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(54) Title: DISPENSING DEVICE FOR PIECE GOODS

(57) Abstract: Dispensing device for piece goods, comprising a conveyor and a discharge device for discharging the piece goods in a direction of passage to the conveyor, wherein the discharge device is provided with a bunker having a bottom surface that is oriented downwardly inclined in the direction of passage, a first stopping surface that is oriented upwardly inclined in the direction of passage for keeping the piece goods situated on the bottom surface in the bunker, a threshold defining the transition from the first stopping surface to the conveyor, and a pusher that can be moved up and down along the first stopping surface by means of a first drive, which pusher is provided with a push-up surface for upwardly pushing the piece goods over the threshold.



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Dispensing device for piece goods

BACKGROUND OF THE INVENTION

The invention relates to a dispensing device for piece goods, such as for instance capsules or tablets in the pharmaceutical industry.

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A known dispensing device for piece goods comprises a conveyor and a bunker for discharging the piece goods to the conveyor. The piece goods on the conveyor can for instance be counted at the end of the conveyor. For a properly running counting process a constant discharge of piece goods from the bunker is needed. In the known dispensing device the discharged quantity of piece goods, however, decreases as the bunker gets emptier. The last piece good sometimes even has to be wiped out of the bunker by hand.

15 Particularly in the pharmaceutical industry, where large numbers of relatively small batches are processed, emptying or wiping takes up relatively a lot of time in the processing of the batches. Manually wiping the bunker while operative is undesirable regarding sterility. In the pharmaceutical industry the dispensing device has to be cleaned after each batch in order to prevent cross-infection with previous batches.

25 It is an object of the invention to provide a dispensing device that is particularly suitable for processing large numbers of relatively small batches.

It is an object of the invention to provide a dispensing device that can easily be cleaned.

SUMMARY OF THE INVENTION

According to one aspect the invention provides a dispensing device for
5 piece goods, comprising a conveyor and a discharge device for
discharging the piece goods in a direction of passage to the conveyor,
wherein the discharge device is provided with a bunker having a bottom
surface that is oriented downwardly inclined in the direction of passage,
a first stopping surface that is oriented upwardly inclined in the
10 direction of passage for keeping piece goods situated on the bottom
surface in the bunker, a threshold defining the transition from the first
stopping surface to the conveyor, and a pusher that can be moved up
and down along the first stopping surface by means of a first drive,
which pusher is provided with a push-up surface for upwardly pushing
15 the piece goods over the threshold.

The pusher that can be moved up and down is able to keep the
discharge of the piece goods to the conveyor actively going, also when
the bunker gets emptier at the end of the batch. Particularly in case of
20 small batches time can be gained, as a result of which per time unit a
large number of small batches can be processed.

In one embodiment the drive is adapted for driving the upward motion
of the pusher at a first speed, and driving the downward motion at a
25 second speed that is higher than the first speed. A temporary
interruption in discharging the piece goods to the conveyor as a result
of the downward motion of the pusher will as a result last shorter than
the subsequent discharge in the upward motion.

30 In one embodiment thereof the second speed is at least ten times,
preferably at least twenty times higher than the first speed. Said
interruption can then be short to such an extent that an emptiness
behind the threshold resulting therefrom can already be compensated in
the flow over the conveyor.

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The discharge of piece goods during the upward motion of the pusher
can take place substantially evenly when the drive is adapted for

driving the upward motion of the pusher at a first speed that is substantially constant over the upward path.

5 In one embodiment the drive is adapted for setting the first and/or second speed during dispensing operations of the dispensing device. In that way the speed can for instance be raised when the push-up surface pushes up fewer piece goods as the bunker gets emptier.

10 In one embodiment the drive is adapted for an upward motion of the pusher from a starting position in which the push-up surface extends substantially in the extension of the bottom surface or below it. Particularly the last piece good on the bottom surface can end up on the push-up surface due to gravity in order to be pushed actively over the threshold.

15 In one embodiment the drive is adapted for an upward motion of the pusher up to an end position in which the push-up surface extends past the threshold or above it, so that all the piece goods situated on the push-up surface can be passed over the threshold.

20 In the said embodiments it is enhanced that the bunker and as a result the entire device can be fully emptied at the end of the batch without manual external intervention. In one embodiment the drive is adapted for adjusting the lowest starting position and/or highest end position of a stroke during dispensing operations of the device, so that said end positions only need to be used when the bunker is almost empty. Prior to that, when the bunker is filled well, sufficient piece goods to be pushed up may still abut the first stopping surface so that a higher starting position and/or a lower end position will do, which means a shorter stroke.

30 The drive is able to effect an accurate motion of the pusher when the drive comprises a servomotor and an actuator unit for the servomotor.

35 In one embodiment the bunker comprises an exit opening for passage of the piece goods to the first stopping surface, wherein at the upper side the exit opening is bounded by a skimming-off end which, considered in the direction of passage, is situated in front of and

spaced apart from the threshold. The skimming-off end is able to decelerate piece goods moving in bulk in the direction of the threshold when cast into the bunker.

- 5 In one embodiment thereof the skimming-off end has a lower end edge which in vertical direction is situated lower than the threshold. This difference in height prevents that the piece goods as a result of gravity move out of the bunker over the threshold of their own accord.
- 10 In one embodiment the pusher comprises a second stopping surface extending in front of the first stopping surface in order to keep the piece goods situated on the bottom surface in the bunker. The piece goods can abut the second stopping surface below the upwardly passed push-up surface, as a result of which exerting pressure forces
- 15 on the piece good can remain substantially limited to an area above the push-up surface.

- Without any touching worth mentioning of piece goods abutting the second stopping surface, the pusher is able to move upwards when the
- 20 first and second stopping surface extend substantially parallel to each other. Furthermore piece goods ending up between the bottom surface and the second stopping surface during the downward motion of the pusher can be counteracted.

- 25 In a simple embodiment the first and second stopping surface are substantially straight surfaces.

- In one embodiment the pusher in order to be guided is situated in a guide bounding a straight translatory path for the pusher which path
- 30 extends substantially parallel to the first stopping surface.

- In one embodiment the guide of the pusher is continued below the extension of the upper surface for retraction of at least a part of, preferably the entire pusher from its push-up surface to below the
- 35 extension of the bottom surface, so that the pusher is also guided in a position that is situated recessed with respect to the bottom surface.

In one embodiment the guide is open above the first stopping surface for inserting and taking out the pusher in a direction substantially transverse to the first stopping surface. The pusher that is in contact with the piece goods during processing a batch, can after processing
5 the batch easily be taken out, cleaned and put back again. The pusher that has been put back may for instance be an exchangeable piece which during processing has been cleaned for use in a next batch.

