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(54) SCREENING ARRANGEMENT WITH INTERNAL MOTOR

(57) A screening arrangement (1) for screening of a window, said screening arrangement (1) comprising a screening body (9) having an upper first end and a lower second end, said screening body (9) being movable in a longitudinal direction between a non-screening position, in which the screening body is rolled up, and a screening position, in which the screening body is extended; a hollow rolling tube (3) adapted for being rotatable when mounted, said rolling tube (3) extending in a transverse direction perpendicular to the longitudinal direction and being connected to the first end of the screening body (9), such that the screening body (9) is rolled up around the rolling tube (3) in the non-screening position; a bottom bar (4) extending parallel with the rolling tube (3), said bottom bar (4) being connected to the second end of the screening body (9); two guidance cords (5a, 5b) adapted for maintaining the bottom bar (4) parallel with the rolling tube (3); and a motor device (8) comprising a motor (80), wherein the motor (80) is arranged inside the rolling tube (3) and is in engagement with the rolling tube (3), preferably by a pinion (86) connected to the motor (80) and an annular gear (35) connected to the rolling tube (3).

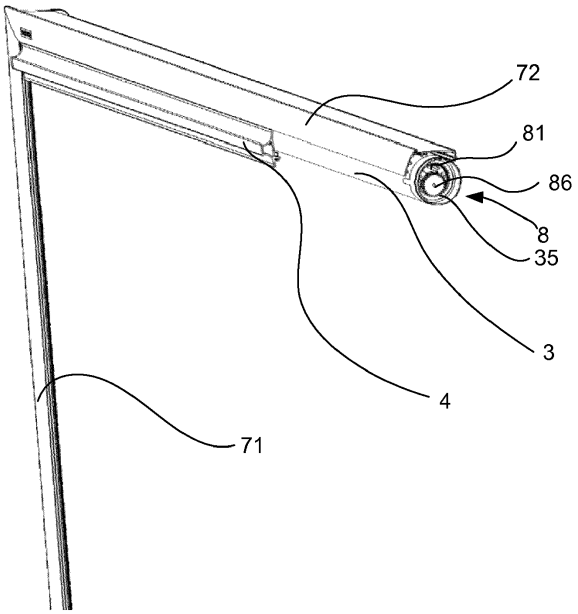

Fig. 2

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Description

Technical Field

[0001] The present invention relates in a screening arrangement for screening of a window, said screening arrangement comprising a screening body having an upper first end and a lower second end, said screening body being movable in a longitudinal direction between a non-screening position, in which the screening body is rolled up, and a screening position, in which the screening body is extended, a hollow rolling tube adapted for being rotatable when mounted, said rolling tube extending in a transverse direction perpendicular to the longitudinal direction and being connected to the first end of the screening body, such that the screening body is rolled up around the rolling tube in the non-screening position, a bottom bar extending parallel with the rolling tube, said bottom bar being connected to the second end of the screening body, two guidance cords adapted for maintaining the bottom bar parallel with the rolling tube, and a motor device comprising a motor, wherein the motor is arranged inside the rolling tube and is in engagement with the rolling tube, preferably by a pinion connected to the motor and an annular gear connected to the rolling tube.

Background Art

[0002] Screening arrangements for windows, particularly those wherein a screening body is rolled up around a rolling tube may be provided with a motor, such that movement of the screening body between a non-screening and a screening position may be automated. This is particularly useful for roof windows which may be situated out of reach for the user such that manual movement of the screening body can be difficult or impossible.

[0003] For screening arrangements adapted to be mounted inside the central opening of a window, it is desirable that the screening body is as wide as possible in order to cover as much of the central opening as possible as the screening body of such screening arrangements do not overlap with the front surface of the frame or sash and therefore only covers an area of the central opening corresponding to the width of the screening body. Arranging a motor in extension of the rolling tube will therefore reduce the amount of space available to the rolling tube and the screening body. This issue also applies for screening arrangements adapted to be mounted side-by-side to other screening arrangement, as the gap formed between their screening bodies will be widened by the motor.

[0004] Furthermore, to screen out sun light effectively, such screening arrangements need to comprise side panels to cover the gap formed between the screening body and the frame or sash. It has been shown that the users prefer the side panels to be as slim as possible. A more aesthetically pleasing screening arrangement may therefore be provided if the width of the screening body can be as close as possible to the width of the central opening of the window frame.

[0005] To allow the width of the screening body of motorized screening arrangements to be increased, it is known to arrange the motor inside the rolling tube, whereby the rolling tube and thus the screening body may be made wider, while maintaining the same total width of the screening arrangement so that it may still fit between the two frame members.

[0006] For the type of screening arrangements, wherein guidance cords are used to guide and/or keep the screening body stretched out, this may however lead to problems as the guidance cords may in some configurations have to pass through the rolling tube. Such guidance cord configurations are impossible with the known screening arrangements, wherein the motor is arranged inside the rolling tube, as the motor prevent the guidance cord from passing.

[0007] DE 9215788 U1 discloses a screening arrangement with a motor arranged inside the rolling tube.

[0008] On this background it is an object of the invention to provide a motorized screening arrangement, of the type having guidance cords, which can be made wider such that the screening body can cover as much of the window pane as possible, while also allowing the guidance cord(s) to guide the bottom bar and keep the screening body stretched out.

Summary of Invention

[0009] In a first aspect of the invention, this is achieved by a screening arrangement as described in the background, wherein the motor is arranged such that a clearance is provided within the cross-sectional space of the rolling tube, and at least one of the guidance cords pass the motor though the clearance.

[0010] The advantage of such a screening arrangement, is that the rolling tube and the screening body may be made wider as the motor is arranged inside the rolling tube and not in extension of the rolling tube. At the same time, the guidance cords exert a force on the bottom bar in the longitudinal direction away from the rolling tube, which ensures that the screening body is kept tensioned between the rolling tube and the bottom bar, and that the bottom bar is guided during movement of the screening body such that the bottom bar remains parallel with the rolling tube. Passing one or both of guidance cords through the rolling tube is possible due to the clearance in the cross-sectional space, which enables the guidance cords to be kept clear of the moving parts of the motor, such that it is avoided that the guidance cord become entangled.

[0011] While portions of the motor may extend beyond the boundary of the rolling tube, the term arranged inside the rolling tube should be understood as the majority, of the motor is arranged inside the hollow cavity of the rolling tube.

[0012] The engagement between the motor and the

rolling tube may be provided in several ways. In an embodiment of the invention, the engagement between the motor and the rolling tube is provided by coupling a rotary axle of the motor to the rolling tube by providing the rotary axle with spokes connected to the rolling tube or a wheel in engagement with the inside surface via friction. In another embodiment the engagement is provided by a pinion connected to the motor and an annular gear connected to the rolling tube.

[0013] In some embodiments, wherein the engagement is provided by a pinion connected to the motor and an annular gear connected to the rolling tube, the pinion has a smaller diameter than the inner diameter of the annular gear. This means that the pinion may be arranged such that it does not overlap with the cross-sectional space of the rolling tube, thus allowing the guidance cord passing through the rolling tube to keep clear of the movable parts of the motor.

[0014] These embodiments provide a reliable engagement between the motor and the rolling tube. The issue arising from using a motor with a rotation axle, is that the clearance provided within the cross-sectional space of the rolling tube must be kept clear, even during operation of the motor. Hence, spokes or pinions cannot pass the area of the clearance during rotation of the axle. This may be avoided in various ways. In an embodiment of the invention the pinion is in engagement with the annular gear via a second gear arranged in-between the pinion and the annular gear. By providing a second gear arranged in-between the pinion and the annular gear, the pinion may be made smaller, such that the pinion does not cover the clearance in the cross-sectional space.

[0015] For embodiments wherein the engagement between the motor and the rolling tube is provided by a pinion, the clearance should be provided in an area between the pinion and the annular gear such that the guidance cord(s) have sufficient clearance to avoid contacting the teeth of either of the gears.

[0016] In an embodiment of the invention, the clearance is provided by a through hole of a hollow axle of the motor. This allows the motor to be in engagement with the rolling tube either by spokes or by a pinion with an outer diameter substantially equal to the inner diameter of the annular gear, while also providing a clearance for the guidance cord pass through.

[0017] The motor may be arranged anywhere within the rolling tube. It is however preferably arranged at an end of the rolling tube such that it can be fixedly mounted to a side piece adapted to be connected to the frame or sash. This allows the side piece to keep the motor fixed while the motor exerts a force on the rolling tube and/or guidance cords.

[0018] In an embodiment of the invention, the motor is arranged eccentrically in relation to a central axis of the rolling tube. This allows the pinion of the motor to be in direct engagement with the annular gear, i.e. without any secondary gears, as the radius of the pinion can be equal to the shortest distance between the axle and the annular gear, whereas the radius of the pinion would have to the inner radius of the annular gear, when the motor is arranged co-axially in relation to a central axis of the rolling tube.

[0019] In an embodiment of the invention, the motor is arranged co-axially in relation to a central axis of the rolling tube. This allows the larger motor to be used as the more of the cross-sectional space of the rolling tube is available, but it does also require that the motor is either provided with a hollow axle or a secondary gear to couple the pinion and the annular gear.

[0020] The guidance cords may be arranged in various configurations. In an embodiment of the invention the guidance cords are arranged in two endless loops, each passing through the clearance provided within the cross-sectional space of the rolling tube, past the motor. Such embodiments are advantageous as they do not require winding reels to store the guidance cords, which winding reels are usually mounted at the end of the rolling tube, whereby the rolling tube will have to be made shorter for the screening arrangement to be mounted in the window. Hence, by arranging the guidance cords in two endless loops, a screening arrangement with less movable parts, wherein the rolling tube and screening body can be made wider, is provided.

[0021] In embodiments wherein the guidance cords are arranged in endless loops, the endless loop should be connected to the motor via a cord engagement element and connected to the bottom bar via a friction element allowing the guidance cord to exert a force in the longitudinal direction on the bottom bar. In such embodiments, the motor will move the screening body towards the screening position by moving the endless loop, whereby the endless loop pulls the bottom bar in the longitudinal direction towards the screening position via the friction element, and the motor will move the screening body towards the non-screening position by rotating the rolling tube, whereby the screening body is pulled in the longitudinal direction towards the non-screening position. This provides and effective way for the motor to apply a pulling force on the screening body towards both the screening and the non-screening position.

[0022] In another embodiment of the invention, the screening arrangement further comprises a winding device with at least one winding reel, said winding device being arranged at the rolling tube and being connected to the rolling tube or the motor, wherein each guidance cord in one end is connected to the winding device and to the bottom bar at their respective other ends, wherein the guidance cords extend along respective sides of the screening body and one of the guidance cords passes through the clearance provided within the cross-sectional space of the rolling tube, past the motor to connect with the winding device.

[0023] Such guidance cord configurations are advantageous as the amount of internal friction caused by the guidance cords is reduced compared to other guidance cord configurations. It is thus possible to reduce the size

of the motor as lesser power is required to move the screening body, which in turn provide a larger clearance in the cross-sectional space of the rolling tube for the guidance cord to pass through.

[0024] In such embodiments, in order to have the guidance cords maintain the screening body stretched between the rolling tube and the bottom bar, the guidance cords have to apply a force on the bottom bar in the longitudinal direction away from the rolling tube. This may be done by having the guidance cords pass a respective return element, the return elements, in an installed condition, being arranged at respective ends of the frame member opposite the frame member where the rolling tube is arranged, to redirect the guidance cord towards the bottom bar.

[0025] In embodiments comprising a winding device, the winding device may be coupled to the motor via the rolling tube or directly to the motor. In such embodiments, the motor will move the screening body towards the screening position by winding the guidance cords, whereby the screening body is pulled in the longitudinal direction towards the screening position, and the motor will move the screening body towards the non-screening position by rotating the rolling tube, whereby the screening body is pulled in the longitudinal direction towards the non-screening position. This provides and effective way for the motor to apply a pulling force on the screening body towards either of the screening or the non-screening positions.

[0026] In an embodiment of the invention, the at least one winding reel is arranged mostly, preferably fully, inside the hollow rolling tube. By providing a winding device which is arranged inside the rolling tube, the rolling tube may be made wider than screening arrangements of the prior art, where the winding reels are arranged at the end of the rolling tube, thereby reducing the amount of space available for the rolling tube and screening body.

[0027] Because the guidance cords have to maintain the screening body tensioned at all positions between the non-screening and screening positions, the winding reel(s) has to wind a length of guidance cord substantially equal to the length of the screening body unrolled from the rolling tube. In embodiments wherein the at least one winding reel is arranged inside the rolling tube, this is made difficult by the restriction that the winding reel will always have a smaller circumference than the rolling tube if it is to be arranged inside the rolling tube.

[0028] In an embodiment of the invention, the at least one winding reel is in engagement with the rolling tube or the motor, such that the at least one winding reel rotate at an angular velocity different from that of the rolling tube. This allows winding reels with a smaller circumference than the rolling tube to revolve several times for each revolution made by the rolling tube, whereby the length of guidance cord wound/unwound can match the length of screening body unrolled/rolled from the rolling tube.

[0029] When moving the screening body between the screening and the non-screening positions, the length of screening body rolled up per revolution of the rolling tube depends on the number of layers of screening body already rolled up on the rolling tube at the given position. This results in a need for the winding reel(s) to take up a varying length of guidance cord depending on the position of the screening body.

