Feb. 21, 1933. F. W. RICKERS 1,898,393

BOTTLE HANDLING APPARATUS

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Fig. 1.

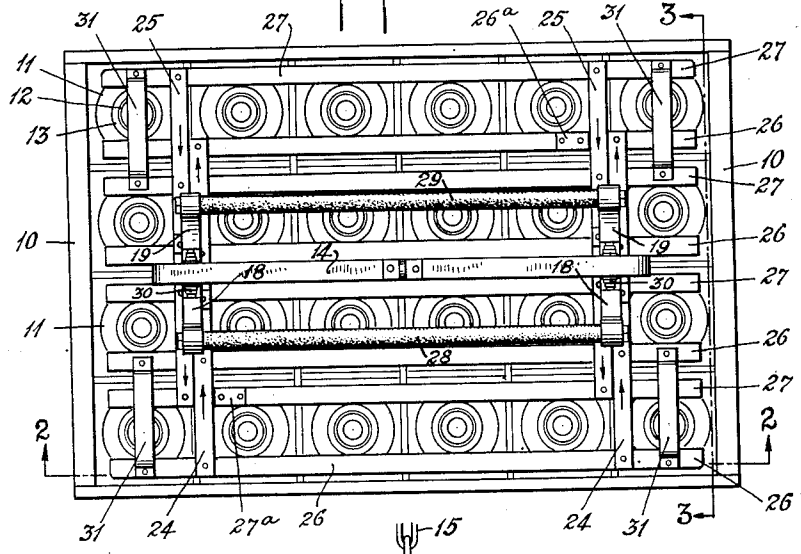
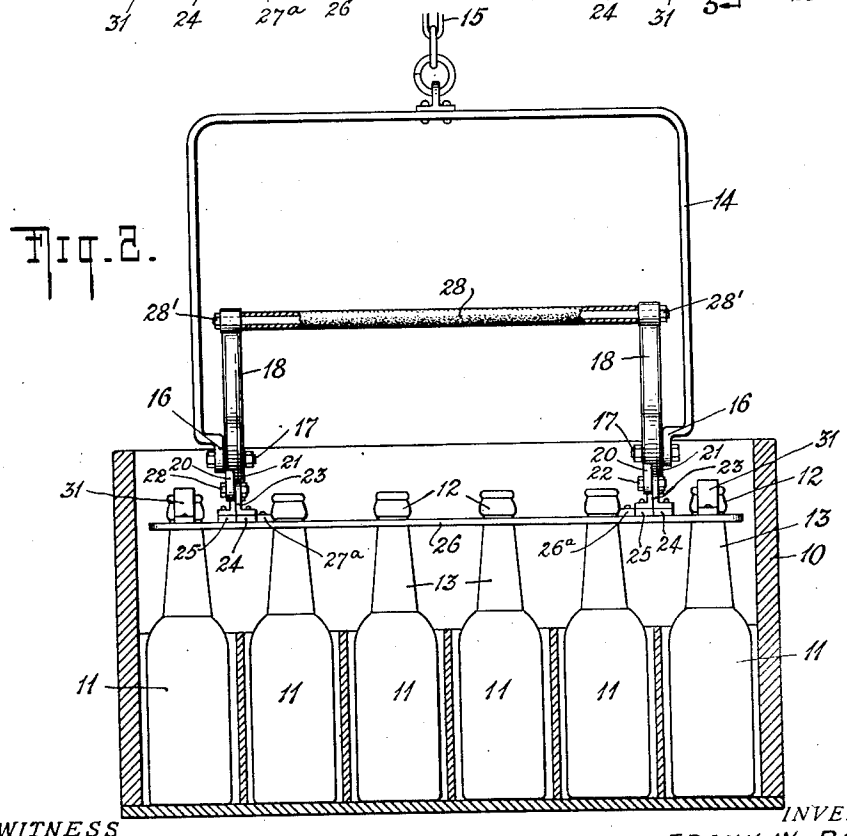


Fig. 2.



WITNESS

G. V. Rasmussen

BY

INVENTOR

FRANK W. RICKERS

Brown, Schrenk

ATTORNEYS

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BOTTLE HANDLING APPARATUS

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Fig. 3.

