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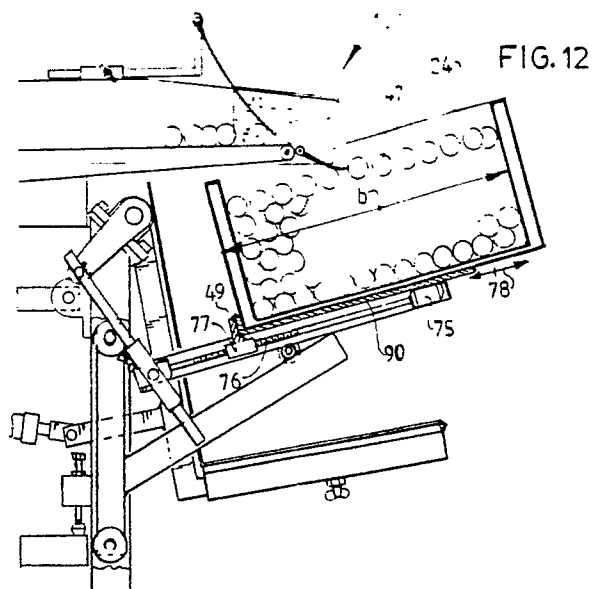
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Method and device for filling a holder with objects.

(57)

Method for filling a holder (24) with objects (47), in particular with market garden and agricultural produce, whereby the holders are moved in each case subject to a degree of filling between an empty position and a filled position relative to a produce feed, in a manner adapted to the dimensions of the diverse types of holders.



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METHOD AND DEVICE FOR FILLING HOLDER WITH OBJECTS

The invention relates to a method for filling a holder with objects, in particular for filling a holder with market garden and agricultural produce, whereby the holder is moved subject to a degree of filling between an empty position and a full position relative to a produce feed.

Such a method is known. The holder is thereby swivelled around a determined axis located under the produce feed.

With the method of the present type the intention is to allow the produce to cover a small rolling path and in particular a small - preferably no - falling path from the feed.

With the known method this cannot be satisfactorily realised, particularly in the case that holders of different dimensions have to be filled, whereby there is the danger that produce, especially fruit, may be damaged.

The invention has for its object to reduce the risk of damage to produce. To this end the characteristic of claim 1, 2 and/or claim 3 is applied.

In this respect the invention also provides a device which is designated in particular in claim 4. Preferred embodiments are designated in claims 5 and following.

Mentioned and other features of the invention will be elucidated in the description following hereafter with reference to a drawing.

In the drawing in schematic form:

fig. 1 shows a partly broken away perspective view of a preferred embodiment of a device according to the invention,

fig. 2 to 4 each show a side view of the device from fig. 1 in successive stages during the filling of a holder,

fig. 5 is a diagram of the control device of the device from fig. 1,

fig. 6 shows a graph which indicates the computer instructions for the movements for a number of different holders depending on the degree of filling.

fig. 7 to 11 show holders of various dimensions to be filled with fruit,

fig. 12 and 13; fig. 14-19, fig. 20, fig. 21 and fig. 22-25 show diagrammatic side views of five other devices according to the invention.

The device 1 from fig. 1-5 comprises a frame 2 and two rollers 3 and 4 of an endless conveyor belt 5 fixedly mounted on the frame 2, of which the roller 3 contains an internal electric motor. The roller 6 further serves for directing the conveyor belt 5. To this end the bearing 7 of the roller 6 is moveable by means of an adjusting member 8 (fig. 1). The roller 4 can have a small diameter, for example 16 mm, as a result of the fact that the

conveyor belt 5 is made of thin material, namely reinforced PVC, and the ends are mutually sealed in one and the same plane with zigzag glass 9.

Also present close to the discharge end of the conveyor belt 5, that is, by the produce feed 53, is an elongate flexible element 10, preferably in the form of an elastic wire, for example of an elastic plastic. A frame 11 is mounted for vertical up and downward movement on the frame 2 by means of two parallel pivot frames 12. The frame 11 rests via a vertically moveable support member 13 on a weighing means 14 carried by the frame 2. On the frame 11 a first holder bearer 15 is mounted for swivelling about a shaft 16 which contains a swivel angle measuring device 17, for example a potentiometer, with which the swivel position α (fig. 3) of the first holder bearer 15 is measured.

In fig. 2 the first holder bearer 15 is drawn in the empty holder position (where $\alpha = 0$), whereby a vertical leg 18 protrudes upward. Gripping slidably around this is a tube 19 of a first stop element 20 which can be fixed thereto by means of a wing nut 21. The stop element 20 is formed as an angle plate against which a bottom 22 and a long side wall 23 of a rectangular holder 24 support.

The swivel frame 15 (in fig. 2) has on its underside a protrusion 25 on which a piston rod 26 of a pneumatic cylinder 27 connected to the frame 11 grips for pivoting. The first swivel frame 15 is coupled for swivelling via an angle lever 28, a pivot lever 29 and a sleeve 30 sliding around the pivot lever 29 to a seesaw member 31 which is pivotably supported around bearing shaft 32 by a support 33 which is guided in a vertical direction by means of rollers 34 in U-shaped guiding rails 35 of the frame 11 and the level of which can be changed via a vertical screwed rod 36 and a bevel gear 37 by means of a rotatable handle 38. The screwed rod 36 co-acts for screwing with a threaded piece 40 of the frame 11.

The seesaw member 31 consists of two roller elements 41 each of which, as reckoned from the free end, consist of a roller 42, a smooth plate 43 and a series of rollers 44. This seesaw member 31 forms a second holder bearer 39 which accommodates the first holder bearer 15 between the roller elements 41 in a later filling stage of fig. 3 and 4. To this end the stop element 20 of the first holder bearer 15 has a narrowed lower piece 40 in contrast to a broad upper part 45, against which the holder 24 supports over a considerable length. The roller elements 41 have a stop element 49 which is adjustable in the direction of arrow 46 by means of adjusting means 51 comprising a wing nut 50 for the adapting to the breadth b of the

holder 24.

The pneumatic cylinder 27 serves as a control cylinder which controls the swivel movement of the first holder bearer 15 and thereby the movement of the holder 24.

From the empty position drawn in fig. 2 the first holder bearer 15 swivels downwards while produce 47 enters the holder 24 until the bottom edge 48 of the holder 24 arrives at the smooth surface 43 and is tilted as a result relative to the first holder bearer 15.

Gradually the holder 24 is increasingly taken over by the second holder bearer 39 until the holder 24 strikes against the stop element 49, whereby the filled position of the holder 24 shown in fig. 4 is reached after the second holder bearer 39 has executed another tilting around the shaft 32 as a result of the coupling with the first holder bearer 15.

Produce 47 is carried as according to arrow 52 onto the conveyor belt 5 and transported by the conveyor belt to the produce feed 53 where it is held back somewhat by a flexible flap 54 of transparent material, the location of which is moveable in the direction of arrow 55 by means of adjusting means 62. A flexible flap 65 which is connected to the flexible element 10 ensures that produce can roll into the holder 24 without being damaged and prevents produce 47 unexpectedly rolling out of the holder 24 over the edge 72.

The pneumatic cylinder 27 is controlled automatically by means of a microprocessor 56 (fig. 5). During a learning process a holder 24 is filled and instructions are given each time on a keyboard 57, in each case for a small degree of lowering, until the holder 24 is lowered such that holder 24 is filled with the least possible rolling and falling of produce 47. These instructions go as arrow 58 to the microprocessor 56 which immediately carries out these instructions by rapidly moving the valve 79 back and forth a number of times with valve 59 opened which enables alternately a very small quantity of air to flow from the cylinder chamber 60 to the cylinder chamber 61 and air to flow from the cylinder chamber 61 to the outer air. In the meantime the instructions 58 are stored in the microprocessor and linked to the momentary angular position α of the first holder bearer 15 measured by the angular position measuring device 17 and linked to the momentary weight G minus the tare weight measured by the weigher 14.