[0030] This can be solved by a flexible cord or by providing spring means, e.g. in the form of helical springs, at the respective other ends of the guidance cords, whereby the winding reels can wind a substantially constant length of guidance cord per revolution, while the spring means or the flexible cord will compensate for the requirement of winding/unwinding a varying length of guidance cord depending on the position of the screening body by keeping the guidance cord tensioned. The screening arrangement may therefore in any embodiment have the at least one guidance cord be spring-loaded at their respective other ends.

[0031] In an embodiment of the invention, the winding reel(s) is/are conical. This provides a solution to the aforementioned problem, that the rolling tube rolls/unrolls varying lengths of screening body depending on how many layers of screening body are already stored on the rolling tube, as the winding reel(s) will also be able to unwind/wind varying lengths of guidance cord, even though the ratio of revolutions between the winding reel(s) and the rolling tube remains constant. In other embodiments of the invention, this is solved by providing winding reel(s) that has a varying pitch along the length of the winding reel(s).

[0032] In an embodiment of the invention, the winding device comprises two winding reels, each being adapted for winding a respective guidance cord. This solution reduces the risk of entangling the guidance cords during winding/unwinding as the guidance cords are stored separately on each winding reel.

[0033] In an embodiment of the invention, the winding device further comprises a winding guide arranged adjacent to each of the at least one winding reels, each winding guide being movable in the transverse direction along the length of the respective winding reel, to guide the at least one guidance cords onto the adjacent winding reel. By providing a winding guide the guidance cord may extend between the guidance element and the winding guide such that the guidance cord can more easily be wound/unwound from the winding reel. Furthermore, by providing a winding guide, the guidance cord passing through the rolling tube is passed over the winding guide before being wound on the winding reel, which in turn results in that the position of the guidance cord is more stable within the clearance, thus further ensuring that the guidance cord is kept free of moving parts.

[0034] In embodiments wherein the winding device comprise two winding reels arranged side-by-side, the winding device may comprise one winding guide arranged between the two winding reels, said winding guide being adapted for guiding each of the guidance

cords onto a respective winding reel. This allows the screening arrangement to be made using only a single winding guide, thus saving moving parts and reducing friction.

[0035] In some embodiments of the invention, the two guidance cords apply substantially equal oppositely directed forces on the winding guide in the transverse direction. The advantage of this, is that the forces applied on the winding guide during operation by the guidance cords cancel each other out, such that the winding guide can slide freely during winding/unwinding of the guidance cords without being pulled sideways. This allows the winding guide to guide the guidance cords onto the winding reels without adding substantially to the collected friction of the screening arrangement.

[0036] In embodiments comprising one winding guide, this is achieved by passing both guidance cords over the winding guide from opposite transverse directions, i.e. from different ends of the rolling tube, whereby the forces applied on the winding guide by the guidance cords will cancel out.

[0037] Each winding guide may be provided by a sled slideably arranged alongside the winding surface of the winding reel, whereby at least one guide element in the form of a pulley or a rounded corner with a low friction surface may guide the guidance cord onto the winding reel.

[0038] In an embodiment of the invention, the screening arrangement further comprises a first shielding element arranged between the motor and the at least one guidance cord passing the motor and/or a second shielding element arranged between the annular and the at least one guidance cord passing the motor and a nearest portion of the annular gear.

[0039] By providing first and/or second shielding elements providing a wall between the clearance and the pinion or the annular gear, it is ensured that the guidance cord are kept free of the moving parts, such that they are not caught up and entangled.

[0040] In an embodiment of the invention, the screening arrangement further comprises a guidance element arranged at an end of the rolling tube aligned with the clearance, wherein the at least one guidance cords that passes though the rolling tube is guided into the clearance by the guidance element.

[0041] By providing a guidance element, preferably provided by a by a pulley or a rounded corner with a low friction surface, aligned with the clearance, the guidance cord may by guided into the rolling tube in the transverse direction towards the clearance, whereby the guidance cord will pass movable parts more securely.

[0042] In a second aspect of the invention, the objects of the invention are achieved by a window, preferably a roof window, comprising a rectangular window frame with four frame members defining a central opening and a window pane arranged in the central opening, wherein a screening arrangement according to any of the previous claims is arranged at a first frame member extending between a third and a fourth frame member op-posed to each other, wherein the bottom bar is movable the longitudinal direction between the rolling tube and the second frame member opposed to the first frame member.

[0043] As described above, the screening arrangement according to the first aspect of the invention allows the rolling tube and the screening body to be as wide as possible, while still allowing the screening arrangement to fit between the third and the fourth frame member, thus screening as much of the window pane as possible. Furthermore, by providing a window comprising the screening arrangement, the screening arrangement may be preinstalled such that the user does not have to perform the installation of the screening arrangement him/herself.

Brief Description of Drawings

[0044] In the following the invention will be described in further detail by means of examples of embodiments with reference to the schematic drawings, in which

Fig. 1 shows a front view of a screening arrangement of the invention mounted in the sash of a roof window;
Fig. 2 shows a perspective view of a screening arrangement according to the invention;
Fig. 3 shows an end view of a screening arrangement according to the invention;
Fig. 4 shows a perspective view of a motor device of a screening arrangement of the invention;
Fig. 5 shows a perspective view of a motor device of a screening arrangement of the invention;
Fig. 6 shows a perspective view of a motor device of a screening arrangement of the invention;
Fig. 7. shows an exploded view of a motor device of the invention;
Fig. 8 shows a perspective view from the back of a motor of a screening arrangement of the invention;
Fig. 9. shows a front view of a screening arrangement of the invention without the screening body;
Fig. 10 shows a drawing of a screening arrangement of the invention, wherein the guidance cords are wound up on a winding device;
Fig. 11 shows a drawing of another screening arrangement of the invention, wherein the guidance cords are wound up on a winding device;
Fig. 12 shows a top view of a return element of the invention;
Fig. 13 shows a side view of a return element of the invention;
Fig. 14 shows a front view of a return element of the invention;
Fig. 15 shows a perspective view of a winding device according to the invention;
Fig. 16 shows an exploded view of a winding device according to the invention;
Fig. 17 shows a front view of part of a screening arrangement of the invention;
Fig. 18 shows a perspective view of a winding device

according to the invention mounted on a window;

Fig. 19 shows a perspective view of a screening arrangement of the invention without the screening body;

Fig. 20 shows a drawing of a screening arrangement of the invention, wherein the guidance cords are arranged in endless loops; and

Fig. 21 shows a drawing of a screening arrangement of the invention, wherein each guidance cord connect to the bottom bar at both ends of the guidance cord.

Description of Embodiments

[0045] In the following, embodiments of the invention will be described in further detail. Each specific variation of the features can be applied to other embodiments of the invention unless specifically stated otherwise.

[0046] Turning first to Figs. 1 and 2 which show part of a screening arrangements 1 of the invention from a front and perspective view, respectively. The screening arrangement 1 is adapted to be used in windows comprising a stationary frame and optionally a movable sash mounted in the frame. In the following, both the frame and the sash may be referred to as the frame. Usually, each frame comprises four frame members forming a rectangular frame and defining a central opening in which either the sash or a window pane is arranged. The screening arrangement 1 is adapted to be mounted at a first frame member of the window, usually the top frame member, extending between a third and a fourth frame member opposed to each other. The screening arrangement 1 is preferably mounted inside the central opening which requires that the width of the screening arrangement 1 should be equal to the distance between the third and fourth frame members. By arranging the screening arrangement 1 inside the central opening of the frame adjacent to the window pane, a more aesthetically pleasing result will be achieved, as the screening arrangement 1 does not protrude beyond the front plane of the window frame.

[0047] While the screening arrangement 1 is adapted to be arranged in the central opening, it would also function if mounted on the front surfaces of the frame, i.e. the surfaces facing the interior of the building if the screening arrangement 1 is mounted inside the building or the surfaces facing the exterior of the building if the screening arrangement is mounted outside the building. Also, the screening arrangement 1 of the invention can be used in any window installation, however, it is particularly well suited for use in inclined or horizontal roof windows, as the guidance cord 5a, 5b and the optional side rails 71 enable the screening body 9 to remain stretched out in both the longitudinal and the transverse directions. This is of importance when the screening arrangement 1 is installed in an inclined or horizontal roof window, where gravity might make the screening body 9 sack downwards if it is not kept stretched out between the rolling tube 3 and the bottom bar 4 and/or between the side rails 71.

[0048] It should be noted, that the terms upper, lower, and bottom which have been used to describe the ends of the screening body 9 and bottom bar 4 are references to the position which these elements will have in the installed condition. Although most screening arrangements 1 will be adapted to be installed at the top frame member such that the screening body 9 is moved vertically towards the bottom frame member when bringing it into the screening position, it is contemplated that the screening arrangement 1 according to the invention could be adapted to be installed at a side frame member such that the screening body 9 is moved horizontally between the non-screening and the screening positions.

[0049] The screening arrangement 1 comprises a screening body 9 for screening a window, said screening body 9 being movable in a longitudinal direction between a non-screening position, in which the screening body 9 is rolled up, and a screening position, in which the screening body 9 is extended.

[0050] The screening body 9 may be roller blinds, awning blinds, roller shutters, or similar and will preferably be adapted to fit the size of the window which the screening arrangement 1 is to be installed in, i.e. have a width substantially equal to the distance between two opposing frame members. In its unrolled condition, the screening body 9 will usually have a rectangular form with two major surfaces, one for facing the interior of the building and one for facing the exterior, and as mentioned above, an upper first end and a lower second end which extends in the transverse direction and two sides extending in the longitudinal direction.

[0051] To store the screening body 9, the screening arrangement 1 comprises a hollow rolling tube 3 connected to the first end of the screening body 9. In the mounted condition, the rolling tube 3 is rotatable, such that the screening body 9 can be rolled up around the rolling tube 3 to bring the screening body 9 into the non-screening position or rolled off the rolling tube 3 to bring the screening body 9 into the screening position. To move the screening body 9, the screening arrangement 1 comprises a bottom bar 4 extending parallel with the rolling tube 3. The bottom bar 4 is connected to the second end of the screening body 9, such that a force applied to the bottom bar 4 in the longitudinal direction away from the rolling tube 3 will move the screening body 9 towards the screening position.

[0052] To automate movement of the screening body 9, the screening arrangement 1 further comprises a motor device 8. The motor device comprises a motor 80 arranged inside the rolling tube 3 in engagement with the rolling tube 3. This makes the screening arrangement 1 well suited for roof windows mounted in tall ceilings and/or allows the screening arrangement 1 to be coupled to and controlled over a network via an external or internal network connector, preferably a wireless network connector.

[0053] The screening arrangement 1 further comprises two guidance cords 5a, 5b (as shown in Figs. 10, 11, or 20) adapted for maintaining the bottom bar 4 parallel with the rolling tube 3 and keep the screening body 9 stretched out in the longitudinal direction. The path of the guidance cords 5a, 5b cannot be seen in Figs. 1 and 2, but will be described in detail below.

[0054] In the shown embodiments, the screening arrangement 1 further comprises two side rails 71 and a top rail 72 adapted to cover the gap formed between the screening body 9 and the side frame members and the top frame member, respectively. While this allows the screening arrangement 1 to effectively block out light, it has been shown that many users prefer the rails 71 to be as slim as possible. The screening arrangement 1 of the invention makes it possible to reduce the width of the side rails as the motor 80 is arranged inside the rolling tube 3 and not in extension of the rolling tube 3.

[0055] Besides covering the gaps between the screening body 9 and the side frame members, the side rails 71 may also comprise a guide groove adapted to accommodate the sides of the screening body 9. This allows the side rails 71 to guide the screening body 9 during movement of the screening body 9 and keep the screening body 9 stretched in the transverse direction.

[0056] In Fig. 2, part of the screening arrangement 1 is shown from a perspective view. To better illustrate the screening arrangement 1, the screening arrangement 1 is shown with only half of the bottom bar 4 and without the right side piece 88 and side rail 72 such that the rolling tube 3 and the motor device 8 can be seen.

[0057] As can be seen in the figure, the motor 80 is arranged inside the rolling tube 3. This allows the rolling tube 3 and the screening body 9 to be made wider than in screening arrangements, wherein the motor is placed in extension of the rolling tube. To enable the motor 80 to rotate the rolling tube 3, the motor 80 and the rolling tube 3 are in engagement via an annular gear 33 connected to the rolling tube 3 via an insertion piece 32 (shown in Figs. 4, 6, and 7) and a pinion 86 connected to an axle of the motor 80.

[0058] In general, the motor 80 may be an electrical motor powered by a battery and/or a solar cell of the screening arrangement 1, such that the screening arrangement may function autonomously, or coupled to an external power source, e.g. the power grid, such that the screening arrangement 1 may function without needing replacement of batteries.

[0059] To allow one or both of the guidance cord 5a, 5b to pass the motor 80 inside the rolling tube 3, the motor 80 is arranged such that a clearance 81 is provided within the cross-sectional space of the rolling tube 3. In the shown embodiment, this is achieved by using a cylindrical motor 80 with a diameter smaller than the inner diameter of the rolling tube 3, the motor 80 being arranged such that the central axis of the motor 80 is parallel with the central axis of the rolling tube 3, i.e. both extending in the transverse direction. To maximize the dimensions of the clearance in the cross-sectional space, the motor 8 is arranged eccentrically in relation to the centre axis of the rolling tube 3.

