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(54) **Plant for feeding twisting machines with fibres, in particular glass fibres**

(57) A plant for feeding twisting machines for fibres, in particular glass fibres, which operate on the fibre leaving first bobbins (91) by twisting it and winding it in the form of second bobbins (92) wound on spindles. The plant comprises a plurality of parallel longitudinal overhead runways (10), positioned above and at a distance from the twisting machines (90), parallel to the longitudinal axis formed by the rows of these machines (90), and a plurality of self-propelled transport carriages (30), arranged to each transport a predetermined number of first bobbins (91) and second bobbins (92), and suspended from and movable along the longitudinal run-

ways (10) above and at a distance from the twisting machines (90). The plant also comprises at least one self-propelled machine (40) for manipulating the first (91) and second (92) bobbins, which is suspended from and movable along the longitudinal runways (10) above and at a distance from the twisting machines (90), to operate on the transport carriages (30) in order to transfer the first bobbins (91) from them to an underlying twisting machine (90) and to transfer onto them the second bobbins (92) taken from the same twisting machine, said machine (40) being movable along the same runway (10) together with the transport carriages (30).

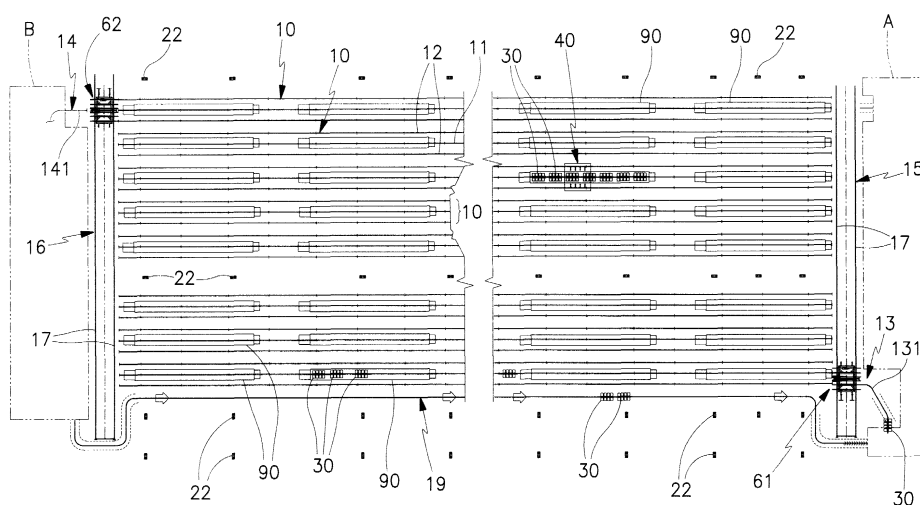


FIG. 1

Description

[0001] The present invention relates to a plant for feeding twisting machines for fibres, in particular glass fibres, which operate on the fibre leaving first bobbins by twisting it and winding it in the form of second bobbins wound on spindles.

[0002] In processing glass fibre, this is wound on large tubular supports to form first bobbins, which after various handling operations (transport, weighing, storage, drying, etc.) are placed on twisting machines where the fibre is unwound from the first bobbin and, after twisting and tensioning, rewound on a spindle to form a second bobbin, to acquire the desired technical properties enabling it to be used.

[0003] The present invention relates to the feeding of twisting machines, i.e. transporting the first bobbins to and loading them onto the twisting machines, removing the second bobbins from these machines and finally transporting these bobbins to a final station.

[0004] Said first bobbins are currently brought in proximity to the twisting machines by suitable carriages and, each time the twisting machine finishes a twisting cycle, these bobbins are transferred by the carriages onto the relative rotary supports of the twisting machine, while the second bobbins are withdrawn from the machine and placed on other carriages; the carriage with the second bobbins is then brought to a final station.

[0005] These transfer operations are currently effected manually with consequent labour costs, relatively lengthy times required for performing the operations and consequent relatively lengthy machine down times.

[0006] A further considerable drawback is the fact that the handling of the first and second bobbins by said transport carriages requires transport lines involving considerable overall floor space, creating obstacles and restraints to the movement of persons and objects, and requiring special complex protection systems against accidents caused by carriage movement.

[0007] An object of the present invention is to provide a plant for feeding twisting machines with bobbins which is able to overcome said drawbacks. This and further objects are attained by the invention as characterised in the claims.

[0008] The plant of the invention is based on the fact of comprising:

at least one longitudinal overhead runway, positioned above and at a distance from the twisting machines,

a plurality of self-propelled transport carriages, arranged to each transport a plurality of first bobbins and second bobbins, and suspended from and movable along the longitudinal runways above and at a distance from the twisting machines,

for manipulating the first and second bobbins, at least one self-propelled machine suspended from and movable along the longitudinal runways above

and at a distance from the twisting machines, to operate on the transport carriages in order to transfer the first bobbins from them to an underlying twisting machine and to transfer onto them the second bobbins taken from the same twisting machine, said machine being movable along the same runway along which the transport carriages move.

[0009] According to a preferred (but not exclusive) embodiment, the plant comprises:

a plurality of mutually parallel longitudinal overhead runways positioned above and at a distance from the twisting machines, parallel to the longitudinal axis of these machines,

a first transverse overhead runway positioned along the initial end of the longitudinal runways, for the transport carriages at least one entry point to the plant, positioned along the first transverse runway,

at least one self-propelled transfer car suspended from and movable along the transverse runway, to receive, suspended on board, the transport carriages at said entry point and transfer them to the initial end of any longitudinal runway, and to release them onto this longitudinal runway.

[0010] There are also provided:

a second transverse overhead runway positioned along the final end of the longitudinal runways, for the transport carriages at least one exit point from the plant, positioned along the second transverse runway,

at least one self-propelled transfer car suspended from and movable along the second transverse runway, to receive, suspended on board, the transport carriages at the final end of any longitudinal runway, to transfer them to said exit point, and to release them thereon.

[0011] Advantageously, said transfer car is arranged to receive, suspended on board, a manipulating machine on any longitudinal runway, to transfer it to the end of another longitudinal runway, and to release it thereon.

[0012] Operation is as follows:

the transport carriages loaded with first bobbins are transferred, by the transfer car of the first transverse runway, from the entry point to a determined longitudinal runway, and are transported therealong to above the twisting machines to be fed;

at these machines, by means of a manipulating machine the first bobbins are transferred from the transport carriages to the twisting machines and the second bobbins are transferred from the twisting machines to the transport carriages;

the transport carriages loaded with second bobbins originating from the twisting machines are transferred by the transfer car of the second transverse runway to the exit point;

the bobbin manipulating machine is transferred from one to another longitudinal runway by the transfer car.

[0013] An important advantage of the invention is that the first bobbins are transferred from the transverse carriages to the twisting machines and the second bobbins are transferred from the machines to the carriages in a mechanized and automatic manner.

[0014] Moreover the plant of the invention is positioned spatially above the twisting machines at a distance therefrom and from the floor, such as to allow the free geometric arrangement of these machines on the floor and the free passage of personnel and vehicles on the floor, and in particular in produces neither encumbrances nor obstacles to the movement of personnel close to the twisting machines.

[0015] Moreover, the personnel can follow the operation of the manipulating machines and transfer car at floor level from close by, in order to control their operation, or to be able to give best and most rapid attention to residual manual operations in sequence with the operation of the manipulating machine, ie the removal of the empty support of the first bobbins from the twisting machines and the insertion thereon of the empty supports for the second bobbins. The invention is described in detail hereinafter with the aid of the accompanying figures which illustrate one embodiment thereof by way of non-limiting example.

