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(71) Applicant: Unitec S.R.L.  
48022 Lugo (IT)

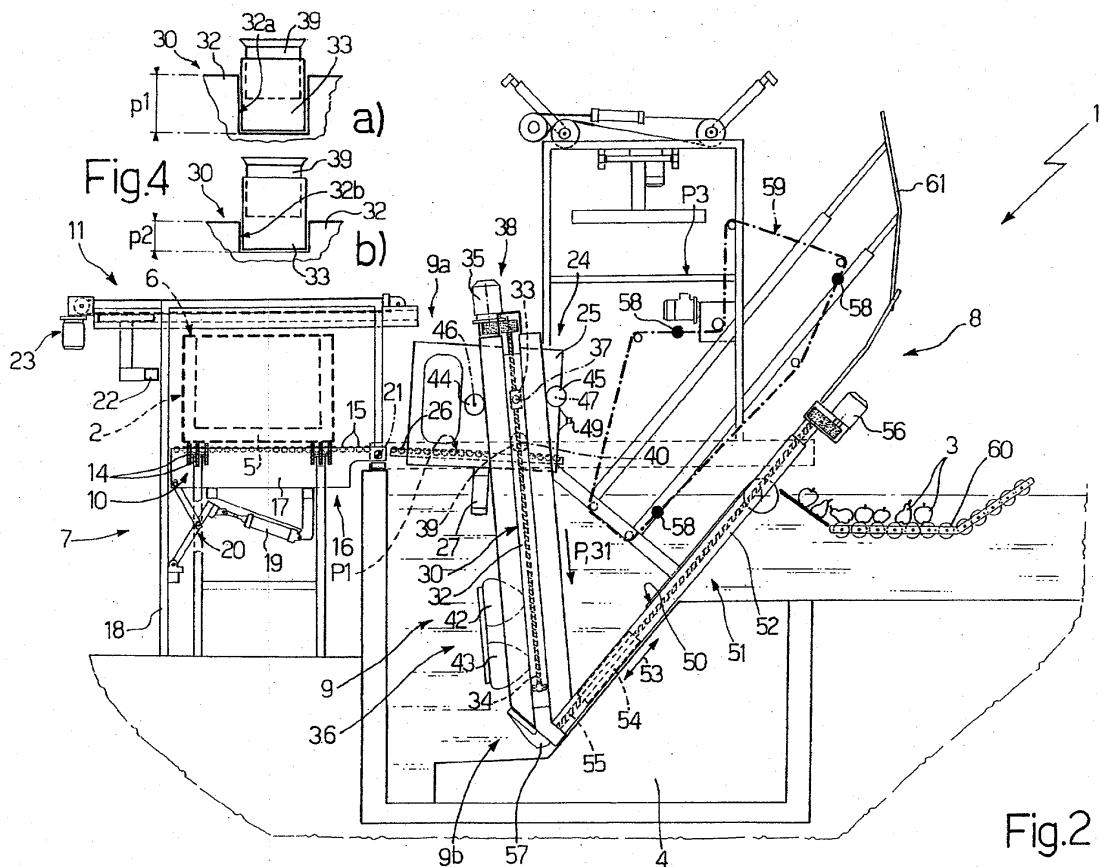
(72) Inventor: Marian, Daniele  
48100 Ravenna (IT)

(74) Representative: Cerbaro, Elena et al  
c/o Studio Torta S.r.l. Via Viotti, 9  
10121 Torino (IT)

### (54) Apparatus for emptying boxes of fruit and vegetable produce into a tank containing a liquid

(57) In an apparatus for emptying boxes (2) of fruit and vegetable produce (3) into a tank (4) containing a liquid, a tipping device (9) has a pocket (24) movable between an input station (9a), where the pocket (24) is set to a first operating position to receive a box (2) positioned with its concavity facing upwards, and an output station (9b), where the pocket (24) is located inside the

liquid and set to a second operating position to release the box (2) with its concavity facing downwards; and an actuating device (36), having at least one orienting member (42, 43) cooperating with at least one tappet (44, 45) carried by the pocket (24), moves the pocket (24) about its hinge axis (37) between the first and second operating position.