Further provided to the microprocessor 56 in the learning program is the information about the holder type T . When the holder 24 is filled to the required weight G_t this required weight G_t is supplied to the microprocessor whereby the instruction is supplied each time for stopping the motor 63 of the conveyor belt 5 when the filling weight G_t is

reached. The momentary weight G is shown on the display 64, this being the weight in produce that is added during the filling process. After placing of the empty holder 24 the microprocessor reads the tare weight then measured by the weigher 14 and thereafter the microprocessor 56 controls the device 1 subject to the weight difference G relative to the tare weight. A variation of the tare weight of a holder 24 does not therefore influence the filling process. At the end of the filling process the microprocessor 56 causes a warning lamp 67 on the display 64 to light up via an output signal 66 so that it becomes apparent that the full holder 24 of this device 1 can be replaced with another empty one.

With the automatic filling of holders 24 in successive filling processes this is carried out through the microprocessor 56, thereby making use of the instructions and experiences which have been stored during the learning process. It is possible to store an instruction program 69 in the microprocessor for every type of holder 24, as is shown in principle in fig. 6.

The weigher 14 can be calibrated by for example placing a standard weight 68 of 15 kg. in the holder 24, whereby the microprocessor is then informed by means of the keyboard 57 that the weight being presently measured is the standard weight of for example 15 kg.

After a filled holder 24 has been received in the filled position, shown in fig. 4 with the dashed and dotted lines, of the second holder bearer 39 the microprocessor 56, which determines the lack of a weight, resets the first holder 15 into the "empty position" by connecting the chamber 60 to a compressed air source 80.

In the case a plurality of devices 1 according to the invention is used, a communal microprocessor 56 can be sufficient. It is conceivable that the learning program is entered into only one of the devices 1 with a particular sort of produce 47 for processing and that this program 69 is also used for the other devices 1 via the connections 74.

The same applies for any corrections which may be carried out during the execution of the filling process with multiple devices 1. A correction on the one device 1 is - if desired - also then applied to the other devices 1 as a corrected control program 69.

Fig. 9 to 11 show various holders 24, 124, 224, 324 and 424 to be filled with fruit, whereby the dimensions are given in cm. The holder 324 is for example manufactured from thick-walled material. The holder 424 is manufactured from thin-walled material, for example cardboard, although the top side has a horizontal upper surface 71 with a filling opening 70, that is, it has a considerable edge-width n of for instance 3.5 cm. For the filling hereof

there has in the "empty position" to be a greater distance between the stop element 20 and the underside of the conveyor belt 5 than is the case for example with a holder 24 from fig. 7. This adaptation can be set with the adjusting means 19, 21.

During adaptation to the depth of the holder 24 by means of rotatable handle 38 the first holder bearer 15 is kept disengaged from the second holder bearer 39 by the loosening of the wing nut 73

With the variant of the device 101 from fig. 12 the holder 24 can be displaced reciprocally in arrow direction 78 by means of a motor 75, a screwed rod 76, a nut 77 and a table 90 fixed to a stop element 49, with the result that the produce 47 is better distributed over the surface of the holder 24. This is particularly important in the case of holders 24 with a large breadth b . In this case it is conceivable that the holders are filled from a short side and are spread out over the length of the holder 24, whereby the movement of the stop element 49 is also controlled by the microprocessor 56.

The device 111 from fig. 13 corresponds substantially with the device 1, with the understanding that the conveyor belt 115 has a produce feed 116 which is moveable in the direction of arrow 117 by means of two drive components 118. The conveyor belt 115 has two fixed reversing rollers 119 and 120 and two reversing rollers 121 and 122 that are slidable by means of the hydraulic cylinders 118. In this manner the produce is controlled by the microprocessor 56 and distributed still better over the width b of the holder 24.

Fig. 14-19 show diagrammatically a device 81 in the two extreme positions, whereby the pivot shaft 82 moves during pivoting by means of a pinion 83 which runs along racks 84 and 85 each of which is driven selectively by means of a respective cylinder 86 and 87.

The figures 14-19 show how by selection of the movement of the racks 84 and/or 85 the holder bearer 89 displaces in the lengthwise direction of the cylinders 86, 87.

With the device 100 from fig. 20 a holder bearer 102 pivots around a pivot shaft 103 which is located at a higher level than the conveyor belt 105. As a result the holder 24 in the filled position comes less deeply beneath the conveyor belt 105 whereby the height of drop is then small.

The level of the pivot shaft 103 is preferably adaptable to the depth of holders 24 by means of a screwed rod 106 and a motor 107.

With the device 121 in fig. 21 a frame 122 with a screwed rod 123 swivels around a fixed axis 125. A motor 126 attached to the frame 122 moves an auxiliary frame 127 along the screwed rod 123. The

auxiliary frame 127 carries an electromotor 128 which moves a bearer 130 for a holder via a screwed rod 129. The swivelling movement of the frame 122 by means of a cylinder 131 and the drivings of the motors 126 and 128 are controlled in order to displace the holder relative to a produce feed 133.

With the device 141 from fig. 22-25 the holder bearer 142 for swivelling around a shaft 143 by means of a cylinder assembly is moveable in a variety of ways depending on the various holders. The pivot shaft 143 is guided in a horizontal guiding 144 and can if required be fixed in a chosen position. The shaft 143 bears a pinion 145 which co-acts with gear racks 146 or 147 respectively above and below this shaft 143. In fig. 22 a low, broad holder is being filled. The rack 146 is then fixed in place and the rack 147 is released. With downward swivelling the shaft 143 moves to the left relative to the produce feed 150.

In fig. 23 both racks 146 are released while the shaft 143 is arranged at a determined location which is adapted to a deep, broad holder.

In fig. 24 the rack 146 is released and the rack 147 is used to cause the shaft 143 to move to the right in the case of a narrow, deep holder.

In fig. 25 the racks 146 and 147 are both rendered inactive and the shaft 143 is arranged at the position 155 which is situated quite far to the right for the filling of a shallow, narrow holder.

Claims

1. Method for filling a holder (24) with objects (47), in particular for filling a holder (24) with market garden and agricultural produce (47), whereby said holder (24) is moved subject to a degree of filling between an empty position and a filled position relative to a produce feed (53), **characterized in that** between the empty position and the filled position said holder (24) is given a movement which is adapted to said holder.

2. Method for filling a holder (24) with objects, in particular for filling a holder (24) with market garden and agricultural produce, whereby said holder (24) is moved subject to a degree of filling between an empty and a filled position relative to a produce feed (53), **characterized in that** the movement is automatically controlled, that during a programming process wherein said holder (24) is filled the movement is controlled with control means operated by a person, the correlation between the degree of filling and the movement traversed by said holder (24) is read at a plurality of moments in time and this correlation is stored in a computer (56) as instruction for future program control and that at least a later filling process for

the filling of a corresponding holder (24) with corresponding objects is controlled making use of the said instruction.

3. Method for filling holders (24) with objects, in particular for filling holders (24) with market garden and agricultural produce, whereby the holder (24) is moved each time relative to a produce feed (53) and subject to the degree of filling between an empty position and a filled position, **characterized in that** using substantially one and the same device (1) at least one first type of holders (24) and a second type of holders (124) having other dimensions than said holders (24) of the first type are filled and that said holders (24) of the first type are given another path of movement than said holders (124) of the second type.

4. Method as claimed in any of the foregoing claims, **characterized in that** in a plurality of filling stations holders are filled and that the relative movement of the holder relative to the relevant produce feed for the plurality of filling stations is centrally adjusted from a central computer in accordance with the types of holders to be filled in each case at the diverse filling stations.

5. Device (1) for filling a holder (24) with objects (47), in particular for filling a holder (24) with market garden and agricultural produce, comprising a produce feed (53) and holder bearing means (15, 39) which are moveable with regard to said produce feed (53) and which cause the holder (24) to move subject to a degree of filling between an empty position and a full position relative to said produce feed (53), **characterized in that** said holder bearing means (15, 39) give the holder (24) a movement between the empty position and the filled position which is adapted to said holder.

