



- (51) International Patent Classification:
A01D 46/24 (2006.01)
- (21) International Application Number:
PCT/NL2013/050514
- (22) International Filing Date:
8 July 2013 (08.07.2013)
- (25) Filing Language: Dutch
- (26) Publication Language: English
- (30) Priority Data:
2009177 12 July 2012 (12.07.2012) NL
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- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- without international search report and to be republished upon receipt of that report (Rule 48.2(g))



(54) Title: HARVEST TRANSPORT VEHICLE

(57) Abstract: The present invention relates to a harvest transport vehicle, comprising a frame displaceable in a longitudinal direction between rows of crops with products for harvesting, a first carrier of empty boxes, crates, containers and/or holders, which first carrier is arranged in, on or at the frame, and a second carrier of boxes, crates, containers and/or holders filled with harvested products, which second carrier is arranged in, on or at the frame, wherein the first carrier and the second carrier each comprise a conveyor for supplying empty boxes, crates, containers and/or holders over the first conveyor in the longitudinal direction of the frame to an end surface of the frame and for discharging boxes, crates, containers and/or holders filled with harvested products in substantially opposite direction over the second conveyor, and with a lifting mechanism. The invention also relates to loading/unloading stations.

HARVEST TRANSPORT VEHICLE

The present invention relates to a harvest transport vehicle, or harvest cart, also referred to as a harvest wagon.

5 The harvesting of all types of vegetable or other agricultural products usually takes place at present on the basis of harvest carts with tables as carriers on at least two levels or layers. Empty boxes, crates, containers and/or holders are placed on an upper layer and the filled boxes, crates, containers and/or

10 holders are set down on the lower layer. The harvest cart stands in the centre of a path, with for instance harvest-bearing crops on either side of such a path, and is displaceable in the path. In a first passage through the path between the harvest-bearing crops, for instance on the outward route, a worker harvests for

15 instance only agricultural products from the crops on one side of the cart. At the end of the path the picker goes and stands on the other side of the harvest cart and harvests products from the crops on an opposite side of the harvest cart. The harvest cart is not turned round when it has reached the end of a path;

20 only the direction of travel is reversed so that the harvest cart or harvest transport vehicle is displaced back to a point of departure. The harvest cart or harvest transport vehicle has a longitudinal direction in which, or opposite to which, the harvest transport vehicle is displaced through the path.

25 For the most efficient possible use of space in the open field or in a greenhouse the dimensions of paths between rows of crops will usually be kept as small as possible. For the picker this means that, following a period of harvesting, empty boxes, crates, containers and/or holders are at an increasingly greater

30 distance from the picker, and the picker often even has to step down from the harvest transport vehicle to take empty boxes, crates, containers and/or holders from the table or carrier while working his/her way through the crops and the harvest transport

vehicle. Although it is possible in some embodiments to stack the boxes, crates, containers and/or holders, such a measure provides only a temporary solution.

Another drawback of the known harvest transport vehicles is that the picker has to bend down (or lift up) in order to place the harvested agricultural products, usually vegetables, in the lower boxes. Pickers sometimes throw the vegetables from a distance into the boxes, crates, containers and/or holders for the sake of convenience, which may damage the vegetables. If a stack of boxes, crates, containers and/or holders is filled in a stackable design thereof with harvested products, such a stack has to be pushed away from the position where the picker is located, which is also difficult and time-consuming for the picker.

A further drawback is that the size of the greenhouse is in some cases limited in that boxes, crates, containers and/or holders filled with harvested products can be very heavy and a picker is only allowed or able to push a harvest cart having a maximum predetermined or statutory weight. It is moreover difficult for the picker to lift or otherwise displace these boxes, crates, containers and/or holders onto and/or from the harvest transport vehicle.

The invention has for its object to provide an improved harvest transport vehicle or harvest cart with which the above stated drawbacks of known configurations are obviated or at least reduced, or options for preventing or reducing these problems can at least be provided, for which purpose a harvest transport vehicle according to the present invention has the features of: a frame displaceable in longitudinal direction between rows of crops with products for harvesting; a first carrier of empty boxes, crates, containers and/or holders, which first carrier is arranged in, on or at the frame; and a second carrier of boxes, crates, containers and/or holders filled with harvested

products, which second carrier is arranged in, on or at the frame, wherein the first carrier and the second carrier each comprise a conveyor for supplying empty boxes, crates, containers and/or holders over the first conveyor in the longitudinal direction of the frame to an end surface of the frame and for discharging 5 boxes, crates, containers and/or holders filled with harvested products in substantially opposite direction over the second conveyor.

A situation can thus be avoided where, while working his/her way through between the crops and the cart, a picker has to 10 collect or remove empty or filled boxes, crates, containers and/or holders relative to a location on the harvest transport vehicle where the picker is normally positioned in order to harvest products from the crops. As a result of the conveyors the harvest cart can be made larger, i.e. a harvest cart can be 15 longer in the longitudinal direction thereof and of a path between the rows of crops with the products for harvesting thereon, because the picker need not collect or remove empty or filled boxes, crates, containers and/or holders from the length 20 of the cart, between the cart and the crops. More products (often vegetables) can hereby also be picked in longer paths, and determined products can be cultivated and harvested in larger greenhouses or larger fields.

The harvest transport vehicle according to the present invention further has the feature that a lifting mechanism is 25 associated with the first conveyor for supplying empty boxes, crates, containers and/or holders for the purpose of lifting at least a part of a stack of empty boxes, crates, containers and/or holders onto the first conveyor. It is hereby possible to ease 30 the task of a picker, who can pick up the lowermost of a stack of empty boxes, crates, containers and/or holders while the rest of the stack is being lifted. This is particularly advantageous when high stacks of empty boxes, crates, containers and/or

holders are being supplied to the picker on the first conveyor and this picker is unable to reach the topmost one of a stack.

The provided improvement can be realized in configurations with carriers disposed adjacently of each other or one above
5 another. In configurations with tables disposed one above another the space taken up by a harvest transport vehicle in the width direction of a path can be minimized, as a result of which these configurations will usually be preferred, although the alternative should certainly not be precluded from the scope of
10 the present invention. In a configuration disposed one above the other an upper or a lower of the tables can serve for empty boxes, crates, containers and/or holders, and the other table for boxes, crates, containers and/or holders filled with harvested
15 products. The only difference is in having to lift or lower filled boxes, crates, containers and/or holders. Because of the ergonomic advantages of being able to lower filled boxes, crates, containers and/or holders and being able to fill boxes, crates, containers and/or holders at hip or chest height with harvested
20 products, the upper of the carriers will usually serve for empty boxes, crates, containers and/or holders, and the lower carrier for filled boxes, crates, containers and/or holders.

Within the scope of the present invention according to the definition thereof in the appended main claim, many embodiments preferred to greater or lesser extent are possible, several of
25 which are defined in the appended dependent claims and/or described in the description following hereinbelow of a specific design of a harvest transport vehicle according to present invention.

In the past there has been resistance to carriers other than
30 substantially horizontally disposed tables, or this has at least not occurred previously to the skilled person in the present technical field, since drives on the basis of hydraulics, pneumatics or electricity are not possible because of the

conduits to be carried to the harvest cart or harvest transport vehicle. Particularly, though not exclusively, in a greenhouse the laying of conduits has drawbacks in respect of the environment in the greenhouse or in the field which is harmful to such conduits, even if such conduits were to be laid only temporarily. In contrast the use of hydraulics, pneumatics or electricity or any other power medium is by no means precluded from the scope of protection of the present invention according to the appended claims.

10 According to specific embodiments of the invention, the lifting of boxes, crates, containers and/or holders can also be taken over by elements, aspects and features of the cart. The picker then no longer need lift empty boxes, crates, containers and/or holders from the upper layer. Full boxes, crates,
15 containers and/or holders need not be carried to the rear to a determined position on the cart, precisely because of the conveyor of the relevant carrier.

 In a first embodiment the harvest transport vehicle according to the present invention has the feature that the
20 lifting mechanism is manually actuatable. In an embodiment with a lifting mechanism it can further be advantageous if there is further provided: an accommodation for the stack of empty boxes, crates, containers and/or holders and guiding thereof in a movement under the action of the lifting mechanism. A cage-like
25 accommodation can for instance thus ensure that the stack of empty boxes, crates, containers and/or holders does not tip over when lifted from below when a lowermost one of the stack has to be made available to the picker.