## Description

**[0001]** The present invention relates to an apparatus for emptying boxes of fruit and vegetable produce into a tank containing a liquid.

**[0002]** More specifically, the present invention relates to an apparatus of the type comprising an upright extending in a vertical first direction and fitted in sliding manner to the tank to move linearly in a horizontal second direction; a slide fitted to the upright to slide linearly along the upright in said first direction; and a pocket for receiving at least one box and hinged to the slide to oscillate, about a hinge axis perpendicular to the first and second direction, between a first operating position, in which the box is positioned with its concavity facing upwards, and a second operating position, in which the box is positioned with its concavity facing downwards.

**[0003]** The slide is movable along the upright between an input station, where the pocket is located substantially outside the liquid in the first operating position to receive the box, and an output station, where the pocket is located substantially inside the liquid in the second operating position to release the box.

**[0004]** The apparatus also comprises an actuating cylinder interposed between the slide and the pocket to move the pocket between the first and second operating position; and an ejector device fitted to the pocket to eject the box from the pocket at the output station.

**[0005]** The ejector device normally comprises two chain conveyors movable in respective parallel vertical planes; and a push bar extending between the chain conveyors, parallel to said hinge axis, and for engaging the box at the rear in a third direction in which the box is ejected from the pocket.

**[0006]** Known apparatuses of the above type have several drawbacks, mainly due to the fact that, as the slide moves from the input station to the output station, the actuating cylinder is immersed in the liquid and so calls for relatively frequent maintenance and/or replacement.

**[0007]** It is an object of the present invention to provide an apparatus for emptying boxes of fruit and vegetable produce into a tank containing a liquid, designed to eliminate the aforementioned drawbacks and which is cheap and easy to produce.

**[0008]** According to the present invention, there is provided an apparatus for emptying boxes of fruit and vegetable produce into a tank containing a liquid, as claimed in Claim 1.

**[0009]** A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic view in perspective, with parts removed for clarity, of a preferred embodiment of the apparatus according to the present invention;

Figure 2 shows a schematic side view, with parts

removed for clarity, of the Figure 1 apparatus; Figure 3 shows a schematic view in perspective, with parts removed for clarity, of a first detail in Figures 1 and 2;

**5** Figure 4 shows a plan view of a second detail in Figures 1 and 2.

**[0010]** Number 1 in Figures 1 and 2 indicates as a whole an apparatus for emptying boxes 2 of loose fruit 10 and vegetable produce 3 into a tank 4 containing a liquid - in the example shown, water.

**[0011]** Each box 2 is substantially cup-shaped, is designed to let in water, has a substantially flat bottom wall 5, and is open outwards at a surface 6 parallel to and 15 opposite wall 5.

**[0012]** Apparatus 1 comprises two conveyor units 7 and 8; and a tipping device 9, which is located between units 7 and 8, is connected to unit 7 at an input station 9a located substantially outside tank 4, is connected to 20 unit 8 at an output station 9b located substantially at the bottom of tank 4, and receives boxes 2 successively from unit 7, and tips them over and releases them successively to unit 8.

**[0013]** Conveyor unit 7 conveys boxes 2 successively 25 with their concavities facing upwards, and comprises two conveying devices 10, 11 arranged in series and connected to each other at a transfer station 12.

**[0014]** Device 10 conveys boxes 2 in a substantially 30 horizontal travelling direction 13 perpendicular to the Figure 2 plane, and comprises a number of chain conveyors 14, which move in respective parallel vertical planes, and extend, at station 12, between the rollers 15 of a roller conveyor 16 forming part of device 11.

**[0015]** Rollers 15 are fitted idly to a supporting frame 35 17 hinged to a fixed frame 18 of apparatus 1 to oscillate - with respect to frame 18, under the control of two actuating cylinders 19 cooperating with respective crank mechanisms 20 interposed between frame 17 and cylinders 19, and about a hinge axis 21 parallel to direction 40 13 - between a lowered rest position (Figure 2), in which rollers 15 are located below the conveying surface defined by conveyors 14, and a raised operating position (not shown), in which rollers 15 are located above the conveying surface defined by conveyors 14 to detach 45 boxes 2 from conveyors 14.

