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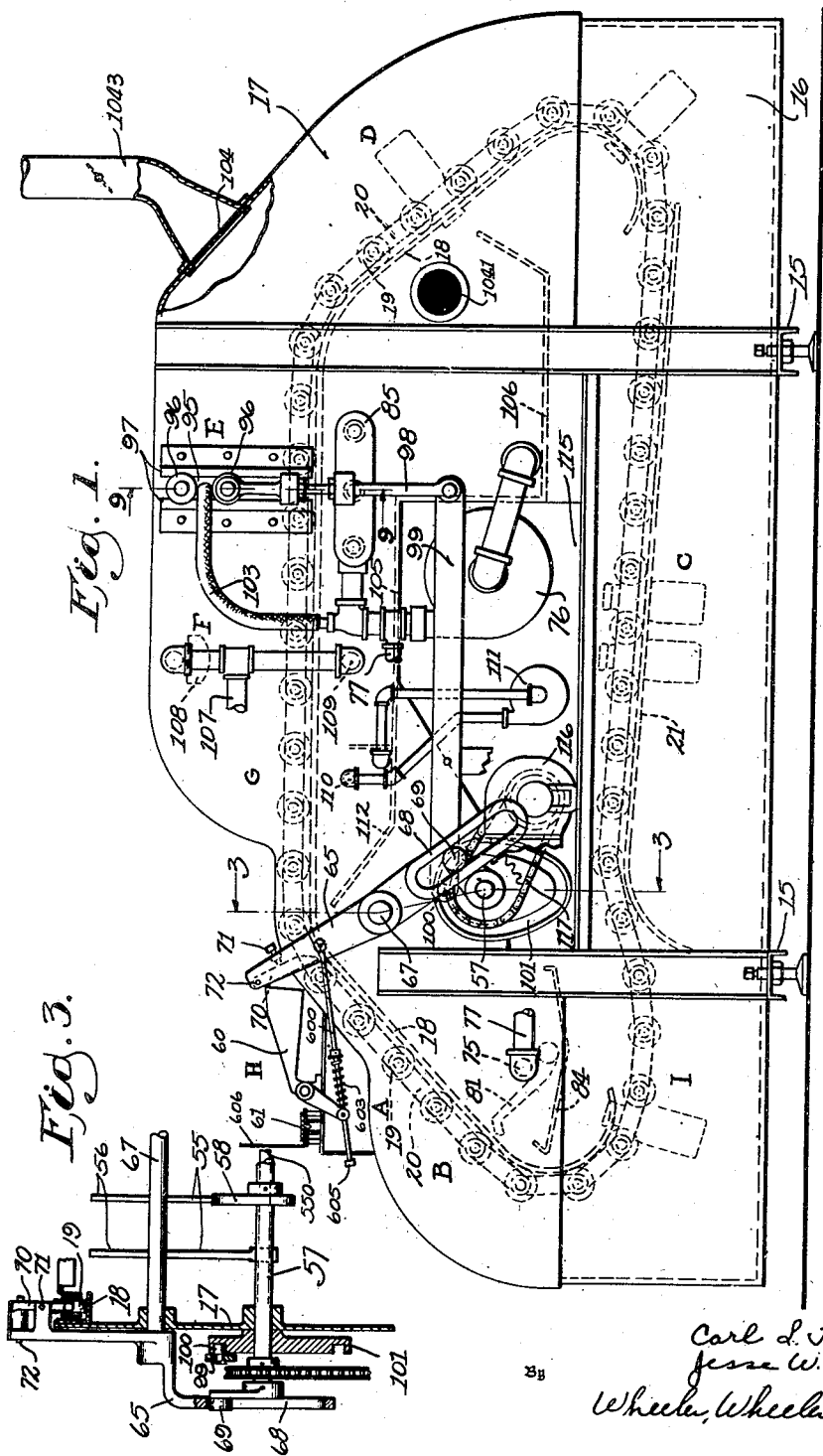
C. L. TRIER ET AL

