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(54) Woodworking machine tool

(57) Tooling machine for wooden pieces including machinings (2, 3) in the underside for location of joining means (4, 5) and being used for covering surfaces, said machine comprising at least: two parallel conveyors belts (21), a fixed left lateral reference guide (20), a retractable frontal stopper guide (23), a movable lateral right guide (24), intermediate parallel gibs (22), an upper frontal longitudinal beam (12) and a movable frontal and rear bar (17), a lower fixed left longitudinal cross tie (11) bearing at least one motorised milling head (15) and a lower movable right and longitudinal lateral guide (26) bearing at least one motorised milling head (15).

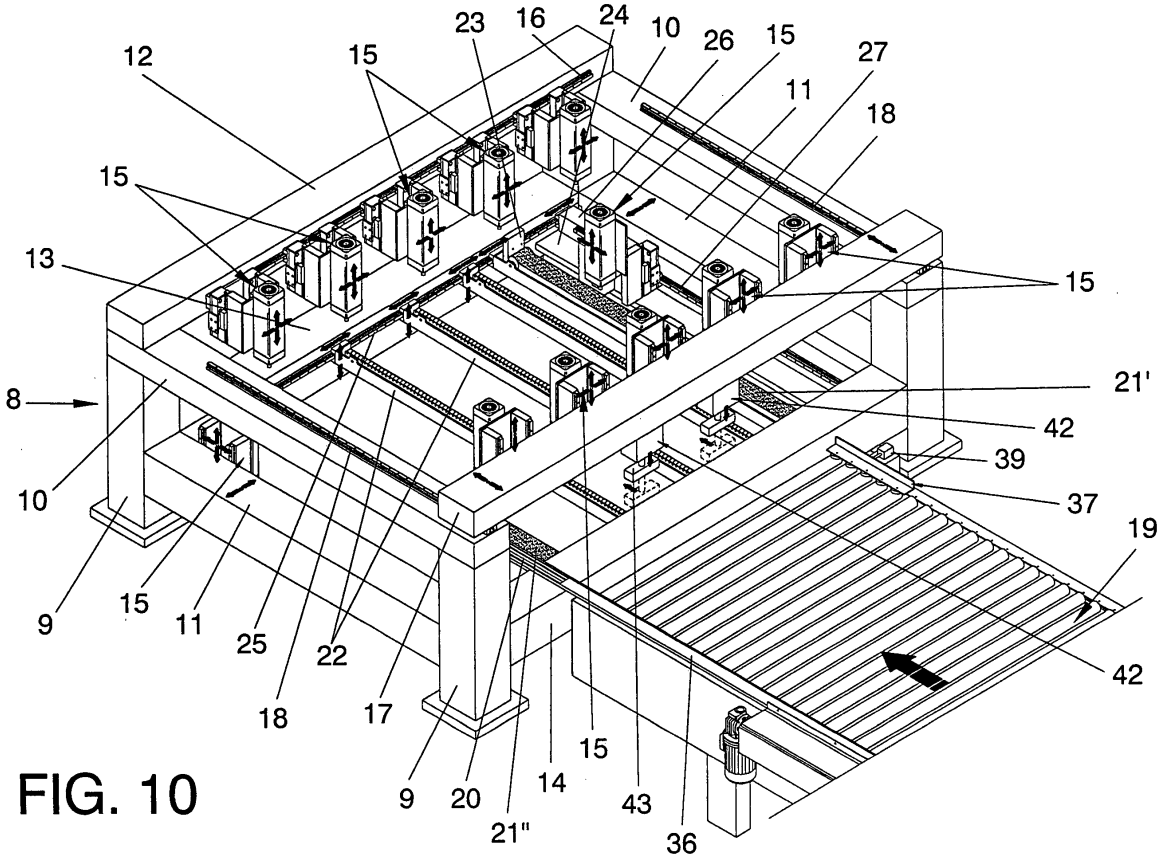

FIG. 10

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Description

OBJECT OF THE INVENTION

[0001] The present invention, as per the descriptive title, refers to a machine for tooling wooden pieces and more specifically for tooling simultaneously all the recess that have to be machined in the underside of wooden tiles for parquet-type floor coverings.

[0002] Therefore the object of the present invention is to configure a tooling centre capable of carrying out, simultaneously, all the operations required for tooling or milling the recess necessary for joining together wooden tiles, with the added advantage that it can be adapted to a multitude of formats and easy to integrate in a standard manufacturing line as those used for this type of wood floor covering.

[0003] Also object of the present invention is to achieve said objective with a high level of precision.

BACKGROUND OF THE INVENTION

[0004] Currently, using wooden tiles as floor covering is a widespread application, such as is the case of products manufactured according to Spanish Patent Applications 200700831, 200701309, 200701920, amongst others, all of them filed by the same applicant submitting the current patent of invention application.

[0005] Having to carry out the various tooling routings required to prepare the wood element was the practice that added production costs to the product, also making more expensive the expansion process.

[0006] Spanish Patent Application N° 200700831 refers to a removable floor which parts or wooden tiles comprise anchoring means on its underside defined by annular groove sections located so they fit the corners and other specified points of the contour of the wood tile. These points are dependent of the shape of the wood tile that can be rectangular or square, as well as size-dependent. Said grooves are open on the edges so the different tiles or wooden pieces can be joined together by means of arched metal male elements that fit in the closed grooves or channels that are configured when joining two or more wooden tiles, except for those grooves where the shape has been made to be semicircular (on the peripheral sides), or worked at 90° in the corners or angular areas.

[0007] The prior patent of invention applications filed by the author contemplate possible improvement to the manufacturing process for this type of floor coverings which correspond to respective addition certificates appended to the aforementioned Spanish patent of invention 200700831.

DESCRIPTION OF THE INVENTION

[0008] In broad lines, the tooling machine used for tooling wooden pieces object of the present invention comprises a conveyor mechanism set on a motor-driven roller table that receives each wooden piece individually as they arrive from the manufacturing line, after having gone through the edge-trimming stations where two of the edges of the rectangular or square contour of the tile are tooled, having rotated 90° to allow trimming of the other two remaining edges of the tile and thus achieve the correct dimensions designed for the tile.

[0009] The conveyor mechanisms is defined by two parallel or lateral conveyor belts, left and right, in which the left one is fixed and the right one is movable so that the mechanism can adapt to the size, shape and position of the wooden pieces and convey them to the exact position under the tool-bearing heads to be precision-tooled. This position is determined by a fixed left lateral reference guide against which the incoming wooden piece leans onto; another retractable frontal stopper guide defines the forward movement; and finally a movable lateral rightguide pushes the wooden piece against the fixed parallel guide.

[0010] The tool-bearing heads are defined by milling motors describing a transversal positioning motion over a slider by numerical control, and in which the milling tools are also capable of pneumatic vertical movement, in and out, from the bearing head. The support on which the tool-bearing heads are mounted individually is also capable of vertical movement and to it is associated a piece-holding element whose function is to secure and hold the wooden piece in place completely immobile before the milling process begins. This piece is supported by intermediate parallel bars or gibs that can move in the longitudinal direction, parallel to themselves, in order to correctly positioning themselves according to the shape and size of the wooden pieces moving towards them on the two parallel conveyor belts.

[0011] In addition, the present invention further comprises a fixed frontal bar where a series of motors are aligned, preferably five motors, of which the two placed at the ends are used for tooling the angles of the wooden piece and the three central motors are used to selectively mill intermediate points in the frontal lip, or depending on the specifications all or none of the intermediate points.

[0012] It also comprises another frontal rear bar being movable in order to position as many tooling motors as the previous bar but in the rear part of the wooden piece.

[0013] For tooling the points located on the lateral edges of the wooden pieces, if needed, the tooling machine for wooden pieces includes two additional longitudinal bars, being the left on fixed and the right one movable, and both bear milling-motors similar to those described above, that are activated when the lateral edges of the wooden pieces have to be tooled.

[0014] All horizontal movements carried out to center the tooling motors are done automatically by numerical control.

[0015] In an alternative embodiment of the present invention the intermediate parallel gibs are, additionally, vertically displaceable in order to be able to position

themselves at different heights and thus adapt to the wooden pieces that could have somewhat of a curve, that is, wooden pieces that are not flat, hence optimising the correct settling and positioning of said special pieces to achieve a perfect, vibration-free tooling process.

[0016] Another feature also proposed in this alternative embodiment is that the fixed left lateral guide further comprises an additional piece placed on top of it in order to enhance lateral contact with the wood piece to be tooled, since the edge of the wooden pieces, being configured in a tongue and groove manner offer a non-uniform edge due to the presence of the recesses and protrusions worked in the joining sides of the wooden tiles. By partially overlapping this additional piece a step-like shape is created that perfectly adapts to the lateral geometry of the wooden piece. This additional piece is at least found in the area occupied by the roller table in order for the piece incoming process to be optimised, resulting in the wooden piece entering the assembly already in the correct position to be placed at the milling point spot.

[0017] Also this alternative embodiment contemplates the option of having the motorised milling heads of the lateral side corresponding to the fixed left lateral guide associated to the lower crosstie, that is also provided with a lateral motion to adjust the milling position to the edge of the wooden tiles. This option is complemented by other characteristic contemplated in the present invention, on the opposite side, in which the motorised milling heads are associated to a moving gib so they can move parallel to each other to adjust to the measurements of the wooden piece to be tooled.

