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

(11) **EP 4 180 612 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
17.05.2023 Bulletin 2023/20

(21) Application number: **22206339.8**

(22) Date of filing: **09.11.2022**

(51) International Patent Classification (IPC):
E06B 9/42 *(2006.01)* ***E06B 9/60*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
E06B 9/60; E06B 9/42

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **10.11.2021 IT 202100028622**

(71) Applicant: **Palagina S.r.l.**
50054 Fucecchio (FI) (IT)

(72) Inventors:
- **OSTUNI, Alessandro**
  50053 Empoli (IT)
- **MELANI, Marco**
  51100 Pistoia (PT) (IT)

(74) Representative: **Gallo, Luca et al**
Gallo & Partners S.r.l.
Via Rezzonico, 6
35131 Padova (IT)

(54) **FABRIC ROLLER DEVICE**

(57) Fabric roller device comprising a box (2), extended along a first extension direction (X) and defining at its own interior a housing volume (V), a take-up roller (3), which is rotatably supported within the housing volume (V) of the box (2), around a first rotation axis (R), and a windable sheet (4), susceptible of being wound around the take-up roller (3) and extended between a first edge, fixed to the take-up roller (3) and an opposite second edge.

The device also comprises at least one torsion spring (5) placed side-by-side the take-up roller (3), extended along a second extension direction (X'), substantially parallel to the first rotation axis (R), between a first end (5') and an opposite second end (5"), and 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 substantially prevented from rotating.

The device also comprises transmission means (6), placed to mechanically connect between the take-up roller (3) and the first end (5') of the torsion spring (5) and configured for twisting the torsion spring (5) around the second extension direction (X') following the rotation of the take-up roller (3) around the first rotation axis (R).

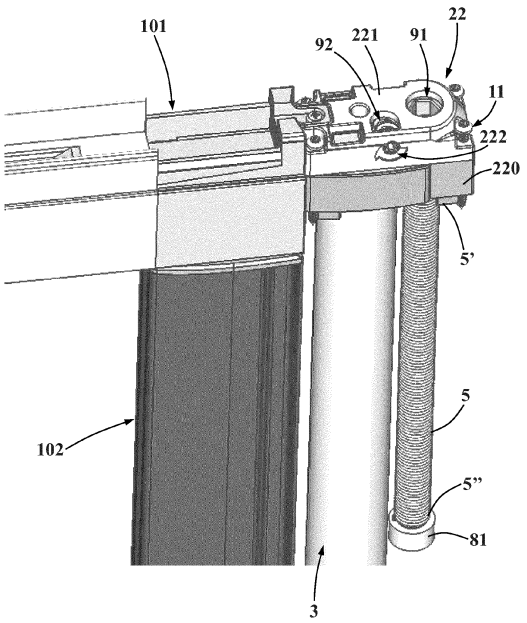

Fig. 5

EP 4 180 612 A1

Description

Field of application

[0001] The present invention 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 aforesaid fabric roller blind comprises a handle bar, which is extended orthogonal to the slide guide between two opposite lateral terminations, and is slidably associated with the latter such that it can be moved along the slide guide 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 second edge fixed to the handle bar 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 placed within the take-up roller, coaxially with the latter and mechanically connected such to be integral in rotation with the take-up roller itself.

[0010] In particular, the torsion spring and the take-up roller are mechanically connected to each other by means of a connection element, which allows rotating the torsion spring following the rotation of the take-up roller due to the movement of the handle bar between the closed position and the open position.

[0011] More in detail, the connection element determines a reduction ratio of 1:1 between take-up roller and torsion spring in a manner such that a revolution of the take-up roller exactly corresponds with a revolution of the aforesaid torsion spring.

[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 determine a large size along both directions orthogonal to the main extension direction of the box, in fact rendering the device and the blind on which the latter will come to be mounted unsuitable for being mounted on minimal doors/windows/shutters, hence provided with wall profiles with reduced size, or on doors/windows/shutters in which the space between the window and, for example the shutter, is reduced, rendering the blind aesthetically less pleasing, having a greater aesthetic impact.

[0014] A further drawback lies in the fact that such fabric roller devices require a large size of the take-up roller so as to prevent increasing the number of revolutions required for completely unwinding the sheet. Indeed this would considerably increase the force required by the user in order to unroll the sheet against the action of the torsion spring.

[0015] In addition, the force to be applied for unrolling the sheet increases progressively as the handle bar is moved between the open position and the closed position, rendering the aforesaid problem even more difficult and rendering the fabric roller device of known type inconvenient during its normal use.

[0016] In order to at least partly overcome such drawbacks, fabric roller devices were developed in which the spring is placed outside the take-up roller on which the sheet is wound.

[0017] Known for example from the document US 294414 is a device provided with a take-up roller and with a leaf spring, which is mounted on a toothed wheel and is provided with a first end, fixed to a fixed support frame of the device, and with a second end integral with the toothed wheel which is in turn rotatably connected to a pinion fixed to the shaft of the take-up roller. Finally, devices are also known, for example from documents WO 9817888, JPH 0972174 and JPH 05163880, which comprise a take-up roller and a helical torsion spring placed side-by-side the take-up roller. Such abovementioned devices comprise loading means of thread and reel type, and in particular comprise a first winding reel mounted on one end of the take-up roller, a second winding reel mounted on one end of the torsion spring, and a wire or cable which is provided with a first end fixed to the first

reel and a second end fixed to the second reel, such that when the sheet is unwound from the take-up roller, the thread is wound on the first reel and unwound from the second reel in order to load the torsion spring, and when the force of the torsion spring brings the sheet to be rewound, the thread is unwound from the first reel and wound on the second reel.

[0018] Also the abovementioned devices of known type have in practice shown that they do not lack drawbacks. In particular, also such fabric roller devices determine large size, in particular in the event in which a high elastic return force is required for the torsion spring.

[0019] A further drawback lies in the fact that such devices have loading means with reduction ratios unsuitable for ensuring an appropriate elastic return force. Finally, such devices of known type have proven insufficiently structurally sound, subjected to frequent wear or breakage of the loading means.

Presentation of the invention

[0020] In this situation, the problem underlying the present invention is to provide a fabric roller device which allows reducing the size.

[0021] A further object of the present invention is to provide a fabric roller device which is suitable for being mounted in blinds, and hence on doors/windows/shutters, with reduced thickness. Another object of the present invention is to provide a fabric roller device which is quick to unload and load even on site.

[0022] Another object of the present invention is to provide a fabric roller device, which is structurally simple and inexpensive to attain and install.

[0023] 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

[0024] The technical characteristics of the invention, according to the aforesaid objects, are clearly found in the contents of the below-reported claims and the advantages thereof will be more evident in the following 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

[0025] With reference to the enclosed drawings, reference number 1 overall indicates the fabric roller device, object of the present invention.

[0026] The device 1 is advantageously mountable on a support structure 10 of a blind, and such support structure 10 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.

[0027] 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 lift-sliding or translating windows or in the case of French windows of large size).

[0028] 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 10 of a blind with horizontal sliding, it being intended nevertheless that the characteristics described below can be applied analogously to a blind with vertical sliding.

[0029] 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".

[0030] 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.

[0031] 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.

[0032] 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.

[0033] 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 101.

[0034] 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.

[0035] 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 fixing holes 200 are extended parallel to the first extension direction X and are made at a perimeter edge 201 of the section 20.

[0036] 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 X, and are aligned with the first fixing holes 200 made on the section 20. The box 2 advantageously comprises fixing means 11, such as for example screws, placed to traverse the first 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.

[0037] The device 1 also comprises a windable sheet 4, susceptible of being wound around 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.

[0038] 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.

[0039] 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.

[0040] The device 1 comprises at least one torsion spring 5 placed side-by-side the take-up roller 3, extended along a second extension direction X', substantially parallel to the first rotation axis R, between a first end 5' and an opposite second end 5".

[0041] The torsion spring 5 is 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.

[0042] 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 the rotation thereof, 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.

[0043] 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.

[0044] 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 con-

trary, 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.

[0045] 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.

[0046] 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.

