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(54) **Device for manufacturing pallets**

(57) The invention relates to a method and a device for manufacturing pallets. The device has a first part (13), which has a conveyor path (19, 21) where a pallet deck is conveyed to a first fastening means in the form of a nailing portal. The conveyor path is arranged such that

the deck is conveyed with the plane of the deck inclined with respect to a vertical plane. Thus block feeding arrangements can be placed beside the device so as to be easily accessible.

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Description

Technical Field

[0001] The present invention relates to a device and a method for manufacturing pallets according to the preamble to claims 1 and 8, respectively.

Background of the Invention

[0002] Pallets, such as so-called EUR pallets, are made of wood and comprise, as seen from the upper side, a deck, a plurality of blocks and a plurality of legs.

[0003] Irrespective of whether the manufacturing is performed manually or automatically, the manufacturing method comprises nailing of the blocks to the deck from the side which will become the upper side of the finished pallet, and nailing of the legs to the blocks from the corresponding underside.

[0004] If the manufacturing is performed manually, a plurality of blocks are placed in a fixture. The deck is arranged over the blocks and fastened with nails. After this, the pallet is turned upside down, so that the blocks are on top. Legs are placed over the blocks and fastened with nails so as to obtain a finished pallet.

[0005] One drawback of a manual manufacturing method is that it is time-consuming and hard work. Therefore, when manufacturing large series, use is made of automatic pallet nailing devices.

[0006] Automatic pallet nailing devices usually function in more or less the same manner as the above-described manual method, and devices capable of manufacturing hundreds of pallets per hour are available on the market.

[0007] One problem of prior-art automatic solutions is that they are in most cases very complex and thus expensive, which of course also affects the cost of the finished pallets. Furthermore, the complexity often results in stoppage of production and great need for maintenance.

Summary of the Invention

[0008] Therefore one object of the present invention is to provide a method for manufacturing pallets and a corresponding device which is less complex.

[0009] This object is achieved by a device and a method for manufacturing pallets according to claims 1 and 8, respectively.

[0010] More specifically, claim 1 relates to a device for manufacturing pallets, which comprises a first fastening means for nailing blocks under a pallet deck in a first direction, from the upper side of the pallet deck, and a second fastening means for nailing legs under the blocks in a second direction, which is substantially opposite the first direction. The device is characterised by a first path which is arranged to support and convey the pallet deck to the first fastening means in such manner that the plane

of the pallet deck is inclined with respect to a vertical plane. The device has a tilting means, which is arranged to tilt thereafter the pallet deck, with blocks fastened thereunder, about its lower edge, so that the plane of the deck passes through said vertical plane, and a second path which is arranged to receive, support and convey the pallet deck and the blocks fastened to the pallet deck from the tilting means to the second fastening means. As the first path is inclined instead of horizontal, block feeding arrangements can be placed beside the device instead of under the same, which simplifies the device.

[0011] The first path can be arranged such that the plane of the pallet deck is inclined between 15° and 50° with respect to the vertical plane. Preferably, the plane of the pallet deck is inclined about 30° with respect to the vertical plane.

[0012] The second path can also be arranged such that the pallet deck, with blocks fastened thereto, is supported and conveyed with the plane of the pallet deck inclined with respect to the vertical plane, for instance at the same angle with respect to the vertical plane as the first path.

[0013] The device can have block feeding paths, which are adapted to feed blocks in a first and a second feeding direction, the second feeding direction being parallel with the direction in which the pallet deck is conveyed.

[0014] The first path can comprise a first and a second beam, the mutual distance of which can be adjustable.

[0015] A substantially corresponding method for manufacturing pallets can comprise the following steps: conveying a pallet deck in a first path, which is inclined with respect to a vertical plane, nailing blocks under the pallet deck, the pallet deck still being inclined with respect to said vertical plane, tilting the pallet deck with blocks fastened thereunder about the lower edge of the deck, so as to pass the pallet deck through said vertical plane and place it in a second path, conveying the pallet deck with blocks fastened thereunder in said second path, and nailing legs under the blocks.