**[0016]** Device 11 comprises a push bar 22, which extends in direction 13, engages boxes 2 at the rear in the travelling direction of boxes 2 on rollers 15, and is connected in known manner to frame 17 to move linearly - 50 with respect to frame 17 and under the control of a known actuating device 23 - between stations 12 and 9a.

**[0017]** Device 9 comprises an oscillating pocket 24, in turn comprising a substantially parallelepiped-shaped 55 box body 25 with a number of openings by which to take in water, and a roller conveyor 26 defining a supporting surface P1 for boxes 2. Conveyor 26 is fitted in known manner to body 25 to move linearly - with respect to

body 25 and under the control of two actuating cylinders 27 fixed to body 25 - to and from a face of body 25 defined by two flat plates 28, which are coplanar with each other to define a supporting surface P2 parallel to surface P1, and are located a given distance apart to define a longitudinal channel 29.

**[0018]** Conveyor 26 is therefore movable, with respect to body 25, between a release position, in which surfaces P1 and P2 are separated by a distance greater than the height of a box 2, and a gripping position, in which the distance between surfaces P1 and P2 substantially equals the height of a box 2, and plates 28 therefore substantially contact relative surface 6.

**[0019]** With reference to Figures 1 and 4, device 9 also comprises two parallel guide posts 30 (only one shown in Figure 1), which extend from the bottom of tank 4 in a given direction 31, are defined by respective substantially channel sections 32, are positioned facing each other, and each comprise two portions 32a, 32b arranged in series in direction 31, and of which the top portion 32a is of a depth p1 greater than the depth p2 of the bottom portion 32b.

**[0020]** Device 9 also comprises two slides 33 (only one shown in Figure 2), each of which is fitted in sliding manner to a respective post 30, is designed to engage both relative portions 32a and 32b, and is also connected by a screw-nut screw coupling to a screw 34, which is rotated by a motor 35, normally common to both screws 34 and located outside tank 4, to move relative slide 33 linearly along relative post 30 in direction 31.

**[0021]** Since body 25 is connected in rotary manner to slides 33 to oscillate - with respect to slides 33 and under the control of an actuating device 36 described in detail later on - about a hinge axis 37 parallel to direction 13, posts 30, slides 33, screws 34, and motor 35 define an actuating device 38 for moving pocket 24 between stations 9a and 9b in direction 31.

**[0022]** Along portions 32a, pocket 24 is maintained in a first operating position (Figure 1) - in which pocket 24 receives a box 2 positioned with its concavity facing upwards - by two tappet rollers 39 (only one shown in Figures 2 and 3), each of which projects from body 25 in a direction parallel to direction 13, is of such a length, measured parallel to direction 13, as to engage relative portion 32a (Figure 4a) but not relative portion 32b (Figure 4b), and has a longitudinal axis 40 aligned with axis 37 in a direction 41 (Figure 3) coincident, at portions 32a, with direction 31.

**[0023]** Device 36 comprises two pairs of cams 42, 43 fixed inside tank 4 and aligned in direction 13. Cams 42, 43 in each pair of cams 42, 43 are arranged in succession in direction 31, and cooperate, as explained in detail later on, with two tappet rollers 44, 45 projecting from body 25 in a direction parallel to direction 13, and having respective axes 46, 47, which are located on opposite sides of axis 37 in a direction 48 (Figure 3) perpendicular to direction 41, are equidistant from axis 37, and are aligned with axis 37 in direction 48.

**[0024]** In actual use, and commencing from the instant in which rollers 15 are in the lowered rest position, and pocket 24 is located at input station 9a, in the first operating and release positions, chain conveyors 14 are

5 operated to feed a box 2 in direction 13 onto rollers 15 and into contact with a stop member (not shown) fitted at station 12 and crosswise to direction 13.

