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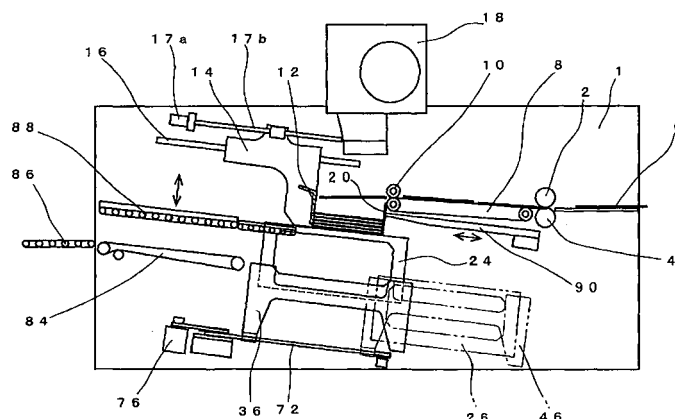
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(74) Representative: **Müller-Boré & Partner****Patentanwälte****Grafinger Strasse 2****81671 München (DE)**(54) **Accumulating and delivering apparatus for group of sheets**

(57) The present invention relates to an apparatus for accumulating and delivering folded cardboard sheets which can be reduced in cost and improved in reliability thereof due to a simplified construction of the apparatus and facilitated control of the movement of the ledge. The apparatus comprises a stacking base for stacking said sheets on its stacking surface, a stacking base driving means for moving said stacking base in a vertical direction between a stacking position for stacking said sheets on said stacking base as a group and a delivering position for delivering said group of said sheets, a ledge for supporting said sheets being fed from below when said stacking base is moved out from its stacking position, and a ledge controlling means for controlling the movement of said ledge, wherein said

ledge is a single ledge positioned at a desired level located between a level corresponding to said stacking position and a sheet feeding level; said apparatus further comprising a ledge reciprocating driving means for moving said single ledge reciprocally in the sheet feeding direction between a sheet receiving position for receiving said sheets to be stacked on said stacking base above said stacking position and a waiting position which is located upstream in the sheet feeding direction from said sheet supporting position; and said ledge controlling means controlling said ledge reciprocating driving means so as to start moving said single ledge from said waiting position to said sheet receiving position, based on the information of the number of said sheets stacked on said stacking base.

FIG. 1



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Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to an accumulating and delivering apparatus which stacks folded cardboard sheets being fed from a box making machine, collects them as an individual group of a predetermined number of the cardboard sheets, and delivers them therefrom.

BACKGROUND ART OF THE INVENTION

[0002] Japanese Patent Document 2000-127262 (A1), for example, conventionally, discloses an accumulating and delivering apparatus which collects folded cardboard sheets being fed from a box making machine, stacks them up until a predetermined number is reached, and delivers them to. This accumulating and delivering apparatus includes an elevator for stacking sheets thereon which elevator is reciprocally moveable in the vertical direction between an upper transferring level at which an auxiliary ledge is disposed and a lower delivering level at which a delivering conveyer is disposed; a ledge which is reciprocally moveable in the vertical direction between an upper waiting level at which it does not receive the sheets being fed and a lower transferring level at which auxiliary ledge is disposed, and which ledge protrudes in the direction upstream of the sheet feeding direction in order to obstruct the sheet vertical path area; and an auxiliary ledge for obstructing the sheet vertical path area by protruding it in the direction lateral to the sheet feeding direction during a period of time from when the elevator starts moving downwardly from its upper transferring level to when the ledge reaches the lower transferring level.

[0003] In accordance with this construction, the cardboard sheets being fed are stacked on the elevator at the upper transferring level. Thereafter, when the stacked sheets reaches a predetermined number, the elevator is moved downwardly to the lower delivering level in order to deliver the group of sheets stacked on the elevator using a delivering conveyer, while the ledge is moved downwardly with the cardboard sheets being fed stacked thereon by using the ledge protruded in a direction upstream of the sheet feeding direction. Then, when the ledge has been moved downwardly to the lower transferring level, the group of sheets stacked on the ledge is transferred onto the auxiliary ledge and the ledge is moved to the upper waiting level. Next, when the elevator has been moved to the upper transferring level at which the auxiliary ledge is disposed, the group of sheets stacked on the auxiliary ledge is transferred onto the elevator.

[0004] By repeating these cycles, it is possible to collect the folded cardboard sheets being continuously fed from a box making machine, stack them up until a predetermined number is reached, and deliver them there-

from as an individual group of the sheets.

[0005] However, these accumulating and delivering apparatus have several technical disadvantages as follows:

Firstly, it is difficult to control the movement of the ledge. More particularly, when the ledge is in the upper waiting level, the ledge is maintained in a position protruding toward the upstream of the sheet feeding direction, and at the moment when a predetermined number of sheets is stacked on the elevator, during the time the next sheet is passing through the sheet vertical path area, the next sheet is received on the upper surface of the ledge by moving it downwardly by a desired distance. Thus, during the time period from when the last sheet in the predetermined number has been passed below the ledge to when the next sheet passes through the sheet vertical path area and drops on the upper surface of the group of the sheets located in the delivering position, it is necessary for the ledge to pass this sheet and receive this sheet on its upper surface, which makes it difficult to control the ledge with respect to the vertical movement of the sheet.

Secondly, the construction of the accumulating and delivering apparatus in relation to the ledge is complicated, thereby the cost is increased and the reliability of the accumulating and delivering apparatus is decreased. More particularly, since the group of the sheets is delivered to the delivering conveyer in the lower delivering level, the next group of sheets being stacked on the ledge must be kept there during the period of time from when the group of sheets has been delivered by the delivering conveyer to when the elevator is moved to the upper transferring level. Furthermore, the ledge must be moved to the upper waiting level in order to receive the next group of sheets. Therefore, it is necessary to provide an auxiliary conveyer in order to hold the group of the sheets during the time the group of the sheets is being transferred from the ledge onto the elevator.

Thirdly, the spring-back of the sheet stacked as a group of the sheets cannot be effectively prevented. More particularly, a blower is disposed above the elevator, and the air blown from this blower is directed through the sheet vertical path area onto the upper surface of the elevator, and thus the spring-back of the group of the sheets stacked on the upper surface of the elevator can be prevented. However, when the ledge is being protruded, since the ledge blocks the air from the blower, it is difficult to prevent the spring-back of the group of the sheets located below the ledge.

SUMMARY OF THE INVENTION

[0006] One object of the present invention is to provide an apparatus for accumulating and delivering groups of sheets which can be reduced in cost and improved in reliability thereof due to a simplified construction of the apparatus and facilitated control of the movement of the ledge.

[0007] Another object of the present invention is to provide an apparatus for accumulating and delivering groups of sheets which can effectively prevent the spring-back of the group of sheets stacked on the stacking base even when the sheets are supported on the ledge.

[0008] According to one aspect of the present invention, there is provided an accumulating and delivering apparatus for a group of sheets being fed one by one comprising a stacking base for stacking said sheets on its stacking surface, a stacking base driving means for moving said stacking base in a vertical direction between a stacking position for stacking said sheets on said stacking base as a group and a delivering position for delivering said group of said sheets, a ledge for supporting said sheets being fed from below when said stacking base is moved out from its stacking position, and a ledge controlling means for controlling the movement of said ledge, wherein: said ledge is a single ledge positioned at a desired level located between a level corresponding to said stacking position and a sheet feeding level; further comprising a ledge reciprocating driving means for moving said single ledge reciprocally in the sheet feeding direction between a sheet receiving position for receiving said sheets to be stacked on said stacking base above said stacking position and a waiting position which is located upstream in the sheet feeding direction from said sheet supporting position; and said ledge controlling means controlling said ledge reciprocating driving means so as to start moving said single ledge from said waiting position to said sheet receiving position, based on the information of the number of said sheets stacked on said stacking base.

[0009] In accordance with the above mentioned construction, the sheets being fed are stacked one by one on the stacking base in its stacking position, forming a group of the sheets including a predetermined number of the sheets, and when the first sheet in the next group of the sheets is being fed based on the information of the number of the sheets stacked on the stacking base, the ledge positioned between the sheet feeding level and the stacking position level is protruded from its waiting position to its sheet receiving position located in a direction downstream of the sheet feeding direction while the stacking base is vertically moved from its stacking position to its delivering position, whereby it becomes possible to stack the sheets on the ledge until the stacking base returns back again to its stacking position without any risk of errors in receiving the first sheet being made. When the stacking base returns back again

to its stacking position, the group of the sheets stacked on the ledge can be transferred onto the stacking base by retracting the ledge from its sheet receiving position to its waiting position.

