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

(11) **EP 3 643 857 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
29.04.2020 Bulletin 2020/18

(51) Int Cl.:
E05B 7/00 *(2006.01)* ***E05B 65/10*** *(2006.01)*

(21) Application number: **19202778.7**

(22) Date of filing: **11.10.2019**

(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
Designated Validation States:
KH MA MD TN

(30) Priority: **23.10.2018 FI 20185890**

(71) Applicant: **Exit-Painike Ky**
61801 Kauhajoki (FI)

(72) Inventors:
- **HAKALA, Timo**
  61800 KAUHAJOKI (FI)
- **HAKALA, Jukka**
  61800 Kauhajoki (FI)

(74) Representative: **Berggren Oy, Helsinki & Oulu**
P.O. Box 16
Eteläinen Rautatiekatu 10A
00101 Helsinki (FI)

(54) ARRANGEMENT FOR TRANSMISSION OF MOVEMENT

(57) The present invention provides an arrangement (101) for transmission of movement which arrangement (101) comprises a body (102), a shaft (118) arranged to the body (102), a locking bar (109) for moving a locking bolt of a lock, an idler sheave (114) attached to the locking bar (109), a lever (120) arranged turnably on the shaft (118), and a cam part (127) connected to the lever (120), said cam part (127) being arranged to rotate the idler sheave (114) when the lever (120) is pushed. In the arrangement (101) for transmission of movement according to the invention the cam part (127) is arranged to be movable with respect to the lever (120). The present invention relates also to a door comprising said arrangement (101).

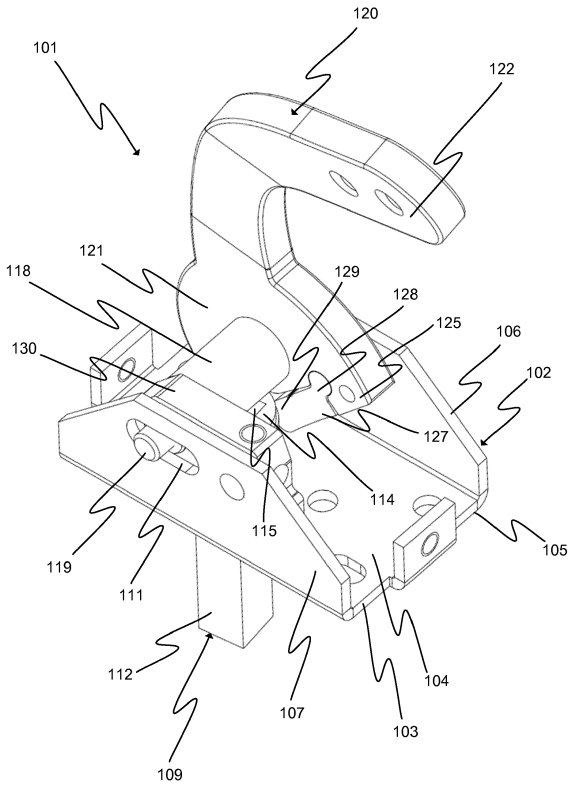

Fig. 1

EP 3 643 857 A1

Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to an arrangement for transmission of movement according to the preamble of the appended independent claim. More precisely the invention relates to an arrangement for transmission of movement of a door handle to a locking bolt of a lock. The invention relates also to a door comprising said arrangement.

BACKGROUND OF THE INVENTION

[0002] Reliable and easy opening of a door is prerequisite in everyday life. Especially, it is important for locked doors, for example, emergency exit doors and entrance doors of residential buildings and warehouses. The door is typically opened using a door handle and/or a key. For opening the door, a movement of the door handle and/or the key is transmitted to a locking bolt of a lock.

[0003] Various kinds of mechanisms which transmits a movement of a door handle and/or a key to a locking bolt of a door's lock are used in prior art. However, problems have arisen with these designs. One of the disadvantages is that parts of the door opening mechanisms are susceptible to wear. Wear and friction between the parts causes problems with the functioning of the door. The force needed for opening the door with a door handle and/or a key becomes excessive and finally the wear between the parts may prevent or substantially inhibit the opening of a lock. This can cause dangerous situations, for example, in a case of an emergency.

OBJECTIVES OF THE INVENTION

[0004] It is the main objective of the present invention to reduce or even eliminate the prior art problems presented above.

[0005] It is an objective of the present invention to provide an arrangement which facilitates transmission of movement of a door handle to a locking bolt of a lock and decreases a force needed for opening a door.

[0006] It is a further objective of the present invention to provide an arrangement which is durable and reliable in use.

[0007] It is a still further objective of the present invention to provide a door which functions reliably, and which is easy to open.

[0008] In order to realise the above-mentioned objectives, the arrangement according to the invention is characterised by what is presented in the characterising part of the appended independent claim. Advantageous embodiments of the invention are described in the dependent claims.

DESCRIPTION OF THE INVENTION

[0009] An arrangement for transmission of movement according to the invention comprises

- a body,
- a shaft arranged to the body,
- a locking bar for moving a locking bolt of a lock,
- an idler sheave attached to the locking bar, the idler sheave optionally comprising a counterpart of a cam part,
- a lever arranged turnably on the shaft, and
- a cam part connected to the lever, said cam part being arranged to rotate the idler sheave when the lever is pushed, wherein the cam part preferably comprises a first end and a second end, the first end optionally being connected to the lever and the second end optionally being operatively connected to the idler sheave, and the connection between the second end of the cam part and the counterpart is preferably releasable.

[0010] In the arrangement for transmission of movement according to the invention the cam part is arranged to be movable with respect to the lever.

[0011] The arrangement for transmission of movement according to the invention is intended to be arranged between a door handle and a lock body of a door for transmitting a movement of a door handle to a locking bolt of a lock. The arrangement according to the invention facilitates opening a door by transmitting the movement of the door handle easily and with minor force to the locking bolt of the lock. In the arrangement according to the invention the wear between the parts transmitting the movement is decreased by arranging the cam part to be movable with respect to the lever. Movability of the cam part enables the cam part to rotate the idler sheave by thrusting it instead of lifting it significantly at the same time. This decreases friction between the parts and also the force needed for pushing the door handle while opening the door.

