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(54) **CABLE RESTRICTOR**

(57) This invention relates to a cable restrictor. The cable restrictor (10, 110) comprises a flexible cable (18) having a first end and a second end, the first end of the cable being connected to a first housing (20), the second end of the cable having a fixing part (24) for insertion into a recess of a second housing. The second housing (22) has locking means (40) including a lock sleeve (54, 154) in the recess (26). The lock sleeve has a locked position and an unlocked position, the lock sleeve in its locked position blocking at least a part of the recess opening. The lock sleeve (54, 154) is rotatable between its locked position and its unlocked position about a lock sleeve rotation axis (A2).

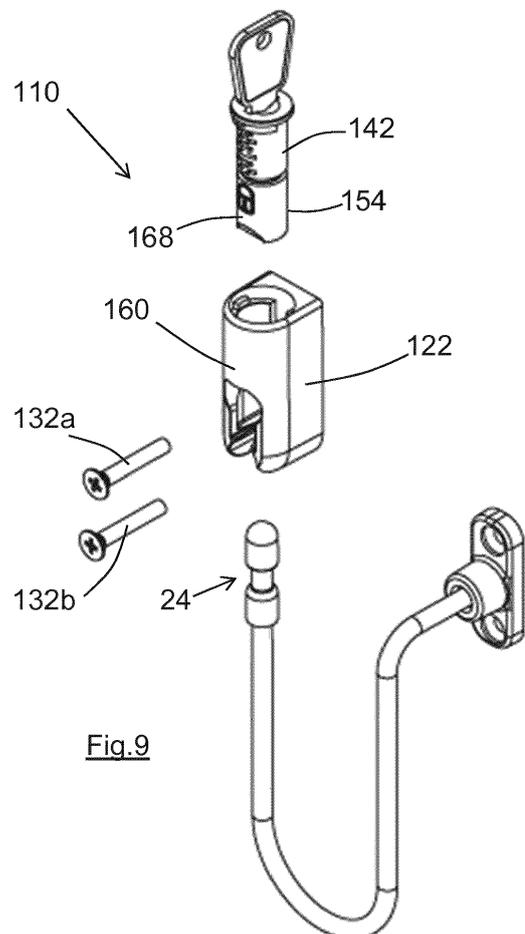


Fig.9

EP 3 228 789 A1

Description

FIELD OF THE INVENTION

[0001] This invention relates to a cable restrictor.

BACKGROUND TO THE INVENTION

[0002] A cable restrictor typically comprises a short length of flexible (usually multi-stranded) wire, the ends of which are fitted to respective housings. One of the housings is adapted for securement to a movable panel such as a window, the other of the housings is adapted for securement to the fixed frame surrounding the panel. The flexible cable is of a length, and the housings are suitably positioned, so that the panel may be moved (opened) only a relatively short distance before the cable becomes taut and further opening movement is prevented.

[0003] Typically, one of the housings has means for releasing the end of the cable so as to permit full opening of the panel when desired. The releasable end of the cable may for example be secured to its housing by a key-operated lock, so that insertion of the key is required to release the end of the cable. The provision of a key-operated lock makes it more difficult for the window to be opened so that an intruder can gain entry (or ease of egress) from a building, even if the intruder is able to access the cable restrictor.

[0004] A cable restrictor is therefore similar to a security chain which may be used to restrict the opening movement of a door, and cable restrictors are known to be used for such a purpose. However, cable restrictors are more commonly used to restrict the opening movement of windows, in particular if it is desired to prevent young children opening the window and perhaps falling out of the opened window. Cable restrictors are therefore typically distinguished from security chains by using a length of flexible wire rather than a length of chain, and by providing primarily a safety function rather than primarily a security function. These products are, however, often interchangeable, although the use of a loose chain to restrict the opening movement of a window is not aesthetically acceptable to many users.

[0005] In an attempt to increase the aesthetic appeal of a security chain, it is known to locate the chain within a flexible sleeve. Even with this modification, however, cable restrictors having a flexible wire are generally more aesthetically pleasing, and therefore tend to be used to restrict the opening movement of windows.

[0006] Notwithstanding that a cable restrictor can be distinguished from a security chain, it will be understood that the present invention is not limited to the use of a "cable", and could for example be used with a chain. Accordingly, the term "cable" when used in the following description and claims should be interpreted to encompass a wire, a loose chain, a chain within a protective sleeve, and any other elongate flexible securing member

which can be connected to respective housings for the purpose of restricting the opening movement of a movable panel.

[0007] Other devices are known to restrict the opening movement of a movable panel, for example the stays which are described in GB 2 263 934, GB 2 391 901 and EP 2 085 546. Stays such as those described in these documents are a class of restrictor utilising a rigid member which pivots as the panel is opened; they are therefore distinguished from cable restrictors by using a rigid member rather than a flexible cable.

[0008] A known cable restrictor comprises a length of flexible wire covered in a protective plastic sheath. One end of the wire is permanently secured to a first housing and the other end of the wire is permanently secured to a fixing part. A second housing is provided with a recess for the fixing part, the fixing part being securable within the recess and being releasable from the recess by way of a key-operated lock. In use, the first housing is secured to the window (or frame) and the second housing is secured to the frame (or window). When the fixing part is secured in the recess the cable interconnects the window to the frame and limits the opening movement of the window. When greater opening movement of the window is required, perhaps for cleaning or for egress in the event of an emergency, the key can be inserted into the lock to release the fixing part from the recess.

[0009] In order to increase the resistance against forced removal of the fixing part from the recess (i.e. removal without insertion of the correct key), and thereby to increase the security provided by the cable restrictor, the cable restrictor should be fitted so that if tension is applied to the cable, that tension acts in a direction which is not coincident with the direction of removal of the fixing part. Alternatively stated, if an attempt is made to force open a restricted window the cable restrictor should be mounted so that the force upon the cable acts in a direction other than that required to remove the fixing part from its recess. In this way it can be arranged that the tension in the cable does not act directly upon the lock or upon any of the movable locking componentry, and instead is resisted by rigid parts of the second housing.

[0010] When installing a known cable restrictor upon an outwardly-opening window, the second housing part is typically fitted to a surface of the frame with the open end of the recess facing inwardly of the room or building. The fixing part is therefore inserted into the recess in a direction which is substantially perpendicular to (and towards) the surface of the frame to which the second housing is mounted. In such an arrangement, tension in the cable due to forced opening of the window seeks substantially to push the fixing part deeper into the recess, which force is countered by rigid parts of the second housing rather than by the locking componentry.

[0011] Another known cable restrictor is disclosed in EP 2 418 343. In that cable restrictor, the fixing part is inserted into the recess in the second housing, and removed from the recess, in a direction parallel to the plane

of the mounting face of the second housing, i.e. parallel to the surface of the frame to which the second housing is mounted. This cable restrictor should be mounted so that tension in a taut cable does not act in the direction of removal of the fixing part from the recess, but rather acts at an angle (preferably substantially perpendicular) to the direction of removal.

[0012] By arranging that the forced removal of the fixing part is not countered by the locking componentry directly, many of the known cable restrictors utilise locking componentry which is not particularly robust, and since the cost of the locking componentry can be a significant proportion of the overall cost of the cable restrictor the locking componentry is generally minimised and simplified so as to reduce the overall cost.

