(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 051 900**
A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **81201246.6**

(22) Date of filing: **05.11.81**

(51) Int. Cl.³: **B 65 B 43/30**

(30) Priority: **11.11.80 NL 8006145**

(43) Date of publication of application: **19.05.82 Bulletin 82/20**

(84) Designated Contracting States: **AT BE CH DE FR GB IT LI LU NL SE**

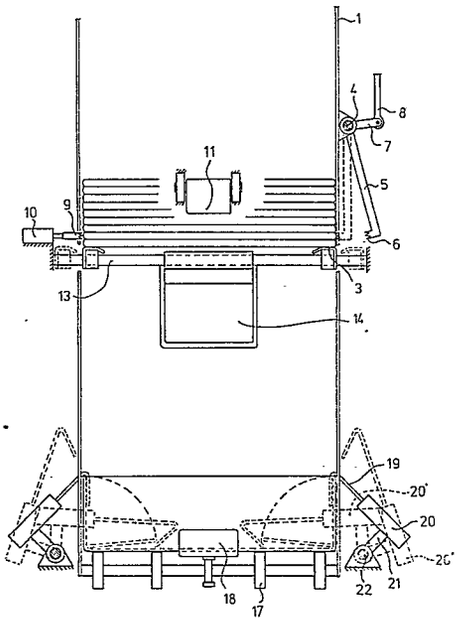
(71) Applicant: **Moba Holding Barneveld B.V., Stationsweg 117, NL-3771 VE Barneveld (NL)**

(72) Inventor: **van Ginkel, Mannes, Amersfoortsestraat 79, Barneveld (NL)**

(74) Representative: **De Wit, Gerard Frederik, Ir. et al, Octrooi- en Merkenbureau De Wit B.V. Breitnerlaan 146, NL-2596 HG Den Haag (NL)**

(54) Box opening device.

(57) Box opening device (19, 20) located below a supply hopper (1) for flat folded boxes, provided with hooks (19), that can be pivoted about shafts (22) outside the area of said hopper and can be extended or retracted with respect to said shafts, preferably flaps (14) being present to have the lowermost box fall down in a horizontal position.



EP 0 051 900 A1

0051900

Box opening device.

The invention relates to a device for opening boxes of the type formed of foldable sheet material in which the boxes are folded flat in manufacture to provide opposite side and end walls, and a bottom superimposed and interconnected along fold lines, said device comprising a stationary frame, a hopper means secured to said frame for maintaining a supply of flat unopened boxes and delivering the lowermost of them and hook means for engaging and erecting said walls.

Such devices are known from for instance the U.S. Patent Specifications 2,577,529 to Kerr et al and 3,279,332 to Dresser.

In these known devices a box has to be displaced horizontally in order to be opened, which means that a rather important floor area is necessary. In many practical cases such floor area is hardly available. With packing devices it often is a problem to have, apart from the supply line for the products to be packed and the delivering line for the packed products, a supply line for the boxes, so that they are located in the said hopper means, that only needs to be refilled after rather long time periods or are supplied from another floor. In grading machines even boxes may be needed at a number of locations, so that in that instance a reduced floor area for the supply of open boxes is even more important.

A further disadvantage of the known devices is, that they are rather complicated.

The invention aims to provide a device of the recited type, that occupies less floor area and due to a simple construction is cheap and reliable.

Accordingly the invention provides that below said hopper means a free space is present, said hooking means comprising two oppositely mounted hook devices, each having a hook pivotably mounted about a shaft, a pivot driving means for pivoting said hook about said shaft and a further driving means for imparting to said hook a movement having a radial component with respect to said shaft.

Because with the invention use is made of oppositely mounted hook devices it is possible to open a box when it is located below the said hopper, the construction being simple because no means for shifting the box with respect to the hook devices is necessary and the hook devices need not to be mounted to a conveying means as for instance is the case with the device known from U.S. Patent Specification 3,279,332 to Dresser.

Because with the invention the unopened box normally will fall down over a height, that must be sufficient to have space for the hook devices to open them the danger occurs, that the flat box will fall down obliquely. Why this happens is difficult to say because if it happens, it does so only extraordinary seldom. Nevertheless it means a break down of the device.

