# United States Patent

**Bauer**

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[54] **APPARATUS FOR CHARGING TRAYS HAVING A SURROUNDING FLANGE WITH ARTICLES ORDERED IN GROUPS**


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[30] **Foreign Application Priority Data**

Jan. 5, 1970 Germany ..... P 20 00 264.6

[52] **U.S. Cl.** ..... **53/159**, 53/163, 53/248

[51] **Int. Cl.** ..... **B65b 5/06**, B65b 21/04, B65b 35/40

[58] **Field of Search** ..... 53/159, 162, 163, 164, 166, 53/244, 245, 246, 247, 248



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[57] **ABSTRACT**

Articles are charged into the tray a group at a time. Each group of articles are pushed into a chute box having a removable bottom. The bottom of the chute box is subsequently quickly removed so that the articles of the group fall by gravity into a tray which is disposed under the chute box.


**13 Claims, 10 Drawing Figures**

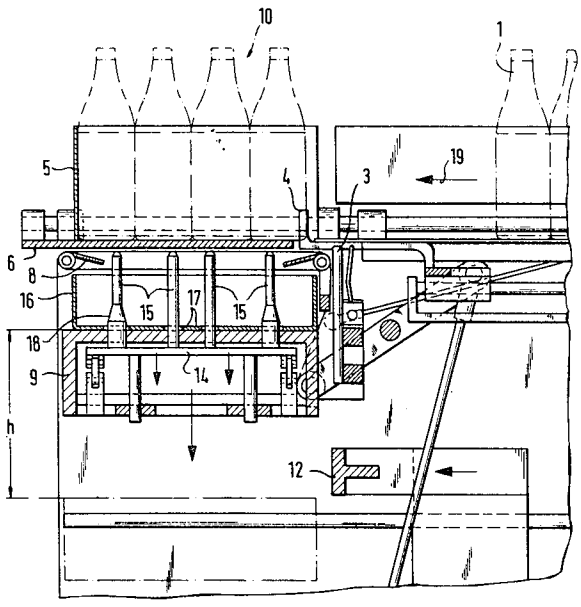

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Fig.1

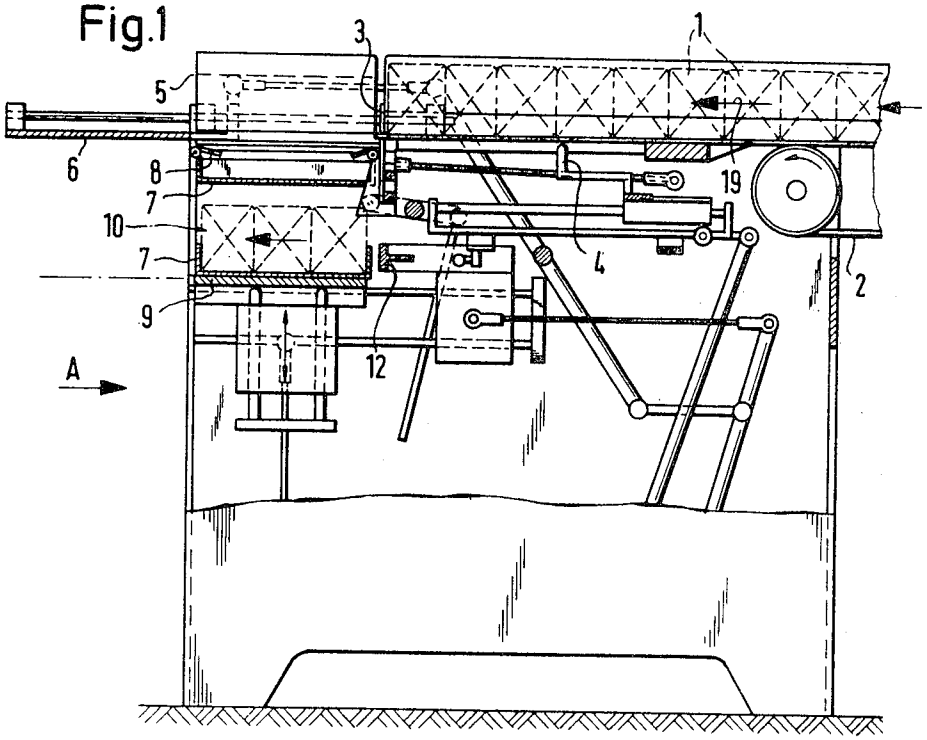


Fig.2

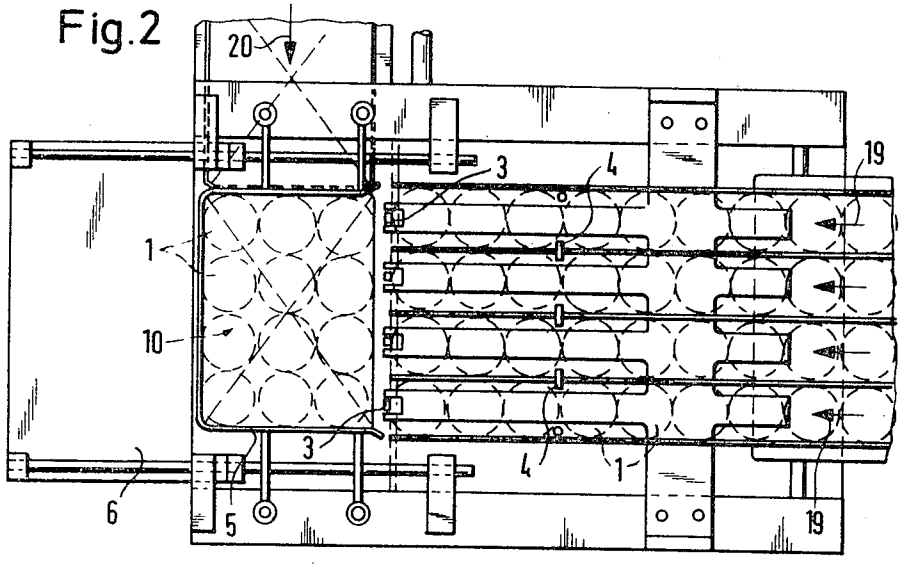


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Fig.3

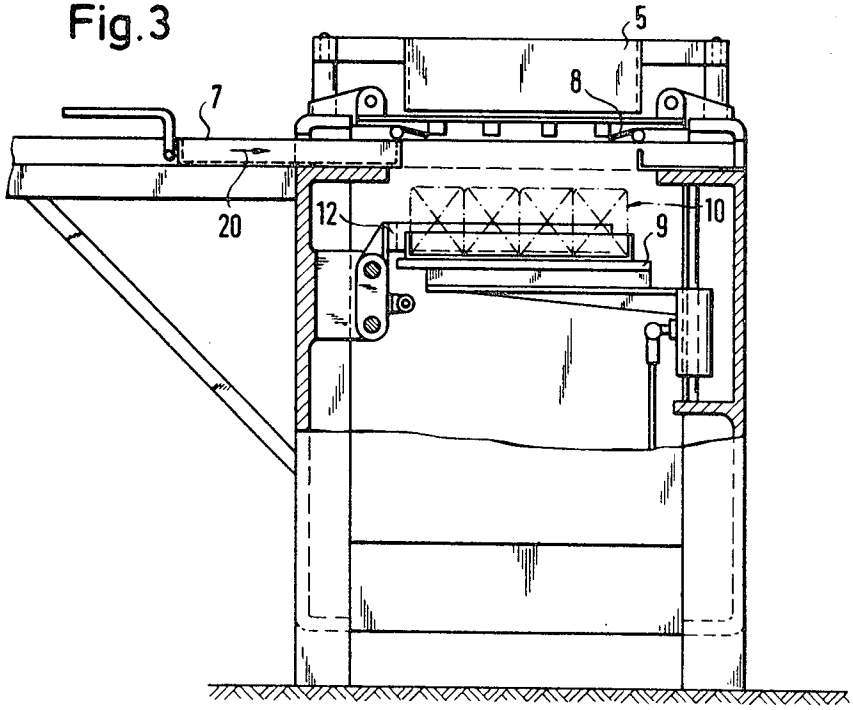
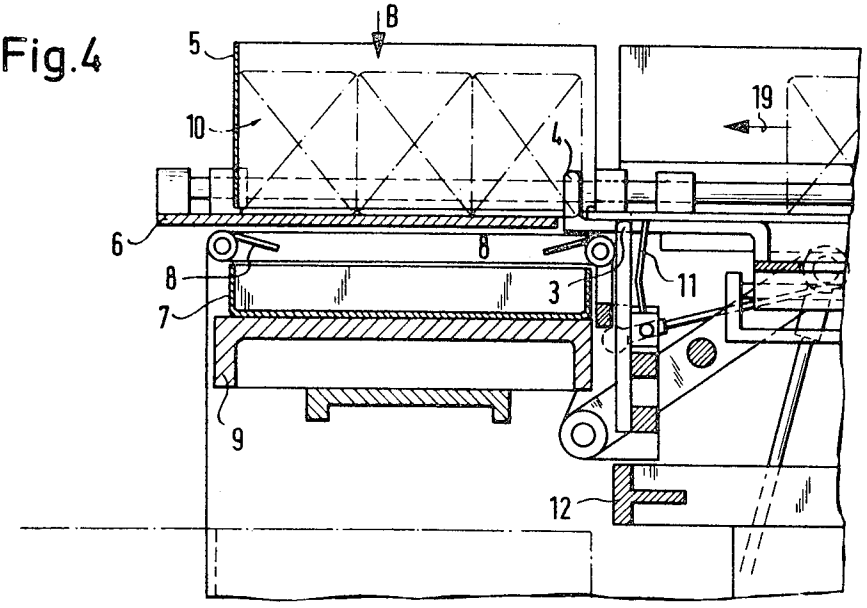