 Additionally or alternatively, the harvest transport
30 vehicle according to the present invention can have the feature that at least one of the first and the second conveyor comprises a component from the group comprising: a slide; a roller track and so on. Such designs of conveyors can function without

electrical, pneumatic or hydraulic power source, although the possible provision of a power source is not precluded. With slides and roller tracks it is possible to displace empty and/or filled boxes, crates, containers and/or holders from and to a location where a picker is present without this latter having to squeeze with the boxes, crates, containers and/or holders between crops and the harvest transport vehicle.

Additionally or alternatively, the harvest transport vehicle according to the present invention can have the feature that at least one of the first and the second conveyor is oriented at an angle relative to horizontal. In an embodiment with roller tracks, slides or other conveyors gravitational force can play a part here, whereby another electrical, pneumatic or hydraulic power source and/or drive need have only a supplementary function or can be wholly dispensed with. It can be advantageous here for at least the one of the first and the second conveyor to be tiltable about a shaft on the frame substantially halfway along the length thereof. An orientation or travel direction of the harvest transport vehicle can thus be varied and a picker can take up position at an opposite location, after which the harvest transport vehicle can continue being used in fully functional manner, solely by tilting the at least one of the first and the second conveyor.

Additionally or alternatively, the harvest transport vehicle according to the present invention can have the feature that the at least one of the first and the second conveyor is oriented substantially horizontally and a pushing mechanism separate of the relevant of the first and the second conveyor is arranged here for displacing boxes, crates, containers and/or holders thereover. Particularly in the case of displacement of filled boxes, crates, containers and/or holders, such a pushing mechanism can provide a solution for avoiding (excessive) strain on the picker. This is not a drive for the relevant of the first

and second conveyor. The pushing mechanism is preferably manually actuatable here so as to reduce or eliminate the need for electrical, pneumatic or hydraulic power sources. Such a pushing mechanism can then be realized even if a lifting mechanism has not been applied.

5 Additionally or alternatively, the harvest transport vehicle according to the present invention can have the feature that the first and the second conveyor are arranged substantially one above the other in, on or at the frame, and one of the first and the second conveyor protrudes beyond the other of the first and the second conveyor. The width of the harvest transport vehicle can hereby be kept small while incorporated space is (or can be made) available for additional elements, components and/or features. A lowering or lifting mechanism can for instance 10 be arranged here in a space where the one of the first and the second conveyor protrudes beyond the other of the first and the second conveyor. This will then take up a limited if not minimal amount of space and, despite the additional elements, components and/or features, the harvest transport vehicle can remain 15 compact, particularly in the width thereof transversely of the direction of movement, although also in respect of amounts of space available for empty and/or filled boxes, crates, containers and/or holders. The lowering or lifting mechanism is preferably manually actuatable. The need for external power 20 sources can hereby be reduced or minimized. 25

The present invention further relates to a system for loading and/or unloading a harvest transport vehicle, this harvest transport vehicle comprising respectively a first conveyor (12) and a second conveyor (14, 15) disposed one above the other, optionally with an intermediate shelf (40), wherein 30 at least one loading/unloading station (45) is provided comprising a lift and/or wherein two loading/unloading stations (43, 44) are provided which are arranged for loading and/or

unloading purposes at separate heights, each corresponding to at least one of the shelf, the first and the second conveyors, wherein at least one of the stations (43, 44, 45) comprises a transport track (47, 49, 52) in combination with a slide (48, 50) or an extendable fork (53). A highly suitable method is thus particularly provided for loading and/or unloading of the harvest transport vehicles, with transport tracks disposed one above another for each box, container, crate or other holder which is filled or to be filled. With this particular configuration the harvest transport vehicles can be displaced through narrow paths, which enhances efficient use of space in a greenhouse, and wherein the loading/unloading stations provide a solution for loading and/or unloading of respectively empty and filled boxes, containers, crates and the like.

After the foregoing general explanation relating to the invention and specific aspects and features thereof, a non-limitative, specific embodiment of a harvesting system according to the present invention will be described hereinbelow with reference to the accompanying drawing. The same or similar parts, components and/or aspects are designated here with the same reference numerals, which can be the case even for different embodiments. In the drawing:

Fig. 1 is a perspective view of a harvest transport vehicle according to the present invention;

Fig. 2 shows a detail of the harvest transport vehicle in Fig. 1;

Fig. 3 is a perspective view similar to Fig. 1 of the harvest transport vehicle shown in Fig. 1 in a later position of use than in Fig. 1, with a pushing mechanism in use;

Fig. 4A and Fig. 4B show details of Fig. 3 in respect of the lifting mechanism at either end of the first conveyor of the harvest transport vehicle, which first conveyor is intended for empty boxes, crates, containers and/or holders;

Fig. 5 and Fig. 6 elucidate the operation of the lifting mechanism according to figures 4A and 4B;

Fig. 7 is a schematic side view of a lowering or lifting mechanism as part or components of the embodiment of the harvest transport vehicle according to the present invention shown in Fig. 1;

Fig. 8 is a perspective view of the harvest transport vehicle shown in Fig. 1 in full operation;

Fig. 9, Fig. 10 and Fig. 11 schematically show respectively a perspective view, a top view and a side view of a system for loading and/or unloading harvest transport vehicles according to the present invention.

Fig. 1 shows a harvest transport vehicle 1 according to the present invention. The harvest transport vehicle 1 comprises a frame 2; a first carrier 3 and a second carrier 4. First carrier 3 serves to supply empty boxes, crates, containers and/or holders, in the shown case boxes 5. The boxes are stacked in high stacks 6. Using a lifting mechanism 7 to be further described hereinbelow the lowermost boxes 5 are moved clear of a stack 6 by lifting the boxes lying thereabove in stack 6.

Manual operation of the lifting mechanism enables a picker at the outer end of harvest transport vehicle 1 shown on the left in Fig. 1 to move a lowermost box 5 clear of a stack 6 and place it at a height, preferably between hip and chest height, to be filled with agricultural products for harvesting such as vegetables. Boxes 5 moved clear of stacks 6 are filled and stacked on a lowering or lifting mechanism 8 which will be further described hereinbelow. A platform 9 of lowering or lifting mechanism 8 supports filled boxes 5 and partially filled boxes 5. When a box 5 has been fully filled, the lowering or lifting mechanism can be set into operation so as to lower filled boxes 5. A new empty box 5 can then be taken from the bottom of a stack 6 and placed onto the filled boxes 5 on platform 9.

When a stack of filled boxes 5 has reached the level of second carrier 4, stacks of filled boxes can be moved away from the position of a picker at the end surface of the harvest transport vehicle 1 in Fig. 1. A pushing mechanism 10 is provided for this purpose. In the shown embodiment this pushing mechanism 10 is preferably separate from second conveyor 14, 15 in the sense that it is not a motor or drive for the roller track or tracks 14, 15. It should be noted here that such a pushing mechanism 10 can even be applied in a harvest transport vehicle without lifting mechanism 7 (see below).

First carrier 3 lies at an angle to horizontal, oriented sloping downward in the direction of the intended position of the picker at the end surface of the harvest transport vehicle 1 on the left in Fig. 1. It is noted that the picker can also stand at the opposite side. First carrier 3 is suspended for this purpose in, on or at frame 2 in pivotable manner about a shaft 11. The downward orientation of first carrier 3 on the left in Fig. 1 can thus be changed such that the right-hand side of first carrier 3 in Fig. 1 can be moved downward. The harvest transport vehicle 1 can thus be made suitable for use from the opposite end surface, on the right-hand side of the harvest transport vehicle 1 in Fig. 1.

First carrier 3 further comprises a conveyor in the form of roller track 12. Such a roller track 12 could optionally be replaced by a slide or other conveyor, preferably requiring no external power source. The roller track 12 shown in Fig. 1 is free-running in the sense that stacks 6 of empty boxes 5 will slide or move over roller track 12 in the direction of the left-hand side of harvest transport vehicle 1 in Fig. 1, where the intended position of the picker is located. Owing to the inclining position of the first carrier with roller track 12 the stacks 6 of empty boxes will move automatically and without

active driving or intervention toward the left-hand side of the harvest transport vehicle in Fig. 1.

Lifting mechanism 7 is associated with frame 13, on which lifting mechanism 7 is arranged. Frame 13 prevents stacks 6 of empty boxes tipping over and provides them with support, and simultaneously forms a guide for movements (to be further described hereinbelow) of lifting mechanism 7.

The lower second carrier 4 comprises a first roller track 14 and a second roller track 15 as embodiment of a conveyor of second carrier 4. Arranged under second carrier 4 are running wheels which can travel over a ground surface or tube system for the purpose of moving the harvest transport vehicle 1.