2,367,652

BOTTLE WASHING MACHINERY

Filed May 6, 1937

4 Sheets-Sheet 1



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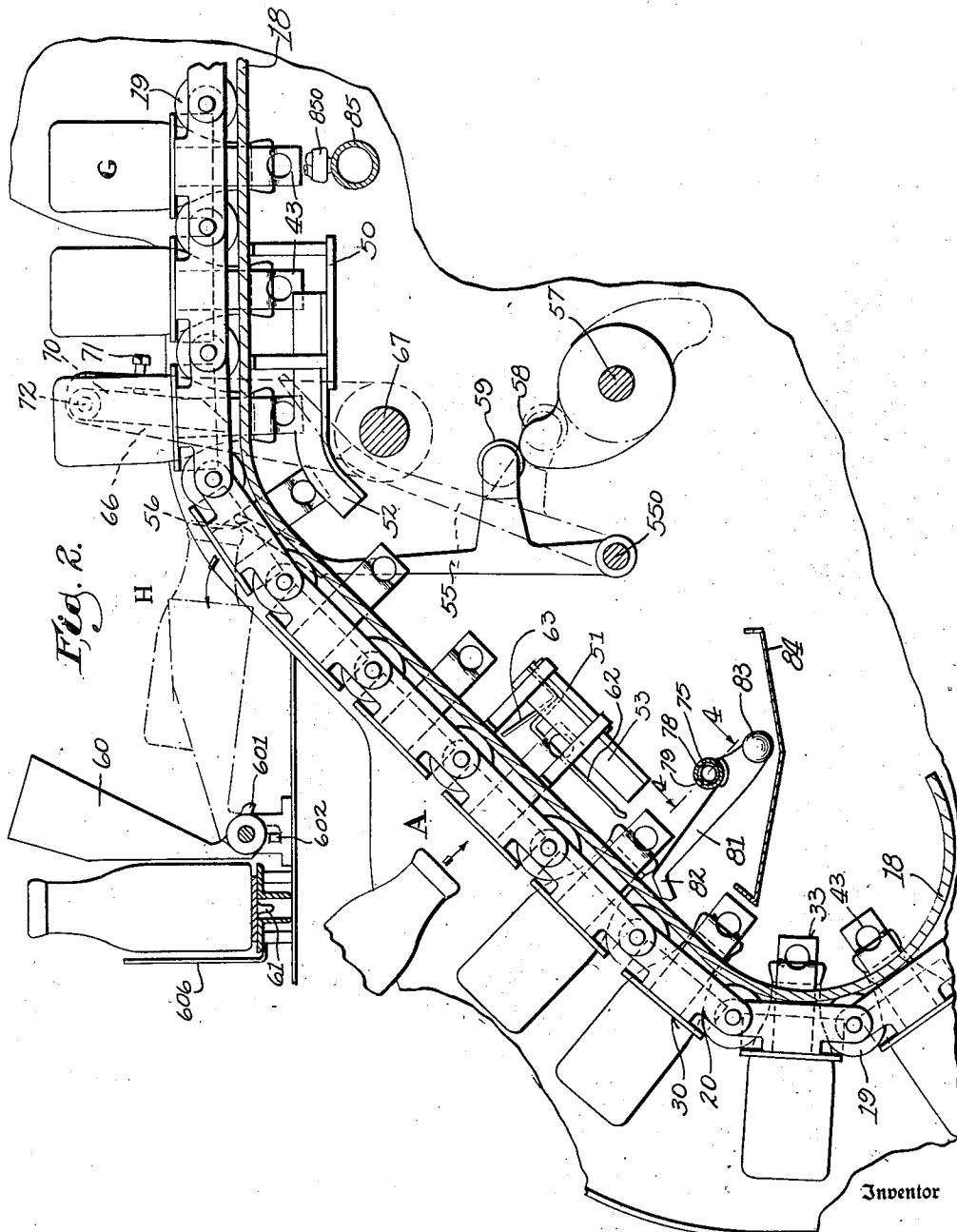
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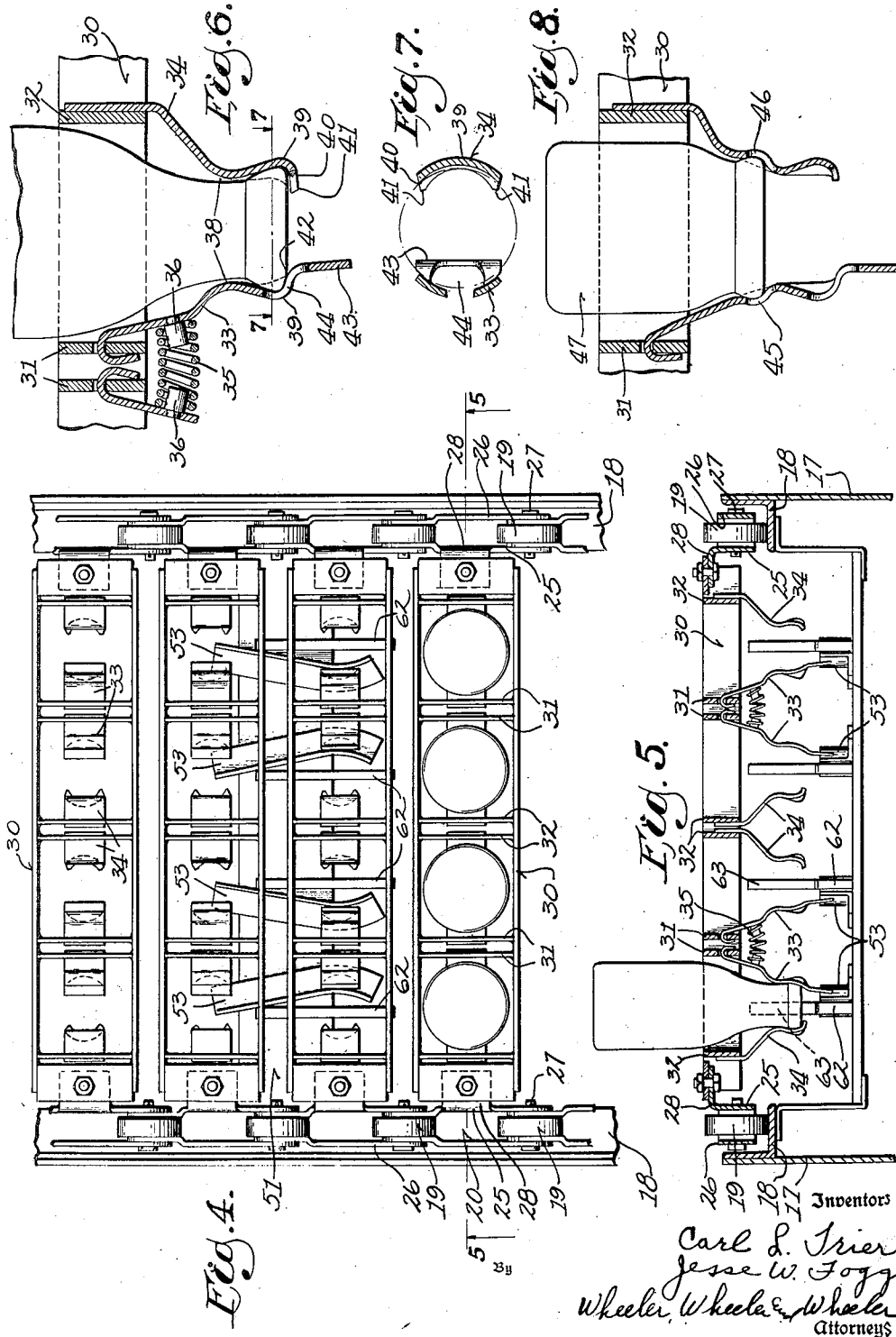
