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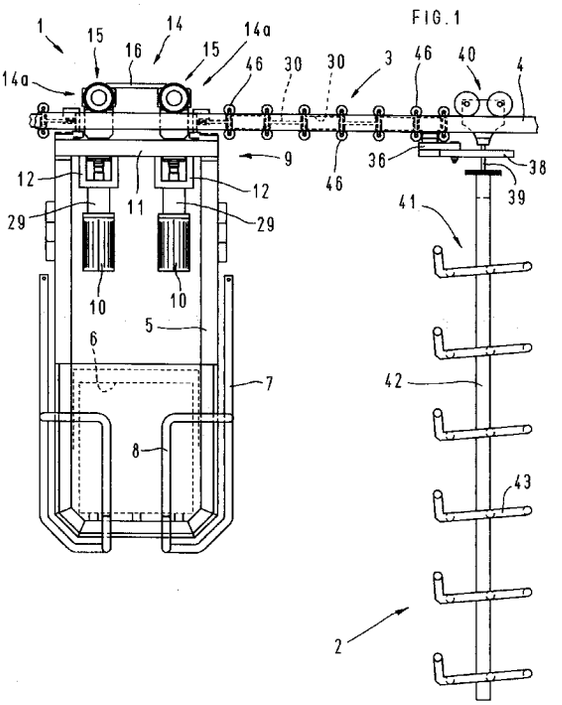
(54) Apparatus for transferring loads

(57) The load transferring plant comprises consecutive stretches of overhead runways (4; 50; 51) defining together at least one transferring route for a load (2, 41, 42, 43) suspended from them; there is at least one shuttle (1) which is joined, with a rolling coupling, to the said overhead runways (4; 50; 51) which support each said load (2, 41, 42, 43), and which is equipped with a device (3; 53; 56, 57, 60) for connecting it with the load so as to effect its controlled transfer form a first starting position to a second position of arrival along the said at least one route.

FIG.1



EP 0 693 409 A1

Description

The invention concerns an apparatus for the transferring of loads, in particular for the food industry, for example, with hangers used in the food processing industries, such as the meat processing industry.

The prior art comprises apparatus for transferring loads by means of rails suspended from the ceiling of the factory, the so-called guideways, in which there are trolleys, or hangers, that roll and are rotatably supported on runways in the guideways: the transfer of the loads is carried out by means of chains pulling on the hangers, in the case of repetitive or substantially straight-line runs, or by the operator manually pushing the suspended trolleys, or hangers, particularly when the path the loads have to follow is variable as a result of contingent situations connected with the processing cycle or due to the plant's configuration.

This is the cause of significant limitations in the efficiency of the transferring, especially as regards the non repetitive runs, in that the operator, once the route that should be taken has been identified, has to carry out the operation of changing the points in the network of rails suspended from the ceiling so as to activate the chosen route prior to rolling the load along it: this causing considerable time wasting and being labour intensive, due also to the difficulty of the physical effort required - especially when the operator has to work in very large plants - with, therefore, inevitably high operating costs.

Such prior art may be subject to considerable improvements with a view to eliminating the said drawbacks.

From the foregoing emerges the need to resolve the technical problem of inventing an apparatus for transferring suspended loads on rails that affords maximum versatility so as to achieve extremely high productivity, with a reduction in the physical effort required of the operator.

The invention resolves the said technical problem by adopting a load transferring apparatus such as, for example, trolleys, or hangers, along overhead runways, for example guideways, comprising consecutive stretches of overhead runways defining, overall, at least one transferring route for a load suspended from them, characterised in that at least one shuttle is provided, having slidibly coupled with the said overhead runway which supports each said load, and which is equipped with a load coupling device to effect a controlled transfer of said load from a first starting position to a second ending position along said at least one route.

This enables the efficiency of the transferring to be considerably increased, mainly due to the elimination of the physical work done by the operators in moving the hangers and in optimising the routes.

In a particularly advantageous version, the shuttle comprises a pair of coupling devices, opposite each other on both sides, for coupling with and holding the load; each controlled load coupling device consisting of articulated links, bilaterally guided in rolling on the rail; the end of said coupling device that is closer to the shuttle being rotatably supported, for example by means of a pin and a sliding block, to a support member of the shuttle; the further end of said coupling device having a coupling plate whose end is substatially "V" shaped to receive a towing pin connected to the load and to hold it by means of a retaining element, that may be activated with relative actuating means.

This ensures the load is securely held, ideal for its subsequent transfer, whether pushed or pulled, even along transferring routes that are not straight.

Also, the adoption of the pair of bilateral opposing load coupling devices enables the shuttle to connect with the loads that are to be conveyed from both sides, without having to perform complicated and difficult rotations of the shuttle around a vertical axis.

In a particularly advantageous version, each shuttle is provided with a frame suspended from the rail by suspension means and coupled to it by means of a pair rolling elements, particularly wheels, rotatably supported to relative box supports. Said suspension means can advantageously comprise at least one shaft, having a vertical axis, coupled at its lower end to an electric motor whose body is rigidly fixed to the said frame, and having at its upper end a pinion meshing with a ring gear rigidly connected to one of the said rolling elements.

This enables the shuttle to be motorised, and also to be suspended from the rail, in an extremely simple and reliable manner.

In a further advantageous version, the shuttle has a pair of longitudinally consecutive electric motors, each one driving one wheel of the relative pair of rolling elements of the shuttle's suspension; it being envisaged that, in particular, the wheels coupled to the said electric motors be positioned on opposite sides of a vertical longitudinal plane passing through the centre line of the relative rail.

This enables the swaying of the shuttle to be considerably reduced, in particular during the acceleration and deceleration phases, thereby ensuring greater stability and safety than if only one electric motor is adopted; furthermore, having just one driven wheel for each pair of rolling elements and on opposite sides with respect to the rail enables progress in the curved sections of the route to be balanced out, avoiding damaging wheel slip due to differences in tip speed between the innermost trajectory and the outermost one when cornering.

The shuttle is also advantageously provided with a spacing bar interposed between the box supports of each pair of rolling elements, and whose ends are rotationally coupled to said supports.

This further increasing stability whilst ensuring the required mobility when cornering.

In a particularly advantageous version, the said controlled load coupling device comprses a power-driven pincer, in particular comprising a device for gripping loads, barrels in particular, coupled to lifting devices to lift the said loads from the ground and to then transfer

them on board the shuttle.

This enables, in particular, to make use of the network of rails, or guide ways, already installed in plants, for example, for meat processing, for conveying the meat to and from their stocking area, also for transferring other loads, for example, barrels that contain products, such as, meats undergoing processing, liquids or aromas, to and from the processing machinery.

One of the advantages of the present invention lies in the possibility of installing the shuttles according to the invention in plants which already have a network of rails for manually transferring hangers, without having to undertake expensive renovation, substitution or adaptation of the existing runways.

Some embodiments of the invention are illustrated, purely by way of example, in the twenty tables of drawings attached in which:

Figure 1 is a side view of a portion of the plant according to the invention, in a version with shuttle for conveying hangers, for example, for conveying hams, or foodstuffs in general;

Figure 2 is a longitudinal section, partial and interrupted, of one of the drive units of the shuttle in Figure 1;

Figure 3 is section III-III of Figure 2;

Figure 4 is a longitudinal section, partial and interrupted, of the coupling joint of the flexible element connecting the shuttle to the hanger;

Figure 5 is the top view of Figure 4;

Figure 6 is a view from the right, partially sectioned and interrupted, of Figure 4;

Figure 7 is section VII-VII, enlarged, of Figure 5;

Figure 8 is a top view of a portion of the transferring apparatus according to the invention, in a portion having a curved trajectory, showing, with dashed lines, the position of the shuttle and the space occupied by the hanger;

Figure 9 is a schematic side view of a device for the controlled coupling of the loads, that may be used on a shuttle in an apparatus according to the invention, suitable for transferring ground level loads, for example, barrels;

Figure 10 is the view from the right of Figure 9, with the position of the barrel lifted for transfer shown with dashed lines.

Figure 11 is section XI-XI of Figure 9;

Figure 12 is a front view of a device for lifting and transferring ground level loads, in a further version with power-driven pincers, its top end rolling on a rail having a top runway and a bottom runway;

Figure 12A is a partial and interrupted view of a further version of a load transfer guide way having a single runway;

Figure 13 is a schematic plan view of a load transferring apparatus according to the invention, showing the working, stocking and parking areas of the hangers and the shuttles;

Figure 14 is a side view as in Figure 1, in a version with shuttle equipped with an upper articulated bar;

Figure 15 is a top view of Figure 14;

Figure 16 is section XVI-XVI, partial, interrupted and enlarged, of Figure 15;

Figure 17 is section XVII-XVII, enlarged and interrupted, of Figure 16;

Figure 18 is a side view of a load coupling device comprising a power-driven pincer;

Figure 19 is a top view of Figure 18;

Figure 20 is a side view as in Figure 1, but in a version of the shuttle with a chain transmission;

Figure 21 is a longitudinal section of a drive unit of the shuttle in Figure 20;

Figure 22 is section XXII-XXII of Figure 21;

Figure 23 is section XXIII-XXIII of Figure 21;

Figure 24 is a longitudinal section of a shuttle, but in a version with a pair of stabiliser arms and single transmission;

Figure 25 is a section as in Figure 24, but of a shuttle with dual transmission;

Figure 26 is the top view, enlarged and interrupted, of the forked end with star-shaped load holding elements;

Figure 27 is section XXVII-XXVII of Figure 26.

As shown in Figure 1, the load transferring apparatus comprises a plurality of shuttles 1, power-driven and self-powered, wich can be coupled to hangers 2 by means of an articulated coupling device 3.

The shuttles 1 and the hangers 2 are joined with a

rolling coupling to an overhead runway, for example, a guideway 4, consisting of rails, or of a pair of longitudinal guiding elements, for example, metallic tubular elements hung from the ceiling by means of ties, not shown, and maintained a distance Z apart.

Each shuttle 1 consists of a frame chassis 5 with at its lower end a seat for housing an electrical accumulator 6, externally enclosed in a protective tubular cage 7, aligned parallel to the risers of the frame 5 and having lateral protective elements 8.

The frame 5 has a top transverse beam 11 to which is attached a transmission 9 for the shuttle 1, comprising a pair of drive units 10 attached to the said transverse beam by means brackets 12 having "C"-shaped sections.

The top transverse beam 11 of the frame 5 is suspended, by means of a pair of drive shafts 13 (Figure 2), with vertical axes and driven by the units 10, from a trolley 14 consisting of two pairs of wheels 15, with one driven wheel 15a and one not driven 15b, rotatably supported to box supports 14a interconnected by a spacing bar 16.

As shown in Figure 3, each box support 14a comprising a pair of half-shells 17 having upper sections rotatably supporting each shaft 13: each said shaft having, at its upper end, a pinion 18 meshing with a ring gear 19 equipped with hub 20 on which, externally, the driven wheel 15a is keyed and, internally, said hub is keyed to the corresponding end of a transverse shaft 21 supported with rotational coupling to the non driven wheel 15b at its other end.

The pair of half-shells 17 is closed at the top by a cover 22 to which one of the ends of the spacing bar 16 is rotatably coupled.

A thrust bearing 23 is inserted beneath the upper end of the shaft 13, to which the pinion is rigidly attached, and placed in a seat made in an intermediate part of the half-shells 17 to support the weight of the frame 5 and of other parts weighing it down.

An intermediate bearing 24 is inserted in a lower seat in the pair of half-shells 17 to act as guiding elements for the shaft 13 and limit the swaying of the said frame during transmission of the driving torque.

A pair of lower bearings 25, inserted in seats made in the transverse beam 11 of the frame 5, limits possible elastic deformation of the shaft 13 inserted between them, in particular at start up and during braking: the said pair of lower bearings, kept in position by ring nut 25a and lower spacer 25b and intermediate spacer 25c, also provide for the transfer of the weight of the shuttle to the shafts 13.

The half-shells 17 relative to each pair of wheels 15a, 15b, have a pair of non-driven wheels 26, having vertical axes and rolling contact, with clearance, between the opposing internal surfaces of the tubular elements 4, so constituting guiding elements for the shuttle 1.

The lower end of each shaft 13 is joined, by means of a box coupling 27, to the output shaft 28 of a reducer 29 forming part of the drive unit 10.

The articulated device 3 connecting the shuttle 1 to the hanger 2 consists of a plurality of links 30 articulated by means of pins 31, with vertical axes, at the terminal sections of each link: the links 30 are preferably inserted between the opposing internal surfaces of the tubular guiding elements 4 so that they are guided by them.

The extremity of the coupling device 3 pointing towards the shuttle 1 is associated with it (Figure 2) by means of vertical pin 32 having its lower end inserted in a slot 33 of a guiding element 34 integral with the transverse beam 11 of the frame 5.

A sliding block 35 is supported at the top end of the pin 32 that is slideably engaged on the pair of tubular guiding elements 4, acting as a propping and guiding element for the pin itself.

As shown in Figure 4, the end of the articulated device 3 opposite the shuttle 1 has a support plate 36 articulated, by means of pin 37, with a plate 38 that couples with a vertical stem 39 integral with the hanger 2: the end of the said coupling plate 38 being "V" shaped in order to facilitate the insertion in it of the said stem.

The vertical stem 38 is placed between an upper carriage 40 of the hanger 2 rolling on the rails 4 and the its lower frame 41, consisting, for example, of a frame 42 to which transverse elements 43 are attached defining shelves for the products, for example, hams, not shown.

As shown in Figure 5, the stem 39 is held in the V-shaped end of the coupling plate 38 by a pivoting locking element 44 made to rotate through a suitable angle with respect to the V-shaped opening by a relative actuator 45.