10 In one embodiment the pusher remains within the guide due to its own weight. Additional retaining means will not be necessary in that case.

In one embodiment the pusher, at its side that faces the first stopping surface, is provided with an engagement for the drive. The engagement then takes place at a side of the pusher that is not in immediate contact
15 with the piece goods, which is advantageous to the integrity of the piece goods.

In one embodiment thereof the drive comprises a gear rack on the pusher and a driving gear wheel which with its axis of rotation is
20 fixedly positioned in the dispensing device, for engagement onto the gear rack. The gear rack can then get into engagement with the gear wheel during placing the pusher in said guide.

In a further development thereof the pusher is provided with a slot
25 extending in its direction of movement in which slot the gear rack and the gear wheel have been accommodated, wherein the axis of rotation of the gear wheel is oriented substantially transverse to the first stopping surface. The gear wheel is then able to extend into the slot over its circumference in order to engage onto the gear rack.

30 In a compact embodiment the pusher is connected to the connecting rod of a linear servomotor extending parallel to the translatory path.

In a simple and easy-to-clean embodiment the pusher comprises a
35 rectangular block-shaped slide of which a head surface defines the push-up surface. Alternatively or additionally the pusher comprises a block-shaped slide of which a side surface defines the second stopping surface.

The first stopping surface is able to effectively keep the piece goods in the bunker when the first stopping surface is oriented substantially transverse to the bottom surface.

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The stopping surface can be taken out or changed simultaneously with the slide in order to be cleaned when the first stopping surface is provided on an exchangeable piece or insert piece of the dispensing device.

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In one embodiment the dispensing device comprises a slideway surface oriented downwardly inclined from the threshold in direction of passage, for discharge of piece goods pushed over the threshold towards the conveyor.

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The piece goods discharged to the conveyor can be divided in direction of passage in order to for instance be counted when the conveyor comprises several vibrating troughs positioned in cascade. The vibrating troughs are able to erase temporary interruptions in the discharge of the piece goods to the conveyor as a result of the downward motions of the pusher.

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The invention furthermore according to a second aspect, provides a dispenser machine comprising a frame having a row of dispensing devices for piece goods and positioned parallel to each other, wherein the dispensing devices each comprise a sub frame having a conveyor, a drive for the conveyor, a bunker for discharging the piece goods to the conveyor, and a piece goods counting device which form a unity, wherein the dispensing devices are positioned between substantially horizontal rails extending parallel to each other and below the conveyor of the dispensing devices, which rails at one side are connected to the frame, wherein the dispenser machine furthermore comprises at least two separate extension pieces that can be coupled in the extension of the rails for in a supported manner placing a dispensing device out of the row substantially in horizontal direction.

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The dispensing devices can be taken out of the row individually for inspection or cleaning by extending the rails in question by means of

the extension pieces and passing the dispensing device over said extension pieces. While the dispenser machine is operative the rails therefore need not project further than the dispensing devices do, as a result of which the operation of the piece goods counting devices can
5 be properly monitored.

The rails can also be used for the discharge of parts of the piece goods that have gotten detached, when the rails are hollow and form a part of a discharge channel between the dispensing devices and a central air
10 extractor.

In one embodiment the dispensing devices and the frame are provided with cooperating electric insertion couplings that are adapted for uncoupling when placing the dispensing device out of the row in a
15 supported manner. Uncoupling electricity on the dispensing device can then take place directly when placing the dispensing devices out of the row.

The aspects and measures described in this description and the claims
20 of the application and/or shown in the drawings of this application may where possible also be used individually. Said individual aspects may be the subject of divisional patent applications relating thereto. This particularly applies to the measures and aspects that are described per se in the sub claims.

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SHORT DESCRIPTION OF THE DRAWINGS

The invention will be elucidated on the basis of a number of exemplary embodiments shown in the attached drawings, in which:

30

Figure 1 shows an isometric front view of a dispenser machine according to the invention, in closed operational condition;

Figures 2A and 2B show an isometric front view and a straight front
35 view of the dispenser machine according to figure 1, partially opened as a result of which the internal dispensing devices of the dispenser machine are visible;

Figure 3 shows the dispenser machine according to figures 2A and 2B, wherein the dispensing devices have been taken out;

Figure 4 shows a side view, partially in longitudinal section, of one of the dispensing devices having a discharge device according to figures 2A and 2B; and

Figures 5A-D are isometric side views of the discharge device according to figure 4, wherein successively a number of parts have been left out.

DETAILED DESCRIPTION OF THE DRAWINGS

The dispenser machine 1 for piece goods according to an embodiment of the invention as shown in figures 1-3 comprises a metal housing 2 having several doors 3 for access to the inside of the dispenser machine 1. The dispenser machine 1 is provided with an electronic control 6 having a display 4 at the outer side of the housing 2. As shown in figure 3 at the inside the housing 2 has been provided with a horizontal back support 5 to which several metal suction pipes 10 have been attached which extend horizontally and parallel to each other. The free ends of the suction pipes 10 that face away from the back support 5 have been provided with a screw cap 11. The suction pipes 10 are connected to a central air extractor that is not further shown and spaced apart from the dispenser machine 1. Collection chutes 7 have been positioned below the suction pipes.

Within the housing 2 the dispenser machine 1 comprises several identical dispensing devices 20 that are positioned parallel adjacent to each other. One of the dispensing devices 20 is also shown in side view in figure 4. The dispensing device 20 comprises a metal frame 21 having a slider 22 on both sides with which the dispensing device 20 rests on two consecutive suction pipes 10, two vibrating troughs 25, 26 positioned in cascade and connected to a vibrating mechanism 23, a discharge device 50 having a bunker 51 for receiving, discharging and passing piece goods 29 substantially in horizontal main direction of passage D to the first vibrating trough 25, and a counting device 30 for counting piece goods 29 discharged in a dosed manner by the second vibrating trough 26. The path of one piece of piece goods 29 is shown

with arrow G. At the rear side an electric insertion coupling 24 is provided for electrically connecting the dispensing device 20 to the back support 5. The dispensing device 20 comprises internal air ducts which at the sliders 22 connect to the suction pipes 10. Via said
5 internal air ducts the parts that have gotten detached from the piece goods 29 can be sucked away.

The dispenser machine 1 can be used in the pharmaceutical industry, for distributing relatively small batches of capsules or tablets over a
10 large number of bottles. The batches for instance consist of a few thousands of capsules that are distributed over a few hundreds of bottles. It is important here that the exact number of capsules or tablets mentioned on the label ends up in the bottles. An operator 28 then dumps the capsules in the bunkers 51 and checks the process
15 from his work station 8 at the front of the dispenser machine 1.