[0010] Transferring the group of the sheets from the stacking base to the ledge is accomplished just by protruding the ledge from its waiting position to its sheet receiving position in a direction downstream of the sheet feeding direction, while transferring the group of the sheets from the ledge to the stacking base is accomplished just by retracting the ledge from its sheet receiving position to its waiting position in a direction upstream of the sheet feeding direction, whereby the movement control of the ledge and construction of the apparatus can be simplified, and thus the cost there is reduced and reliability is improved.

[0011] In one embodiment of the present invention, said ledge has a press lever on the lower surface thereof for pressing said sheets stacked on said stacking surface.

[0012] In another embodiment of the present invention, said ledge has a groove on the lower surface thereof for containing said press lever therein; said press lever being attached on said lower surface of said ledge to be pivotable between an accommodated position in which said press lever is contained in said groove and a pressing position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] For a better understanding of the present invention, and to show more clearly how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 illustrates a schematic side view of an accumulating and delivering apparatus for cardboard sheets in accordance with one embodiment of the present invention, wherein one of the stacking bases is in its stacking position;

Figure 2 illustrates a schematic side view of an accumulating and delivering apparatus for cardboard sheets in accordance with one embodiment of the present invention, wherein one of the stacking bases is in its delivering position;

Figure 3 illustrates a schematic side view of an accumulating and delivering apparatus for cardboard sheets in accordance with one embodiment of the present invention, wherein one of the stacking bases is in its resting position;

Figure 4 illustrates a schematic side view of an accumulating and delivering apparatus for cardboard sheets in accordance with one embodiment of the present invention, wherein one of the stacking bases is in its ejecting position;

Figure 5 illustrates a schematic side view of a driving mechanism of an accumulating and delivering

apparatus for cardboard sheets in accordance with one embodiment of the present invention;

Figure 6 illustrates a schematic top plan view of four pairs of driving mechanisms which are driven by two servo motors;

Figure 7 illustrates an enlarged front view of a driving mechanism which supports one of the stacking bases;

Figure 8 illustrates an enlarged front view of a driving mechanism which supports another one of the stacking bases;

Figure 9 illustrates a cross sectional front view of four pairs of driving mechanisms of an accumulating and delivering apparatus for cardboard sheets in accordance with one embodiment of the present invention;

Figure 10 illustrates an enlarged side view of a ledge driving mechanism in accordance with one embodiment of the present invention; and

Figure 11 illustrates an enlarged view of a ledge in accordance with one embodiment of the present invention.

A PREFERRED EMBODIMENT OF THE INVENTION

[0014] As can be seen in Figure 1, reference numeral 1 indicates a machine frame, which machine frame 1 includes a pair of inlet rollers 2 and 4, folded cardboard sheets 6 being fed one by one between the inlet rollers 2 and 4 from a box making machine (not shown). A feeding conveyer 8 is disposed at a downstream side of the inlet rollers 2 and 4, and a feeding roller 10 is disposed at the front end of the feeding conveyer 8. A guiding plate 12 is disposed in a direction of feeding of the cardboard sheets 6 from the feeding conveyer 8 and feeding roller 10 in such a manner that the front end of the cardboard sheet 6 comes into contact with the guiding plate 12.

[0015] The guiding plate 12 is mounted on a sliding plate 14 moveably supported along a rail 16 which is mounted on the machine frame 1. The rail 16 is mounted to be parallel to the cardboard sheet 6 which is to be stacked on either one of stacking bases 24 and 26, as will be described in detail below. The sliding plate 14 can be moved along the rail 16 by rotating a threaded shaft 17b which is driven by a motor 17a mounted on the machine frame 1.

[0016] An air blower 18 is mounted at the top of the machine frame 1, and the air blown therefrom is directed toward the cardboard sheet 6 being fed by the feeding conveyer 8 and the feeding roller 10. An aligning plate 20 is disposed adjacent to the front end of the feeding conveyer 8 opposite to the guiding plate 12 in such a manner that the cardboard sheet 6 fed by the feeding conveyer 8 will drop in between the guiding plate 12 and the aligning plate 20. A ledge 22 is disposed below the feeding conveyer 8, which ledge 22 can be projected toward the guiding plate 12 through a window formed

on the aligning plate 20. When the ledge 22 is projected, the cardboard sheets 6 can be stacked thereon.

In this embodiment, four sets of stacking bases 24,26, each set of which consisting of a pair of stacking bases 24,26, are aligned with each other in the width-wise direction of the cardboard sheet 6. As shown in Fig. 9, two sets of stacking bases 24,26 on the right side with respect to a vertical centerline and two sets of stacking bases 24,26 on the left side with respect to a vertical centerline are arranged symmetrically with respect to the vertical centerline. The two sets of stacking bases 24,26 on the right side are mounted on corresponding driving mechanisms 28, respectively, while the two sets of stacking bases 24,26 on the left side are mounted on corresponding driving mechanisms 30, respectively.

The height of each of the stacking bases 24 and 26 needs to be selected in such a manner that, during the time when they are indexed in its stacking position, the cardboard sheets 6 will not be dislocated or damaged when the cardboard sheets 6 supported on the ledge 90 are dropped and/or transferred onto the upper surface of each of the stacking bases 24 and 26 by retracting the ledge to its waiting position.

[0017] In this embodiment, the four sets of stacking bases 24 and 26 are disposed below the guiding plate 12 and the aligning plate 20, and support the cardboard sheets 6 from below in order to stack a predetermined number of them, whereby a group of sheet is collected.

Since four sets of stacking bases 24 and 26 with the driving mechanisms 28, 30 have a similar construction, only one set of them will be described in detail below.

[0018] As can be seen in Figures 5 and 7, the stacking bases 24 in the stacking bases 24 and 26 are mounted on a moving stage 36 via a pair of rails 32 and 34 which are disposed in an upward/downward moving direction. The moving stage 36 is moveably supported on a rail 38 disposed in a frontward/rearward direction of the machine frame 1. As can be seen in Figure 8, the stacking bases 26 are mounted on a moving stage 46 via a pair of rails 42 (only one is shown) which are disposed in an upward/downward moving direction. The moving stage 46 is moveably supported on a rail 48 disposed in a frontward/rearward direction of the machine frame 1.

[0019] A spline shaft 50 is rotationally mounted on the machine frame 1 to be a parallel to the rails 38 and 48, as shown in Figure 5, and a pair of pulleys 52 and 54 are mounted on the spline shaft 50 in such a manner that they can be slidably moveable along the spline shaft 50, whereas they are fixed as to the rotational movement of the spline shaft 50, as shown in Figures 7 and 8. One of the pulleys 52 is rotationally mounted on the moving stage 36, while the other one of the pulleys 54 is rotationally mounted on the moving stage 46.

[0020] Pulleys 56 and 58 are rotationally mounted below a pair of moving stages 36 and 46, respectively. As can be seen in Figure 7, a timing belt 60 is wound around the pulley 56 and the pulley 52, both of which are mount-

ed on the moving stage 36. A portion of the timing belt 60 is affixed on the stacking base 24 via a mounting member 61. As can be seen in Figure 8, a timing belt 64 is wound around the pulley 58 and the pulley 54, both of which are mounted on the moving stage 46. A portion of the timing belt 64 is affixed on the stacking base 26 via a mounting member 63.

[0021] As can be seen in Figure 5, the spline shaft 50 is rotationally driven via a belt transmission device 66 and a servo motor 64 mounted on the machine frame 1. When the spline shaft 50 is rotated in one direction, the stacking base 24 is moved upwardly while the stacking base 26 is moved downwardly. On the contrary, when the spline shaft 50 is rotated in the direction opposite to said one direction, the stacking base 24 is moved downwardly while the stacking base 26 is moved upwardly. In this way, each of the stacking bases 24 and 26 is moved vertically, as shown in Figure 7, between its first upper level where the stacking bases 24 and 26 can be positioned at a stacking position and an ejecting position, and its second lower level where the stacking bases 24 and 26 can be positioned at a delivering position and a resting position, by the rotation of the spline shaft 50.

[0022] As can be seen in Figures 5 and 6, pairs of pulleys 68 and 70 are mounted on the machine frame 1 in a spaced apart relationship along the longitudinal direction thereof, and timing belts 72 are wound around each pair of the pulleys 68 and 70, respectively. A pair of the moving stages 36 and 46 are affixed on each one of the timing belts 72 by mounting members 73a and 73b.