A positioning element 47 is interposed between support plate 36 and the coupling plate 38, supported so that it may slide in an elastic manner in an axial direction on the coupling plate 38 and destined to be inserted in imprints 48 made on the surface of the support plate 36 facing the coupling plate 38: the positioning element 47 being such as to enable a predetermined angular position between the said support plate 36 and coupling plate 38 to be maintained, particularly in the curved sections of the guide way 4.

Each articulation pin 31 of the links 30 of the coupling device for the hangers 2 has a vertical axis, perpendicular to the axis of the guide way 4, and has ends with rolling elements 46 bilaterally in rolling contact on the opposing surfaces of the shaped sections 4 making up the guide way.

Each shuttle can also roll on guide ways consisting of a pair of symmetrical opposing longerons 49 in which runners 50 are made, each longeron having the profile as in a single omega, as in Figure 12A, or as in a double omega as in Figure 12, the longerons being interconnected by positioning and fixing flanges 51 distributed at suitable intervals.

The lower extremity of the shuttle 1 can be equipped with a pincer 52 (Figure 12) to grip a load 53, power-driv-

en to enable the load to be lifted and transferred.

As shown in Figures 9, 10, the shuttle 1 can also be used in association with a device 54 for lifting loads, for example, barrels, integral with the shuttle 1.

The load lifting device 54 has two pairs of wheels 40 coupled to a frame 55 to suspend it from the guide way, said frame having two pairs of risers 56 to which are joined, with sliding coupling, by means of rolling elements 57 and relative linear actuators 57a, a horizontal support 58 in the shape of a "C" and encircling the barrel to be lifted by about 180°.

The support 58 has extremities with holding devices consisting of a pair of elements 60 that grip the barrel close to its upper edge, activated by actuators 61.

In this way it is possible, once the gripping elements have been activated in the closed position against the barrel 59, to lift the barrel with the contact between the frame 58 and an annular rim 62 of the barrel 59.

In a plant according to the invetion, as shown in Figure 13, there is a network of guide ways 4 suspended from the ceiling of a working area 63 extending in such a way as make the full hangers 2, or the loads 53, 59 converge towards a storing area consisting of, for example, cells 64, or other work stations, not shown.

The plant also comprises an area 65 for parking the shuttles 1 during the processing rest periods and to periodically recharge the batteries, and an area 66 for parking the empty hangers.

As shown in Figure 14, the frame 5 can have the upper transverse beam 11 subdivided into sections 11a, aligned and free to rotate around a common axis A on hinge pins 11b interconnecting each section 11a to the next and their respective ends to the risers of the frame 5 by means of bushes 11c (Figure 16).

The division of the transverse beam 11 into two sections affords the further advantage of making the shuttle 1 more stable when moving even in the case of discontinuities, or misalignments, or defects in the planarity of the runways that would tend to cause relative angular displacements between one pair of wheels 15 and the other, as shown with dashed lines in Figure 17.

The protective tubular cage 7 can be equipped with a foot board 70 at its lower end for the operator and with a handle bar 71 with hand grips 72 incorporating the controls of the shuttle 1.

The device for connecting with and holding the load can consist of a power-driven pincer 73 fixed to the plate 36.

The articulated device comprising the links 30 can also have a single upper rolling element 46a positioned at the end furthest from the shuttle 1. The end closest to the said shuttle can have a vertical pin 74 protruding downwards from one of the box supports 14a.

Figure 15 shows how the longitudinal elements can be arranged to form a T junction, so that it is possible, by appropriately activating the switching elements 75 of a central plate 76, to direct the shuttle 1 and any load associated with it either one way or the other.

To this end, sensors 77 can be distributed along the shuttle's pathway and activated by an exciter device 78 that can be activated by the operator on board the shuttle 1 to send a signal to the said switching elements regarding to the chosen direction, suitably in advance of the manoeuvre.

Alternatively, the switching devices 75 can be activated using manual controls.

Figure 16 shows how the box coupling 27 can comprise a sliding part 27a to uncouple the shaft 13 from the relative motor reducer unit 10, 29.

As shown in Figure 17, the wheel 15a driven by the bevel gear 18, 19, can be made rotationally integral with the opposite wheel 15a of the pair of wheels 15, for example, by keying this second wheel to the shaft 21.

Figure 18 shows how the pincer 73 can comprise a pair of jaws 78 swivelling on a relative pin 78a and activated by means of a corresponding pair of connecting rods 79, hinged to the said jaws by means of pins 78b, and coupled to a relative linear actuator 80: the return stroke of the jaws can be achieved with an elastic element 83.

A safety bracket 81 can also be provided, made to slide axially along the sides of the jaws 78 by a relative linear actuator 82.

The particular conformation of the pincer in Figure 19 enables a high degree of accuracy to be achieved in holding and positioning the load.

As shown in Figure 20, the motors 10 can be coupled to the wheels 15a by means of a flexible transmission, for example, chain 84 (Figure 21) wound on a pair of sprockets 85, one of which is supported inside the box support 17 to drive the wheels 15a, the other coupled to a motor reducer 29a coupled to the motor 10.

The reducer 29a is hinged, by means of a pin 86, to a lower support 87 integral with a respective tubular element 88 inside which the flexible transmission 84 is inserted, guided by opposing sliding blocks 97 inserted in the box support 14a.

Each tubular element 88 is fixed at its top end to the corresponding box support 17 and is joined, with rotational coupling, to the corresponding section 11a of transverse beam 11 by means of bearings 89, 90: to this end, the section 11a of transverse beam has a through hole 11c.

The reducer 29a has an appendage 29b co-operating with a tensioning device 90 for the flexible transmission 84, said tensioning device comprising a rod 91, hinged to one of the risers of the frame 5 by means of pin 91a, on which slides a slider 92 coupled to the appendage 29b.

The tensioning device 90 comprises a pair of opposing elastic elements 93 that are able to produce a foreseeable thrust by means of end plates 94 whose position on the rod 91 is adjustable, said rod being threaded for this purpose.

The sprocket 85 driving the wheels 15a is keyed on a shaft 21a on the ends of which are also keyed the

wheels themselves.

As shown in Figure 24, opposing arms 95 are rotatably coulped to the lower end of the tubular body 88 that incorporate suitable shock absorbing elements and supporting, at their respective ends, stabiliser wheels, in contact with the lower side of the longitudinal guiding elements 4.

The tubular element 88 extends downwards in a tubular sleeve 96a joined at its lower end, with a revolving coupling with a substantially vertical axis, by means of a step bearing 98, to the lower body 99 of the hanger housing the drive unit 100 of the flexible transmission 84. The lower body 99 can be equipped with a foot board 101 for the operator and controls 102 for activating the shuttle 1a.

An arm 103 coupled to the load 2 can be supported on the tubular element 88, 96, with revolving coupling by means of bearing 103, so that the coupling of the load can be achieved from both sides of the shuttle.

In the case of a double transmission, as shown in Figure 25, the stabiliser arms 95 with wheels 96 are superfluous.

The end of arm 103 is advantageously forked 104 having star-shaped load coupling elements supported, with revolving coupling, by means of pins 106, to the branches of the fork 104.

The load coupling elements each have on the lower side a saw tooth joint 107 that enable rotation in one direction only when the pin 39 of the hanger 2 is made to penetrate through the fork 104 so preventing it exiting during transfer.

Each joint 107 can be disconnected by means of actuator 108 to enable the release of the hanger 2 once the transfer has been completed.

With automatic operation without the operator, the shuttles 1 can be programmed, by means of a remote computerised control unit, for the automatic coupling with a hanger 2 and for its transfer to a predetermined part of the plant; traffic control is managed by monitoring and control systems, for example, using laser beams, infra red beams, or by other means able to predetermine an automatic choice of the routes to be taken activating actuators for switching the points 67.

In the versions of shuttle having an operator on board, the choice of route is taken is made at the time in function of the requirements by operating relative controls.

The operator can also follow the shuttle without getting on board, in which case the foot board 70 is superfluous.

In practice the materials, dimensions and details of execution may be different from, but technically equivalent to those described without departing from the scope of the present invention.

Claims

1. Apparatus for transferring loads (2; 53; 59), comprising consecutive stretches of overhead runways (4; 50; 51) together defining at least one transfer route for a load (2; 53; 59) suspended from them, each said runway (4; 50; 51) being defined by the substantially coplanar upper surfaces of a pair of longitudinal guiding elements (4; 50) maintained a fixed distance (Z) apart, characterised in that there is at least one shuttle (1) joined with a rolling coupling to the said overhead runway (4; 50; 51) on which each said load (2; 53; 59) is supported.

2. Apparatus as claimed in claim 1, wherein on each said runway (4; 50; 51) is singularly coupled, with rolling coupling, at least one pair of rolling elements (15a, 15b) rotatably supported by said shuttle (1).

3. Apparatus as claimed in claim 1, wherein said shuttle (1) comprises a frame (5, 11, 11a) interconnected at the top to the said pair of rolling elements (15a, 15b) by suspension means (13; 88) passing through an opening defined by the said distance (Z).

4. Apparatus as claimed in claim 3, wherein said suspension elements (13; 88) are coupled to a box support (14a, 17) in the upper part of which are coupled, with rotational coupling, the said pair of rolling elements (15a, 15b).

5. Apparatus as claimed in claims 3 and 4, wherein said suspension means (13; 88) comprise at least one drive shaft (13) driving, at its upper end, a rolling element (15a) of the said pair of rolling elements (15a, 15b) by means of bevel gear (18, 19) and rotatably coupled, at its lower end, to a transverse beam (11, 11a) of the said frame (5, 11) around a substantially vertical axis.

6. Apparatus as claimed in claims 3 and 4, wherein said suspension elements (13; 88) comprise at least one tubular body (88) fixed at its upper end to said box support (14a, 17) and coupled at its lower end to said frame (5, 11) with a rotational coupling having a substantially vertical axis: said tubular body (88) housing internally a flexible transmission (84) driving at its upper end a rolling element (15a) of said pair of rolling elements (15a, 15b).

7. Apparatus as claimed in claims 5, or 6, wherein the rolling elements (15a, 15b) of said pair of rolling elements are made rotationally integral with respect to the relative coupling shaft (21) to the box support (14a, 17).

8. Apparatus as claimed in claim 6, wherein said tubular body (88) is coupled to an upper transverse beam

(11, 11a) of said frame (5, 11).

9. Apparatus as claimed in claims 5, or 8, characterised in that said beam (11, 11a) is divided into sections (11a) aligned longitudinally on the same axis (A), free to rotate around said axis with respect to each other and to the said frame (5).

10. Apparatus as claimed in claim 9 and in claim 6, or 5, wherein said flexible transmission (84), or said drive shaft (13), passes through one of the said sections (11a) and is coupled to drive units (10) positioned below the said axis (A).

11. Apparatus as claimed in claim 10 as appended on claim 6, and claim 3, wherein said drive units (10) are supported on said frame (5) so that they may oscillate and so that their position with respect to it may be adjusted by means of tensioning devices (90) for the said flexible transmission (84).

12. Apparatus as claimed in claim 1, characterised in that the shuttle (1) comprises at least one device (3) for connecting with and holding the load (2; 53; 59).

13. Apparatus as claimed in claim 12, wherein said device (3) for connecting with and holding the load comprises consecutive links (30) articulated to one another by means of pins (31), inserted between the opposing internal surfaces of the said longitudinal guiding elements (4) and having at least one guiding rolling element (46) located at the end of the device (3) furthest from the shuttle (1).

14. Apparatus as claimed in claim 13, wherein the said coupling device (3) closest to the shuttle (1) is rotationally supported, by means of pin (32) and sliding block (35), at a slot (33) in a support element on the frame (5) of the shuttle (1).

15. Apparatus as claimed in claim 13, wherein the extremity of the said coupling device (3) closest to the shuttle (1) is rotationally supported, by means of a pin (32), to an extremity of the said box support.

16. Apparatus as claimed in claim 13, characterised in that said furthest extremity has a coupling plate (38) having an extremity shaped as in a "V" to receive a towing stem (39) integral with the load (2; 53; 59) and held in it by means of a locking element (44), activated by means of a relative actuator (45).

17. Apparatus as claimed in claim 16, wherein said coupling plate (38) is orientably associated with a support plate (36) by means of positioning element (47) inserted in the coupling plate (38) and which may slide elastically in an axial direction to so as engage in predetermined cavities in the said support plate (36).

18. Apparatus as claimed in claim 13, wherein said furthest extremity has a power-driven pincer (73) for holding and towing the load (2; 53; 59).

19. Apparatus as claimed in claims 6 and 13, wherein said device (3) for connecting with and holding the load (2; 53; 59) comprises an arm (103) rotationally supported at one end on the said tubular body (88) and having at the opposite end a fork (104) for receiving the load (2; 53; 59).

20. Apparatus as claimed in claim 19, wherein said fork (104) is equipped with a pair of star-shaped holding elements (105) for the load (2; 53; 59), rotationally supported at the extremities of the said fork and each coupled to an unidirectional disengageable joint (107).

21. Apparatus as claimed in claim 4, characterised in that a first and a second box support (14a, 17) are provided, with relative independent drive units (10), between which a spacing bar (16) is positioned having extremities hinged to each support (14a, 17).

22. Apparatus as claimed in claim 12, wherein said controlled coupling device (3) for the load (53) consists of a power-driven pincer.

23. Apparatus as claimed in claim 1, wherein an independent device (54) is provided for transferring the load (59), suspended from the guide way (4; 50; 51), and which is equipped with a power-driven pincer, consisting of a device for holding the loads (59) coupled to lifting devices (57a) and guiding devices (56), to lift the load (59) from the ground and to put it back down once it has been transferred.

24. Apparatus as claimed in claim 23, characterised in that said lifting devices consist of linear actuators (57a) coupled to a horizontal support (58) having a shape matching that of the load (59) to be lifted.

25. Apparatus as claimed in claim 24, wherein the support (58) has extremities with holding devices consisting of a pair of elements that grip the load (59) near its upper rim, each activated by means of a relative actuator (61).

