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(54) **FABRIC ROLLER DEVICE**

(57) Fabric roller device comprising a box (2), a take-up roller (3), rotatably supported within the box (2) and a windable sheet (4), susceptible of being wound around the take-up roller (3). The device (1) also comprises at least one torsion spring (5) extended between a first end (5') mechanically connected and integral in rotation with the take-up roller (3) and an opposite second end (5'') mechanically connected to the box (2) and susceptible of taking on at least one preloading position, in which the second end (5'') is twisted with respect to the first end (5'). The device (1) also comprises loading means (9), which comprise a loading gear (91), mechanically connected to the second end (5'') of the torsion spring, and actuatable in order to rotate in a loading direction the second end (5'') with respect to said first end (5') and position the torsion spring (5) in a first preloading configuration in which the second end (5'') is placed in a first preloading position. The adjustment means (9) also comprise a worm screw (92), rotatably mounted in the box (2), mechanically engaged with the loading gear (91) and actuatable in order to rotate the loading gear (91) in the loading direction and position the torsion spring (5) in a second preloading configuration in which the second end (5'') is placed in a second preloading position. The worm screw (92) is arranged for preventing the rotation of the loading gear (91) at least in a direction opposite the loading direction and retaining the second end (5'') in the preloading position.

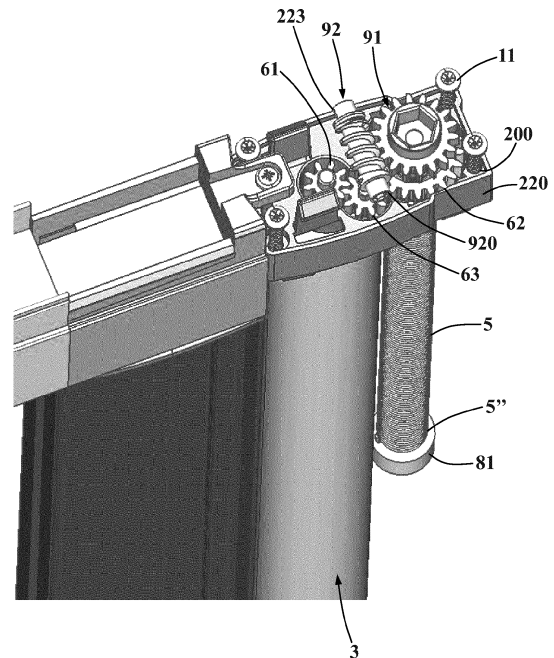


Fig. 6

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Description

Field of application

[0001] The present finding regards fabric roller device according to the preamble of the independent claims number 1.

[0002] The present fabric roller device is intended to be advantageously associated with a fabric roller blind for adjustably closing openings made on walls of buildings, in particular for windows, for doors, for French windows and doors/windows/shutters in general.

[0003] More in detail, the fabric roller device is associable with a blind, or a mosquito netting, with horizontal sliding and in particular provided with a translatable handle bar for opening or closing the aforesaid opening.

[0004] The fabric roller device, object of the present invention, is therefore inserted in the industrial field of production of parts of doors/windows/shutters, or also in the field of production of blinds, in particular windable and provided with a sheet with function of protection from sunbeams, from insects or other different applications.

State of the art

[0005] Known on the market are fabric roller devices which are susceptible of being associated with a support structure of a blind in order to allow closing openings of doors/windows/shutters (such as windows, doors or French windows).

[0006] More in detail, the support structure of the blinds of known type comprises a support frame, fixed at a lateral wall of an opening of a building, which is provided with an upper slide guide, fixed on an upper wall of the opening, and at least one lateral upright, fixed to a lateral wall of the opening itself.

[0007] In particular, the fabric roller blinds comprise a handle bar, which is extended orthogonal to the slide guide between two opposite lateral terminations, and is slidably associated with the slide guide such that it can be moved therealong between an open position and a closed position.

[0008] The fabric roller device is, as mentioned above, associable with the support frame of the fabric roller blind and comprises a box placed vertically and defining, at its interior, a housing volume within which a take-up roller is placed which is rotatably mounted in the box. The aforesaid take-up roller carries, wound thereon, a windable sheet which is extended between a first edge fixed to the take-up roller and an opposite free second edge, fixed to the handle bar and susceptible of being moved in order to allow the unwinding and the re-winding of the windable sheet following the movement of the aforesaid handle bar.

[0009] The fabric roller device of known type also comprises a torsion spring, which is mechanically connected with one end thereof to the take-up roller such to be twisted following the rotation of the take-up roller itself.

[0010] The aforesaid fabric roller devices of known type also comprise adjustment means, which are adapted to allow adjusting the preload of the torsion spring, in particular by twisting end of the torsion spring not connected to the take-up roller.

[0011] The devices of known type comprise adjustment means provided with a loading gear, mechanically connected and integral in rotation with the free end of the torsion spring and actuatable in rotation in order to rotate the aforesaid end, determining a preloading configuration of the torsion spring, in which its free end is placed in a preloading position, rotated with respect to the end of the torsion spring connected to the take-up roller. In order to allow retaining the spring in the aforesaid preloading configuration, the adjustment means comprise a locking element, adapted to prevent the rotation of the loading gear in a direction opposite that of loading. The locking element is usually constituted by a housing seat, in which the loading gear is inserted and which is shaped such to define an abutment surface adapted to prevent the rotation of the aforesaid gear in a direction opposite the loading direction. More in detail, the housing seat comprises at least one slide along which the loading gear is susceptible of sliding, during the rotation thereof, and such slide comprises a step, in particular placed at the lowest point of the slide, which defines the aforesaid abutment surface against which the loading gear abuts.

[0012] The fabric roller devices of known type briefly described up to now have in practice demonstrated that they do not lack drawbacks.

[0013] A first drawback lies in the fact that such fabric roller devices have resulted poorly precise in their adjustment of the preload of the torsion spring.

[0014] More in detail the loading gear, being configured in order to allow the adjustment of the torsion spring during the mounting of the blind, does not allow obtaining a precise adjustment of the same torsion spring, in particular to be executed when the blind is already installed.

[0015] In addition, the configuration of the locking element does not allow stopping the opposite rotation of the loading gear immediately following the attainment of the desired preloading position, since it is a function of the position of the step with respect to the constraining element made on the loading gear.

[0016] A further drawback lies in the fact that such fabric roller devices do not allow preloading the torsion spring afterwards, following the mounting of the fabric roller blind, since the loading gear is directly connected to the torsion spring and is actuatable by an upper portion of the box, not accessible once the blind is mounted.

[0017] In order to at least partly overcome such drawbacks, fabric roller devices were developed, for example of the type described in the document US 2008/314533, which comprise a worm screw operatively associated with the loading gear. Such worm screw, in addition to acting as locking element of the loading gear, is actuatable by a user in order to impart a rotation to the loading gear, determining the loading of the torsion spring. Nev-

ertheless, even the latter solution of known type does not always allow an easy adjustment of the torsion spring.

Presentation of the invention

[0018] In this situation, the problem underlying the present invention is to provide a fabric roller device which allows adjusting, in a precise and easy manner, the preload of the torsion spring. Another object of the present invention is to provide a fabric roller device which is easy to adjust even after its installation, in particular without having to provide for the disassembly thereof.

[0019] Another object of the present invention is to provide a fabric roller device which is simultaneously adjustable in a quick manner, before its installation, and in a precise manner, after its installation.

[0020] Another object of the present invention is to provide a fabric roller device, which is structurally simple and inexpensive to attain and install.

[0021] Another object of the present invention is to provide a fabric roller device, which is safe and entirely reliable in operation.

Brief description of the drawings

[0022] The technical characteristics of the invention, according to the aforesaid objects, can be clearly seen in the contents of the below-reported claims and the advantages thereof will be more evident in the following detailed description, made with reference to the enclosed drawings, which represent a merely exemplifying and non-limiting embodiment of the invention, in which:

- figure 1 depicts a front view of the fabric roller device, object of the present invention, mounted on a fabric roller blind;
- figure 2 depicts a detail of the device of figure 1, with several parts removed in order to better illustrate other parts;
- figure 3 depicts a front view of only the fabric roller device of figure 1;
- figure 4 depicts a section view of the device of figure 3;
- figure 5 depicts a perspective view of the device of figure 2, with a containment body of a torsion spring removed in order to better show the latter;
- figure 6 depicts a detail of the device of figure 5, in which a closure body of an upper head is removed in order to better show the components inside the latter;
- figure 7 depicts a top plan view of the device of figure 6;
- figure 8 depicts a front view of the device of figure 6, with several parts removed in order to better illustrate other parts;
- figure 9 depicts a perspective view of a detail of the device of figure 8, relative to loading means and transmission means;

- figures 10A and 10B respectively depict a top plan view and a perspective view of a detail of the loading means of figure 9, relative to a second gear;
- figure 11 respectively depicts a perspective view of a detail of the transmission means of figure 9, relative to a first gear;
- figure 12 depicts a further detail of the transmission means of figure 9, relative to a worm screw;
- figure 13 depicts a top plan view of the device of figure 7, with transmission means and loading means removed in order to better show the upper head;
- figure 14 depicts a perspective view of a detail of the device, relative to support means;
- figure 15 depicts a bottom perspective view of a loading gear.

Detailed description of a preferred embodiment

[0023] With reference to the enclosed drawings, reference number 1 overall indicates the fabric roller device, object of the present invention.

[0024] The device 1 is advantageously mountable on a support structure of a blind, and such support structure is usually associated with a door/window/shutter, e.g. a window, a door or a French window, or directly with an opening made on a building, so as to adjustably close the aforesaid opening.

[0025] The blind on which the device 1, object of the present invention, is mounted can be a blind with vertical sliding, in particular provided with a sheet susceptible of vertically translating (e.g. in the case of French windows of limited size or of classic windows) or instead, without departing from the protective scope of the present invention, it can be a blind with horizontal sliding, in which the sheet is susceptible of horizontally translating (e.g. in the case of liftsliding or translating windows or in the case of French windows of large size).

[0026] More in detail hereinbelow, for the sake of description simplicity, reference will be made to a fabric roller device 1 mounted on the support structure of a blind with vertical sliding, it being intended nevertheless that the characteristics described below can be applied analogously to a blind with horizontal sliding.