[0012] The body of the arrangement is preferably separate from a lock body. The body of the arrangement comprises a flat bottom and a first and a second side edge. The bottom is preferably rectangular in shape. The bottom comprises an inner surface and an outer surface. The first and the second side edge, preferably the longitudinal side edges, are bent upwards from the bottom of the body in such a manner that the side edges are substantially perpendicular to the bottom of the body. The bottom of the body comprises an aperture where the locking bar is protruding through. The first and the second side edge of the body can comprise an aperture for the

shaft or a pin. The apertures are preferably oval in a longitudinal direction of the side edge. The body can be made of a metal, preferably of a metal sheet. The arrangement according to the invention is fastened to the door in such a manner that the outer surface of the bottom of the body is against the surface of the door. The body can be fastened to the door with fastening means, such as screws.

[0013] The shaft is a straight cylindrical bar comprising a first end and a second end. The shaft is preferably hollow. The shaft is arranged between the bended first and the second side edge of the body. The shaft can be movably or fixedly attached to the body. If the shaft is fixedly attached to the body, the attachment can be made for example by welding. If the shaft is attached to the body movably, the attachment can be made for example with a pin. A diameter of the shaft can be smaller at its first end for the lever. The shaft connects the lever to the body.

[0014] The locking bar of the arrangement moves a locking bolt of a lock. The locking bar can be for example a square spindle or a flat bar which can fit to the lock body. The locking bar comprises a first end and the second end. The first end of the locking bar is operatively adaptable to the mechanism of the lock through the aperture in the lock body. The second end of the locking bar is arranged through the aperture at the bottom of the body of the arrangement. Preferably, the locking bar is arranged essentially perpendicular to the bottom of the body.

[0015] The idler sheave is disposed to the second end of the locking bar protruding through the aperture at the bottom of the body. The idler sheave can comprise a hole in the middle of it, through which the second end of the locking bar can be arranged for fastening the locking bar to the idler sheave. The idler sheave is preferably arranged against the inner surface of the bottom of the body. The idler sheave comprises a counterpart to the cam part of the arrangement which counterpart is operatively connected with the cam part for rotating the idler sheave and the locking bar correspondingly when the lever is pushed. The idler sheave can comprise a second cam which is preferably arranged substantially opposite side of the idler sheave to the counterpart of the cam part. A turning angle of the idler sheave can be in a range of 15-65°, preferably 29-32°.

[0016] The lever is preferably elongated and can be bent in its longitudinal direction. The lever comprises a first end and a second end. The first end of the lever comprises an aperture through which the shaft is arranged so that the axis of the shaft is essentially perpendicular to the lever. Preferably, the first end of the lever is arranged to the first end of the shaft. The lever is arranged turnably in respect of the shaft. The second end of the lever is intended to be attached to a door handle or acting as a door handle itself. The door handle can be attached to the second end of the lever for example with screws. The first end of the lever may comprise a first and a second limiter for limiting the turning of the lever in respect to the shaft.

[0017] The arrangement comprises the cam part. The cam part has preferably an elongated shape. The cam part comprises an upper and a lower surface. The lower surface of the cam part can be straight or rounded in a longitudinal direction of the cam part. The upper surface of the cam part is preferably straight in the longitudinal direction of the cam part. The cam part is connected to the first end of the lever so that it locates between the lever and the inner surface of the bottom of the body. The cam part is operatively connected to the counterpart of the cam part of the idler sheave. The cam part rotates the idler sheave when the lever is pushed.

[0018] In the arrangement according to the invention, the cam part is arranged to be movable with respect to the lever. This enables the cam part to adapt and slide on the inner surface of the bottom of the body when the lever is moved. The movability of the cam part with respect to the lever enables the cam part to rotate the idler sheave by thrusting the counterpart of the cam part without significant lifting motion between the parts.

[0019] The arrangement according to the invention transmits the movement of the door handle by means of the lever, the cam part, the idler sheave and the locking bar to the lock body of a door. When the door handle and at the same time the lever which is attached to the door handle is pushed, the lever rotates around the shaft. The lever moves the cam part which is connected to the lever so that the cam part adapts and slides on the inner surface of the bottom of the body and thrusts the counterpart of cam part of the idler sheave. This thrusting motion of the cam part is transformed to the slewing motion of the idler sheave and the locking bar which locking bar opens the locking bolt of the lock.

[0020] The arrangement according to the invention can be connected to any lock as long as the connection can be carried out so that the movement of the locking bar is transmitted to the locking bolt of the lock. Thus, old locks in which the movement of the key or the door handle is not, considering their purpose, advantageously transmitted to the locking bolt of the lock can be provided with the arrangement according to the invention and therethrough the advantages of the invention can be achieved even without having to replace the original lock body.

[0021] An advantage of the arrangement according to the invention is that the arrangement is reliable in use and makes it easy to open the door. The arrangement facilitates opening the door even if carrying something or pushing a trolley. Besides, the arrangement enables safety of the door in dangerous situations. Another advantage of the arrangement according to the invention is that the arrangement is durable due to the decreased wear and friction between the parts. The movable cam part enables the motion between the cam part and the idler sheave to be thrusting when before it has been thrusting and lifting. This decreases the wear between the cam part and the idler sheave and increases their

lifetime. Still further advantage of the arrangement according to the invention is that the force needed to push the door handle and open the door is reduced.

[0022] According to an embodiment of the invention the arrangement comprises a slide arranged on the shaft, said slide being arranged to rotate the idler sheave when the lever is pushed. The slide is preferably attached to the second end of the shaft. The slide is rectangular in shape. The slide comprises a first aperture through which the shaft is arranged in such a manner that the bottom of the slide is against the inner surface of the bottom of the body. Preferably, the slide is arranged substantially perpendicularly to the axis of the shaft. The slide comprises a second aperture which opens to the bottom of the slide. In the arrangement, the second cam of the idler sheave is arranged to the second aperture of the slide. The second aperture is operatively connected to the second cam of the idler sheave. When the lever is pushed, the edge of the second aperture touches to the second cam of the idler sheave and thrusts it and rotates the idler sheave. The idler sheave rotates the locking bar which opens the locking bolt of the lock. The cam part and the slide are arranged to rotate the idler sheave from different sides of the idler sheave in the same direction and at equal force. This decreases friction between the moving parts. The slide facilitates rotating the idler sheave and locking bar when less force is needed for opening the door.