According to a further elaboration of the invention the horizontally oriented down-fall of the boxes is safeguarded by providing that below said hopper flaps having a plane surface are present pivotable from a position in which they protrude into the space below the lowermost flat unopened box and their upper surface is mainly horizontal and a position in which the said plane surfaces tilt downward toward said space and are located outside said space.

It is remarked that flaps of this type are known per se from the German Patent Specification 658,581, but with a falling height that does not allow the objects to be positioned obliquely, so that the insight, that such flaps prevent obliquely falling down of flat objects cannot be learned from this publication.

The invention in the following is elucidated on hand of the drawing in which

figure 1 shows schematically a side view of an embodiment of a device according to the invention;

figure 2 shows a front view of the device; and

figure 3 is a scheme in which the movements of the members present in the shown device have been indicated as a function of time.

In the drawing reference 1 indicates a hopper in which a stack of folded boxes 2 is present, wherewith it is indicated that the stack may be considerably higher than has been shown in the drawing.

This stack rests on stop members 3, which, as has been shown clearly in fig. 2, can be moved from a position in which they support the stack (solid lines) into a position in which they are not located inside the hopper so that they cannot support the stack.

Further retaining members 5 pivotable about a shaft 4 and having a toothed gripping surface 6 are mounted at one side of the hopper.

The member 5 is coupled to an activation arm 7 which by means of an activation link 8 enables movement of the member 5 from the position shown in solid lines into the position indicated with interrupted lines.

At the other side of the hopper 1 in fig. 2 a retaining member 9 has been shown, that by means of a pneumatical cylinder 10 can move from the position shown in solid lines into a position that is retained from the stack and vice versa.

Stack release members 11 are movable about a shaft 12 and can be moved from the position indicated with solid lines into the position shown with interrupted lines. In the position shown with solid lines they are inactive but when they

have pivoted upward into the position shown with interrupted lines they come below one of the objects 2 and lift it somewhat, together with the stack positioned higher up, so that the members that support the stack or have to retain it are considerably released.

Further flaps 14 are mounted pivotably about shafts 13, which flaps by means of an activation arm 15 and an activation link 16 can be moved from the position shown in solid lines into the position shown in interrupted lines and vice versa.

At the lower side of the hopper a roller track 17 is present. A shifting member 18 that is movable in horizontal direction can remove an object laying on the roller track toward the left in fig. 1.

Further at the lower side of hopper 1 (vide fig. 2) hooks 19 have been mounted, which can be activated pneumatically by means of pneumatical cylinders, which themselves can be pivoted by means of an arm 21 about a shaft 22 from the position shown in solid lines into the positions shown in interrupted lines and vice versa.

The working of the above described device is further elucidated on hand of the time scheme of fig. 3.

In this figure different lines are indicated with the reference pertaining to the members of which they indicate the movement.

The line 3 indicates the position of the stop members wherewith the lower level corresponds to the position shown in fig. 2 with solid lines and the higher part corresponds to the position shown in that figure in interrupted lines.

The retaining members 5 are in the time period that corresponds to the high level of this line in the position shown in solid lines, consequently outside the hopper 1 and in

the lower part of line 5 in the position in which they cooperate with the stack.

The line 9 shows also in the higher part of this line the position in which the members 9 do not cooperate with the stack, whereas in the lower part of this line they do cooperate with the stack.

The shift member 18 is in the lower part of line 18 in the shown position, wherewith the higher part of this line indicates movement toward the left in fig. 1.

The hook 19 is in the lower part of the line 19 in the retracted position, that means retracted into pneumatical cylinder 20.

The line 20 indicates in its high part the position indicated with 20" of the pneumatical cylinders 20 and in the lower part the position indicated with 20'.

Because the work cycle partly overlaps, which means that stop and retaining members cooperate already with the next object when shift member 18 is still busy with the preceding object, it is meant that discussion will be clearest if it starts with lines 3, 5 and 9. These show that firstly the retaining members 5 gradually are moved toward the stack and that, when they have reached their final position the retaining members 9 are relatively fastly moved toward the stack. In this position the one but lowest object is clamped between the members 9 and 5 by means of the corresponding toothed gripping surfaces.