[0027] In accordance with the invention the fabric roller device 1 comprises a box 2, extended along a first extension direction X and defining a housing volume V at its interior. The box 2 is advantageously intended to be associated with a support structure 10 of a fabric roller blind, which preferably comprises at least one upper guide 101, fixed at an upper wall of the opening A of the building, and a handle bar 102, slidably connected to the upper guide 101 in order to be moved along the aforesaid opening A between an open position and a closed position. Advantageously the box 2 is fixed at a lateral wall of the opening A, preferably substantially orthogonal to the upper guide 101 of the support structure 10 of the fabric roller blind and even more preferably is extended

between the upper wall and a lower wall of the opening A, between an upper end 2' and an opposite lower end 2".

[0028] Of course, without departing from the protective scope of the present invention, the box 2 can also be fixed to the aforesaid lateral wall by means of an abutment section, preferably substantially C shaped and interposed between the lateral wall and the box 2.

[0029] The device 1 also comprises a take-up roller 3, which is rotatably supported within the housing volume V of the box 2, around a first rotation axis R.

[0030] Advantageously the take-up roller 3 is extended for the entire length of the box 2 and in particular between a first end 3', placed at the upper end 2' of the box 2, and a second end 3', placed at the lower end 2" of the box 2 itself.

[0031] More in detail, the box 2 advantageously comprises a section 20, preferably a tubular section with substantially rectangular section, internally hollow and extended between two opposite openings. The box 2 advantageously comprises two heads, mechanically connected to the section 20 and each of such heads is placed to close a separate opening of the section 20. More in detail, the box 2 comprises a lower head 21, susceptible of being placed in abutment against the lower wall of the opening or, alternatively in the event in which the support structure 100 of the fabric roller blind comprises a lower guide, in abutment against the latter, and an upper head 22, which is preferably fixed to the upper guide.

[0032] In particular the upper head 22 is advantageously fixed to the section 20 and defines the upper end 2' of the box 2, while the lower head 21 is advantageously fixed to the section 20 and defines the lower end 2" of the box 2 itself.

[0033] Advantageously the section 20 is internally hollow, defines the aforesaid housing volume V at its own interior, and is extended along the first extension direction X between two opposite connection faces, each of which provided with a corresponding opening communicating with the aforesaid housing volume V. The section 20 is advantageously provided with at least two first longitudinal fixing holes 200 for each connection face, and such first longitudinal fixing holes 200 are extended parallel to the first extension direction and are made at a perimeter edge 201 of the section 20.

[0034] In the same manner, each head 21, 22 is advantageously provided with at least two corresponding second longitudinal fixing holes, which are extended parallel to the first extension direction, and are aligned with the first longitudinal fixing holes 200 made on the section 20.

[0035] The box 2 advantageously comprises fixing means 11, such as for example screws, placed to traverse the first longitudinal fixing holes 200 and second fixing holes for fixing the section 20 to the heads 21, 22, allowing the closing of the housing volume V.

[0036] The device 1 also comprises a windable sheet 4, susceptible of being wound on the take-up roller 3 and extended between a first edge, fixed to the take-up roller

3 and an opposite second edge, susceptible of being fixed to the handle bar 102, in order to allow unwinding and winding the sheet 4 following the movement of the handle bar 102.

[0037] The windable sheet 4 is therefore advantageously movable between a wound configuration, in which it is preferably substantially completely wound on the take-up roller 3 when the handle bar 102 is in open position, and an unwound configuration, in which is unwound to close the opening A of the building, when the handle bar 102 is in the closed position.

[0038] Hereinbelow, with the expression "windable sheet" it must be intended an element adapted to define a protection element dividing between the building interior and exterior, whether this is a sheet with sun screen function or a sheet with insect protection function, such as for example a mosquito netting.

[0039] The device 1 also comprises at least one torsion spring 5 extended between a first end 5' mechanically connected and integral in rotation with the take-up roller 3 and an opposite second end 5" mechanically connected to the box 2 and susceptible of taking on at least one preloading position, in which the second end 5" is twisted with respect to the first end 5'.

[0040] Advantageously the torsion spring 5 is extended along a second extension direction X'.

[0041] In particular, with the expression "preloading position", it will be intended hereinbelow a position of the second end 5" of the torsion spring 5 rotated around the second extension direction X' and adapted to determine, on the torsion spring 5, a pre-tensioning torsional state, which is greater the more the rotation of the second end 5" with respect to the first end 5' of the torsion spring.

[0042] In this manner the torsion spring 5 is advantageously mechanically connected to the box 2 with the first end 5' free to rotate around the second extension direction Y and with the second end 5" constrained to the support box 2 and susceptible of being prevented from rotating.

[0043] In particular, with the expression "susceptible of being prevented from rotating" it is intended that the second end 5" is substantially prevented from rotating, or alternatively limited in its rotation, when the first end 5' is rotated around the aforesaid second extension direction X', without however excluding that the second end 5" can rotate with respect to the box 2 in other situations, as better described hereinbelow.

[0044] More in detail, the first end 5' is substantially released from the box 2 while the second end 5" is at least partially connected to the box 2 itself, in a manner such that the second end 5" rotates in a limited manner with respect to the rotation of the first end 5', causing a twisting of the torsion spring 5.

[0045] In accordance with the preferred embodiment the first end 5' of the torsion spring 5 is placed on the upper part, at the first end 3' of the take-up roller 3 and in proximity to the upper end 2' of the box 2. On the contrary, the second end 5" is placed distal from the first end

3' of the take-up roller 3 and from the upper end 2' of the box 2, towards the lower head 21 of the same box 2.

[0046] Of course, without departing from the protective scope of the present invention, it is also possible to reverse the aforesaid ends 5', 5" of the torsion spring 5, providing that the first end 5', free to rotate, is placed distal from the first end 3' of the take-up roller 3 and from the upper end 2' of the box 2, towards the lower head 21 of the same box 2, with the second end 5" placed substantially at the first end 3' of the take-up roller 3 and in proximity to the upper end 2' of the box 2.

[0047] Preferably the torsion spring 5 has a length comprised between 50 and 150 cm and even more preferably the ratio between the length of the torsion spring 5 along the second extension direction X' and the length of the take-up roller 3 along the first extension direction X is comprised between 0.17 and 0.75.

[0048] The device 1 comprises loading means 9, arranged for adjusting the tension of the torsion spring 5, which comprise a loading gear 91, mechanically connected to the second end 5" of the torsion spring, integral in rotation with the latter and provided with a first actuation portion 910 arranged for being actuated in order to rotate, in a loading direction, the second end 5" of the torsion spring 5 with respect to the first end 5' and position the torsion spring 5 in a first preloading configuration in which the second end 5" is placed in a first preloading position.

[0049] The loading means 9 also comprise a worm screw 92, rotatably mounted in the box 2 along a third extension direction Y substantially orthogonal to the first extension direction X, mechanically engaged with the loading gear 91 and actuatable in order to rotate the loading gear 91 in the loading direction and position the torsion spring 5 in a second preloading configuration in which the second end 5" is placed in a second preloading position.

[0050] The worm screw 92 is arranged for preventing the rotation of the loading gear 91 at least in a direction opposite the loading direction and retaining the second end 5" of the torsion spring 5 in the preloading position.

[0051] In this manner it is possible to adjust the preload of the torsion spring 5 in two modes, both by acting directly on the loading gear 91, and by acting indirectly on the latter, in particular by actuating the worm screw 92.

[0052] In accordance with the idea underlying the present invention, at least one between the loading gear 91 and the worm screw 92 is movable between an operating position, in which the loading gear 91 is uncoupled from the worm screw 92 and is directly actuatable in rotation around the second extension direction X' in order to adjust the preload of the torsion spring 5, and a locking position, in which the loading gear 91 is coupled to the worm screw 92 and actuatable in rotation around the second extension direction X' by means of the worm screw 92.

[0053] Advantageously the loading gear 91 is arranged for being driven in rotation by the worm screw 92 in the loading direction with a reduction ratio comprised be-

tween 1/15 and 1/25.

[0054] By means of the present invention, it is possible to obtain a first quick adjustment, substantially rough adjustment of the preload of the torsion spring 5, by acting directly on the loading gear 91, and a precise adjustment by acting instead on the worm screw 92 since one actuation revolution of the worm screw 92 corresponds with a fraction, in particular preferably comprised between 1/15 and 1/25, of a revolution of the loading gear 91. Advantageously the loading gear 91 is provided with an external toothing 911, which preferably comprises a number of teeth comprised between 15 and 25 which are engageable with the worm screw 92. In particular the worm screw 92, in a per se known manner, is provided with an external thread 921, preferably having a pitch comprised between 2 and 4 mm and is susceptible of engaging the external toothing 911 of the loading gear 91. Advantageously the loading gear 91 is extended between an upper face and an opposite lower face and comprises a first stem 912, on which the first actuation portion 910 is obtained, and a second stem 913. The loading gear 91 is advantageously provided with an adjustment opening 914, directed towards the upper end 2' of the box 2, and an opposite constraining opening 911, directed towards the lower end 2" of the box 2. Preferably the adjustment opening 914 and the constraining opening 915 are extended respectively on the first stem 912, in depression from the upper face, and on the second stem 913, in depression from the lower face.

[0055] In particular the aforesaid adjustment opening 914 at least partially defines a cavity of the actuation portion 910, within which a user can insert a tool, for example an Allen wrench, in order to actuate the loading gear 91 in rotation.

[0056] Advantageously, the loading gear 91 comprises an elongated portion 916, in which the aforesaid constraining cavity is made, which is extended along the second extension direction X'.

[0057] As mentioned above, the box 2 advantageously comprises an internally hollow section 20 and extended between a first opening and a second opening, and at least one upper head 22 mechanically connected to the section 20 and placed to close the first opening.

[0058] The loading means 9 are advantageously at least partially housed in the upper head 22.

[0059] More in detail the upper head 22 of the box 2 comprises a main body 220, mechanically connected to the section 20, and a closure body 221, mechanically connected on the upper part to the main body 220 and defining the upper end 2' of the box 2.

[0060] Advantageously the main body 220 is provided with two retention tabs, which are extended projectingly on the upper part, towards the closure body 221, along a direction substantially parallel to the first extension direction X and are substantially shaped as an L. Advantageously moreover the closure body 221 is provided with two corresponding coupling openings, preferably through, which snap-house the aforesaid retention tabs

in order to mechanically connect the main body 220 and the closure body 221.

[0061] Advantageously the loading means 9 are at least partially housed in the closure body 221, which is preferably provided with corresponding actuation openings, and in particular with a first actuation opening 222, placed at the first actuation portion 910 of the loading gear 91, above the latter and arranged in order to allow the insertion of a tool, such as for example an Allen wrench, adapted to engage the actuation portion 910 of the loading gear 91 in order to rotate it in the loading direction.