**[0025]** At this point, actuating cylinders 19 are operated to move rollers 15 into the raised operating position 10 to detach box 2 from conveyors 14, and push bar 22 is operated to feed box 2 inside pocket 24 and into contact with a stop member 49 (Figures 2 and 3) fixed to body 25.

**[0026]** As box 2 contacts member 49, actuating cylinders 15 are operated to move pocket 24 into the gripping position, in which plates 28 prevent fallout of produce 3 from box 2; and motor 35 is operated to move pocket 24 along posts 30 in direction 31, with tappet rollers 39 engaging relative portions 32a (Figure 4a).

**[0027]** When rollers 39 release relative portions 32a and are positioned outside relative portions 32b, thus enabling pocket 24 to oscillate about axis 37, rollers 44 contact the top portions of relative cams 42, and pocket 24 is rotated, clockwise in Figure 2, about axis 37. By 25 combining the movements of pocket 24 in direction 31 and about axis 37, rollers 39 are first positioned between cams 42 and 43, and rollers 45 then contact the bottom portions of relative cams 43 to set pocket 24, at output station 9b, into a second operating position, in which box 30 2 is positioned with its concavity facing downwards.

**[0028]** In the course of each operating cycle of apparatus 1, pocket 24 therefore performs, along a path P extending between stations 9a and 9b, a reciprocating rotation-translation movement comprising a forward stroke, in which pocket 24 is moved from station 9a to station 9b and from the first to the second operating position, and a return stroke, in which pocket 24 is moved from station 9b to station 9a and from the second to the first operating position.

**[0029]** When pocket 24 reaches station 9b in the second operating position, surface P2 is positioned coplanar with a flat chute 50 fixed to tank 4; motor 35 is deactivated; and box 2 is ejected from pocket 24 and fed along chute 50 by an ejector device 51 forming part of 45 conveyor unit 8.

**[0030]** Device 51 comprises two guides 52 (only one shown in Figure 2) fixed to tank 4 and extending in a given direction 53; and two slides 54 (only one shown in Figure 2), each of which is fitted in sliding manner to 50 a respective guide 52, and is connected by a screw-nut screw coupling to a screw 55, which is rotated by a motor 56, normally common to both screws 55 and located outside tank 4, to move relative slide 54 linearly along guide 52 in direction 53.

**[0031]** Slides 54 support an ejector blade 57, which engages channel 29 defined between plates 28, engages the rear of box 2 to first eject it from pocket 24, and then cooperates with a push bar 58 of a known feed de-

vice 59 to feed box 2 along chute 50. At the end of chute 50, produce 3 falls freely out of box 2 onto a known roller conveyor 60 for removing produce 3 from tank 4.

**[0032]** Once the whole of box 2 has been unloaded on chute 50, pocket 24 is moved back to station 9a by actuating device 38; rollers 45 and rollers 44 cooperate successively with cams 43 and 42 respectively to move box 2 back into the first operating position; and the unloaded box 2 is fed by device 59 along a known contoured guide 61 to turn box 2 over onto an output surface P3, again with its concavity facing upwards.

**[0033]** Operation of ejector device 51 is therefore fully independent of the rotation-translation movement of pocket 24 in direction 31 and about axis 37, thus enabling a relatively high output rate of apparatus 1.

**[0034]** Obviously, actuating device 36 for rotating pocket 24 about axis 37 may be replaced by similar actuating devices comprising at least one tappet, and at least one cam cooperating with the tappet to swing pocket 24 about axis 37 according to a given law of motion.

**[0035]** Apparatus 1 therefore has the advantage of motors 35 and 56 being located completely outside tank 4, and of pocket 24 simply being rotated about axis 37 by cams 42, 43 and tappet rollers 44, 45.

**[0036]** In a variation not shown, actuating devices 36 and 38 are replaced by an actuating device comprising at least one sprocket, which is hinged to pocket 24 to rotate, with respect to pocket 24, about an axis parallel to direction 13, and has a fork, which is fixed to and projects from the sprocket in direction 13, and is engaged by a tappet projecting from body 25 in a direction parallel to direction 13. The sprocket meshes simultaneously with a chain conveyor moving in a vertical plane substantially perpendicular to direction 13, and with a fixed chain located on the opposite side of the sprocket to the chain conveyor.

