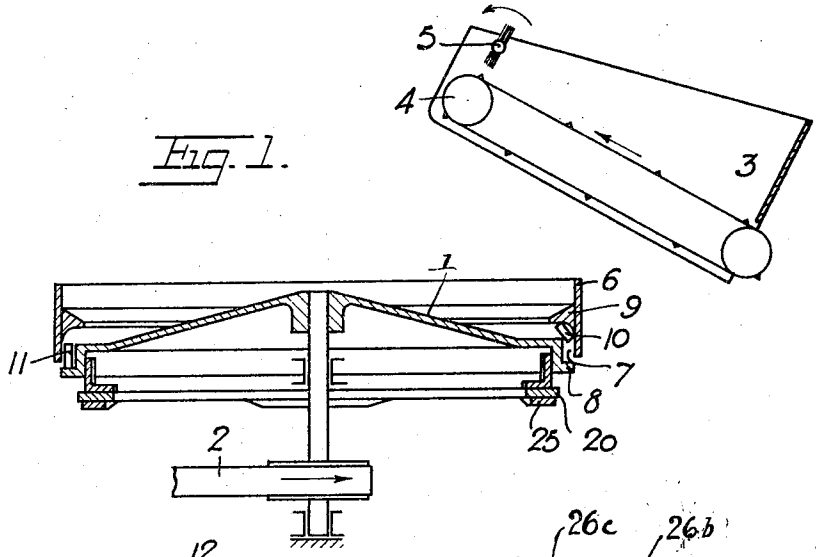
March 3, 1931. O. E. BERGLING 1,795,243

DEVICE FOR ARRANGING BOXES

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Fig. 1.



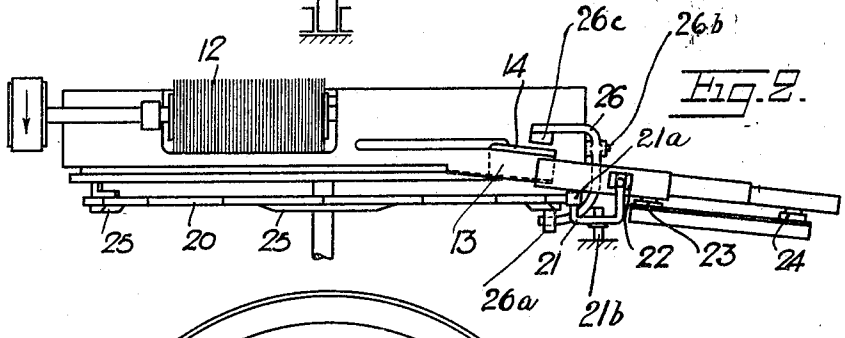


Fig. 2.

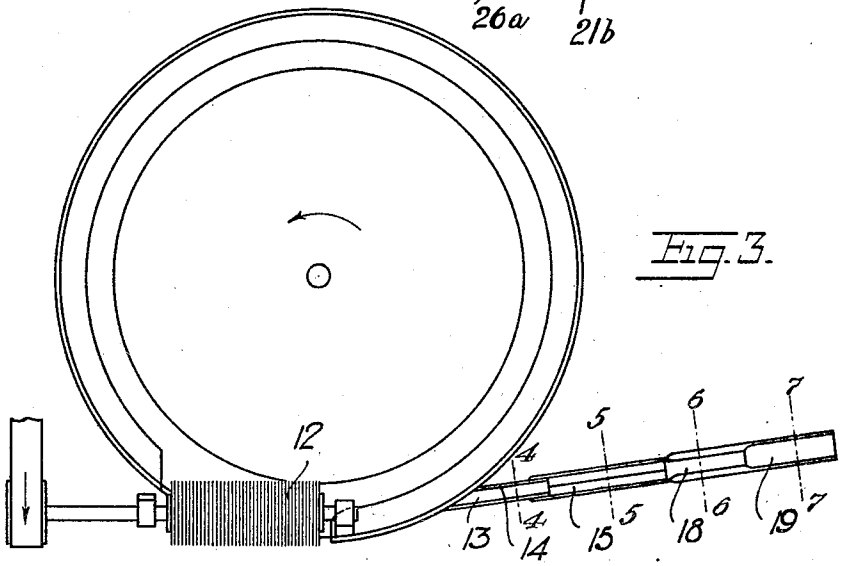


Fig. 3.

