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(54) **COVERING APPARATUS**

(57) Covering apparatus (1), which comprises a support structure (2), provided with two lateral beams (21), a series of covering blades (3), supported by the lateral beams (21), first movement means (4), arranged for rotating the covering blades (3) between a closed position and an open position, and second movement means (5), arranged for translating the covering blades (3) between a packed configuration, and an extended configuration.

In particular, the covering apparatus (1) comprises cam actuation means (6) provided with a translation profile (62) mechanically engaged, by means of a corresponding translation cam follower (50), to the second movement means (5). In addition, the covering apparatus (1) comprises motor means (7), mechanically connected to the cam actuation means (6) in order to move them, actuating the second movement means (5).

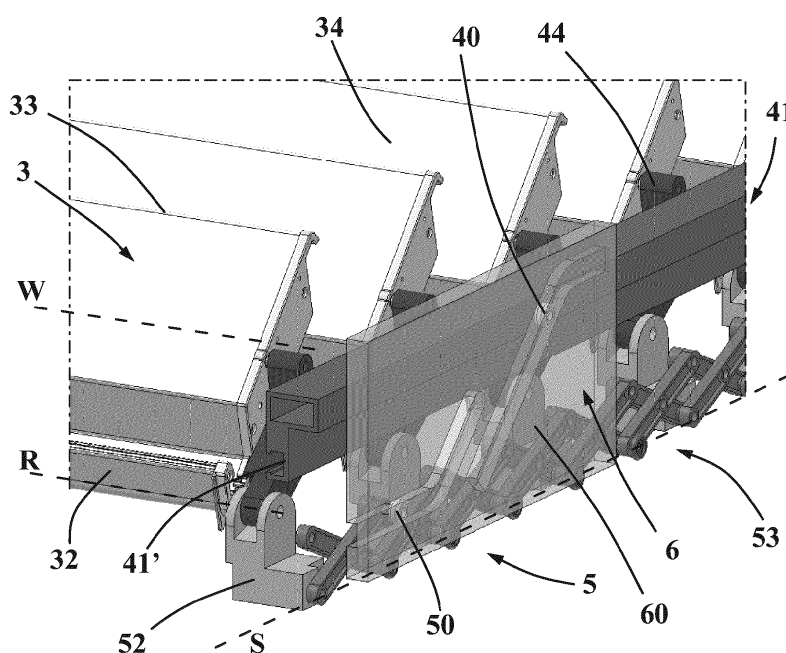


Fig. 3

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, thus falls within the industrial field of production of blinds 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] Brise soleil covering apparatuses are for example known which comprise a series of oscillating blades, each of which provided at its ends with rotation pins hinged with 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] Covering apparatuses are also known 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 placed spaced from each other.

[0009] Such apparatuses for example comprise two guides made on the corresponding longitudinal members, and on each guide a series of carriages is mounted which rotatably carry, 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.

[0010] In addition, each blade is connected to the others in order to simultaneously rotate following the rotation of the first covering blade.

[0011] The main drawback relative to such solution lies in the fact that the rotation of the blades is entirely connected with their translation. Indeed, the rotation can only be actuated when the lever of the first blade is inserted in the fixed track and this occurs when the blades are completely in the extended configuration.

[0012] A further drawback of the covering apparatuses of known type lies in the fact that 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.

[0013] A further drawback of the above-described solution lies in the fact that during packing the blades can be stuck on each other and be damaged. Indeed, during packing, the actuation lever is not connected to the fixed track and therefore the blades are not maintained fixed in a predetermined position. Hence, overly high oscillations in translation or particularly windy climate conditions can bring the blades to rotate in an uncontrolled manner and hit against each other or remain stuck.

[0014] The patent US 9,175,511 describes a further covering apparatus of known type, in which the carriages are connected to each other by a pantograph mechanism having one end constrained to a fixed guide element and the other end connected to a head carriage. In addition, the covering apparatus comprises a motor which actuates a worm screw, which is engaged in a nut screw of the head carriage which, following the rotation of the worm screw, is actuated to slide along the lateral longitudinal members, causing the opening or the closing of the pantograph, which in turn determines the sliding of the other carriages, maintaining them equidistant. The carriages are provided with vertical slots in which several pantograph junction pins are inserted. Such solution does not allow resolving the abovementioned problems in a satisfactory manner.

Presentation of the invention

[0015] 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 functionally and designably flexible and versatile in use.

[0016] 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 from the opening movement of the blades themselves.

[0017] A further object of the present invention is to provide a covering apparatus that is reliable in use.

[0018] A further object of the present invention is to

provide a covering apparatus that is structurally simple and inexpensive to make.

Brief description of the drawings

[0019] The technical characteristics of the present invention, according to the aforesaid objects, can be clearly seen from the content 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 several merely exemplifying and non-limiting embodiments of the invention, in which:

- figure 1 shows a top perspective view of the covering apparatus for outside settings, object of the present invention;
- figure 2 shows a perspective view of a detail of the covering apparatus relative to movement means and to the covering blades along a section of a respective lateral beam, in accordance with a first embodiment of the invention, with several components of the movement means removed in order to better show other components of the covering apparatus;
- figure 3 shows a perspective view from another angle of an enlarged detail of figure 2, with several components removed and others transparent;
- figure 4 shows a side view of the detail of figure 3, with several components removed and others transparent;
- figure 5 shows a detail of cam movement means of the present covering apparatus, in accordance with the aforesaid first embodiment;
- figure 6 shows a perspective view of a detail of the covering apparatus relative to movement means and to the covering blades along a section of a respective lateral beam, in accordance with a second embodiment of the invention, with several components of the movement means removed in order to better show other components of the covering apparatus;
- figure 7 shows a perspective view from another angle of an enlarged detail of figure 6, with several components removed and others transparent;
- figure 8 shows the cam actuation means of the covering apparatus in accordance with the aforesaid second embodiment;
- figure 9 shows a perspective view of a detail of the covering apparatus relative to movement means and to the covering blades along a section of a respective lateral beam, in accordance with a third embodiment of the invention, with several components of the movement means removed in order to better show other components of the covering apparatus;
- figure 10 shows a front view of an enlarged detail of figure 9;
- figure 11 shows a perspective view from another angle of an enlarged detail of figure 9, with several components removed and others transparent.

Detailed description of a preferred embodiment

[0020] With reference to the enclosed drawings, reference number 1 overall indicates the covering apparatus that is the object of the present invention.

[0021] The present covering apparatus 1 is indicated for making pergolas, verandas and more generally covering structures of outside environments, such as for example gardens of private homes and open spaces of public places such as restaurants, hotels, bathing establishments etc.

[0022] In accordance with the embodiments illustrated in the enclosed figures, the present covering apparatus 1 comprises a support structure 2 provided with a framework 20, advantageously quadrangular, which comprises at least two lateral beams 21 that are parallel to and side-by-side each other. In addition, the support structure preferably comprises also two front beams 22 that are parallel to and side-by-side each other, placed to connect the lateral beams 21.

[0023] More in detail, advantageously, each lateral beam 21 is longitudinally extended, between a head portion 21' and a bottom portion 21", along a corresponding first extension direction X that is preferably substantially horizontal, and advantageously each front beam 22 is longitudinally extended along a corresponding second extension direction Y substantially orthogonal to the first extension directions X of the lateral beams 21.

[0024] In particular, one of the two front beams 22 is placed to connect the head portions 21' of the lateral beams 21, and the other of the front beams 22 is placed to connect the bottom portions 21" of the lateral beams 21 themselves.

[0025] Advantageously, each beam 21 and 22 of the support structure 2 respectively comprises a first and a second elongated body 23 and 24, each preferably obtained with a metal section, in particular made of extruded aluminum.

[0026] Advantageously, the support structure 2 also comprises two first columns 25 abutted against the ground, and each of which supports the head portion 21' of the corresponding lateral beam 21. Preferably, the support structure 2 comprises two further second columns 26 placed to support the bottom portions 21" of the corresponding lateral beams 21, in this manner attaining a self-supporting structure, in particular with substantially parallelepiped shape.

[0027] Otherwise, in accordance with a different embodiment variant not illustrated in the enclosed figures, the support structure 2 of the covering apparatus 1 is backed against a vertical wall (such as for example the wall of a building), at which the head portions 21' or the bottom portions 21" of the lateral beams 21 are anchored.

[0028] In accordance with a further different embodiment variant not illustrated in the enclosed figures, the head portions 21' and the bottom portions 21" of the lateral beams 21 of the support structure 2 are respectively supported 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.

[0029] Advantageously, the aforesaid lateral beams 21 and front beams 22 of the framework 20 of the support structure 2 between them delimit an upper opening of the support structure 2 itself, placed above a ground surface intended to be protected by the covering apparatus 1.

[0030] According to the present invention, the covering apparatus 1 comprises a series of covering blades 3 placed one after the other according to the aforesaid first extension direction X of the lateral beams 21, preferably from the bottom portions 21" to the head portions 21' of the lateral beams 21, and advantageously actuatable for closing the aforesaid upper opening of the support structure 2, respectively so as to cover the underlying ground surface in order to protect the latter from sun and/or rain.

[0031] Of course, without departing from the protective scope of the present invention, the succession of the aforesaid covering blades 3 can be considered, in an entirely equivalent manner, in the sense opposite that considered above, i.e. from the bottom portions 21" to the head portions 21' of the lateral beams 21.

[0032] Each covering blade 3 is extended, according to a longitudinal axis W thereof that is substantially orthogonal to the first extension direction X (and preferably substantially horizontal), between two opposite ends 31 supported by the respective lateral beams 21. According to the present invention, the covering apparatus 1 comprises first movement means 4 mechanically connected to the covering blades 3 and arranged in order to rotate each of the covering blades 3 around a corresponding rotation axis R, parallel to the longitudinal axis W, between a closed position and at least one open position.

[0033] In particular, the movement of the covering blades 3 between the closed position and the open position is any one movement that has at least one rotary component, for example a pure rotation movement or a rotational-translation movement.

[0034] Advantageously, the covering blades 3 in the closed position, are placed to close the upper opening of the support structure 2, in a manner such, in particular, to cover the underlying ground surface.

[0035] Preferably, in the closed position, the covering blades 3 are placed one in contact with the next (advantageously also by means of seals), in order to close the upper opening of the support structure 2.

[0036] Advantageously, in the open position, the covering blades 3 are placed spaced one from the next, between them delimiting passage openings, advantageously susceptible of being traversed by light and air.