As shown in figure 3 the dispenser machine 1 comprises at least two separate metal pipe extension pieces 13 provided with threaded bushes 12, which pipe extension pieces after screwing off the screw caps 11
20 in direction A can be placed adjacent to each other on the suction pipes 10 and screwed onto a handle 14 in direction B. The dispensing device 20, borne by the two extended suction pipes 10, can then be slid to the fore in its entirety in direction C in order to be inspected all round or cleaned. The insertion coupling 24 uncouples of its own accord, so that
25 the dispensing device 10 becomes electrically dead. The pipe extension pieces 13 and the extended dispensing device 20 therefore are only outside of the housing 2 above the work station 8 of the operator 28 when inspection of the dispensing device 20 in question is necessary.

30 The discharge device 50 of one of the dispensing devices 20 according to figure 4 is also shown in figures 5A-5C. The metal bunker 51 of the discharge device 50 at the upper side comprises a vertical front wall 52, a vertical rear wall 53 and two vertical side walls 62. Via a narrowing 54 the side walls 62 merge into a chute 55. The chute 55
35 defines the longest portion of a, considered in the main direction of passage D, straight bottom surface 56 of the bunker 51, which bottom surface is oriented downwardly inclined. The vertical front wall 52 at the bottom side merges into an inclined front wall 57, which at the end

is provided with a quarter round turned skimming-off end 58 having a lower end edge 41. The skimming-off end 58 and the bottom surface 56 bound the internal exit opening 61 of the bunker 51. The continuation 63 of the chute 55 is attached against a cover plate 69.

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The discharge device 50 is provided with a rectangular block-shaped, synthetic pusher 70 which can only slide up and down in direction E in a straight channel 82 of a pillar guide 71. At its upper side the pillar guide 71 comprises, considered in the main direction of passage D, a first stopping surface 72 that is oriented upwardly inclined and intended to keep piece goods 29 situated on the bottom surface 56 within the bunker 51 or the continuation 63 of the chute 55, and for that purpose in this example is oriented substantially transverse to the bottom surface 56. At the bottom side the straight channel 82 has an outlet 77 towards one of the internal air ducts for the discharge of parts of the piece goods 29 that have gotten detached. At the upper side the pillar guide 71 is provided with three set receiving pins 83 that fittingly extend through three parallel semi-open slots 68 in the cover plate 69. The detachable bunker 51 is secured on the pillar guide 71 by placing it on the pillar guide 71 and then slide it down as shown by arrow F.

The first stopping surface 72 merges at the upper side via a straight horizontal threshold 75 into a slide surface 76 oriented downward towards the first vibrating trough 25. The slide surface 76 and its extension are bounded by parallel side walls 59 that extend partially above the first vibrating trough 25. The threshold 75 in vertical direction is situated higher than the lower end edge 41 of the skimming-off end 58.

The head surface of the block-shaped pusher 70 defines a straight push-up surface 74 that is oriented transverse to the first stopping surface 72. The flat broad front side defines a second stopping surface 73 that extends parallel to the first stopping surface 72. The slide direction E is oriented parallel to the first stopping surface 72.

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At the front side the pusher 70 is provided with a U-shaped suspension 78 having on both sides thereof supports 79 that extend sideways. The supports 79 have each been connected to a straight drive rod 81

that has been inserted into a linear electric servomotor 80. The servomotors 80 are fixedly connected to the pillar guide 71. The servomotors 80 are connected to the control 6 of the dispenser machine 1 by means of the insertion coupling 24. The servomotors 80
5 are positioned below in the bunker 51 in vertical direction in order to avoid contact with the piece goods 29. The pusher 70 with the U-shaped suspension 78 and the drive rods 81 can be removed as one unity in direction E out of the pillar guide 71 in order to be cleaned. In an embodiment that is not further shown the pusher has furthermore
10 been provided with a gear rack that is engaged by a driven gear wheel in order to move the pusher up and down.

The servomotors 80 are electronically synchronised. The stroke of the servomotors 80 in direction E is such that the servomotor 80 is able to
15 put the pusher 70 downward in a starting position in which the push-up surface 74 extends in the extension of the bottom surface 56 or below it, and able to put it upwards in an end position in which the push-up surface 74 extends along the threshold 75 or above it. The upward and the downward speed, as well as the starting and end position are
20 variable and adjustable both before and during dispensing operations.

While operative a batch of piece goods 29 to be processed, such as pharmaceutical capsules, are manually dumped into the bunker 51. A part of the piece goods 29 due to the action of gravity immediately
25 drops through the opening 61 and comes to abut the first stopping surface 72 amply below the threshold 75. Subsequently the servomotor moves the pusher 70 upwards in direction E at a constant speed, as a result of which a part of the piece goods 29 abutting the first stopping surface 72 is passed gradually over the threshold 75 and the slide
30 surface 76 to the first vibrating trough 25. Piece goods 29 that have not been taken along then substantially motionless abut the second stopping surface 73 of the pusher 70 which stopping surface slides below past it.

35 At the end of the upward stroke the servomotors 80 move the pusher 70 downwards at increased speed, for instance a tenfold speed, as a result of which a next load of piece goods 29 can be passed over the threshold 75 without any interruption worth mentioning in the supply of

piece goods 29 over the threshold 75 and to the first vibrating trough 25. The optional interruption in the supply from the slide surface 76 is erased completely on the vibrating troughs 25, 26.

- 5 In case of a fully loaded bunker 51 the piece goods 29 will be positioned to below the skimming-off end 58, as a result of which a relatively short stroke of the pusher 70 from an intermediate position will be sufficient to ensure a constant supply of piece goods 29 to the first vibrating trough 25. As the bunker 51 becomes emptier, larger or
10 deeper strokes are necessary, having the push-up surface 74 to below the extension of the bottom surface 56 and past the threshold 75 in order to let the very last piece good 29 roll or slide on the push-up surface 74 and then drive it out of the bunker 51. As a result the bunker 51 will be fully emptied.

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- The above description is included to illustrate the operation of preferred embodiments of the invention and not to limit the scope of the invention. Starting from the above explanation many variations that fall within the spirit and scope of the present invention will be evident to an
20 expert. For instance several pushers that move counter each other can be active within the guide, which pushers in turns pass the piece goods over the same threshold.