Boxes 5 filled with products, particularly agricultural products such as vegetables, can be transported over roller tracks 14 and 15 away from the location of the picker, in Fig. 1 on the left-hand side. In the centre two stacks of filled boxes 5 are shown in Fig. 1 in a rest position against frame 2. Filled boxes 5 can possibly also be moved further away from the location of the picker, i.e. to the opposite outer end of roller tracks 14 and 15 on the right in Fig. 1.

Fig. 2 shows a detail of the harvest transport vehicle 1 of Fig. 1, particularly at the intended location of the picker on the left-hand side of the harvest transport vehicle 1, with the lowering or lifting mechanism 8 at a height such that upper boxes for filling are located at a position between hip and chest height.

Lifting mechanism 8 is shown in more detail in Fig. 6 and 7 and comprises at least one upright 16 along which extends a pivoting rod 17 with protrusions 18 thereon for carrying or supporting platform 9. Pivoting rod 17 is rotatable about the longitudinal axis thereof by means of control knob 19, whereby a protrusion 18 on pivoting rod 17 can be rotated away from under platform 9.

As shown in Fig. 7, a cable 20 is coupled on one side to a spring 21 and on the other via a running wheel or reversing wheel 40 and a damping cylinder 41 to platform 9, via two running wheels 22, 23 between cylinder 41 and platform 9. A piston 42 with a throttle passage 43 is arranged in cylinder 41. When rotary knob 19 is operated and a relevant protrusion 18 is pivoted away from under platform 9, platform 9 with boxes 5 filled with agricultural products or vegetables thereon will gradually descend. Due to the weight on platform 9 and the resulting gravitational force, spring 21 is stretched and the piston is pulled to the left in the drawing. Throttle passage 43 in piston 42 provides for a slowing of this movement. The user has sufficient time to pivot the rotary knob 19 back in order to bring a lower protrusion 18 into position to "catch" platform 9 in this downward movement. As in the case of roller track 12 of the first carrier, no external power source is thus necessary here either, other than utilizing the force of gravity in practical manner, supplemented here with a damping action of cylinder 41 and/or spring 21. Spring 21 can be arranged in a tube 24. Lowering the platform 9 is therefore accompanied by stretching of spring 21 in combination with the slowing action of throttle passage 43 in piston 42 of cylinder 41. A lowering or lifting mechanism 8 is thus realized in very robust, simple and reliable manner. The platform rises after boxes have been or are removed from the platform. Spring 21 retracts here and pulls piston 42 in cylinder 41. Cylinder 41 in turn pulls cable 20, whereby the platform rises. Air is hereby pressed again through the throttle passage so as to allow the upward movement of the platform to once again progress gradually. It is possible to provide more than one throttle passage in order to give the upward and downward movements of platform 9 their own speeds.

Fig. 3 shows that all empty boxes 5 delivered via first carrier 3 over the conveyor or roller track 12 thereof have been

filled. Platform 9 is lowered here onto a wheel track 26 with the same orientation as roller tracks 14 and 15 of second carrier 4. When platform 9 of lowering or lifting mechanism 8 has reached this position, pushing mechanism 10 can be set into operation in order to push boxes 5 filled with agricultural products such as vegetables away from the intended location of the picker, on the left-hand side of the harvest transport vehicle 1 in Fig. 3. A picker (not shown) can for this purpose actuate a control handle 27 with manual force to cause push rods 28 to tilt via a transmission (not shown) in the direction of arrow A. Where reference is made here to manual force, this of course includes leg force, and these terms can additionally or alternatively be referred to together or individually as muscle power or manpower. Boxes 5 filled with agricultural products are thus pushed away from the left-hand side of the harvest transport vehicle 1 in the embodiment of Fig. 3 and collected in the centre of the lower second carrier 4.

Figures 4A and 4B show views of the configuration of lifting mechanism 7 at both outer ends of first carrier 3. As already noted, a frame 13 forms an effective stop for halting empty boxes, but also a guide for a movement of lifting mechanism 7. This is possible in that lifting mechanism 7 comprises two slides 31 with a connecting rod therebetween on which a handle 30 is arranged. Slides 31 are displaceable along bars of frame 13. Arranged on slides 31 are transmissions 32 which are coupled at the outer ends located opposite slides 31 to rotation shafts 33 with fingers 34 rotatable thereon.

A picker can grip handle 30 and pull slides 31 downward from the position thereof shown in Fig. 3, 4A and 4B. Transmission 32 is thereby set into motion and rotation shaft 33 is thereby rotated, whereby fingers 34 engage on the lowest but one box 5 in a stack 6 and lift it from lowermost box 5, as shown in Fig. 2 and 5 on the right-hand side of the harvest transport vehicle

1 and in more detail in Fig. 6. The picker can thus take out the lowermost of a stack 6 of boxes while all boxes 5 in stack 6 are lifted above the lowermost box 5 thereof using lifting mechanism 7.

5 In the embodiment of Fig. 8 the harvest transport vehicle 35 has several clear differences from the above described embodiment(s). Wider fingers 34 are thus applied per rotation shaft 33, one finger 34 per rotation shaft 33, and filled boxes can be displaced all the way to an outer end located opposite
10 a picker, as already noted above. The upper first carrier 3 is further not tiltable or disposed at an angle relative to horizontal but is substantially horizontal, and a hydraulic, pneumatic or electrical power source may be necessary or be utilized for movement of empty boxes 5 over first carrier 3. The
15 harvest transport vehicle 35 can thus be moved back to a point of departure without adjustment of the angular position of first carrier 3, wherein boxes 5 can be filled with products for harvesting on the right-hand side in this figure after empty boxes have been displaced over conveyor 12 of first carrier 3
20 to this right-hand side of the harvest transport vehicle 35.

It is further possible to dispense with a pushing mechanism. The platform of the lowering or lifting mechanism can be provided for this purpose with rollers (not shown) of a piece of roller track the length of the platform, wherein these rollers of the
25 platform extend parallel to the rollers of roller tracks 14 and/or 15. Providing the rollers on, in or at the platform enables a picker to give a stack of filled boxes, crates, containers and/or holders a push, after which the filled boxes and so on roll off the platform and roll further on at least one of the
30 roller tracks 14, 15 to the centre of the lower of the carriers 4 in Fig. 1, 3 and/or 5, or in any case in the direction of the other outer end of the lower carrier 4, as shown in Fig. 8. This also provides a considerable simplification compared to the

provision of an additional pushing mechanism, even though the platform of the lowering or lifting mechanism has to be equipped for this purpose with rollers in order to transfer the filled boxes and so on to roller tracks 14, 15.

5 Fig. 9, 10 and 11 show respectively a perspective view, a top view and a side view of a system 36 for loading and/or unloading harvest transport vehicles 37 of a slightly different type than that of the previous figures. The harvest transport vehicle 37 in Fig. 9, 10 and 11 comprises a frame 38 with lower
10 roller tracks 39, a shelf 40 with carriers 42 thereabove for a cassette 41 in which empty boxes, crates, containers and/or holders 5 can be placed and into which a lifting mechanism 7 is incorporated for lifting a number of empty boxes, crates,
15 containers and/or holders 5 in a stack so that lowermost empty boxes, crates, containers and/or holders 5 in the stack can be made easily accessible to a user. In view of the foregoing description in combination with the other embodiments of the harvest transport vehicles with reference to figures 1-8, the lifting mechanism of cassettes 41 in the embodiment of system
20 36 is not further shown in figures 9-11. Shelf 40 of the harvest transport vehicle 37 serves for placing thereon of a series of boxes or containers in which a picker can place waste such as cutting waste, leaves and the like.

System 36 comprises substantially three stations 43, 44 and
25 45 disposed along a rail 46. Disposed at first station 43 is a conveyor 47 displaceable from and to rail 46 and configured to perform a movement designated with arrow B in figure 10. Disposed opposite conveyor 47 relative to rail 46 is a slide 48, as shown in figure 10, and wherein slide 48 performs a movement in the
30 direction of arrow C extending over rail 46. A row of stacks of filled boxes, crates, containers and/or holders 5 can in this way be pushed from the lower roller tracks 39 onto conveyor 47. The view of figure 9 clearly shows that station 43 and station

44 differ from each other substantially only with respect to the height of conveyor 49 and of slide 50, whereby second station 44 is suitable for unloading boxes 5 filled with cutting waste or leaves and the like onto shelf 40 by displacing the conveyor 49 in the direction of arrow D and back and displacing the slide 50 in the direction of arrow E and back. Once the boxes with cutting waste, leaves and/or other remnants have been transferred onto conveyor 49, they can be discharged individually.

