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

(11) **EP 4 119 738 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.01.2023 Bulletin 2023/03

(21) Application number: **22185154.6**

(22) Date of filing: **15.07.2022**

(51) International Patent Classification (IPC):
E04F 10/10 *(2006.01)* ***E06B 9/06*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
E04F 10/10; E06B 9/0676

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

(30) Priority: **15.07.2021 IT 202100018725**

(71) Applicant: **GIBUS S.p.A.**
35030 Saccolongo (PD) (IT)

(72) Inventors:
- **RUGGERO, Riccardo**
  35035 Mestrino (PD) (IT)
- **ZANOTTO, Vanni**
  31050 Povegliano (TV) (IT)
- **BELLIN, Gianfranco**
  35030 Selvazzano Dentro (PD) (IT)

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

(54) COVERING APPARATUS

(57) Covering apparatus, which comprises a support structure (2) provided with two lateral beams (4), a series of covering blades (8) supported by the lateral beams (4), first movement means (10) arranged for rotating the covering blades (8) between a closed position and an open position, and second movement means (16) arranged for translating the covering blades (8) between a packed configuration and an extended configuration. In particular, the first movement means (10) comprise an articulated parallelogram mechanism (21) provided with two cranks (22) and with a connecting rod (23) provided with a longitudinal guide (24) with which a corresponding end (9) of each covering blade (8) is slidably and rotatably engaged, and a linear actuator (32), which is connected to the articulated parallelogram mechanism (21) in order to move the latter in order to rotate covering blades (8) between the open position and the closed position.

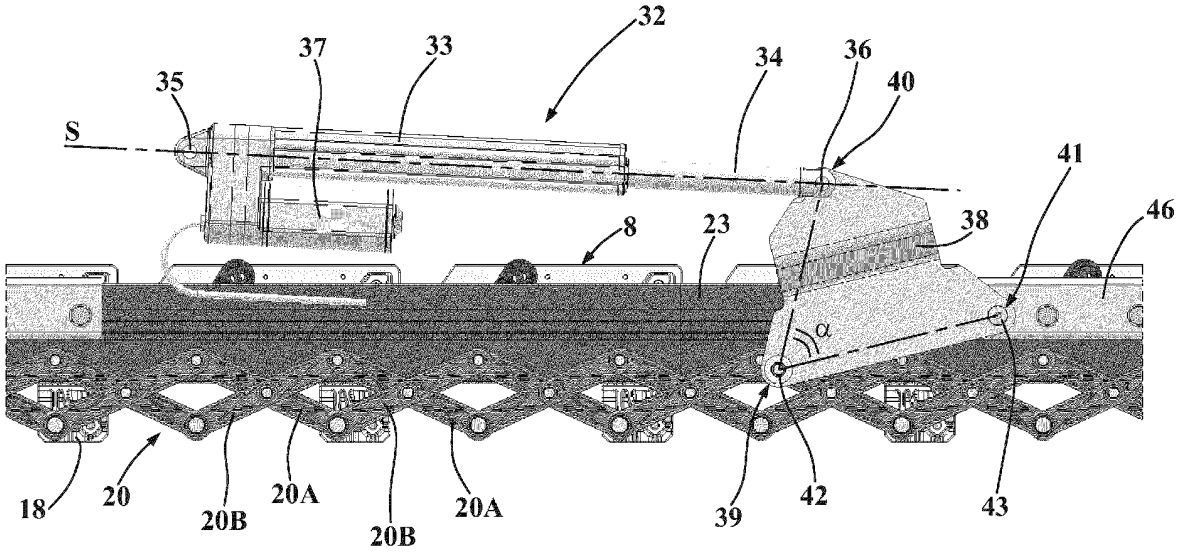

Fig. 5

EP 4 119 738 A1

Description

Field of application

[0001] The present invention regards a covering apparatus according to the preamble of the independent claim.

[0002] The present apparatus is intended to be employed for covering external surfaces, protecting them from atmospheric agents and in particular from the sun and rain.

[0003] The present covering apparatus is indicated for making pergolas, verandas and more generally covering structures, both in gardens of private homes and in open spaces of public places, such as for example restaurants, hotels, bathing establishments or other structures.

[0004] The covering apparatus, object of the present invention, therefore falls within the industrial field of production of blinds/awnings for covering outside environments.

State of the art

[0005] Known on the market are numerous solutions of covering apparatuses for outdoor settings, termed brise soleil in the jargon of the field, which comprise a support structure, e.g. with canopy, fixed to the ground and provided with two lateral longitudinal members which support a series of oscillating blades adapted to protect an underlying ground surface.

[0006] Known for example are brise soleil covering apparatuses comprising a series of oscillating blades, each of which provided at the ends thereof with rotation pins hinged to the corresponding longitudinal members.

[0007] Such apparatuses also comprise movement means connected to the oscillating blades in order to actuate the latter to rotate between a closed position, in which the blades are placed substantially horizontal and partially superimposed on each other in order to prevent the passage of light and/or rain, and an open position, in which the blades are placed tilted, between them delimiting openings for the passage of light.

[0008] Also known are covering apparatuses whose blades can also be moved, by means of further movement means, between a packed configuration, in which the blades are side-by-side each other in proximity to a same side of the covering apparatus, and an extended configuration, in which they are arranged spaced from each other.

[0009] Such apparatuses for example comprise two guides made on the corresponding longitudinal members and on each of which a series of carriages is mounted which carry, rotatably mounted thereon, the rotation pins of the corresponding covering blades. In addition, at least one of the ends of a first covering blade carries, mounted thereon, an actuation lever, tilted with respect to the blade, which terminates with an engagement wheel slidably associable with a fixed track positioned on the longitudinal member in order to actuate the rotation of the blade when it is in extended configuration. In addition, each blade is connected to the other through a lever chain which, following the rotation of the first covering blade, simultaneously also rotate the other blades.

[0010] The main drawback relative to such solution lies in the fact that the transmission of the rotation by means of the actuation lever driven by the fixed track is subjected to numerous jamming risks due to clearances and tolerances of such components and the lever chain between the blades. In particular, the rotation of the blades by means of the transmission of the movement through a single blade is difficult and mechanically disadvantageous. This can cause frequent failures in the actuation means and therefore overall the covering apparatus is unreliable in use.

[0011] A further drawback of the above-described solution lies in the fact that during the packing the blades can be stuck with each other and be damaged. Indeed, during the packing, the actuation lever is not connected to the fixed track and therefore the blades are not maintained fixed in a predetermined position. Therefore, overly high oscillations in translation or particularly windy weather conditions can lead the blades to rotate in an uncontrolled manner and to knock against each other or be stuck.

[0012] The patent application WO 2020/136274 A1 describes a plate covering system for windows, which comprises a series of plates placed on a vertical plane (corresponding with the plane of the window) and actuatable to rotate, between an open position and a closed position, by means of a belt actuation system. The latter solution of known type belongs to applications different from those of the brise-soleil apparatuses mentioned above and does not allow overcoming the abovementioned drawbacks.

Presentation of the invention

[0013] In this situation, the problem underlying the present invention is therefore that of eliminating the drawbacks of the solutions of known type mentioned above, by providing a covering apparatus which is entirely efficient in operation and reliable.

[0014] A further object of the present invention is to provide a covering apparatus which allows executing, in an entirely efficient manner, the packing movement of the covering blades in a manner independent of the opening movement of the blades themselves.

[0015] A further object of the present invention is to provide a covering apparatus which is structurally simple and inexpensive to attain.

