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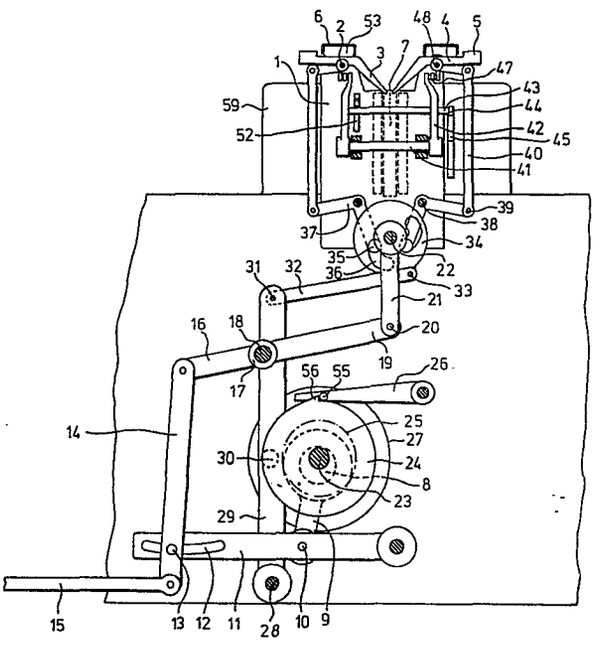
(54) Adjustable device for controlled lowering and discharging an object.

(57) Device for lowering an object and preferably a row of objects in dischargeable retaining members (3), which are movable vertically, the vertical distance over which the retaining members are lowered being adjustable without influencing the upper level from which the lowering starts and the fact that discharge always occurs in the lowermost position, a horinzontal shift of the retaining members being also adjustable.



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Adjustable device for controlled lowering and discharging an object.

The invention relates to a device for controlled lowering and discharging of at least one object, provided with a dischargeable retaining member for the object, a lowering device for moving up and down the retaining member and an opening device for letting the retaining member discharge. Such a device has been described in the United States Patent Specification 3,973,667 to Jellema et al.

With such a device it is possible to lower objects gently to a level where they can be discharged safely into a packing means, with in case of eggs or other vulnerable or breakable objects the advantage of a minimum falling height and a minimum shock.

With such a known device, however, a difficulty may arise because it has to be suitable for filling quite different packages. Specially with eggs it is important that the height of the package may vary. This generates the problem that in the highest position of the retaining member also the highest package must be able to move along below the retaining member in order to bring a new pocket of the package below the retaining member, whereas with low packages mostly the level at which the objects finally lay in the package is rather low. This means that ~~with~~ a device of this type, which is suitable for high packages, with use for low packages has an undesired high falling height.

The invention aims to eliminate this difficulty and to provide a device which in principle is suitable for packages of different heights. This yields important economical advantage because more and more types of packages are used

and it has to be possible for an automatic packing machine for instance to fill all current packages.

Accordingly the invention provides that the vertical distance over which the lowering device causes the retaining member to move is adjustable.

A simple adjusting mechanism, which in principle can be served from a greater distance, even mechanically, so that operation at the outside of an automatic machine, which often is rather large, is possible, consist in that the lowering device is provided with a driving member adapted to carry out a predetermined stroke and by means of a system of pivotable rods is connected to said retaining member, at least one rod having an adjustable work arm length.

A further embodiment hereof exists in that said rod is a lever pivotable about a fixed pivot point, which lever is connected to said driving member for being pivoted by it, said lever being further connected to a second rod by means of a connection having a pin at the one side and a slit in which the pin protrudes at the other side.

An elaboration of the above embodiment, which has the advantage that adjustment of the device does not change the starting level of the retaining member consists in that the slit is fixedly located with respect to the lever and has the shape of a circle arc, said second rod being pivotably connected to a further rod in a point that almost coincides with the centre of the circle of said arc.

With the invention it is further important that discharge of the retaining member always occurs at the lower end of its movement, even when the length of this movement has been changed by the adjustment. Accordingly a further elaboration of the invention provides that the opening device is movable up and down together with the retaining member and is activated by a rod that is horizontally or nearly horizontally oriented and is movable in a mainly horizontal direction. By reason of this the mutual shift in vertical

direction of the driving member and the driven member of the discharge device has hardly any influence on the time the retaining member discharges.

