United States Patent

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[33] **France**
[31] **No. 128,322**

[54] **APPARATUS FOR THE TURNING-OVER TRAYS OF CONTAINERS**
6 Claims, 9 Drawing Figs.

[52] **U.S. Cl.** **214/312**
[51] **Int. Cl.** **B65g 65/34**
[50] **Field of Search** 214/312, 313, 314, 318, 309, 310, 300, 19

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ABSTRACT: The Specification describes an apparatus for turning over trays of bottles prior to insertion in a bottle filling machine. The lid of the tray is removed and the bottles, neck-down on the tray are placed so that they are supported by the lower flanges of a pair of channel section members which are mounted for rotation about inclined axes. Immediately above the bottoms of the bottles is a plate. Upon rotation of the plate about a horizontal axis by half a turn, the bottles stand on the plate and the two flanges are then sufficiently spaced apart to allow the tray to be removed.

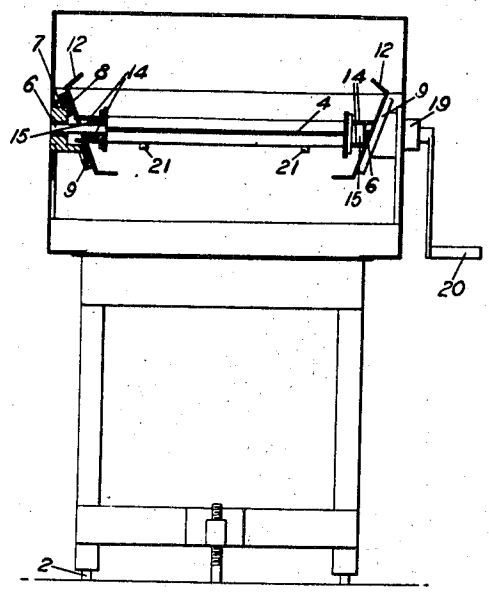

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Fig. 1.

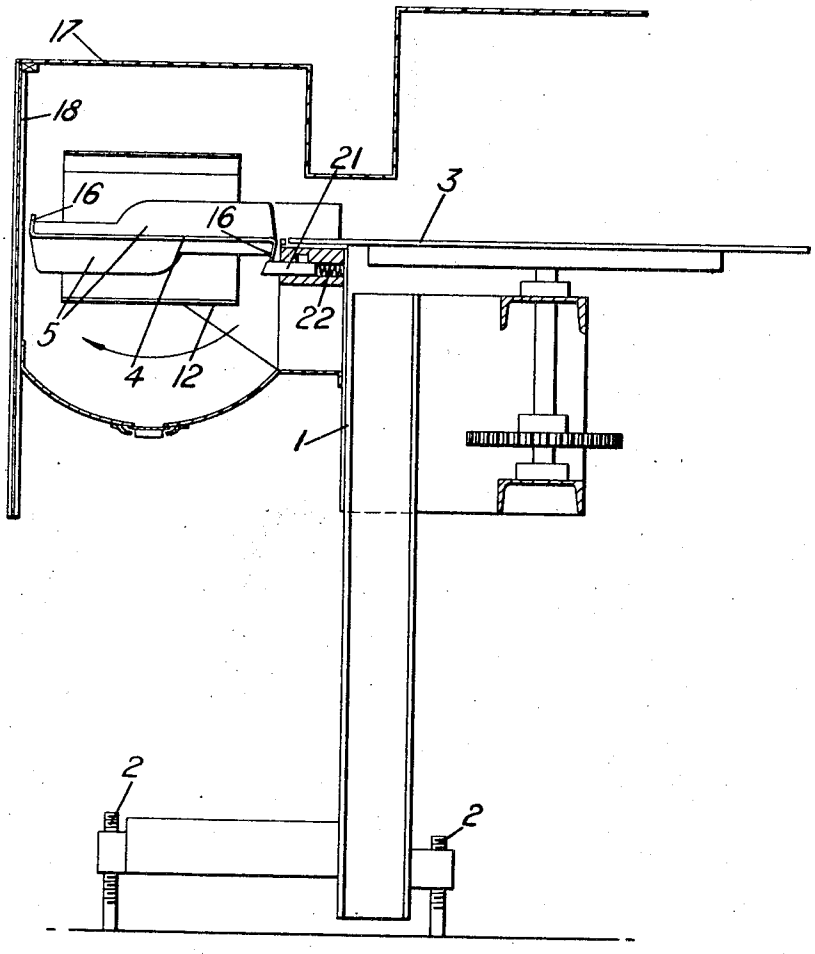

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Fig. 2.