6. Device (1) as claimed in claim 5, **characterized in that** the bearing means (15, 39) comprise at least two holder bearers (15, 39) moveable relative to each other.

7. Device (1) as claimed in claims 5 to 6, **characterized in that** the bearing means comprise at least a first holder bearer (15) and a second holder bearer (39), whereby said first holder bearer (15) can swivel about an axis and during the downward swivelling transfers the holder (24) to said second holder bearer (39).

8. Device (1) as claimed in claims 5 to 7, **characterized in that** the second holder bearer (39) can swivel and that this swivelling movement is coupled to the swivelling movement of the first holder bearer (15).

9. Device (1) as claimed in any of the claims 5 to 8, **characterized in that** a second holder bearer (39) has at least one adjustable holder stop element (49).

10. Device as claimed in any of the claims 5 to 9, **characterized in that** the second holder bearer

(39) has a carrying surface which is provided with transport means or with friction reducing support means.

11. Device (1) as claimed in any of the claims 5 to 10, **characterized in that** the first holder bearer (15) has at least one adjustable stop element (20) to compensate for the edge width of the holder (24).

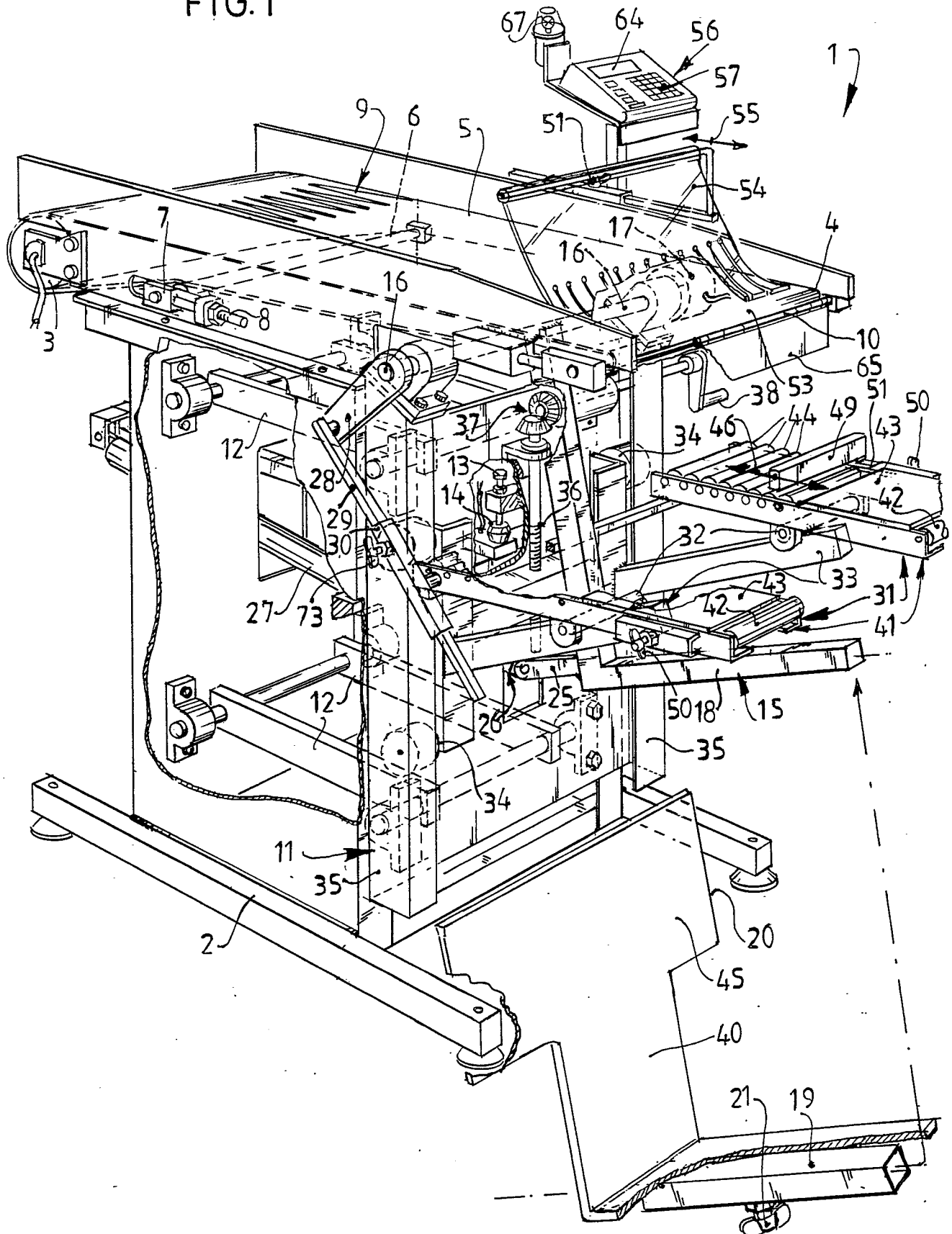
12. Device as claimed in any of the claims 5 to 11, **characterized in that** at least one second holder bearer (39) is adjustable in a downward or upward sense for the adaptation of the filled position of the holder (24) to the depth thereof.

