To all whom it may concern:

Be it known that we, HORATIO GATES, a citizen of the United States, and FRANK O. WOODLAND, a subject of the King of Sweden and Norway, both residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Automatic Feed Mechanism for Bottle-Stoppers, &c., of which the following, together with the accompanying drawings, is a specification sufficiently full, clear, and exact to enable persons skilled in the art to which this invention appertains to make and use the same.

The prime objects of our present invention are to attain an increased capacity of feed and to provide a simple and efficient mechanism for attachment to or use in connection with a bottle-stopping machine for feeding thereinto that class of stoppers known as "caps" or "crown" bottle-stoppers and to render said mechanism adapted for rapidly transposing such crown bottle-stoppers or similar articles from an irregularly-commingled mass in the receptacle to proper sequence and uniformly-disposed order for delivery at the place of use or to the mechanism by which they are affixed upon the bottles.

Another object is to provide a hopper with a pocket, interval, or subchamber for the assemblage of the stoppers in singular order and endwise upright position preparatory to their exit through an opening or openings at the bottom of such interval in differently-facing relation; also, to provide such hopper with an endwise-reciprocating slide-plate having suitable surfaces or projections for pushing or moving the bottle stoppers or crowns in a manner to hasten their egress from the hopper-chamber.

Another object is to provide, in combination with such hopper, a system of conducting-ways or guide-clutches adapted for receiving the crowns in differently-facing positions and for bringing the same to a common position of facing and into coinciding planes of passage, as more fully hereinafter explained.

Minor objects and features of our invention will be disclosed by the following detailed description, the particular subject-matter claimed being hereinafter definitely specified.

We attain these objects by mechanism, the nature and construction of which are illustrated in the accompanying drawings, in which—

Figure 1 is a side view of the mechanism embodying our invention. Fig. 2 is a back view, the hopper devices being shown in section at line X X on Fig. 1. Fig. 3 is a plan view of the slide-race or bottom of the hopper. Fig. 4 is a front view having a portion of the front plates removed to reveal the interior parts. Fig. 5 is a horizontal section at line Y Y. Fig. 6 is a vertical section through the transverse passway and its gate-slide. Fig. 7 is a front view of the hopper, one-half of the face-wall being omitted to show the reciprocative slide-plate and interior hump. Fig. 8 is a plan view of the hopper. Fig. 9 is a horizontal section at the line W on Fig. 4, showing the hopper as made with a single exit-opening; and Fig. 10 is a vertical sectional diagram of the race or bottom of the interval or subchamber, illustrating the position taken by stoppers or crowns therein.

In this specification for convenience and brevity of expression the term "crown" or "crowns" is used for denoting the caps, bottle-stoppers, or articles for the assemblment and feed of which the mechanism is designed or employed.

In the embodiment of our invention as illustrated in the drawings, A indicates the receptacle or hopper, into which the crowns or articles to be arranged and fed are primarily deposited in an irregularly commingled mass. The upper portion A' of said hopper is shown broken away to come within the limit of the sheet, but in practice may form a pan or rim of any desired dimension. The hopper A is formed wedge-shaped or downwardly tapering and transversely of oblong rectangular shape, preferably with one straight upright wall a and one inclined wall a', the latter having thereon a hump A' or double-inclined upward protuberance disposed to the incline of the wall a' and with the line of its apex angle sloping toward the opposite or upright wall a. At the foot of the wall a there is a horizontal race or bottom ledge D, while the end walls a' are pro-
vided with an upright slot opening above said race, as indicated at b. An endwise-movable slide-plate B is arranged across the lower part of the hopper at the foot of the inclined wall a', said plate being disposed through the slots b and supported on the race D in upright position parallel with the wall a at such distance therfrom as will accord between the adjacent surfaces a sub-chamber, pocket, or interval C, the width of which approximately corresponds to the thickness of the crown or just sufficient to freely admit, edgewise and in singular order, such crowns as may descend thereinto, but with the interspace so narrow that two crowns or disks placed together and crowns that lie in crosswise position cannot enter the interval. The bottom surface or race D may in some instances be made flat; but preferably it is formed with a central longitudinal deflecting-rib 3 (see Figs. 3 and 10) and with oppositely-formed discharge-ways or exit-openings E and E', the wider parts of which respectively coincide with the grooves 4 and 5 at the opposite sides of the rib B. The chamber or interspace C is best slightly increased in width near the bottom, so that the crowns S can assume limited right or left inclination for passing to their respective exits, accordingly as their flanges fall to the right or left of the deflecting-rib. The openings E and E' are preferably offset laterally to an extent that will bring their flared edges into alinement with the grooves 4 and 5, respectively, and to leave a portion of the rib 3 extending along the back edge of the opening, thereby providing a guard- lip 6 for preventing the flange of a crown entering an oppositely-facing opening.

