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Remarks:
In accordance with Article 14(2), second sentence EPC the applicant has filed a text with which it is intended to bring the translation into conformity with the original text of the application.

(54) **Plano sheet feeder**

(57) The supply device 1 has two rows each with two suction cups 17 and 19 for the sucking of a fixed plate 35. The suction cups are over the support arms 7 and 9, and a swing arm 5 is connected to a carriage 23. Between the carriage and the arms are pneumatic cylinders 11-15 are present for moving the suction cups.

The supply device further has a pressure roller 21 during the moving of the suction cups against the press plate and thereby to the vacuum break. The pressure roller is movable against a spring force.

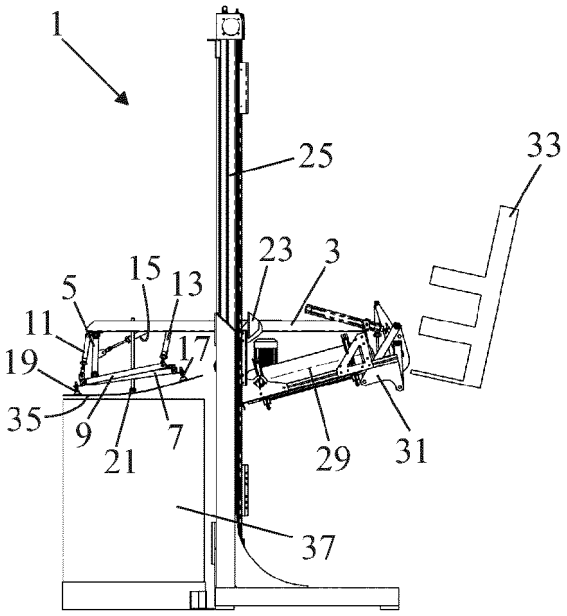

FIG. 6

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Description

Technical filed of the invention

[0001] The invention relates to a feed device for flat sheets, in particular cardboard sheets, comprising a frame, as well as at least one suction cup for securing sucking of a plate, as well as connected to the frame displacing means for displacing the suction cup between a pick up position in which the suction picks up a plate and a lay down position where the suction plate lays down.

Background of the invention

[0002] At such a feeding device is generally known. To the plate after moving the suction cup to release the vacuum should be lifted. This is often done through an opening in the suction cup of the opening or instead of suction via the suction cup connected to the conduit to blow.

Summary of the invention

[0003] It is an object of the present invention to provide a device of the type defined in the opening paragraph in which the suction cup the face plate can let go. For this purpose, the supply device according to the invention is **characterized in that** the feed apparatus further comprises a frame found to be pressure element, in which during the moving of the suction cup of the pick-up position to the lay down position, the pressure element and the plate in contact with each other and against each other pressing whereby the plate has a suction cup is directed away from the force which breaks the vacuum and the sheet separates from the suction cup. By moving the plate pressed against the pressure element is pulled so that the plate bends slightly and apply the vacuum to the suction cup hangs up. Preferably, only the achievement of the near lay down position the large force is sufficient to break the vacuum.

[0004] An embodiment of the supply device according to the invention is **characterized in that** the feed apparatus further comprises a further suction cup comprises those seen in displacement direction at a distance from the suction cup is present, and is also connected to the displacement means, wherein the pressure element between the two suction cups is present. As a result, the plate can be more securely held, and in particular be bent to better breaking the vacuum. Preferably, seen in the direction of displacement next to each suction cup, a further suction cup is present, wherein the pressure element is present next to each other between the two pairs of suction cups is present.

[0005] A further embodiment of the supply device according to the invention is **characterized in that** the displacement means comprise a pivot arm cover, which is with one end connected to the frame is connected, as well as supporting arms, of which two support arms near a first end being hingedly connected with the swiveling arm and near the other, second end pivotally connected to the first ends of two further support arms, wherein the other, second ends of the further supporting arms via a first cylinder-piston combination are connected to the pivot arm, the second ends of the support arms via a second cylinder-piston combination are connected with the frame, and the pivot arm via a further cylinder-piston combination is connected to the frame, and wherein the suction cups are connected to the second ends of the support arms and further support arms. The construction of the swing arm, suspension arms and piston-cylinder combinations make it possible for the mutual position of the suction cups and the position of the suction cups with respect to the frame is optimal for the picking up and putting down of moving sheets from a stack into a container.