[0062] The closure body 221 also preferably comprises at least one second actuation opening 223, placed at the worm screw 92, and preferably two second actuation openings 223.

[0063] More in detail, the worm screw 92 is extended advantageously along the aforesaid third extension direction Y, between a first end 92' and a second end 92'', preferably for the entire width of the closure body 221.

[0064] More in detail, the closure body 221 is extended between a front face and an opposite rear face and is advantageously provided with a second actuation opening 223 on the front face and preferably with an opposite second actuation opening 223 on the rear face. The worm screw 92 is extended preferably aligned with the aforesaid second actuation openings 223 and is advantageously provided with respective actuation cavities 920, preferably with hexagonal shape.

[0065] The actuation cavities 920 of the worm screw 92 are advantageously made at the opposite ends 92', 92'' of the worm screw 92 and each at a second actuation opening 223, in order to allow the insertion of a tool adapted to rotate the worm screw 92.

[0066] In this manner it is possible to adjust the preload of the torsion spring 5 without disassembling the box 2, being able to operate the adjustment of the preload of the torsion spring 5, even with the device 1 already mounted.

[0067] As indicated above, at least one between the loading gear 91 and the worm screw 92 is movable between the aforesaid operating position (in which the loading gear 91 is uncoupled from the worm screw 92 and is directly actuatable in rotation around the second extension direction X' in order to adjust the preload of the torsion spring 5), and the aforesaid locking position (in which the loading gear 91 is coupled to the worm screw 92 and actuatable in rotation around the second extension direction X' by means of the worm screw 92). Advantageously, with the loading gear 91 in the operating position, the latter is actuatable in rotation around the second extension direction X' both in the loading direction, in order to allow the loading of the torsion spring 5, and in a discharging direction, opposite that of loading, in order to allow discharging the torsion spring 5 itself.

[0068] More in detail, in accordance with the preferred embodiment, the loading gear 91 is slidably mounted in the box 2, in particular in the upper head 21, and is mov-

able along the second extension direction X' between a lifted position, which coincides with the locking position, and a lowered position, coinciding with the operating position.

5 **[0069]** Advantageously the loading gear 91 is movable by means of a tool placed to engage the cavity of the first actuation portion 910 of the loading gear 91, in abutment against the cavity itself, in order to allow exerting a thrust against the loading gear 91 along the aforesaid second extension direction X'.

10 **[0070]** More in detail, the loading gear 91 is mechanically connected to the second end 5'' of the torsion spring 5 and forces the second end 5'' to translate along the second extension direction X' during its movement between the lifted position and the lowered position. The torsion spring 5 is advantageously driven during the movement of the loading gear 91 and exerts an elastic return force, which is proportional to the traction exerted on the torsion spring 5 and is adapted to push the loading gear 91 in order to bring it back from the lowered position towards the lifted position.

15 **[0071]** In operation, in the event in which the external tothing 911 of the loading gear 91 is not perfectly aligned with the external thread 921 of the worm screw 92, the elastic return force of the torsion spring 5 will not allow bringing back the loading gear 91 exactly into the lifted position, caused by the impediment due to the presence of the external thread 921 of the worm screw 92. In such case, it is sufficient that the user slightly rotates the loading gear 91, acting by means of the tool on the first actuation portion 910, in order to correctly align the external tothing 911 of the loading gear 91 and the external thread of the worm screw 92, allowing the correct movement of the loading gear 91 towards the lifted position.

20 **[0072]** Advantageously the torsion spring 5 is provided with a length lower than that of the elongated pin 80, such that there is always a vertical axial thrust on 91 also in the case maximum load supportable by the torsion spring 5.

25 **[0073]** In accordance with an embodiment variant, not illustrated in the enclosed figures, the worm screw 92 is movable between the aforesaid locking position and the operating position.

30 **[0074]** Advantageously in such embodiment variant the closure body 221 is provided with a seat in which the worm screw 92 is housed with clearance, in which the clearance is oriented along a direction substantially orthogonal to the first extension direction X and to the third extension direction Y, in order to allow the movement of the worm screw 92 along such direction between a proximal position, in which it is placed in engagement contact with the loading gear 91, and a distal position, in which it is placed spaced and does not engage the loading gear 91.

35 **[0075]** Advantageously the box 2 comprises support means 8, placed within the housing volume V and side-by-side the take-up roller 3 and the torsion spring 5 is at least partially wound on the support means 8 with the

second end 5" integral with the support means 8.

[0076] Advantageously the loading gear 91 is mechanically connected and integral in rotation with the support means 8.

[0077] Advantageously the support means 8 comprise at least one elongated pin 80, mechanically connected to the section 20 and preferably rotatably connected with the latter.

[0078] More in detail, the constraining opening 915 advantageously defines a constraining cavity, adapted to allow the housing of the elongated pin 80 of the support means 8, with the latter integral in rotation the loading gear 91.

[0079] The support means 8 advantageously also comprise a constraining element 81, which is mounted on the elongated pin 80 and integral in rotation with the latter.

[0080] In particular, in accordance with the preferred embodiment the elongated pin 80 is a prismatic pin, i.e. provided with prismatic shape and polygonal section. Preferably, in accordance with the aforesaid embodiment, the polygonal section of the elongated pin 80 is hexagonal. Of course, without departing from the protective scope of the present invention, it is also possible to provide for an elongated pin 80 with square or octagonal section or other polygonal sections suitable for such purpose.

[0081] Advantageously, the constraining opening 915 and the corresponding constraining seat are preferably counter-shaped with respect to the elongated pin 80 of the support means 8, and in particular, in accordance with the preferred embodiment, it has a hexagonal section.

[0082] The constraining element 81 is advantageously substantially T shaped and comprises an elongated retention portion 810, preferably cylindrical, which is extended parallel to the second extension direction X' and on which the torsion spring 5 is at least partially wound, preferably with its second end 5".

[0083] Advantageously the constraining element 81 is provided with an insertion hole 811, which is extended parallel to the second extension direction X', preferably along the entire extension of the retention portion 810.

[0084] The insertion hole 811 is advantageously arranged for housing the elongated pin 80 and is preferably internally shaped such to render integral in rotation the elongated pin 80 and the constraining element 81 of the support means 8.

[0085] More in detail, in accordance with the aforesaid embodiment in which the elongated pin 80 has hexagonal section, the insertion hole 811 is a hexalobe hole, therefore provided with an internal surface adapted to cooperate with an external surface of the elongated pin 80 and allow the integral in rotation coupling between the two elements.

[0086] The retention portion 810 is preferably provided with at least one circumferential rib 812 which is extended preferably along the entire perimeter of the retention por-

tion 810 itself and defines a retention surface adapted to cooperate with the turns of the torsion spring 5 in order to prevent the torsion spring 5 from disengaging, with its second end 5", the retention portion 810 and, consequently, the support means 8.

[0087] The constraining element 81 also comprises an enlarged abutment portion 813, which is extended from a lower end of the retention portion 810, substantially orthogonal to the latter and against which it is susceptible of abutting against the second end 5" of the torsion spring 5.

[0088] Preferably the abutment portion 813 is made integrally with the retention portion 810.

[0089] In accordance with the preferred embodiment, the elongated pin 80 is placed in abutment with the insertion hole 811 against a lower wall of the retention portion 810, and the elongated pin 80 is preferably integral with the constraining element 81 for translations along directions parallel to the second extension direction X'.

[0090] Alternatively, in accordance with an embodiment variant not illustrated in the enclosed figures, the insertion hole 811 passes along the entire extension of the constraining element 81 and the elongated pin 80 is therefore slidably associated with the constraining element 81 itself, so as to allow the latter to be able to translate along the elongated pin 80 in order to follow the elongation or the shortening of the torsion spring 5 connected thereto during the twisting of the same torsion spring 5.

[0091] Indeed, the twisting of a torsion spring 5 advantageously determines a corresponding mutual approaching and/or moving away of the turns of the torsion spring 5, consequently causing its total elongation and/or shortening.

[0092] The support means 8 advantageously comprise a containment body 82, preferably with cylindrical shape and internally hollow, which at its interior partially houses the torsion spring 5, the elongated pin 80 and at least the retention portion of the constraining element 81, so as to define an assembly that is easy to mount and dismount from the box 2.

[0093] Advantageously the device 1 comprises transmission means 6, interposed between the take-up roller 3 and the first end 5' of the torsion spring 5 and comprising at least one first gear 61, integral in rotation with the take-up roller 3 around the first rotation axis R, and at least one second gear 62, integral in rotation with the first end 5' of the torsion spring 5, around the second extension direction X'.

[0094] Advantageously the transmission means 6 are interposed between the first end 3' of the take-up roller 3 and the first end 5' of the torsion spring 5 and are preferably placed substantially above the take-up roller 3 itself, in proximity to the upper head 21 of the box 2.

[0095] The first gear 61 is provided with a first external diameter D1 and the second gear 62 is provided with a second external diameter D2. Preferably the ratio between the first external diameter D 1 of the first gear 61 and the second external diameter D2 of the second gear

62 is comprised between 0.3 and 0.6 and even more preferably substantially equal to 0.5. In this manner the reduction ratio between the rotation of the take-up roller 3 and the first end 5' of the torsion spring 5 is preferably comprised between 3 and 1.5 and even more preferably substantially equal to 2.

[0096] In accordance with the preferred embodiment, illustrated in the enclosed figures in which the torsion spring 5 is placed side-by-side the take-up roller 3 and is not coaxial with the latter, the transmission means 6 advantageously comprise at least one third gear 63, interposed between the first gear 61 and the second gear 62 in order to actuate in rotation the second gear 62 around the second extension direction X' based on the rotation of the first gear 61 around the first rotation axis R.

[0097] Advantageously the third gear 63 is provided with a third external diameter D3 smaller than the first external diameter D1.

[0098] The third gear 63 advantageously allows reducing the first external diameter D1 of the first gear 61 and the second external diameter D2 of the second gear 62, maintaining unaltered the aforesaid reduction ratio and therefore allowing the reduction of the size of the transmission means 6.

[0099] Advantageously the take-up roller 3 comprises, at the first end 3', an insertion seat 30 and the first gear 61 comprises a connection stem 610, with prismatic shape, inserted in the insertion seat 30 in order to render integral in rotation the take-up roller 3 and the first gear 61. Advantageously, in accordance with the preferred embodiment, the insertion seat 30 has a polygonal section, preferably cross-shaped, and the connection stem 610 of the first gear 61 is counter-shaped with respect to the insertion seat 30, preferably cross-shaped as well. The connection stem 610 is advantageously tapered at a lower end thereof inserted within the insertion seat 30, in order to facilitate its insertion.

