This invention relates to a machine in which provision is made for removing a cap from a bottle and for automatically inserting one or more drinking straws in the bottle as the cap is removed therefrom. More particularly, the invention comprises a machine in which the straw inserting mechanism functions automatically in response to movement of a cap removing device which is actuated by a bottle during removal of the bottle cap.

It is an object of this invention to provide a machine of the character described in which the component parts are designed and assembled to ensure satisfactory and reliable operation. It is also an object of this invention to provide a machine of the character described in which the component parts are designed to facilitate economical manufacture and assembly thereof.

Other objects, advantages and characteristic features of the invention will be apparent from the following detailed description of the preferred embodiment shown in the accompanying drawings, in which—

Figure 1 is a view, in front elevation, of a machine constructed in accordance with what is now considered to be a preferred embodiment of the invention.

Figure 2 is a view, in elevation, of the right hand side of the machine appearing in Figure 1. In this view certain parts, which would ordinarily appear, have been omitted for the sake of clearness.

Figure 3 is a view similar to Figure 1 but showing portions of the casing structure broken away so that underlying parts may be shown in full lines.

Figure 4 is a view similar to Figure 3 but showing certain operating parts in a different position.

Figure 5 is a transverse sectional view taken substantially along the line 5—5 of Figure 3.

Figure 6 is a sectional view taken substantially along the line 6—6 of Figure 5.

Figure 7 is a view similar to Figure 2 but with the chute and portions of the casing removed to disclose parts that are hidden from view in Figure 2.

Figures 3 and 9 are views which are similar to Figure 2 and serve, in conjunction with the latter figure, to illustrate the action of the cap removing device during the uncaping operation.

Figure 10 is a perspective view of the straw delivery member.

Referring more particularly to the drawings, 5 designates a bottle cap removing device mounted beneath the lower end of a vertical guide chute 6. The latter serves to guide a drinking straw A into the neck of a bottle 7 as the bottle cap is removed by the cap removing device 5. The straw is delivered to chute 6 by a straw delivery member 8 which is supplied with straws through the dispensing opening 9 (Figure 5) of the straw dispensing container 10. The delivery member 8 is pivoted at 11 to swing from a horizontal straw receiving position X (Figure 1) to an inclined straw delivering position X' or vice versa. Swinging movement of the member 8 is effected through the agency of a toggle generally indicated at 12. During the cap removing operation an arm 13 engages the cap removing member 8 and operates the toggle 12 against the resistance of a spring 14 to swing the member 8 to the straw delivering position X'. As the cap is removed from the bottle, arm 13 moves back to its original position and spring 14 becomes effective to initiate return of the member 8 to its straw receiving position X (Figure 1).

The cap removing device 5 comprises a plate 16 provided with an integral hook 17 at its upper end. Pivots 18 project laterally from the lower end of plate 16 and are journaled in the ears 19 of suitable bracket plates 20 fastened to the base 21. Plate 16 is also provided with stop lugs 22 and cap retaining fingers 23. The lugs 22 work in the slots 24 (Figures 2, 7, 8 and 9) of the cooperating stops 25 formed integral with the bracket plates 20.

In removing the cap from the bottle 7 the latter is first arranged in the horizontal position shown in Figure 2 with the top of the cap 7a flatly engaged with the plate portion 16 of the cap removing device 5, the edge of the skirt portion of the cap being engaged beneath the cap removing hook 17 and the cap retaining fingers 23. The bottle 7a is then tilted downwardly to the position shown in Figure 8. During this movement of the bottle, cap 7a acts against hook 17 to tilt plate 16 forwardly about the axes of the pivots 18 until further forward movement of the plate is arrested by engagement of the lugs 22 with the outer closed ends of the slots 24. With the plate 16 thus held against continued forward tilting, further downward pressure on the bottle 7 results in the cap 7a being pulled off the neck of the bottle by the cap removing hook 17. As soon as this occurs, plate 16 is swung back to its original position by the pressure of the spring 27 (Figures 1, 3 and 4) acting against the arm 13. The cap 7a, being confined beneath the cap retaining fingers 22, is carried back with the plate 16 but is a sufficiently loose fit between these
fingers and the front surface of the plate to drop to the floor or into a suitable receptacle as the plate 6 strikes the base 21. The position assumed by the bottle 7 as the cap removing device 5 returns to its original position upon removal of the cap is approximately as indicated by dotted lines in Figure 9, where it will be noted that the mouth of the bottle is suitably located to receive a straw from the delivery end of the chute 6.

The toggle 12 includes a link 23 having its lower end fastened by a pivot 30 to a suitable bracket structure 31 carried by the bracket plate 28. The upper end of link 23 is pivoted at 32 to the lower end of a link 33, the upper end of which is fastened to the straw delivery member 8 by a pivot 34 suitably located between the pivot 11 and the adjacent right hand end of member 8. The spring 14 bears against the pivotally connected ends of the links 23 and 33 and normally tends to urge these links to the position shown in Figure 3. The arm 13 of the cap removing device 5 is provided with an angular extension 13c and is slightly twisted so that when plate 16 of the cap removing device is tilted to the position shown in Figures 7 and 8 the angular extension 13c is engaged against the upper edge of toggle link 29 and serves to swing the latter downwardly about the pivot 30. This movement of link 29 acts through the companion link 33 to swing the straw delivery member 8 from the straw receiving position X to the straw delivering position X'. As the member 8 reaches this position the straw A carried thereon slides downwardly so that the lower end of the straw (see Figures 1 and 4) is projected across the delivery chute 6 to underlie a bent shoulder forming portion 36 of the chute wall 37. As plate 16 of the cap removing device 5 is returned to its original position by spring 27 the angle X' becomes that shown in Figure 5 to receive a straw which is delivered thereto through the opening 9 of the container. During movement of the member 8 to the straw delivering position X' the dispensing opening 9 of the container is blocked by a follower 45 which is pivotally connected to member 8 and is held in a position to assume the position shown in Figure 5 when said member 8 is swung to the position X'. As shown to advantage in Figs. 6 and 10, the follower comprises a bar 46 having its forward end pivoted to an intermediate portion of the member 8 as indicated at 47 and its rear end bent to form a U 48 which embraces the left hand end of the member 8 when the latter is in the straw receiving position X. The weight of follower 45 helps to return member 8 from the position X' to the position X.