Description of Figures

[0016]

Fig. 1 shows a pallet of a common type.

Fig. 2 shows a nailing portal in a first part of a device for manufacturing pallets.

Figs 3a-3d illustrate a method for feeding and nailing blocks.

Fig. 4 is a perspective view of a device for manufacturing pallets.

Description of Preferred Embodiments

[0017] Fig. 1 is a perspective view of a pallet 1 of a common type, as seen from above. As shown in the Figure, the pallet comprises four layers. On top there is a plurality of parallel deck boards 3, six in the shown ex-

ample. The deck boards 3 are fastened to three stringers 5, which extend perpendicularly to the deck boards. The deck boards and the stringers together form the deck 7 of the pallet.

[0018] Under the deck 7, a plurality of blocks 9 are fastened. In the shown example, there are three blocks under each stringer: one at each end and one in the centre. Under the blocks, three legs 11 in the form of boards are fastened, which extend parallel with the deck boards 3.

[0019] The space between the blocks and the legs allows the pallet and a load placed thereon to be lifted by means of a pallet lift or fork lift truck. If desired, the pallet can be provided with pallet collars in conventional manner. The pallet can be entirely made of wood, for instance spruce wood, which is nailed with hot-galvanized nails in a manner known per se. It is also possible to use, for instance, blocks of plastic.

[0020] The pallet manufacturing device and the method for manufacturing pallets described hereinafter can be applied to several types of pallets, which are more or less different from the pallet described above. The number of deck boards can, for instance, vary as well as the number of stringers, blocks and legs. The deck boards can be fastened to the stringers in various positions. The blocks can be placed in various positions on the stringers and the legs can extend perpendicularly to the deck boards. Other variations are also feasible and the dimensions can vary a great deal. The device and the method for manufacturing pallets can, for instance, be used for manufacturing standardised so-called EUR pallets.

[0021] When manufacturing a pallet of the above-described type, the deck is first made. Subsequently, the blocks are nailed to the deck from the upper side of the pallet. Finally, the legs are nailed to the blocks from the underside of the pallet.

[0022] Fig. 4 is a perspective view of a pallet manufacturing device. The device is essentially composed of three major parts: a first part 13 in which blocks are fastened to an already finished deck, a second part or tilting section 15 and a third part 17 in which legs are fastened under the blocks so as to provide a finished pallet.

[0023] In principle, feeding of material to such a device and removal of finished pallets can be performed manually. But the device is well suited to be integrated in a larger system including additional devices. The device can thus cooperate with a block saw, which produces blocks and feed them to the device, a deck device, which produces decks and places them in the device, an arrangement which produces legs and feed them to the device, and a pallet stacker, which removes the finished pallet. Such additional devices are already known per se and are thus not described in more detail.

[0024] First, a description is made of the first part 13 of the device. It comprises a first 19 and a second 21 horizontal beam, which together form a first path, which is adapted to convey a pallet deck. Each beam has a

support plate 23 (visible only on the lower beam 19), which is fastened at its back edge, so that the pallet deck can be supported between the beams 19 and 21. A corresponding support plate thus extends downwardly from the beam 21. A chain, driven by an electric motor 27 and 29, respectively, runs in each of the horizontal beams. To these chains, dogs 25 are fastened. When a pallet deck 33 is positioned in the first path and the motors 27, 29 are driven, the pallet deck is conveyed to the fastening means 35 of the first part 13. The deck is now supported by the beams 19 and 21 and their associated support plates 23.

[0025] The path formed by the first 19 and the second 21 horizontal beam is inclined with respect to a vertical plane, and thus also with respect to a horizontal floor plane. As seen, this is achieved by the beams being fastened to an inclined part of a column 31. Thus, in the shown embodiment, the plane of a positioned deck is inclined 30° with respect to a vertical plane (i.e. forms this angle with the vertical plane) and 60° with respect to the floor.

