurality of clamping fingers 9a (four, in this example) that are joined via proximal sections, wherein distal sections of the fingers 9a engage external sides of the nut 8 (see Figure 2B). In the first example, the clamping fingers 9a are relatively flat, platelike clamping elements. The clamping fingers 9a are constructed such that they are expandable or elastically swiveable (bendable) outwardly, in substantially normal directions with respect to their respective outer surfaces (which outer surfaces face four respective opposite inner sides of the holder 1 after mounting) as is indicated by arrows in Figures 2B and 2C. It follows that the example includes as many separately expandable clamping fingers 9a as the number of opposite inner surfaces of the (I this example polygonal) holder 1.

[0033] Figure 2D shows an alternative extra advantageous example of the expandable clamping part 9' in cross-section, which differs from the first example in that the clamping part 9' includes at least one clamping profile 19 instead of a pair of separate platelike neighboring clamping fingers 9a of the first embodiment. Particularly,

the clamping profile 19 is an angle profile (e.g. having a L-shaped cross-section), having two substantially flat profile sections 19a, 19b, the two profile sections 19a, 19b including an angle ß (in this case an angle β of about 90 degrees) with one another when viewed in cross-section (see Fig. 2D). In particular, the present alternative embodiment includes only two such angle profiles 19 that are located opposite one another (with their concave inner sides facing each other) for engaging the nut 8 via distal sections of the profiles 19. Each of the angle profiles 19 can deform or bend outwardly towards two respective opposite (in this example flat) inners sides of the holder 1 during clamping operating. It has been found that this configuration provides a significantly higher clamping force (compared to the first embodiment) and is relatively durable due to significant reduction in wear.

[0034] During use of the fastener, the holder 1 can be rotated to adjust an axial position of the nut 8, which can lead to adjusting the shape (expansion) of the expandable clamping part 9 (or 9'). An inner side of the holder 1 engages the outer rim 8a of the nut 8 in order for the nut 8 to follow the holder's 1 rotation. The same holds for rotation of the expandable clamping part 9/9' (it is engaged by the inner side of the holder 1, to rotate therewith).

[0035] After mounting the fastener in a system comprising the panel, and the frame, the user can operate the fastener by adjusting the resistance of the fastener through rotation of the holder, which causes axial displacement of the nut 8 leading to more or less engagement of the laterally expandable clamping part 9 (or 9')on the nut 8. One direction of rotation diminishes the frictional forces of the clamping device 5 on the holder 1, and the opposite direction of rotation builds up the frictional forces of the clamping device 5 on the holder 1, until blocking of the arm's position with respect to the holder, if desired. The user can easily adapt the resistance of the fastener to the need of the actual situation: higher resistance of the fastener's clamping device may be useful on windy days, and lower resistance can be handy when a position of the panel with regard to a frame has to be changed frequently. After adjusting the resistance of the fastener through rotation of the holder 1, a user can adjust a panel's position with respect to a frame's position by pushing or pulling the panel to move that panel, which causes the arm 2 to further extend from the holder 1 or to withdraw into the holder 1. If needed, a user can then fix the desired position of the panel with respect to the window by rotating the holder 1 again until frictional forces between the clamping device 5 and the inner side of the holder 1 are high enough to resist to an attempt to further change the arm's 2 position with respect to the holder 1.

[0036] It should be clear to the person skilled in the art that the invention is not limited to the embodiment described above. Many alternatives are possible within the scope of protection as formulated in the claims hereafter. Different clamping devices can be combined with a fastener according to the invention as long as the clamping device is configured to clamp an inner side of the holder. Other possible variations include, among others, the shape of the mounting parts as well as the way the fastener is mounted.

Claims

1. Fastener, for positioning a movable panel with respect to a frame, comprising an elongated tubular holder (1) having a telescopically adjustable arm (2), a first mounting part (3) which is pivotally connected to a proximal section of the holder (1), a second mounting part (4) which is pivotally connected to a distal section of the arm (2), and an operable clamping device (5) for releasingly locking the c arm (2) to the holder (1), **characterized in that** said tubular holder (1) is configured to operate the clamping device (5), particularly such that the holder (1) can be manually repositioned in order to adjust a clamping force achieved by the clamping device.