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Fig. 4.

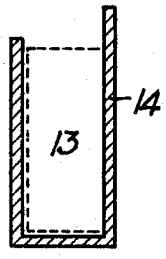


Fig. 5.

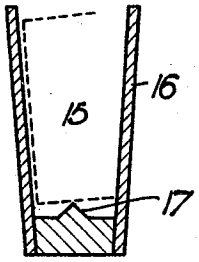


Fig. 6.

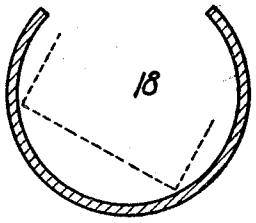


Fig. 7.

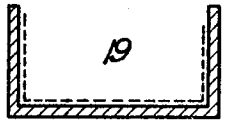
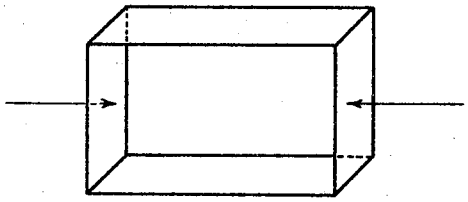


Fig. 8.



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Patented Mar. 3, 1931 1,795,243

UNITED STATES PATENT OFFICE

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DEVICE FOR ARRANGING BOXES

Application filed March 14, 1929, Serial No. 347,014, and in Sweden January 15, 1929.

In the manufacture of matches or in other industries where mechanical means are used to fill boxes, to insert drawers into shells, or to perform other operations relating to boxes it is necessary that the boxes when supplied to said means are all arranged in the same way, that is, with their bottoms downwards. Where such arranging has been performed manually, as is usually the case, it represents a rather hard and expensive work.

This invention has for its object to provide method and means whereby boxes of the type having bottom but no cover, can be automatically turned to right position for such supply. The method of turning the boxes to right position according to this invention is based upon the fact that the centre of gravity of a box of the above said type is not situated in the geometric centre of the box but at a point between the geometric centre and the bottom of the box.

Therefore, according to one feature of the invention the boxes are first arranged so that their bottoms will assume a substantially vertical position and, while in this position, the boxes are rotatably mounted in such a way as to turn over under the influence of the torque resulting from the weight of their bottoms, so that the bottoms will be directed more or less downwards. The above said mounting may be realized, for instance, by placing the box with one of its longer or shorter sides upon a knife-edge engaging said side along its middle line and allowing the box to turn freely on said knife-edge. Owing to the weight of the bottom the box will, of course, turn to that side at which the bottom is situated.

According to another method the box, after having been placed with its bottom in vertical position, is seized at two opposite points situated on a line through the centre of the box, so that the box owing to the weight of its bottom may turn around the axis represented by said line, so that the bottom will be directed downwards.

One embodiment of the invention is illustrated in the drawings in which, Fig. 1 is a vertical cross section of a mechanism for arranging the boxes in succession to cause the bottom thereof to take up a vertical position. Fig. 2 is an elevation of the same mechanism together with means for turning the boxes to bring the bottoms thereof downwards. Fig. 3 is a top plan view of the mechanism shown in Fig. 2. Figs. 4–7 are cross sections on an enlarged scale taken along the lines 4—4, 5—5, 6—6 and 7—7, respectively, in Fig. 3. Fig. 8 is a perspective view of a box to illustrate a method of mounting the box by means of needle shaped supporting members.