**[0037]** The movement of the sprocket along the fixed chain, the design of the fixed chain, and engagement of the fork by the tappet, provide for both moving pocket 24 between stations 9a and 9b, and also rotating it about axis 37 between the first and second operating position.

## Claims

1. An apparatus for emptying boxes (2) of fruit and vegetable produce (3) into a tank (4) containing a liquid, the apparatus comprising a tipping device (9) for tipping at least one box (2), and in turn comprising an input station (9a) substantially outside said liquid; an output station (9b) substantially inside said liquid; a pocket (24) mounted for rotation about a given first axis (37) to oscillate between a first operating position, in which the pocket (24) receives the box (2) positioned with its concavity facing upwards, and a second operating position, in which the pocket (24) releases the box (2) with its concav-

ity facing downwards; first actuating means (38) for moving the pocket (24) along a given path (P) extending between said input station and said output station (9a, 9b); and second actuating means (36) for selectively moving the pocket (24) into said first and said second operating position; **characterized in that** said second actuating means (36) comprise at least a first tappet (44) carried by said pocket (24), and orienting means (42, 43) cooperating with said first tappet (44) to orient the pocket (24) about said first axis (37).

2. An apparatus as claimed in Claim 1, wherein said orienting means (42, 43) comprise cam means.
3. An apparatus as claimed in Claim 1 or 2, wherein said orienting means (42, 43) comprise at least one first cam (42) located along the path (P) to cooperate with said first tappet (44) and move the pocket (24) about said first axis (37) as of a first operating position, and at least one second cam (43) located along the path (P); the second actuating means also comprising at least one second tappet (45) carried by said pocket (24) and cooperating with said second cam (43) to move the pocket (24) about said first axis (37) as of the second operating position.
4. An apparatus as claimed in Claim 3, wherein said first and said second tappet (44, 45) have a longitudinal second and, respectively, third axis (46, 47) substantially parallel to said first axis (37) and located on opposite sides of the first axis (37) in a given first direction (48); said first, said second, and said third axis (37, 46, 47) being aligned in said first direction (48).
5. An apparatus as claimed in Claim 4, and also comprising at least one third tappet (39) cooperating with both the first cam (42) and the second cam (43) as said pocket (24) moves between said first and said second operating position.
6. An apparatus as claimed in Claim 5, wherein said third tappet (39) has a longitudinal fourth axis (40) substantially parallel to said first axis (37); said first and said fourth axis (37, 40) being aligned in a second direction (41) substantially perpendicular to said first direction (48).
7. An apparatus as claimed in Claim 6, and also comprising at least one guide (32a) extending along part of said path (P); said third tappet (39) engaging said guide (32a) to keep the pocket (24) in said first operating position along the guide (32a).
8. An apparatus as claimed in any one of the foregoing Claims, wherein the pocket (24) comprises a supporting wall (28) defining a supporting surface (P2)

for said box (2) when the pocket (24) is in said second operating position; said wall (28) having a guide channel (29) extending through the wall (28).

9. An apparatus as claimed in Claim 8, and also comprising ejector means (51) for ejecting the box (2) from the pocket (24) at said output station (9b); the ejector means (51) comprising an ejector member (57) engaging and movable along said guide channel (29). 5

10. An apparatus as claimed in Claim 9, wherein said ejector means (51) comprise transportation means (54) fitted in sliding manner to said tank (4) to move said ejector member (57) along said guide channel (29); and at least one motor (56) for driving the transportation means (54); the motor (56) being located outside said liquid. 15

11. An apparatus as claimed in any one of the foregoing Claims, wherein said first actuating means comprise further transportation means (33) fitted in sliding manner to said tank (4) to move the pocket (24) between said input station and said output station (9a, 9b); and at least one further motor (35) for driving said further transportation means (33); said further motor (35) being located outside said liquid. 20

