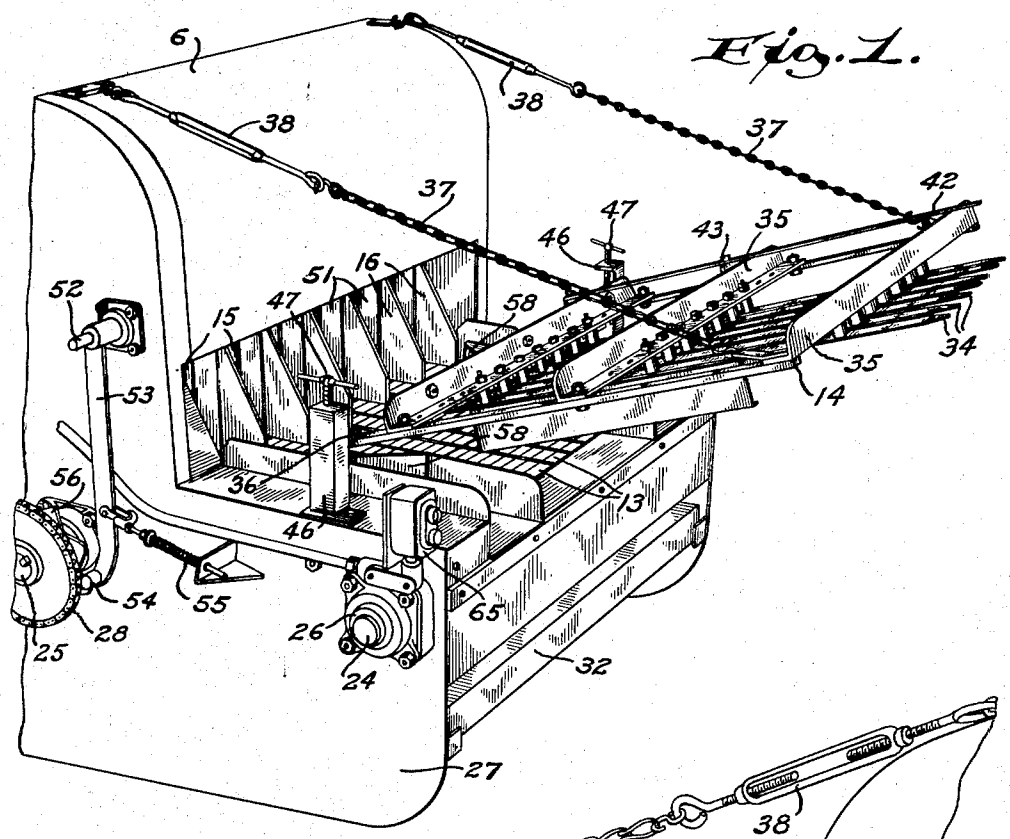
Aug. 24, 1954 A. E. LADEWIG 2,687,203

LOADING MECHANISM FOR BOTTLE WASHERS

Filed Sept. 15, 1950 3 Sheets-Sheet 1

Fig. 1.



