United States Patent [19]

Hull et al.

[11] **3,757,929**

[45] **Sept. 11, 1973**

[54] **BOTTLE CARRIER**

[75] Inventors: **Henry E. Hull; Herbert C. Abrams; Charles A. Cummings,** all of Columbus, Ohio

[73] Assignee: **Liberty Glass Company,** Sapulpa, Okla.

[22] Filed: **Sept. 27, 1971**

[21] Appl. No.: **183,997**

[52] **U.S. Cl.** **198/179**

[51] **Int. Cl.** **B65g 15/00**

[58] **Field of Search** ..... 198/179, 131; 294/86 A, 86 R

[56] **References Cited**

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FOREIGN PATENTS OR APPLICATIONS

615,105 2/1961 Italy ..... 294/86 A

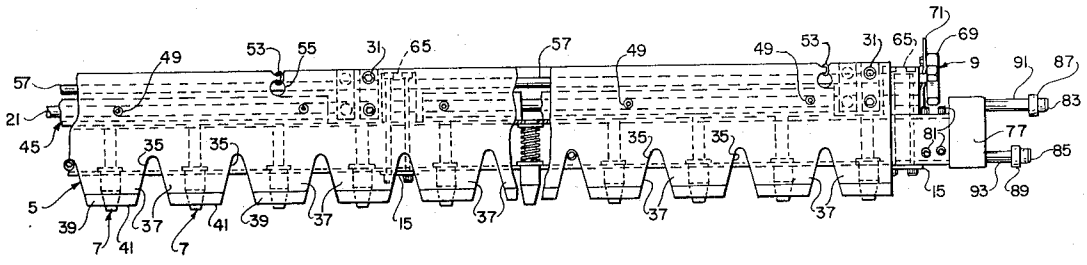
Primary Examiner—Richard E. Aegerter

Attorney—Koenig, Senniger, Powers & Leavitt

[57] **ABSTRACT**

A bottle carrier comprising an elongate support adapted to be conveyed by conveyor means in a direction at right angles to its length, having means for clamping a plurality of bottles at their moutns with the bottles spaced at intervals along the length of the support and suspended at their mouths from the support, the clamping means being formed to clamp the bottles on the outside thereof immediately below the "finish" at the bottle mouths, a plurality of spring-loaded bottle mouth centers carried by the support for entry in the mouths of the bottles gripped by the clamping means to center the bottles relative to the clamping means, and means operable from one end of the support for effecting opening and closing of the clamping means.