[0047] The device 1 also comprises transmission means 6, placed to mechanically connect between the take-up roller 3 and the first end 5' of the torsion spring 5 and configured for twisting the torsion spring 5 around the second extension direction X' following the rotation of the take-up roller 3 around the first rotation axis R.

[0048] 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 22 of the box 2. Advantageously the box 2 comprises support means 8, placed within the housing volume V and side-by-side the take-up roller 3.

[0049] Advantageously the support means 8 are rotatably mounted on the section 20 of the box 2. The torsion spring 5 is advantageously at least partially wound on the support means 8 with the second end 5" thereof integral with the aforesaid support means 8.

[0050] 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.

[0051] 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.

[0052] 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.

[0053] 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".

[0054] 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.

[0055] 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.

[0056] 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.

[0057] 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 portion 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.

[0058] 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.

[0059] Preferably the abutment portion 813 is made integrally with the retention portion 810.

[0060] 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'.

[0061] 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.

[0062] 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.

[0063] 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.

[0064] In accordance with the idea underlying present invention, the transmission means 6 comprise 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'.

[0065] Advantageously, 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 D1 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.

[0066] In addition, the transmission means 6 comprise at least one third gear 63, interposed between the first gear 61 and the second gear 62 in order to rotate the second gear 62 around the second extension direction X' on the basis of the rotation of the first gear 61 around the first rotation axis R.

[0067] Advantageously, the third gear 63 is provided with a third external diameter D3 smaller than the first external diameter D 1.

[0068] 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 and hence of the entire device 1.

[0069] 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.

[0070] 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.

[0071] Advantageously 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 above the main body 220 and defining the upper end 2' of the box 2.

[0072] Advantageously the main body 220 is provided with two retention tabs, which are projectingly extended, towards the closure body 221, along a direction substantially parallel to the first extension direction X and are substantially L-shaped.

[0073] 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.

[0074] 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.

[0075] 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.

[0076] 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 insertion 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 first 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'.

[0077] The stem portion 621 of the second gear 62 is advantageously provided with a housing hole within which the support means 8 are at least partially housed, free to rotate within the aforesaid housing hole. Preferably the aforesaid housing hole is through and is also extended along the actuation portion 620, for the entire extension of the second gear 62. 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.

[0078] 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.

[0079] More in detail, each engagement protuberance 622 is extended tapered, towards the lower head 21, between a retention edge, which defines an abutment surface adapted to cooperate with the torsion spring 5, and an opposite connector edge.

[0080] 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.

[0081] 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 61 is at least partially housed. More in detail, the first housing seat 202 is provided with a second bottom wall, which defines the aforesaid second 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.

[0082] 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 61 abuts against the second abutment lip, allows the reduction of the friction between the second gear 61 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.

[0083] Advantageously the device 1 comprises loading means 9, in order to adjust the tension of the torsion spring 5, comprising a loading gear 91, mechanically connected to the support means 8 and integral in rotation with the latter.

[0084] More in detail, the loading gear 91 is advantageously housed within the upper head 22, and in particular within the closure body 221, and is placed at the second gear 62, preferably aligned with the latter along a direction substantially parallel to the second extension direction X'. The loading gear 91 is provided with an actuation portion 910, provided with an adjustment opening 914, directed towards the upper end 2' of the box 2.

[0085] 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 actuation portion 910 is obtained, and a second stem 913, on which an opposite constraining opening 915 is obtained, directed towards the second gear 62.

[0086] 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.

[0087] 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'.

[0088] In addition, the aforesaid 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 with the loading gear 91.

[0089] In particular, 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. Advantageously between the adjustment opening 914 and the constraining opening 915, an abutment wall is placed against which the elongated pin 80 is susceptible of abutting, in order to allow the constant upward thrust of the loading gear 91.

[0090] Advantageously, the second stem 913 is inserted within the through insertion hole 623 of the stem portion 621 of the second gear 62. Preferably, the second stem 913 of the loading gear 91 is provided with a narrow 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 hence allowing the loading gear 91 to freely rotate with respect to the second gear 62.

[0091] The loading gear 91 is advantageously actuatable by a user in order to rotate the support means 8, and the second end 5" of the torsion spring 5 integral therewith, around the second extension direction X' in a loading direction and adjust the preloading of the torsion spring 5. More in detail, by means of the loading gear 91 it is possible to rotate the second end 5" of the torsion spring 5 with respect to the first end 5' of the same torsion spring 5 since the latter is released from the loading gear 91.

[0092] Advantageously the loading gear 91 is provided with a fourth external diameter D4 which is close to the second external diameter D2 of the second gear 62.

[0093] Advantageously the loading means 9 comprise a worm screw 92, rotatably mounted in the box 2, mechanically connected to the loading gear 91. The worm screw 92 is advantageously actuatable by a user in order to rotate the loading gear 91 in the loading direction and is configured for preventing the rotation of the loading gear 91 in a direction opposite the loading direction fol-

lowing the adjustment of the preloading of the torsion spring 5.

[0094] The worm screw 92 is advantageously housed within the closure body 221 of the upper head 22 and is preferably extended along a third extension direction Y, substantially orthogonal to the first extension direction X.

[0095] Advantageously the worm screw 92 is extended along the aforesaid third extension direction Y, between a first end and a second end, preferably for the entire width of the closure body 221.

[0096] More in detail, the closure body 221 is extended between a front face and an opposite rear face and is advantageously provided with a first actuation opening 222 on the front face and preferably with a second actuation opening 223 on the rear face. The worm screw 92 is extended preferably aligned with the first and with the second actuation opening 222, 223 and is, in a per se known manner, provided with respective actuation cavities 920, preferably with hexagonal shape, made at the opposite ends of the worm screw 92 and each of which is placed at an actuation opening 222, 223, in order to allow the actuation of the worm screw 92, for example by means of an Allen wrench.

[0097] 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.

[0098] 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 can be engaged 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.

[0099] In particular, through the worm screw 92 it is possible to rotate the loading gear 91, actually adjusting the preload of the torsion spring 5. The worm screw 92 therefore allows adjusting, in a more precise manner, the aforesaid preload of the torsion spring 5 since one revolution of the worm screw 92 corresponds with a revolution portion of the loading gear 91. Advantageously the loading gear 91 is movable between a locking position, in which it is coupled to the worm screw 92 in order to prevent the rotation of the support means 8 around the second extension direction X', and an operative position in which the loading gear 91 is uncoupled from the worm screw 92 and actuatable in rotation around the second extension direction X' in order to adjust the preloading of the torsion spring 5.

[0100] Advantageously, with the loading gear 91 in the operative position, the latter can be actuated in rotation around the second extension direction X' both in the loading direction, in order to allow the loading of the torsion spring 5, both in a discharge direction, opposite that of loading, in order to allow discharging the torsion spring 5 itself.

[0101] Advantageously the loading gear 91 is movable along the second extension direction X' between a lifted position, in which is coupled to the worm screw 92, and a lowered position, in which it is uncoupled from the worm screw 92 itself. Preferably the aforesaid movement of the loading gear 91 is obtained by means of the sliding of the latter and of the elongated pin 80 within the housing hole of the stem portion 621 of the second gear 62.

[0102] 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'.

[0103] In operation, in the event in which the external toothing 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 toothing 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.

[0104] In this manner the elongated pin 80 and the constraining element 81 are moved along the aforesaid second extension direction X', against the elastic action of the torsion spring 5 since the first end 5' of the latter is integral with the second gear 62 while the second end 5" of the torsion spring 5, being wound on the constraining element 81 is moved downward, forcing the torsion spring 5 to be elongated and causing a return force by the latter on the loading gear 91 such to allow its return from the lowered position to the lifted position.

[0105] 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 even in the case of maximum load supportable by the torsion spring 5.

[0106] Of course, without departing from the protective scope of the present invention, it is also possible that the constraining element 81 be slidable along the elongated pin 80, allowing the free movement of the elongated pin 80 with respect to the constraining element 81 when the loading gear 91 is moved between the lifted position and the lowered position.

[0107] Such configuration in which the constraining element 81 is slidable along the elongated pin 80 also allows facilitating possible elongations and shortenings of the torsion spring 5 following the twisting thereof, as mentioned above.