The convergent interior of the hopper terminates in the subchamber or pocket C, so that the crowns consecutively settle therein to as preceding ones are discharged through the exit, the slide-plate at its central part allowing those on the surface of the inclined wall to slip down over its edge. The slide-plate B is extended higher at the end portions than at the central part, which is level with or lower than the inclined inner surface of the hopper, and said end portions present inward edges B' of any desired height for engaging and moving the crowns within the hopper.

The interspace of the pocket C is extended upward between the high portions of the slide and the straight side wall a, and the crowns can enter edgewise between the edges B' of said portions and the wall at any part thereof as the edges B' are projected into the hopper by movement of the slide-plate.

The height of the slide at its central part, above the race D, is made somewhat greater than the extreme diameter of the crown-disk, so that one or more crowns can stand upright within the interspace C and any crown approaching in edgewise position can readily fall between the plate B and straight wall a of the hopper. The hump A terminates with an upright face in plane with the inner face of the slide B. By reciprocative action of the plate B its edges B', in conjunction with the inclined surfaces of the hump A, serve to shift or turn the crowns in the hopper and aid them in entering the interval C at some of its length and also to prevent the mass of crowns from becoming clogged in the convergent part of the hopper.

The straight wall of the hopper opposite the slide-plate B is preferably provided with a trap or door a', opening into the interval C, the lower edge of its opening being about half the diameter of a crown (more or less) in height above the bottom race and the height of its opening such as will allow a crown to pass through, as indicated in Figs. 2 and 7. This construction facilitates the removal from the interval or pocket-space of any defective crown or foreign substance that may get into the hopper and become clogged before the exit-opening. The door may be perforated with small holes or glazed, if desired, to afford sight of the interior. A suitable button or fastener 7 is provided to secure the door when closed.

F and F' indicate oppositely-directed pushers or inclined plows disposed within the interspace and sliding upon or adjacent to the race or bottom D. Said pushers are preferably attached to and move with the plate B and serve for plowing under and lifting the crowns that stand edgewise in the interval 100 or for pushing and rolling the same into the discharge openings or openings. The body of the pushers fill and close the lower part of the slots b at the ends, and lips 7 on the hopper-body stand inward to the face of the slide-plate at the ends of the interval C and prevent the escape of the crowns otherwise than through an exit-opening.

G and G' indicate a pair of twisted guide-chutes, their upper ends disposed in a plane coincident with the subchamber C and connected with the bottom of the hopper, so that their internal passages respectively communicate with the exit-openings, while their lower ends are disposed in the same plane and joined with a transverse passway H, to which there is also joined the single delivery chute or guide K, that conducts the uniformly-arranged crowns to the place of use at x, where the chute connects to the stopper-taching head or capper, which latter may be of any suitable or well-known kind, but not being a part of our invention is not herein shown.