[0060] In the shown embodiment, the motor 80 is attached to a pinion 86 via a rotating axle and the rolling tube 3 is fixedly connected to an annular gear 35 in engagement with the pinion 86. To avoid that the pinion 86 covers the clearance in the cross-sectional space 81, the pinion 86 has a smaller diameter than the inner diameter of the annular gear 35. Providing a pinion 86 with a smaller diameter than then inner diameter of the annular gear 35 is possible, due to the eccentric placement of the motor 8 which brings the axle closer to the annular gear 35. In alternative embodiments, it is enabled by placing an intermediary secondary gear between the pinion 86 and the annular gear 35 to transfer the torque of the pinion 86 to the annular gear 35.

[0061] Turning now to Fig. 3, an end view of the rolling tube 3 is shown. The motor device 8 further comprises a first shielding element 83 arranged between the teeth of the pinion 86 and the guidance cord 5 (not shown in Fig. 3) passing through the clearance 81 in the cross-sectional space of the rolling tube 3. This ensures that the guidance cord 5 can pass the clearance 81 without getting entangled in the teeth of the pinion 86 or the axle of the motor 8.

[0062] The first shielding element 83 may be provided by a metal or plastic plate attached to the motor 8 or to a side piece 88 and arranged such that it extends over the pinion 86 to protect the guidance cord(s) 5a, 5b from getting caught in the toothing during operation of the motor device 8. In most embodiments the plate forming the first shielding element 83 has a curvature matching the curvature of the pinion 86 such that the first shielding element 83 can be arranged as close as possible to the pinion 86, thus maximizing the area of the clearance 81 in the cross-sectional space.

[0063] In general, all embodiments comprising a pinion 86 with a diameter smaller than the inner diameter may comprise such a shielding element 83. These embodiments may also further comprise a second shielding element (not shown) arranged between the guidance cord 5 passing through the clearance 81 and a nearest portion of the annular gear 35, such that the second shielding element prevents the guidance cord from contacting with the teeth of the annular gear 35. The first and second shielding elements will thus define a portion of the outer periphery of the clearance 81 in the cross-sectional space.

[0064] To mount the motor 80, the motor device 8 comprises a mounting element 87 adapted the be connected to either a side piece 88 of the motor device (shown in Fig. 7 - 9) or directly to frame member. The mounting element 87 enables the motor 80 to be mounted to the window, such that the remains fixed when rotating the rolling tube 3 and/or driving the guidance cord 5.

[0065] Figs. 4 to 6 show various perspective views of a motor device 8 of the invention. To connect the motor

device 8 to the rolling tube 3, the screening arrangement 1 comprises an insertion piece 32. The insertion piece 32 comprises two surface portions, a first surface portion adapted to be inserted into the rolling tube 3, said first surface portion having an outer circumference which allows it to fit tightly into the hollow cavity of the rolling tube 3, and a second surface portion which has a diameter substantially equal to the of the rolling tube 3. Thus, when inserted into the rolling tube 3, the insertion piece 32 will form part of the rolling tube 3, whereby the total length of the rolling tube 3 will be the length of the rolling tube itself plus the width of the second surface portion. The insertion piece 32 is provided with a number of flanges 39 adapted to be received in corresponding recesses 31 in the rolling tube 3. The insertion piece 32 and the rolling tube 3 may be provided with mutually interlocking snap-lock portions, such that the two may not unintentionally come apart when clicked together.

[0066] Fig. 7 shows an exploded view of the motor device 8 and the insertion piece 32. The shown embodiment further comprises a side piece 88 adapted for connecting the motor device 8 and the screening arrangement 1 to the window frame. To connect the rolling tube 3 to the side piece 88 and thus also the window frame, the insertion piece 32 is rotatably connected to the side piece 88. The rotatable connection may preferably be provided by a ball bearing or by a smooth cylindrical outer surface of the side piece 88, on which a smooth cylindrical inner surface of the insertion piece 32 may rotate around. The side piece 88 thus fixedly mounts the motor 80 to the window frame, while also rotatably mounting the rolling tube 3 and the screening body 9.

[0067] As can be seen in Fig. 8, the motor device 8 further comprises a guidance element 82 in the form of a pulley or a rounded surface with low surface friction adapted to guide the guidance cord 5b into the rolling tube 3. This makes it possible to redirect the guidance cord 5b towards the clearance 81 in the cross-sectional space with as little added friction as possible. The guidance element 82 is arranged such that it is aligned with the clearance.

[0068] Fig. 9 shows an embodiment of the screening arrangement 1 of the invention without the screening body 9, such that the connection between the insertion piece 32 and the rolling tube 3 is better illustrated.

[0069] Figs. 10 and 11 show a possible guidance cord 5 configuration of a screening arrangement 1 of the invention, wherein each guidance cord 5a, 5b is, in one end, connected to a winding device 2, and, in another end, connected to the bottom bar 4. The guidance cords 5a, 5b provides a force in the longitudinal direction on the bottom bar 4 such that the screening body 9 is kept tensioned between the rolling tube 3 and the bottom bar 4.

[0070] The winding device 2 comprises at least one winding reel 21 which wind/unwind the guidance cords 5a, 5b when the screening body 9 is unrolled/rolled from the rolling tube 3. The two guidance cords 5a, 5b extend from the bottom bar 4 in the longitudinal direction away from the rolling tube 3 to respective return elements 6a, 6b arranged at the second frame member. From the return elements 6a, 6b, the guidance cords 5a, 5b extend back up in the longitudinal direction to respective ends of the rolling tube 3.

[0071] In the shown embodiments, the winding device 2 is arranged at an end of the rolling tube 3 opposite from the motor device 8. This means that one of the guidance cords 5b must pass through the rolling tube 3, past the motor 80 to connect to the winding device 2. This guidance cord 5a, 5b configuration is possible in the screening arrangement 1 of the invention, as the guidance cord 5b passing through the rolling tube 3 can pass the motor 80 through the clearance in 81 the cross-sectional area of the rolling tube 3.

[0072] This guidance cord configuration produces very little internal friction when moving the screening body 9. This in turn allows a much smaller motor 80 to be used, whereby the clearance 81 in the cross-sectional area can be made larger, thus providing a larger spacing between the guidance cord 5b and the moving parts of the motor device 8.

[0073] In the embodiment shown in Fig. 8, the winding device 2 is arranged at an end of the rolling tube 3 in extension of the rolling tube 3. The winding device 2 can however, also be arranged inside the rolling tube 3 as shown in Fig. 9, such that the rolling tube 3 and thus also the screening body 9 may be made wider. In both embodiments, one guidance cord 5b passes through the rolling tube 3, past the motor 80, to connect with the winding device 2.

[0074] For these types of screening arrangement 1 to function, the guidance cords 5a, 5b must keep the screening body 9 tensioned between the rolling tube 3 and the bottom bar 4. This means that the winding device 2 should unwind/wind a length of guidance cord 5a, 5b substantially equal the length of screening body 9 rolled/unrolled by the rolling tube 3 when the bottom bar 4 is moved.

[0075] This can be achieved by providing the winding device 2 with at least one, preferably two, winding reels with substantially the same diameter as the rolling tube 3, as shown in Fig. 10. This however, is impossible for screening arrangements 1 wherein the winding device 2 is arranged inside the rolling tube 3, as the winding reels must fit in the hollow cavity of the rolling tube 3 and therefore must have a smaller diameter than the inner diameter of the rolling tube 3.

[0076] In preferred embodiments of the invention, this is solved by a winding device 2 in engagement with the rolling tube 3 or the motor device 8, wherein the winding reels 21 rotate at an angular velocity different from that of the rolling tube 3 during movement of the screening body 9. With this solution, the winding reels 21 can rotate faster than the rolling tube 3, such that the winding device 2 can wind/unwind the right length of guidance cord 5a, 5b, to keep the screening body 9 stretched at all positions.

[0077] The spring elements 7a, 7b shown in Fig. 11 are optional and are adapted to compensate for the rolling tube rolling/unrolling a length of screening body 9 different from the length of guidance cord 5a, 5b unwound/wound by the winding reel(s). Such spring elements can be arranged inside the bottom bar 4 as shown in Fig. 2.

[0078] Turning now to Figs. 12, 13, and 14, an embodiment of the return element 6 is shown from the top, side, and front, respectively. The return element 6 comprises a pulley 61 which allows the guidance cord 5 to be guided back towards the bottom bar 5 almost frictionless. Alternatively, the pulley may be replaced by a rounded low-friction surface.

[0079] The shown return element 6 is adapted for being mounted on the third or fourth frame member near the second frame member so that the guidance cords 5a, 5b can provide a force in the longitudinal direction towards the second frame member on the bottom bar 4 in any position of the screening body 9. The front face of the return element 6 is flat, so that the bottom bar can pass is, so that the return element 6 and the bottom bar 4 are flush with each other in the fully extended screening position of the screening body 9. In general, the window arrangement of the invention may comprise a bottom rail arranged at the second frame member to cover the gap between the second frame member and the bottom bar 4 in the fully extended position of the screening body 9.

[0080] To mount the return element 6 on the third or fourth frame member, the return element 6 has been provided with an aperture 62 for attachment means such as screws. In other embodiments, the return element 6 may be an integral part of either a side or a bottom rail, such that the number of individual parts may be reduced.

[0081] Turning now to Fig. 15, 16 and 17, a winding device 2 of an embodiment of the invention is shown in a perspective view, in an exploded view, and inside the rolling tube 3, respectively.

[0082] The winding device 2 comprises two winding reels 21a, 21b, each adapted for storing a respective one of the two guidance cords 5a, 5b. While some embodiments of the invention only comprise a single winding reel 21 adapted to store both of the two guidance cords 5a, 5b, the guidance cords 5a, 5b have a smaller chance of getting entangled if stored on separate winding reels 21a, 21b. To allow the winding reels 21a, 21b to fit inside the rolling tube 3, the winding reels 21a, 21 b have dimensions which are smaller than the inner dimensions of the hollow rolling tube 3.

[0083] To connect the winding device 2 to the rolling tube 3, the screening arrangement 1 comprises an insertion piece 32 similar to that connecting the motor device 8 to the rolling tube 3.

[0084] To facilitate winding and unwinding of the guidance cords 5a, 5b the winding device 2 comprises a winding guide 23. The winding guide 23 is adapted for redirecting the guidance cords 5a, 5b, which extend in the transverse direction into the rolling tube 3 from respective ends of the rolling tube 3, onto the respective winding reels 21a, 21b. This is done either by passing the guidance cords 5a, 5b over rounded corners with a low friction surface or by providing a pulley 24 on the winding guide 23. To allow the winding guide 23 to slide during winding/unwinding of the guidance cords 5a, 5b, the winding guide 23 is mounted on two rails 27 extending from a side piece 28 (shown in Fig. 17) parallel with the winding reels 21a, 21 b. This which allows the winding guide 23 to slide alongside the winding reels 21a, 21b, such that the guidance cord 5a, 5b can be stored in a single layer on the winding reel 21a, 21b.

[0085] In the shown embodiment the two winding reels 21a, 21 b are arranged side-by-side. This allows a single winding guide 23 to be used, as it can simultaneously guide both guidance cords 5a, 5b onto their respective winding reel 21a, 21b. In some embodiments, the winding reels 21a, 21b may be arranged differently, e.g. in opposite ends of the rolling tube 3, whereby a separate winding guide 23 will have to be provided for each winding reel 21a, 21 b.

[0086] An advantage of arranging the winding reels 21a, 21b side-by-side such that a single winding guide 23 can guide both guidance cords 5a, 5b onto their respective winding reels 21a, 21b, is that the guidance cords 5a, 5b which extend onto the winding guide 23 from opposite ends of the rolling tube 3 will apply equal oppositely directed forces on the winding guide 23. This allows the winding guide 23 to slide almost frictionless alongside the winding reels, thereby not adding to the friction of the screening arrangement 1 and thus providing a more seamless movement of the screening body 9.

[0087] The winding reels 21a, 21b of the shown embodiment comprise a cord thread on their outer surface, which is adapted to store a respective guidance cord 5a, 5b in a single layer. The cord thread enables each winding reel 21a, 21b to store the guidance cord 5a, 5b without risking that the guidance cords 5a, 5b become entangled in itself. A further advantage of the cord thread is that the guidance cords 5a, 5b are stored in one layer on the winding reels 21a, 21b. This allows the winding reel 21a, 21b to unwind a predetermined length of guidance cord 5a, 5b for each revolution of the winding reel 21a, 21b, depending on the diameter of the winding reel 21 at a given winding.

[0088] To allow the winding reels 21a, 21b to rotate, each of the winding reels 21a, 21b are rotatably connected to the side piece 28 (shown in Fig. 17) in one end of the respective winding reels 21a, 21b. The winding device 2 of the shown embodiment further comprises an end element 29 attached at the end of the rails 27, to which end element 29 the winding reels 21a, 21b are rotatably connected at their other end. Although the end element 29 could be omitted, it provides stability to the winding device 2 by keeping the winding reels 21a, 21b stable during rotation.

[0089] Fig. 16 shows an exploded view of the winding device. In this figure, the guidance element 22, similar to

that of the motor device 8, which guides the guidance cord 5a, 5b from the end opening of the rolling tube 3 towards the winding guide 23 and the winding reels 21a, 21b can be seen. In the shown embodiment the guidance element 22 is provided by a pulley but it may alternatively be provided by a rounded corner with a low friction surface. By adding a guidance element 22 the guidance cords 5a, 5b may pass more frictionless into the rolling tube 3.

