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(54) **MOVING SYSTEM FOR MOVING A ROLLER FOR WORKING OR CLEANING A PIECE**

(57) The present invention refers to a moving system for moving a roller (R), for working or cleaning a piece comprising an actuator (1) movable along a reference axis (X,C), a beam (2) couplable to a supporting element (21) for the roller (R), at least one first arm (3) rotatably connected to said beam (2) so as to rotate around a first axis (A), perpendicular to a longitudinal axis (D) of said beam (2), and at least one second arm (4) connected to said first arm (3) and rotatably connected to said beam (2) so as to rotate around a second axis (B), parallel to

said first axis (A). Said actuator (1) may be connected to said first arm (3) or to said second arm (4) so that when the actuator (1) moves, so that, when the actuator (1) moves, the arm connected to the actuator (1) rotates around the respective axis on a respective plane perpendicular to said axis, causing the rotation of the other arm on a second plane, perpendicular to the respective axis. Depending on the direction of rotation of the two arms (3,4), the beam (2) is raised and lowered according to an oscillating circular motion, and with it the roller (R).

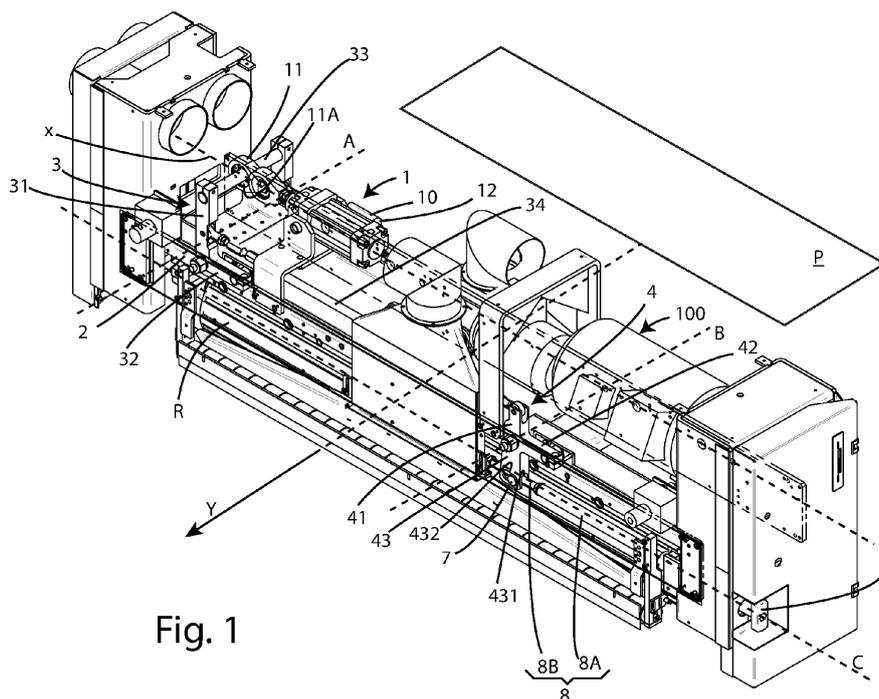


Fig. 1

Description

[0001] The present invention refers to a moving system for moving a roller for working or cleaning a piece.

[0002] In particular, the invention relates to the structure of a system which allows a roller to be raised or lowered with respect to a piece, such as a panel.

[0003] As for the roller, in general, it is a roller used in a machine tool for machining a piece and is configured to be removably coupled with a brush.

[0004] Depending on the type of brush that is coupled to the roller, it is possible to obtain a different effect on the workpiece or to clean said workpiece after its processing.

[0005] In fact, once the piece has been subjected to the action of the brush mounted on the roller, it is possible to obtain different finishing on said piece (for example a surface of the piece may have reliefs or be polished or smoothed by the action of the brush) or this piece can be cleaned, removing chips and/or dust from the piece, after machining the same piece.

Prior art

[0006] Currently, moving systems are known for moving a roller in a machine tool.

[0007] With reference to a first example of a known type of moving system, said moving system is equipped with specific guides to allow the roller to be mobile along a vertical axis, perpendicular to the advancement direction of the workpiece.

[0008] In other words, the roller is raised and lowered by means of said guides.

[0009] With reference to a second example of a known type of moving system, said moving system has a rod having a first end, and a second end, to each one of which, one end of a roller is connected by means of a respective connecting element.

[0010] The rotations of said rod are on planes parallel to the advancement direction of the piece, and therefore parallel to the work plane on which said piece moves.

[0011] However, said known type of moving systems have some disadvantages.

[0012] Said disadvantages may concern the complexity of the structure of said moving systems and therefore the cost for their production, or the difficulty of replacing the brush mounted on the roller or the roller itself, or a not easy maintenance of the moving system, or a limited adjustment of the roller position.

Scope of the invention

[0013] The object of the present invention is to overcome said disadvantages by providing a simple and low-cost moving system for moving a roller for working or cleaning a workpiece, such as for example a panel.

[0014] A second object is to provide a moving system whose structure allows to reduce the time required to

replace the brush mounted on the roller with another brush, or even to replace the roller itself, if necessary.

[0015] A third object of the present invention is to provide a moving system capable of moving the roller with high precision with respect to the piece to be subjected to the action of the brush mounted on said roller.

[0016] Consequently, by means of the system, it is possible to adjust the position of the roller with respect to the workpiece according to the desired effect on a surface of the workpiece by means of the brush mounted on the roller.

[0017] A further object is to provide a moving system whose structure allows easy maintenance, thus reducing costs.

Object of the invention

[0018] It is therefore object of the present invention a moving system for moving a roller comprising:

- an actuator movable along a reference axis,
- a beam couplable to a supporting element for supporting said roller, wherein said beam has a longitudinal axis, parallel to said reference axis,
- at least one first arm rotatably connected to said beam so as to rotate around a first axis, perpendicular to said longitudinal axis of said beam,
- at least one second arm rotatably connected to said beam so as to rotate around a second axis, parallel to said first axis,

where

said second arm and said first arm are connected to each other, and

said actuator is connected to said first arm or to said second arm and configured to move said first arm or said second arm, so that the movement of said actuator causes

the rotation of said first arm around said first axis respectively in a first direction or in a second direction on a first plane perpendicular to said first axis, and the rotation of said first arm causes the rotation of said second arm around said second axis respectively in a first direction or in a second direction on a second plane perpendicular to said second axis, or

the rotation of said second arm around said second axis respectively in a first direction or in a second direction on a second plane perpendicular to said second axis, and rotation of said second arm causes rotation of said first arm around said first axis respectively in a first direction or in a second direction on a first plane, perpendicular to said first axis.

[0019] The rotation of said first arm and of said second arm in said first direction and in said second direction respectively cause said beam to be lifted and lowered according to a circular oscillatory motion, so that the roller is respectively lifted and lowered according to the same motion.

[0020] In particular, said moving system may comprise two first arms connected to each other by means of a first connecting element, and two second arms, each of which is connected to a respective first arm by means of a respective second connecting element.