The guide-chutes G and G' are constructed and arranged to separately receive crowns from the hopper in differently-faced relation and to turn them by the twisted form of the guide-chutes so that said crowns will stand in, with their disks in a common plane or in a uniformly-facing relation to each other when at the junction of the two guide-chutes with the passway H. We provide the transverse passway with an endwise-sliding gate I.
for controlling the passage, the parts being organized for operation in the manner here described. The ends of the chutes G G' are separated by a barrier B, that in width substantially corresponds to the internal dimension of the lower guide or delivery-run K, which joins with the transverse passway H centrally beneath said barrier, while the chutes G and G' enter the passway from above, at either side thereof.

The gate I consists of a slide having end portions I', that close the transverse passway against the escape of crowns, and top portions i, that alternately cut off the guide-chute passages. The space between the end lugs I' of the gate is such as will compass the width of one of the guide-chutes and the delivery-chute. By endwise reciprocation of the gate I the two guide-chute passages are alternately put in connection with the chute K.

The pass-gate I is best made of less height than the diameter of a crown. (See Figs. 4 and 6, in which the edges as indicate the positions of the crowns.) The outer portions 8 of the guides fit down to the top line 8 of the gate ends I', while the lower edge of the barrier G is at the line 10, some distance above the gate top, and at such height that a crown supported on the bottom 11 of the way can readily pass beneath the barrier. This construction enables the gate to shift, carrying forward the lower crown S without materially interfering with the overlying crown S'.

The mechanism for imparting motion to the slide-plate B and the pass-gate I comprises an actuating-rod L, arranged in supporting-bearings on the chute-frame, and suitable operating connections between said rod and the slides for effecting reciprocative movement thereof. In the present instance the plate B is furnished with a stud and antifriction-roll B3, that engages with a slotted cam L', fixed on the rod L, whereby a horizontal movement of the plate is effected by vertical movement of the rod.

J indicates an agitator or spindle extending up through an opening in the inclined wall a' of the hopper and connected for operation with the rod L. One or more of such agitators may be provided, as desired. Its purpose is to stir or lift masses of crowns that might otherwise tend to choke or form a bridge across the convergent interior of the hopper.

N indicates a stationary guide-rod disposed parallel with the actuating-rod L, and M indicates a sliding head with bearings r, that run on said rods, said head carrying a slotted cam M', that engages a roller-stud fixed in the slide-gate I for giving motion thereto. Buffers h, of leather or other suitable material, may be arranged at the ends of the pass-way-frame as stops for limiting the movement of the gate I. Oppositely-directed springs P and P' connect said head with both the slide-gate I and the actuating-rod L above and below the position of the pass-gate. The springs P P' are best made to hook onto the lugs and over the stud fixed to the slide-head, so that they can be readily taken off or replaced.

Normally the slide-head M and pass-gate I move with the action of the rod L; but in the event of a clog at the gate the springs or one of them will yield, thereby permitting operation of the slide-plate B without forcing a movement of the gate-operating head M. The hopper and guide-chutes are connected together by screws t.

This feed apparatus may be attached in any suitable manner to the bottle-stoppering machine, (not shown,) the lower end L' of the actuating-rod L being connected with such machine in a suitable manner to produce a relative reciprocative movement thereof by the action of clenching the crown upon a bottle, as will be understood by persons conversant with this art.

In some instances it may be desired to employ our improved hopper and its actuating mechanism in connection with a guiding-crowns having a single inlet thereinto. In such instances the slide-plate or bottom of the sub-chamber may be made with a single discharge-opening, substantially as indicated at E2 in Fig. 10. The longitudinal rib may be omitted and the opening shaped, as at E3, to pass crowns when facing in either direction, thereby adapting the hopper for use in connection with a feed-chute mechanism having within itself a means for separating and turning the crowns.