Brief description of the drawings

[0016] The technical characteristics of the present 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 shows a top perspective view of the covering apparatus, object of the present invention;
- figure 2 shows a perspective view of a detail of the covering apparatus relative to the covering blades and to the relative movement means;
- figure 3 shows a front view of a detail of the covering apparatus at the movement means of the covering blades, with several parts removed in order to better illustrate other parts;
- figures 4A, 4B and 4C show, in side view, the detail of figure 2 with the blades positioned, respectively, in closed position, open at 45° and open at 90°;
- figure 4D shows, in side view, the detail of figure 3 with the blades positioned in packed configuration;
- figure 5 shows a side view of a further detail of the covering equipment, relative to a linear actuator of the movement means.

Detailed description of a preferred embodiment

[0017] With reference to the enclosed drawings, reference number 1 overall indicates the covering apparatus, object of the present invention.

[0018] The present covering apparatus 1 is indicated for making pergolas, verandas and more generally structures for covering outside environments, such as for example gardens of private homes and open spaces of public places such as restaurants, hotels, bathing establishments etc.

[0019] In accordance with the embodiments illustrated in the enclosed figures, the present covering apparatus 1 comprises a support structure 2 provided with a framework 3, advantageously quadrangular, which comprises at least two lateral beams 4 that are parallel to and side-by-side each other. In addition, the support structure 2 also comprises preferably two front beams 5 that are parallel to and side-by-side each other placed to connect the lateral beams 4.

[0020] More in detail, advantageously, each lateral beam 4 is longitudinally extended, between a head portion 4' and a bottom portion 4", along a corresponding first extension direction X that is preferably substantially horizontal, and advantageously each front beam 5 is longitudinally extended along a corresponding second extension direction Y substantially orthogonal to the first extension directions X of the lateral beams 4. Advantageously, each beam 4, 5 of the support structure 2 comprises one or more elongated bodies that are fixed to each other, obtained for example with metallic sections, in particular made of extruded aluminum.

[0021] Advantageously, the support structure 2 also comprises two first columns 6 abutted against the ground, each of which supports the head portion 4' of the corresponding lateral beam 4. Preferably, the support structure 2 further comprises two second columns 7 placed to support the bottom portions 4" of the corresponding lateral beams 4, in this manner attaining a self-standing structure, in particular with substantially parallelepiped shape.

[0022] Otherwise, in accordance with a different embodiment not illustrated in the enclosed figures, the support structure 2 of the covering apparatus 1 lie on a vertical wall (such as for example the wall of a building) to which the head portions 4' or the bottom portions 4" of the lateral beams 4 are anchored.

[0023] In accordance with a further different embodiment not illustrated in the enclosed figures, the head portions 4' and the bottom portions 4" of the lateral beams 4 of the support structure 2 are supported respectively by a first and by a second vertical wall that face each other, such that the support structure 2 of the covering apparatus 1 is interposed between the two aforesaid vertical walls.

[0024] Advantageously, the aforesaid lateral beams 4 and front beams 5 of the framework 3 of the support structure 2 between them delimit an upper opening of the support structure 2 itself, placed above a surface of the ground intended to be protected by the covering apparatus 1.

[0025] According to the present invention, the covering apparatus 1 comprises a series of covering blades 8 placed one after the other according to the aforesaid first extension direction X of the lateral beams 4, and advantageously actuatable in order to close the aforesaid upper opening of the support structure 2, respectively in order to cover the underlying surface of the ground to protect the latter from the sun and/or from the rain. Each covering blade 8 is extended, according to a longitudinal axis W substantially orthogonal to the first extension direction X (and preferably substantially horizontal), between two opposite ends 9 supported by the respective lateral beams 4.

[0026] According to the present invention, the covering apparatus 1 comprises first movement means 10 mechanically connected to the covering blades 8 and arranged for rotating each of the covering blades 8 around a corresponding rotation axis R, parallel to the longitudinal axis W, between a closed position (illustrated for example in figure 4A) and at least one open position (two of which are illustrated in the examples of figures 4B and 4C).

[0027] In particular, the movement of the covering blades 8 between the closed position and the open position is any one movement which has at least one rotary component, for example a rotation movement or a roto-translation movement.

[0028] Advantageously, the covering blades 8 in the closed position are placed to close the upper opening of the support structure 2, in particular such to cover the underlying surface of the ground.

[0029] Preferably, in the closed position, the covering blades 8 are placed one in contact with the next (advantageously also by means of gaskets), in order to close the upper opening of the support structure 2.

[0030] Advantageously, in the open position, the covering blades 8 are placed spaced from each other, together delimiting passage openings, advantageously susceptible of being traversed by the light and air.

[0031] Preferably, with reference to the example of figures 2 and 3, each covering blade 8 is provided with a first longitudinal edge 11 and with a second longitudinal edge 12 which are extended along the corresponding longitudinal axis W between the two opposite ends 9 of the covering blade 8 itself. In particular, the second longitudinal edge 12, with the covering blades 8 in closed position, is placed above the first longitudinal edge 11 of the subsequent covering blade 8.

[0032] Advantageously, each covering blade 8 comprises a central body 13, with elongated shape, which is longitudinally extended along the rotation axis R between two corresponding ends, at which the ends 9 of the covering blade 8 are placed. For example, the central body 13 comprises a metallic section (e.g. made of extruded aluminum) advantageously closed at the ends thereof by lateral caps 14. Advantageously, each covering blade 8 is provided with a pin 15 aligned with the rotation axis R and at least rotatably connected, at each end 9 of the covering blade 8, with the corresponding lateral beam 4, so as to allow the rotation of the covering blade 8.

[0033] Preferably, the pin 15 projects projectingly outward from the corresponding end 9 of the covering blade 8, and can be formed also by multiple parts, for example two separate portions constrained to the corresponding end 9 and aligned with the rotation axis R. Advantageously, the rotation axis R of each covering blade 8, and in particular the corresponding pin 15, are preferably placed at the first longitudinal edge 11 of the covering blade 8.

[0034] According to the present invention, the covering apparatus 1 comprises second movement means 16 mechanically connected to the covering blades 8 and arranged for translating the aforesaid covering blades 8 along the first extension direction X of the lateral beams 4. In particular, the covering blades 8 are movable by the second movement means 16 between a packed configuration (illustrated for example in figure 4D), in which the covering blades 8 are placed next to each other in the open position at the head portions 4' (or, alternatively, at the bottom portion 4") of the aforesaid lateral beams 4, and an extended configuration (illustrated for example in figures 4A-C), in which the covering blades 8 are placed distributed along the first extension direction X of the lateral beams 4.

[0035] Advantageously, with reference to figures 3 and 4A-D, the second movement means 16 comprise two fixed lateral guides 17, each arranged on the corresponding lateral beam 4 and extended parallel to the first extension direction X of the latter, and a plurality of carriages 18, which are slidably engaged with the lateral guides 17. In particular, each carriage 18 advantageously rotatably carries, mounted thereon, a corresponding covering blade 8 around the rotation axis R, at the respective end 9.

[0036] In particular, an end blade 8' of the covering blades 8 is fixed along the lateral guides 17 (only being able to rotate) and is advantageously pivoted to two fixed carriages 18' fixed to the corresponding lateral beams 4 in a manner such that the first end blade 8' always remains placed at the head portions 4' (or bottom portions 4") of the lateral beams 4, while the other covering blades 8, during the movement between the packed configuration and the extended configuration, slide along the lateral guides 17 by means of the corresponding carriages 18.

[0037] In particular, each lateral guide 17 is provided with one or more rails 17' to which the carriages 18 are coupled, by means of for example corresponding first wheels 19.

[0038] Advantageously, the end 9 of each covering blade 8 is hinged to the corresponding carriage 18 by means of the aforesaid corresponding pin 15.

[0039] Advantageously, the second movement means 16 comprise a pantograph mechanism 20, which connects together the carriages 18 constrained to the same lateral guide 17. Such pantograph mechanism 20, in substance, maintains the carriages 18 equidistant from each other during their movement along the lateral guide 17.