[0026] There are several advantages of an inclined path. First, feeding arrangements, such as conveyor belts, which provide the fastening means 35 of the first part 13 with blocks, can be positioned beside the device instead of under the same, which would be the case in a device with a horizontal pallet path in which the nails are attached from the upper side. This results in a much simpler device in which it is much easier to have access to the block feeding functions, for instance in connection with maintenance work. Moreover, the pallet deck obtains a given reference line in the form of its lower edge, which is supported by the beam 19 and its support plate 23.

[0027] The plane of the pallet deck preferably forms an angle of between 15° and 50° with the vertical plane (corresponding to 40°-75° with respect to the floor). If the path is more horizontal than this, some of the above-mentioned advantages of easy access are lost. A more vertical path may imply a risk of the pallet deck falling out of the path during transport. An inclination of 30° with respect to the vertical plane is considered as particularly suitable (60° with respect to the floor).

[0028] The position of the upper horizontal beam 21 relative to the column 31 can be movable, so that the pallet nailing device can be adjustable for production of various types of pallets with different dimensions. This makes it possible to achieve profitable production of small series of, for instance, special pallets.

[0029] The fastening means 35 of the first part 13 includes a nailing portal with three hydraulic nail driving tools, one for each stringer of the pallet deck 33. Corresponding to the three nail driving tools, there are three block feeding arrangements, which convey blocks, in an L-shaped path, which are to be nailed under the pallet deck, as will be described in more detail below.

[0030] A deck is placed in the pallet path and conveyed in the above-described inclined position until the front

edge of the deck reaches the position of the nail driving tools. At the same time, three blocks are conveyed, one in each block feeding arrangement, to a position under the stringers of the deck. Subsequently, the nail driving tools fasten the blocks under the stringers, for instance, by means of two nails for each block. The deck is then conveyed a bit further until its centre position reaches the nail driving tools. Simultaneously, three more blocks are conveyed, which are fastened in a similar manner under the deck. This is repeated a third time, so that three more blocks are fastened under the stringers also at the back edge of the deck. Subsequently, the deck is pushed out to the second part of the device, the tilting section 15.

[0031] The tilting section 15 (see also Fig. 2) can have a very simple construction, such as two panels which are joined together so as to present an L-shape in cross-section. They are articulated so that they can be tilted forward, as illustrated by Fig. 4. This motion can easily be provided by a pneumatic or hydraulic piston. In this motion, the pallet deck with the nailed blocks is tilted from the tilting section 15 to end up in a second path 37, 39 belonging to the third part 17 of the device for further transport. When tilted, the pallet deck rotates about its lower edge and passes through a vertical plane, so that the blocks are now on top of the deck. Owing to this, the blocks are exposed so that they can be provided with legs.

[0032] The third part 17 of the device can include a path which is arranged in a manner similar to that of the first part of the device. Also this path can thus comprise a first 37 and a second 39 horizontal beam, which have support plates and motor-driven chains which drive dogs. Also this path can be inclined with respect to the above-mentioned vertical plane, but at the other side of the vertical plane. In the shown example, the paths of both the first and the third part are inclined at an angle of 60° with respect to the floor, and the angle between the paths is 60°. Seen in the transport direction of the deck, the paths of the first and the third part thus form a V.

[0033] The path 37, 39 of the third part 17 of the device supports and conveys the deck now turned upside down (the blocks are on top) to a second fastening means in the form of a nailing portal 40 in which legs are fastened under the blocks in a manner known per se.

[0034] Nails can be fed from nail boxes to both the first and the second nailing portal 35, 40 by means of pressurised air which blows nails through hoses.

[0035] Fig. 2 shows a nailing portal in the first part 13 of the device for manufacturing pallets. The Figure shows three L-shaped block paths 41, 43 and 45, which are used to simultaneously feed three blocks which are to be fastened at three different vertical levels under the pallet deck. Normally, this is performed three times per pallet so that nine blocks in total are fastened under the pallet deck. Preferably, the vertical levels of the two upper block paths 43, 45 and the corresponding nail driving tools are adjustable, so that the device can be adjusted for manufacturing different types of pallets. It is, however, also

possible to have fixed block paths.