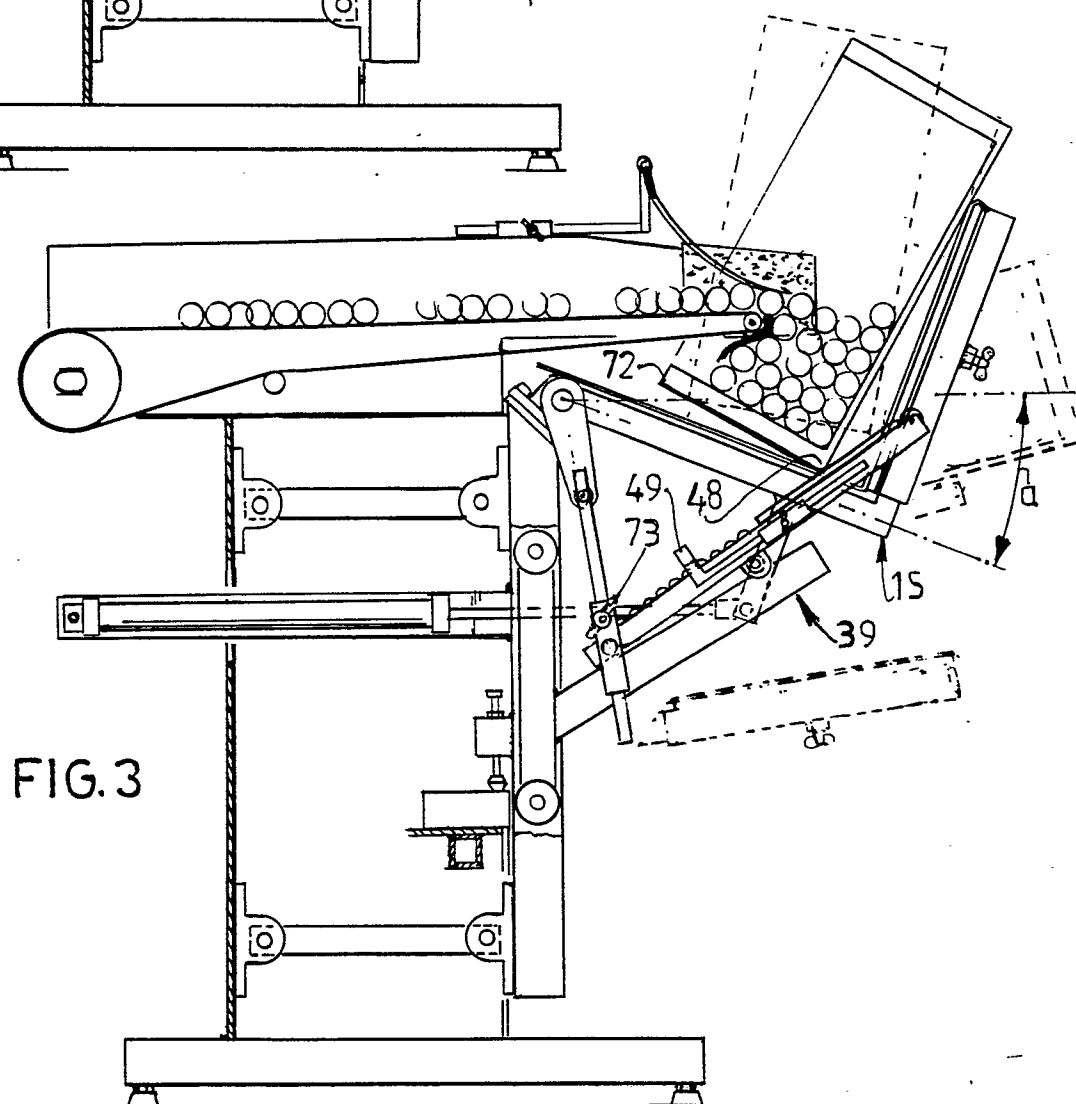
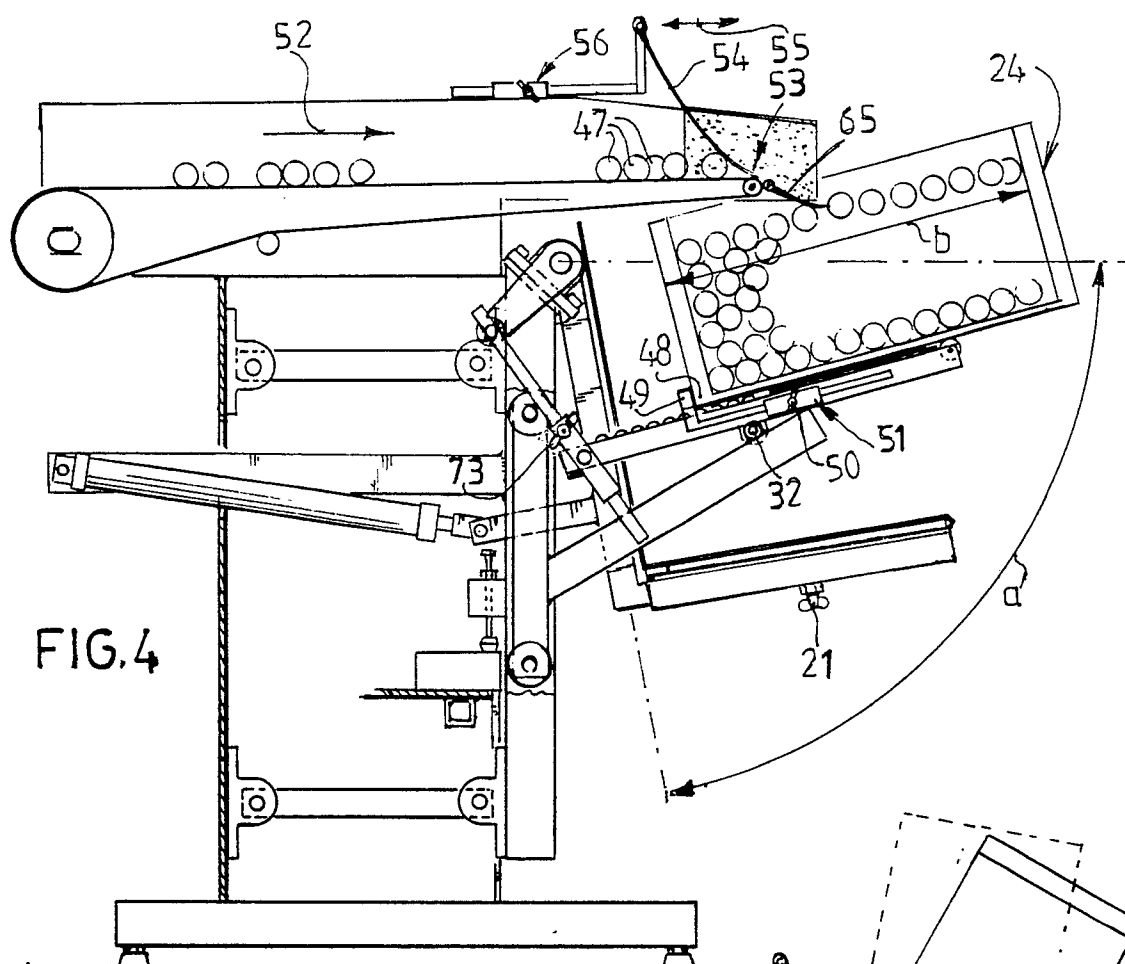
13. Device (1) as claimed in any of the claims 5 to 12, **characterized in that** the movement of the bearing means (15, 39) is controlled by means of at least one hydraulic or pneumatic cylinder assembly (26, 27) whereby at least one frequently and rapidly opening and closing valve regulates the flow of fluid from and/or to said cylinder assembly.

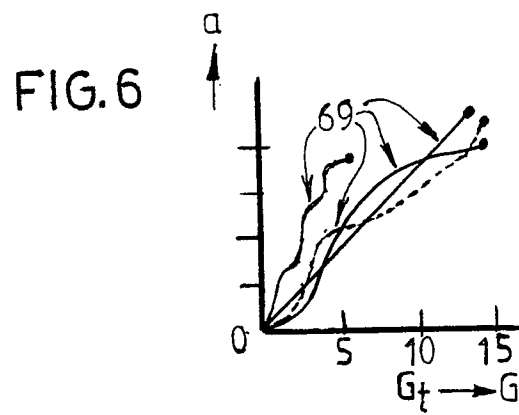
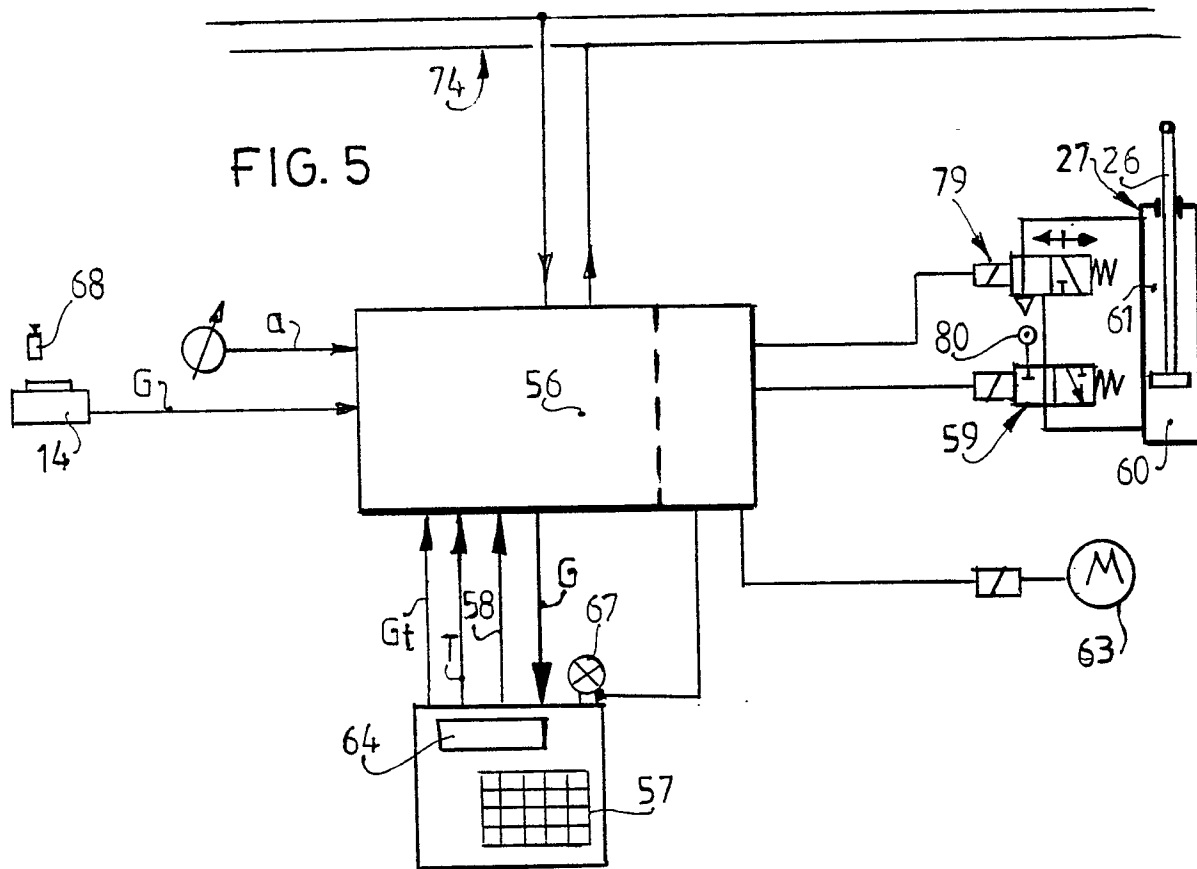
14. Device (1) as claimed in any of the claims 5 to 13, **characterized in that** the produce feed (53) is displaceable in horizontal direction relative to the holder bearing means (15, 39).