[0040] In a per se conventional manner, the pantograph mechanism 20 comprises (as is visible for example in the detail of figure 5) a series of multiple pairs of levers 20A, 20B pivoted like a scissors, in which each pair comprises a first lever 20A and a second lever 20B whose ends are pivoted to the ends, respectively, of the second lever 20B and of the first lever 20A of the subsequent pair. In particular, pairs of levers 20A, 20B are pivoted to the corresponding carriages 18, for example at the hinging point between the first lever 20A and the second lever 20B of the subsequent pair, preferably at the first wheel 19 of the carriage 18.

[0041] Suitably, in accordance with the embodiment illustrated in the enclosed figures, the second movement means 16 comprise two pantograph mechanisms 20, each connected to the corresponding series of carriages 18 arranged on the respective lateral guide 17. Preferably, the second movement means 16 comprise actuation means (not illustrated in the enclosed figures), which are mechanically connected to the carriages 18 and are arranged for moving them along the lateral guides 17 in order to move the covering blades 8 between the packed configuration and the extended configuration.

[0042] In particular, the aforesaid actuation means comprise, in a per se conventional manner, an electrical drive motor mechanically connected, for example by means of belt transmission means, to the carriages 18 in order to drive the movement thereof along the lateral guides 17.

[0043] In accordance with the idea underlying the present invention, the first movement means 10 comprise

an articulated parallelogram mechanism 21 comprising two cranks 22, which are hinged to the support structure 2, and a connecting rod 23, which is connected to the cranks 22 in a manner such that cranks 22 and connecting rod 23 and are moved parallel to a movement plane M perpendicular to the rotation axes R of the covering blades 8.

[0044] The connecting rod 23 is also provided with a longitudinal guide 24 to which the corresponding end 9 of each covering blade 8 is slidably and rotatably engaged.

[0045] More in detail, with reference to figures 3 and 4A-D, the articulated parallelogram mechanism 21 is configured as a flat articulated parallelogram which is moved on the movement plane M (configured therefore with revolute pairs having axis orthogonal to the movement plane M itself).

[0046] In particular, the cranks 22 are hinged, at corresponding first ends 25 thereof, to the support structure 2 by means of corresponding first revolute pairs 26 having first axes orthogonal to the movement plane M, and are hinged, at corresponding opposite second ends 27 thereof, to the connecting rod 23 by means of second revolute pairs 28 having second axes parallel to the aforesaid first axes. Suitably, the second revolute pairs 28 are connected to the connecting rod 23 by means of first attachment brackets 45. Advantageously, the connecting rod 23 has elongated shape (in particular with rod shape), extended mainly along a longitudinal direction L parallel to the first extension direction X of the lateral beams 4, in particular between two opposite ends in proximity to which the corresponding cranks 22 are hinged by means of the aforesaid corresponding second revolute pairs 28.

[0047] Preferably, the longitudinal guide 24 of the connecting rod 23 has rectilinear extension, in particular parallel to the longitudinal direction L of the connecting rod 23 itself.

[0048] Advantageously, the articulated parallelogram mechanism 21 is placed at the corresponding lateral beam 4 with the first ends of the cranks 22 hinged to such lateral beam 4.

[0049] Advantageously, with reference to the example of figure 3, each covering blade 8 carries, mounted thereon, at at least one of the ends 9, an engagement element 29 placed in distal position from the rotation axis R of the covering blade 8 itself. The engagement element 29 is advantageously rotatably and slidably engaged with the longitudinal guide 24 of the connecting rod 23, allowing the movement of the covering blades 8 along the lateral beams 4 during the movement between the packed configuration and the extended configuration.

[0050] Advantageously, the engagement element 29 comprises a slide element 30, for example a second wheel, rotatably connected (in particular in an idle manner) to the end 9 of the covering blade 8 and slidable along the longitudinal guide 24. The latter is advantageously obtained with a longitudinal rail 31 made on the connecting rod 23 and having a section (on a plane orthogonal to the first extension axis X) with substantially "C" shape with an opening directed towards the corresponding ends 9 of the covering blades 8 and traversed by the engagement element 29, and an upper and lower wall between which the slide element 30 is slidably inserted, substantially to size. According to the invention, the first movement means 10 comprise a linear actuator 32 arranged in order to move the articulated parallelogram mechanism 21 so as to drive the rotation of the covering blades 8.

[0051] More in detail, the aforesaid linear actuator 32 comprises a first member 33, which is rotatably constrained to the support structure 2 (and preferably to the respective lateral beam 4), and a second member 34 (preferably rigid), which is slidably coupled to the first member 33 according to a movement direction S parallel to the movement plane M and is rotatably connected to the articulated parallelogram mechanism 21. The second member 34 is actuatable to be moved, with relative motion with respect to the first member 33, along the aforesaid movement direction S in order to move the articulated parallelogram mechanism 21 on the movement plane M in order to rotate the covering blades 8 between the open position and the closed position.

[0052] In this manner, the linear actuator 32 is capable of actuating, by means of the articulated parallelogram mechanism 21, the rotation movement of the covering blades 8, without having to arrange complicated mechanisms, with consequent structural simplification and low risks of jamming or malfunctioning during the movement of the covering blades 8 themselves.

[0053] Advantageously, as illustrated in the example of figure 2, the first movement means 10 comprise two articulated parallelogram mechanisms 21 and two corresponding linear actuators 32 placed at the respective lateral beams 4 of the support structure 2.

[0054] Preferably, with reference to figures 3 and 5, the first member of the linear actuator 32 is hinged to the support structure 2 (and in particular to the lateral beam 4) by means of a first hinge 35 having a first hinging axis orthogonal to the movement plane M, and the second member 34 is connected to the articulated parallelogram mechanism 21 at a second hinge 36 having a second hinging axis, also orthogonal to the movement plane M.

[0055] In particular, one between the first member 33 and the second member 34 comprises a jacket provided with a slide seat, and the other between the first member 33 and the second member 34 comprises a stem inserted in such slide seat and movable in extension and retraction with respect to the jacket, in a manner such to respectively lengthen or shorten the length of the linear actuator 32 along the movement direction S, consequently determining the movement of the articulated parallelogram mechanism 21.

[0056] Preferably, the first member 33 comprises the aforesaid jacket and the second member 34 comprises the aforesaid stem.

[0057] Advantageously, the linear actuator 32 is of

electric type and is provided, in particular, with an electric motor 37 mechanically connected to the first member 33 and to the second member 34 and arranged in order to move the second member 34 with respect to the first member 33 along the movement direction S. For example, the electric motor 37 is mounted on the jacket of the first member 33 and is connected, for example by means of a screw-nut screw mechanism, to the stem of the second member 34 so as to movement the latter in extension and retraction with respect to the jacket.

[0058] In operation, during the actuation of the linear actuator 32, the latter (due to the rotatable connection of the first and of the second member 33, 34, respectively, to the support structure 2 and to the articulated parallelogram mechanism 21) varies its position in order to be adapted to the movement of the articulated parallelogram mechanism 21, with consequent variation of the movement direction S, which, while remaining parallel to the movement plane M, varies its position and/or tilt. Advantageously, the second member 34 of the linear actuator 32 is connected to the connecting rod 23 of the articulated parallelogram mechanism 21.

[0059] Advantageously, the first movement means 10 comprise a rigid connection body 38, which is placed to connect between the second member 34 of the linear actuator 32 and the connecting rod 23 of the articulated parallelogram mechanism 21.

[0060] More in detail, with reference to the example of figure 5, the connection body 38 is provided with:

- a first hinging point 39, at which the connection body 38 is hinged to the support structure 2 (and in particular to the respective lateral beam 4);
- a second hinging point 40, at which the connection body 38 is hinged to the second member 34 of the linear actuator 32;
- a third hinging point 41, at which the connection body 38 is hinged to the connecting rod 23 of the articulated parallelogram mechanism 21.