[0013] The purchasers of cable restrictors, particularly those purchasing large numbers of cable restrictors (such as for blocks of flats and the like), nevertheless want the locking componentry to be relatively secure, and in particular to be sufficiently secure that a single key can only unlock a single cable restrictor. The manufacturers of cable restrictors are therefore often facing the conflicting requirements of minimising cost whilst providing a more secure cable restrictor.

SUMMARY OF THE INVENTION

[0014] There is therefore a need to provide a relatively low cost cable restrictor which utilises more complex and secure locking componentry.

[0015] According to a first aspect of the invention there is provided a cable restrictor comprising a flexible cable having a first end and a second end, the first end of the cable being connected to a first housing, the second end of the cable having a fixing part, the cable restrictor further comprising a second housing having a recess configured to receive the fixing part, the second housing having key-operated locking means for securing the fixing part in the recess, the second housing having a mounting face adapted to engage a surface of a panel or frame when installed, the locking means including a lock cylinder which is rotatably mounted in the second housing, the lock cylinder being rotatable about a lock cylinder rotation axis, the locking means further comprising a lock sleeve which is rotatable about a lock sleeve rotation axis, the lock sleeve rotation axis being substantially parallel to the lock cylinder rotation axis.

[0016] In embodiments according to this first aspect, the lock cylinder and the lock sleeve can rotate about the same axis, and may be integral components.

[0017] According to a second aspect of the invention there is provided a cable restrictor comprising a flexible cable having a first end and a second end, the first end of the cable being connected to a first housing, the second end of the cable having a fixing part, the cable restrictor further comprising a second housing having a recess configured to receive the fixing part, the second housing having key-operated locking means for securing

the fixing part in the recess, the second housing having a mounting face adapted to engage a surface of a panel or frame when installed, the recess having a first recess opening in a first side face of the second housing and a second recess opening in a second side face of the second housing, the first side face opposing the mounting face and the second side face interconnecting the mounting face and the first side face, the first recess opening being connected to the second recess opening, the fixing part being inserted into the recess through the first recess opening in use, the second end of the cable occupying at least a part of the second recess opening when the fixing part is located in the recess.

[0018] The first side face and the second side face may be substantially perpendicular. In embodiments according to this second aspect, the direction of insertion of the fixing part into the second housing is at an angle to the longitudinal axis of the cable, and is ideally substantially perpendicular to that longitudinal axis. It will be understood that tension in the cable will act along the axis of the cable, and that by arranging the insertion direction to be at an angle to the axis of the cable, tension in the cable acts to pull the fixing part out of the recess by way of the second recess opening. Because the fixing part is inserted through the first recess opening rather than the second recess opening, however, it can be arranged that the fixing part cannot physically pass through the second recess opening. The tension in the cable can therefore be resisted by fixed parts of the second housing rather than by movable locking componentry.

[0019] According to a third aspect of the invention there is provided a cable restrictor comprising a flexible cable having a first end and a second end, the first end of the cable being connected to a first housing, the second end of the cable having a fixing part, the cable restrictor further comprising a second housing having a recess configured to receive the fixing part, the recess having a recess opening through which the fixing part is inserted, the second housing having locking means including a lock sleeve, the lock sleeve having a locked position and an unlocked position, the lock sleeve in its locked position blocking a part of the recess opening whereby to prevent the fixing part passing out of the recess, the lock sleeve being rotatable between its locked position and its unlocked position about a lock sleeve rotation axis.

[0020] Desirably, the second housing has a mounting face adapted to engage a surface of a panel or frame when installed, and the lock sleeve rotation axis is approximately parallel to the mounting face.

[0021] Preferably, the lock sleeve has a lock sleeve opening through which a part (usually the end part) of the fixing part can pass in the unlocked position. Desirably, the lock sleeve has a side wall, part of the side wall being removed to provide the lock sleeve opening. Desirably also, when the fixing part is in the second housing, the side wall surrounds at least half of the circumference of the fixing part. The side wall therefore provides a circumferential segment surrounding at least half of the fix-

ing part. It is not necessary that the side wall provides a continuous circumferential segment, and in some embodiments a series of discrete side wall segments together surround the fixing part.

[0022] Preferably, the fixing part is inserted into the recess in an insertion direction, and the insertion direction is at an angle to the lock sleeve rotation axis. Desirably the insertion direction and the lock sleeve rotation axis are approximately perpendicular, and ideally are perpendicular.

[0023] In the context of this third aspect, the terms "approximately parallel" and "approximately perpendicular" encompass a large range of angles, for example up to around 15° or so. Accordingly, it will be understood that the lock sleeve rotation axis can be at an angle of up to 15° or so out of alignment with the plane of the mounting face whilst maintaining the benefits of the invention and without departing from the scope of the invention.

[0024] Preferably, the locking means includes a lock cylinder which is rotatably mounted to the second housing, the lock cylinder being rotatable about a lock cylinder rotation axis. Desirably, the lock cylinder rotation axis is parallel to and coincident with the lock sleeve rotation axis. Ideally, the lock sleeve is integral with the lock cylinder so the rotation axes are necessarily parallel and coincident.

[0025] Preferably, the fixing part has a longitudinal axis and the second end of the cable has a longitudinal axis, the longitudinal axis of the second end of the cable being substantially aligned with the longitudinal axis of the fixing part. Desirably, the longitudinal axis of the fixing part is substantially parallel to the lock sleeve rotation axis when the fixing part is located in the recess. Preferably, the longitudinal axis of the fixing part is substantially aligned with the lock sleeve rotation axis when the fixing part is located in the recess.

[0026] In common with known cable restrictors, the fixing part and recess are configured to define the orientation and direction of insertion of the fixing part into the recess. Alternatively stated, the cooperating configurations of the fixing part and the recess require the fixing part to be inserted into the recess in a defined orientation and in a defined direction. In many known cable restrictors, the alignment of the longitudinal axis of the fixing part, and the direction of insertion of the fixing part into the recess, are substantially perpendicular to the mounting face of the second housing, i.e. the fixing part is directed towards, and is moved towards, the mounting face as it is inserted into the recess.

[0027] Also, it is typical of the known cable restrictors that the lock cylinder is oriented with its rotation axis substantially perpendicular to the mounting face of the second housing. Whilst it is possible to increase the security of such a lock cylinder, this typically requires an increase in the length of the lock cylinder (to accommodate more tumblers or lock discs). It is a recognised concern, however, that this will increase the depth of the second housing, and in particular increase the distance by which the

second housing projects into the room or building. Increasing the distance by which the second housing projects into the room or building is generally undesirable, firstly because it makes the second housing more obtrusive, and secondly because it increases the chances of the user inadvertently impacting the second housing.

[0028] In the present invention on the other hand, the rotation axis of the lock cylinder can be parallel to the mounting face, so that increasing the length of the lock cylinder (to increase the number of tumblers or discs so as to increase its security) can readily be accommodated by increasing the length of the second housing in the plane of the panel or frame. Such an increased length has little or no aesthetic detriment, nor does it significantly increase the likelihood of the user inadvertently impacting the second housing.

[0029] Desirably, the second housing is substantially cuboid in form (albeit perhaps with rounded corners and/or tapered faces); desirably also, the recess is open to two of the side faces of the second housing. This permits the fixing part to be inserted into the second housing in a first direction, with the second end of the cable projecting from the housing in a second direction. Preferably, the direction of insertion of the fixing part is substantially perpendicular to the mounting face, which matches the direction of insertion of the fixing part of many of the known cable restrictors. Such a direction of insertion is often considered to be the most convenient for users, and to provide the greatest security against forced removal of the fixing part.