26. Apparatus as claimed in claim 6, wherein two opposing arms (95) are rotationally coupled to the said tubular element (88), diverging upwards and each supporting a rolling locator element (96) at its extremity, engaging with the lower surface of the longitudinal guiding elements (4; 50; 51).

27. Apparatus as claimed in claim 1, characterised in

that the said shuttle (1) is provided with relative control devices and/or operator support devices (70).

FIG.1

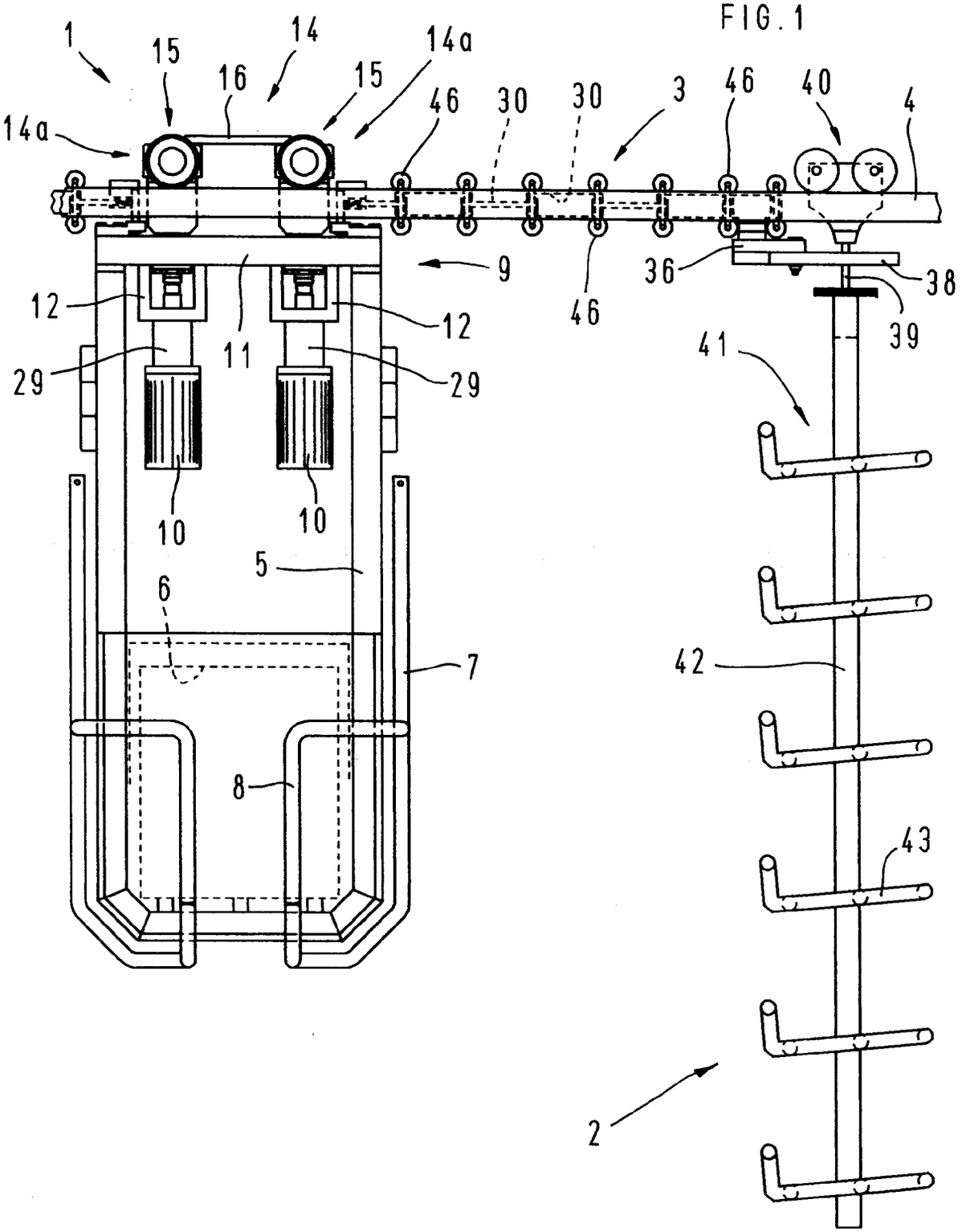

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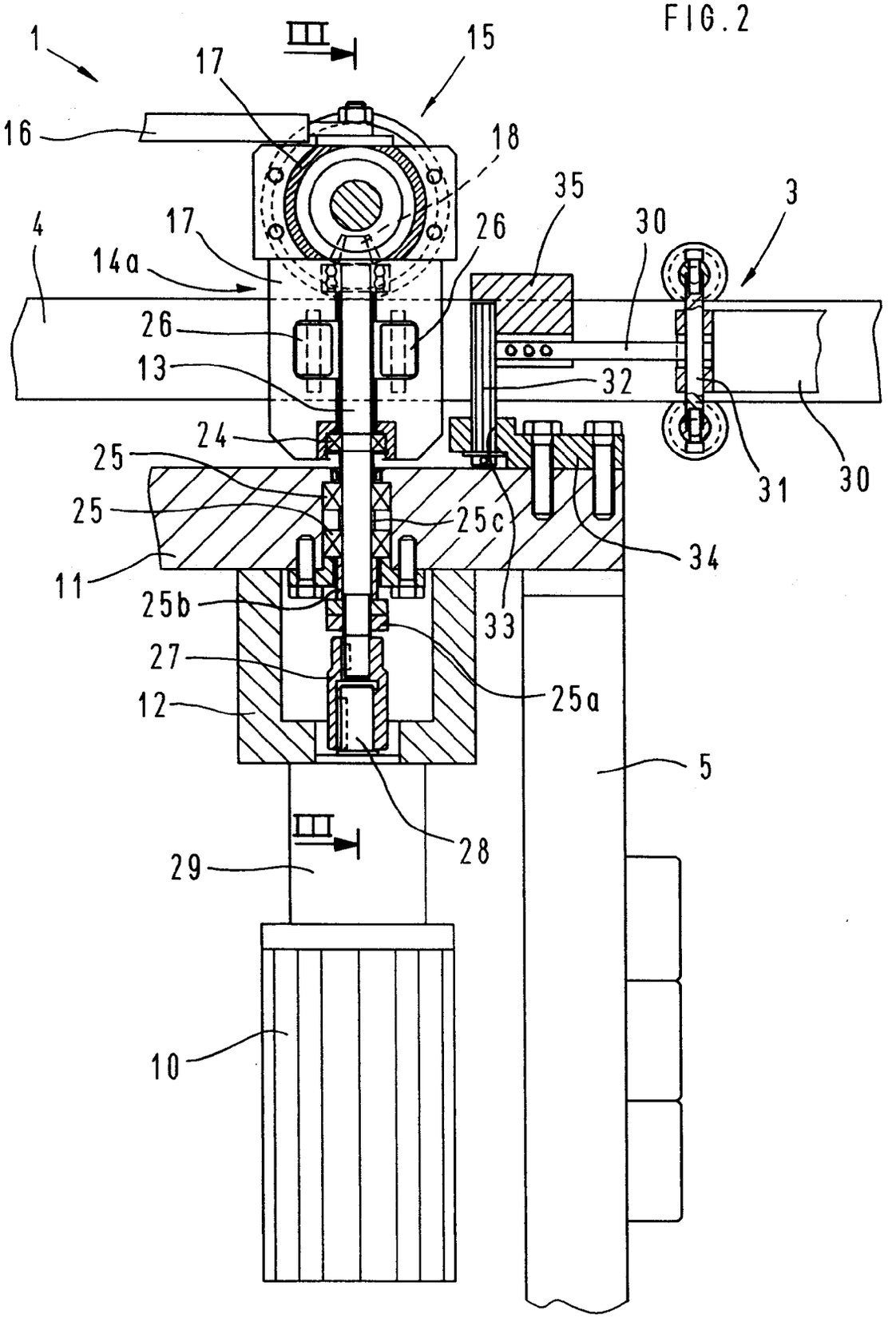
FIG.2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12
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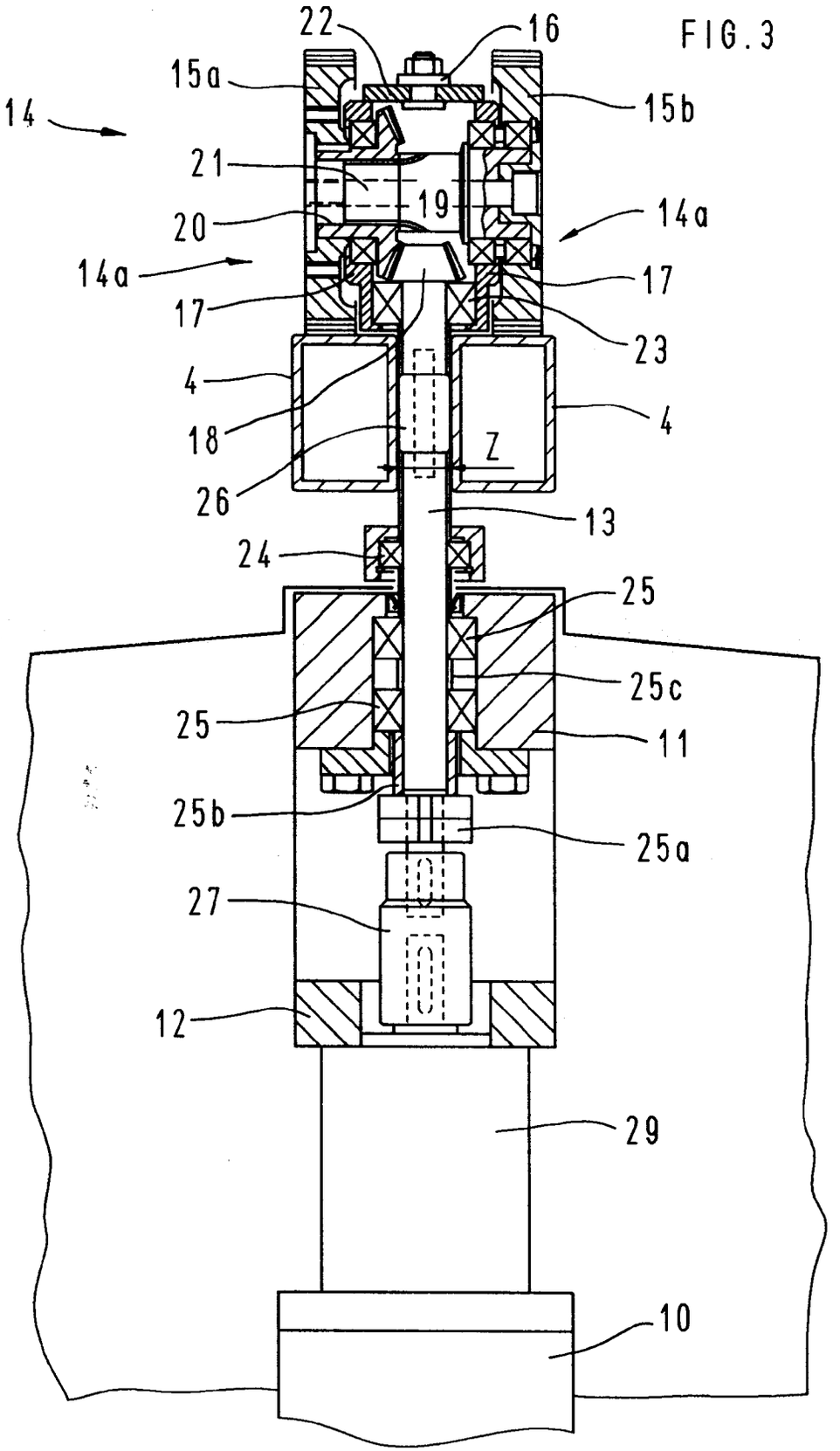
28
29
10

FIG.3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15a
15b
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14a
14a
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Z
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25c
25
11
25b
25a
27
12
29
10