Claims

1. Dispensing device for piece goods, comprising a conveyor and a discharge device for discharging the piece goods in a direction of passage to the conveyor, wherein the discharge device is provided with a bunker having a bottom surface that is oriented downwardly inclined
5 in the direction of passage, a first stopping surface that is oriented upwardly inclined in the direction of passage for keeping the piece goods situated on the bottom surface in the bunker, a threshold defining the transition from the first stopping surface to the conveyor, and a pusher that can be moved up and down along the first stopping
10 surface by means of a first drive, which pusher is provided with a push-up surface for upwardly pushing the piece goods over the threshold.
2. Dispensing device according to claim 1, wherein the drive is adapted for driving the upward motion of the pusher at a first speed, and driving
15 the downward motion at a second speed that is higher than the first speed.
3. Dispensing device according to claim 2, wherein the second speed is at least ten times, preferably at least twenty times higher than the first
20 speed.
4. Dispensing device according to any one of the preceding claims, wherein the drive is adapted for driving the upward motion of the pusher at a first speed that is substantially constant over the upward
25 path.

5. Dispensing device according to any one of the claims 2-4, wherein the drive is adapted for setting the first and/or second speed during dispensing operations of the dispensing device.
- 5 6. Dispensing device according to any one of the preceding claims, wherein the drive is adapted for an upward motion of the pusher from a starting position in which the push-up surface extends substantially in the extension of the bottom surface or below it.
- 10 7. Dispensing device according to any one of the preceding claims, wherein the drive is adapted for an upward motion of the pusher up to an end position in which the push-up surface extends past the threshold or above it.
- 15 8. Dispensing device according to claim 6 or 7, wherein the drive is adapted for adjusting the lowest starting position and/or highest end position of a stroke during dispensing operations of the device.
- 20 9. Dispensing device according to any one of the preceding claims, wherein the drive comprises a servomotor and an actuator unit for the servomotor.
- 25 10. Dispensing device according to any one of the preceding claims, wherein the bunker comprises an exit opening for passage of the piece goods to the first stopping surface, wherein at the upper side the exit opening is bounded by a skimming-off end which, considered in the direction of passage, is situated in front of and spaced apart from the threshold.
- 30 11. Dispensing device according to claim 10, wherein the skimming-off end has a lower end edge which in vertical direction is situated lower than the threshold.
- 35 12. Dispensing device according to any one of the preceding claims, wherein the pusher comprises a second stopping surface extending in front of the first stopping surface in order to keep the piece goods situated on the bottom surface in the bunker.

13. Dispensing device according to claim 12, wherein the first and second stopping surface extend substantially parallel to each other.
14. Dispensing device according to claim 12 or 13, wherein the first
5 and second stopping surface are substantially straight surfaces.
15. Dispensing device according to any one of the preceding claims, wherein the pusher is situated in a guide bounding a straight translatory path for the pusher, which path extends substantially parallel to the
10 first stopping surface.
16. Dispensing device according to claim 15, wherein the guide of the pusher is continued below the extension of the upper surface for retraction of at least a part of, preferably the entire pusher from its
15 push-up surface to below the extension of the bottom surface.
17. Dispensing device according to claim 15 or 16, wherein above the first stopping surface the guide is open for inserting and taking out the pusher in a direction substantially transverse to the first stopping
20 surface.
18. Dispensing device according to any one of the claims 15-17, wherein the pusher remains within the guide due to its own weight.
- 25 19. Dispensing device according to any one of the preceding claims, wherein the pusher at its side that faces the first stopping surface is provided with an engagement for the drive.
20. Dispensing device according to claim 19, wherein the drive
30 comprises a gear rack on the pusher and a driving gear wheel which with its axis of rotation is fixedly positioned in the dispensing device, for engagement onto the gear rack.
21. Dispensing device according to claim 20, wherein the pusher is
35 provided with a slot extending in its direction of movement in which slot the gear rack and the gear wheel have been accommodated, wherein the axis of rotation of the gear wheel is oriented substantially transverse to the first stopping surface.

22. Dispensing device according to any one of the claims 15-21, wherein the pusher is connected to the connecting rod of a linear servomotor extending parallel to the translatory path.

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23 Dispensing device according to any one of the preceding claims, wherein the pusher comprises a block-shaped slide of which a head surface defines the push-up surface.

10 24. Dispensing device according to any one of the preceding claims, wherein the pusher comprises a rectangular block-shaped slide of which a side surface defines the second stopping surface.

15 25. Dispensing device according to any one of the preceding claims, wherein the first stopping surface is oriented substantially transverse to the bottom surface.

20 26. Dispensing device according to any one of the preceding claims, wherein the first stopping surface is provided on an exchangeable piece or insert piece of the dispensing device.

25 27. Dispensing device according to any one of the preceding claims, comprising a slideway surface oriented downwardly inclined from the threshold in direction of passage for discharge of piece goods pushed over the threshold towards the conveyor.

30 28. Dispensing device according to any one of the preceding claims, wherein the conveyor comprises several vibrating troughs positioned in cascade.

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29. Dispenser machine comprising a frame having a row of dispensing devices for piece goods and positioned parallel to each other, wherein the dispensing devices each comprise a sub frame having a conveyor, a drive for the conveyor, a bunker for discharging the piece goods to the conveyor, and a piece goods counting device which form a unity, wherein the dispensing devices are positioned between substantially horizontal rails extending parallel to each other and below the conveyor of the dispensing devices, which rails at one side are connected to the

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frame, wherein the dispenser machine furthermore comprises at least two separate extension pieces that can be coupled in the extension of the rails for in a supported manner placing a dispensing device out of the row substantially in horizontal direction.

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30. Dispenser machine according to claim 29, wherein the rails are hollow and form a part of a discharge channel between the dispensing devices and a central air extractor.

10 31. Dispenser machine according to claim 29 or 30, wherein the dispensing devices and the frame are provided with cooperating electric insertion couplings that are adapted for uncoupling when placing the dispensing device out of the row in a supported manner.

15 32. Device provided with one or more of the characterising measures described in the attached description and/or shown in the attached drawings.