[0036] In the block paths, the blocks are first moved in a first feeding direction towards the pallet deck and then in a second feeding direction, which coincides with the direction of the pallet deck, and thus describe an L-shaped motion in which the L is placed in a horizontal plane.

[0037] Figs 3a-3d illustrate a method for feeding and nailing blocks in the middle block path 43 of Fig. 2. So as not to block the view of the feeding arrangement, the pallet deck is not shown in Figs 3a-3c, but only in Fig. 3d. Fig. 3a shows how a block 47 is conveyed to the path of the pallet deck by a first sliding piston 49. As the block 47 reaches the path of the pallet deck, as shown in Fig. 3b, a pallet deck is placed with a stringer in a corresponding position, so that the block is clamped between the sliding piston 49 and the stringer. Simultaneously, a stopping means 51 is extracted at the far end of the block path.

[0038] In Fig. 3c, the block is conveyed in the second feeding direction by a second piston 53. The block slides off the first piston 49 to be supported instead by a support plate 55. At the same time, the pallet deck is conveyed by dogs in the pallet path (cf. 25 in Fig. 4), so that the block 47 is clamped between the pallet deck and the support plate 55. The block is slidably conveyed in the second feeding direction all the way to the stopping means 51. In this position, the block is fastened under the pallet deck by means of a hydraulic nail driving tool 57 in the nailing portal. After this, the stopping means 51 is retracted.

[0039] When all blocks are fastened under the pallet deck, it is conveyed to the tilting section. This can be achieved by one of the pistons that move blocks in the second feeding direction, for instance, by means of the piston 59, which has a particularly long stroke length, as shown in Fig. 2.

[0040] The invention is not limited to the above-described embodiment but can be varied within the scope of the appended claims.

[0041] For example, the path 37, 39 of the third part can convey the pallet deck with the plane of the pallet deck in horizontal position, since the legs are attached to the blocks from the upper side.