[0006] Yet a further embodiment of the supply device according to the invention is **characterized in that** the pressure element is movable against a spring force. This vacuum is not broken abruptly but gradually as the pressure force by the sag is gradually built up.

[0007] The frame is preferably attached to a carriage which is movable along a vertical guide. This allows in a simple manner to take account of the lowering of the stack of plates during the fall and to a processing device feeding of the plates.

[0008] Furthermore, it is preferably a plate holder in which the sheets will be deposited connected with the frame, as well as a gripper which the plates from the plate holder moves to a receiving tray. This allows the plates after they have been taken from the stack simply is provided to a processing device.

Brief description of the drawings

[0009] The invention will be further elucidated below on the basis of drawings. These drawings show an embodiment of the micro gas turbine manufactured according to the method in the present invention. In the drawings:

Figure 1 is a perspective view of the supply device;
Figure 2 shows the supply device in perspective from a different angle;
Figure 3 shows a detail of the carriage of the feed device in perspective;
Figure 4 shows the detail of the supply device in perspective from a different angle;
Figure 5 is a side view of the supply device at the time of gripping of a plate by means of suckers;
Figure 6 the feeder while picking up the plate using the suction cups;
Figure 7 shows the feed device during the displacement of the plate by means of the suction cups;
Figure 8 the feed device during the transport of the plate by means of transport wheels;
Figure 9 of the supply device with the plate in a tray;

Figure 10 the feeder with the plate gripped by a gripper with open base halves of the receptacle;
Figure 11 the supply device in which the plate is properly released by the gripper, and
Figure 12 the feeder back into the starting position.

Detailed description of the drawings

[0010] In Figures 1 to 4 is an embodiment of the supply device according to the invention in perspective in the whole and shown in detail, from different angles. The supply device 1 (blank feeder) has a frame 3, with two parallel main profiles that are connected to each other via transverse profiles are. A swing arm to the frame 5 with one end attached, with which the other end is pivotably connected with a carrier. The carrier is formed by carrier arms, of which two bearing arms 7 adjacent a first end being hingedly connected with the swiveling arm and near the other, second end is pivotably connected to the first ends of two further support arms 9. The other, second ends of the supporting arms 9 are further connected via a first cylinder-piston combination 11 is connected to the swinging arm 5 and the second ends of the bearing arms 7 are connected via a second cylinder-piston combination 13 is connected to the frame 3. The pivot arm 5 is connected via a further cylinder-piston combination 15 is connected to the frame 3. Suction cups 17 and 19 are connected to the second ends of the support arms 7 and further supporting arms 9. The construction of the swing arm, suspension arms and piston-cylinder combinations make it possible for the mutual position of the suction cups and the position of the suction cups with respect to the frame is optimal for the picking up and putting down of moving sheets from a stack into a container. The cylinders are preferably pneumatic cylinders, but can also be hydraulic cylinders or electrical solenoids are.

[0011] The supply device further has a frame 3 connected with the pressure element 21, which during the moving of the suction cups against a plate held by the suction cups to the vacuum press and thereby breaks (see below for description of Figure 7). The pressure element 21 is located between the suction cups 17, which are connected with the carrying arms 7 on the one hand, and the suction cups 19 which are connected to the further support arms 9 on the other. The pressure element 21 is formed by a pressure roller which is displaceable against a spring force. The spring assembly is formed by two rods, or inner tubes which are telescopically slidable in two outer tubes. In the outer tubes or to the rods / pipes within can be a coil spring or the present inner and outer tubes can form gas springs.

[0012] The frame 3 is attached to a carriage 23 that runs along a vertical guide 25 is displaceable. On the slide there are further transport wheels 27, for the further displacement of the plate to a plate holder 29, and a gripper 31 for gripping of a sheet present in the holder plate and the placement of the plate in a tray 33.