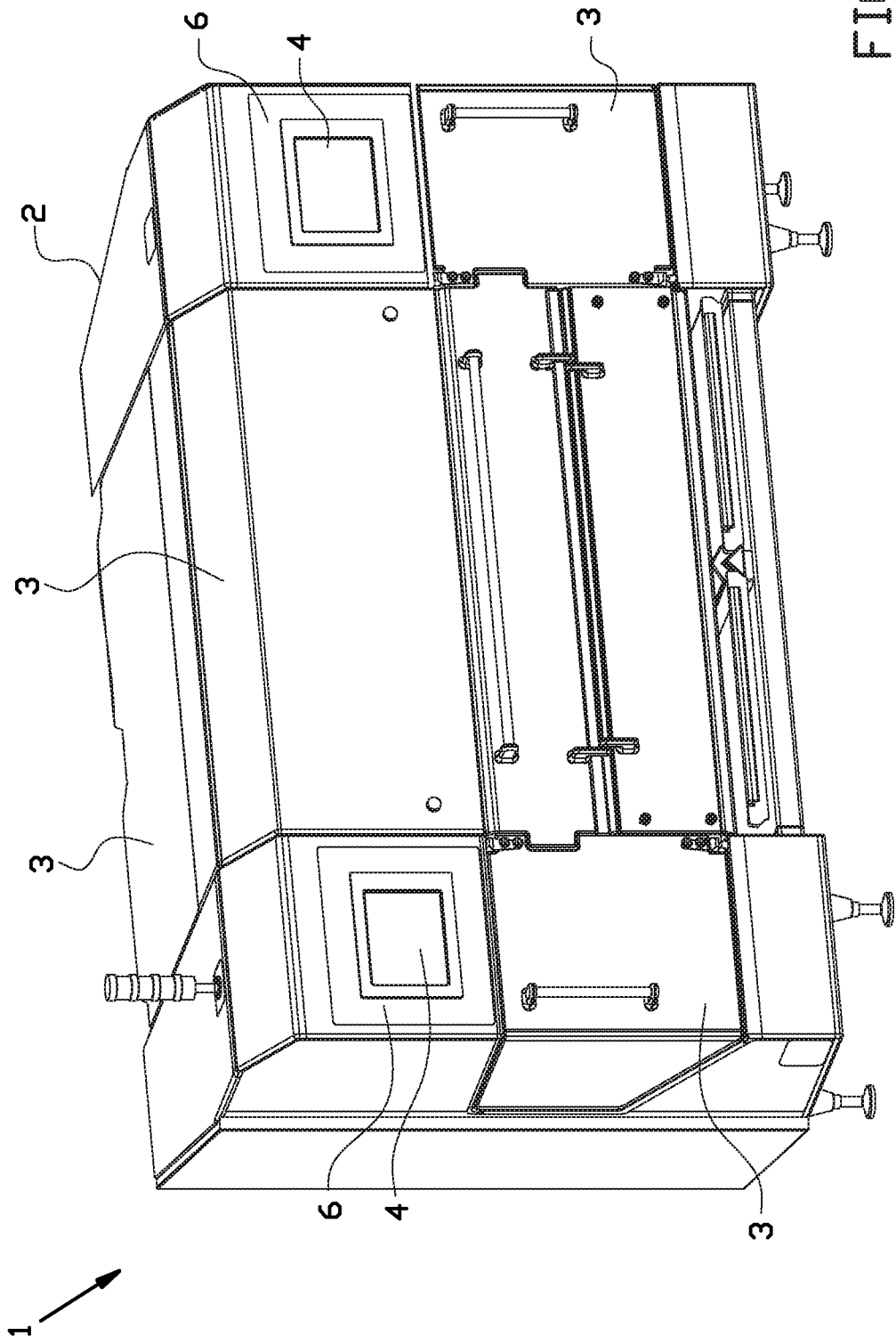
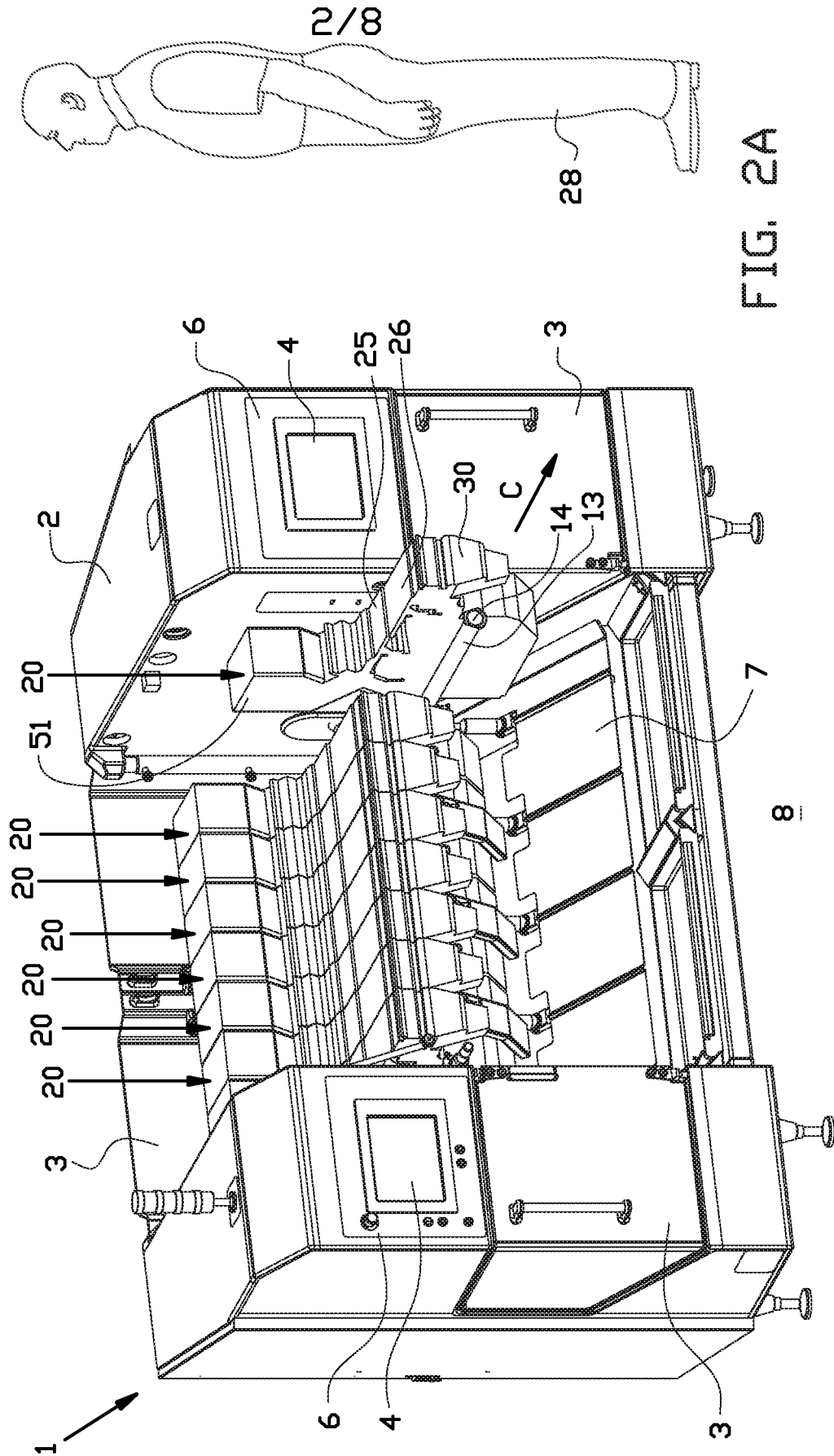