[0030] Preferably, the second end of the cable, when the fixing part is located in the second housing, projects from the second housing in a direction which is substantially parallel to the mounting face. This can be substantially perpendicular to the insertion direction, and can also be substantially perpendicular to the direction in which the second end of the cable of many of the known cable restrictors projects. The cable of the present invention can therefore lie closer to the plane of the window and frame, and in particular can project into the room or building by a smaller distance than the cable of many of the known cable restrictors. In addition, a taut cable is required to bend through a smaller angle with the present invention than with the known cable restrictors, and this is expected to increase the operational lifetime of the cable restrictor.

[0031] The preferable and desirable features of the cable restrictor according to the third aspect of the invention can be utilised with the cable restrictor according to the first and second aspects with which they are compatible. In addition, cable restrictors sharing features of the first, second and/or third aspects of the invention also fall within the scope of the present invention.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0032] The invention will now be described in more detail, by way of example, with reference to the accompanying drawings, in which:

- Fig.1 shows a perspective view of a window and frame to which a first embodiment of cable restrictor according to the present invention is fitted;
- Fig.2 shows an enlarged view of the circled portion of Fig.1;
- Fig.3 shows an exploded perspective view of the first embodiment of cable restrictor according to the first, second and third aspects of the invention;
- Fig.4 shows a perspective view of the first embodiment of cable restrictor with the fixing part released from its recess;
- Fig.5 shows a front view of the first embodiment of cable restrictor with the fixing part released from its recess;
- Fig.6 shows a sectional view at the line VI-VI of Fig.5;
- Fig.7 shows a front view of the first embodiment of cable restrictor with the fixing part secured in its recess;
- Fig.8 shows a sectional view at the line VIII-VIII of Fig.7;
- Fig.9 shows a partially exploded perspective view of a second embodiment of cable restrictor according to the first, second and third aspects of the invention; and
- Fig.10 shows a sectional view similar to that of Fig.8, but of the second embodiment of cable restrictor.

DETAILED DESCRIPTION

[0033] The cable restrictor 10 (and similarly the cable restrictor 110) of the present invention has been designed primarily for use with an opening panel such as window 12 which can be opened relative to its surrounding (fixed) frame 14. The window 12 is a pivoting window, but it will be understood that the restrictors could alternatively be used upon a tilt and turn window, or a sliding window, or a door, as desired. The cable restrictor is mounted upon the opening edge of the window 12, alongside the operating handle 16.

[0034] The first embodiment of cable restrictor 10 in-

cludes a flexible cable 18 in the form of a multi-stranded wire sheathed in a plastic covering, so that the cable 18 matches that of known cable restrictors. The cable restrictor 10, like the known cable restrictors, is not primarily intended as a security product, notwithstanding that it does increase the security of the window 12. Instead, the cable restrictor 10 is designed primarily to provide additional safety, for example for windows in high-rise buildings where it is desired to prevent the inadvertent full opening of the window, such as by young children. Thus, it will be understood that when the cable restrictor 10 is in its locked or enabled position as shown in Figs. 1, 2, 7 and 8, the window 12 may be only partially opened before the cable 16 becomes taut and further opening movement is prevented. In order to permit full opening of the window 12 the restrictor 10 must be unlocked or disabled, as explained below.

[0035] The cable restrictor 10 comprises a first housing 20 and a second housing 22. In this embodiment the window 12 is inwardly-opening, i.e. it opens towards the bottom left corner of the sheet as drawn in Fig.1 relative to the frame 14. The first housing 20 is mounted upon the frame 14 and the second housing 22 is mounted to the movable panel 12, but these locations may be reversed if desired. However, these mounting locations are preferred for an inwardly-opening window such as that shown since attempts to force a restricted window further open beyond its restricted limit will (generally) cause the fixing part 24 to be pushed deeper into its recess 26.

[0036] For an outwardly-opening window the locations of the first and second housings are preferably reversed, it being understood that if the mounting locations of Figs. 1 and 2 were used for an outwardly-opening window attempts to force a restricted window further open beyond its restricted limit would cause the fixing part 24 to be pulled out of its recess 26. By arranging the first and second housings as preferred, attempts to forcibly open a panel beyond its restricted limit are resisted by rigid parts of the second housing 22, rather than directly by the locking componentry.

[0037] The first end of the cable 18 is secured (permanently) to the first housing 20. The securement may be made by any known means, and may facilitate some adjustment in the length of the cable 16 at the factory or manufacturing location. Alternatively, the manufacturer may stock cables of differing lengths for the customer to choose the appropriate length for each installation. In any event, once the length of the cable 18 has been determined by the manufacturer, it is intended that no further adjustment of the length of the cable 18 (for example by the user) is possible.

[0038] The second end of the cable 16 is secured (permanently) to the fixing part 24. Any suitable means of securing the second end of the cable to the fixing part 24 could be used, it being necessary that the connection is sufficiently secure to resist attempts to forcibly open a restricted panel.

[0039] In known fashion, the first and second housings

20, 22 each have mounting holes 30 by which they may be secured to the respective panel 12 and frame 14 by suitable fixings 32. The heads of the fixings 32 can be obscured by plugs if desired to increase the aesthetic appeal of the installed cable restrictor 10.

[0040] The second housing 22 has a key-operated locking means 40, the detail of which is best seen in Fig. 3. The locking means 40 comprises a lock cylinder or barrel 42 which has a number of tumblers or lock discs 44 (see also Fig.6). Each of the lock discs 44 can project through a respective slot 46 in the cylindrical wall of the lock cylinder 42, and into an undercut region 50 of the second housing 22 (Fig.6). The lock cylinder 42 is adapted to receive a key 52. When the correct key 52 is inserted into the lock cylinder 42 the lock discs 44 are withdrawn out of the undercut region 50, permitting the lock cylinder 42 to be rotated through approximately 180° in known fashion, between the locked condition of Figs. 7 and 8 and the unlocked condition of Figs. 5 and 6.

[0041] In this embodiment the lock cylinder 42 has four lock discs 44. It will be understood that increasing the number of lock discs 44 increases the level of security afforded by the lock cylinder. It will also be appreciated from Figs. 6 and 8 that increasing the number of lock discs increases the length of the lock cylinder which must be accommodated by the second housing 22.

[0042] The second housing 22 has a mounting face 36 (Fig.6) which in the installed condition of Figs. 1 and 2 engages a surface of the window panel 12. The mounting face 36 is substantially planar to match the substantially planar surface of the window panel to which the second housing is to be fitted (the projections from the mounting face 36 which are seen in Fig.6 represent the fixings 32).

[0043] The lock cylinder 42 rotates in the second housing 22 about a lock cylinder rotation axis A1. It will be seen from Fig.6 in particular that the lock cylinder rotation axis lies in a plane which is substantially parallel to (and in this embodiment is precisely parallel to) the mounting face 36.