[0016] Figure 1 is a general plan view of the entire plant.

[0017] Figure 2 is a particular section through Figure 1 on a generic vertical plane perpendicular to the longitudinal runways.

[0018] Figure 3 is an enlarged detail of Figure 1, showing a transfer car.

[0019] Figure 3A is a section on the plane IIIA-III A of Figure 3, in which two transport carriages are positioned on the transfer car.

[0020] Figure 4 is an enlarged detail of Figure 2.

[0021] Figure 4A is a plan view of Figure 4 from above.

[0022] Figure 4B is an enlarged sectional detail of Figure 4.

[0023] Figure 5 is a vertical side elevation of a transport carriage.

[0024] The plant shown in the figures is provided for feeding a plurality of twisting machines (indicated by 90) of known type, arranged on the floor aligned along different parallel longitudinal rows. As is well known, the machines 90 operate by twisting fibres which they unwind from first bobbins 91 to then rewind them on a spindle 93 of vertical axis to form second bobbins 92.

[0025] The plant of the invention transfers first bobbins 91, of non-twisted fibre wound on a tubular support

910, in proximity to the machines 90 and loads them on to the appropriate horizontal transverse mandrels of the machines. Advantageously, the first bobbins 91 are handled with the aid of a rigid support saddle 95, in the form of a plate arched as a saddle to sustain the tubular support 910, as this is not sufficiently rigid.

[0026] Upstream of the plant of the invention there is a preliminary region (indicated overall by A and shown only partly in Figure 1) in which known preliminary operations are carried out on the glass fibres, to form the described first bobbins 91, which are then fed to the machine 90 by the plant of the invention.

[0027] The plant of the invention also removes from the machines 90 the second bobbins 92 and transfers them into a final region (indicated overall by B in the figures), in which they are stored (or otherwise).

[0028] The plant of the invention comprises a plurality of parallel longitudinal overhead runways 10, positioned above and at a distance from the twisting machines 90, and each composed of a central longitudinal rail 11 and two lateral rails 12 positioned to the side of and at a distance from the central rail 11. These rails 11, 12 are supported by brackets 101 fixed to overlying horizontal overhead beams 21 supported by columns 22 fixed to and possibly forming part of the cladding and roofing structure of the building in which the plant of the invention operates (see Figure 2 in particular).

[0029] The rails 11, 12 are positioned above and at a convenient vertical distance from the twisting machines 90, which are positioned on the floor and aligned to form long rows the longitudinal axis of which lies substantially in the vertical plane passing through the axis of the overlying longitudinal runway 10.

[0030] A first transverse overhead runway 15 is positioned along the initial end of the longitudinal runways 10, immediately downstream of the preliminary region A, while a second transverse overhead runway 16 is positioned along the final end of the same runways 10 (see Figure 1 in particular).

[0031] The bobbins 91 and 92 are handled with the aid of a plurality of self-propelled transport carriages 30, arranged to each transport a predetermined number of first bobbins 91 and second bobbins 92, and suspended movable along the runways 10 above and at a distance from the twisting machines 90.

[0032] The transport carriages 30 arrive at the plant of the invention from the preliminary region A where they are loaded with the first bobbins 91. After they have released the first bobbins 91 onto the machines 90, and have received the second bobbins 92, the carriages 30 are transferred to the final region B where they release the second bobbins 92. After this, the empty carriages are again transferred to the preliminary region A via an overhead return runway 19 directly connecting the final region B to the preliminary region A.

[0033] Along the first transverse runway 15 there are positioned one or more points of entry 13 to the plant for the carriages 30 originating from the preliminary region

A, one or more points of exit 14 from the plant being positioned along the second transverse runway 16 for the carriages which pass to the final region P.

[0034] Each transport carriage 30 comprises a substantially flat, central vertical support frame 31 carrying on its upper edge two upper wheels 32 of horizontal axis, of which one is driven by an electric motor 320, and by which the carriage 30 is suspended in a vertical position and can run along the central rail 11 (see Figures 4 and 5 in particular).

[0035] From the two sides of the frame 31 there project, in a transverse direction, a number of pairs of horizontal prongs 33, arranged to support a corresponding plurality of first bobbins 91. Specifically, each bobbin 91 is supported by a saddle 95 having downwardly extending ribs 951 by which it rests on two prongs 33 while maintaining the central region within the tubular support 910 free (see F 5).

[0036] To the lower edge of the frame 31 there is fixed a horizontal lower base 34 carrying a plurality of upwardly facing projections 35 which fit into the spindles 93 of the second bobbins 92 to receive them.

[0037] Along the longitudinal runways 10, above and at a distance from the twisting machines 90, there is provided at least one machine 40, suspended from and movable along the lateral rails 12, for manipulating the first bobbins 91 and second bobbins 92.

[0038] This machine 40 is movable along the same runway 10 together with the transport carriages 30 and is arranged to operate on the carriages 30 to transfer the first bobbins 91 from them to an underlying twisting machine 90 and transfer onto them the second bobbins 92 taken from the twisting machine 90.

[0039] Said machine 40 comprises a support frame 41 suspended from the two lateral rails 12 by motorized wheels 42. The frame 41 runs external to the two sides of and below the transport carriages 30 suspended from the central rail 11. Specifically, when seen from the front (see Figure 4 in particular) it presents an H profile, which defines an upwardly facing upper concavity within which the carriages 30 run, and a downwardly facing lower cavity which runs above the twisting machine 90.

[0040] In detail, the support frame 41 comprises two vertical sidepieces 43, each consisting of a flat frame-piece, which are joined together by a flat horizontal central frame-piece 44. On the upper edge of each sidepiece 43 there are two wheels 42 slidable along a respective rail 12. The wheels are motorized by a single motor 420, carried by the frame 41, to transmit movement to all the wheels 42 via a transmission system comprising belts 421 which substantially follow the H profile of the frame 41.

[0041] The rails 11 and 12 are positioned at a suitable height from the factory floor, in relation to the height of the machine 40 and of the carriage 30, such that the lower ends of these (and in particular of the machine 40 given that it projects downwards below the carriage 30) are suspended at a greater height, with a suitable mar-

gin of safety, than the machines 90 and the personnel moving around the machines 90.

[0042] On the two lateral sidepieces 43 there are provided two frames 45 movable vertically along the support frame 41, between an upper position (shown on the left part of Figure 4) in which they are parallel and adjacent to the sidepieces 43 and to the lateral sides of the transport carriage 30 and a lower position (shown on the right part of Figure 4) in which they face the lateral sides of the twisting machine 90.

[0043] Each movable frame 45 defines a pair of vertical rails 451 with which a carriage 46 is associated, engaging and sliding along these rails by means of slide blocks 461. Each carriage 46 is raised and lowered by a pair of belts 462 which pass about pulleys 463 carried by a shaft 465 driven by a motor 464. The carriage 46, in moving, drags with it the relative movable frame 45; when the carriage 46 is in its upper position it also retains the frame 45 in an upper position. When the carriage 46 is moved downwards, the frame 45 halts with its upper end portion engaged with the lower end portion of the sidepiece 43 (as shown on the right part of Figure 4); the carriage 46 slides however further downwards along the frame 45.

[0044] The frame 45 hence acts as an upwardly retractable guide for the carriage 46.

[0045] Each carriage 46 carries two superposed rows of means for manipulating the bobbins 91 and 92.

[0046] The upper row of means comprises a plurality of transverse horizontal arms 47 projecting towards the centre of the machine 40, each carried by a member 471 engaged with and slidable along a respective horizontal transverse support rod 48 projectingly fixed to the carriage 46. Each member 471 is movable forwards and rearwards in a horizontal direction, by the action of a belt passing endlessly about two pulleys 473, one of which is pivoted to the carriage 46 and the other is pivoted to the front end of the respective support rod 48. The rear pulleys 473 are driven by a motor 474.