FIG. 1



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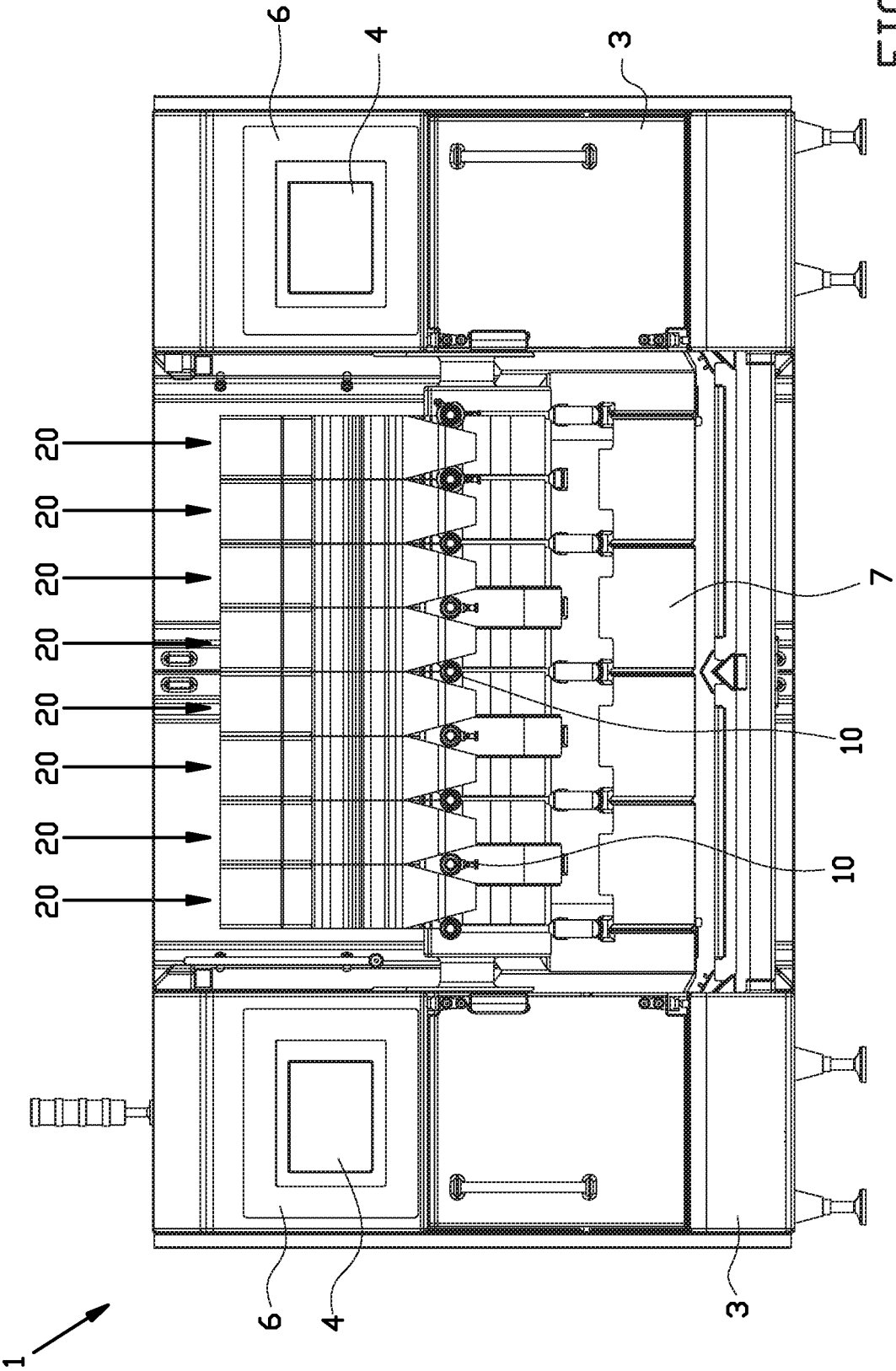