2. Fastener according to claim 1, wherein a proximal section of said arm (2) comprises an external screw thread (7) for cooperation with the clamping device (5).

3. Fastener according to claim 2, wherein said clamping device (5) comprises a nut (8) having an internal screw thread arranged to cooperate with said external screw thread (7).

4. Fastener according to any of the preceding claims, including an expandable clamping part (9; 9') located within the holder (1).

5. Fastener according to claims 3 and 4, wherein said expandable clamping part (9) is arranged to be engaged by said nut (8), and wherein through said engagement, said expandable clamping part (9; 9') expands and frictionally engages an inner side of the holder (1).

6. Fastener according to claims 4 or 5, wherein the expandable clamping part (9) is movable along the arm (2), wherein said clamping device (5) comprises a spring (10) arranged to apply a spring force on said expandable clamping part (9; 9') towards the nut (8).

7. Fastener according to any of the preceding claims 4-6, wherein friction between said expandable clamping part (9; 9') and an inner side of the holder (1) is adjustable to a friction state such that movement of the arm (2) into and out of the holder (1) remains possible.

8. Fastener according to any of the preceding claims

4-7, wherein a cross-sectional shape perpendicular to the longitudinal axis of said expandable clamping part (9; 9') substantially has the same shape as a cross-sectional shape perpendicular to the longitudinal axis of the holder (1), for example polygonal, in particular quadrangular or octagonal.

9. Fastener according to any of the preceding claims 4-8, wherein the expandable clamping part (9') includes at least one angle profile (19), for example a plurality of angle profiles (19)located opposite one another, particularly for engaging a nut (8) of the clamping device (5).

10. Fastener according to any of the preceding claims, wherein the holder's (1) length is at least 50%, preferably 80% of the telescopic arm's (2) length.

11. Fastener according to any of the preceding claims, wherein the holder (1) is rotatable.

12. Fastener according to any of the preceding claims, wherein a cross-sectional shape perpendicular to the longitudinal axis of the holder (1) is substantially different from circular, for example polygonal, in particular quadrangular or octagonal.

13. Fastener according to any of the preceding claims, wherein said first mounting part (3) and said second mounting part (4) each contain at least one aperture (11) for receiving a fixing means, for example a screw.

14. Fastener according to any of the preceding claims, wherein at least one of a first mounting part (3) and a second mounting part (4) has an L-shaped profile, wherein a first, for example longer, arm of the L-shaped profile is arranged to be fixed on one of a frame and a movable panel, for example a window or a door, and wherein a second, for example shorter, arm of the L-shaped profile is arranged to be pivotally connected to one of a proximal section of the holder (1) and a distal section of the telescopically adjustable arm (2).

15. System comprising a stationary support structure, for example a frame, and a movable panel, for example a door or a window, wherein the movable panel is movable with respect to the stationary support structure, and wherein the system is equipped with a fastener according to any of the preceding claims, wherein the first mounting part (3) is connected to the frame or the panel, respectively, wherein the second mounting part (4) which connected to the panel or the frame, respectively.