[0047] To each member 471 there is also fixed, in a lower position, a respective cylinder-piston unit 49 of horizontal transverse axis, carrying at the front end of its rod a thrust plate 491, arranged to act on the rear end of the bobbin 91 hanging on the respective arm 47.

[0048] By virtue of the forward and rearward horizontal movement of the slidable member 471 combined with the vertical up and down movement of the carriage 46, each arm 47 is able to penetrate through the hollow support 910 of a first bobbin 91 positioned on the transport carriage 30, in particular in the central upper free region between the two prongs 33 which support the relative saddle 95, to raise it slightly in order to disengage it from the prongs 33 and then lower it and transfer it with a similar but opposite movement onto the relative support means of the twisting machine 90; the cylinder-piston unit also acts during this transfer, to push the bobbin 91 forward.

[0049] Below the arms 47, the carriage 46 carries a

plurality of gripper means 51 projecting towards the centre of the machine 40 and movable in a transverse direction, to grip the upper end of the spindle 93 of the second bobbins 92 to transfer them from the twisting machine 90 to the transport carriage 30.

[0050] In detail, to each carriage 46 there are projectingly fixed two respective horizontal transverse support rods 52, along which two members 521, joined together by a crosspiece 522, are slidable by engagement. This latter carries, projectingly fixed thereto, a plurality of arms 53, to the ends of which are fixed the gripper means 51 which act as clamps operated by respective cylinder-piston units 511.

[0051] By virtue of the forward and rearward horizontal movement of the slidable members 521 combined with the vertical up and down movement of the carriage 46, each gripper means 51 is able to grip the upper end of a spindle 93 of a second bobbin 92 positioned on the machine 90 and raise it in order to engage it, by its lower end, on a respective projection 35 on the carriage 30.

[0052] With the first transverse runway 15 there is associated at least one self-propelled transfer car 61, suspended from and movable along said runway 15, to receive, suspended on board, the transport carriages 30 at the entry point 13, to transfer them to the initial end of any longitudinal runway 10, and to release them onto this runway 10.

[0053] Likewise, with the second transverse runway 16 there is associated at least one self-propelled transfer car 62, identical with the car 61, and suspended from and movable along said runway 16, to receive, suspended on board, the transport carriages 30 at the final end of any longitudinal runway 10, to transfer them to said exit point 14, and to release them thereonto.

[0054] Each transfer car 61, 62 is also able to receive, suspended on board, a machine 40 at any longitudinal runway 10, to transfer it to the end of another longitudinal runway 10, and to release it thereonto.

[0055] Each transfer car 61, 62 comprises a flat horizontal frame 63 provided with wheels 64 which are driven by a motor 640 and by which it engages and runs on two rails 17, which constitute the transverse runways 15 and 16.

[0056] Relatively short lengths of rail 71 and 72 are suspendedly fixed, perpendicular to the rails 17, on the lower face of the frame 63 at a lower level than the rails 17; two rails 71 are provided to each support a suspended transport carriage 30 and are positioned a distance apart such as to enable two carriages 30 to be loaded simultaneously onto the car 61, 62. Two rails 72 are also provided, positioned outwards of the rails 71, to suspendedly support a manipulating machine 40.

[0057] In the central vertical plane of the frame 63 there is provided a central guide 65, fixed by columns 652 to the frame 63, and presenting a pair of guide recesses 651 into which a number of idle wheels 66, of vertical axis, positioned on the lower base 34 of each carriage 30 are fitted. This guide serves to restrain the

carriages 30 loaded onto the car 61, 62 against lurching in a direction parallel to the rails 17.

[0058] In each longitudinal runway 10, the central rail 11 and one of the rails 12 is electrified, the carriages 30 and the machines 40 which run on them possessing suitable devices in sliding contact with the electrified rails, to power the electric motors mounted on them.

[0059] Likewise the rails 71 and one of the rails 72 are electrified.

[0060] One of the rails 17 in the transverse runways is also electrified, to power the motors provided on the car 61, 62.

[0061] The plant of the invention comprises automatic control means which determine the following operation.

[0062] The transport carriages 30 are loaded with first bobbins 91 in the preliminary region A and from here they arrive at the entry points 13 positioned facing the transverse runway 15 where they are loaded, in particular two at a time, onto a transfer car 61 positioned on the runway 15. They are transferred by this car 61 from the entry point 13 to a longitudinal runway 10, on which they are brought above one of the twisting machines 90 which is terminating or has terminated the winding of bobbins with twisted fibre and requires the second bobbins 92 to be removed in order to be fed with further first bobbins 91.

[0063] Specifically, the car 61 moves into the entry point 13, in such a position as to align one of its rails 71 with the rail 131 of the entry point 13; then the carriage 30 positioned in 13 rises onto the carriage 61 and this moves slightly along the runway 15 to align its other rail 71 with the rail 131 and receive on board a second carriage 30 positioned in 13. The car 61 then moves to the initial end of the programmed longitudinal runway 10 where, aligning both the rails 71 one at a time with the central rail 11, releases both the carriages 30 onto the runway 10. Finally, the car 61 returns to the entry point 13 to receive further carriages 30.

[0064] When the number of transport carriages 30 accumulated above the twisting machine 90 is such as to contain a number of bobbins 91 equal to the number required by the twisting Machine, a manipulating machine 40 is also moved above this latter along the same longitudinal runway 10. This machine, operating on one transport carriage 30 at a time, transfers the first bobbins 91 from the carriages 30 to the twisting machine 90 and withdraws the just completed second bobbins 92 from the twisting machine 90 and fits them onto the projections 35 on the carriages 30.

[0065] Specifically, the arms 47 operate first to take the first bobbins 91 together with the relative support saddles 95 from the prongs 33 positioned on both faces of the carriage 30; the arms 47 are then lowered to the level of the machine 90 and the bobbins 91 are transferred onto the support means of the machine 90 by the action of the cylinder-piston units 49 which urge the bobbins 91 onto the said means, so releasing them from their support on the saddles 95, which instead remain

engaged by the arms 47; the arms 47 are then returned to their upper position where they return the saddles 95 (now without the bobbins 91) onto their supporting prongs 33.

[0066] The gripping means 51 then withdraw the second bobbins 92 from the machine 90 and arrange them on the carriage 30, fitted onto the projections 35.

[0067] The transport carriage 30 loaded with these second bobbins 92 originating from the twisting machine are moved to the final end of the longitudinal runway 10, where, by means of the transfer car 62 of the second transverse runway 16, they are transferred to an exit point 14, in the same manner in which the transfer car 61 of the first transverse runway 15 operates.

[0068] Having completed the feed to the machine 90, the bobbin manipulating machine 40 is transferred to another machine 90 positioned on the same longitudinal runway 10 or on another runway 10. Transfer from one to another longitudinal runway 10 is effected by a transfer car 61 or 62, in the same manner in which the carriages 30 are transferred.

[0069] The plant of this invention is advantageously suitable for operation with a high degree of automatic control and data memorization by means of a central computer connected to all the machine PCs and to a general computer which also oversees the upstream and downstream regions; in particular, for each second bobbin it enables the characteristic data (count, quality, etc.) of the first bobbin, from which its yarn originates, to be recorded.

[0070] Numerous modifications of a practical and applicational nature can be made to the invention, but without deviating from the scope of the inventive idea as claimed below.