A good mutual match of the vertical movement of the retaining member and its discharge, also with differing vertical strokes, is according to a further elaboration of the invention attained by providing that the lowering device and the opening device are driven by mutually coupled cams or eccentres.

The device according the mentioned United States Patent Specification 3,973,667 is also provided with a number of retaining members located in a row, which retaining members are shiftably mounted in the direction of the row and are coupled to each other, means being present to displace at least one retaining member lengthwise in the row with the up and down movement.

This allows to induce a horizontal displacement in order to adapt the distance between the retaining members in the row to different distances between the receiving locations for the objects in the packages. Because the invention aims to adapt the device to different packages it will be clear that in such circumstances also adaption in horizontal direction may be necessary. Accordingly the invention preferably provides in this instance that the coupling between adjacent retaining members is elastical and the displacement means is adjustable to adjust the displacement to be imparted to the said one retaining member.

The adjustment of the movement of the retaining members in the row can according to a further elaboration of the invention easily be realized by providing that the displacement means is provided with a fixed control cam and an adjustable cam, which cams are not movable with the lowering means and a cam follower member cooperating with both cams.

Herewith the adjustable cam may lift the cam follow member from the fixed cam, so that it is possible to give the fixed

cam a work region covering the maximum displacement of the related retaining member and by bringing the adjustable cam in the corresponding position to restrict this displacement. Herewith it is pointed to the fact, that the horizontal movement of the retaining members occurs over relatively small distances, so that it is allowable without more to carry out such a partial horizontal displacement of the retaining members in only part of the vertical movement of these retaining members.

In the following the invention is elucidated on hand of the drawing in which:

Figure 1 shows partly in cross-section an end view of a device according the invention,
Figure 2 is a side view of figure 1,
Figure 3 is an end view, corresponding to figure 1 but in an other position of the device,
Figure 4 is a side view corresponding to figure 2 but in the position of figure 3 of the device,
Figure 5 schematically shows a plan view.

In figure 1 reference 1 indicates a frame that is movable up and down. In this frame shafts 2 are mounted, which on their term serve as bearing means for retaining members. These retaining members each consist of two sets of fingers 3, wherewith one set of these fingers on each of the shafts 2 is positioned opposite another and two sets form a retaining member.

These retaining members have at their part that is located outside the shafts 2 an arm 4 with at its end a counter weight 5. Further a beam 6 can work on the arms 4 of the fingers 3 to tilt them in such a way, that the fingers 3 move outward and away from each other wherewith the counter weight 5 is lifted.

The beams 6 are supported by blocks 53 which also have been mounted to shafts 2.

Reference 7 indicates a guide mounted to frame 1

The vertical movement of frame 1 is deduced from an eccentric 8, the accentre wheel of which is mounted on a shaft 23. The eccentric rod 9 is at 10 pivotably connected to an arm 11, which to the right has a fixed pivot point and to the left a partly circular slit 12. Into this slit a pin 13 protrudes which is fixedly connected to a rod 14. Reference 15 indicates an adjustment member that by displacement in its longitudinal direction determines the location where the pin 13 protrudes into slit 12. The rod 14 is connected to a further rod 16, the connection point forming the centre of the circle through the middle of slit 12 and remains almost in this centre when the arm 11 is pivoted. The further rod 16 is by means of a fixed connection non pivotably connected to a shaft 18, which supports non pivotably arms 19 which via pins 20 are connected to arms 21 connected to a support rod 22 for the frame 1. When the shaft 23 rotates over one revolution the arm 11 by reason of its coupling with eccentric 8 pivots to and fro, which pivot movement via 14, 16, 17, 18, 19, 20, 21 and 22 is transmitted to frame 1 in the form of a vertical movement. The length of the vertical stroke is determined by the location of pin 13 in slit 12. In the highest position of the frame 1, which has been shown in fig. 1, movement of pin 13 in slit 12 does not influence the height position of this frame.

The shaft 23 is driven by an one-revolution-coupling with a decoupling disc 24 and a continuously driven part 25. The disc 24 cooperates with a pawl which, when it in the way shown in figure 1 with a stop member 55 engages a protrusion 56 prevents the shaft 23, that is coupled to said disc, to rotate. The coupling is a spring band clutch which, when the disc 24 is liberated by retracting pawl 26, realizes a coupling between the driven part 25 and the shaft 23. Such clutches are well known. When the disc 24 has carried out a complete revolution the protrusion 56 engages again the stop member 55 and the shaft 23 is again brought to a stand still.

