

C. S. DAYTON.

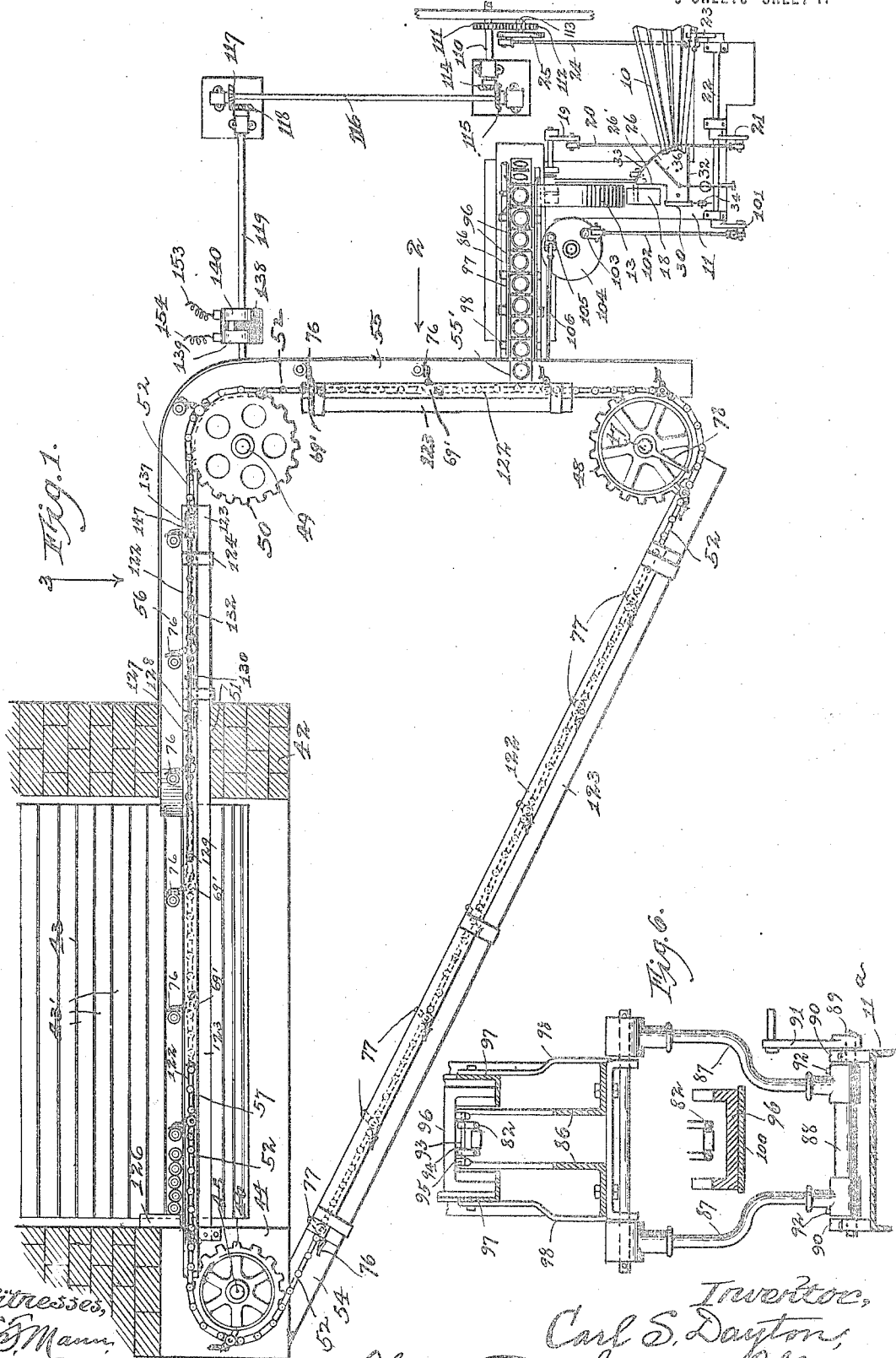
APPARATUS FOR THE MANUFACTURE OF BOTTLES AND SIMILAR GLASSWARE.