Third station 45 comprises a lift 51 which is arranged associated with a conveyor 52. Lift 51 comprises a fork with teeth 53, which fork with teeth 53 is movable up and downward in the direction of arrow G in figure 11. Having reached a height corresponding to cassette 41, lift 51 is configured to extend and retract the fork with teeth 53 in the direction of arrow F. An empty cassette 41 can thus be removed from a harvest transport vehicle 37 or, conversely, a cassette 41 filled with empty boxes 5 can be placed on the harvest transport vehicle 37. Lift 51 co-acts with conveyor 52, wherein a cassette 41 is displaceable in the direction of double arrow H between lift 51 and conveyor 52. An empty cassette 41 arranged on conveyor 52 is filled with empty boxes 5 and then placed back onto a waiting harvest transport vehicle 37. From here the harvest transport vehicle 37 can be taken into use again for harvesting products.

It is noted that in another embodiment a system can comprise only one or two of the shown stations 43, 44 and 45, or other stations with other functions can also be arranged, for instance for cleaning harvest transport vehicles. It is possible for the third station 45, which has been described in the foregoing as comprising a lift, and in order to avoid such a lift, to comprise the features that conveyor 52 and the fork, or a slide as alternative to the fork, are arranged at a height corresponding to shelf 40 or preferably corresponding to the upper roller track

of the harvest transport vehicle 37. Cassettes with empty boxes thereon are then carried at a height over conveyor 52 to station 45, which can then be formed without lift.

5 It will already be apparent that many alternative and additional options, features, aspects, elements and components are applicable within the scope of the invention defined in the independent claim, differing from or in addition to those described above and shown with reference to the embodiments in the accompanying drawing, without departing from the scope of
10 protection of the invention as defined in said independent claim.

CLAIMS

1. A harvest transport vehicle (1), comprising:

5 - a frame (2) displaceable in a longitudinal direction between rows of crops with products for harvesting;

- a first carrier (3) of empty boxes, crates, containers and/or holders (5), which first carrier is arranged in, on or at the frame (2); and

10 - a second carrier (4) of boxes, crates, containers and/or holders (5) filled with harvested products, which second carrier is arranged in, on or at the frame (2), wherein the first carrier (3) and the second carrier (4) comprise respectively a first conveyor (12) and a second conveyor (14, 15) for respectively supplying empty boxes, crates, containers and/or holders (5)

15 over the first conveyor (12) in the longitudinal direction of the frame (2) to an end surface of the frame and for discharging boxes, crates, containers and/or holders (5) filled with harvested products in substantially opposite direction over the second conveyor (14, 15),

20 characterized by

a lifting mechanism (7) associated with the first conveyor (12) for supplying empty boxes, crates, containers and/or holders (5) for the purpose of lifting at least a part of a stack (6) of empty boxes, crates, containers and/or holders (5) onto the first
25 conveyor (12).

2. The harvest transport vehicle as claimed in claim 1, wherein the lifting mechanism (7) is manually actuable.

3. The harvest transport vehicle as claimed in claim 1 or 2, further comprising an accommodation (13) for the stack (6) of empty boxes, crates, containers and/or holders (5) and guiding
30 thereof in a movement under the action of the lifting mechanism (7).

4. The harvest transport vehicle as claimed in at least one of the foregoing claims, wherein at least one of the first and the second conveyor (12; 14, 15) comprises a component from the group comprising: a slide; a roller track and so on.

5 5. The harvest transport vehicle as claimed in at least one of the foregoing claims, wherein at least one of the first and the second conveyor (12; 14, 15) is oriented at an angle relative to horizontal.

10 6. The harvest transport vehicle as claimed in claim 5, wherein at least the one of the first and the second conveyor (12; 14, 15) is tiltable about a shaft (11) on the frame (2) substantially halfway along the length thereof.

15 7. The harvest transport vehicle as claimed in at least one of the foregoing claims, wherein at least the one of the first and the second conveyor (12; 14, 15) is oriented substantially horizontally.

20 8. The harvest transport vehicle as claimed in at least one of the foregoing claims, wherein a pushing mechanism (10) is arranged at at least one of the first and the second conveyor (12; 14, 15) for the purpose of displacing boxes, crates, containers and/or holders (5) thereover.

9. The harvest transport vehicle as claimed in claim 8, wherein the pushing mechanism is manually actuatable.

25 10. The harvest transport vehicle as claimed in claim 8 or 9, wherein the pushing mechanism (10) comprises a transmission separately of the conveyor.

30 11. The harvest transport vehicle as claimed in claim 10, wherein the transmission comprises a system with push rods (28) and is connected for selective tilting to the frame (2) for the purpose of displacing at least one of the boxes, crates, containers and/or holders (5) over the relevant of the first and the second conveyor (12; 14, 15).

12. The harvest transport vehicle as claimed in at least one of the foregoing claims, wherein the first and the second conveyor (12; 14, 15) are arranged substantially one above the other in, on or at the frame (2), and one of the first and the second conveyor (12; 14, 15) protrudes beyond the other of the first and the second conveyor (14, 15; 12).

13. The harvest transport vehicle as claimed in claim 12, further comprising a lowering or lifting mechanism (8) in a space where the one of the first and the second conveyor (12; 14, 15) protrudes beyond the other of the first and the second conveyor (14, 15; 12).

14. The harvest transport vehicle as claimed in claim 13, wherein the lowering or lifting mechanism (8) is manually actuatable.

15 15. A system for loading and/or unloading a harvest transport vehicle, this harvest transport vehicle comprising respectively a first conveyor (12) and a second conveyor (14, 15) disposed one above the other, optionally with an intermediate shelf (40), wherein

20 - at least one loading/unloading station (45) is provided comprising a lift, and/or

- two loading/unloading stations (43, 44) are provided which are arranged for loading and/or unloading purposes at separate heights, each corresponding to at least one of the shelf, the first and the second conveyors,

25 - wherein at least one of the stations (43, 44, 45) comprises a transport track (47, 49, 52) in combination with a slide (48, 50) or an extendable fork (53).