[0100] The first gear 61 advantageously comprises a first support stem 611, which is extended from an opposite side with respect to the connection stem 610.

[0101] Advantageously the closure body 221 is provided with a first support seat, placed at the first support stem 611 and in which the aforesaid first support stem 611 is inserted, in order to support the first gear 61 during its rotation around the first rotation axis R.

[0102] Advantageously the third gear 63 comprises a second support stem 630 and the closure body 221 is provided with a second support seat, preferably cylindrical, within which the second support stem 630 of the third gear 63 is at least partially housed, in order to support the latter during its rotation.

[0103] The main body 220 comprises a first support seat 224, placed above the take-up roller 3 and within which the first gear 61 is at least partially housed. Preferably the first support seat 224 is provided with a first bottom wall, against which the first gear 61 is placed in abutment and such first bottom wall is provided with a through hole aligned and communicating with the inser-

tion seat 30 made on the take-up roller 3, in order to allow the passage of the connection stem 610 of the first gear 61. The first bottom wall of the first support seat 224 defines a support shoulder, placed circumferentially with respect to the through hole and adapted to support the first gear 61. The first bottom wall is preferably provided with at least one first abutment lip, which is extended projecting from the bottom wall of the support seat 224, preferably placed at least partly circumferentially with respect to the through hole. In this manner the first gear 61 abuts against the first abutment lip, allowing the reduction of the friction between the first gear 61 and the main body 220, thus improving the operation of the device 1. Preferably, the first bottom wall is provided with four first abutment lips, spaced from each other, preferably equidistant along the circumference of the through hole. Advantageously the second gear 62 is substantially T-shaped and comprises an actuation portion 620. The second gear 62 is advantageously provided with a stem portion 621, which is extended preferably projectingly from the actuation portion 620, along a direction substantially parallel to the second extension direction X'.

[0104] Advantageously the second gear 62 is provided with a through insertion hole 623, within which the loading gear 91 is at least slidably housed, at least with its elongated portion 916.

[0105] More in detail, the elongated portion 916 of the loading gear 91 is inserted within the housing hole of the stem portion 621 of the second gear 62. Preferably, the aforesaid elongated portion of the loading gear 91 is provided with a tapered external diameter with respect to the diameter of the aforesaid through insertion hole 623, so as to prevent the mutual coupling between the two gears and therefore allowing the loading gear 91 to freely rotate with respect to the second gear 62.

[0106] In particular, at least the stem portion 621 of the second gear 62 is advantageously provided with the aforesaid through insertion hole 623, within which the support means 8 are at least partially housed, free to rotate with the aforesaid housing hole. Preferably the aforesaid housing through hole 622 is also extended along the actuation portion 620, for the entire extension of the second gear 62.

[0107] Advantageously the torsion spring 5 is mechanically connected to the second gear 62, in particular with at least the first end 5' wound on the stem portion 621 of the second gear 62. Advantageously the stem portion 621 is provided, on an external surface thereof, with at least one engagement protuberance 622, arranged for collaborating at least with the first end 5' of the torsion spring 5.

[0108] Preferably the stem portion 621 of the second gear 62 is provided with multiple engagement protuberances 622 and in particular three engagement protuberances 622, placed spaced from each other along the stem portion 621.

[0109] More in detail, each engagement protuberance 622 is extended tapered, towards the lower head 21, be-

tween a retention edge, which defines an abutment surface adapted to cooperate with the torsion spring 5, and an opposite connector edge.

[0110] Advantageously the box 2 is provided with at least one first housing seat 202, defining a shoulder 203, and the second gear 62 is at least partially housed in the first housing seat 202, in abutment against the aforesaid shoulder 203.

[0111] Advantageously the first housing seat 202 is made on the main body 220 of the upper head 22 and is preferably side-by-side the first support seat 224 within which the second gear 62 is at least partially housed. More in detail, the first housing seat 202 is provided with a second bottom wall, which defines the aforesaid shoulder 203 and adapted to abuttingly support the second gear 62. The second bottom wall of the first housing seat 202 is advantageously provided with a through opening within which the stem portion 621 of the second gear 62 is inserted.

[0112] The second bottom wall is preferably provided with at least one second abutment lip, which is extended projectingly from the second bottom wall of the first housing seat 202, preferably placed at least partly circumferentially with respect to the through opening. In this manner the second gear 62 abuts against the second abutment lip, allowing the reduction of the friction between the second gear 62 and the main body 220, thus improving the operation of the device 1. Preferably, the second bottom wall is provided with four second abutment lips, spaced from each other, preferably equidistant along the circumference of the through opening.

[0113] The fabric roller device 1 thus conceived therefore attains the pre-established objects.

Claims

1. Fabric roller device comprising:

- a box (2), extended along a first extension direction (X) and defining a housing volume (V) at its interior;
- a take-up roller (3), which is rotatably supported within the housing volume (V) of said box (2), around a first rotation axis (R);
- a windable sheet (4), susceptible of being wound around said take-up roller (3) and extended between a first edge, fixed to said take-up roller (3) and an opposite second edge;
- at least one torsion spring (5) extended between a first end (5') mechanically connected and integral in rotation with said take-up roller (3) and an opposite second end (5'') mechanically connected to said box (2) and susceptible of taking on at least one preloading position, in which said second end (5'') is twisted with respect to said first end (5');
- loading means (9), arranged for adjusting the

tension of said torsion spring (5), which comprise:

- a loading gear (91), mechanically connected to the second end (5'') of said torsion spring, integral in rotation with the latter and provided with a first actuation portion (910) arranged for being actuated in order to rotate the second end (5'') of said torsion spring (5) in a loading direction with respect to said first end (5') and position said torsion spring (5) in a first preloading configuration in which said second end (5'') is placed in a first preloading position;
- a worm screw (92), rotatably mounted in said box (2) along a third extension direction (Y) substantially orthogonal to said first extension direction (X), mechanically engaged with said loading gear (91) and actuatable for rotating said loading gear (91) in said loading direction and positioning said torsion spring (5) in a second preloading configuration in which said second end (5'') is placed in a second preloading position;

said worm screw (92) being arranged for preventing the rotation of said loading gear (91) at least in a direction opposite said loading direction and retaining the second end (5'') of said torsion spring (5) in said preloading position;

said device being **characterized in that** at least one between said loading gear (91) and said worm screw (92) is movable between an operating position, in which said loading gear (91) is uncoupled from said worm screw (92) and is directly actuatable in rotation around said second extension direction (X') in order to adjust the preload of said torsion spring (5), and a locking position, in which said loading gear (91) is coupled to said worm screw (92) and actuatable in rotation around said second extension direction (X') by means of said worm screw (92).

2. Device according to claim 1, **characterized in that** said loading gear (91) is arranged for being driven in rotation by said worm screw (92) in said loading direction with a reduction ratio comprised between 1/12 and 1/24.
3. Device according to claim 1 or 2, **characterized in that** said box (2) comprises a section (20) that is internally hollow and is extended between a first opening and a second opening, and at least one upper head (21) mechanically connected to said section (20) and placed to close said first opening; said loading means (9) being at least partially housed in said upper head (21).
4. Device according to any one of the preceding claims,

characterized in that said loading gear (91) is slidably mounted in said box (2) and is movable, along said second extension direction (X') between a lifted position, coinciding with said locking position, and a lowered position, coinciding with said operative position. 5

5. Device according to claim 4, **characterized in that** said loading gear (91) is mechanically connected to the second end (5") of said torsion spring (5) and forces said second end (5") to translate along said second extension direction (X') during its movement between said lifted position and said lowered position; 10
 said torsion spring (5) being driven during the movement of said loading gear (91) and exerting an elastic return force, proportional to the traction of said torsion spring (5) adapted to push said loading gear (91) from said lowered position to said lifted position. 15
6. Device according to any one of the preceding claims, **characterized in that** said box (2) comprises support means (8), placed within the housing volume (V) and side-by-side said take-up roller (3); 20
 said torsion spring (5) being at least partially wound on said support means (8) with said second end (5") integral with said support means (8). 25
7. Device according to claim 6, **characterized in that** said loading gear (91) is mechanically connected and integral in rotation with said support means (8). 30
8. Device according to any one of the preceding claims, **characterized in that** it comprises transmission means (6), interposed between said take-up roller (3) and the first end (5') of said torsion spring (5); 35
 said transmission means (6) comprising at least one first gear (61), integral in rotation with said take-up roller (3) around said first rotation axis (R), and at least one second gear (62), integral in rotation with the first end (5') of said torsion spring (5), around said second extension direction (X'). 40
9. Device according to claim 8, **characterized in that** said second gear (62) is provided with a through insertion hole, within which said loading gear (91) is at least slidably housed. 45