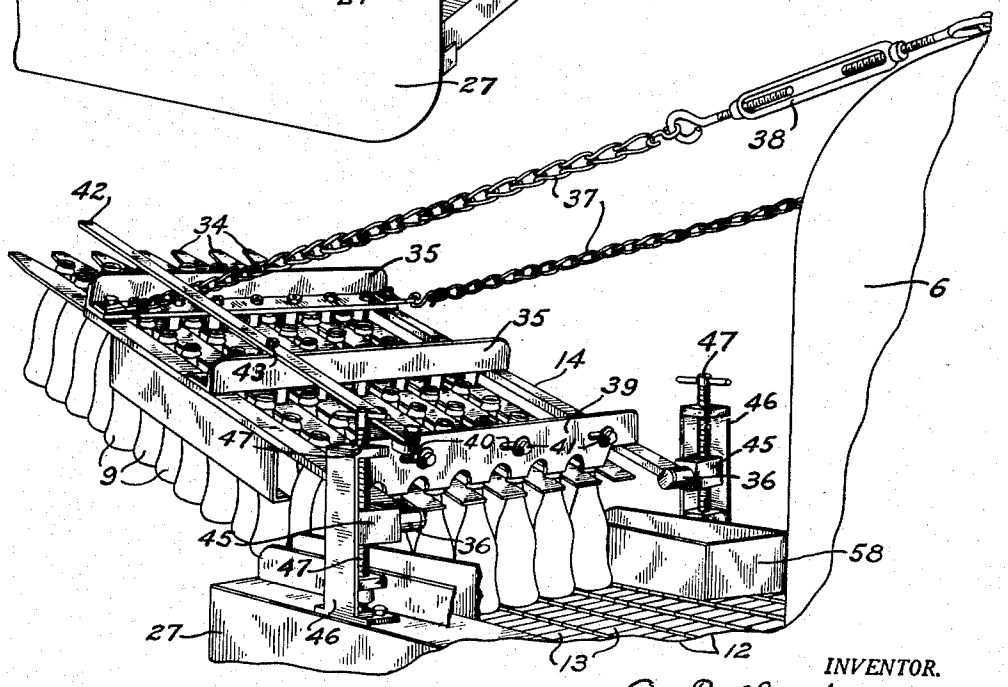


Fig. 2.

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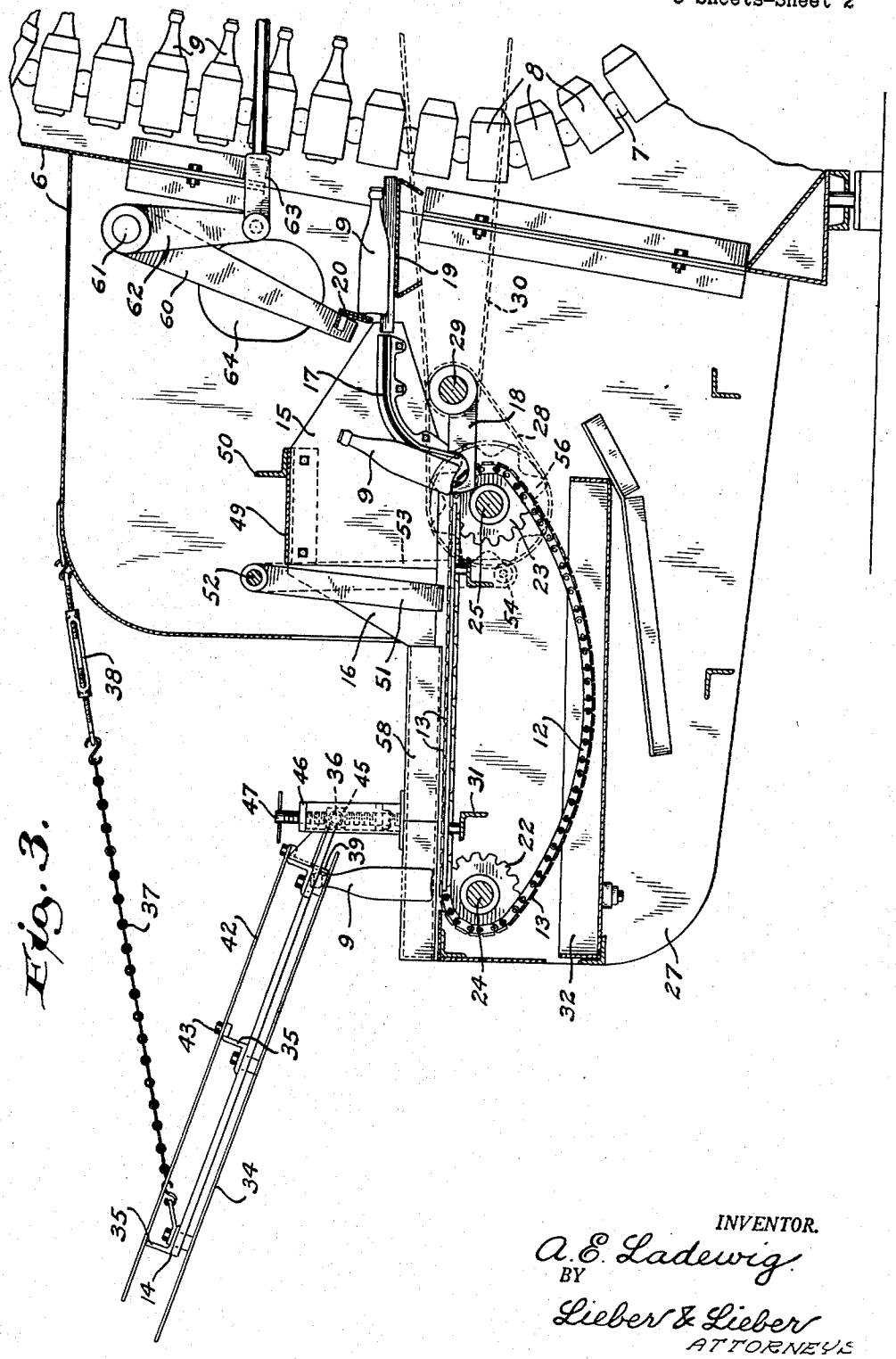


Fig. 3.