APPLICATION FILED DEC. 13, 1913.

1,148,474.

Patented July 27, 1915.

5 SHEETS—SHEET 1.



Witnesses,
F. B. Mann,
S. N. Pond

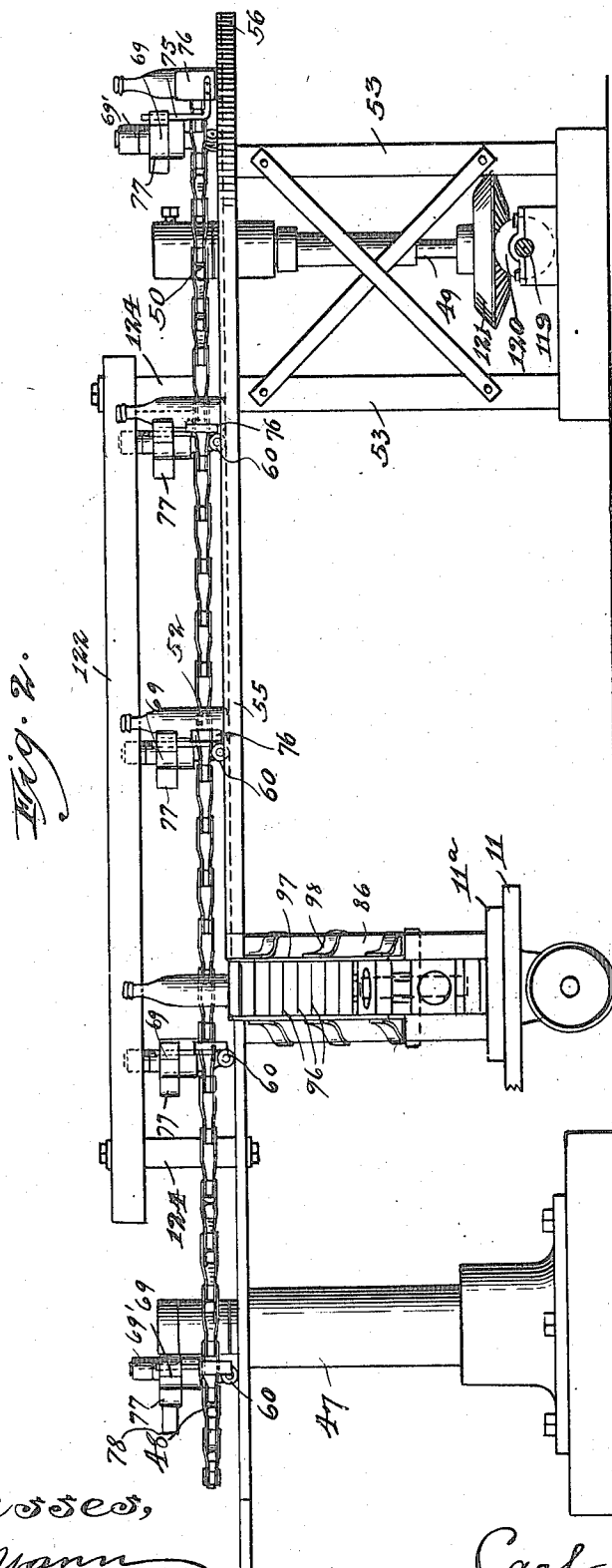
Inventor,
Carl S. Dayton,