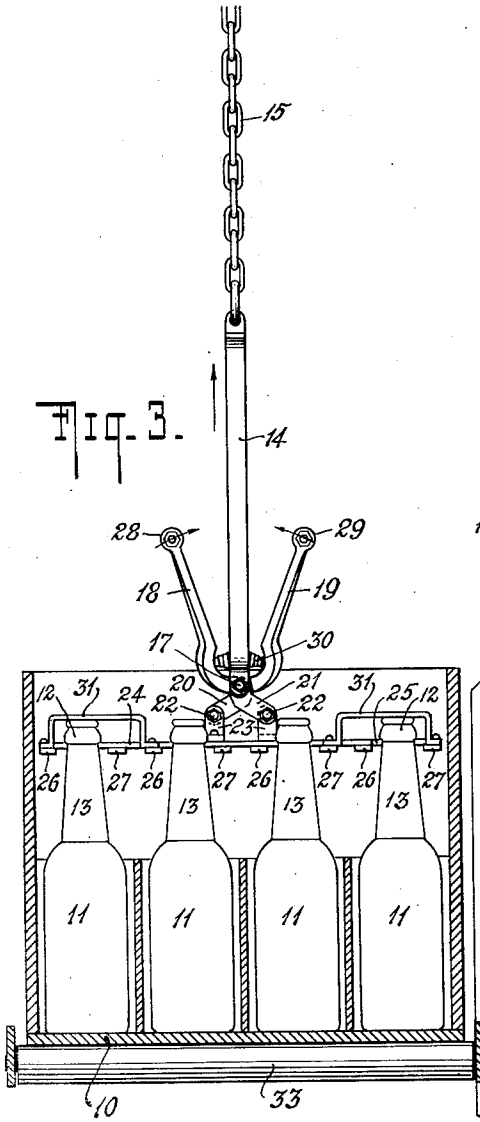
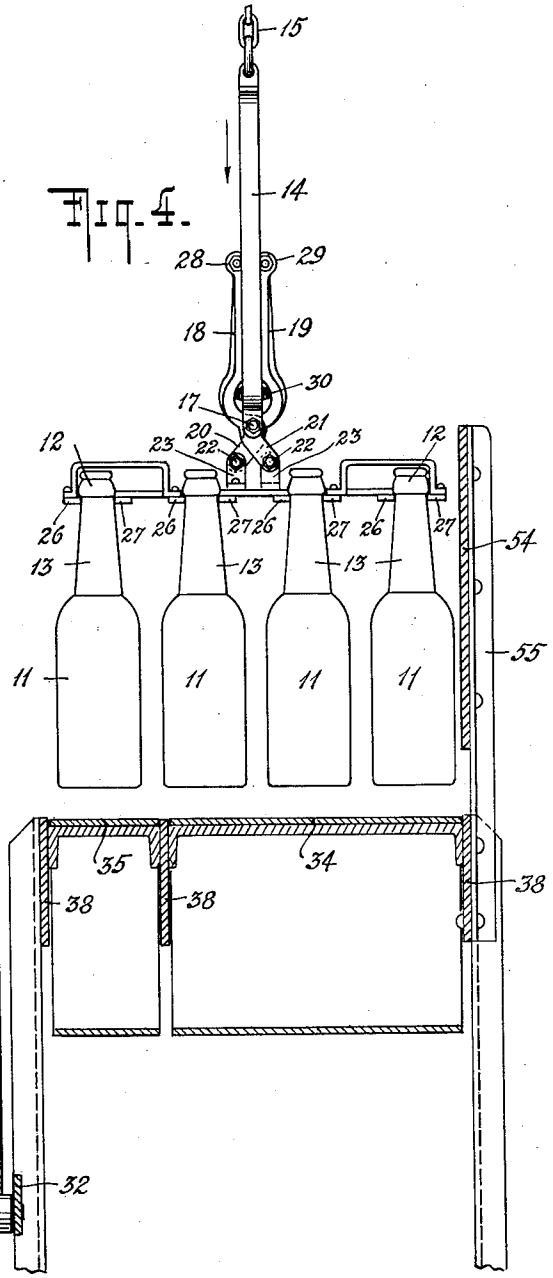


Fig. 4.