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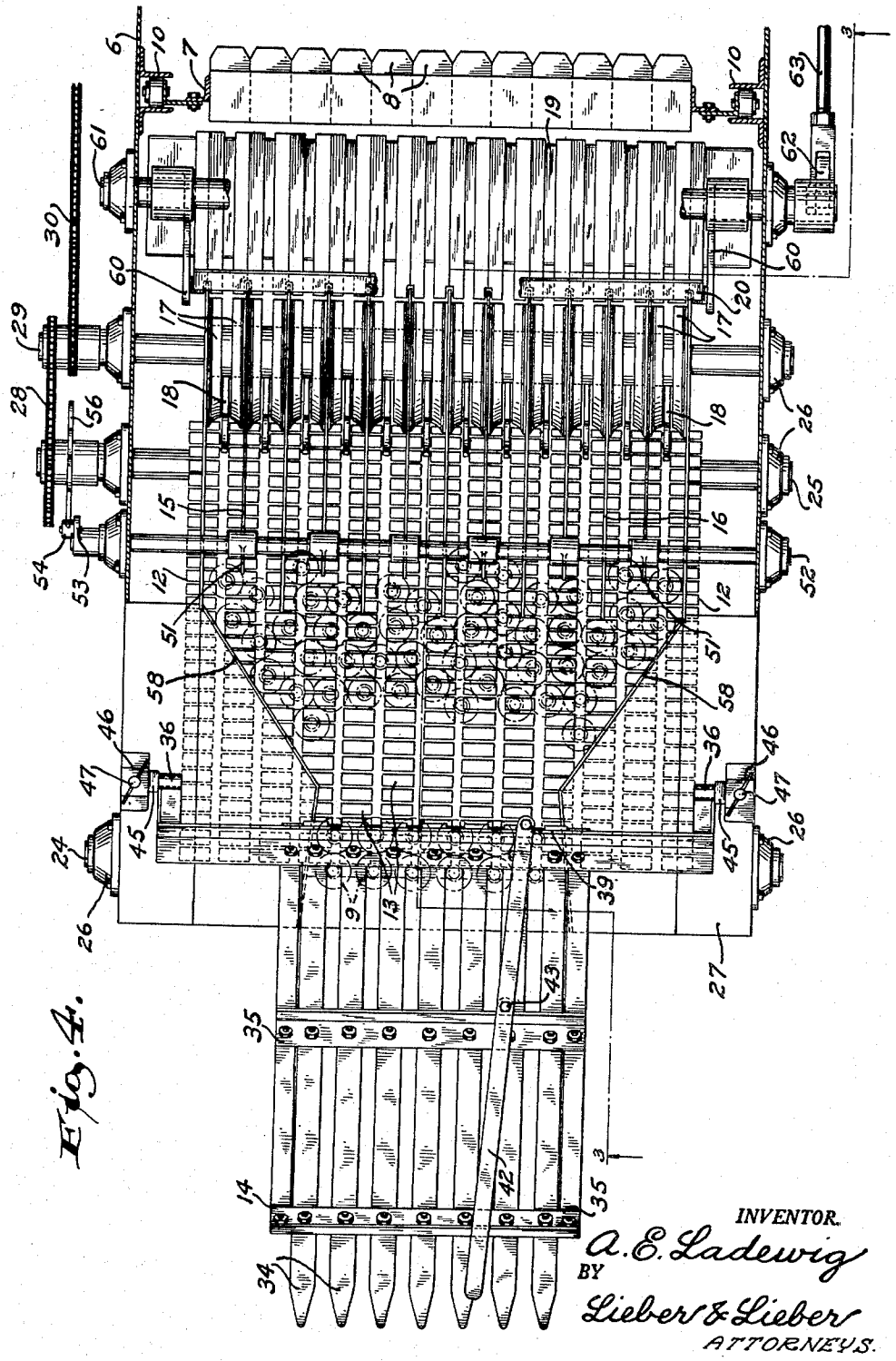


Fig. 4.

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UNITED STATES PATENT OFFICE

2,687,203

LOADING MECHANISM FOR BOTTLE WASHERS

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Application September 15, 1950, Serial No. 185,116

7 Claims. (Cl. 198—25)

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My present invention relates generally to improvements in the art of transferring a succession of similar articles from place to place, and relates more specifically to improvements in the construction and operation of mechanism for automatically transferring receptacles such as bottles in predetermined order from a loading zone to the transporting pockets or carriers of a washing machine or the like.