[0044] Connected to the lock cylinder 42 is a lock sleeve 54. As seen in Fig.3 the lock sleeve 54 is a partial continuation of the wall of the lock cylinder 42. As seen in Fig.6, the lock sleeve rotates relative to the second housing 22 about a lock sleeve rotation axis A2. In this embodiment, because the lock sleeve 54 is integral with the lock cylinder 42 the rotation axes A1 and A2 are the same axis. The reference to two separate rotation axes A1 and A2 is to clarify that these two axes do not need to be the same, nor do they need to be precisely parallel or aligned. For example, the respective rotation axes A1 and A2 could be angled and/or misaligned in alternative embodiments in which the lock sleeve is separate from, but driven by, the lock cylinder.

[0045] The angling and/or misalignment between the respective rotation axes A1 and A2 could be significant without departing from the scope of the present invention. For example, each of the axes A1 and A2 could be angled by up to 15° or so relative to the mounting face 36 (and

consequently angled relative to each other). Also, even if the axes A1 and A2 were parallel they could be misaligned by several millimetres, with a suitable connection to ensure that rotation of the lock cylinder is transmitted into rotation of the lock sleeve.

[0046] The second housing 22 is generally cuboid in form. The term "cuboid" is to be interpreted very broadly herein because some of the corners are rounded as shown, and some of the side faces could be tapered, without detriment to the operation of the cable restrictor.

[0047] The recess 26 is open at two of the side faces of the second housing 22. In particular the recess 26 has a first recess opening in the first side face 60 which opposes the mounting face 36, and a second recess opening in the second side face 62 (Fig.6) which second side face 62 interconnects the mounting face 36 and the first side face 60. The first recess opening and the second recess opening are interconnected (i.e. contiguous). As will be seen from Fig.4, and by comparing Figs. 6 and 8, the fixing part 24 is inserted into the recess 26 in the direction of the arrow INS of Fig.4, i.e. in a direction which is substantially perpendicular to, and towards, the mounting face 36.

[0048] It will also be seen from Figs 2 and 7 that when the fixing part 24 is located in its recess 26, the longitudinal axis L-L of the fixing part and of the second end of the cable 18 (Fig.4) is substantially parallel to (and in this embodiment precisely parallel to) the plane of the mounting face 36. This has two particular benefits over the known cable restrictors in which the longitudinal axis of the fixing part and second end of the cable is substantially perpendicular to the mounting face. Firstly, when the cable 18 is taut (as will be the case when a restricted window has been opened to its maximum extent), the second end of the present cable is required to bend through a smaller angle. Secondly, as is most clearly seen in Fig. 2, when the window 12 is closed the present cable 18 lies close to the window 12 and frame 14 and is significantly less obtrusive than is the case with the known cable restrictors in which the longitudinal axis of the fixing part and second end of the cable is substantially perpendicular to the mounting face.

[0049] The form of the lock sleeve 54 which secures the fixing part 24 in the recess 26 is seen in Fig.3. The lock sleeve 54 is generally tubular with an open end 64, the open end 64 being sized to accommodate the neck 66 of the fixing part 24 (as seen in Fig.8). Part of the side wall 68 of the lock sleeve 54 is removed to provide a lock opening 70 which is sized to accommodate the enlarged end 72 of the fixing part 24.

[0050] As explained above, rotation of the lock cylinder 42 causes corresponding rotation of the lock sleeve 54, between a locked or enabled position of Figs. 7 and 8 and an unlocked or disabled position of Figs. 5 and 6. The lock sleeve 54 is also in its unlocked or disabled position in Fig.4, and it will be appreciated that in this position the fixing part 24 can be inserted in the direction INS into the recess 26, with the enlarged end 72 passing

through the first recess opening in the first side face 60 and then through the lock opening 70 and into the lock sleeve 54. The neck 66 passes through the first recess opening in the first side face 60 and into the open end 64 of the lock sleeve 54.

[0051] When the fixing part 24 has been fully inserted into the recess 26, the enlarged end 72 engages the side wall 68 of the lock sleeve 54, the side wall 68 surrounding much of the enlarged end 72. In the unlocked position of Figs. 5 and 6, a part of the side wall 68 of the lock sleeve 54 lies between the enlarged end 72 and the mounting face 36.

[0052] The lock cylinder 42 and the lock sleeve 54 can then be rotated about the rotation axis A1/A2 so that the side wall 68 of the lock sleeve 54 moves (slides) around the enlarged end 72. It is arranged that the lock cylinder 42 and the lock sleeve 54 rotate through approximately 180° between the unlocked and locked positions so that in the locked position of Figs. 7 and 8 the side wall 68 completely blocks the first recess opening in the side face 60 as seen in Fig.7, and secures the fixing part 24 within the recess 26.

[0053] In the secured or enabled condition of Figs. 7 and 8, it will be understood that the side wall 68 of the lock sleeve 54 prevents the fixing part 24 being removed from the recess 26 in the direction opposed to the insertion direction INS. It will also be understood that when the cable 18 is taut the tension acts to pull the fixing part through the second recess opening in the side face 62, so that the side wall 68 is not required to directly oppose the tension in the cable 18.

[0054] It is arranged that the enlarged end 72 is too large to pass through the open end 64 of the lock sleeve 54, and is also too large to pass through the second recess opening in the second side face 62. As with the known cable restrictors, therefore, attempts to forcibly open the window 12 beyond its restricted limit can be resisted by rigid parts of the second housing 22 rather than being resisted solely by the locking componentry.

[0055] It will be understood that in this embodiment the longitudinal axis L-L of the secured fixing part 24 is parallel to and coincident with the rotation axes A1 and A2, and this is the mechanically simplest form of the present invention. It will also be understood, however, that in alternative embodiments the longitudinal axis L-L of the fixing part could be parallel to but offset from the rotation axis A2 (by up to a few millimetres), and in other alternative embodiments these axes could be misaligned by an angle of up to around 15° or so, without unduly affecting the operation of the cable restrictor.

[0056] A second embodiment of cable restrictor 110 is shown in Figs. 9 and 10. The cable restrictor 110 shares most of its relevant components with the first embodiment of Figs. 1-8 and also shares the method of operation of the first embodiment. Accordingly, only the structural differences between the first and second embodiments will be described. Also, a component of the second embodiment which is identical to that of the first embodiment

utilises the same reference numeral.

[0057] The second embodiment of cable restrictor 110 differs in the size and shape of the second housing 122. In particular, the second housing 122 is smaller than the second housing 22, and has a smaller mounting face (or footprint).

[0058] The second housing 122 does not accommodate the fixings 132a,b alongside the lock cylinder 142 as in the first embodiment, but rather in line with the lock cylinder 142 and the lock sleeve 154. As better seen in Fig.10, the fixing hole in the second housing 122 for the fixing 132a is located directly behind the lock sleeve 154. It will therefore be understood that the second housing 122 must be fixed to the window, with the fixing 132a inserted and secured, before the lock cylinder 142 and its connected lock sleeve 154 are inserted into the second housing 122. To enable the installer to achieve this, the lock cylinder 142 has a retainer (not seen, but ideally a retaining disc) that is spring-biased to automatically latch in a retaining position when the lock cylinder is inserted into the second housing 122. Once the lock cylinder 142 has been inserted it can only be removed by way of a specialist tool. The inserted lock sleeve 154 covers the fixing 132a and prevents its removal.

[0059] The particular way in which the lock cylinder 142 is secured to the second housing 122 does not form part of the present invention and a skilled person will appreciate that many alternative means of latching or otherwise securing the lock cylinder 142 could be utilised.