[0023] According to an embodiment of the invention the shaft is arranged to the body with a pin. The pin can be arranged through the hollow shaft or be fixed to the both ends of the shaft. Preferably, the pin is arranged through the hollow shaft so that the shaft can move with respect to the pin. The pin is arranged through the apertures at the first and the second side edge from its ends. When using the pin to arrange the shaft to the body, the arrangement is easier to assemble. The pin also enables the shaft to move.

[0024] According to an embodiment of the invention the pin is arranged to be movable with respect to the body. Preferably, the pin is movable in a longitudinal direction of the body. In this case, the pin is arranged through the apertures at the first and the second side edge and the apertures are preferably oval in shape in longitudinal direction of the side edge of the body. The movable pin enables the shaft to move with respect to the body when the lever is pushed. This allows the cam part and the slide to thrust idler sheave when the lever is pushed.

[0025] According to an embodiment of the invention the idler sheave comprises a counterpart of the cam part, the counterpart of the cam part being a first cam or a toothing. In a case, when the counterpart of the cam part is the toothing, the cam part comprises also a corresponding toothing. The first cam part or the toothing is operatively connected to the cam part. The advantage of the first cam and the toothing is that a large contact area can be achieved between the cam part and the counterpart of the cam part when the lever is pushed.

[0026] According to an embodiment of the invention the cam part comprises a first end and a second end, the first end being connected to the lever and the second end being operatively connected to the idler sheave. The first end of the cam part is connected to the first end of the lever. The second end of the cam part is operatively connected to the counterpart of the cam part for thrusting it when the lever is pushed. The connection between the second end of the cam part and the counterpart of the cam part of the idler sheave can be releasable or fixed. Preferably, the connection is releasable. The releasable connection provides the effect that when the lever is being pushed, the cam part rotates the idler sheave, however, when the lever is moved to the opposite direction, the cam part does not pull the idler sheave (that is the cam part is releasable relative to the idler sheave). Thus, when the lever is at the initial position (the cam part is not in contact with the idler sheave), the idler sheave may be arranged to rotate freely when the lock is being operated, for example, by a door handle and/or a key. This makes the opening of the door from the other side of the door easier because various parts of the arrangement are not being operated. When the first end of the cam part is connected to the lever, the second end of the cam part can move with respect to the lever. This enables the cam part to adapt the inner surface of the bottom of the body and thrust the idler sheave without significant lifting motion when the lever is pushed.

[0027] According to an embodiment of the invention the length of the cam part is in a range of 10-25 mm. Preferably, the length of the cam is in a range of 16-21 mm. By adjusting the length of the cam part, the slewing motion of the idler sheave and the locking bar attached to it can be increased or decreased. This enables locks with the different turning angle to be opened. With the longer cam part, the idler sheave and the locking bar can be rotated more. With a small movement of the door handle, a greater rotary movement of the idler sheave and the locking bar for opening the locking bolt of the lock can be achieved.

[0028] According to an embodiment of the invention the cam part comprises two or more portions connected to each other. The portions can be for example pivoted to each other. This enables the cam part to be flexible and thrust the counterpart of the cam part of the idler sheave longer which increases the slewing motion of the locking bar.

[0029] According to an embodiment of the invention the cam part is releasably connected to the lever. Preferably, the first end of the cam part is releasably connected to the first end of the lever. The releasable connection can be pivoted connection or via for example cogwheels. The releasable connection allows the cam part to be changed without changing the whole lever in a case of, for example, wear or other disorder.

[0030] According to an embodiment of the invention the cam part is pivoted to the lever. In a case of the pivoted

connection between the cam part and the lever, the cam part can comprise a male part of the pivot at its first end and the lever can comprise a female part of the pivot at its first end, or vice versa. Preferably, the cam part comprises a tongue at its first end and the lever comprises a groove where the tongue can fit at its first end. The pivoted connection enables the cam part to move in respect of the lever. This kind of connection is also simple and easy to assemble and releasable if needed.

[0031] According to an embodiment of the invention the cam part is connected to the lever via cogwheel. In that case, both the cam part and the lever comprise a cogwheel. The cogwheel is preferably arranged to the first end of the cam part and to the first end of the lever. Via cogwheels, the movement of the lever can be easily transmitted to the cam part.

[0032] According to an embodiment of the invention the cam part comprises a roll. The roll is preferably arranged to the second end of the cam part for facilitating the movement of the cam part. The roll can be arranged to move along the inner surface of the bottom of the body. The advantage of the roll is that the friction and wear between the lower surface of the cam part and the inner surface of the body can be decreased.

[0033] According to an embodiment of the invention the cam part is made of a metal such as stainless steel, aluminium or black iron. Preferably, the cam part is made of a stainless steel. The cam part can be manufactured by casting or by cutting from a metal sheet. A good formability, high melting point and strength make a metal an ideal material for the cam part. Additionally, stainless steels have a good corrosion resistance. The cam part, the lever and the idler sheave are preferably made of the same material for avoiding the wear between the parts.

[0034] According to an embodiment of the invention the cam part is heat treated or coated. The cam part can be heat treated for example by annealing or by tempering, quenching and austenitising or coated for example with hard chromium plating. In a case the cam part is heat treated, the cam of the idler sheave can be also heat treated. The heat treatment or coating increases for example the strength, durability, toughness and ductility of the used metal. The heat treatment or coating decreases the wear between the parts in contact to each other.

[0035] The present invention relates also to a door comprising the arrangement according to the invention. The arrangement according to the invention is arranged between a door handle and a lock body of a door for transmitting a movement of a door handle to a locking bolt of a lock. The arrangement can be installed to an exterior or an interior side of a door in a horizontal or in an upright position. The arrangement according to the invention can be used in a right-handed or left-handed door. The door can be an exit door or a communicating door, such as a door of a dwelling house, public premises, place of work or a ship.

[0036] According to an embodiment of the invention the door is an exit door. The locks of the exit doors are to be relatively easy to open in any circumstances, and thereof, a plurality of authority regulations regulate the properties affecting said aspect. It is of importance that the exit doors can be opened at a given minimum force, also in situations in which forces inhibiting the opening exert an impact on the doors.

[0037] The exemplary embodiments of the invention presented in this text are not interpreted to pose limitations to the applicability of the appended claims. The verb "to comprise" is used in this text as an open limitation that does not exclude the existence of also unrecited features. The features recited in the dependent claims are mutually freely combinable unless otherwise explicitly stated.