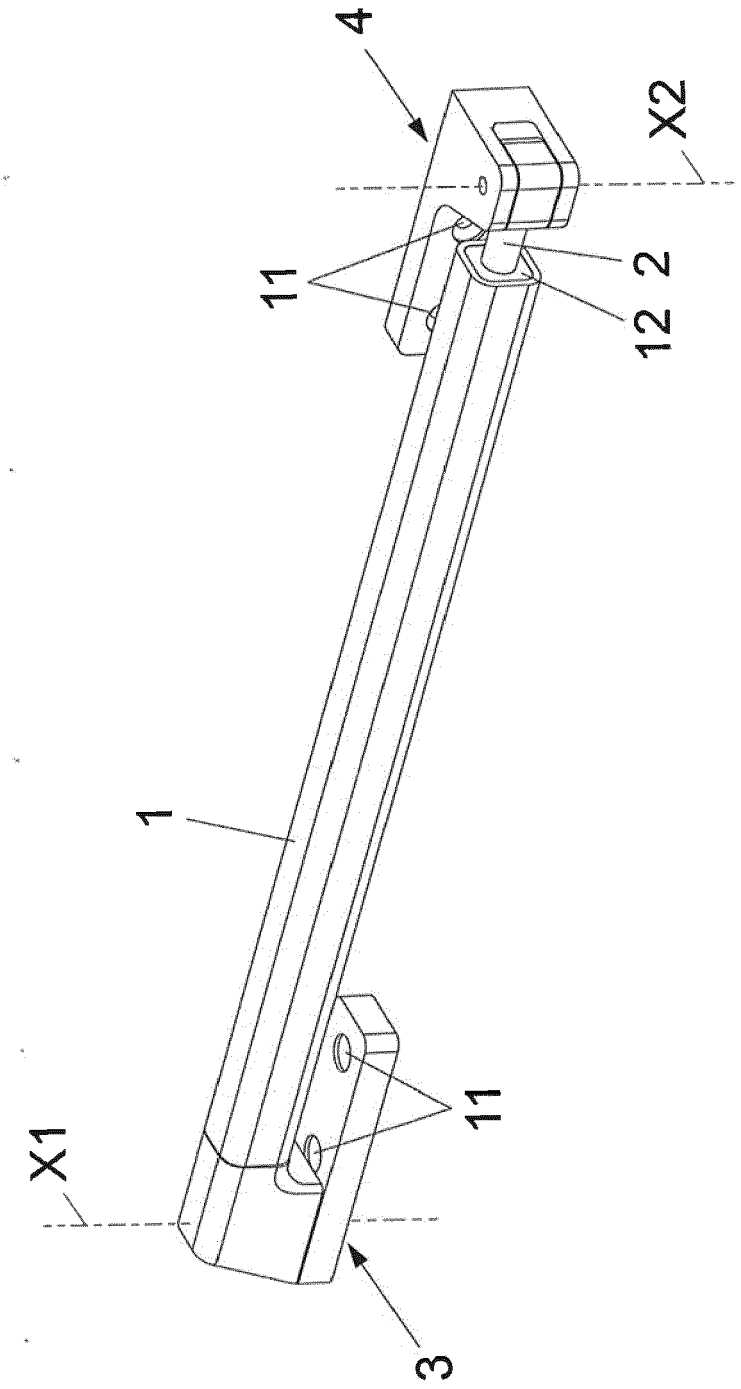

Fig. 1

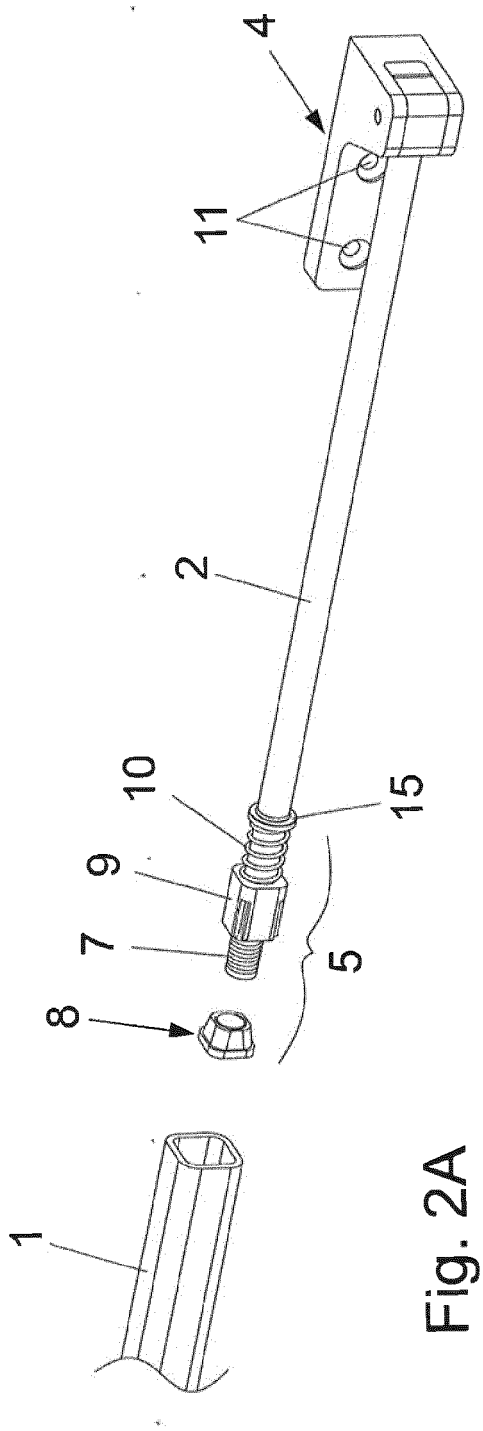

Fig. 2A

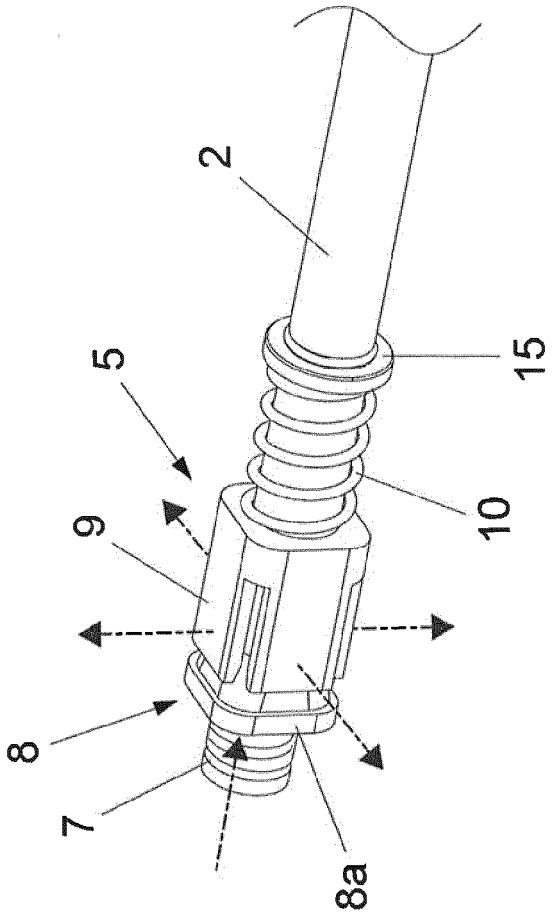

Fig. 2B

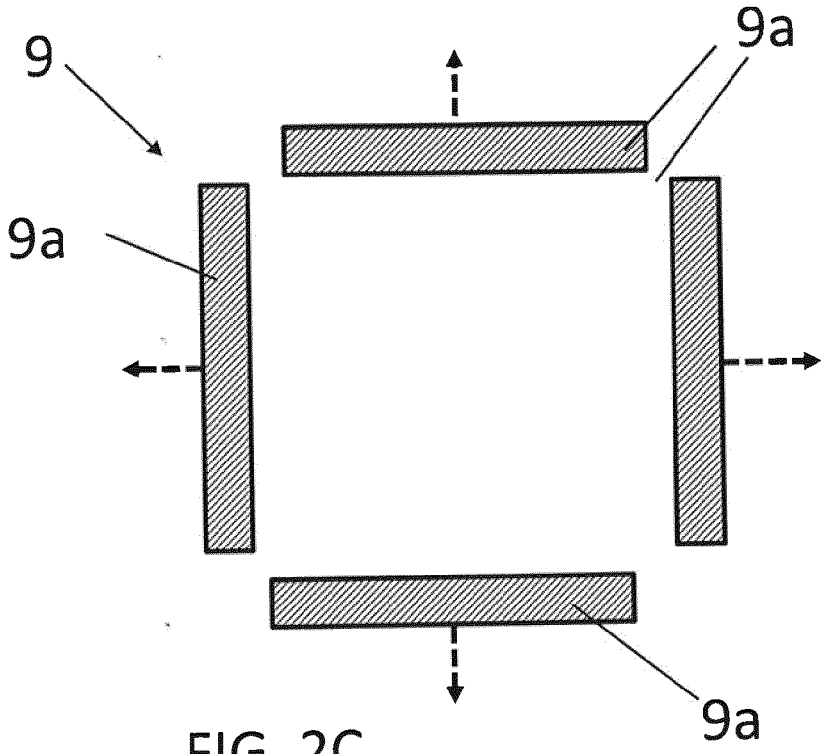

FIG. 2C

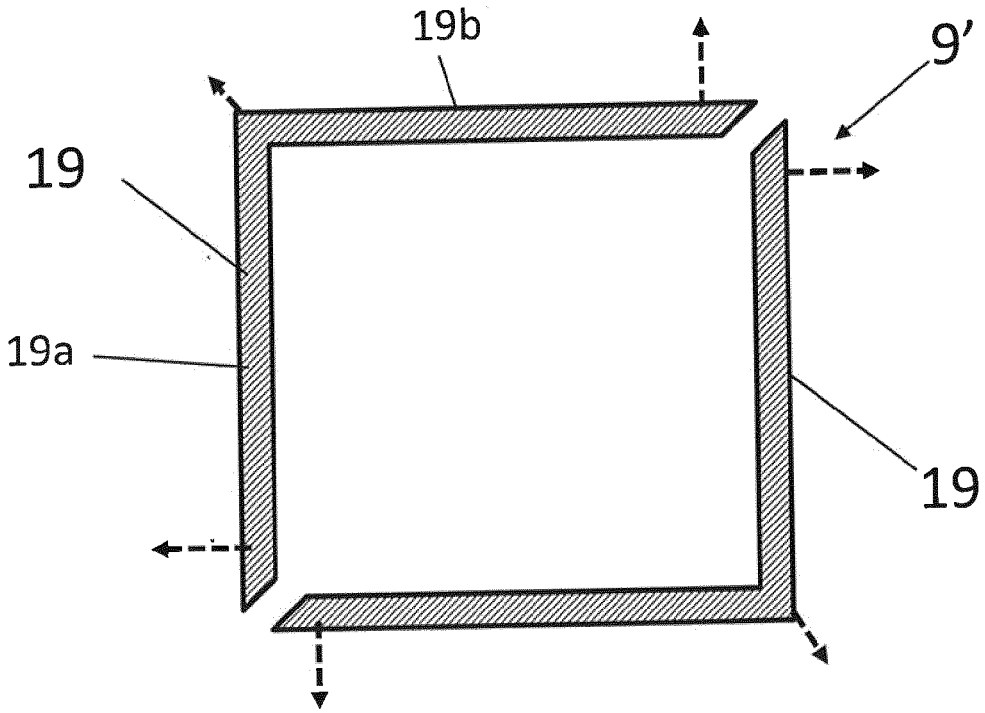

FIG. 2D

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EUROPEAN SEARCH REPORT

Application Number
EP 16 17 3320

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	US 1 478 404 A (JOHN SIBLEY EDWIN) 25 December 1923 (1923-12-25) * page 1, line 80 - page 2, line 14; figures 1,2 *	1-15	INV. E05C17/30
X	US 1 554 041 A (SIBLEY EDWIN J) 15 September 1925 (1925-09-15)	1,2,4,7, 8,10,11, 13,15	
A	* the whole document *	3,5,6,9, 12,14	
X	NL 292 681 A (-) 26 July 1965 (1965-07-26) * the whole document *	1-15	
A	US 1 818 977 A (GRAY ROBERT C) 18 August 1931 (1931-08-18) * the whole document *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

E05C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 December 2016	Cruyplant, Lieve

CATEGORY OF CITED DOCUMENTS

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 1478404 A	25-12-1923	NONE	
US 1554041 A	15-09-1925	NONE	
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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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Patent documents cited in the description

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