16 Claims, 9 Drawing Figures



3 Sheets-Sheet 1

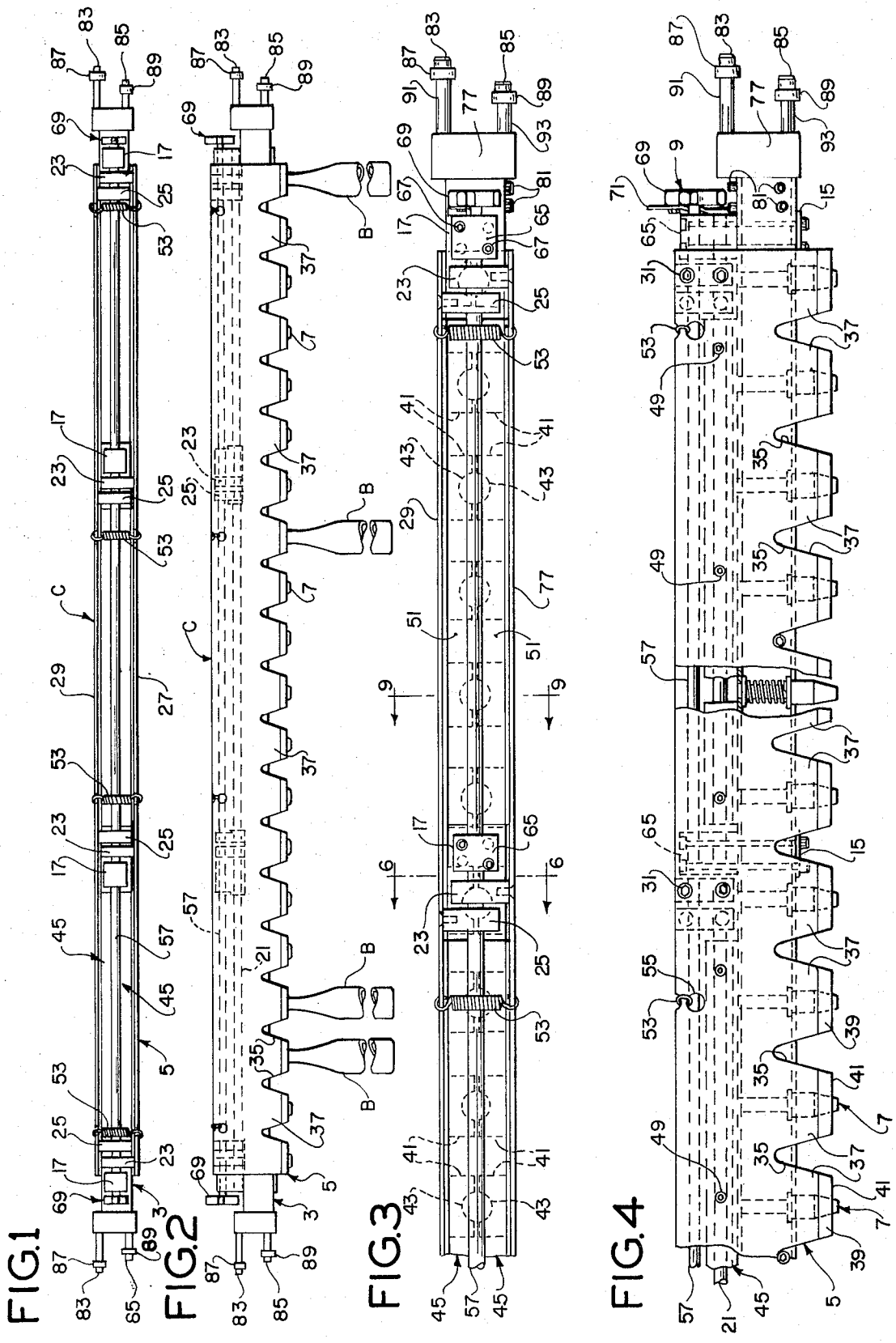


FIG. 6

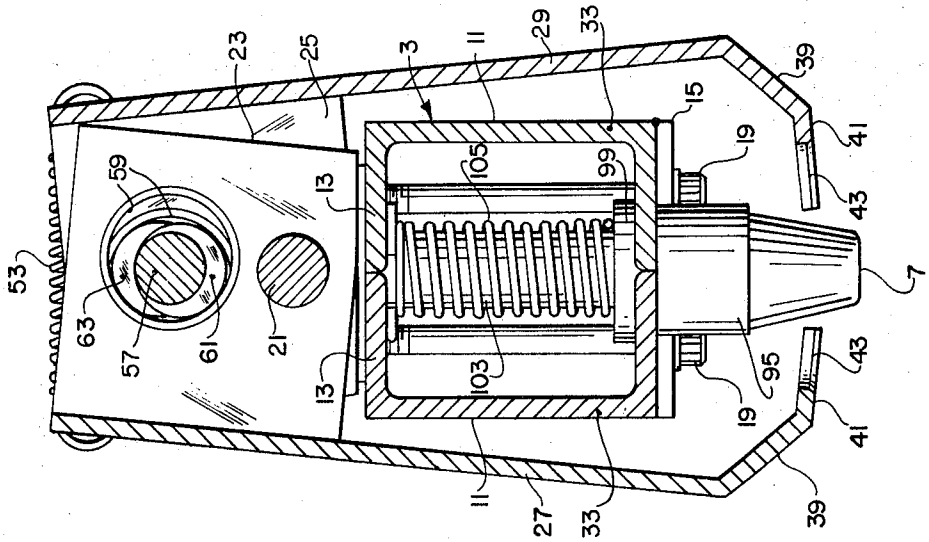

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FIG. 5

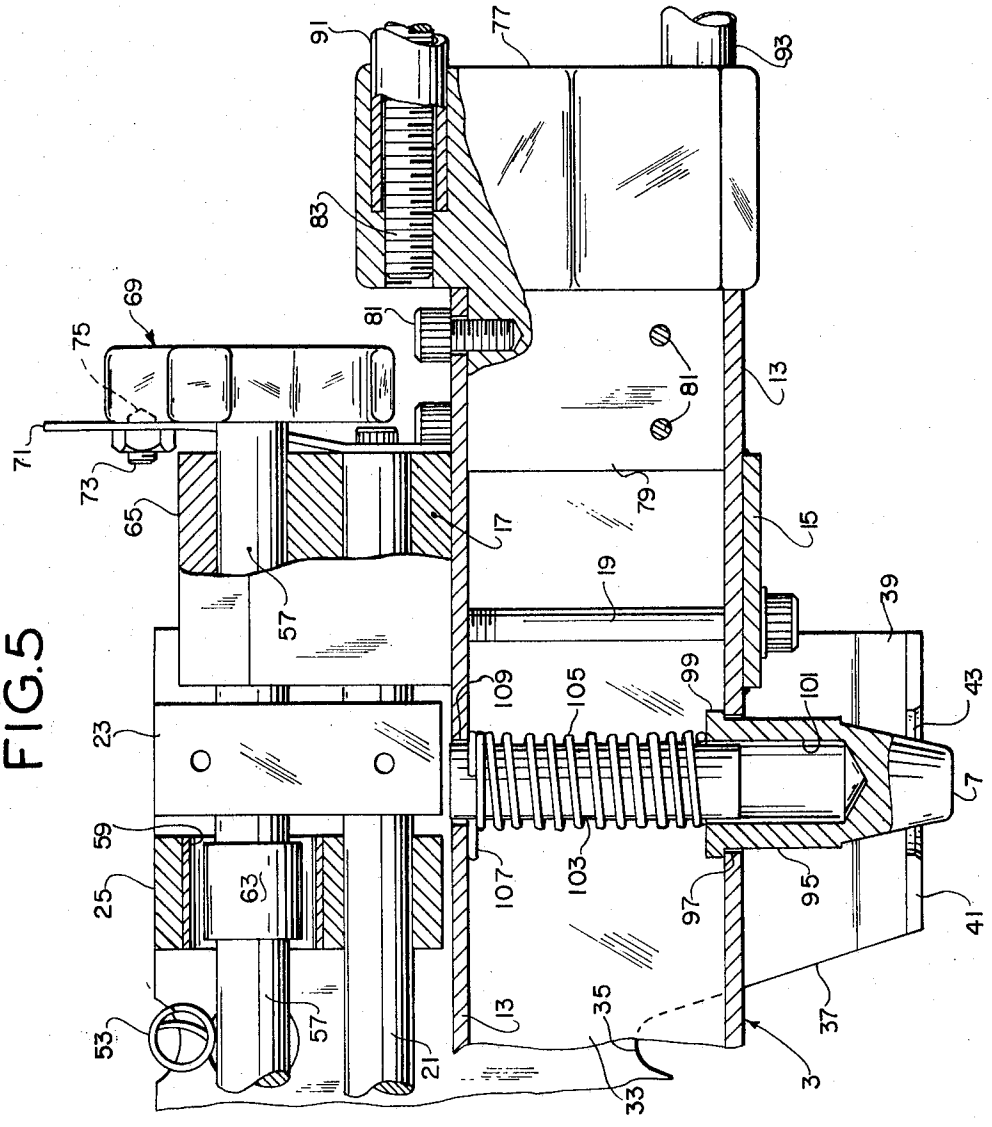