[0108] 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 operative position.

[0109] 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.

[0110] 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), and
- 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) placed side-by-side said take-up roller (3), extended along a second extension direction (X'), substantially parallel to said first rotation axis (R), between a first end (5') and an opposite second end (5"), and mechanically connected to said box (2) with said first end (5') free to rotate around said second extension direction (Y) and with said second end (5") constrained to said rolling-shutter support box (2) and substantially selectively prevented from rotating;
- transmission means (6), placed to mechanically connect between said take-up roller (3) and the first end (5') of said torsion spring (5) and configured for twisting said torsion spring (5) around said second extension direction (X') following the rotation of said take-up roller (3) around said first rotation axis (R);

said device being **characterized in that** said transmission means (6) comprise:

- at least one first gear (61), integral in rotation with said take-up roller (3) around said first rotation axis (R),
- 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'); and
- at least one third gear (63), interposed between said first gear (61) and said second gear (62) in order to rotate said second gear (62) around said second extension direction (X') on the basis of the rotation of said first gear (61) around said first rotation axis (R).

2. Device according to claim 1, **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);
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).

3. Device according to claim 2, **characterized in that** said support means (8) comprise at least one elongated pin (80), mechanically connected to a section (20) of said box (2), and a constraining element (81), mounted on said elongated pin (80) and integral in rotation with the latter;
said constraining element (81) comprising an elongated retention portion (810), which is extended parallel to the second extension direction (X') and on which the second end (5") of said torsion spring (5) is at least partially wound.

4. Device according to claim 3, **characterized in that** said support means (8) comprise a containment body (82), which at least partially houses at its interior said torsion spring (5), said elongated pin (80) and at least the retention portion (810) of said constraining element (81).

5. Device according to any one of the preceding claims, **characterized in that** said take-up roller (3) comprises, at a first end (3') thereof, an insertion seat (30) and said first gear (61) comprises a connection stem (610), with prismatic shape, inserted in said insertion seat (30) in order to render said take-up roller (3) and said first gear (61) integral in rotation.

6. Device according to any one of the preceding claims, **characterized in that** said second gear (62) is provided with a stem portion (621), provided with a housing hole within which said support element (8) is at least partially housed, which is free to rotate within said housing hole;
said spring (5) being mechanically connected to said second gear (62) fit with its upper end (5') on the stem portion (621) of said second gear (62).

7. Device according to claim 6, **characterized in that** said 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 said torsion spring (5).

8. Device according to any one of the preceding claims, **characterized in that** said box (2) is provided with at least one first housing seat (200), defining a shoulder (201), and said second gear (62) is at least partially housed in said first housing seat (200), in abutment against said shoulder (201).

9. Device according to any one of the preceding claims, **characterized in that** said box (2) comprises a containment body (20) and said support means (8) are rotatably mounted on said containment body (20);
said device (1) comprising loading means (9), in order to adjust the tension of said torsion spring (5), comprising a loading gear (91), mechanically connected to said support means (8) and integral in rotation with the latter, said loading gear (91) being actuatable by a user in order to rotate said support means (8) and the second end (5") of said torsion spring (5) integral therewith around said second extension direction (X') in a loading direction and to adjust the preloading of said torsion spring (5).

10. Device according to claim 9, **characterized in that** said loading means (9) comprise a worm screw (92), rotatably mounted in said box (2), mechanically connected to said loading gear (91);
said worm screw (92) being actuatable by a user in order to rotate said loading gear (91) in said loading direction and being configured for preventing the rotation of said loading gear (91) in a direction opposite said loading direction following the preloading adjustment of said torsion spring (5).

11. Device according to claim 10, **characterized in that** said loading gear (91) is movable between a locking position, in which said loading gear (91) is coupled to said worm screw (92) in order to prevent the rotation of said support means (8) around said second extension direction (X'), and an operative position in which said loading gear (91) is uncoupled from said worm screw (92) and actuatable in rotation around said second extension direction (X') in order to adjust the preloading of said torsion spring (5).