On the shaft 23 further a cam 27 is mounted that cooperates with a cam follower 30 that is mounted to an arm 29, which at its lower side at 28 has a fixed pivot point. At its upper side this arm is at 31 connected to a link 32 that at its other side is connected to a cam disc 34 freely rotatably mounted to shaft 22. This cam disc is provided with two control slits 36 in which follow pins 35 protrude, which are connected to hooked arms 37 that can pivot about shafts 38 which are fixedly mounted in the frame that is movable in vertical direction. At their ends the hooked arms 37 are by means of pivot connections connected to links 40 which cooperate with the blocks 53 to cause the activation beams 6 to pivot about shafts 2 for letting the retaining members 3 discharge.

In the frame 1 that is movable up and down further two arms 42 are mounted to a shaft 41, mounted in said frame. With the arms 42 a transverse rod 43 is connected which at an end supports a cam follower 44 which can cooperate with a fixed control cam 45. Each arm 42 is at its upper end connected to a link 47, which by means of a pivot connection 46 is connected to a shift member 48 connected to the next one of a number of sleeves 49. Between these sleeves springs 50 are present. The fingers 3 of the retaining members are pivotably mounted to said sleeves 49 which each are provided with a collar 51 fixing the fingers in axial direction.

If now the cam follower 44 moves along cam 45 the arm 42 pivots about shaft 41, so that the location of the retaining member fingers 3 on the shaft 2 is modified, wherewith, however, the distance between successive retaining members is the same, because of the identity of the springs 50.

When a complete mutual movement of the retaining members is not wanted, a stepped member 52 with different heights 52' and 52" is mounted to the frame 1 and suchlike adjusted that the rod 43 comes on one of the steps 52' or 52" for restricting the axial shift of the fingers 3.

The working of the described device is the following:

When a control pulse im imparted to pawl 26 the shaft 23 carries out one revolution, by reason of which the eccentric 8 moves the frame 1 downward and up again.

By the rotation of shaft 23 also via cam 27, cam follower 30, cam disc 34 and hooked arms 37 discharge of the retaining members is brought about. Therewith adjustment of member 15 by shifting it lengthwise will see to it, that the vertical stroke carried out by the frame 1 can be adjusted, wherewith, however, always the time at which the retaining members discharge is in the lowermost part of their movement.

In the same time the vertical movement of the frame 1 is used to move the cam follower 44 along the fixed cam 45 in order to cause an axial shift of the retaining members 3. The axial shift can be limited by cooperation between the stepped member 52 and the member 43.

The described device has the advantage that the objects can always be lowered in a controlled way unto a desired lowest level, so that adaption to different heights of packages is possible. If therewith also the distance between the object in a row differs the vertical movement of the frame is used to generate a shifting movement of the retaining members on their shafts. By means of an additional cam, which is adjustable, a limitation of this shift can be realized, dependent on the desired axial shift.

The shown device further in essence is provided with a vertically non movable part 57, which via a mounting rod 58 supports sheets 59 to which the cams 45 are mounted, and the frame 1 that by means of links 21 and the shaft 22 can be moved vertically, wherewith the cam follower 44 runs over the cam 45. The vertical stroke is adjustable with the adjustment member 15 and the horizontal shift of the fingers 3 by displacement of cam 52. Discharge of the retaining members formed by the fingers 3 occurs in the lowermost position of frame 1 with each position of the adjustment

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member 15. The highest position of frame 1 is independent from adjustment member 15 so that feeding objects to the retaining members formed by the fingers 3 is not influenced by the position of adjustment member 15.

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Claims:

1. Device for controlled lowering and discharging of at least one object, provided with a dischargeable retaining member (2,3) for the object, a lowering device (11, 14, 16, 18-22) for moving up and down the retaining member and an opening device (34-40, 53) for letting the retaining member discharge,
characterized in
that the vertical distance over which the lowering device causes the retaining member to move is adjustable.

2. Device according to claim 1,
characterized in
that the lowering device is provided with a driving member (9) adapted to carry out a predetermined stroke and by means of a system of pivotable rods (11, 14, 16) is connected to said retaining member (2, 3), at least one rod (11) having ad adjustable work arm length.

