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(54) **DEVICE AND METHOD FOR BORING THE COVERING FILM OF PALLETIZED LOADS**

(57) A device for boring the covering film of wrapped pallets comprising at least one linear conveyor (10) suitable for accommodating pallets (11) of products wrapped with films advancing with linear movement thereon and comprising at least one boring unit (20), associated with the linear conveyor (10), wherein each boring unit (20) comprises a pair of uprights (21) placed on opposite sides with respect to the linear conveyor (10) and each one bearing a plurality of boring groups (30) distributed in height along an axis (Z), characterized in that each boring group (30) comprises a perforating element (32), engageable in support against the wrapped pallet (11) moving along the linear conveyor (10). A relative boring method is also part of the invention.

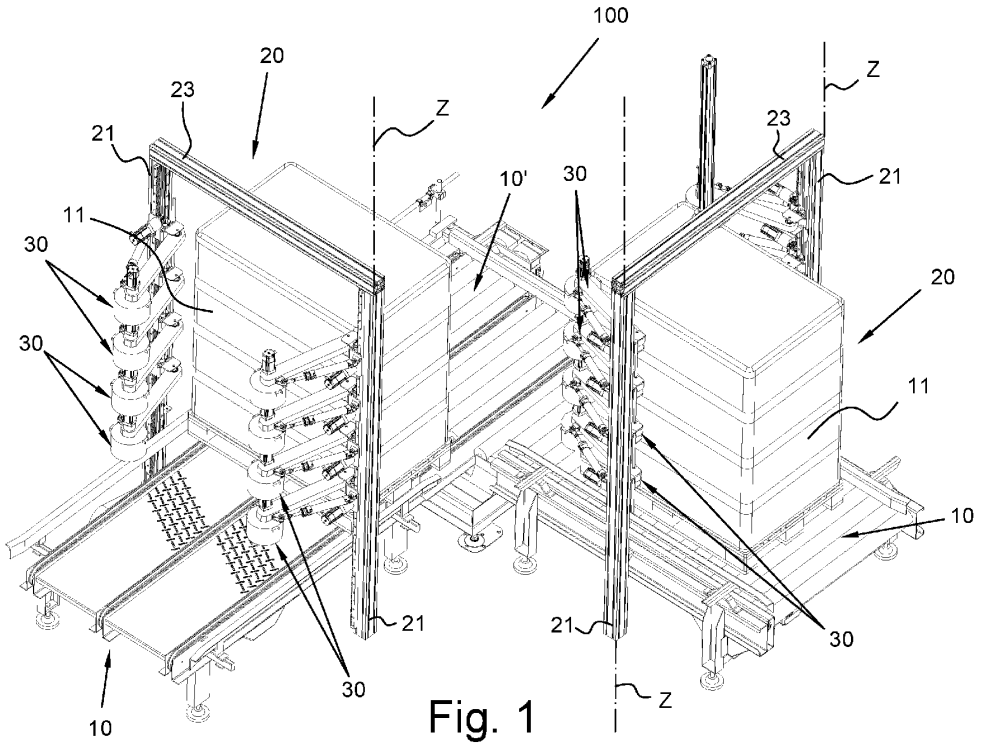

Fig. 1

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Description

[0001] The present invention relates to a device and to a method for boring the covering film of wrapped pallets.

[0002] Numerous methods are known for wrapping palletized loads which enable the transpiration of the load contained. Good transpiration can make it possible to prevent condensation forming inside the product and therefore an unsatisfactory package from an aesthetic point of view, but also potentially harmful for stagnant moisture inside it.

[0003] A first solution to the problem consists in the use of systems that enable the pallet wrapping program to be specifically changed, in order to leave a gap of exposed product and guarantee ventilation through such gap. However, such program may not be optimal for the consumption of film and the stability of the pallet.

[0004] Other solutions consist in the use of already micro-perforated films, but this system which is not in itself particularly effective on overlapping films, causes an increase in the film costs and also causes film machinability problems in the wrapping machine, requiring appropriate adjustments.

[0005] Other solutions relate to the boring of the film with appropriate punches, which takes place in a relevant section of the system separate from the wrapping. Such solutions contemplate the presence of appropriately shaped punches that are moved towards the pallet until boring the film with a certain shape in clearly precise points. Such punches can be arranged according to a matrix and adjusted in a suitable position at a format change or be movable along a vertical and horizontal axis to make a series of holes in sequence layer per layer, according to what is shown for example in EP1721830A1 and EP2850005A1.

[0006] The main problem of such system is its reduced speed, which is insufficient to satisfy the requirements, in particular of high frequency PET bottling lines, where the need emerges to wrap 120 or 150 pallets per hour.

[0007] A first intrinsic limitation of the boring speed of such systems relates to the intermittent operation of the line, which envisages the need to stop the pallet and actively move the structure bearing the boring heads towards the pallet.

[0008] Furthermore, in particular, the alternative system with sequence boring of the different layers of pallet strongly limits the frequency and requires complicating the line layout forcing the installer to place in general four or more systems in parallel.

[0009] Another solution, shown in DE19503927A1, consists of making the wrapped pallet transit below a fixed portal structure, bearing packed thereto a plurality of nozzles able to blow compressed air against the lateral walls of the wrapped pallet and cause the punctual breaking of the film.

[0010] However, this solution is not adaptable to different pallet dimensions and is necessarily limited to the sole and exclusive use of air nozzles as boring means.

[0011] The aim of the present invention is that of realizing a device and method for boring the covering film of wrapped pallets which enables the number of pallets processed per hour to be increased.

[0012] Another aim of the present invention is that of realizing a device and a method for boring the covering film of wrapped pallets adaptable to wrapped pallets of different shapes and sizes, through simple initial setting operations.

[0013] A further aim of the present invention is that of realizing a device and a method for boring the covering film of wrapped pallets able to operate with a wide tolerance range on the dimensions and irregularities of the pallets.

[0014] These aims according to the present invention are reached by realizing a device and a method for boring the covering film of wrapped pallets as set out in claim 1.

[0015] Further features are comprised in the dependent claims.

