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(54) **Method and apparatus for automatically forming cardboard boxes from a flat unfinished board**

(57) This invention relates to a method and an apparatus for automatically forming open-top parallelepipedic board containers or cartons (2) from flattened blanks (3) stacked inside a carton blank magazine (4), each blank basically comprising the sidewalls (PL,PC) of the ultimate carton, a first pair (PL,PC) of upper walls being juxtaposed to a second pair (PC,PL) of lower walls in a substantially flat configuration. The method comprises the successive steps of:

picking up a carton blank (3) from the magazine (4) by individually gripping the first blank (3) with a robot (40) of the pick-and-place type having a tooling head (45) provided with a gripper means (47,48)

which is applied to the first pair (PL,PC) of upper walls of the blank (3);

positioning the blank (3) on a supporting deck (35) equipped with a holding means (36), and applying the means (36) to just one wall (PL) in the second pair (PC,PL) of lower walls;

opening up the blank (3) by moving the tooling head (45) away from the supporting deck (35) along a predetermined blank unfolding (opening up) path to obtain a substantially box-like open-ended structure.

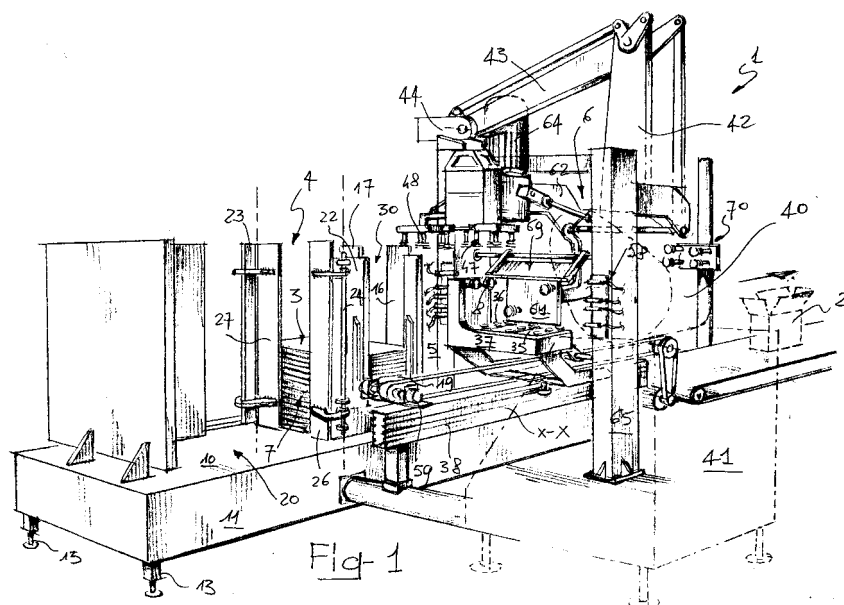


Fig. 1

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Description

[0001] This invention broadly relates to a method of forming cardboard containers of parallelepipedic shape, useful for storing and shipping food products therein.

[0002] Such containers are commonly referred to as "cartons" in the art, and this term will be used to designate them throughout this specification and the appended claims. Cartons are generally obtained from board diecuts which, by appropriate folding and gluing along preset lines, are given the form and stiff feature of an open-top parallelepipedic box having two or more flaps provided at its open top for effectively closing the box after it has been filled.

[0003] In particular, the invention relates to a method of forming open-top parallelepipedic cartons from flattened blanks stacked inside a carton blank magazine, each blank basically comprising the sidewalls of the ultimate carton and having a first pair of such walls laid opposite a second pair in a substantially flattened configuration.

Prior Art

[0004] To manufacture cartons intended for packing food articles in general, and pre-packaged food articles in particular, therein, somewhat complex automated machinery has been made available in the art which included a carton blank magazine, a carton forming station, and a carton blank transport for transferring the carton blanks from the magazine to the forming station.

[0005] In particular, prior art automatic machines had the carton blank magazine side-mounted above the forming station and arranged to receive and hold a vertical or sub-vertical stack of superimposed carton blanks, such that the transport could pick up the blanks one-by-one from the stack bottom. In order to periodically refill the carton blank stack in such a magazine, it had been necessary to provide a special loader, which is admittedly made somewhat unreliable by its complicated construction and, above all, by the nature and unpredictability of the carton blank "behavior". Thus, the operation of the whole machine is heavily dependent on this device being functional.

[0006] At the forming station, the blanks are variously treated (folded, glued, etc.) to produce a desired open-top carton which is then delivered to a packaging machine, also known as boxing machine.

[0007] To speed up the carton forming process, and keep the magazine size small, it has become common practice to load the magazine with carton blanks in a flattened condition, the so-called "pre-glued blanks", rather than with flat cardboard diecuts.

[0008] A blank of this type is obtained from a corresponding diecut by making the sidewall of the carton to be produced and juxtaposing one pair of faces of said sidewall to the other face pair.

[0009] The use of such pre-glued blanks involves the

need to open up the blanks prior to their processing through the forming station (the so-called blank unfolding step). In the prior art, this is done by the transport itself as it picks up the pre-glued blanks from the magazine, the latter being provided with a means adapted to cooperate with the transport in the operation.

[0010] With the above operation, a carton blank is opened up into an orientation of its juxtaposed faces at right angles to each other, thereby yielding a substantially box-like open-ended structure.

[0011] At the forming station, a forming die is engaged with the interior of said open-ended structure to enable pusher arms to fold and bond respective flaps together so as to close one of said ends, thereby yielding an open-top carton article.

[0012] At the end of this forming step, the forming die is withdrawn, and the finished carton is conveyed to a loading station for further processing through the boxing machine.

[0013] Although advantageous in more than one way, and substantially performing as expected -- as witnesses their widespread acceptance -- conventional automatic carton forming machines of the type just described have certain drawbacks, as explained herein below.

[0014] First, automatic carton forming machines are highly complicated items of equipment which are expensive to run, critical to adjust, and command careful designing, all of which make them inflexible in terms of changes in production rate and of capability to handle varying size cartons.

[0015] For instance, the blank magazine is complicated and expensive to run, in that it involves some critical manipulations of mechanical devices incorporated thereto for accommodating the stack of blanks, and coordinate operation of suction means for picking up each blank from the stack bottom, individually in a timed fashion. Furthermore, a FIFO (First-In-First-Out) processing mode is likely to contribute additional service costs from a jammed up blank picking up mechanism.

[0016] Another drawback is that the blank unfolding operation involves a complex co-operation of interlinked suction mechanisms which dictate the machine timing and restrict the possibility of boosting the machine throughput.

[0017] In addition, the forming station is difficult to adapt for handling cartons of different sizes. In an effort to fill this demand, in fact, a number of different forming dies are usually provided which can be exchanged according to the carton size to be manufactured. This contributes costly shut-downs for die switching, as well as added difficulty and downtime for re-adjusting the equipment to accept the new size.

[0018] The technical problem underlying this invention is to provide a method and associated apparatus for forming cartons from flattened blanks with construction and performance features effective to overcome the aforementioned drawbacks with which the prior art is beset, by enhancing the production rate of and providing

the apparatus with automatic carton size switching capabilities.

Summary of the Invention

[0019] The concept behind this invention is that of using a pick-and-place type of robot to perform the action of picking up the carton blanks and opening up or "unfolding" them.

[0020] Based on this concept, the technical problem is solved by a method as previously indicated and defined in the characterizing portions of Claim 1 foll..

[0021] The invention also relates to an automatic apparatus as indicated and defined in the characterizing portion of Claim 12.

[0022] The features and advantages of the method and apparatus according to the invention will become apparent from the following description of an embodiment thereof, given by way of non-limitative example with reference to the accompanying drawings.

Brief Description of the Drawings

[0023] In the drawings:

Figure 1 is a perspective view of an apparatus according to the invention for forming cartons from blanks fed in a flattened condition;

Figure 2 is another perspective view, under a different angle, of the apparatus shown in Figure 1;

Figure 3 is a perspective view of a detail of the apparatus according to the invention;

Figures 4 to 8 are respective schematic side views of the apparatus shown in Figure 1, during successive steps of the inventive method;

Figures 9 to 14 are respective schematic side views of a second embodiment of the apparatus shown in Figure 1, during successive steps of the inventive method.

Detailed Description

[0024] Referring to the drawing views, an automatic apparatus according to the invention for forming open-top cartons 2 from carton blanks 3 is shown generally at 1 in schematic form.

[0025] Each blank 3 consists essentially of a board die-cut which comprises the four sidewalls, delimited by fold lines L, of the carton 2 to be formed and a plurality of flaps P arranged to form the carton end panels.

[0026] In particular, each blank 3 comprises first and second juxtaposed pairs of said walls in a flat configuration. Where the cartons to be produced have rectangular bases, each of said wall pairs is comprised of a

large wall PL and a small wall PC, and in said flat configuration, the large wall PL in the first wall pair has the small wall PC in the other pair juxtaposed to it. In other words, the large wall PL in one pair is offset from the large wall PL in the other pair.

[0027] In addition, the blank 3 is of the pre-glued type, that is, said wall pairs are connected together by a fold line, at one end, and by a glued joint along their respective free sides opposite from said fold line, at the other end.

[0028] The apparatus 1 is intended, particularly but not exclusively, for forming cartons provided with a side window for viewing the articles contained therein, being known in the trade as "American" cartons. The description to follow will deal with this specific design for convenience of illustration, without this implying any limitations to the Applicant's rights.

[0029] The apparatus 1 comprises a blank magazine 4 for the blanks 3, a blank "unfolding" station 5 for opening up the blanks, and a carton forming station 6.

[0030] The stations 5 and 6 are preferably aligned along a main longitudinal axis X-X of the apparatus 1; the magazine 4 being offset to one side of said axis X-X.

[0031] The magazine 4 is to receive and hold a plurality of flattened blanks 3 which are laid horizontally on top of one another into a preferably vertical stack 7. The blanks 3 are made of a cardboard or another suitable material to yield strong but lightweight cartons 2.