[0037] Preferably, each covering blade 3 is provided with a first longitudinal edge 32 and with a second longitudinal edge 33 which are extended along the corresponding longitudinal axis W between the two opposite ends 31 of the covering blade 3 itself. In particular, the second longitudinal edge 33, with the covering blades 3

in closed position, is placed above the first longitudinal edge 32 of the subsequent covering blade 3.

[0038] Advantageously, each covering blade 3 comprises a central body 34, with elongated shape, which is longitudinally extended along the rotation axis R between two corresponding ends, at which the ends 31 of the covering blade 3 are placed.

[0039] For example, the central body 34 comprises a metal section (e.g. made of extruded aluminum) advantageously closed on its ends by lateral caps 34'.

[0040] In particular, each covering blade 3 (and in particular its central body 34) is extended transversely between the first longitudinal edge 32 and the second longitudinal edge 33 according to a transverse axis T orthogonal to the longitudinal axis W of the covering blade 3 itself.

[0041] Preferably, in addition, each covering blade 3 (and in particular its central body 34) is provided with a closure surface 35, in particular substantially flat, which is advantageously extended between the first longitudinal edge 32 and the second longitudinal edge 33 and, when the covering blade 3 is placed in the closed position, is directed downward and is preferably substantially coplanar with the closure surfaces 35 of the other covering blades 3, also placed in the closed position.

[0042] Advantageously, each covering blade 3 is provided with a pin 36 aligned with the rotation axis R and at least rotatably connected, at each end 31 of the covering blade 3, to the corresponding lateral beam 21, so as to allow the rotation of the covering blade 3.

[0043] Preferably, the pin 36 projects overhanging and towards the exterior from the corresponding end 31 of the covering blade 3, and can also be formed by multiple parts, e.g. two separate parts constrained to the corresponding ends 31 and aligned with the rotation axis R.

[0044] Advantageously, the rotation axis R of each covering blade 3, and in particular the corresponding pin 36, are preferably placed at the first longitudinal edge 32 of the covering blade 3.

[0045] Advantageously, the first movement means 4 comprise at least one actuation element 41, which is provided with a first longitudinal guide 41' (obtained for example with a first hollow rail), with which a corresponding end 31 of each covering blade 3 is slidably and rotatably engaged. The actuation element 41 is advantageously actuatable in order to be moved on a movement plane M substantially perpendicular to the rotation axes R of the covering blades 3 (and in particular substantially vertical) in order to rotate the covering blades 3 between the open position and the closed position.

[0046] Advantageously, the actuation element 41 comprises a rigid body (possibly constituted by multiple parts fixed together) which is extended at least along the first extension direction X of the lateral beams 21, so as to be connected to the corresponding ends 31 of the covering blades 3.

[0047] In accordance with the embodiment illustrated in the enclosed figures, the actuation element 41 com-

prises a movable bar 41 which is extended substantially parallel to the first extension direction X of the lateral beams 21.

[0048] In particular, the actuation element 41 is actuable for completing, on the movement plane M, a translation motion having only one component (in particular vertical) orthogonal to the first extension direction X.

[0049] In this manner, this movement type allows a more compact configuration of the lateral beams 21, not requiring space for a horizontal translation of the embodiment itself.

[0050] Of course, without departing from the protective scope of the invention, the actuation element 41 (and in particular the movable bar) can also be actuated for completing a translation motion with a component (in particular horizontal) parallel to the first extension direction X of the lateral beams 21, e.g. each point of the actuation element 41 can complete a curved or oblique trajectory.

[0051] In accordance with a non-illustrated embodiment variant, the first movement means 4 comprise (in place of the actuation element 41) an actuator kinematic mechanism composed of multiple movable parts connected to the ends 31 of the covering blades 3, such as for example a pantograph kinematic mechanism.

[0052] Advantageously, each covering blade 3 carries mounted thereon, at at least one of the ends 31, an engagement element 43 placed in distal position with respect to the rotation axis R of the covering blade 3 itself. The engagement element 43 is advantageously rotatably and slidably engaged with the longitudinal guide 41' of the actuation element 41, allowing the movement of the covering blades 3 during the movement between a packed configuration and an extended configuration, described more in detail hereinbelow.

[0053] Advantageously, in addition, the engagement element 43 comprises a slide device 43', e.g. a wheel, rotatably connected (in particular in an idle manner) to the end 31 of the covering blade 3 and slidable along the longitudinal guide 41'.

[0054] According to the present invention, the covering apparatus 1 comprises second movement means 5 mechanically connected to the covering blades 3 and arranged for translating the aforesaid covering blades 3 along the first extension direction X of the lateral beams 21. In particular, the covering blades 3 are movable by the second movement means 5 between a packed configuration, in which the covering blades 3 are placed next to each other in the open position at the head portions 21' (or, alternatively, at the bottom portion 21'') of the aforesaid lateral beams 21, and an extended configuration, in which the covering blades 3 are placed distributed along the first extension direction X of the lateral beams 21.

[0055] Advantageously, the second movement means 5 comprise two fixed first lateral guides 51, each arranged on the corresponding lateral beam 21 and extended parallel to the lateral beam 21, and a plurality of carriages 52, which are slidably engaged with the first lateral guides

51. In particular, each carriage 52 advantageously carries, rotatably mounted thereon, a corresponding covering blade 3 around the rotation axis R, at the respective end 31.

[0056] In particular, a first end blade 3' is fixed along the first lateral guides 51 (since it is only able to rotate) and is advantageously pivoted to two carriages 52' fixed to the corresponding lateral beams 21 in a manner such that the first end blade 3' always remains placed at the head portions 21' (or bottom portions 21'') of the lateral beams 21, while the other covering blades 3, during the movement between the packed configuration and the extended configuration, slide along the first lateral guides 51 by means of the corresponding carriages 52. In particular, in the passage from the packed configuration to the extended configuration, a second end blade 3'', opposite the first end blade 3' in the series of covering blades 3, is brought by the respective carriages 52 to the bottom portions 21'' (or head portions 21') of the lateral beams 21.

[0057] In particular, each first lateral guide 51 is provided with one or more rails 51', with which the carriages 52 are coupled, by means of corresponding wheels.

[0058] Advantageously, each carriage 52 comprises a lower portion, engaged with the corresponding first lateral guide 51 (and in particular provided with wheels), and an upper portion (preferably integral with the lower portion) which is raised above the first lateral guides 51 and with which the pin 36 of the corresponding covering blade 31 is hinged.

[0059] Advantageously, in addition, the second movement means 5 comprise at least one movement device 53, which is mechanically connected to the carriages 52 and arranged in order to move them along the first lateral guides 51 in order to move the covering blades 3 between the packed configuration and the extended configuration.

[0060] In accordance with the idea underlying the present invention, the covering apparatus 1 also comprises cam actuation means 6, which are provided with a translation profile 62, mechanically engaged, by means of a translation cam follower 50, to the second movement means 5.

[0061] Advantageously, the cam means 6 are provided with a rotation profile 61 mechanically engaged, by means of a rotation cam follower 40, to the first movement means 4.

[0062] The covering apparatus 1 also comprises motor means 7, which are mechanically connected to the cam actuation means 6, and are arranged for moving, parallel to the movement plane M, the translation profile 62 in order to drive the second movement means 5 to move the covering blades 3 between the packed configuration and the extended configuration.

[0063] Advantageously, the motor means 7 are arranged for moving, parallel to the movement plane M, the rotation profile 61 in order to drive the first movement means 4 (and in particular the actuation element 41) to rotate the covering blades 3 between the closed position

and the open position.

[0064] In particular, the profiles 60, 61 of the cam means 6 operate as driving members, while the cam followers 40, 50 as driven members, according to the generally known jargon of the field.

[0065] The motor means 7 are advantageously arranged for moving the translation profile 62 (and preferably the rotation profile 61) of the cam actuation means 6 along a translation direction S substantially parallel to the first extension direction X of the lateral beams 21.

[0066] In this manner, in particular, by means of the claimed configuration of the cam movement means 6, the motor means 7 are capable of moving, by means of the translation profile 62, the translation movement of the covering blades 3.

[0067] Advantageously, the motor means 7 are capable of moving, by means of the rotation profile 61, the rotation movement of the covering blades 3.

[0068] Such configuration confers particular design and functional flexibility and versatility, since it is sufficient to modify the shape of the profiles 61, 62 of the cam movement means in order to determine the movement law of the covering blades 3 in the translation between the extended configuration and the packed configuration and advantageously in the rotation between the open position and the closed position.

[0069] More in detail, the translation profile 62, and preferably the rotation profile 61, of the cam actuation means 6 advantageously lie on corresponding lying planes parallel to the movement plane M.

[0070] Preferably, the covering apparatus 1 comprises guide means (not illustrated in the enclosed figures) defining the aforesaid translation direction S. The cam actuation means 6 are therefore advantageously slidably constrained to the guide means in order to slide the translation profile 62 (and preferably the rotation profile 61) along the translation direction. For example, the guide means comprise one or more rails, placed in the corresponding lateral beam 21, along which the cam actuation means 6 are susceptible of sliding.

[0071] Of course, without departing from the protective scope of the present invention, the guide means might not be implemented by the same motor means 7 which sustain and support the cam actuation means 6 (also without the arrangement of suitable rails on the lateral beam 21).

[0072] In accordance with the embodiments illustrated in figures 5 and 8, the rotation profile 61 advantageously comprises at least one movement section 63 which is tilted with respect to the translation direction S of the guide means.

[0073] The translation profile 62 advantageously comprises at least one displacement section 64 which is tilted with respect to the translation direction S of the guide means.

[0074] In this manner, the movement along the translation direction S of the profiles 61, 62 is advantageously transformed into a substantially vertical movement of the

cam followers 40, 50, which in turn actuate the first and the second movement means 4, 5.

[0075] The rotation and translation displacement sections 63, 64 are advantageously configured in a manner such that the movements of the covering blades 3, respectively, between the open and closed positions and between the extended and packed configurations occur at separate moment. For such purpose, the profiles 61, 62 are configured in a manner such that, when the rotation cam follower 40 is engaged with the movement section 63 of the rotation profile 61, the translation cam follower 50 is outside the displacement section 64 of the translation profile 62. In addition, advantageously, when the translation cam follower 50 is engaged with the displacement section 64 of the translation profile 62, the rotation cam follower 40 is outside the movement section 63 of the rotation profile 61.

[0076] Of course, without departing from the protective scope of the invention, the movement section 63 and/or the displacement section 64 can be rectilinear or curved, with tilts dependent on the speed with which one desires to pass between the open and closed positions and between the extended and packed configurations.