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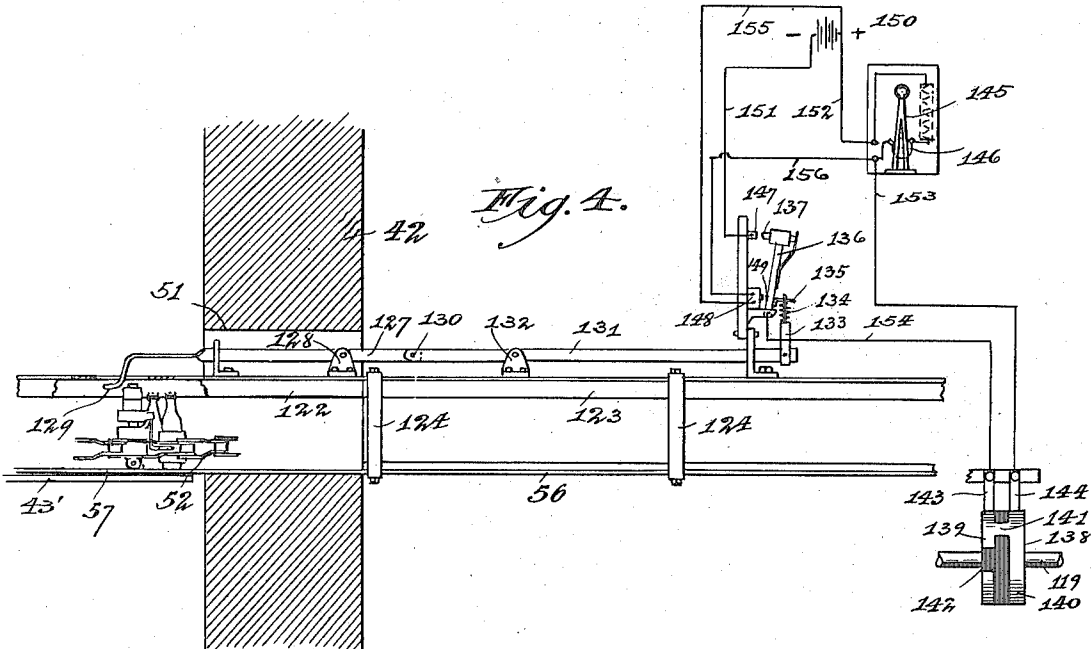
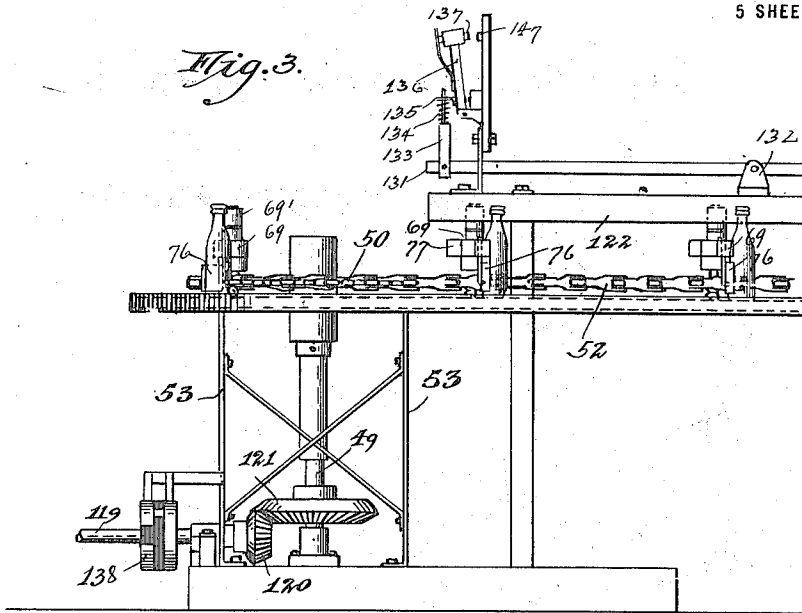
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O. W. Ford