[0032] During the blank unfolding step, to be carried out in accordance with the inventive method as explained hereinafter, the diecut is opened up, and the sidewalls PL, PC of the blank 3 are brought to an orientation at right angles with each other, thereby yielding a parallelepipedic or box-like open-ended structure.

[0033] Thus, the magazine 4 will contain a stack 7 of blanks 3 laid onto a belt conveyor 10 surface. The conveyor 10 is mounted to a magazine base 1 and only operated through an electric motor 12 as a new stack 7 of blanks is to be loaded.

[0034] The base 11 has an elongate rectangular shape in plan view, and rests on supporting feet 13. The base 11 includes a loading area 20 and an adjacent storage area 30 for the blanks 3, as shown best in Figure 1.

[0035] A metal wall 14 is secured on a short side of the base to delimit the loading area 20 of the magazine 4 lengthwise.

[0036] A second metal wall 15 is secured on a long side of the base to extend from the wall 14 perpendicularly thereto and serve as a bottom for the loading area 20.

[0037] Provided along the other short side of the base 11, opposite from the wall 14, are two vertical angle bars 16, 17 of metal which delimit the storage area 30 of the magazine 4 lengthwise and engage with and retain the blanks 3 by the corner edges of their stacked configuration.

[0038] One angle bar 16 is mounted fixedly and the other 17 is mounted slidably along a horizontal track ex-

tending parallel to the short side of the base 11. Thus, the spacing of the bars 16, 17, and hence the width of the storage area 30, can be adjusted to accommodate different width blanks.

[0039] Advantageously, each of the bars 16, 17 has the end of a respective plate 19, 21 attached thereto which overhangs the conveyor 10 parallel to the long sides of the base 11 facing the loading area 20.

[0040] The opposite end of each plate 19, 21 supports a respective sheet-like side frame 22, 23 which extends vertically to retain the blanks 3 sideways at their corners next to the loading area 20.

[0041] A pintle 24, 25 is mounted on each of the side frames 22, 23, outside the storage area 30, for hinge connection to a respective closure plate 26, 27 extending perpendicularly to the side frames 22, 23.

[0042] The plates 26, 27 cover and bound the storage area 30 on the loading area 20 side. A hydraulic drive is arranged to operate each pintle 24, 25 for angularly moving the plates 26, 27 to an open position where the loading area 20 is placed in direct communication with the storage area 30 for refilling the magazine 4.

[0043] By operating the conveyor 10, a new stack 7 of blanks 3 can be readily moved from the loading area 20 into the storage area 30.

[0044] According to the invention, the blanks 3 are picked up individually and transferred to the opening or unfolding station 5, where they are laid onto and held against a supporting deck 35 equipped with a suction hold-down means 36.

[0045] According to an advantageous feature of this invention, the blanks 3 are picked up individually from the magazine 4, starting with the topmost accessible blank in the stack 7.

[0046] Also advantageously, a robot 40 of the pick-and-place type is provided at the opening station 5. In particular, the robot 40 is mounted on a base 5 at the side away from the magazine 4.

[0047] The robot 40 has an arm 42 which is journaled on the base 41 and continued in a forearm 43 ending in a removable tooling "head" 45 at its free end 44.

[0048] The tooling head 45 includes a gripper means 46 of the suction type. Specifically, first and second gripper means are provided which comprise first 47 and second 48 sets of suction cups, respectively.

[0049] The first set 47 include six suction cups adapted, as explained hereinafter, to grip a blank 3 from above, by the large wall PL of the latter. Advantageously, the second set 48 of grippers are mounted tiltably to the tooling head 45 of the robot 40 to more conveniently handle the blanks 3, as explained hereinafter. In particular, the second set includes four suction cups adapted to grip the blank 3 by its small wall PC adjacent the large wall PL gripped by the first set 47 of gripper means.

[0050] The robot 40 is driven through a plurality of electric motors and pneumatic actuators, and is controlled by an electronic controller, not shown, which is input a plurality of signals relating the positions and move-

ments of the arms 43, 43 and the head 45. The controller controls the movements of the robot 40 according to a sequence of instructions contained in a program which is run under an internal clock of the apparatus.

[0051] The controller outputs a plurality of control signals which are addressed to corresponding motion transducers, not shown because conventional, for the electric motors to operate the robot arms and head, and to the pneumatic actuators for operating the suction means of the apparatus 1 in a manner and at times as will ensure proper timing with the inventive method.

[0052] As shown best in Figure 3, the forearm 43 is obviously designed to reach above the stack 7 in the magazine 4 for individually picking up the blanks 3 and placing them onto the supporting deck 35.

[0053] Advantageously, the tooling head 45 of the robot 40 is driven unfailingly over the stack 7 in the magazine 4, for the picking up step, to directly grip a blank 3, based on computations of the blank conjectural position carried out by the electronic controller. The tooling head 45 is also provided with proximity sensors connected to the controller, which sensors are only operated after a predetermined number of automatic pick-ups, e.g. ten pickups, to re-calibrate and re-initialize the location of the stack 7 top stored in a memory associated with the electronic controller.

[0054] The supporting deck 35 extends horizontally and forms the top wall of a powered carriage 37 which is moved back-and-forth on a central rail 38 extending along the longitudinal axis X-X of the apparatus 1 from the blank opening station 5 to the carton forming station 6.

[0055] Advantageously, the carriage 37 is provided with a suction holding means 36, e.g. pneumatically operated suction cups. These cups are operative to exert their holding power on the large wall PL of the lower pair of juxtaposed walls of the blank 3.

[0056] A sidewall 39 is attached to the carriage 37 along the adjacent side of the carriage to the magazine 4 and extends vertically. An additional suction means 52 is provided at the top end of the wall 39; this means preferably comprises a set of horizontally aligned suction cups.

[0057] The forming station 6 includes a pad 60 facing the carriage 37 and provided, on its side facing the carriage 37, with a vertical abutment plate 61 basically rectangular in shape.

[0058] The underside of the plate is adjustable to lie flush with the hold-down supporting deck 35. The plate 61 also has first 66 and second 67 portions carrying a respective suction cup 68, 69 for holding the bottom of the carton 2.

[0059] The two portions 66, 67 of the plate 61 are mounted on telescoping guides for movement toward and away from each other in order to change the extended setting of the pad 60 when the dimensions of the carton 2 to be produced are changed.

[0060] These portions 66, 67 of the plate 61 are guid-

ed for movement toward and away from each other in an automatic manner by drives, according to the change in size involved.

[0061] The pad 60 is mounted on a bridge structure 65, which is integral with the robot base 41 and the base 11 of the magazine 4, through a power driven arm 62 which is pivoted on an upper cross-member 63 of the bridge 65 and operated through a drive 64 carried on the same structure.

[0062] The drive 64 for the arm 62 allows the pad 60 to be moved angularly through approximately 90° about the pivot axis of the arm 62 for shifting the plate 61 from its carton forming position, where it is facing the carriage 37, to a discharge position where the finished carton is delivered onto a transport 70.

[0063] The forming station 6 is provided with oppositely located glue dispensing devices 58 which are mounted to the bridge structure 65 on either sides of the axis X-X of the apparatus. Relative to the linear path of travel of the carriage 37 toward the forming station 6, these dispensers 58 are located upstream of the plate 61 at an adjustably set level.

[0064] The operation of the glue dispensers 58 is controlled by the controller 50 upon receiving an electric signal from an encoder 59, the encoder 59 being positioned at one end of the rail 38 to keep accurate track of the carriage 37 displacement and cause the dispensers to apply, during the carriage travel movement, an amount of glue onto at least two opposite flaps of the open-ended carton 2, in timed relationship with the flap movement past the dispensers 58.

[0065] Also provided is a pusher means 69 for closing the bottom of the carton 2 during the final section of the carriage 37 travel path, with the carton 2 already fitting partly over the pad 60.

[0066] The means 69 comprises a pair of oppositely located pushers 8, mounted to the bridge structure 65 on either sides of the axis X-X of the apparatus 1 and consisting of plates disposed above and below the pad 60 for angular displacement toward the supporting deck 35.

[0067] The steps of the method of this invention will now be described with reference to an initial condition of the apparatus 1 being ready to pick up the topmost blank 3 from a stack present in the magazine 4.

[0068] This blank picking up step is carried out by lowering the gripper means of the tooling head 45 of the robot 40 into engagement with the upper pair of upward-facing walls PL and PC of each blank 3.

[0069] The robot 40 will then take the blank 3, held parallel to itself (in a horizontal orientation throughout), from the magazine 4 to the forming station 5, and lay the blank 3 down onto the supporting/retaining deck 35 in the station.

[0070] At this stage, the blank 3 is opened up with a pantograph-like movement (unfolded) by moving the tooling head 45 away from the retaining deck 35 along a predetermined blank unfolding path.

[0071] Advantageously, this blank unfolding path may be the return travel path of the tooling head 45 of the robot 40 toward the magazine 4 to pick up the next blank. This enables the apparatus to handle the blanks 3 at a much faster rate than that provided by conventional "carton opening" equipment.

[0072] As a characterizing feature of this invention, only the small wall PC in the upper wall pair of said blank 3 is released, by just de-actuating the second gripper means 48 of said tooling end, before said tooling head 45 is moved away from the supporting deck 35. With this condition, only the large wall PL in the upper wall pair of the blank 3 and the large wall PL in the lower wall pair of the blank 3, being offset from each other, will be held in the respective gripper means 47 and 36. Advantageously, the gripper means 48 are mounted for tilt movement on the tooling head 45, and when operated, are shifted angularly not to interfere with the sidewall 39 of the carriage 37 during the return movement of the tooling head toward the magazine 4.

[0073] During this return movement, the first gripper means 47 of the tooling end 45 retains its hold on the large wall PL of the upper wall pair of the blank 3. Said wall PL is then lifted off the supporting deck 35, entraining in its movement the adjacent walls PC of the blank and forcing them to move angularly about their respective fold/connection lines to the wall PL held against the supporting deck 35. In this way, the blank walls PL and PC, which have been opened with a substantially pantograph-like movement in a positive direction, are caused to take a position at right angles to each other and produce a box-like open-ended structure.