[0018] Also described in the alternative embodiment is a pusher located on the opposite side of the roller table. Said pusher consist of a horizontal profile provided with roller guides that push the wooden piece to be tooled against the fixed lateral left guide, while the pusher is actuated by a pneumatic cylinder.

[0019] Said pneumatic cylinder is placed between each mill motor head pressing against the bar of the rack where it is mounted. The pressure created in between these elements contributes to immobilise it (sic) and thus prevent small movements that would detract from the precision of the tooling action, such as vibrations and therefore contributing to improve stability while the motorised milling heads are at work.

[0020] Lastly, this alternative embodiment incorporates a frontal pusher that acts on the rear edge of the wooden piece to be tooled and keeps it in contact with the retractable frontal stopper guide, thus ensuring that when the piece-holding elements of the motorised mill heads and the milling heads come down to carry out the tooling action, the wooden piece is held perfectly in place.

[0021] The following attached drawings, which are part of this descriptive report and their description, are provided to facilitate understanding of the characteristics of the present invention with the intention of illustrating and not limiting the scope of the invention:

BRIEF DESCRIPTION OF THE FIGURES

[0022]

Figure 1. Shows a perspective view of a wooden tile or piece whose underside has been tooled with the tooling machine object of the present invention to mill the machinings necessary to provide coupling means between contiguous wooden pieces.

Figure 2. Shows a perspective view of the underside of several wooden pieces joined together by means of metal anchoring and joining parts that have been inserted in the machinings tooled in said pieces to configure a floor covering material.

Figure 3. Shows a perspective view of the tooling machine for tooling wooden tiles object of the present invention.

Figure 4. Shows a partial perspective view of the frontal area of the right side parallel conveyor belt, where the retractable frontal stopper guide used for positioning the wooden piece can be seen, as well as the movable lateral guide that is used to provide the reference position.

Figure 5. Shows a partial perspective view of the coupling mechanism in one of the motorised milling head and the system that applies pressure to the wooden piece to be tooled.

Figure 6. Shows a partial perspective view of one of the parallel conveyor belts to which the pushing system used to drag the wooden tiles to be tooled is associated to.

Figure 7. Shows a plan view of Figure 3.

Figure 8. Shows a frontal elevation view of the machine shown in Figure 3 detailing the distribution arrangement of the motorised milling heads.

Figure 9. Shows a lateral elevation view of Figure 8.

Figure 10. Shows a perspective view of the tooling machine for tooling wooden pieces according to the alternative embodiment of the invention describe in the present descriptive report.

Figure 11. Shows a frontal elevation view of the machine shown in Figure 10, that is, the tooling machine object of the invention according to the alternative embodiment.

Figure 12. Shows a partial perspective view with a transversal elevation detail view showing the area where the wooden piece contacts the fixed left lateral

reference guide in the machine shown in Figure 10, that is, the machine according to the alternative embodiment.

Figure 13. Shows a perspective view of the roller table focusing on the area occupied by the lateral element that pushes the wooden pieces towards the fixed left lateral guide in the machine shown in Figure 10, that is, the machine according to the alternative embodiment.

Figure 14. Shows a partial perspective view of one of the motorised milling heads at the point where the cylinder that immobilised the milling head is located during the tooling action in Figure 10, that is, the machine according to the alternative embodiment.

References:

[0023]

1: wooden pieces to be tooled (square shaped)
1' : wooden pieces to be tooled (rectangularly shaped)
2: machinings (at the corners)
3: machinings (in the centre)
4: joining means (270° arch)
5: joining means (180° arch)
6: tongue edges
7: grooved recesses
8: bench or chassis
9: support legs
10: upper cross ties
11: lower cross ties
12: upper frontal longitudinal beam
13: lower frontal longitudinal beam
14: lower rear longitudinal beam
15: motorised milling heads
16: rack, integral with the upper cross tie
17: movable rear bar
18: side racks
19: roller table
20: fixed left lateral guide
21: parallel conveyor belts
21': right parallel conveyor belt
21": left parallel conveyor belt
22: intermediate parallel gibs
23: retractable frontal stopper guide
24: movable lateral right guide
25: racks associated to the ends of the intermediate parallel gibs
26: movable lateral guide
27: lateral racks, integral to the lower cross tie
28: slider element
29: vertical guides
30: support associated to the vertical guides (29)
31: slider element
32: vertical guides
33: support associated to the vertical guides (32)
34: piece-holding element
35: pneumatic pusher
36: additional piece
37: longitudinal support
38: roller guides
39: pneumatic cylinder
40: pushing device
41: second pneumatic cylinder
42: frontal pushers
43: contact piece with the rear edge of the wooden pieces

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0024] The numbers used to identify the parts and elements of the machine object of the invention, and more particularly those shown in figures 1 and 2, where the underside of the wooden flooring elements or tiles (1) can be seen will be used as reference in the following description of the invention object of the aforementioned patent of invention 200700831. Said wooden tiles (1) are fitted with tooled machinings (2) at the angle points and with other tooled machinings (3) at the centre of the wood tile's (1) sides. For square pieces (1) only one tooling is preferably done in the centre area, while for rectangular pieces (1') (not shown in figures 1 and 2) three tooled machinings (3) are done preferably in the central area.

[0025] When several wooden tiles or pieces (1) are joined together to configure a floor covering assembly, the machinings (2) tooled at the angles of the four wooden tiles (1) that converge at a vertex (see enlarged detail in figure 2) configure an annular groove in the underside of the wooden tiles (1), where a joining element 4 is pressure-inserted in an open annular manner and fitted to the annular groove section having an approximate amplitude of 270°. This same type of joining element 4 is used to anchor two pieces of wood (1) in the central area of the sides where machinings have been tooled (3) because when two wooden pieces (1) are joined an annular groove is likewise configured.

[0026] There is another type of joining or anchoring element 5 having an amplitude of approximately 180° that is used to join together two wooden pieces (1) located in the periphery of the configuration (see enlarged detail in figure 2).

[0027] The wooden tiles or pieces 1 have additional tongue and groove joining means defined, which in this particular example are embodied by complementary tongues 6 and grooves 7 tooled in all the piece's edges.

[0028] Then, according to the description provided in the present invention, machinings 2 and 3 are tooled simultaneously by a machine as the one shown in figure 3 in one single operation, simplifying the task and minimising costs as it is the intended purpose.

[0029] Figure 3 and the following figures show the general structure of the tooling machine for tooling wooden tiles. Said structure comprises a robust bench or chassis

8 equipped with support legs 9 between which there are upper 10 and lower 11 cross ties, as well as some longitudinal beams or upper 12 and lower 13 frontal bars and a longitudinal beam or lower rear 14 bar, all of them mounted as fixed elements of the structure.

[0030] Upper frontal bar or longitudinal beam 12 is embodied by a first fixed frontal bar at the fore of the structure that bears an array of motorised milling heads 15 that effect vertical movements and that can move laterally in a rack 16 integral to the upper cross tie or frontal bar 10. The preferred number of motorised milling heads is an array of five units.

[0031] Parallel to the upper frontal bar 12 there is a second frontal movable bar 17 set behind the first and bearing as many motorised milling heads 15. The first bar 12 can move in a path parallel to itself by means of lateral racks 18 arranged on the upper cross ties 10. The motorised milling heads 15 are assembled onto another rack (cannot be seen in the perspective view shown in figure 3) that is parallel to the previous rack 16.

[0032] Wooden tiles or elements 1 to be tooled arrive on a roller table 19 resting on the left side supported by a left lateral guide element 20 that defines the left longitudinal line of reference. When the pieces arrive thus to the machine, wooden tiles or elements 1 progress forward supported and propelled by lateral parallel conveyor belts 21, and also supported by intermediate parallel gibs 22 until they bump against a retractable frontal stopper guide 23 which function is to stop the incoming pieces from advancing further. This guide is embodied by two retractable stopper elements associated to the respective lateral parallel conveyor belts 21, as shown in figure 4, that can be further differentiated into right lateral parallel conveyor belt 21' and left lateral parallel conveyor belt 21 ".

[0033] Figure 4 also shows the frontal part of a lateral right guide 24 that is movable and pushes wooden part 1 to be tooled against lateral left reference guide 20, so the wooden part 1 is then pressed against the lateral left reference guide 20 by said movable lateral right guide 24.

[0034] The left lateral parallel conveyor belt 21" is a fixed element, while the right lateral parallel conveyor belt 21' is a movable element which purpose is to come closer or apart from the fixed belt depending on the size of the wooden tile 1 to be tooled. In the same manner intermediate parallel gibs 22 can move for the same reason, although they move as a whole mounted on racks 25 that are associated to their ends. In this manner the right lateral parallel conveyor belt 21' and intermediate parallel gibs 22 move in a mutually parallel fashion to adjust their distances from each other to the width of the pieces they are carrying by means of racks 25 associated to their respective ends.

[0035] In order for the different machinings to be tooled simultaneously - the machinings to be tooled in central area 3 of the lateral edges of wooden tiles 1 - there is a different set of motorised mill heads 15 that are similar to the previous set, which are mounted on the left side on lower cross tie 11 and on the right side another movable lateral guide 26 that can move parallel to itself on the same racks 25 that the intermediate parallel gibs 22 and right lateral parallel conveyor belt 21' move.