[0023] A large pulley 74 is fixedly attached on each of the pulleys 68, and a timing belt 80 is wound around each of the large pulleys 74 and each driving pulley 78 mounted on a servo motor 76 which is mounted on the machine frame 1. When the timing belt 80 is rotationally driven in one direction, the moving stage 36 is moved frontward while the moving stage 46 is moved rearward. On the contrary, when the timing belt 80 is rotationally driven in the direction opposite to said one direction, the moving stage 36 is moved rearwards while the moving stage 46 is moved frontward. In this way, the moving stages 36 and 46 are moved by the rotation of the timing belt 80 in frontward or in rearward directions along the feeding direction of the cardboard sheets 6, as shown in Figure 6, between their first position in the feeding direction and their second position in the feeding direction located to the rearward of the first position with respect to the feeding direction of the cardboard sheets 6.

[0024] In this embodiment, two of the driving mechanisms 28 are driven by the commonly used servo motors 64 and 76 in such a manner that two of the spline shafts 50 are driven by only one servo motor 64, while two timing belts 72 are driven by only one servo motor 76. The servo motors 64 and 76 are connected to a controlling device 81, as shown in Figure 5, and the servo motors 64 and 76 are driven while their rotating speed is being controlled in accordance with the signal supplied from

the controlling device 81.

[0025] The driving mechanism 28 enables each of the stacking bases 24 and 26 to move in, for example, generally horizontal and vertical directions in a straight manner. Thus, for example, when the stacking base 24 is moved frontward toward its first position in the feeding direction as well as upwardly toward its first upper level, it moves toward the stacking position for stacking the cardboard sheets 6 thereon, as shown in Figure 1. When the stacking base 24 is moved downwardly from this stacking position to its second lower level, it moves toward the delivering position, as shown in Figure 2, and when the stacking base 24 is moved rearward from the delivering position to its second position in the feeding direction, it moves toward the resting position, as shown in Figure 3. Furthermore, when the stacking base 24 is moved upwardly from the resting position to its first upper level, it moves toward the ejecting position, as shown in Figure 4, and when the stacking base 24 is moved frontward from the ejecting position to its first position in the feeding direction, again it moves toward the stacking position, as shown in Figure 1. In this way, the stacking base 24 can be moved along a rectangular-shaped loop which connects the stacking position, the delivering position, the resting position and ejecting position, the stacking base 24 being indexed at each of these positions. The stacking base 26 is moved in the same manner, but the movement thereof is 180 degrees different from that of the stacking base 24. In this way, the pair of stacking bases 24 and 26 is moved in such a manner that they are positioned alternately among the four positions, i.e., the stacking position, the delivering position, the resting position and the ejecting position, so that when one of the stacking bases 24 or 26 is positioned in the stacking position, the other one of the stacking bases 26 or 24 is positioned in the resting position, while when one of the stacking bases 24 or 26 is positioned in the delivering position, the other one of the stacking bases 26 or 24 is positioned in the ejecting position. In an alternative embodiment of the present invention, the distance between the stacking bases 24 or 26 may be varied depending on the width of the cardboard sheets 6 in order to obtain stable stacking of the cardboard sheets 6, and the number of the stacking bases may be increased as well.

[0026] As can be seen in Figures 7 and 8, roller conveyers 82 are disposed along both sides of the driving mechanism 28 in such a manner that the top surface of the roller conveyers 82 is positioned above the top surface of the stacking bases 24 and 26 when they are in the delivering positions, as shown in Figure 2. An ejecting conveyer 84 and a transport conveyer 86 are disposed along with the roller conveyers 82. A press conveyer 88 is disposed above the ejecting conveyer 84, which press conveyer 88 is adjustable as regards its distance from the ejecting conveyer 84.

[0027] As can be seen in Figure 1, a ledge 90 is disposed below the feeding conveyer 8, which ledge 90 is

reciprocally moveable along the feeding direction of the cardboard sheets 6 via a ledge driving mechanism 92, as shown in Figure 10. More particularly, the ledge 90 is reciprocally moveable along the feeding direction of the cardboard sheets between its sheet receiving position in which the ledge protrudes through a window 20a formed in the aligning plate 20 toward the guiding plate 12 (see Figure 10) and its waiting position located in a direction downstream of the sheet feeding direction (see Figure 1). The ledge has an upper surface which is large enough to receive and stack thereon the cardboard sheets being fed when it is in its sheet receiving position, and the ledge may be divided, for example, into four parts across the width direction of the cardboard sheet to form a fork-like shape.

[0028] The ledge 90 has a press lever 98 on the lower surface thereof for pressing the cardboard sheets stacked on the stacking surface. As can be seen in Figure 11, the press lever 98 is formed in a L-shaped manner, and one end of the press lever 98 is connected to the rod of a cylinder 102 while the other end thereof includes a flat spring 104 which presses the upper surface of a group of sheets being stacked. The cylinder 102 is, for example, a trunion cylinder which is supported integrally together with the ledge 90. As can be seen in Figure 11, the ledge 90 has a longitudinal groove 96 the opening of which faces in a downward direction, and the length of the groove 96 is adapted to contain the press lever 98 therein. Thus, the press lever 98 is pivotable between an accommodated position in which the press lever is contained in the groove 96 and a pressing position for pressing the upper surface of the group of sheets being stacked in the delivering position (see Figure 2).

[0029] As can be seen in Figure 10, the ledge driving mechanism 92 includes a straight rail 94 mounted on the machine frame 1, and the rail 94 is mounted along the feeding direction of the cardboard sheets 6 by the feeding conveyer 8 in such a manner that it is slightly angled upwardly toward a direction downstream of the feeding, and the ledge 90 is supported moveably along the rail 94. This angle can be selected to facilitate the receiving of the cardboard sheets 6 when the ledge 90 is protruded. The ledge driving mechanism 92 has a driving source (not shown) which moves the ledge 90 reciprocally along the rail 94 between its sheet receiving position and its waiting position.

[0030] The number of the cardboard sheets stacked on the stacking bases 24 and 26, respectively, is counted by using a sensor (not shown) consisting of, for example, a light sensitive tube.

[0031] The operation of the accumulating and delivering apparatus of the embodiment described above will now be explained below.

[0032] When a folded cardboard sheet 6 is fed from a box making machine (not shown) to this apparatus, the cardboard sheet 6 is received by the inlet rollers 2 and 4 therebetween, the cardboard sheet 6 is then car-

ried by the feeding conveyer 8 and the feeding roller 10, to be transferred toward the guiding plate 12. When the front end of the cardboard sheet 6 comes into contact with the guiding plate 12, the cardboard sheet 6 will drop in between the guiding plate 12 and the aligning plate 20 along inner faces of the guiding plate 12 and the aligning plate 20.

[0033] At this time, an air flow supplied by the air blower 18 prevents the folded cardboard sheet 6 from being unfolded and pushes the cardboard sheet 6 against the top surface of the stacking base 24. Air outlets of the blower 18, as shown in Figure 9, extend across the width of the cardboard sheets 6, although the location and/or number of the air outlets of the blower 18 may vary depending on the width of the cardboard sheets 6. The position of the guiding plate 12 is adjusted by moving the sliding plate 14 which is driven by the motor 17a in such a manner that the distance between the guiding plate 12 and the aligning plate 20 is generally made to correspond to the length of the cardboard sheet 6.

[0034] In this way, the cardboard sheet 6 is stacked on the stacking bases 24. As can be seen in Figure 1, the cardboard sheets 6 being successively fed are stacked on the stacking bases 24 one by one, and the number of the cardboard sheets 6 is detected by a sensor (not shown). When the number of the cardboard sheets 6 reaches a predetermined number, the cardboard sheets 6 form a group stacked on the stacking bases 24, and the ledge 22 is projected through the aligning plate 20, whereby the cardboard sheets 6 are temporarily supported on the ledge 22.

[0035] More particularly, when the sensor detects a predetermined number of cardboard sheets 6 has been stacked on the stacking base 24, the detection signal is then transmitted to the ledge driving mechanism 92, whereby the ledge 90 starts protruding from its waiting position to its sheet receiving position. As long as the protruding speed of the ledge 90 is selected properly, there is no risk of making an error in receiving the next cardboard sheet 6 on the upper surface of the ledge 90, because the ledge 90 is protruded in a direction downstream of the sheet feeding direction.

[0036] Thereafter, the stacking bases 24 and 26 are moved by driving the corresponding driving mechanisms 28, 30. As can be seen in Figure 2, the stacking bases 24 with the cardboard sheets stacked thereon (Figures 6 and 9 show a group of the sheets stacked on the stacking bases 24) are moved from its stacking position to its delivering position. The stacking bases 26 are moved upwardly from its resting position to its ejecting position. When the stacking bases 24 are moved downwardly toward its delivering position, the stacked sheets 6 are supported on the roller conveyer 82.