[0038] The embodiments presented in this text and their advantages relate by applicable parts to the arrangement as well as the door according to the invention, even though this is not always separately mentioned.

BRIEF DESCRIPTION OF THE DRAWINGS

[0039]

Fig. 1	illustrates an arrangement for transmission of movement according to an embodiment of the invention,
fig. 2	illustrates an exploded view of the arrangement of fig. 1,
fig. 3a-3b	illustrate an arrangement according to an embodiment of the invention at the first position, and
fig. 4a-4b	illustrate an arrangement according to an embodiment of the invention at the second position.

DETAILED DESCRIPTION OF THE INVENTION

[0040] The same reference signs are used of the same or like components in different embodiments.

[0041] In fig. 1 is illustrated an arrangement for transmission of movement according to an embodiment of the invention. In fig. 2 is illustrated the arrangement of fig. 1 as an exploded view. The arrangement 101 comprises a rectangular body 102. The body 102 comprises a flat bottom 103 with an inner 104 and an outer surface 105. The body comprises also a first 106 and a second side edge 107 which are bent perpendicularly upwards from the bottom 103. The bottom 103 of the body 102 comprises an aperture 108 (shown in fig. 2) for a locking bar 109. The first side edge 106 of the body 102 comprises a first oval aperture 110 (shown in fig. 2) and the second side edge 107 comprises a second oval aperture 111. The arrangement 101 is intended to be fastened to a door in such a manner that the outer surface 105 of the bottom 103 of the body 102 is against the door surface.

[0042] The locking bar 109 of the arrangement 101 is a square spindle having a first end 112 and the second end 113 (shown in fig. 2). The first end 112 of the locking bar 109 is operatively adaptable to the mechanism of the lock through the aperture in the lock body. The second 113 end of the locking bar 109 is arranged through the aperture 108 at the bottom 103 of the body 102 in such a manner that the locking bar 109 is essentially perpendicular to the bottom 103 of the body 102. An idler sheave 114 is attached to the second end 113 of the locking bar 109. The idler sheave 114 comprises a square hole 115 in the middle of it, through which the second end 113 of the locking bar 109 is arranged. The idler sheave 114 is arranged against the inner surface 104 of the bottom 103 of the body 102. The idler sheave 114 comprises a first cam 116 and a second cam 117 (shown in fig. 2). The second cam 117 is located substantially opposite to the first cam 116. The idler sheave 114 is intended to rotate the locking bar 109 whereas the locking bar 109 is intended to move a locking bolt of a lock.

[0043] The arrangement 101 comprises a hollow cylindrical shaft 118 which is arranged to the body 102 with a pin 119. The shaft 118 is located between the bent first 106 and the second side edge 107 so that the pin 119 is arranged through the hollow shaft 118. The first end of the pin 119 is arranged through the first oval aperture 110 at the first side edge 106 of the body 102 and the second end of the pin 119 is arranged through the second oval aperture 111 at the second side edge 107 of the body 102. The pin 119 can move within the oval apertures (110, 111). This enables also the shaft 118 to move with respect to the body 102. The shaft 118 connects a lever 120 to the body 102.

[0044] The lever 120 is arranged turnably on the shaft 118. The lever 120 is a plate-like elongated structure having first end 121 and a second end 122. The first end 121 of the lever 120 comprises an aperture 123 (shown in fig. 2) through which the shaft 118 is arranged. The first end 121 of the lever 120 comprises also a first 124 (shown in fig. 2) and a second limiter 125 for limiting turning of the lever 120 with respect to the shaft 118. The second end 122 of the lever 120 is intended to be attached to a door handle or acting as a door handle itself. In the arrangement 101, a washer 126 (shown in fig. 2) is arranged between the lever 120 and the first side edge 106 of the body 102.

[0045] The arrangement 101 according to the invention comprises the cam part 127. The cam part 127 has an elongated shape with a first end 128 and a second end 129. The first end 128 of the cam part 127 is releasably connected to the first end 121 of the lever 120 so that the cam part 127 locates between the lever 120 and the inner surface 104 of the bottom 103 of the body 102. The connection between the cam part 127 and the lever 120 is pivoted. The first end 128 of the cam part 127 comprises a tongue and the first end 121 of the lever 120 comprises a groove where the tongue fits. In that case, the second end 129 of the cam part 127 can move with respect to the lever 120. This enables the cam part 127 to adapt the inner surface 104 of the bottom 103 of the body 102 when the lever 120 is moved and to thrust the first cam 116 of the idler sheave 114 without significant lifting motion. The second end 129 of the cam part 127 is operatively connected to the first cam 116 of the idler sheave 114 for rotating the idler sheave 114 and the locking bar 109 correspondingly when the lever 120 is pushed.

[0046] The arrangement 101 comprises a plate-like rectangular slide 130 arranged on the shaft 118. The slide 130 is located to the opposing end of the shaft 118 in respect of the lever 120. The slide 130 comprises a first aperture 131 (shown in fig. 2) through which the shaft 118 is arranged. The bottom of the slide 130 is arranged against the inner surface 104 of the bottom 103 of the body 102. The slide 130 comprises a second aperture 132 (shown in fig. 2) which opens to the bottom of the slide 130. The second cam 117 of the idler sheave 114 is arranged to the second aperture 132 of the slide 130. The slide 130 rotates the idler sheave 114 when the lever 120 is pushed by thrusting the second cam 117 of the idler sheave 114.

[0047] In figs. 3a and 3b is illustrated an arrangement according to an embodiment of the invention at a first position as a side view and from below upwards. With the first position of the arrangement 101 is meant a position when the lever 120 is at its initial position and a lock of a door is locked. When the lever 120 is at its initial position, the first limiter 124 is against the inner surface 104 of the bottom 103 of the body 102. The pin 119 is at a first end of the first oval aperture 110 of the first side edge 106 of the body 102. Similarly, the pin 119 is at the first end of the second oval aperture (no shown) of the second side edge 107 of the body 102. The shaft 118 is at the same position with the pin 119. The second end 129 of the cam part 127 touches to the inner surface 104 of the bottom 103 of the body 102. When the lever 120 is at the initial position, the first cam 116 if the idler sheave 114 can rotate freely in the space between the first limiter 124 and the cam part 127. This makes the opening of the door from the other side of the door easier.