Fig.4



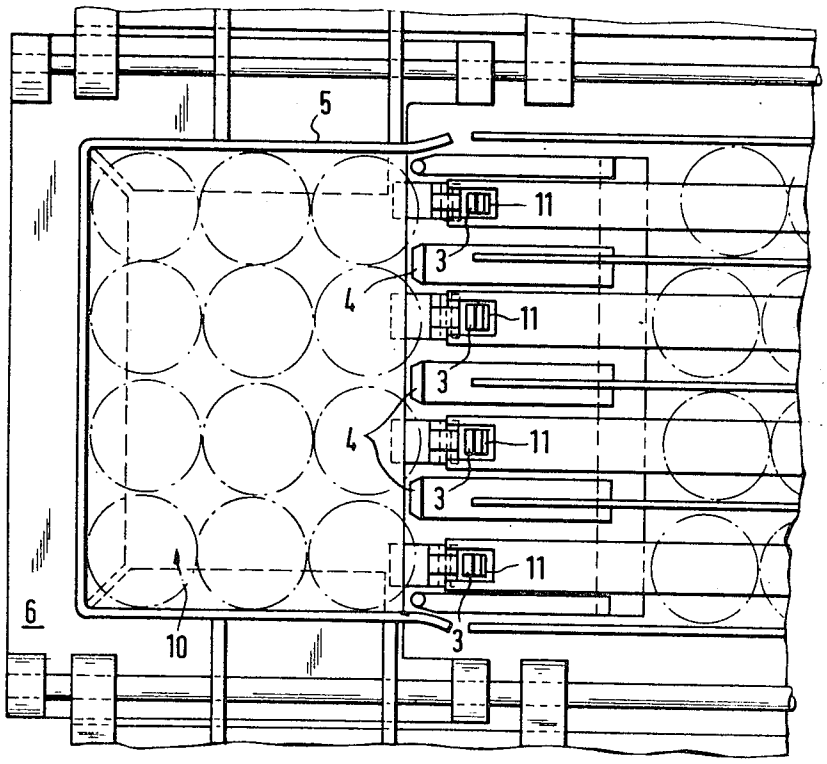



Fig.5

Fig.6

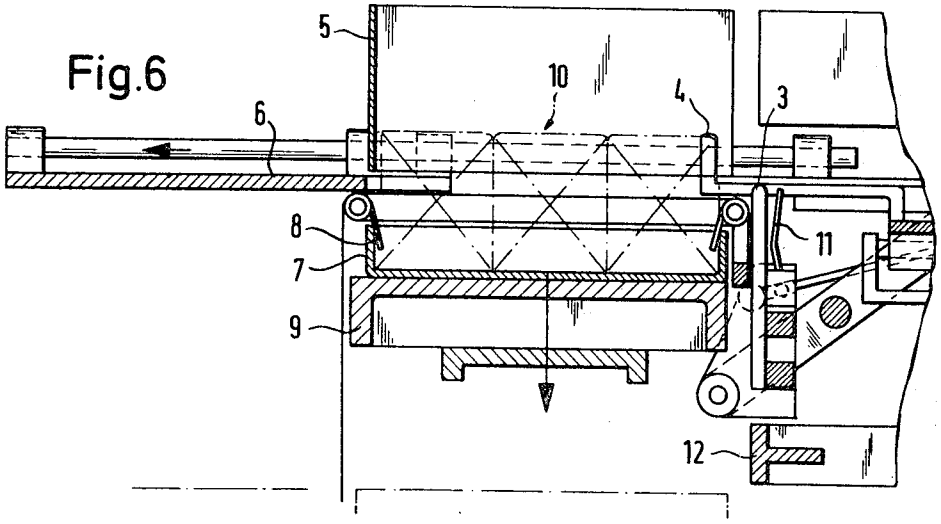