[0061] The aforesaid hinging points 39, 40, 41 are non-aligned with respect to each other on the movement plane M, in a manner in particular such that their projection on the movement plane M identifies the vertices of a triangle.

[0062] In this manner, advantageously, the linear actuator 32 acts on a point (the second hinging point 40) which is placed with a specific advance angle α with respect to the third hinging point 41 in which connecting rod 23 is connected to the connection body 38, allowing avoiding specific unique points in which the articulated parallelogram mechanism 21 would be unable to ensure the correct movement of its members and, consequently, of the covering blades 8. For example, in the event in which the covering blades 8 are stopped with the engagement elements 29 horizontally aligned with the pins 15, the slidable coupling of the engagement elements 29 to the connecting rod 23 could induce, in the subsequent movement, an incorrect movement of the connecting rod 23, for example by tilting it with respect to the first extension direction X of the lateral beams 4, with consequent incoherent movement of the covering blades 8. The arrangement of the connection body 38 according to the invention allows the linear actuator 32 to act on the connecting rod 23, maintaining it in the correct position, without the action of the engagement elements 29 causing incorrect movements thereof. In operation, the actuation of the linear actuator 32 determines, by acting on the second hinging point 40, the rotation of the connection body 38 around the first hinging point 39 (hinged to the support structure 2). The consequent moment applied to the connection body 38 generates a corresponding force of the third hinging point 41 hinged to the connecting rod 23, moving the latter according to the movement allowed by the cranks 22 of the articulated parallelogram mechanism 21.

[0063] In detail, with reference to the example of figure 5, the first, second and third hinging point 39, 40, 41 identify an advance angle α with vertex in the first hinging point 39 and having width comprised between 10° and 80°, preferably between 20° and 60°.

[0064] In particular, the connection body 38 is provided, at the first and third hinging point 39, 41, respectively with a first and with a second pin 42, 43 having axes parallel to the movement plane M, and by means of which the connection body 38 is connected, respectively, to the support structure 2 and to the connecting rod 23 of the articulated parallelogram mechanism 21. Suitably, the second pin 43 is connected to the connecting rod 23 by means of a second attachment bracket 46.

[0065] Preferably, the connection body 38 is connected to the second member 34 of the linear actuator 32, at the second hinging point 40, by means of the aforesaid second hinge 36.

[0066] Advantageously, the second hinging point 40 and the third hinging point 41 of the connection body 38 are always placed on a same side with respect to a horizontal reference plane K passing through the first hinging point 39 (and in particular of the relative first pin 42). Therefore, in any position between the open position and the closed position of the opening blades 8, the second hinging point 40 and the third hinging point 41 of the connection body 38 are always placed on the same side as the first hinging point 39, as defined above.

[0067] Preferably, also the linear actuator 32 is always situated on the same side as the second and third hinging point 40, 41 with respect to the reference plane K.

[0068] In particular, with reference to the examples of the enclosed figures 4A-4D, the second hinging point 40 and the third hinging point 41 (and preferably the linear actuator 32) are always placed at a height greater than the first hinging point 39 (i.e. always above the aforesaid reference plane K).

[0069] In this manner, in particular, the third hinging point 41 is never horizontally aligned with the first hinging point 39 (hinged to the support structure 2) and/or it is never situated on a side different from that of the linear

actuator 32 with respect to the reference plane K. Consequently, the connection body 38 is never situated in a condition in which, following the actuation of the linear actuator 32, it is not possible to provide for the rotation sense of the connection body 38 itself around the first hinging point 39.

[0070] Advantageously, the first pin 42 of the first hinging point 39 of the connection body 38 is aligned with the first revolute pairs 26 which connect the cranks 22 of the articulated parallelogram mechanism 21 to the support structure 2, in particular lying on the aforesaid reference plane K.

[0071] Preferably, the second pin 43 of the third hinging point 41 of the connection body 38 is aligned, according to the longitudinal direction L of the connecting rod 23 of the articulated parallelogram mechanism 21, with the second revolute pairs 28 which connect the cranks 22 to the connecting rod 23.

[0072] Advantageously, the connection body 38 has substantially plate-like shape with main extension substantially parallel to the movement plane M. Preferably, the connection body 38, obtained for example with a metallic plate, can have bends transverse to the movement plane M so as to allow the connection thereof with the support structure 2, the linear actuator 32 and the connecting rod 23.

[0073] In particular, the hinging points 39, 40, 41 can be placed on different planes parallel to the movement plane M, in this case the abovementioned spatial relations of the hinging points 39, 40, 41 being defined by their projection on the movement plane M.

[0074] In accordance with the particular embodiment illustrated in the enclosed figures (with reference for example to figure 3), each covering blade 8 is provided, at its ends 9, with corresponding movement levers 44, each of which interposed between the corresponding end of the central body 13 of the covering blade 8 and the corresponding carriage 18.

[0075] In particular, each movement lever 44 is fixed, preferably removably, to the corresponding end of the central body 13 and carries, mounted thereon, the corresponding pin 15 (hinged to the carriage 18), and the corresponding engagement element 29 slidably and rotatably engaged with the connecting rod 23 of the articulated parallelogram mechanism 21.

[0076] For example, the movement lever 44 is L shaped and is advantageously fixed to the exterior of the central body 13, e.g. by means of reversible coupling means or other attachment means of known type, so as to make the movement lever integral in rotation with the covering blade 8.

[0077] In accordance with a different non-illustrated embodiment, the covering blades 8 do not comprise the aforesaid movement levers 44 and, in particular, the pin 15 and the engagement element 29 are fixed directly to the central body 13 of the covering blade 8. In operation, the first movement means 10 are arranged for rotating the covering blades 8 in a first rotation sense VI (counterclockwise in the example of figures 4B and 4C) in order to bring them from the closed position to the open position, and in an opposite second rotation sense V2 (clockwise in the example of figures 4B and 4C) in order to bring them from the open position to the closed position.

[0078] In particular, the articulated parallelogram mechanism 21 is configured such that it is moved with the connecting rods 23 which rotate in the aforesaid first rotation sense VI in order to actuate the covering blades 8 to rotate towards the open position, and in the aforesaid second rotation sense V2 in order to actuate the covering blades 8 towards the closed position.

[0079] Suitably, the connecting rod 23 of the articulated parallelogram mechanism 21 is actuated to be moved upward in order to move the covering blades 8 to rotate towards the open position, and downward in order to move the covering blades 8 towards the closed position.

[0080] Preferably, the linear actuator 32 is arranged for rotating the connection body 38 (around the first hinging point 39) in the first rotation sense VI in order to move the covering blades 8 towards the open position and in the opposite second rotation sense V2 in order to move the covering blades 8 towards the closed position.

[0081] In operation, starting for example from the condition of figure 4a (in which the covering blades 8 are in closed position and in extended configuration), the linear actuator 32 is actuatable in order to move, preferably by means of the connection body 38, the articulated parallelogram mechanism 21, such that the movement of the connecting rod 23 on the movement plane M rotates, by means of the engagement elements 29, the covering blades 8 towards the open position, e.g. like that of figures 4B or 4C. Subsequently, the second movement means 16 are actuated in order to bring the covering blades 8 from the extended position to the packed configuration (illustrated in figure 4D). In particular, following the actuation of the second movement means 16, the engagement elements 29 are susceptible of sliding along the longitudinal guide 24 of the connecting rod 23 in order to allow the movement of the covering blades 8 along the lateral beams 4.

[0082] The aforesaid operations are carried out in the opposite manner in order to bring the covering blades 8 back into the open position and extended configuration.

[0083] The invention thus conceived therefore attains the pre-established objects.