[0021] In a first alternative said actuator may be a linear actuator, and said actuator may be connected to said first connecting element.

[0022] In a second alternative said actuator may be a rototranslating actuator, and said actuator may be connected to said at least one second arm.

[0023] Each first arm may be L-shaped and comprise a respective first portion and a respective second portion, having a length shorter than the length of said first portion, in cross section the first portion and the second portion of each first arm having a respective first contact point and said first axis passing through said first contact points.

[0024] Furthermore, the first portions of each first arm may have an end connected to a respective end of said first connecting element.

[0025] Said beam may be provided with a first recess for each first arm, inside which a respective first shoe is arranged, each first shoe being connected to an end portion of a respective first arm and being sliding in said first recess, and a second recess for each second arm, inside which a respective second shoe is arranged, each second shoe being connected to an end portion of a respective second arm and sliding in said second recess.

[0026] Furthermore, said system may comprise a further supporting element for supporting said beam, coupleable to said beam and to said supporting element, wherein said further supporting element is arranged between said supporting element and said beam.

[0027] With reference to said at least one second arm, said at least one second arm may comprise at least one first portion and one second portion. In cross section the first portion and the second portion of each second arm has a respective second contact point and said second axis passing through said second contact points.

[0028] Said at least one second arm may comprise a third portion, so that said at least one second arm is T-shaped.

[0029] In a variant, when said actuator is a linear actuator, said moving system may comprise an adjustment device for adjusting the height position of said moving system itself. Said adjustment device may comprise:

- a slider,
- a bar engaged with said slider, wherein said bar comprises a body having a first end and a second end, as well as a protruding portion, wherein said protruding portion extends from said first end outwards and is arranged at least partially inside a through hole arranged on a side of said third portion,
- adjustment means, connected to the second end of said bar, for adjusting the position of said bar with respect to said slider so that said bar is movable with

respect to said slider along a fourth axis, parallel to said reference axis between a first position, wherein the slider is at a first distance from the body of said bar, substantially in contact with the first end of said body, and a second position, in which the slider is at a second distance from the body of said bar, greater than said first distance.

[0030] In particular, said at least one second arm may have a slot formed in a further side of said third portion, perpendicular to said side on which said through hole is arranged, and said slider may be sliding in said slot between a first position, wherein said slider is arranged at a first end of said slot, to a second position, wherein said slider is arranged at a second end of said slot, opposite to said first end.

[0031] In a further variant, when said actuator is a rototranslating actuator, said actuator may comprise:

- a slider,
- a bar engaged with said slider, wherein said bar comprises a body having a first end and a second end, as well as a protruding portion, wherein said protruding portion extends from said first end outwards and is arranged at least partially inside a through hole arranged on a side of said third portion,
- adjustment means, connected to the second end of said bar, for adjusting the position of said bar with respect to said slider so that said bar is movable with respect to said slider along said reference axis, so as to cause rotation of said at least one second arm.

[0032] Regardless of the type of actuator, the protruding portion of said bar may be threaded and said slider may have a hole whose internal surface is threaded to allow said protruding portion to slide with respect to the slider, inside the slider itself.

[0033] Further, said adjustment means may comprise a knob.

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List of Attached Figures

[0034] The present invention will be now described, for illustrative but not limitative purposes, according to its preferred embodiments, with particular reference to the figures of the enclosed drawings, wherein:

figure 1 is a first perspective side view of the moving system for moving a roller, object of the invention, in which a first panel is transparent to show a part of said moving system;

figure 2 is a second perspective side view of the moving system, object of the invention, similar to figure 1, in which a second panel is transparent to show a second part of said moving system;

figure 3 is a third perspective side view of the moving system, object of the invention, in which a third panel is transparent to show a third part of said moving

system

figure 4 is a side view of the moving system, object of the invention;

figure 5 is an exploded view of a detail of the moving system showing a beam of said moving system, a support element for said beam and a roller, on which a brush is mounted;

figure 6 is a side view of the moving system, when the first arms and the second arms of said moving system are rotated in a counter-clockwise direction; figure 7 shows a detail of the moving system of figure 6.

Detailed description of the invention

[0035] With reference to figures 1-5, the moving system for moving a roller, object of the invention, is described.

[0036] As already mentioned, a brush can be mounted on this roller intended to contact a piece, such as a panel, or to create a specific finishing on said piece (which, for example, can consist of creating reliefs on the piece, or polishing the piece, or the sanding of the piece) or to clean said piece of any residues, after processing the piece itself.

[0037] In particular, said moving system is configured to raise and lower a roller with respect to a piece that needs to be finished or cleaned.

[0038] In the embodiment described, both the roller indicated with R and the brush indicated with S, mounted on said roller R, are shown for a better understanding of the technical solution.

[0039] However, the roller R and the brush S, mounted on the roller R, are not part of the moving system object of the invention.

[0040] Said moving system comprises:

- an actuator 1 movable along a reference axis X,
- a beam 2 which can be coupled to a support element 21 to support said roller R, wherein said beam 2 has a longitudinal axis D, parallel to said reference axis X,
- at least one first arm 3, rotatably connected to said beam 2, in such a way as to rotate around a first axis A, perpendicular to said longitudinal axis D of said beam 2, and
- at least a second arm 4, rotatably connected to said beam 2, in such a way as to rotate around a second axis B, parallel to said first axis A.

[0041] In particular, said first arm 3 and said second arm 4 are connected to each other, and said actuator 1 can be connected to said first arm 3 or to said second arm 4, and configured to move said first arm 3 or said second 3.

[0042] In the embodiment described, said actuator 1 is a linear actuator and is connected to said first arm 3.

[0043] In particular, in the embodiment that is de-

scribed, said linear actuator is a pneumatic type actuator.

[0044] The moving system is configured in such a way that the movement of the actuator 1 causes the rotation of said at least one first arm 3 around the first axis A, respectively in a first direction or a second direction, on a first plane, perpendicular to said first axis A (which, in the embodiment described, is also perpendicular to said reference axis X), and that the rotation of said at least one first arm 3 causes the rotation of said at least one second arm 4 around the second axis B, respectively in a first direction or in a second direction on a second plane, perpendicular to said second axis B.

[0045] Each one of said axes, i.e., said first axis A and said second axis B, is parallel to a third axis Y, which identifies the advancement direction of a piece P on a work plane (not shown).

[0046] As can be seen from the figures, said third axis Y is the axis along which a piece P moves forward.

[0047] In other words, the first arm 3 and the second arm 4 rotate on planes that are perpendicular to the advancement direction of the piece P, which must be subjected to the action of the brush S mounted on the roller R, and therefore perpendicular to the work plane on which said piece P moves.

[0048] The rotation of the first arm 3 and of the second arm 4 in said first direction and in said second direction causes the raising and the lowering of said beam 2 (connected to the roller R by means of the support element 21 for the roller, which can be coupled to the beam 2 by means of a further support element for the beam, as mentioned in the following), according to an oscillating circular motion, so that the roller R is also raised and lowered according to the same motion.