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FIG. 9

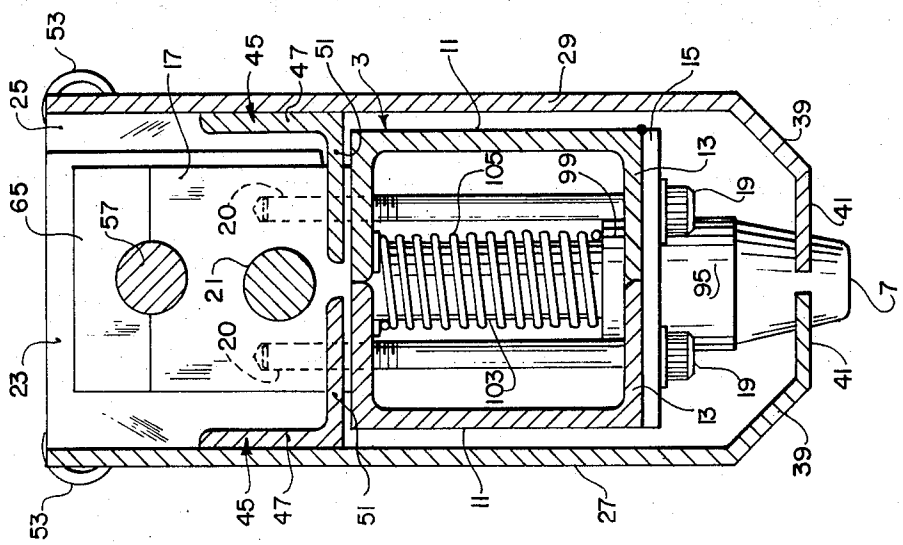


FIG. 8

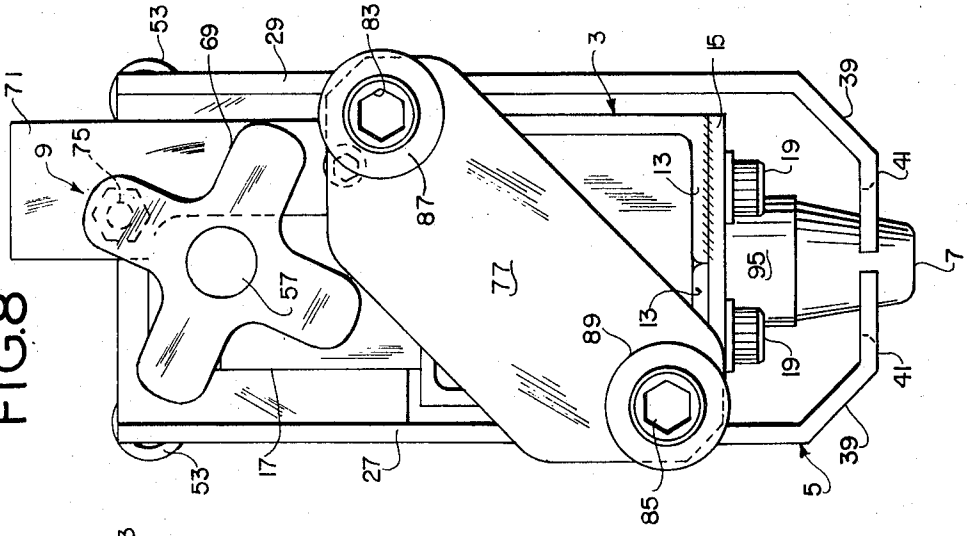
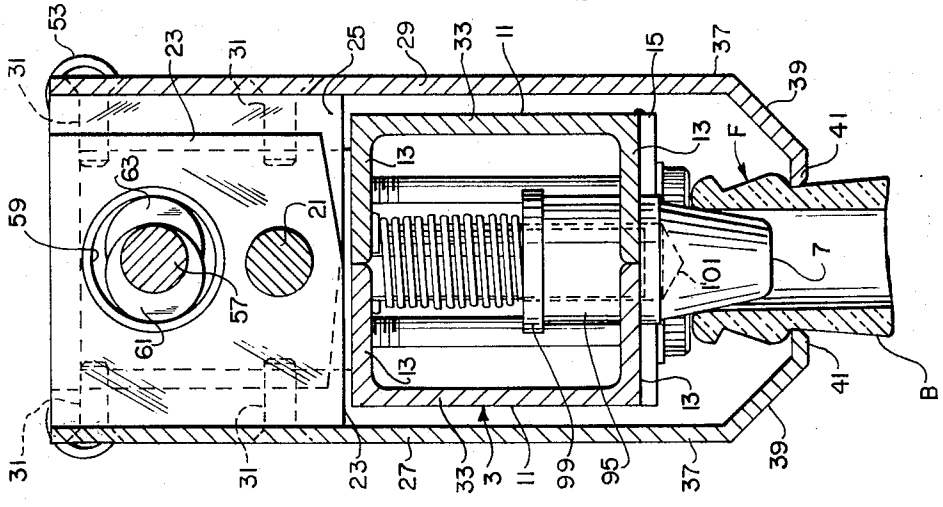


FIG. 7



BOTTLE CARRIER

CROSS-REFERENCE TO RELATED APPLICATION

The bottle carrier of this invention is particularly adapted for use to transport bottles in the bottle processing system disclosed and claimed in the copending coassigned U.S. patent application of Robert C. Russell and Richard W. Entler, Ser. No. 188,157, filed Oct. 24, 1971 entitled Bottle Coating.