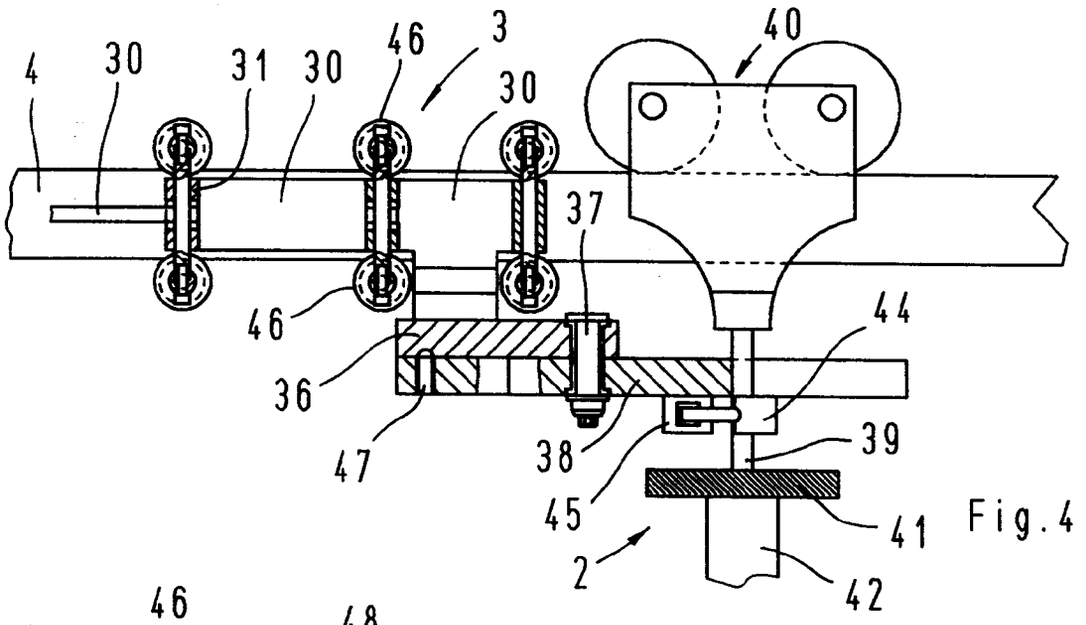


Fig.4

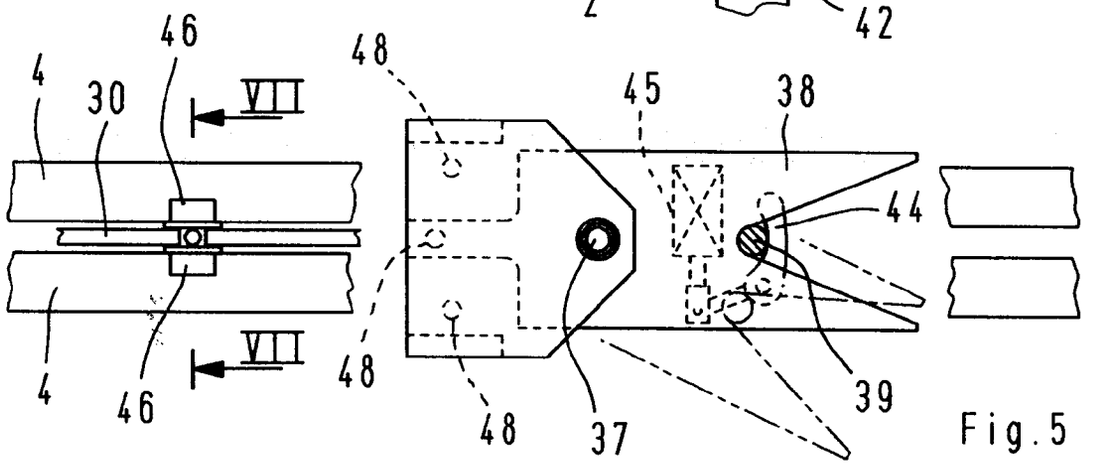


Fig.5

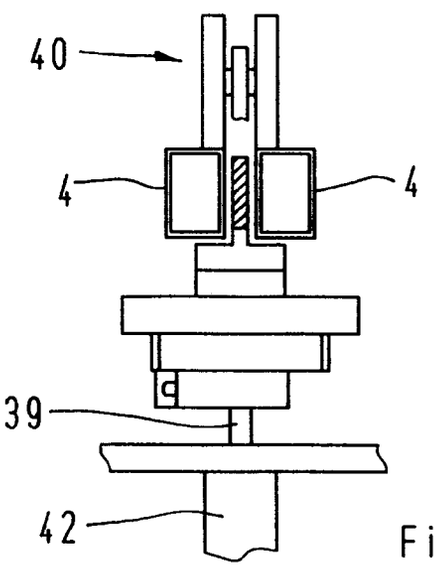


Fig.6

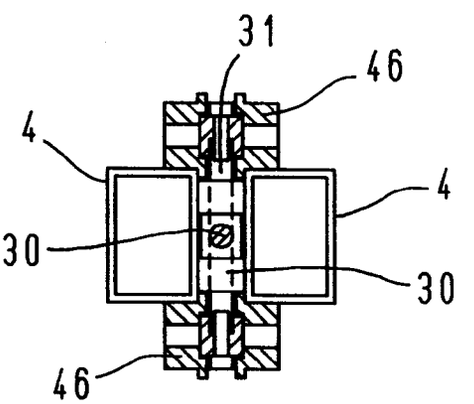
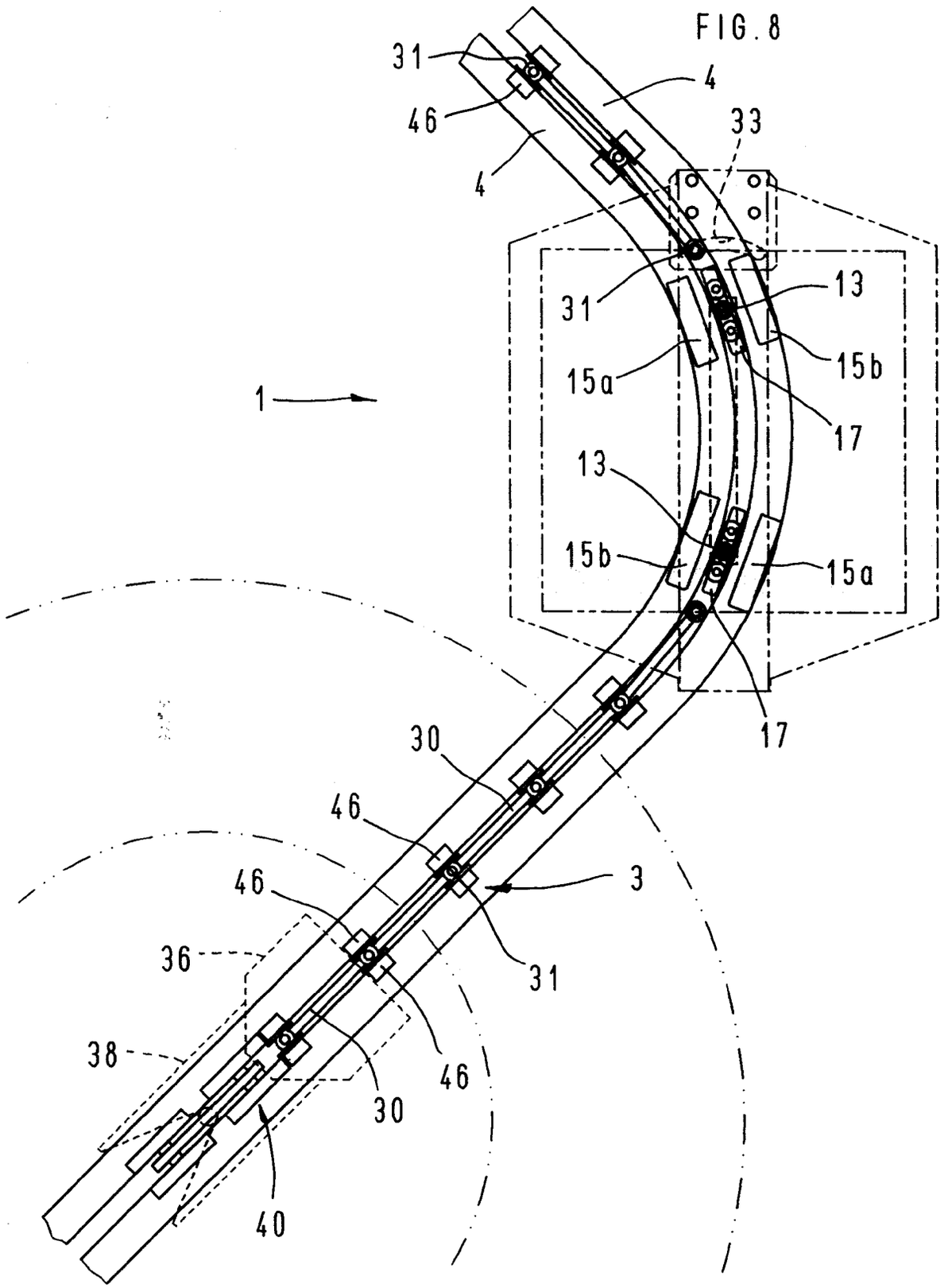


Fig.7

FIG. 8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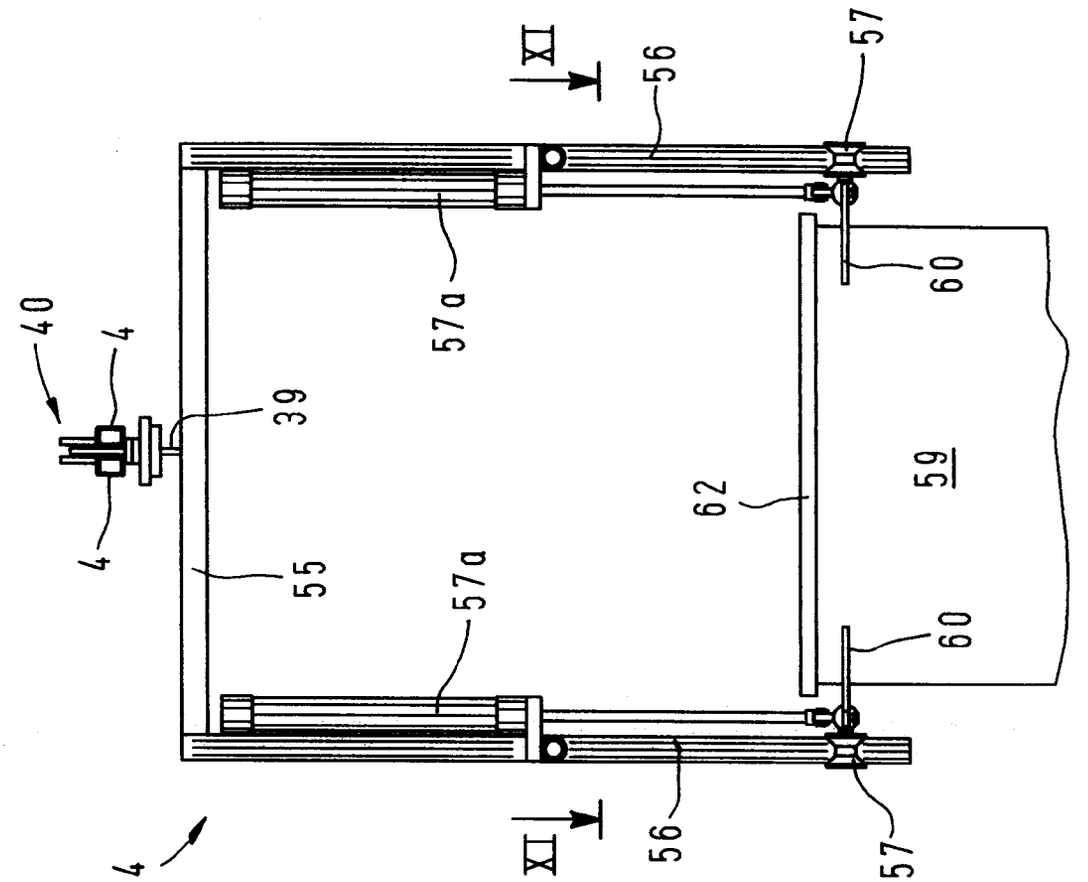
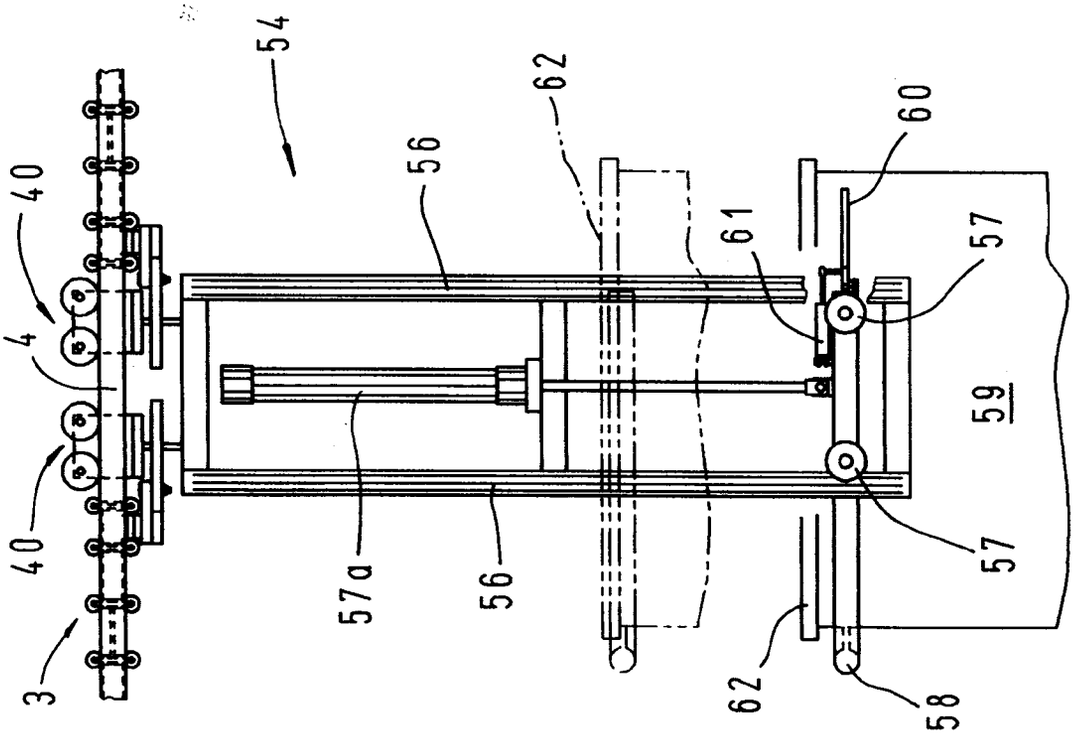