[0049] In the embodiment described, the moving system comprises two first arms 3 and two second arms 4, each one of which is connected to a respective first arm 3.

[0050] Said two first arms 3 are connected to each other by means of a first connecting element 33, and each second arm 4 is connected to a respective first arm 3 by means of a respective second connecting element 34.

[0051] In the described embodiment, said first connecting element 33 is a first rod, and each second connecting element 34 is a respective second rod.

[0052] The actuator 1 comprises a body 10, a first end portion 11, and a second end portion 12.

[0053] The first end portion 11 has an opening 11A shaped to allow the passage of the first connecting element 33, which connects the two first arms 3.

[0054] In this way the actuator 1 is connected to said two first arms 3 by means of said first connecting element 33, so that when the actuator 1 moves in a first direction or in a second direction along said reference axis X, it pushes or pulls said first connecting element 33, causing the rotation of said first arms 3 respectively in a first direction, or in a second direction.

[0055] The second end portion 12 is connected to a motor unit 100.

[0056] Said motor unit 100 is connected to a driving

pulley P1, which is in turn is connected to a driven pulley P2 by means of a transmission belt T.

[0057] The distance between said driving pulley P1 and said driven pulley P2 can be reduced or increased by means of spacer means MD (in the embodiment described, said spacer means comprise a knob), so as to increase or reduce the tensioning degree of said transmission belt TC.

[0058] In other words, in the described embodiment, the moving system object of the invention is substantially a four-bar linkage, wherein the movement of the actuator 1 causes the rotation of said first arms 3, which in turn cause the rotation of said second arms 4.

[0059] With particular reference to the first arms 3, each first arm 3 is L-shaped.

[0060] In particular, each first arm 3 has a first portion 31 and a second portion 32, having a length less than the length of said first portion 31.

[0061] In cross-section, the first portion 31 and the second portion 32 of each first arm 3 have a respective first point of contact.

[0062] The first portion 31 of each first arm 3 has one end connected to a respective end of said first connecting element 33.

[0063] The second portion 32 of each first arm 3 has one end connected to said beam 2.

[0064] In particular, the second portion 32 of each first arm 3 is connected to a respective first shoe 5 sliding inside a respective first recess 6 formed in said beam 2.

[0065] The first axis A (around which each first arm 3 rotates) passes through said two first contact points.

[0066] Furthermore, in the embodiment described, said moving system comprises a further support element 22 to support said beam 2, which can be coupled to said beam 2 and to said support element 21 for the roller R.

[0067] In particular, said further support element 22 is equipped with a relief 221 having a through-hole 221A for the passage of a rod (not shown) connected to a further actuator (not shown), which is a linear attenuator.

[0068] With particular reference to the second arms 4, each second arm 4 comprises at least one first portion 41 and one second portion 42.

[0069] In cross-section, the first portion 41 and the second portion 42 of each second arm 4 have a respective second point of contact.

[0070] The first portion of each second arm 4 has one end connected to a respective end of a second connecting element 34, which, as mentioned, connects each second arm 4 to a respective first arm 3.

[0071] The second portion 42 of each second arm 4 has one end connected to a respective second shoe 5', sliding inside a respective second recess 6' formed in said beam 2.

[0072] The second axis B (around which each second arm 4 rotates) passes through said two second contact points.

[0073] As shown in the figures, it is preferable that at least one of the two second arms 4 comprises a third

portion 43, so that said at least one second arm 4 is T-shaped, and that the moving system comprises an adjustment device for height adjusting the position of the moving system itself.

[0074] In this way, before use, the moving system can be positioned at a predetermined height with respect to the piece P, chosen by an operator.

[0075] Said adjustment device comprises:

- 10 - a slider 7,
- a bar 8, engaged with said slider 7, wherein said bar comprises a body 8A having a first end and a second end, and a protruding portion 8B, wherein said protruding portion 8B extends from said first end towards the outside, and is arranged at least partially inside a through-hole 431, arranged on one side of said third portion 43,
- adjustment means 9, connected to the second end of said bar 8, for adjusting the position of said bar 8 with respect to said slider 7, so that said bar 8 is movable with respect to said slider 7 along a fourth axis C, parallel to said reference axis X, between a first position, in which the slider 7 is at a first distance from the body 8A of said bar 8, substantially in contact with the first end of said body 8A, and a second position, in which the slider 7 is at a second distance from the body 8A of said bar 8, greater than said first distance.

[0076] In particular, the protruding portion 8B of the bar 8 is threaded and said slider 7 has a hole 7A, whose internal surface is threaded to allow the protruding portion 8B of the bar 8 to slide with respect to the slider 7 and inside the slider itself.

[0077] In the embodiment described, said adjustment means 9 comprise a knob.

[0078] Furthermore, said second arm 4 has a slot 432 formed in a further side of said third portion 43 (in which said further side is perpendicular to the side on which the through-hole 431 is placed), and said slider 7 slides in said slot 432 from a first position, in which said slider 7 is arranged at a first end 432A of said slot 432, to a second position, in which said slider 7 is arranged at a second end 432B of said slot 432, opposite to said first end 432A.

[0079] When the moving system is not in use, said slider 7 is locked in said first position.

[0080] When the moving system is in use, said slider 7 is locked in said second position, as shown in figures 1 to 5.

[0081] When the moving system is in use and it is no longer required to be in use, a command signal is received by a logic control unit (not shown) of the moving system, wherein said logic control unit is configured to send a signal to said actuator 1, so that its movement causes the rotation of said first arms 3 and said second arms 4 in a counterclockwise direction, and the slider 7 slides inside the slot 432 passing from said second position to said first position.

[0082] In the embodiment that is described, the slider 7 also has the function of end stroke for the rotation of said at least one second arm 4, and consequently of the first arms 3.

[0083] In fact, following the rotation of said at least one second arm 4, the slot 432 abuts the slider 7, and the rotation of said second arm stops.

[0084] Figure 6 shows the moving system when the first arms 3 (one of which is visible) and the second arms 4 (one of which is visible) are rotated around their respective axes A, B in a first direction, i.e., an anticlockwise direction.

[0085] As shown in the figure, following the rotation of each first arm 3 and each second arm 4, the second portion 32 of each first arm 3, which is on a respective recess 6 of the beam 2, and the second portion 42 of each second arm 4, which is on a respective second recess 6', causes the lifting of the beam 2, and consequently of the roller R.

[0086] Figure 7 shows the position of the third portion 43 of one of the two second arms 4 after rotation.

[0087] Different from the embodiment described above, the actuator can be an actuator other than a linear actuator and need not be connected to the first arm.

[0088] For example, the actuator 1 can be connected to said second arm 4, and its movement would cause the rotation of said second arm 4 around said second axis B, respectively in a first direction or in a second direction on said second plane (perpendicular to said second axis B), and the rotation of said second arm 4 would cause the rotation of said first arm 3 around said first axis A respectively, in a first direction or in a second direction on said first plane (perpendicular to said first axis A).