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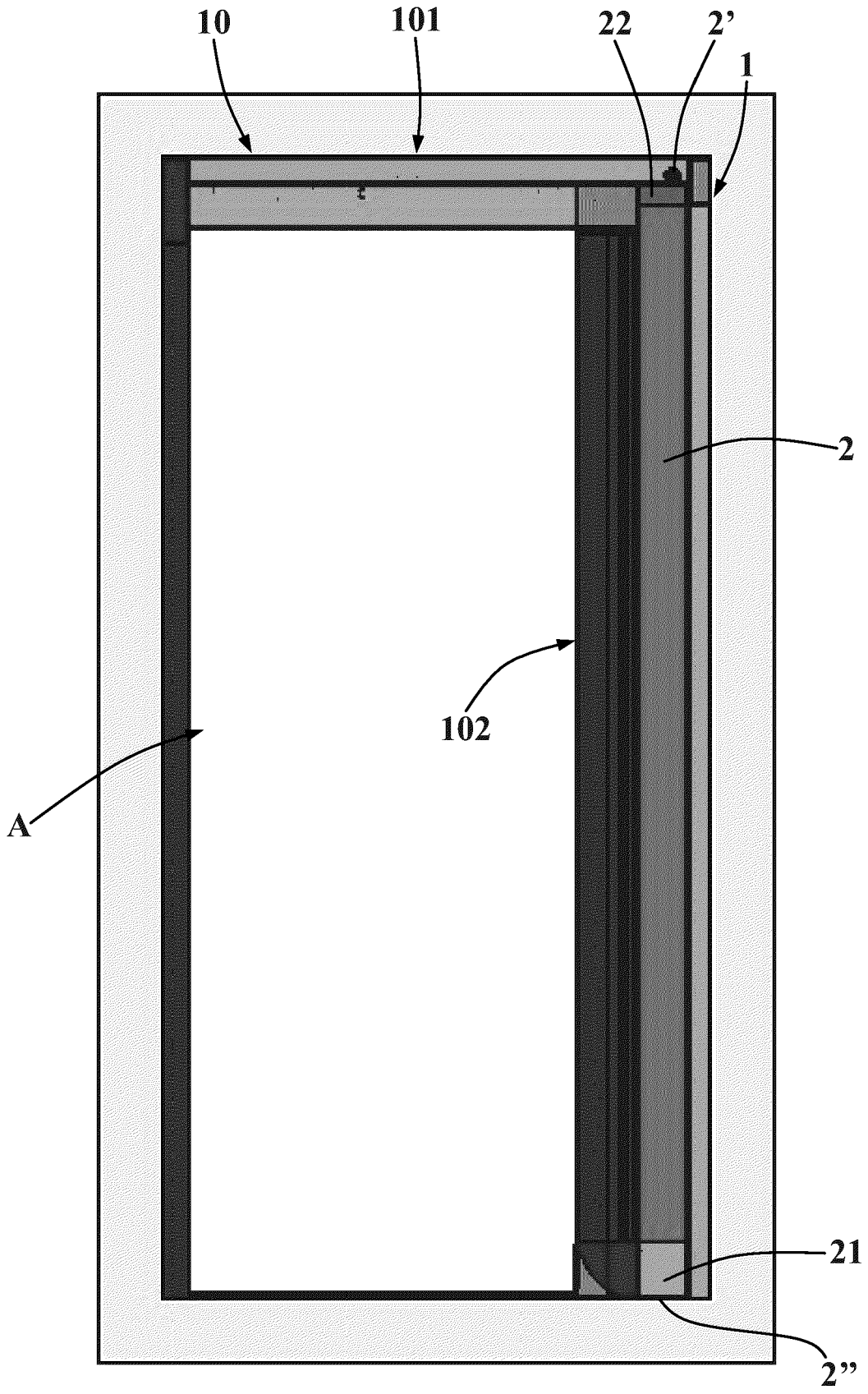