[0036] Although figure 3 only shows a motor on each side, it may become necessary to have two or more motors on each side if there are at least two tooling points, therefore the design incorporates, in addition to the movement described above, the possibility for said motors to also move longitudinally on a different set of lateral racks 27 integral to the lower cross tie 11 and to the movable lateral guide 26. In this manner the distance between motors can be varied to adjust to desired position.

[0037] Figure 5 shows how any one of the tool-bearing heads is arranged. The motorised mill heads 15 can move vertically and pneumatically in a position that depends on the thickness of the wooden piece 1 to be tooled to mill the groove at the desire depth, that is so the tool can come in and out aided by a slider element 28 and vertical guides 29 associated to a supporting element 30 that can in turn move vertically aided by a different slider element 31 and vertical guides 32 associated to another sliding support element 33 in the corresponding rack 16 or 27. To the underside of supporting element 30 is attached a wooden piece-holding element 34 that holds the wooden piece 1 down while it is being tooled. Figures 7 and 9 show these wooden piece-holding elements 34 in a schematic manner.

[0038] Figure 6 show pneumatic pushers 35 that are collateral to the parallel set of conveyor belts 21 that press on the rear edge of wooden tiles 1 and can move up and down and forwards and backwards.

[0039] The plan view shown in figure 7 depicts how the milling heads are arranged for tooling a rectangular wooden tile 1'. The five frontal and the five rear motorised milling heads 15 act on the longer sides of the tile while the corresponding central motorised milling heads 15 act on the shorter sides.

[0040] The already tooled wooden tile 1' is shown on the outgoing table in figure 7 and shows the four tooled machinings 2 on the corners and the eight tooled grooves 3 distributed in the central area of the sides.

[0041] When the piece 1 to be tooled is squared-shaped only three of the five frontal motorised milling heads 15 need act after having adjusted the position of parallel conveyor belts 21, intermediate parallel gibs 22 and right lateral guide 24, while the same reference lines left (left lateral reference guide 20) and the first frontal (retractable frontal stopper guide 23) are maintained in the same positions as before.

[0042] All the positioning movements are achieved by numerical control after entering the formats via a tactile interface; the tooling machine is equipped with an LCD display and memory to store the operational programs.

[0043] The operational sequence is as follows:

The pieces (1, 1') are fed to the machine and are positioned correctly in the machine after being trans-

ported by the parallel conveyor belts 21 and supported by the intermediate parallel gibs 22 until the bump against the retractable frontal stopper guide 23. The wooden piece-holding elements 34 he motorised milling heads 15 are fitted with exert a light pressure on the piece (1, 1') to keep it flat in place. The movable lateral right guide 24 pushes the wooden piece (1, 1') towards the fixed left lateral reference guide 20 thus placing said piece at the "0" spot. In the meantime, rear pushers 35 keep the piece pressed against the retractable frontal stopper guide 23, completing the squared positioning of the piece at the "0" spot (which is the left front area of the piece (1, 1') to be tooled).

[0044] In the alternative embodiment of the present invention illustrated in figure 10, the intermediate parallel gibs 22 against which the wooden piece 1 to be tooled rests while in the operational position, can be moved vertically to gain independent height as needed and thus be able to adjust to any curvature the wooden piece 1 may have, that is, this is feature used for pieces that are not perfectly flat. In figures 10 and 11 the path of said movements is indicated by means of directional arrows.

[0045] In addition, in the alternative embodiment of the invention the fixed left lateral reference guide 20 is fitted with an additional component 36 (see figures 10 and 12), which improves the guiding process used to lead wooden piece 1 by skipping over the wooden tongue 6 element from the tongue and groove assembly of wooden piece 1. Said additional component 36 is exchangeable according to the actual format of wooden piece 1 to be tooled (see schematic detail as shown in figure 12).

[0046] In the alternative embodiment of the invention, and in order to be able to adjust the tooling distance required for the motorised milling heads 15 of the left side mounted on rack 27 - which is integral with the lower left cross tie 11, as shown in figure 10 - the lower left cross tie 11 is replaced by a movable cross tie, that is, said cross tie is thus enabled to move describing a parallel motion to itself (as opposed to be fixed as in the original embodiment of the invention). The double arrow drawn on lower cross tie 11 shows in a schematic way this possibility of movement. The motorised milling heads 15 assembled on the right side move to adjust to the width of the wooden pieces to be tooled, as they are assembled on the movable lateral guide 26.

[0047] Another addition to the alternative embodiment is a roller table 19 placed on the right side (see figure 10 and exploded detail on figure 13), at the entry point of the chassis 8, a longitudinal support 37 with roller guides 38 that can move when driven by pneumatic cylinder 39, configuring a pushing device 40 that push the wooden pieces 1 so they are kept in contact with the fixed left lateral reference guide 20.

[0048] Figure 14 shows how the alternative embodiment also incorporates a second pneumatic cylinder 41 that when actuated expands between the bar supporting the motorised milling heads 15 and the motorised milling heads 15 themselves, thus preventing vibrations from occurring.

[0049] To conclude the alternative embodiment to the present invention also proposes a mechanism to optimise how the wooden piece 1 is securely held during the tooling operation by two frontal pushers 42 that exert pressure on the rear edge of wooden piece 1 to ensure there is pressure contact against the retractable frontal stopper guide 23 located at the front of the assembly. These frontal pushers 42 are actuated by pneumatic cylinders which rods include a part 43, the actual element that comes into direct contact with the rear edge of wooden piece 1. Said pneumatic cylinders are also capable of a short longitudinal-bound movement since, at their retracted at their initial position to allow wooden piece 1 to enter the operational centre and when the piece is in place they come down and move forward to effect the actual holding in place action.

[0050] In an alternative manner, the assembly could have only one frontal pushers 42 placed in a central position instead of having two such devices 42, as shown in figure 10.

Claims

1. **TOOLING MACHINE FOR WOODEN PIECES**, particularly wooden tiles intended as parquet-type floor covering, on which underside and/or sides machinings (2, 3) have been tooled to locate joining means (4, 5), the tooling machine intended for integration in a standard manufacturing of this type of floor covering pieces and **characterised in that** it comprises:

   - two parallel conveyor belts (21), a right conveyor (21') and a left conveyor (21"), conveying the wooden pieces (1, 1') singly as they are received from a roller table (19) or feeder until they are placed at the simultaneous tooling position where a series of motorised milling heads (15) effect with a cutting or milling tool, positioned at the preselected points, while said pieces (1, 1') are supported by three intermediate parallel gibs (22),
   - a fixed left lateral reference guide (20) that marks the initial reference position for the pieces (1, 1') to be tooled,
   - a retractable frontal stopper guide (23) that stops the forward movement of the pieces (1, 1') with the same initial positioning effort, said retractable frontal stopper guide (23) being retractable in order to allow exit of the pieces by means of rear pneumatic pushers (35),
   - a movable lateral right guide (24) with pneumatic activation by numerical control that pushes the wooden pieces (1, 1') towards the fixed left lateral reference guide (20),

- the intermediate parallel gibs (22) that support the wooden pieces (1, 1') have a numerical control sliding motion,
- an upper frontal longitudinal beam (12) that supports a first frontal array of motorised milling heads (15),
- a movable and frontal rear bar (17) that supports a second array of motorised milling heads (15), and can be positioned longitudinally on numerical control sliders,
- a lower fixed left longitudinal cross tie (11) bearing at least one motorised milling head (15),
- a lower movable right and longitudinal lateral guide (26) bearing at least one motorised milling head (15).

2. **TOOLING MACHINE FOR WOODEN PIECES,** according to claim 1 **characterised in that** one of the parallel conveyor belts (21), more specifically the left one (21 ") is fixed while the right one (21') is movable and its positioning is by numerical control so that it is adjusted to the size of the wooden piece (1, 1') to be tooled; having a compensation spring system for the pressure phase of the piece and an operational speed that is operated through an inverter and managed by numerical control.

3. **TOOLING MACHINE FOR WOODEN PIECES,** according to claim 1 **characterised in that** the upper frontal longitudinal beam (12) and the rear movable bar (17), as well as the lower cross tie (11) and the lateral guide (26) are all elements that bear motorised milling heads (15), including transversal positioning means of said motorised milling heads (15) on slider and numerically controlled; said motors further having a vertical pneumatic movement for entry-exit of the milling tool; and existing a piece-holding element 34 of the wooden piece (1, 1') to be tooled associated to a support (30) for each of the motorised milling heads (15).

4. **TOOLING MACHINE FOR WOODEN PIECES,** according to claim 1 **characterised in that** the intermediate gibs (22) are vertically displaceable to change their height independently, for supporting non-flat pieces.

5. **TOOLING MACHINE FOR WOODEN PIECES,** according to claim 4 **characterised in that** the fixed lateral reference guide (20) includes an additional piece (36) provided with a step that fits the side of the wooden piece (1) to be tooled in order to prevent its exit.

6. **TOOLING MACHINE FOR WOODEN PIECES,** according to claim 5 **characterised in that** the lower cross ties (11) bearing the motorised milling heads (15) for tooling the sides, corresponding to the fixed left lateral reference guide (20) moves parallel to itself in order to adjust the operational width on that side.