[0048] When the lock of the door is opened, the lever 120 is pushed to the position where the second limiter 125 is against the inner surface 104 of the bottom 103 of the body 102. At the same time when the lever 120 is pushed, the pin 119 moves within the oval apertures (110) to the second end of the apertures (110). The shaft 118 moves with the pin 119. The cam part 127 moves with respect to the lever 120 and slides on the inner surface 104 of the bottom 103 of the body 102. The second end 129 of the cam part 127 touches to the first cam 116 of the idler sheave 114 and thrusts it horizontally. This thrusting motion of the cam part 127 is transformed into slewing motion of the idler sheave 114. At the same time when the lever 120 is pushed, and also the pin 119 and shaft 118 are moved, the slide 130 moves to the opposite direction with respect to the cam part 127. The slide 130

trusts the second cam 117 (shown in fig. 3b) of the idler sheave 114 thus facilitating the slewing motion of the idler sheave 114. The idler sheave 114 rotates the locking bar 109 which opens the locking bolt of the lock.

[0049] In fig. 4a and 4b is illustrated an arrangement according to an embodiment of the invention at a second position as a side view and from below upwards. With the second position of the arrangement 101 is meant a position when the lever 120 is at its opening position and a lock of a door is open. When the lever 120 is at its opening position, the second limiter 125 is against the inner surface 104 of the bottom 103 of the body 102 and the pin 119 is at a second end of the first oval aperture 110 of the first side edge 106 of the body 102. Similarly, the pin 119 is at the second end of the second oval aperture (not shown) of the second side edge 107 of the body 102. The shaft 118 is at the same position with the pin 119. The bottom surface of the cam part 127 is against the inner surface 104 of the bottom 103 of the body 102 and the second end 129 of the cam part 127 is touching the first cam 116 of the idler sheave 114. The idler sheave 114 and the locking bar 109 attached to it are at the rotated position. The slide 130 has moved with the shaft 118 and the pin 119.

[0050] Only advantageous exemplary embodiments of the invention are described in the figures. It is clear to a person skilled in the art that the invention is not restricted only to the examples presented above, but the invention may vary within the limits of the claims presented hereafter. Some possible embodiments of the invention are described in the dependent claims, and they are not to be considered to restrict the scope of protection of the invention as such.

Claims

1. An arrangement (101) for transmission of movement, the arrangement (101) comprising:

   - a body (102),
   - a shaft (118) arranged to the body (102),
   - a locking bar (109) for moving a locking bolt of a lock,
   - an idler sheave (114) attached to the locking bar (109), the idler sheave (114) comprising a counterpart of a cam part (127),
   - a lever (120) arranged turnably on the shaft (118),
   - the cam part (127) connected to the lever (120), said cam part (127) being arranged to rotate the idler sheave (114) when the lever (120) is pushed, wherein the cam part (127) comprises a first end (128) and a second end (129), the first end (128) being connected to the lever (120) and the second end (129) being operatively connected to the idler sheave (114),

   characterised in that the cam part (127) is arranged to be movable with respect to the lever (120), and the connection between the second end (129) of the cam part (127) and the counterpart is releasable.

2. The arrangement (101) according to claim 1, **characterised in that** the arrangement (101) comprises a slide (130) arranged on the shaft (118), said slide (130) being arranged to rotate the idler sheave (114) when the lever (120) is pushed.

3. The arrangement (101) according to claim 1 or 2, **characterised in that** the shaft (118) is arranged to the body (102) with a pin (119).

4. The arrangement (101) according to claim 3, **characterised in that** the pin (119) is arranged to be movable with respect to the body (102).

5. The arrangement (101) according to any of the preceding claims, **characterised in that** the idler sheave (114) comprises a counterpart of the cam part, the counterpart of the cam part being a first cam (116) or a toothing.

6. The arrangement (101) according to any of the preceding claims, **characterised in that** the length of the cam part (127) is in a range of 10-25 mm.

7. The arrangement (101) according to any of the preceding claims, **characterised in that** the cam part (127) comprises two or more portions connected to each other.

8. The arrangement (101) according to any of the preceding claims, **characterised in that** the cam part (127) is releasably connected to the lever (120).

9. The arrangement (101) according to any of the preceding claims, **characterised in that** the cam part (127) is pivoted to the lever (120).

10. The arrangement (101) according to any of the preceding claims, **characterised in that** the cam part (127) is connected to the lever (120) via cogwheel.

11. The arrangement (101) according to any of the preceding claims, **characterised in that** the cam part (127) is made of a metal such as stainless steel, aluminium or black iron.

12. The arrangement (101) according to any of the preceding claims, **characterised in that** the cam part (127) is heat-treated or coated.