[0060] It will also be seen that in this embodiment the second fixing 132b is not covered by the lock sleeve 154 and is therefore accessible when the fixing part 124 is released from the second housing 122. As shown in Fig. 10, however, the fixing part 24 in its secured condition overlies and obscures the second fixing 132b so that both of the fixings 132a,b are obscured in that condition.

[0061] The other difference of the second embodiment is primarily aesthetic, in that the second housing 122 is rounded to more closely follow the cylindrical form of the lock cylinder 142, the lock sleeve 154 and the fixing part 24.

[0062] It will be understood that in both embodiments of the invention, increasing the number of lock discs 44 results in an increase in the size of the second housing in the direction along the lock cylinder rotation axis A1. That axis should, however, normally be directed along the window edge as shown in Figs. 1 and 2 and an increase in the length of the second housing in that direction has little or no detrimental effect upon the aesthetic appeal of the cable restrictor, nor is this expected to reduce the number of windows or other panels with which the cable restrictor can be used.

[0063] Apart from the lock discs 44, each of the second housings 22,122 have just one moving component, namely the rotatable combined lock cylinder 42,142 and lock sleeve 54,154. The second housing, and therefore the cable restrictor 10, 110, is therefore mechanically extremely simple and cost-effective despite using a multi-

disc and secure lock cylinder 42, 142. In particular, the prior art arrangement in which the rotation of a lock cylinder causes the transverse movement of a peg or lock plate is avoided. Also, the side wall 68,168 of the respective lock sleeve 54,154 in its secured condition engages the fixing part 24 over a relatively large length and area so that the point loading in the event of attempts to forcibly remove the fixing part from the second housing is reduced.

[0064] It is preferably arranged that the key 52 cannot be removed from the lock cylinder 42,142 unless the lock cylinder is rotated back to its secured position. The presence of the key in the lock cylinder can help to alert a user to the fact that the cable restrictor is disabled.

Claims

1. A cable restrictor (10, 110) comprising a flexible cable (18) having a first end and a second end, the first end of the cable being connected to a first housing (20), the second end of the cable having a fixing part (24), the cable restrictor further comprising a second housing (22, 122) having a recess (26), the recess having a recess opening through which at least a part (66,72) of the fixing part (24) can pass into the recess, the second housing (22) having locking means (40) including a lock sleeve (54, 154) in the recess (26), the lock sleeve having a locked position and an unlocked position, the lock sleeve in its locked position blocking at least a part of the recess opening, the lock sleeve (54, 154) being rotatable between its locked position and its unlocked position about a lock sleeve rotation axis (A2).
2. The cable restrictor (10, 110) according to claim 1 in which the second housing has a mounting face (36) adapted to engage a surface of a panel (12) or frame (14) when installed, and in which the lock sleeve rotation axis (A2) is approximately parallel to the mounting face (36).
3. The cable restrictor (10, 110) according to claim 1 or claim 2 in which the lock sleeve has a lock sleeve opening (70) through which the part (66,72) of the fixing part (24) can pass in the unlocked position.
4. The cable restrictor (10, 110) according to claim 3 in which the lock sleeve has a side wall, part of the side wall being removed to provide the lock sleeve opening (70).
5. The cable restrictor (10, 110) according to claim 4 in which, when the fixing part (24) is in the second housing (22, 122), the side wall surrounds at least half of the circumference of the part (66,72) of the fixing part.
6. The cable restrictor (10, 110) according to any one of claims 1-5 in which the part (66,72) of the fixing part (24) is inserted into the recess (26) in an insertion direction (INS), and the insertion direction is at an angle to the lock sleeve rotation axis (A2).
7. The cable restrictor (10, 110) according to claim 6 in which the insertion direction (INS) and the lock sleeve rotation axis (A2) are approximately perpendicular.
8. The cable restrictor (10, 110) according to any one of claims 1-7 in which the locking means (40) includes a lock cylinder (42, 142) which is rotatably mounted in the second housing (22), the lock cylinder being rotatable about a lock cylinder rotation axis (A1), in which the lock cylinder rotation axis (A1) is substantially parallel with the lock sleeve rotation axis (A2).
9. The cable restrictor (10, 110) according to claim 8 in which the lock cylinder rotation axis (A1) is coincident with the lock sleeve rotation axis (A2).
10. The cable restrictor (10, 110) according to any one of claims 1-9 in which the fixing part (24) has a longitudinal axis (L-L) and the second end of the cable (18) has a longitudinal axis, the longitudinal axis of the second end of the cable being substantially aligned with the longitudinal axis (L-L) of the fixing part (24), and in which the longitudinal axis (L-L) of the fixing part (24) is substantially parallel to the lock sleeve rotation axis (A2) when the fixing part is in the second housing (22, 122).
11. The cable restrictor (10, 110) according to claim 10 in which the longitudinal axis (L-L) of the fixing part (24) is substantially aligned with the lock sleeve rotation axis (A2) when the fixing part is in the second housing (22, 122).
12. The cable restrictor (10, 110) according to any one of claims 1-11 in which the second housing (22, 122) is substantially cuboid in form, with or without a curved first side face (60, 160).
13. The cable restrictor (10, 110) according to claim 12 in which the recess (26) is open to two of the side faces (60, 62, 160) of the second housing (22, 122).
14. The cable restrictor (10, 110) according to claim 13 in which the recess opening is a first recess opening in a first side face (60, 160) of the second housing (22, 122), and the recess has a second recess opening in a second side face (62) of the second housing, the first recess opening and the second recess opening being interconnected, in which the fixing part has an enlarged end (72) and a neck (66), and in which

the second recess opening is large enough to accommodate the neck (66) but is too small for the enlarged end (72) to pass therethrough.

- 15. The cable restrictor (10) according to claim 14 in which the lock sleeve has an open end (64), and in which the open end (64) is large enough to accommodate the neck (66) but is too small for the enlarged end (72) to pass therethrough.