BACKGROUND OF THE INVENTION

This invention relates to a bottle carriers, and more particularly to a bottle carrier for transporting a plurality of bottles, such as soft drink bottles, through processing operations on the bottles.

Reference may be made to the above-noted copending U.S. patent application Ser. No. 188,157, for a particular use of bottle carriers of this invention in effecting dip coating of bottles, and it will be understood that the bottle carriers may be used in various other operations where bottles are to be transported.

Reference may also be made to U.S. Pats. Nos. 2,981,639 and 3,069,035 in the field of this invention.

SUMMARY OF THE INVENTION

Among the several objects of this invention may be noted the provision of an improved bottle carrier adapted to carry a plurality of bottles side-by-side for transport in an upright orientation; the provision of such a bottle carrier adapted to grasp the bottles on the outside below the "finish" (the usual outwardly extending annular rim formation on the outside of the bottle at its mouth) with a sufficiently firm grasp for processing of the bottles, and with allowance for dimensional tolerances of the bottles (as molded); the provision of such a bottle carrier adapted to grasp bottles with crown, screw top or pilferproof finishes, without any requirement for manual change-over to handle these different finishes; the provision of such a bottle carrier which permits controllable tilting of the bottles carried thereby, as for prevention of entrapment of air in concave bottoms on bottles on immersion of the bottles in a dip coating bath, and for controllably forming a tear of excess coating material (the tear to be subsequently removed) on withdrawal of the bottles from the bath; and the provision of such a bottle carrier as to which bottle grasping and release actions may be effected while the bottles are in motion (at relatively slow speed).

In general, a bottle carrier of this invention comprises an elongate support adapted to be conveyed by conveyor means in a direction at right angles to its length, said carrier having means for clamping a plurality of bottles at their mouths with the bottles spaced at intervals along the length of the support and suspended at their mouths from the support, said clamping means being formed to clamp the bottles on the outside of their necks immediately below the finish at the bottle mouths, bottle mouth centers carried by the support for entry in the mouths of bottles to be gripped by the clamping means, and means for opening and closing said clamping means.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan of a bottle carrier of this invention, showing its complete length;

FIG. 2 is a side elevation of FIG. 1;

FIG. 3 is an enlarged view of the righthand half of FIG. 1;

FIG. 4 is an enlarged view of the righthand half of FIG. 2, with parts broken away and shown in section;

FIG. 5 is an enlarged fragment of FIG. 4 with parts broken away and shown in section;

FIG. 6 is an enlarged section on line 6—6 of FIG. 3, showing certain bottle clamping plates open;

FIG. 7 is a view similar to FIG. 6 showing the plates closed and gripping a bottle;

FIG. 8 is an end elevation of the carrier on the same scale as FIGS. 6 and 7; and

FIG. 9 is an enlarged section on line 9—9 of FIG. 3.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, a bottle carrier of this invention, designated in its entirety by the reference character C, is shown to comprise an elongate support generally designated 3 which is adapted to be conveyed by suitable conveyor means in a direction at right angles to its length, as more particularly shown in the aforesaid copending U.S. patent application Ser. No. 188,157. This support carries means generally designated 5 for clamping a plurality of bottles B at their mouths with the bottles spaced at intervals along the length of the support and suspended at their mouths from the support. Clamping means 5 is formed to clamp the bottles on the outside thereof immediately below the finish F (see FIG. 7) at the bottle mouths. Support 3 also carries a plurality of spring-loaded bottle mouth centers 7 for entry in the mouths of the bottles to center them relative to the clamping means. It further carries means indicated generally at 9 operable from one end of the support for effecting opening and closing of the clamping means.