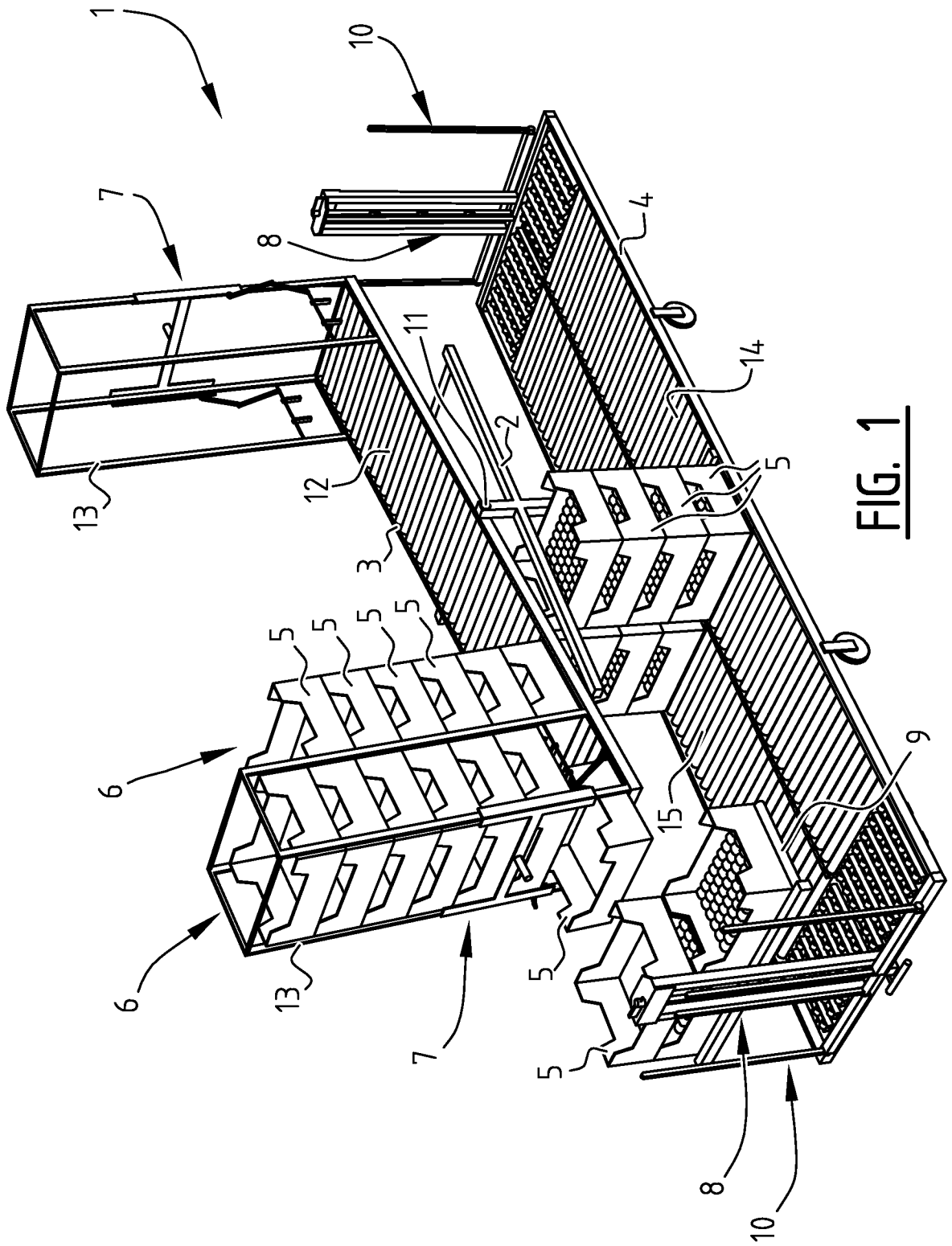
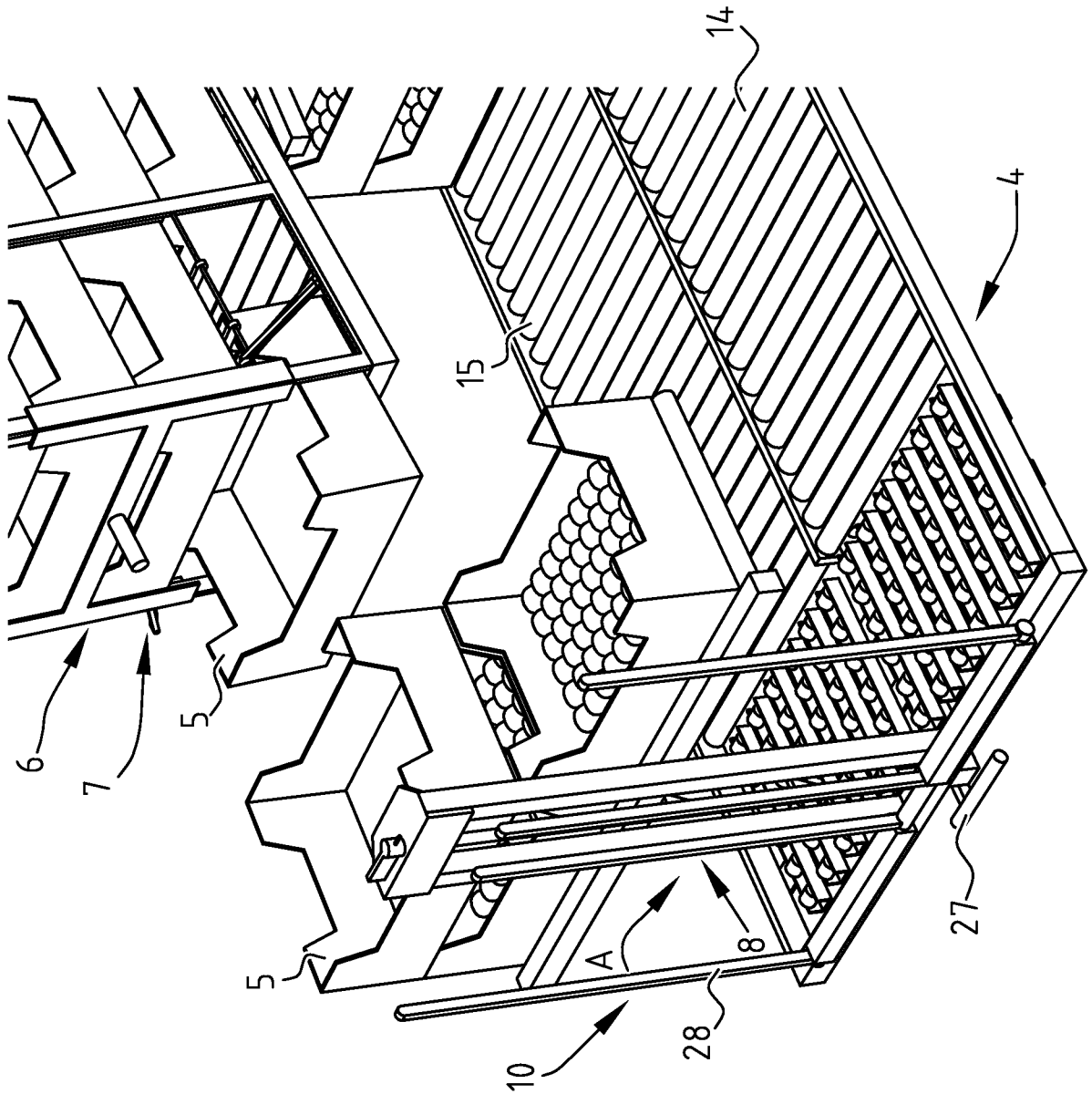