The primary object of the present invention is to provide an improved receptacle transfer mechanism for bottles or the like, adapted to automatically and effectively segregate and prearrange the bottles deposited indiscriminately upon a conveyor into parallel rows, and to thereafter deliver the successive bottles of the several rows from the conveyor into the bottle carriers of a cleansing machine.

The matter of leading bottles and similar receptacles into cleansing machines has heretofore been a source of constant trouble to the manufacturers and operators of such equipment especially when handling bottles of relatively small diameter and when operating the machines at high speed. These washers are ordinarily provided with an endless series of bottle transfer pockets or carriers arranged in transverse rows of various widths for transporting the articles through the cleansing zones, and the receptacles are customarily delivered into the successive rows of these carrier pockets with the aid of a loading conveyor and other allied mechanism for indiscriminately receiving the upright bottles and for tilting and introducing them into the empty carriers. Since the functioning of the washer is automatic, it is preferable to maintain the individual bottle carriers filled to capacity, and the loading of these carriers must therefore be rapid and dependable and devoid of human effort.

When the dirty bottles are supplied indiscriminately to the conveyor in case lots or otherwise, and especially when the individual recepatcles are tall and of relatively small diameter, they tend to fall over while they are being applied to or transported by the initial loading conveyor, and in doing so the fallen bottles either prevent proper supplying of some of the empty carrier pockets with bottles, or they completely interrupt the loading until the misplaced bottles have been righted by hand. This obviously materially reduces the capacity and reliability of the washing units; and in order to enhance the flexibility of use of these washers it is also desirable to provide for automatic and dependable loading of bottles of various heights and at diverse speeds without excessive interruption and delay.

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It is therefore an important object of my present invention to provide an improved loading mechanism for bottle washers or the like, which obviates all of the above mentioned difficulties, and which is effectively cooperable with automatic washing units of various sizes and capacities operating at diverse speeds and with bottles of different shapes.

Another important object of this invention is to provide an improved automatic mechanical feeder for bottles or the like delivered indiscriminately upon a conveyor, which will effectively segregate the mass of advancing bottles into prearranged parallel rows while eliminating falling, jamming and breakage of the upright bottles.

A further important object of the invention is to provide an improved bottle feeding device for washing machines, which is adapted to handle dirty bottles delivered thereto in large groups or case lots and which may also be readily adjusted to vary the rate of feeding and to accommodate bottles of different heights.

Still another important object of my invention is to provide improved mechanism for systematically tilting upright successive bottles into approximately horizontal position and for feeding the reclining bottles in succession into the advancing transfer pockets or carriers of a washing machine or the like, gently and without excessive shock or breakage of bottles.

An additional object of the present invention is to provide an improved bottle loader which is simple, compact and durable in construction, and which is safely operable at high speeds and for perfect coordination with washers of various types and of diverse capacities.

These and other objects and advantages of the invention will be apparent from the following detailed description; and the present application is a continuation in part of my Patent No. 2,551,140, granted May 1, 1951, while some of the improved features of bottle feeding mechanism shown and described but not specifically claimed herein form the subject of my Patent No. 2,614,678, granted October 21, 1952.

A clear conception of the features constituting my present improvement, and of the construction and operation of a typical commercial loading mechanism for bottle washers embodying the invention, may be had by referring to the drawings accompanying and forming a part of this specification in which like reference characters designate the same or similar parts in the various views.

Fig. 1 is a front and side perspective view of one

of the improved loading mechanisms completely assembled and applied to the loading zone of an automatic washer;

Fig. 2 is a slightly enlarged side and rear perspective view of the improved loading rack constituting a part of the new mechanism;

Fig. 3 is a further enlarged longitudinal vertical section through the improved loading mechanism taken along the irregular line 3—3 of Fig. 4, and showing its cooperation with the bottle carriers of the washer; and

Fig. 4 is a partial top view of the same mechanism with a section taken horizontally through the casing of the washer above the loader, the bottles having been shown in dot-and-dash lines and some parts having been omitted for the sake of clearness.

The gist of my present invention is the provision of an improved loader for bottle cleansing machines having transverse rows of bottle carriers successively presentable at a final loading station, and wherein the dirty bottles may be applied indiscriminately to an initial loading conveyor and are subsequently segregated from the mass and arranged in longitudinal rows the successive bottles of which are gently and effectively transferred to the corresponding carriers of the transverse rows in rapid succession, and while only one commercial embodiment of the improvement has been shown and described herein, it is not my desire or intention to unnecessarily restrict the utility of the invention by virtue of this limited showing. It is furthermore contemplated that specific descriptive terms employed herein be given the broadest possible interpretation consistent with the actual disclosure.