The elongate support 3, as illustrated, is in the form of a box beam, made up of two channel-section members each designated 11 assembled open side to open side with the edges of their flanges 13 abutting one another, held in such assembly by means of tie plates 15 on the bottom thereof and blocks 17 on the top thereof, with cap screws 19 extending through holes in the tie plates 15 and flanges 13 and threaded in tapped holes 20 which extend up in the blocks from their bottoms. As shown there are four sets of tie plates 15, blocks 17 and screws 19, two of these being located adjacent the ends of the support or beam 3 and the remaining two at approximately the third points of the length of the beam 3.

A pivot shaft 21 extends parallel to and above the beam 3 throughout substantially the full length of the latter, mounted at its ends in the end blocks 17 and mounted approximately at the third points of its length in the intermediate blocks 17. Pivoted on this shaft and extending laterally there-from in one direction (up as viewed in FIG. 3 and toward the right as viewed in FIGS. 6 and 7) are four cam follower blocks or lugs each designated 23, two of these being located immediately on the inside of the end blocks 17 and the remaining two being located immediately on the inside of the intermediate blocks 17. Pivoted on shaft 21 and extending laterally therefrom in the opposite direction (down as viewed in FIG. 3 and toward the left as

viewed in FIGS. 6 and 7) are four more cam follower blocks or lugs each designated 25, two of these being located immediately inward of the end blocks 23 and the remaining two being located immediately on the inside of the intermediate blocks 23. The clamping means 5 comprises a pair of elongate clamp plates or jam members 27 and 29 (which may be made of sheet metal) extending substantially the full length of the support or beam 3 on opposite sides thereof, plate 27 being secured to the end faces (the left-hand faces as viewed in FIGS. 6 and 7) of lugs 23 as by screws 31, and plate 29 being similarly secured to the end faces of lugs 25. The plates 27 and 29 are spaced outwardly of the sides of the beam 3, i.e., outwardly of the webs 33 of the channel-section members 11, to permit pivoting thereof about the axis of shaft 21. Each of the plates 27 and 29 extends down from the lugs 23 and 25 on the respective side of the beam 3 below the bottom of the beam, and each has a series of notches 35 each of inverted V-shape extending up from its bottom to a point above the bottom of beam 3 dividing the lower margin of the plate into a series of individual spaced clamping jaws each designated 37. These jaws are resilient by reason of having been formed by the notching out at 35 of the sheet metal plates 27 and 29. Each of the jaws is bent to have an inwardly and downwardly inclined lower side section 39, and an inwardly directed lip 41 at its lower end at right angles to the plate proper having a generally semicircular notch or recess 43 at its inner end for receiving the neck of a bottle. Each of plates 27 and 29 is internally braced by angle-section members 45 located above the beam 3, each member 45 having a vertical leg 47 secured as by screws 49 to the inside of the respective plate, and an inwardly extending horizontal leg 51.

As shown, there are 19 notches 35 in each of plates 27 and 29, so that there are twenty pairs of the resilient clamping jaws 37. The plates 27 and 29 are biased by coil tension springs 53 connected between the upper margins of the plates via holes 55 in the plates to swing all 20 pairs of jaws 37 open, i.e., to swing the tops of the plates 27 and 29 toward one another and to swing the jaws on the two plates away from one another. When open, the lips 41 of the jaws of each pair are spaced so that the carrier C may be lowered to position each pair of jaws on opposite sides of twenty bottles standing in a row.

The opening and closing means 9 comprises a camshaft 57 extending above and parallel to pivot shaft 21 journalled for rotation at its ends in the end and intermediate blocks 17. This camshaft extends through circular bushed openings 59 of larger diameter than the camshaft in the lugs 23 and 25. The camshaft has a cam constituted by an eccentric 61 in the opening 59 in each lug 23 and a cam constituted by an eccentric 63 in the opening 59 in each lug 25, these eccentrics 61 and 63 being 180° out of phase. The maximum radius of each eccentric generally equals the radius of the opening 59 in which it rotates, the arrangement being such that the cams or eccentrics 61 and 63 are rotatable with the shaft 57 between a jaw-opening position as shown in FIG. 6 wherein the eccentrics are generally in a vertical position permitting the upper ends of plates 27 and 29 to be swung inward toward one another by the springs 53, and a jaw-closing position as shown in FIG. 7 wherein the eccentrics are in a generally horizontal position spreading apart the upper ends of the plates 27 and 29 against the return bias of springs 53 so that the jaws 37 are swung toward one another and hence closed.