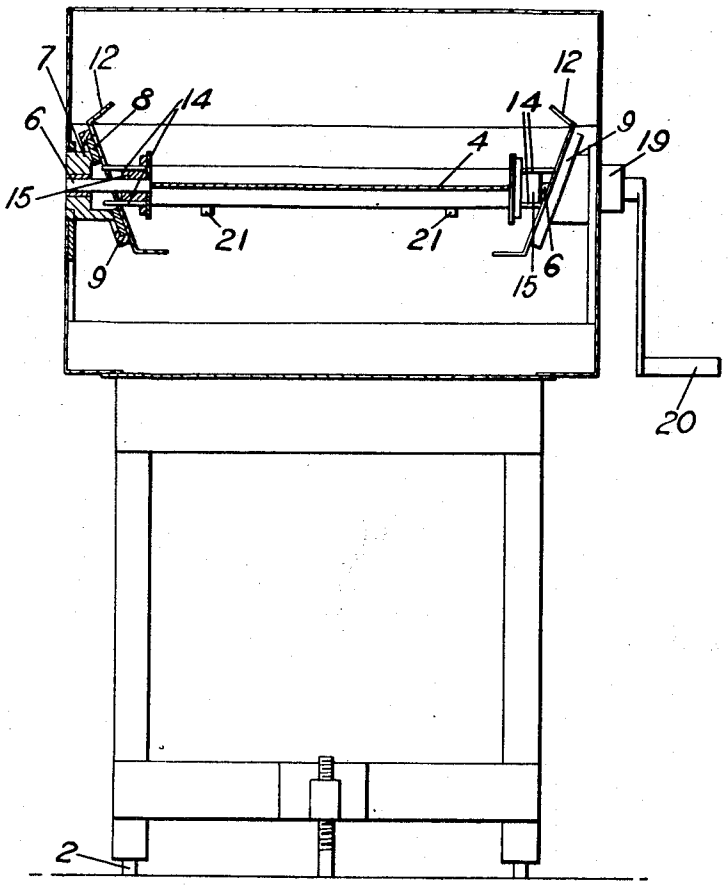

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Fig. 3.