Claims

1. Covering apparatus (1), which comprises:

- a support structure (2) provided with a framework (3), which comprises at least two lateral beams (4) that are parallel to and side-by-side each other, each of which is longitudinally extended, along a corresponding first extension direction (X);

- a series of covering blades (8) placed one after the other according to said first extension direction (X), each of said covering blades (8) being extended, according to a longitudinal axis (W) thereof that is substantially orthogonal to said first extension direction (X), between two opposite ends (9) supported by the respective said lateral beams (4);
- first movement means (10) mechanically connected to said covering blades (8) and arranged for rotating each of said covering blades (8) around a corresponding rotation axis (R), substantially parallel to said longitudinal axis (W), between a closed position and at least one open position;
- second movement means (16) mechanically connected to said covering blades (8) and arranged for translating said covering blades (8) along the first extension direction (X) of said lateral beams (4) between a packed configuration, in which said covering blades (8) are placed next to each other in said open position, and an extended configuration, in which said covering blades (8) are placed distributed along the first extension direction (X) of said lateral beams (4);

wherein said first movement means (10) comprise:

- at least one articulated parallelogram mechanism (21), which comprises at least two cranks (22) hinged to said support structure (2), and a connecting rod (23) connected to said cranks (22) in order to be moved on a movement plane (M) that is substantially perpendicular to the rotation axes (R) of said covering blades (8); wherein said connecting rod (23) is provided with a longitudinal guide (24) with which a corresponding said end (9) of each said covering blade (8) is slidably and rotatably engaged;
- at least one linear actuator (32), which comprises a first member (33), which is at least rotatably constrained to said support structure (2), and a second member (34), which is slidably coupled to said first member (33) according to a movement direction (S) parallel to said movement plane (M), is at least rotatably connected to said articulated parallelogram mechanism (21) and is actuatable to be moved, with relative motion with respect to said first member (33), along said movement direction (S) in order to move said articulated parallelogram mechanism (21) on said movement plane (M) in order to rotate said covering blades (8) between said open position and said closed position;

wherein said second movement means (16) comprise:

- two fixed lateral guides (17), each of which is arranged on the corresponding said lateral beam (4) and is extended parallel to said first extension direction (X);
- a plurality of carriages (18), which are slidably engaged with said lateral guides (17) and each carry, rotatably mounted thereon, a corresponding said covering blade (8), around said rotation axis (R), at the respective said end (9) of said covering blade (8).

2. Covering apparatus (1) according to claim 1, **characterized in that** the second member (34) of said linear actuator (32) is connected to the connecting rod (23) of said articulated parallelogram mechanism (21).

3. Covering apparatus (1) according to claim 1 or 2, **characterized in that** said first movement means (10) comprise a rigid connection body (38), which is placed to connect the second member (34) of said linear actuator (32) to the connecting rod (23) of said articulated parallelogram mechanism (21);
wherein said connection body (38) is provided with:

- a first hinging point (39), at which said connection body (38) is hinged to said support structure (2);
- a second hinging point (40), at which said connection body (38) is hinged to the second member (34) of said linear actuator (32);
- a third hinging point (41), at which said connection body (38) is hinged to said connecting rod (23);

wherein said hinging points (39, 40, 41) are non-aligned with respect to each other on said movement plane (M).

4. Covering apparatus (1) according to claim 3, **characterized in that** said second hinging point (40) and said third hinging point (41) are always placed on a same side with respect to a horizontal reference plane (K) passing through said first hinging point (39).

5. Covering apparatus (1) according to claim 4, **characterized in that** said second hinging point (40) and said third hinging point (41) are always placed at a greater height with respect to said first hinging point (39).

6. Covering apparatus (1) according to any one of the preceding claims from 3 to 5, **characterized in that** said first, second and third hinging point (39, 40, 41) identify an advance angle (α) with vertex in said first hinging point (39) and having width comprised between 10° and 80°.

7. Covering apparatus (1) according to claim 6, **characterized in that** said advance angle (α) has width comprised between 20° and 60°.

8. Covering apparatus (1) according to any one of the preceding claims 3 to 7, **characterized in that** said connection body (38) has substantially plate-like shape with main extension substantially parallel to said movement plane (M).

9. Covering apparatus (1) according to any one of the preceding claims, **characterized in that** said second movement means (16) comprise a pantograph mechanism (20), which connects together said carriages (18) constrained to the same said lateral guide (17).

10. Covering apparatus (1) according to claim 9, **characterized in that** said pantograph mechanism (20) comprises a series of pairs of levers (20A, 20B) pivoted like a scissors, wherein at least some of said pairs of levers (20A, 20B) are pivoted to corresponding said carriages (18).