Fig. 1

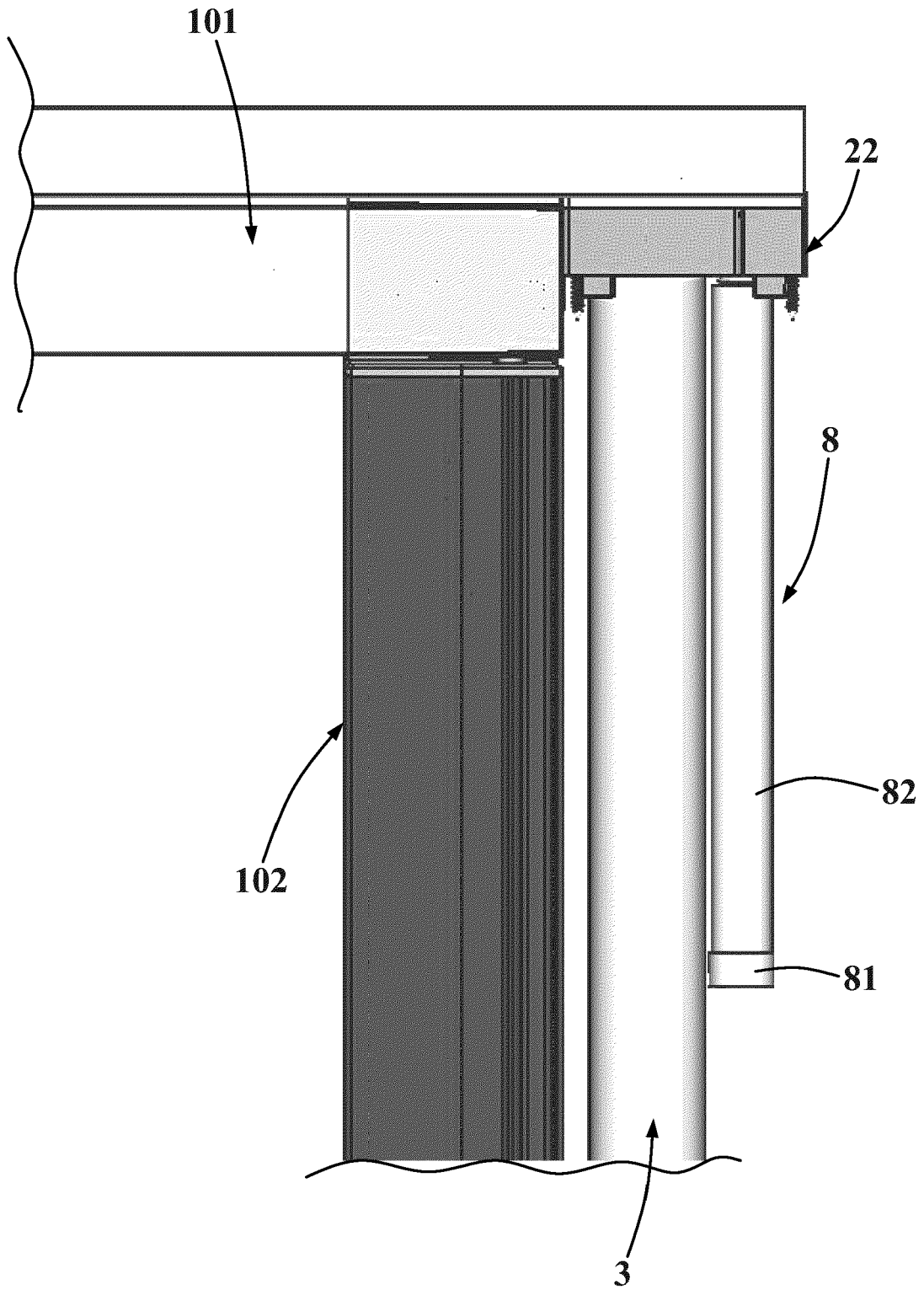


Fig. 2

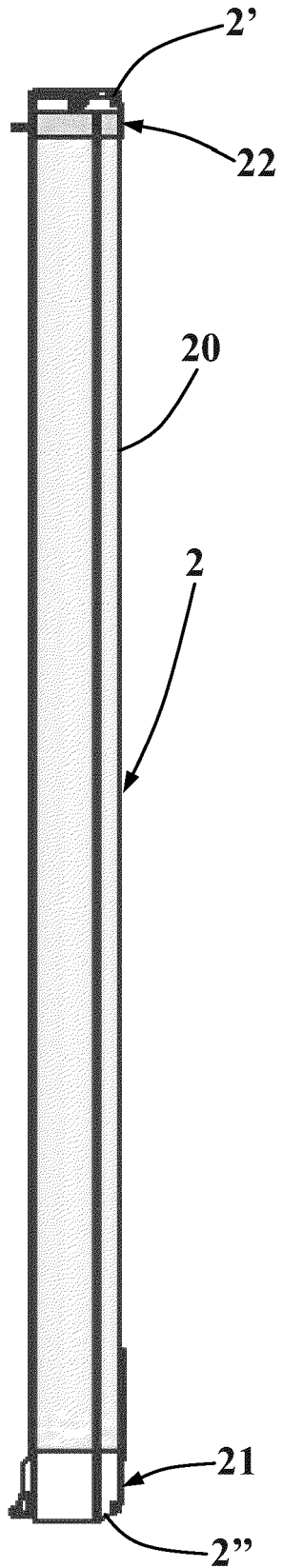


Fig. 3

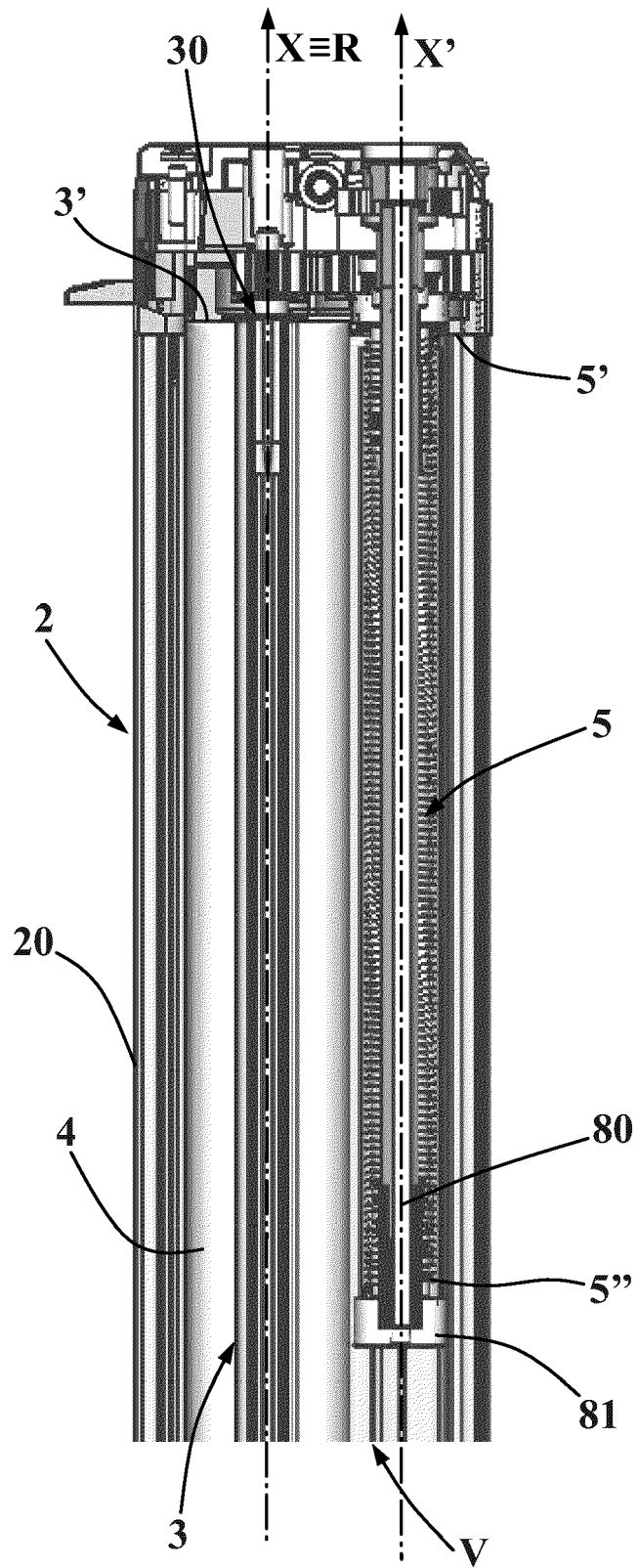


Fig. 4

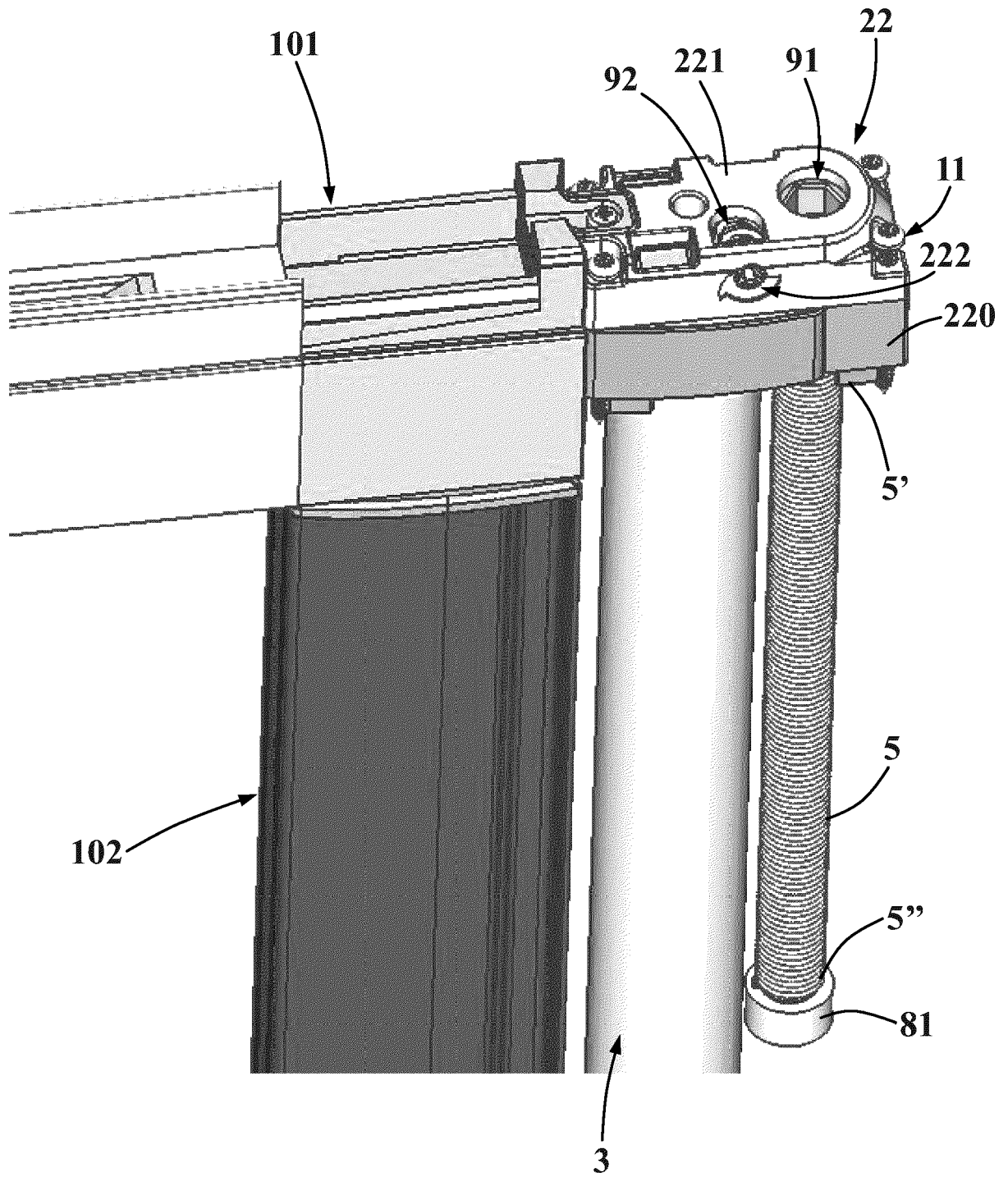


Fig. 5

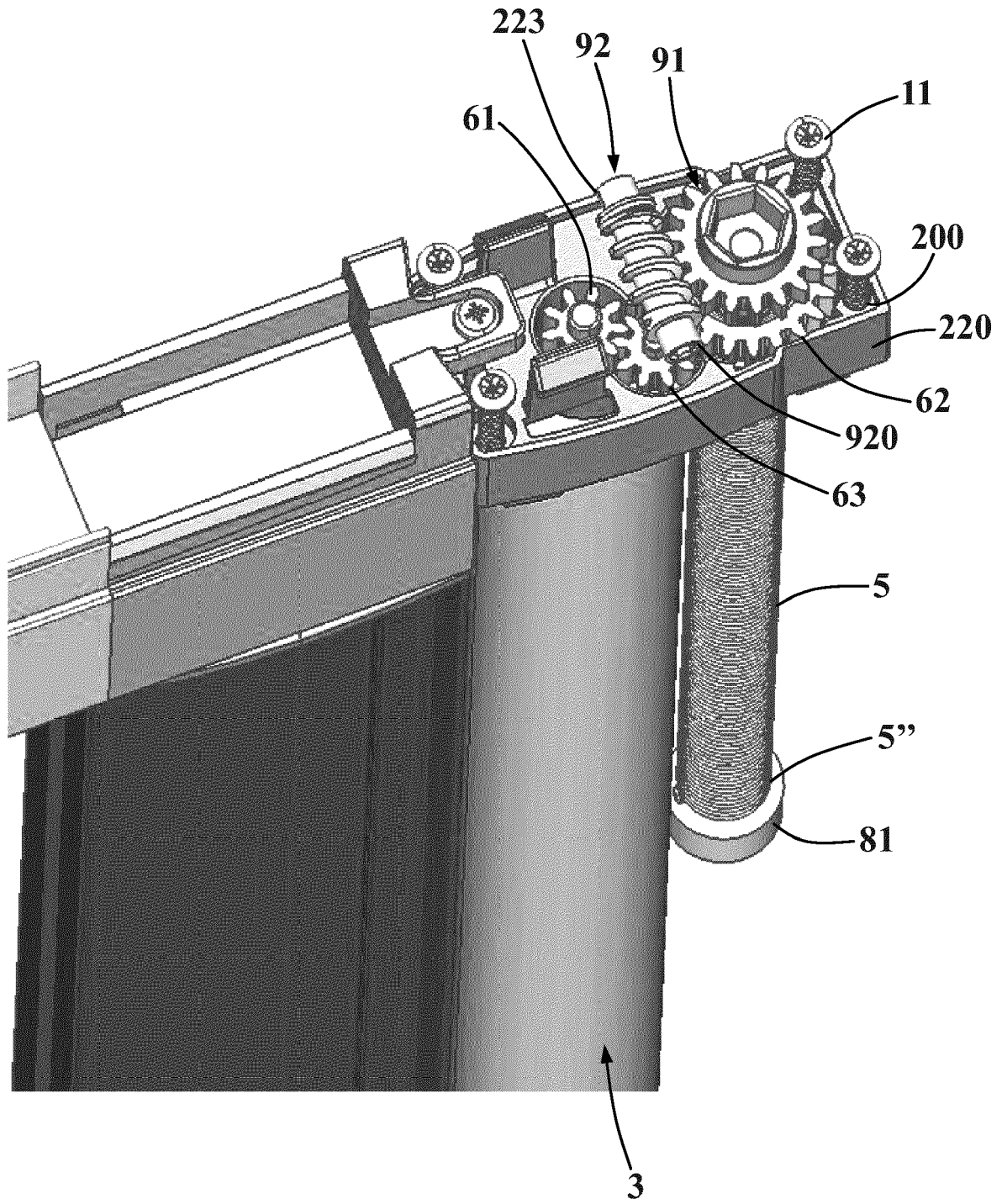


Fig. 6

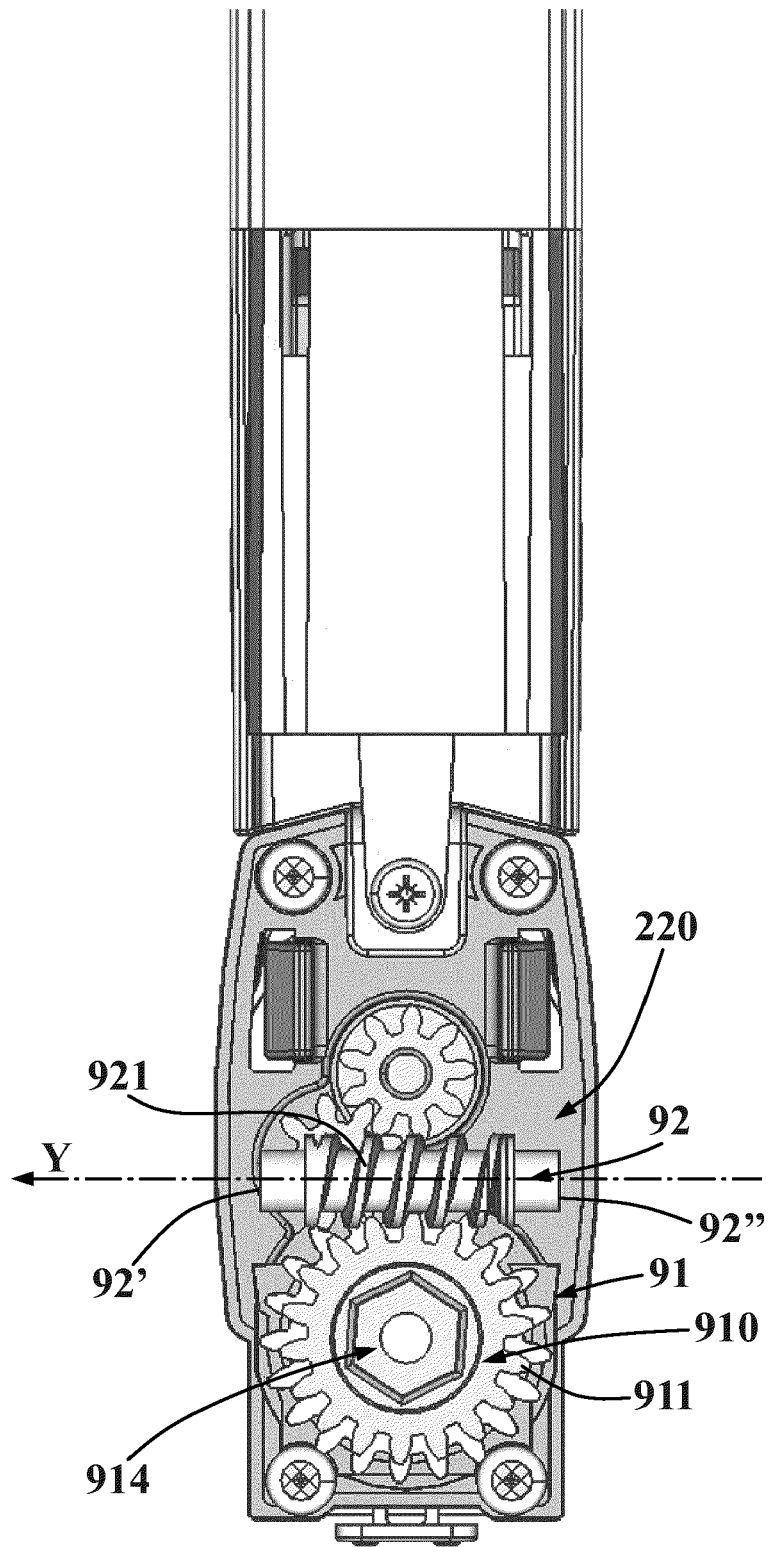


Fig. 7

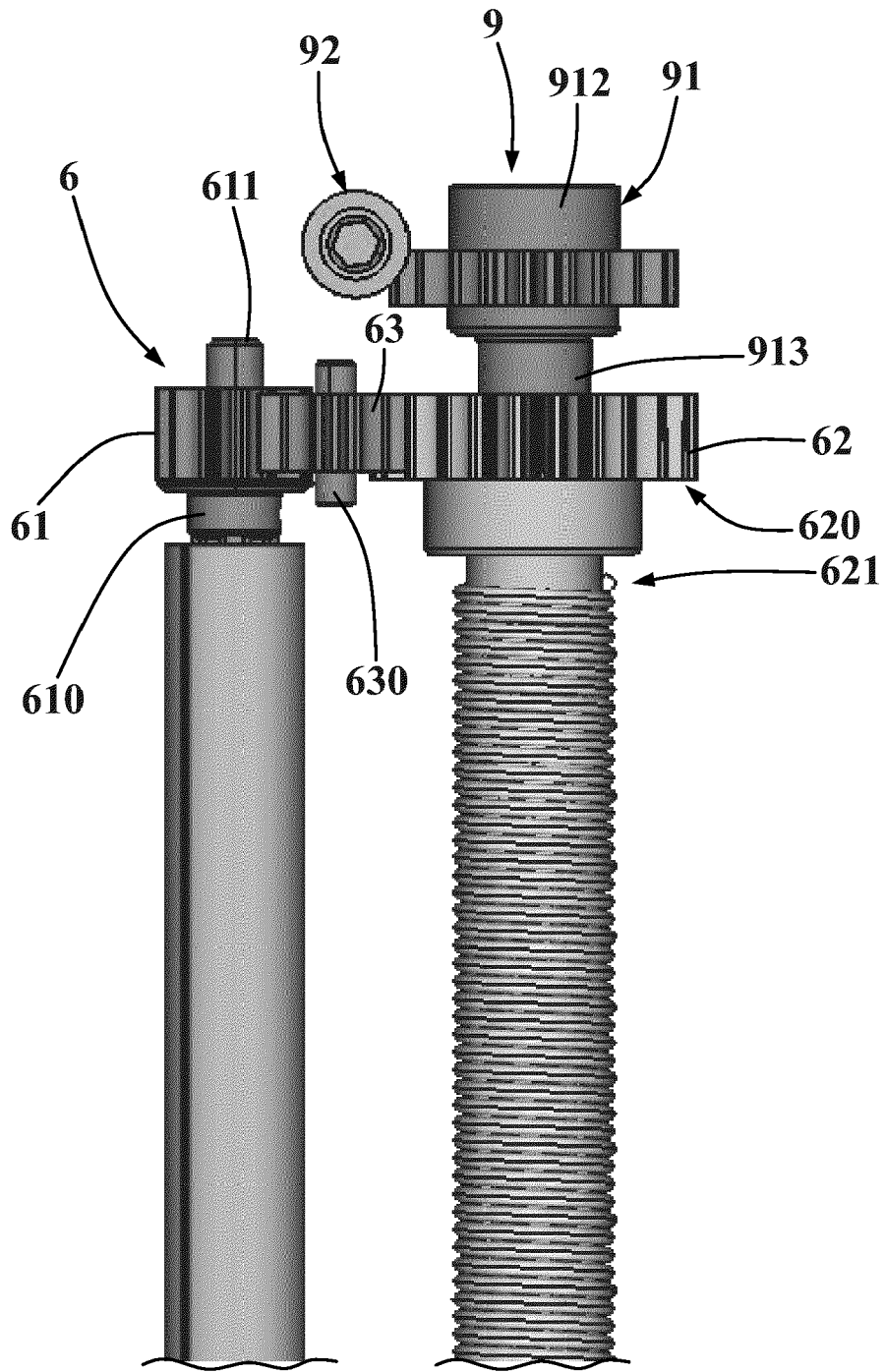


Fig. 8

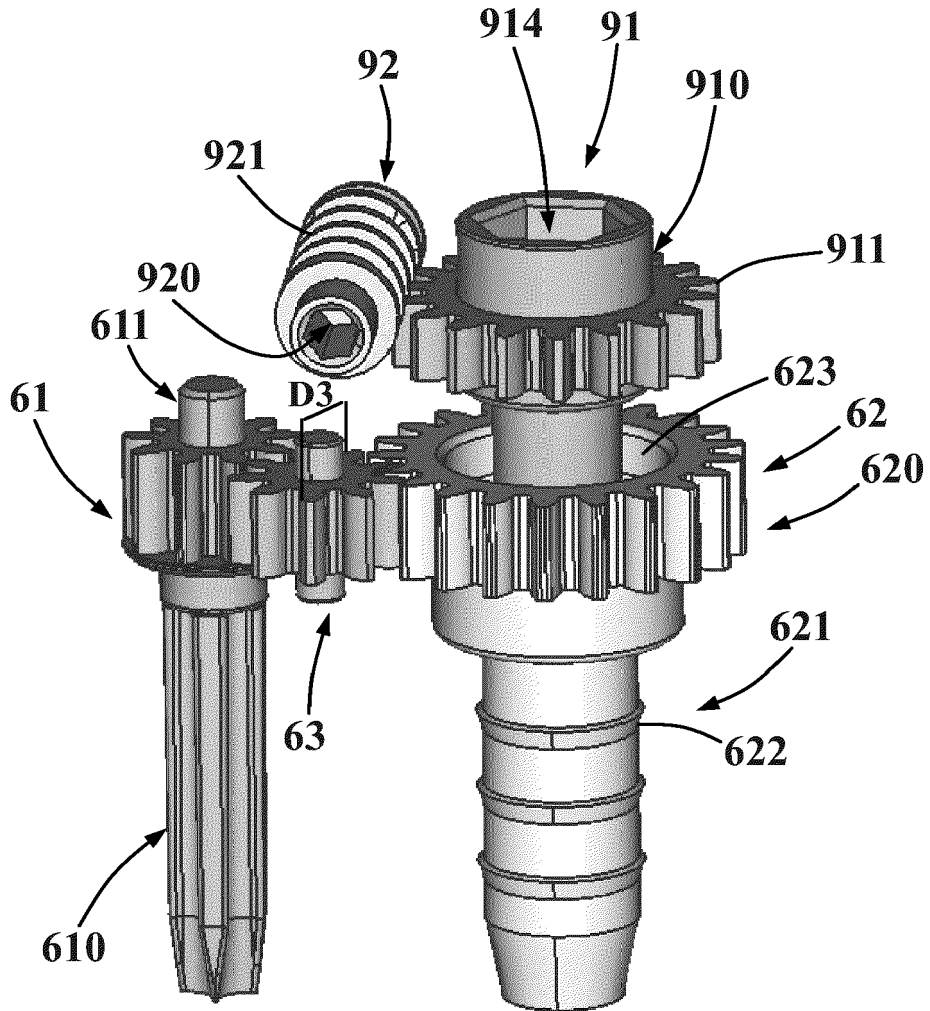