WITNESS

E. V. Rasmussen

BY

INVENTOR

FRANK W. RICKERS

Brown & Brown

ATTORNEYS

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BOTTLE HANDLING APPARATUS

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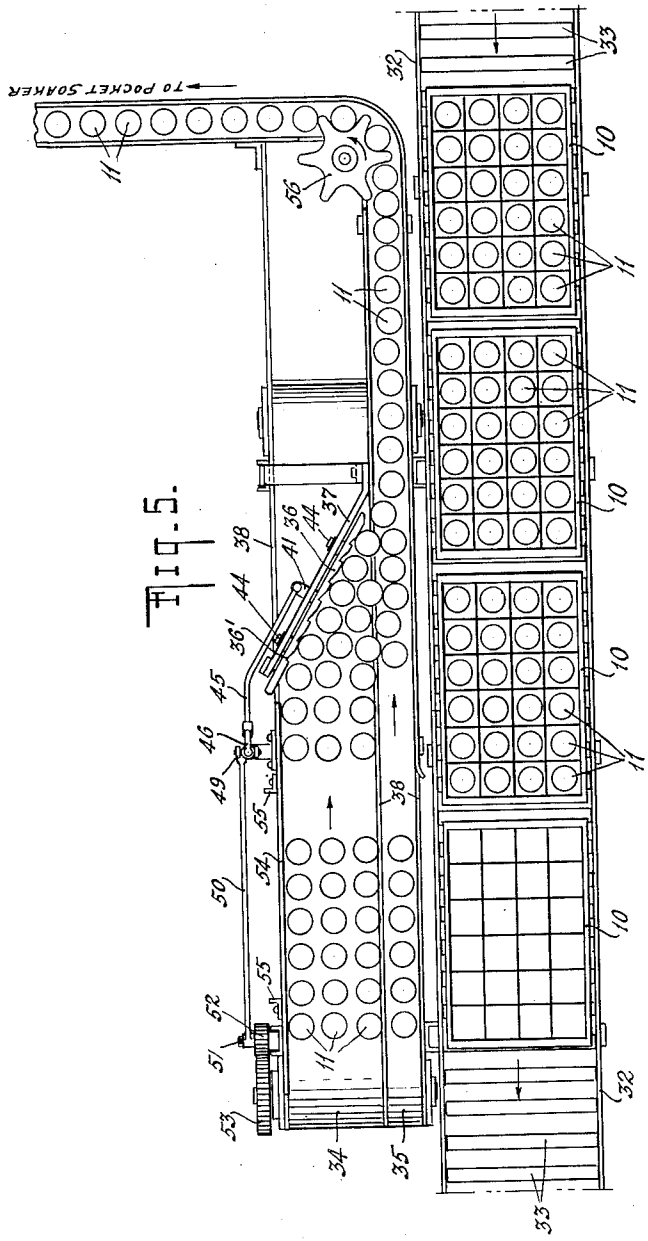


FIG. 5.

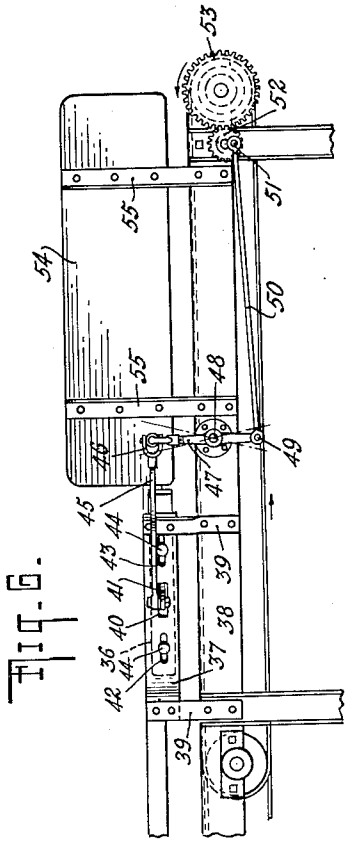


FIG. 6.

WITNESS
G. V. Rasmussen

BY

INVENTOR
FRANK W. RICKERS
Brosius, Rehrauch
ATTORNEYS

Patented Feb. 21, 1933 1,898,393

UNITED STATES PATENT OFFICE

FRANK W. RICKERS, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE F. & M. SCHAEFER BREWING CO., OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK

BOTTLE HANDLING APPARATUS

Application filed July 19, 1932. Serial No. 623,366.