With reference to the drawings, the numeral 1, Fig. 1, represents a conical disc the apex of which is directed upwardly. Said disc may be rotated in the direction indicated by the arrow by means of a belt transmission 2 or the like. 3 represents a box container the bottom of which comprises an endless conveyor belt arranged in an inclined position by means of which the boxes are lifted over the upper roller 4 of the conveyor belt. As said roller 4 is situated above the conical disc 1 the boxes after having passed over the roller 4 will drop upon the conical disc. This feeding of the boxes may be regulated by a rotating brush 5 situated above the conveyor belt near the upper end thereof and arranged to throw the surplus of boxes back again down into the container. The boxes dropping on the conical disc will be thrown outwardly by the action of the centrifugal force and the shape of the rotating disc towards a surrounding, stationary mantle 6 situated at such a distance apart from the periphery of the disc that the boxes can only stand on their edges in the annular space 7 therebetween. The boxes entering said space will be standing on a support 8 formed by a flange of the disc 1 with their bottoms in a vertical position. In order to cause the boxes to place themselves on one of their longitudinal sides in the space 7 the mantle 6 is formed with an inwardly directed annular guiding flange 9 situated at such a distance apart from the disc 1 and being of such a shape on its under surface as to prevent the boxes from passing between said flange 9 and the disc 1 with either of their end surfaces first but only with their longest dimension extending peripherally.

To the right in Fig. 1 there is shown a box 10 as guided by the flange 9 in the above stated way and to the left in the same figure another box 11 is shown wholly contained in the annular space 7.

From the annular space 7 the boxes, while standing on one of their longitudinal sides, are discharged due to the pressure of the succeeding boxes through an opening in the mantle 6 into an outlet channel or chute 13 one wall 14 of which extends adjacent to the periphery of the rotating disc 1 thereby to cause the boxes to enter the chute 13. A cross section of this chute is shown in Fig. 4 which also shows the position of a box in the chute. In order to prevent any box from being discharged from the annular space 7 into the outlet 13 in another position than standing on one of its longitudinal sides a suitably driven, rotating brush 12 (Figs. 2 and 3) is provided which sweeps off the surplus of boxes as well as those boxes which are not in correct position.

From the outlet chute 13 the boxes are first passed into another chute 15 the cross section of which is shown in Fig. 5. This chute serves to effect a preliminary turning over of the boxes in a direction to bring the bottoms thereof downwards. To this end in the embodiment shown the bottom of the chute 15 is provided with an upstanding knife-edge 17, extending longitudinally midway between the side walls of the chute. Owing to the weight of the bottom of the box a torque will be produced sufficient to turn the box over towards one side wall of the chute. In order to positively maintain the box in this position the side walls 16 of the chute may diverge upwardly, as shown. The boxes when discharged from the chute 15 enter a chute 18 of more or less circular cross section, Fig. 6. In this chute the turning of the boxes to the position desired for the subsequent operation is completed. After having been thus turned to the position desired the boxes are passed into a chute 19 of rectangular cross section through which the boxes move with their bottoms downwards, as indicated in Fig. 7. The boxes are now in position for subsequent operations.

As a modification of the method the boxes may be passed directly from the outlet chute into the circular chute 18 which may thus alone effect the turning of the boxes to the position desired.

At the moment at which the boxes start their turning movement they should be out of contact with the preceding and succeeding boxes so that their movement cannot be interfered with due to friction against said preceding or succeeding boxes. Provided sufficient space is available this effect may be obtained in a very simple way by the use of chutes inclined in the direction of feed so that the boxes may slide down individually, according as they enter the chutes. In many cases, however, the boxes should be directly supplied to another machine, as, for instance, to a machine for filling the boxes or pushing the drawers into the shells, and in such case it is not advisable to allow the boxes to fall too far down towards the floor.

In such a case the chutes be made less inclined but instead thereof they may be put into a shaking movement, either to and fro in the longitudinal direction or in any other suitable way yet, however, always in a longitudinally extending vertical plane. A preferred mechanism of the said first mentioned type is shown in Figs. 1 and 2. Attached to the rotary disc 1 is a radially working cam 20 engaged by a roller 21*a* upon one end of a lever 21 having a fixed fulcrum 21*b* and operated by a spring (not shown) to maintain the roller in engagement with the cam. The other end of the lever 21 is pivotally connected to a guide 22 on the chute 15—18—19. The chute which is mounted in guides, at 23 and 24, will thus be caused to perform a reciprocating movement upon the rotation of the disc 1. The cam 20 is provided with a number of axially working abutments 25 to engage a roller 26*a* mounted on the one end of another lever 26 likewise turning on a fixed fulcrum, at 26*b*. This will depress the other end of said lever 26 which is shaped as a hammer, as shown at 26*c*, at intervals causing it to rest upon the boxes contained in the outlet chute 13 during a period of time of sufficient duration to allow the preceding box that has entered the chute 15 to turn. In order to prevent the boxes from getting out of order or being thrown out during the shaking movement the chutes may be provided with suitable covers.