[0013] In Figures 5 to 12 is the feeding of a plate 35 from the packing of a plate 35 of a stack 37 to the deposit of the plate in a tray 33 during various stages shown. In figure 5 the situation is shown wherein the upper plate 35 of the stack 37 is sucked by means of the suction cups 17 and 19. Then, the plate 35 of the stack is lifted, as shown in Figure 6, and then in the direction of the plate holder 29 moves, as shown in Figure 7. Here, the plate 35 bears against the pressure element 21 is pulled so that the plate bends slightly and thereby disconnects the vacuum to the suction cups. Thereafter, the plate 35 by the transport wheels 27 to the holder plate 29 is transported. This is shown in Figure 8.

[0014] Figure 9 shows the situation in which the plate 35 in the plate holder 29 is present. The plate is then grasped by the gripper 31 and bottom parts of the plate holder 29 folded, as shown in Figure 10. Thereafter, the plate 35 by the gripper 31 in the collecting tray 33 is placed. Figure 11 shows the situation in which the plate is released by the gripper correctly. In Figure 12, finally, shows the situation in which the supply device again back to the starting situation.

[0015] Although the present invention is elucidated above on the basis of the given drawings, it should be noted that this invention is not limited whatsoever to the embodiments shown in the drawings. The invention also extends to all embodiments deviating from the embodiments shown in the drawings within the context defined by the claims.

Claims

1. Feeding device for flat sheets, in particular cardboard sheets, comprising a frame (3), as well as at least one suction cup (17) for the fixed sucking of a plate (35), as well as connected to the frame displacing means for displacing the suction cup between an pick-up position in which the suction cup a plate picks up and a lay down position where the suction cups of the plate replaces the handset, **characterized in that** the supply device (1) further comprises a with the frame (3) were pressure element (21), wherein during moving of the suction cup (17) of the pick-up position to the lay down position, the pressure element (21) and the plate (35) in contact with each other and against each other pressing the plate being a of the suction cup is directed away force which the vacuum break and the plate breaks free from the sucker.

2. Feeding device according to claim 1, **characterized in that** the feed device (1) further comprises a further sucker (19) comprises seen in displacement direction at a distance from the suction cup (17) is present, and is also connected to the displacement means, wherein the pressure element (21) is present between the two suction cups.

3. Feeding device according to claim 2, **characterized in that**, viewed in the direction of displacement next to each suction cup (17,19), a further suction cup is present, wherein the pressure element (21) between the two pairs of suction cups present next to each other is present.

4. Feeding device according to claim 3, **characterized in that** the displacement means comprise a pivot arm (5) comprise, with which one end to the frame (3) is connected, as well as supporting arms (7.9), of which two support arms (7) near a first end are hingedly connected with the swiveling arm (5) and near the other, second end is pivotably connected to the first ends of two further support arms (9), in which the other, second ends of the other supporting arms (9) via a first cylinder-piston combination (11) are connected to the pivot arm (5), the second ends of the support arms via a second cylinder-piston combination (13) are connected to the frame (3), and the swivel arm (5) via a further cylinder-piston combination (15) is connected to the frame (3), and wherein the suction cups (17,19) are connected to the second ends of the supporting arms (7) and further supporting arms (9).

5. Feeding device according to one of the preceding claims, **characterized in that** the pressure element (21) against a spring force is movable.

6. Feeding device according to one of the preceding claims, **characterized in that** the frame (3) is attached to a carriage (23) along a vertical guide (25) is displaceable.

7. Feeding device according to claim 6, **characterized in that** with the frame (3) further comprises a plate holder (29) is connected in which the plates (35) will be deposited, as well as a gripper (31) that the plates from the plate holder to a receptacle (33) moves.