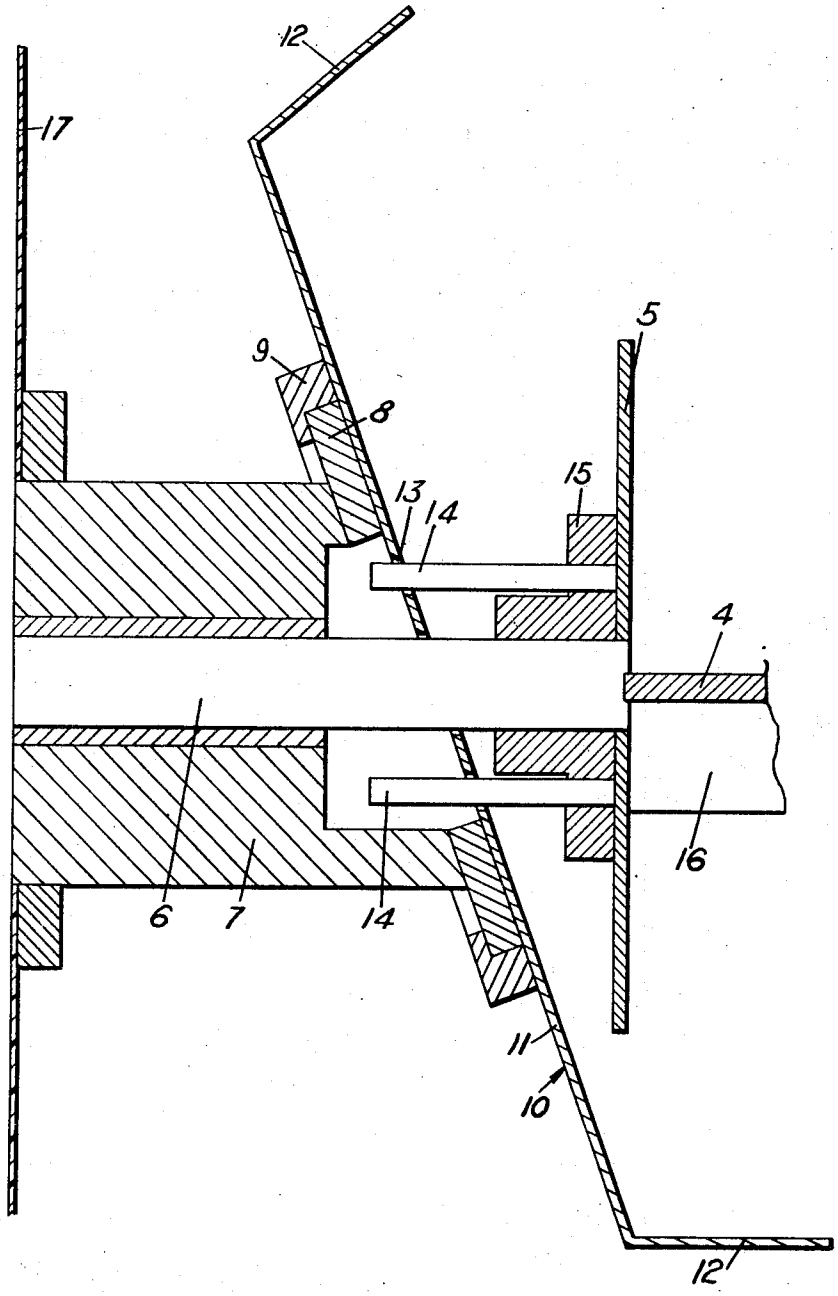

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Fig. 4.

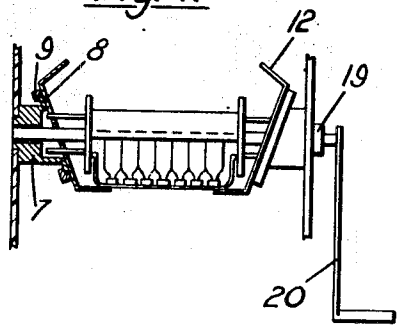


Fig. 4A.

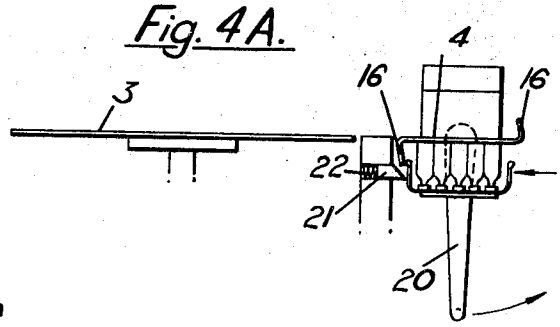


Fig. 5.

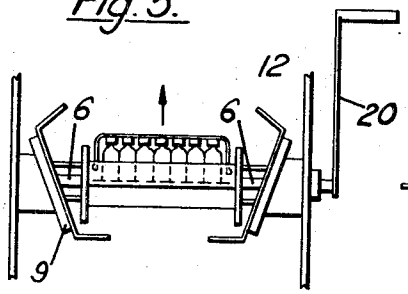


Fig. 5A.

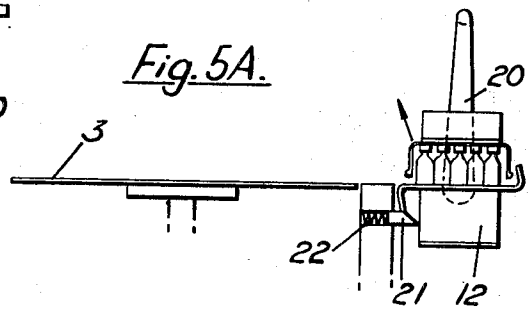


Fig. 6.