[0077] Advantageously, the rotation profile 61 is provided with a first maintenance section 65 which is substantially parallel to the translation direction S and which, when the covering blades 3 are in the open position, engages the rotation cam follower 40, at least when the translation cam follower 50 is engaged with the displacement section 64 of the translation profile 62. In this manner, the aforesaid first maintenance section 65 stably maintains the covering blades 3 in open position during the translation between extended configuration and packed configuration, preventing the covering blades 3 themselves from being angularly shifted from the open position.

[0078] Advantageously, in addition, the translation profile 62 is provided with a second maintenance section 66 which is substantially parallel to the translation direction S and which, when the covering blades 3 are in the extended configuration, engages the translation cam follower 50, at least when the rotation cam follower 40 is engaged with the movement section 63 of the rotation profile 61. In this manner, the aforesaid second maintenance section 66 maintains the covering blades 3 stably spaced in extended configuration, during their rotation between closed and open positions.

[0079] Of course, the profiles 61, 62 can be provided with multiple displacement sections and multiple maintenance sections based on the movement requirements of the covering blades 3.

[0080] In accordance with a different embodiment of the present invention, and without departing from the protective scope of the present patent, the profiles 61, 62 can be configured in a manner such that the movement section and displacement section 63, 64 simultaneously engage, respectively, the rotation and translation cam followers 40, 50. Such configuration is for example aimed

to ensure that the passage of the covering blades 3 from the extended configuration to the packed configuration occurs at least partly simultaneously with respect to the passage from the closed position to the open position.

[0081] In general, based on the shape of the profiles 61, 62, it is advantageously possible to adjust in a versatile manner the synchrony of the movements, as well as the speed and the stresses applied to the mechanical components of the covering apparatus 1.

[0082] In accordance with the embodiments illustrated in the enclosed figures, the cam means 6 comprise one or more cam bodies 60, 60A, 60', 60", on which one or both profiles 61, 62 are made (advantageously such cam bodies 60, 60A, 60', 60" being elements separate from the carriages 52).

[0083] For example, the aforesaid cam bodies 60, 60A, 60', 60" can be made of machined metal sheet or of polymer material.

[0084] Advantageously, the cam body 60, 60A, 60', 60" is mechanically connected to the motor means 7 in order to be moved along the translation direction S. Preferably, the actuator means comprise one or more linear actuators connected to one or more of the cam bodies 60, 60A, 60', 60".

[0085] In accordance with the examples illustrated in the enclosed figures, the cam bodies 60, 60A, 60', 60" have substantially plate-like shape, and are preferably placed parallel to the movement plane M.

[0086] Advantageously, the cam body 60, 60A, 60', 60" is provided with a corresponding internal face 601, directed towards the corresponding end 31 of the covering blade 3, and on such internal face 601 the corresponding profile 61, 62 or both profiles 61, 62 are made.

[0087] Advantageously, the rotation profile 61 comprises a first slide track 67 (in particular made on the internal face 601) provided with two first longitudinal sides 67' between which the rotation cam follower 40 is slidably inserted, substantially to size.

[0088] Preferably, in addition, the translation profile 62 comprises a second slide track 68 (in particular made on the internal face 601) provided with two second longitudinal sides 68' between which the translation cam follower 50 is slidably inserted, substantially to size.

[0089] In accordance with a first embodiment, illustrated in figures 2-4, the cam actuation means 6 comprise a common cam body 60 (for example made in a single body) on which both the rotation profile 61 and the translation profile 62 are made. In particular, the motor means 7 advantageously comprise a linear actuator 71 connected to the cam body 60 and preferably placed within the lateral beam 21.

[0090] Still with reference to the first embodiment illustrated in figures 2-4, the cam actuation means 6 also advantageously comprise an auxiliary cam body 60A placed along the first extension direction X of the lateral beam 21 spaced from the cam body 60.

[0091] The aforesaid auxiliary cam body 60A is provided with a corresponding auxiliary profile which is sub-

stantially equal to the rotation profile 61 and is intended to be engaged by a corresponding third cam follower mechanically placed along the actuation element 41 (and in particular along the movable bar) when the rotation cam follower 40 is engaged by the rotation profile 61 of the cam body 60.

[0092] In particular, the auxiliary cam body 60A is connected to the cam body 60 by means of a coupling bar 69 fixed to such cam bodies 60, 60A, in a manner such that the motor means 7 can move them simultaneously along the translation direction S.

[0093] Such configuration, in particular, allows distributing the forces transmitted by the cam actuation means 6 to the actuation element 41 at two different points, spaced from each other, of the actuation element 41 itself such to better balance the movement of the latter and prevent jamming with the engagement elements 43 of the covering blades 3.

[0094] In accordance with a second embodiment illustrated in figures 6 and 7, the cam actuation means 6 comprise two separate cam bodies 60', 60", including a first cam body 60', on which the rotation profile 61 is obtained, and a second cam body 60", on which the translation profile 62 is obtained. Preferably such first and second cam bodies 60', 60" are separately made and are placed spaced from each other along the first extension direction X of the lateral beam 21. Advantageously, the motor means 7 comprise a first linear actuator 71' and a second linear actuator 71" respectively connected to the first and to the second cam body 60', 60" and suitably placed within the lateral beam 21. Such configuration of the motor means 7 allows in particular to independently move the two cam bodies 60', 60" and hence the respective profiles 61, 62. In this manner, by means of the separate control of the linear actuators 71', 71", the movements of the covering blades 3 between extended configuration and packed configuration and between open position and closed position are advantageously controlled independent of each other.

[0095] Suitably, in particular according to the aforesaid first and second embodiment, one of the cam bodies 60, 60A, 60', 60" is placed at the head portion 21' of the lateral beams 21 while the other is placed in a position substantially intermediate between the head portion 21' and the bottom portion 21" of the lateral beams 21.

[0096] Of course, the movement means 6 can also comprise more than two cam bodies, as a function of the structural and functional needs of the specific applications.

[0097] In accordance with a third embodiment illustrated in the enclosed figures 9-11, the cam actuation means 6 comprise a common cam body 60, analogous to the aforesaid first embodiment, without however arranging the auxiliary cam body 60A.

[0098] Of course, without departing from the protective scope of the invention, in place of the linear actuators 71 it is possible to arrange any other type of electric motor connectable to the cam actuation means 6 by means of

kinematic mechanisms suitable for moving such cam actuation means 6 along the translation direction S.

[0099] Advantageously, the covering apparatus 1 is provided with a logic control unit (not represented in the figures) electrically connected to the motor means 7 in order to enable the operation thereof. In particular, in the event in which the motor means comprise multiple linear actuators 71', 71'', the logic control unit is configured for synchronizing their actuation based on the desired operating needs.

[0100] Advantageously, the actuation element 41 is provided with a second longitudinal guide 41'' (for example obtained with a second hollow rail), illustrated for example in the enclosed figures 9-11.

[0101] In addition, the first movement means 4 advantageously comprise a fixed guide 42, illustrated in figure 11, integral with the support structure 2 and extended parallel to the first extension direction X of the lateral beam 21.

[0102] Advantageously, the first movement means 4 comprise motion transmission means 8 placed as a mechanical connection between the actuation element 41 and the rotation cam follower 40. The motion transmission means 8 are advantageously arranged, following the engagement of the cam follower 40 on the movement section 63 of the rotation profile 61, to move the actuation element 41 along a movement direction D substantially orthogonal to the first extension direction X and to the longitudinal axis W, and preferably vertical, as indicated above.

[0103] More in detail, the motion transmission means 8 advantageously comprise a scissors device 81, which is provided with a first arm 82 extended between a first hinging portion 83, which is pivoted, preferably by means of entirely rotational coupling, with the actuation element 41, and a first slide portion 84, which is slidably and rotatably engaged with the fixed guide 42.

[0104] In addition, the scissors device 81 advantageously comprises a second arm 85 extended between a second hinging portion 86, which is pivoted, preferably by means of entirely rotational coupling, to the fixed guide 42, and a second slide portion 87, which is slidably and rotatably engaged with the second longitudinal guide 41'' of the actuation element 41.

[0105] In particular, the first arm 82 and the second arm 85 are preferably hinged with each other around a pivoting axis, which is advantageously parallel to the rotation axis R of the covering blades 3, is interposed (preferably in median position) between the first hinging portion 83 and the first slide portion 84 of the first arm 82, and is interposed (preferably in median position) between the second hinging portion 86 and the second slide portion 87 of the second arm 85. Preferably, the rotation cam follower 40 is mounted at least on one between the first arm 82 and the second arm 85, still more preferably at the pivoting axis.

[0106] In this manner, it is possible to decrease the size of the cam actuation means 6. Indeed, advanta-

geously, the motion is not directly transmitted to the actuation element 41, and therefore it is not necessary to arrange a rotation profile 61 such that it reaches the maximum height reached by the actuation element 41, for example when the covering blades 3 are in open position.

[0107] In order to optimize the balancing between the compactness of the components and the stresses applied, the pivoting axis is advantageously placed at the midpoint of the first arm 82 and at the midpoint of the second arm 85.

[0108] Advantageously, the motion transmission means 8 are provided with at least two scissors devices 81 placed spaced along the fixed guide 42, as illustrated in figures 6, 7 and 9, in order to render the actuation element 41 more reliable in movement, balancing the eccentric forces applied on the rotation cam follower 40.

[0109] Of course, the rotation cam follower 40 can also be mounted directly on the actuation element 41, as illustrated in the example of figures 2-4, without departing from the protective scope of the present invention. In addition, in accordance with a non-illustrated embodiment variant, the actuation element 41 can be slidably connected to the corresponding lateral beam 21 by means of guide means which constrain the movement according to the movement direction D.

[0110] In accordance with the preferred embodiment of the invention, illustrated in the enclosed figures, the first movement means 4 comprise multiple movement levers 44, each of which interposed between the end of the covering blade 3 and the actuation element 41. In particular, each movement lever 44 is fixed, preferably removably, at one of the ends 31 of a corresponding covering blade 3 and carries, mounted thereon, the engagement element 43 engaged, slidably and rotatably, with the actuation element 41 in order to move the covering blade 3 between the open position and the closed position.

[0111] More in detail, the movement lever 44 has L shape and is provided with a first component 45 and a second component 46 connected to each other by a junction portion 47.