Claims

1. A plant for feeding twisting machines for fibres, in particular glass fibres, the twisting machines (90) operating on the fibre leaving first bobbins (91) by twisting it and winding it in the form of second bobbins (92) wound on spindles, characterised by comprising:

at least one longitudinal overhead runway (10), positioned above and at a distance from the twisting machines (90),

a plurality of self-propelled transport carriages (30), arranged to each transport a predetermined number of first bobbins (91) and second bobbins (92), and suspended from and movable along the longitudinal runways (10) above and at a distance from the twisting machines (90),

for manipulating the first (91) and second (92) bobbins at least one self-propelled machine (40) suspended from and movable along the

longitudinal runways (10) above and at a distance from the twisting machines (90), to operate on the transport carriages (30) in order to transfer the first bobbins (91) from them to an underlying twisting machine (90) and to transfer onto them the second bobbins (92) taken from the same twisting machine, said machine (40) being movable along the same runway (10) together with the transport carriages (30).

2. A plant as claimed in claim 1, characterised by comprising:

a plurality of mutually parallel longitudinal overhead runways (10) positioned above and at a distance from the twisting machines (90), parallel to the longitudinal axis formed by the rows of these machines (90),

a first transverse overhead runway (15) positioned along the initial end of the longitudinal runways (10),

for the transport carriages (30) at least one entry point (13) to the plant, positioned along the first transverse runway (15),

at least one self-propelled transfer car (61) suspended from and movable along the transverse runway, to receive, suspended on board, the transport carriages (30) at said entry point (13) and transfer them to the initial end of any longitudinal runway (10), and to release them onto this longitudinal runway (10).

3. A plant as claimed in claim 2, characterised by comprising:

a second transverse overhead runway (16) positioned along the final end of the longitudinal runways (10),

for the transport carriages (30) at least one exit point from the plant, positioned along the second transverse runway (16),

at least one self-propelled transfer car (62) suspended from and movable along the second transverse runway (16), to receive, suspended on board, the transport carriages (30) at the final end of any longitudinal runway (10), to transfer them to said exit point (14), and to release them thereon.

4. A plant as claimed in claim 3, characterised in that said transfer car (61, 62) is arranged to receive, suspended on board, a manipulating machine (40) on any longitudinal runway (10), to transfer it to the initial end of another longitudinal runway (10), and to release it thereon.
5. A plant as claimed in claim 3, characterised by comprising the following operation:

the transport carriages (30) loaded with first bobbins (31) are transferred, by the transfer car (61) of the first transverse runway (15), from the entry point (13) to a determined longitudinal runway (10), where they are transported to 5 above the twisting machines (90) to be fed with first bobbins (91);

then, by means of a manipulating machine (40), the first bobbins (91) are transferred from the transport carriages (30) to the twisting machines (90) and the second bobbins (92) are transferred from the twisting machines (90) to the transport carriages (30); the transport carriages (30) loaded with second bobbins (92) originating from the twisting machines (90) are transferred by the transfer car (62) of the second transverse runway (16) to the exit point (14); 10

the bobbin manipulating machine (40) is transferred from one to another longitudinal runway (10) by the transfer car. 20

6. A plant as claimed in claim 1, characterised in that

each longitudinal runway (10) comprises a central longitudinal rail (11) and two lateral rails (12) positioned to the side of and at a distance from the central rail (11); 25

each transport carriage (30) comprises a structure suspended, by motorized wheels (32), from the central rail (11); 30

the manipulating machine (40) comprises a support frame (41) suspended by motorized wheels (42) from the two lateral rails (12), and running external to the two lateral sides of and below the transport carriages (30) suspended from the central rail (11). 35

7. A plant as claimed in claim 1, characterised in that each transport carriage (30) comprises a plurality of pairs of horizontal prongs (33) projecting transversely outwards from both lateral sides of the carriage (30), to support that number of first bobbins (91), and a lower base (34) carrying vertical projections (35) onto which the self-propelled (93) of the second bobbins (92) are fitted to be retained. 40 45

8. A plant as claimed in claim 7, characterised in that the manipulating machine (40) comprises: 50

two frames (45) positioned on the two lateral sidepieces (43) of the machine support frame (41) and movable between an upper position in which they are parallel and adjacent to the lateral sides of the transport carriage (30) and a lower position in which they face the lateral sides of the twisting machine (90), 55

a pair of carriages (46) movable vertically along

the movable frames (45) and carrying transverse horizontal arms (53) projecting towards the centre and movable in a transverse direction to penetrate through the tubular support (910) of the first bobbins (91) and raise them to transfer them from the transport carriage (30) to the relative support means of the twisting machine (90), and gripper means (51) projecting towards the centre and movable in a transverse direction to grip the upper end of the self-propelled (93) of the second bobbins (92) in order to transfer them from the twisting machine (90) to the transport carriage (30).

9. A plant as claimed in claim 8, characterised in that the manipulating machine (40) comprises, on each lateral sidepiece (43), a pair of vertical rails (451) telescopically slidable on, and projecting downwards from, said sidepieces (43), to vertically guide said movable frames (45).

10. A plant as claimed in claim 4, characterised in that each transfer car (61, 62) comprises a flat horizontal frame (63) provided with motorized wheels (64) by which it engages and runs on the two rails (17), which constitute the transverse runways (15 and 16), and a number of lengths of rail (71 and 72) suspendedly fixed, perpendicular to the rails (17), to the lower face of the frame (63) at a lower level than the rails (17), to suspendedly support at least one carriage transport (30) and possibly a manipulating machine (40).

11. A plant as claimed in claim 7, characterised in that each first bobbin (91) is supported by a saddle (95) presenting downwardly facing ribs (951) by which it rests on two prongs (33) while maintaining the central region within the tubular support (910) free.