Referring to the drawings, the improved loading mechanism is shown herein as having been applied to an automatic bottle washer of the type having a main casing 6 forming a housing for an endless conveyor 7 provided with successive transverse parallel rows of transfer pockets or carriers 8 adapted to receive the bottles 9 in approximately horizontal reclining position and head foremost at a loading station located within the front portion of the casing 6. The conveyor 7 may be driven either continuously or intermittently in any suitable manner and at any desired speed, and coacts with guide rails 10 mounted within the casing 6 to transport the successive bottles 9 confined within the carriers 8 through the soaking, washing and rinsing zones of the cleanser. While each transverse row of carriers 8 specifically shown comprises twelve pockets, this number may be increased or diminished depending upon the desired capacity of the machine and these various elements of the bottle washer may be constructed and operated as shown and described in my Patent No. 2,551,140 of which this is a continuation in part.

The present improved bottle loading mechanism comprises in general an initial loading conveyor consisting of a series of laterally spaced endless chains 12 having slats 13 thereon forming a horizontal upper deck for receiving the dirty bottles 9 indiscriminately and for advancing them rearwardly in upright position toward the carriers 8 at the final loading zone; an inclined bottle feeding rack 14 of lesser transverse width than the initial loading conveyor for depositing groups of the bottles 9 by gravity upon the upper front ends of the chains 12; a series of upright laterally spaced bottle segregating and alining partitions 15, 16 suspended within the front end of the main casing 6 above the rear upper ends of the conveyor chains 12 and each having an arcuate bottle tilting guide member 17 secured to its lower opposite sides and each being spaced from the guide member of the adjacent partition in vertical alinement with the space between the adjoining conveyor chains 12; a series of revolving bottle transfer arms 18 each periodically movable upwardly and rearwardly through one set of the vertically alined spaces or gaps between the adjacent members 17 and chains 12; a fixed serrated bottle transfer shelf 19 interposed between the rear upper ends of the members 17 and the empty carriers 8 positioned at the final loading station; and an oscillatory pusher 20 for advancing the successive reclining bottles 9 across the shelf 19 and into the receiving carrier pockets 8.

The chains 12 of the initial loading conveyor may be driven by front and rear sprockets 22, 23 respectively secured to transverse shafts 24, 25 which are journalled in bearings 26 carried by an auxiliary casing 27 associated with the front end of the main washer housing casing 6, and the rear shaft 25 may be constantly rotated by means of a chain drive 28 which is operable from another transverse shaft 29 journalled in the casing 6 and to which the transfer arms 18 are secured. The shaft 29 may also be constantly rotated by another chain drive 30 from the main drive of the washer, or directly by a motor, so that the loading conveyor deck will be constantly advancing toward and approaching the carriers 8 of the washer whenever the latter is operating. The upper deck of the loading conveyor is supported against sagging by transverse beams 31, while the lower return run of this conveyor may be permitted to dip within a rinsing liquid pan 32 as illustrated in Fig. 3, and except for the exposed upper deck the entire loading conveyor is concealed within the casing 27.

The inclined bottle feeding rack 14 is composed of a series of parallel elongated elements or strips 34 which are firmly secured to transverse angle irons 35 and are spaced apart distances slightly greater than the diameters of the bottle necks but less than the diameters of the heads of the bottles 9, so that these bottles may be freely suspended from and slide by gravity along the spaced strips, as illustrated in Figs. 2 and 3. The foremost portions of the guide strips 34 are tapered as shown in order to facilitate insertion of the bottles 9 which may be applied either in case lots or in smaller numbers, and the rack is swingably suspended at its lower end from the auxiliary casing 27 by means of axially alined pivots 36 while its upper portion is suspended from the upper part of the washer casing 6 by chains 37 having turn-buckles 38 therein. The inclination of the rack 12 should always be such that the head suspended bottles 9 will gravitate freely along the strips 34, and in order to control the delivery of the bottles from the lower extremity of the rack 14, a laterally slidable regulating and stop bar 39 having slots 40 cooperable with guide bolts 41 and which is adjustable by means of a lever 42 swingable about a pivot 43, is provided, see Figs. 2 and 3.