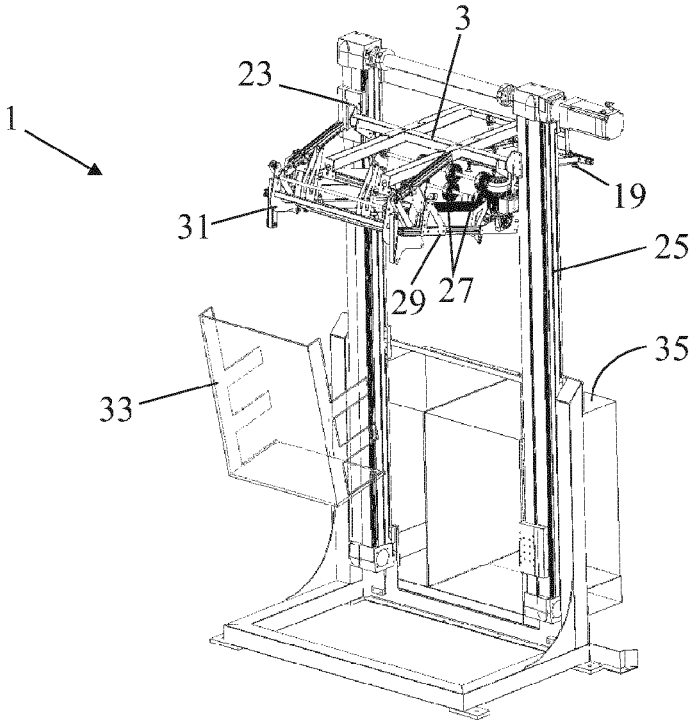


FIG. 1

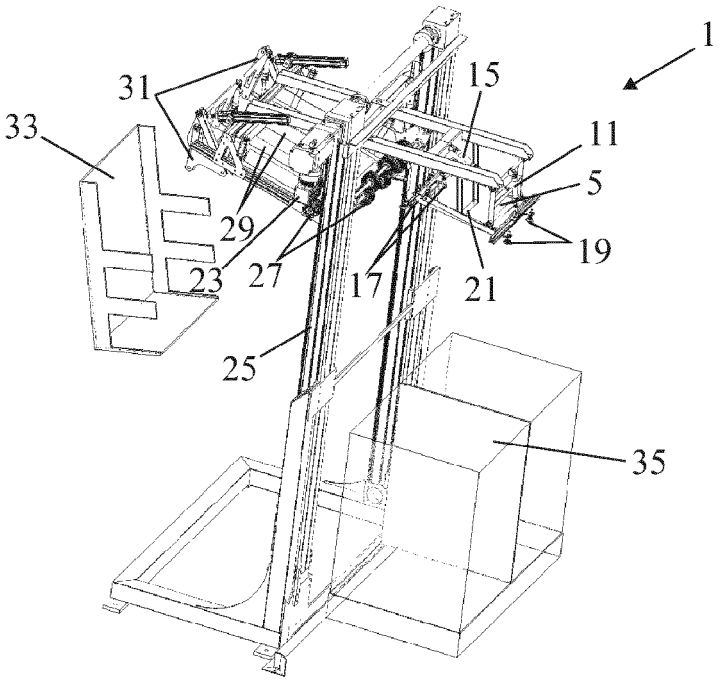
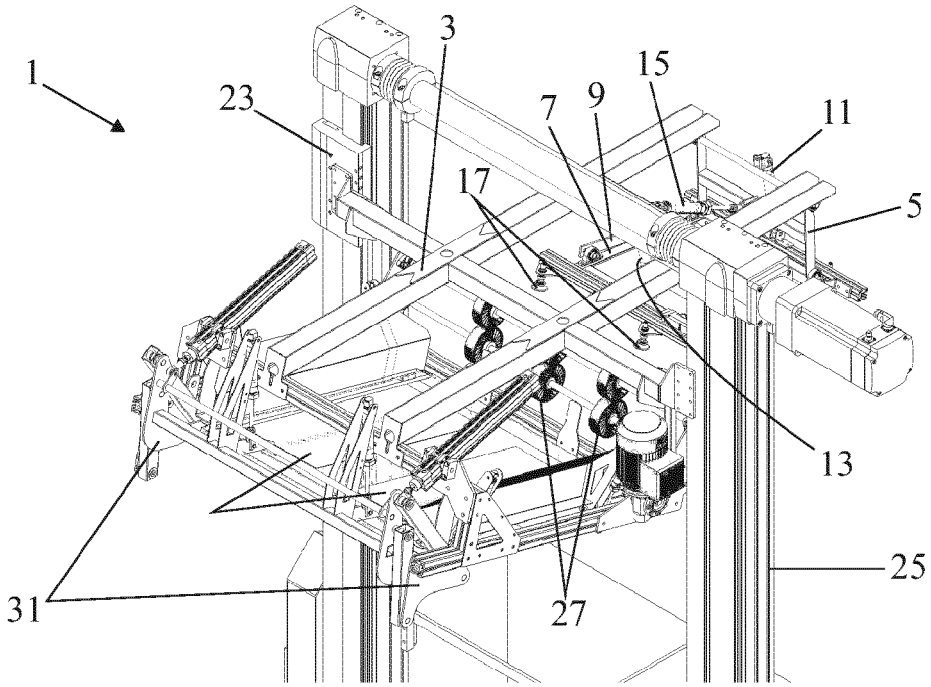