[0016] The characteristics and advantages of a device and a method for boring the covering film of wrapped pallets according to the present invention shall become clearer from the following exemplifying and nonlimiting description, with reference to the appended schematic drawings in which:

Figure 1 is a perspective view of a device for boring the covering film of wrapped pallets according to the invention in a conformation comprising two boring units arranged orthogonally to one another;
Figure 2 is a plan view from above of Figure 1;
Figures 3 and 4 are a lateral and front view of a device for boring covering film according to the present invention, according to a minimum conformation;
Figure 5 shows an enlarged detail of the boring unit shown in Figures 1-4;
Figure 6 and 7 show two different conformations of the rotating disc of the boring unit according to the invention;
Figures 8 to 10 show an enlarged detail of the boring element according to three different embodiments;
Figure 11 shows a boring unit comprising an additional roller guide.

[0017] With reference to the figures, a device for boring the covering film of wrapped pallets is shown, indicated overall with the number 100 and comprising at least a first linear conveyor 10 on which pallets 11 of products wrapped with film are supplied in succession, which advance with linear movement on the linear conveyor 10, as schematized by the arrow F.

[0018] The device 100 comprises at least one boring unit 20, associated with the linear conveyor 10.

[0019] Each boring unit 20 comprises a pair of uprights 21, in the example joined by a cross member 23 to form a portal, placed on opposite sides with respect to the linear conveyor 10 and each one bearing a plurality of

boring groups 30 distributed in height along an axis Z.

[0020] According to a more complete conformation, shown in Figures 1 and 2, the device 100 according to the invention comprises at least a second linear conveyor 10, extending orthogonally from the first linear conveyor 10 and connected to the same by means of an orthogonal deviator 10'. The second linear conveyor 10 comprises at least one further boring unit 20 for boring the pallet 11 on second opposite sides orthogonal with respect to the first two opposite perforated sides.

[0021] According to a further simplified configuration, shown in Figures 3 and 4, the device 100 according to the invention can comprise only one linear conveyor 10 bearing at least one forming unit 20.

[0022] According to the invention, on each of the linear conveyors 10 multiple forming units 20 can be arranged in series so as to offset the boring in alternate layers. For example, the first boring unit 20 acts on the layer 1 and 3, the second portal acts on the layer 2 and 4. This enables low products to be processed, whose height would not enable all the cutting edges to be aligned on a single vertical adjustment guide 22 along the upright 21.

[0023] Each boring group 30 comprises a perforating element 32 elastically articulated to the upright 21 and engageable in support against the wrapped pallet 11 which is supplied and moves along the linear conveyor 10.

[0024] According to a preferred embodiment, shown in the enlarged detail of Figure 5, each boring unit 30 comprises an arm 31, hinged to the upright 21 and bearing at its free end the perforating element 32.

[0025] Each boring group 30 further comprises an actuator 33 acting on the perforating element 32 for modulating the pressure of the perforating element 32 against the wrapped pallet 11 that moves along the linear conveyor. The perforating element 32 is therefore kept resting against the pallet 11 with or without sliding with respect to the latter according to the configuration thereof.

[0026] Preferably, the actuator 33 is a pressure-controlled cylinder actuator hinged between the upright 21 and the perforating element 32. The pressure adjustment of the cylinder 33 influences the shear force of the perforating element 32 and acts as a spring guaranteeing constant contact with the film. Furthermore, such cylinder 33 enables the arm 31 to be brought back into an open rest position.

[0027] The boring group 30 is provided with a height adjustment system comprising a vertical adjustment guide 22 arranged on the upright 21 along the axis Z and preferably comprising a dedicated motor 34 for automatic height adjustment, which can be used for the format change and also for the correction of the level between one pallet and the next one.

[0028] According to a first configuration shown for example in Figure 5, the perforating element 32 comprises a rotating disc 35 bearing at least one cutting element 37. The rotating disc 35 may be idle or preferably moved by a motor 36 placed in axis therewith, as shown in the figures.

[0029] The rotating disc 35 is able to roll on the lateral wall of the pallet 11, thus cutting the film at the desired pitch determined by the position of the cutting edges and the rotation speed.

[0030] The motor 34 enables the cutting phase to be adjusted and by varying the speed ratio between the linear conveyor 10 of the pallet 11 and the rotation of the rotating disc 35 also the pitch to be changed and possibly also the number of holes made on the side of the pallet 11.

[0031] According to what is shown by way of example, respectively in Figures 6 and 7, the rotating disc 35 comprises a cylindrical portion having a sufficient height for abutting the wall of the wrapped pallet 11, or can be shaped like a thinner disc 35 which acts punctually in the cutting zone without abutting the bottle if the resistance of the wrapping enables this.

[0032] The disc 35 is preferably shaped with a large diameter so as to roll as uniformly as possible and find a repeatable abutment on the side of the bottles wrapped in the film casing that are treated.

[0033] The cutting element comprises one or more blades 37 (Figures 5, 8 and 9) or a shaped conical tip 37' (Figure 10), possibly heated to facilitate cutting the film.

[0034] According to two particular embodiments shown in Figures 8 and 9 the perforating element 32 comprises means for folding inwards a flap of cut film combined with the cutting element 37, 37', shown provided by means of air jets 38, 38' or also alternatively possible through mechanical means.

[0035] Figure 8 shows a nozzle 38 integrated into the support arm 11, which shoots after the cutting element 37 has performed the cut; Figure 9 instead shows the nozzle 38' integrated into the cutting element 37.

[0036] According to an alternative embodiment, the device 100 according to the invention can comprise a roller guide 39, articulated to the boring group 30 for resting on the side of the wrapped pallet 11 more continuously.

[0037] The device 100 according to the invention comprises a detection system 24 for the height of the product, exemplified by the feeler cylinder positioned on the cross member 23, which verifies the height of each individual pallet 11 arriving, so as to correct the height adjustment of the boring groups 30 and correct any errors mainly due to tolerances on the wooden pallet.

[0038] The number of boring groups 30 arranged on each side depends on the maximum number of layers of the pallet 11 on which the boring is to be performed. Possible unused boring groups 30 are adjusted in a position outside the dimensions of the pallet 11 at the top end of the uprights 21.

[0039] In the device 100 according to the invention, the position of the pallet 11 is communicated to a control unit of the machine by a trigger photocell. The conveyor 10 can be provided with an encoder to guarantee the maximum precision and repeatability of the boring.