[0112] Advantageously, the movement lever 44 is extended between a first end portion 45' of the first component 45 and a second end portion 46' of the second component 46 and is advantageously fixed to the end of the covering blade 3, for example by means of screws and bolts fixed at the first end portion 45' and/or at the second end portion 46', reversible connection means or other attachment means of known type, so as to render the movement lever 44 integral in rotation with the covering blade 3.

[0113] Preferably, in addition, the movement lever 44 carries, mounted thereon, at the first end portion 45' of the first component 45 (or at the second end portion 46' of the second component 46), the pin 36 of the covering blade 3. Advantageously, in addition, the engagement element 43 is fixed to the movement lever 44 at the junction portion 47 of the latter.

[0114] Operatively, the sliding of the rotation profile 61 of the cam actuation means 6 in a first sense along the translation direction S moves upward, i.e. away from the ground, the rotation cam follower 40 and consequently the actuation element 41. The latter in turn acts with a first thrust force on the movement lever 44, which determines the rotation of the covering blade 3 in a first rotation sense from the closed position to the open position.

[0115] However, the sliding of the rotation profile 61 of the cam actuation means 6 in a second sense, opposite the first sense, moves downward, i.e. closer to the ground, the rotation cam follower 50 and consequently the actuation element 41. The latter acts with a second thrust force on the movement lever 44, which determines the rotation of the covering blade 3 in a second rotation sense from the open position to the closed position.

[0116] In accordance with the preferred embodiment of the invention, illustrated in the enclosed figures, the movement device 53 of the second movement means 5 carries, mounted thereon, the translation cam follower 50.

[0117] Therefore, the movement device 53 is arranged for moving the carriages 52, following the movement of the translation cam follower 50 along the translation profile 62.

[0118] For example, the movement device 53 comprises a series of pairs of movement rods 54 connected to a pantograph.

[0119] More in detail, at least one pair of rods 54 comprises a first movement rod 55 and a second movement rod 56.

[0120] Advantageously, the second movement rod 56 comprises a first connection portion 56', rotatably connected to the first movement rod 55 of a preceding pair 54' in the series of pairs of rods 54, a second connection portion 56'', rotatably connected to the first movement rod 55 of a subsequent pair 54'' in the series of pairs of rods 54, and a central connection portion 57, rotatably connected to the first movement rod 55 of the aforesaid pair of rods 54.

[0121] In particular, the carriages 52 are advantageously rotatably constrained to a corresponding connection portion between the first connection portion 56' and the second connection portion 56'' (preferably the first connection portion 56') of the second movement rods 56 of alternate pairs of rods 54.

[0122] In addition, the second movement device 5 advantageously comprises at least one second lateral guide (not illustrated in the enclosed figures), arranged on the corresponding said lateral beam 21 and extended advantageously along the first extension direction X of the lateral beam 21 itself.

[0123] Advantageously, each first connection portion 56' carries, mounted thereon, a slide element 58, for example a wheel, slidably engaged with the second lateral guide.

[0124] Advantageously, in addition, the translation cam follower 50 is fixed to the second connection portion

56'' of the second rod 56 of at least one pair of rods 54.

[0125] In this manner, the movement of the translation profile 62 along the translation direction S brings the translation cam follower 50 to be moved vertically and consequently brings the first and the second movement rods 55, 56 connected to a pantograph to be extended or packed (based on the movement sense of the translation profile 62). The carriages 52 and the corresponding covering blades 3 are therefore consequently driven by the movement device 53 to slide along the first lateral guides 51.

[0126] Advantageously, in order to uniformly distribute the loads on both sides of the covering apparatus 1, the first movement means 4 comprise two actuation elements 41 (in particular two movable bars), each placed in a corresponding lateral beam 21 and connected in the previously-described modes to a corresponding end 31 of the covering blade 3.

[0127] Advantageously, the second movement means 5 also comprise two movement devices 53, each placed in a respective lateral beam 21 and connected to the carriages 52 on which the corresponding ends 31 of the covering blades 3 are mounted.

[0128] Advantageously, in addition, the cam actuation means 6 are placed at both ends 31 of the covering blades 3, by means of arranging the profiles 61, 62 along each of the lateral beams 21, for example by arranging, at both lateral beams 21, the cam bodies 60, 60A, 60', 60'' treated in the above-discussed embodiments.

[0129] Suitably, motor means 7 are provided at both lateral beams 21, e.g. by means of linear actuators 71, 71', 71'' according to the above-discussed configurations.

[0130] Advantageously, the motor means (and in particular the linear actuators 71, 71', 71'') are synchronized by means of the logic control unit, so as to simultaneously move the cam movement means 6 at both ends 31 of the covering blades 3 in order to ensure the correct movement of the latter.

[0131] Of course, without departing from the protective scope of the invention, the movement of the cam movement means 6 can be mechanically synchronized by means of a single rotary actuator placed within one of the front beams 22 and mechanically connected to the rotation profiles 61 and/or to the translation profiles 62 through motion transformation means. For example, the motion transformation means can comprise two transmission shafts, each connected to a transmission belt in turn provided with one portion fixed to the respective rotation profile 61 and/or translation profile 62.

[0132] In operation, when the covering blades 3 are in the packed configuration and in open position, the rotation cam follower 40 is engaged in the first maintenance section 65 of the rotation profile 61, while the translation cam follower 50 is engaged with an end of the displacement section 64 of the translation profile 62.

[0133] Advantageously, the movement of the covering blades 3 from the packed configuration with the covering

blades 3 in open position to the extended configuration with the covering blades 3 in closed position occurs by means of the initial movement of the rotation profile 61 and of the translation profile 62 along the movement direction S. From such movement, one obtains the simultaneous sliding of the rotation cam follower 40 along the first maintenance section 65, maintaining the covering blades 3 in open position, and of the translation cam follower 50 along the displacement section 64, in particular downward, moving the covering blades 3 from the packed configuration to the extended configuration.

[0134] Subsequently, the continuation of the movement of the cam actuation means 6 along the movement direction S advantageously brings the rotation cam follower 40 to exit from the first maintenance section 65 in order to engage the movement section 63, and the translation cam follower 50 to exit from the displacement section 64 in order to preferably engage the second maintenance section 66.

[0135] Then, by continuing to move the cam actuation means 6, the rotation cam follower 40 slides along the movement section 63, in particular downward, actuating the covering blades 3 to rotate towards the closed position, and the translation cam follower 50 slides along the second maintenance section 66, maintaining the covering blades 3 in extended configuration. However, with the movement of the rotation profile 61 and of the translation profile 62 along the movement direction S, in a sense opposite the preceding, one advantageously obtains the opposite movement of the covering blades 3 from the extended configuration with the covering blades 3 in closed position to the packed configuration with the covering blades 3 in open position.

[0136] In general, without departing from the protective scope of the present patent, the cam means 6 can also comprise more than one translation cam follower 50 engaged with a same or with separate translation profiles 62, and/or more than one rotation cam follower 40 engaged with a same or with separate rotation profiles 61.

[0137] In accordance with an embodiment variant of the present invention, not illustrated in the enclosed figures, the rotation profile 61 of the cam means 6 (adapted to drive the rotation of the covering blades 3) is substituted by a different drive device, such as for example a pantograph kinematic mechanism placed as a connection between the covering blades 3 and the first movement means 4.

[0138] 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 (20), which comprises at least two lateral beams (21) that are parallel to and side-by-side

each other, each of which is longitudinally extended, along a corresponding first extension direction (X), between a head portion (21') and a bottom portion (21");

- a series of covering blades (3) placed one after the other according said first extension direction (X), each of which said covering blades (3) is extended, according to a longitudinal axis (W) thereof substantially orthogonal to said first extension direction (X), between two opposite ends (31) supported by the respective said lateral beams (21);

- first movement means (4) mechanically connected to said covering blades (3) and arranged for rotating each of said covering blades (3) around a corresponding rotation axis (R), parallel to said longitudinal axis (W), between a closed position and at least one open position;

- second movement means (5) mechanically connected to said covering blades (3) and arranged for translating said covering blades (3) along the first extension direction (X) of said lateral beams (21) between a packed configuration, in which said covering blades (3) are placed next to each other in said open position at the head portions (21') of said lateral beams (21), and an extended configuration, in which said covering blades (3) are placed distributed along the first extension direction (X) of said lateral beams (21);

said covering apparatus (1) being **characterized in that** it comprises:

- cam actuation means (6) provided with at least one translation profile (62), mechanically engaged, by means of at least one translation cam follower (50), with said second movement means (5);

- motor means (7), which are mechanically connected to said cam actuation means (6), and are arranged for moving said translation profile (62) parallel to a movement plane (M) substantially perpendicular to the rotation axes (R) of said covering blades (3), in order to drive said second movement means (5) to move said covering blades (3) between said packed configuration and said extended configuration.

2. Covering apparatus (1) according to claim 1, **characterized in that** the translation profile (62) of said cam actuation means (6) lies on a corresponding lying plane parallel to said movement plane (M).

3. Covering apparatus (1) according to claim 1 or 2, **characterized in that** it comprises guide means defining a translation direction (S) substantially parallel to the first extension direction (X) of said lateral

beams (21), and said cam actuation means (6) are slidably constrained to said guide means in order to slide said translation profile (62) along said translation direction (S).

4. Covering apparatus (1) according to claim 3, **characterized in that** said translation profile (62) comprises at least one displacement section (64) which is tilted with respect to the translation direction (S) of said guide means.

5. Covering apparatus (1) according to any one of the preceding claims, **characterized in that**:

- said cam actuation means (6) are provided with at least one rotation profile (61) mechanically engaged, by means of at least one rotation cam follower (40), with said first movement means (4);

- said motor means (7) are arranged for moving, parallel to said movement plane (M), said rotation profile (61) in order to drive said first movement means (4) to rotate said covering blades (3) between said closed position and said open position.

6. Covering apparatus (1) according to claims 3 and 5, **characterized in that** the rotation profile (61) of said cam actuation means (6) lies on a corresponding lying plane parallel to said movement plane (M).

7. Covering apparatus (1) according to claim 6, **characterized in that** said rotation profile (61) comprises at least one movement section (63) which is tilted with respect to the translation direction (S) of said guide means.

8. Covering apparatus (1) according to claim 7, **characterized in that**:

- with said rotation cam follower (40) engaged with said movement section (63) of said rotation profile (61), said translation cam follower (50) is outside the displacement section (64) of said translation profile (62);

- with said translation cam follower (50) engaged with said displacement section (64) of said translation profile (62), said rotation cam follower (40) is outside the movement section (64) of said rotation profile (61).