In the time period in which these members 5 and9 retain the one but lowest object of the stack the stack release members 11 are active and the stack is relatively released.

In this time the stop members 3 move outward and at a predetermined moment, that by way of example has been indicated with an arrow the lowermost object falls down, mostly firstly at one side.

In the mean time the flaps 14 are at the end of their movement from their position shown in solid lines toward their position shown in interrupted lines, so that they support the edges of the object that fell down and in all cases time is available until both edges of the object are released by the stop members 3.

It has been shown that when pivoting downward these flaps retain and guide the object in such a way that it falls down with a high degree of certainty in a horizontal position, at least not in an oblique undefined position.

The small arrows indicate the moments at which falling downs normally occurs firstly from the stop members 3 and then from the flaps 14.

The shift member 18 has returned into its position shown in fig. 1 before the flaps let the object fall down, after completion of the removal of the preceding object.

Finally the folded boxes are opened by means of hooks 19. Before the box to be opened falls on the roller track 17, the hooks are in the position indicated with 20". After a box has arrived on roller track 17 they pivot with extended hooks 19 into the position indicated with 20'. The hooks now are retracted wherewith they come below the downwardly folded side walls of the box. During the last part of the retracting movement or thereafter their cylinders are pivoted into the position shown with solid lines. Following to this the hooks 19 are extended until they are located above the side wall of the box, after which the cylinders 20 pivot further into their starting position indicated with 20".

Because the hooks in their position indicated with 20' can press against the bottom of the box, if this is desired and then will scrape along said bottom during their retracting movement, it may be preferred to chamfer them or round them off at this location in order to prevent damage to the bottom. Such a movement along the bottom will only be

necessary when the side walls of the box practically engage the bottom. In that instance it is also possible to shape the foreside of the hooks such like, that they only slide between the side wall and the bottom.

The length of the refolded part of the hooks enables the device to work satisfactory with boxes having a somewhat deviating side wall height without need to readjust the apparatus.

In this way, as appears from fig. 2 the side wall may have a considerably lower height before readjustment of the pivot movement of the cylinders 20 or variation of their stroke length is necessary.

A further advantage of the invention is, that the same control mechanisms, to wit that for pivoting the cylinders and that for extending and retracting the hooks can be used not only for opening the boxes but also to bring the hooks outside the hopper 1.

Claims:

1. Device for opening boxes of the type formed of foldable sheet material in which the boxes are folded flat in manufacture to provide opposite side and end walls, and a bottom superimposed and interconnected along fold lines, said device comprising a stationary frame, a hopper means (1) secured to said frame for maintaining a supply of flat unopened boxes (2) and delivering the lowermost of them, hook means (19) for engaging and erecting said walls, characterized in that below said hopper means a free space is present, said hook means comprising two oppositely mounted hook devices (19, 20), each having a hook pivotably mounted about a shaft (22), a pivot driving means for pivoting said hook about said shaft and a further driving means (20) for imparting to said hook a movement having a radial component with respect to said shaft.

2. Device according to claim 1, characterized in that said further driving means (20) comprises a pneumatical or hydraulical cylinder.

3. Device according to claim 1 or 2, characterized in that said hook means (19) are pivotable toward a position in which they are completely outside said space.

4. Device according to any of the preceding claims, characterized in that said hook means (19) have a straight forward edge.

5. Device according to any of the preceding claims, characterized in that said hook means (19) have an edge that at the side directed towards the bottom of the box is chamfered or rounded.

6. Device according to any of the preceding claims, characterized in
that a control means for the pivot driving means and the further driving means is present adapted to cause said hooks to be pivoted from outside the said space unto the bottom of an unopened box located at the lower side of said free space, to let the further driving means (20) scrap the hooks along said bottom, to pivot said hooks until said walls are mainly vertical, to let the further driving means disengage the hooks from the said walls and to pivot said hooks until they are located outside said space.

7. Device according to any of the preceding claims, characterized in
that flaps are present having a plane upper surface which flaps are pivotable from a position in which they protrude into the space below the lowermost flat unopened box and their upper surface is mainly horizontal into a position in which the said plane surfaces tilt downward toward said space and are located outside said space.