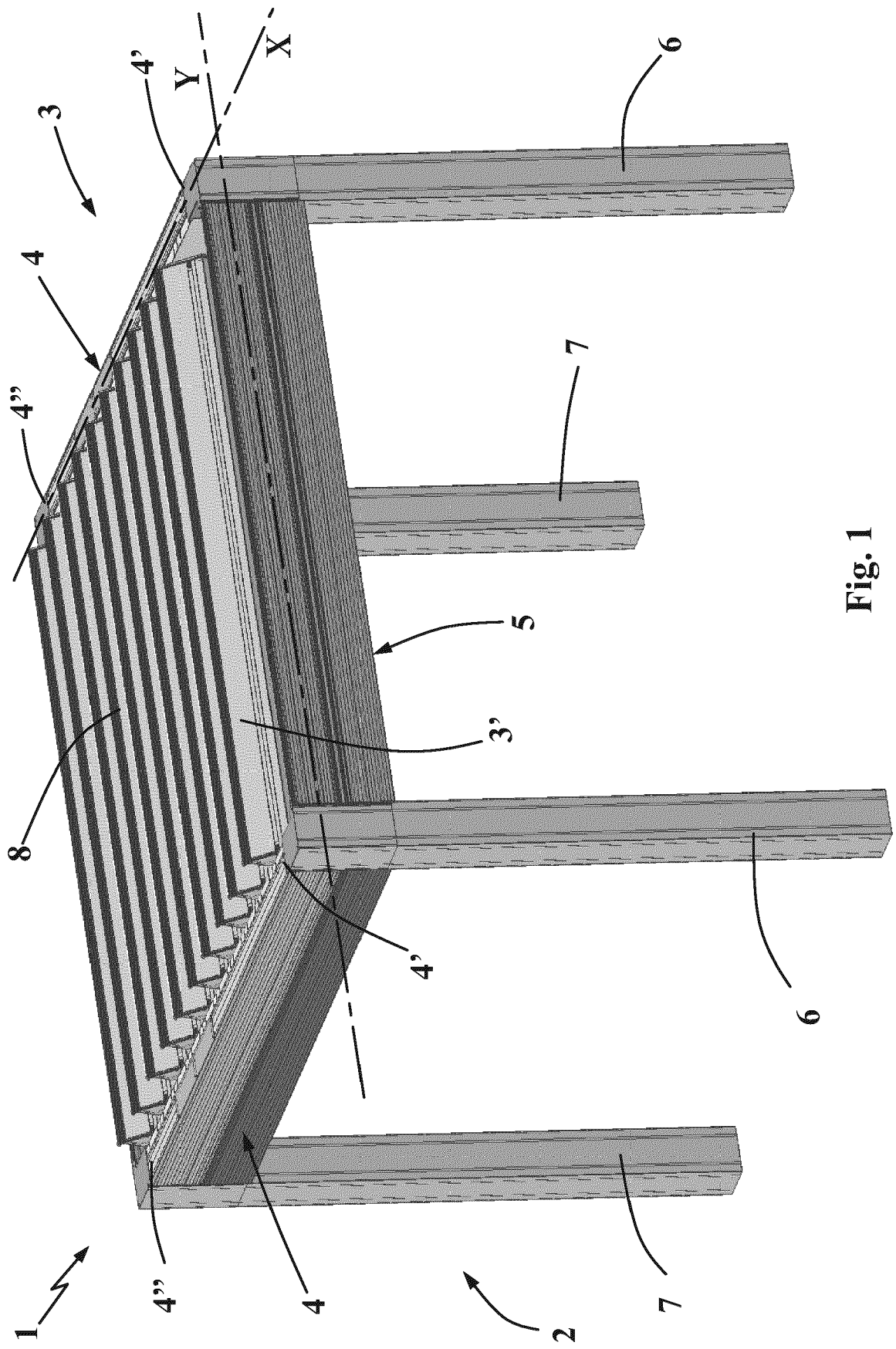

Fig. 1

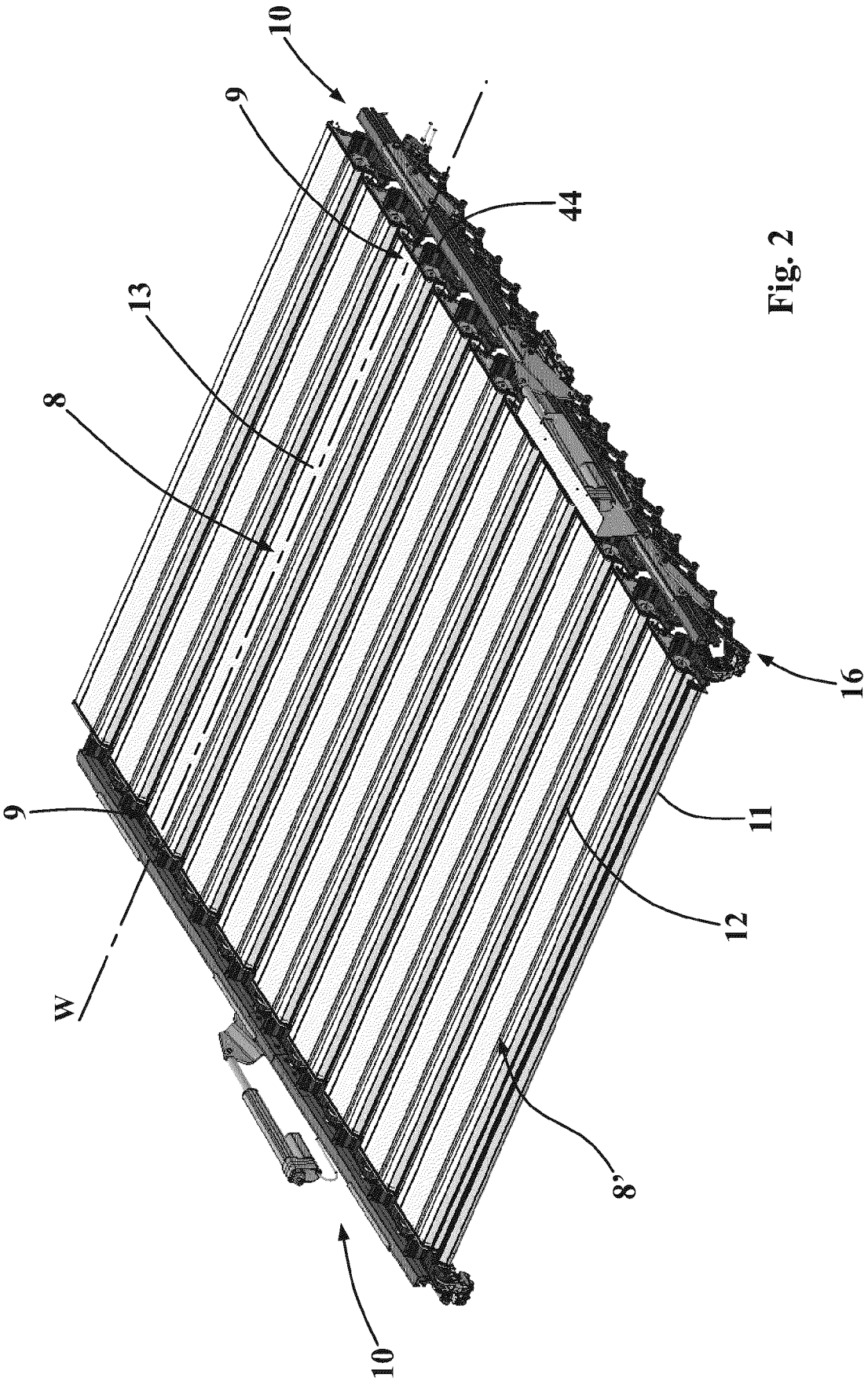

Fig. 2

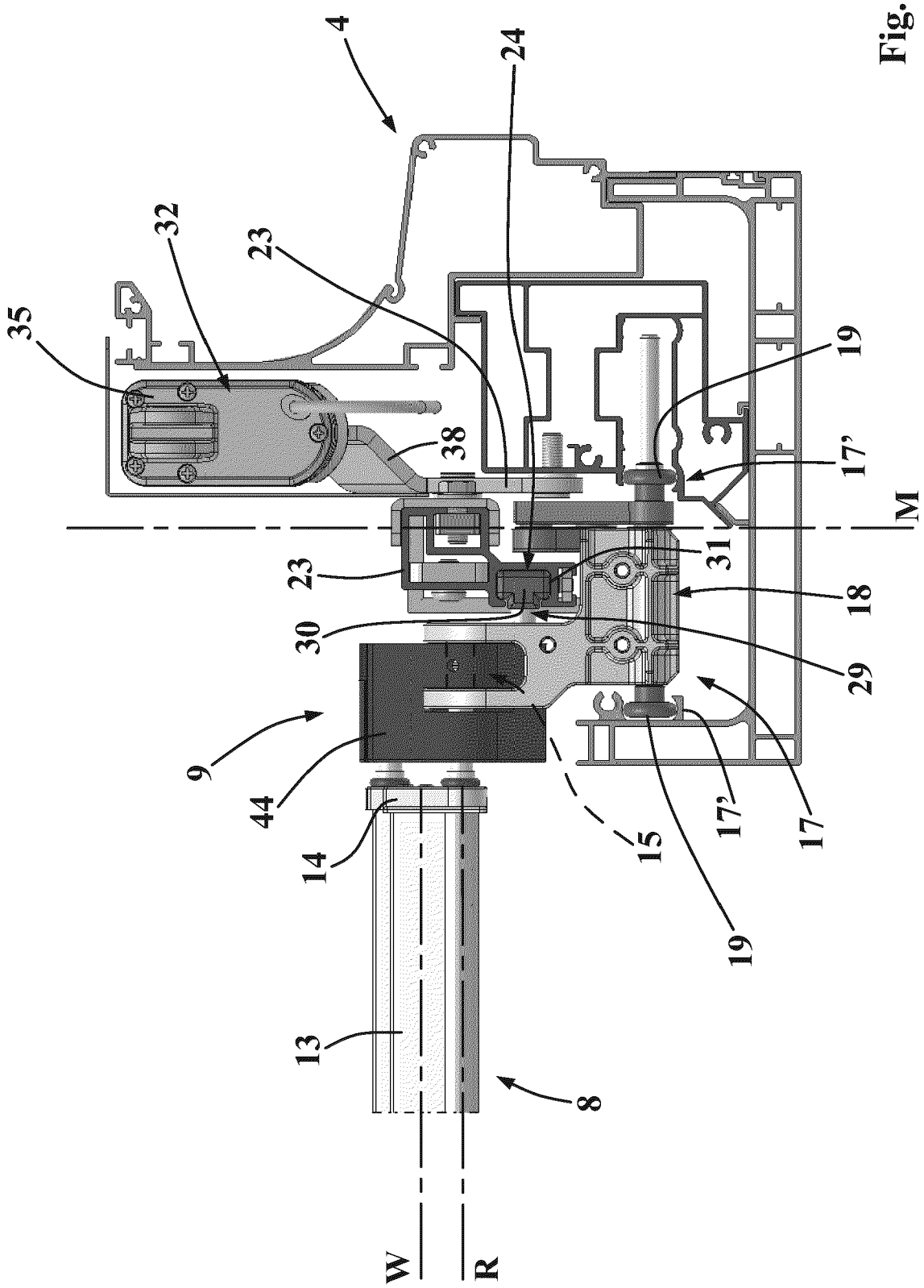

Fig. 3

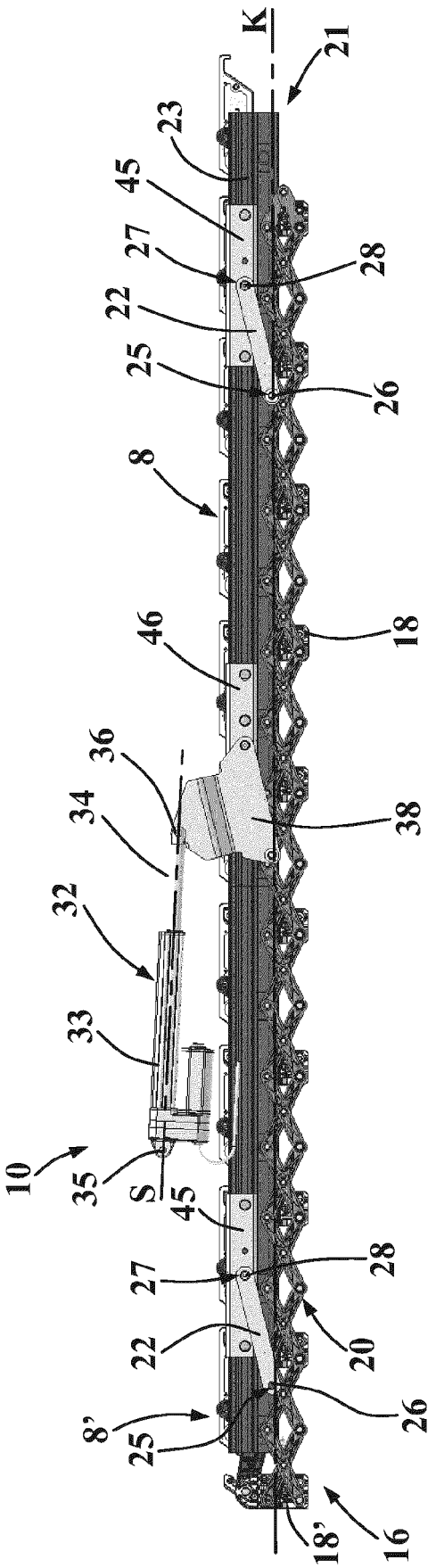
K
21
23
45
27
28
22
25
26
8
46
18
36
34
38
32
33