13. A door comprising the arrangement (101) according to any of the preceding claims.

14. The door according to claim 13, **characterised in that** the door is an exit door.

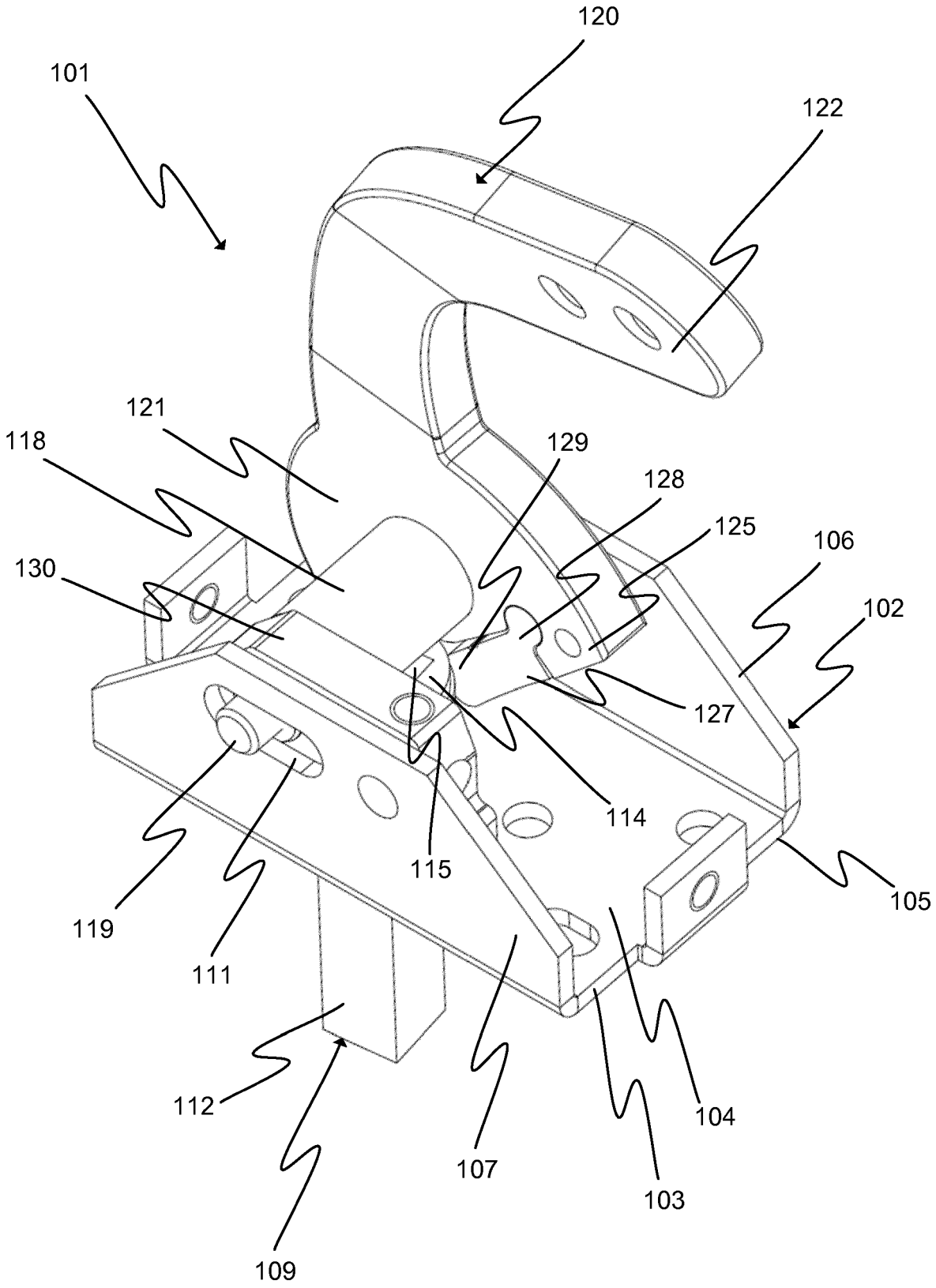
120
101
122
121
118
129
128
125
106
130
102
127
114
115
105
119
111
112
104
107
103
109

Fig. 1

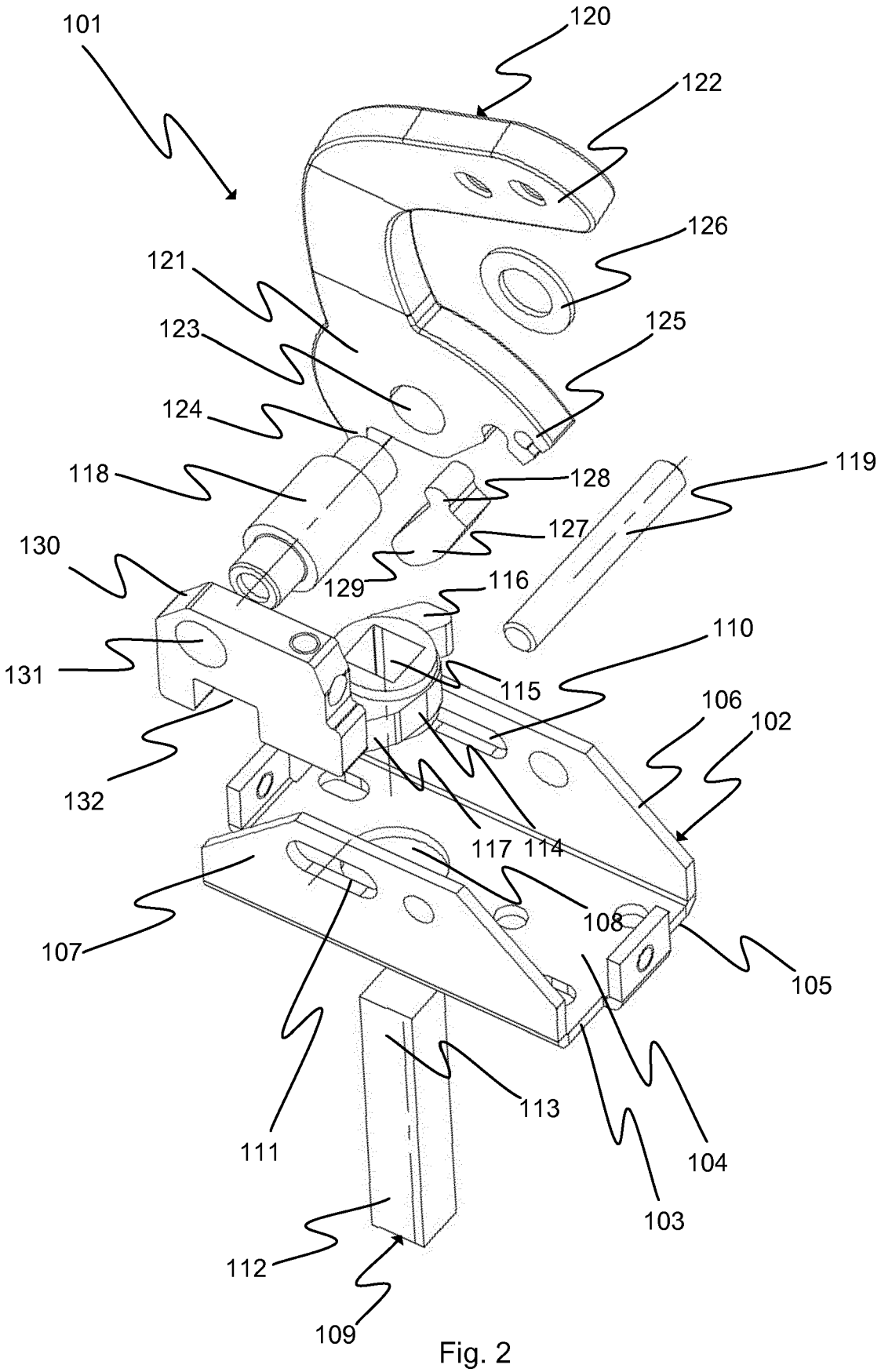
101
120
122
126
121
123
125
124
118
128
119
127
130
129
116
110
131
115
106
102
132
117
114
108
107
105
113
111
104
103
112
109