An angle plate 49 is preferably fastened to member 8 above the left hand portion of the shelf 60 to prevent the upper end of the straw resting on said shelf being thrown off the shelf by the momentum of the member 8 as it is snapped to its delivery position X'. As the member 8 reaches this position the straw A slides downwardly on the shelf 60 so that its lower end is positioned beneath the shoulder 36 of the chute 6. During this sliding movement of the straw the upper end passes below the angle 49 so that the latter does not interfere with the upward positioning of the straw in the chute during the subsequent return movement of the member 8.

Another purpose of the angle plate 49 is to prevent delivery of more than one straw onto the shelf 60. In the absence of this plate it is possible that, due to crowding of the straws, the straw initially delivered to member 8 may be forced upwardly by another straw which would thus be placed on shelf 60. Plate 49 prevents this by preventing upward displacement of the straw initially deposited on shelf 60. If desired, plate 49 may be formed as an integral tongue extension punched from the member 8.

In order to prevent crowding and possible jamming of the straws at the dispensing opening 9 of the container 10, I have found it best to provide a pusher plate 51 which is operated to push some of the straws away from the opening 9 during returning of the straw delivery member 8 from its straw delivery position X'. Plate 51 is rigidly suspended from the hinged cover 10a of the container 10 as indicated at 52. It is arranged to have a limited swing movement between the outer rear wall 43 of the container and an opposing inner rear wall 53. The lower portion of plate 51 projects below the lower edge of wall 53 and serves as an abutment for the straws contained in the layer immediately adjacent the bottom layer of straws resting directly on the sloping bottom wall 10b of the container 10.

An arm 54 projecting from one end of plate 51 is engaged in a fork 55 provided at the upper end of an intermediate pivoted lever 56. Lever 55 is pivoted to a suitable bracket 57 as indicated at 58 (Fig. 1) and is provided, at its lower end, with a second fork 55 embracing the arm 13 of the cap removing plate 16. When the cap removing plate 16 is returned from the position shown in Fig. 7 to the position shown in Fig. 2, the arm 13 swings to the lower end of the lever 56 to the right as viewed in Fig. 7. The upper end of the lever 56 is thus moved to the left as viewed in Fig. 7 and acts against the arm 54 to swing the plate 51 (Fig. 5) toward the wall 53. During this movement the lower portion of
4. A machine of the character described comprising a movable cap removing device, a drinking straw guide chute located above said device so that a straw placed therein will pass into a bottle after the cap is removed therefrom by said cap removing device, a pivoted straw delivering member, means for supplying straws to said member and means for operating said member so that a straw carried thereby is deposited in said chute to occupy an upright position therein, said last mentioned means being operated by and in timed relation to the cap removing means so that the straw will be deposited in the chute to enter the bottle at the termination of the cap removing operation.

5. A machine of the character described comprising a movable cap removing device, a drinking straw guide chute located above said device, means for supplying straws to said chute comprising a straw delivery member mounted to swing about a horizontal axis, a toggle connected between said member and a fixed point, a spring acting against said toggle to normally position said member in a straw receiving position and an arm on the cap removing device adapted to act against said toggle to swing said member to a straw delivering position in response to movement of the cap removing device during the operation of removing the cap from the bottle, said straw delivering device serving to deliver a straw carried thereby into said chute so that the straw will pass from the chute into the bottle at the termination of the cap removing operation.

6. A machine as set forth in the character described comprising a movable cap removing device, a drinking straw guide chute located above said device, means for supplying straws to said chute comprising a straw delivery member mounted to swing about a horizontal axis, a toggle connected between said member and a fixed point, a spring acting against said toggle to normally position said member in a straw receiving position and an arm on the cap removing device adapted to act against said toggle to swing said member to a straw delivering position in response to movement of the cap removing device during the operation of removing the cap from the bottle, said straw delivering device serving to deliver a straw carried thereby into said chute so that the straw will pass from the chute into the bottle at the termination of the cap removing operation.

7. A machine as set forth in claim 2 including means preventing the straw leaving the chute before the lower end of the straw enters the bottle.

8. A machine as set forth in claim 3 including means for preventing jamming of straws at the dispensing opening of the container.

9. A machine as set forth in claim 4 including means for preventing jamming of straws at the dispensing opening of the container.

10. A machine as set forth in claim 5 including means for preventing jamming of straws at the dispensing opening of the container.

11. A machine as set forth in claim 6 including means for preventing jamming of straws at the dispensing opening of the container.

12. A machine as set forth in claim 7 including means for preventing jamming of straws at the dispensing opening of the container.