[0037] Next, as can be seen in Figure 2, the cardboard sheets 6 stacked on the ledge 6 are prevented from causing spring-back by the blower 18, while the air from the blower 18 is interrupted by the ledge 6 because the ledge 6 is in its protruded position, as to the group of the

sheets located below the ledge 6, since the press lever 98 is pivoted from its waiting position to its pressing position and the pressing force of the flat spring 104 keeps pressing down the upper surface of the group of the sheets on the stacking bases 24, the folded cardboard sheets 6 are prevented to cause spring-back or to be dislocated.

[0038] Thereafter, as can be seen in Figure 3, the stacking bases 24 are moved back from its delivering position to its resting position located in a direction opposite to the sheet feeding direction by driving the driving mechanism 28. At the same time, the stacking bases 26 are moved forwardly from its ejecting position to its stacking position located in a direction forward of the sheet feeding direction. At this time, the sheets 6 on the roller conveyer 82 are pushed out in a direction upstream of the sheet feeding direction by the front end of the stacking bases 26, whereby the sheets 6 are transferred onto the ejecting conveyer 84. The stacked sheets 6 on the ejecting conveyer 84 are held with a press conveyer 88, transferred onto the transport conveyer 86, and then delivered from the transport conveyer 86.

[0039] Next, after the stacking bases 26 are moved to its stacking position, the ledge 22 is retracted from its sheet receiving position to its waiting position in a direction upstream of the sheet feeding direction, whereby the group of sheets on the ledge 22 is dropped to be transferred on the upper surface of the stacking base 26 in its stacking position. At this time, the height of the stacking base may be adjusted to prevent an adverse effect on the group of the sheets upon their being drop. Next, the cardboard sheets 6 continuously fed are stacked on the stacking bases 26, and when a predetermined number of sheets has been stacked thereon, the ledge 22 is again, protruded from its waiting position to its sheet receiving position in a direction downstream of the sheet feeding direction, whereby the sheets 6 are stacked on the ledge 22. Although in this embodiment the ledge 22 starts retracting after the stacking bases 26 are moved to its stacking position, retracting of the ledge 22 may be started while the stacking bases 26 are still moving toward its stacking position.

[0040] Thereafter, as can be seen in Figure 4, the stacking bases 26 are moved from its stacking position to its delivering position, whereby the cardboard sheets 6 stacked thereon are supported on the roller conveyer 82. At the same time, the stacking bases 24 are moved upwardly from its resting position to its ejecting position. Next, the stacking bases 26 are moved back to its resting position, while the stacking bases 24 are moved frontward from its ejecting position to its stacking position, whereby the cardboard sheets 6 supported on the roller conveyer 82 are pushed out by the front ends of the stacking bases 24, and transferred onto the ejecting conveyer 84. By repeating these operations, the cardboard sheets 6 being continuously fed can be delivered out from this apparatus in the form of separated units

each consisting of a predetermined number of the cardboard sheets 6.

[0041] Although this invention has been disclosed with respect to a specific embodiment which is an example thereof, those skilled in the art will be able to realize the invention in different embodiments without departing from the spirit and scope of the invention.

10 Claims

1. An accumulating and delivering apparatus for a group of sheets being fed one by one comprising a stacking base for stacking said sheets on its stacking surface, a stacking base driving means for moving said stacking base in a vertical direction between a stacking position for stacking said sheets on said stacking base as a group and a delivering position for delivering said group of said sheets, a ledge for supporting said sheets being fed from below when said stacking base is moved out from its stacking position, and a ledge controlling means for controlling the movement of said ledge, wherein:

said ledge is a single ledge positioned at a desired level located between a level corresponding to said stacking position and a sheet feeding level;

said apparatus further comprising a ledge reciprocating driving means for moving said single ledge reciprocally in the sheet feeding direction between a sheet receiving position for receiving said sheets to be stacked on said stacking base above said stacking position and a waiting position which is located upstream in the sheet feeding direction from said sheet supporting position; and

said ledge controlling means controlling said ledge reciprocating driving means so as to start moving said single ledge from said waiting position to said sheet receiving position, based on the information of the number of said sheets stacked on said stacking base.

2. The accumulating and delivering apparatus for a group of sheets as recited in claim 1, wherein said ledge has a press lever on the lower surface thereof for pressing said sheets stacked on said stacking surface.
3. The accumulating and delivering apparatus for a group of sheets as recited in claim 2 wherein:

said ledge has a groove on the lower surface thereof for containing said press lever therein; and

said press lever is attached on said lower surface of said ledge to be pivotable between an accommodated position in which said press lever is contained in said groove and a pressing position.