0051900

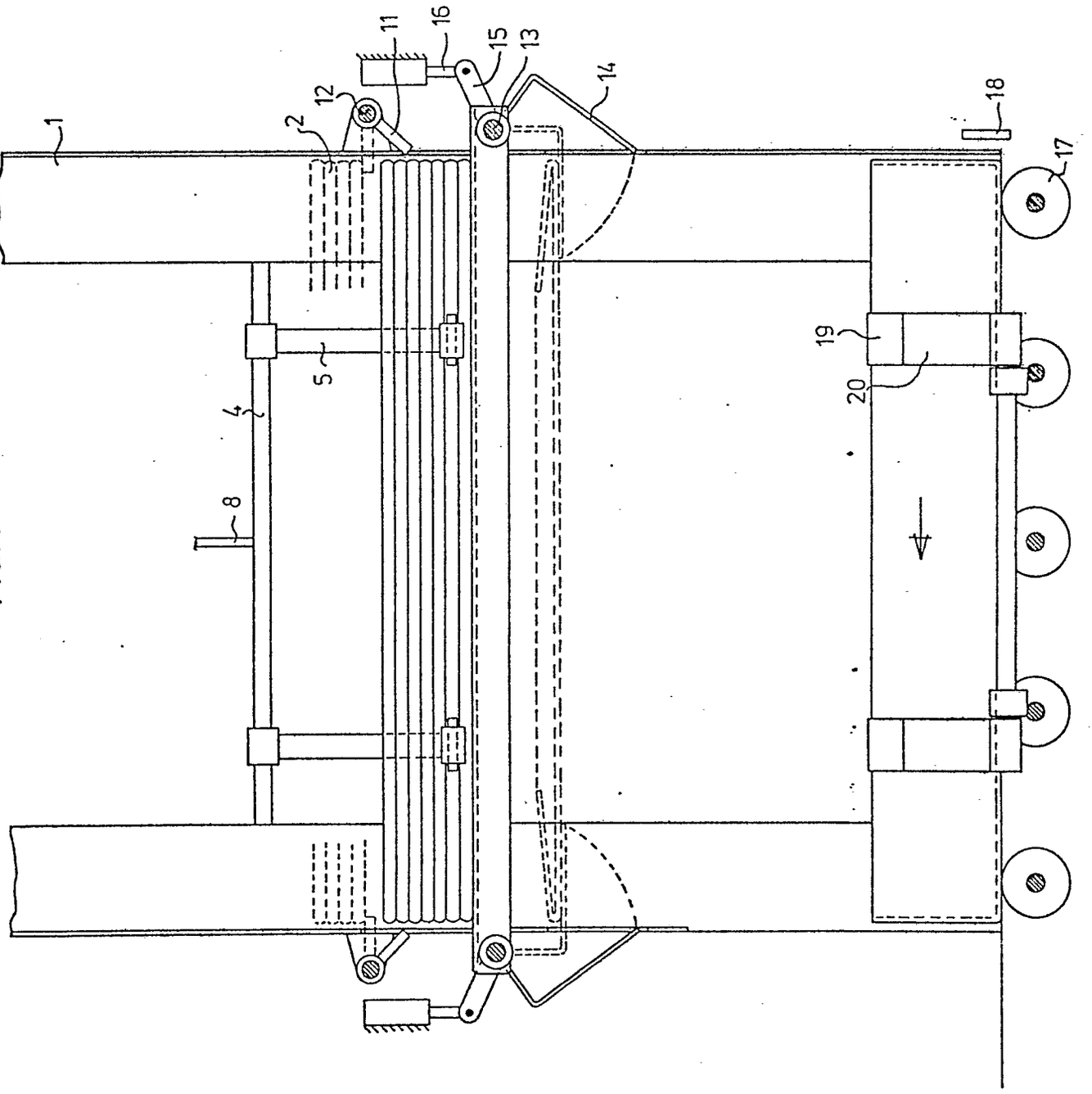