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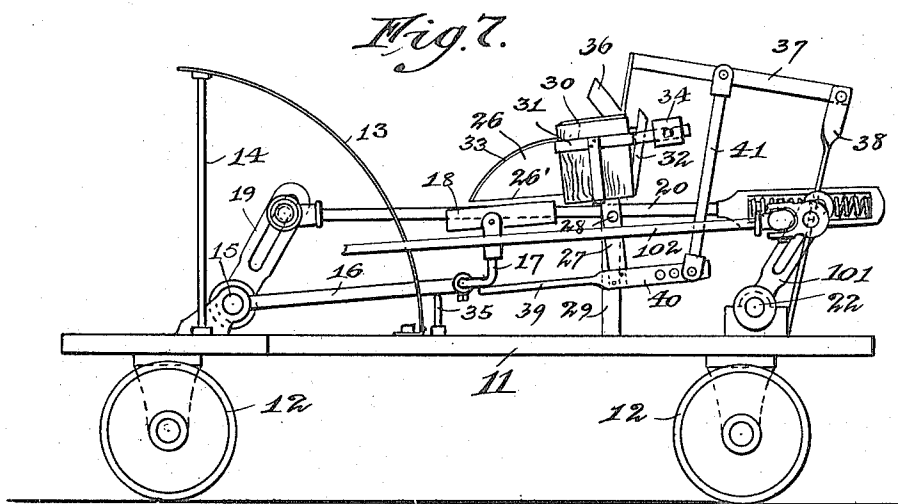
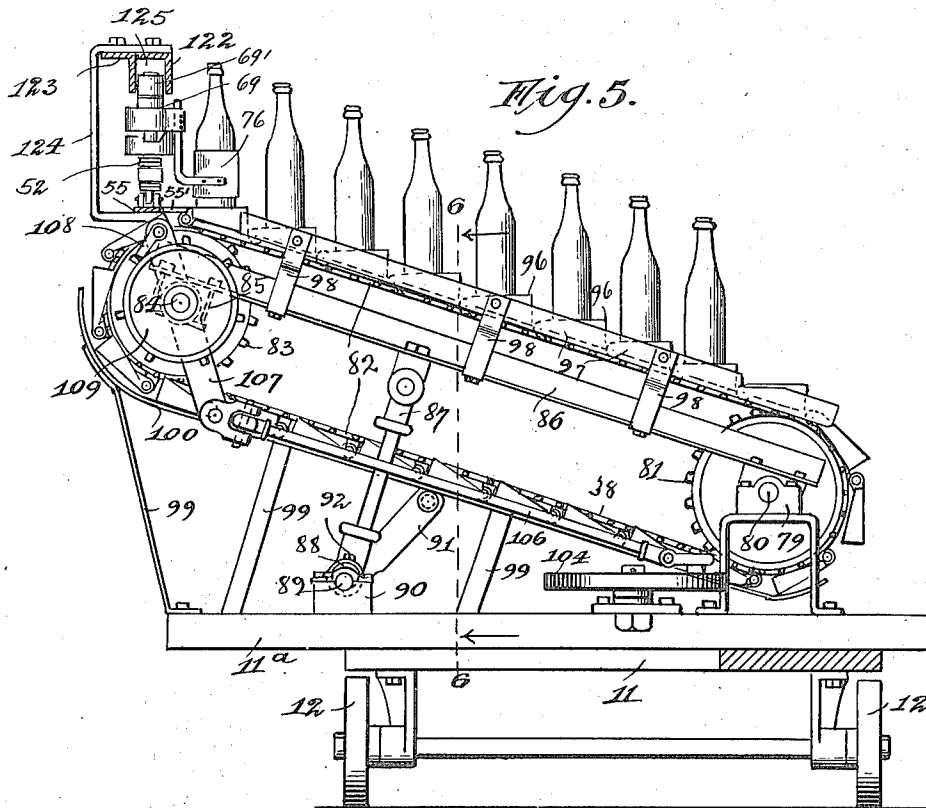
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Inventor,