9. Covering apparatus (1) according to claim 8, **characterized in that** said rotation profile (61) is provided with a first maintenance section (65) which is substantially parallel to said translation direction (S) and which, with said covering blades (3) in said open position, engages said rotation cam follower (40), at least with said translation cam follower (50) engaged

with the displacement section (64) of said translation profile (62).

10. Covering apparatus (1) according to any one of the preceding claims, **characterized in that** said translation profile (62) comprises a slide track (68) provided with two longitudinal sides (68'), between which said translation cam follower (50) is slidably inserted, substantially to size.

11. Covering apparatus (1) according to any one of the preceding claims 5 to 9, **characterized in that** said first movement means (4) comprise at least one actuation element (41), which is provided with a first longitudinal guide (41') with which a corresponding end (31) of each said covering blade (3) is slidably and rotatably engaged, and is actuable to be moved on said movement plane (M) in order to rotate said covering blades (3) between said open position and said closed position.

12. Covering apparatus (1) according to claim 11, **characterized in that** said first movement means (4) comprise motion transmission means (8) placed as a mechanical connection between said actuation element (41) and said rotation cam follower (40) and arranged, following the engagement of said rotation cam follower (40) on the movement section (63) of said rotation profile (61), to move said actuation element (41) along a movement direction (D) that is substantially orthogonal to said first extension direction (X) and to said longitudinal axis (W).

13. Covering apparatus (1) according to claim 12, **characterized in that** said actuation element (41) is provided with a second longitudinal guide (41''); and **in that** said first movement means (4) comprise a fixed guide (42) integral with said support structure (2) and extended parallel to the first extension direction (X) of said lateral beam (21); wherein said motion transmission means (8) comprise a scissors device (81), which is provided with:

- a first arm (82) extended between a first hinging portion (83), which is pivoted with said actuation element (41), and a first slide portion (84), which is slidably and rotatably engaged with said fixed guide (42);

- a second arm (85) extended between a second hinging portion (86), which is pivoted with said fixed guide (42), and a second slide portion (87), which is slidably and rotatably engaged with second longitudinal guide (41'') of said actuation element (41);

wherein said first arm (82) and said second arm (85) are hinged to each other around a pivoting axis, which is parallel to the rotation axis (R) of said cov-

ering blades (3), is interposed between the first hinging portion (83) and the first slide portion (84) of said first arm (82), and is interposed between the second hinging portion (86) and the second slide portion (87) of said second arm (85);

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wherein said rotation cam follower (50) is mounted at least on one between said first arm (82) and second arm (85).

14. Covering apparatus (1) according to any one of the preceding claims, **characterized in that** said second movement means (5) comprise:

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- two fixed first lateral guides (51), each arranged on the corresponding said lateral beam (21) and extended parallel to said lateral beam (21), and
- a plurality of carriages (52), which are slidably engaged with said first lateral guides (51).

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15. Covering apparatus (1) according to any one of the preceding claims, **characterized in that** said cam means (6) comprise at least one cam body (60, 60A, 60', 60"), on which at least said translation profile (62) is obtained.

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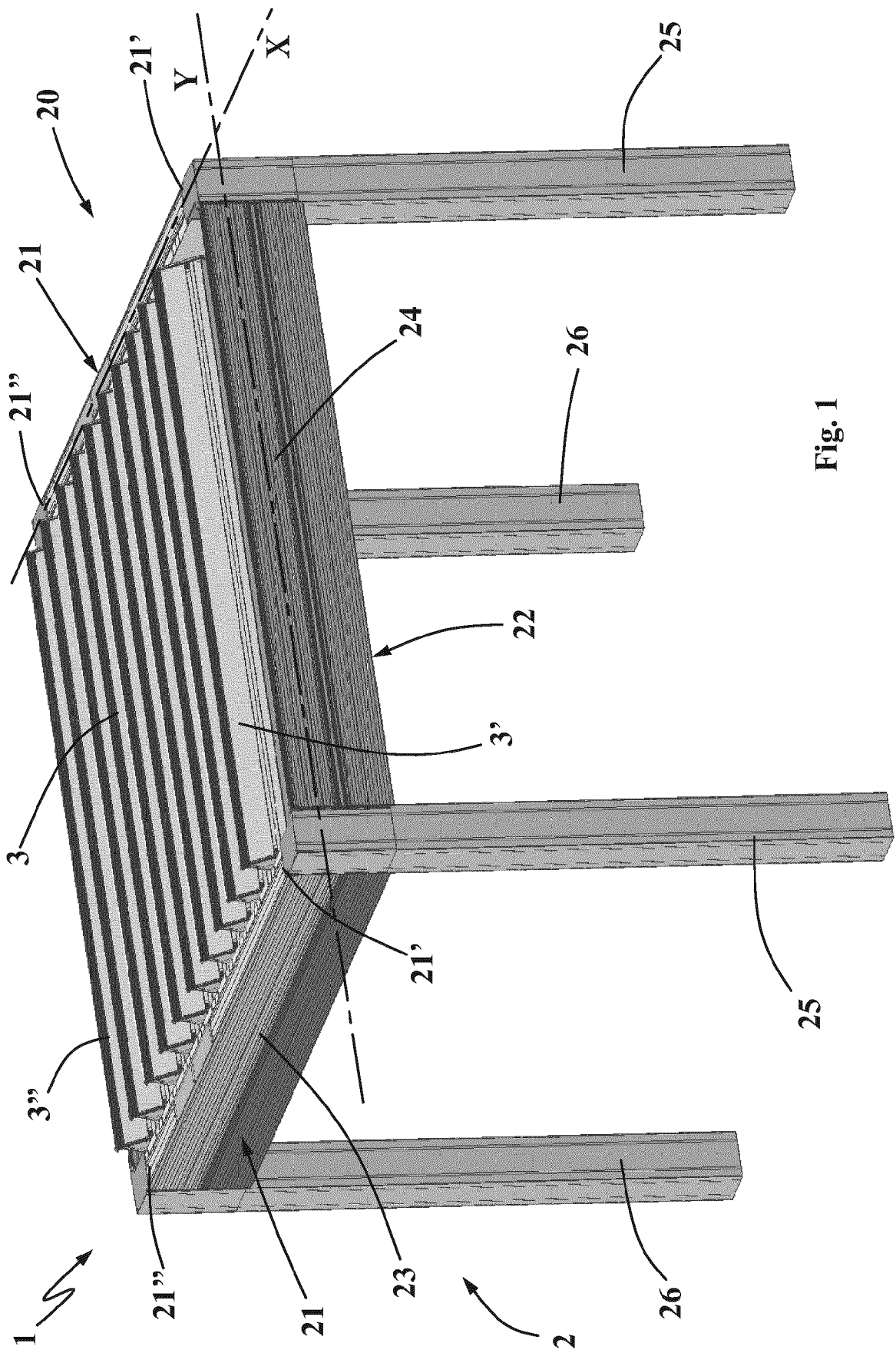
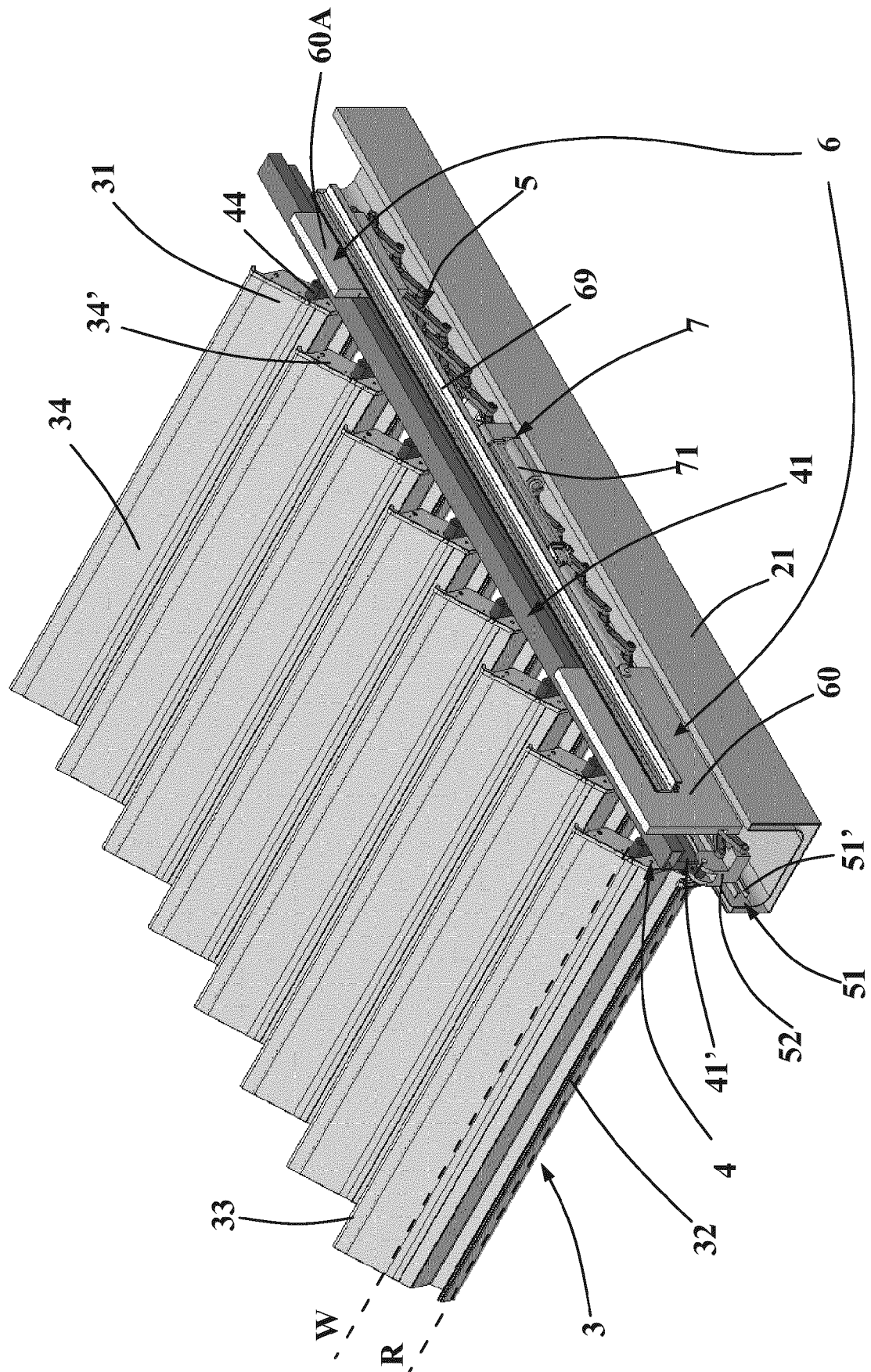