Fig. 2

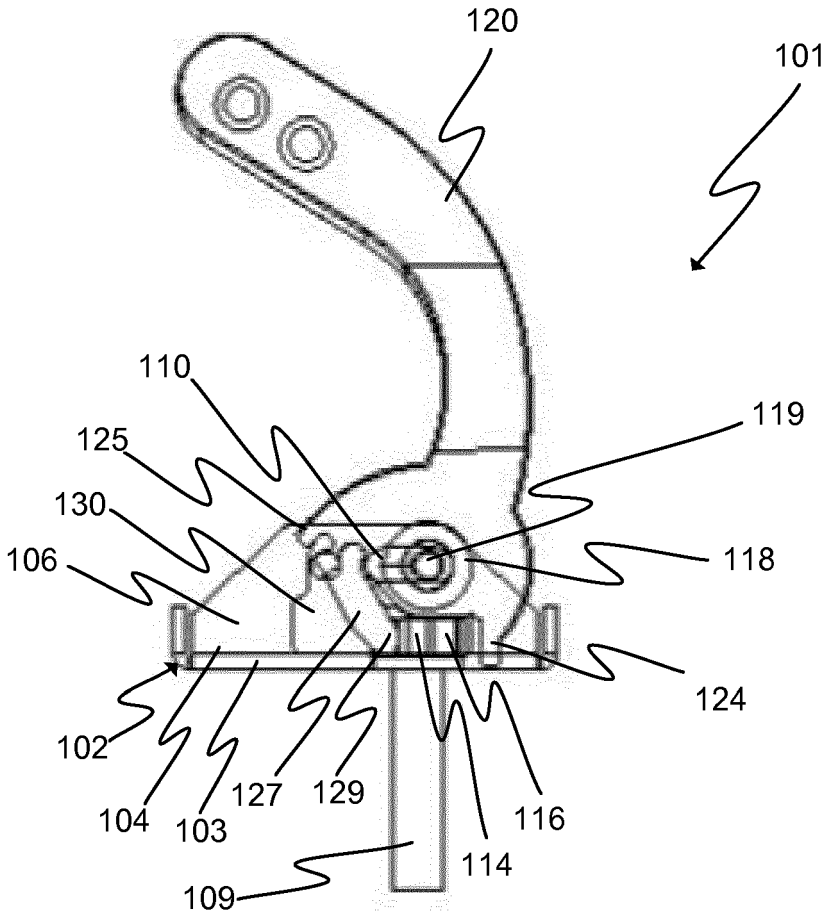
120
101
110
119
125
130
106
118
124
102
104
103
127
129
116
114
109

Fig. 3a

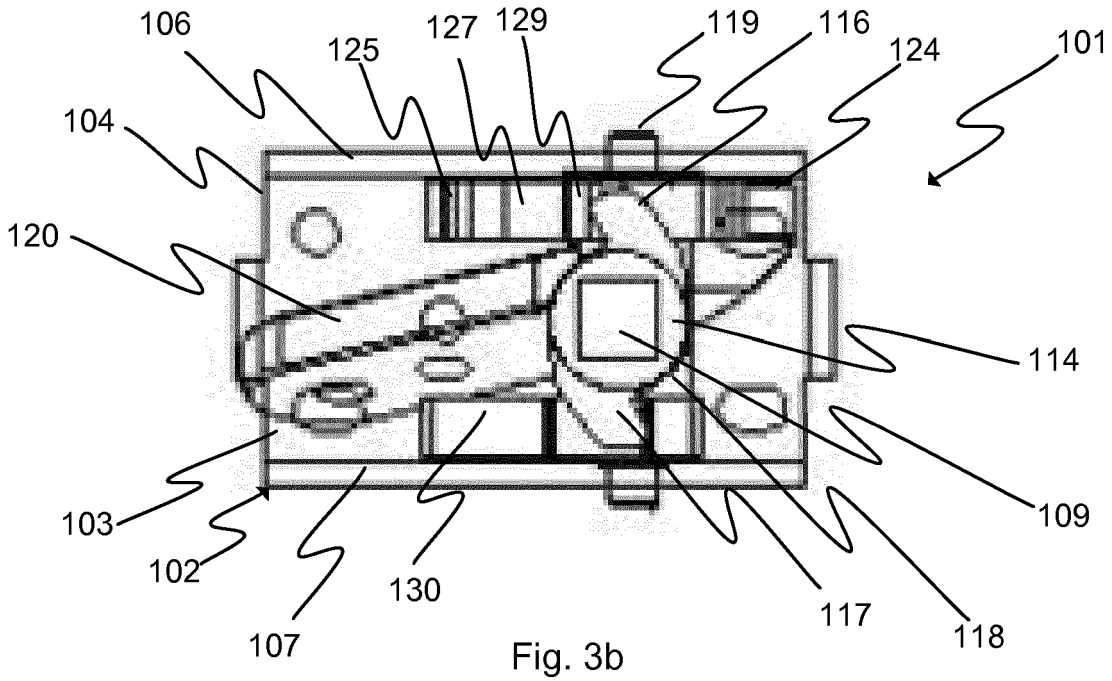
106
125
127
129
119
116
124
101
104
120
114
109
103
102
130
107
117
118