[0040] A method for boring the covering film of

wrapped pallets according to the present invention envisages continuously feeding a pallet 11 onto a linear conveyor 10 towards a boring unit 20 and cutting the film of the moving pallet 11 during the passage of the latter inside the boring unit 20, forcing the pallet 11 to pass through boring groups 30 arranged on opposite sides and distributed on the vertical axis Z and acting under pressure against the side walls of the pallet 11.

[0041] The device and method for boring the covering film of wrapped pallets according to the present invention have the advantage of enabling the boring of a high number of pallets per hour thanks to carrying out the cut without stopping the pallet.

[0042] The device and method according to the present invention are further advantageously adapted to obtain the boring of all four sides of the pallet.

[0043] Advantageously, the device can assume different spatial configurations in a versatile way.

Claims

1. Device for boring the covering film of wrapped pallets comprising at least a first linear conveyor (10) suitable for accommodating pallets (11) of products wrapped with films advancing with linear movement thereon and comprising at least one boring unit (20), associated with the linear conveyor (10), wherein each boring unit (20) comprises a pair of uprights (21) placed on opposite sides with respect to the linear conveyor (10) and each one bearing a plurality of boring groups (30) distributed in height along an axis (Z), **characterized in that** each boring group (30) comprises a perforating element (32) elastically articulated to the upright (21), engageable in support against the wrapped pallet (11) moving along the linear conveyor (10).

2. Device according to claim 1, **characterized in that** each boring group (30) comprises an arm (31), hinged to the upright (21) and bearing at its free end the perforating element (32), and comprises an actuator (33) acting on the perforating element (32), suitable for modulating the pressure of the perforating element (32) against the wrapped pallet (11) moving on the linear conveyor.

3. Device according to claim 2, **characterized in that** the actuator (33) is a pressure-controlled cylinder actuator hinged between the upright (21) and the perforating element (32).

4. Device according to any of the preceding claims, **characterized in that** the perforating element (32) comprises a rotating disc (35), preferably moved by a motor (36), and bearing at least one cutting element (37, 37').

5. Device according to claim 4, **characterized in that** the cutting element comprises one or more blades (37) or a shaped conical tip (37'), possibly heated to facilitate cutting the film.

6. Device according to claim 5, **characterized in that** the perforating element (32) comprises means for folding inwards a flap of cut film, preferably by means of air jets (38, 38') combined with the cutting element (37, 37').

7. Device according to claim 5 or 6, **characterized in that** the rotating disk (35) comprises a cylindrical portion for striking against the wrapped pallet (11).

8. Device according to any of the preceding claims, **characterized in that** it comprises a roller guide (39) for resting on the side of the wrapped pallet (11).

9. Device according to any one of the preceding claims, **characterized in that** the boring group (30) is equipped with a height adjustment system comprising a vertical adjustment guide (22) arranged on the upright (21) along the axis (Z) and, preferably a dedicated motor (34) for automatic adjustment.

10. Device according to any one of the preceding claims, **characterized in that** it comprises at least a second linear conveyor (10) extended orthogonally by the first linear conveyor (10) and connected to the same by means of an orthogonal deviator (10'), wherein the second linear conveyor (10) comprises at least one further boring unit (20) for drilling the pallet on second opposite sides orthogonal to the first two opposite perforated sides.

11. Device according to any one of the preceding claims, **characterized in that** it comprises at least two boring units (20) arranged in series aligned on the linear conveyor (10).

12. Device according to any one of the preceding claims, **characterized in that** it comprises a detection system (24) for the height of the product.

13. Method for boring the covering film of wrapped pallets (11) according to the present invention, **characterized in that** it comprises the steps of:

    - continuously feeding a pallet (11) on a linear conveyor (10) towards a boring unit (20)
    - forcing the pallet (11) to pass through boring groups (30) arranged on opposite sides of the boring unit (20) and distributed on a vertical axis (Z), elastically articulated and acting under pressure against the side walls of the pallet (11);
    - cutting the film of the pallet (11) in movement during the passage between the cutting ele-

ments (37) of the boring groups (30) inside the boring unit (20).