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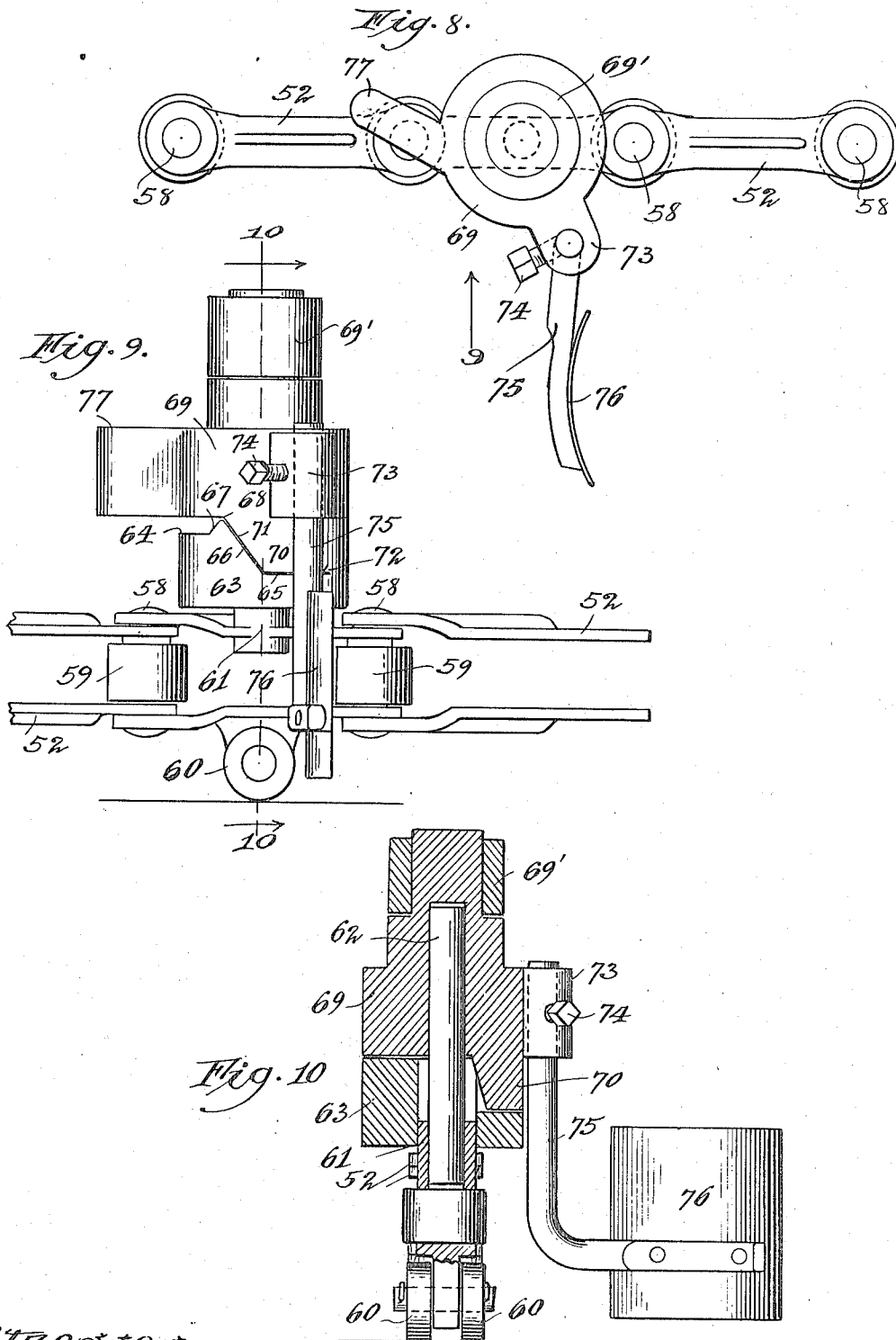
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5 SHEETS—SHEET 5.