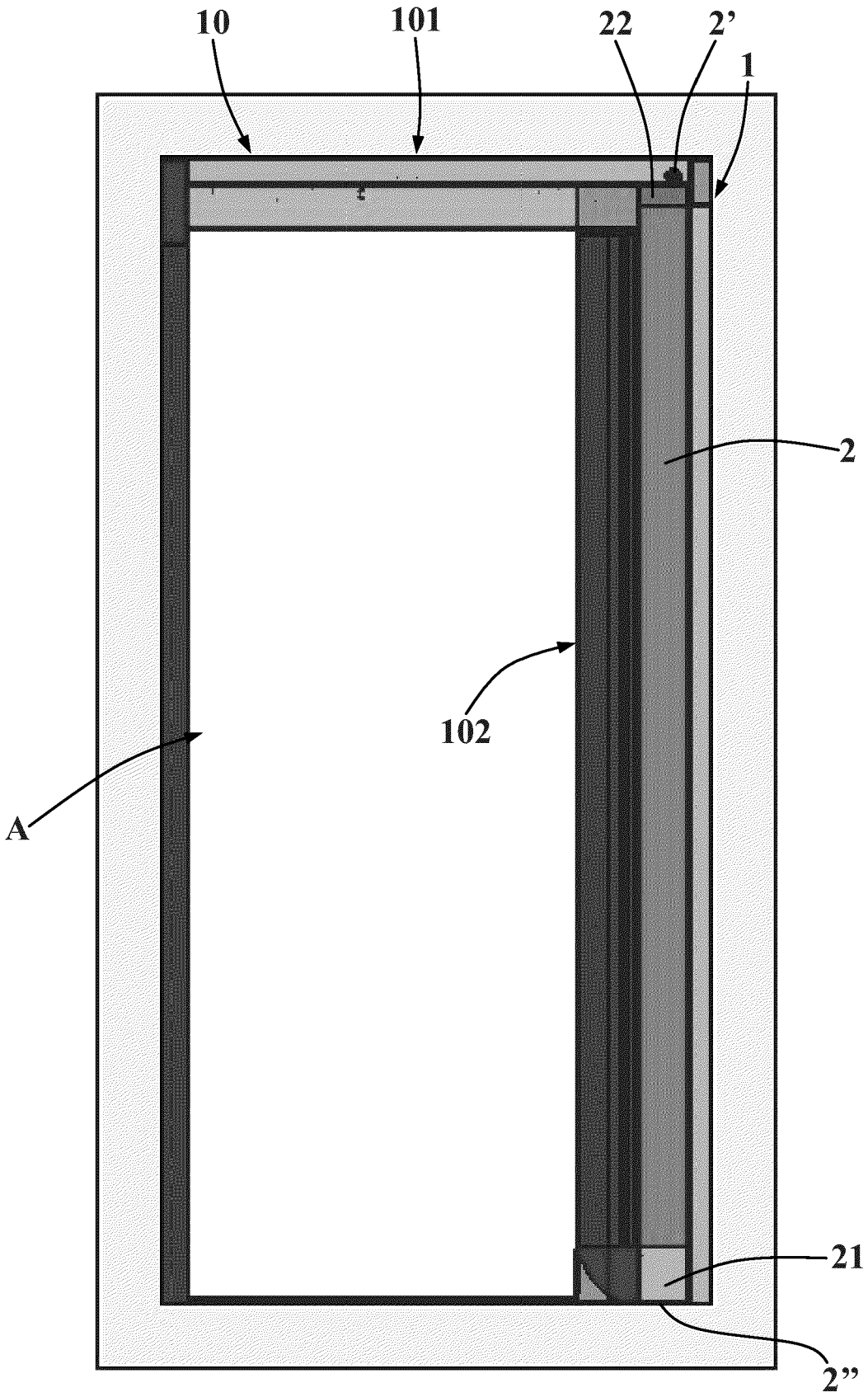

Fig. 1

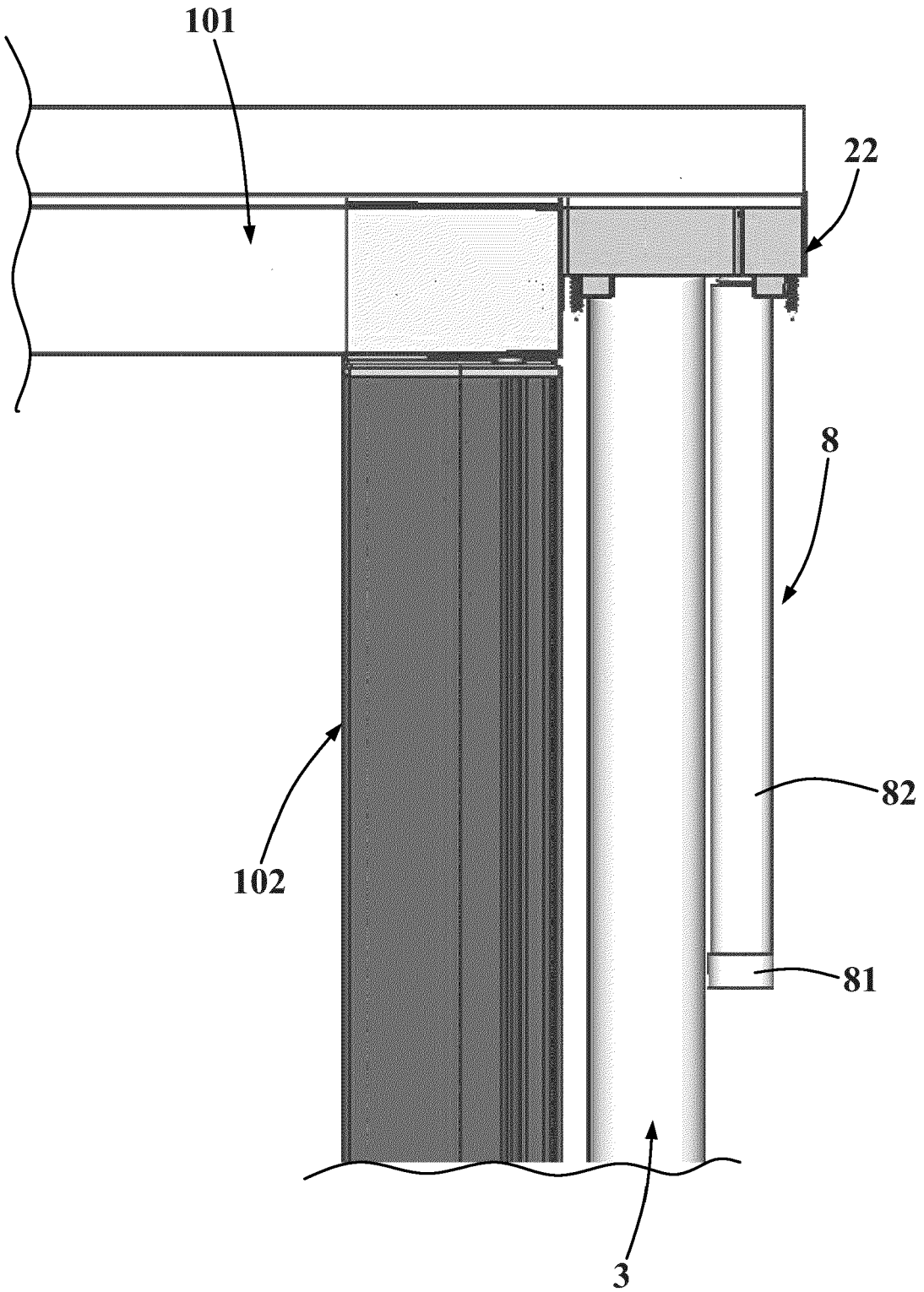

Fig. 2

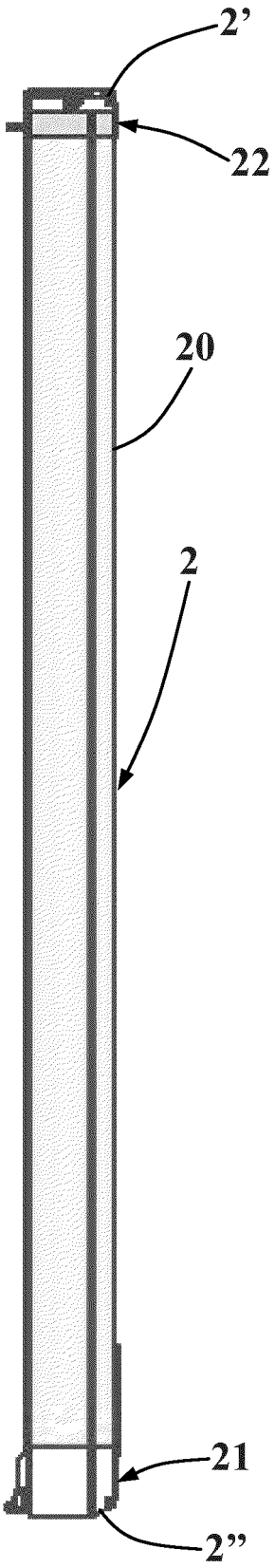

Fig. 3

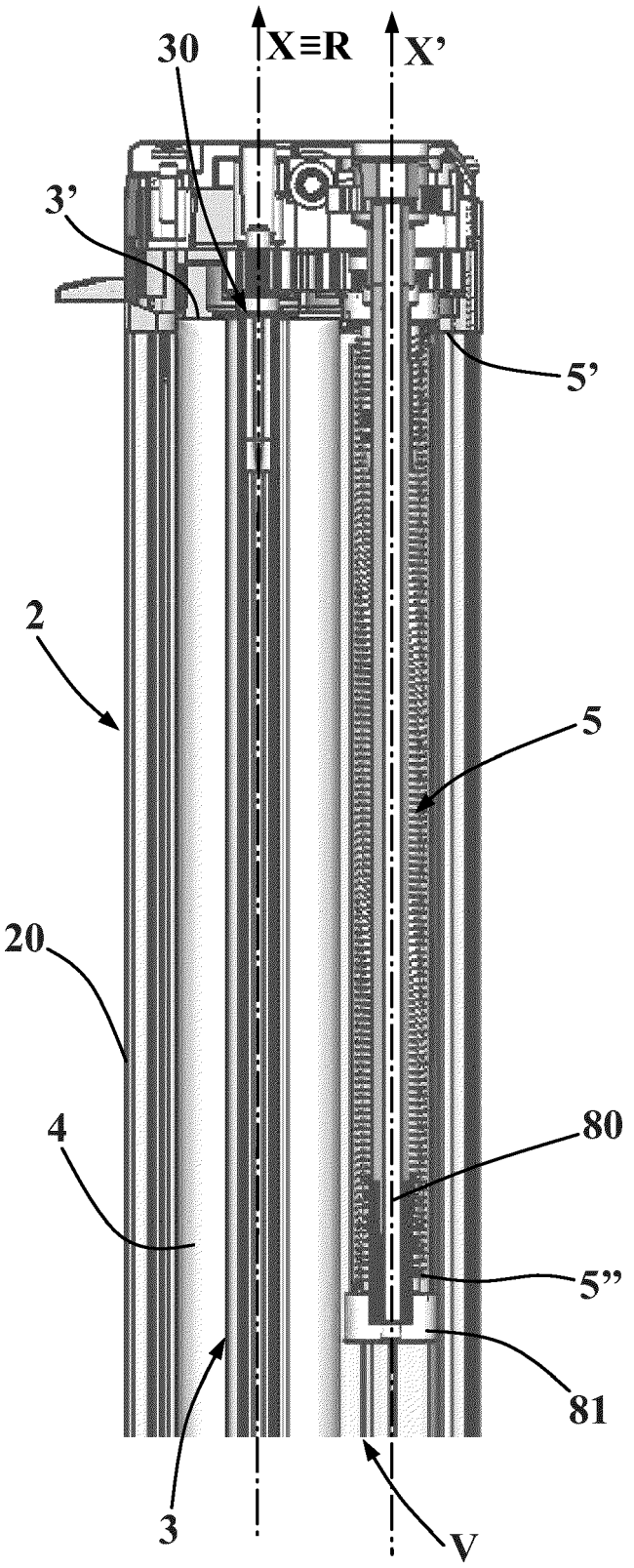

Fig. 4

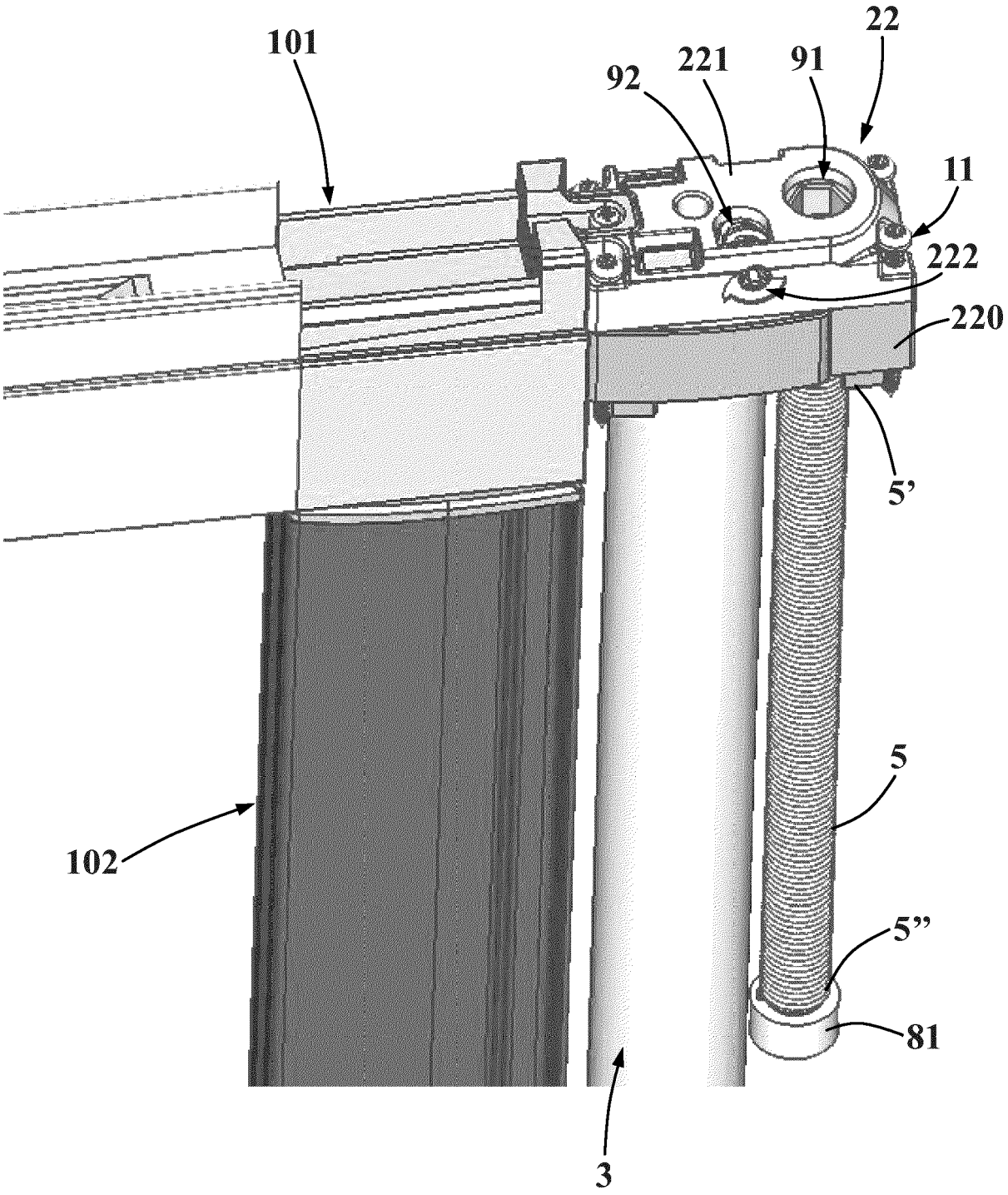

Fig. 5

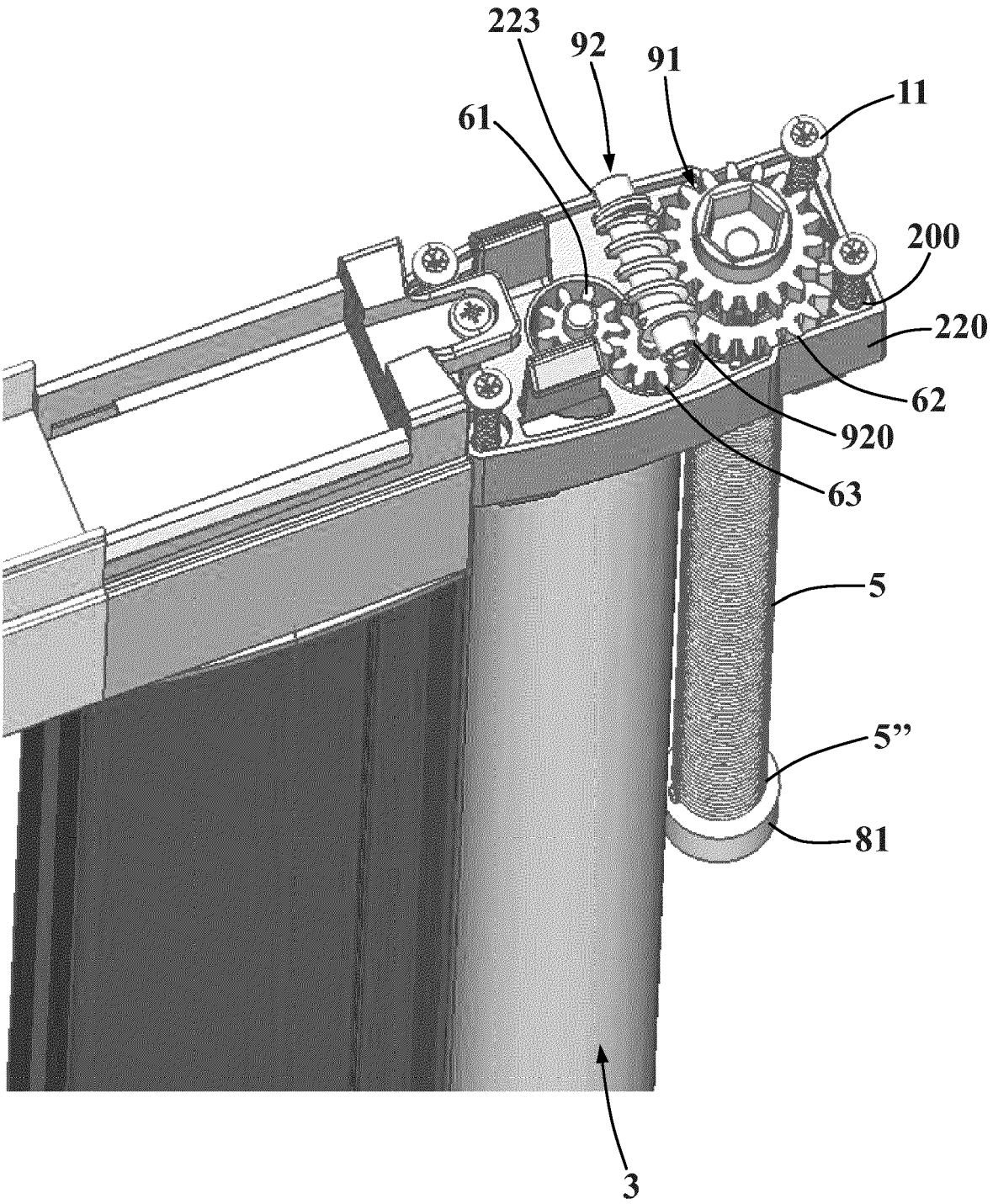

Fig. 6

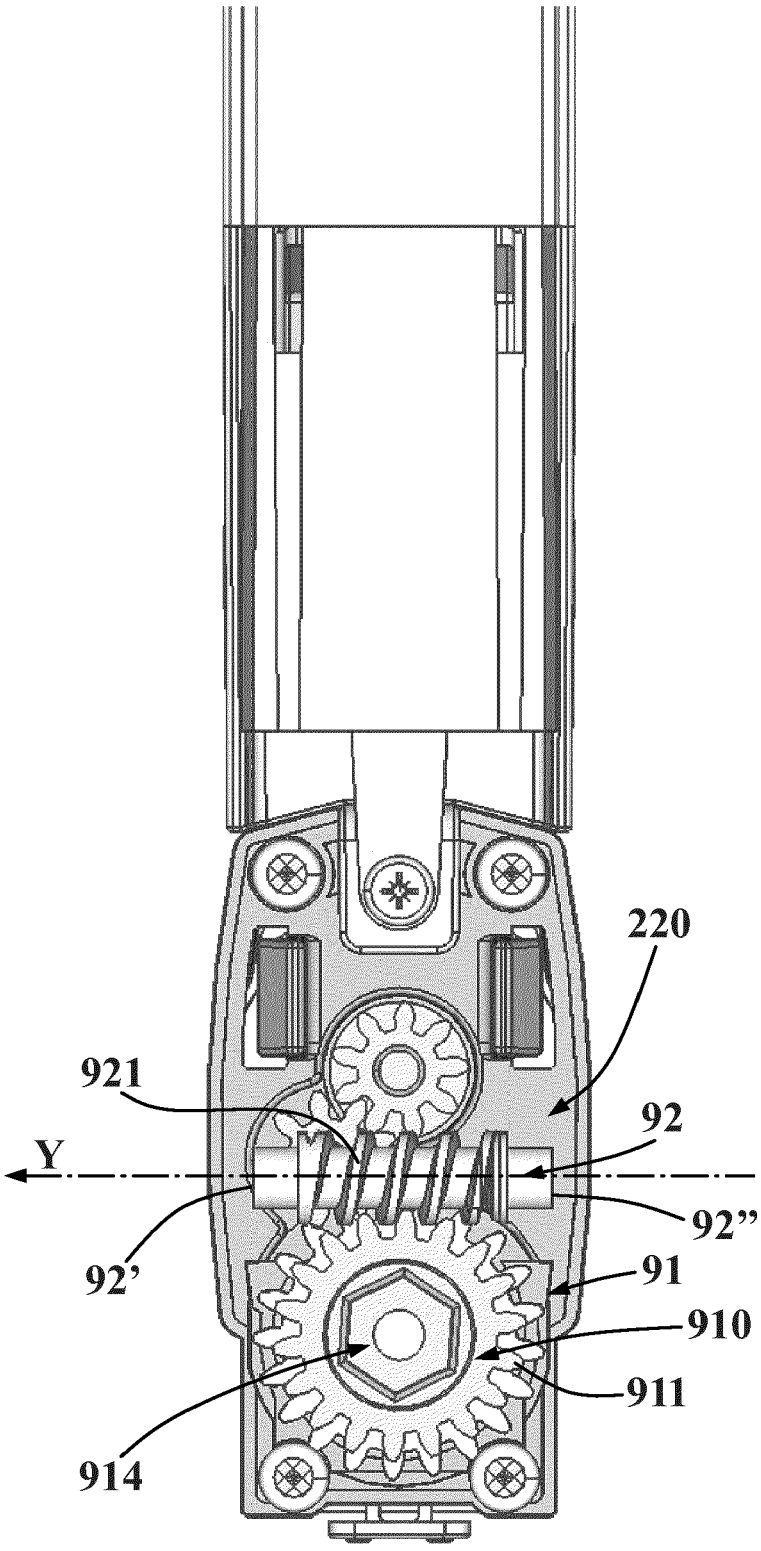

Fig. 7

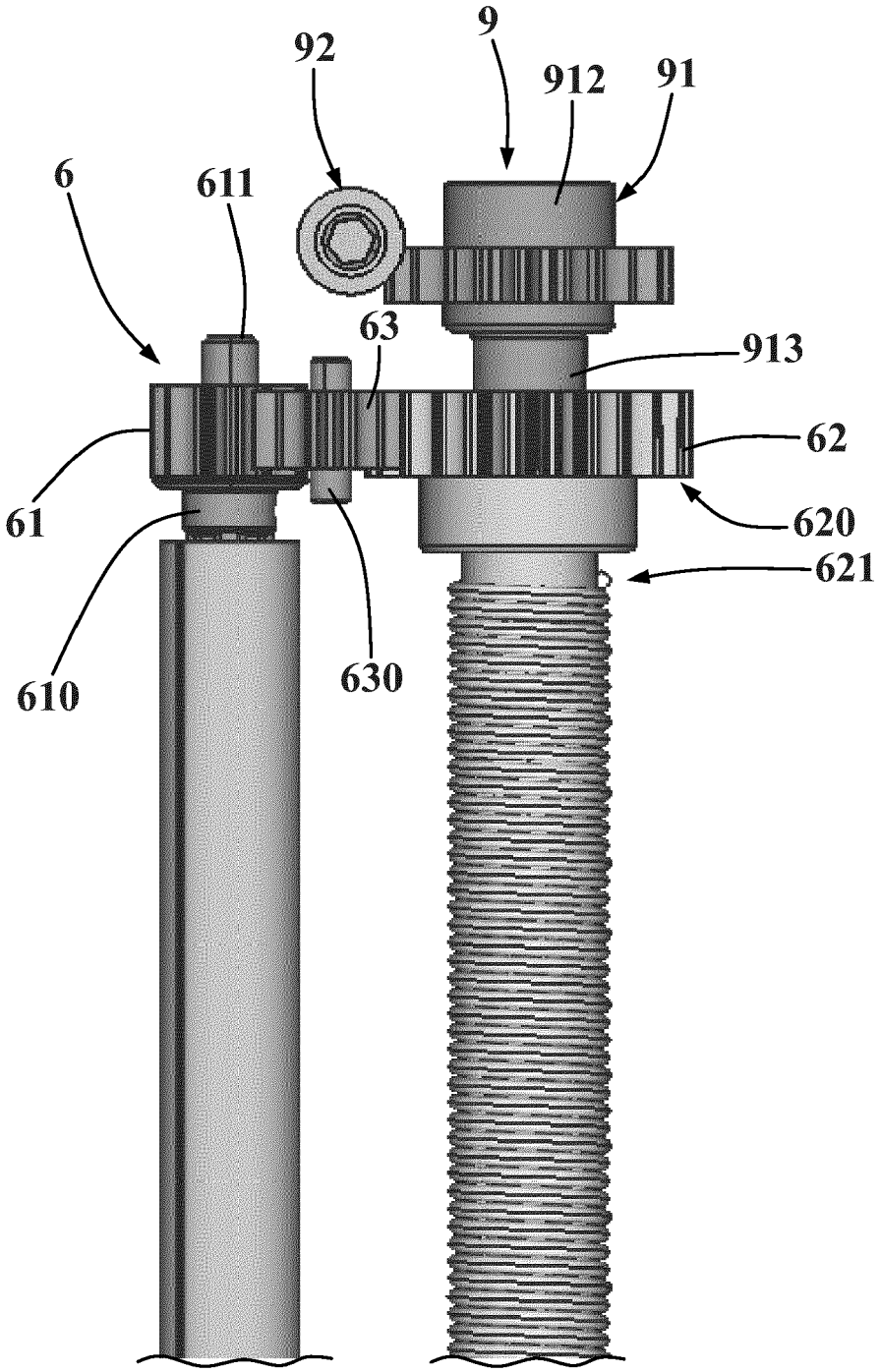

Fig. 8

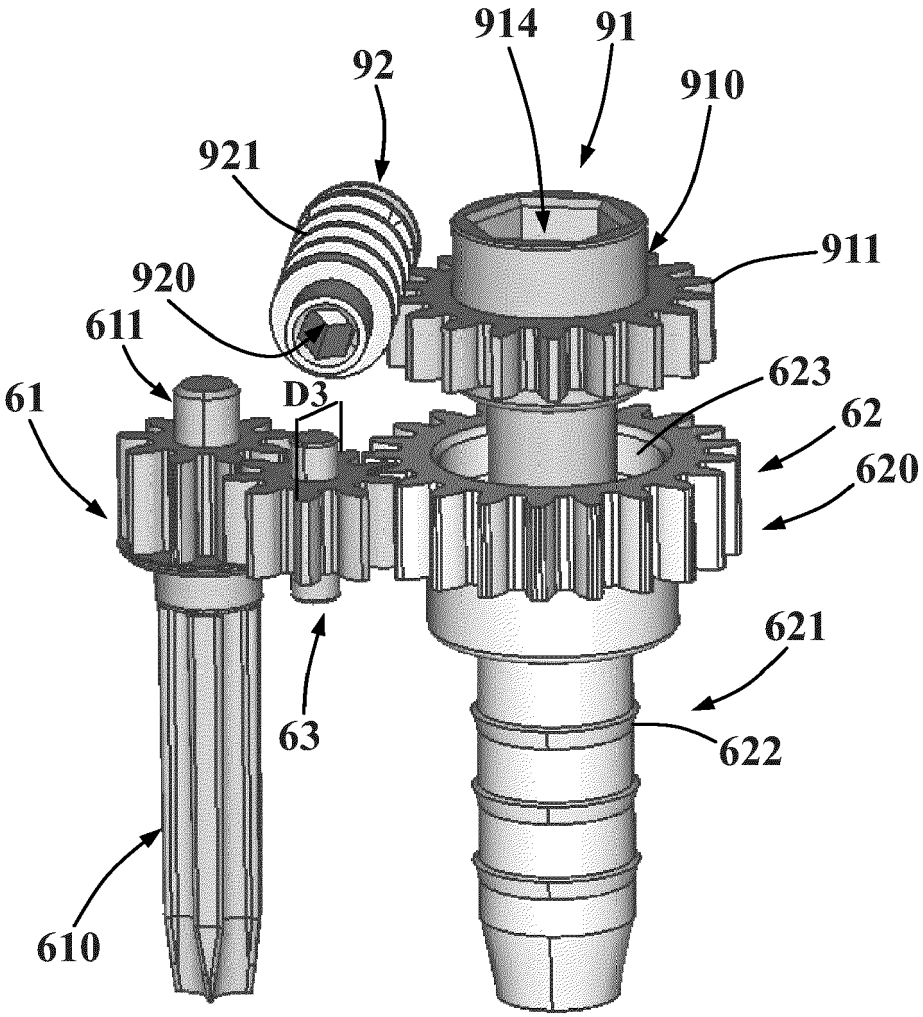