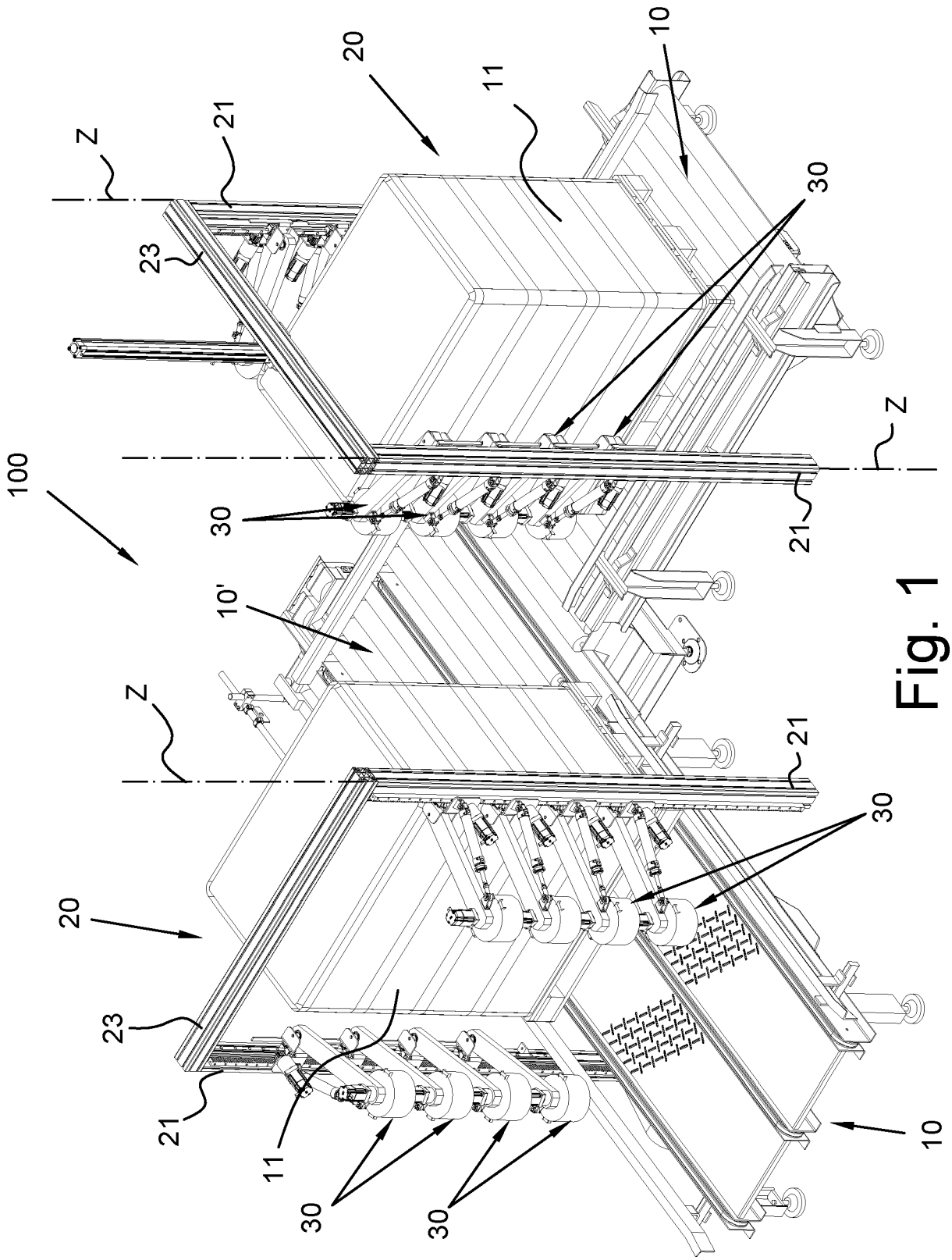

Fig. 1

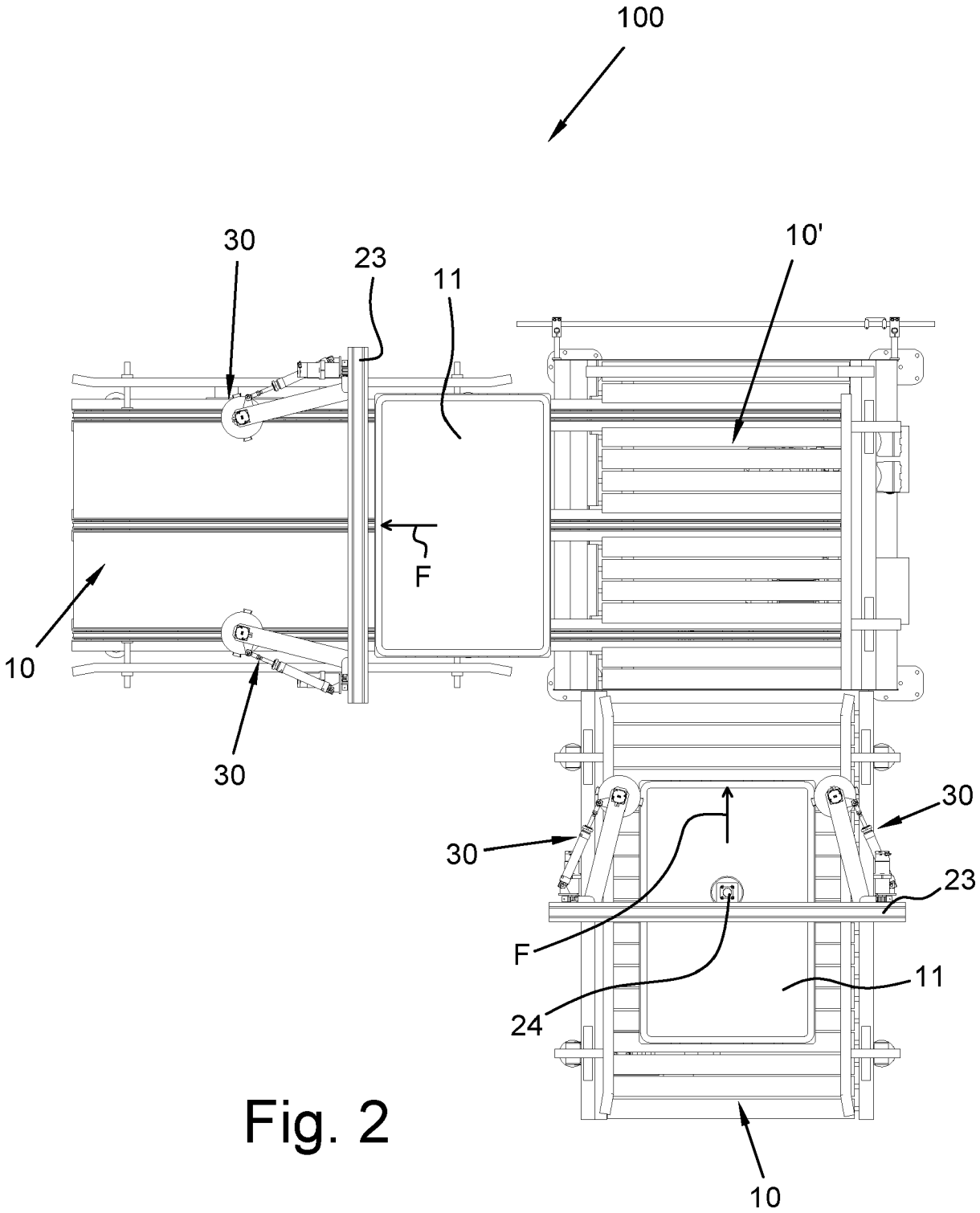

Fig. 2

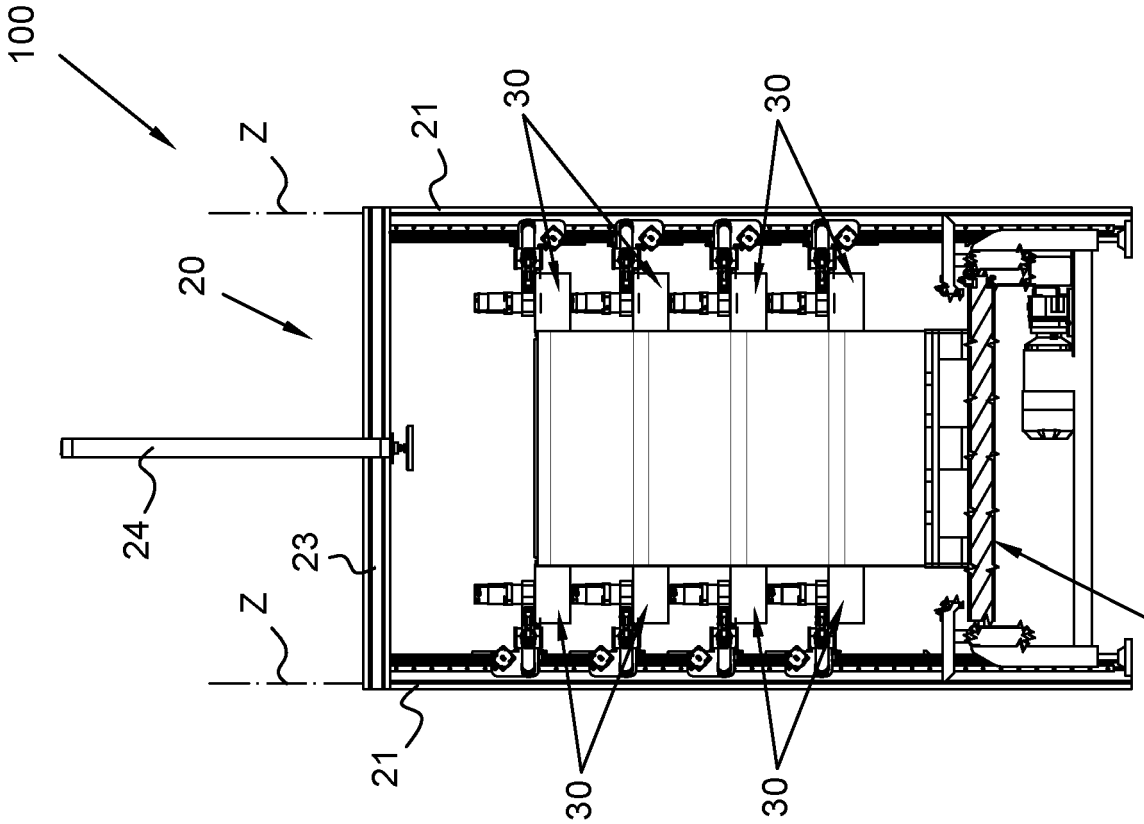

Fig. 4

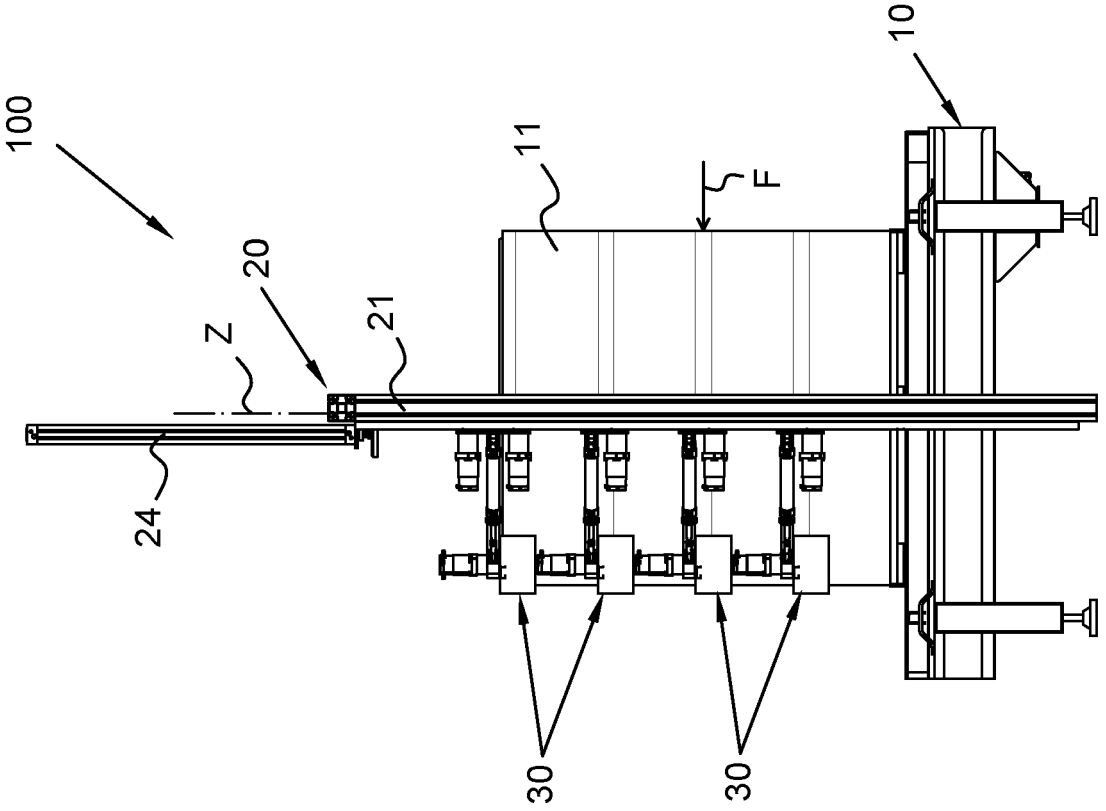