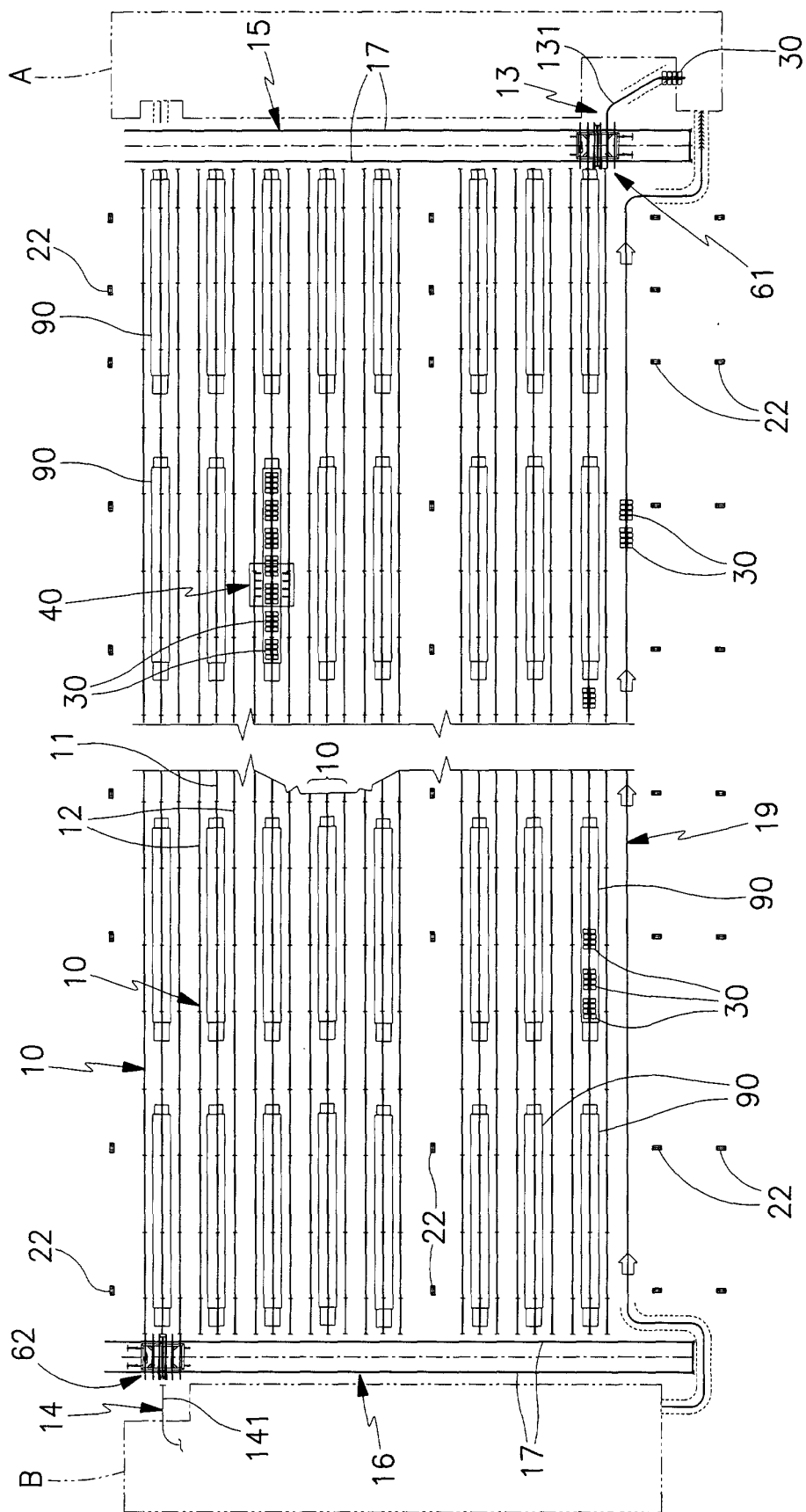
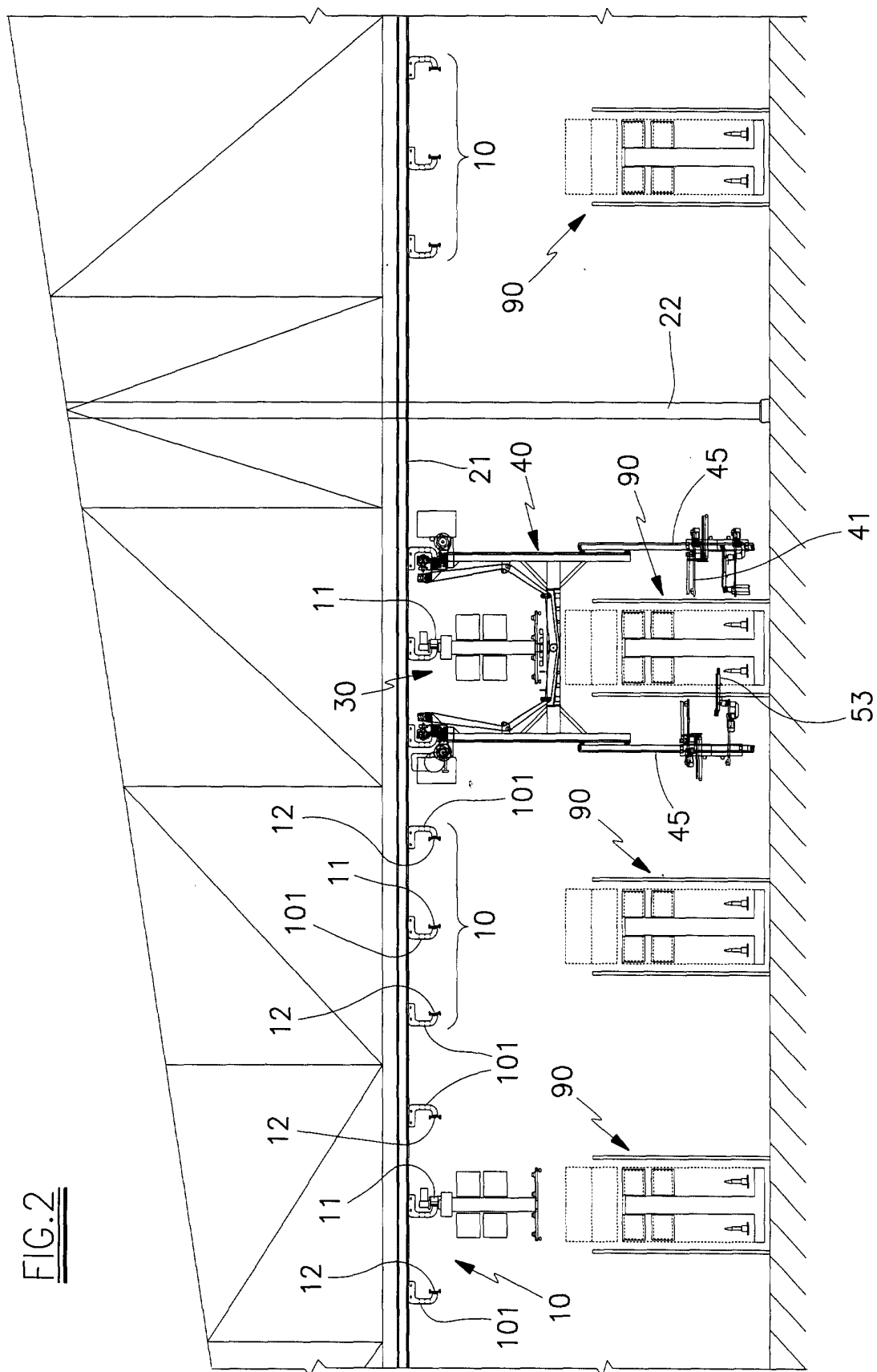
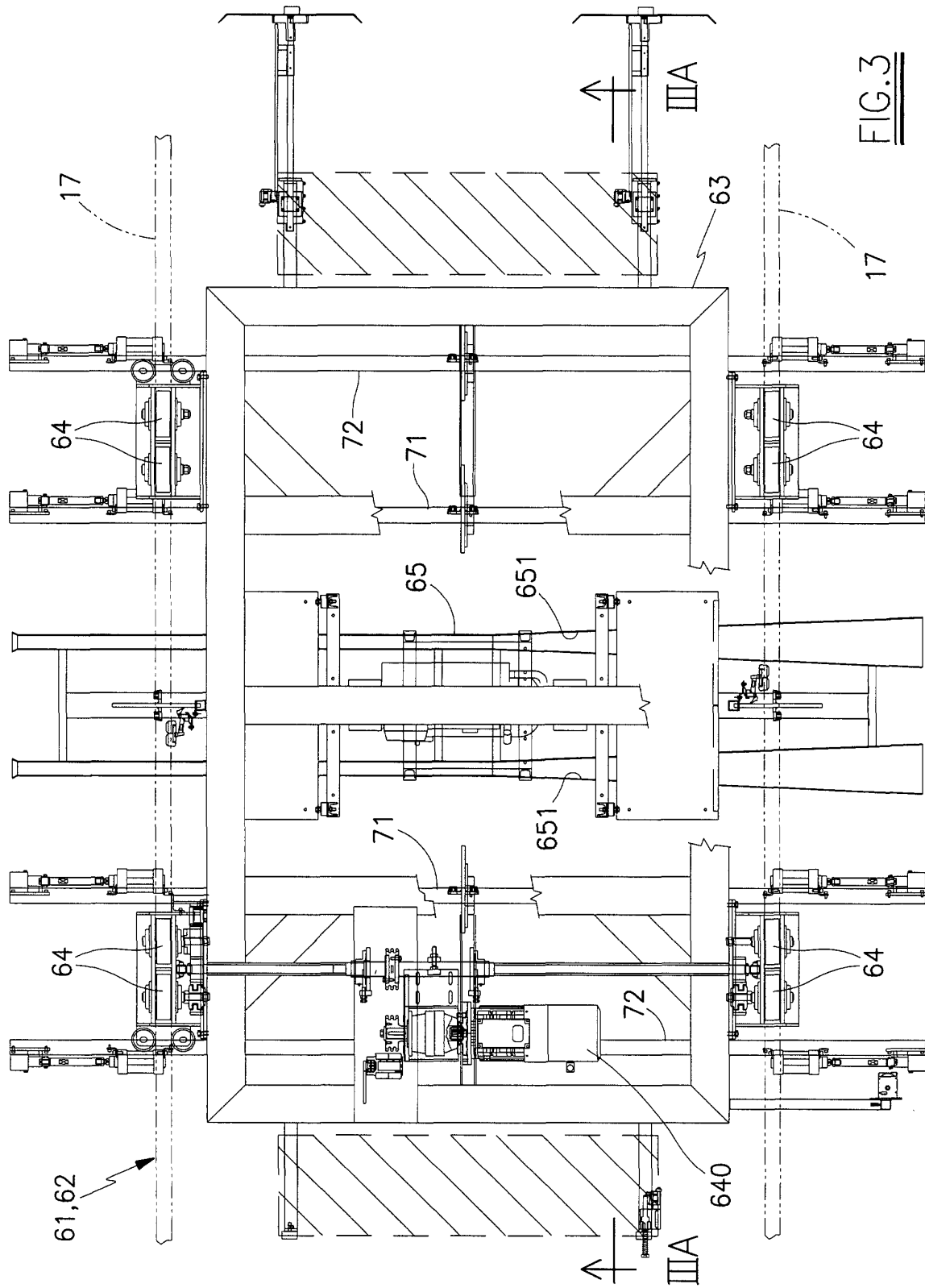