Fig.7

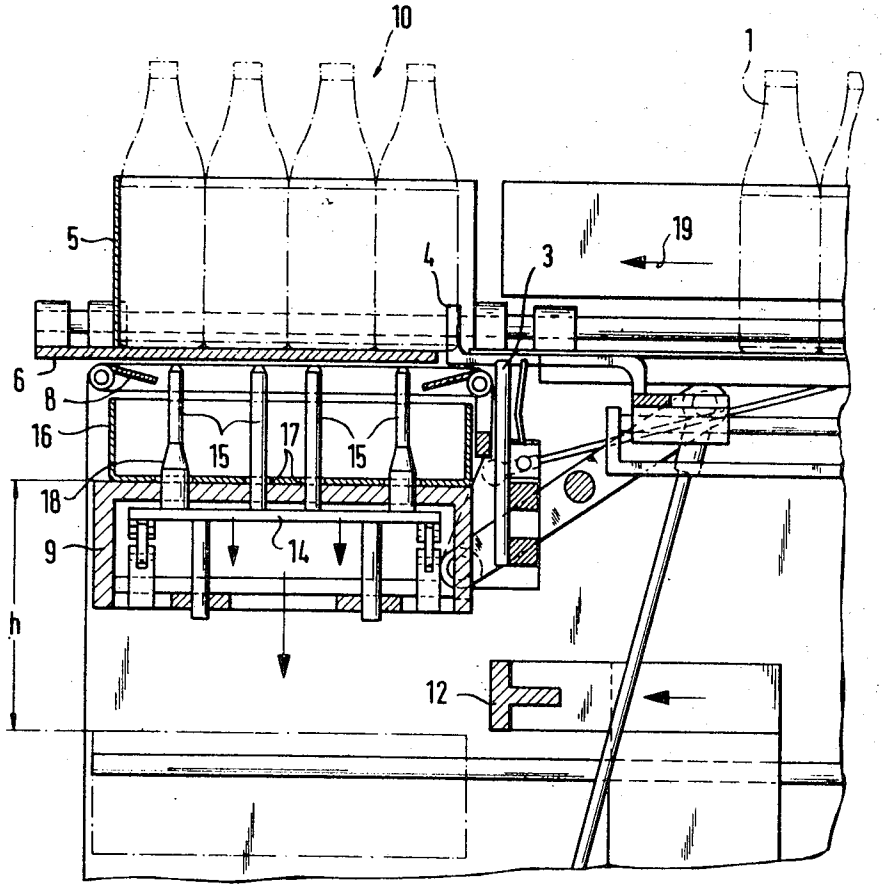


Fig.8

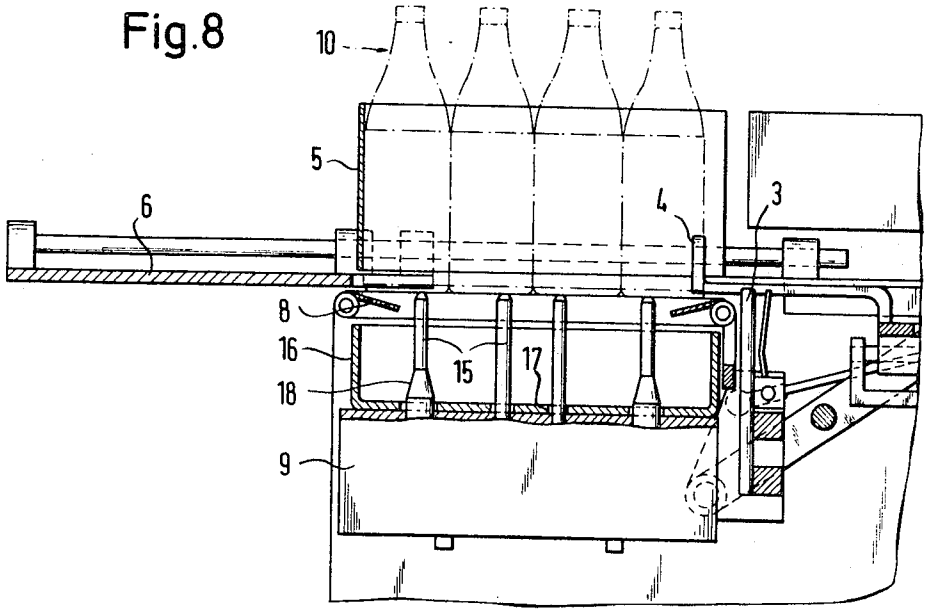