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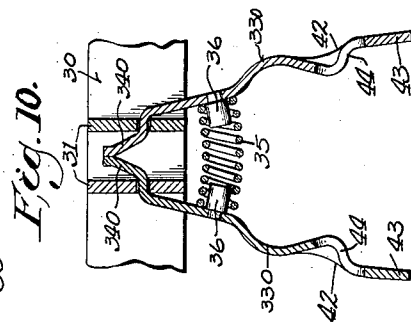
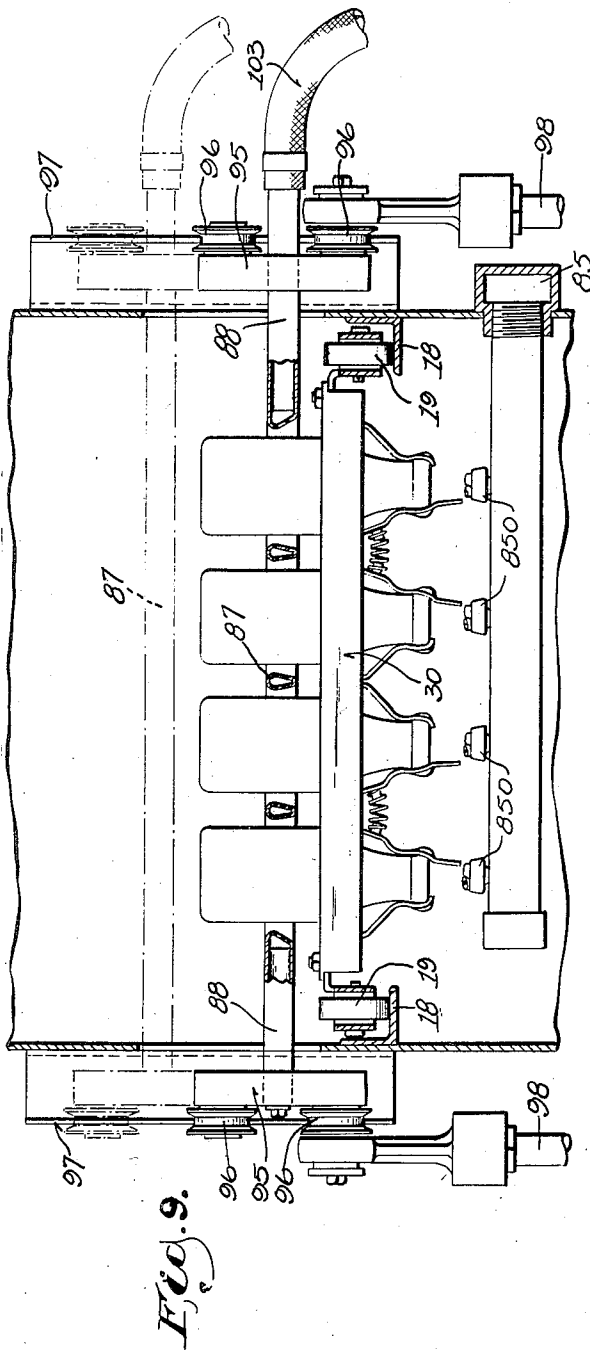
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,367,652