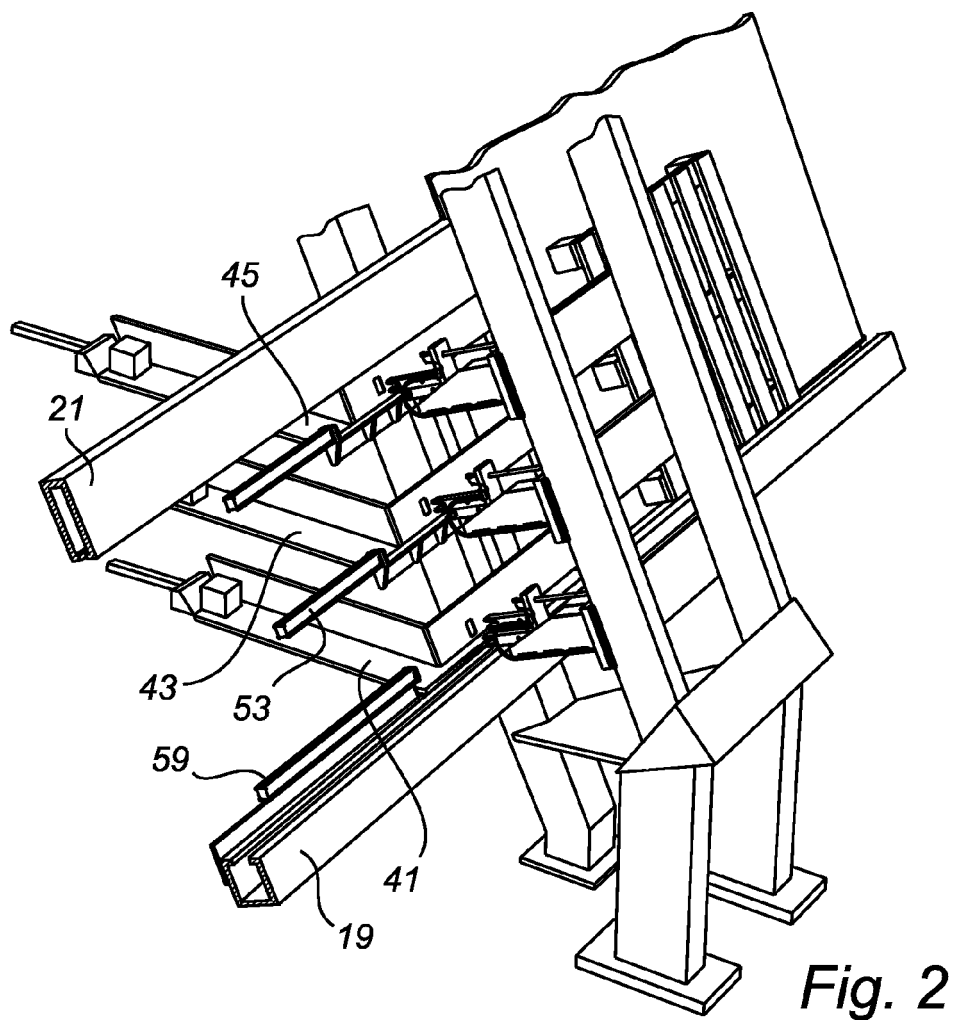
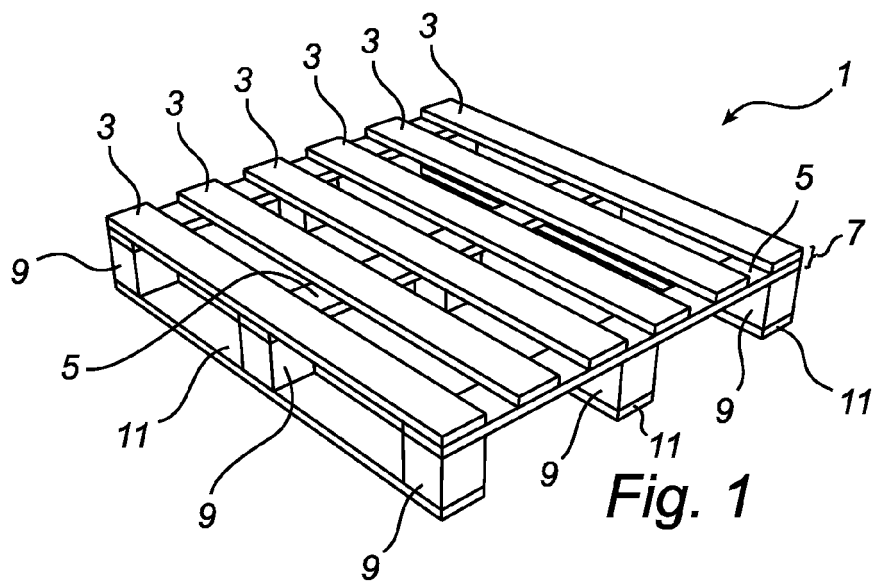
Claims

1. A device for manufacturing pallets, which comprises a first fastening means (35) for nailing blocks under a pallet deck (33) in a first direction, from the upper side of the pallet deck, and a second fastening means (40) for nailing legs under the blocks in a second direction, which is substantially opposite the first direction, **characterised by** a first path (19, 21) which is arranged to support and convey the pallet deck to said first fastening means in such manner that the plane of the pallet deck is inclined with respect to a vertical plane, the first fastening means

being adapted to fasten blocks under the pallet deck, a tilting means (15) which is arranged to tilt thereafter the pallet deck, with blocks fastened thereunder, about its lower edge, so that the plane of the deck passes through said vertical plane, and a second path (37, 39) which is arranged to receive, support and convey the pallet deck and the blocks fastened to the pallet deck from the tilting means to said second fastening means (40), the second fastening means being adapted to fasten legs to the blocks. 5 10