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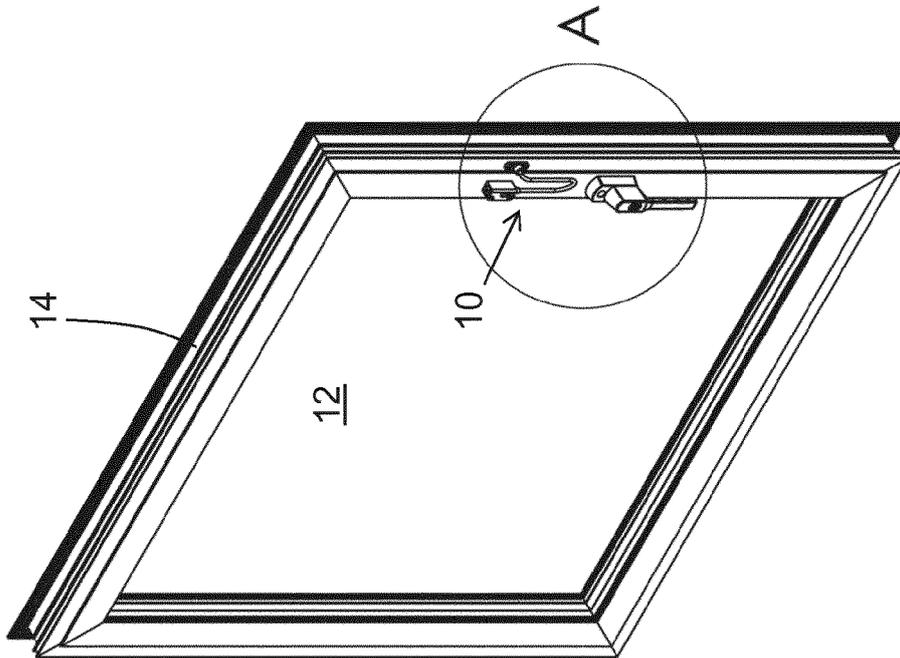
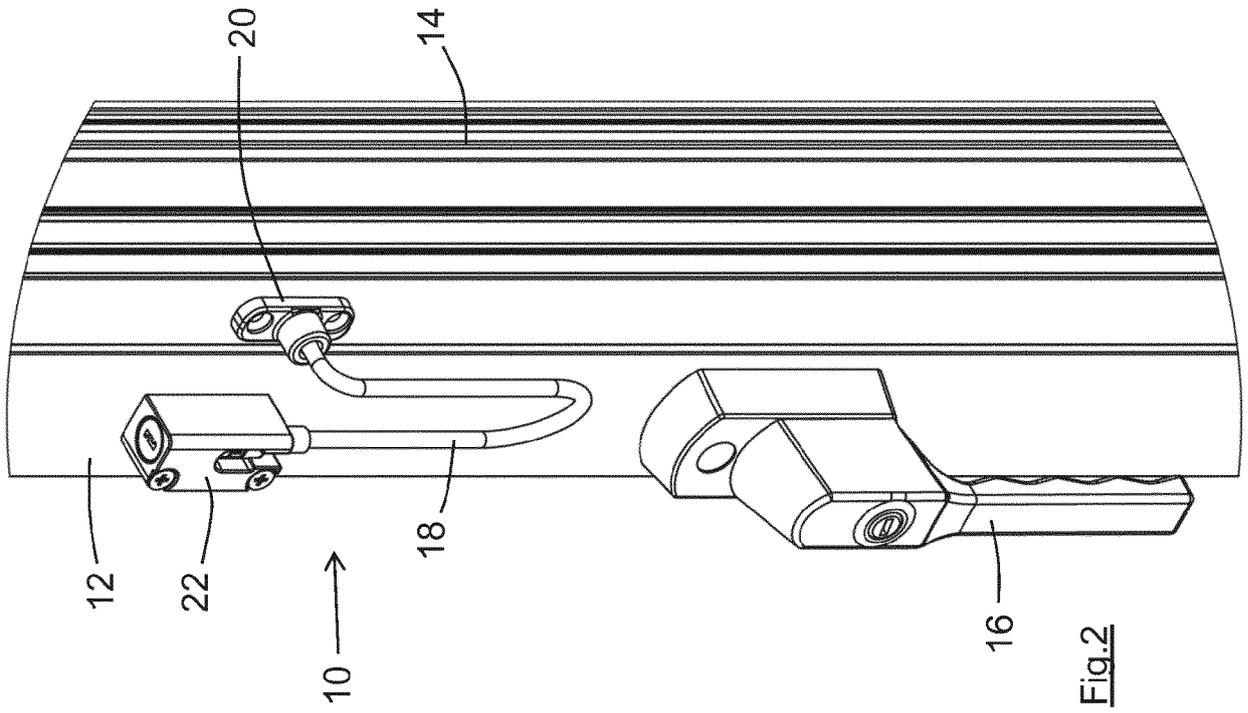
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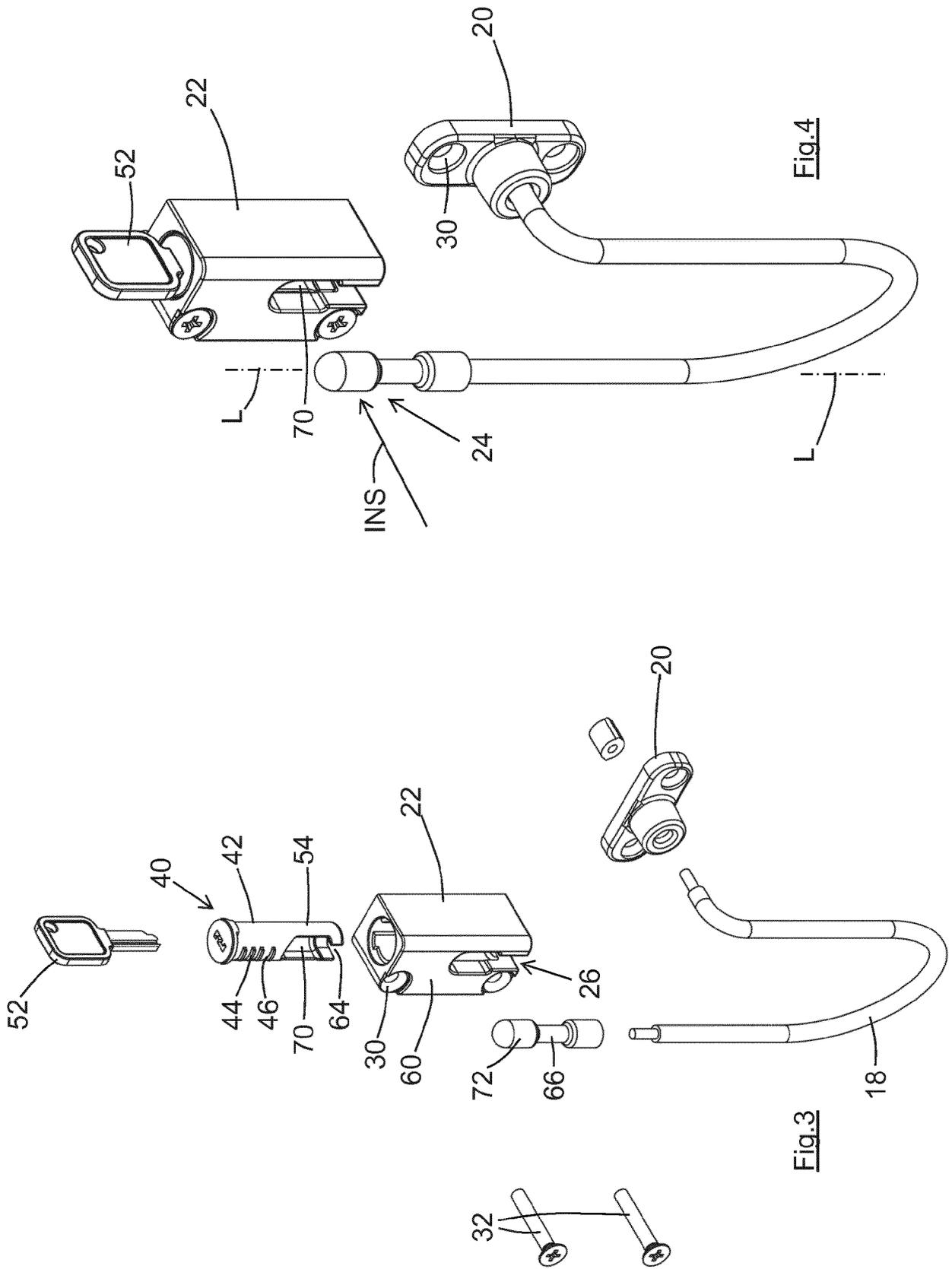
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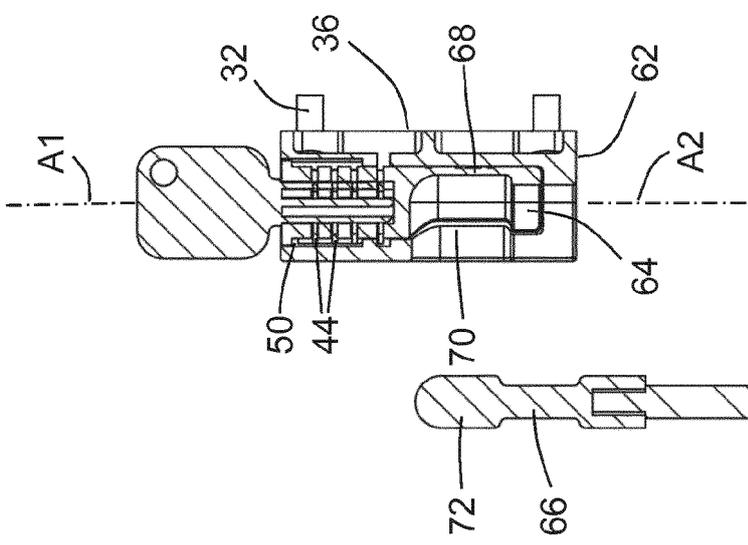