BOTTLE WASHING MACHINERY

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Application May 6, 1937, Serial No. 141,084

15 Claims. (Cl. 198—131)

This invention relates to improvements in bottle washing machinery. More particularly the present invention relates to novel improvements in mechanisms for supporting bottles while being conveyed or carried through the bottle washing machine, and to the combination of the improved bottle pockets or supports with the associated mechanisms for their satisfactory operation, and to the novel improvements in said associated mechanisms.

The aspects of the invention which relate particularly to the automatic bottle discharge mechanism, to the arrangements for tempering bottles intermediate individual washing operations, and to the improved washing or spraying apparatus are fully disclosed and set forth in our divisional applications entitled Bottle washer discharge apparatus, Bottle tempering apparatus for bottle washers and Washing apparatus for bottle washers, respectively, each of which was filed on April 25, 1940.

In the conventional bottle washer of the type disclosed in the present invention, including an intermittently movable conveyor provided with transversely extending rows of bottle supports mounted on transversely extending frames, the construction normally is such as not to permit the ready removal of individual pocket supporting frames from the conveyor. The bottle supports or gripping elements used in the conventional conveyor for a bottle washer are usually not readily removable from the frames upon which they are supported or, if not supported from frames, from the conveyor.

Such ready removability of either the frames or the bottle pocket or bottle gripping mechanisms as such is a desirable feature in that it permits the ready replacement of individual elements as such replacement becomes necessary. Neither are the bottle gripping elements of the conventional type of bottle washing machines as contemplated by this invention so constructed as to grip the bottle only at spaced points about the bottle bead to thereby rigidly hold the bottle in predetermined relative position with respect to the bottle support and conveyor and yet expose substantially all of the bottle surface to the effect of the washing mechanism of the bottle washer.

It is, therefore, the prime object of the present invention to provide novel and improved bottle holders or gripping mechanisms for a bottle washer for firmly gripping and positively releasing bottles or other containers to be washed while

affording maximum access of the washing and rinsing water to all surfaces of the bottles or containers while being carried through the bottle washer.

5 A further object of the present invention is to provide novel improved mechanism operatively associated with the improved bottle gripping apparatus to assure the positive gripping and releasing of bottles or containers by the improved gripping apparatus.

10 Other objects and important features of the present invention will become more apparent to those skilled in the art upon the examination of the details of construction and operation of the improvements in bottle washing machinery, as illustrated in the drawings and as clearly described in the specification and pointed out in the appended claims, reference being made to the accompanying drawings in which:

20 Figure 1 is a view showing our improved bottle washer largely in side elevation and partially in section.

Figure 2 is an enlarged detail view showing the loading and discharge portion of the conveyor and its associated parts fragmentarily in side elevation.

25 Figure 3 is a fragmentary detail view in section taken on the line 3—3 of Figure 1.

Figure 4 is a fragmentary detail view looking at a portion of the conveyor at the loading zone.

30 Figure 5 is a detail view in transverse section taken on the line 5—5 of Figure 4.

Figure 6 is an enlarged detail view in cross section through one of the bottle holding devices of the conveyor carriage.

35 Figure 7 is a detail view taken in section on the line 7—7 of Figure 6.

Figure 8 is a view similar to Figure 6 showing a modified embodiment of the invention.

40 Figure 9 is a detail view in vertical transverse section at the line 9—9 in Figure 1.

Figure 10 is a detail view in section showing a modified set of spring supported bottle engaging jaws.

45 Like parts are identified by the same reference characters throughout the several views.

The frame members 15 support a soaking tank 16 upon which is erected the top portion 17 of the casing of the machine.

50 At the opposite sides of the casing we provide generally symmetrically arranged guides or tracks 18 which may be made of angle iron as shown, for example, in Fig. 9, to support the rollers 19 of the conveyor 20. The lower flight of the con-

veyor is supported on similar guides or trackways 21 as indicated in Fig. 1. The bottom flight of the conveyor moves from left to right as viewed in Fig. 1, and the whole arrangement represents a more or less conventional type of machine which is adapted to receive the bottles at a loading station A in a substantially inverted position (Fig. 1 and Fig. 2), to carry them downwardly past a rinsing station B (Fig. 1 and Fig. 2), through a soaking zone in tank 16 as indicated at C, and thence upwardly in a partially inverted position for draining as shown at D to the washing stations E, rinsing station F, and the chlorinating station G, to the unloading station H.

The nature of the preferred type of chain conveyor which carries the bottles from one station to another through the machine is best shown in Figs. 2, 4 and 9. There is a chain at each side of the machine and each chain comprises inner links 25 and outer links 26 spaced by the rollers 19 which turn upon the pins 27 that pivotally connect the respective links (see Fig. 4).

Each of the inner links 25 is formed to provide a bracket arm 28 projecting centrally. The carrier frames 30 bridge the spaces between the respective chains and are mounted at their opposite ends upon the bracket arms 28 as clearly appears in Figs. 4 and 5.

Each of the bottle carrier frames 30 is subdivided by means of webs 31 and 32 upon which respectively the relatively movable and fixed bottle engaging supports 33 and 34 are mounted. The cross webs 31 are apertured as best shown in Fig. 6, and the supports or arms 33 have hooked terminal portions engaged in the apertures and thereby pivoted for relative movement to the extent permitted by the abutment of their ends with the webs 31 as shown in Fig. 5 and Fig. 6. Substantial compression springs 35 are interposed between each pair of relatively movable bottle supports 33 and positioned by the spring guides 36 which are riveted to the supports. These springs tend to hold the respective bottle engaging elements 33 in bottle engaging positions while permitting the forcible retraction of the supporting elements 33 by means of cams hereinafter to be described. It is an advantage to have separate springs instead of merely making the arms of resilient material.