[0090] The winding reels 21a, 21b each comprise a gear 26a, 26b. The gears 26a, 26b provide an engagement between each winding reel 21a, 21b and an annular gear 33 arranged on an inner side of the insertion piece 32, and thereby also between each winding reel 21a, 21b and the rolling tube 3. This allows the motor device 8 to wind up the guidance cords 5a, 5b by rotating the rolling tube 3 which in turn causes the guidance cords 5a, 5b to pull the bottom bar 4 and the screening body 9 towards the screening position by rotating the rolling tube 3. In alternative embodiments, the winding device 2 may be directly connected to the motor 8.

[0091] The gear dimensions, i.e. the ratio between the number of teeth on the winding reel gears 26a, 26b and on the annular gear 33, are such that the winding reels 21a, 21b rotate more times than the rolling tube 3, thus allowing them to unwind/wind a length of guidance cord 5a, 5b substantially equal to the length of screening body 9 rolled/unrolled by the rolling tube 3.

[0092] During operation, the length of screening body 9 unrolled/rolled per rotation of the rolling tube 3 depends on the number of layers of screening body 9 stored on the rolling tube 3 at the given position, as each layer of screening body 9 rolled onto the rolling tube 3 increases the diameter of the rolling tube 3 by approximately two times the thickness of the screening body 9. Thus, when the screening body 9 is in the non-screening position, i. e. all of the screening body 9 is stored on the rolling tube 3, the first revolution of the rolling tube 3 will unroll a longer length of screening body 9 than the following revolutions.

[0093] As the winding reels 21a, 21b perform a constant number of revolutions for each revolution of the rolling tube 3 this brings some issues if the winding reels 21a, 21b are to match the length of the guidance cords 5a, 5b with the position of the screening body 9. To compensate for this, the winding reels 21a, 21b are made with a conical shape, such that the length of guidance cord 5a, 5b wound/unwound per revolution changes depending on the diameter of the winding reel 21a, 21b at the given position.

[0094] The guidance cords 5a, 5b will thus be attached to the thickest portion of the winding reels 21a, 21b, such that when the guidance cords 5a, 5b are completely unwound from the winding reels 21a, 21b, i.e. the screening body 9 is completely rolled up on the rolling tube 3, the winding reels 21a, 21b will wind a longer length of guidance cord 5a, 5b in the first revolution than the successive revolutions. The winding reels 21a, 21b will therefore wind/unwind substantially the same length of guidance cord 5a, 5b as the length of the screening body 9 unrolled/rolled by the rolling tube 3, regardless of the position of the screening body 9.

[0095] In other embodiments of the invention, this may be achieved by varying the pitch of the cord thread along the length of the winding reels 21a, 21b. This would also enable the winding reels 21a, 21b to wind/unwind a varying length of guidance cord 5a, 5b depending on the pitch of the cord thread at the given position. In general, the screening arrangement 1 may also be provided with spring elements 7a, 7b and/or an elastic guidance cord 5a, 5b to help compensate for the varying length of screening body 9 unrolled/rolled for each revolution of the rolling tube 3, such that the guidance cords 5a, 5b can maintain the screening body 9 stretched at all positions depending on the tolerance of the window in which the screening arrangement 1 is to be mounted.

[0096] As can be seen in Fig. 17, the guidance cord 5b passing through the rolling tube 3, i.e. the guidance cord 5b passing through the clearance 81, should be guided towards a winding guide 23 arranged centrally in the rolling tube 3, and the guidance cord 5b may therefore not extend exactly in the transverse direction, depending on the location of the clearance 81 in relation to the winding guide 23. The guidance element 82 of the motor device may therefore advantageously be arranged shifted a bit upwards in relation to the center of the clearance 81, such that the guidance cord 5b may be guided from the guidance element 82, through the clearance 81 and to the winding guide 23 without rubbing against the motor 8 or optional shielding elements. This ensures that the guidance cord 5b is led to winding guide 2, described below, with as little added friction as possible.

[0097] Turning now to Fig. 18, a winding device 2 according to the invention is shown mounted in a window. The winding device 2 is shown without the rolling tube 3 and the screening body 9 to illustrate the placement of the winding device 2 when mounted.

[0098] Fig. 19 shows a perspective view of the rolling tube 3, with the motor device 8 and the winding device 2 inserted in opposite ends of the rolling tube 3 and in engagement with the rolling tube 3 via respective insertion pieces 32. This is possible due to the clearance 81 in the cross-sectional space of the screening arrangement 1 of the invention, which allows the guidance cord 5b to pass the motor 8 to connect with the winding device 2.

[0099] Turning now to Fig. 20, a drawing of an embodiment of the invention with another guidance cord configuration is shown. In this embodiment, the screening arrangement 1 comprises two guidance cords 5a, 5b arranged in endless loops, i.e. closed loops. This is advantageous as the winding device 2 can be omitted from screening arrangement 1 because the loops formed by the guidance cords 5a, 5b does not need to be wound. This reduces the amount of movable parts in the screening arrangement 1, thereby making it more cost-efficient

to manufacture. Additionally, because this guidance cord configuration does not need a winding device 2, the rolling tube 3 and the screening body 9 can be made wider than in screening arrangements with external winding devices.

[0100] To allow the guidance cords 5a, 5b to exert a force in the longitudinal direction away from the rolling tube 3 on the bottom bar 4, the guidance cords 5a, 5b extend along respective sides of the screening body 9 down to pass return elements 6a, 6b as described in previous embodiments.

[0101] Whereas the motor device 8 in previously described embodiments could unroll the screening body by winding up the guidance cords 5a, 5b to pull the bottom bar 4 towards the screening position, this embodiment exerts a force directly on the guidance cords 5a, 5b, i.e. the motor 80 is in engagement with the guidance cords 5a, 5b, such that the motor 80 can pull the screening body 9 towards the screening position via the guidance cords 5a, 5b.

[0102] In the shown embodiment, the guidance cords 5a, 5b are not fixedly attached to the bottom bar 4 themselves, but are connected via friction elements (not shown). The friction elements allow the guidance cords 5a, 5b to exert a force on the bottom bar 4 through friction, while also allowing the guidance cord 5a, 5b loops to slide through the bottom bar 4, when the bottom bar 4 is moved manually by a user. This allows the screening arrangement 1 to be operated both automatically through the motor device 8, as well as manually through a user applying a force on the bottom bar 4.

[0103] The motor device 8 may advantageously in this embodiment be adapted to disengage from the rolling tube 3 when the motor 80 is not activated, such that manual operation of the screening arrangement 1 is possible without driving the motor 80 through rotation of the rolling tube 3.

[0104] If the screening body 9 is made of a non-rigid structure, e.g. roller blind, the rolling tube 3 may be provided with a biasing element 37 which urges the rolling tube 3 to rotate to roll up the screening body 9. In the shown embodiment, the biasing element 37 is provided by a spring which is attached to the side piece 88 in one end and to the rolling tube 3 at the other end, such that the spring is tensioned as the rolling tube 3 rotates and the screening body 9 is put in a screening position.

[0105] The force applied by the biasing element 37 on the rolling tube 3 should be of such a magnitude, that the biasing element 37 will not roll up the screening body 9 by its own force, but should be great enough to rotate the rolling tube 3 to roll the screening body 9 onto the rolling tube 3 when the user moves the bottom bar 4 towards the non-screening position. The biasing element 37 may be omitted if the screening body 9 is of a rigid type, e.g. rolling shutters made from rigid slats, as the screening body 9 may drive the rotation of the rolling tube 3 when the user pushes the bottom bar 4 towards the non-screening position.

[0106] Fig. 21 shows another embodiment of the invention similar to the one shown in Fig. 20. In this embodiment, the guidance cords 5a, 5b do not form loops. Instead, each guidance cord 5a, 5b is connected to the bottom bar 4 at both ends of the guidance cord 5a, 5b. Thus, part of the guidance cords 5a, 5b is transferred from one side of the screening body 9 to the other, through the rolling tube 3, when the bottom bar 4 is moved.

[0107] The invention should not be regarded as being limited to the described embodiments. Several modifications and combinations of the different embodiments will be apparent to the person skilled in the art.

List of reference numerals

[0108]

1	screening arrangement
2	winding device
3	rolling tube
4	bottom bar
5a	guidance cord
5b	guidance cord
6a	return element
6b	return element
7a	spring element
7b	spring element
8	motor device
9	screening body
21a	winding reel
21b	winding reel
22	guidance element
23	winding guide
24	pulley
26a	gear
26b	gear
27	rails
29	end element
31	recesses
32	insertion piece
33	annular gear
35	annular gear
37	biasing element
39	flanges
62	aperture
71	side rails
72	top rail
80	motor
81	clearance
82	guidance element
83	shielding element
86	pinion
87	mounting element
88	side piece

Claims

1. A screening arrangement (1) for screening of a window, said screening arrangement (1) comprising:

   a screening body (9) having an upper first end and a lower second end, said screening body (9) being movable in a longitudinal direction between a non-screening position, in which the screening body is rolled up, and a screening position, in which the screening body is extended;
   a hollow rolling tube (3) adapted for being rotatable when mounted, said rolling tube (3) extending in a transverse direction perpendicular to the longitudinal direction and being connected to the first end of the screening body (9), such that the screening body (9) is rolled up around the rolling tube (3) in the non-screening position;
   a bottom bar (4) extending parallel with the rolling tube (3), said bottom bar (4) being connected to the second end of the screening body (9);
   two guidance cords (5a, 5b) adapted for maintaining the bottom bar (4) parallel with the rolling tube (3); and
   a motor device (8) comprising a motor (80), wherein the motor (80) is arranged inside the rolling tube (3) and is in engagement with the rolling tube (3), preferably by a pinion (86) connected to the motor (80) and an annular gear (35) connected to the rolling tube (3),
   characterized in that the motor (80) is arranged such that a clearance (81) is provided within the cross-sectional space of the rolling tube (3), and at least one of the guidance cords (5a, 5b) pass the motor (80) though the clearance (81).

2. A screening arrangement (1) according to claim 1, wherein the motor (80) is arranged co-axially in relation to a central axis of the rolling tube (3), and wherein:

   the pinion (86) has a smaller diameter than the inner diameter of the annular gear (35) and is in engagement with the annular gear (35) via a second gear wheel arranged in-between the pinion (86) and the annular gear (35), such that the clearance (81) is provided in an area between the pinion (86) and the annular gear (35), or
   the pinion (86) has a diameter substantially identical to the inner diameter of the annular gear (35) and is mounted on a hollow axle of the motor (80), through which axle the clearance (81) within the cross-sectional space of the rolling tube (3) is provided.

3. A screening arrangement (1) according to claim 1, wherein the pinion (86) has a smaller diameter than the inner diameter of the annular gear (35), and wherein the motor (80) and the pinion (86) is arranged eccentrically in relation to a central axis of the rolling tube (3).

4. A screening arrangement (1) according to any one of the preceding claims, wherein the guidance cords (5a, 5b) are arranged in two endless loops, each passing through the clearance (81) provided within the cross-sectional space of the rolling tube (3), past the motor (80).

5. A screening arrangement (1) according to any one of the preceding claims, further comprising a winding device (2) with at least one winding reel (21a, 21b), said winding device (2) being arranged at the rolling tube (3) and being connected to the rolling tube (3) or the motor (80),
   wherein each guidance cord (5a, 5b) in one end is connected to the winding device (2) and to the bottom bar (4) at their respective other ends, wherein the guidance cords (5a, 5b) extend along respective sides of the screening body (9) and one of the guidance cords (5a, 5b) passes through the clearance (81) provided within the cross-sectional space of the rolling tube (3), past the motor (80) to connect with the winding device (2).

6. A screening arrangement (1) according to claim 5, wherein the winding device (2) is arranged inside the rolling tube (3).

7. A screening arrangement (1) according to claim 5 or 6, further comprising a winding guide (23) arranged adjacent to each of the at least one winding reels (21a, 21b), each winding guide (23) being movable in the transverse direction along the length of the respective winding reel (21a, 21b), to guide the at least one guidance cords (5a, 5b) onto the adjacent winding reel (21a, 21b).

8. A screening arrangement (1) according to any one of the preceding claims, further comprising a first shielding element (83) arranged between the motor (80) and the at least one guidance cord (5a, 5b) passing the motor (80) and/or a second shielding element arranged between the at least one guidance cord (5a, 5b) passing the motor (80) and a nearest portion of the annular gear (35).

9. A screening arrangement (1) according to any one of the preceding claims, further comprising a guidance element (82) arranged at an end of the rolling tube (3) aligned with the clearance (81), wherein the at least one guidance cords (5a, 5b) that passes though the rolling tube (3) is guided into the clearance (81) by the guidance element (82).

10. A window, preferably a roof window, comprising a

rectangular window frame with four frame members defining a central opening and a window pane arranged in the central opening, wherein a screening arrangement (1) according to any of the previous claims is arranged at a first frame member extending between a third and a fourth frame member opposed to each other, wherein the bottom bar (4) is movable the longitudinal direction between the rolling tube (3) and the second frame member opposed to the first frame member.