FIG. 2


1
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11
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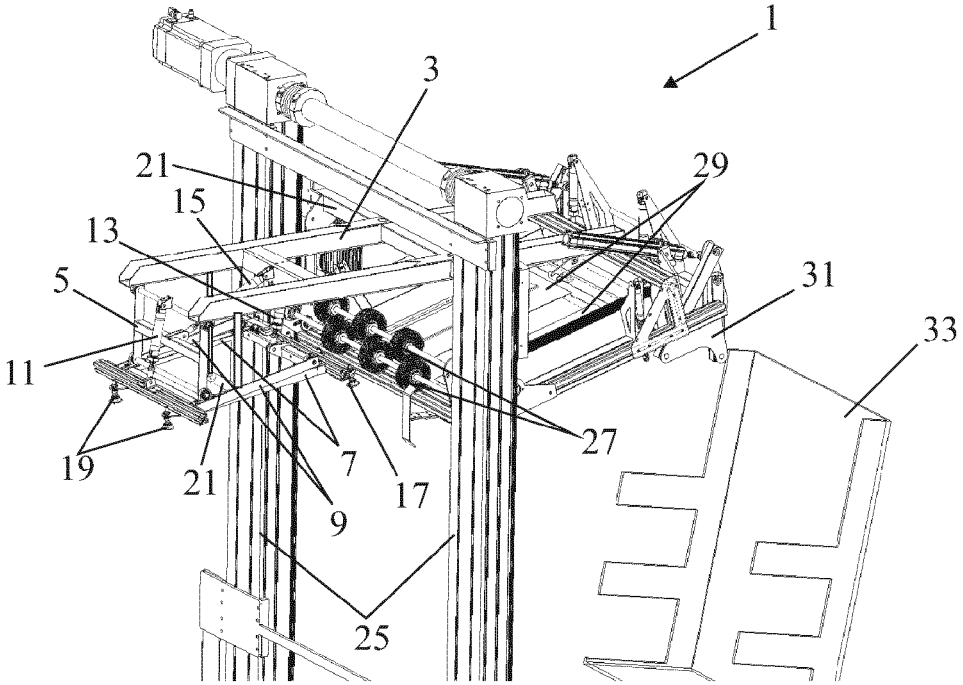
31
27

FIG. 3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27
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17
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25