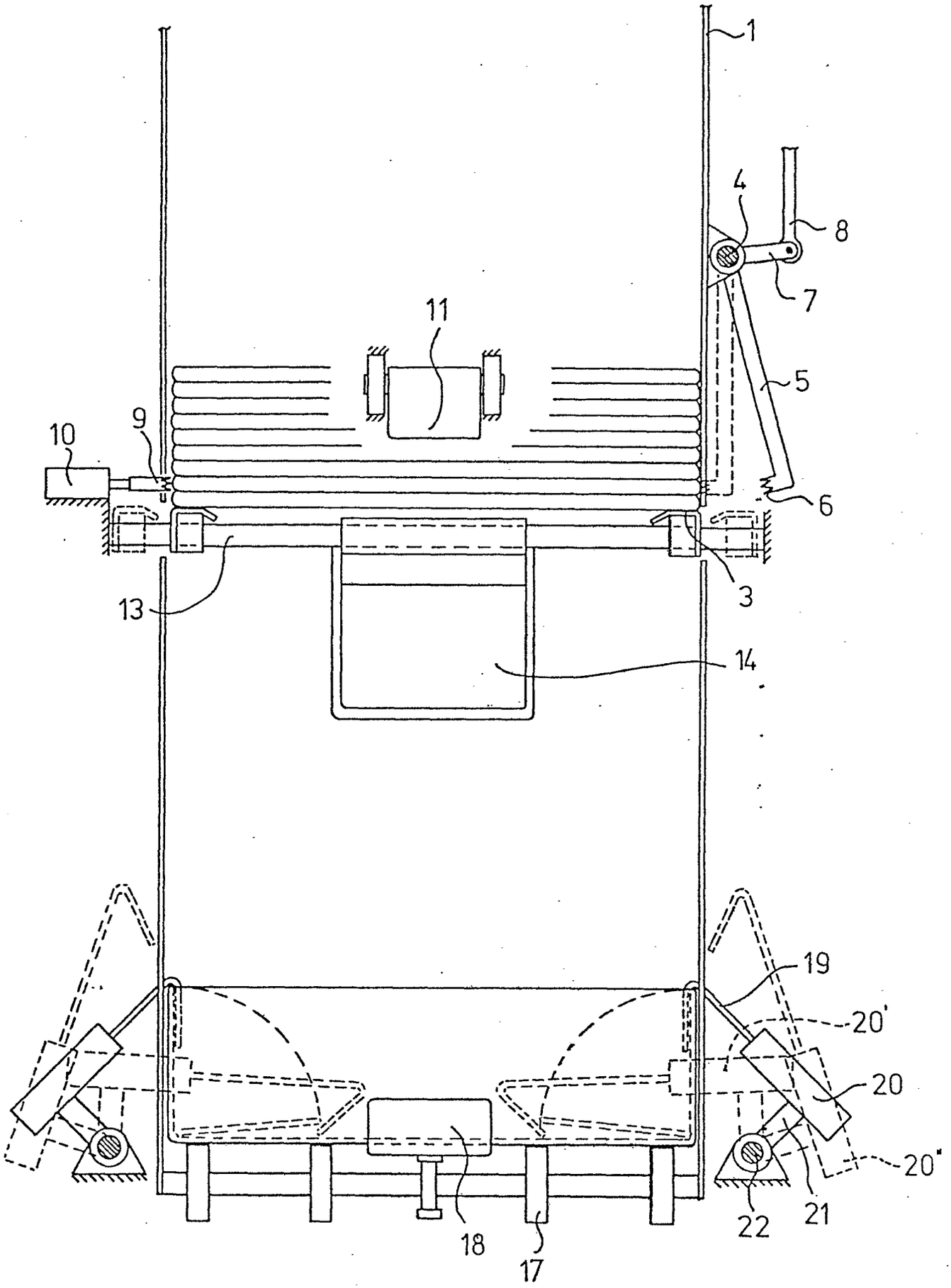