The spring pressed arms are limited as to movement by their hinge constructions so that the springs cannot be lost.

The arms 34 are fixed to the webs 32 by welding or otherwise. While they have a certain degree of resilience they will tend to be substantially rigid, thereby accurately determining the position of each bottle for alignment with the nozzles hereinafter to be described. Each of the arms 33 and 34 comprising a bottle engaging pair is curved inwardly at 38 to approach the neck of the bottle behind the bead. The bottle neck is not contacted by these arms, however. Below the point 38 each of the arms is reversely curved outwardly as at 39 to extend around the bead portion of the bottle. The side margins of each arm are fitted to the bead portion of the bottle to engage it with a finger-like grip action at spaced points, the arm being curved in transverse cross section so that its central portion clears the bead of the bottle, leaving almost the entire bead fully exposed. Immediately below this outward bend the arm 34 terminates at 40, its lower corner margins being formed inwardly at 41 to act as stops limiting the downward movement of the bottle

during the insertion thereof, but out of contact with the pouring lip of the bottle when the clamping arms are released for bottle engagement. The arm 33 has similar marginal portions at 42 for engaging the bead of a bottle at spaced points, but arm 33 continues below the bottle to provide a cam follower 43 at its lower end. Water can find access to the pouring lip and bead of the bottle between the apices 41 of the terminal portion 40 of arm 34 and through a special opening at 44 which is provided adjacent the bead engaging portion of arm 33.

The illustrated construction of these arms is not only adapted to receive a conventional bottle as shown in broken lines in Fig. 6, but will also receive with equal facility special forms of bottles such as bottles having a crown finish beyond the wash ring or bead. In either case the bead of the bottle is tightly engaged at four spaced points by the margins of the clamping arms, and neither the pouring lip nor any other portion of the bottle is touched by any element of the clamp. This leaves all portions of the pouring lip and the rest of the bottle fully exposed for the washing operation, although the bottle is rigidly supported.

If desired, the arms may be given an extra convolution at 45 and 46 respectively, as shown in Fig. 8, to support a cheese jar 47 or the like. These extra convolutions do not in any way interfere with the normal use of the arms for supporting bottles, the other contours of the arms shown in Fig. 8 being identical with those already described.

The particular conformation of the clamping arms as above described not merely supports the bottles rigidly, and not merely exposes almost the entire surface of each bottle to the cleansing jets, but there is the additional advantage that the bottles are centered over the jets and there is a minimum of metallic contact of the clamping surfaces with the bottle, the quick heating and cooling of the bottle being thereby promoted.

In the construction shown in Fig. 6 the movement of the jaws under pressure of spring 35 is limited, in the absence of the bottles, by engagement of the hinged ends of the jaws with the cross members 31 of the carrier frame. This arrangement is entirely satisfactory from the standpoint of the operation of the device, but where it is expedient to remove or replace the jaws from time to time, some structure such as that shown in Fig. 10 may be preferred.

In this organization the structure of the carrier frame is unaltered. The spring 35 and its abutments or guides 36 are likewise the same. The individual spring pressed jaws 330, however, have been altered by bending their hinged ends upwardly instead of downwardly as at 340. The arrangement is such that they contact each other to limit the separation of their free ends under compression of the spring. With this type of moving clamp support it is possible for the operator to release either jaw by manipulating the pair of jaws as far as they can be pushed to one side or the other, and then withdrawing the upwardly formed end 340 of the jaw on that side through the aperture in frame element 31. Of course the withdrawal of one jaw will leave the spring and the other jaw free so that they can readily be taken out also.

The strength of the springs 35 is such that the movable supporting elements 33 are preferably mechanically retracted prior to the discharge of the bottle and prior to the insertion of another bottle in the given support. Mechanical retrac-

tion enables us to use strong springs for accurate bottle positioning without chipping the bottle by using it to press the supporting element 33 aside. In order to accomplish such retraction we preferably provide two sets of retracting cams both of which appear in side elevation in Fig. 2, and one of which appears in plan and end elevation in Figs. 4 and 5 respectively. While the cams differ in extent and form, their principle of operation is identical.

Prior to the unloading station H we provide a bridge plate 50 which spans the rails 18 in the same manner in which the bridge plate 51 extends across beneath the conveyor at the loading station A. On the bridge plate 50 we mount pairs of cam elements 52 which are opposed in the same manner as the cam elements 53 which are mounted on the bridge 51 at the loading station. In each instance the arrangement is such that as the conveyor advances, the free end portions 43 of the sets of retractable bottle supporting elements 33 are engaged by the opposed cams and moved toward each other in opposition to the compression of the interposed springs 35. As a result, the relatively movable bottle engaging elements are retracted from the relatively fixed bottle engaging elements, leaving sufficient clearance so that the bead portion of the bottle may be freely inserted or removed.