In the operation the crowns are deposited in a mass within the hopper. As the crowns settle or move downward they assume edgewise position within the sub-chamber or interval C, the upright edges B' of the movable slide-plate and the hump A' causing the flatwise-approaching crowns to move back or turn to a position for edgewise entrance between the plate B and wall a. When in this edgewise position, they are readily caused to fall through the exit opening or openings by being moved one way or the other by the pushers F F'. The crowns then drop down the twisted guide-chutes G G', as before described, and hence pass to the delivery-chute K from one or the other of said twisted chutes, accordingly as the pass-gate I is shifted. The pass-gate makes a reciprocal movement back and forth at each time a crown is copped upon a bottle from the delivery end x of the chute. Hence, crowns can pass from each guide-chute into the passway and delivery-chute at each action of the machine, thus keeping a rapidly-accumulative constant supply of crowns in the delivery-chute, so that there is in practice, but little liability of exhausting the feed at any time while the hopper contains any supply. If in any instance it is so desired, the chutes can be united by the converging curve of their channels, and the pass-gate I used with the lug or obstructing portion P', centrally disposed upon the gate-slide, instead of the ends I', for alternately intercepting the crowns at the foot of the guides.
G and G' and controlling their passage into the delivery-chute K, the gate permitting the drop of the crowns at either side of said obstructing-lug P as the sliding of the pass gate to the right or left carries said lug P from beneath one guide-chute or the other, the passage in this case having endwise-reciprocative movement in the same manner and by similar means as that hereinbefore described. An example of this modified construction is illustrated by the small scale diagram, Fig. 6.

We are aware that a circular hopper having two exit-passages at opposite sides of the circle, with both passages formed to pass the bottle-stoppers or crowns relatively in the same predetermined position and combined with a main chute, two branch chutes, and a swinging tubular switch at the junction of the chutes, has been illustrated and described in a prior patent. It will therefore be understood that we do not herein claim the broad idea or feature of combining a single hopper with a branch chute uniting in a single manner irrespective of the construction and manner of combination of the mechanisms.

What we claim as of our invention, and desire to secure by Letters Patent, is

1. In a crown-feeding mechanism for bottle-stopping machines, the wedge-shaped containing-hopper, provided at the bottom thereof with a straight oblong subchamber or pocket extending longitudinally across the width of the hopper, with its space approximately corresponding to the thickness of a crown, and its vertical depth greater than the diameter of a crown, said pocket having a horizontal bottom and adapted for the assembly thereof of a row of crowns in single edgewise upright order, an opening, or openings, through said bottom for the edgewise exit of the crowns, one upright side of said pocket being movable endwise thereof and provided with means for pushing the crowns edgewise along the bottom, from right and left, toward the exit, substantially as set forth.

2. In a feed mechanism for the purpose set forth, a laterally-tapering hopper terminating in an oblong subchamber or pocket having a straight upright wall, a bottom race with an exit-opening or openings therethrough, a slide-plate forming one wall of said pocket, the interspace adapted for the assembling therein of crowns in edgewise upright order, portions of said slide-plate projecting upward within the hopper for stirring the crowns therein, the foot of said slide-plate working adjacent to said race, and means for operating said slide-plate.

3. In a feed mechanism for the purpose set forth, the tapering hopper terminating in an oblong pocket adapted for the edgewise reception of the crowns, and having a straight side wall, an endwise-movable slide-plate forming one side of said pocket, and having upward-extended end portions that project within the hopper, the pocket-interspace being

4. In a feed mechanism for the purpose set forth, a tapering hopper terminating in an oblong subchamber adapted for the assembling therein of the crowns in singular edgewise order, a bottom race, an endwise-reciprocative slide-plate forming one wall of said subchamber, and pusher devices within the interval, movable along the bottom race toward and from the exit-opening.

5. In a feed mechanism for bottle-stopping machines, in combination, a hopper having a straight wall and an inclined wall; a movable slide-plate disposed parallel to said straight wall and forming therewith an interval or pocket at the foot of the incline adapted for receiving stopper-crowns in edgewise position, a bottom race for said slide having two adjacent oppositely-disposed exit-openings therethrough, a central longitudinal rib along said race, and side grooves leading to the respective openings, and a push device movable over said race at either side of the openings for stirring the edgewise-disposed crowns within the pocket.