FIG.1

0051900

FIG. 2



0051900

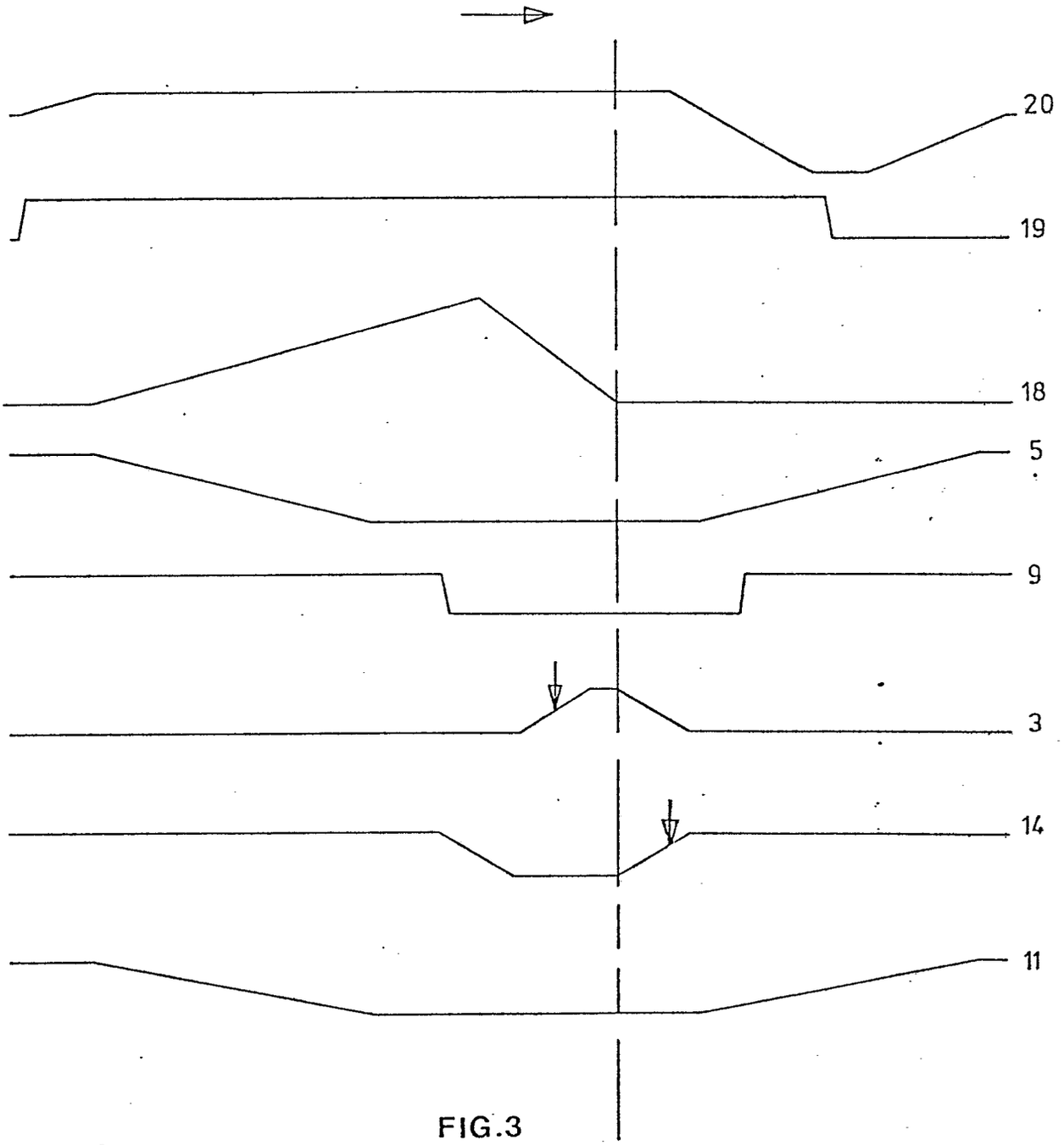


FIG.3

European Patent Office

0051900
Application number
EP 81 20 1246

EUROPEAN SEARCH REPORT

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
D	US - A - 3 279 332 (DRESSER) * Column 4, lines 18-75; figures 5,8 *	1,5
D	US - A - 2 577 529 (KERR et al.) * Figures 4,13-17 *	1,5
D	DE - C - 658 581 (SACHSENBERG et al.) * Page 2, lines 15-55 *	7

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

B 65 B 43/30

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

B 65 B
B 65 G

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	08-12-1981	KIRSCHBAUM