FIG. 4

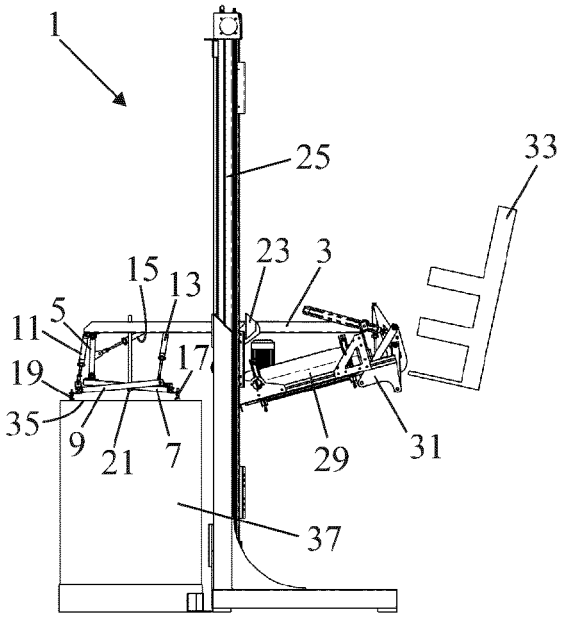

FIG. 5

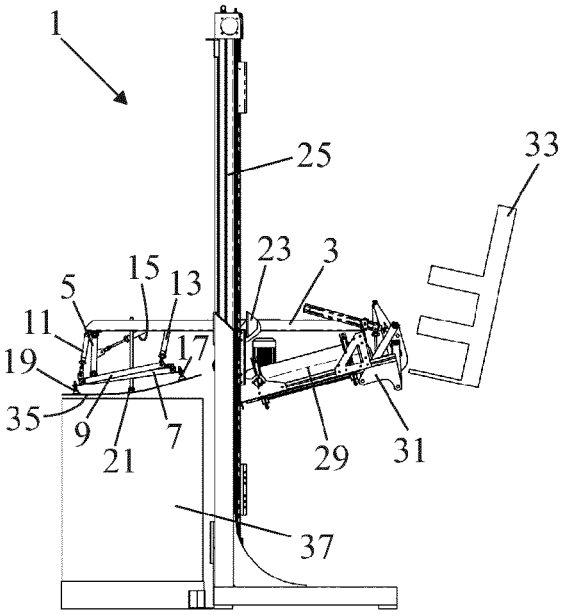

FIG. 6

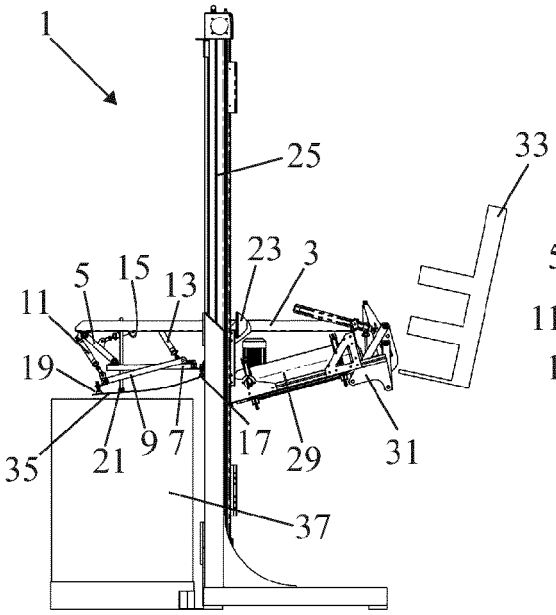

FIG. 7

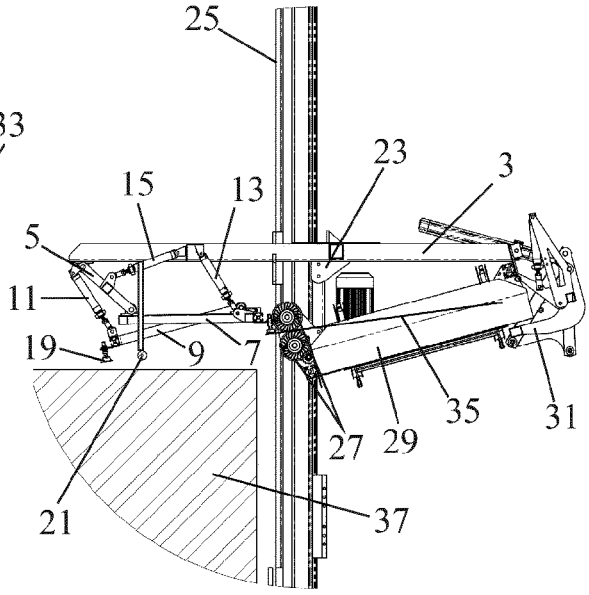

FIG. 8