[0089] For example, in a further embodiment, not shown, the actuator of the moving system can comprise or consist of said slider 7 and said bar 8, engaged with said slider 7 and said adjustment means 9.

[0090] In this further embodiment, differently from the embodiment described above, the actuator is a rototranslating actuator, and the moving system has no linear actuator, and the third portion 43 of said second arm 4 has no slot 432.

[0091] However, as for the embodiment described above, the bar 8 comprises the body 8A, having a first end and a second end, as well as a protruding portion 8B, which extends from the first end outwards and is arranged at least partially within the through-hole 431 arranged on one side of said third portion 43.

[0092] The protruding portion 8B is threaded, and the slider 7 has the hole 7A, whose internal surface is threaded to allow the projecting portion 8B to slide with respect to the slider 7, within the slider itself.

[0093] Furthermore, as for the embodiment described above, said adjustment means 9 are connected to the second end of the bar 8, to adjust the position of said bar 8 with respect to the slider 7, so that the bar 8 is movable with respect to the slider 7 along said fourth axis C, which in said further embodiment becomes the reference axis

for the actuator movement.

[0094] Said fourth axis C is the axis about which the bar 8 rotates.

[0095] The longitudinal axis D of the beam 2 is also parallel to said fourth axis C.

[0096] The rotoranslating movement of said bar 8 along said reference axis C (and therefore of said protruding portion 8B) allows the rotation of said at least one second arm 4 in a first direction or in a second direction, opposite to said first direction, depending on the rotation direction of said bar 8, causing the rotation of said at least one first arm 3.

[0097] As for the embodiment described above, said adjustment means 9 comprise a knob.

[0098] An operator acting manually on the knob decides the direction of rotation of the bar 8, and consequently the direction of rotation of said at least one second arm 4.

[0099] In other words, in said further embodiment the moving system is a manual moving system.

Advantages

[0100] Advantageously, the moving system object of the invention has a simple structure, which allows easy replacement of the brush mounted on the roller or possibly of the roller itself, as well as easy maintenance of the structure.

[0101] A second advantage is given by the possibility of height adjusting the moving system.

[0102] The present invention has been described for illustrative but not limitative purposes, according to its preferred embodiments, but it is to be understood that modifications and/or changes can be introduced by those skilled in the art without departing from the relevant scope as defined in the enclosed claims.

Claims

1. Moving system for moving a roller (R), said moving system comprising:

- an actuator (1; 7,8,9) movable along a reference axis (X,C),
- a beam (2) couplable to a supporting element (21) for supporting said roller (R), wherein said beam has a longitudinal axis (D), parallel to said reference axis (X, C),
- at least one first arm (3) rotatably connected to said beam (2) so as to rotate around a first axis (A), perpendicular to said longitudinal axis (D) of said beam (2),
- at least one second arm (4) rotatably connected to said beam (2) so as to rotate around a second axis (B), parallel to said first axis (A),

where

said second arm (4) and said first arm (3) are connected to each other, and
 said actuator (1; 7,8,9) is connected to said first arm (3) or to said second arm (4) and configured to move said first arm or said second arm, so that the movement of said actuator (1; 7,8,9) causes the rotation of said first arm (3) around said first axis (A) respectively in a first direction or in a second direction on a first plane perpendicular to said first axis (A), and the rotation of said first arm (3) causes the rotation of said second arm (4) around said second axis (B) respectively in a first direction or in a second direction on a second plane perpendicular to said second axis (B), or
 the rotation of said second arm (4) around said second axis (B) respectively in a first direction or in a second direction on a second plane perpendicular to said second axis (B), and rotation of said second arm (4) causes rotation of said first arm (3) around said first axis (A) respectively in a first direction or in a second direction on a first plane, perpendicular to said first axis (A),
 where the rotations of said first arm (3) and of said second arm (4) in said first direction and in said second direction respectively cause said beam to be lifted and lowered according to a circular oscillatory motion, so that the roller (R) is respectively lifted and lowered according to the same motion.

2. Moving system according to claim 1, **characterized in that** said moving system comprises:

two first arms (3) connected to each other by means of a first connecting element (33),
 two second arms (4), each of which is connected to a respective first arm (3) by means of a respective second connecting element (34).

3. Moving system according to claim 2, **characterized in that** said actuator (1) is a linear actuator,
in that said actuator (1) is connected to said first connecting element (33).

4. Moving system according to claim 2, **characterized in that** said actuator (7,8,9) is a rototranslating actuator,
in that said actuator (7,8,9) is connected to said at least one second arm (4).

5. Moving system according to any one of claims 2-4, **characterized in that** each first arm (3) is L-shaped and comprises a respective first portion (31) and a respective second portion (32), having a length shorter than the length of said first portion (31), in cross section the first portion (31) and the second portion (32) of each first

arm (3) having a respective first contact point and said first axis (A) passing through said first contact points,

in that

the first portions (31) of each first arm (3) have an end connected to a respective end of said first connecting element (33).

6. Moving system according to any one of claims 2-5, **characterized in that** said beam (2) is provided with:

a first recess (6) for each first arm (3), inside which a respective first shoe (5) is arranged, each first shoe (5) being connected to an end portion of a respective first arm (3) and being sliding in said first recess (6), and
 a second recess (6') for each second arm (4), inside which a respective second shoe (5') is arranged, each second shoe (5') being connected to an end portion of a respective second arm (4) and sliding in said second recess (6').

7. System according to any one of previous claims, **characterized in that** said moving system comprises a further supporting element (22) for supporting said beam (2), couplable to said beam (2) and to said supporting element (21), wherein said further supporting element (22) is arranged between said supporting element (21) and said beam (2).

8. Moving system according to any one of claims 2-7, **characterized in that** said at least one second arm (4) comprises at least one first portion (41) and one second portion (42), in cross section the first portion (41) and the second portion (42) of each second arm (4) having a respective second contact point and said second axis (B) passing through said second contact points,
in that said at least one second arm (4) comprises a third portion (43), so that said at least one second arm (4) is T-shaped.

9. Moving system according to claim 8, when depending on claim 3, **characterized in that** said moving system comprises an adjustment device for adjusting the height position of said moving system, said adjustment device comprising:

- a slider (7),
 - a bar (8) engaged with said slider (7), wherein said bar (8) comprises a body (8A) having a first end and a second end, as well as a protruding portion (8B), wherein said protruding portion (8B) extends from said first end outwards and is arranged at least partially inside a through hole (431) arranged on a side of said third portion

(43),
 - adjustment means (9), connected to the second end of said bar (8), for adjusting the position of said bar (8) with respect to said slider (7) so that said bar (8) is movable with respect to said slider (7) along a fourth axis (C), parallel to said reference axis (X) between a first position, wherein the slider (7) is at a first distance from the body (8A) of said bar (8), substantially in contact with the first end of said body (8A), and a second position, in which the slider (7) is at a second distance from the body (8A) of said bar (8), greater than said first distance.