6. In a feed mechanism for bottle-stopping machines, the combination of a hopper terminating in an oblong subchamber or pocket adapted for assembling crowns in singular order preceding the exit, said hopper having a straight wall, and an inclined wall provided with an intermediate hump or transversely-disposed inclines thereon adjacent to the edge or entrance to said pocket, a slide-plate at the foot of said inclined wall having means for stirring or working the crowns at either side of the hopper toward the exit along the bottom of the pocket, and means for reciprocating said slide-plate.

7. In a feed mechanism for bottle-stopping machines, the combination of a hopper having a straight wall and an opposite inclined wall, with an upwardly-projecting transverse hump, a longitudinally-reciprocative slide-plate disposed at the foot of said inclined wall parallel to said straight wall with an interval or pocket between adapted for the singular edgewise reception of crowns, the bottom race having an exit-opening therein, pusher devices attached to the slide-plate and movable over said bottom race, and upwardly-projecting portions on said slide-plate, the edges of which move into conjunction with said hump, for the purposes set forth.

8. In a feed mechanism for the purpose set forth, the combination with the hopper-body of the guide-chutes; of a pocket or subchamber adapted for arranging the crowns in singular edgewise relation, said chamber having its lower portion slightly broadened and outwardly inclined at the sides, the bottom or raceway provided with a longitudinal deflecting-rib and side grooves, two adjacent exit-openings oppositely disposed with their openings laterally offset to align at one edge with
said grooves, and having a raised guard-lip at the back edge of said openings in continuation of the longitudinal rib, and dividing the edge of the exit-opening from the opposite groove.

9. In a feed mechanism for bottle-stopping machines, the combination with the hopper having the straight oblong pocket or interval for edgewise-arranged crowns, and the oppositely-facing adjacent exit-openings in the bottom thereof; of two twisted guide-chutes respectively connected to said openings, and turning to a common position of facement, a transverse passway-groove joining said chutes with a single delivery-way, and a sliding-bar pass-gate supported parallel with the plane of the crowns and having end lugs that close or control the passway, said gate-bar being horizontally movable endwise within said passway-groove, and means for reciprocally moving said pass-gate, substantially as set forth.

10. In a feed mechanism for the purpose set forth, the combination with two guide-chutes formed with a separating-barrier approximately the width of the chute, and the outer guide-walls of the chute at 8 disposed at lower position than the bottom edge 10 of said barrier, the transverse passway connecting said chutes, and the single delivery-chute centrally disposed beneath said barrier; of the endwise-movable pass-gate slide I having the end lugs 9 that control the guide-chutes, the height of said pass-gate slide being less than the diameter of the crowns or article to be fed, substantially as and for the purpose set forth.

11. In a feed mechanism for the purpose set forth, a feed-hopper having an interspace or subchamber adapted for the assembling of the 40 crowns in singular edgewise relation, a longitudinal bottom race with the exit-opening therefrom, a reciprocating slide-plate and pushers movable along said race, and a removable section or door in the wall of the hopper arranged to open said interspace adjacent above and along the line of said bottom race, substantially as shown and for the purpose set forth.

12. In a feed mechanism for the purpose set forth, the combination with the hopper, its reciprocating slide-plate, the guide-chutes, the pass-gate thereof, the actuating-rod and connections therewith for moving said slide-plate; of the gate-operating head, the guides thereof, and the oppositely-directed springs connecting said gate-operating head with said actuating-rod, substantially as described.

13. In a feed mechanism for the purpose set forth, the combination with the hopper having the inclined wall, the reciprocating slide-plate, and the actuating-rod whereby said slide-plate is operated; of the lifter-pin J connected with said actuating-rod and projecting upward through the wall of the hopper, substantially as set forth.

Witness our hands this 28th day of October, 1898.

HORATIO GATES.
FRANK O. WOODLAND.

Witnesses:
CHAS. H. BURLEIGH,
ELLA P. BLENUX.