The camshaft 57 is held in the bearing blocks 17 by bearing caps 65 secured on these blocks by screws 67 and extends at its ends beyond the end blocks 17. A four-armed star wheel 69 is secured on each end of the camshaft, these wheels being cooperable with means such as pins or rods (not shown) of a conveyor system which may be used for transporting the bottle carrier C for rotating the camshaft in one direction and the other for closing and opening the jaws 37. Each star wheel is detained in a jaw-closing position by a spring detent such as indicated by 71 having a nose 73 receivable in a recess 75 in one of the arms of the wheel.

Extending diagonally across each end of the beam 3 is an end head 77. Each of these is secured to its respective end of the beam by having an insert 79 received in the end of the beam and held therein as by screws 81. Arms constituted by screws 83 and 85 of unequal length are threaded in each head 77 adjacent its ends and extend outwardly from the head parallel to the longitudinal axis of the beam. These arms or screws have bearings or rollers 87 and 89 held thereon adjacent their outer ends between the heads of the screws and the outer ends of tubular spacers 91 and 93 on the screws. It will be observed that the two rollers 87 and 89 at each end of the beam are staggered vertically and transversely with respect to the beam; they are also staggered endwise of the beam, roller 89 being an inboard and roller 87 being an outboard roller. The screws with the spacers and rollers thereon constitute means for mounting the beam at its ends on suitable tracks or the like for translation of the beam in a direction at right angles to its length, the rollers providing for such translational movement by rolling of the beam on the tracks with low friction. The screws with the spacers therein are engageable by suitable pushers (as on an endless chain conveyor) to push the beam along the tracks, and the tracks may be formed to rock the beam about an axis parallel to its longitudinal axis for tilting the bottles. The screws are preferably of unequal length as shown to avoid interference between the rollers in a compact conveyor arrangement wherein tilting to a relatively high degree is required.

As shown, there are twenty spring-loaded bottle centers 7, one for each pair of jaws 37, each center being located between the two jaws of the respective pair. Each center 7 is of frustoconical shape, tapering down from a cylindric plunger 95 vertically slidable in a hole 97 formed in the bottom of the box beam 3 (i.e., formed in the flanges 13 of the channels 11 which form the beam). The plunger 95 has a rim 99 at its upper end, and a bore 101 receiving a rod 103 which extends down from the top of the box beam. The plunger 95 with the conical center 7 thereon is vertically slidable on the rod 103, and is biased downward by a spring 105 to a lower limiting position determined by engagement of rim 99 with the bottom of the box beam 3 around the hole 97. Spring 105 is a coil compression spring surrounding the rod 103 with its lower end engaging the upper end of the plunger 95 and its upper end engaging a cotter pin 107 in the rod and holding the upper end of the rod in a hole 109 in the top of the box beam. Each conical center 7 is adapted to enter the mouth of a bottle (when the respective jaws are open) to center the bottle relative to the jaws.

In the use of the bottle carrier C, with the camshaft 57 turned to position the eccentrics 61 and 63 in their generally vertical jaw-opening position of FIG. 6 (springs 53 pulling the upper portions of plates 27 and 29 together to open all the jaws 37), the carrier may be lowered down onto a row of 20 bottles to enter the bottle mouth centers 7 in the bottle mouths and to bring the lips 41 below the finish at the bottle mouths. The centers 7 yield upward relative to the beam 3 during this procedure. Then the camshaft is turned (generally 90° in one direction or the other) to rotate the eccentrics 61 and 63 to their generally horizontal jaw-closing position of FIG. 7 to spread apart the upper portions of the plates 27 and 29 and move together the lower portions of the plates constituting the jaws 37 thereby closing each of the twenty pairs of jaws on a respective bottle. In closing, the lips 41 of the jaws engage the outside of the neck of the bottle immediately below the finish F and, in conjunction with the bottle mouth center 7, firmly grip the bottle so that it is in effect rigid with the bottle carrier. In this regard, each bottle mouth center 7 functions to create a restraining moment to prevent tipping of the bottle in which it is entered relative to the carrier. Also, each bottle mouth center, being spring loaded, adapts to different bottle mouth internal diameters. Variation in dimension of the bottle necks is readily accommodated by yielding of the jaws 37 themselves, these being resilient, as above noted, by reason of having been formed by the notching out at 35 of the sheet metal plates 27 and 29. The bottle carrier C may be transported as above described, with tilting if desired, and subsequently the jaws are opened by rotating the camshaft 57 to bring the eccentrics 61 and 63 back to their FIG. 9 jaw-opening position for disengagement of the bottle carrier from the bottles.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A bottle carrier comprising an elongate support adapted to be conveyed by conveyor means in a direction at right angles to its length, said carrier having means for clamping a plurality of bottles at their mouths with the bottles spaced at intervals along the length of the support and suspended at their mouths from the support, said clamping means comprising a pair of elongate jaw members extending lengthwise of said elongate support from adjacent one end thereof to adjacent its other end, said jaw members being formed to clamp the bottles on the outside of their necks immediately below the finish at the bottle mouths, bottle mouth centers carried by the support for entry in the mouths of bottles to be gripped by said jaw members, and means for opening and closing said jaw members.