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10. Moving system according to claim 9, **characterized in that** 15

said at least one second arm (4) has a slot (432) formed in a further side of said third portion (43), perpendicular to said side on which said through hole (431) is arranged, and

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in that
 said slider (7) is sliding in said slot (432) between a first position, wherein said slider (7) is arranged at a first end (432A) of said slot (432), to a second position, wherein said slider (7) is arranged at a second end (432B) of said slot (432), opposite to said first end (432A).

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11. Moving system according to claim 8, when depending on claim 4, **characterized in that** said actuator (7,8,9) comprises: 30

- a slider (7),
 - a bar (8) engaged with said slider (7), wherein said bar (8) comprises a body (8A) having a first end and a second end, as well as a protruding portion (8B), wherein said protruding portion (8B) extends from said first end outwards and is arranged at least partially inside a through hole (431) arranged on a side of said third portion (43),
 - adjustment means (9), connected to the second end of said bar (8), for adjusting the position of said bar (8) with respect to said slider (7) so that said bar (8) is movable with respect to said slider (7) along said reference axis (C), so as to cause rotation of said at least one second arm (4).

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12. Moving system according to any one of claims 9-11, **characterized in that** the protruding portion (8B) of said bar (8) is threaded and said slider (7) has a hole (7A) whose internal surface is threaded to allow said protruding portion (8B) to slide with respect to the slider (7), inside the slider itself. 50
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13. Moving system according to any one of claims 9-12, **characterized in that** said adjustment means (9)