Fig.9

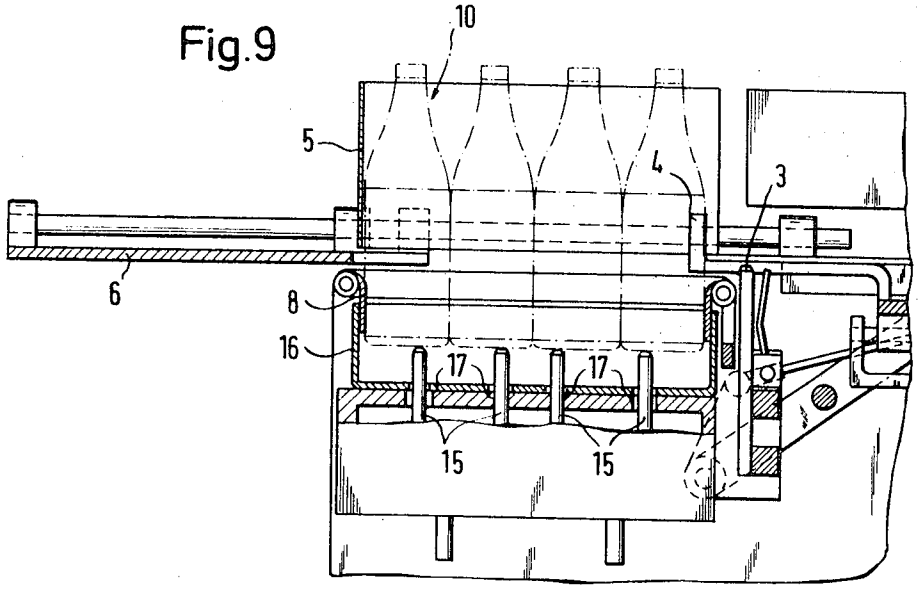
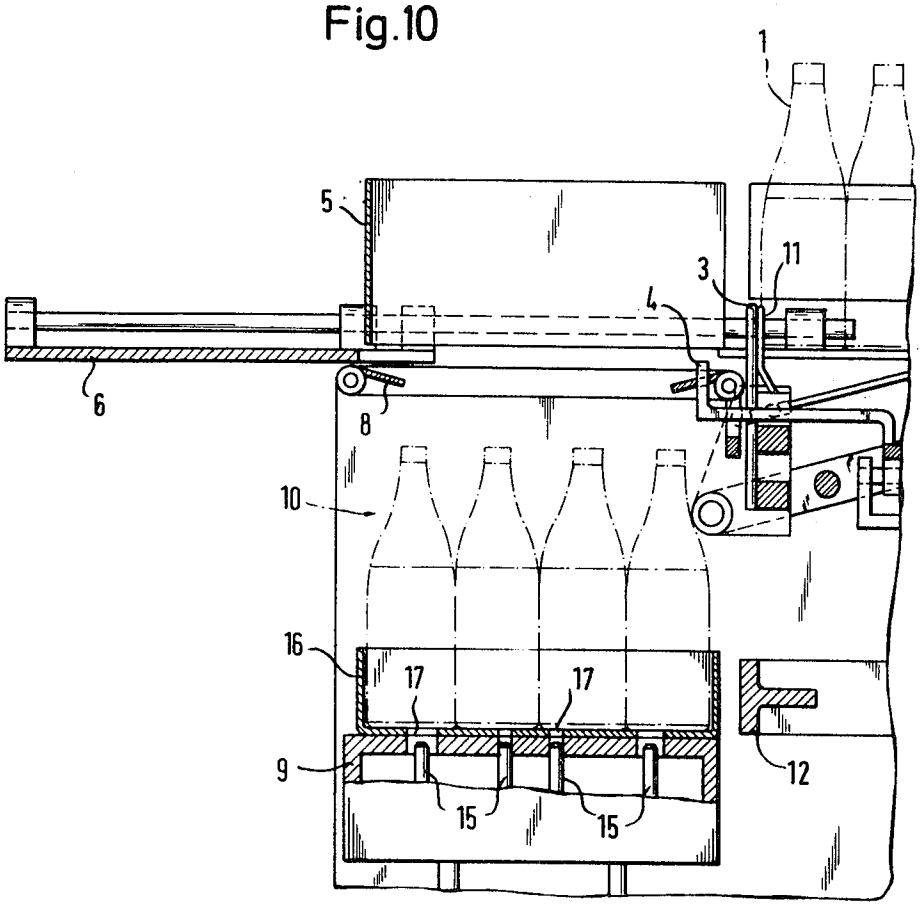