Fig. 9

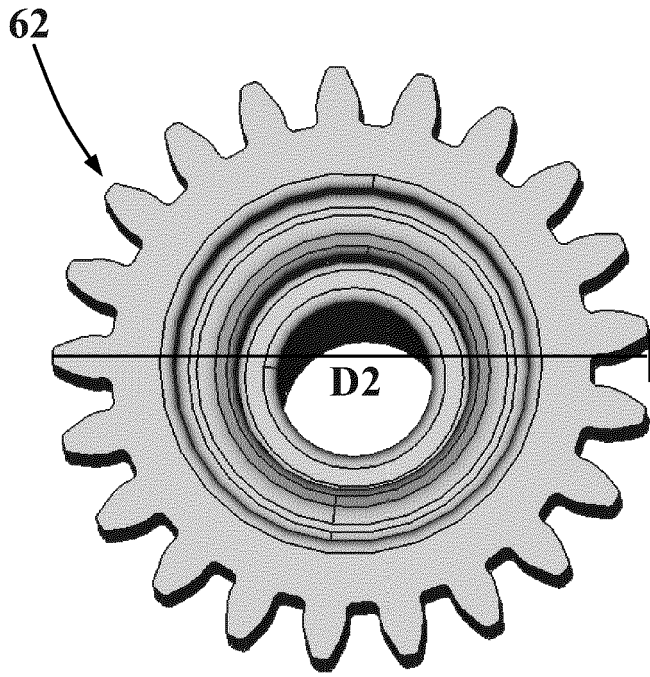


Fig. 10A

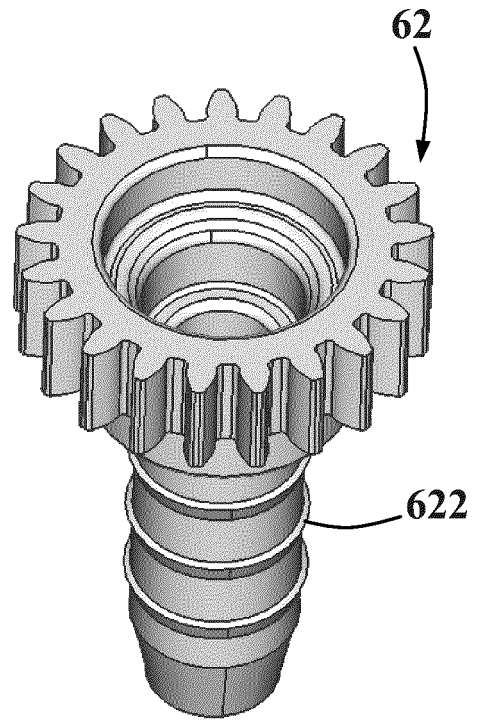


Fig. 10B

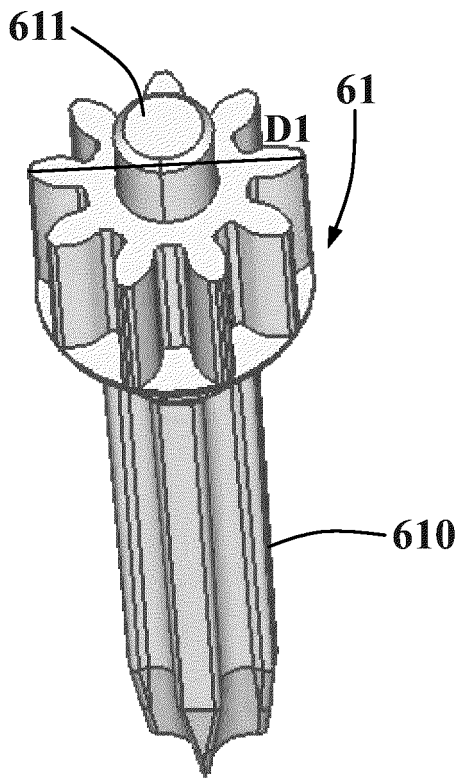


Fig. 11

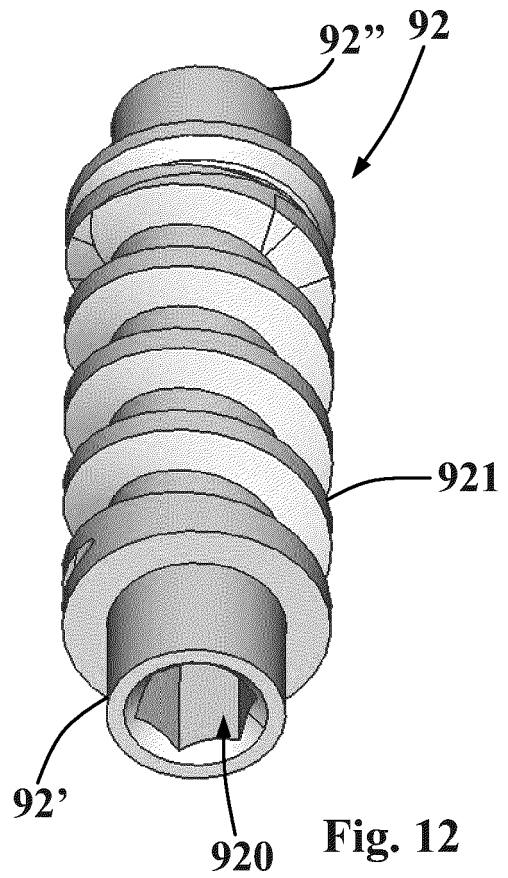


Fig. 12

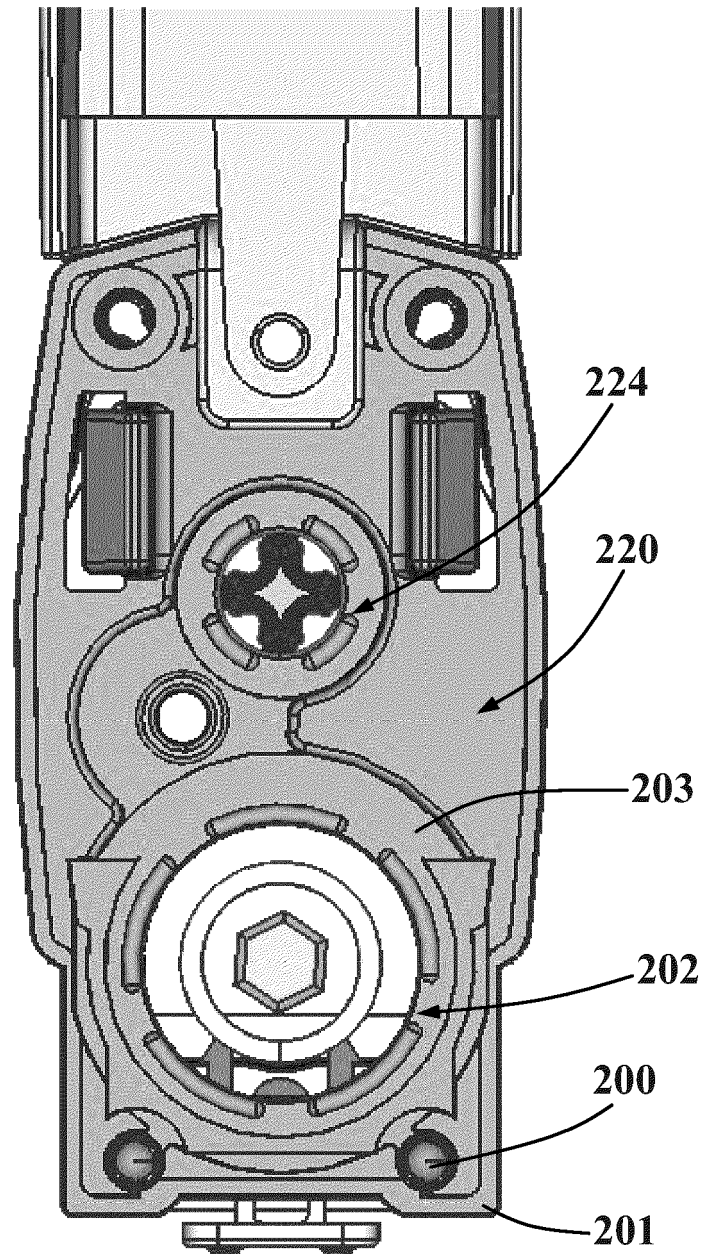


Fig. 13

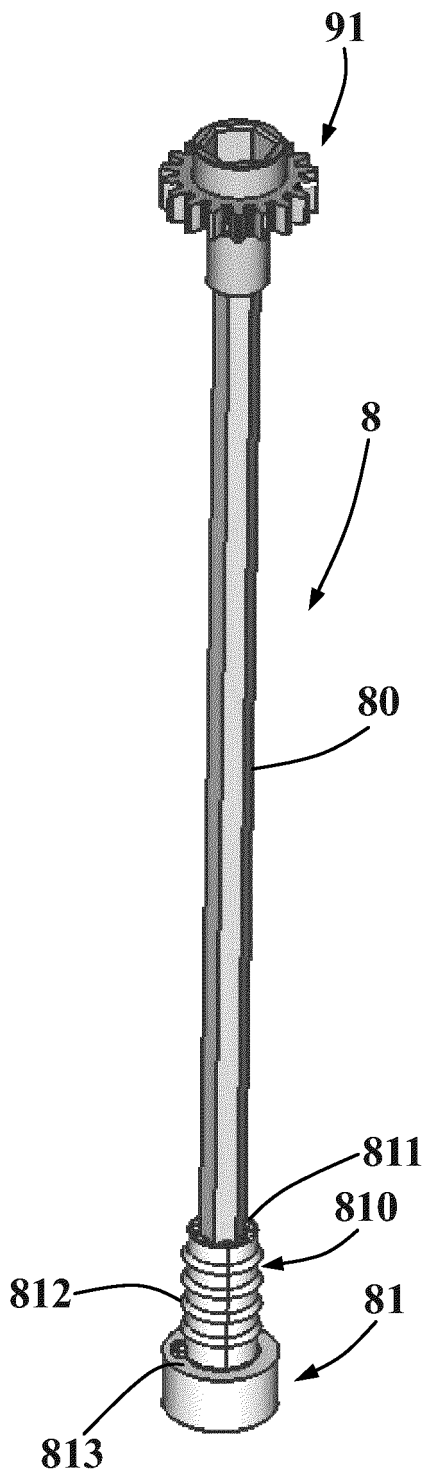


Fig. 14

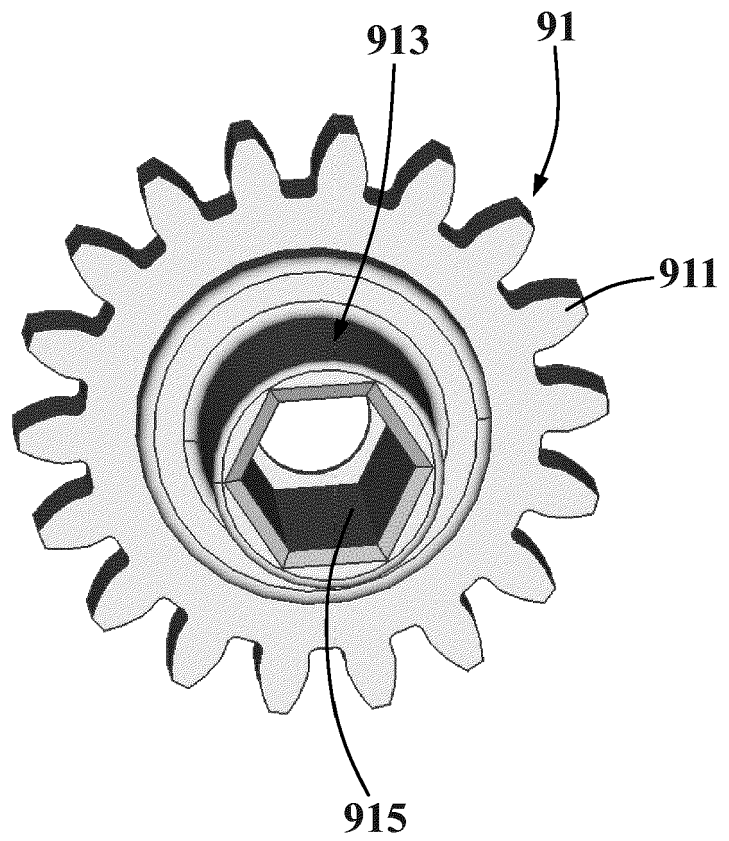


Fig. 15



EUROPEAN SEARCH REPORT

Application Number
EP 22 20 6344

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			TECHNICAL FIELDS SEARCHED (IPC)
			E06B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 January 2023	Examiner Bourgoin, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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26-01-2023

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