12. An apparatus as claimed in Claim 1, wherein said first actuating means comprise a chain conveyor, a fixed chain, and a sprocket hinged to said pocket (24) and meshing with both the chain conveyor and the fixed chain to move the pocket (24) between said input station and said output station (9a, 9b) by virtue of the chain conveyor; said second actuating means comprising a seat formed in said sprocket and engaged by said first tappet. 30

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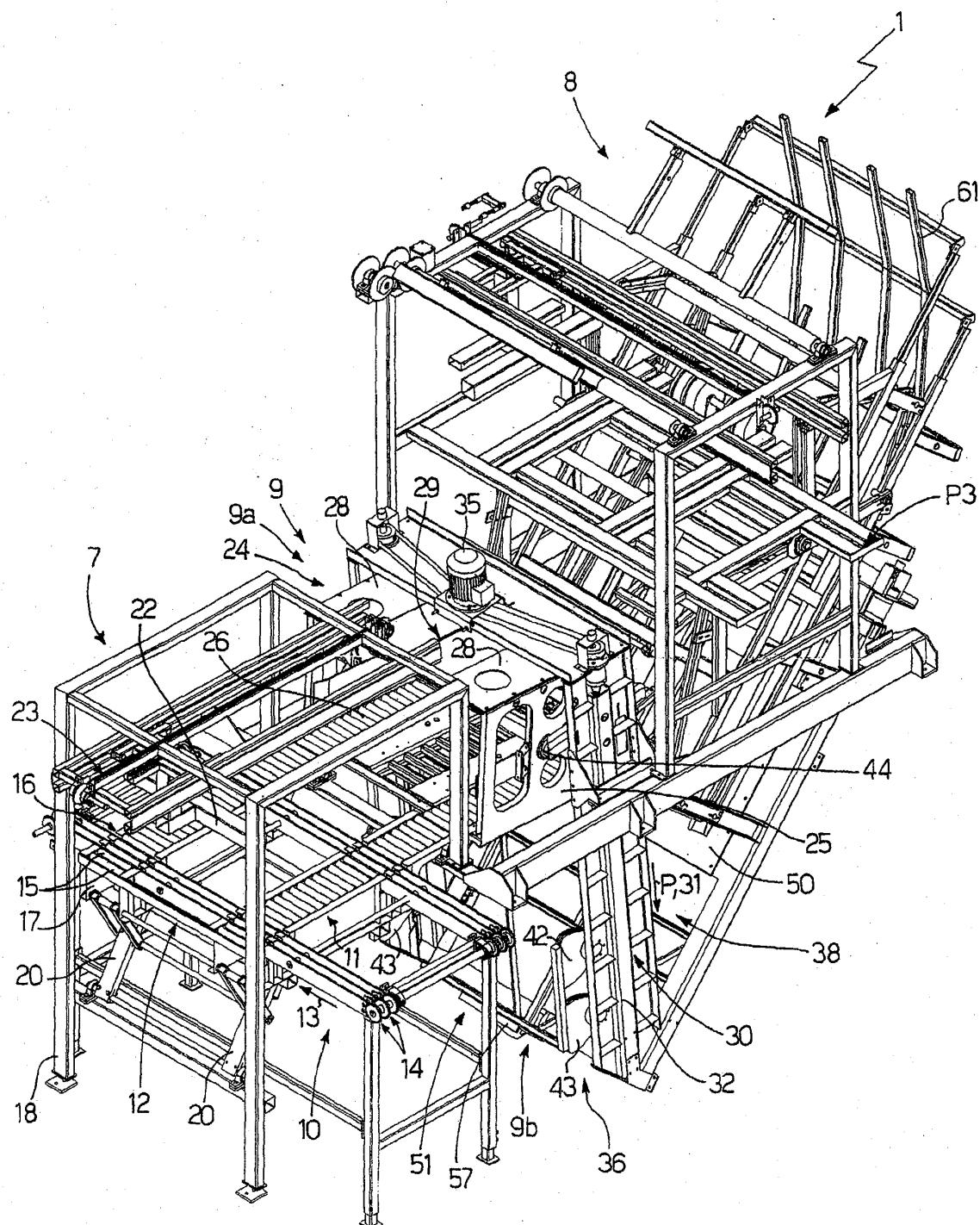
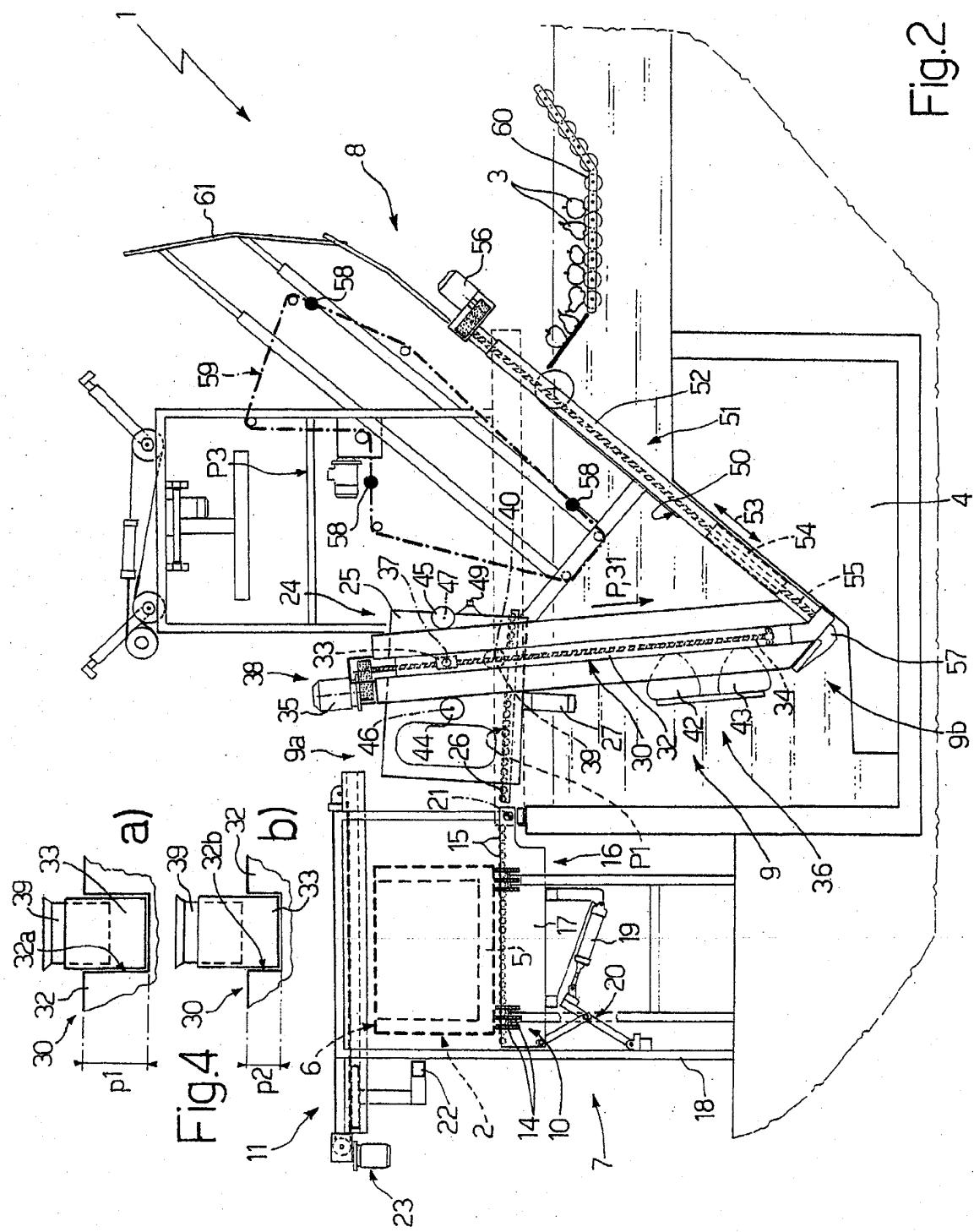