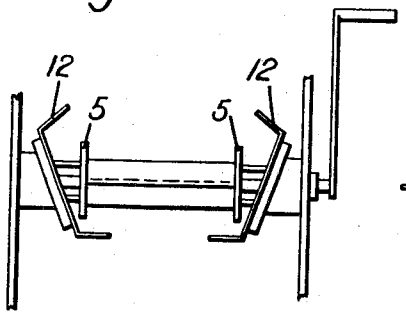
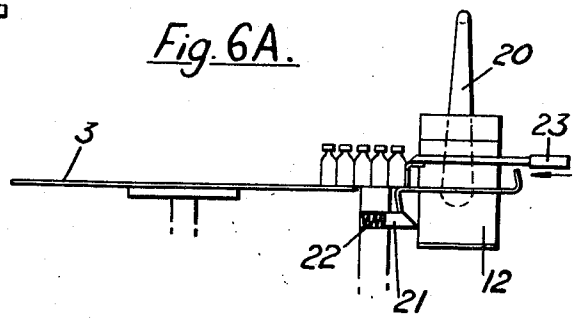


Fig. 6A.



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APPARATUS FOR THE TURNING-OVER TRAYS OF CONTAINERS

The present invention relates to apparatus for turning over trays of containers.

It is an object of the invention to provide apparatus capable of turning over trays of containers resting with their opening directed downwardly, *e.g.* trays containing sterilized empty bottles such as those used in the pharmaceutical industry, without the need for any manual contact with the bottles.

According to the present invention there is provided apparatus for turning over trays of containers, such apparatus comprising: a flat plate rotatable about a substantially horizontal axis in the plane of the plate; means for rotating the plate about said axis; a pair of tray support elements on the same side of, and spaced from the plane of the plate, and spaced apart from one another; means connecting the support elements to the plate for rotation therewith; and means for increasing the distance apart of the support elements upon rotation of said plate from a first position in which the support elements are below the plate, to a second position in which the support elements are above the plate.

The apparatus according to the invention is particularly well suited for working with trays provided with lids containing sterile bottles intended for supplying a machine for distributing a sterile pharmaceutical product in unitary doses into the bottles.

In order to condition sterile pharmaceutical products the product is divided under sterile conditions and dispensed in doses into sterile bottles. The division and dispensing into bottles are effected automatically by means of machines known as dividing machines. Supplying the accumulation tables of these machines with sterile bottles whilst preventing all contact either with the outside air or with the hands of the operators has always presented some difficulties.

In fact the full trays which have been used for sterilizing the empty bottles and which are closed by a lid have the bottles removed therefrom in a small lock chamber adjoining the hopper of the dividing machine. The problem becomes very difficult to solve when it is a question of providing a uniform supply for modern dividing machines whose production rates are from 60 to 250 bottles per minute, especially when these machines are not in a continuous production line with an oven for the continuous sterilization of empty bottles. Even when they are, the problem still exists when an accidental interruption occurs in the production line. Therefore, a manual turning-over apparatus is an indispensable item of equipment.

If a turning-over apparatus according to the invention is associated with the machine and duly covered and put in a position such that the bottles which issue from it can be transferred without difficulty in a sterile atmosphere to the accumulation table of the dividing machines, this problem is overcome.

The apparatus according to the invention makes it possible in a simple manner to proceed, once the lid of the bottle tray has been removed with the charging in a sterile atmosphere of the trays full of sterile bottles resting on their necks, with the turning-over of these trays, with the removal of the trays, and with the supplying of the accumulation table of the dividing machine.