7. **TOOLING MACHINE FOR WOODEN PIECES,** according to claim 5 **characterised in that** the roller table (19) includes on its side, opposing the side where the fixed left lateral reference guide (20) is located, a longitudinal support (37) fitted with roller guides (38) and assisted by a pneumatic cylinder (39) that drives the wooden piece (1) to be tooled against the fixed left lateral reference guide (20).

8. **TOOLING MACHINE FOR WOODEN PIECES,** according to claim 5 **characterised in that** it includes a second pneumatic cylinder (41) located in between each motorised milling heads (15) and a bar in which it is mounted, acting by pressure for immobilization of the cylinder in order to achieve a greater precision during the tooling operation.

9. **TOOLING MACHINE FOR WOODEN PIECES,** according to claim 5 **characterised in that** it includes at least one frontal pusher (42) associated to the movable and frontal rear bar (17) that acts on the rear edge of the wooden piece (1) to optimise the tooling position by pressing the frontal edge of the wooden piece (1) against the retractable frontal stopper guides (23).

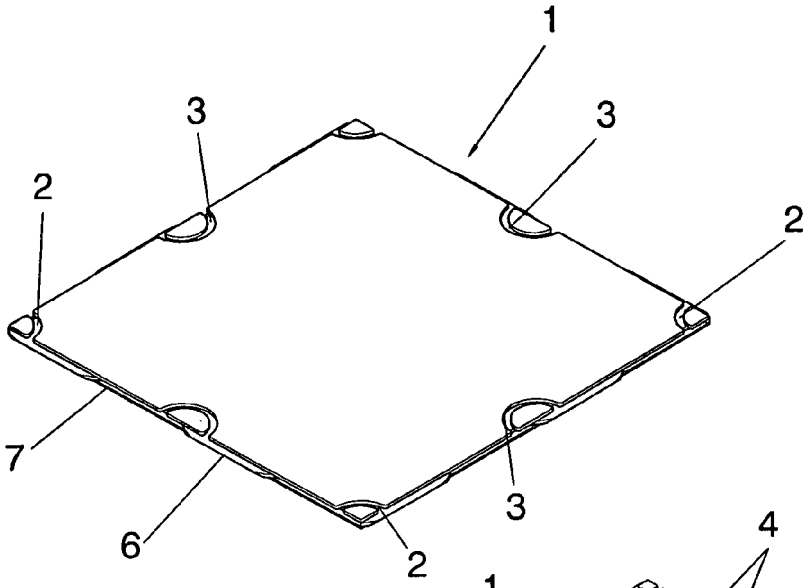


FIG. 1

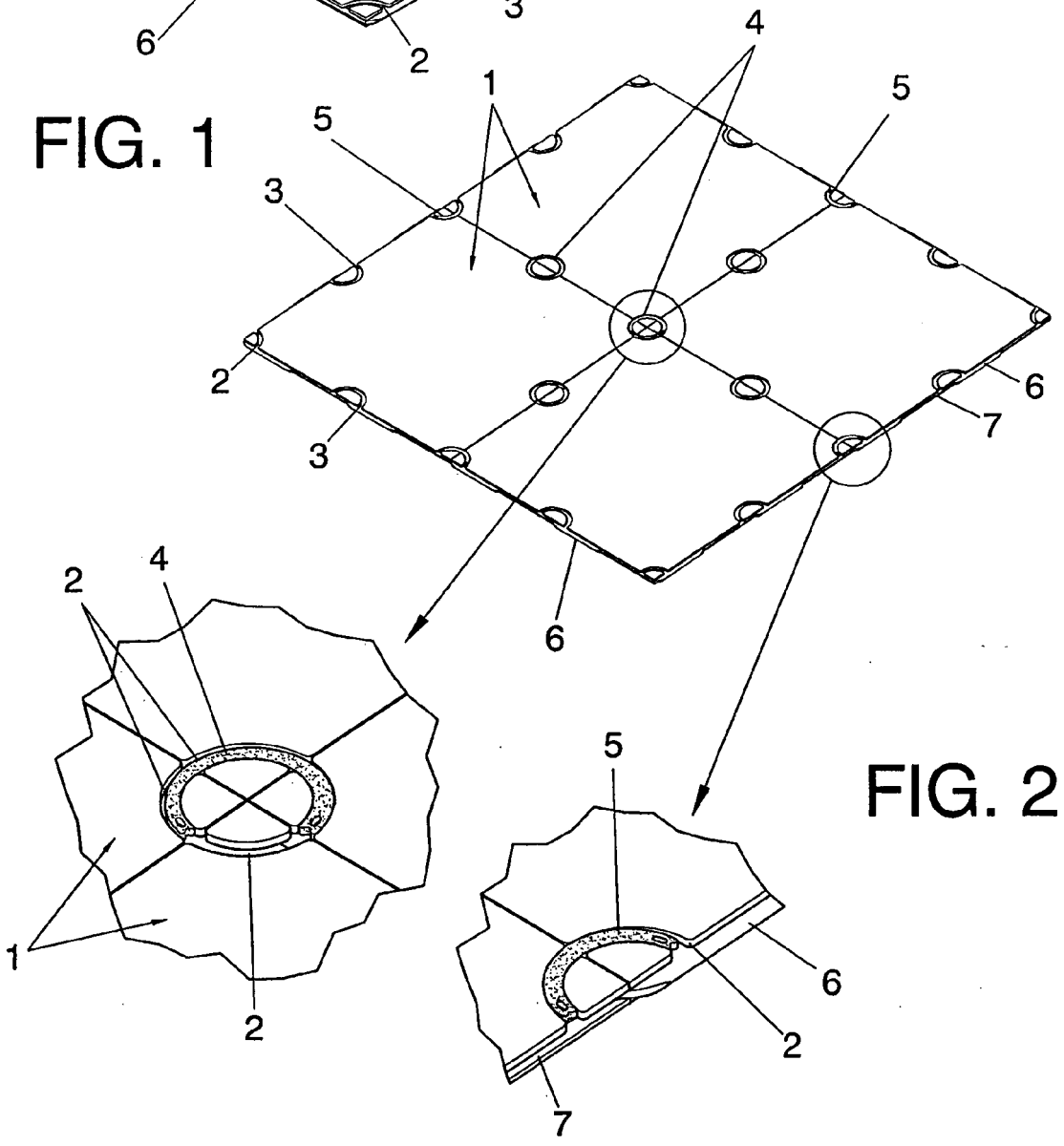


FIG. 2

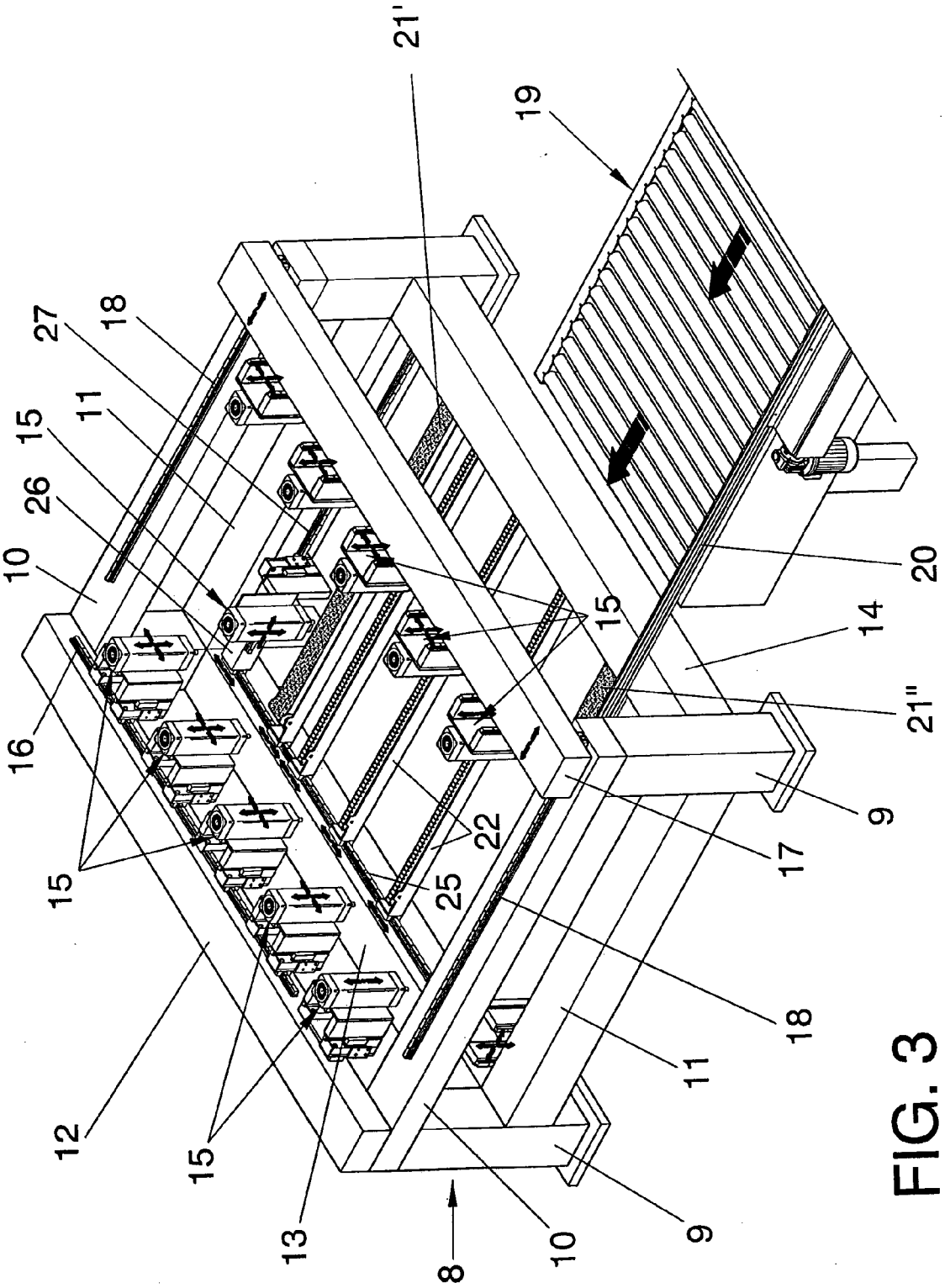


FIG. 3

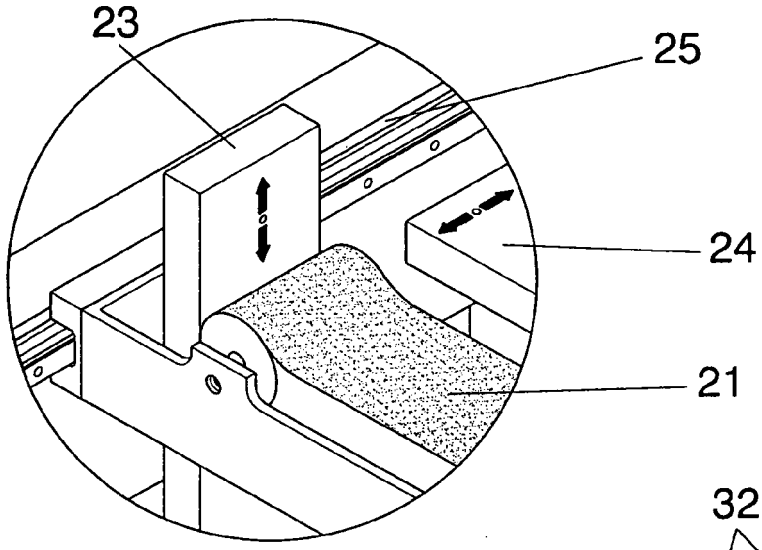


FIG. 4

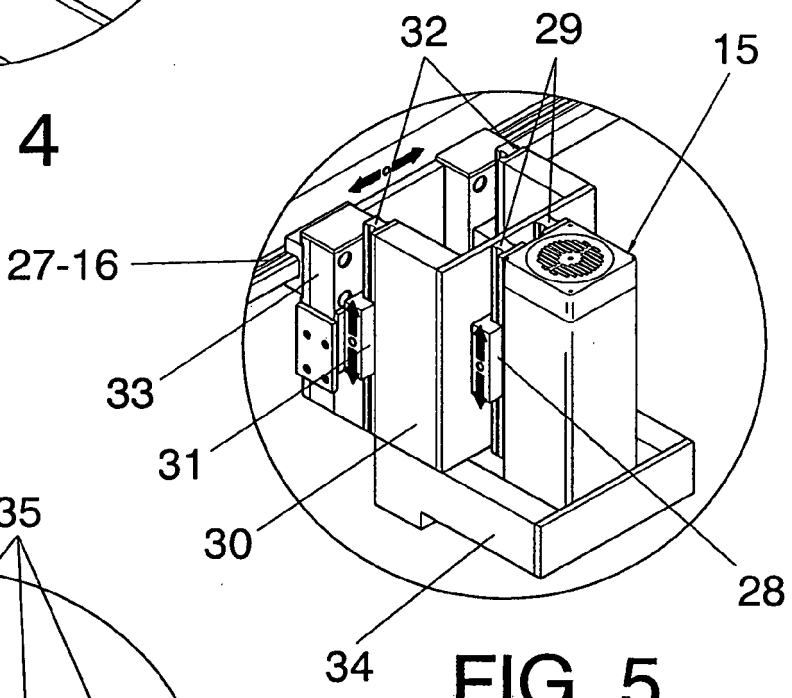


FIG. 5

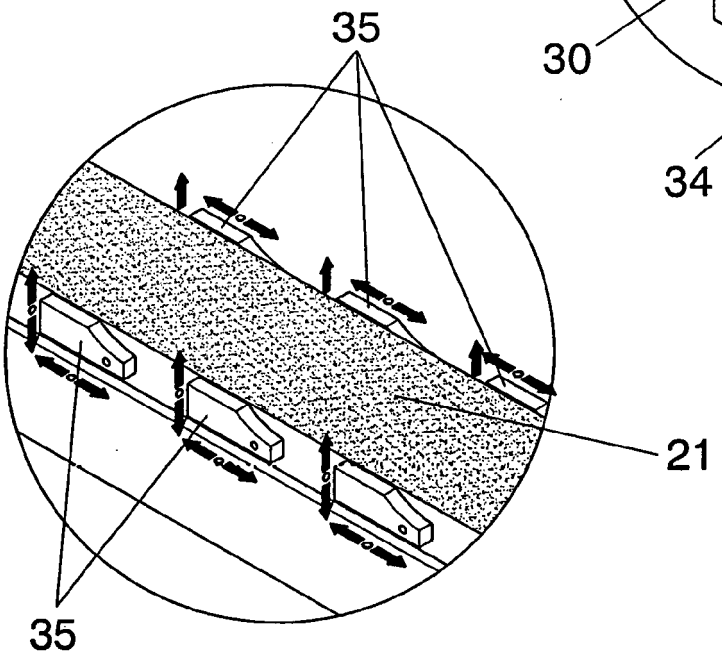
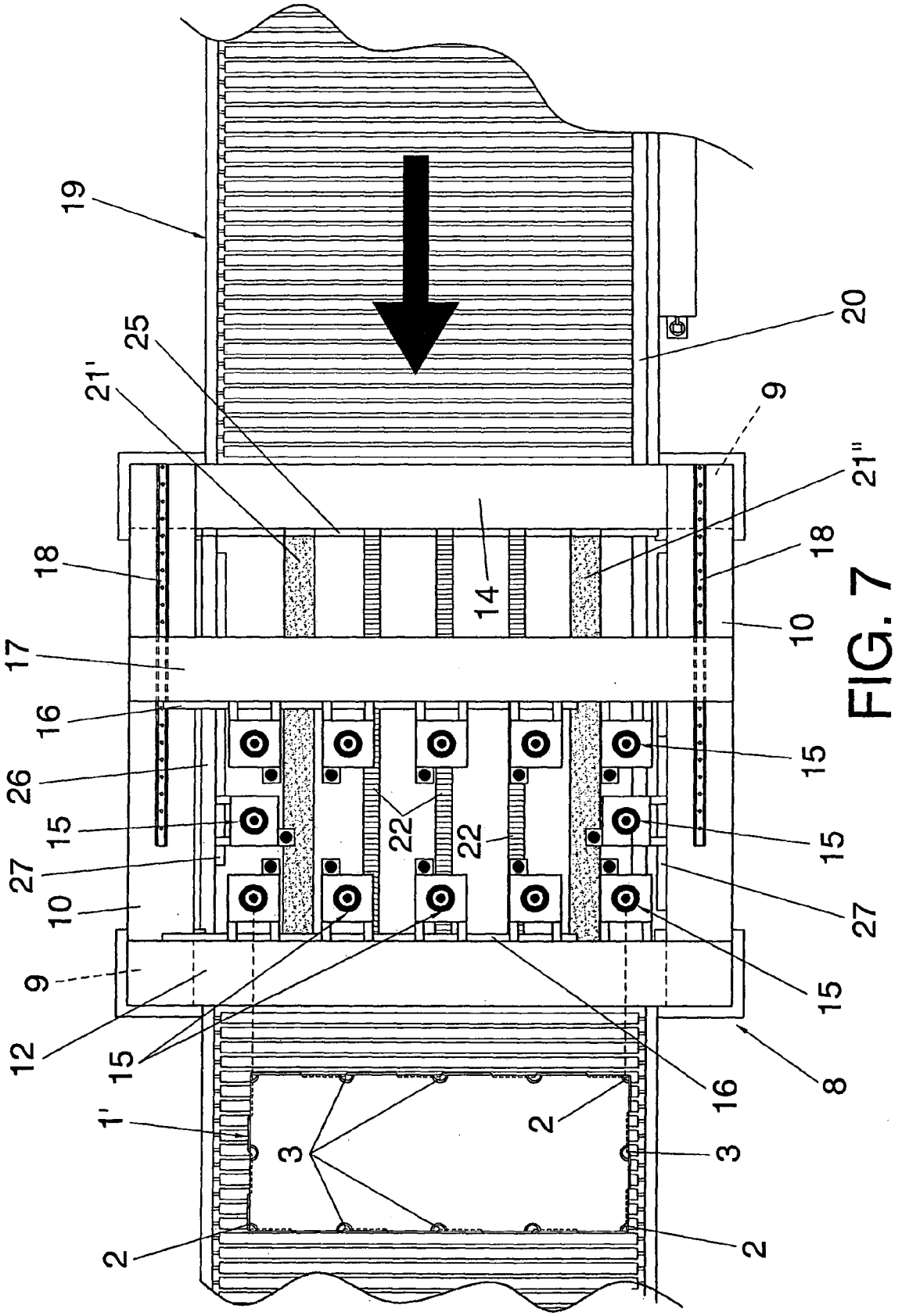