FIG. 1

FIG.2





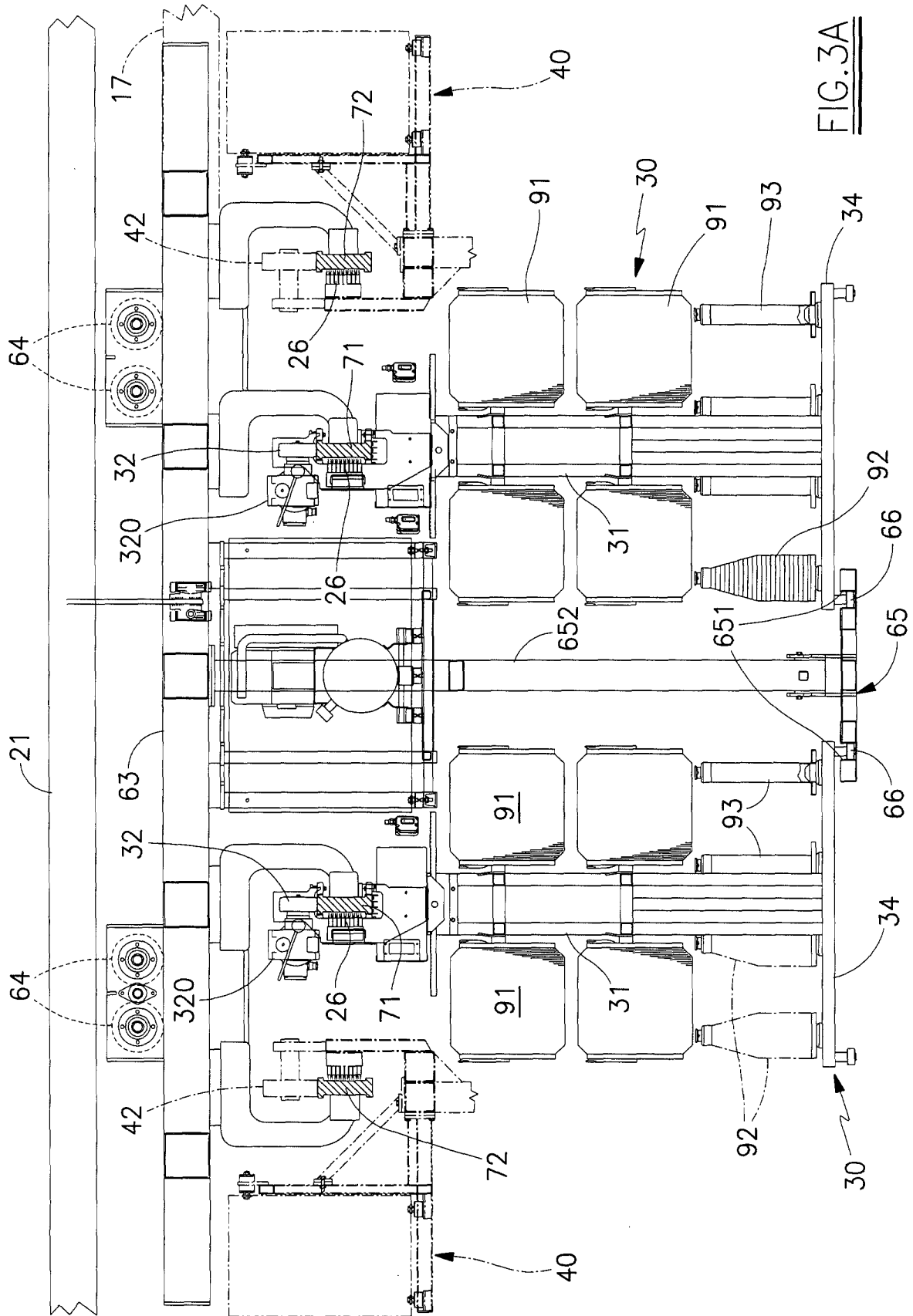
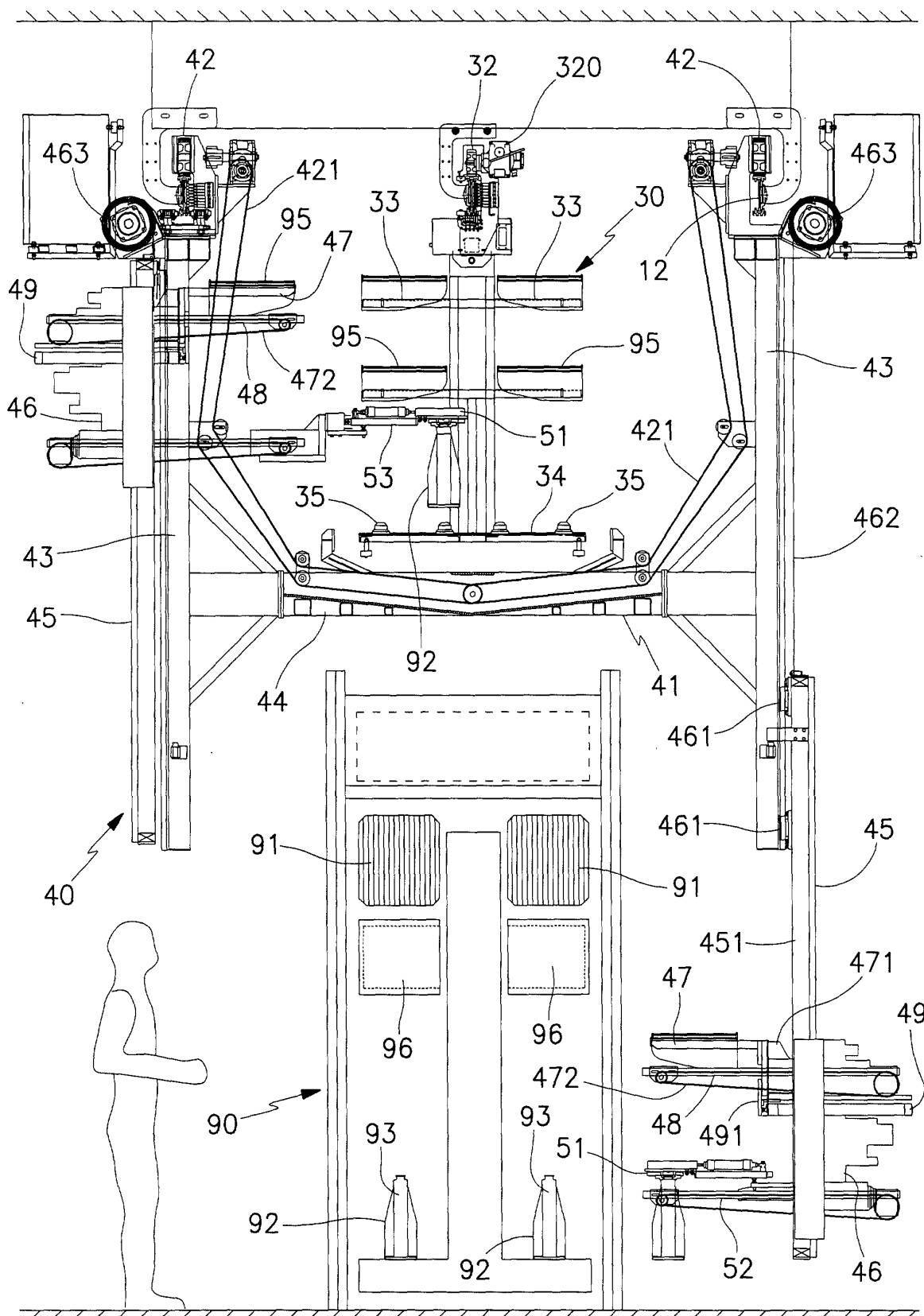