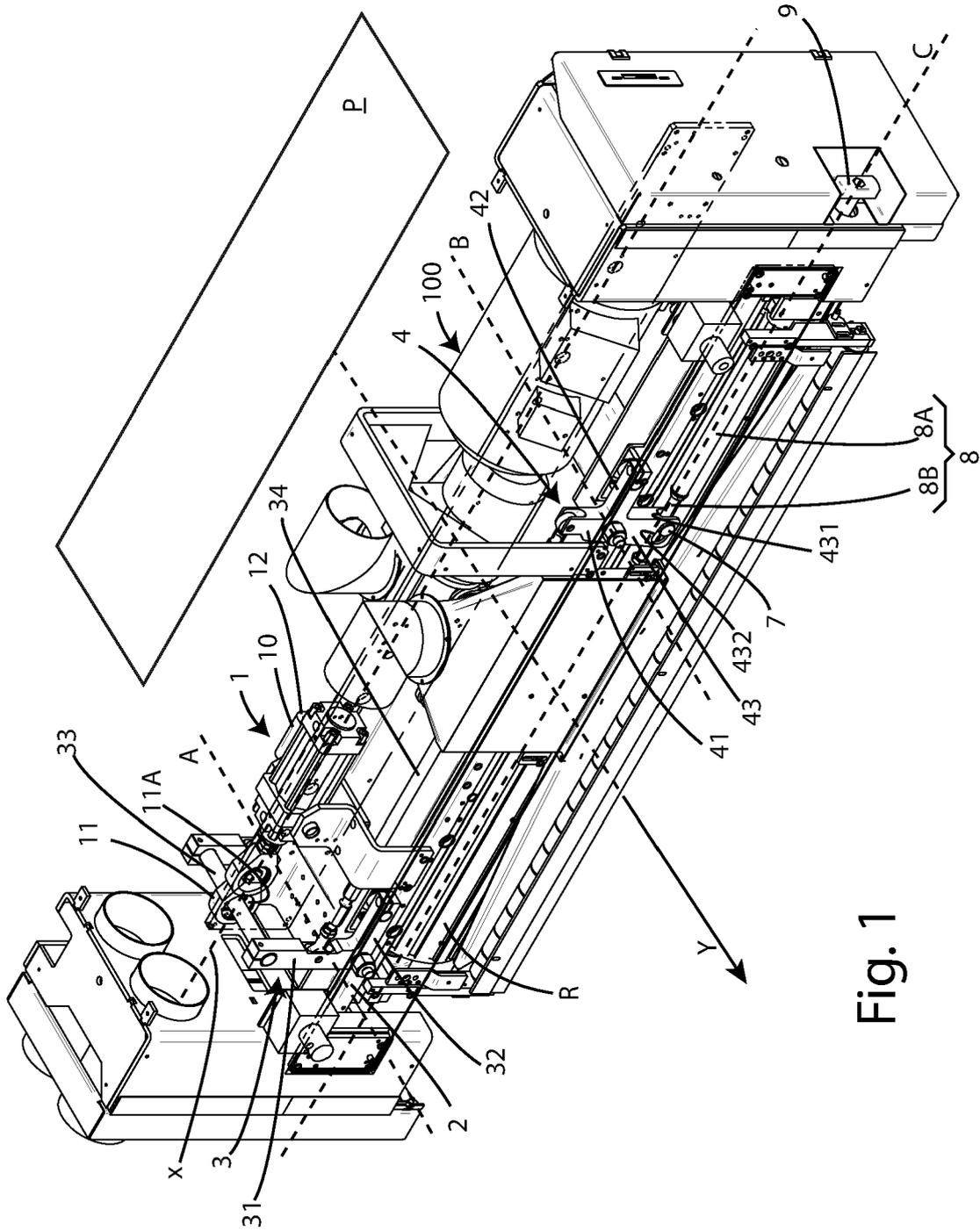


Fig. 1

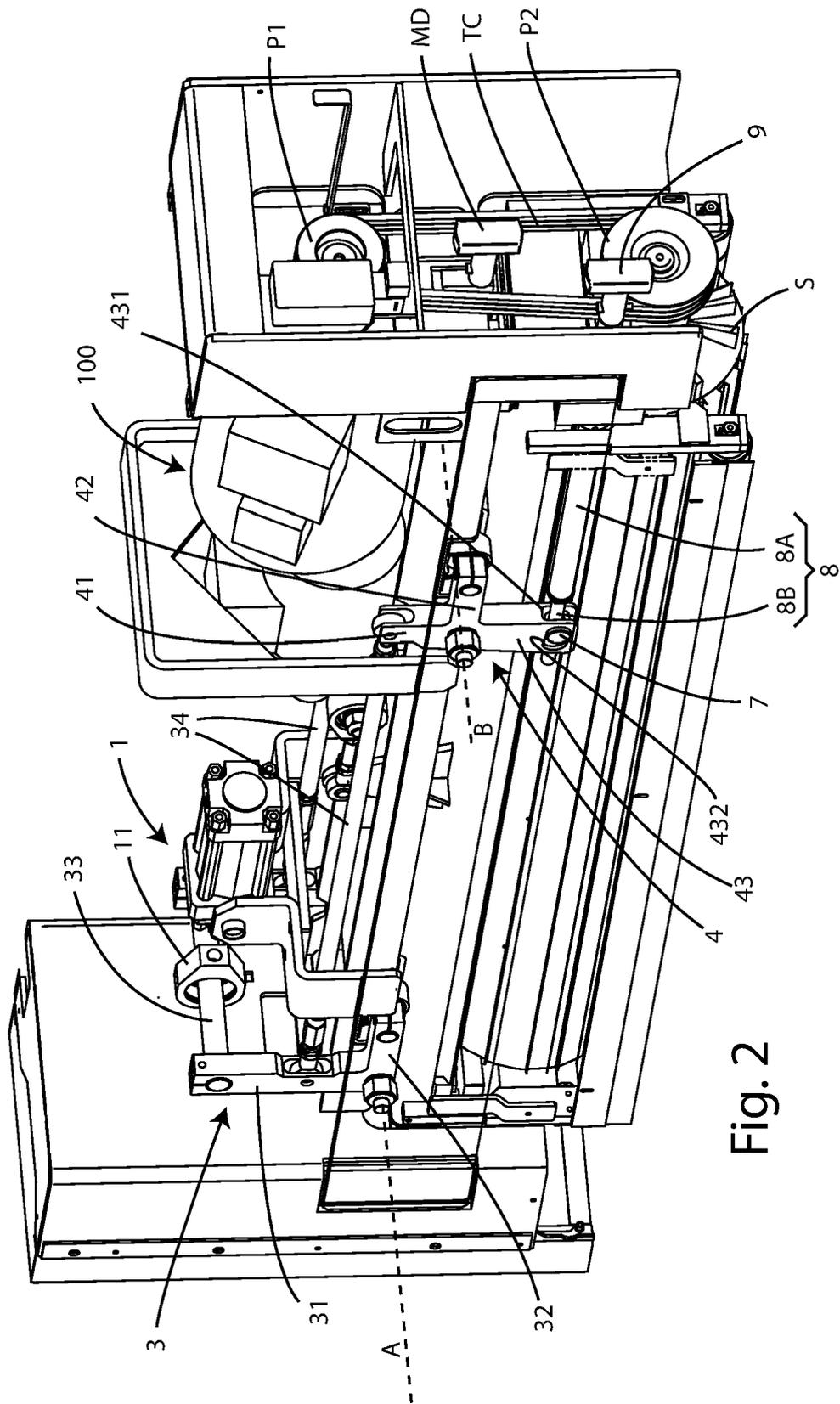


Fig. 2

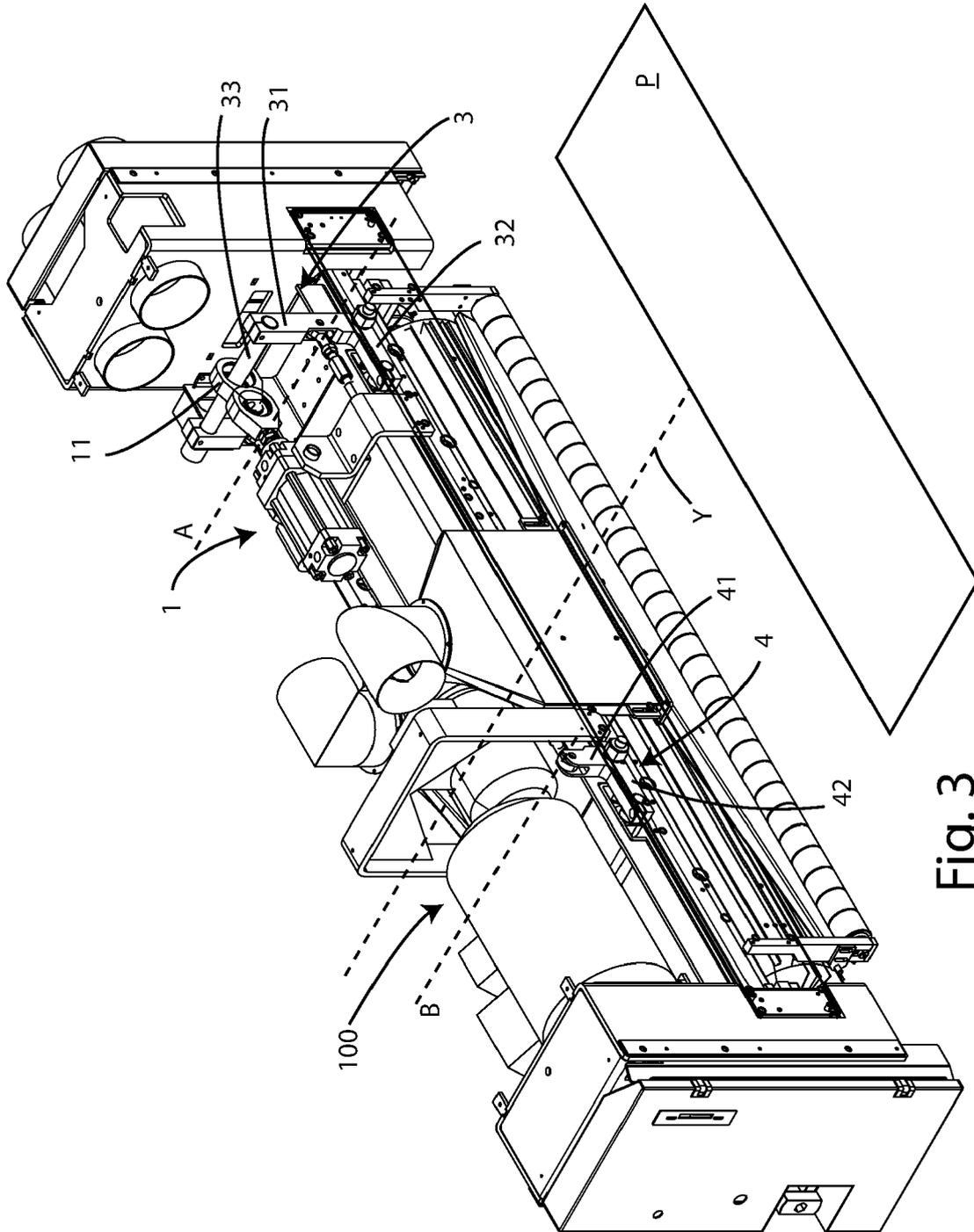