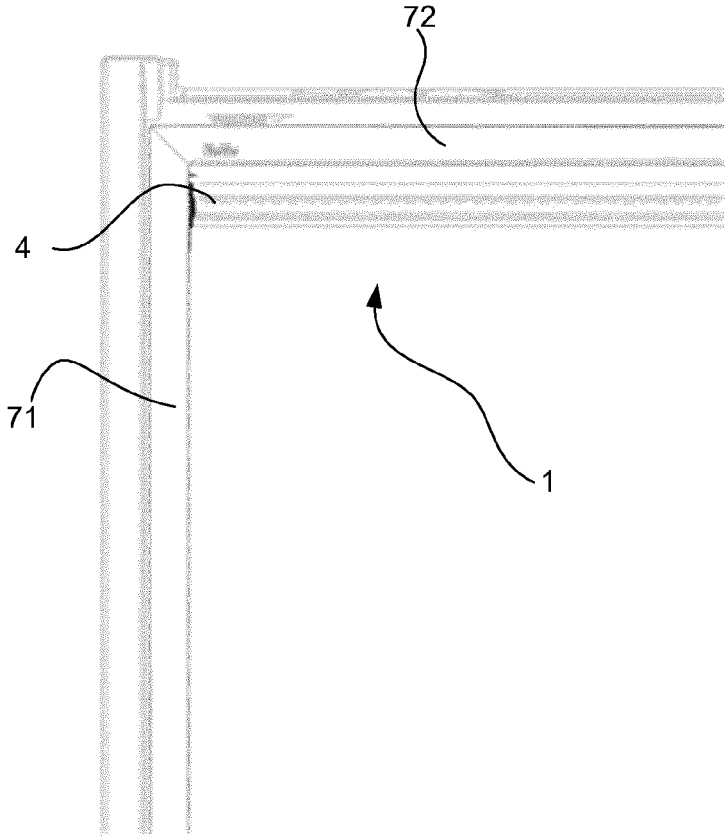


Fig. 1

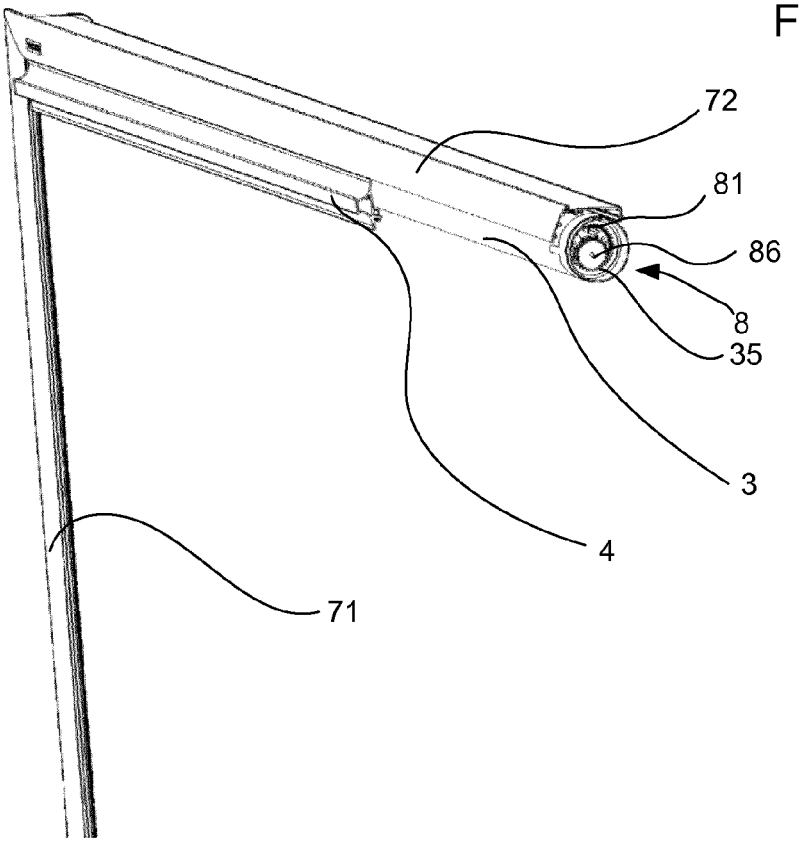


Fig. 2

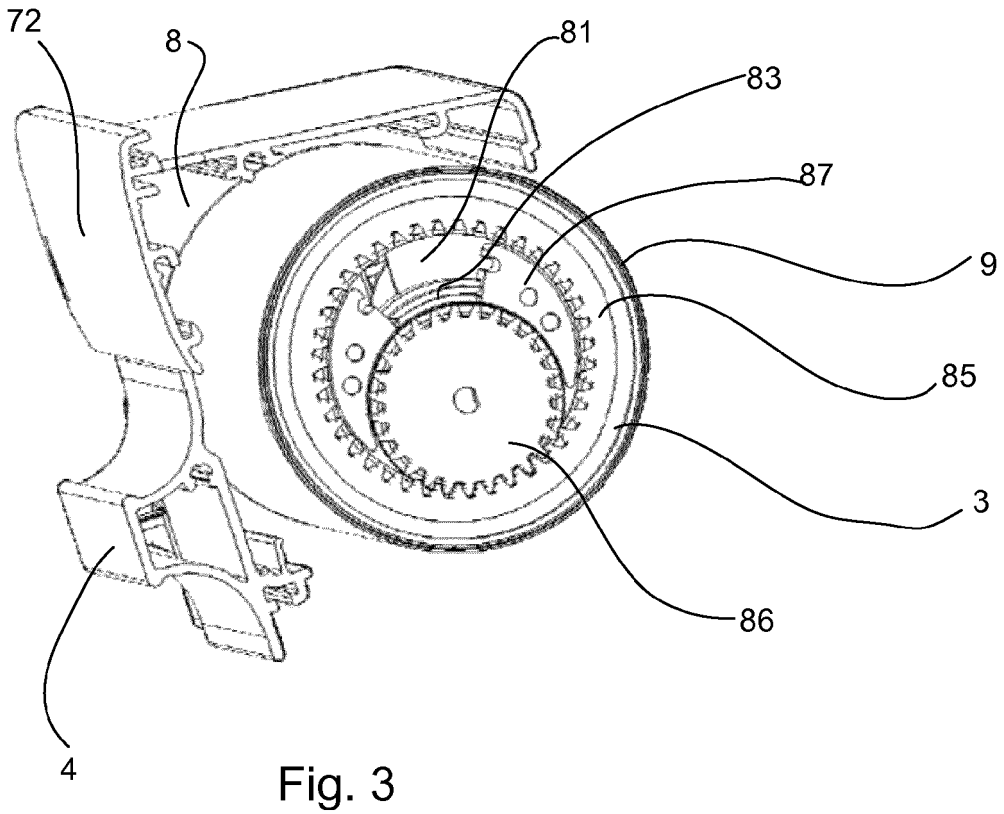


Fig. 3

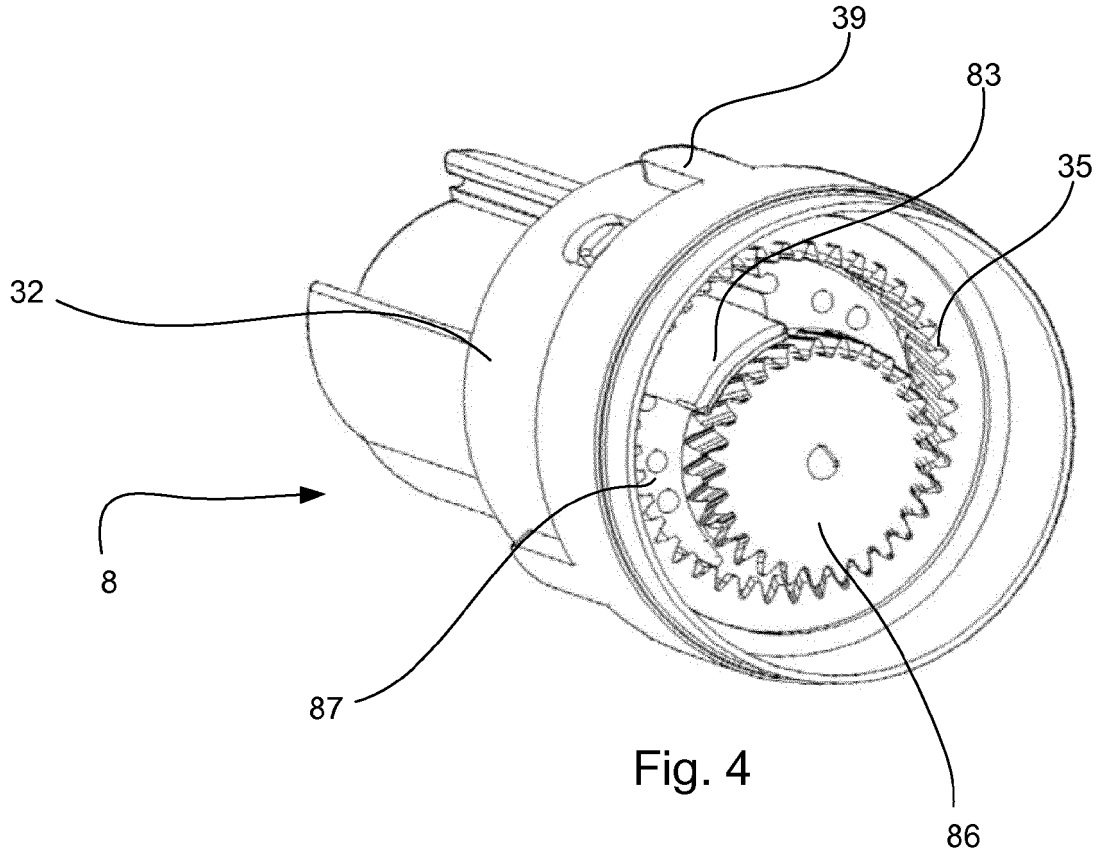


Fig. 4

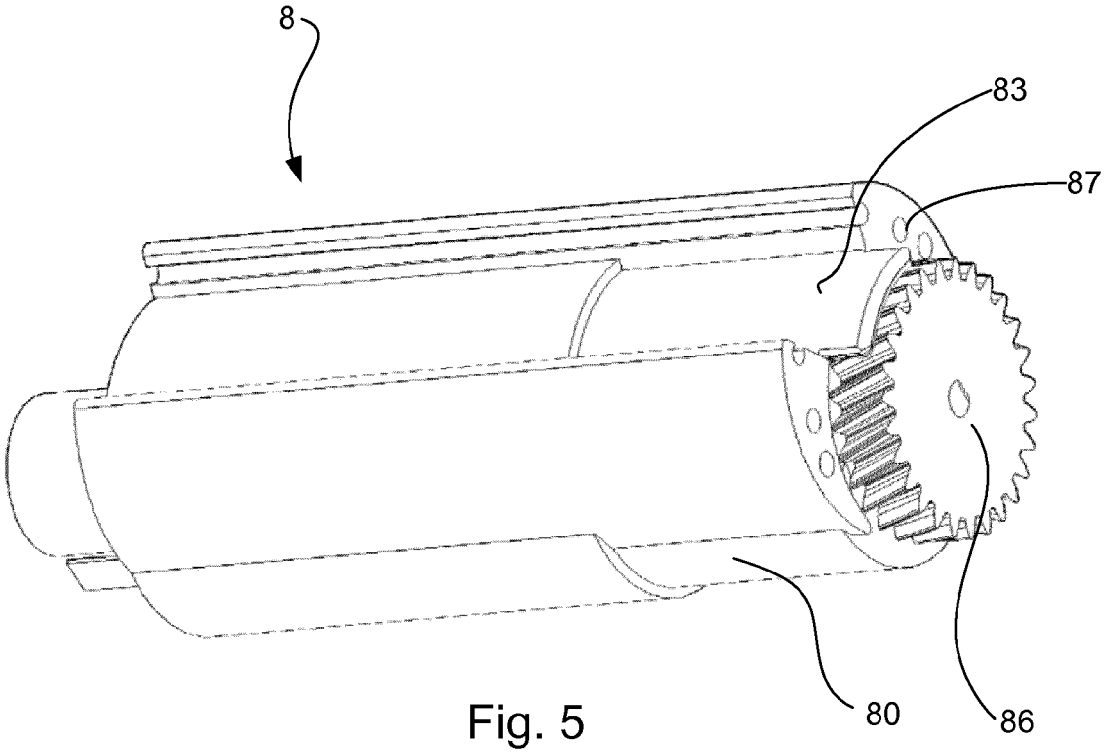


Fig. 5

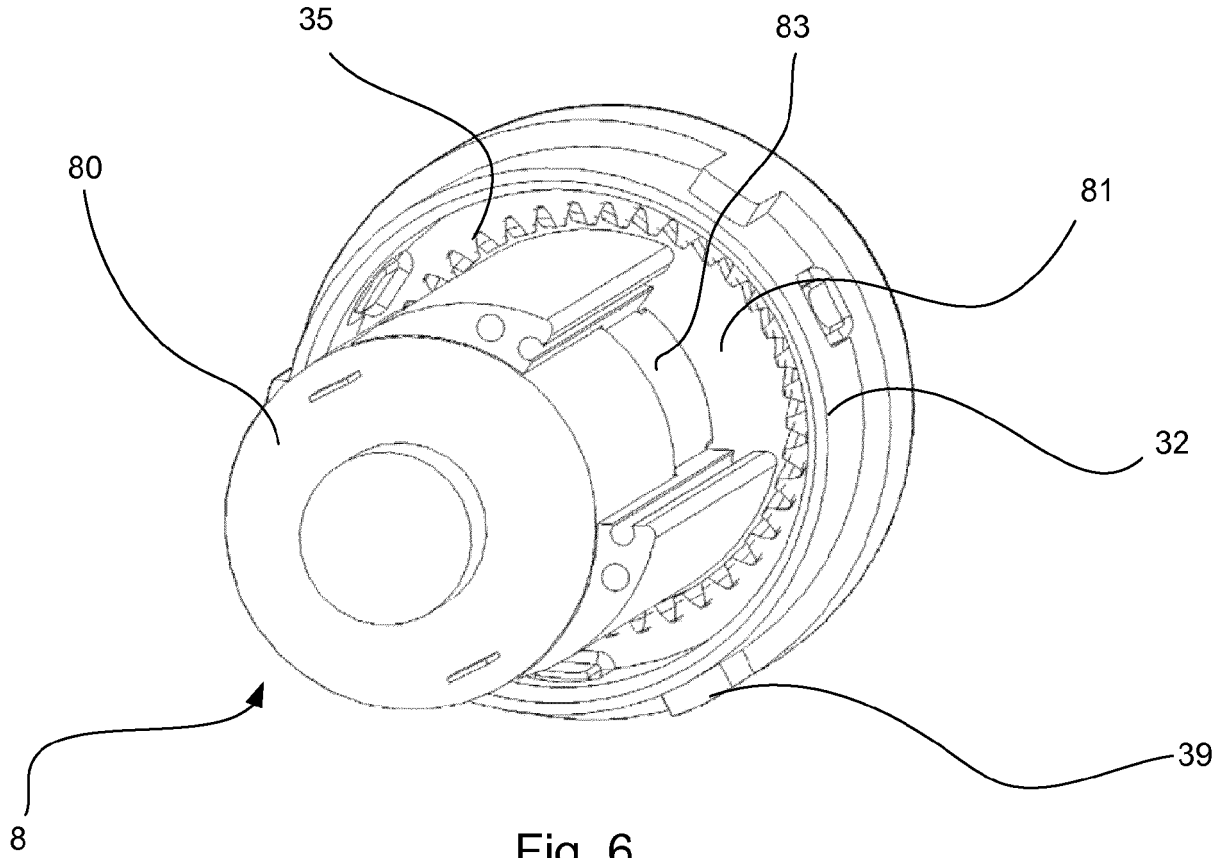


Fig. 6

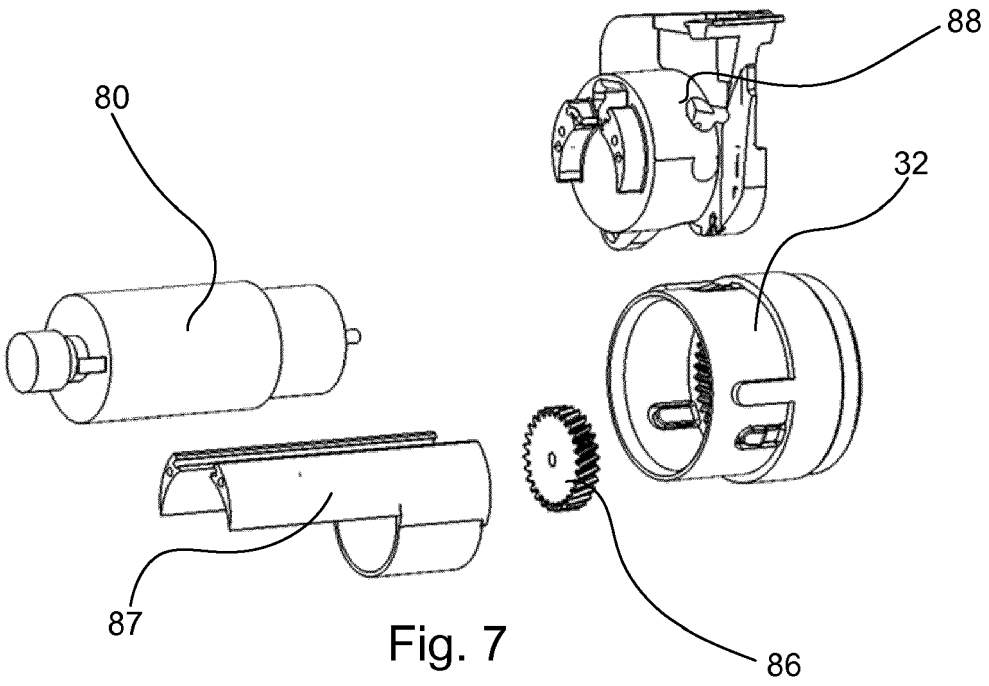


Fig. 7

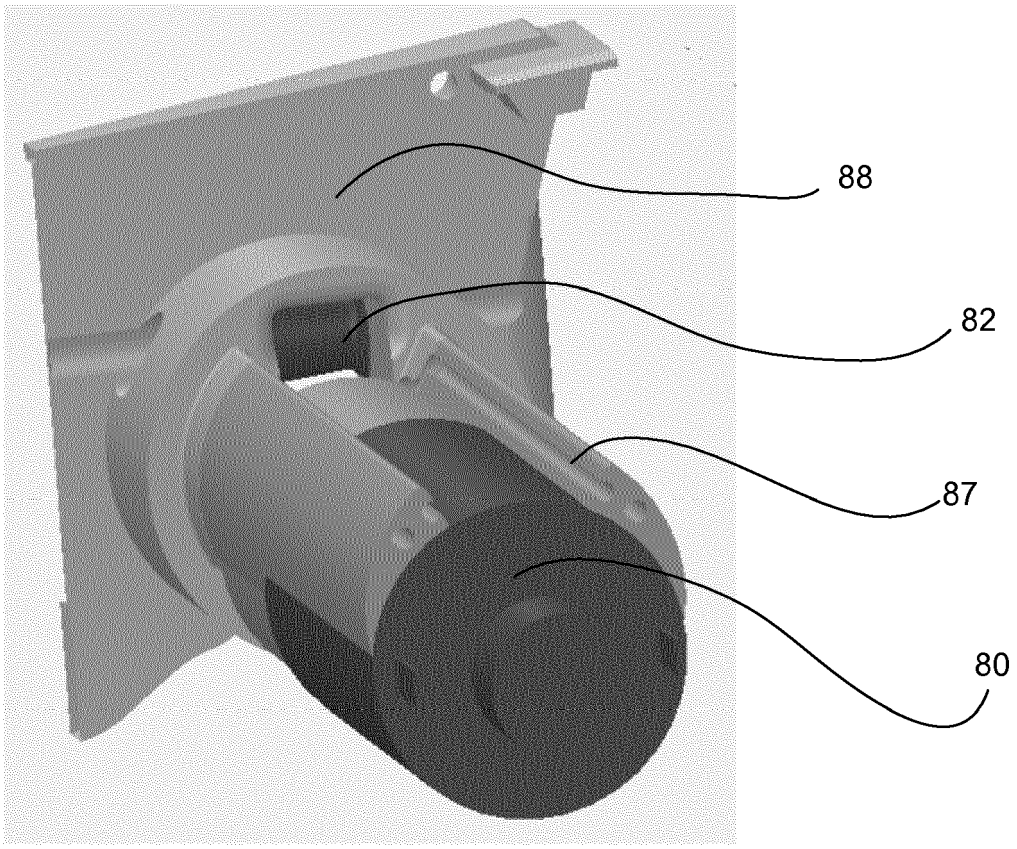


Fig. 8