My invention relates to apparatus for handling bottles and more particularly to mechanism for transferring a plurality of bottles, as exemplified for instance by the entire contents of a case of bottles such as are commonly used for containing beverages of various kinds, from a case to an apparatus whereby the empty bottles are advanced, for instance to machinery for washing the same. My invention contemplates particularly the provision of handling mechanism adapted to grasp a plurality of bottles in groups, and conveying means constructed to receive said bottles from said handling mechanism and to maintain the arrangement of bottles in at least one of said groups, and to sort the bottles of the remaining groups into arrangements corresponding to and following after the arrangement of said one of said groups.

A particular object of my invention is to provide a gripping means whereby a set, for instance of twenty four bottles, may be lifted out of the case in which the empty bottles are returned from the consumer, a single manual operation being sufficient to grasp the entire set of empty bottles, and by means of said gripping means to transfer such set of bottles to the cooperating portion of my apparatus designed to effect the feeding of the bottles in a single line in equally spaced relation to the washing apparatus. A still further object of my invention is to provide means for effectively grasping all of the empty bottles within a case at a given time. Other more specific objects will appear from the description hereinafter and the features of novelty will be pointed out in the claims.

In the accompanying drawings which illustrate an example of the invention without defining its limits, Fig. 1 is a plan view of the novel gripping means located above a conventional box or case of bottles in position to grasp the bottles therein; Fig. 2 is a sectional elevation on the line 2—2 of Fig. 1; Fig. 3 is a sectional elevation on the line 3—3 of Fig. 1; Fig. 4 is a fragmentary cross-section illustrating the conveying means adapted to receive the bottles from the gripping mechanism; Fig. 5 is a plan view of the cooperating portion of the apparatus whereby the bottles after release from the gripping mechanism are sorted and advanced in association with means whereby the cases of empty bottles are brought into position for the removal of the bottles therefrom by said gripping mechanism, and Fig. 6 is a side elevation of a portion of the mechanism shown in Fig. 5.

Referring to the drawings, 10 represents a case or box of wood, metal or any other suitable material divided into a predetermined number of compartments each adapted to accommodate a bottle 11; the illustrated example shows a customary case provided with twenty four compartments designed to accommodate a corresponding number of bottles 11. The bottles 11 are of the usual type having heads 12 located at the upper extremity of the necks 13 and of somewhat larger diameter at least at one cross-sectional portion thereof than said necks. The gripping mechanism as shown in the illustrated example is constructed and designed to grasp, by a single operation, the twenty four bottles constituting the set in the case 10 and to remove the entire set of bottles from such case 10 simultaneously. The gripping mechanism accordingly includes a bail or yoke 14 suspended from a chain 15 which in practice is provided at its other end with a counterweight (not shown). At its free ends the bail or yoke 14 is preferably bent inward to form angle sections 16 apertured to receive bolts 17 whereby cooperating levers 18 and 19 are pivotally mounted on said bail or yoke 14 to form a tong structure at opposite sides thereof. The levers 18 and 19 are provided respectively with members 20 and 21 projecting in opposite directions away from each other and pivotally connected at their free ends, by means of bolts 22, with angles 23. The latter are secured in any suitable manner, as by rivets, to strips 24 and 25 respectively lying in parallel relation to and preferably in slidable contact with each other, said strips 24 and 25 in turn being connected to gripping bars 26 and 27; the latter are located in cooperating pairs as shown in Fig. 1, it being understood that the strips 24 are connected with the gripping bars 26 of each pair, but have no connection with the bars

27, while the strips 25 are connected with the bars 27 of each pair, but have no connection with the bars 26 thereof. Blocks 26ª and 27ª are provided to prevent strips 24 and 25, and therefore the frame-works of which they form parts, from changing their relative positions in a sidewise manner. To facilitate the simultaneous actuation of each pair of tong levers 18 and 19, the cooperating levers of each pair are connected respectively by means of handles 28 and 29, fixed in place by means of bolts 28′ as shown in Fig. 2. Suitable means is provided for automatically forcing the levers 18 and 19 of each tong structure in directions away from each other to actuate correspondingly the strips 24 and 25 in a manner to force the gripping bars 26 and 27 in each cooperating pair apart, or in other words, to inoperative positions; in the illustrated example this means is shown in Fig. 3 in the form of telescopic springs 30. In the practical use of the gripping mechanism, it is desirable to limit the downward movement of the gripping mechanism relatively to the bottles so as to bring the gripping bars 26 and 27 to the most effective gripping positions; in the illustrated example this means serves to position said gripping bars 26 and 27 immediately below the heads 12 of the bottles 11. In the illustrated example the means in question constitutes a plurality of bridge elements 31 extending between and connected with adjacent gripping bars having movements in the same direction; the illustrated example shows four of these bridge elements each located in registry with the corner compartments of the case 10 and constructed to engage the heads 12 of the bottles 11 to limit thereby the downward movement of the gripping mechanism relatively to the bottles.