What is stated above in respect to boxes in general is also true in respect of drawers with shells put thereon, especially in case of boxes not yet filled. This is due to the fact that the shells only add such powers to the movable system as are already balanced when the turning over of the boxes begins and which cannot, therefore, interfere with the turning operation.

What I claim is:

1. A device for arranging boxes having bottom but no cover to a position in which their bottoms are directed downwards, comprising in combination, a disc rotatable around a vertical axis to receive the boxes to be arranged, said disc having a flange around its periphery to form a circular carrier, a stationary mantle surrounding said disc at such a distance therearound as to allow only such boxes as are standing with their bottoms in vertical position to rest on said carrier, a guiding flange on the inner side of said mantle to cause the boxes to reach said carrier in such a position as to be resting on one of their longitudinal sides

thereon, a chute connected to an opening in said mantle to receive the boxes therefrom, guiding means to cause the boxes to enter said chute, and other chutes connected with said first mentioned chute and constructed to effect a turning of the boxes so that the bottoms thereof will be directed downwards.

2. A device for arranging boxes having bottom but no cover to a position in which their bottoms are directed downwards, comprising in combination a disc rotatable around a vertical axis to receive the boxes to be arranged, said disc having a flange around its periphery to form a circular carrier, an open-topped and open-bottomed stationary mantle surrounding the disc at such a distance therearound as to allow only such boxes as are standing with their bottom in vertical position to rest on said carrier, a guiding flange on the inner side of said mantle to cause the boxes to reach said carrier in such a position as to be resting on one of their longitudinal sides thereon, a chute connected to an opening in said mantle to receive the boxes therefrom, guiding means to cause the boxes to enter said chute, a rotary brush to prevent boxes which are not in correct position from entering the chute, and other chutes connected with said first-mentioned chute and constructed to effect a turning of the boxes so that the bottom thereof will be directed downwards.

3. A device for arranging boxes having bottom but no cover to a position in which their bottoms are directed downwards, comprising in combination a disc rotatable around a vertical axis to receive the boxes to be arranged, said disc having a flange around its periphery to form a circular carrier, an open-topped and open-bottomed stationary mantle surrounding the disc at such a distance therearound as to allow only such boxes as are standing with their bottoms in vertical position to rest on said carrier, a guiding flange on the inner side of said mantle to cause the boxes to reach said carrier in such a position as to be resting on one of their longitudinal sides thereon, a chute connected to an opening in said mantle to receive the boxes therefrom, guiding means to cause the boxes to enter said chute, a second chute connected with said first-mentioned chute and having a longitudinal central knife-edge on its bottom to effect a preliminary turning of the boxes, and a third chute of cylindrical cross section connected with said second chute and adapted to complete the turning of the boxes so that the bottoms thereof will be directed downwards.

4. A device for arranging boxes having bottom but no cover to a position in which their bottoms are directed downwards, comprising in combination, a disc rotatable around a vertical axis to receive the boxes to be arranged, said disc having a flange around its periphery to form a circular carrier, an open-topped and open bottomed stationary mantle surrounding the disc at such a distance therearound as to allow only such boxes as are standing with their bottoms in vertical position to rest on said carrier, a guiding flange on the inner side of said mantle to cause the boxes to reach said carrier in such a position as to be resting on one of their longitudinal sides thereon, a chute connected to an opening in said mantle to receive the boxes therefrom, guiding means to cause the boxes to enter said chute, a rotary brush to prevent boxes which are not in correct position from entering the chute, and a second chute connected with said first mentioned chute and having a longitudinal central knife edge on its bottom to effect a preliminary turning of the boxes, and a third chute of cylindrical cross section connected with said second chute and adapted to complete the turning of the boxes so that the bottoms thereof will be directed downwards.

In testimony whereof I have signed my name.

OSKAR EMANUEL BERGLING.