FIG. 1

FIG. 2



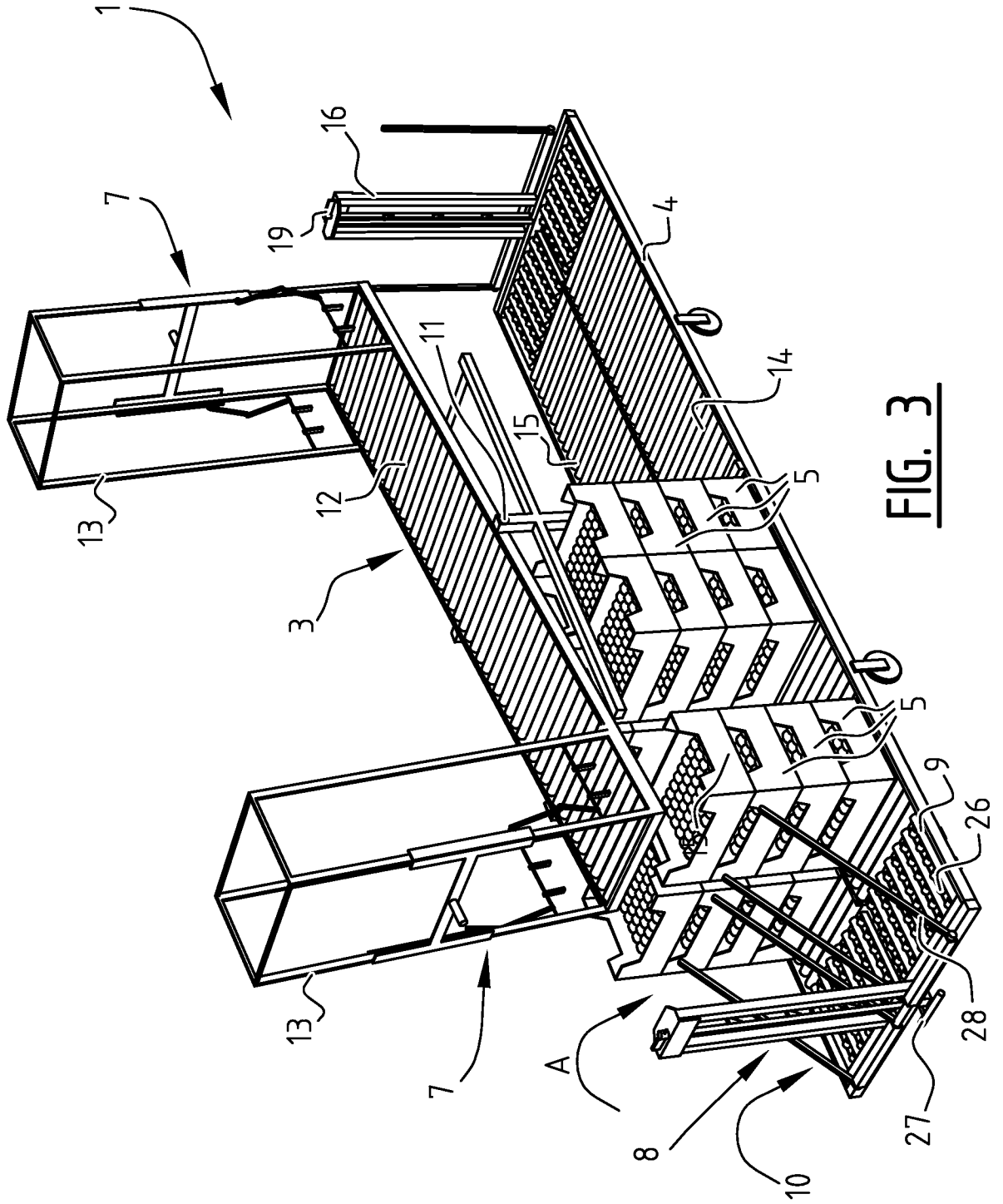


FIG. 3

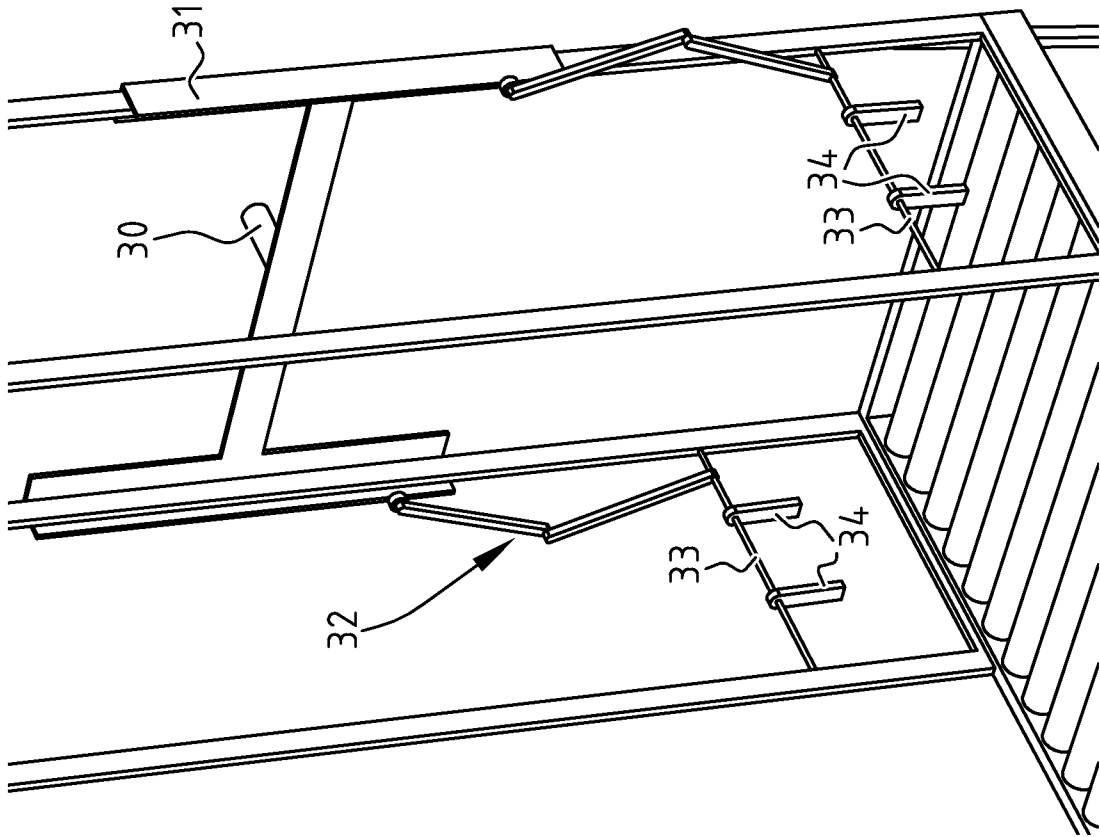


FIG. 4B

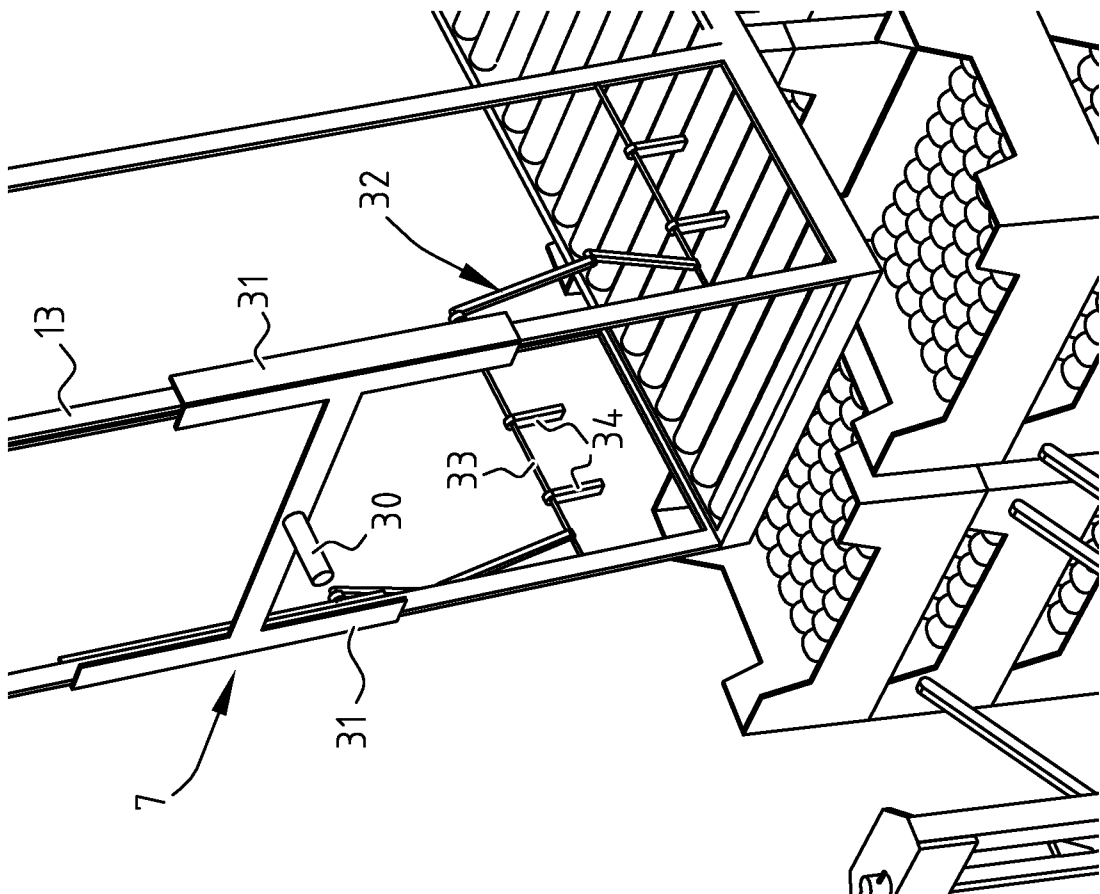