Fig. 6

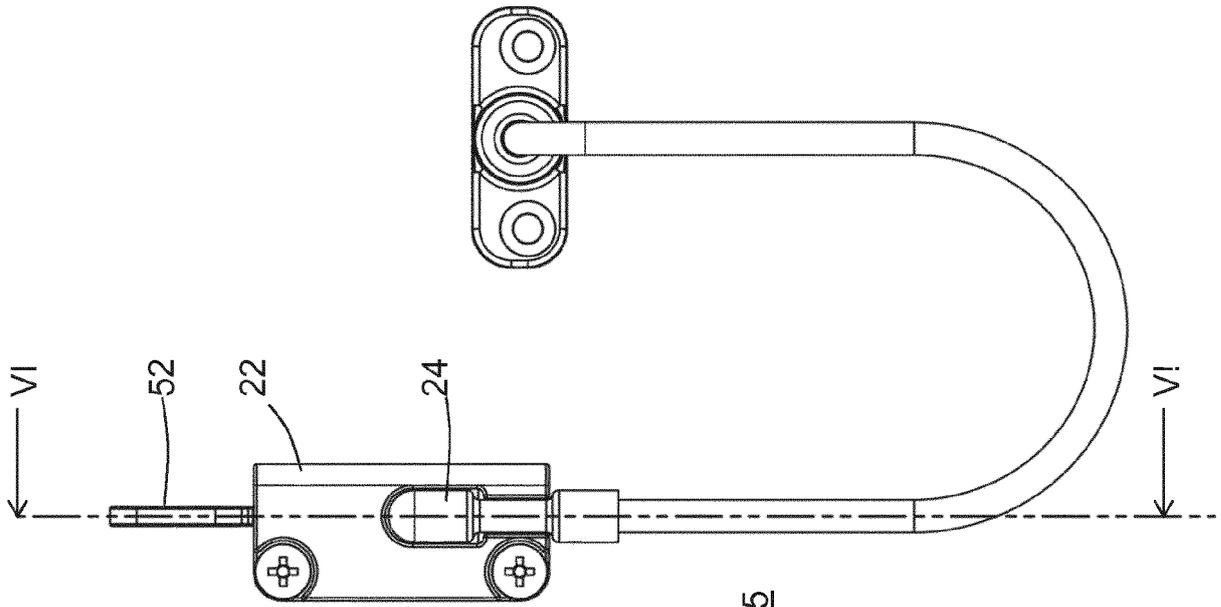
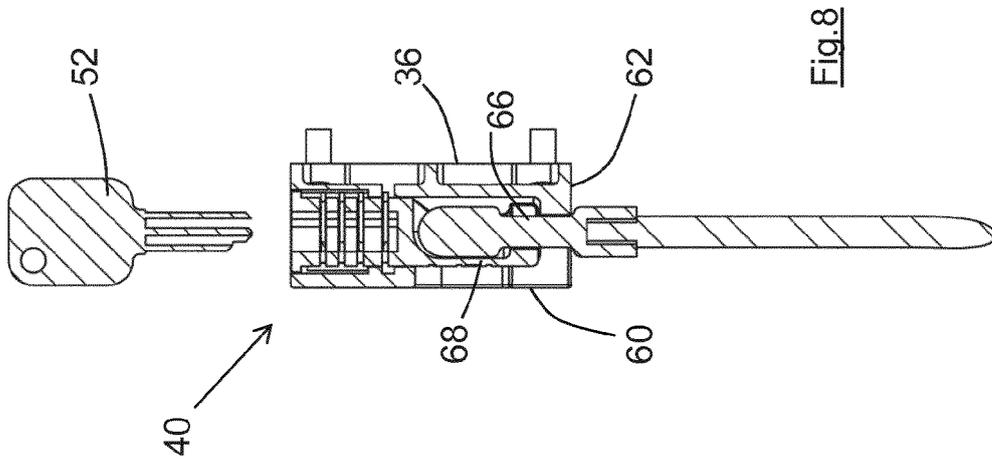
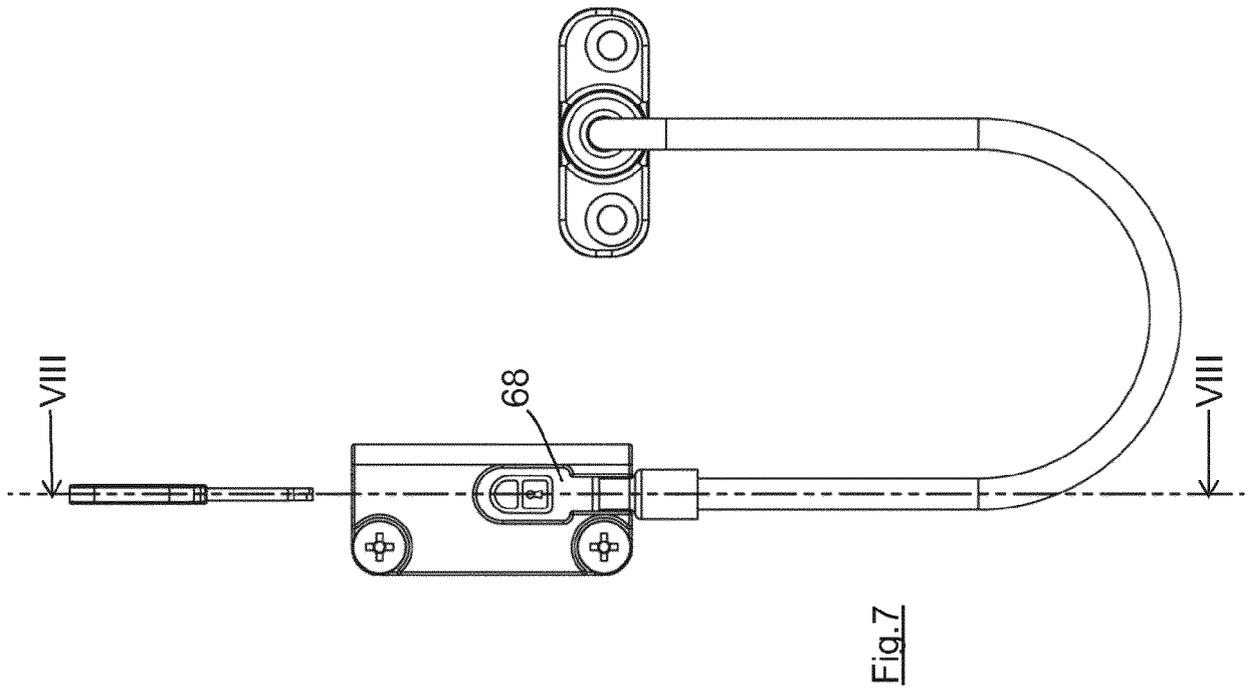