[0074] At this stage, said box-like open-ended structure is fitted over the pad 60, itself held stationary, with the plate 61 facing the carriage 37, while the latter is being driven along the rail 38 toward the pad.

[0075] During the travel movement of the carriage 37, the glue dispensers are actuated by the controller 50 receiving electric signals from the encoders 59 to dab with glue at least two opposite flaps of the open-ended structure.

[0076] The pusher means 69 is then operated to produce a closed bottom in said structure, with the latter held over the plate 61 of the pad 60 by the suction cups of the plate. The bottom closing step provides for the pushers 8 to fold the glue-coated flaps in a direction toward the plate 61, and the plate 69 to concurrently fold the perpendicular flaps to the glue-coated ones. Thus, a carton is produced on the pad 60 which has a closed bottom and an open top.

[0077] The apparatus 1 of this invention does solve the technical problem and offers a number of advantages, foremost among which is that the apparatus throughput and rate of carton blank unfolding can be much higher than in conventional apparatus.

[0078] In addition, the apparatus and method of this invention can complete the formation of cartons in a more effective and simple style, to the point that the pos-

sible occurrence of a jam condition in the automatic operation of the apparatus is effectively minimized, and in all events can be easily fixed by unskilled personnel.

[0079] Cartons of any shapes and sizes can be formed by the method and apparatus of this invention. This is exemplified by the blank 3' shown in Figures 9 to 14, commonly referred to as a "display tray" blank.

[0080] In the modified embodiment schematically illustrated by these Figures, the tooling head 45 of the robot 40 picks up the blank 3' and places it against a vertical supporting deck, where the blank 3' will be held by a suction means.

[0081] In this modification, the supporting deck is also mounted on a carriage transport which allows the blank to be transferred and fitted over a pad former, through successive steps of this method.

[0082] In essence, the blanks 3' would first be processed at the blank unfolding station 5 and then transferred to the forming station 6, in this modified embodiment as well.

Claims

1. A method of automatically forming open-top parallelepipedic cartons from flattened blanks (3) stacked inside a carton blank magazine (4), each blank basically comprising the sidewalls (PL,PC) of the ultimate carton, a first pair (PL,PC) of said walls being juxtaposed to a second wall pair (PC,PL) in a substantially flat configuration; characterized in that it comprises the successive steps of:

picking up a carton blank (3) from said magazine (4) by individually gripping said blank (3) with a robot (40) of the pick-and-place type having a tooling head (45) provided with a gripper means (47,48) which is applied to said first wall pair (PL,PC) of the blank (3);

positioning the blank (3) on a supporting deck (35) equipped with a holding means (36), and applying said means (36) to just one wall (PL) in said second wall pair (PC,PL);

opening up said blank (3) by moving the tooling head (45) away from the supporting deck (35) along a predetermined blank unfolding (opening up) path to obtain a substantially box-like open-ended structure.

2. A method according to Claim 1, characterized in that it further comprises the steps of:

closing said structure at one of said ends to obtain an open-top carton (2); and

delivering said open-top carton (2) to a food ar-

ticle packing step.

3. A method according to Claim 1, characterized in that said unfolding path is at least one section of the return travel path of the tooling head (45) of the robot (40) toward the magazine (4).
4. A method according to Claim 1, characterized in that said blank is picked up by first (47) and second (48) gripper means, and that, before the step of moving said tooling head (45) away, a wall (PC) of the blank (3) is released by de-actuating one (48) of said gripper means.
5. A method according to Claim 4, characterized in that the step of de-actuating said gripper means (48) is followed by lifting a tiltable holder arm thereof.
6. A method according to Claim 4, characterized in that said opening up step is carried out with the remaining ones of the gripper means (47) acting on another wall (PL) of the blank (3).
7. A method according to Claim 1, characterized in that, at the end of the opening up step, the resulting carton (2) is retained laterally by gripper means (52) located at the sides of said supporting deck (35).
8. A method according to Claim 1, characterized in that the blanks (3) are laid in a vertical stack (7) within the magazine (4), and that said robot picks up the topmost accessible blank (3) in the stack (7).
9. A method according to Claim 1, characterized in that said supporting/holding deck (35) lies horizontally and is guided slidably to a station (6) where one of the open ends of said box-like structure is closed to produce an open-top carton (2).
10. A method according to Claim 7, characterized in that the step of holding the carton laterally comprises holding a small wall (PC) of the opened up blank.
11. A method according to Claim 8, characterized in that said tooling head (45) is driven by an electronic controller of the robot directly to the top of said stack (7), and that proximity sensors mounted to said head (45) and connected to the electronic controller are only activated after a predetermined number of automatic picking-ups to re-calibrate and re-initialize the stored position of the stack (7) top in the electronic controller.
12. An apparatus for automatically forming parallelepipedic cartons from flattened blanks, comprising:

a carton blank magazine (4) for containing a

plurality of carton blanks (3) essentially comprising the sidewalls (PL,PC) of the ultimate carton, one pair of said walls being juxtaposed to the other wall pair in a substantially flat configuration;

5

an opening station (5) comprising a means of picking up a carton blank (3) from said magazine and a means of opening up said blank (3) to obtain a substantially box-like open-ended structure;

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a carton (2) forming station (6) having a means of closing one end of said structure to obtain an open-top carton (2);

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characterized in that said means of picking up the blank (3) from the magazine (4) comprises a robot (40) of the pick-and-place type having a tooling head (45) provided with a gripper means (47,48), and that said opening station (5) includes a horizontal supporting/holding deck (35) where to said tooling head will transfer the blank (3) picked up from the magazine, said supporting deck (35) being the top wall of a powered carriage (37) moved back-and-forth between the blank opening station (5) and the carton forming station (6).

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13. An apparatus according to Claim 12, characterized in that the blanks (3) are laid in a vertical stack (7) inside the magazine (4), and that said robot picks up the topmost accessible blank (3) in the stack (7).

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14. An apparatus according to Claim 13, characterized in that said robot (40) is driven by an electronic controller, and that said tooling head (45) is provided with proximity sensors connected to the controller, said sensors being only activated after a predetermined number of automatic picking-ups to re-calibrate and re-initialize the stored position of the stack (7) top in a memory associated with the electronic controller.

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15. A method of automatically forming open-top parallelepipedic cartons from flattened blanks (3,3') stacked (7) inside a carton blank magazine (4); characterized in that it comprises the successive steps of:

45

picking up a carton blank (3,3') from said magazine (4) by individually gripping said blank (3,3') with a robot (40) of the pick-and-place type having a tooling head (45) provided with a gripper means (47,48) which is applied to one surface of the blank (3,3');