3. Device according to claim 2,
characterized in
that said rod (11) is a lever pivotable about a fixed pivot point, which lever is connected to said driving member (9) for being pivoted by it, said lever being further connected to a second rod (14) by means of a connection having a pin (13) at the one side and a slit (12) in which the pin protrudes at the other side.

4. Device according to claim 3,
characterized in
that the slit (12) is fixedly located with respect to the lever (11) and has the shape of a circle arc, said second rod (14) being pivotably connected to a further rod (16)in a point that almost coincides with the centre of the circle of said arc.

5. Device according to one or more of the preceding claims, characterized in

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the opening device (34-40, 53) is movable up and down together with the retaining member (2, 3) and is activated by a rod (32) that is horizontally or nearly horizontally oriented and is movable in a mainly horizontal direction.

6. Device according to claim 5, characterized in that the lowering device and the opening device are driven by mutually coupled cams or eccentres (27, 8).

7. Device according to any of the preceding claims, provided with a number of retaining members (3) located in a row, which retaining members are shiftable mounted in the direction of the row and are coupled to each other, means (41-50, 52, 52', 52") being present to displace at least one retaining member lengthwise in the row with the up and down movement, characterized in that the coupling (50) between adjacent retaining members is elastical and the displacement means (52) is adjustable to adjust the displacement to be imparted to the said one retaining member.

8. Device according to claim 7, characterized in that the displacement means is provided with a fixed control cam (45) and an adjustable cam (52), which cams are not movable with the lowering means and a cam follower member (44) cooperating with both cams.

9. Device according to any of the preceding claims, characterized in that the up and down movement is adjustable with a fixed upper level and a adjustable lower level.