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FIG. 1

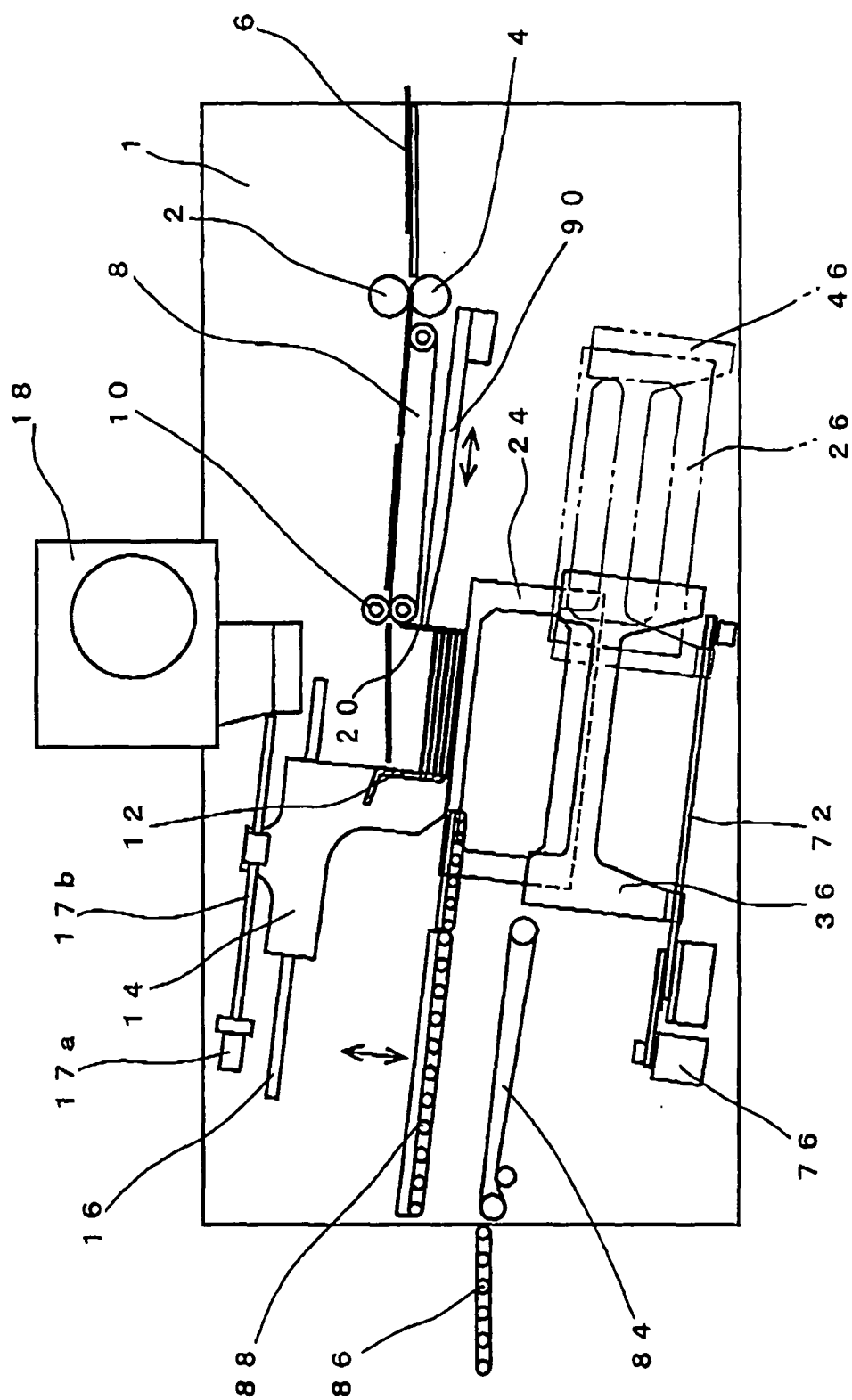


FIG. 2

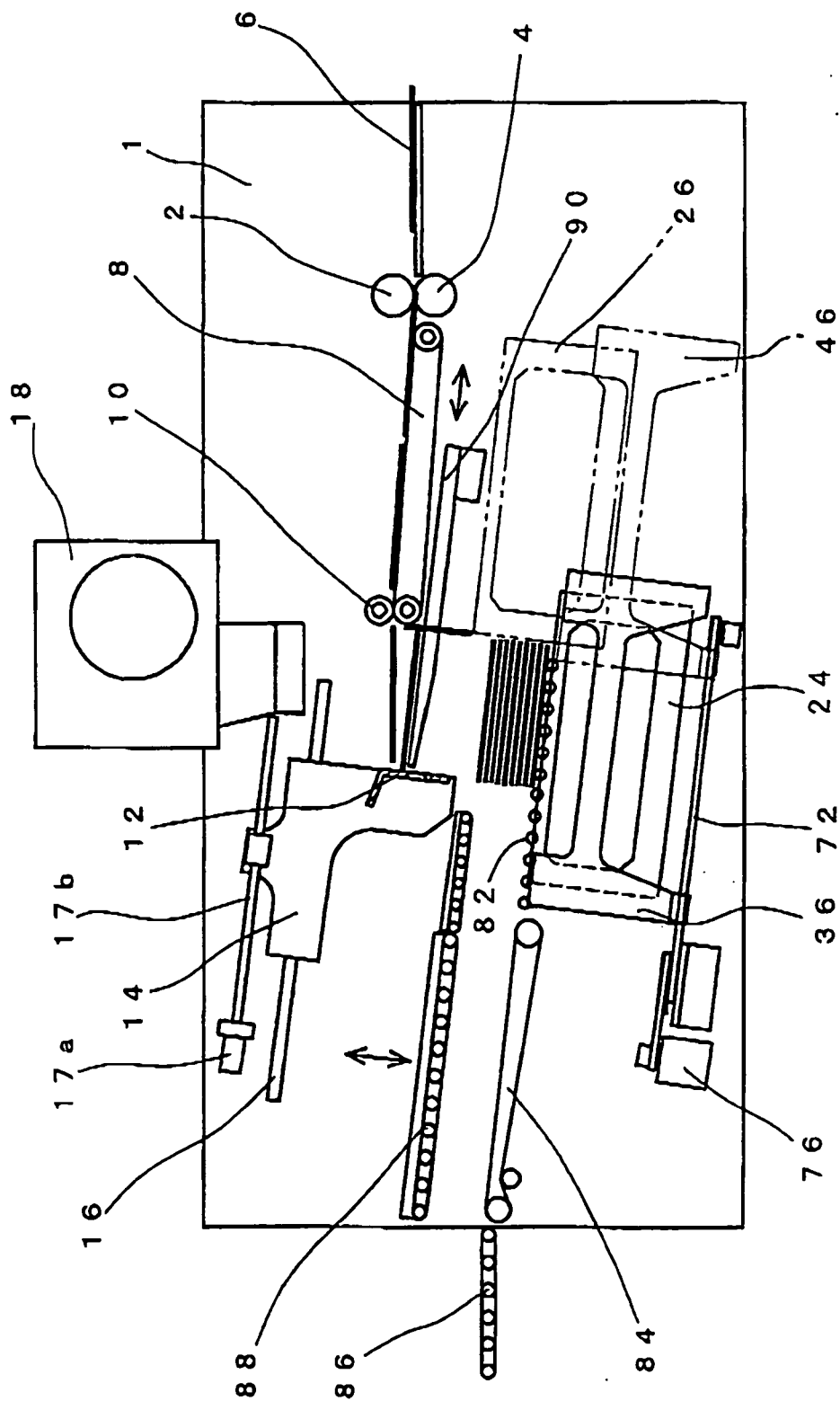


FIG. 3

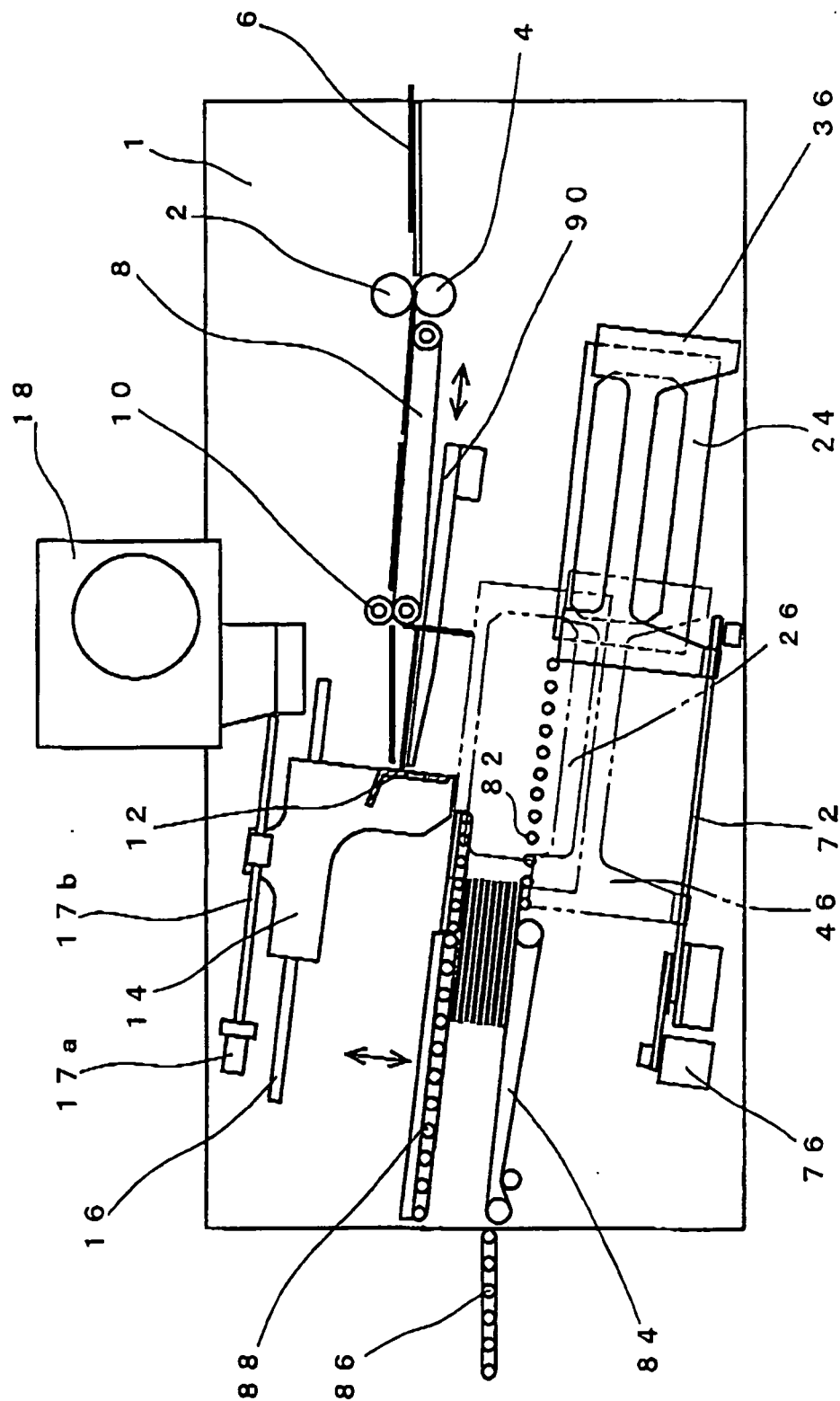


FIG. 4