Fig. 3b

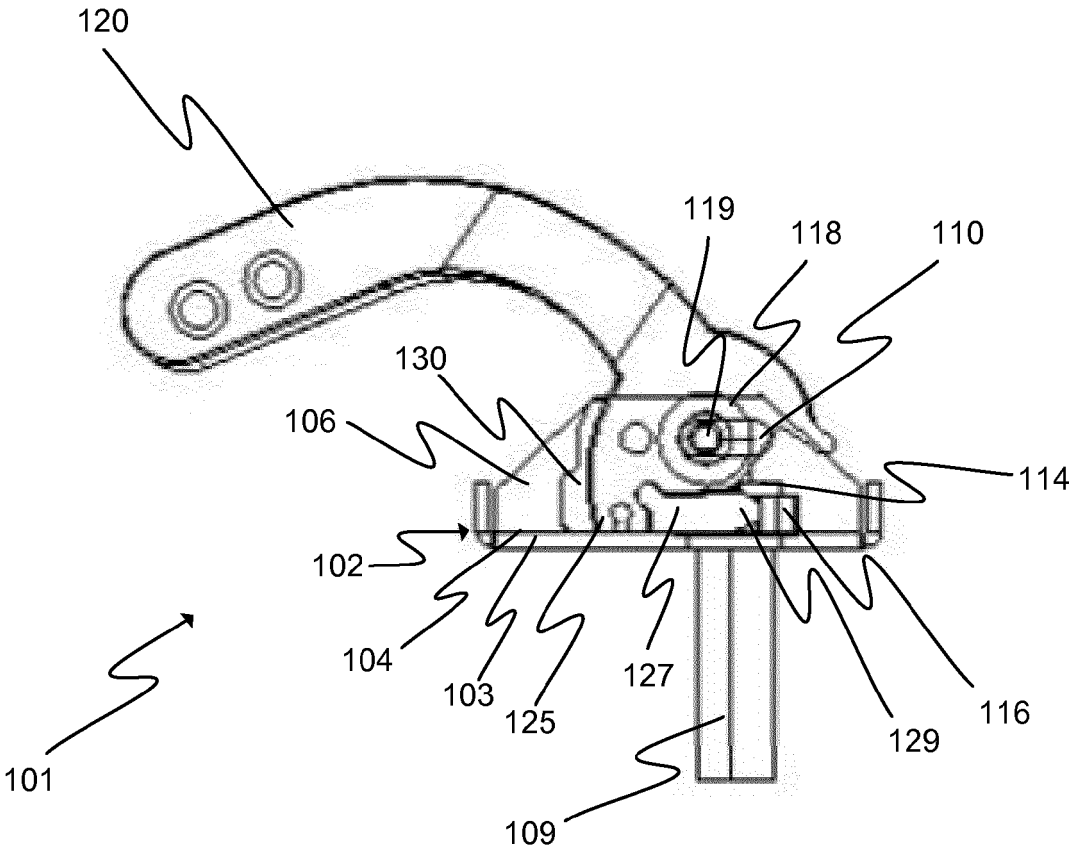
120
119
118
110
130
106
114
102
104
103
125
127
116
129
101
109

Fig. 4a

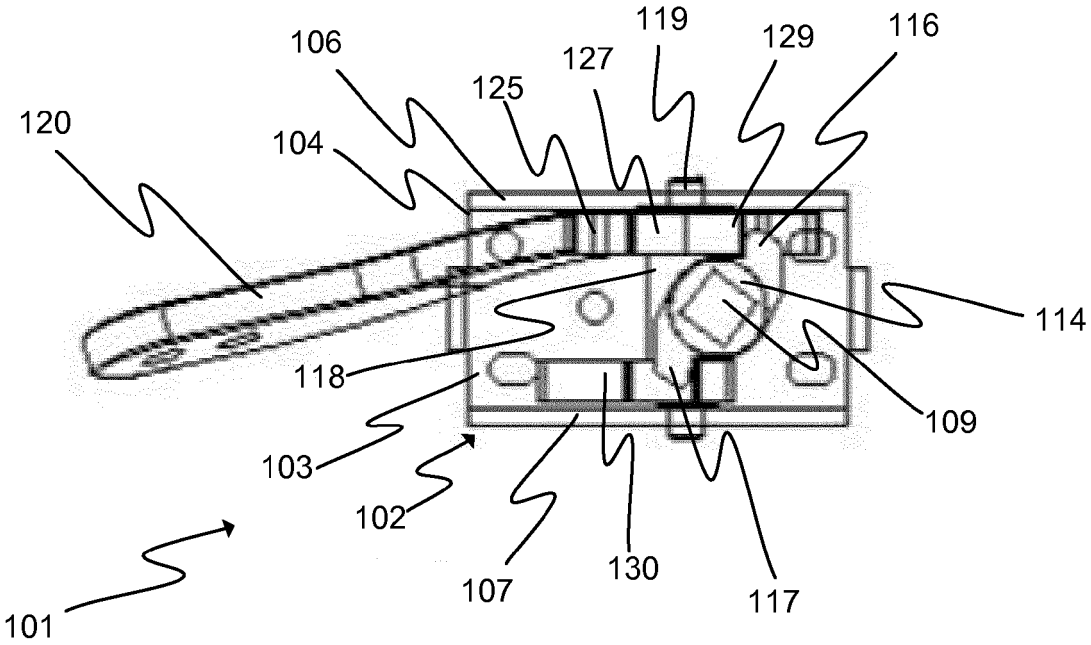
106
119
129
116
127
125
120
104
114
118
109
103
102
107
130
117
101

Fig. 4b

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 19 20 2778

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 Y	DE 32 44 647 A1 (HOERMANN KG FREISEN [DE]) 14 June 1984 (1984-06-14) * page 10, line 1 - page 13, line 29; figures 1-4 *	1-8, 10-14 1-5,13, 14	INV. E05B7/00 E05B65/10
X Y	DE 79 36 680 U1 (M. J. COCKER; P. G. LEGG; S. BRAMHALL; M.A. TINDALL) 24 July 1980 (1980-07-24) * the whole document *	1-14 1-5,13, 14	
X Y	US 1 025 102 A (VOIGHT HENRY G [US]) 30 April 1912 (1912-04-30) * the whole document *	1-14 1-5,13, 14	
Y A	EP 0 989 268 A1 (EXIT PAINIKE KY [FI]) 29 March 2000 (2000-03-29) * paragraphs [0003], [0011] - paragraph [0022]; figures 1-6 *	1-5,13, 14 6-12	

TECHNICAL FIELDS SEARCHED (IPC)

E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 March 2020	Goddar, Claudia

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 20 2778

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

11-03-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 3244647 A1	14-06-1984	NONE	
DE 7936680 U1	24-07-1980	AU 539367 B2	27-09-1984
		DE 2952639 A1	17-07-1980
		DE 7936680 U1	24-07-1980
		GB 2054029 A	11-02-1981
		GB 2056546 A	18-03-1981
US 1025102 A	30-04-1912	NONE	
EP 0989268 A1	29-03-2000	AT 237725 T	15-05-2003
		DE 69906899 D1	22-05-2003
		EP 0989268 A1	29-03-2000
		FI 981889 A	05-03-2000

EPO FORM P0459

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