Fig. 3

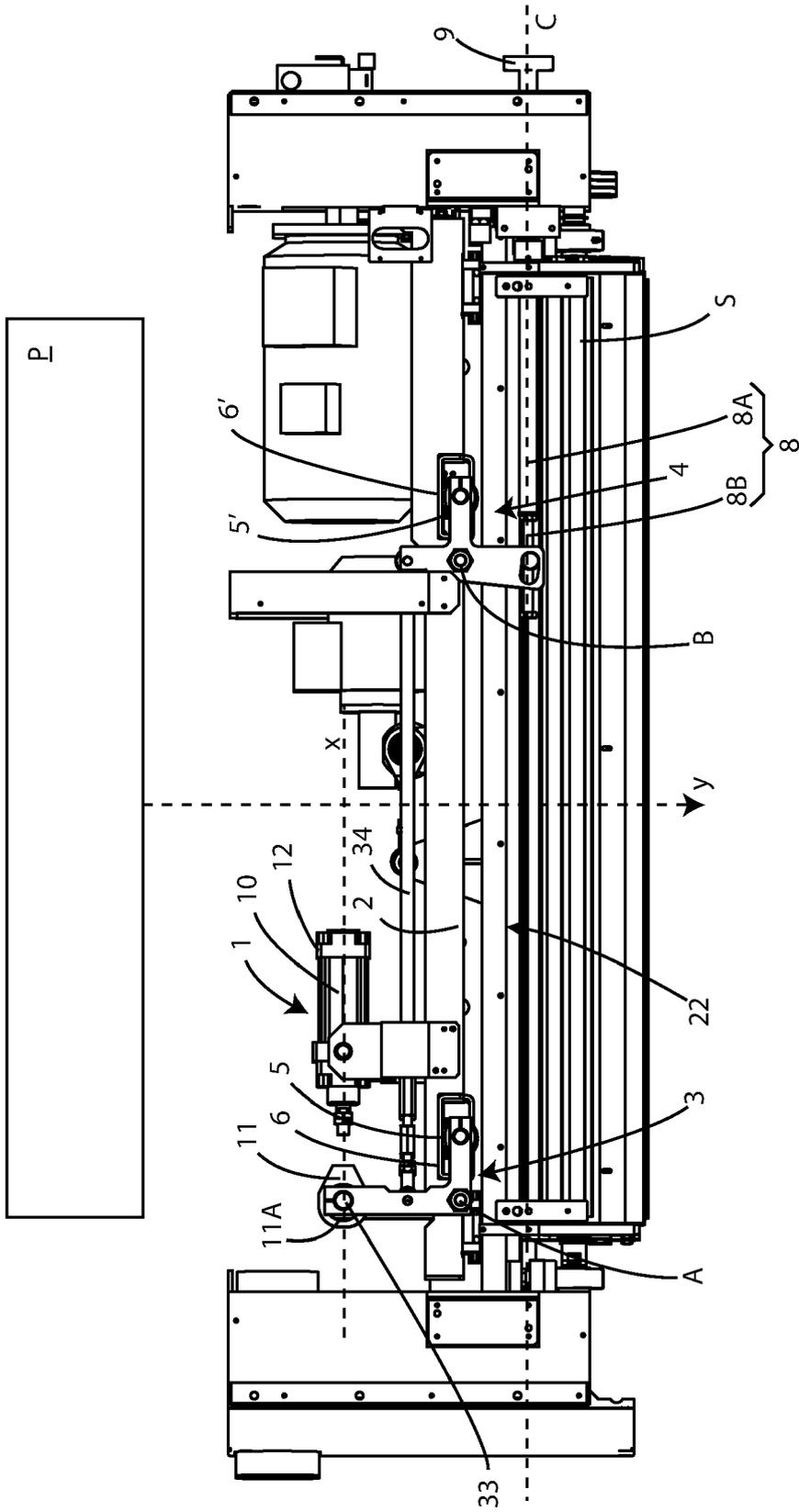


Fig. 4

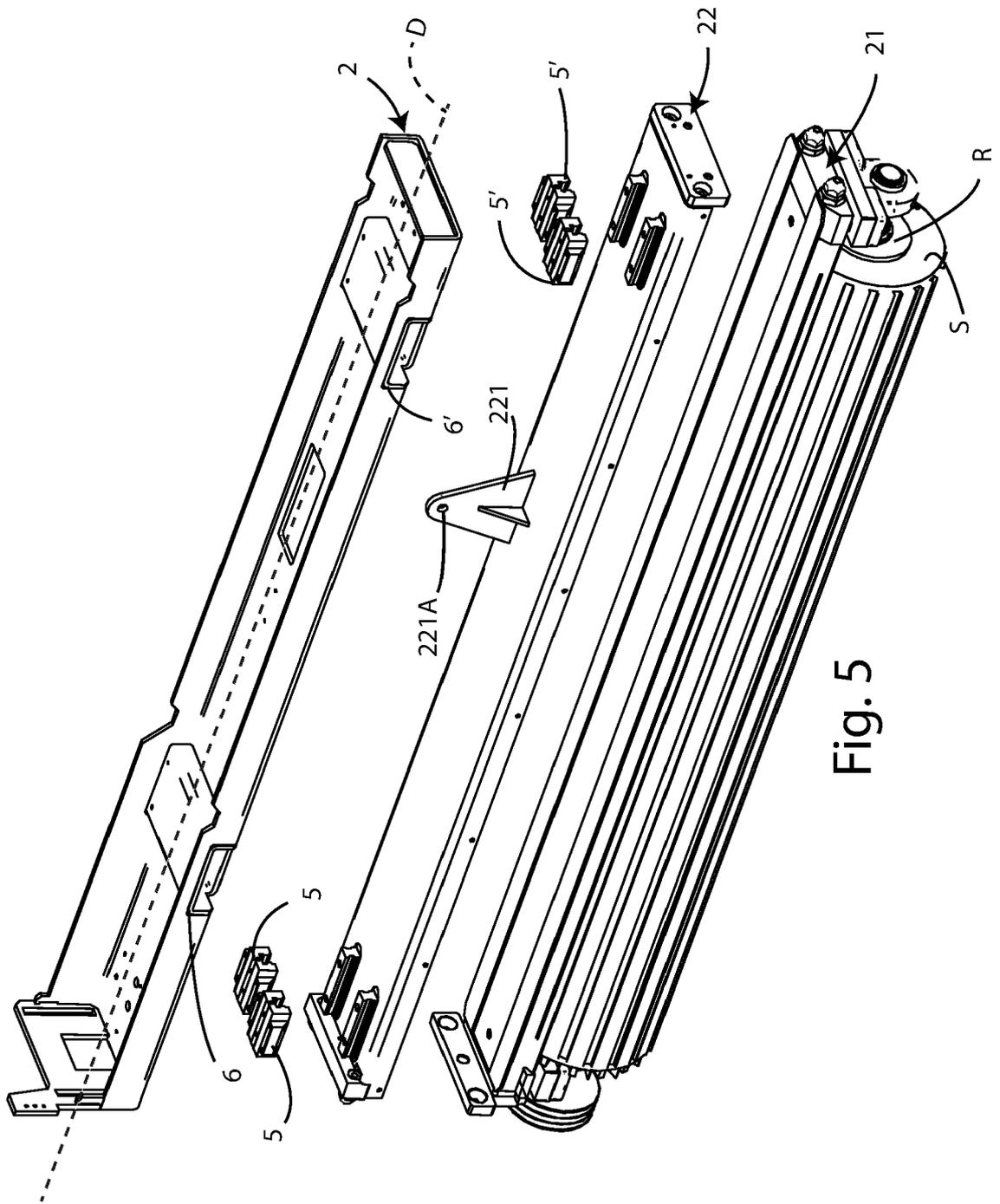


Fig. 5