XI
XI
54
40
4
4
39
55
57a
57a
56
56
57
57
60
60
62
59

FIG.9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3
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57a
56
62
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60
57
57
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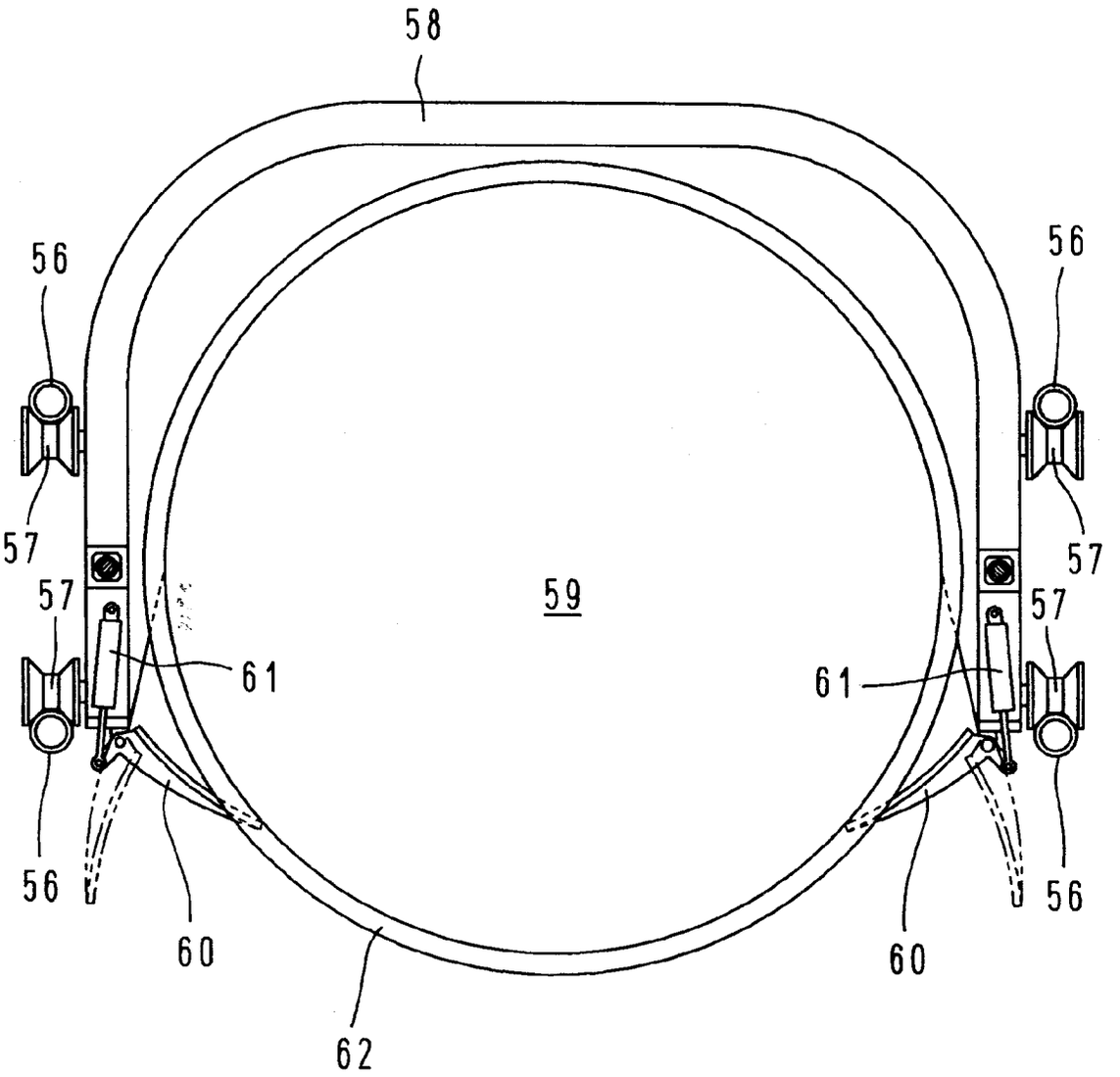
62
58

FIG.10

FIG.11



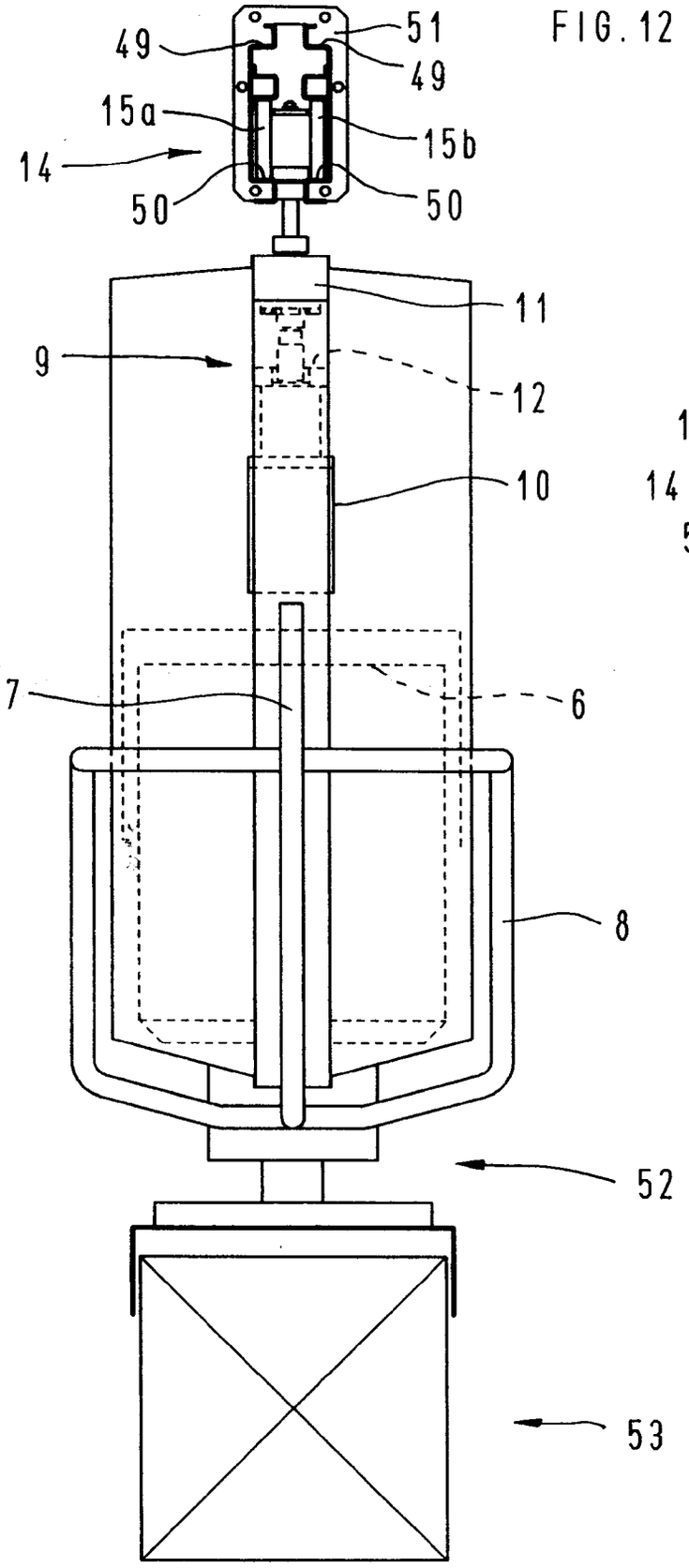


FIG. 12

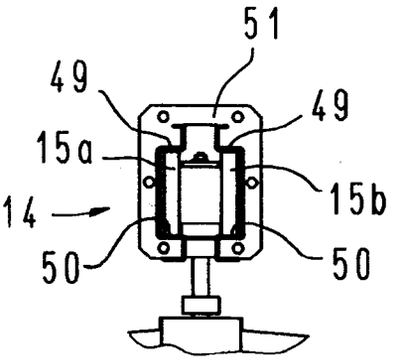


FIG. 12A

FIG.13

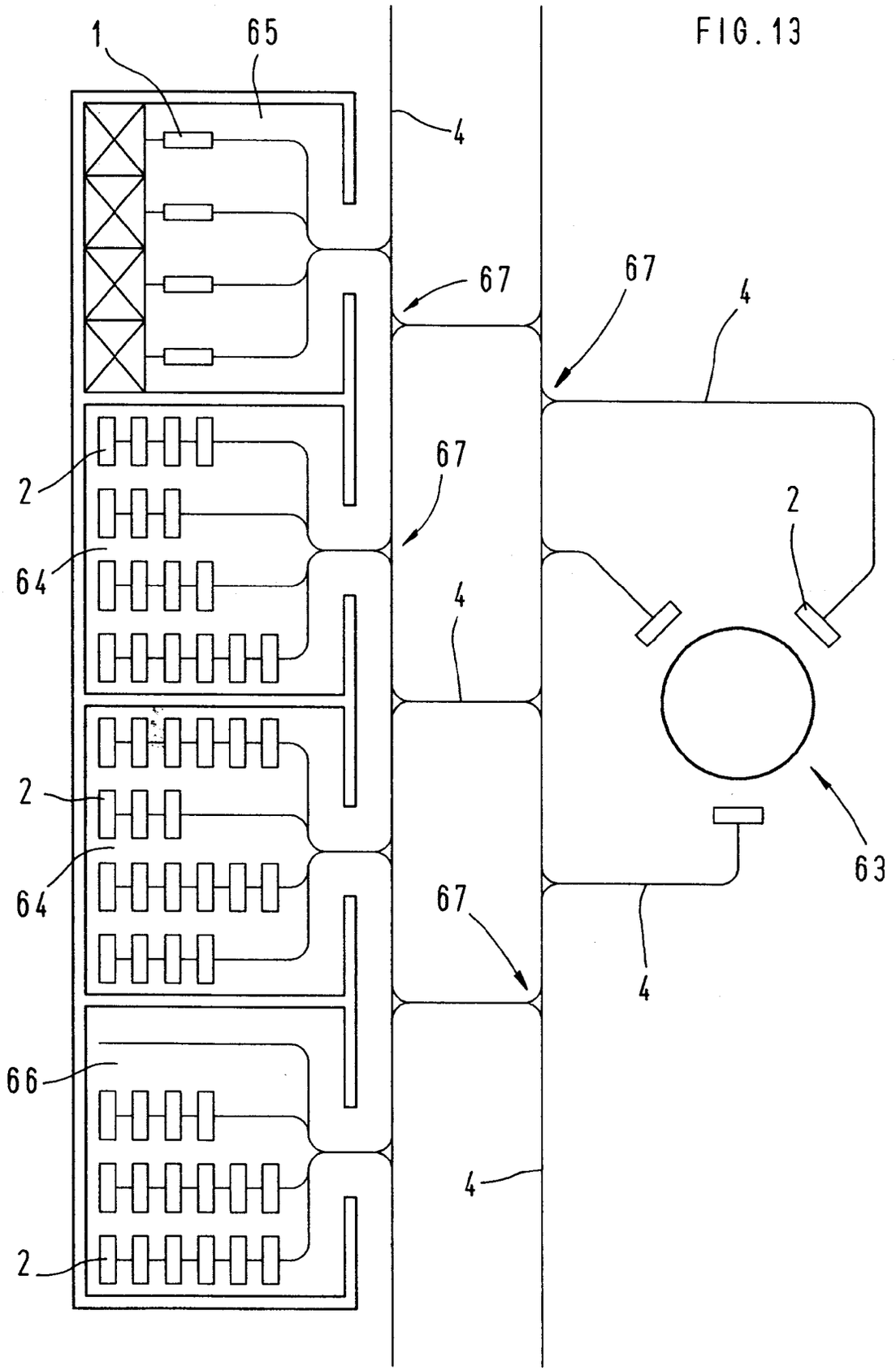
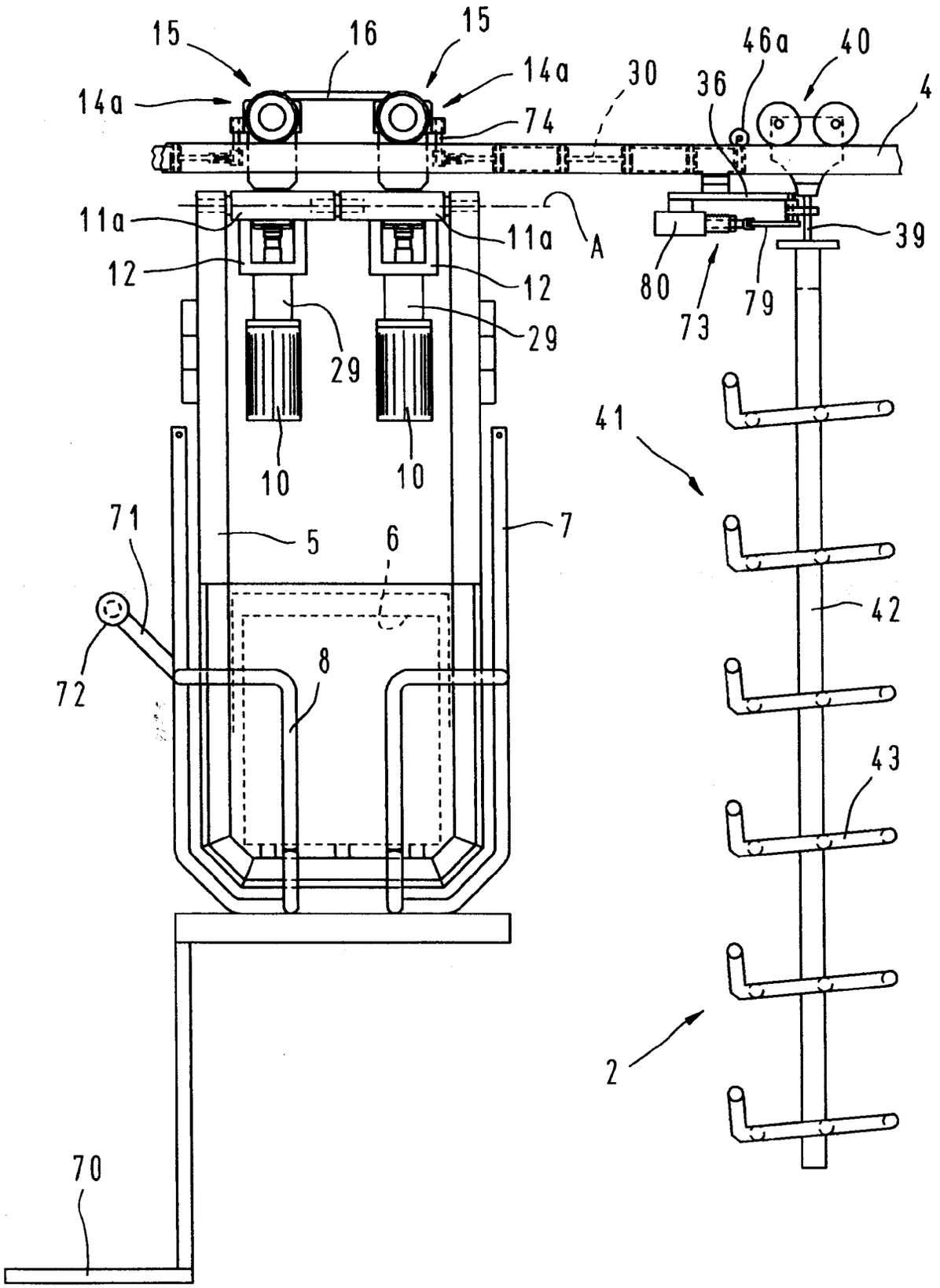