Witnesses.

J. B. Mann

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UNITED STATES PATENT OFFICE.

CARL S. DAYTON, OF NEWARK, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE
TOLEDO GLASS COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

APPARATUS FOR THE MANUFACTURE OF BOTTLES AND SIMILAR GLASSWARE.

1,148,474.

Specification of Letters Patent.

Patented July 27, 1915.

Application filed December 13, 1913. Serial No. 806,411.

To all whom it may concern:

Be it known that I, CARL S. DAYTON, a citizen of the United States, residing at Newark, in the county of Licking and State of Ohio, have invented certain new and useful Improvements in Apparatus for the Manufacture of Bottles and Similar Glassware, of which the following is a specification.

This invention relates to the general art of glass manufacture, and has reference more particularly to a new and useful apparatus for conveying bottles and similar glass articles from the machine in which they are formed into the annealing oven or leer.

Various devices for accomplishing this object have heretofore been devised, but, so far as I am aware, none of them has heretofore proved sufficiently practicable to be adopted and used in any glass manufacturing plant. At the present time the freshly made bottles are transferred partly or wholly by manual operation from the forming machine to the leer. On account of the fragile and sticky character of the product, when first delivered from the forming machine, the matter of successfully conveying the same by purely mechanical means into the leer has proved one of considerable difficulty. After long study and experiment I have devised and developed a practicable and workable apparatus for performing this operation, and the same forms the subject matter of the present invention which is illustrated in an improved mechanical form in the accompanying drawings, in which—

Figure 1 is a top plan view of the apparatus shown in association with and between the delivery chute of a bottle-forming machine and the receiving end of a leer. Fig. 2 is a side elevation, on a somewhat enlarged scale, viewed in the direction of the arrow 2, Fig. 1. Fig. 3 is a side elevation, viewed in the direction of the arrow 3, Fig. 1. Fig. 4 is an enlarged detail showing the automatic trip mechanism for advancing the leer-carrier one step as soon as a complete row of bottles has been deposited across the forward or receiving end of the leer-carrier. Fig. 5 is a side elevation of an inclined auxiliary conveyer that receives the bottles from a bottle-handling device adjacent to the bottle-forming machine and delivers them successively to the main conveyer by which they are transferred into the leer.

Fig. 6 is a cross-section on the line 6—6 of Fig. 5. Fig. 7 is a side elevation of the bottle-righting device that cooperates with the auxiliary conveyer of Figs. 5 and 6, transferring the bottles from the bottle-forming machine upright to said auxiliary conveyer. Fig. 8 is an enlarged detail in top plan of one of the conveyer-flights of the main conveyer and the means for mounting the same upon the conveyer chain. Fig. 9 is a side elevation of the device shown in Fig. 8 viewed in the direction indicated by the arrow 9 on the latter figure. Fig. 10 is a vertical axial section of the device shown in Figs. 8 and 9 taken on the line 10—10 of Fig. 9.

Referring first to Figs. 1 and 7, 10 designates a stationary delivery chute into which the freshly made bottles are successively dropped, neck foremost, from the molds of the bottle-forming machine (not shown). Opposite the discharge end of the chute 10 is positioned the bottle-righting mechanism, the essential features of which are shown in Fig. 7. In this mechanism, 11 designates a low platform that is preferably mounted on trucks 12.

On the platform 11 is mounted an arc-shaped guide or slideway 13, the lower end of which is secured to the platform 11, while its upper end is supported by a post 14. The upper end of the slideway 13 registers with the lower end of the inclined auxiliary bottle-conveyer shown in Fig. 5, being disposed at right angles to the latter, as clearly shown in Fig. 1.

Journaled across one end of the platform 11 is a rock shaft 15, fast on which is a radius arm 16 carrying upon an angularly bent extension 17 of its outer end a cradle 18, which latter, in the operation of the device, reciprocates over and lengthwise of the slideway 13.

On one end of the rock shaft 15 is a crank-arm 19 that is connected by a link 20 to a similar crank-arm 21 (Fig. 1) fast on a rock shaft 22 journaled upon and transversely of the other end of the platform 11. On one end of the rock shaft 22 is a crank-arm 23 that is connected by a pitman 24 to a crank-disk 25 that is rotated in timed relation to the rotary bottle-forming machine and in a fixed ratio to the rotary movement of the latter.

26 designates a quadrant-shaped pan, to

the under side of which is secured a strap metal supporting or carrying member having a depending arm 27 by which it is pivoted through a hinge bolt 28 to an upright support 29 on the platform 11. As shown in Fig. 1, the pan 26 is notched out at 26' through a little more than one-half the length of one of the radial sides thereof, and to the remaining portion of said notched-out side is secured an upright stop-block 30 supported by a frame 31 and serving to receive the impact of the open ends of the freshly made bottles as they are delivered onto the pan from the chute 10. The other radial side of the pan 26 is provided with a flange 32, and the curved side is also preferably provided with a low flange 33.