In addition to the parts so far described, the apparatus includes means adapted to receive the set of bottles from the gripping mechanism and to distribute and sort the groups of bottles constituting the set into a single line of evenly spaced bottles and to transfer them to another point as for instance exemplified by the pocket soaker of a bottle washing apparatus; the means in question is arranged to cooperate with the gripping mechanism in a maner to maintain at least one of the groups of bottles included in the set in the arrangement in which said group of bottles is gripped by the gripping mechanism and to sort the bottles of the remaining groups and gradually distribute them into a corresponding arrangement following after that of the group first mentioned. In the illustrated example the means further includes a runway or the like on which the cases 10 of empty bottles are moved to a position in which the gripping mechanism may become effective to remove the bottles therefrom. In the form illustrated in the drawings, the runway in question consists of parallel spaced side members 32 serving as guides to maintain the cases 10 in their intended path, and a plurality of rollers 33 journalled in said side members 32 in spaced relation and comprising the bottom of the runway as illustrated in Fig. 5. The means to which the sets of bottles are transferred from the gripping mechanism comprises conveyor belts 34 and 35 arranged in parallel contiguous relation to each other and in adjacent parallel relation to the runway 32—33. As shown in Fig. 5 the conveyor belt 34 is relatively wider than the conveyor belt 35. The belt 34 is driven at a relatively slower speed than the conveyor belt 35; in the illustrated example the conveyor belt 35 is of such dimensions and so located as to receive one group of bottles contained in the set being transferred, and to maintain the arrangement of the bottles in said group in a single line, while the conveyor belt 34 is of such dimensions and so arranged as to receive the bottles in the remaining groups comprising the set being transferred. The relative speeds of the two conveyor belts 34 and 35 are predetermined by the results which are desired; I have found in the instant case that the relative speeds of the two conveyor belts, in order to feed 120 bottles per minute, for instance to the washing apparatus, should be approximately twenty four feet per minute for the conveyor belt 34 and thirty six feet per minute for the conveyor belt 35. Any suitable mechanism may be provided for driving the conveyor belts 34 and 35 in the directions indicated by the arrows in Fig. 5 to secure this or an equivalent result. In the illustrated example the mechanism whereby the groups of bottles located on the conveyor belt 34 are sorted and transferred to the conveyor belt 35 in an arrangement corresponding to and following the arrangement of the group of bottles deposited upon the belt conveyor 35, comprises a jigger plate 36 one face of which is preferably provided with a plurality of serrations or teeth 36′, and mounted upon a backing plate 37 secured to the side board 38 of the conveyor support by means of brackets 39 as illustrated in Fig. 6. To permit the jigger plate 36 to be reciprocated in the performance of its functions, the backing plate 37 is provided with an elongated slot 40 through which extends a projection 41 secured to the rear face of said jigger plate 36 as shown in Figs. 5 and 6; the backing plate 37 is further provided with elongated slots 42 and 43 for slidably accommodating pins 44 extending from said rear face of the jigger plate 36 whereby the latter is guided in its reciprocatory movements. As shown in the drawings, the mechanism for imparting reciprocatory motion to the jigger plate 36 comprises a connecting rod 45 pivotally secured at one end to the projection 41 and provided at its other end with a universal joint 46 pivotally connected with one end of a lever 47. The latter is piv-

otally mounted at its center at 48 upon the side board 38 and has its opposite end pivotally connected at 49 with one end of a connecting rod 50, the other end of which is pivotally secured to an eccentric pin 51 of a pinion 52 journalled upon the frame of the conveyor as shown in Fig. 6. The pinion 52 meshes with a gear 53 also journalled upon said conveyor support and rotating in the direction of the arrow in Fig. 6, said gear 53 being driven by any suitable mechanism as for instance directly from the shaft of one of the conveyor belts 34 or 35. A back board 54 is mounted upon the side board 38 by brackets 55 to prevent the bottles in the groups located upon the conveyor belt 34 from being displaced from the latter in other than the intended manner.