Fig. 5



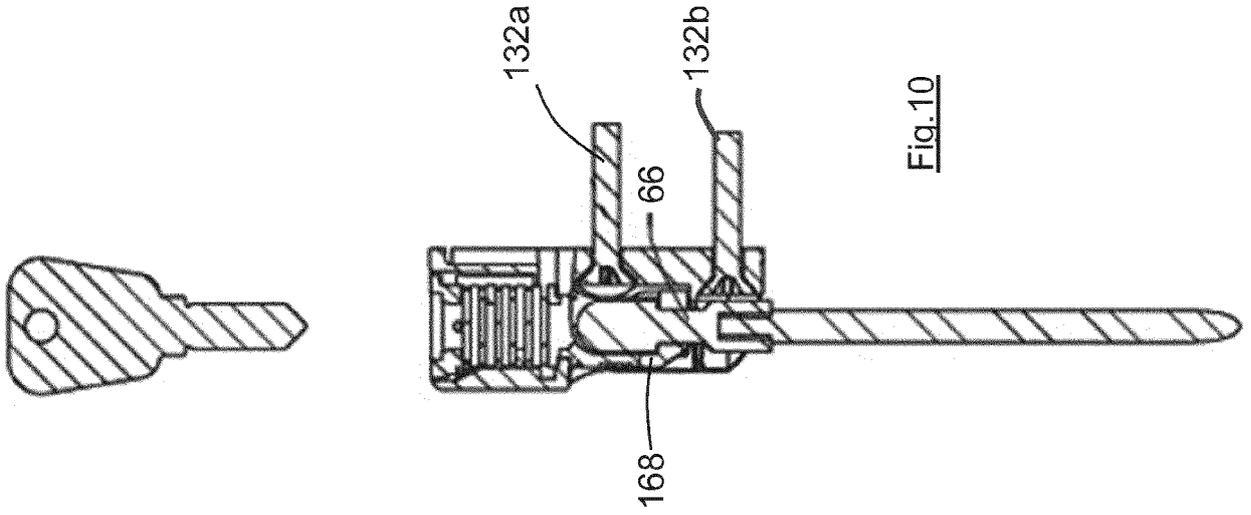


Fig. 10

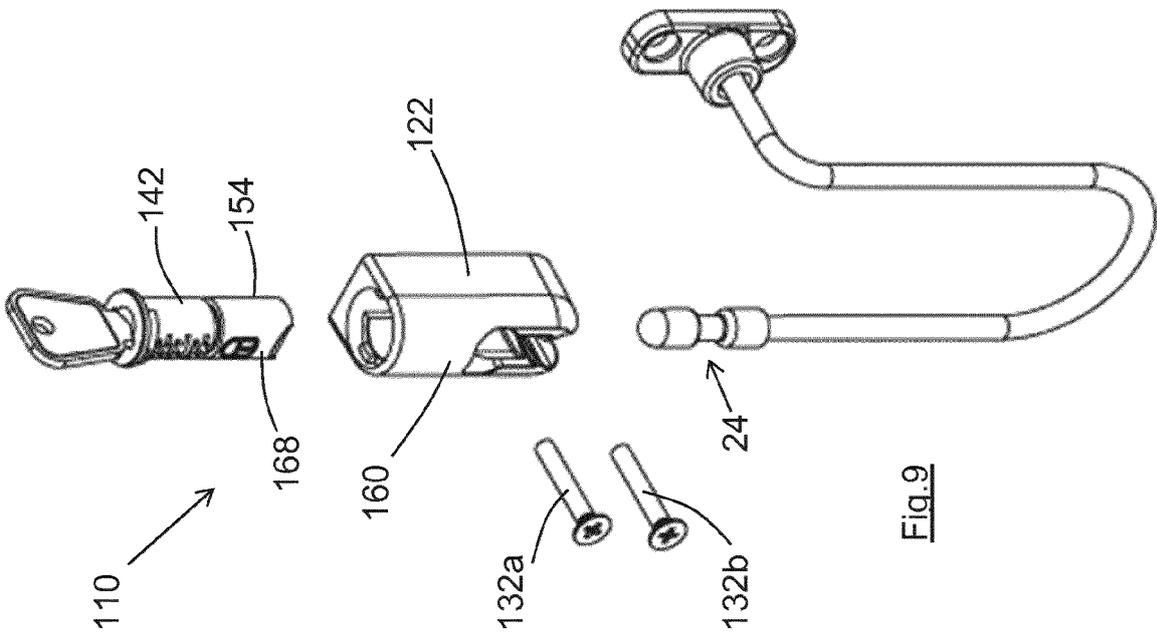


Fig. 9



EUROPEAN SEARCH REPORT

Application Number
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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,D A	EP 2 418 343 A2 (LANE ANDREW JOHN [GB]) 15 February 2012 (2012-02-15) * paragraph [0020] - paragraph [0028] * * figures 1-11 *	1,2,6,7, 12,13 3-5, 8-11,14, 15	INV. E05C17/36
A	----- WO 2014/108680 A1 (JACKLOC COMPANY LTD [GB]) 17 July 2014 (2014-07-17) * page 2, line 17 - line 30 * * page 6, line 16 - page 8, line 24 * * figures 1-7 *	1-15	
A	----- GB 2 527 920 A (BANKS J & CO LTD [GB]) 6 January 2016 (2016-01-06) * page 6, line 29 - page 9, line 5 * * figures 1-5 *	1-15	
A	----- US 3 125 875 A (G. J. FRIEDMAN) 24 March 1964 (1964-03-24) * column 167, line 4 - column 4, line 40 * * figures 1-6 *	1-15	
A	----- GB 2 019 932 A (LAINE Y T) 7 November 1979 (1979-11-07) * page 2, line 4 - line 82 * * figures 1-5 *	1-15	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC) E05C
Place of search The Hague		Date of completion of the search 30 August 2017	Examiner Antonov, Ventseslav
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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ON EUROPEAN PATENT APPLICATION NO.

EP 17 16 5583

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2418343 A2	15-02-2012	NONE	
WO 2014108680 A1	17-07-2014	NONE	
GB 2527920 A	06-01-2016	NONE	
US 3125875 A	24-03-1964	NONE	
GB 2019932 A	07-11-1979	DE 2916242 A1	08-11-1979
		FI 781318 A	28-10-1979
		FR 2424394 A1	23-11-1979
		GB 2019932 A	07-11-1979
		SE 421440 B	21-12-1981
		SU 953989 A3	23-08-1982
		US 4192537 A	11-03-1980

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- GB 2263934 A [0007]
- GB 2391901 A [0007]
- EP 2085546 A [0007]
- EP 2418343 A [0011]