The turnbuckles 38 in the upper rack suspension chains 37 may be utilized in conjunction with the lower pivots 36 in order to vary the inclination or slope of the rack 14 relative to the upper deck of the loading conveyor so as to alter the speed of travel of the bottles 9 along the strips 34, and the transversely movable bar 39

may be employed to momentarily stop the bottles and to arrest their swinging motion before they are deposited in upright position upon the loading deck slats 13. In order to accommodate bottles 9 of various heights, it is also preferable to make the pivots 36 vertically adjustable, and in order to effect such adjustment each pivot 36 may be secured to a block 45 slidably confined within a bracket 46 mounted upon the auxiliary casing 27, and adapted to be raised or lowered at will by means of an adjusting screw 47, as depicted in Figs. 2 and 3. Whenever such height adjustment is made, the turnbuckles 38 may also be utilized to produce proper inclination of the rack 14, thus making the use of such rack very flexible for meeting various operating conditions.

The series of upright laterally spaced bottle segregating and alining partitions 15, 16 which extend along the delivery end of the loading conveyor, constitute an important feature of the present invention, and all of these partitions are fixedly suspended from the main casing 6 well above the conveyor chains 12 by means of a transverse horizontal suspension plate 49 and an angle bar 50 as shown in Fig. 3. The alternate partitions 15 are of shorter length than the intervening partitions 16, but the trailing ends of all of these partitions are provided with tapered extensions projecting well beyond the rear extremities of the chains 12, and the laterally spaced arcuate bottle tilting and guiding members 17 are permanently secured to the opposite sides of these rear tapered extensions of the partitions 15, 16.

The front or leading end of each of the shorter partitions 15 is provided with an oscillatory edge portion or blade 51 all of which are swingably suspended for reciprocation upon a transverse shaft 52 journalled in the main casing 6, and the leading ends of the intervening longer partitions 16 slope downwardly and forwardly well beyond the blades 51. The blades 51 and the shaft 52 are oscillatable by means of a lever 53 secured to an end of the shaft and carrying a roller 54 cooperable with a toothed cam wheel 56 secured to and rotatable by the transverse shaft 29, the roller 54 being constantly urged against the cam wheel 56 by a spring 55, see Fig. 1.

The partitions 15, 16 of different lengths and the movable edge portions 51 of the shorter partitions 15 cooperate to segregate the mass of bottles 9 which are being advanced by the conveyor chains 12, and when a loading rack 14 of less width than that of the initial conveyor is being utilized, some means for spreading the mass throughout the width of this conveyor before the bottles engage the partitions, should be provided. In order to accomplish such spreading action, I provide diverging walls 58 on opposite sides of the group of conveyor chains 12 beyond the lower end of the rack 14 as shown in Figs. 1, 2 and 4, and these walls 58 are fixed but cooperate with the upright advancing bottles 9 to effectively spread the mass laterally for engagement with the leading edge portions of all of the partitions 15, 16. These walls 58 are also useful even when no loading rack 14 is being employed, in cases where a constricted initial loading zone is desired.

The series of transversely alined bottle transfer arms 18 radiate from and are constantly revolvable by the rotating shaft 29, and each of these arms 18 is periodically swingable upwardly and rearwardly through the alined gaps or spaces between adjacent chains 12 and guide members 17 to transfer the successive reclining bottles 9

from the loading conveyor onto the fixed shelf 19. This transfer shelf 9 extends entirely across the final loading station and has a series of bottle guiding grooves for receiving and conducting the reclining bottles 9 axially into the horizontally disposed upwardly advancing empty carriers or pockets 8 as illustrated in Fig. 3, and the oscillatory pusher 20 is periodically movable downwardly and rearwardly along the inclined upper edges of the tapered partition extensions so as to positively push the reclining bottles head foremost across the shelf 19 and into the receiving carriers 8.

The pusher 20 consists primarily of a transverse angle bar secured to the lower swinging ends of levers 60 secured to a pivot shaft 61 journalled in the casing 6, and the shaft 61 is provided with an oscillating arm 62 which is swingable by means of a connecting rod 63 operable from any suitable source of power such as the main washer drive. With this assemblage the transverse pusher bar 20 is swingable back and forth in close proximity to the sloping upper edges of the tapered rear extensions of the partitions 15, 16 whenever a transverse row of bottles 9 has been deposited upon the shelf 19 by the revolving arms 18, and all of this mechanism is concealed and protected within the front portion of the main casing 6 or within the auxiliary loader casing 27, but may be constantly viewed through sight openings 64 shown in Fig. 2. The front portion of the loader casing 27 may also be provided with a control switch 65 for controlling the operation of the washing machine and its bottle loader, as depicted in Fig. 1.