As the bottles constituting the groups located on the conveyor belt 34 are sorted and transferred to the conveyor belt 35 into the desired arrangement, they will assume more or less irregularly spaced positions in said arrangement; in order to transfer the bottles for instance to the washing apparatus in the most efficient manner, it is desirable to have the bottles equally spaced from each other before the washing apparatus is reached. In order to effect such equal spacing of the bottles upon the conveyor belt 35 for introduction, for instance into the pocket soaker of the washing apparatus, I provide a star wheel 56 suitably mounted in operative relation to the conveyor belt 35 for rotation in the direction of the arrow in Fig. 5 by any suitable and conventional mechanism.

The operation of my novel bottle handling apparatus is as follows: A case containing a set of twenty four empty bottles arranged in four parallel rows each containing six bottles is placed upon the rollers 33 of the runway and shifted thereon to a position at which the transfer of the set of bottles from the case 10 to the conveyor belts 34 and 35 is to be effected; to expedite the operation of the apparatus, a series of successive cases 10 each containing a set of twenty four empty bottles are placed in succession upon the rollers 33 and advanced thereon consecutively to the aforesaid position at which said transfer of the bottles is to take place. After a case 10 of empty bottles has been brought to the indicated position, the operator grasps the handles 28 and 29 of the gripping mechanism and exerts a downward pull thereon sufficient to overcome the resistance of the counterweight at the end of the chain 15 or otherwise actuates said gripping mechanism to lower the latter into gripping relation to the bottles contained in the particular case occupying the position above mentioned; as previously stated, this gripping position will be determined by the engagement of the bridge elements 31 with the heads 12 of the bottles 11 contained in the set in question. When the gripping mechanism has thus been properly positioned with respect to the bottles 11 in the particular case 10, the operator exerts pressure upon the handles 28 and 29 tending to move the same toward each other to the position illustrated in Fig. 4. This movement of the handles 28 and 29 correspondingly actuates the levers 18 and 19 of the tong structures and accordingly moves the strips 24 and 25 in opposite directions and accordingly shifts the gripping bars 26 and 27 of each pair toward each other into gripping engagement with the necks of the bottles 11 contained in the respective rows or lines of the set of bottles; this gripping engagement of the gripping bars 26 and 27 with the respective rows of bottles is effected immediately below the heads 12 of said bottles so that the latter are securely suspended in the gripping mechanism, as will be apparent. At this stage the operator while maintaining a pressure on the handles 28 and 29 sufficient to maintain the gripping bars 26 and 27 of the respective pairs in gripping engagement with the bottles of the respective rows, exerts a slight upward force upon said handles 28 and 29 sufficient, with the aid of the counterweight, to raise the gripping mechanism and the set of twenty four bottles gripped thereby out of the case 10; during this transfer of the entire set of bottles from the case 10, the major portion of the lifting operation is performed by the counterweight at the end of the chain 15 so that only a slight manual effort is required to lift said bottles from the case 10.

The gripping mechanism is then shifted by the operator, without releasing his grip upon the handles, to a position immediately above the conveyor belts 34 and 35 and so as to bring one row of bottles 11 into registry with the conveyor belt 35 and the remaining three rows of bottles comprising the set, into registry with the conveyor belt 34, after which the gripping mechanism is lowered, for instance by a downward pull upon the chain 15, until the bottoms of the respective groups of bottles come into contact with the respective surfaces of the conveyor belts 34 and 35. The operator then releases his grip upon the handles 28 and 29 whereupon the telescopic springs 30 or equivalent means will automatically force the levers 18 and 19 apart to the position indicated in Fig. 3; this movement of the levers 18 and 19 is transferred to the strips 24 and 25 which are correspondingly moved automatically in opposite directions to adjust the gripping bars 26 and 27 of each pair in directions away from each other whereby the bottles are released and transferred in the relation previously mentioned to the conveyor belts 34 and 35 respectively. The group of bottles deposited upon the conveyor belt 35 is accordingly immediately advanced by the

latter in the direction of the arrow in Fig. 6 and at a speed relatively greater than the speed of travel of the conveyor belt 34. At the same time the bottles in the remaining groups of the set are advanced at a slower rate by the conveyor belt 35 and are finally brought into contact with the jigger plate 36 which is being reciprocated on the backing plate 37 by the mechanism previously described. As this occurs the bottles contained in the groups located upon the conveyor belt 34 will be gradually sorted and forced toward the conveyor belt 35 in an arrangement corresponding to and following the arrangement of the group initially deposited upon said conveyor belt 35; in other words, in the instant case the bottles will be transferred from the conveyor belt 34 and brought into line upon the conveyor belt 35 in succession after the line of bottles advanced initially by the conveyor belt 35. The entire line of bottles will finally reach the star wheel 56 whereby said bottles will be equally spaced apart as the conveyor belt 35 continues its travel at approximately right angles to its initial path of travel and finally transfers the bottles in the aforesaid equally spaced relation to the pocket soaker of the washing apparatus or to an equivalent mechanism or point.