In order that the invention may more readily be understood, the following description is given, merely by way of example, reference being made to the accompanying drawings, in which:

FIG. 1 is a vertical sectional view in a plane perpendicular to the axis of rotation of the assembly, showing one embodiment of the turning-over apparatus of the invention, associated with a circular accumulation table of a dividing machine;

FIG. 2 is a sectional view through the turning-over apparatus on a vertical plane passing through its axis;

FIG. 3 is a detail view of the mechanism of the turning-over apparatus;

FIGS. 4, 5 and 6 are schematic vertical sectional views passing through the axis of the apparatus; illustrating the stages of operation; and

FIGS. 4A, 5A and 6A are corresponding schematic vertical sectional views taken in a plane in section perpendicular to those FIGS. 4, 5 and 6 respectively.

The turning-over apparatus comprises (FIGS. 1 and 2) a support 1 which is preferably made of steel sections, and is vertically adjustable by screw feet 2. As illustrated in FIG. 1, it is associated with a dividing machine, substantially at the height of the supply or accumulation table 3 of the machine.

The apparatus of the invention includes an essentially flat plate 4 provided with end flanges, and mounted for rotation about a substantially horizontal axis passing essentially through the plane of the plate 4. Mounting of the plate 4 about this axis is effected by means of stub shafts 6 rotatable in sleeved bearings 7 having at their axially inner ends inclined faces carrying annular bearing members 8. These bearing members are inclined to the axis of the stub shafts 6, and converge downwardly towards one another. Mounted for rotation about these bearing members 8, by means of bearing rings 9, are channel section members 10 having a web portion 11, and flange portions 12 diverging outwardly from the web portion. As can be seen from the drawings, the lower flange portion of the channel members, when at a position immediately below the plate 4 is parallel to the plate 4.

In order to rotate the channel section with the plate 4, apertures 13 are formed in the web portion, and these are engaged by pins 14 mounted on members 15 secured to the flanges 5.

Each longitudinal edge of the plate 4 is turned down to form a portion 16, the two portions 16 being turned in opposite directions.

The whole of the apparatus is mounted in a housing 17 having a sliding door 18 for filling the apparatus.

Rotation of the plate 4 may be effected by a handle 20, and the direction of rotation may be limited to one direction by a ratchet 19 (FIGS. 2 and 4) secured to one of the stub shafts 6. Rotation of the plate may be prevented selectively, with the plate horizontal, by a locking pin 21 which is resiliently urged by a spring 22 to engage one of the downturned portions 16 of the plate 4.

In operation, the door 18 is opened, and a tray of sterilized bottles provided with its lid is presented manually with the bottles resting upside down on their necks. The lid is removed and the tray of bottles slid onto the lower flange portions 12, which then form tray support elements (FIGS. 4 and 4A). The tray is pushed so as to engage the locking pins 21 (see FIG. 4A), until these locking pins are disengaged from the downturned portions 16. Rotation of the plate 4 brings the bottles to rest on the plate, the bottom of the tray bearing on the necks of the of the bottles. During this rotation, flange portions or tray support elements 12 comes into the upper position and have moved apart, whilst the flange portions or tray support elements 12 which were in the upper position have come closer together and move to the lower position below the plate (FIG. 5A).

The locking pin 21, no longer being urged backward by the tray, springs forward under the action of the spring 22 and immobilizes the central plate 4 after exactly one half a revolution, the plate then again being in the horizontal position (see FIG. 5A). The bottom of the tray is then removed by lifting it to release the bottles, this being possible, since the flanges 12 are now sufficiently far apart to permit removal of the tray. The bottles are then pushed, for example by a rake 23, onto the accumulating table 3 of the dividing machine.

The apparatus of the invention is then free, as can be seen in FIG. 6, and the door can be closed and the operations recommenced at will.

The plate 4, and the bearing members 7 and 9 are preferably formed of stainless steel. The housing 17 may be made of plastic material, preferably of the transparent type such as cellulose acetate, methyl methacrylate or acrylate. It is also possible to use translucent plastic material such as polyesters, which may or may not be provided with glass fibre fillers.

If necessary, the covering may alternatively be made of metal such as aluminum or stainless steel.

The materials used have simply to meet the desired mechanical requirements and permit the preservation of a sterile condition. The rings, bearings, shafts, flanges, and bearing members may be made of any suitable material in accordance with the usual rules of mechanical construction.