When this happens, as each successive carrier is approaching station H, the bottle will be left loose within the frame. Beneath each opening there is a lever 55 having a bottle ejecting terminal portion 56 which is normally retracted in the dotted line position of the lever shown in Fig. 2. As the cam shaft 57 revolves, its cam 58 will engage the cam follower roller 59 carried by one of the levers 55, with the result that, at the proper time, the rock shaft 550 will be oscillated and each lever will be lifted to the full line position shown in Fig. 2, thereby ejecting the bottles out of their respective openings on to the receiver 60 which is thereupon erected by means of the link 600 from the position shown in Fig. 1 to the position shown in Fig. 2. The bottle receiving position shown in Fig. 1 may conveniently be defined by any suitable stop such as the lug 601 on the bottle receiver and the complementary lug 602 on the supporting bracket (as shown in Fig. 2). The compression spring 603 (Fig. 1) absorbs any excess movement of the actuating rod 600 after the stops 601 and 602 are engaged.

The position of the head 605 on the actuating link or rod 600 will determine the upright position of the bottle receiver 60. In this latter position the bottles are delivered on to a cross conveyor 61 by means of which they may be removed. The guard 606 holds the bottles upright on the cross conveyor at the time of delivery thereto.

As each carrier leaves the unloading station H the termination of the cam elements 52 will allow the movable jaws 33 of the bottle supports to close temporarily, only to be re-opened as the carriers approach the loading station A by the engagement of the surfaces 43 with the fixed cam elements 53. At station A the bottles are inserted into the conveyor holders either mechanically or by hand, the means of insertion being unimportant to the present invention.

It is, however, important to note that we provide at the loading station temporary supports for the individual bottles to ensure that each bottle will be maintained temporarily at the prop-

er height to be accurately engaged by the clamping portions of the supporting elements 33 and 34. For this purpose we mount upon the bridge plate 51 beneath the path of each bottle opening a supporting spring 62 and an anti-tilting spring 63, as best shown in Figs. 2, 4 and 5. The supporting springs 62 receive resiliently the impact of the incoming bottles and assure the support of the bottles with their bead portions in line with the bead receiving curves 39 of the clamping elements 33 and 34 of the carrier. Since the bottle will be inclined when inserted into the carrier at station A, it is desirable to employ the anti-tilting springs 63 which tend to maintain the bottle temporarily at right angles to the carrier. As the carrier leaves station A in the course of the conveyor movement, the cam will release the movable supporting elements 33 of the bottle engaging clamp and these elements will clampingly co-operate with the fixed elements 34 to retain the bead portions of the bottle so that each bottle will be rigidly supported in the position illustrated in broken lines in Fig. 6 throughout its traverse of the machine.

The conveyor is preferably given a step by step movement, each step being equivalent to the distance from center to center of consecutive carrier elements. By locating the chain propelling means immediately adjacent station H we keep all slack out of the chain throughout that flight which passes the washing jets, thus assuring accurate registration of the several carriers with the successive jets during each dwell of the conveyor. We prefer to use the conveyor advancing means which includes levers 65 and 66 pivoted on a rock shaft 67 at opposite sides of the machine, the lever 65 having a slotted extension 68 engaged by the crank 69 which is mounted on shaft 57. The levers 65 and 66 respectively are each provided with dogs 70 adjustably limited as to movement in one direction by means of the set screws 71, and free to move pivotally in the opposite direction about the fulcrum pins 72 whereby they are connected with their respective levers.

Each of the dogs 70 is in the plane of the rollers 19. When the levers oscillate in a clockwise direction as viewed in Fig. 1 and Fig. 2, the dogs swing to the left and upwardly to ride over the rollers, dropping by gravity behind each roller. During the counterclockwise oscillation of the levers 65 on shaft 67, each dog will engage the adjacent roller and will simultaneously engage its adjustable stop 71 so that the rollers will be propelled by the counterclockwise movement of the arms, thus advancing the entire conveyor one step. The arrangement of the conveyor guides 18 and 21 as illustrated in Fig. 1, is such that all of the slack in the conveyor chains will occur at station I in tank 16.

Throughout the progress of the conveyor through the soaking tank 16 the bottle will be right side up and will be full of the soaking liquid and will be entirely surrounded by such liquid.

As the bottle approaches station D it will gradually be inverted and drained of its contents which will return to the soaking tank, leaving the bottle empty.

At station E the bottle will, in three successive advances, stop in registration with washing jets delivered from the pipes shown in dotted lines in Fig. 1 and supplied by a header 85 connected with pump 76.

The water discharged by the washing jets supplied by pump 76 is returned by tray 105 to the

sump 106 from which leads the intake of pump 76.

Since some of the water taken from the sump 106 is delivered by pump 76 to the pre-rinse jet 75 as already described, it is necessary to replace this water. This is done by means of a supply line 107 leading from any desired external source to the overhead shower spray 108 and the rinsing spray 109.

Before the cleaned and rinsed bottle leaves the machine it is treated at station G by a chlorinated jet from pipe 110 which is supplied from a special pump 111 circulating the sterilizing liquid from the sump 112 in which such liquid collects. Thence the bottles proceed to the point of discharge and are ejected by lever 55 as already described, to make room for the insertion of other bottles.