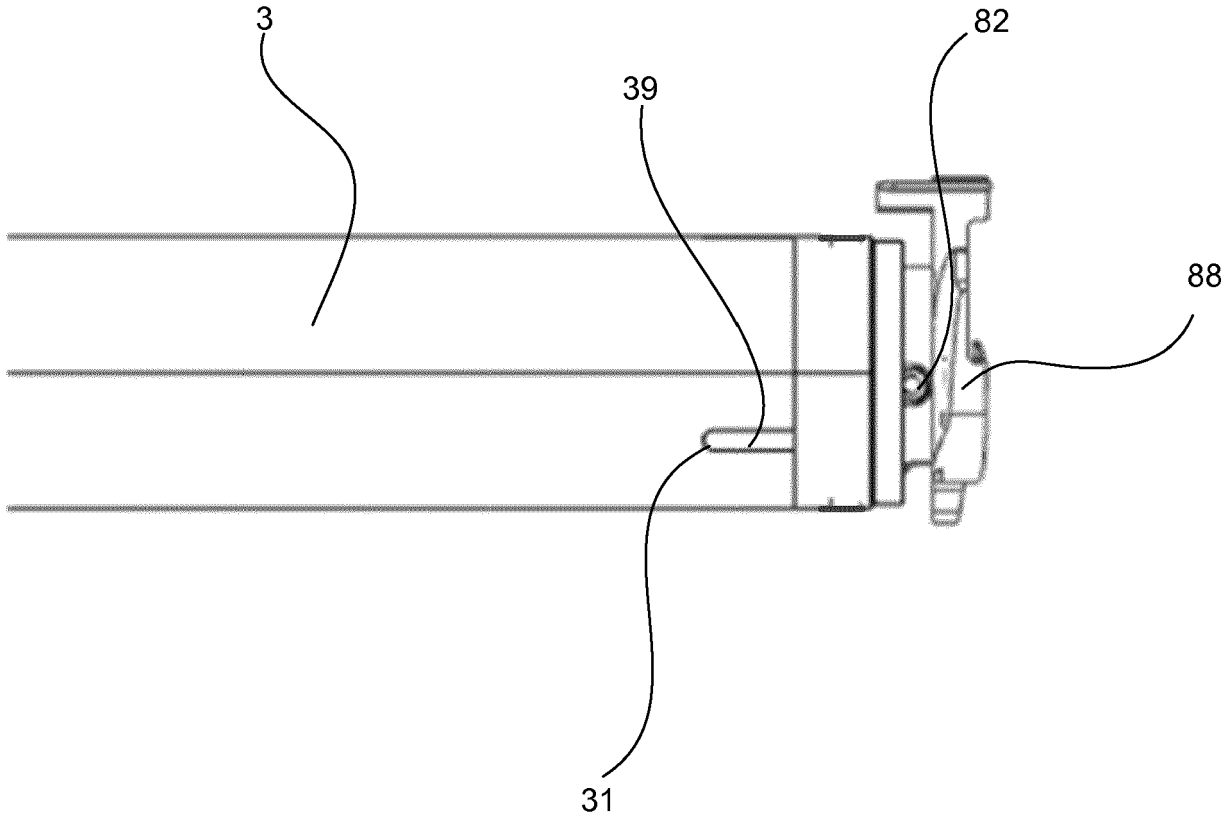


Fig. 9

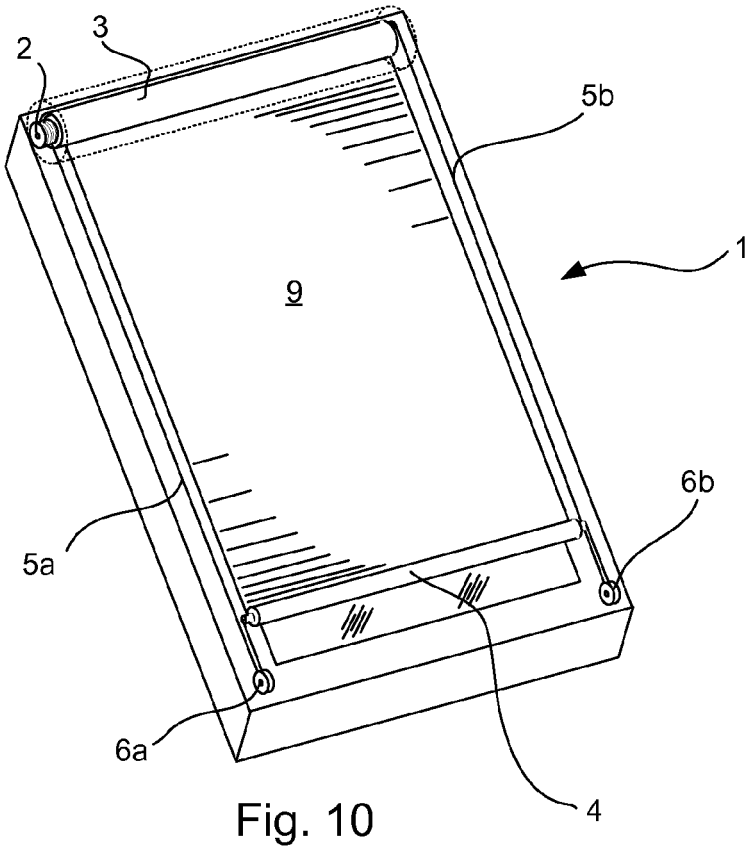


Fig. 10

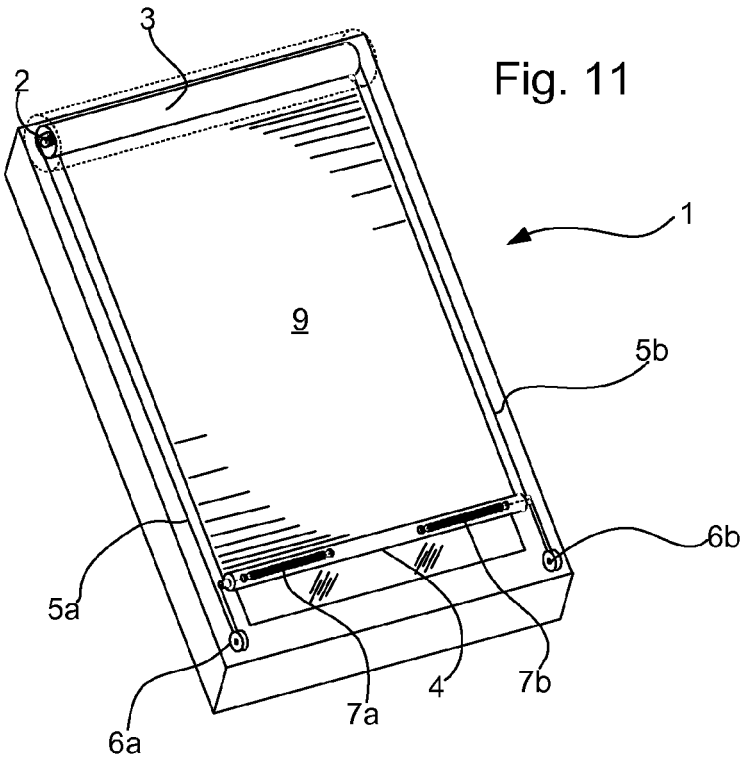


Fig. 11

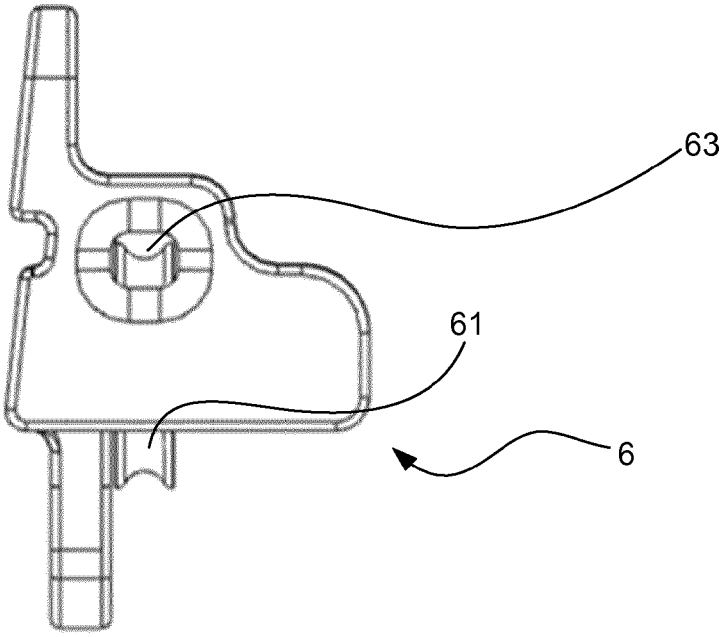


Fig. 12

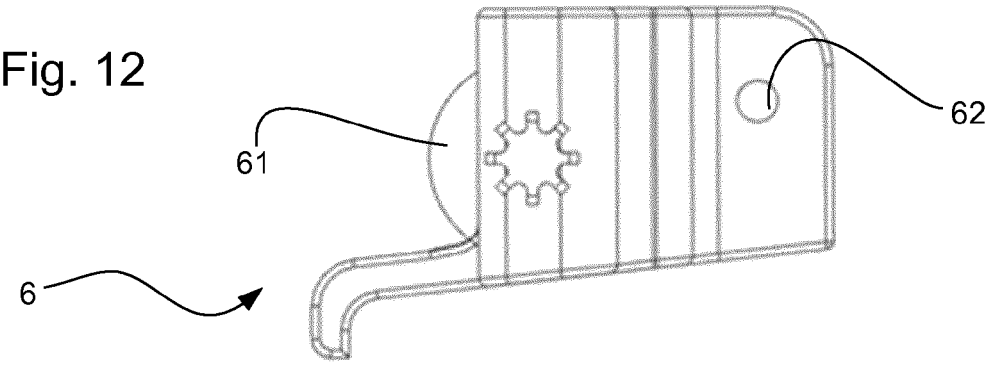


Fig. 13

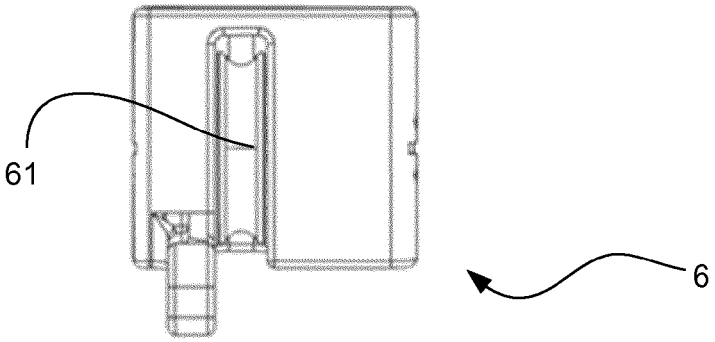


Fig. 14

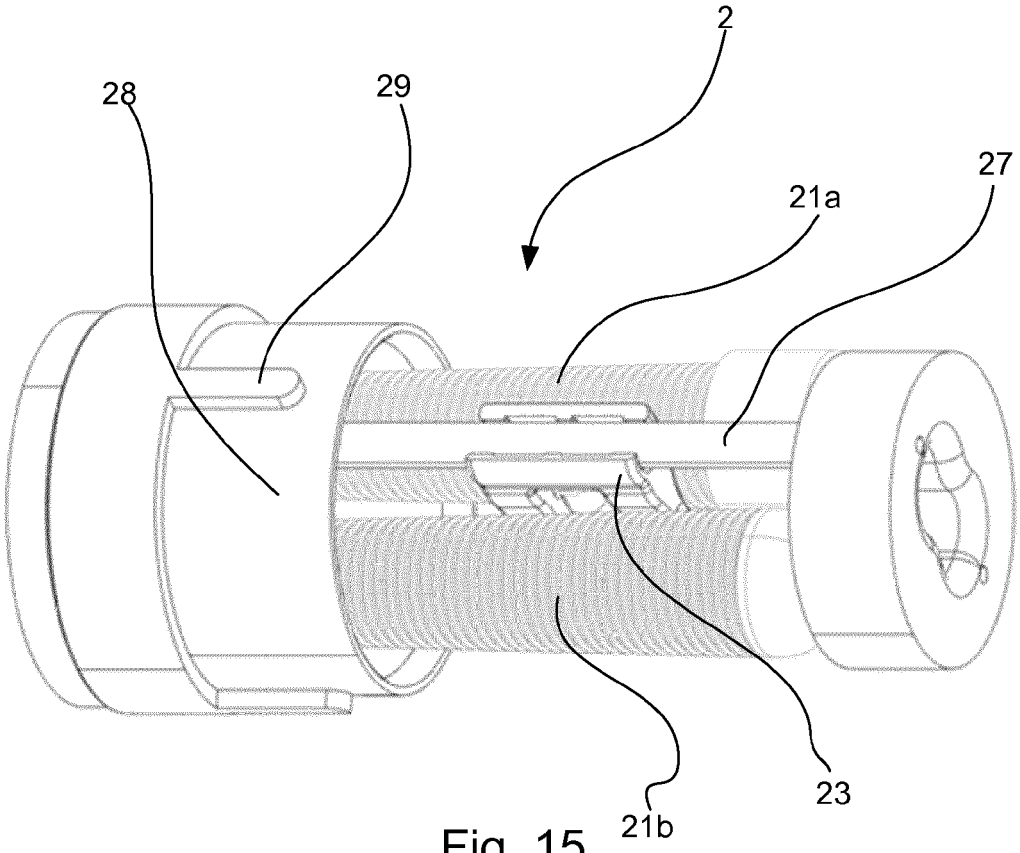


Fig. 15

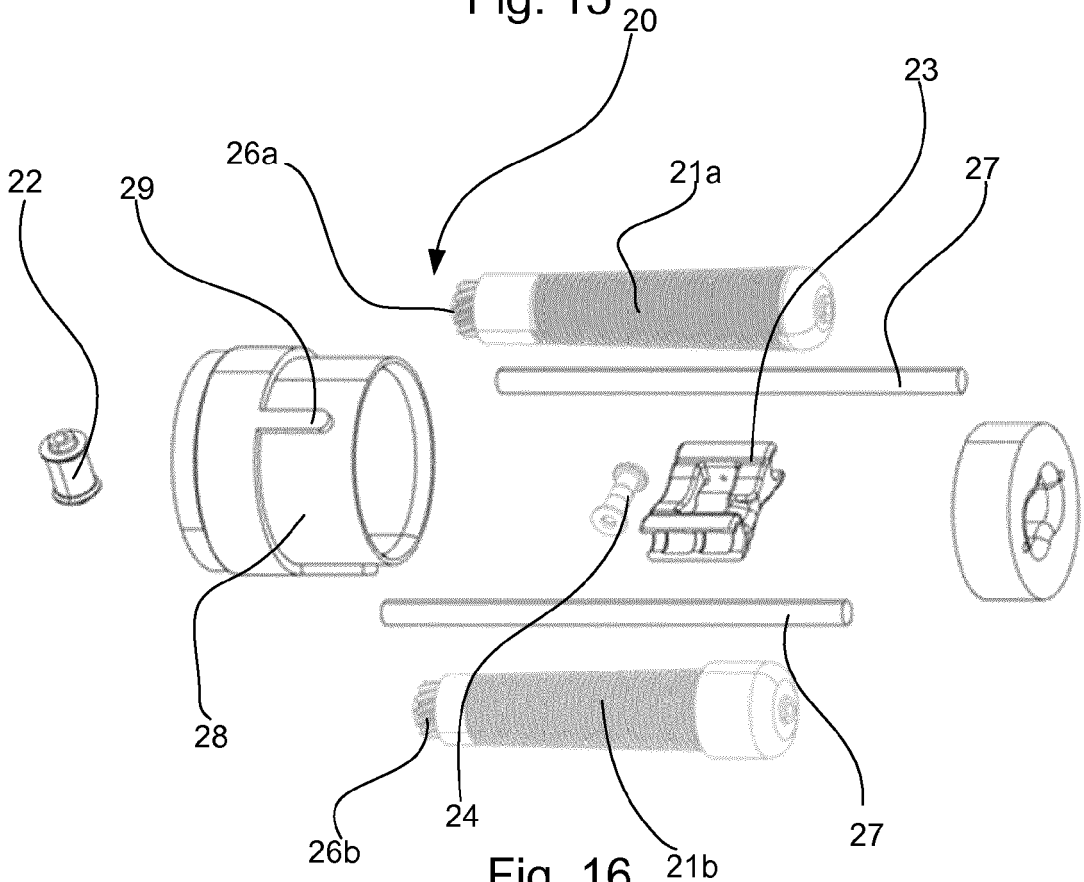


Fig. 16