Fig.1



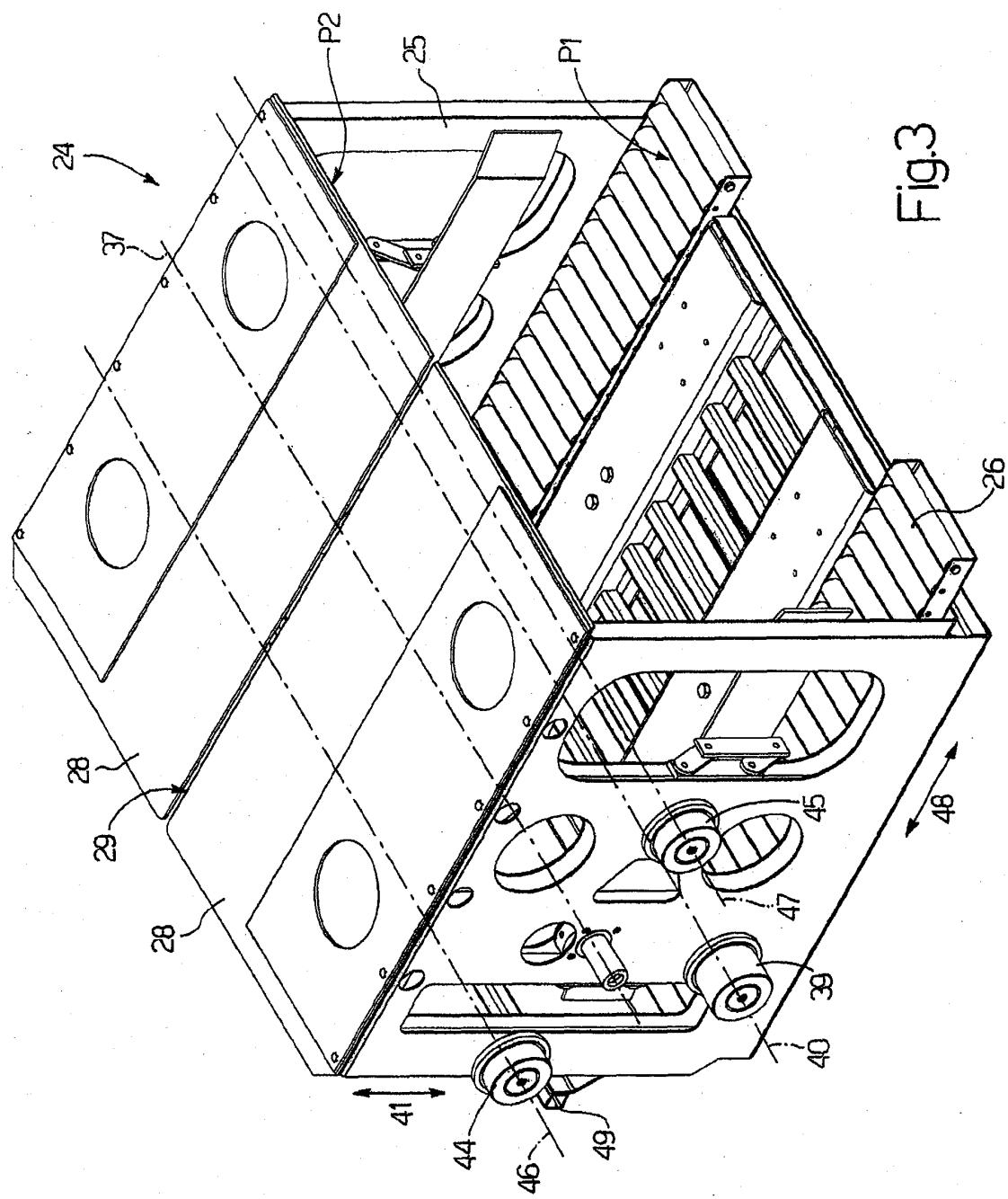


Fig.3



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## EUROPEAN SEARCH REPORT

Application Number  
EP 03 42 5558

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
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The present search report has been drawn up for all claims			
Place of search Munich	Date of completion of the search 3 February 2004	Examiner Gaiser, M	
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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

EP 03 42 5558

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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