FIG. 6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15
27
27
10
9
15
12
15
16
8
1'
2
3
3
2
2

FIG. 7

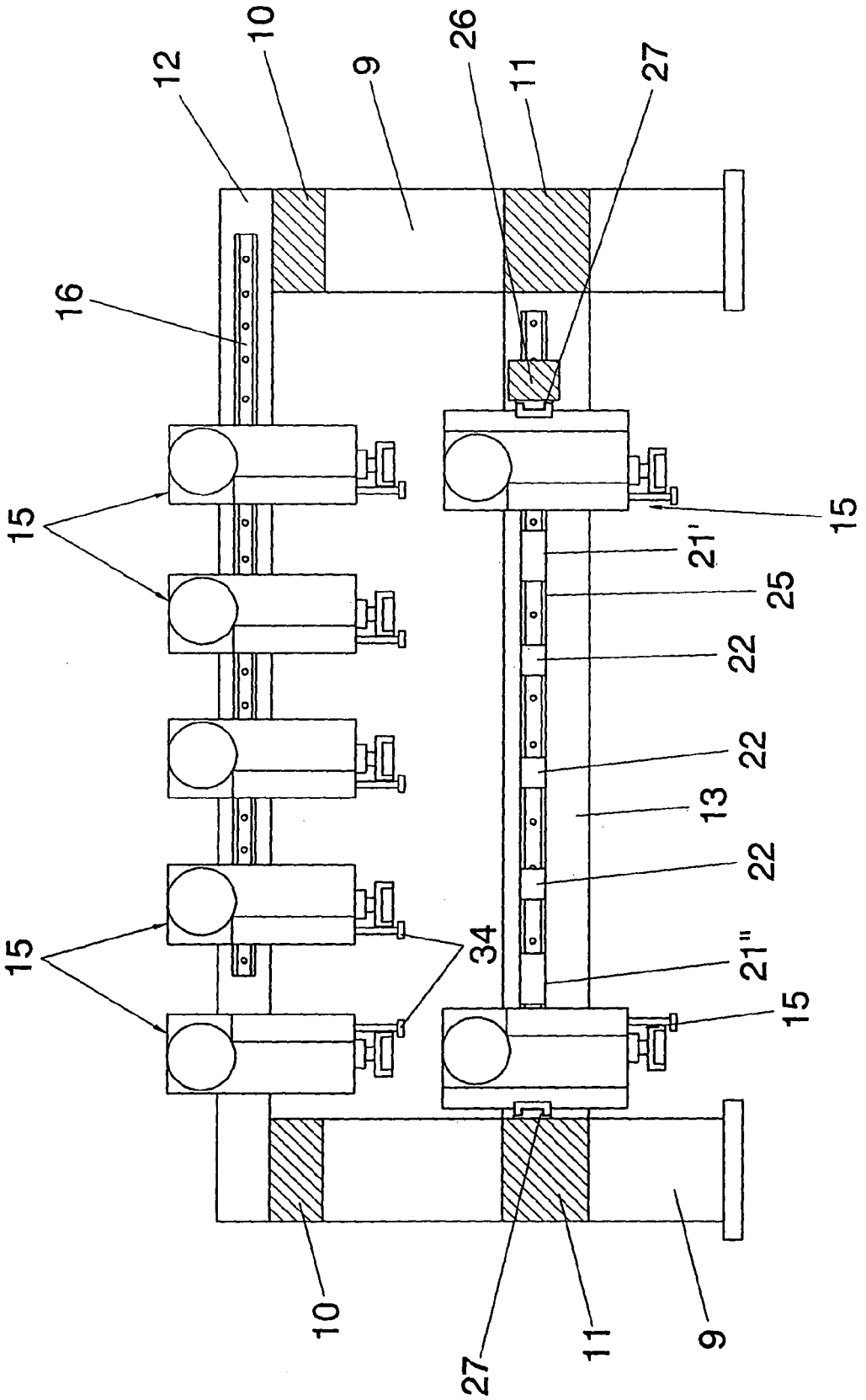

FIG. 8

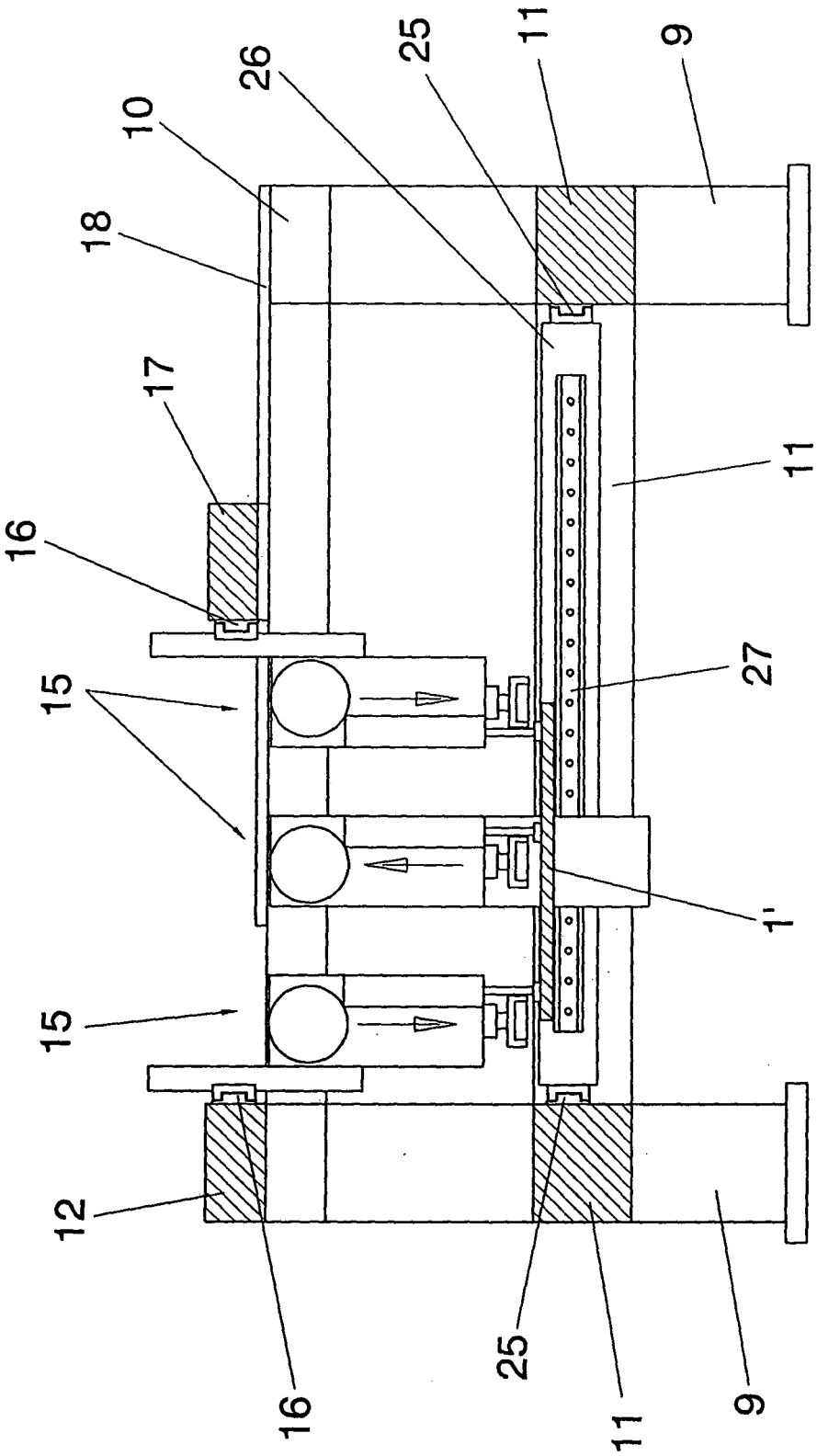

FIG. 9

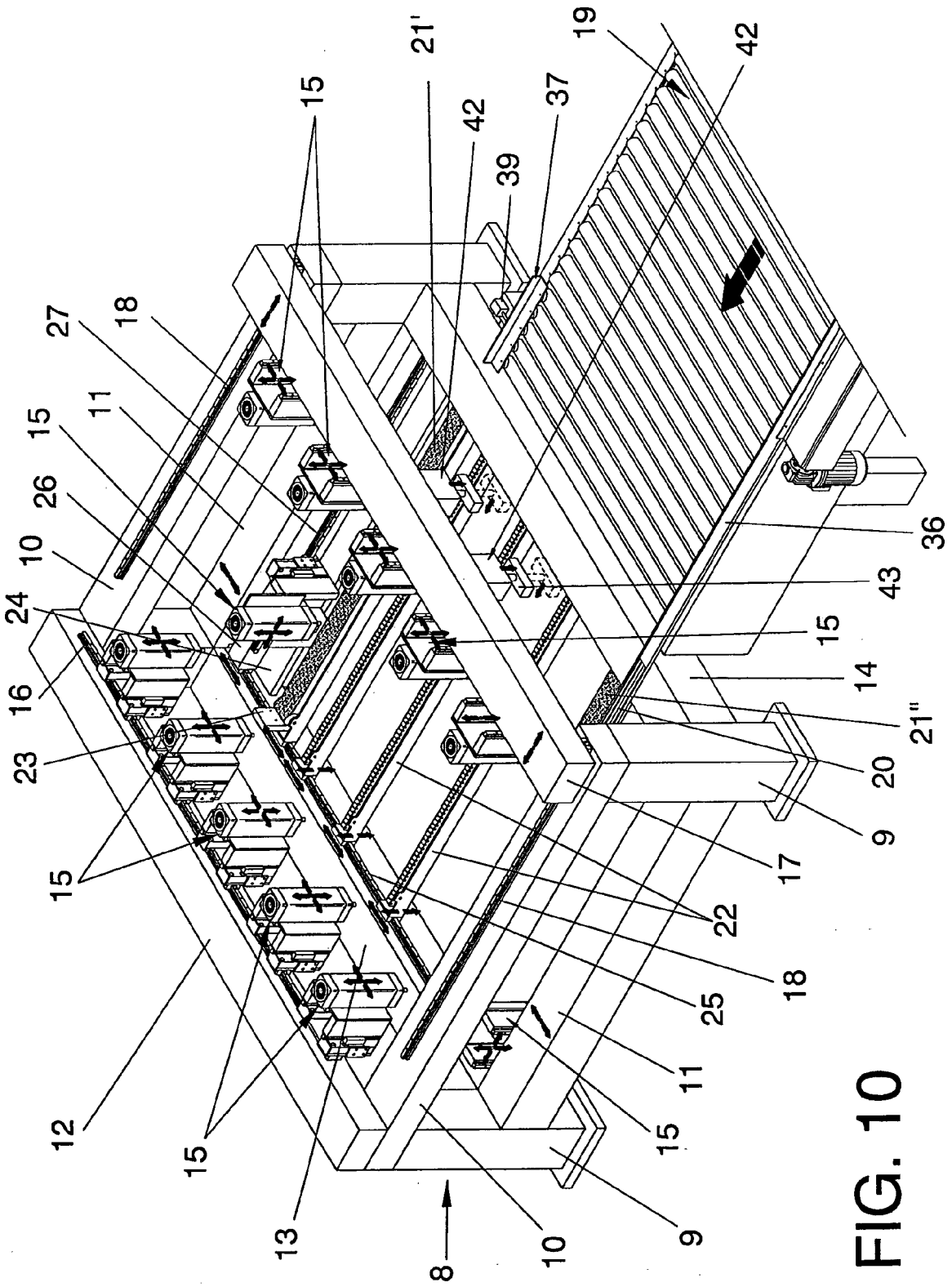
19
21'
42
15
42
37
39
27
18
11
15
26
10
24
16
23
15
12
15
13
8
10
9
15
11
25
18
22
17
9
20
21"
14
15
43
36