FIG. 4A

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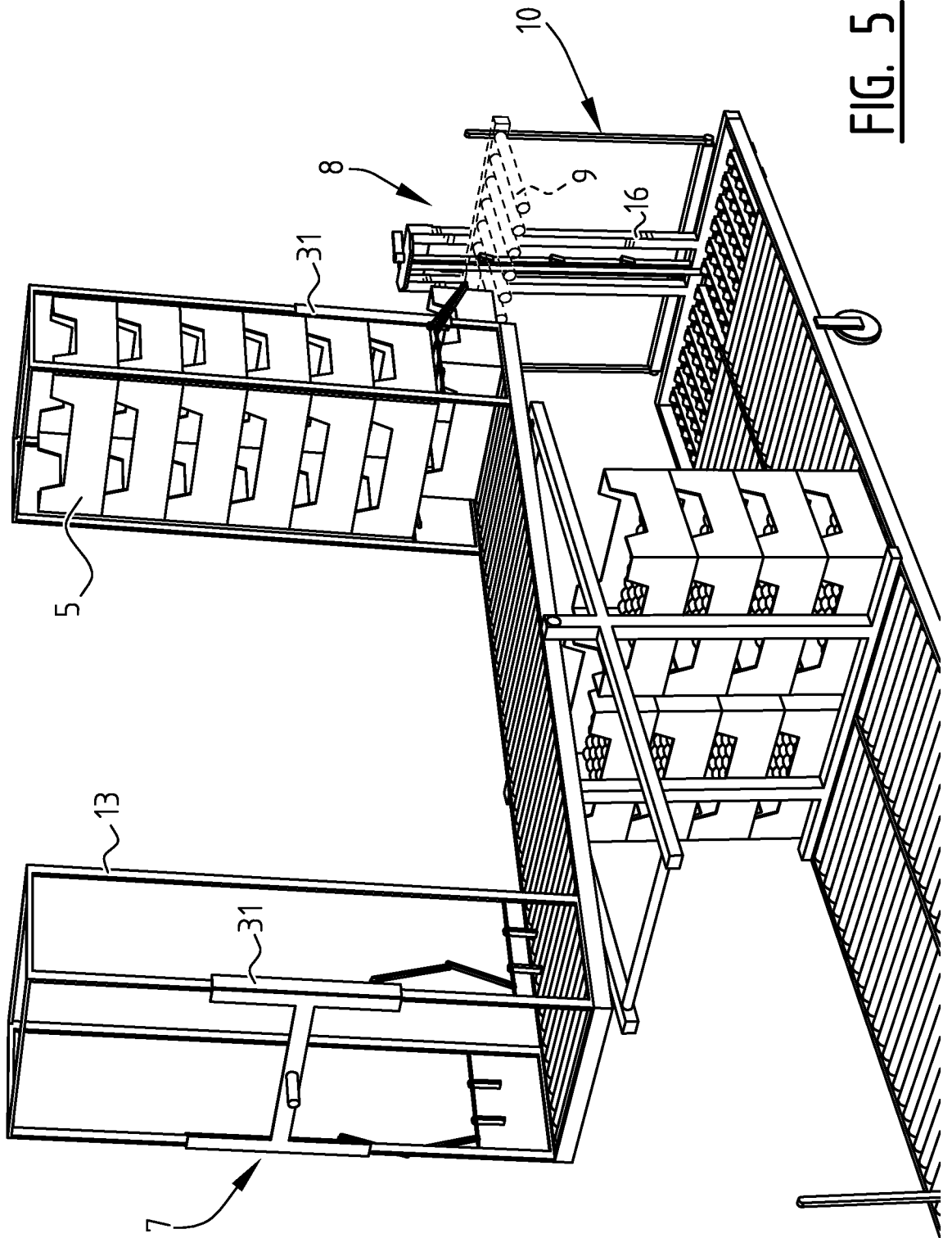
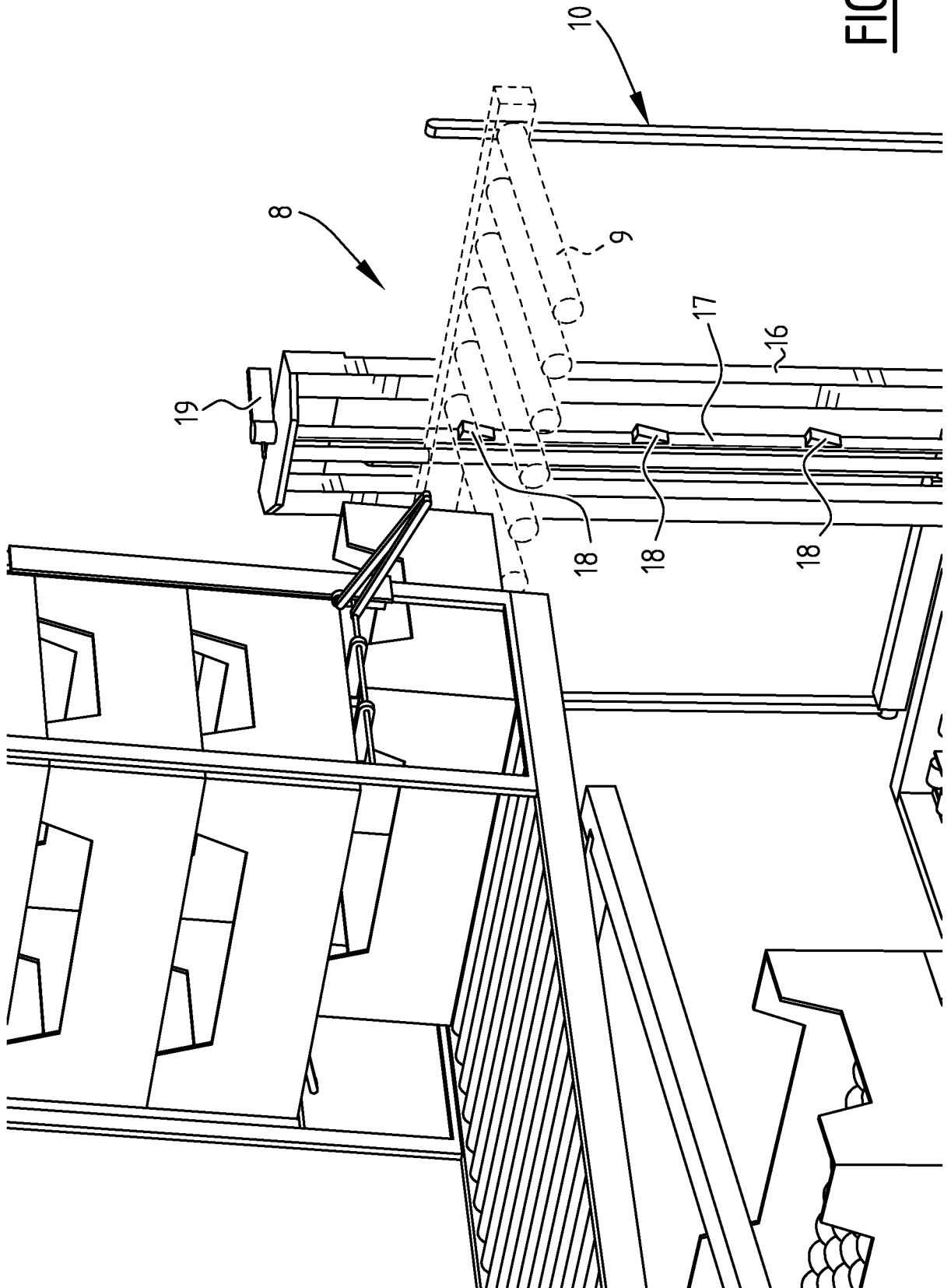