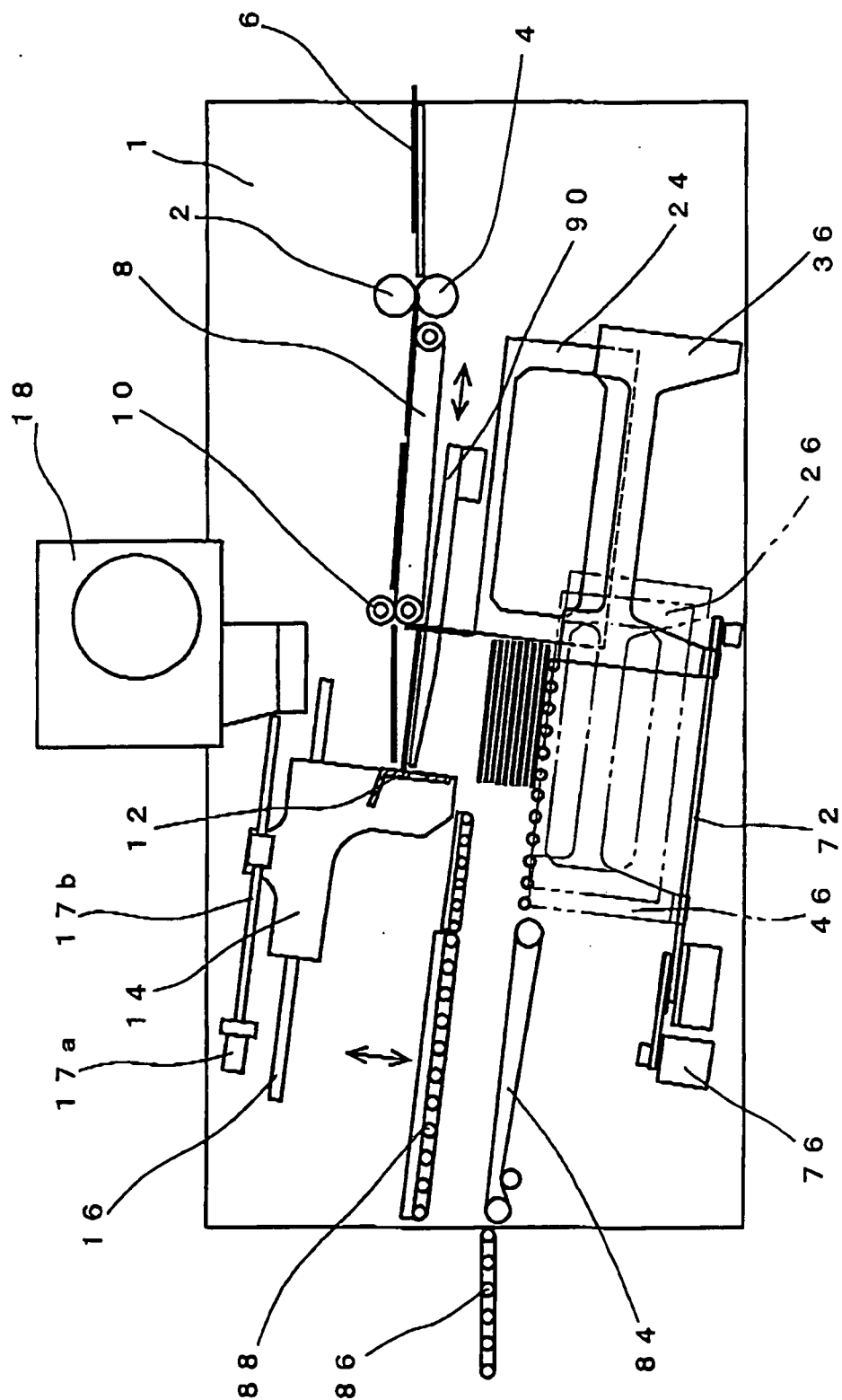


FIG. 5

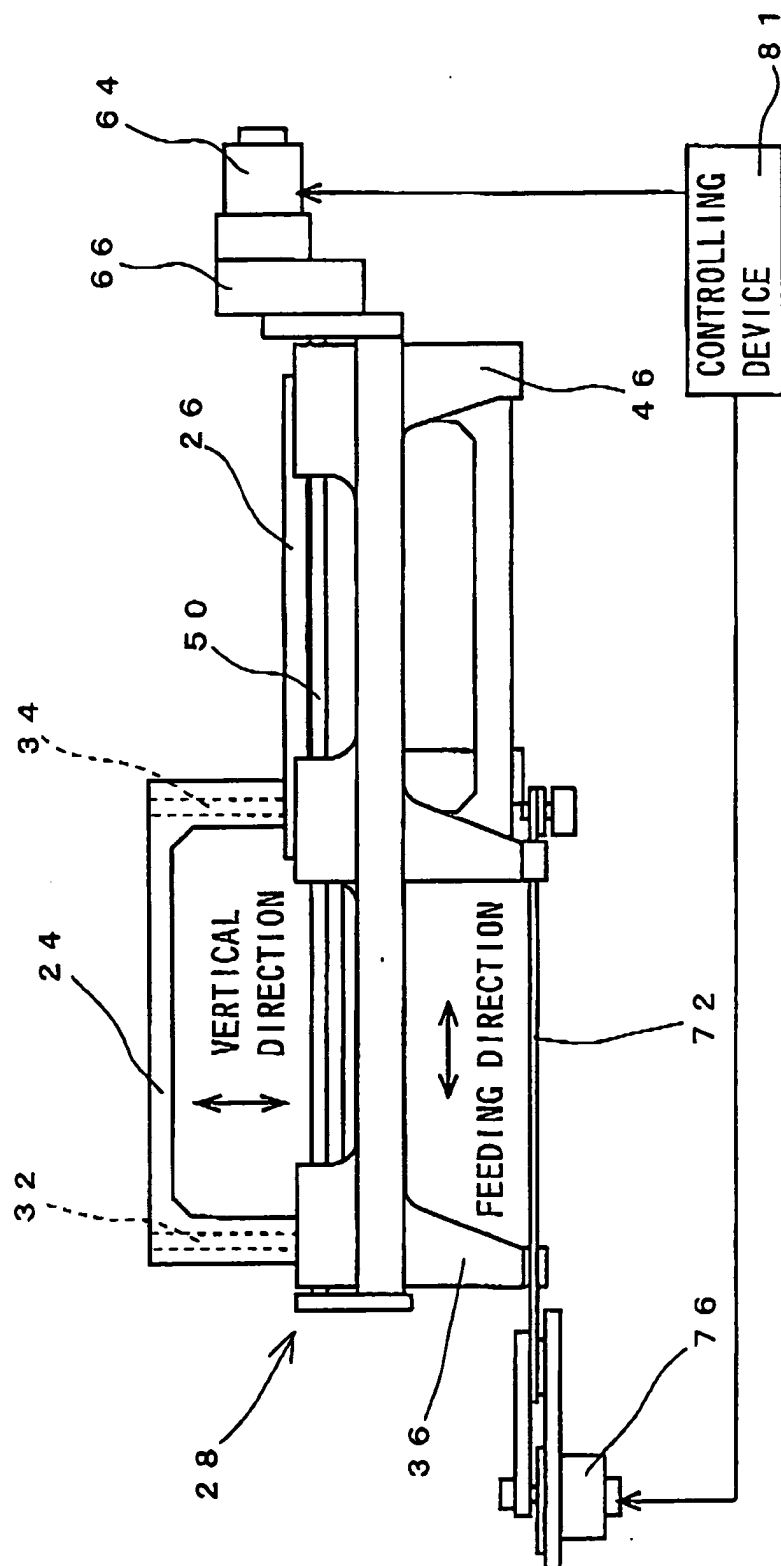


FIG. 6

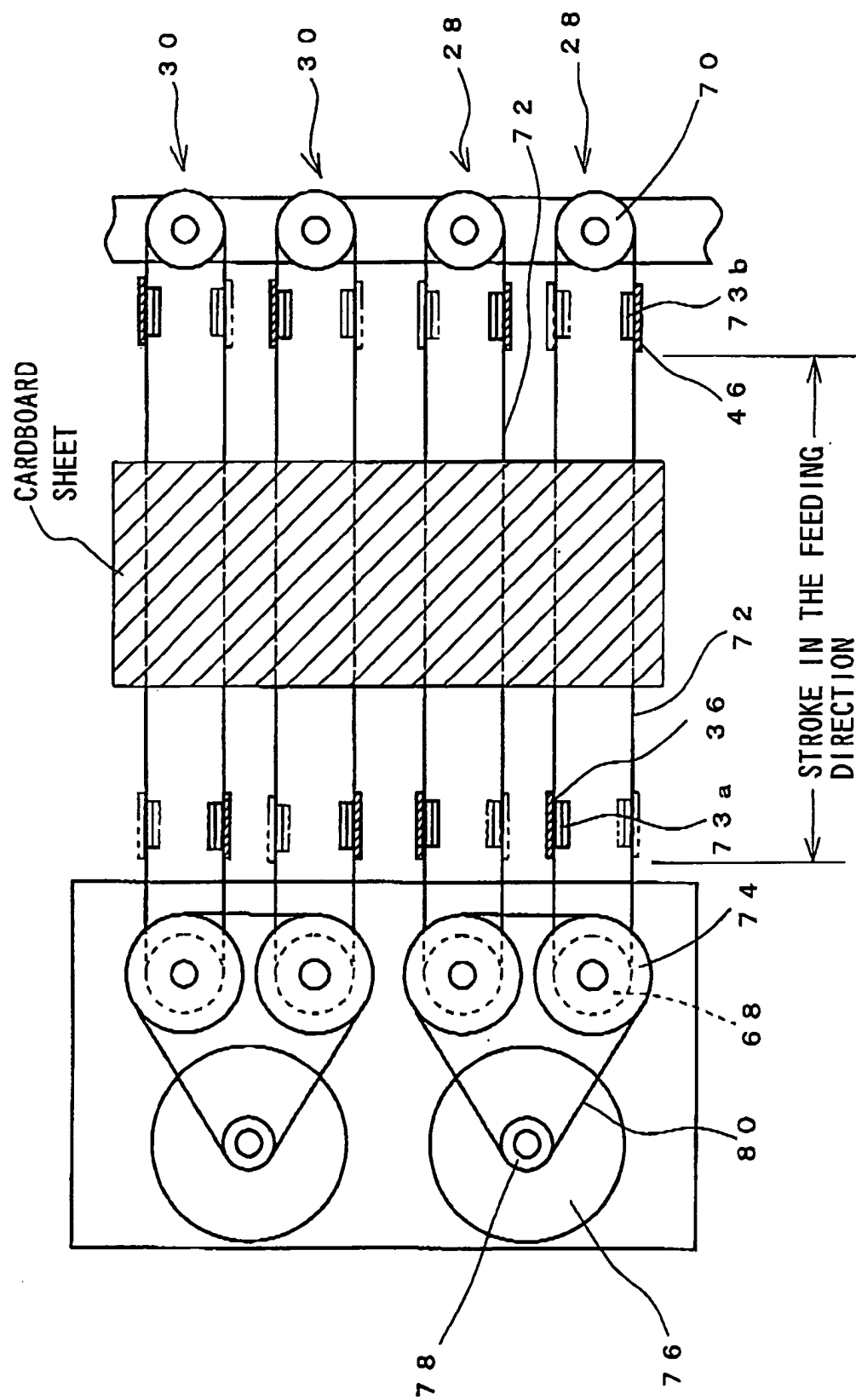


FIG. 7

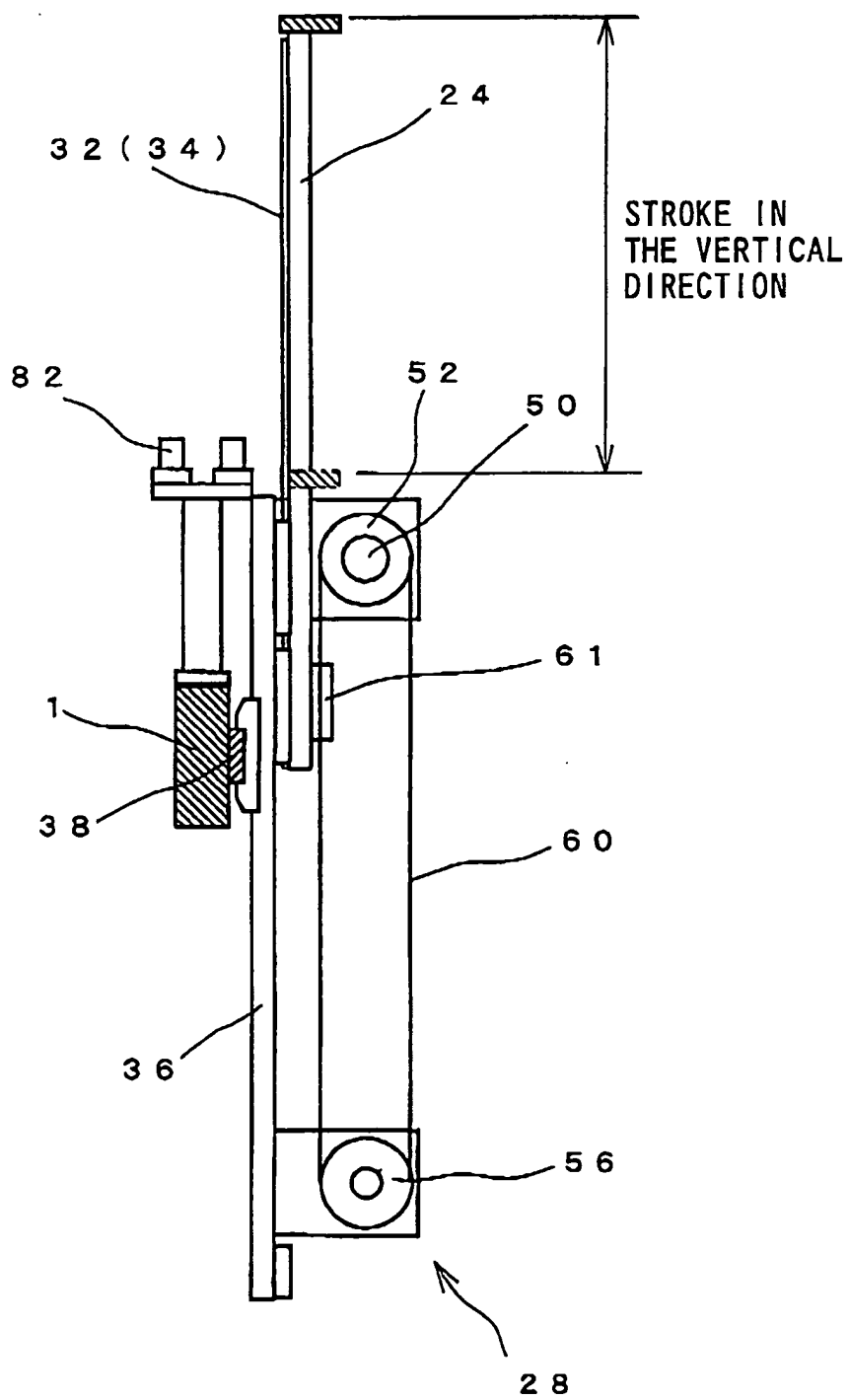


FIG. 8