FIG. 2B

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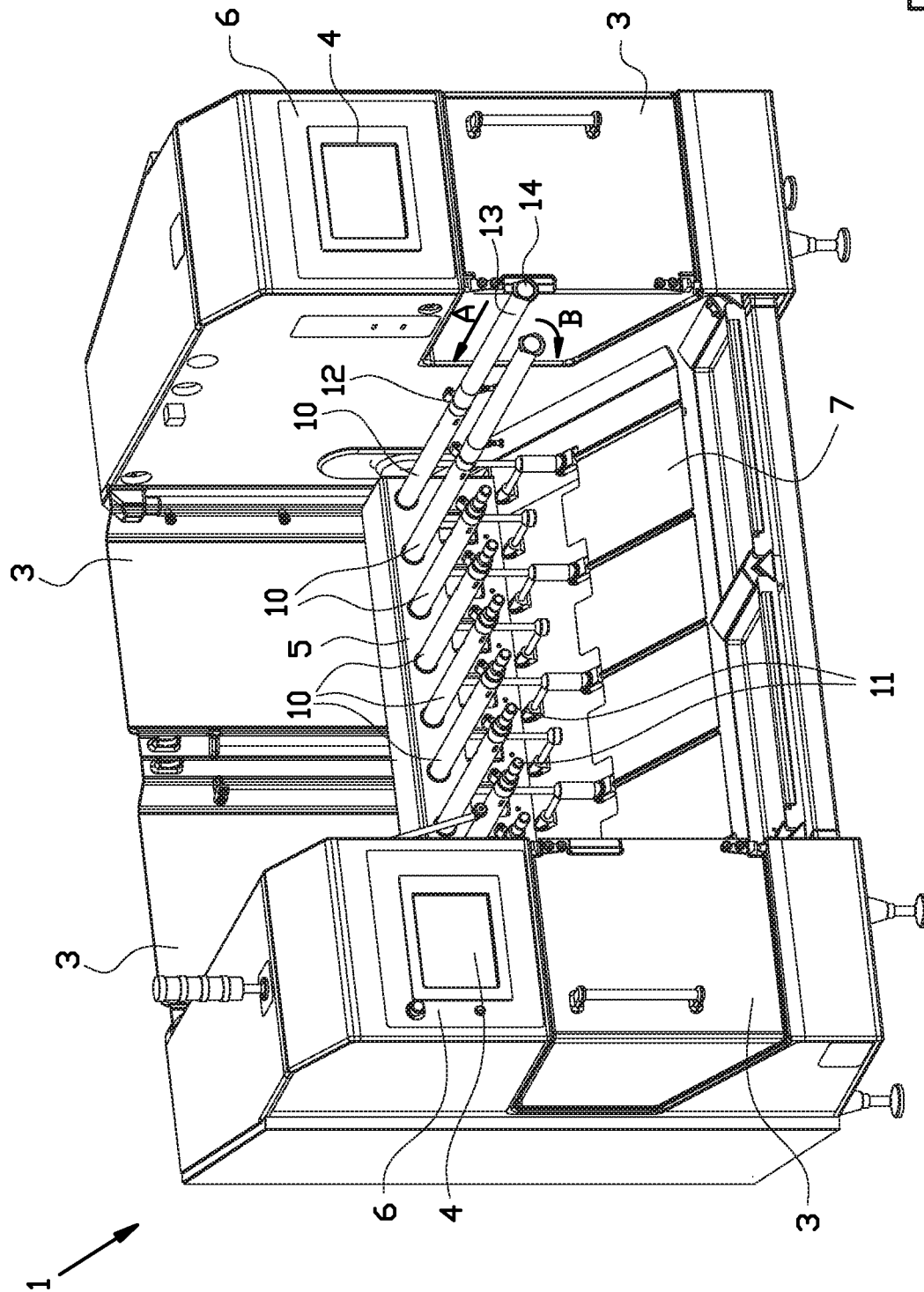
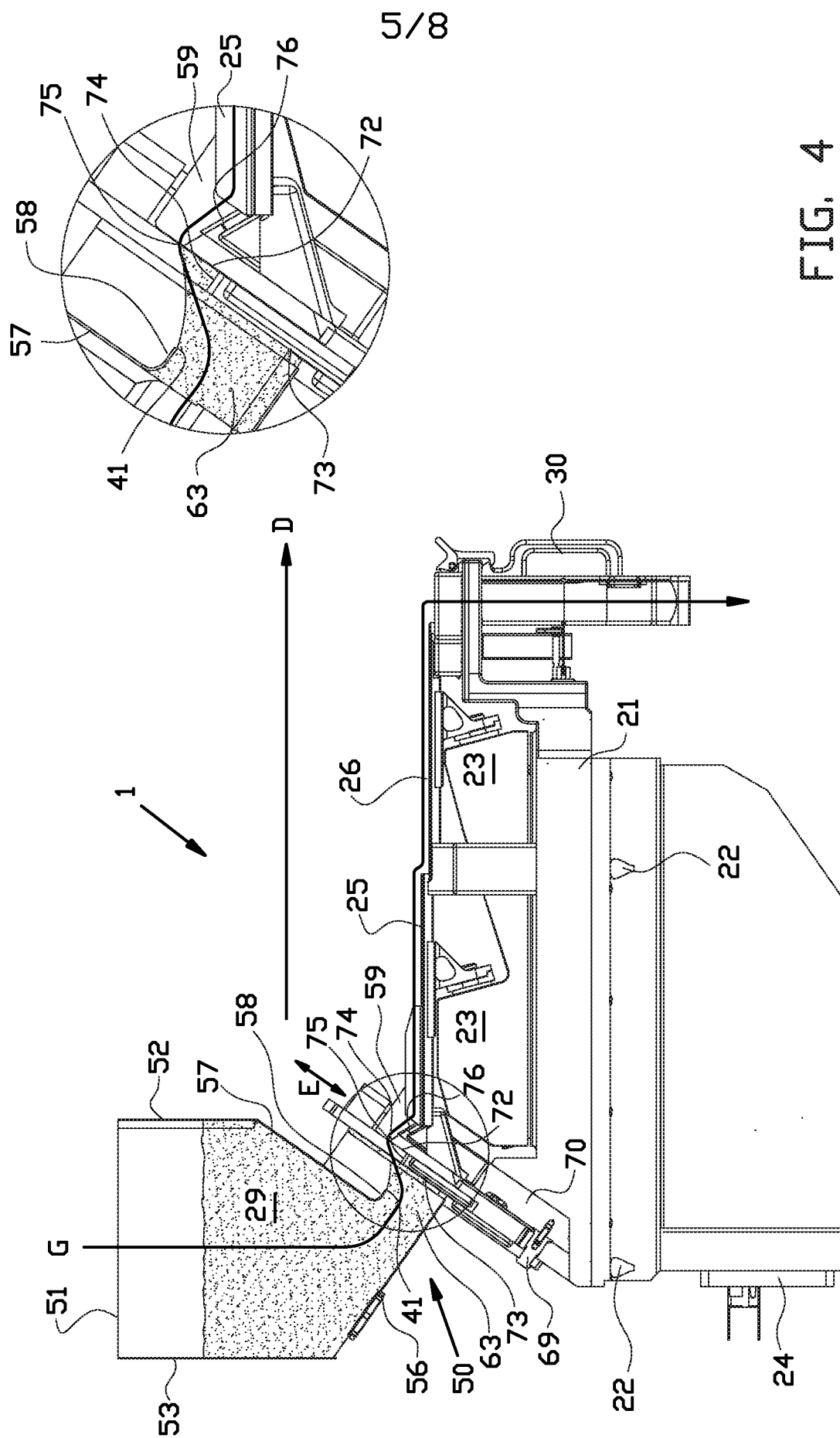