Fig. 3

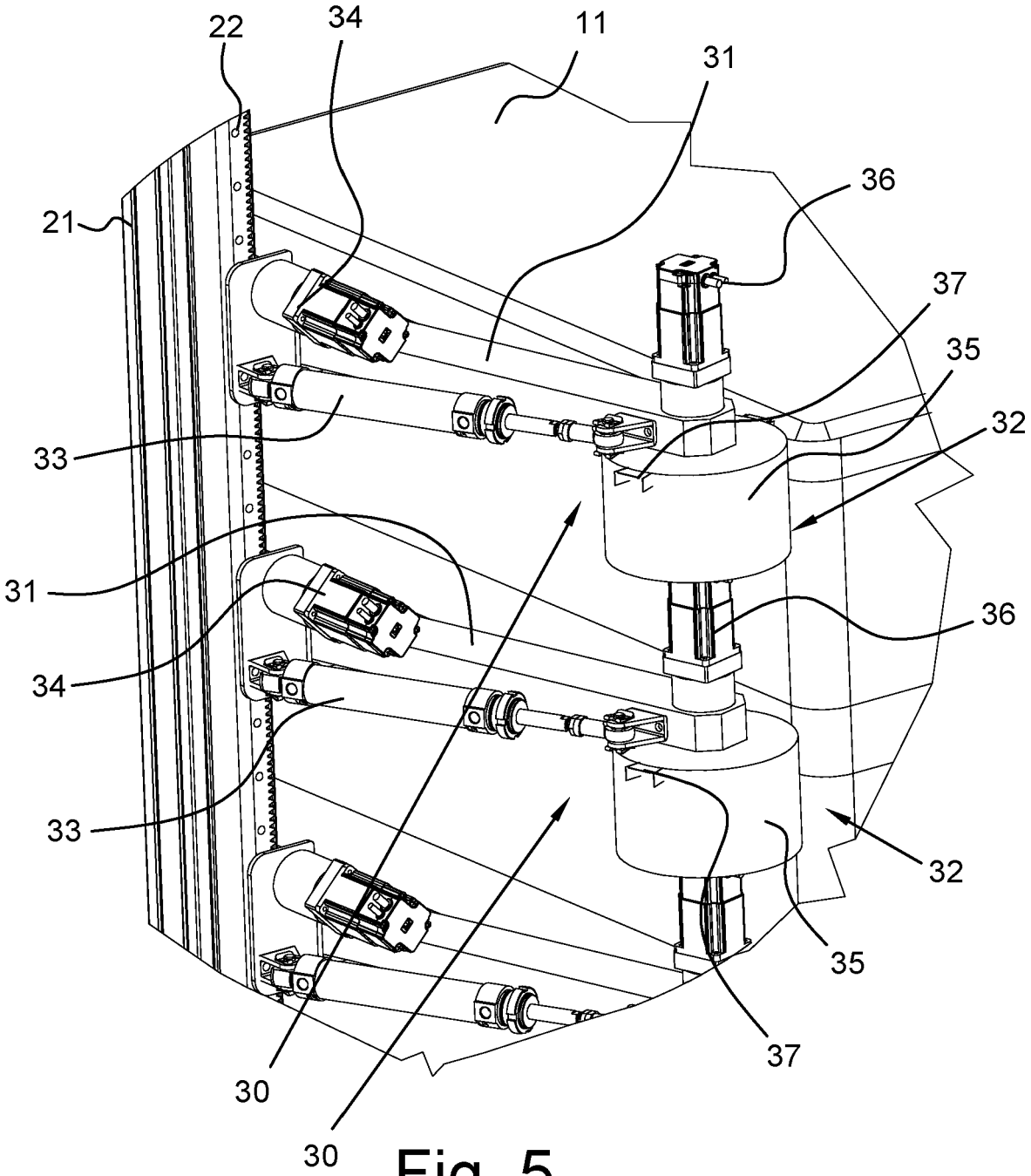

Fig. 5

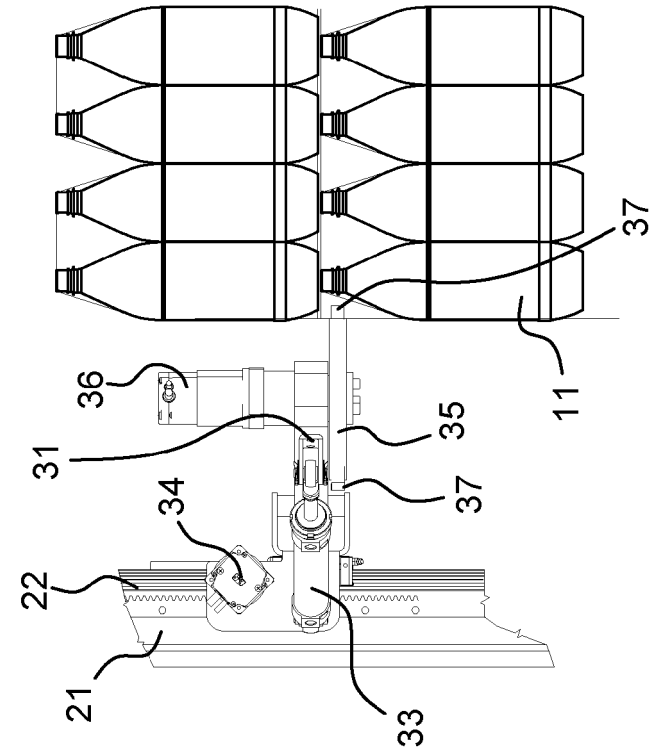

Fig. 7

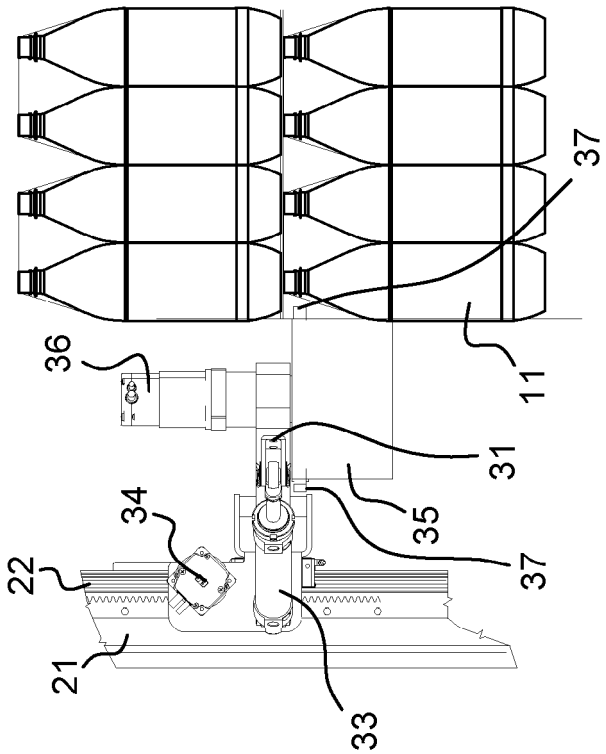