FIG. 14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16
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14a
14a
74
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36
46a
40
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11a
11a
A
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29
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6
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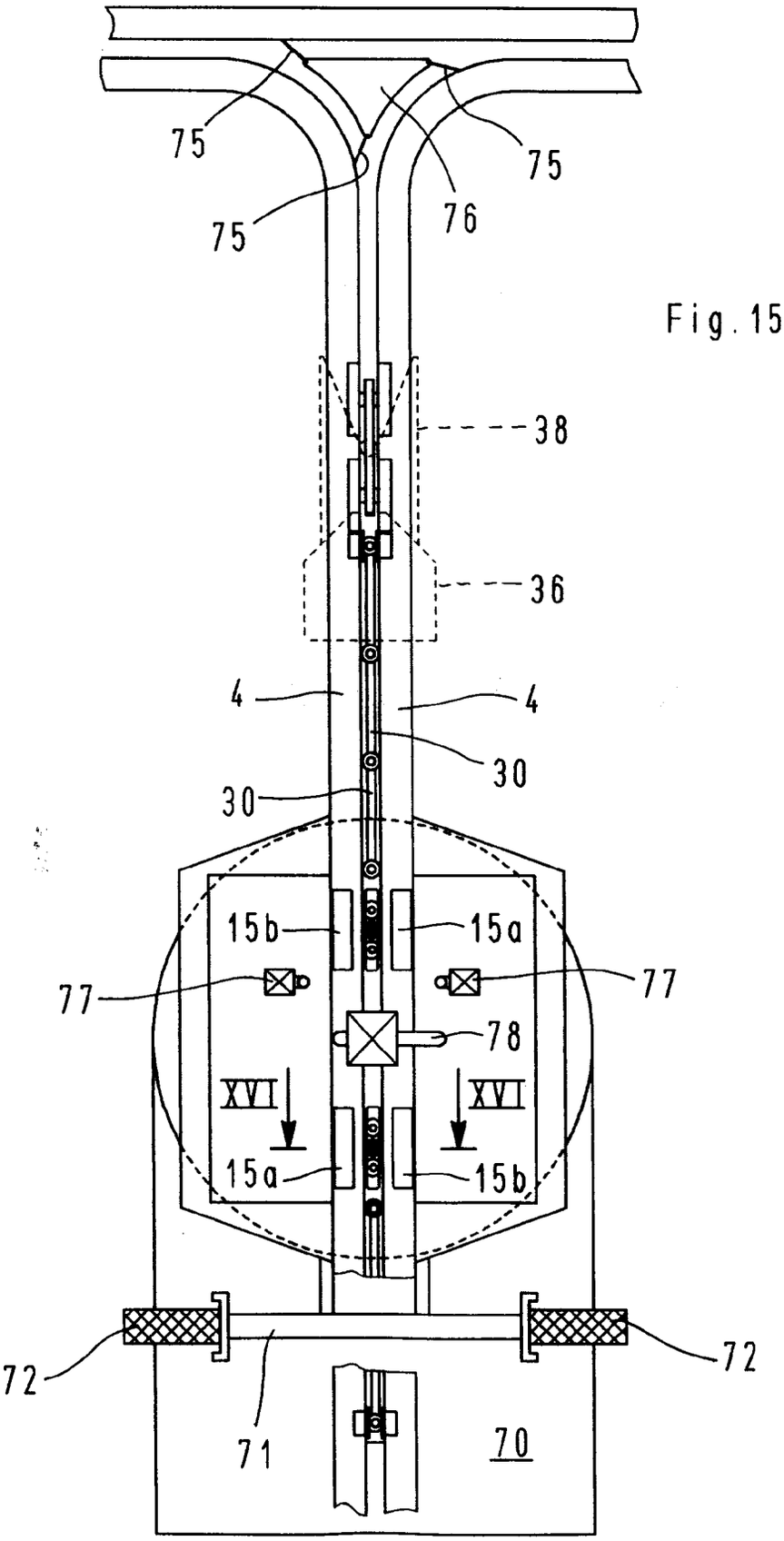
2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38
36
4
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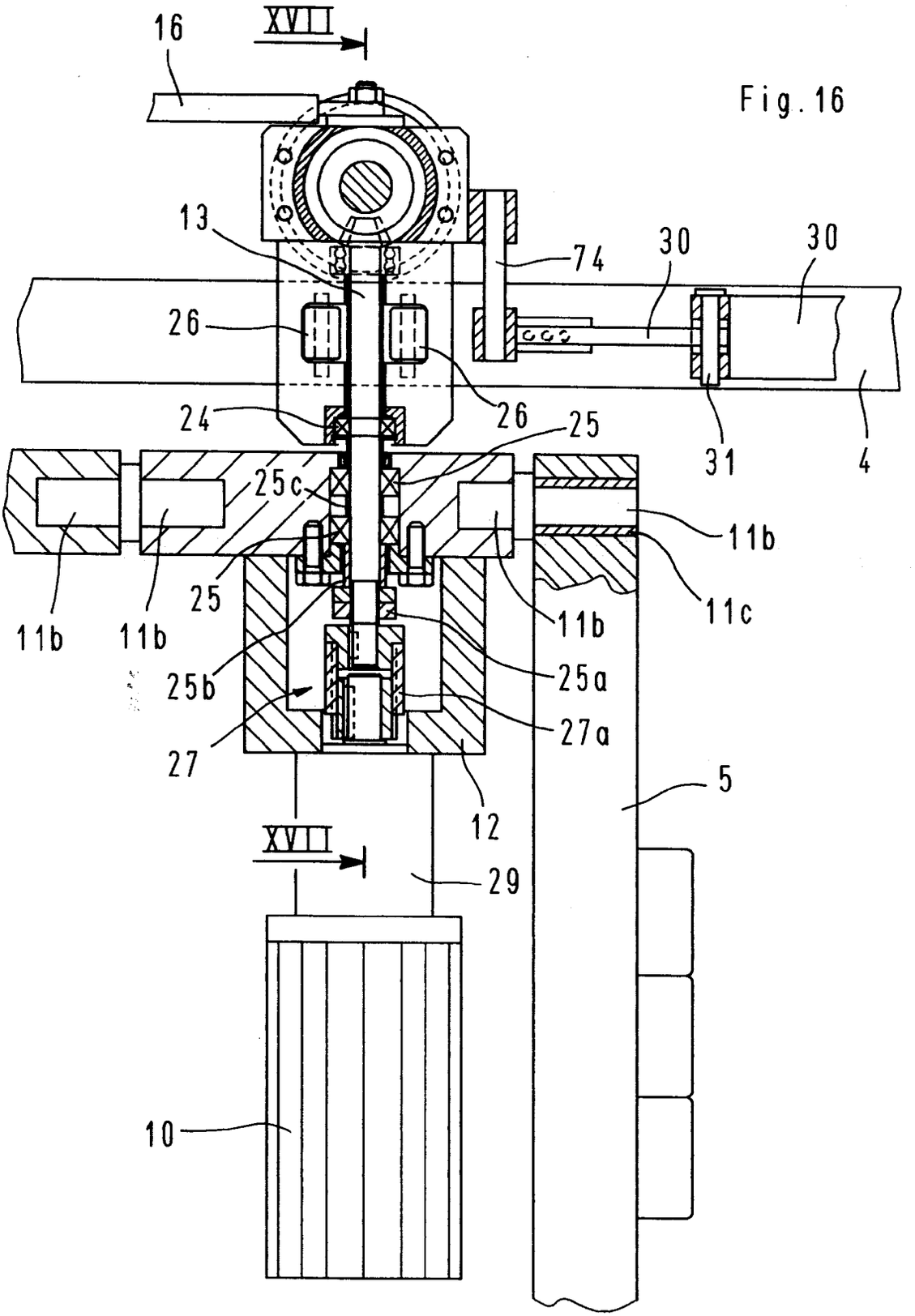
15b
15a
77
77
78
XVI
XVI
15a
15b
72
72
71
70

Fig. 15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XVII
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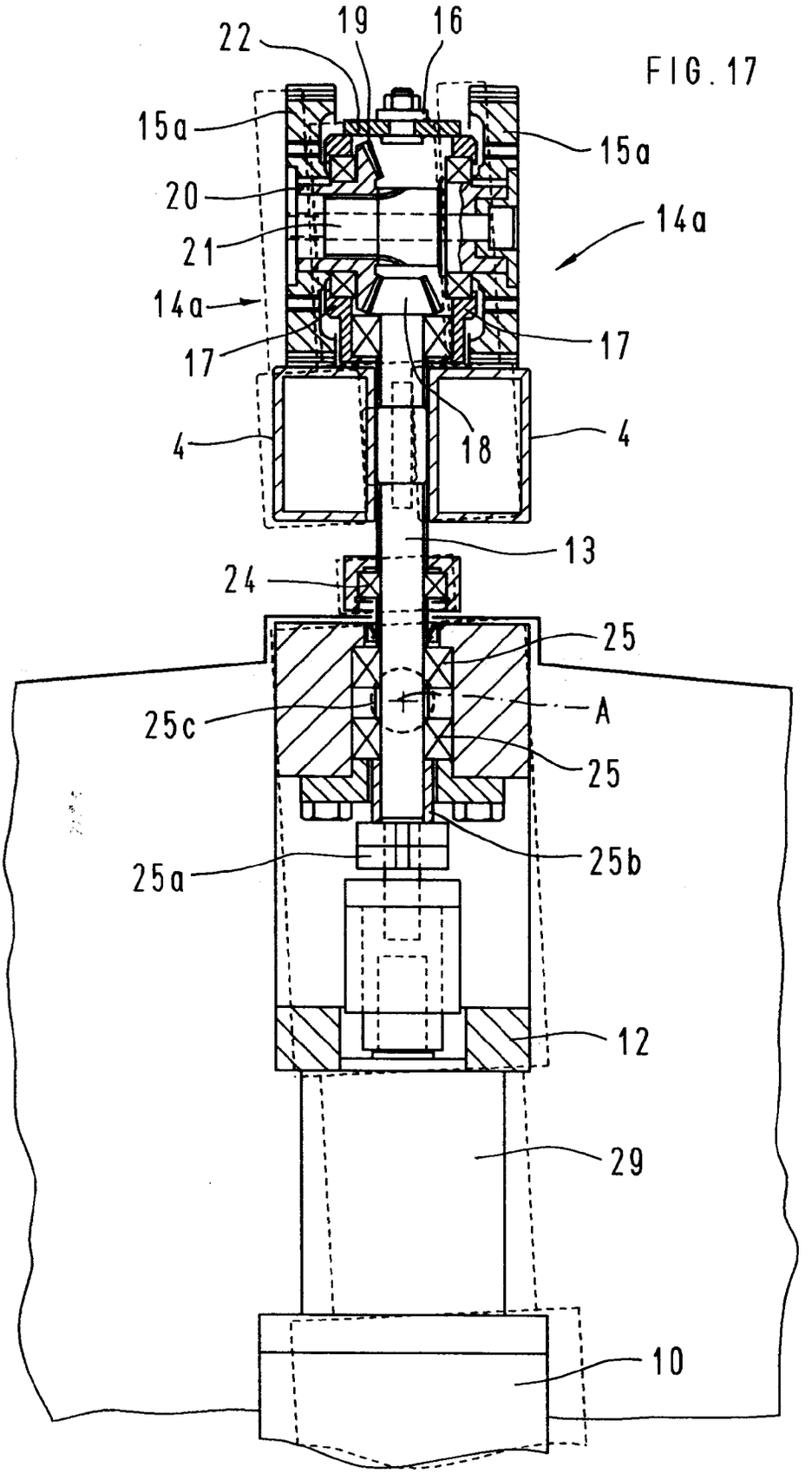
25
31
4
25c
11b
25
11b
11b
11b
11c
25b
25a
27a
27
5
12
XVII
29
10