FIG. 3A

FIG. 4



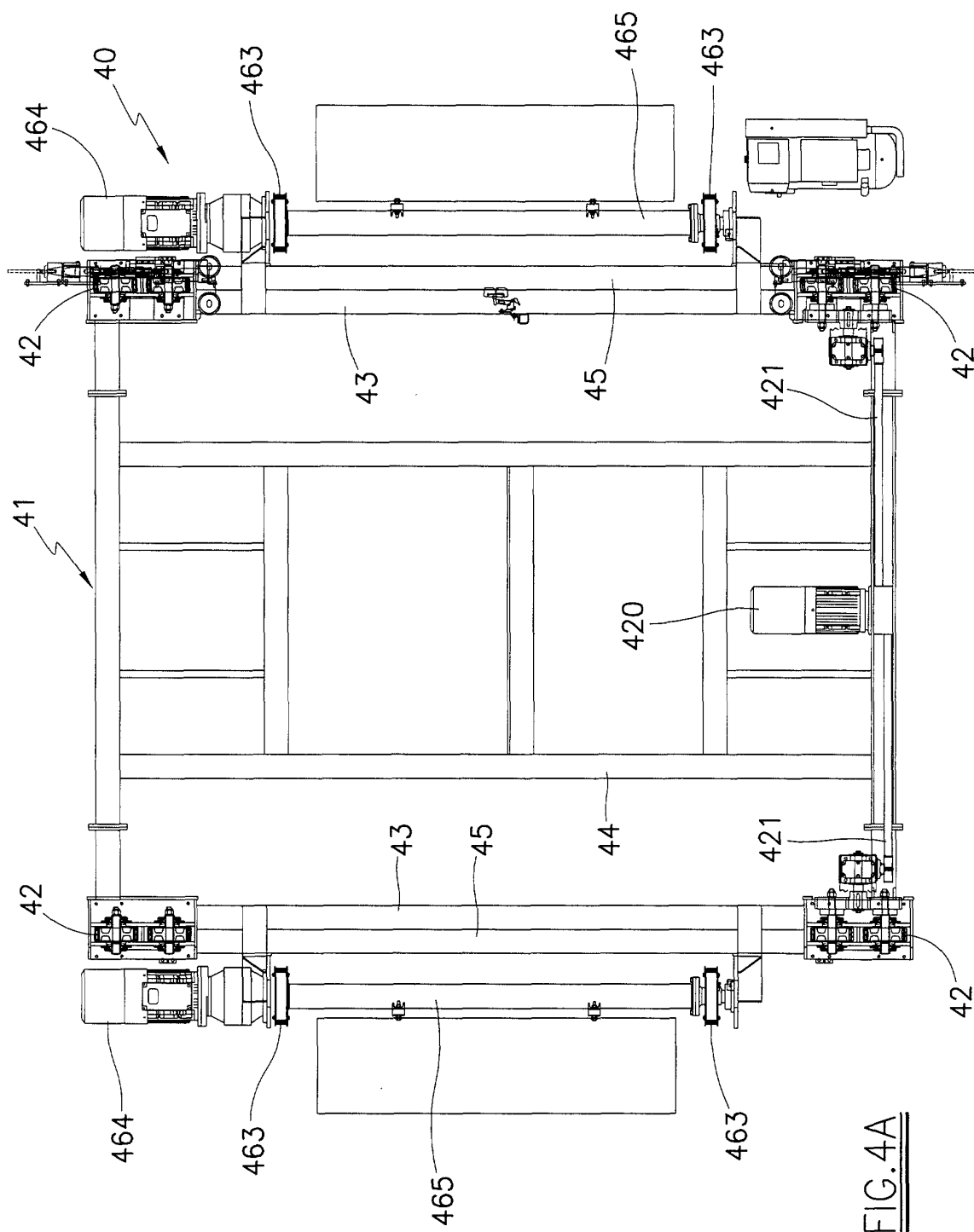
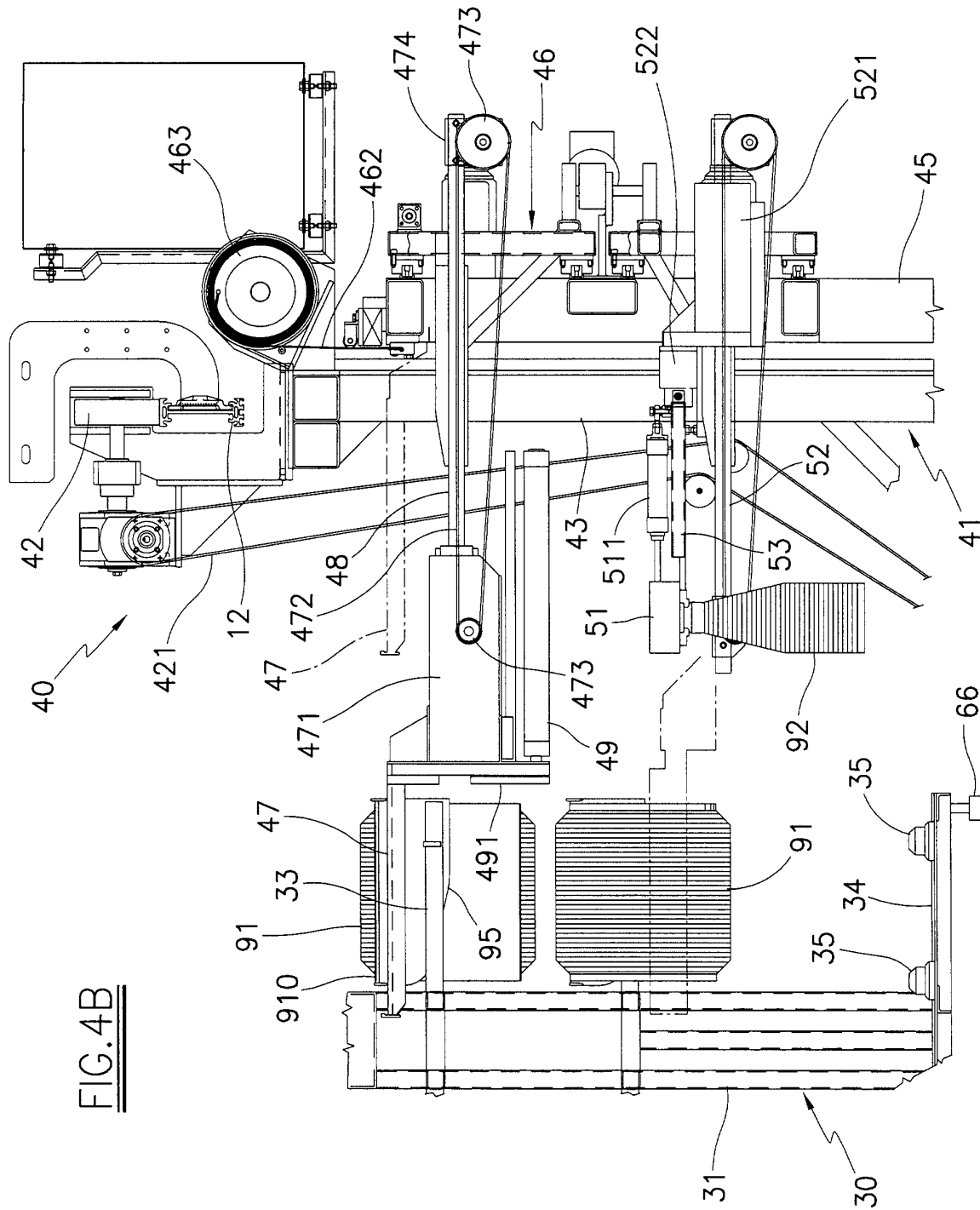
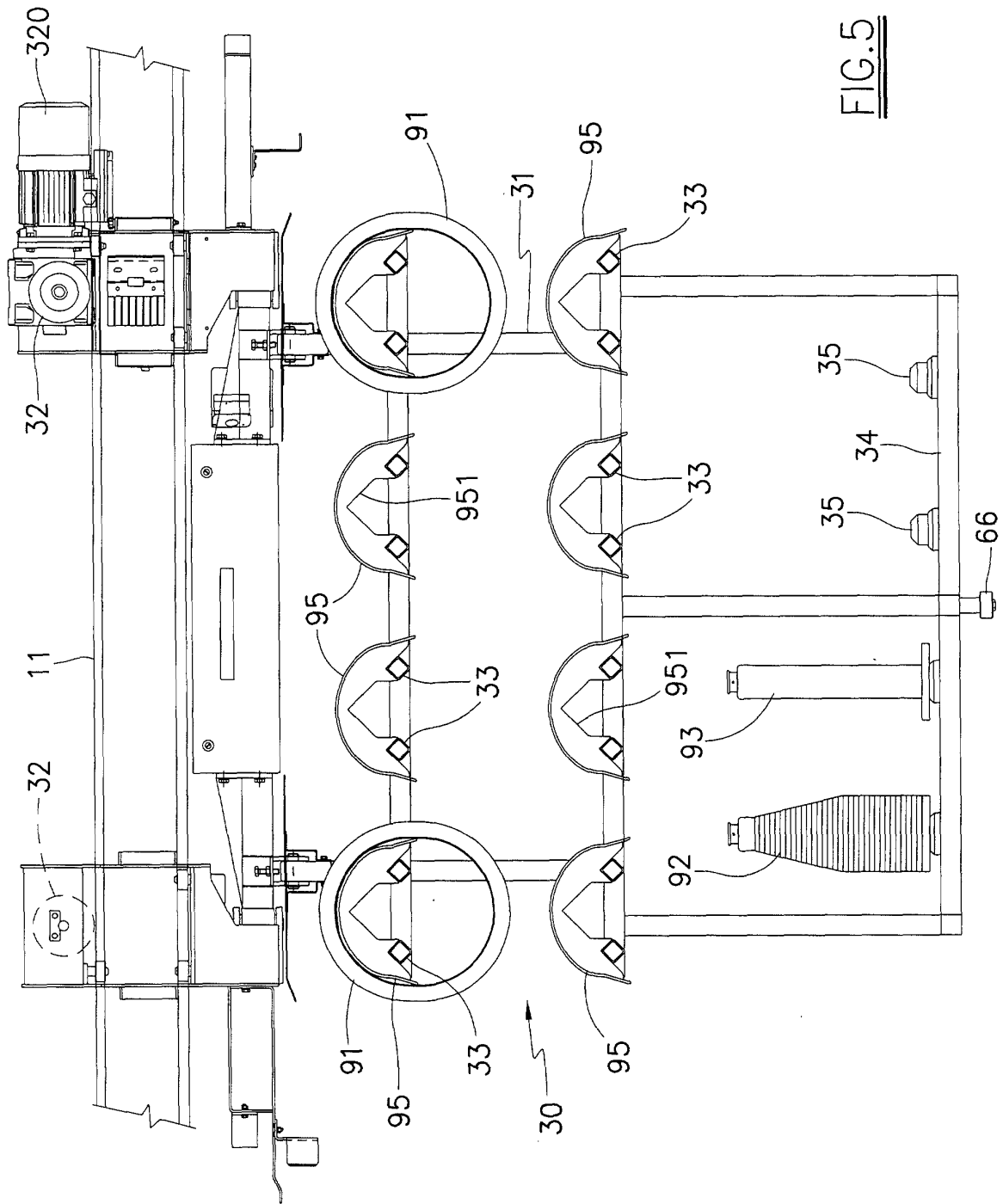


FIG. 4A







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EUROPEAN SEARCH REPORT

Application Number
EP 01 20 0465

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CI.7)
A	FR 2 742 167 A (ICBT VALENCE) 13 June 1997 (1997-06-13) * page 6, line 10 - page 7, line 31; figures 1-7 *	1-11	D01H9/18 D01H1/18 B65H67/06
A	DE 196 20 265 A (SALMOIRAGHI SRL) 28 November 1996 (1996-11-28) * page 2, line 25 - page 4, line 35; figures 1-3 *	1-11	
A	DE 196 21 151 A (SALMOIRAGHI SRL) 21 November 1996 (1996-11-21) * the whole document *	1-11	
A	EP 0 448 530 A (GUALCHIERANI SYSTEM) 25 September 1991 (1991-09-25) * the whole document *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.CI.7) D01H B65H
Place of search THE HAGUE		Date of completion of the search 3 July 2001	Examiner Henningsen, O
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 01 20 0465

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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03-07-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2742167 A	13-06-1997	NONE	
DE 19620265 A	28-11-1996	IT MI951040 A	22-11-1996
		GB 2301120 A,B	27-11-1996
		JP 9111551 A	28-04-1997
DE 19621151 A	21-11-1996	IT MI950996 A	18-11-1996
		GB 2300866 A,B	20-11-1996
		JP 9104565 A	22-04-1997
EP 0448530 A	25-09-1991	IT 1238901 B	04-09-1993
		JP 5287624 A	02-11-1993

EPO FORM P0469

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