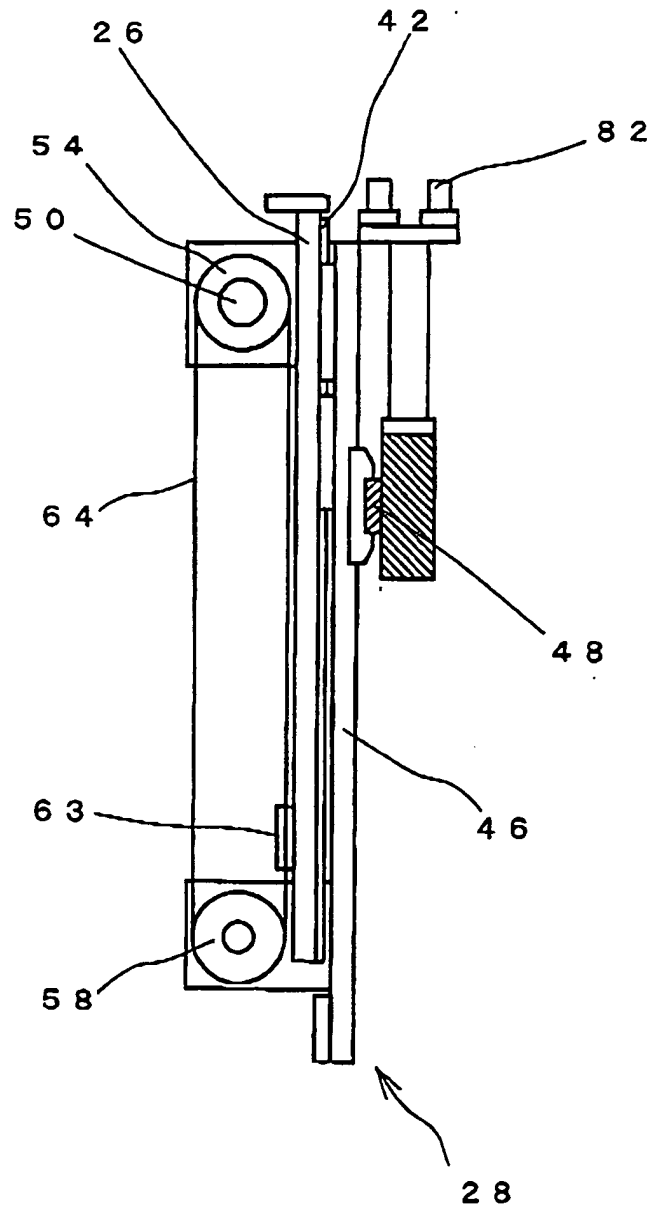


FIG. 9

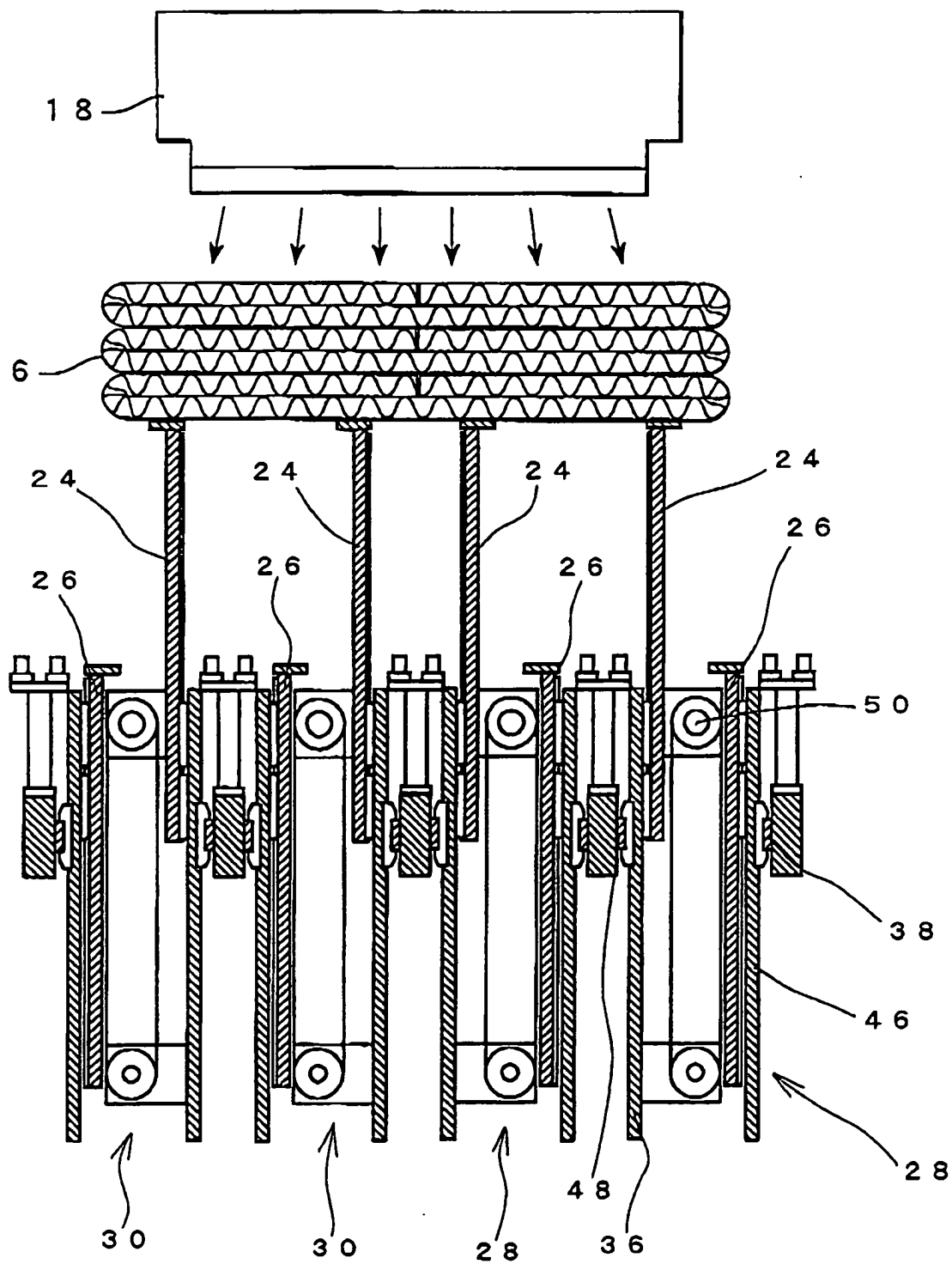


FIG.10

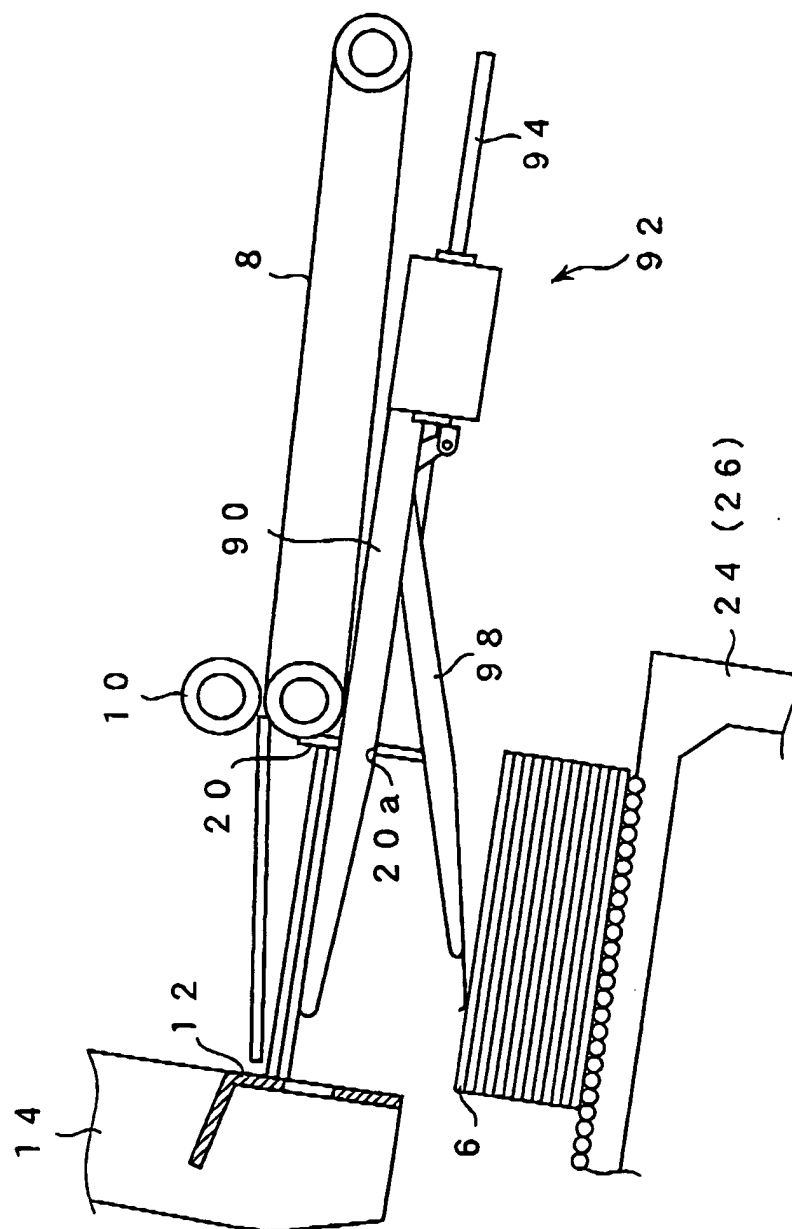
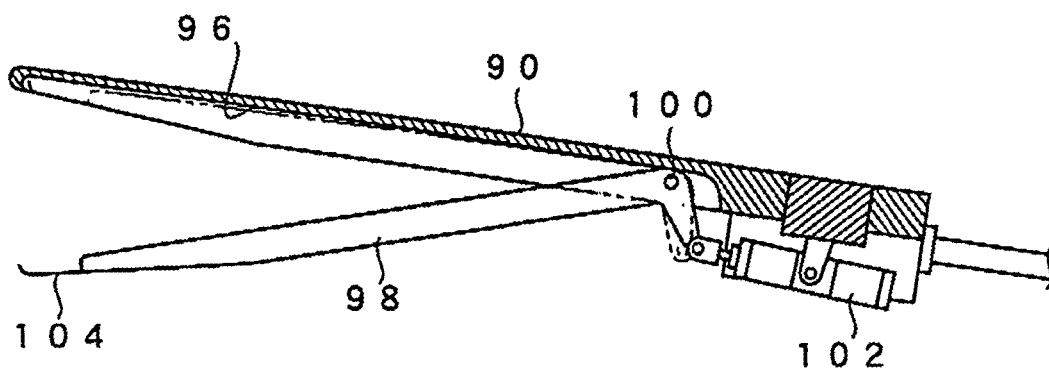


FIG.11





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
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			B65H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 January 2005	Examiner Stroppa, G
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