2. A device as claimed in claim 1, in which the first path is arranged such that the plane of the pallet deck is inclined between 15° and 50° with respect to the vertical plane. 15
3. A device as claimed in claim 2, in which the first path is arranged such that the plane of the pallet deck is inclined 30° with respect to the vertical plane. 20
4. A device as claimed in any one of claims 1-3, in which also said second path is arranged such that the pallet deck, with blocks fastened thereto, is supported and conveyed with the plane of the pallet deck inclined with respect to said vertical plane. 25
5. A device as claimed in claim 4, in which the first and second paths are arranged so as to support and convey the pallet deck with the plane of the pallet deck at the same angle with respect to said vertical plane and at each side of the same. 30
6. A device as claimed in any one of the preceding claims, in which block feeding paths (41, 43, 45) are arranged, which are adapted to feed blocks in a first and a second feeding direction, the second feeding direction being parallel with the direction in which the pallet deck is conveyed. 35
7. A device as claimed in any one of the preceding claims, in which said first path comprises a first (19) and a second (21) beam, the distance between the first and the second beam being adjustable. 40
8. A method for manufacturing pallets, 45
characterised by the following steps:
 - conveying a pallet deck in a first path, which is inclined with respect to a vertical plane,
 - nailing blocks under the pallet deck, the pallet deck still being inclined with respect to said vertical plane, 50
 - tilting the pallet deck with blocks fastened thereunder about the lower edge of the deck, so as to pass the pallet deck through said vertical plane and place it in a second path, 55
 - conveying the pallet deck with blocks fastened thereunder in said second path, and

- nailing legs under the blocks.