Fig. 6

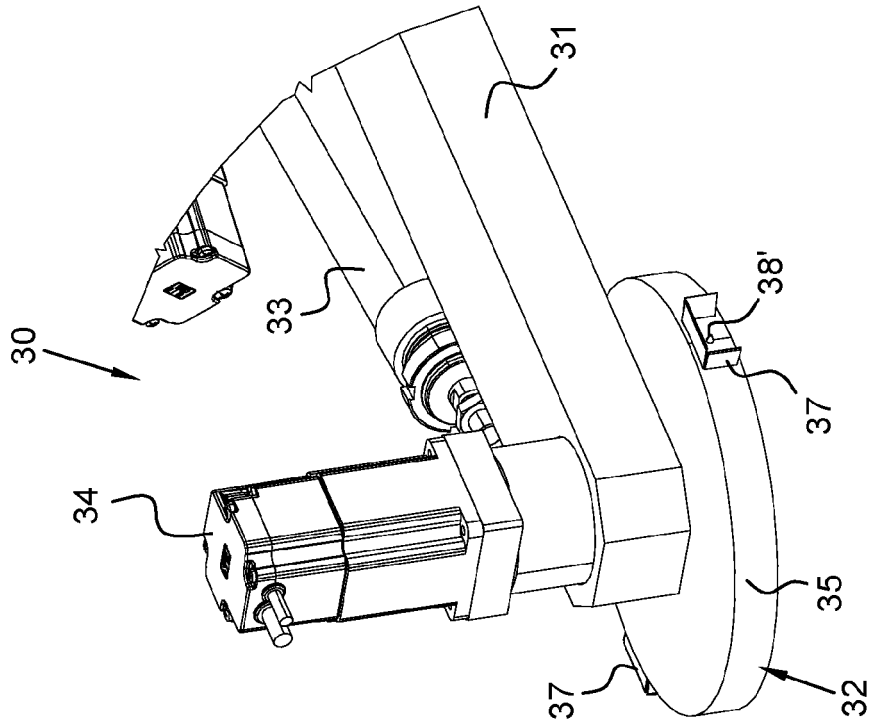

Fig. 9

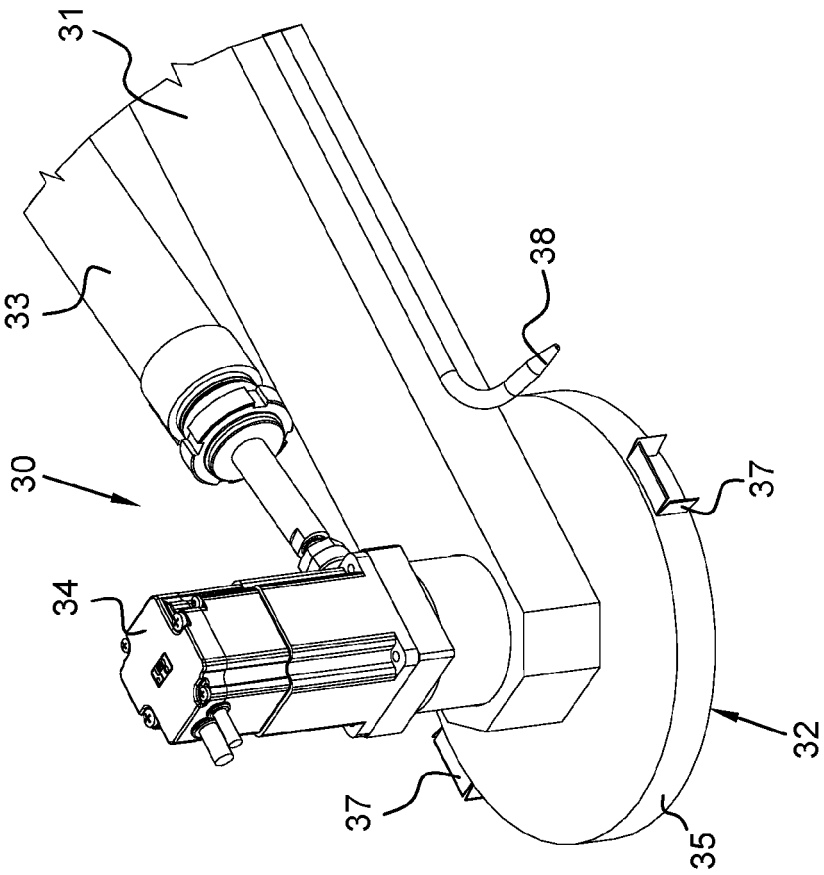

Fig. 8

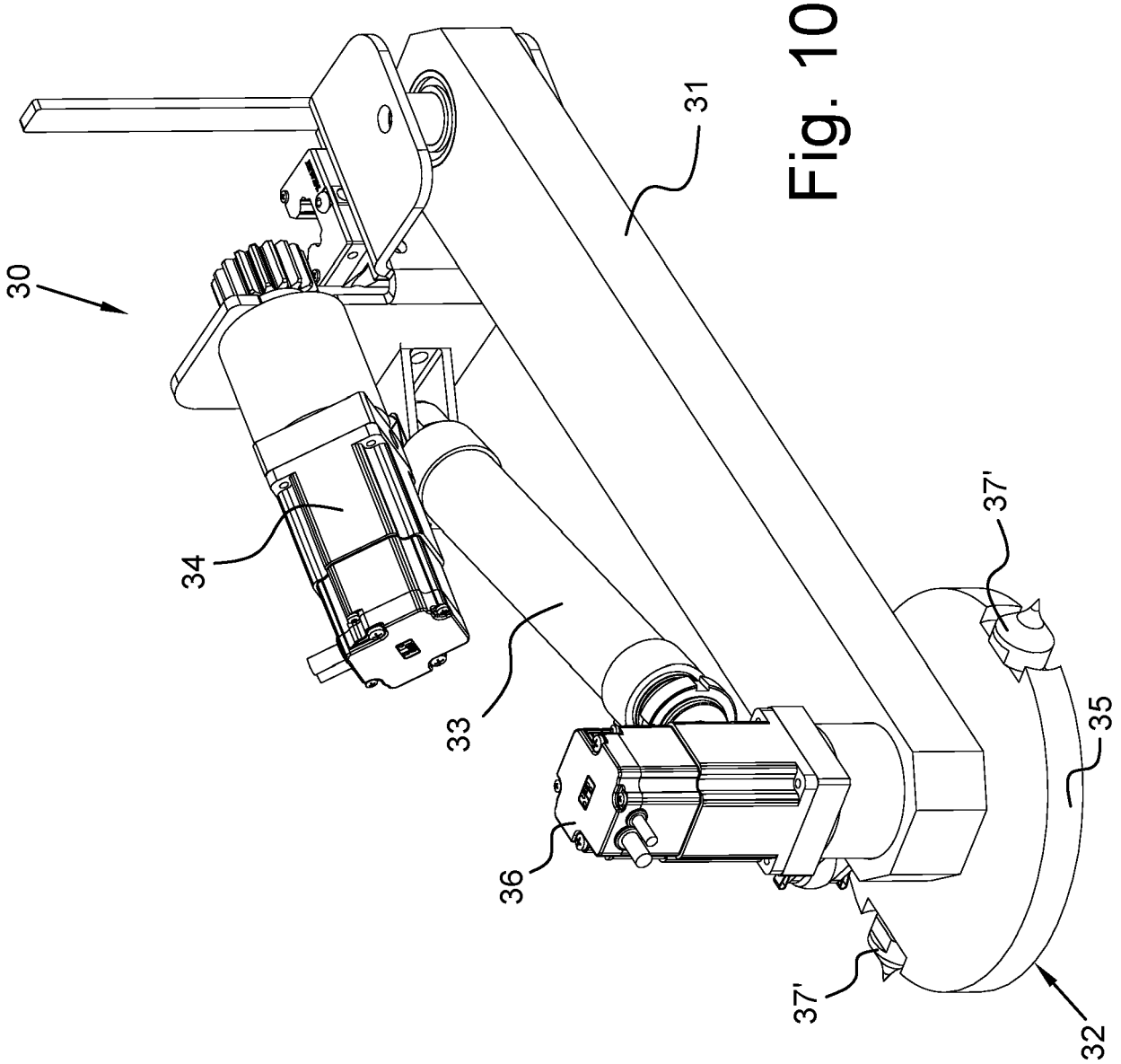

Fig. 10