10
35
S
45
27
28
22
20
26
8'
25
18'
16
M

Fig. 4A

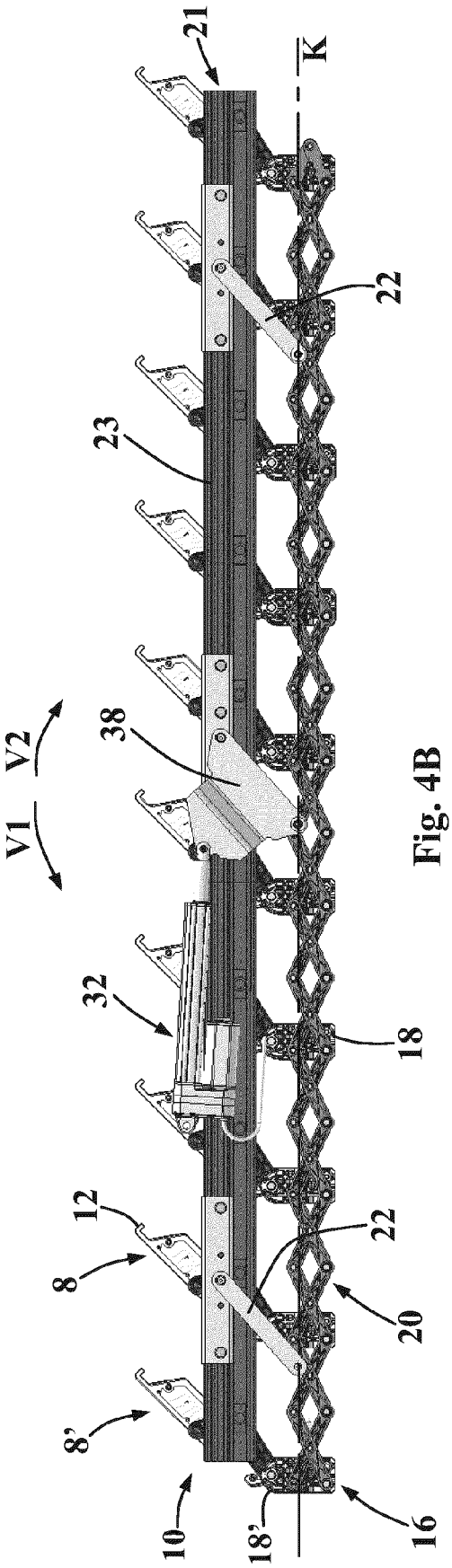
21
K
22
23
V1
V2
38
32
18
12
8
22
20
8'
10
18'
16

Fig. 4B

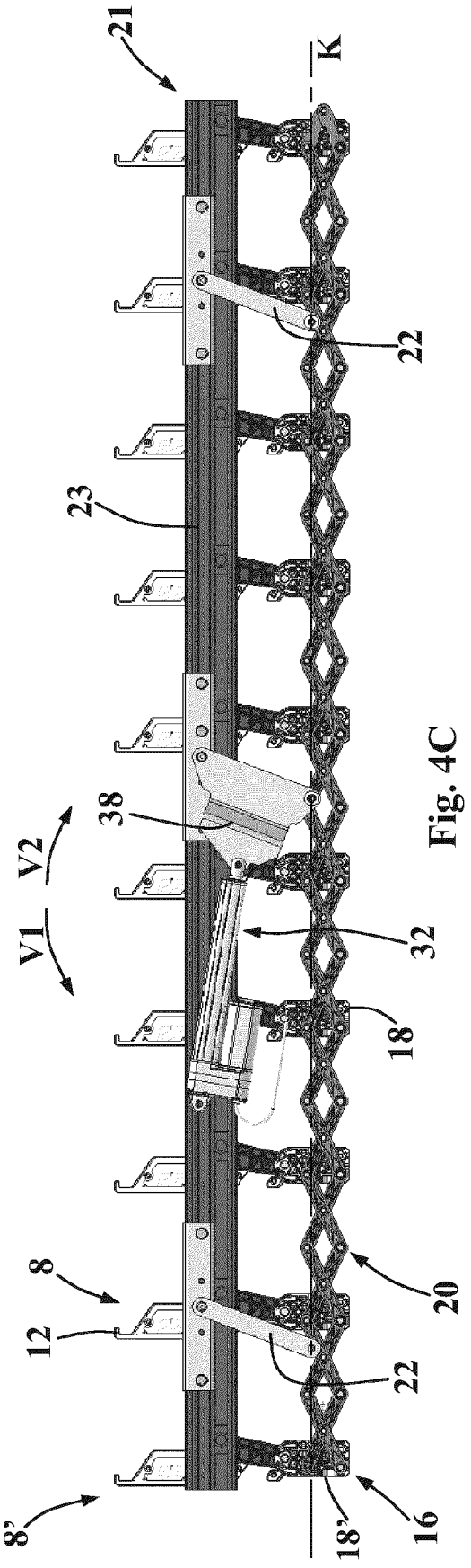
21
K
22
23
38
V2
V1
32
18'
8
12
22
20
8'
18'
16