Fig. 1



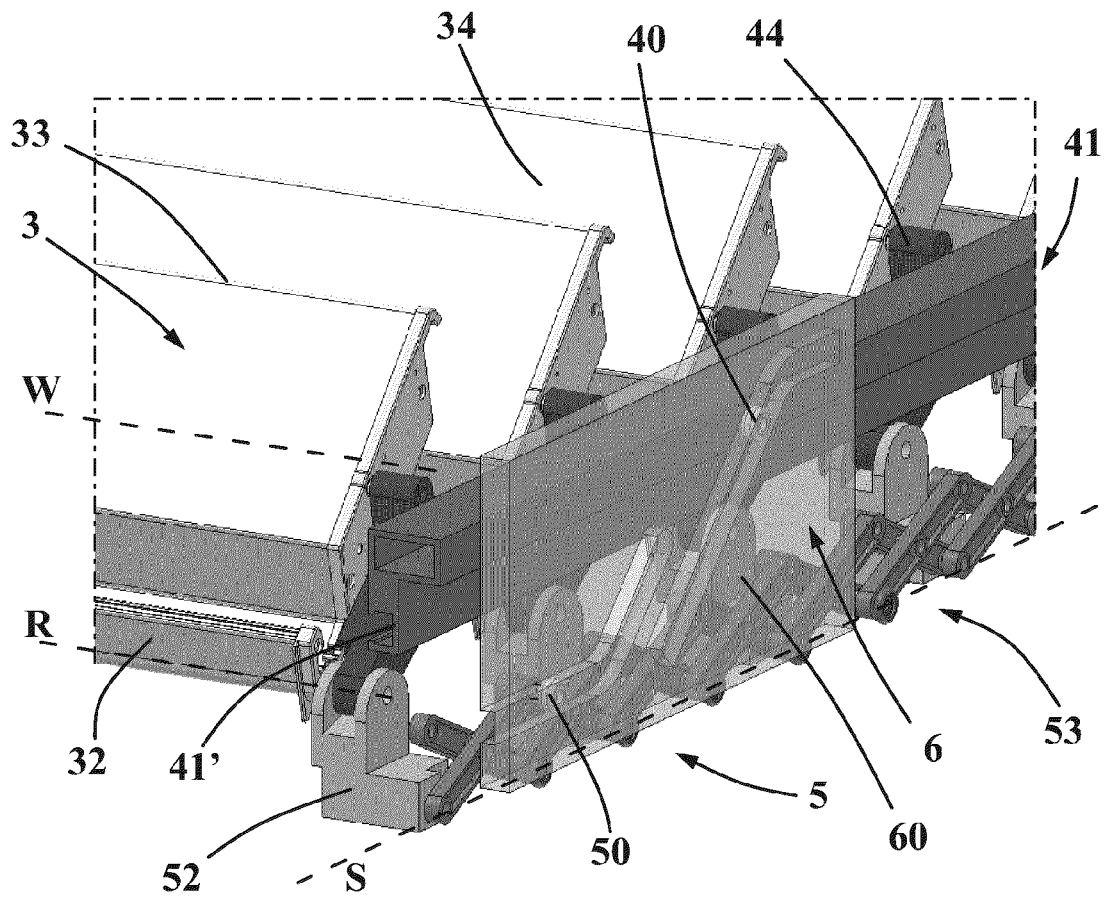


Fig. 3

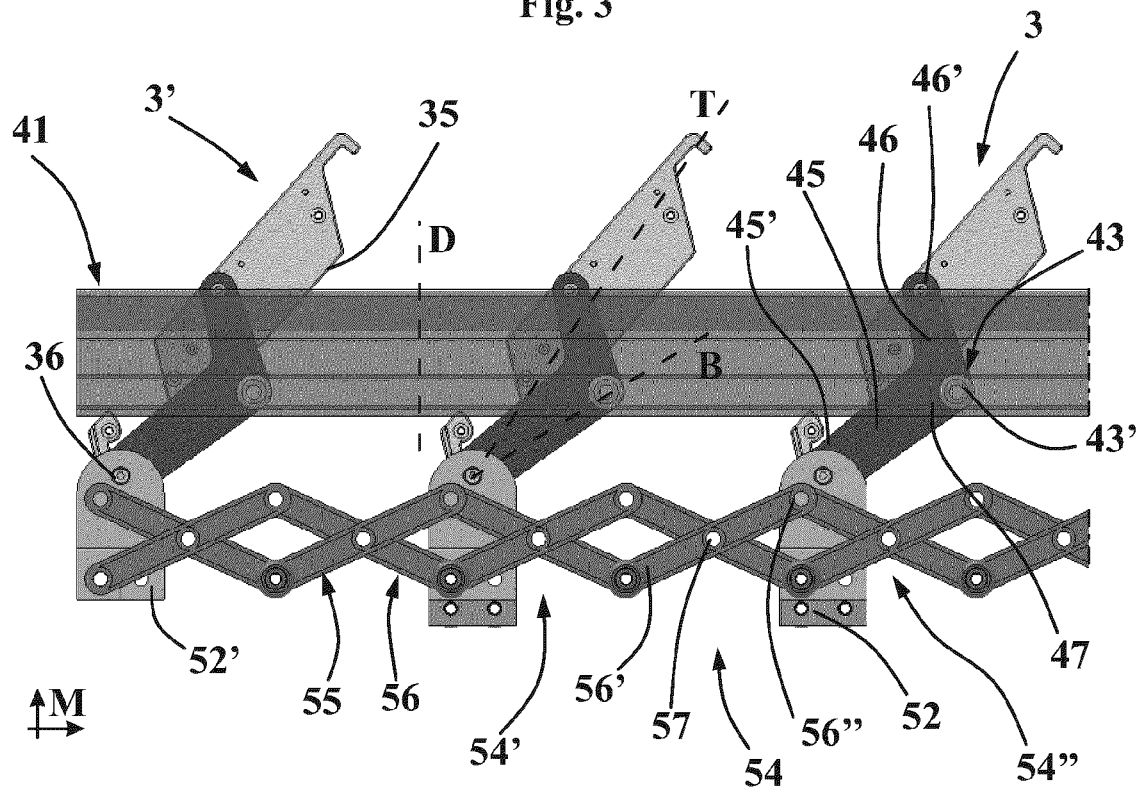
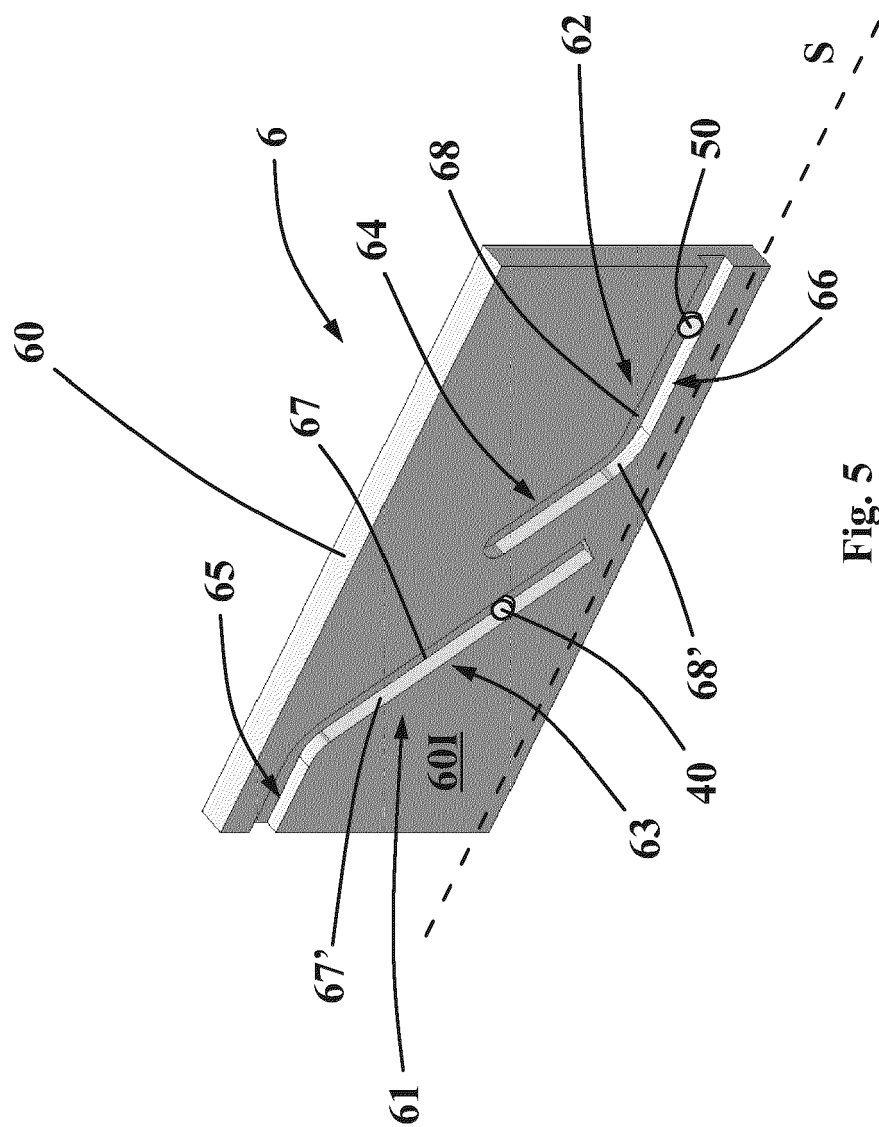