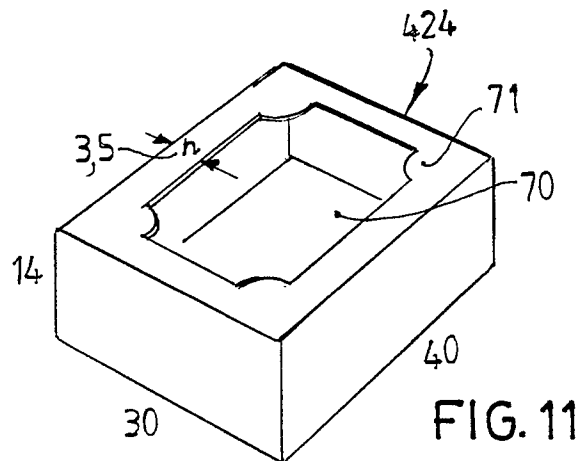
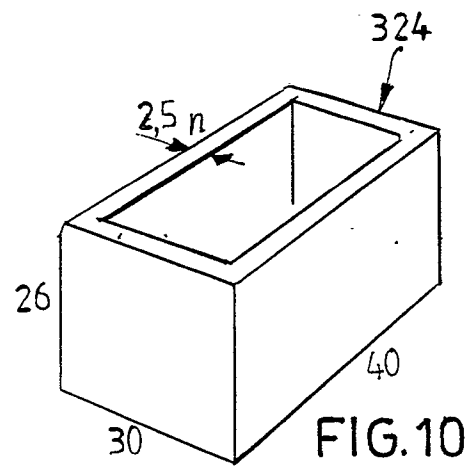
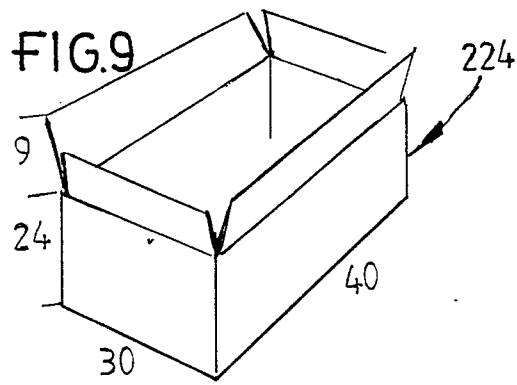
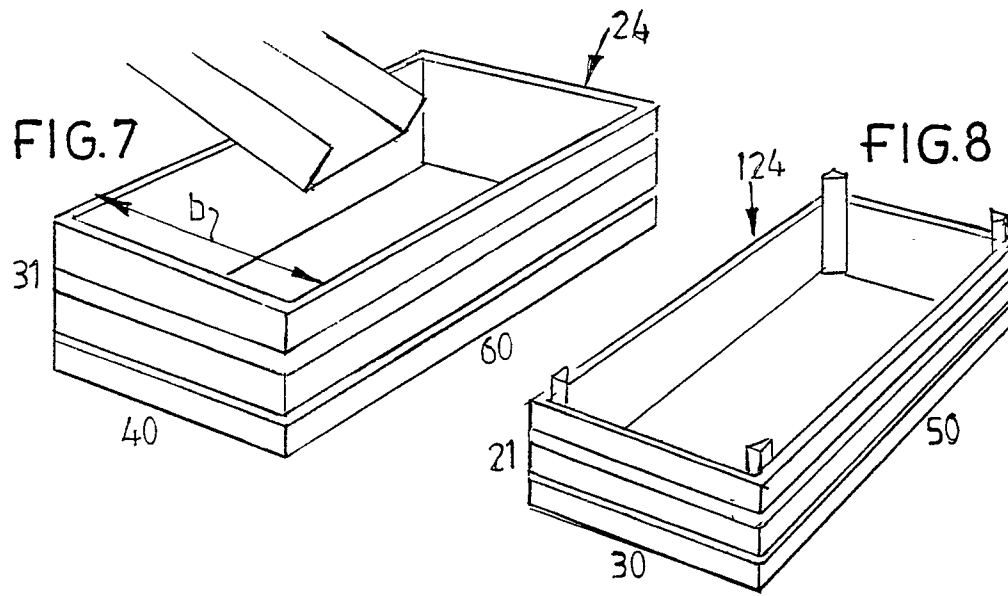
15. Device (1) as claimed in any of the claims 5 to 14, **characterized in that** the produce feed (53) comprises a conveyor belt, the ends whereof are mutually connected with a slanted join, for example a serrated join, and/or said produce feed (53) is provided at its end with an elastic wire (10).