When the various parts of the improved automatic bottle loader have been properly constructed and assembled as described, this mechanism may be actuated either with or without the loading rack 14. If the loading rack 14 is utilized, the bottles 9 may be fed in case lots thereto by merely slipping the necks of the bottles confined in rows in each case, into the slots between the adjacent strips 34 of the rack, and when the confining case is subsequently removed downwardly the suspended bottles 9 will slide by gravity down the inclined rack 14 and will eventually be deposited indiscriminately and in upright position upon the upper deck slats 13 of the conveyor chains 12. In order to insure proper gravity descent and delivery of the bottles to the loading conveyor, the inclination of the rack 14 should be adjusted by manipulating the turn-buckles 38 and the height of the discharge end of this rack should also be adjusted with the aid of the screws 47; and the lever 42 may be manipulated at any time so as to eliminate excessive swinging of the suspended descending bottles before they drop onto the loading conveyor.

After these adjustments have been properly effected, the carrier conveyor 7 and the conveyor chains 12 may be constantly operated to continuously advance the empty carriers 8 upwardly toward and past the final bottle loading station and to simultaneously continuously advance the mass of upright bottles 9 deposited upon the loading conveyor deck horizontally toward these advancing carriers. As the advancing upright bottles reach the walls 58 and encounter the leading edges of the upright partitions 15, 16, the mass spreads laterally as depicted in Fig. 4, and the inclined front edges of the longer partitions 16 quickly cooperate with the oscillating front edge portions or blades 51 of the shorter partitions 15 to segregate the bottle mass into par-

allel longitudinally advancing rows of upstanding bottles 9.

Whenever the leading bottle of each of these rows encounters a pair of the adjacent members 17 mounted on the partitions 15, 16, its motion is momentarily arrested until the corresponding revolving upwardly moving arm 18 engages its bottom, whereupon these arms 18 lift and tilt the bottles and slide them over the spaced members 17 onto the shelf 19 in approximately horizontal reclining position as illustrated in Fig. 3. The constantly oscillating pusher 20 thereafter slides the successive rows of reclining bottles 9 into the continuously advancing empty carriers or pockets 8, thus completing the loading operation, and the operation continues automatically and systematically as long as there are dirty bottles available. If the use of the loading rack 14 is not desired, the dirty bottles 9 may be deposited individually or in groups upon the receiving ends of the loading conveyor chains 12 by hand or in any other desired manner, whereupon the partitions 15, 16, guide members 17, transfer arms 18, and pusher 20 will still function as described.

From the foregoing detailed description of my present bottle loading mechanism, it should be apparent that I have in fact provided an improved assemblage for effectively handling the bottles 9 and for rapidly loading them into the successive carrier pockets 8 without delay or excessive breakage. The improved partitions 15, 16 of different length and having the oscillatory edge portions 51 function to automatically and effectively segregate the mass of upright bottles 9 into parallel rows so that the guide members 17 and elevating arms 18 may properly function to tilt and deliver the successive bottles of each row upon the shelf 9 in reclining position. When the loading rack 14 is utilized, it may be readily adjusted to vary both its inclination so as to change the speed at which the bottles travel therealong, or to vary the elevation of its delivery end so as to accommodate bottles of different heights.

The laterally adjustable control bar 39 associated with the rack 14 is also important since it may be utilized to eliminate undesirable swinging and falling of the bottles 9 as they reach the loading conveyor, and the spreader walls 58 serve to effectively distribute the mass of upright bottles throughout the entire transverse extent of the loading conveyor deck so that all empty pockets 8 will be properly loaded. The lateral spacing of the endless chains 12 and of the adjacent guide members 17 also permits the revolving arms 18 to swing upwardly midway between the partitions 15, 16 so as to engage each bottle along its central vertical plane, and the pusher 20 functions to rapidly transfer the bottles in succession to the moving pockets or carriers 8.

The entire loading unit functions smoothly and quietly and is cooperable with washing machines operating at high or low speeds wherein the carriers 8 are advanced either continuously or intermittently and are loaded while in either horizontal or inclined position. It is also operable with bottles of various shapes and sizes with minimum breakage, and has proven highly satisfactory and successful in actual commercial use. It should be understood that it is not desired to limit this invention to the exact details of construction or to the precise mode of operation, herein shown and described, for various modifications within the scope of the appended claims may occur to persons skilled in the art.

I claim:

1. In a bottle loader for a cleaning machine having transverse rows of carriers successively presentable in empty condition at a final loading station, a conveyor for receiving the bottles indiscriminately and in upright position, means for actuating said conveyor to advance the mass of bottles toward the carriers, partitions extending along and in the direction of advancement of the bottles for segregating the advancing mass into longitudinal rows disposed in approximate alinement with the carriers of the transverse rows, the rear portions of all of the partitions being fixedly mounted but the forward edge portions of some of said partitions being reciprocable only fore and aft in the direction of advancement of the bottles to prevent jamming and to divide the advancing mass into parallel longitudinal bottle rows, and means for transferring the successive bottles of each longitudinal row from said conveyor to the successive empty carriers at the loading station.