More particularly, the self-lubrication of the rotating parts can be effected by a suitable choice of the contacting materials. The annular bearing member **8** is advantageously made of a material providing good sliding properties such as polyvinyl chloride, polytetrafluoroethylene, polyamides, high-density polyethylene.

The flange portions **12** which have to support the trays are advantageously lined with a material such as polyvinyl chloride or polyamides, which sound-deadens the assembly and ensures good sliding of the trays.

The dimensions of the apparatus are not critical, and they have simply to be such that the entry and exit of the trays can be effected without difficulty and there is no excessive play between the flanges **12** in the lower horizontal position and the lower face of the plate **4**. This distance is to be adapted to the height of the bottles and the thickness of the trays, so that the turning-over is effected without excessive shaking of the bottles.

An apparatus has been described whose plate is double-faced and which can consequently operate by rotation in one and the same sense, each face of the plate serving alternately for supporting the bottles. It will be apparent that it is possible to provide an apparatus one side of which only would be used, and then it should be capable of effecting a movement through half a revolution and of being returned to its original position by half a revolution in the opposite direction. This apparatus would only have one useful half-revolution out of two.

By way of example an apparatus in accordance with the drawings of which the plate **4** was made of stainless steel of 10/10 mm. with side bearing plates of stainless steel and channel section members **10** made of stainless steel plate of 3 mm. thickness, with flange portions 50 mm. in width, having an inclination relative to the web of the channel section members of 110° was found suitable for trays of 220 bottles, 26 mm. in diameter and 60 mm. in height.

By turning over in 1 second a tray every 60 seconds, an antibiotic dividing machine operating at a rate of 220 bottles per minute can be supplied.

As has been stated, the turning over apparatus according to the invention may be used in many other cases, and its dimensions have simply to be adapted to the containers and the batch supports used. If it is not necessary to operate in a sterile medium, the covering may, of course, be dispensed with. It is possible for example to use the turning over apparatus for supplying an automatic bottling machine with bottles made to drain on grids with their head downwards.

I claim:

1. Apparatus for turning over trays of containers, said apparatus comprising, in combination:

a. a flat plate defining a plane and rotatable about a substantially horizontal axis in said plane;

b. means for rotating said plate about said axis;

c. a pair of tray support elements on the same side of and spaced from the plane of said plate and spaced apart from one another;

d. means operatively connecting said support elements to said plate, effective to cause rotation of said support elements upon rotation of said plate; and

e. means for increasing the distance apart of said tray support elements upon rotation of said plate from a first position in which said support elements are below said plate to a second position in which said tray support elements are above said plate.

2. Apparatus for turning-over trays of containers, said apparatus comprising, in combination:

a. a flat plate defining a plane and rotatable about a substantially horizontal axis in said plane;

b. ends to said plate;

c. means for rotating said plate about said axis;

d. a bearing member fixedly located axially outwardly over each of said ends of said plate, said bearing members being inclined to said axis so as to be downwardly convergent;

e. a channel section member mounted on each of said bearing members;

f. a web to each of said channel section members mounted on said bearing member for rotation thereon about an axis, perpendicular to the associated bearing members;

g. two flange portions to each of said channel section members, each flange portion forming a tray support element spaced from the plane of said plate, the tray support elements being arranged in pairs on opposite sides to the plane of said plates; and

h. means operatively connecting said channel section members to said plate, effective to cause rotation of said support elements upon rotation of said plate, whereby upon rotation of said plate from a first position in which one pair of tray support elements is below said plate, to a second position in which said one pair is above said plate, the distance between said one pair of tray support elements is increased, by the distance between said other pair is decreased.

3. The apparatus defined in claim **2**, wherein said flange portions of each of said channel section members diverge away from the associated web.

4. The apparatus defined in claim **2**, wherein the means operatively connecting said channel section members to said pins include end flanges to said plate, apertures in said webs of said channel section members and pins carried by said end discs and engaged in said apertures.

5. Apparatus as defined in claim **2**, and further comprising oppositely turned edge portions to said plate parallel to said axis.

6. Apparatus as defined in claim **2**, and further comprising means for selectively locking said plate against rotation with the plane thereof substantially horizontal.