The pan is normally maintained in elevated or bottle-receiving position by suitable means, such as a weight 34 adjustably mounted on an extension of the horizontal member of the frame 31. In the forwardly tilted, or bottle-delivering position of the pan 26 shown in Fig. 7, the cradle 18 registers with the notched-out radial side 26' of said pan so that the bottle rolls sidewise off the pan and onto the cradle.

Secured to the platform 11 is a short up-standing rod 35 that forms a stop to limit the downward swing of the cradle-carrying arm 16, to a position at which the cradle 18 lies substantially flush with the discharge side of the tilting pan 26 in the lowered position of the latter.

To check the bottles, when received from the chute 10 onto the pan 26, from rolling down and off the discharge side of the latter before the cradle 18 has reached bottle-receiving position, there is provided a movable guard comprising a rod or bar bent to form a guard-arm 36 (Fig. 1) overlying the pan 26 and an actuating arm 37 therefor, which latter is pivoted at its outer end on the upper end of a standard 38. The depending arm 27 of the hinged member that carries the pan 26 has secured to its lower end, below the pivot 28, a forwardly projecting arm 39 having a rear extension 40 that is connected to the actuating arm 37 of the guard 36 by a link 41. The free end of the arm 39 is adapted to be struck by the radius arm 16, or its laterally bent extension 17, when the latter is on its downward or return movement, thereby tilting the pan 26 and simultaneously raising the guard 36 so as to permit the bottle freshly received on the pan 26 to roll sidewise and angularly down the pan 26 and onto the cradle 18. As soon as this has occurred, the cradle carrying arm 16, 17 is actuated on its upward swinging movement, during which time the bottom of the bottle rests upon the curved guide or slideway 13, so that the bottle is carried upwardly over the slideway 13 and thence onto the auxiliary inclined conveyer as

shown in Fig. 5, and next described. In this connection I wish to state that the mechanism last described, although preferably employed as a component part of the organized apparatus herein disclosed, is not specifically new with me, and I, therefore, make no claim to this apparatus specifically as the device for receiving freshly made bottles successively from the bottle-forming machine and delivering them upright to a receiver located opposite the discharge end of the slideway 13.

Referring to Fig. 1, 42 designates the forward or receiving end of the leer, shown in horizontal section and in the plane of the endless carrier 43 of the latter, which carrier comprises essentially a series of pans 43' disposed in close edgewise relation to each other, and each adapted to receive a row of bottles thereon. This carrier 43 is of the usual and known construction, and, as is the usual practice, it is given an intermittent or step-by step travel by an electric motor geared to a driving sprocket at the rear end of the leer as fast as the front portion of the carrier is filled with freshly made bottles to be annealed. The front opening of the leer is, of course, provided with the usual doors (not here shown).

The front end of one side wall of the leer is cut away or notched out, as shown at 44, to provide a space for the reception of a short spindle 45 on which is journaled in a horizontal plane a sprocket wheel 46. On a post 47 located laterally opposite the bottle-righting apparatus hereinbefore described in connection with Fig. 7 is radially mounted another sprocket wheel 48 similar to the sprocket wheel 46; and fast on the upper end of a vertical rotary shaft 49 (see Fig. 3) located laterally opposite the other side wall of the leer 42 is a third sprocket wheel 50. Trained around the three sprocket wheels 46, 48 and 50, and extending through a slot 51 in the side wall of the leer adjacent to the sprocket 50 is an endless sprocket conveyer chain 52, one leg or limb of which it will be seen travels directly across the front end or fire-box of the leer over the foremost end of the carrier 43. It will thus be seen from Fig. 1 that the main bottle-conveyer, of which the endless chain 52 constitutes the principal element, has the general form, in top plan, of a right-angle triangle, one side of which extends across the front end of the leer, another side of which extends parallel with the leer, while the third oblique side or diagonal extends obliquely of the front end of the leer. This particular outline form of the main conveyer is not, of course, of the essence of the invention, but constitutes the approved form where the leer is located relatively to the bottle-forming machine substantially as herein indicated.