2. In a bottle loader for a cleaning machine having transverse rows of carriers successively presentable in empty condition at a final loading station, a conveyor for receiving the bottles indiscriminately and in upright position, means for actuating said conveyor to advance the mass of bottles toward the carriers, partitions extending along and in the direction of advancement of the bottles for segregating the advancing mass into longitudinal rows disposed in approximate alinement with the carriers of the transverse rows, the rear portions of all of the partitions being fixedly suspended but the forward edge portions of alternate partitions being swingably reciprocable from a pivot located above said conveyor and only fore and aft in the direction of advancement of the bottles to prevent jamming and to divide the advancing mass into parallel longitudinal bottle rows, and means for tilting and for transferring the successive tilted bottles of each longitudinal row beyond said partitions and into the successive empty carriers at the loading station.

3. In a bottle loader for a cleansing machine having transverse rows of carriers, a conveyor having a series of endless sections forming a deck for receiving the bottles indiscriminately and in upright position, means for simultaneously actuating said conveyor sections to constantly advance the mass of bottles toward the carriers, partitions extending along and in the direction of advancement of the bottles midway between each conveyor section for segregating the advancing mass into longitudinal rows disposed in approximate alinement with the carriers of the transverse rows, the front edge portions of some of said partitions being inclined forwardly and downwardly to engage only the base portions of advancing bottles and the front edge portions of other partitions being reciprocable only in the direction of advancement of the bottles to prevent jamming and to divided the constantly advancing mass into parallel longitudinal bottle rows, and means for transferring the successive bottles of each longitudinal row from said conveyor to the successive advancing carriers.

4. In a bottle loader for a cleansing machine having transverse rows of carriers, a conveyor for receiving the bottles in upright position, means for actuating said conveyor to constantly advance the mass of bottles toward the carriers, partitions extending along and above said conveyor in the direction of advancement of the bot-

tles for segregating the advancing mass into longitudinal rows disposed in approximate alinement with the carriers of the transverse rows, the forward edges of some of said partitions being inclined forwardly and downwardly and located in advance of others to prevent jamming and the forward edges of said other partitions being reciprocable in the planes thereof to divide the advancing mass into said longtiudinal bottle rows, and means for tilting and transferring the successive bottles of each longitudinal row from said conveyor to the successive carriers.

5. In a bottle loader for a cleansing machine having transverse rows of carriers, a conveyor for receiving the bottles in upright position, means for actuating said conveyor to advance the bottles toward the carriers, a series of partitions extending along and above said conveyor in the direction of advancement of the bottles for segregating the advancing bottle mass into longitudinal rows disposed in approximate alinement with the carriers of the transverse rows, alternate partitions of said series being shorter in the direction of advancement of the bottles than the intervening partitions and having forward edges movable fore and aft in said direction to divide the advancing mass of bottles into said longitudinal rows, and means for tilting and transferring the successive bottles of each longitudinal row from said conveyor to the successive carriers.

6. In a bottle loader for a cleansing machine having transverse rows of carriers, a conveyor for receiving the bottles in upright position, means for actuating said conveyor to advance the bottles toward the carriers, and a series of partitions extending along and above said conveyor in the direction of advancement of the bottles for segregating the advancing bottle mass into longitudinal rows disposed in approximate alinement with the carriers of the transverse rows, alternate partitions of said series being shorter in the direction of advancement of the bottles than the

intervening partitions and having forward edges movable fore and aft in said direction to divide the advancing mass of bottles into said longitudinal rows, and the longer intervening partitions having downwardly inclined fixed forward edges.

7. In a bottle loader for a cleansing machine having transverse rows of carriers, a conveyor for receiving the bottles in upright position, means for actuating said conveyor to advance the bottles toward the carriers, a series of partitions extending along and above said conveyor in the direction of advancement of the bottles for segregating the advancing bottle mass into longitudinal rows disposed in approximate alinement with the carriers of the transverse rows, alternate partitions of said series being shorter in the direction of advancement of the bottles than the intervening partitions and having forward edges movable fore and aft in said direction to divided the advancing mass of bottles into said longitudinal rows, arcuate guide members secured directly to each of the opposite sides of the trailing end of each of said partitions, and means for transferring the successive bottles of each longitudinal row from said conveyor along an adjacent pair of said guides to the successive advancing carriers travelling past said pair.

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