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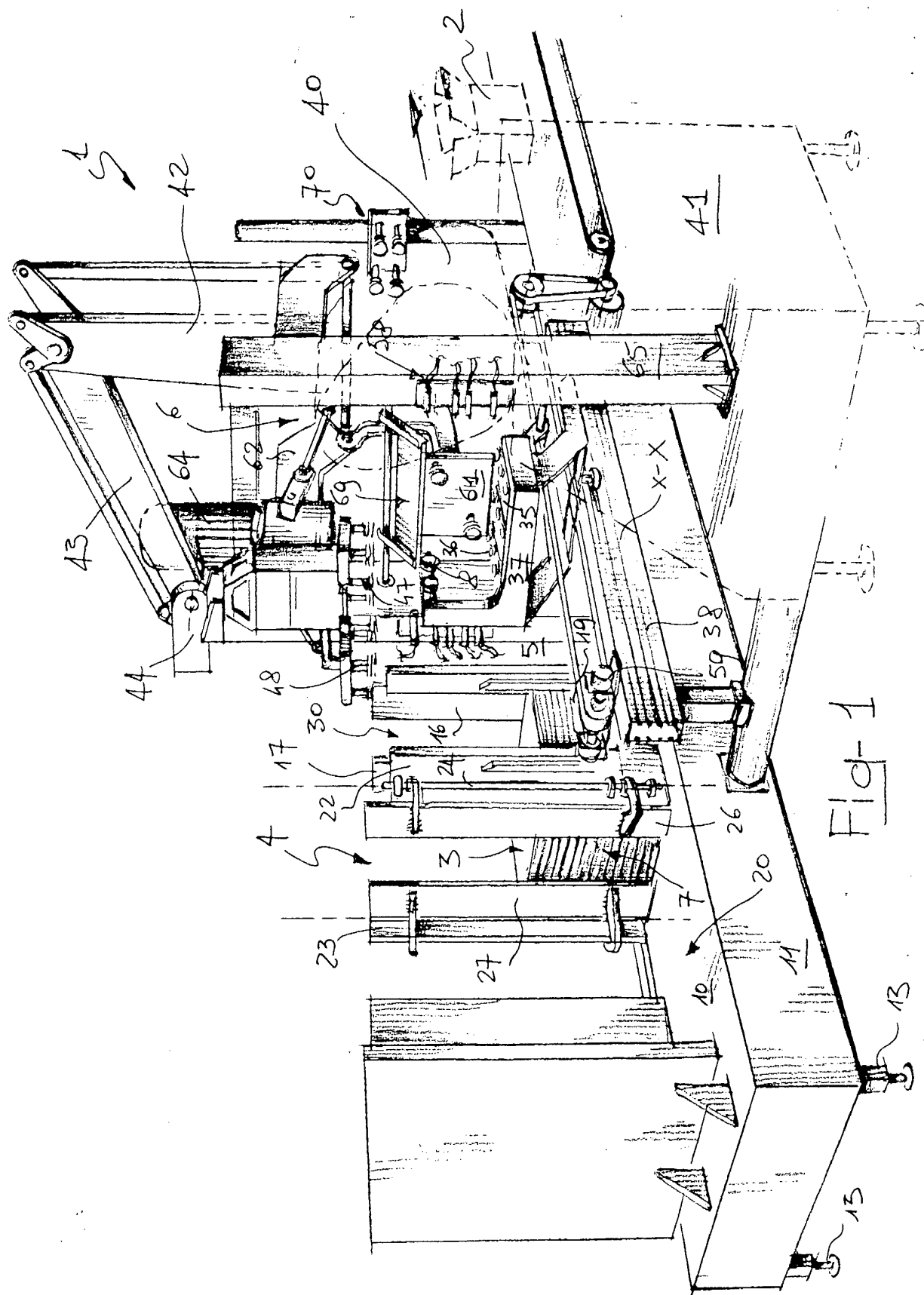
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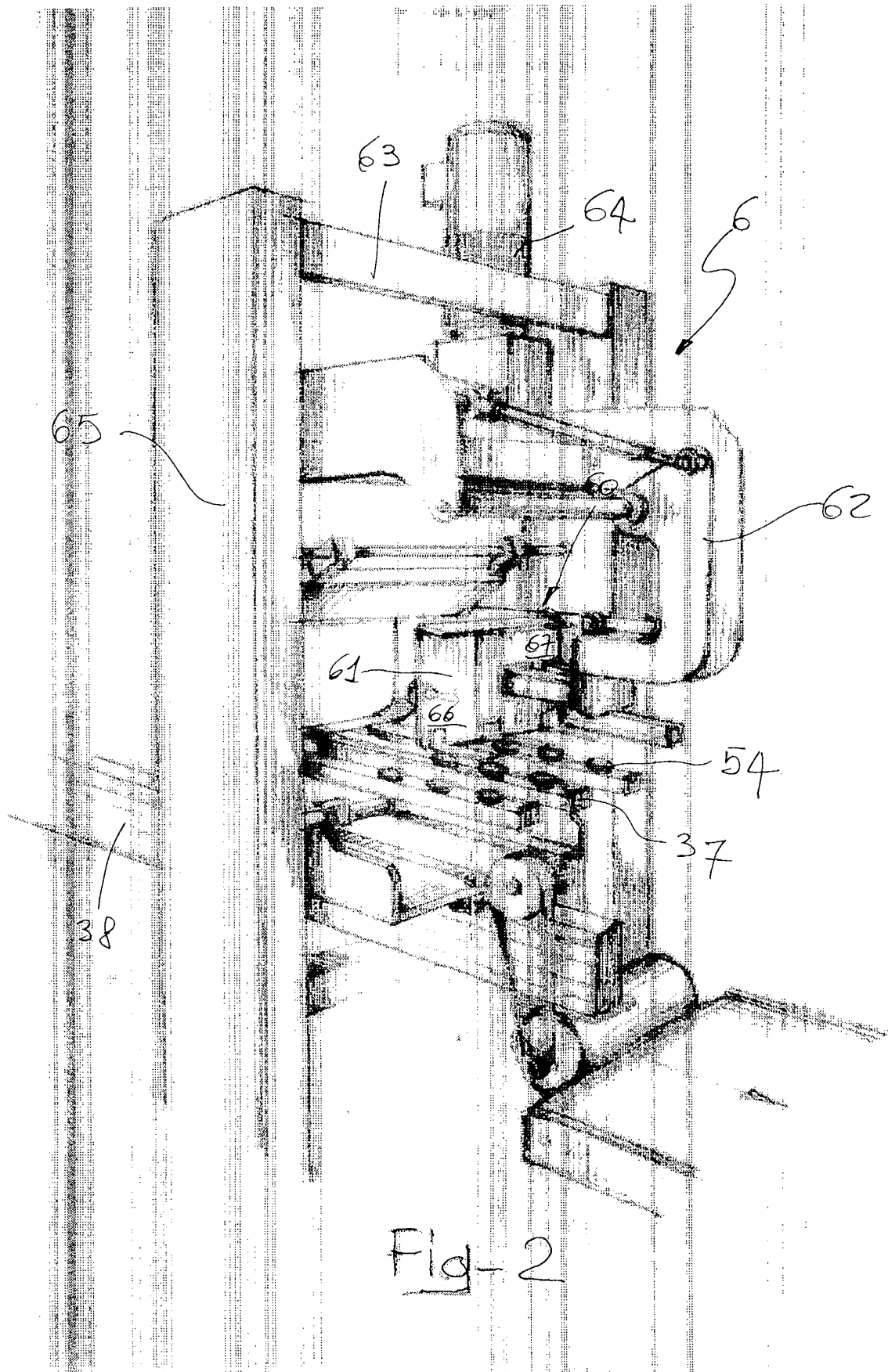
positioning the blank (3,3') on a supporting deck (35,55) equipped with a holding means

(36), and operating said means (36);

moving the tooling head (45) away from the supporting deck (35,55);

transferring the blank (3,3') to a pad (60) of a carton forming station (6) for forming the carton.