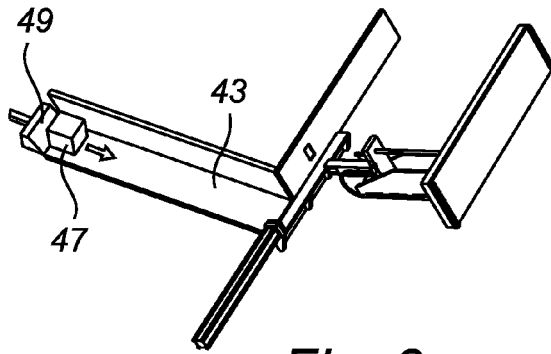


Fig. 3a

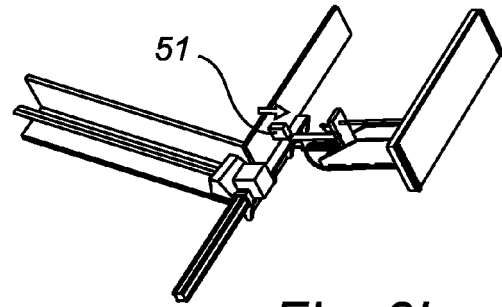


Fig. 3b

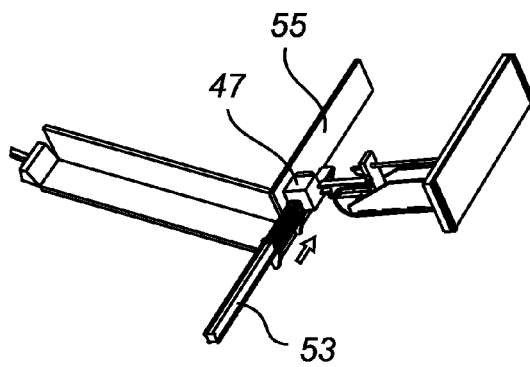


Fig. 3c

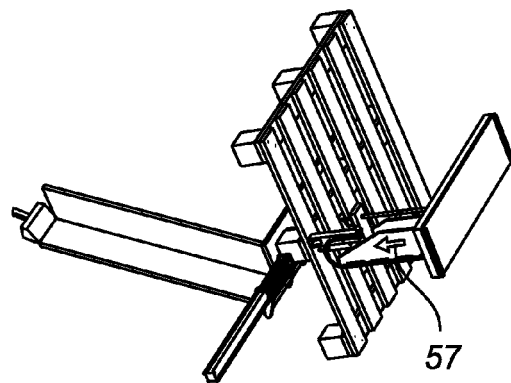


Fig. 3d

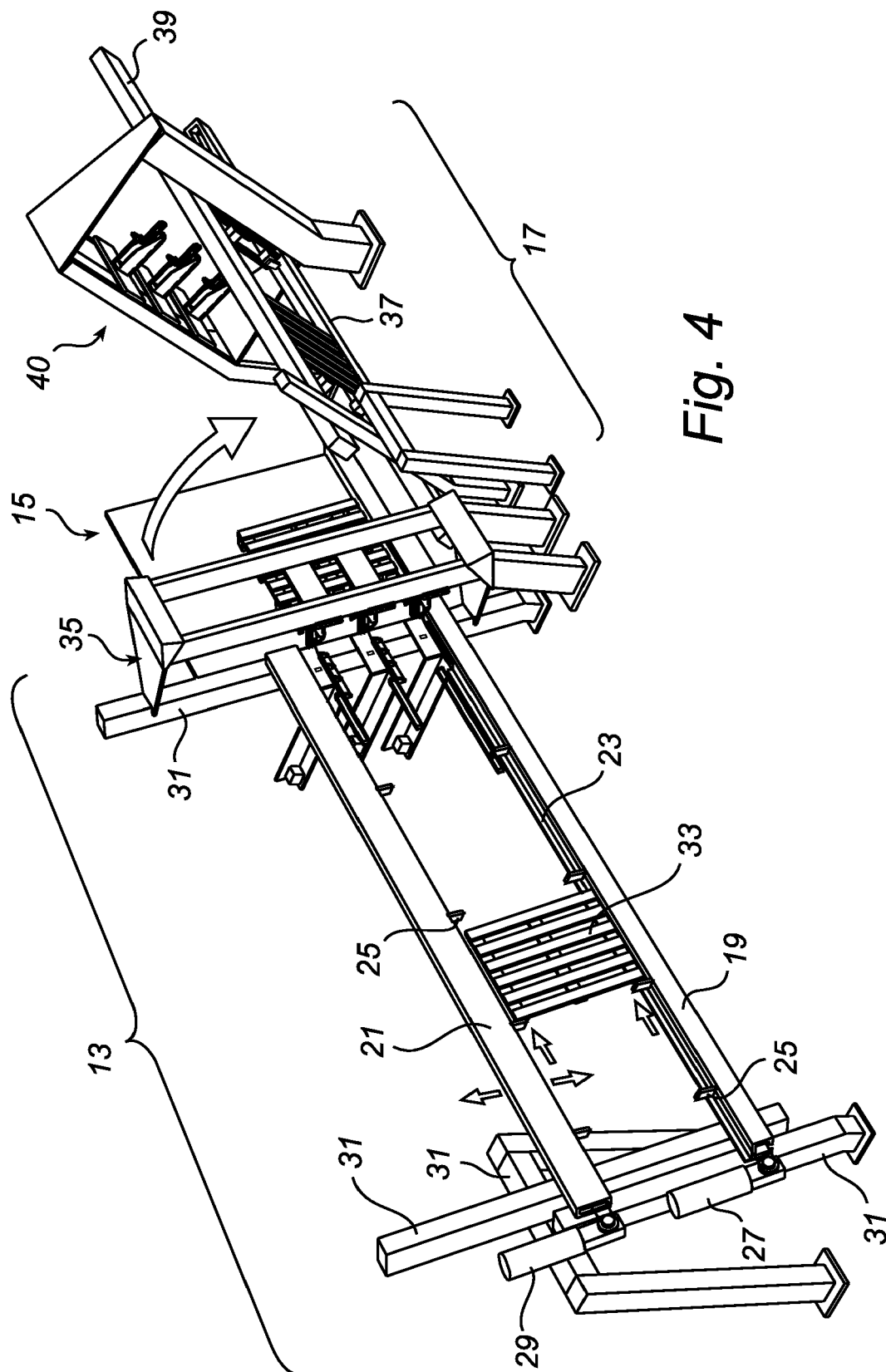


Fig. 4