2. A bottle carrier as set forth in claim 1 wherein said opening and closing means is operable from one or the other ends of the support.

3. A bottle carrier as set forth in claim 1 having means for yieldably mounting the bottle mouth centers relative to the support.

4. A bottle carrier as set forth in claim 1 having means at the ends of the support for rolling thereof on a track.

5. A bottle carrier as set forth in claim 4 wherein said rolling means comprises an inboard and an outboard roller at each end of the track.

6. A bottle carrier as set forth in claim 1 wherein each elongate jaw member has a series of individual jaws spaced at intervals along its length extending downwardly therefrom, each jaw on one of the jaw members being paired with a jaw on the other jaw member for clamping a bottle therebetween.

7. A bottle carrier as set forth in claim 6 wherein said jaws are resilient for resiliently clamping the bottles.

8. A bottle carrier comprising an elongate support adapted to be conveyed by conveyor means in a direction at right angles to its length, said carrier having means for clamping a plurality of bottles at their mouths with the bottles spaced at intervals along the length of the support and suspended at their mouths from the support, said clamping means being formed to clamp the bottles on the outside of their necks immediately below the finish at the bottle mouths and including a pair of plates extending lengthwise of the support on opposite sides thereof and extending down below the support, said carrier having means for pivoting the plates for swinging movement on an axis extending lengthwise of the support, said plates being formed at their lower margins into a plurality of pairs of jaws for gripping the bottles, bottle mouth centers carried by the support for entry into the mouths of bottles to be gripped by the clamping means, and means for opening and closing said clamping means.

9. A bottle carrier as set forth in claim 8 wherein each plate has a series of notches extending up from its bottom dividing the lower margin of the plate into a series of said jaws spaced at intervals along the length of the plate, each jaw having an inwardly directed lip at its lower end provided with a bottle-neck-receiving recess at its inner end.

10. A bottle carrier as set forth in claim 9 wherein said plates are made of sheet metal, said jaws thereby being resilient.

11. A bottle carrier as set forth in claim 8 wherein said opening and closing means comprises spring means biasing the plates toward a jaw-open position, and a camshaft extending lengthwise of the support having cam means thereon for moving the plates to close the jaws against the bias of said spring means.

12. A bottle carrier as set forth in claim 11 wherein said support comprises a beam, said pivoting means for the plates comprises a pivot shaft extending lengthwise of the beam above the beam, said plates being secured to lugs pivoted on said pivot shaft, said cam-shaft extending lengthwise of the beam above the pivot shaft and said lugs having openings receiving the cam-shaft, said camshaft having cams in said openings for effecting opening and closing of the jaws.

13. A bottle carrier as set forth in claim 12 wherein said camshaft has means at least at one end thereof for rotating it.

14. A bottle carrier as set forth in claim 11 having a pair of arms extending out at each end of the beam carrying rollers for rolling of the beam on a track.

15. A bottle carrier as set forth in claim 14 wherein said arms are staggered vertically and transversely with respect to the beam, and are of unequal length.

16. A bottle carrier as set forth in claim 11 wherein said beam is a box beam, and said bottle mouth centers are vertically slidable in the bottom of said box beam and biased downward by springs within the box beam.

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