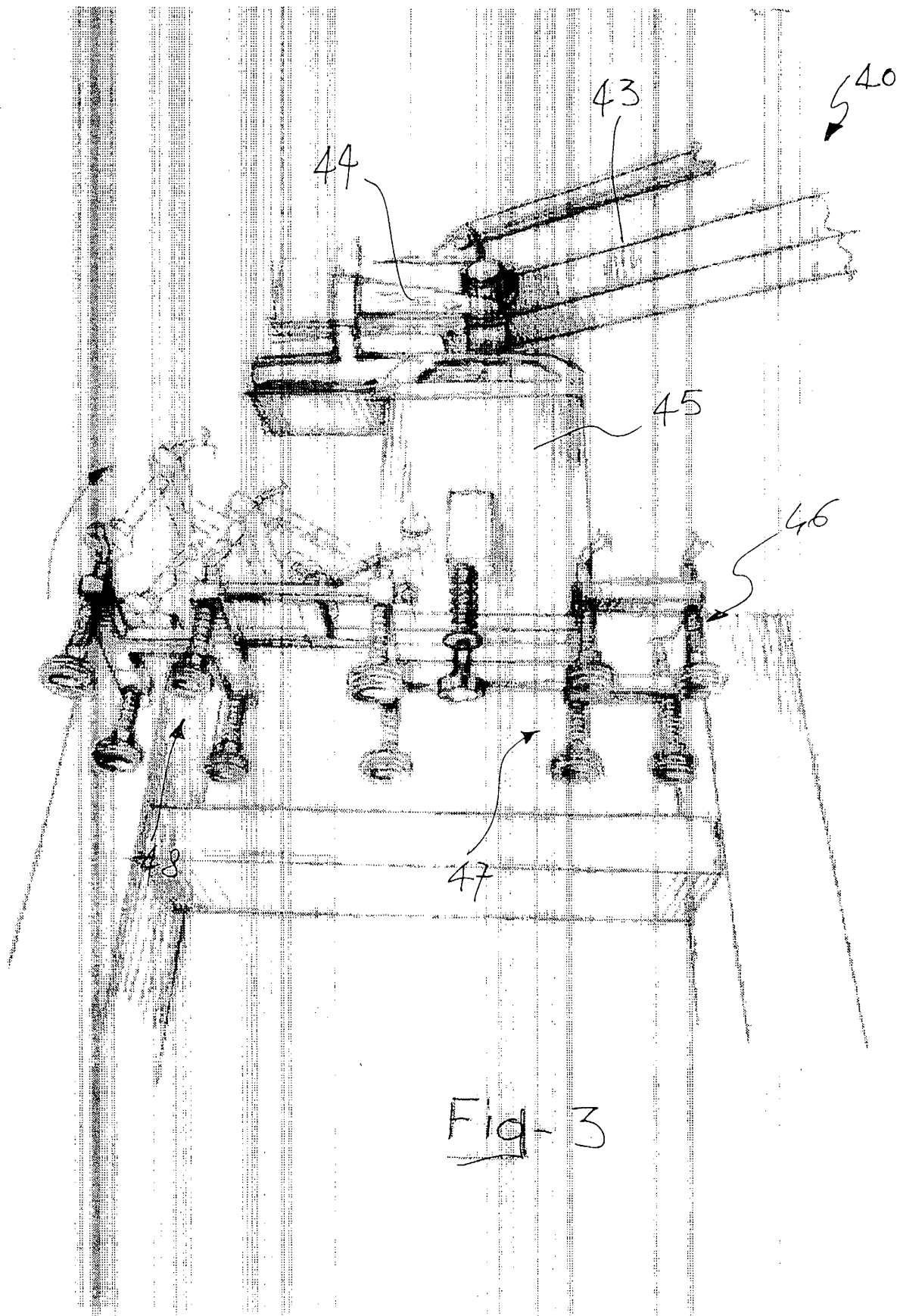


Fig- 3

FIG. 4

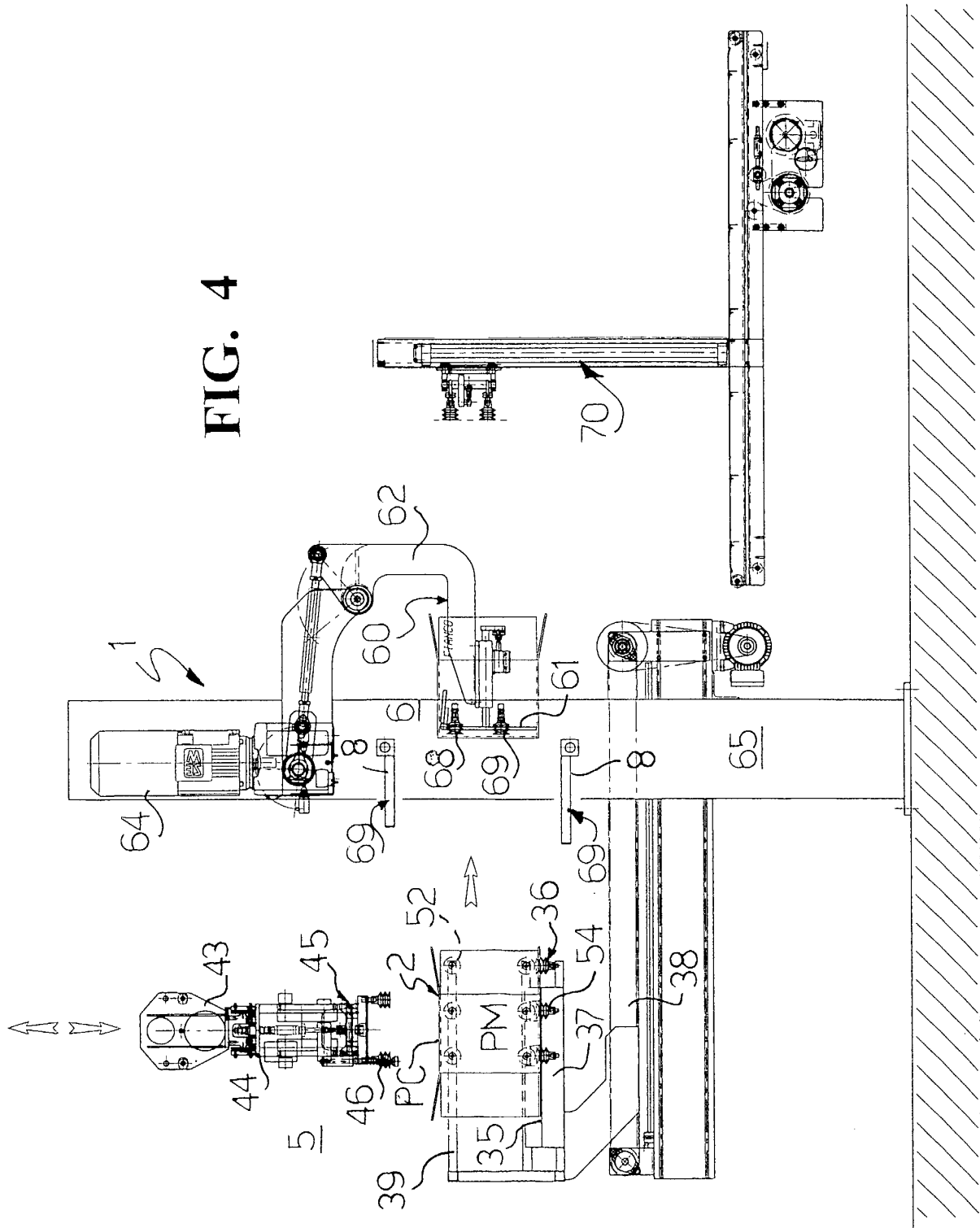


FIG. 5

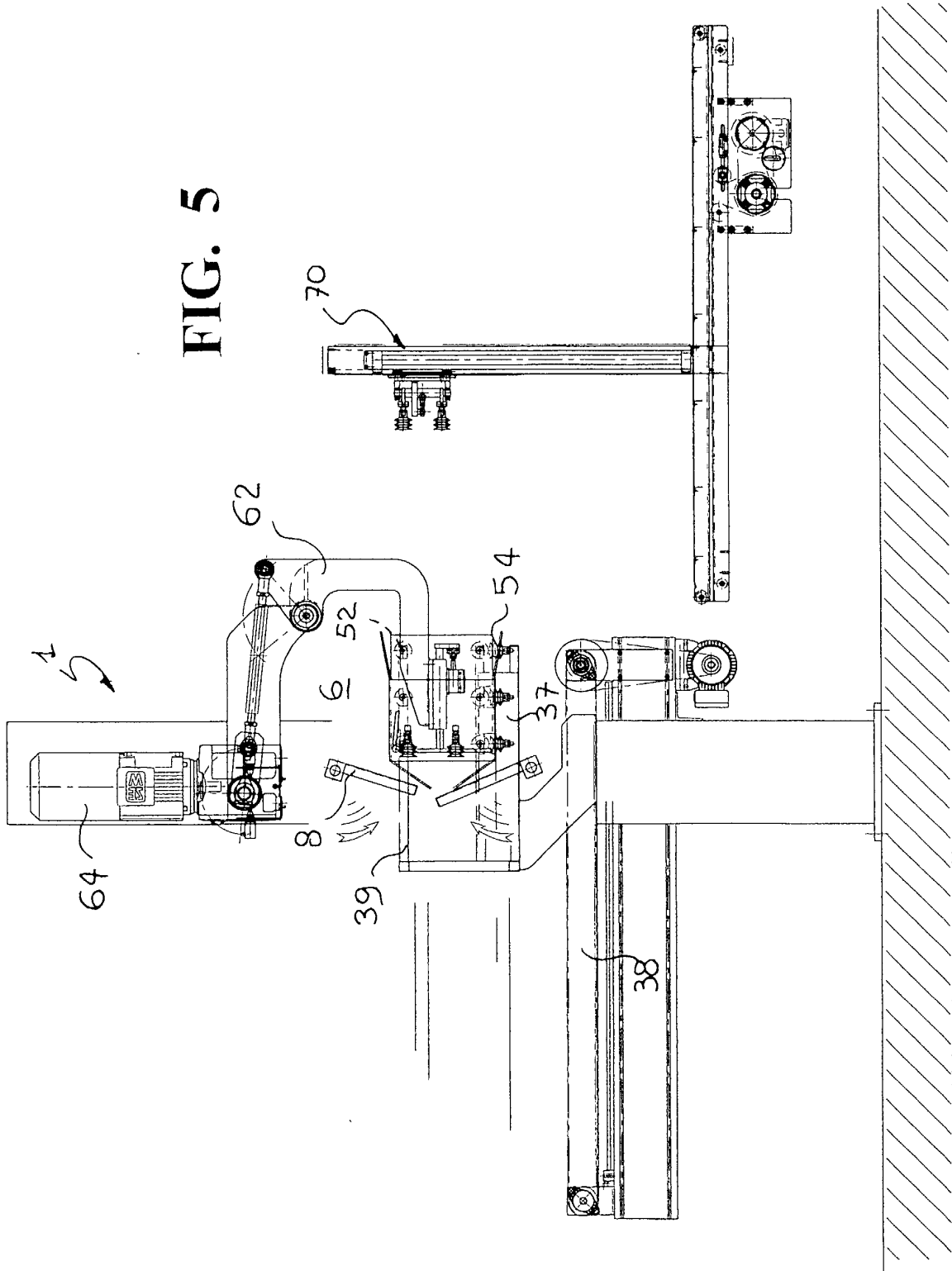