FIG. 10

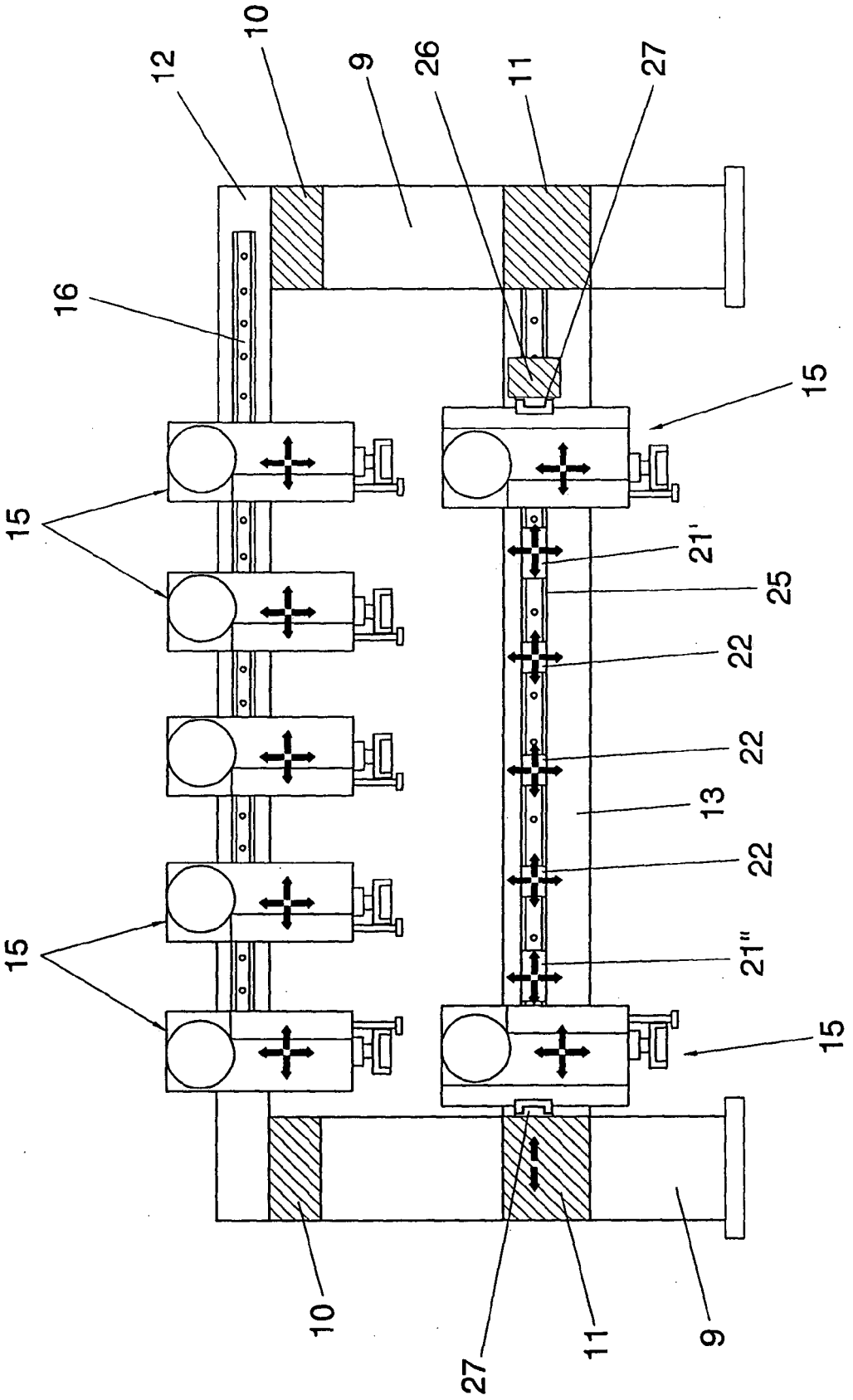

FIG. 11

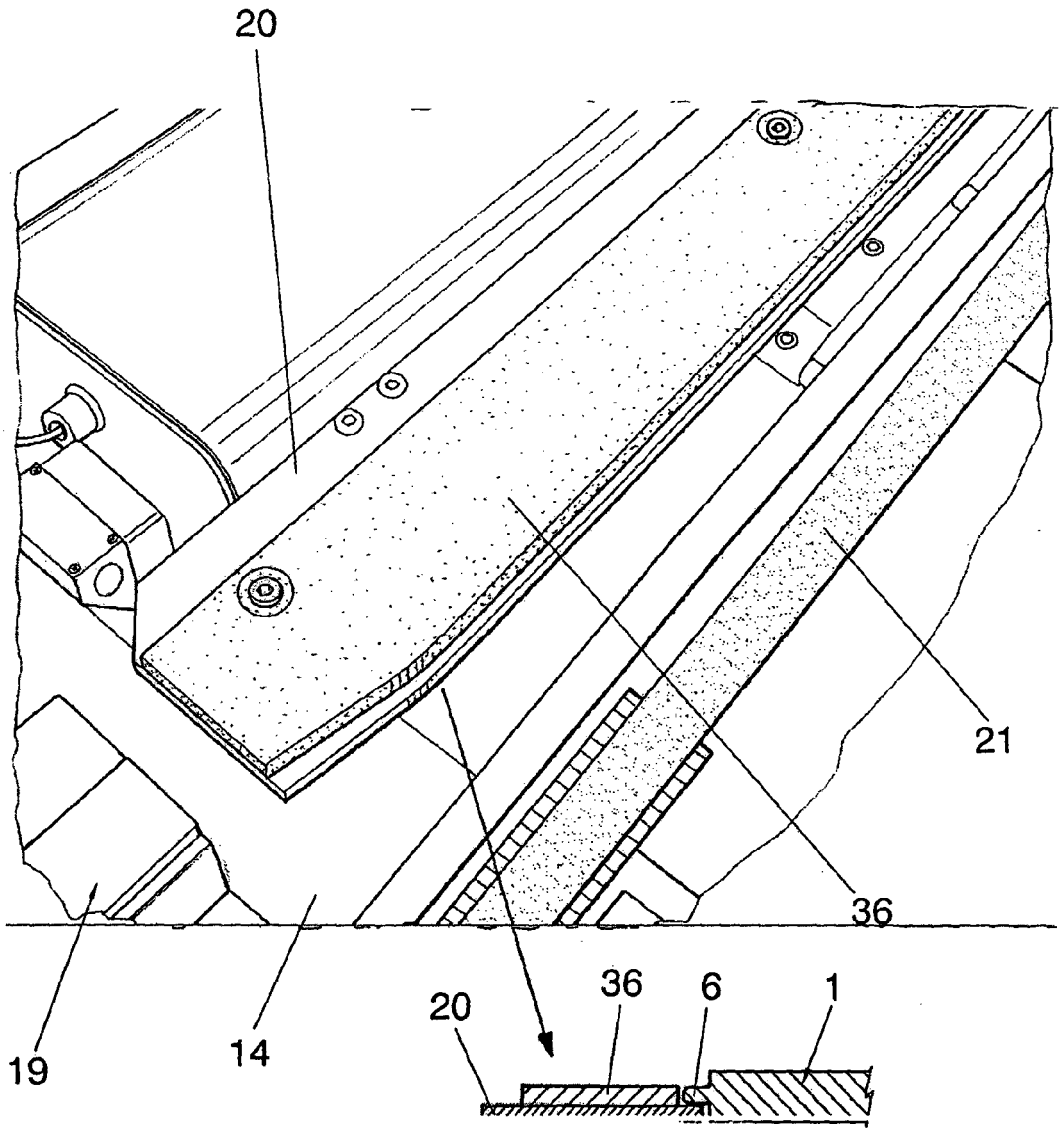

FIG. 12

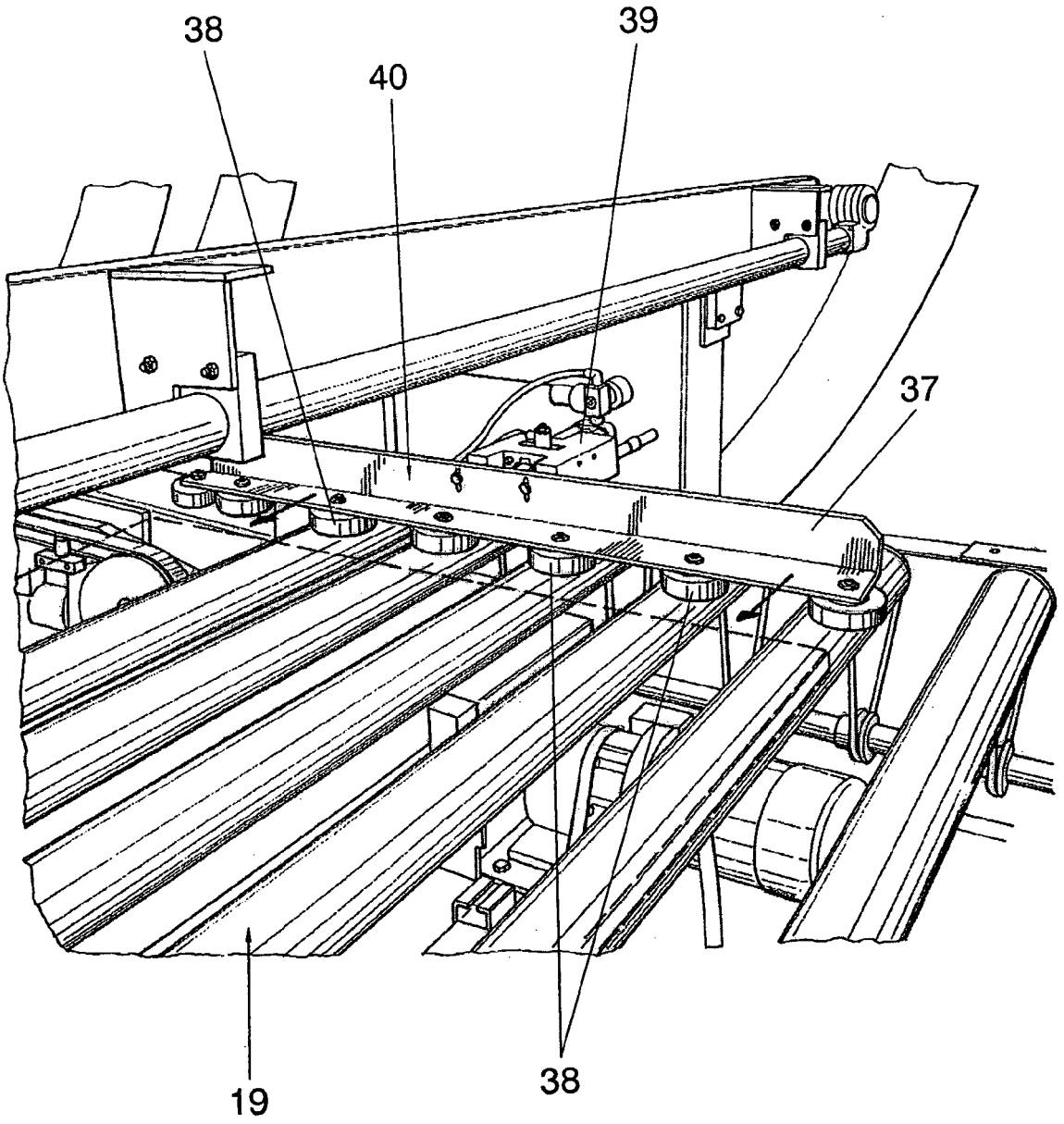

FIG. 13