Fig. 4



File 5

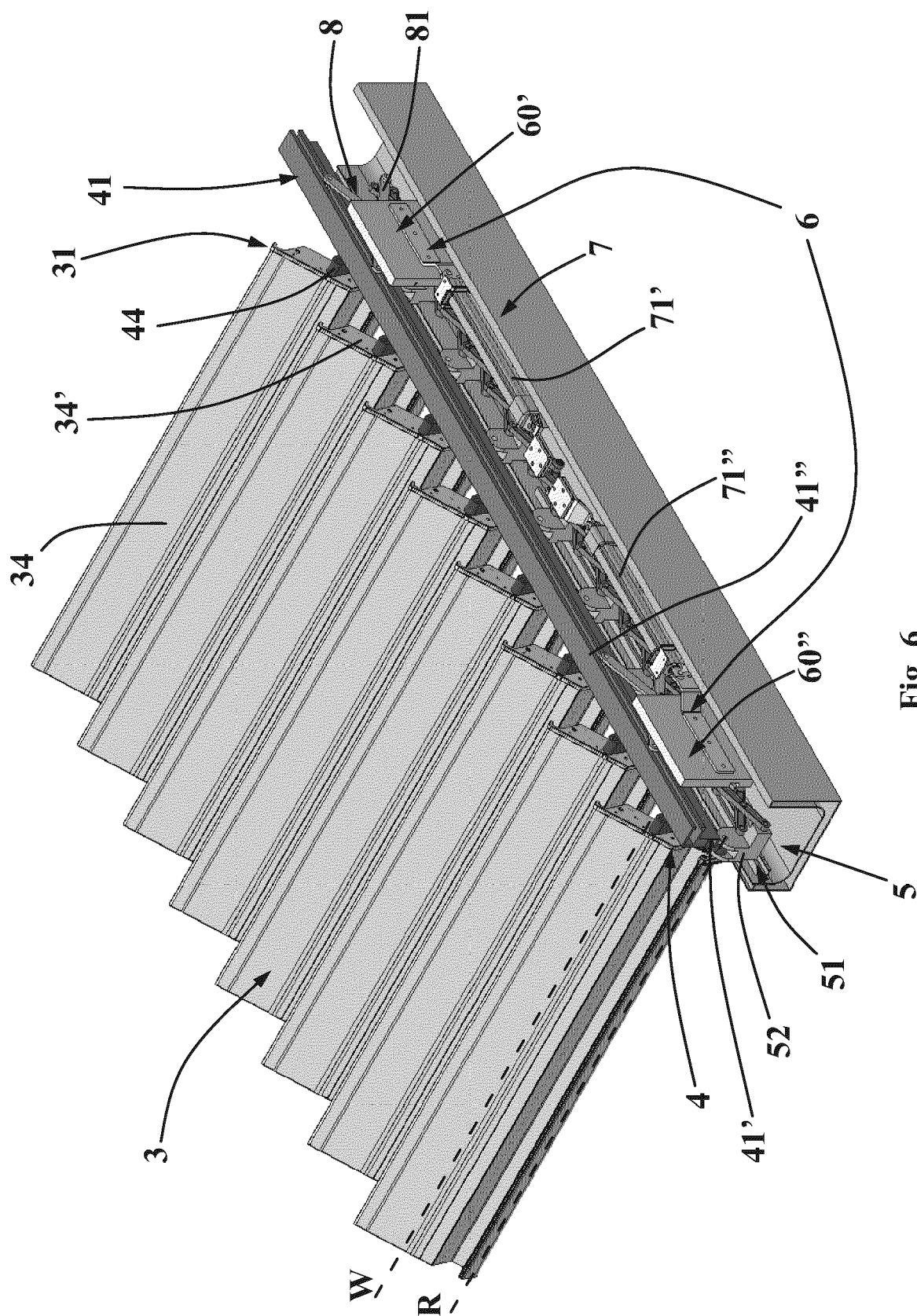


Fig. 6

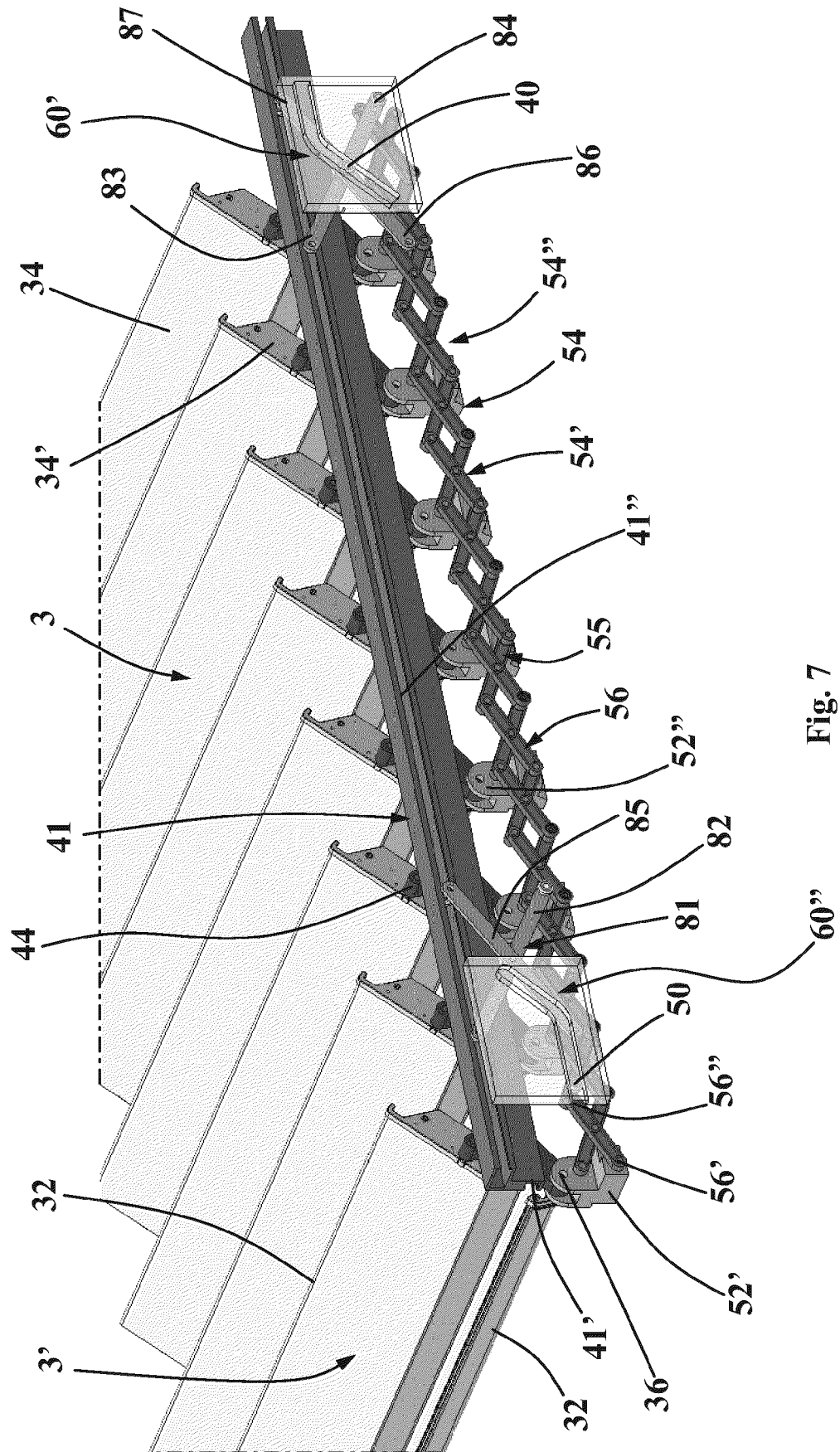


Fig. 7

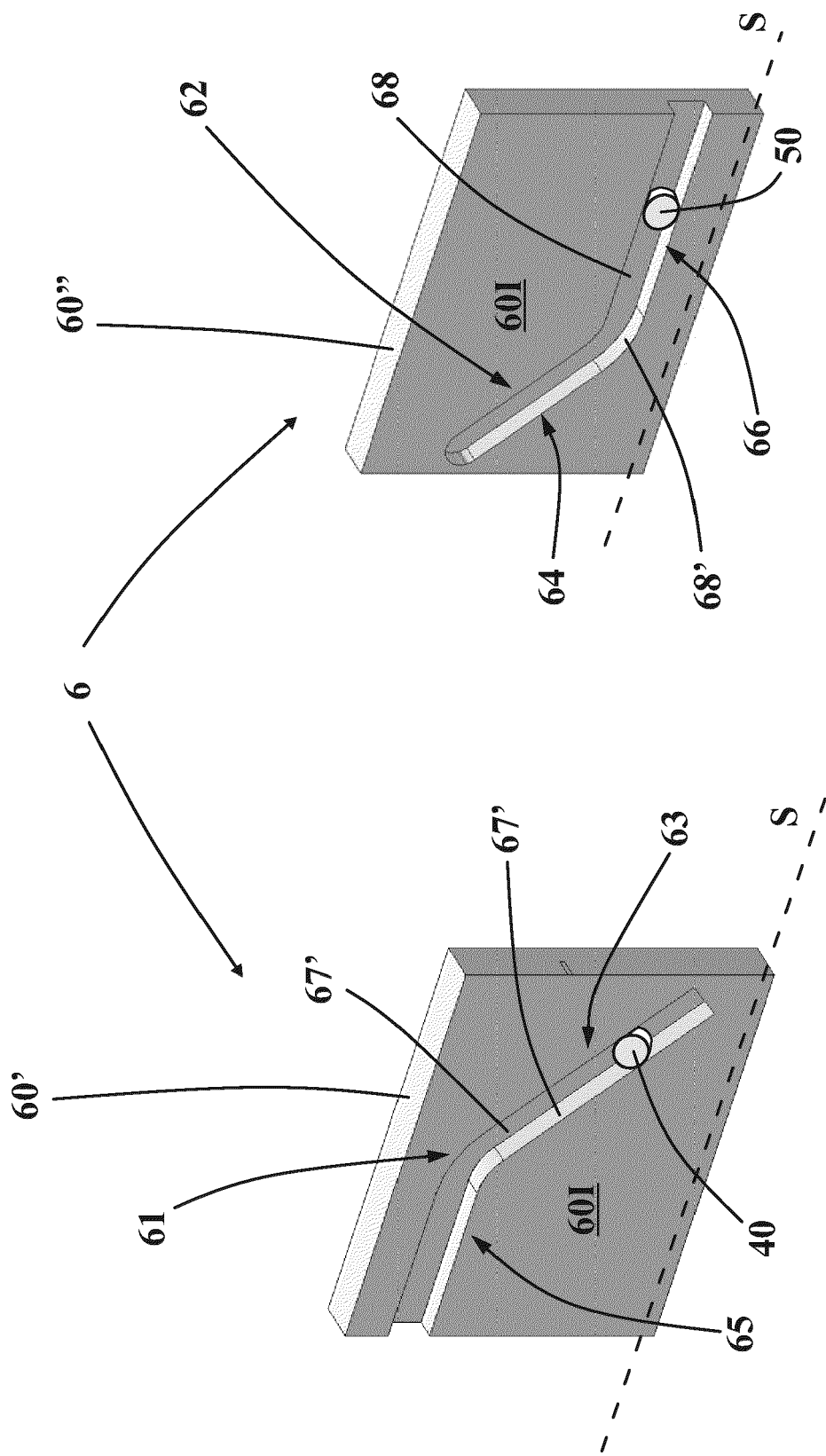
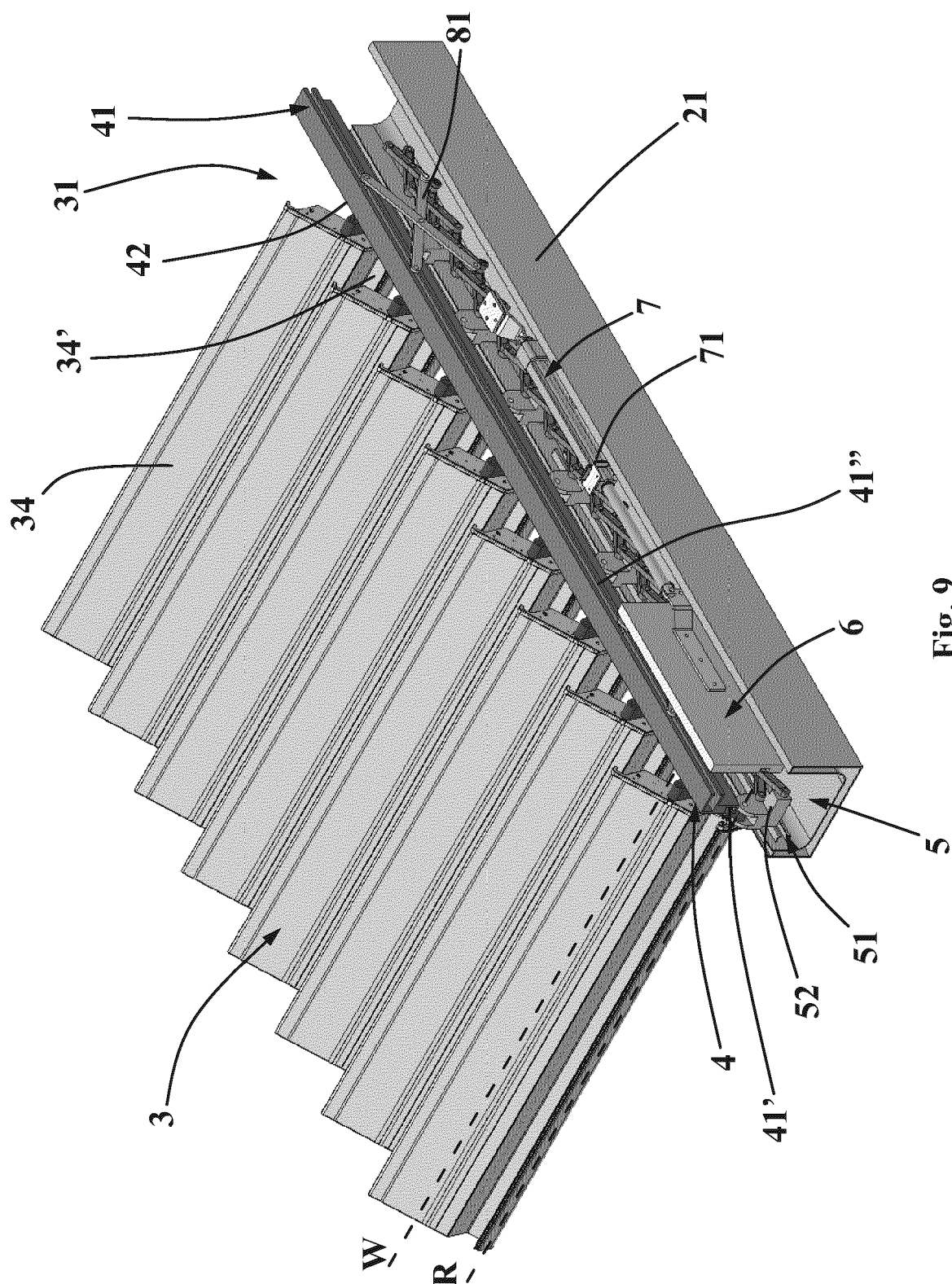
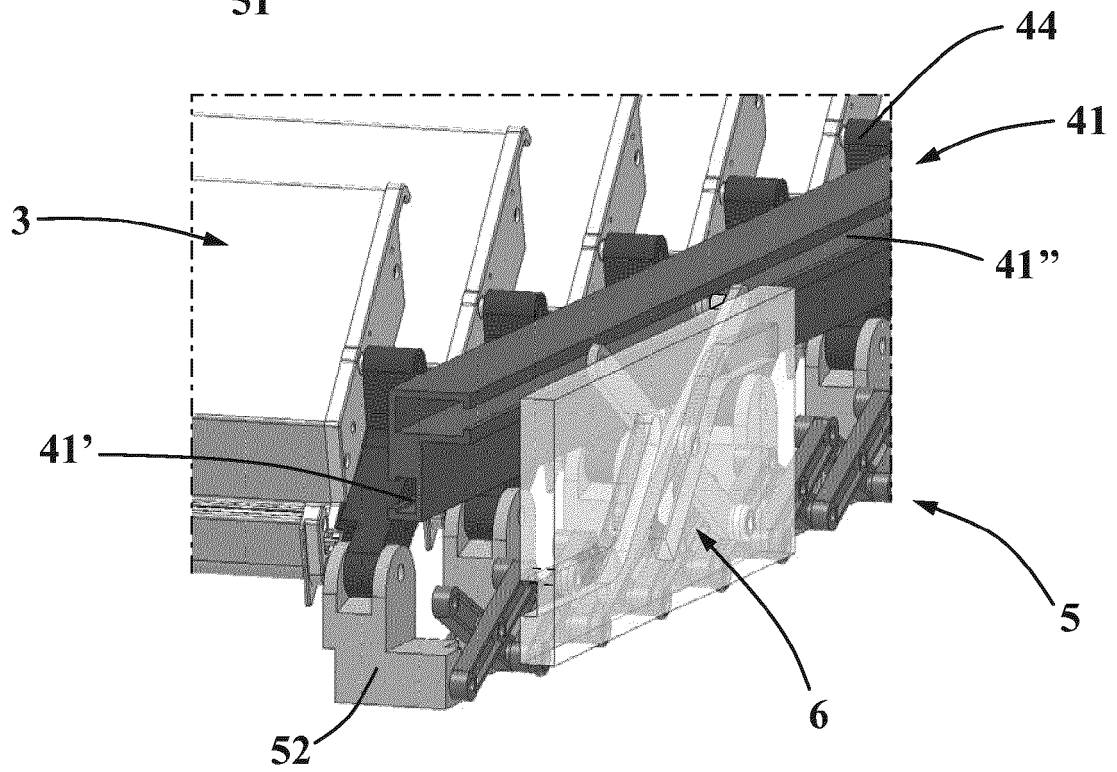
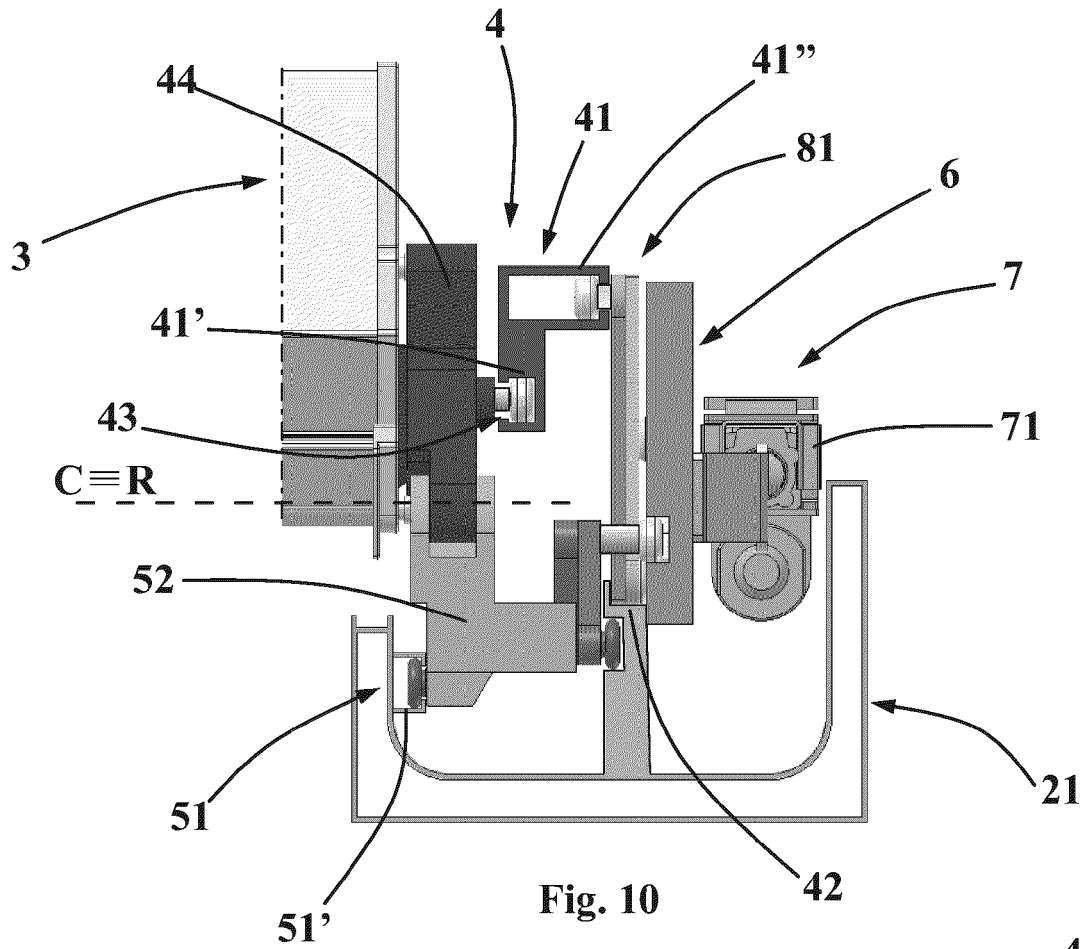


Fig. 8



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EUROPEAN SEARCH REPORT

Application Number
EP 21 17 5345

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A	* column 3, lines 24-35; figures 1a,1b,2a,2b,3 *	4-9, 11-15	
A	* column 2, lines 53-59 * * column 3, lines 13-23 * -----		
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			E04F E06B E04B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 September 2021	Examiner Bourgoin, J
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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15-09-2021

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