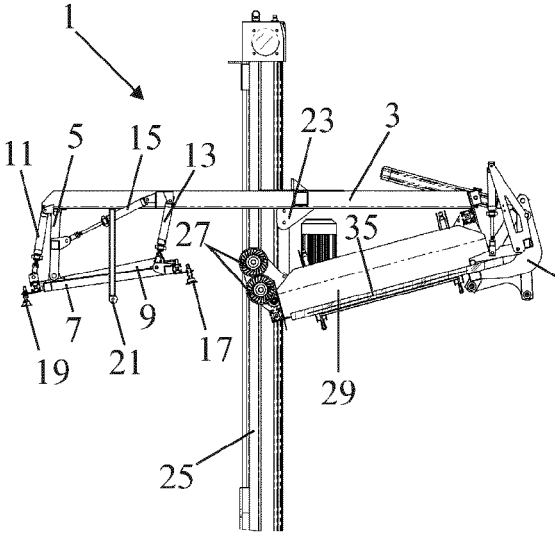

FIG. 9

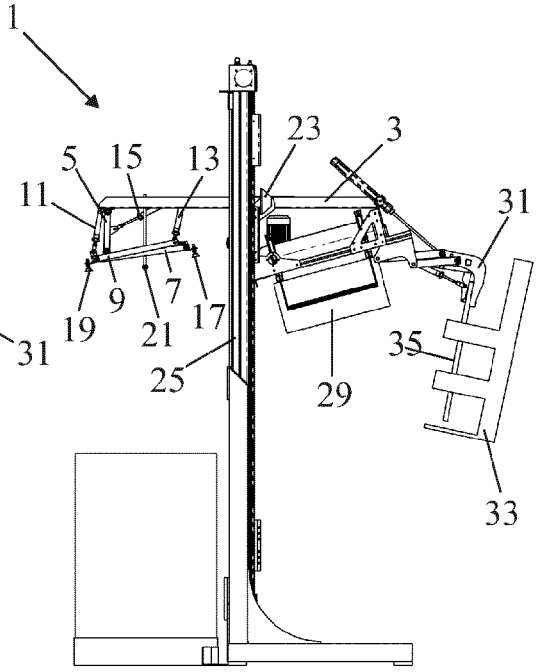

FIG. 10

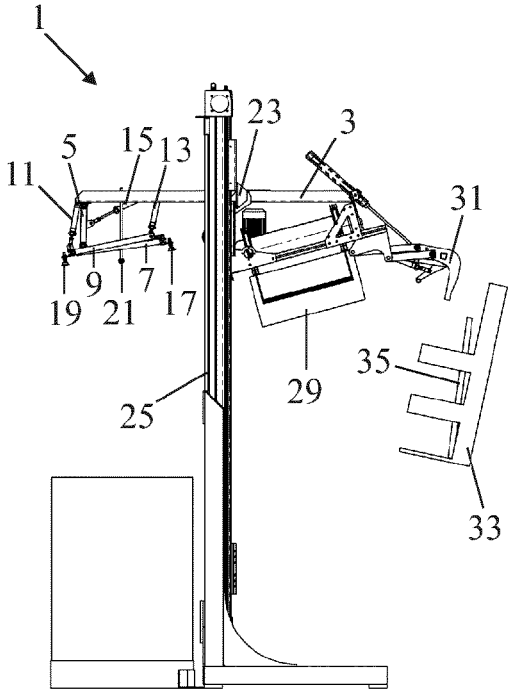

FIG. 11

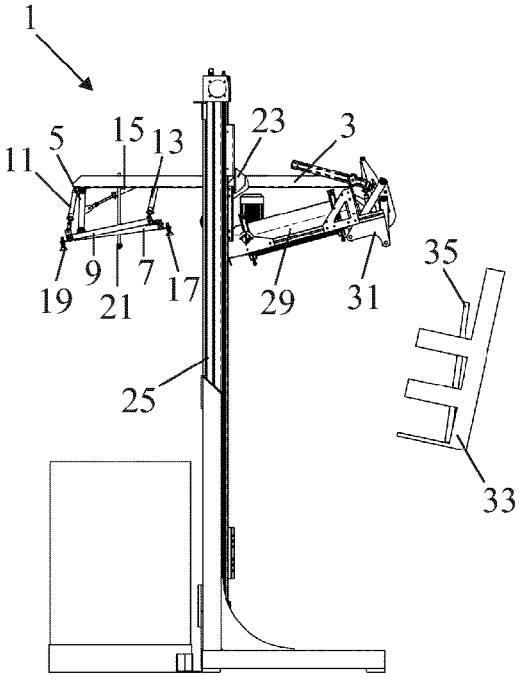

FIG. 12