It will be noted that there is an opening at 115 transversely through the center of the casing. Within this opening the pumps 76 and 111 and the speed reducer 116 (from which shaft 57 is driven by chain 117) are all accessible.

The organization of the machine is exceptionally compact, all of the mechanism being selected with a view to its accommodation in an unusually small amount of space, considering the capacity of the apparatus.

In accordance with the foregoing description applicants have provided an improved bottle gripping mechanism for an automatic bottle washer in which each of the bottles, as it is being carried through the bottle washer, is individually gripped at spaced points about the bottle head, thereby exposing substantially all of the entire surface of the bottle to the effect of the washing water and rinsing sprays. By virtue of this minimum contact of the surface of the bottle by the metal gripping fingers of the bottle supports, a minimum amount of cooling water or heating water is required to effect a temperature change of the bottle.

By positively gripping the bottle and maintaining it in predetermined relative position with respect to the gripping mechanism which supports each respective bottle, it is possible to so arrange the various washing and rinsing mechanisms as to secure the desired alinement between these washing or rinsing mechanisms and the bottle to be washed during the various periods of dwell of the intermittently moving conveyor. The novel construction of the bottle pockets and the manner of supporting them on the transversely extending frames of the bottle conveyor provide an organization of parts in which various elements of the supporting pockets can be easily removed or inserted into the supporting frames of the conveyor to facilitate the ready, rapid repair of the washer in case it becomes necessary.

The invention has been described in its preferred embodiment, as disclosed in the various drawings. However, the novel principles thereof can well be applied in various modifications of the specific apparatus disclosed. The invention is, therefore, not to be restricted except in so far as is necessitated by the prior art and the spirit of the appended claims.

We claim:

1. In a bottle washer, the combination with laterally spaced conveyor elements, of a frame connected at its ends with said elements and having side bars and intervening partitions forming at least one opening, jaw members connected with partitions at opposite sides of the opening and being relatively movable in a direction trans-

verse with respect to the movement of said conveyor elements, said jaw members having bottle-engaging portions spaced from the frame formed to fit a bottle adjacent the mouth thereof, spring means urging one of said jaw members toward the other with sufficient force to enable said jaw members to comprise the sole support for a bottle in said opening to maintain said bottle normally out of contact with said frame and partitions, and means disposed in the path of movement of said spring-pressed jaw member for acting on the spring-pressed jaw member in opposition to the spring, whereby to separate the bottle-engaging portions of said jaw members.

2. In a bottle washing machine having discharging and loading stations, the combination with a conveyor operable between said stations and provided with a series of bottle receiving openings, and jaws associated with each of the respective openings and relatively movable for clamping engagement upon bottles positioned in the respective openings, means for actuating the conveyor, means for maintaining said jaws normally in bottle-engaging positions, means in the path of movement of said jaws at said stations for mechanically acting upon said jaws to open said jaws for the release of a bottle to be discharged and the reception of another bottle to be loaded on said conveyor, and means disposed in the path of advance of said jaws at said stations for supporting bottles in predetermined jaw-engaging positions.

3. In a bottle washing machine, the combination with a conveyor including a series of unitary frames providing bottle receiving openings, of relatively fixed jaw members carried by said frames in association with the respective openings, relatively movable jaw members carried by said frames in association with the respective openings, individual springs acting on each of the relatively movable jaw members in directions to urge them individually and independently of other movable jaw members toward the respective complementary fixed jaw members for mechanically retaining bottles in the respective openings, the relatively movable jaw members having cam operable portions, and cam means disposed at a predetermined station in the path of conveyor advance for acting on the cam operable means of the movable jaw members in a direction to retract said members to bottle releasing positions, each of said movable and complementary fixed jaw members being so constructed and arranged as to form a pocket-like construction, the walls of which aid in guiding the bottles to be clamped into proper clamping positions.

4. In a device of the character described, the combination with spaced conveyor elements, of a series of carrier frames connected at their ends with the respective elements and each providing a number of work receiving openings, fixed jaw members connected with the respective carrier frames adjacent each opening and having work engaging portions, movable jaw members connected with said frames adjacent the respective openings and having work engaging portions respectively opposed to the corresponding portions of the fixed jaw members, the movable jaw members of two adjacent openings being disposed back to back and movable in opposite directions transversely of the path of conveyor movement, a spring interposed between said last mentioned members for urging said members toward their

respective fixed jaw members into clamping engagement with work disposed in the respective openings, and cam means disposed in the path of conveyor advance for retracting the movable jaw members toward each other to work releasing positions.

5. In a bottle handling conveyor, a carrier frame comprising side bars and pairs of partitions subdividing the space between said bars into openings, movable jaw members connected with alternate pairs of partitions to move oppositely for engagement with work in adjacent openings, spring means interposed between said members for urging them in opposite directions toward work engaging positions, and other jaw members connected with remaining pairs of partitions and opposed to said spring actuated members, each of the several jaw members having its central portions spaced from the bead of a bottle for engagement with such a bead only at points peripherally spaced thereon, whereby to leave other portions of a bottle bead accessible for cleansing.