Various changes in the specific forms shown and described may be made within the scope of the claims without departing from the spirit of the invention.

I claim:—

1. In a bottle handling apparatus, a gripping means adapted to be raised and lowered and comprising a plurality of parallel gripping members arranged in co-operating pairs each adapted to grip a plurality of bottles, means connecting one member of each pair with the corresponding members of the other pairs whereby said members are adjusted in groups toward and away from each other into and out of gripping positions, and means for operating said gripping members.

2. In a bottle handling apparatus, a gripping means adapted to be raised and lowered and comprising a plurality of parallel gripping members arranged in co-operating pairs each adapted to grip a plurality of bottles, means connecting one member of each pair with the corresponding members of the other pairs whereby said members are adjusted in groups toward and away from each other into and out of gripping positions, means for operating said gripping members, and means whereby the position of the gripping members is determined.

3. In a bottle handling apparatus, a gripping means adapted to be raised and lowered and comprising a plurality of parallel gripping members arranged in co-operating pairs each adapted to grip a plurality of bottles, means connecting one member of each pair with the corresponding members of the other pairs whereby said members are adjusted in groups toward and away from each other into and out of gripping positions, means for operating said gripping members, and bridge elements connected with correspondingly movable gripping members for engaging the tops of certain of said bottles to limit the downward movement of the gripping means on all of said bottles.

4. In a bottle handling apparatus, a gripping means adapted to be raised and lowered and comprising parallel gripping bars arranged in a plurality of co-operating pairs to grip a plurality of groups of bottles at the necks thereof, strips connecting corresponding gripping bars of each pair with each other whereby each pair of bars are coincidentally moved toward and away from each other, manually operated means connected with said strips for adjusting the bars of each pair into gripping engagement with said bottles, and means for automatically actuating said manually operated means to separate the bars of each pair to release said bottles.

5. In a bottle handling apparatus, a gripping means adapted to be raised and lowered and comprising parallel gripping bars arranged in a plurality of co-operating pairs to grip a plurality of groups of battles at the necks thereof, strips connecting corresponding gripping bars of each pair with each other whereby each pair of bars are coincidentally moved toward and away from each other, manually operated means connected with said strips for adjusting the bars of each pair into gripping engagement with said bottles, means for automatically actuating said manually operated means to separate the bars of each pair to release said bottles, and bridge elements extending between adjacent gripping bars moving in the same direction whereby the downward movement of the gripping means on said bottles is limited.

6. In a bottle handling apparatus, a gripping means adapted to be raised and lowered and comprising parallel gripping bars arranged in a plurality of co-operating pairs to grip a plurality of groups of bottles at the necks thereof, strips connecting corresponding gripping bars of each pair with each other whereby each pair of bars are coincidentally moved toward and away from each other, tongs pivotally connected with each other and with said strips for adjusting the bars of each pair into gripping engagement with said bottles, gripping handles connected with said tongs for manually operating the same in gripping directions, and springs whereby said tongs are automatically operated to separate the bars of each pair to release said bottles.

7. In a bottle handling apparatus, a grip-

ping means adapted to be raised and lowered and comprising parallel gripping bars arranged in a plurality of co-operating pairs to grip a plurality of groups of bottles at the necks thereof, strips connecting corresponding gripping bars of each pair with each other whereby each pair of bars is coincidentally moved toward and away from each other, tongs pivotally connected with each other and with said strips for adjusting the bars of each pair into gripping engagement with said bottles, gripping handles connected with said tongs for manually operating the same in gripping directions, springs whereby said tongs are automatically operated to separate the bars of each pair to release said bottles, and bridge elements extending between adjacent bars moving in the same direction whereby the downward movement of the gripping means on said bottles is limited.

In testimony whereof I have hereunto set my hand.

FRANK W. RICKERS.