FIG. 5

FIG. 6



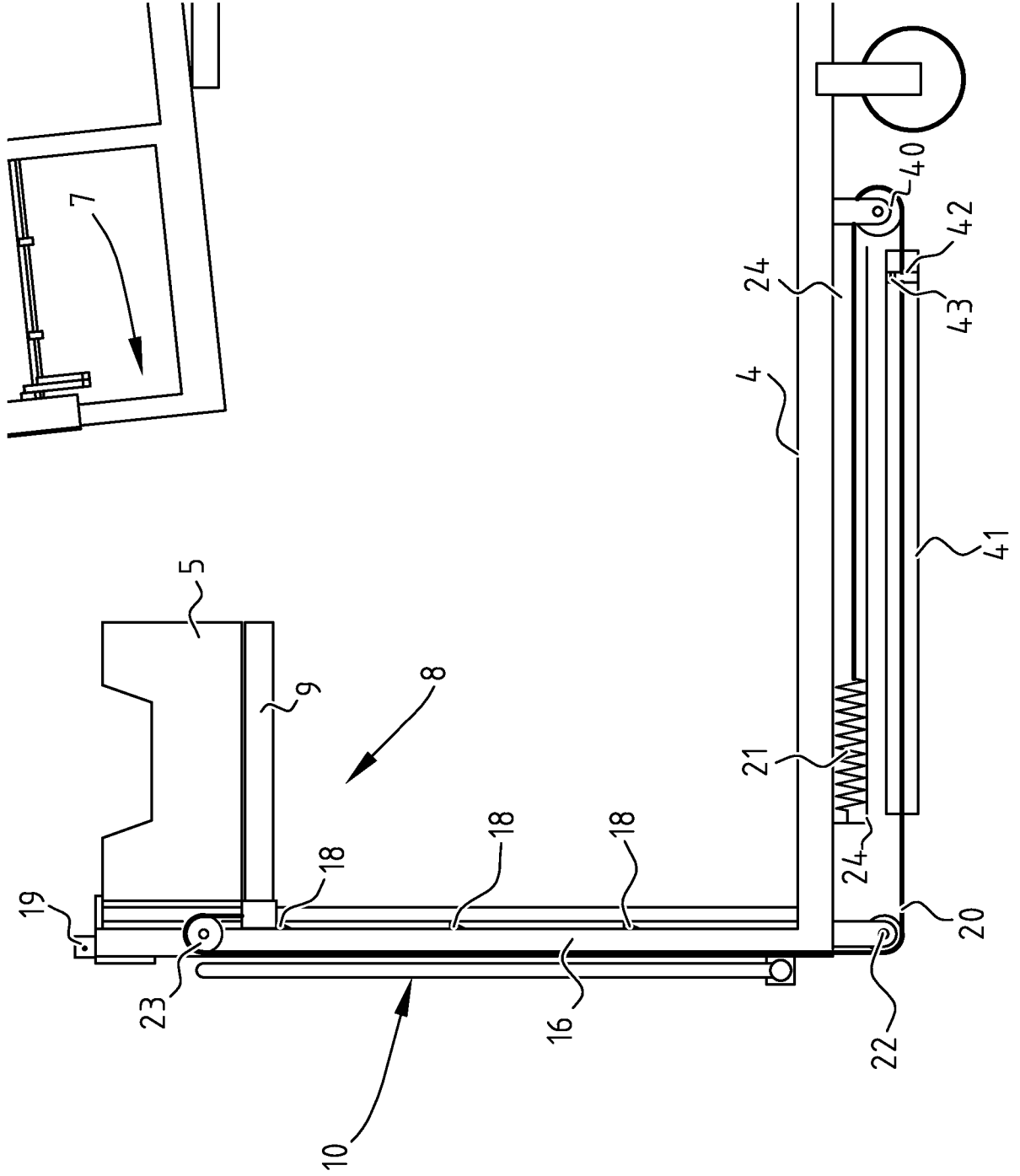


FIG. 7

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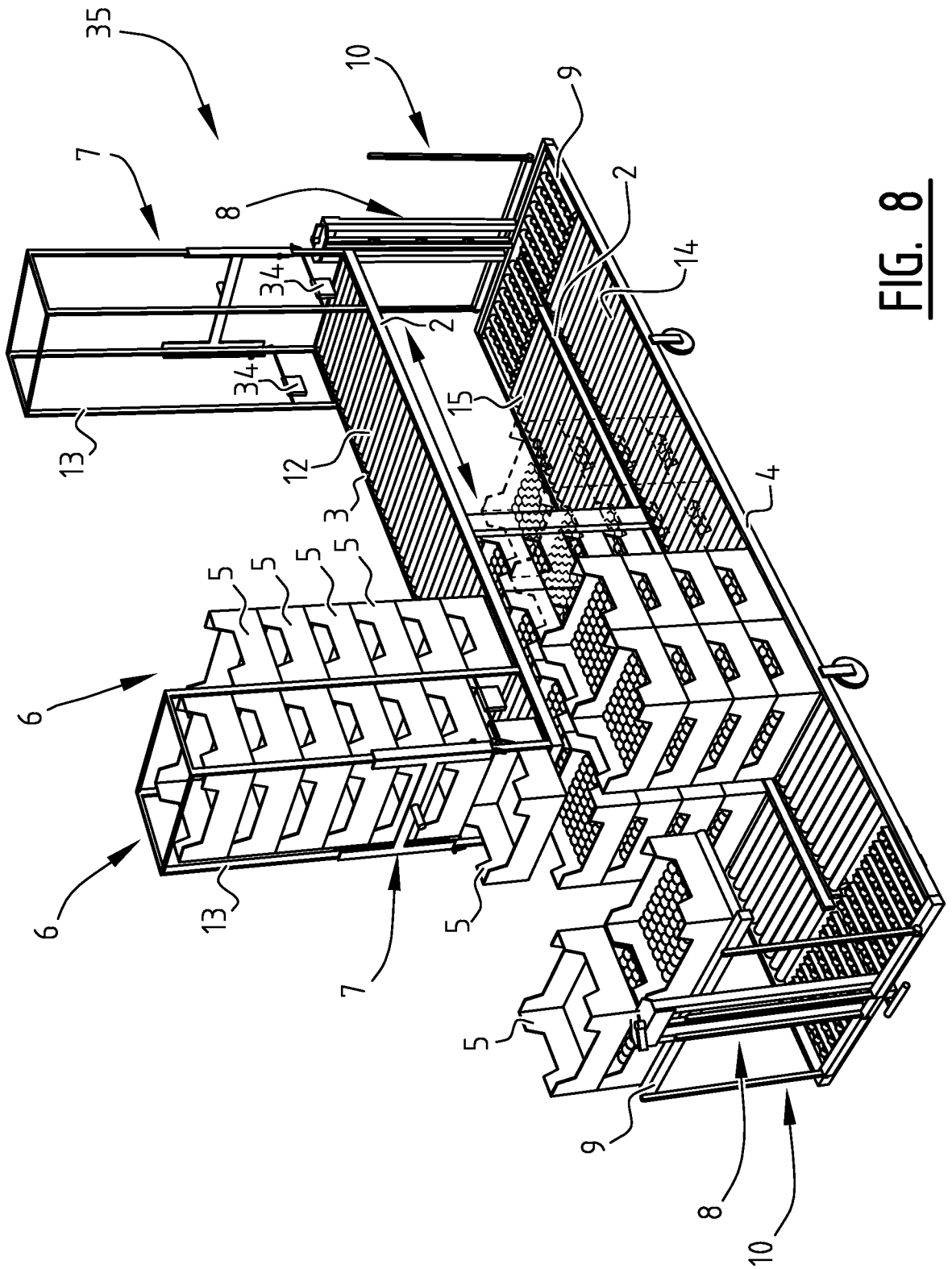


FIG. 8

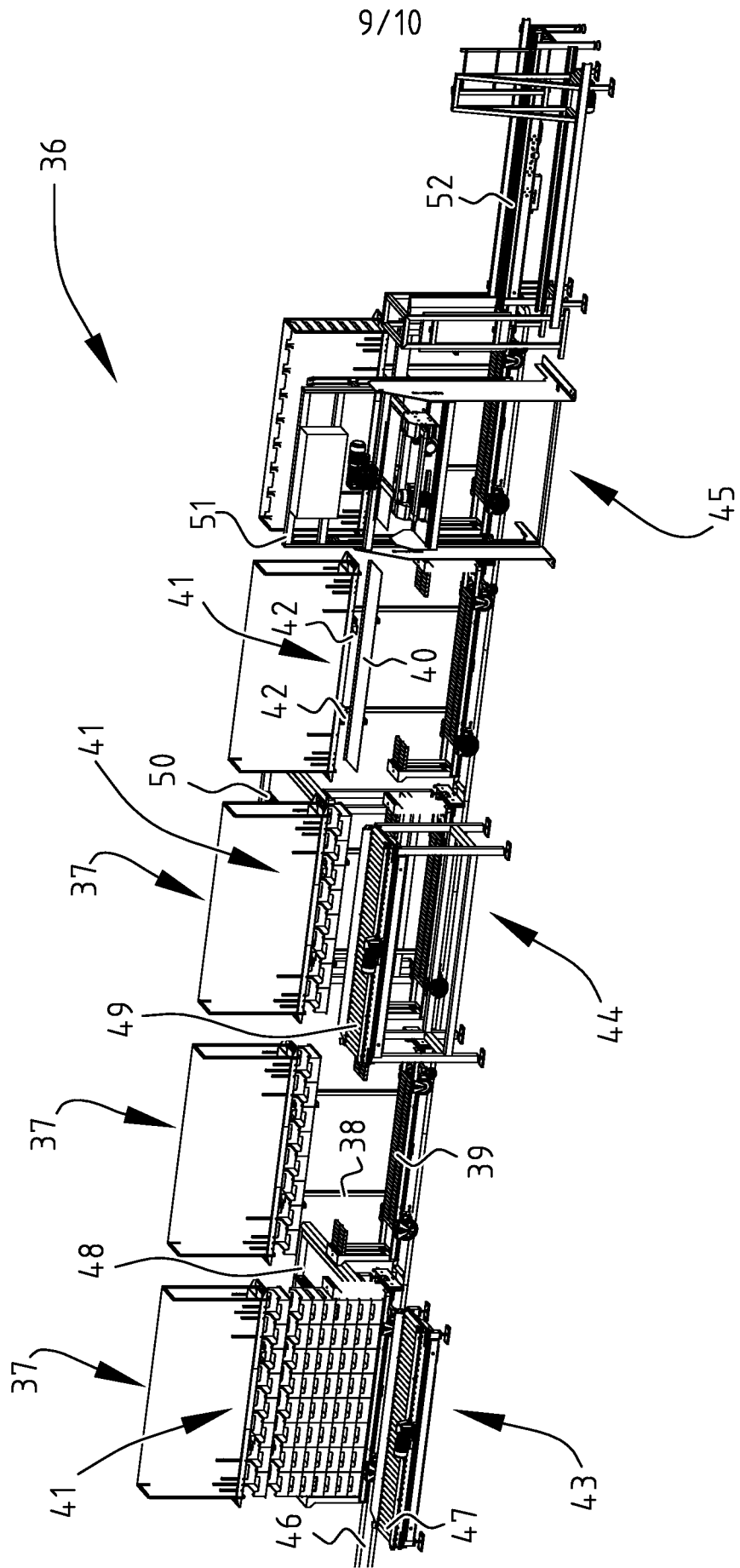


FIG. 9