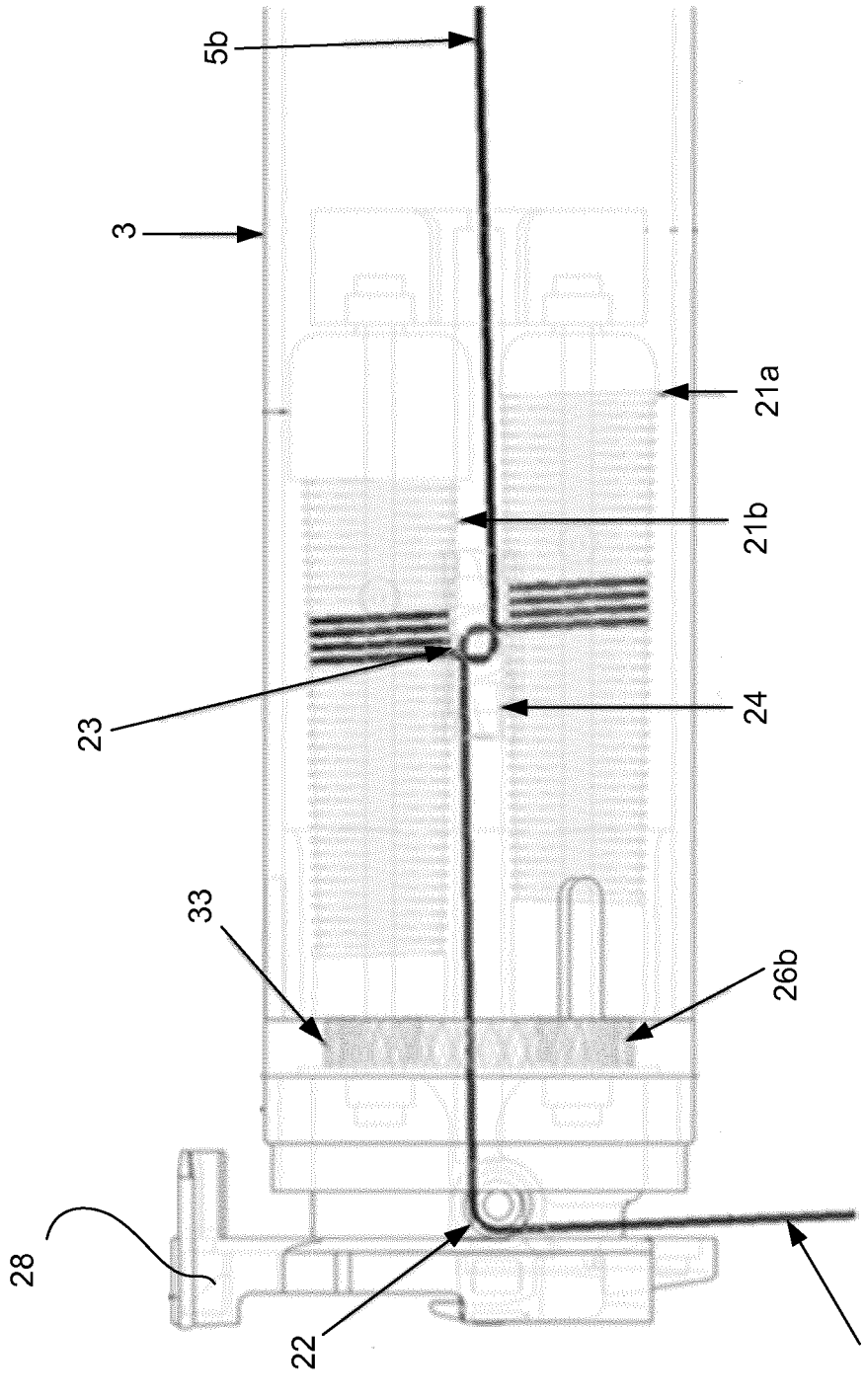


Fig. 17

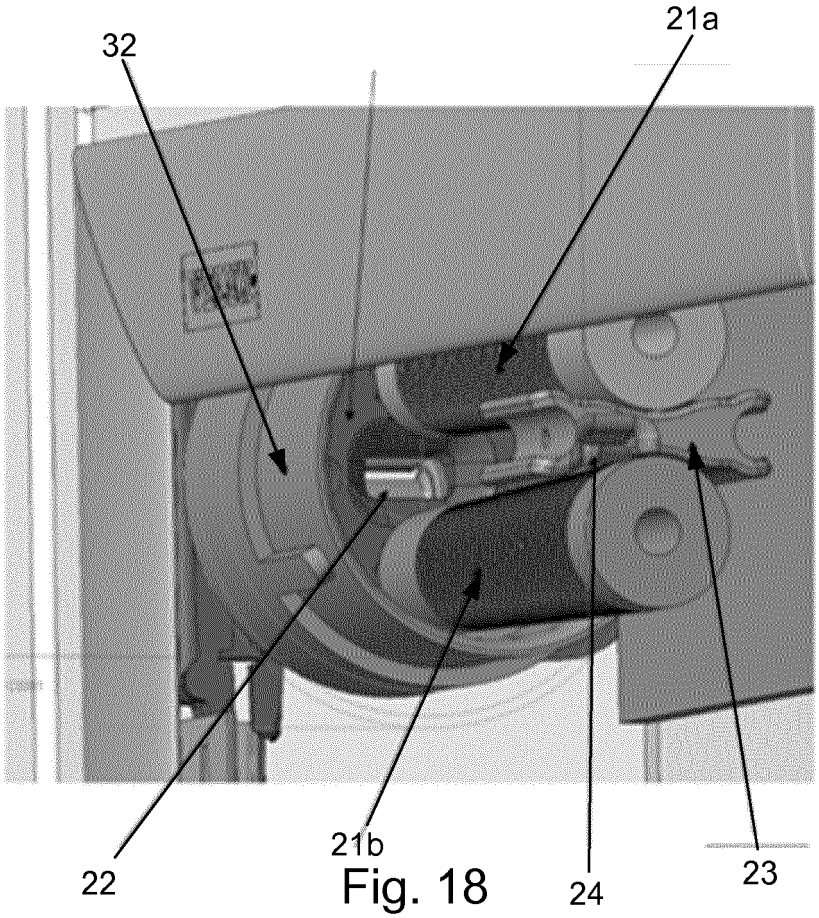


Fig. 18

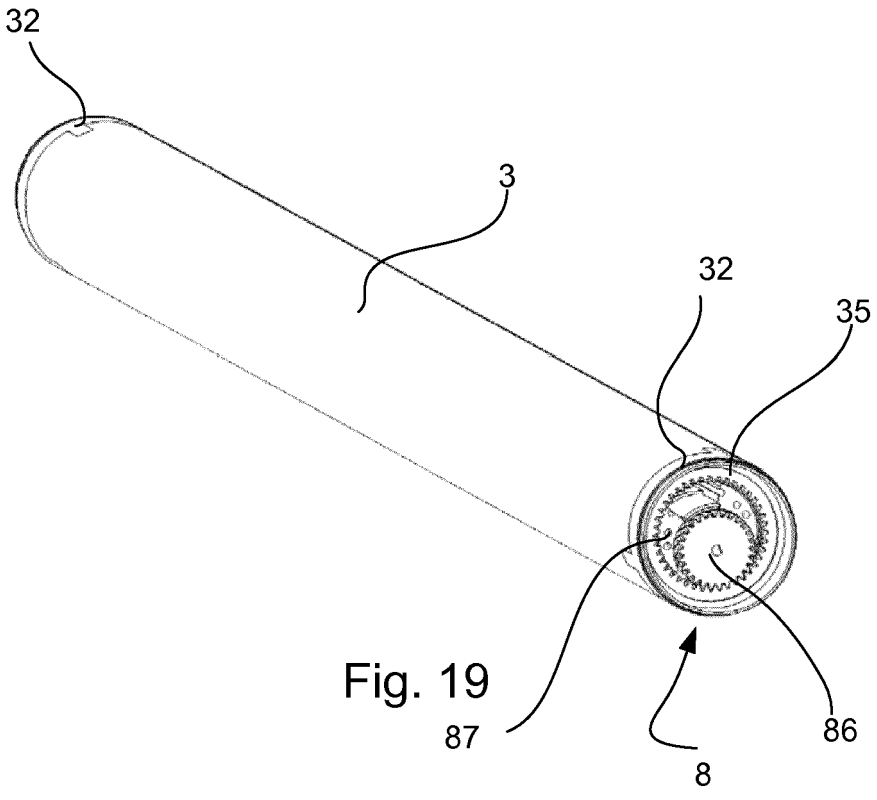


Fig. 19

Fig. 20

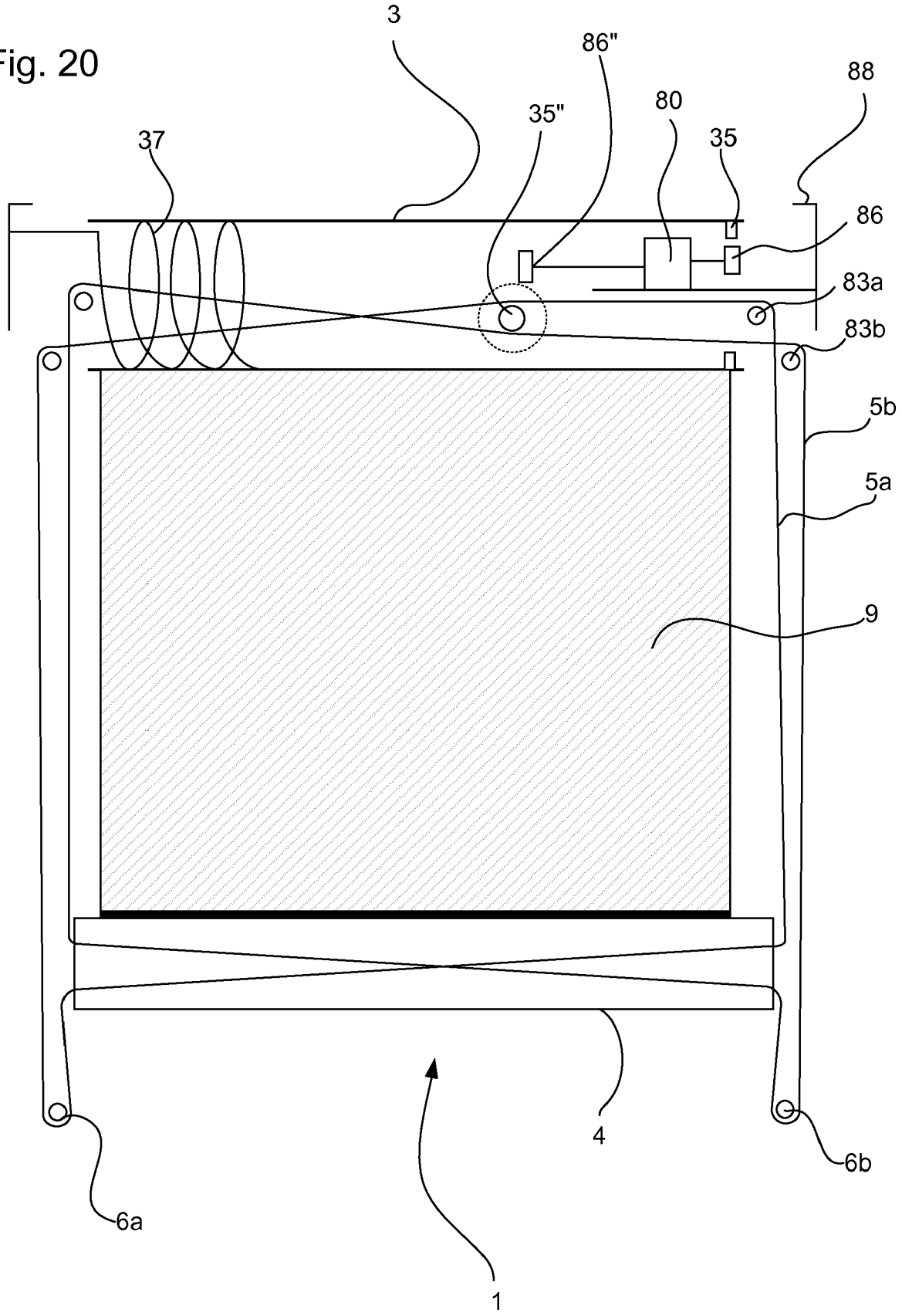
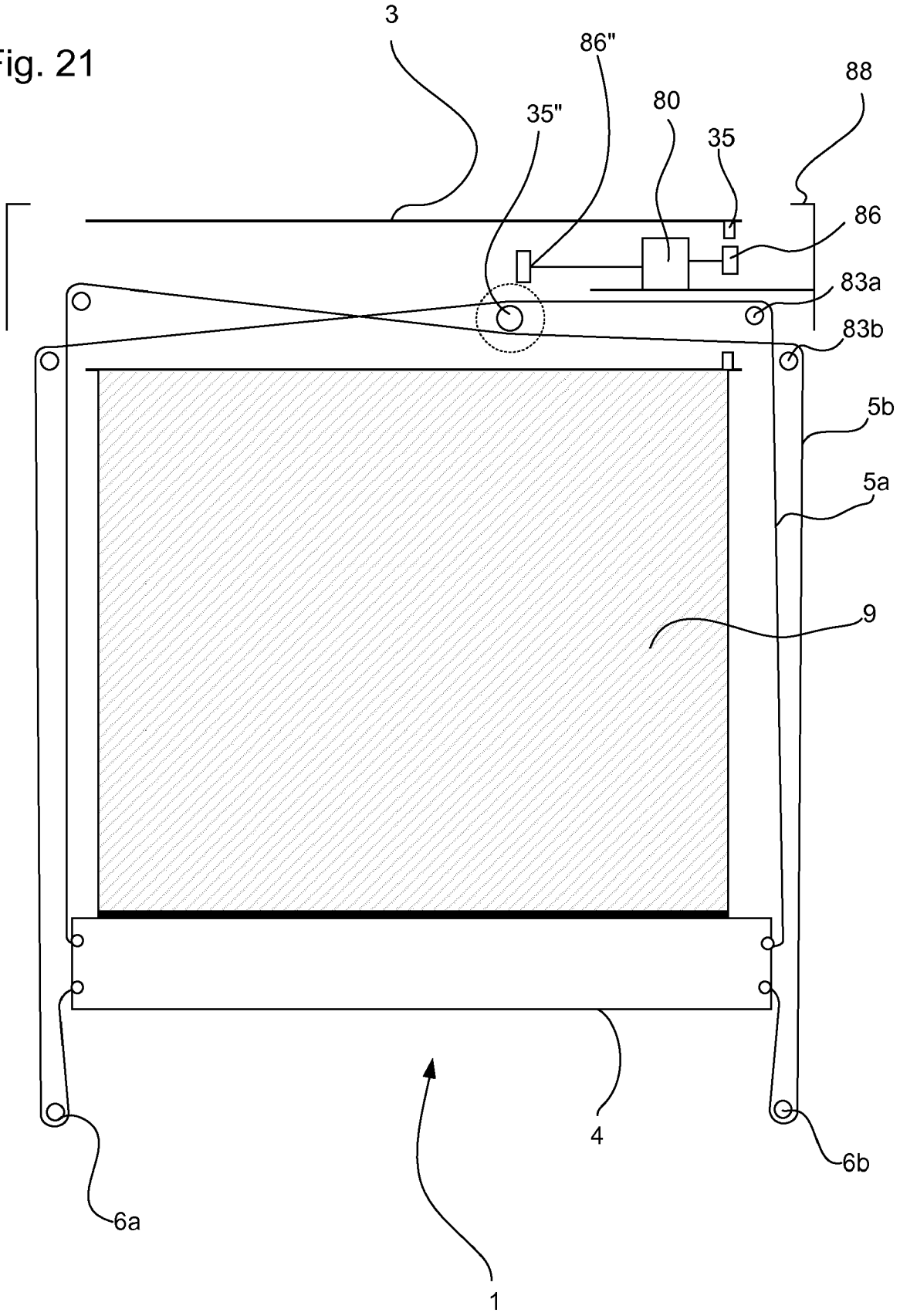


Fig. 21



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EUROPEAN SEARCH REPORT

Application Number
EP 18 17 6858

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 92 15 788 U1 (GOLDNER HORST H) 21 January 1993 (1993-01-21) * page 1, line 27 - page 2, line 4; figure 1 * -----	1-10	INV. E06B9/42 E06B9/58 E06B9/72
			TECHNICAL FIELDS SEARCHED (IPC) E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 October 2018	Kofoed, Peter

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DE 9215788 U1	21-01-1993	NONE	

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