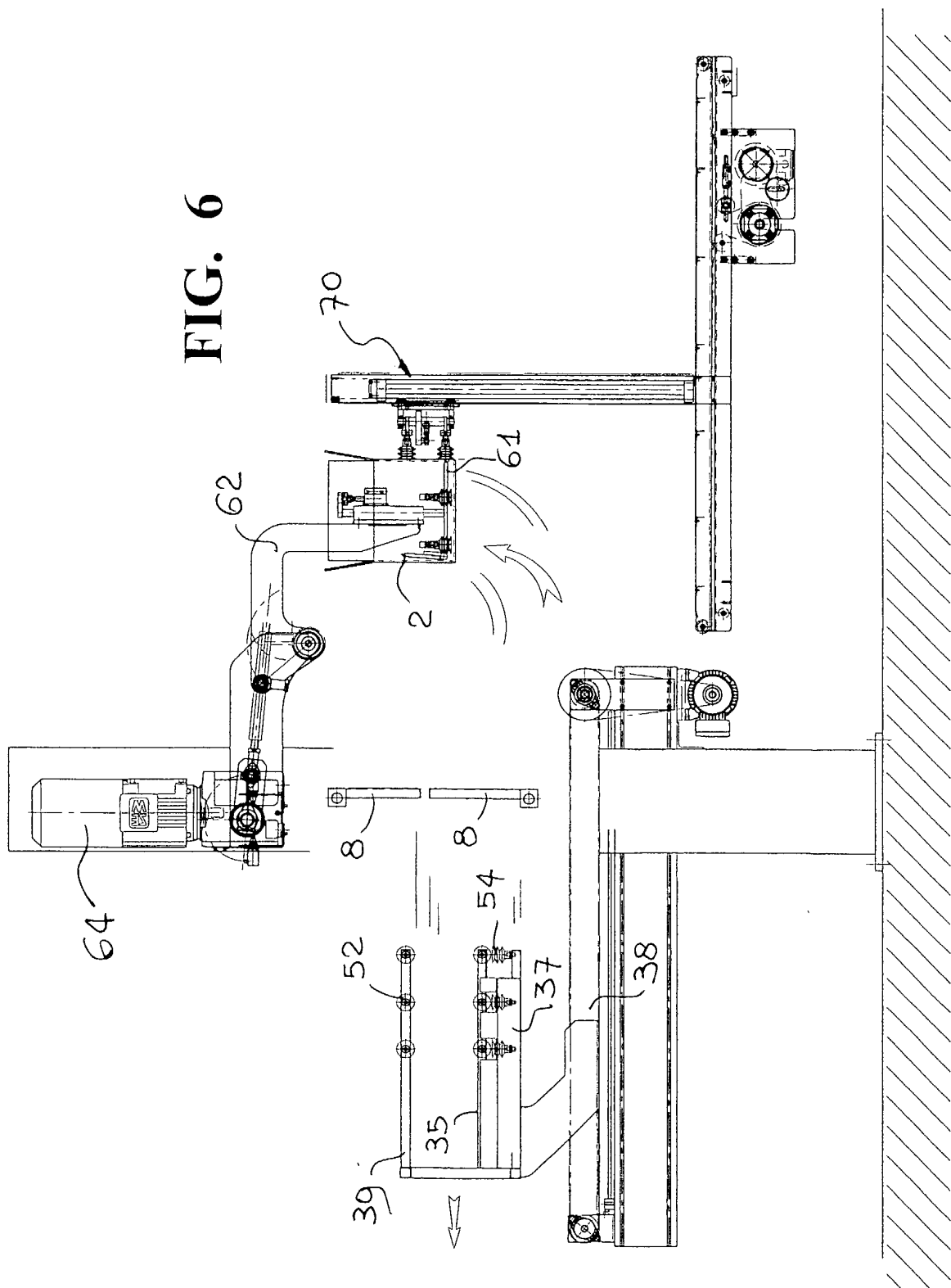
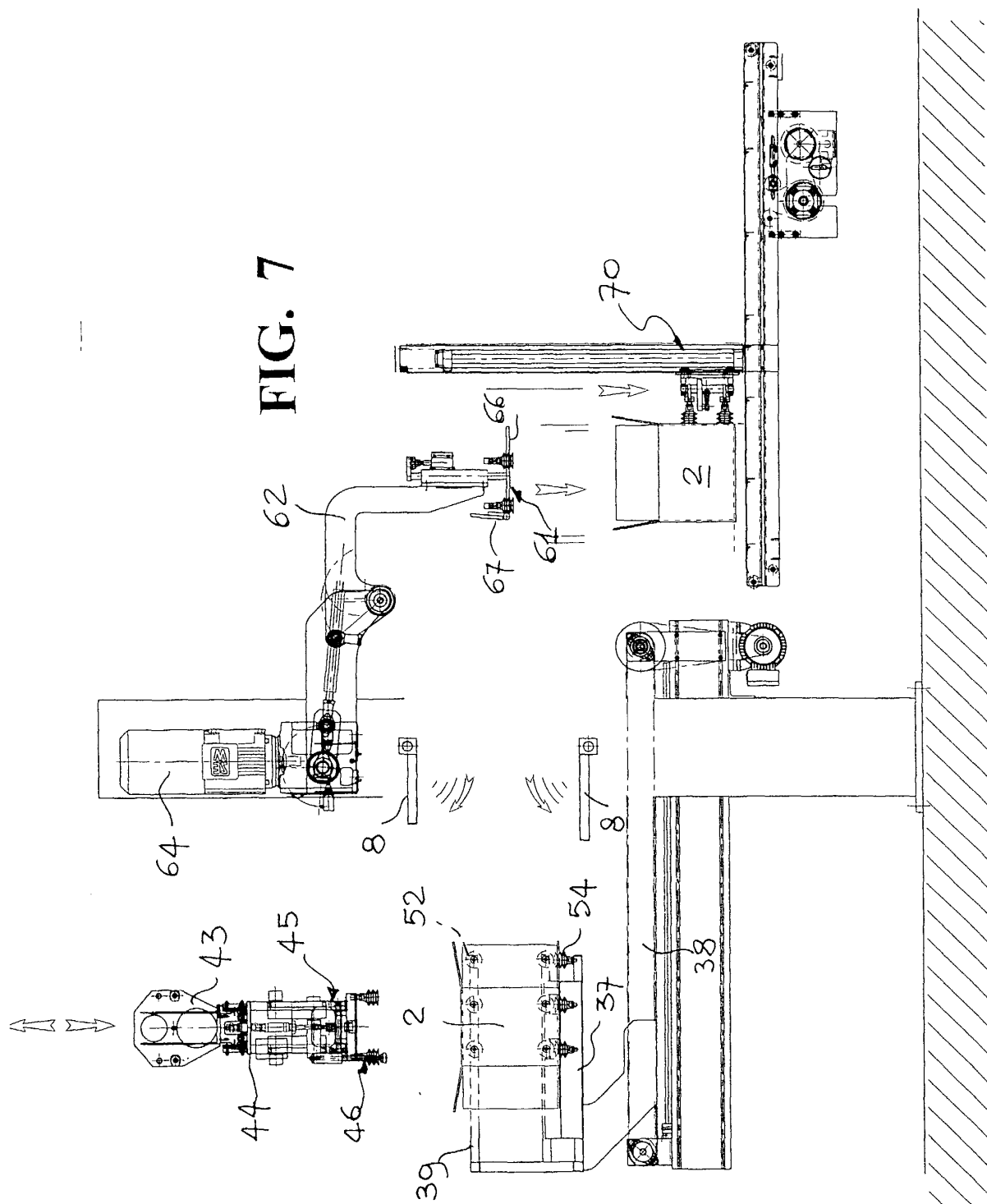
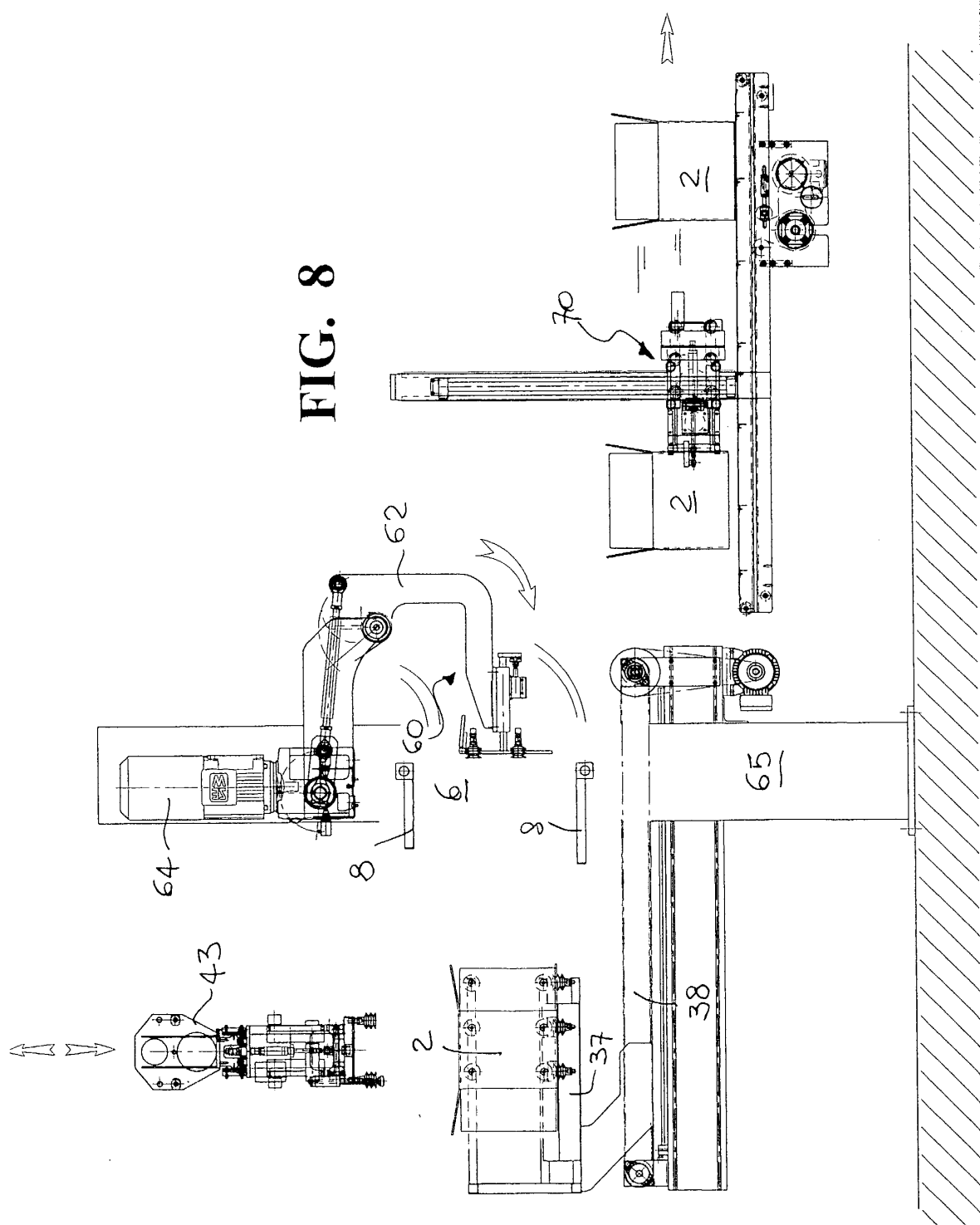
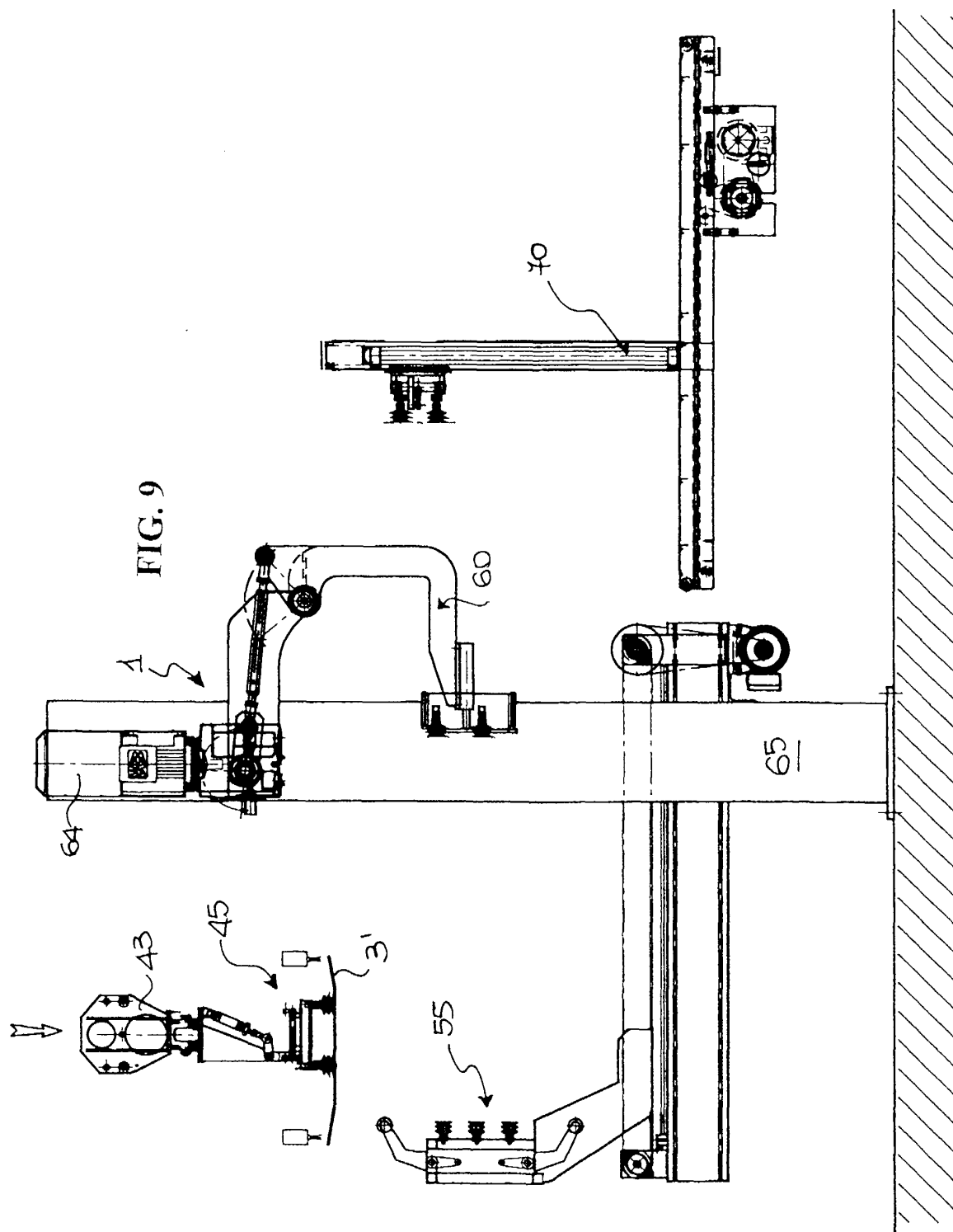