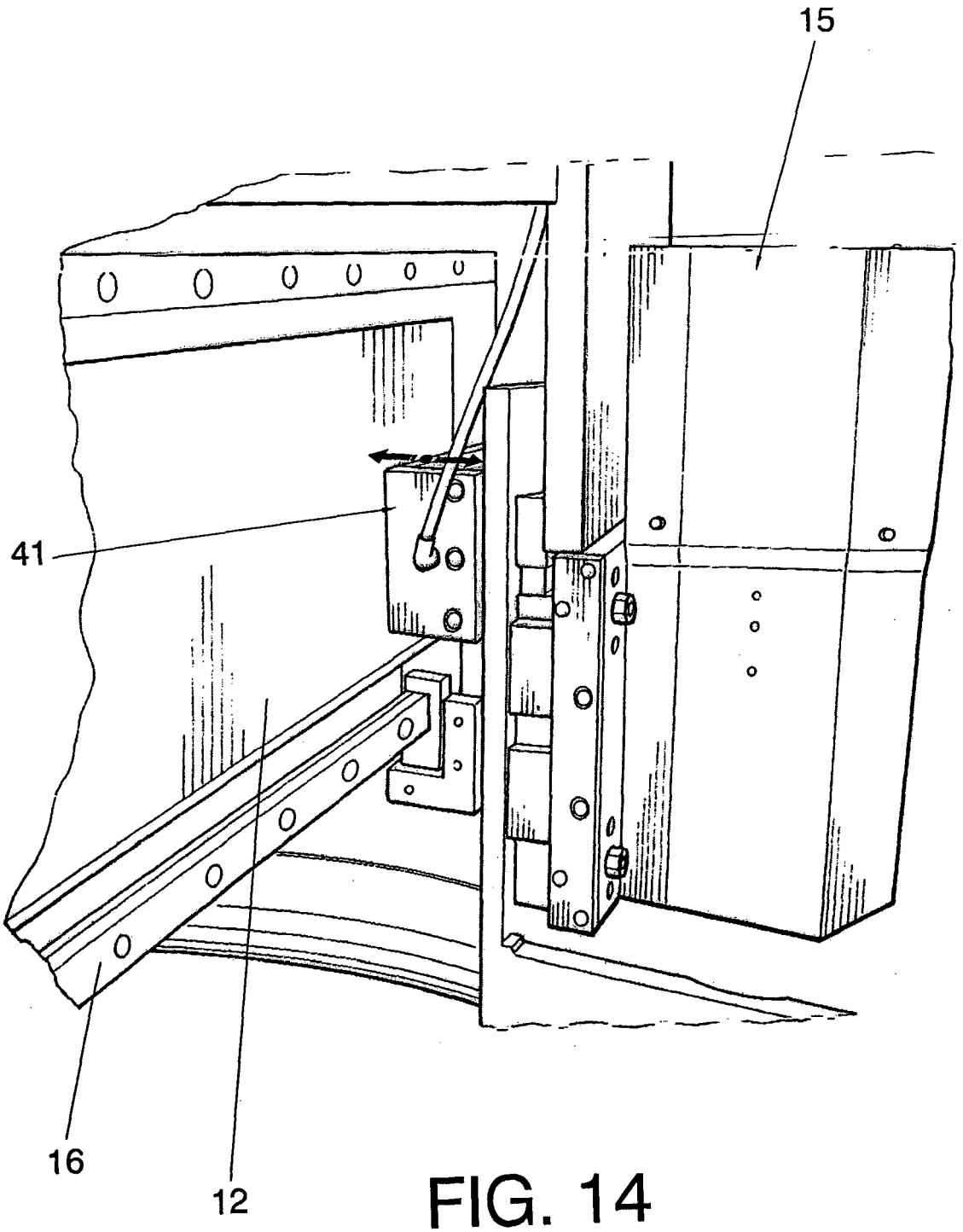

FIG. 14

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- ES 200700831 **[0004] [0006] [0007]**
- ES 200701309 **[0004]**
- ES 200701920 **[0004]**