FIG. 1









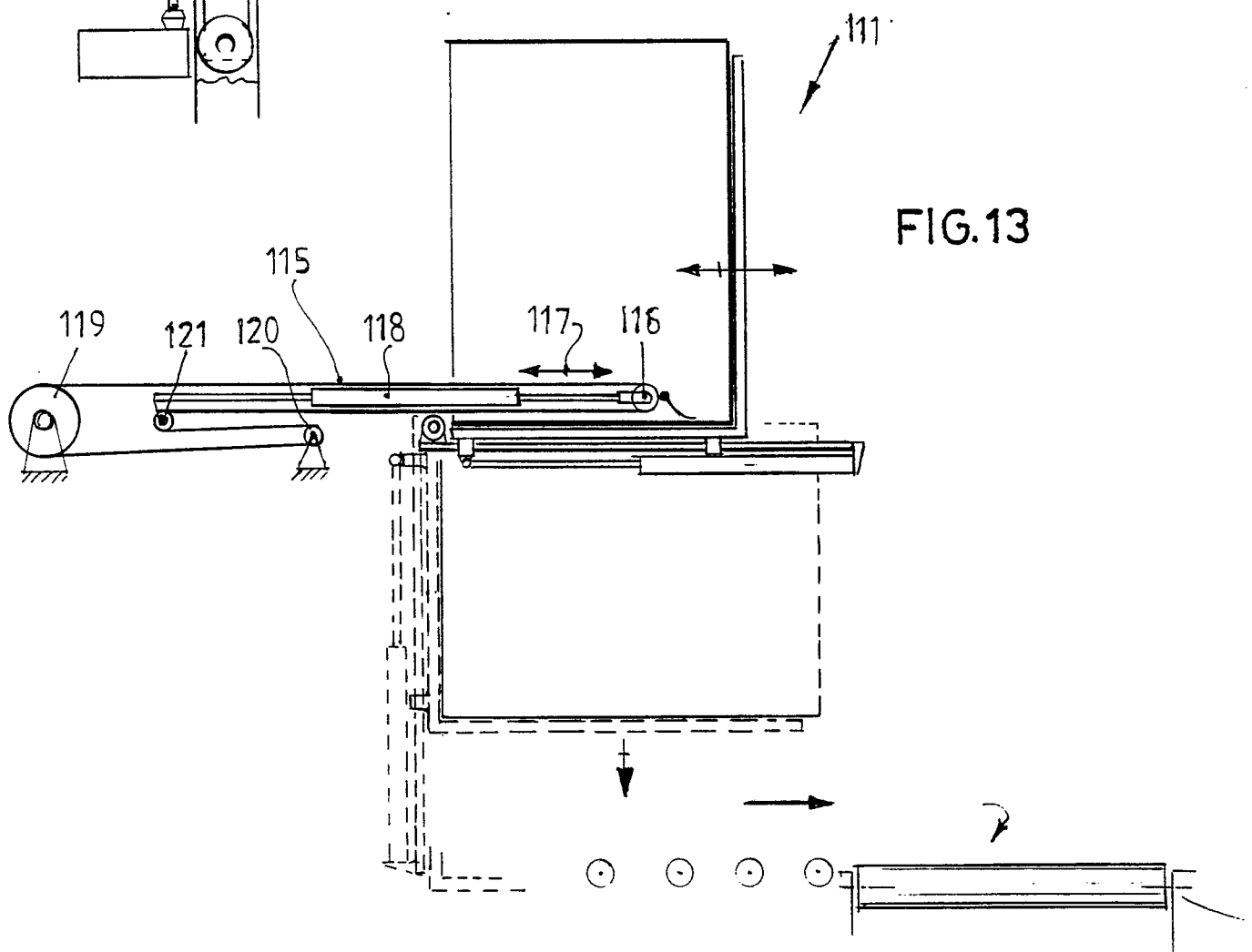
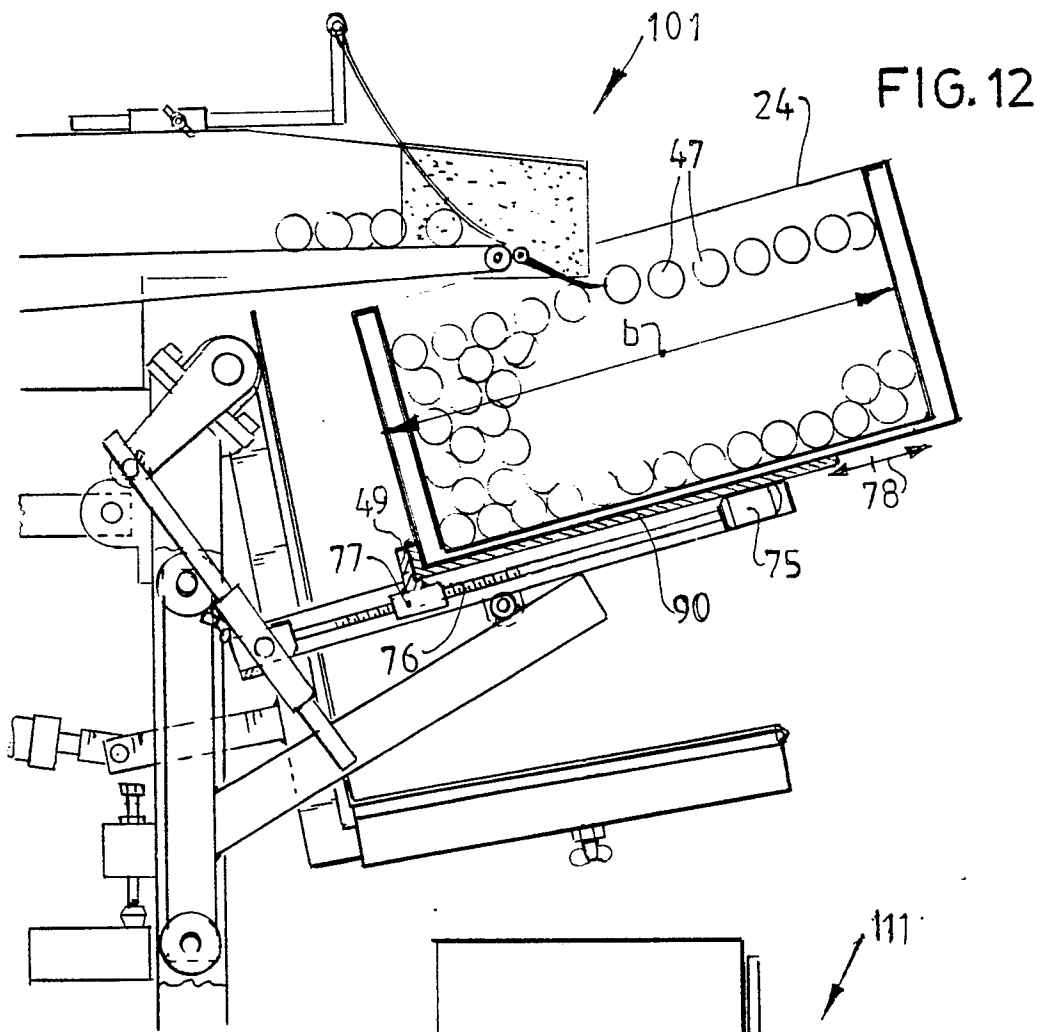