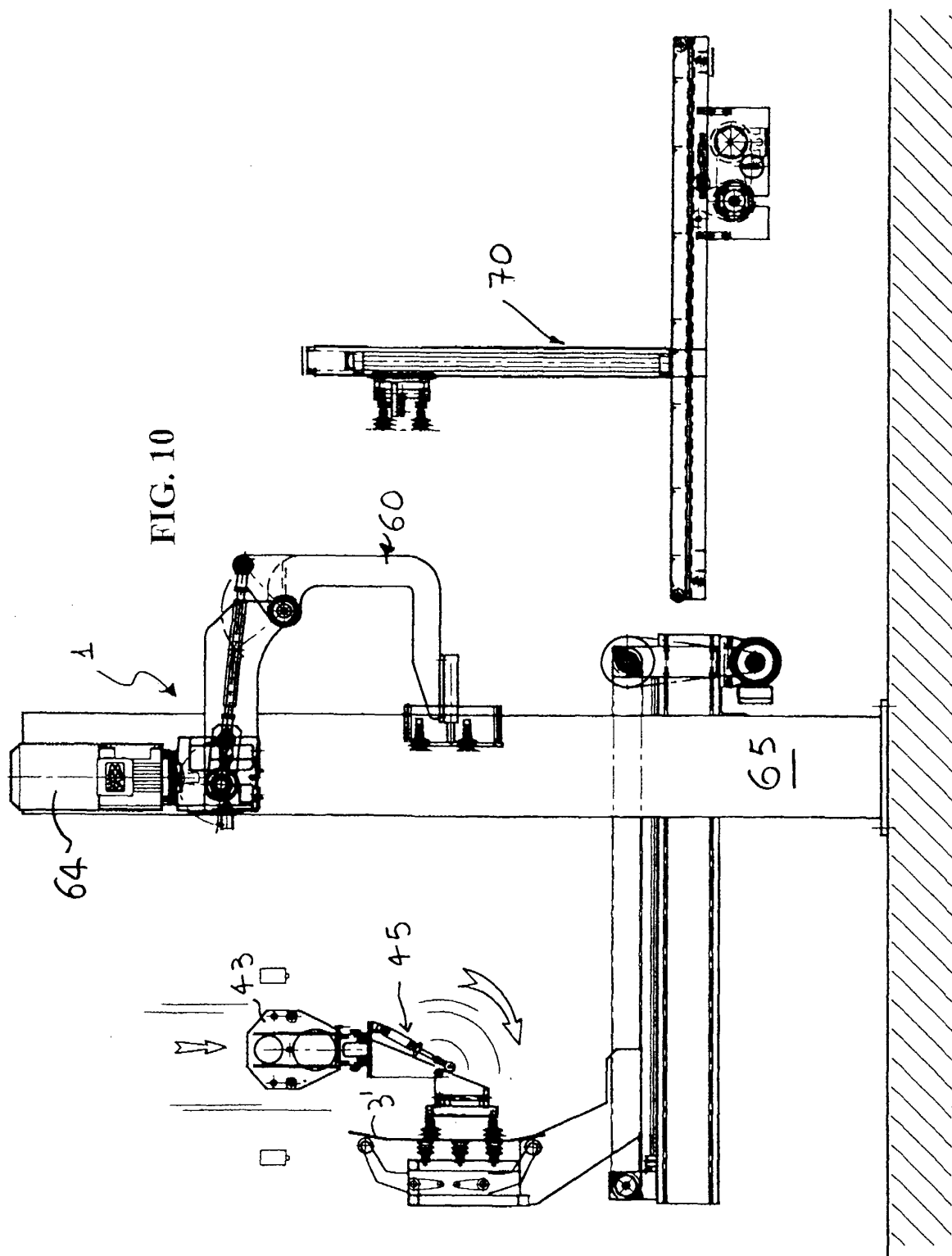
FIG. 6

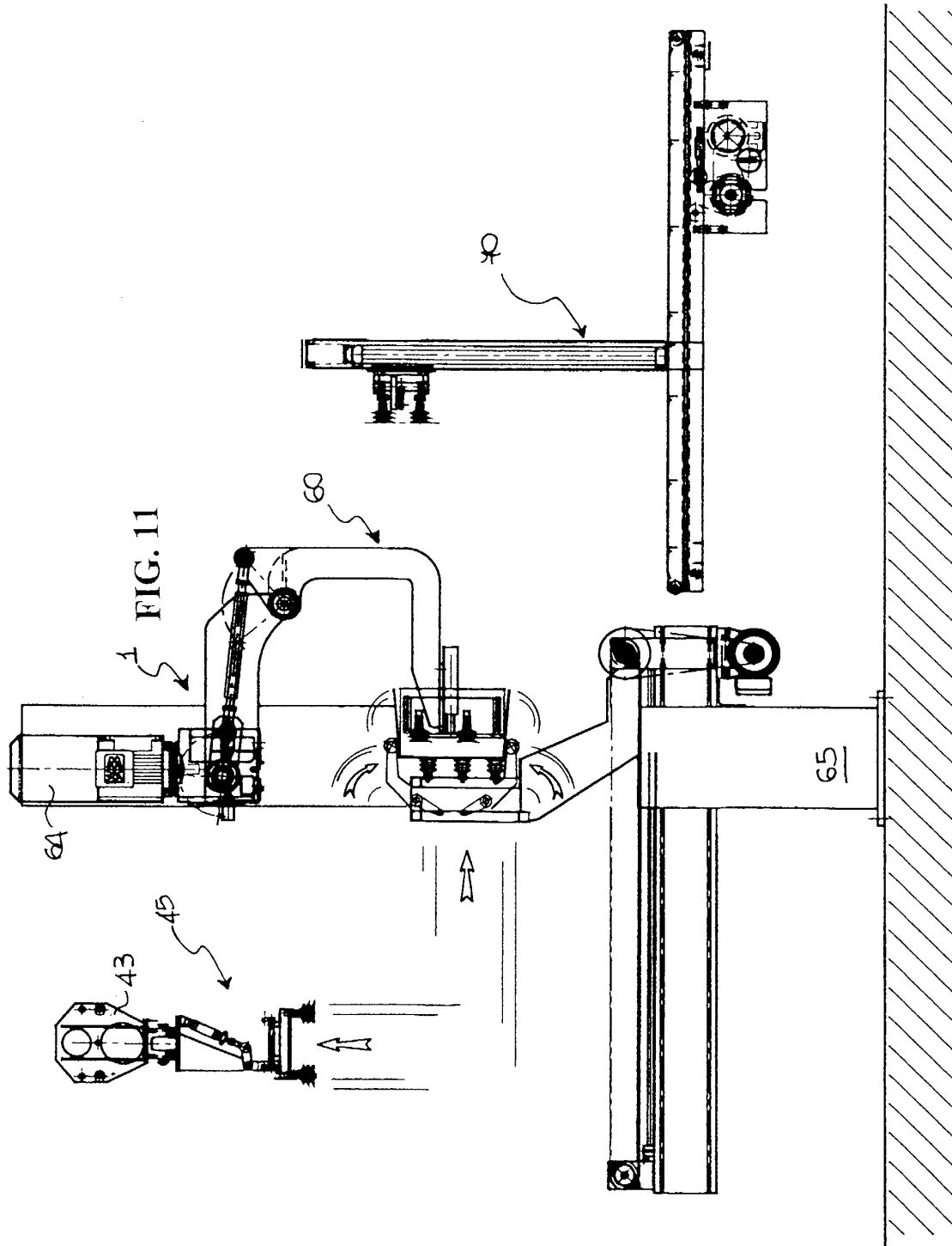


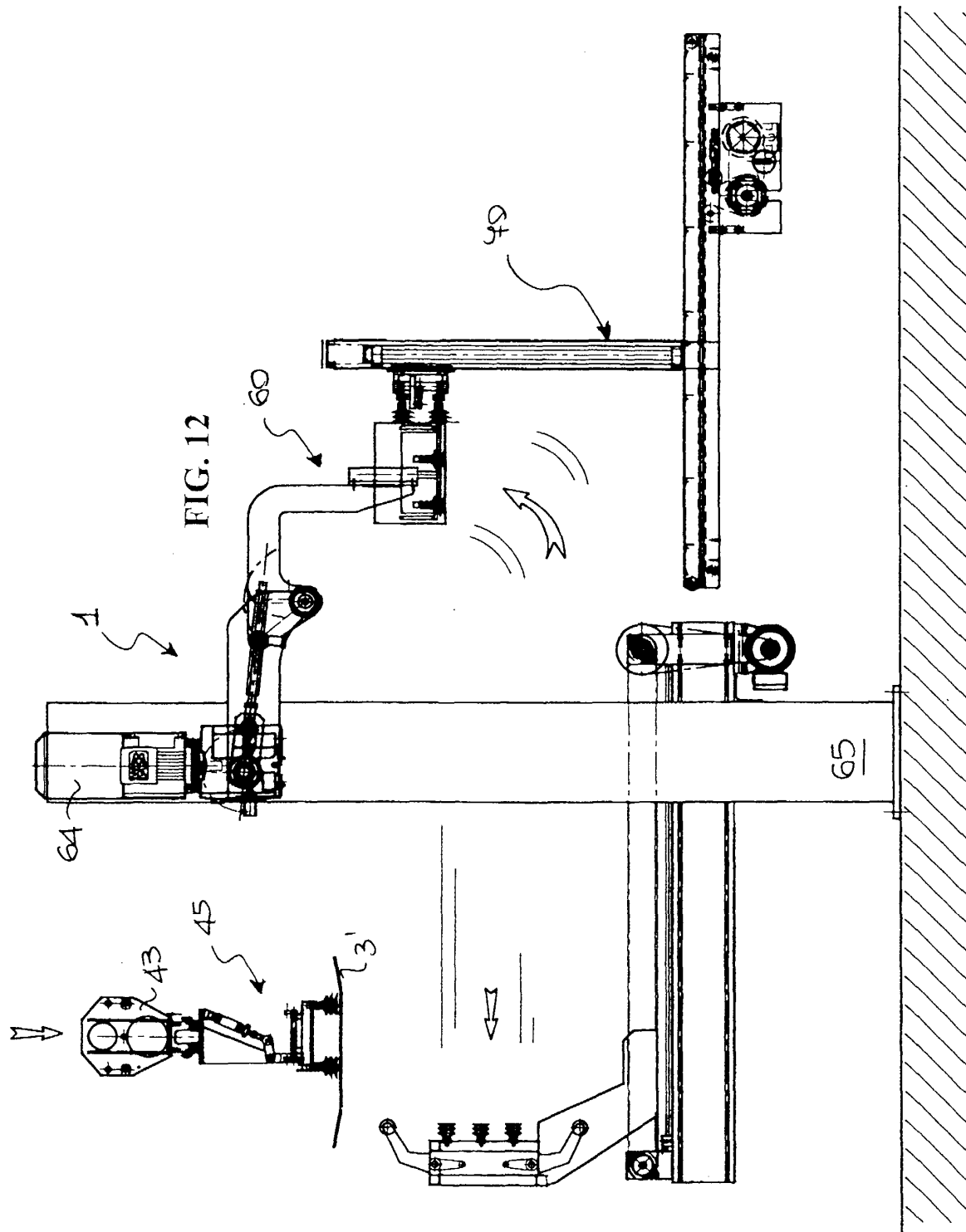


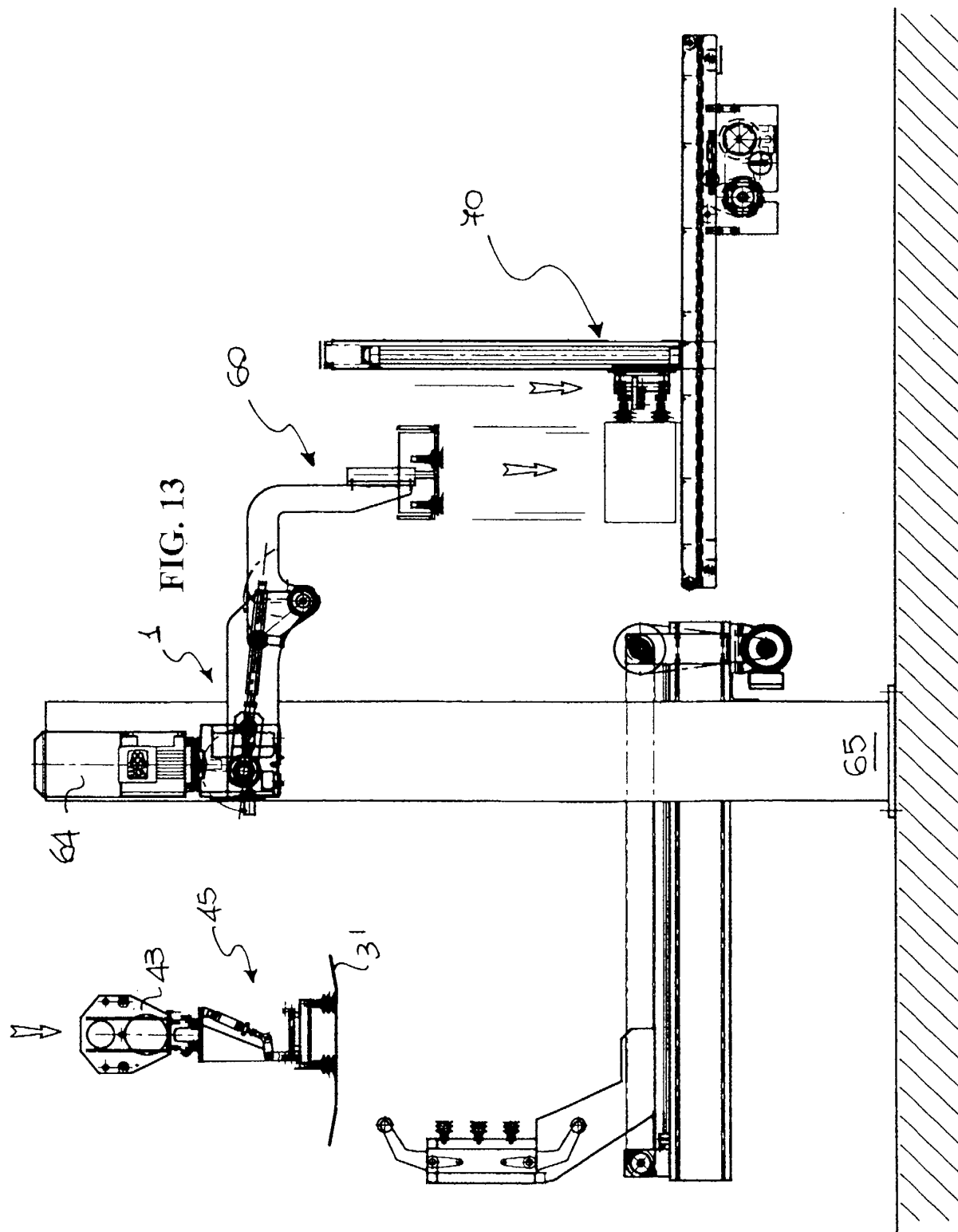


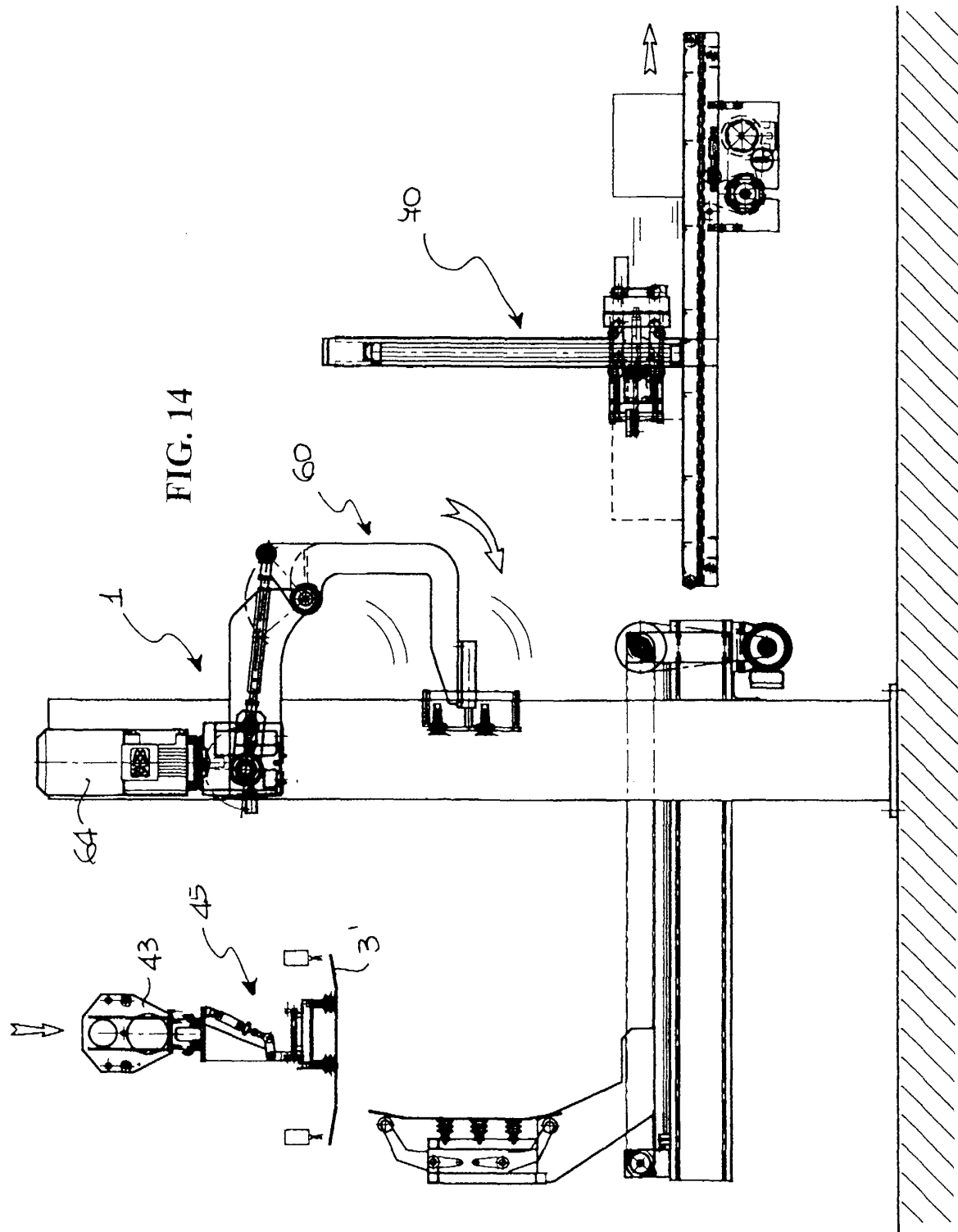














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Application Number
EP 99 83 0419

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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 21 January 2000	Examiner Pipping, L
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