Fig. 9

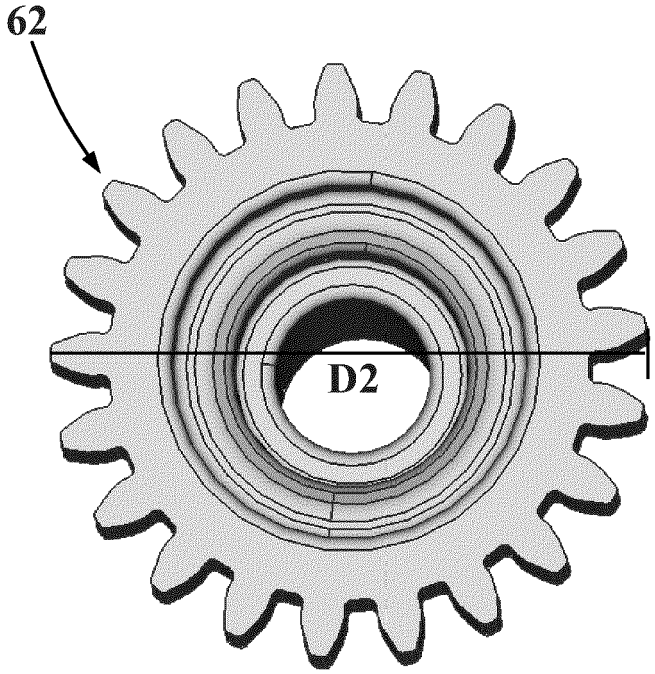

Fig. 10A

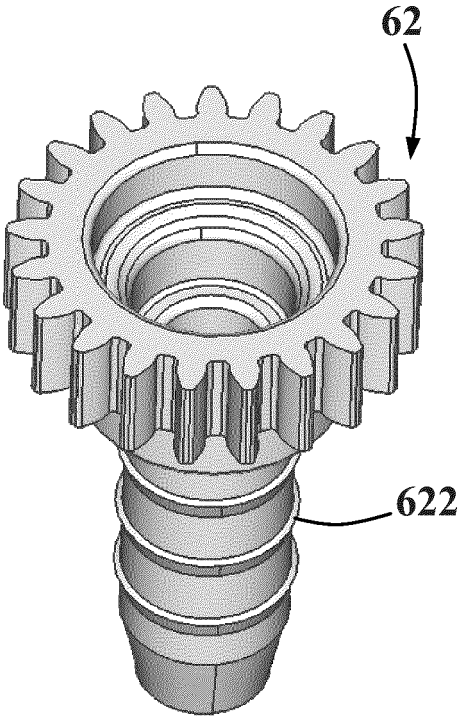

Fig. 10B

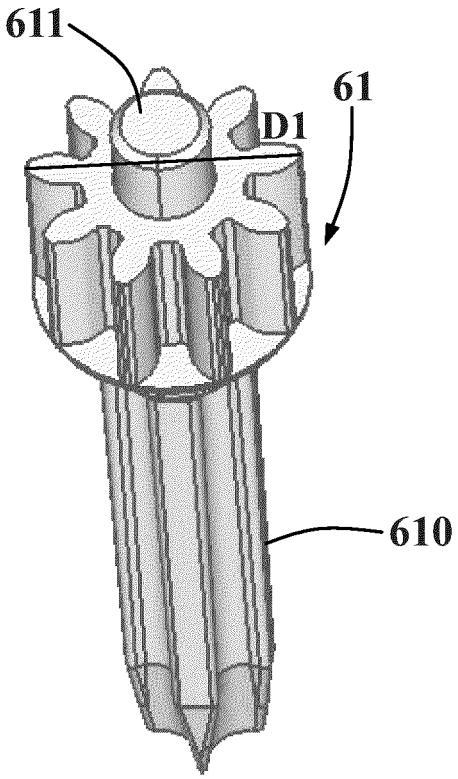

Fig. 11

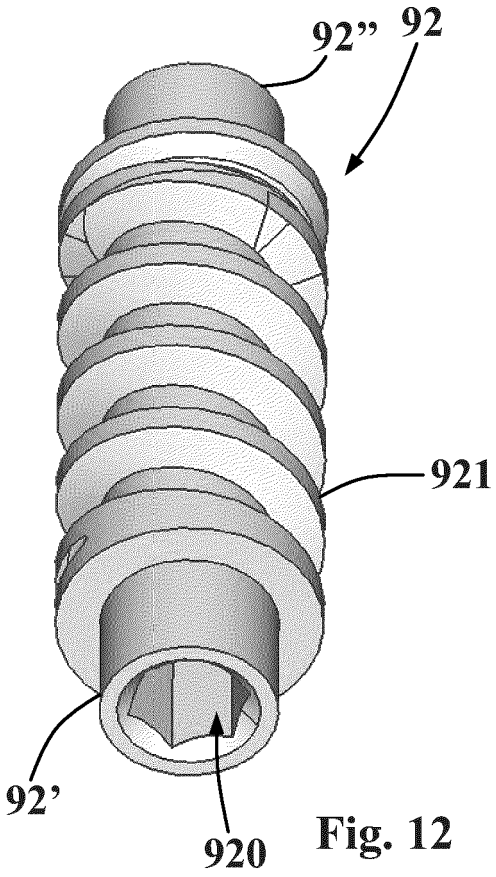

Fig. 12

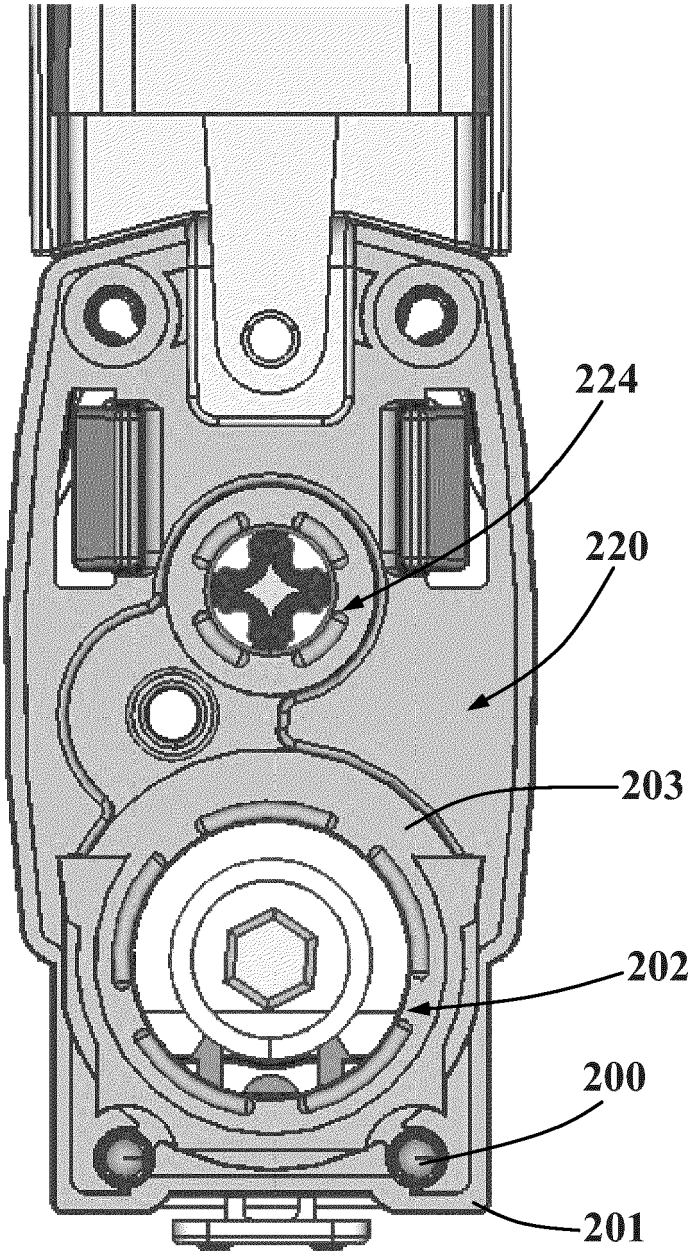

Fig. 13

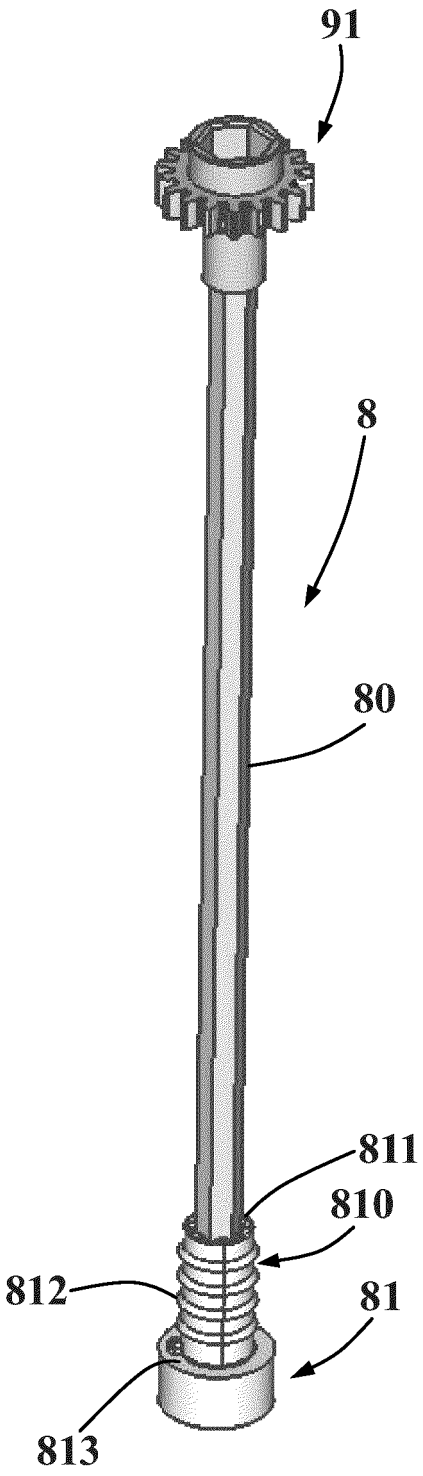

Fig. 14

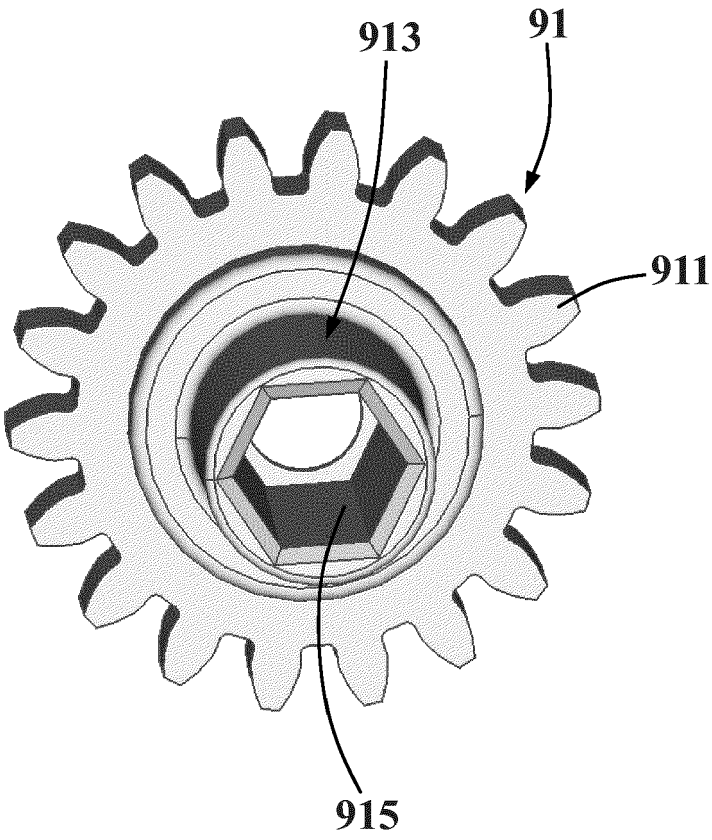

Fig. 15

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 22 20 6339