FIG. 14

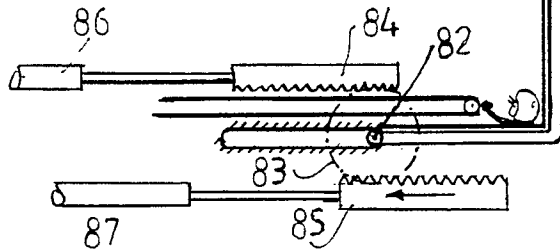


FIG. 15

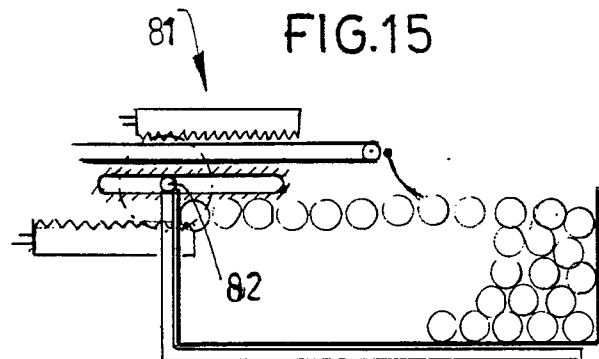


FIG. 16

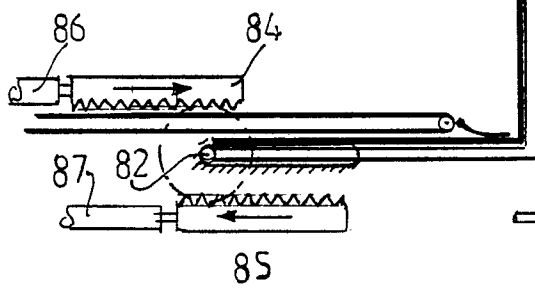


FIG. 17

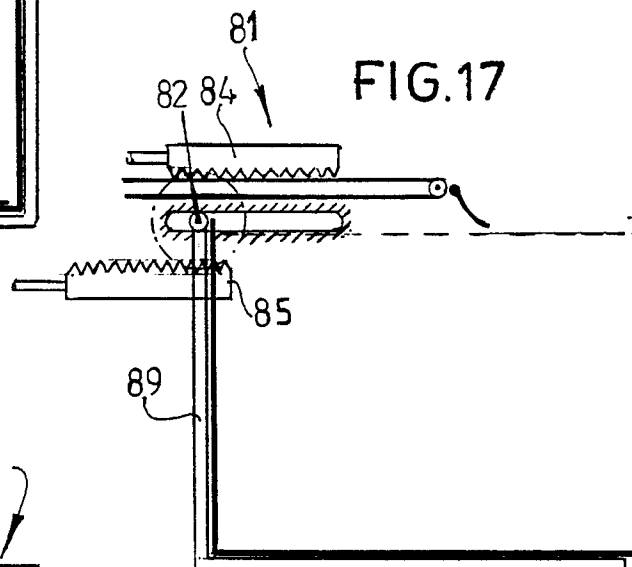


FIG. 18

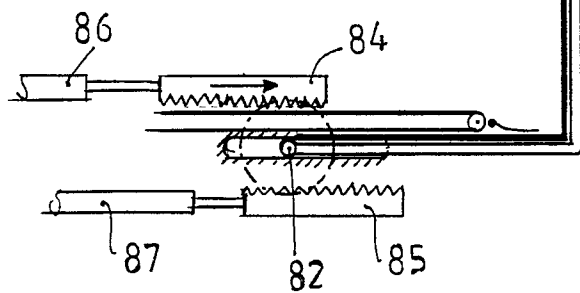
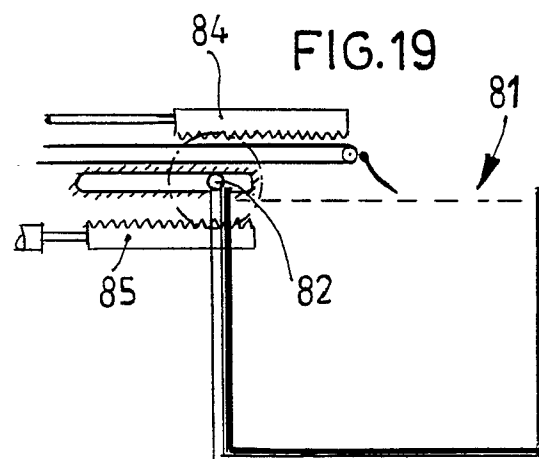
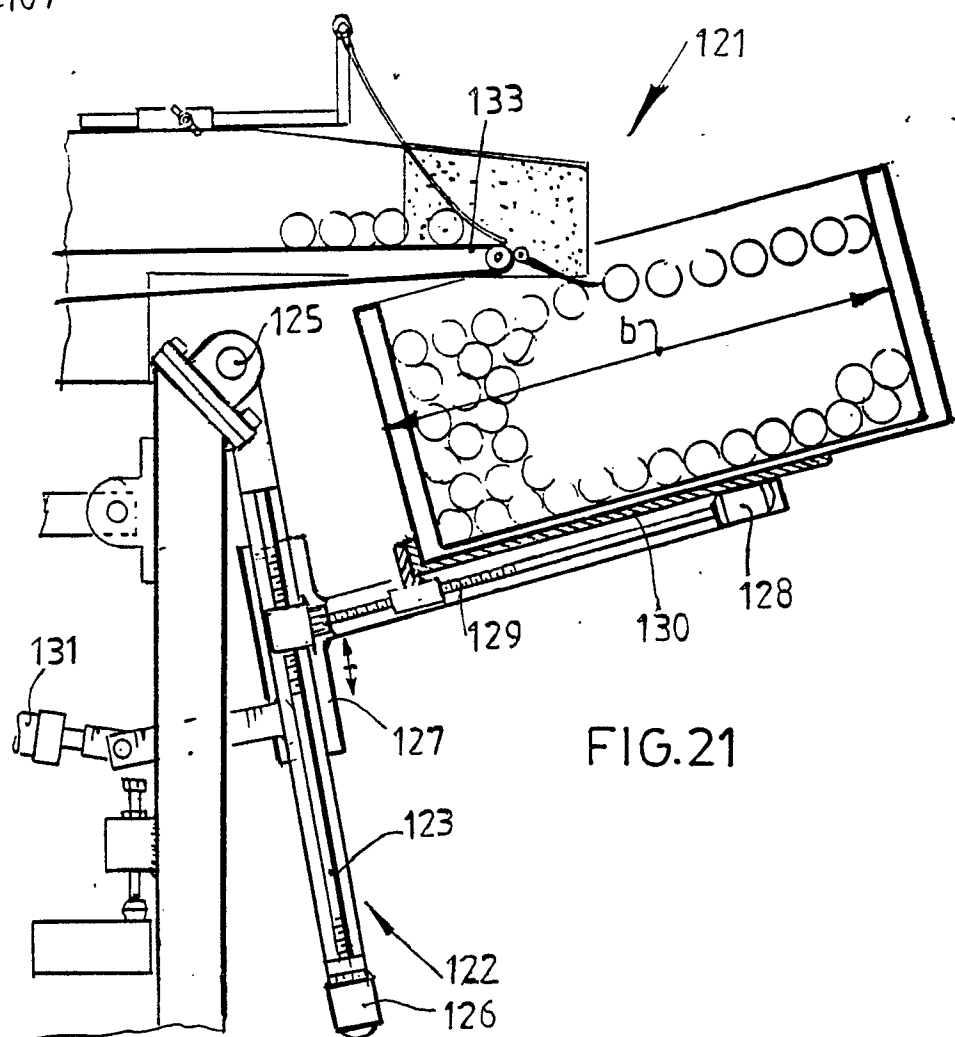
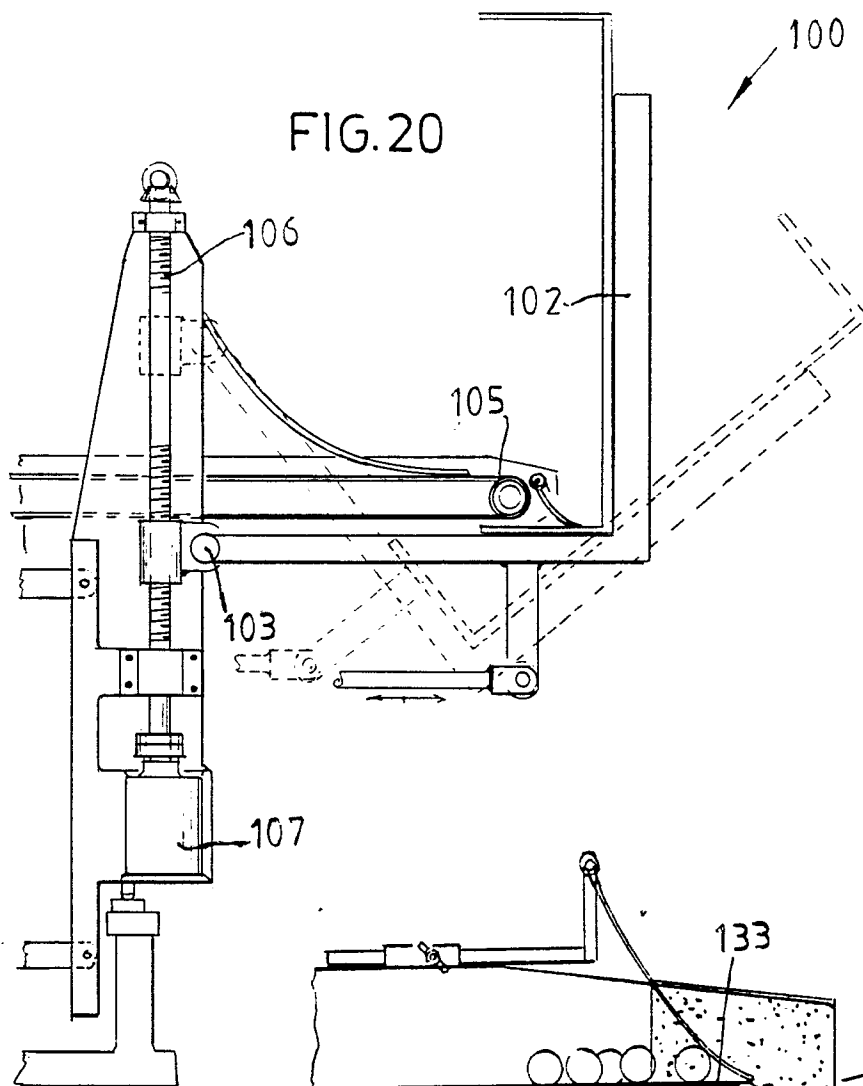