6. In a bottle handling conveyor, a carrier frame comprising side bars and pairs of partitions subdividing the space between said bars into openings, movable jaw members connected with adjacent partitions to move oppositely for engagement with work in adjacent openings, spring means interposed between said members for urging them in opposite directions toward work engaging positions, and other jaw members connected with other partitions and opposed to said spring actuated members, each of the several jaw members having its central portions spaced from the bead of a bottle for engagement with such a bead only at points peripherally spaced thereon, whereby to leave other portions of a bottle bead accessible for cleansing, said spring actuated jaw members being extended beyond their respective bead-engaging portions and apertured between said portions.

7. In a bottle washing machine, bottle-engaging jaws for supporting and rigidly positioning a bottle and formed to provide and maintain clearance between it and all portions of the surface of a bottle other than the bead, each of said jaws being concave in a manner complementary to the outer periphery of the bead of the bottle to be engaged thereby for clamping engagement about the bottle bead at points axially spaced from the bottle mouth, said concavity of the bead-engaging portion of the jaws also being such as to afford contact with the bead only at peripherally spaced points thereon while elsewhere affording and maintaining clearance therefrom.

8. A pair of jaws each in accordance with claim 7, means mounting said jaws for relative movement in opposition to each other, means urging one of said jaws toward the other, said urged jaw having a cam operable portion projecting beyond its bead-engaging portion and being apertured at its bead-engaging portion to afford access to the bead engaged thereby, and means positioned below said jaws to support a bottle in jaw-engaging position when said jaws are being moved relative to each other.

9. The combination with a conveyor including a carrier frame, of work positioning jaws carried by said frame and having work engaging portions fitted to the work to be engaged thereby, of means urging one of said jaws toward the other, cam means in the path of jaw advance for temporarily retracting said last mentioned jaw,

and means disposed adjacent the cam means for resiliently supporting work inserted between said jaws at a level such that the work will be accurately engaged by said jaws upon the release of the last mentioned jaw by the cam.

10. In a bottle washing machine, the combination with a conveyor provided with a series of carriers, of relatively fixed and relatively movable jaw members mounted on the respective carriers and provided with bottle bead-engaging portions, means urging the relatively movable jaw members toward the relatively fixed jaw members for bottle bead engagement, cam means disposed in the path of jaw movement for mechanically retracting the movable jaw members to bottle releasing positions, and a support adjacent the cam means in the path of bottle introduction at a level to sustain the mouth of a bottle in registry with the bottle-engaging portions of said jaw members to be engaged thereby upon the release of the movable jaw member by said cam means.

11. In a bottle washing machine, the combination with a conveyor provided with a series of bottle carriers, of pairs of jaws associated with the respective carriers for bottle bead engagement, each of said pairs comprising a fixed and a movable jaw, means urging the movable jaws of the respective carriers normally to bottle-engaging position, means at a predetermined station in the path of carrier advance for mechanically retracting the movable jaws from said position, and means independent of said jaws at said station for temporarily positioning bottles interposed into the respective carriers pending the engagement of said bottles by said jaws.

12. In a bottle washing machine or the like, a pair of bottle-engaging jaws having bottle bead-engaging portions, said jaws being provided with toric surfaces of lesser diameter axially and transversely than the bead of said bottle and each jaw being adapted for clamping engagement about said bottle bead at points spaced axially and transversely on the outer periphery of said bottle bead, said jaws being formed to clear a bottle at all other points and one of said jaws being extended beyond its bead engaging portion and apertured to afford access of cleansing water to portions of the bead between said points of said toric surfaces not in engagement with the bottle bead.

13. In a device of the character described, the combination with laterally spaced conveyor elements, of work carrying frames carried in alignment between said elements and providing work receiving openings, movable jaw members connected with the respective frames and relatively movable transversely with respect to the path of conveyor movement, complementary fixed jaw members carried by the frames which co-act with said relatively movable jaw members, all of said jaw members having work engaging portions spaced from said carrier frames for engagement with work in the respective openings when all of said jaws are in bottle-engaging position, springs acting on said relatively movable jaw members for the engagement thereof with the work, and separate cam devices operatively disposed in the path of advance of said movable jaws and at spaced points relative thereto for temporarily moving each of said movable jaw members away from its complementary fixed jaw member while at the work releasing position.

14. In a bottle washing machine or the like, the

combination with a conveyor including a series of frames transversely disposed to the direction of movement of the conveyor and provided with bottle receiving openings, of a bottle supporting jaw element having bottle bead-engaging portions at different levels, each separately adapted for clamping engagement with a bead of a bottle and fixed to said frame, whereby beaded bottles of different sizes may be positively engaged and rigidly held in position during the movement of said conveyor.

15. In a bottle washing machine, the combination with a carrier, of sets of bottle-engaging jaws carried thereby, said carrier including an

apertured frame element and one of said jaws of each set having a portion extending through an aperture of said frame element and releasably interlocked in pivotal connection therewith, and means including a spring for normally confining said jaw to a position adapted for free pivotal movement thereof in which it will remain in interlocking connection with said frame element, said jaw being freely disengageable from said frame element when manipulated to the extreme bottle disengaging position.

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