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	WO 98/17888 A1 (YAMATO TAPE CO LTD [JP]; IGARASHI HISAHIRO [JP]) 30 April 1998 (1998-04-30) * paragraph [0090]; figures 1,2 *	1-11	INV. E06B9/42 E06B9/60
A	US 294 414 A (D. R. STEDMAN) 4 March 1884 (1884-03-04) * page 1, column 1, lines 35-40; figures 1-3 *	1-11	
A	JP H09 72174 A (SHOWA ORIFA KK; SHIN NIKKEI CO LTD) 18 March 1997 (1997-03-18) * figures 2,3 *	1-11	
A	JP H05 163880 A (IGARASHI SHOHIN KAIHATSU KK) 29 June 1993 (1993-06-29) * figures 1-3,23 *	1-11	

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	25 January 2023	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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 20 6339

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

25-01-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9817888 A1	30-04-1998	EP 0869253 A1	07-10-1998
		JP H10121873 A	12-05-1998
		KR 19990076607 A	15-10-1999
		US 5996670 A	07-12-1999
		WO 9817888 A1	30-04-1998
US 294414 A	04-03-1884	NONE	
JP H0972174 A	18-03-1997	NONE	
JP H05163880 A	29-06-1993	JP 2620008 B2	11-06-1997
		JP H05163880 A	29-06-1993

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 294414 A **[0017]**
- WO 9817888 A **[0017]**
- JP H0972174 B **[0017]**
- JP H05163880 B **[0017]**