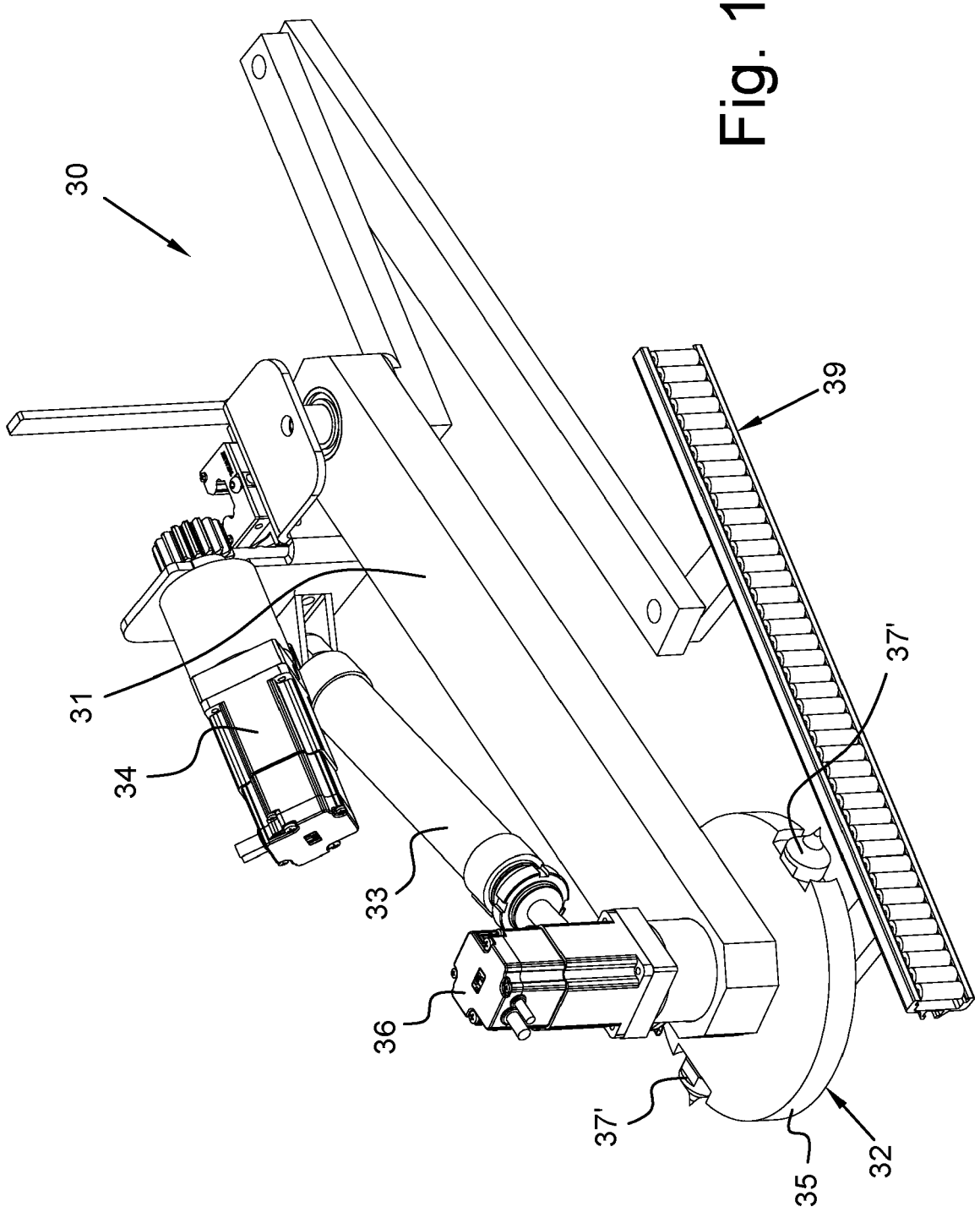

Fig. 11

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EUROPEAN SEARCH REPORT

Application Number
EP 21 17 4756

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

B26F
B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	16 September 2021	Garlati, Timea

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