Fig.10



# APPARATUS FOR CHARGING TRAYS HAVING A SURROUNDING FLANGE WITH ARTICLES ORDERED IN GROUPS

This invention relates to an apparatus for charging trays having a surrounding flange with articles ordered in groups, in which one group of articles are charged into the tray at a time.

For reasons of economy and in view of the steadily increasing demand for so-called transparent packages, the packaging industry increasingly abandons the use of the conventional carton package or re-usable package and uses the less expensive transparent plastics material sheeting as packaging materials. The packaging methods using that material comprise usually a shrinking of transparent sheeting about a plurality of articles, in most cases under a vacuum. In the case of smaller articles and smaller bundles, this shrinking can be carried out without need for any support or tray because the sheeting is strong enough to support these articles. Groups containing a larger number of articles or heavier articles must be placed into trays before they can be wrapped with transparent sheeting in order to avoid damage to the transparent sheeting, particularly when it is still soft during the shrinking operation.

The German Pat. No. 1,269,937 describes a process of placing articles on supports, in which process the articles are combined in groups and are pushed from a fixed plate into a car, which has a bottom on which the support has been placed. The fixed plate on which the articles are pushed by a pusher onto the support is disposed closely above the support so that the articles fall only through a very small distance. Besides, a correspondingly fast return movement of the pusher ensures that the articles are not excessively tilted as they are pushed beyond the edge of the plate. That known process and the apparatus used to carry it out may be used only in connection with supports which have no surrounding flange, as is comprised in a tray, because such flange increases the distance between the fixed plate and the bottom of the tray so that a tilting of the articles cannot be avoided when the articles are pushed from the fixed plate. Even if the flange of the trays is low, the articles must be pushed quickly onto the tray so that the function will not be disturbed by articles which assume an inclined position. For this reason, a high acceleration is required and may result in shocks and possible damage, particularly in the case of delicate commodities, such as glass bottles.

So-called tray-charging machines have been disclosed, which have been developed from the known carton-filling machines and in which the articles are dropped. The used cartons are provided with crossing partitions, which define chambers for receiving the articles. The increasing use of shrinkable sheeting eliminates the need for the relatively expensive crossing partitions so that that process can no longer be used.

In view of the state of the art which has been described hereinbefore, it is an object of the present invention to provide a process and an apparatus for charging trays having a surrounding flange, which process and apparatus result in an increased functional reliability and lower risk of damage in conjunction with a considerable increase in output. This object is accomplished by the process according to the invention in that each group of articles are pushed into a chute box having a removable bottom and the bottom of the chute box is subsequently quickly removed so that the articles of the group fall by gravity into a tray which is disposed under the chute box.

This measure enables a pushing of the articles into the chute box by a pusher without damage to the articles and without involving a risk that the articles may be tilted as they enter the tray because the articles enter the tray by a vertical fall when the bottom of the chute box has been removed.

The increasing trend to use discardable bottles compels glass manufacturers to reduce their prices so that the wall thickness of glass bottles and glass containers is steadily reduced and the risk of a breakage of such articles is increased. For this reason, it has been usual, e.g., when bottles were handled by the so-called tray-charging machines, to grip the bottles at their neck and to lower them mechanically into



the packaging carton provided with crossing partitions. That process is fairly time-consuming and requires complicated grippers and an actuating mechanism therefor so that the output of that process can hardly be increased. A special embodiment of the process according to the invention may also be used for such containers. For this purpose, the fall of the articles is mechanically braked when they have fallen through a short distance and the articles are then introduced in a controlled manner into the tray. In this way, trays having a high flange may be charged even with delicate bottles and glass containers.

The apparatus which has been disclosed in the above-mentioned German Pat. No. 1,269,937 for charging supports with groups of articles, particularly with cans, bottles or the like, comprises a conveyor for feeding the articles and a pusher for pushing a group into a confined space, which is associated with and conforms to the tray. As distinguished therefrom, the invention provides apparatus for charging trays having a surrounding flange and that apparatus is characterized in that the receiving space is defined by a chute box having a removable bottom and a tray for receiving the group is disposed under the bottom.