Fig. 16

FIG. 17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15a
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14a
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18
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25
25c
A
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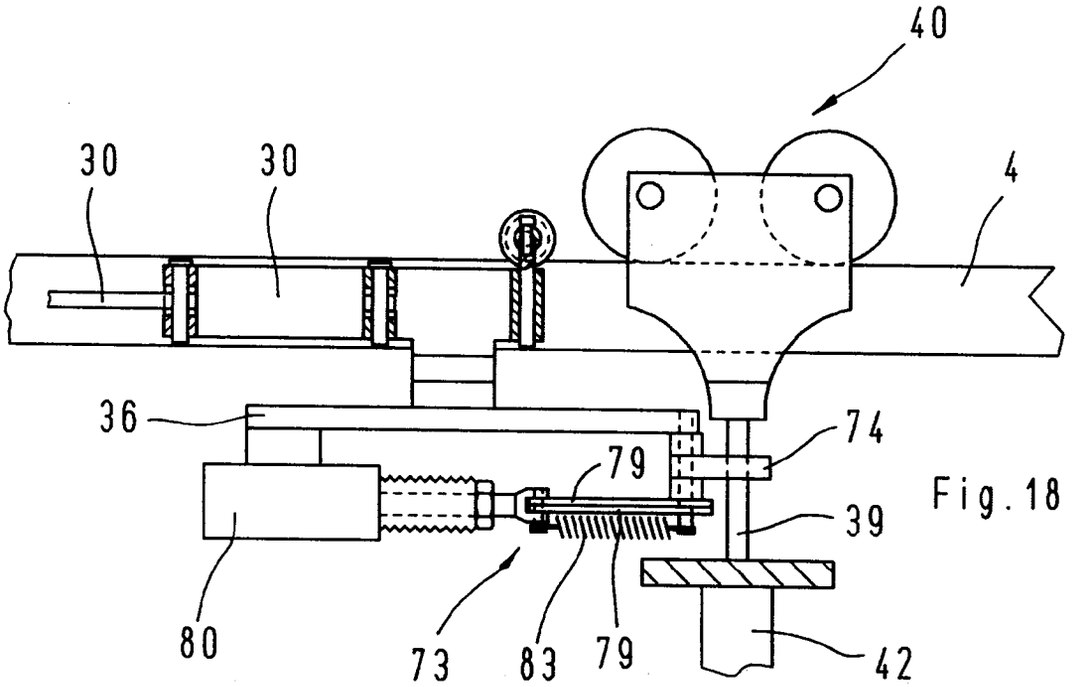
25a
25b
12
29
10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83
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Fig.18

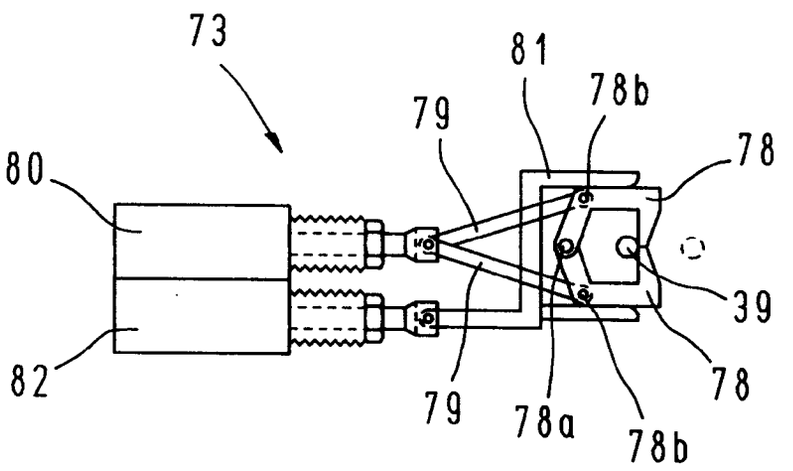
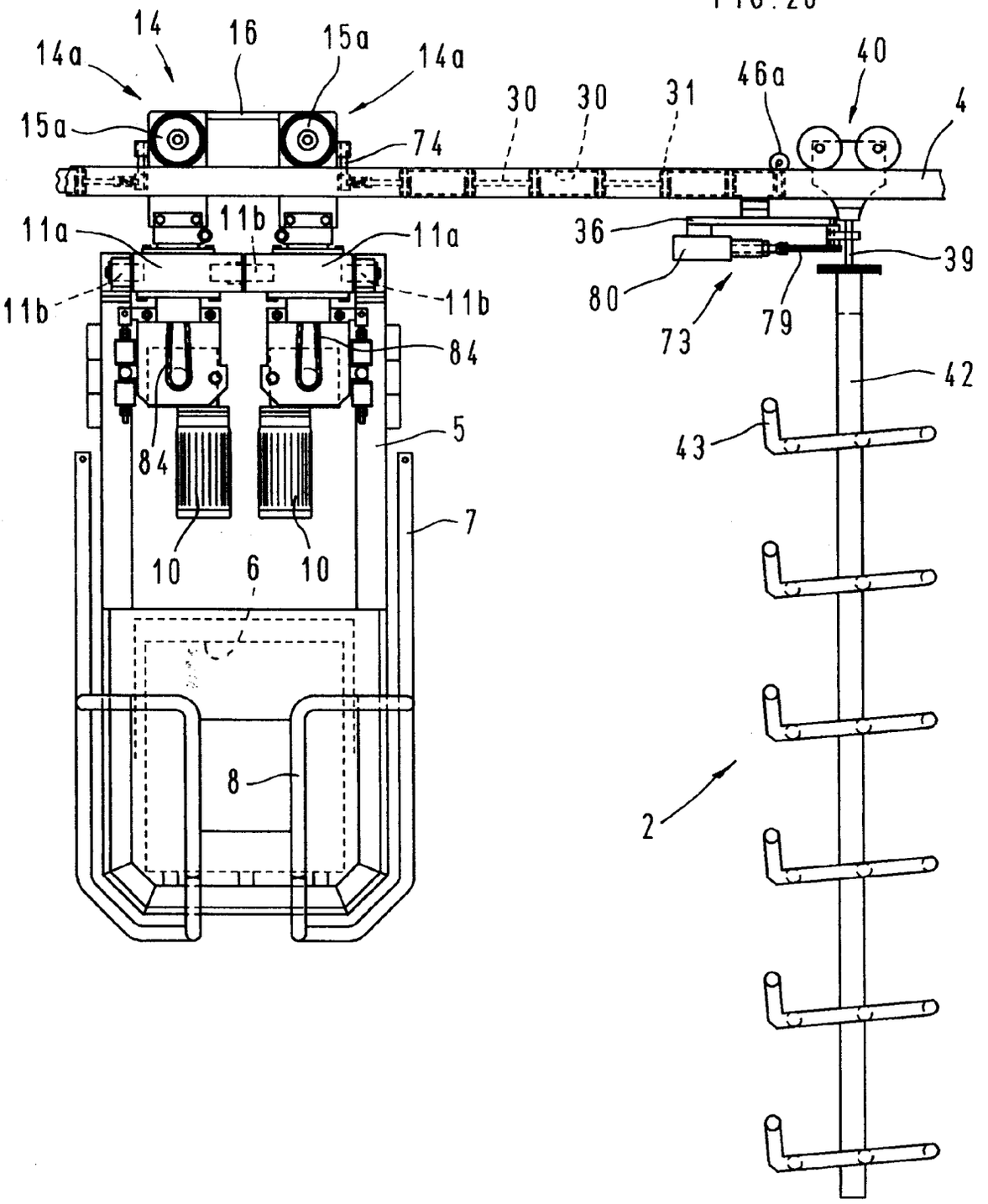

73
81
78b
79
78
80
39
82
79
78a
78b
78

Fig.19

FIG.20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11a
11b
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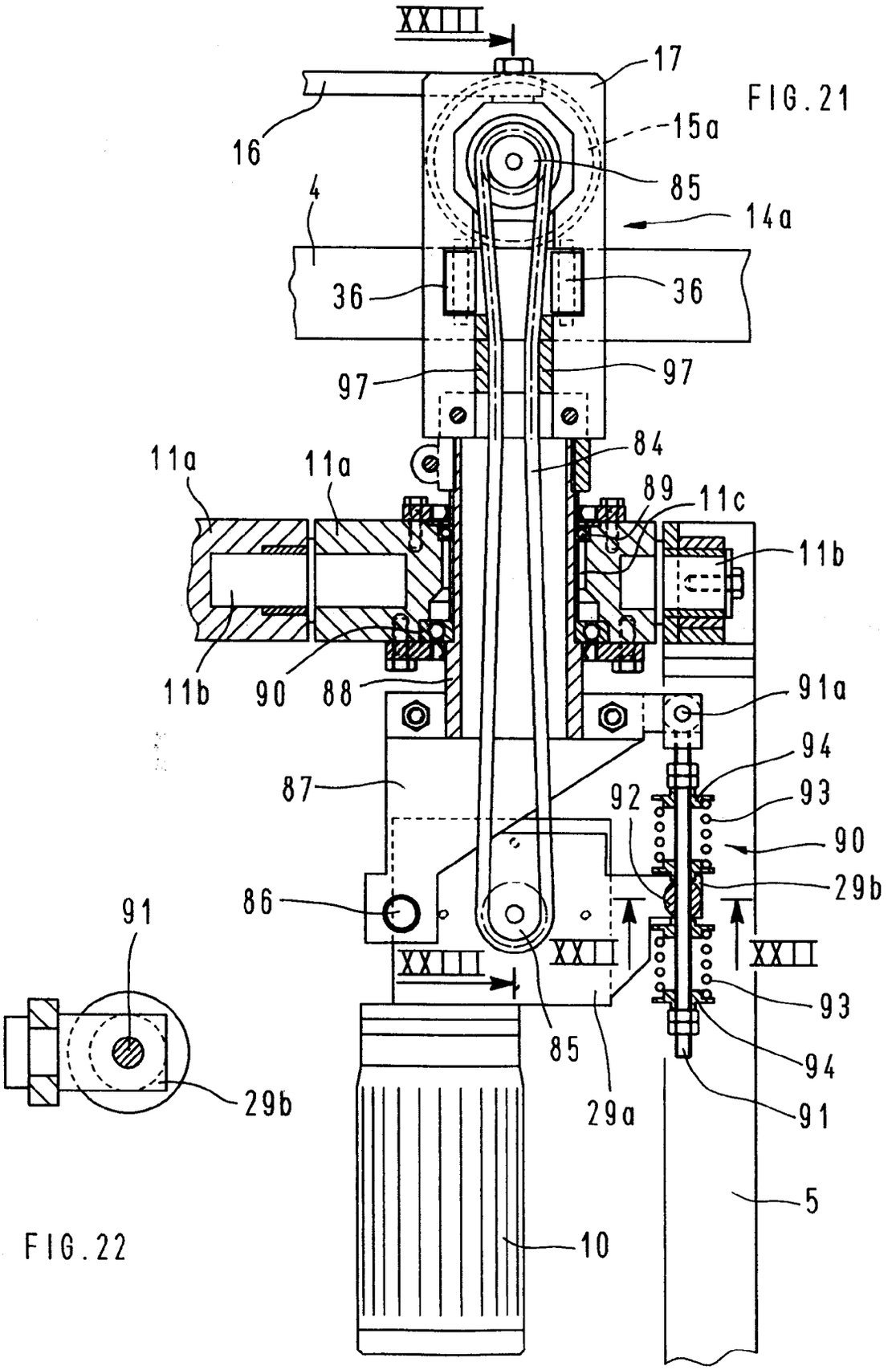
6
10
8
2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84
11a
11a
89
11c
11b
11b
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88
91a
94
87
92
93
90
29b
86
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XXII
XXII
XXIII
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85
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29a
91
29b
5
10