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FIG.1

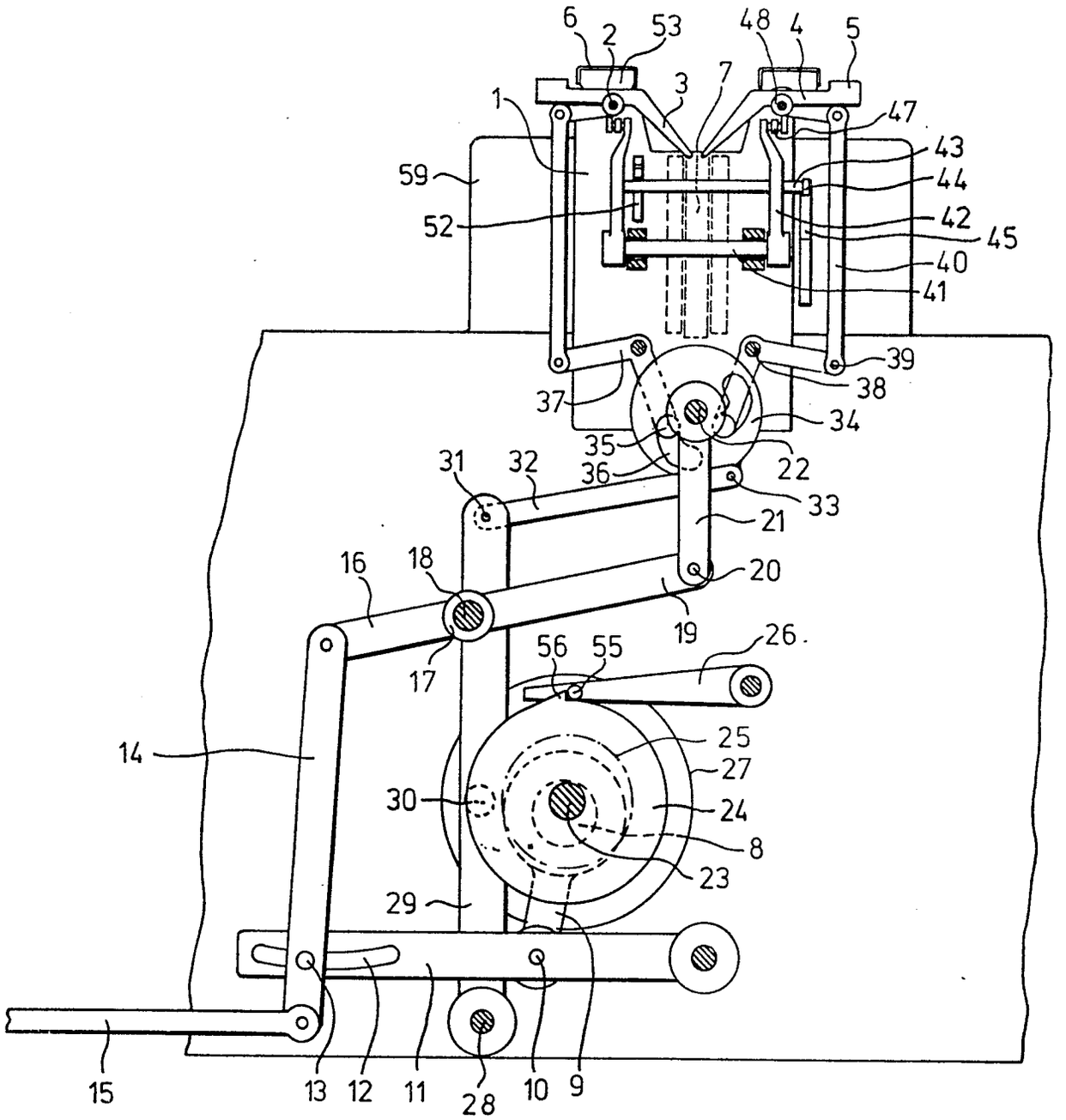

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FIG.2

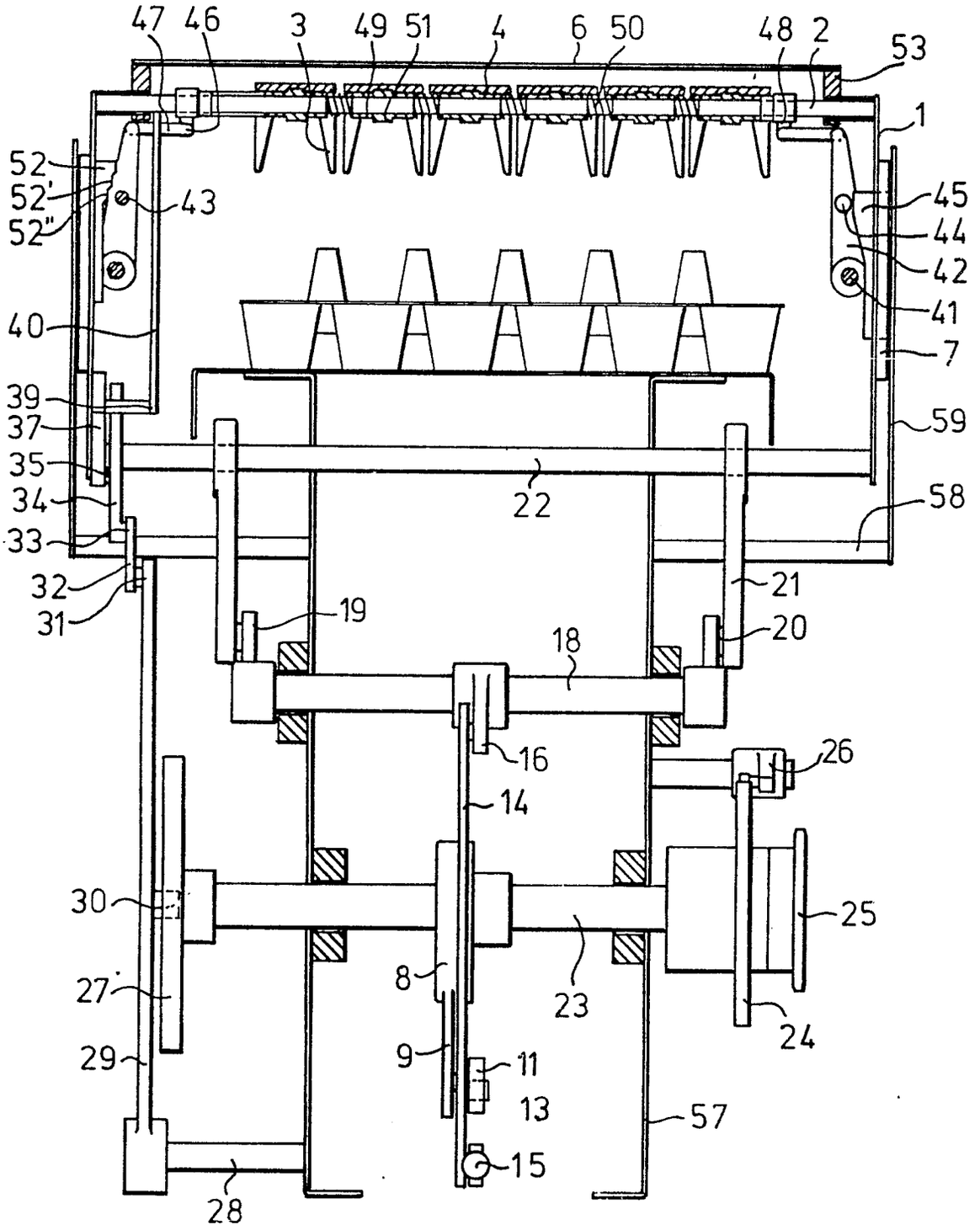

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FIG.3

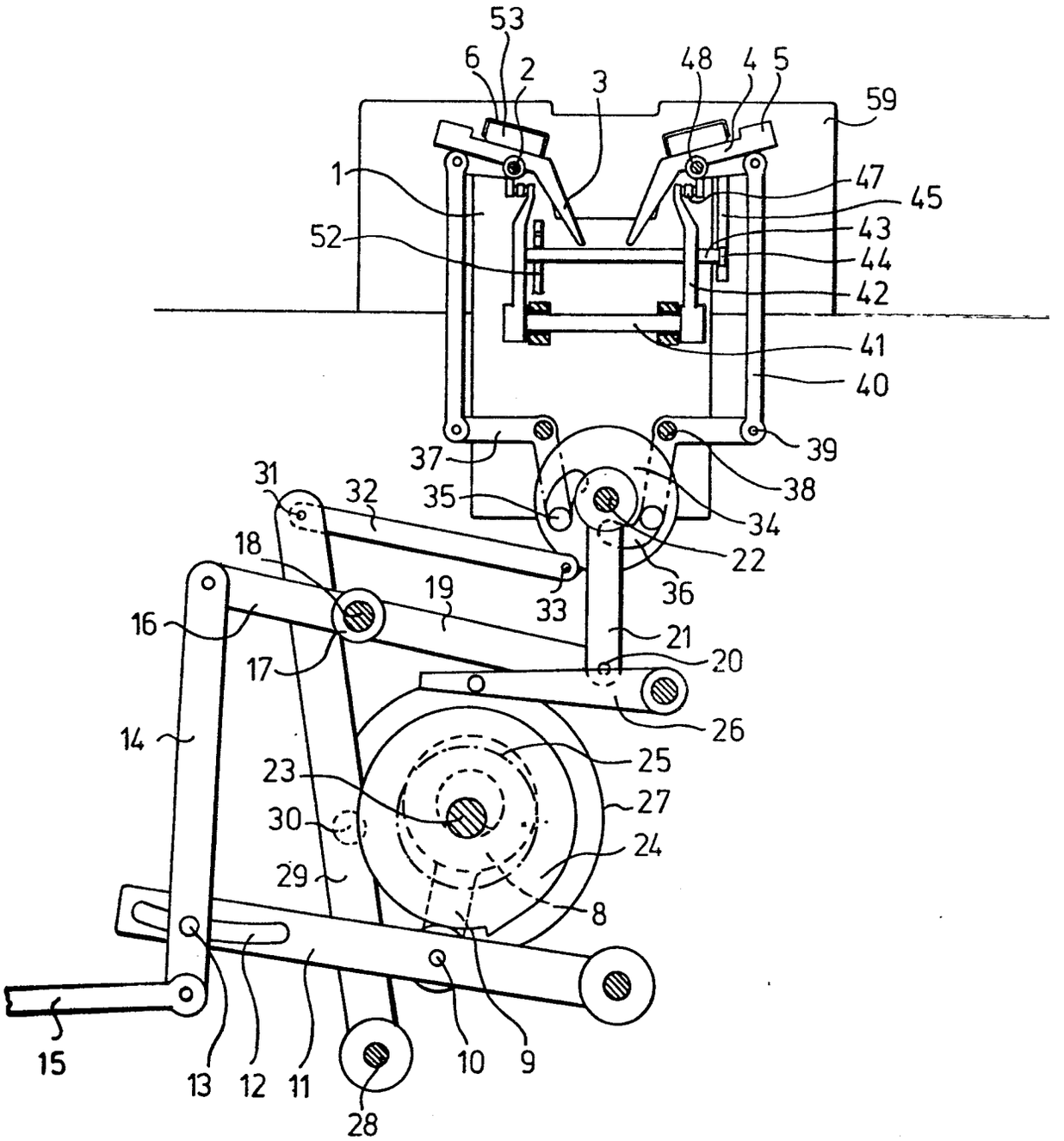