In a particularly desirable embodiment, the bottom of the tray is provided with openings through which vertically displaceable supporting rods can be introduced, which serve to support and brake the articles. The supporting rods are suitably secured to a common frame, which is disposed under a support for the tray and is movable relative to said tray. In a preferred development of the invention, at least two of the supporting rods consist of centering rods for centering the tray.

It will be desirable if the removable bottom of the chute box consists of a sliding plate which can be pulled out.

Additional advantages and features of the present invention will become apparent from the following description of preferred embodiments shown by way of example in the accompanying drawings, and from the sub-claims.

FIG. 1 is a transverse sectional view showing only the essential elements of apparatus according to the invention for charging trays,

FIG. 2 is a top plan view showing the apparatus of FIG. 1,

FIG. 3 is an elevation taken in the direction A in FIG. 1,

FIG. 4 is a transverse sectional view which is similar to that of FIG. 1 and shows specially the charging station with a group of containers inserted therein,

FIG. 5 is an elevation taken in direction B in FIG. 4 in the same operative position,

FIG. 6 is a view like that of FIG. 4 but with the sliding plate removed,

FIG. 7 shows another embodiment of a charging station for tall articles, such as bottles,

FIG. 8 is a view like that of FIG. 7 with the sliding plate pulled off and supporting rods moved into position,

FIG. 9 is a view like that of FIG. 7 with the supporting rods lowered by one-half of their stroke, and

FIG. 10 is a view like that of FIG. 7 with the support for the tray in lowered position.

In the apparatus shown in FIG. 1, a conveyor belt 2 moves individual containers or articles 1 in the direction of the arrow 19 continuously to a charging apparatus according to the invention. The containers or articles accumulate before stops 3 (FIG. 2). The stops 3 contain feelers 11 (FIG. 4), which interrupt the charging operation until all rows, in this case four rows, have been fully set with containers. When the group has been completed, the stops 3 and with them the feelers 11 are lowered. At the same time, feeding grippers or pushers 4 are raised into the interstices at the rear end of the group of containers.

The stops 3 are succeeded by a chute box 5 (FIG. 2), which has a bottom consisting of a slide plate 6 (FIG. 4). This chute box 5 defines a receiving space which is open on one side. The separated group of containers are pushed from between their swordlike guides into the receiving space by means of the

feeding grippers or pushers **4**. The pushers **4** may be positively operated to perform an optimum function so that they may have a high feeding speed when this is required and possible. This arrangement will minimize the risk of damage to the containers of the group as they are fed and when they engage the walls of the chute box **5**. Subsequent articles may be fed during a much longer time and at a lower speed.

As the chute box **5** is filled with the group of containers **10**, an open tray **7** (FIG. 3) is pushed in the direction of an arrow **20** on a support **9** disposed under the chute box **5** (FIG. 4). The support is arranged to be vertically movable and is controlled by a cam. When the tray is in position, the sliding plate **6** is pulled off from below the group of containers **10** at relatively high speed so that said containers drop almost simultaneously under the action of gravity. Guide flaps **8** are disposed under the chute box **5** throughout the periphery thereof adjacent to the edges of the tray and by the dropping containers these flaps are moved into contact with the tray to ensure a reliable sliding of the containers into the tray. The provision of such guide flaps will be of special advantage when cardboard trays are used because they always differ somewhat in dimensions from one tray to another. The guide flaps used in the present invention may be pivotally secured below the chute box adjacent to the flanges of the trays to be filled, although this construction is not necessary.

When the group of containers **10** have been properly lowered into the tray **7**, the tray support **9** is lowered to a lower plane whereas the guide flaps **8** secured to the machine frame under the chute box **5** are left back and spring back to their original horizontal position. To guide the dropping group of containers also at the open side of the chute box **5**, the feeding grippers **4** remain in the advanced position until the group of containers **10** have become supported on the tray **7**.

The stops **3** are then moved back to their locking position. The feeding grippers **4** are lowered to their initial position at the same time. The packaging cycle which has been described will not be repeated until all feelers **11** have been fully depressed. When the tray support **9** is in its lower position, the entire group of containers are pushed by a pusher **12** out of the charging device to the succeeding wrapping machine.

Experience has shown that a tray having a low flange is not sufficient for tall containers, particularly glass bottles. In this case, trays having a relatively high flange are required so that the containers fall through a larger distance. For the reasons described initially hereinbefore, filled discardable bottles will not withstand a fall through such distance. In the embodiment shown in FIGS. 7 to **10**, the charging device according to the invention ensures that when the sliding plate **6** has been pulled off the bottles can fall only through a very small distance so that they attain only a small kinetic energy and after said fall are intercepted and slowly and carefully inserted by mechanical means into the tray having a high flange.