FIG. 19





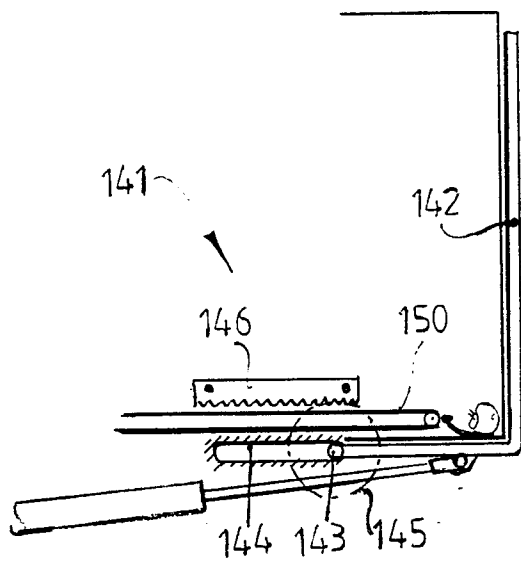


FIG. 22

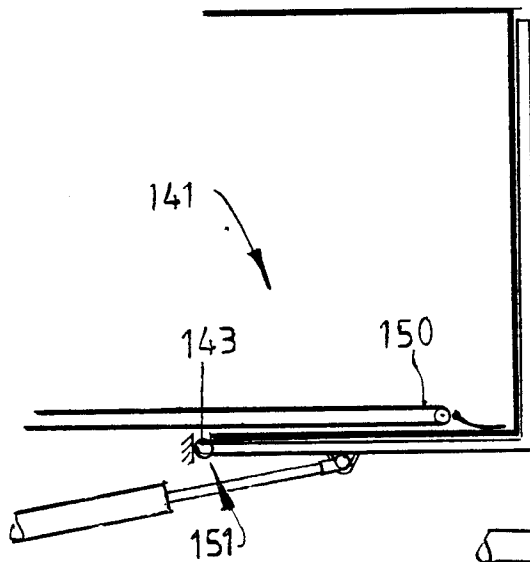
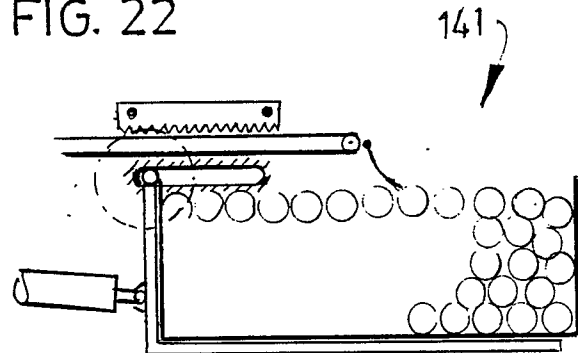
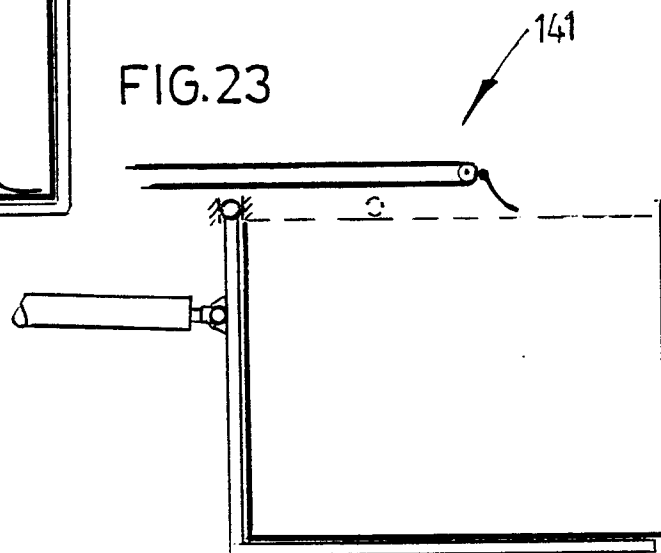
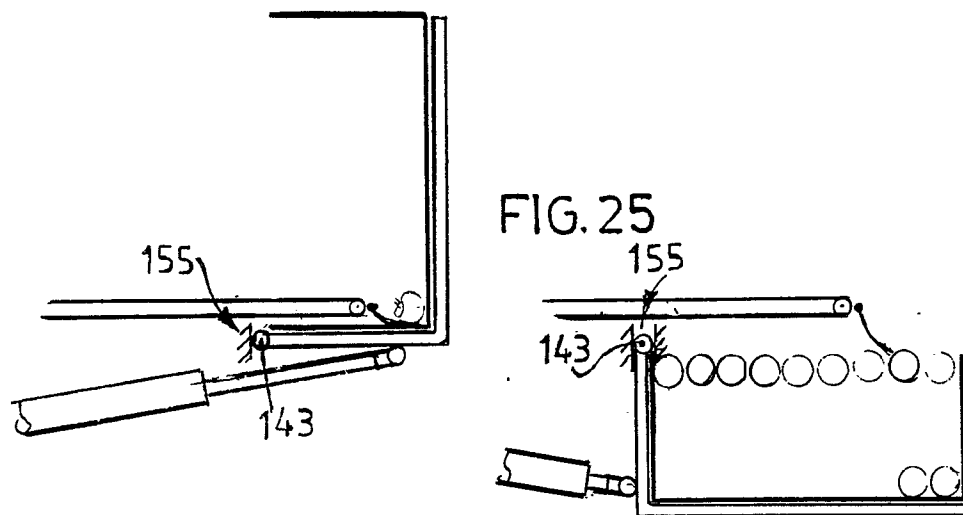
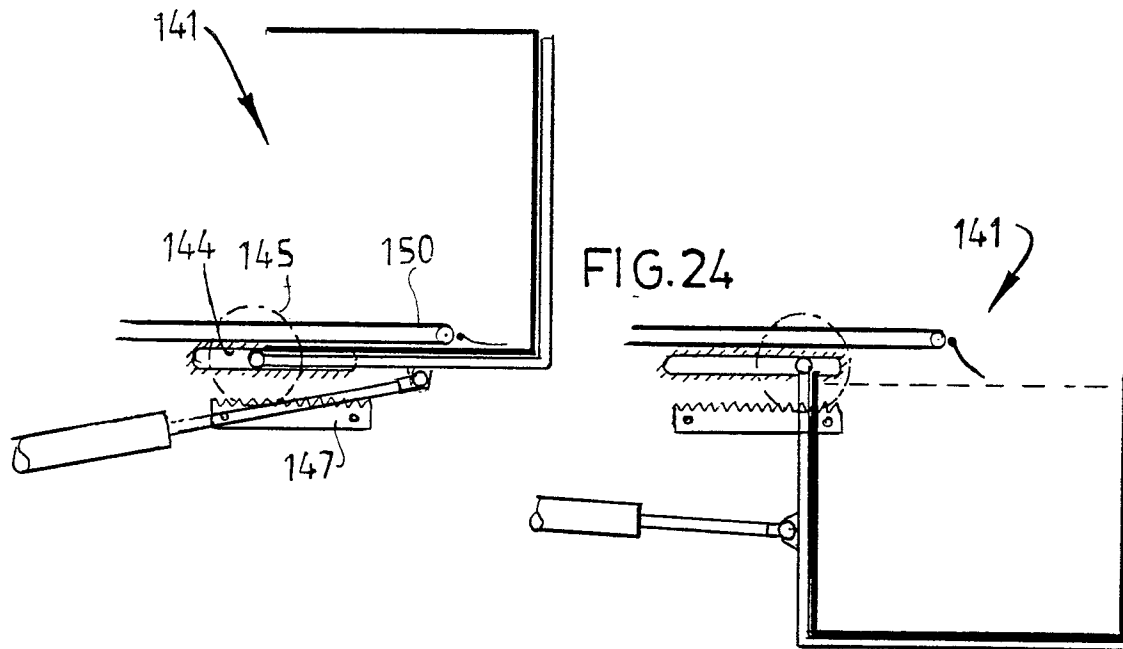


FIG. 23







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.5)
X	DE-A-1 906 517 (J. DE GREEF) * Page 2, line 25 - page 6, line 23; figures *	1,3,5, 14,15	B 65 B 25/04
A	US-A-2 896 384 (E. CARLSEN)		
A	US-A-2 827 082 (A. BAUM)		
A	FR-A-2 228 673 (R. PAILLET)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 65 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 19-10-1989	Examiner JAGUSIAK A.H.G.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			