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FIG.4

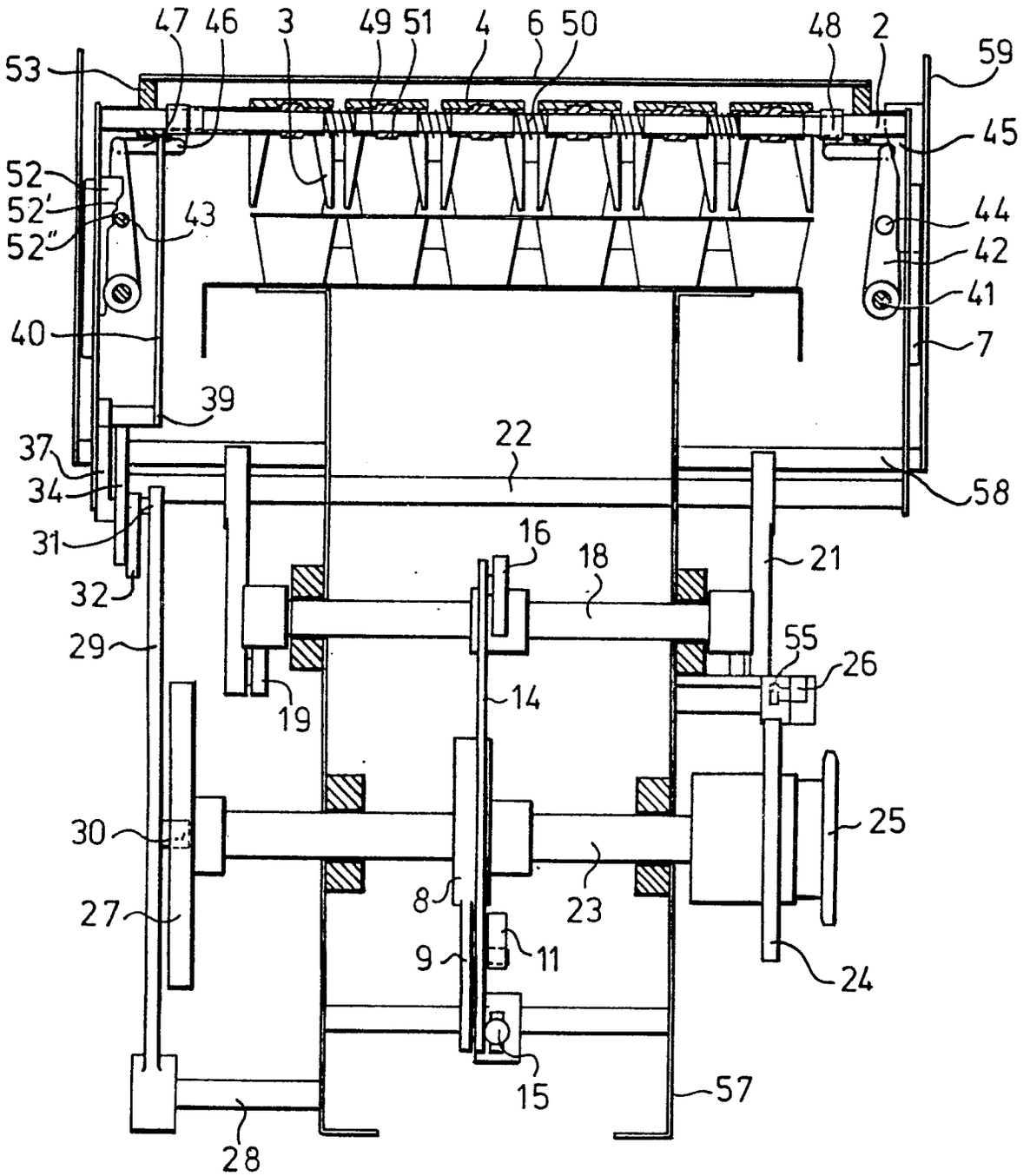

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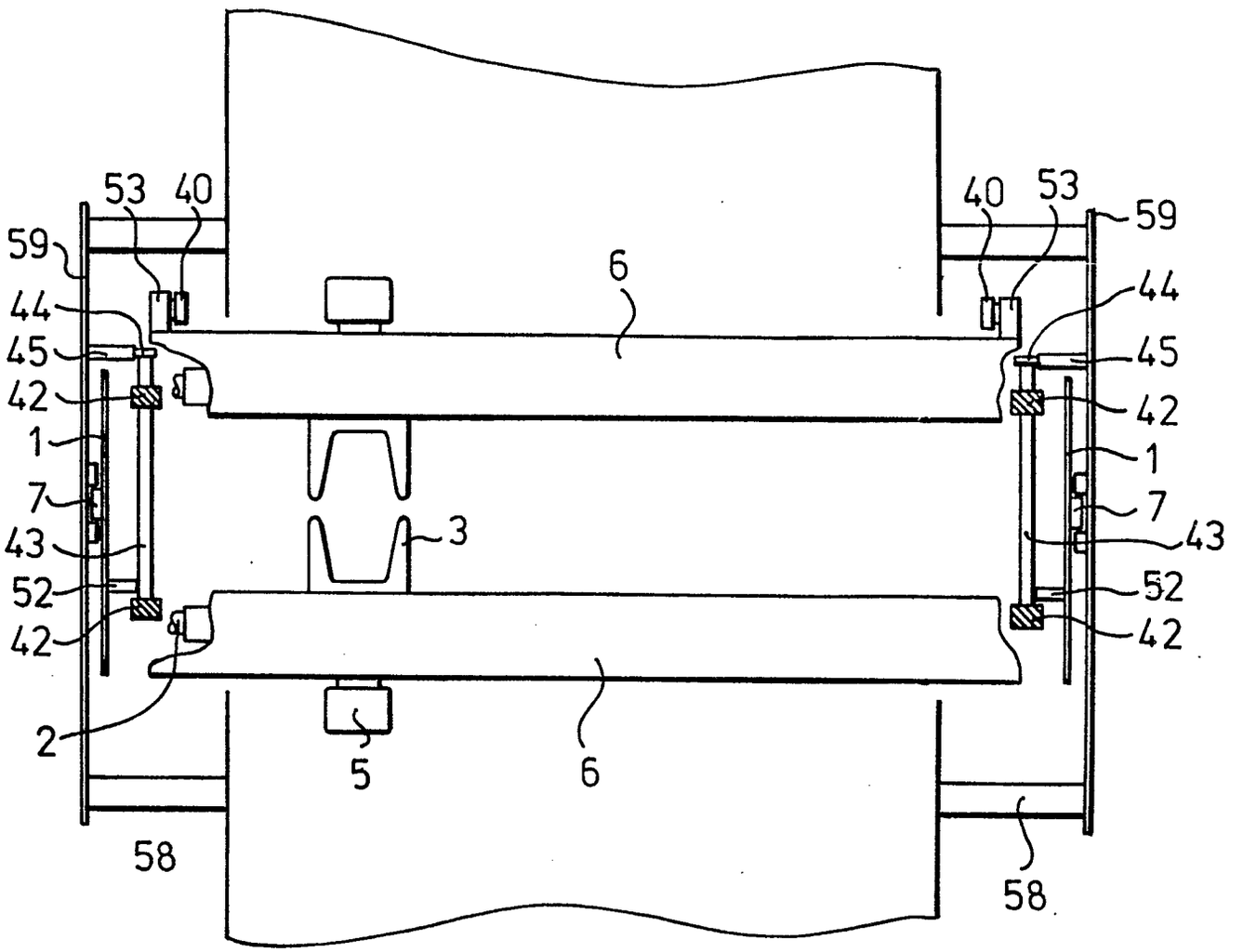
FIG.5



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EUROPEAN SEARCH REPORT

Application number

EP 82 20 0125

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
D,Y	US-A-3 973 667 (A.JELLEMA) *Column 1, line 65 - column 3, line 42; figures*	1,5,6, 8	B 65 B 23/06 B 65 B 35/36
A		7	

Y	US-A-3 525 195 (J.MOSTERD) *Column 2, line 60 - column 4, line 14, figures*	1,5,6, 8	
A		9	

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

B 65 B
B 65 G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	28-04-1982	JAGUSIAK A.H.G.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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