The trays shown in FIG. 7 are formed in their bottom with holes **17** equal in number to the bottles to be charged. It is desired to punch the holes in the bottom so that they are not disposed at the center of the respective individual containers but are slightly eccentric so that when trays charged, e.g., with crown cap bottles are stacked the crown caps cannot become forced into the holes of an overlying tray. Besides, the holes should be smaller than the crown caps so that even when the stacked trays slide relative to each other there is no risk for a crown cap of the lower group slipping into the holes of the tray for the upper group whereby the sheeting would be destroyed.

An actuator for supporting rods **15** is disposed under the tray support **9** and essentially comprises a frame **14**, to which the supporting rods **15** are secured. The frame **14** is movable up and down relative to the tray support **9**. Before the charging operation, the supporting rods **15** are pushed through the holes **17** of the tray **16** until the rods extend almost to the level of the top edge of the tray. When the supporting rods **15** are in this position, the sliding tray **6** is pulled off under the chute box **5** filled with bottles so that the bottles fall directly and through a small distance onto respective supporting rods **15**. The frame **14** is then operated to lower the supporting rods **15** while the bottoms of the bottles rest on the upper ends of the supporting rods **15**. Lowering may be effected at a desired maximum speed so that an impact due to a fall will be avoided.

In a preferred embodiment of this invention, the openings in the tray bottoms are made so that at least two of the supporting rods **15** act to center the trays to be filled. As shown in FIG. **8**, this can be accomplished by providing two of the supporting rods **15** with lower conical sections so that when the supporting rods are raised up through the holes in the tray bottoms, the conical sections of the centering supporting rods fit snuggly within the corresponding openings in the tray bottoms thereby centering the trays.

When the group of containers or bottles **10** have been received by the supporting rods **15**, the latter are lowered and the tray support **9** is moved to a lower level (FIGS. **9** and **10**) at the same time. This will reduce the time required for the charging operation.

What is claimed is:

**1**. Apparatus for charging trays with articles ordered in groups, each tray having a surrounding flange and openings in the tray bottom slightly eccentric to the centers of the individual articles when contained therein, which apparatus comprises a first support for receiving a number of articles, conveyor means to feed the articles onto said first support, a chute box located in communication with said first support, said chute box conforming in shape to the shape of the trays to be filled and having a removable bottom, means to feed a predetermined number of articles from said first support to said chute box, a second support adapted to receive trays to be filled and located under the bottom of said chute box, said second support having openings therein corresponding to the openings of the trays when received thereon, a plurality of vertically displaceable supporting rods arranged to pass through said second support and the openings in the bottom of said tray when received on said support, means for vertically displacing said rods between a first position where said articles are deposited on said rods and a second position where said articles are deposited in said tray, and means for quickly and entirely removing said removably bottom from said chute box whereby said articles are dropped substantially simultaneously onto said rods while said rods are in said first position.

**2**. The apparatus of claim **1** wherein the articles are cans.

**3**. The apparatus of claim **1** wherein the articles are bottles.

**4**. The apparatus of claim **15** adapted to charge trays with articles having caps larger than the openings located in the tray bottoms of the trays to be filled.

**5**. The apparatus of claim **15** wherein at least two of the supporting rods consist of centering rods for centering the tray.

**6**. The apparatus of claim **5** wherein the two supporting rods adapted for centering the tray have conical lower portions.

**7**. The apparatus of claim **1** having guide flaps pivotally located below the chute box adjacent to the flanges of the trays to be filled when said trays are received on said second support.

**8**. The apparatus of claim **7** wherein said guide flaps are similar to leaf springs.

**9**. The apparatus of claim **1** wherein said removable bottom of said chute box is a sliding plate adapted to be pulled out horizontally.

**10**. The apparatus of claim **1** wherein said means to feed a predetermined number of articles from said first support to said chute box is a pusher.

**11**. The apparatus of claim **10** wherein said chute box is defined by three walls and during the charging operation is defined by a fourth wall comprised by the pusher.

**12**. Apparatus of claim **10** wherein said pusher consists of more than one pusher element and the articles are guided from said first support into said chute box by elongated horizontally positioned guides.

**13**. The apparatus according to claim **1** wherein said second support is adapted to be lowered by pneumatic, hydraulic or mechanical means.