Fig. 4C

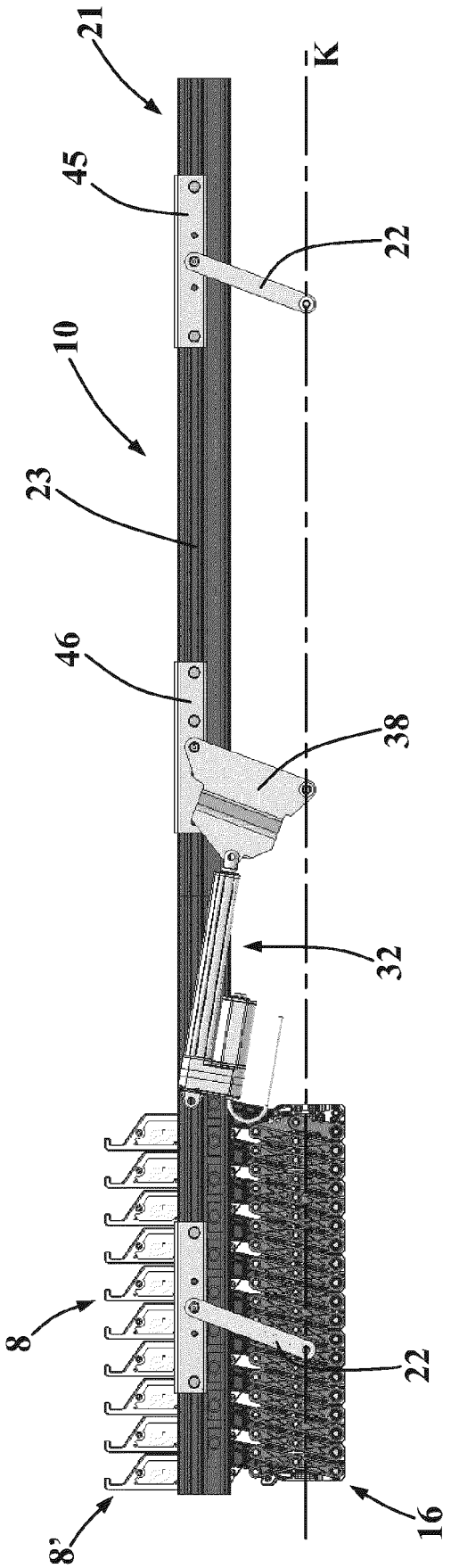

Fig. 4D

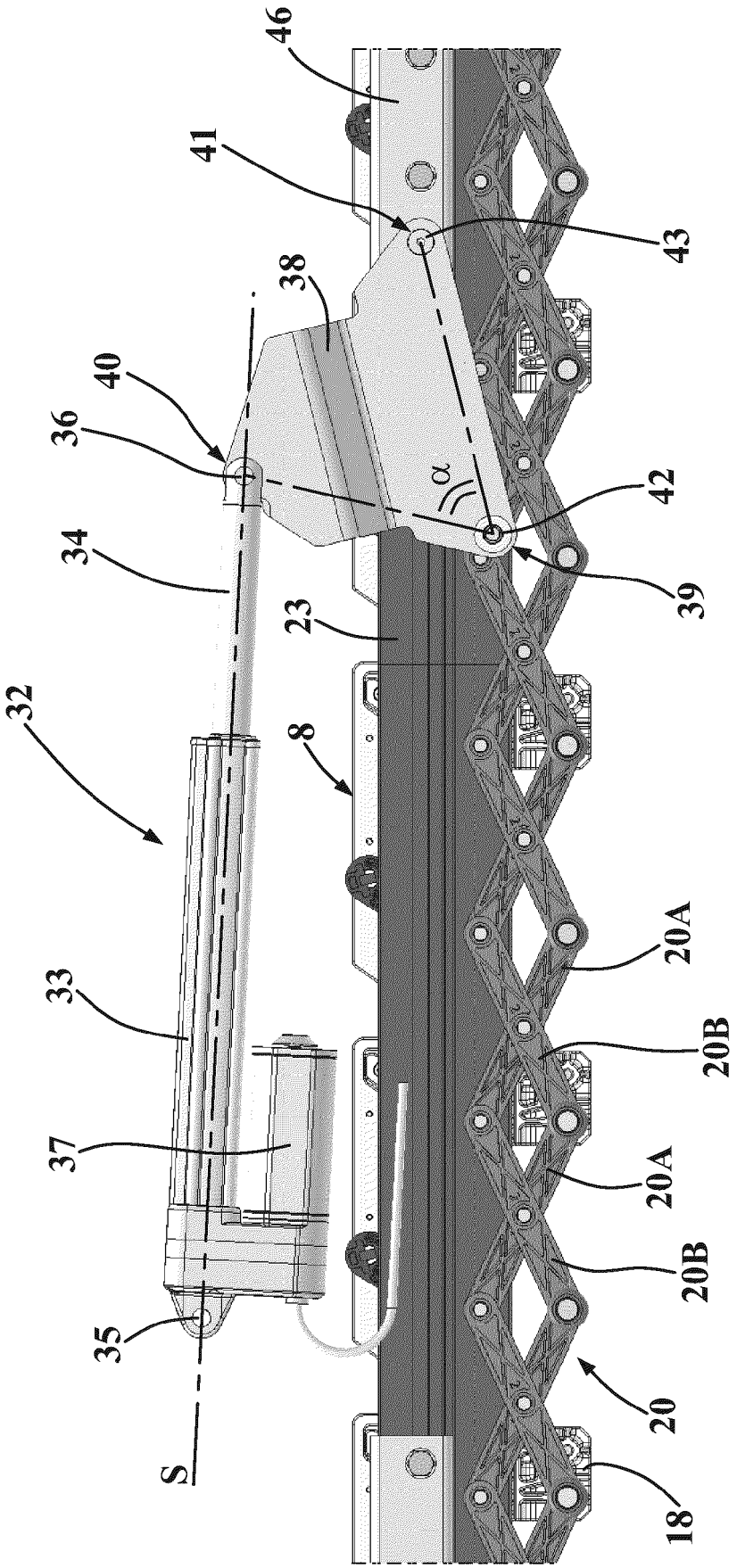

Fig. 5

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 22 18 5154

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 2020/136274 A1 (JOERN KRAB HOLDING APS [DK]) 2 July 2020 (2020-07-02) * page 28, line 28 - page 29, line 2; figures 1,5A,5B,5C,6A,6B,6C,8A,8B,8C * * page 24, lines 17-29 *	1-10	INV. E04F10/10 E06B9/06
A	WO 2020/074451 A1 (TENDER SRL [IT]) 16 April 2020 (2020-04-16) * the whole document *	1-10	
A	US 2019/128055 A1 (BADENHORST MARLENE [ZA]) 2 May 2019 (2019-05-02) * the whole document *	1-10	

TECHNICAL FIELDS SEARCHED (IPC)
E04F E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	26 September 2022	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 18 5154

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.

26-09-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2020136274 A1	02-07-2020	DK 201870872 A1	03-08-2020
		EP 3902967 A1	03-11-2021
		US 2022090445 A1	24-03-2022
		WO 2020136274 A1	02-07-2020
WO 2020074451 A1	16-04-2020	CA 3115576 A1	16-04-2020
		EP 3864232 A1	18-08-2021
		US 2021355685 A1	18-11-2021
		WO 2020074451 A1	16-04-2020
US 2019128055 A1	02-05-2019	AU 2017300883 A1	25-10-2018
		CN 109219685 A	15-01-2019
		EP 3488068 A1	29-05-2019
		US 2019128055 A1	02-05-2019
		WO 2018018053 A1	25-01-2018
		ZA 201702185 B	30-05-2018

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

- WO 2020136274 A1 **[0012]**