FIG. 3



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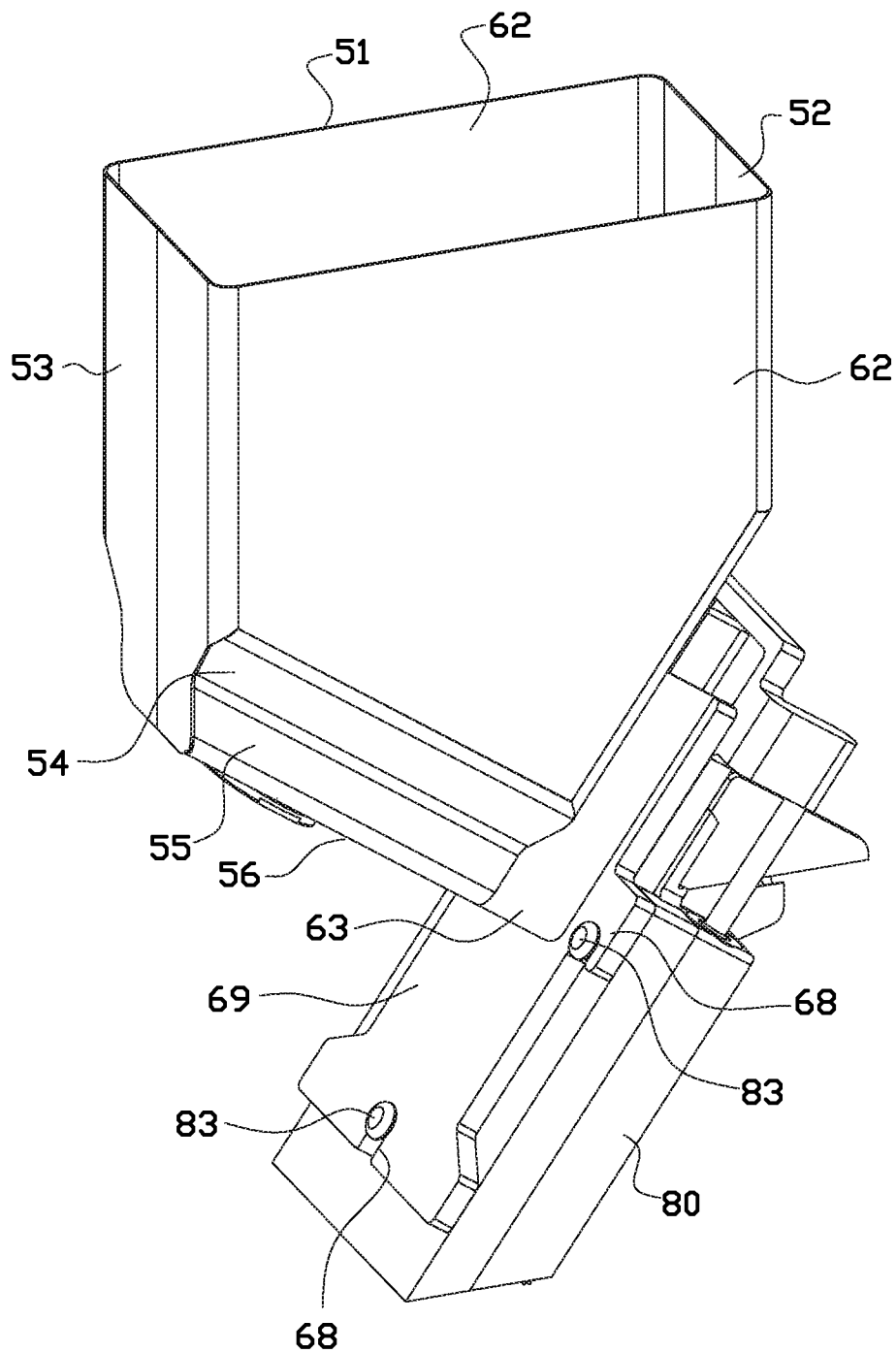


FIG. 5A

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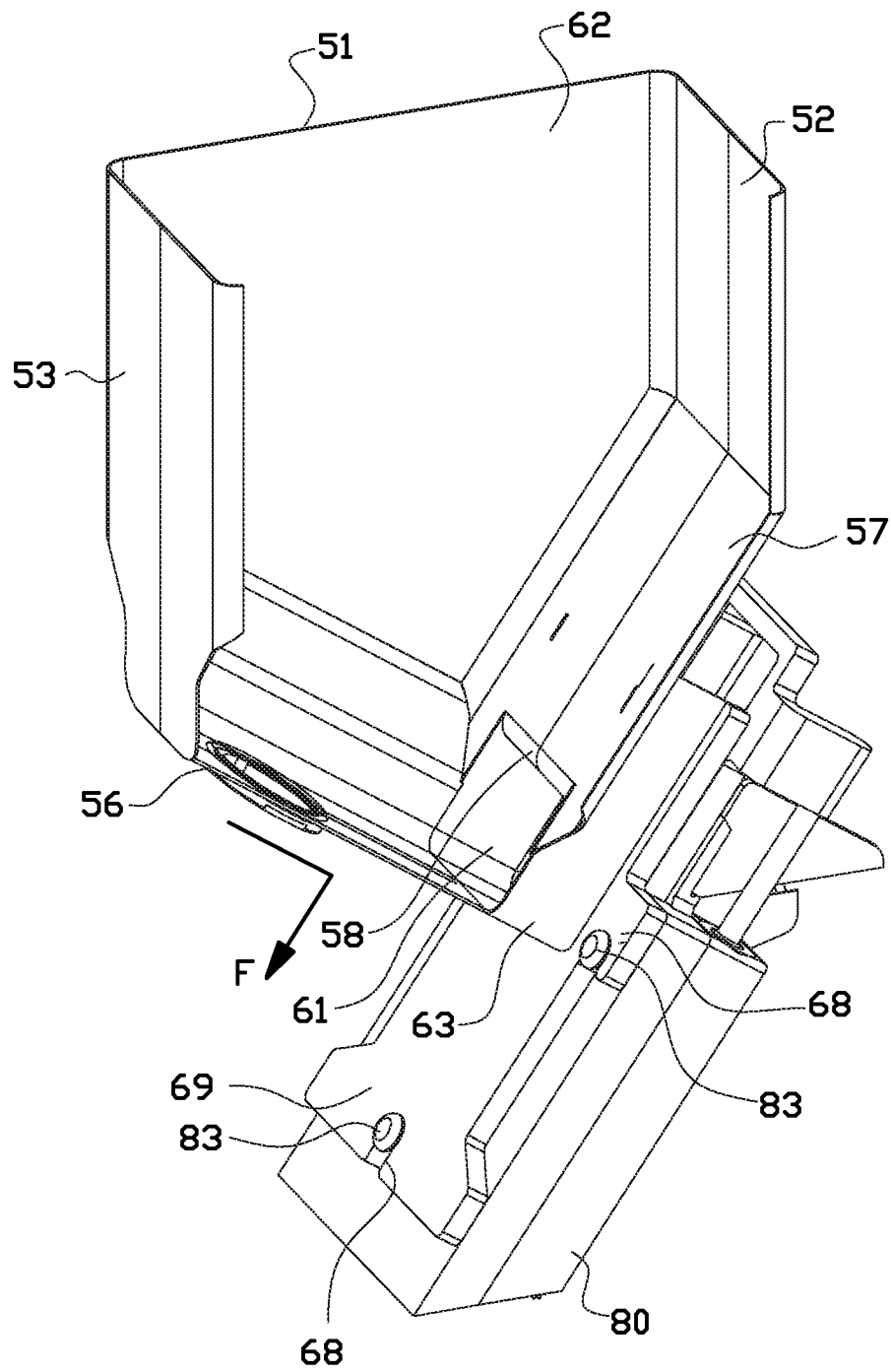


FIG. 5B