FIG.21

FIG.22

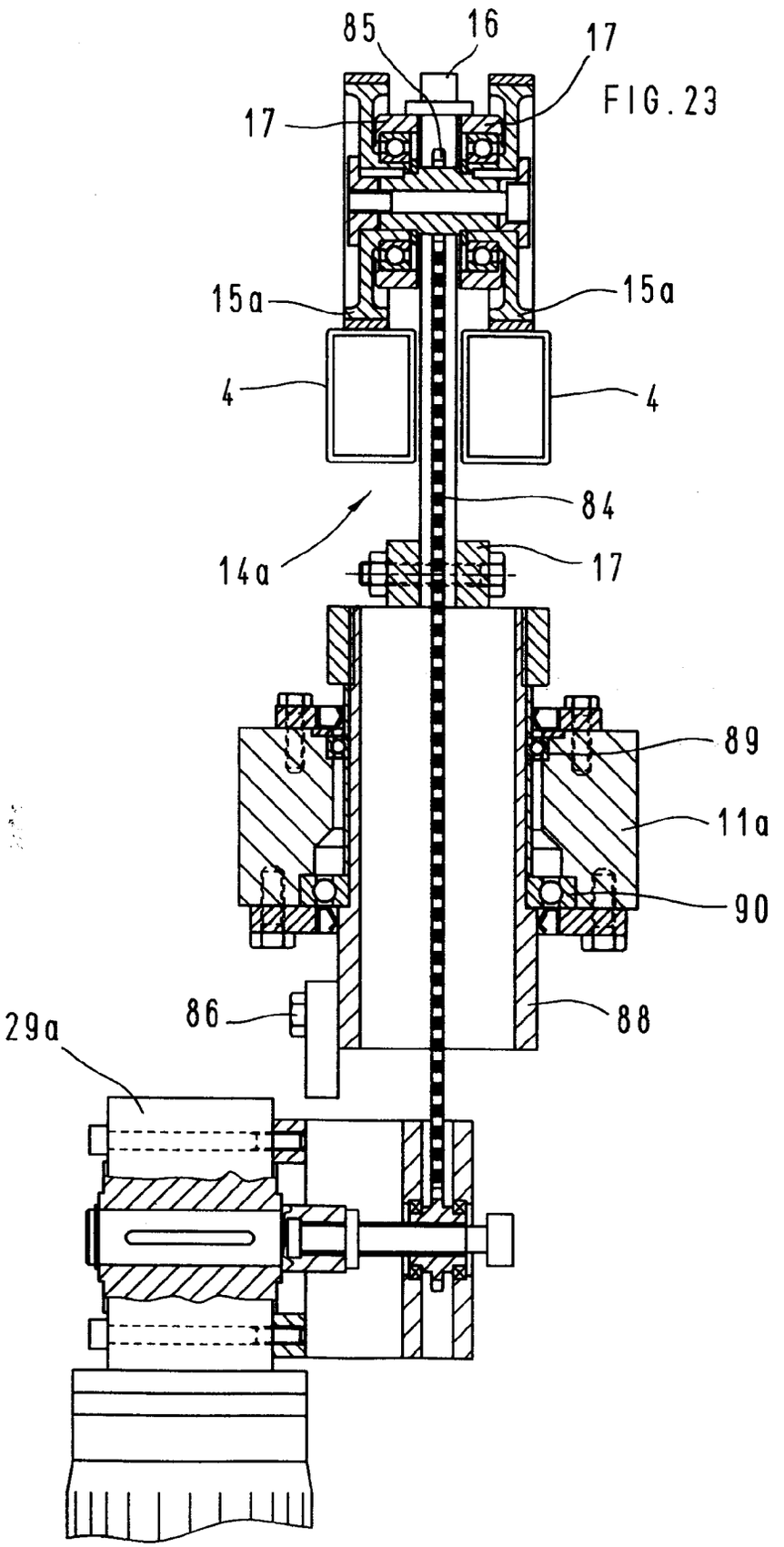
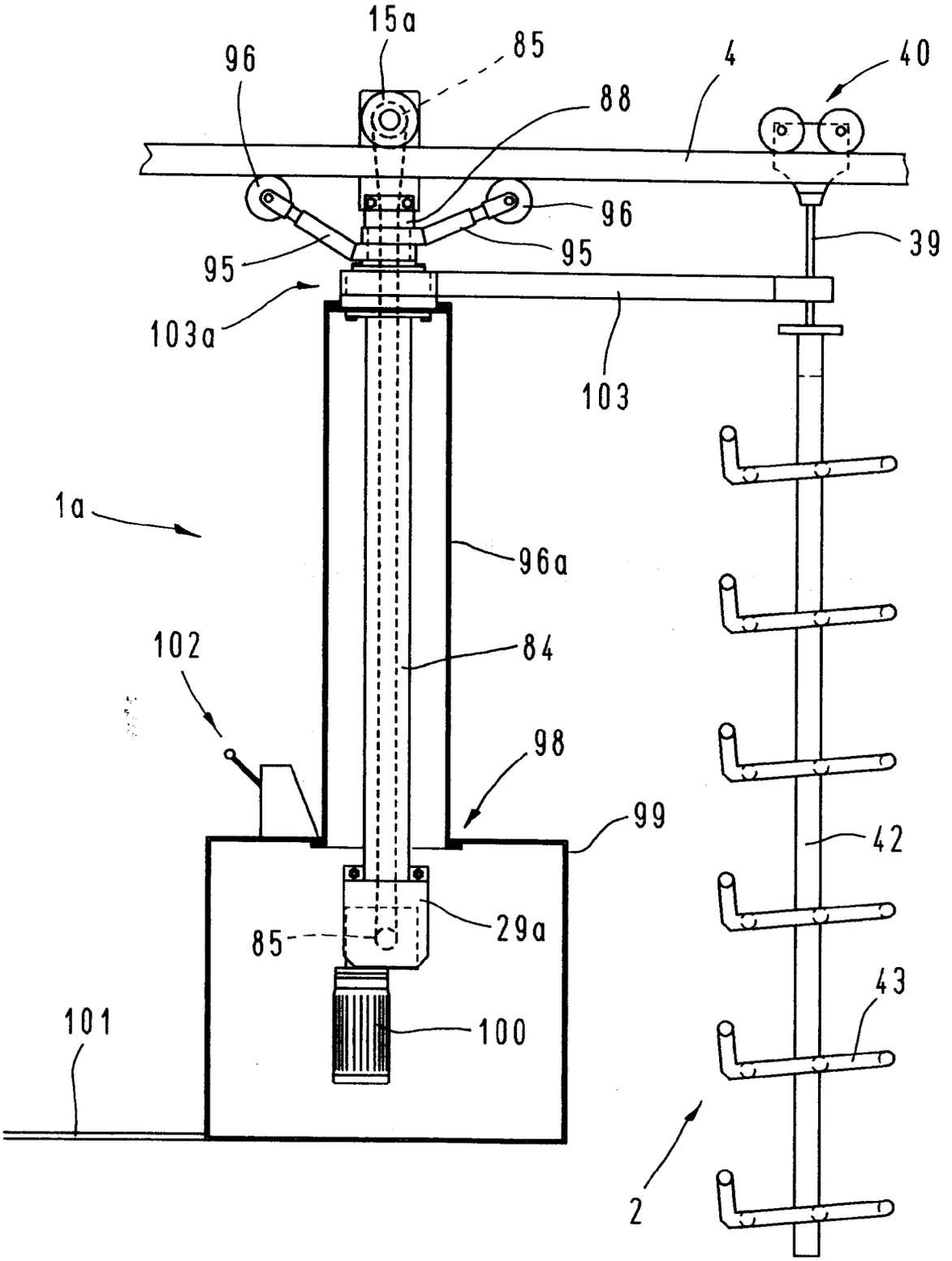


FIG. 23

FIG.24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29a
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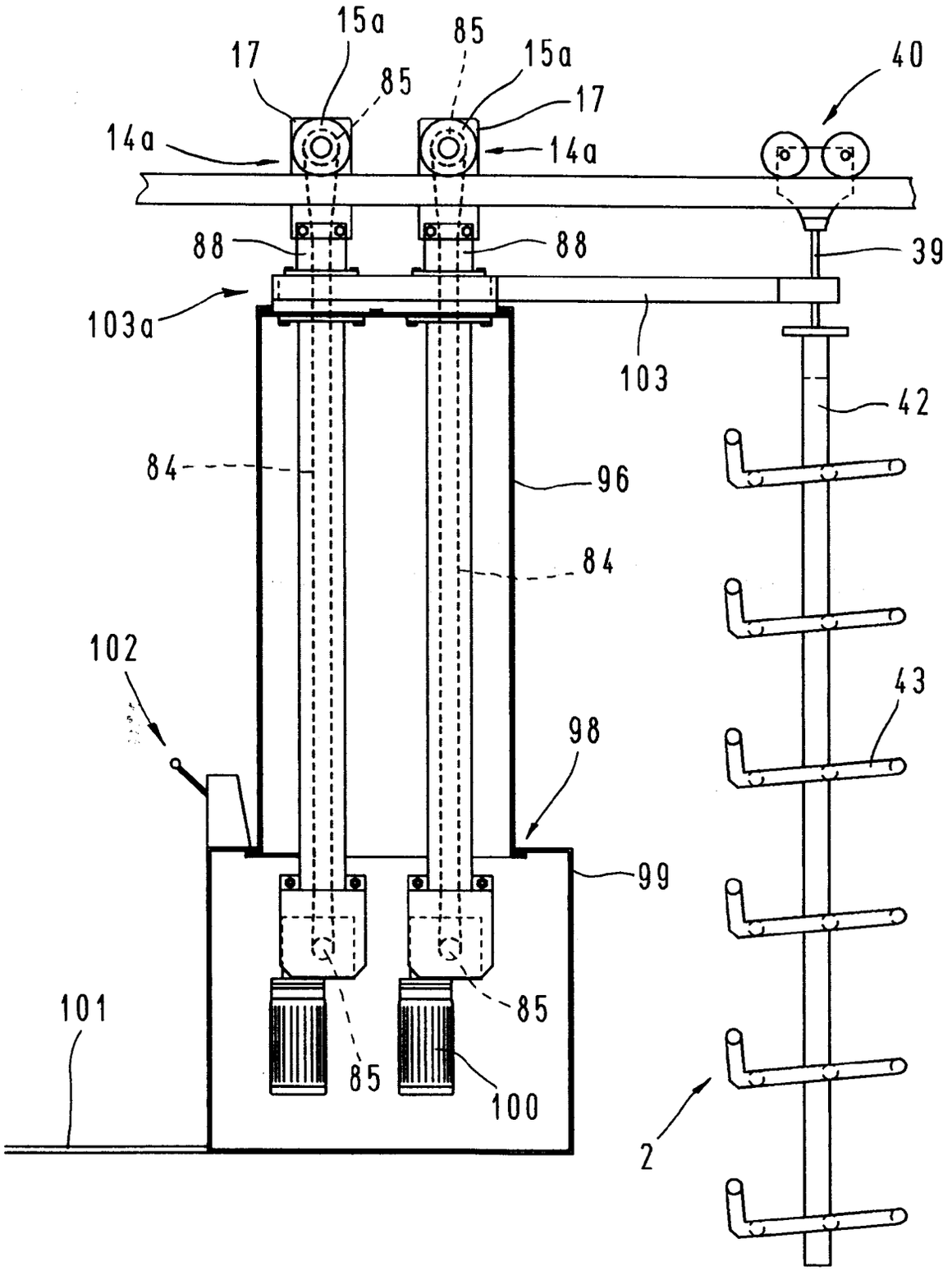
101
100
2

FIG.25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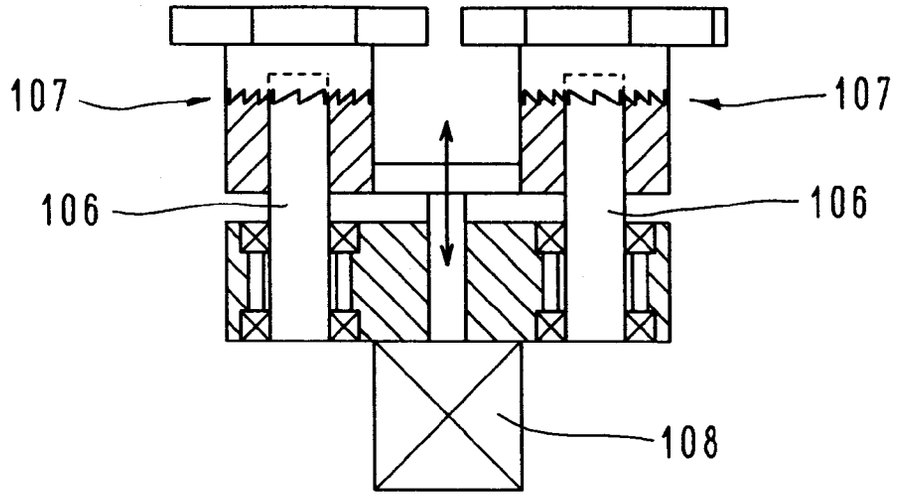
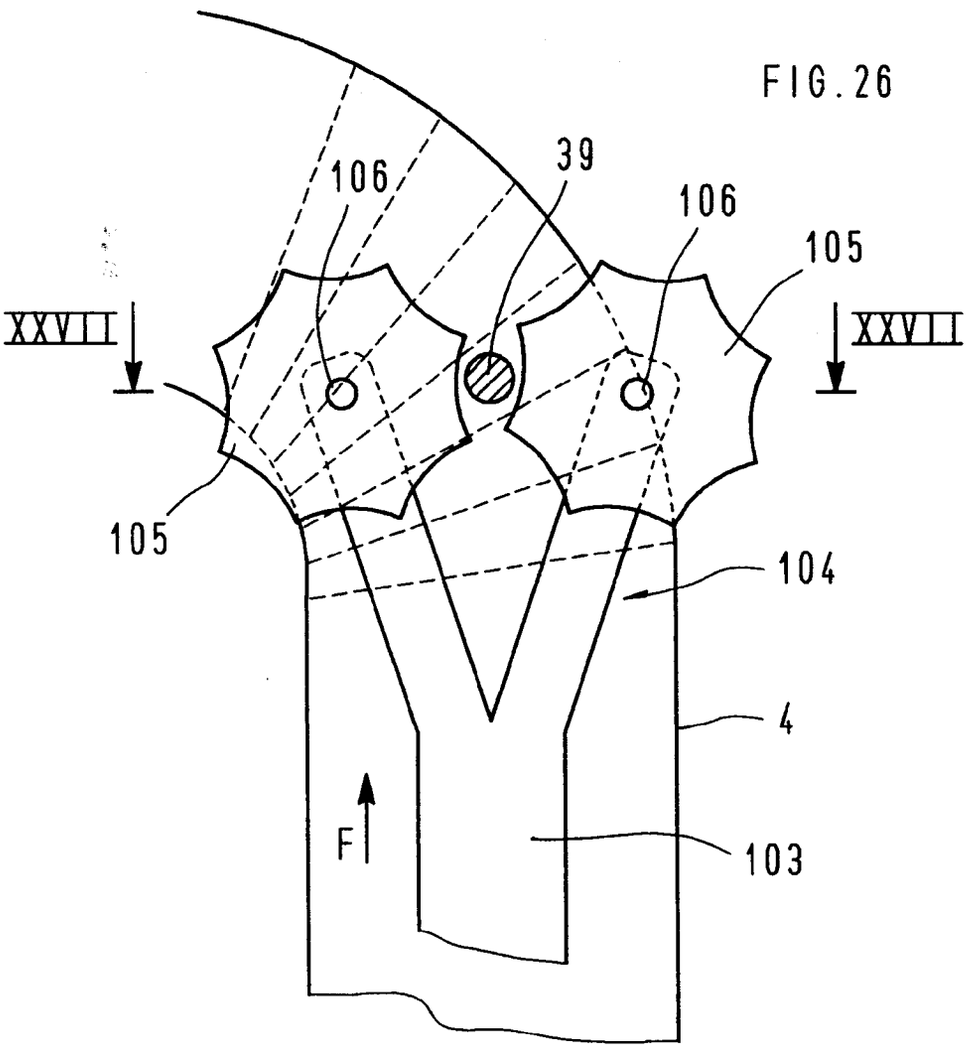


FIG.27

FIG.26



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 20 1992

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP-A-0 582 348 (FATA AUTOMATION) 9 February 1994 * column 3, line 23 - column 4, line 19; figures 1-3 *	1	B61C13/04
A	GB-A-2 175 558 (FATA EUROP GROUP) 3 December 1986 * page 1, line 55 - line 108; figures 1,2 *	1	
A	US-A-4 974 520 (DEHNE CLARENCE A) 4 December 1990 * column 2, line 50 - column 3, line 39; figures 1,2 *	22,23	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B61C
B61B
B62D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	2 November 1995	Chlosta, P

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