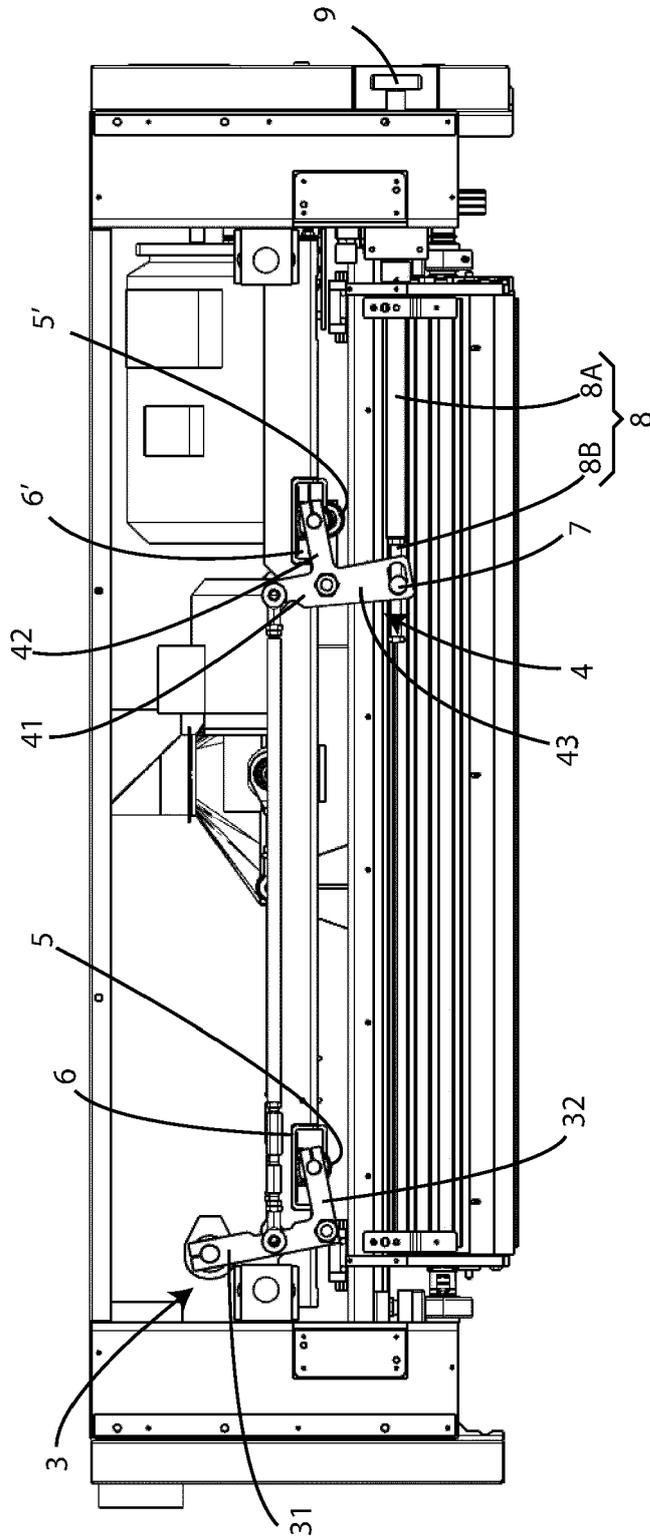


Fig. 6

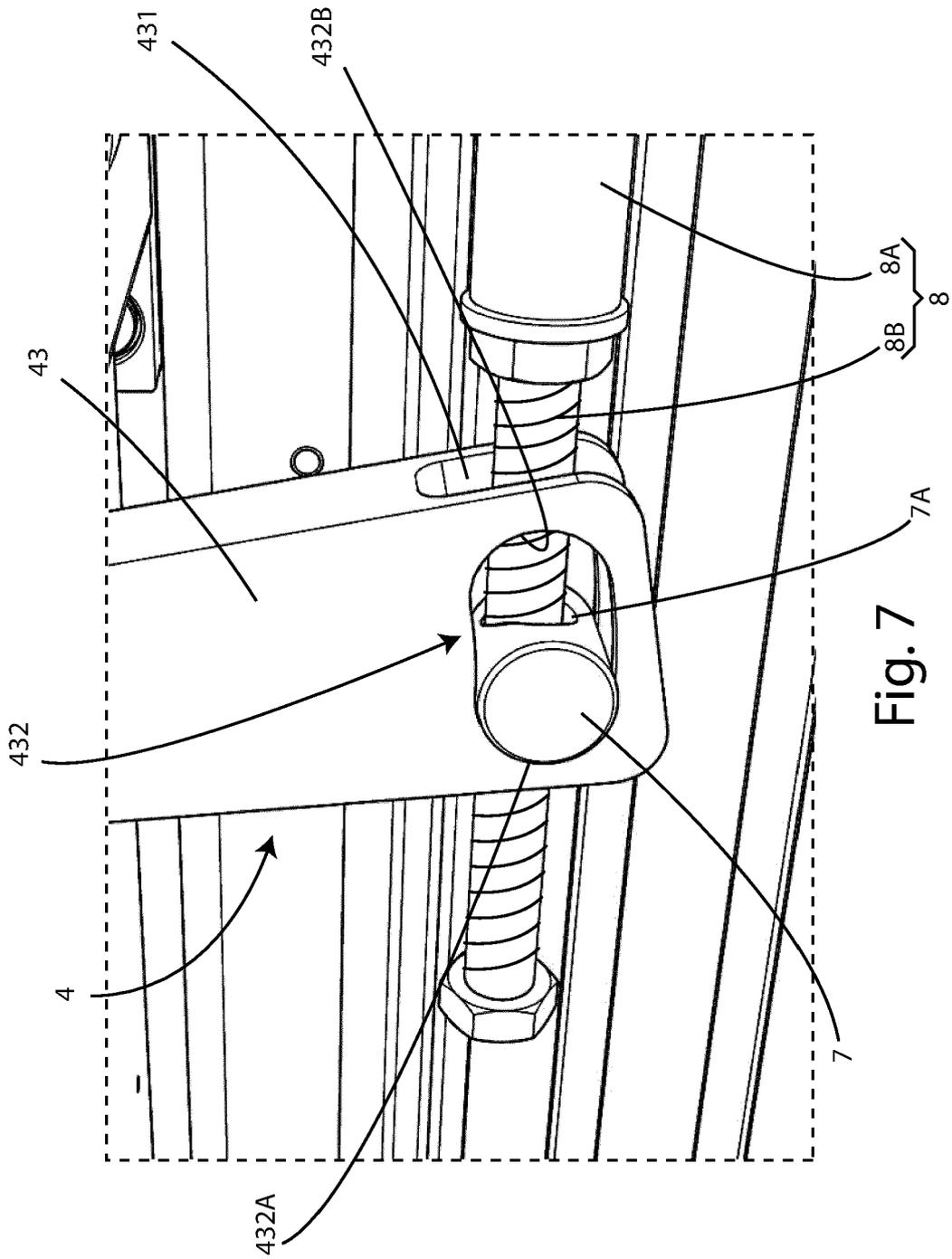


Fig. 7



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