Secured to and supported upon the post 47, the front wall of the leer, and suitable intermediate upright supports 53 (Fig. 2) is a horizontal trackway comprising a section 54 beneath the oblique or diagonal limb of the conveyer chain (between the sprockets 46 and 48), a section 55 beneath the short limb of the sprocket chain (between the sprockets 48 and 50), a section 56 that constitutes an extension of the section 55 leading around the sprocket wheel 50 and into and through the side wall of the leer, and a narrow section 57 forming a continuation of the section 56 across the front end of the leer and substantially flush with the foremost horizontal pan 43' of the carrier 43. The inner end of the section 56 a portion of which is laterally offset relatively to the section 57 just overlaps the adjacent edge of the leer-carrier 43, being tapered down to a level substantially flush with the upper lap of the latter. The trackway sections 55 and 56 not only form a support for the sections of the conveyer chain 52 traveling thereover, but also form horizontal slideways to support the bottles during their travel into the leer, as hereinafter described.

The main conveyer chain 52 is disposed with its pivot pins 58 vertical, as best shown in the detail views Figs. 8 to 10 inclusive, and each pivot pin 58 is preferably provided with an anti-friction roller 59 for engagement with the teeth of the sprockets. On the lower sides of certain links of the chain, at uniformly spaced intervals; are wheels or rollers 60, whereby the chain as a whole is rollingly supported upon the horizontal track. The main conveyer chain 52 is further provided at uniformly spaced intervals with laterally extending flights which, in turn, engage the bottles successively as they are delivered onto the section 55 of the trackway and push the bottles over the sections 55 and 56 of the trackway onto the front end of the carrier 43 of the leer, and leave them on the latter. These flights are pivotally mounted on the chain so as to be yieldable angularly at the completion of the travel of each bottle to its proper position on the leer-carrier, and means are provided for automatically restoring each flight, after it has deposited a bottle, to a position favorable for reengagement with another bottle upon its next round. This mechanism is best illustrated in the detail views Figs. 8, 9 and 10; and, referring thereto, 61 designates a sleeve or socket member that is preferably cast integral with the upper limb of a link of the chain 52, preferably that link which is directly supported by the track-wheels 60. Within the socket member 61 is mounted by a drive fit a spindle 62; and fitted on the upper end of the socket member 61, also by a drive fit, is a cam block 63. By reference to Fig. 9 it will be noted

that the cam block 63 has a high horizontal side 64, a low horizontal side 65, and, between the two, long and short cam inclines 66 and 67, respectively, which slant in opposite directions and merge in an apex 68 above the level of the high horizontal side 64 of the cam block.

Slidably and pivotally mounted on the spindle 62 is a cam sleeve 69 having on its lower side a depending extension 70, on one side of which latter is a long cam incline 71 that coöperates with the cam incline 66 of cam block 63, and on the other side of which is a short cam incline 72 that coöperates with the cam incline 67 of cam block 63. On one side of the sleeve 69 is a laterally extending lug 73 containing a vertical bore in which is adjustably keyed by a set screw 74 a vertically depending arm 75, on the lower end of which is secured a bottle-flight or paddle 76 preferably of a concave form on its bottle-engaging side in order to substantially fit the convex outer surface of the bottle or other article engaged and pushed forward thereby. On the sleeve 69 is also formed a short laterally extending arm 77 that constitutes an element of the means for restoring the paddle or flight 76 from idle to operative position.

On the upper end of the supporting post 47 that carries the sprocket wheel 48 is a rigid laterally extending arm 78 that coöperates with the arm 77 to restore the flight to bottle-engaging position in the manner hereinafter described.

Where the trackway of the main conveyer that travels across the front end of the leer is at a higher level than the delivery point of the bottle-righting apparatus that directly receives the bottles from the bottle-forming machine, it is necessary to provide an auxiliary conveyer, or mechanism of that nature, for transferring the bottles from the bottle-righting mechanism onto the trackway of the main conveyer. I have provided such an auxiliary conveyer, and the same is mainly illustrated in the detail views Figs. 5 and 6; although it is to be understood that, where circumstances will permit, this auxiliary conveyer may be dispensed with, and the bottles transferred directly from the bottle-righting mechanism of Fig. 7, or a similar mechanism, onto the trackway of the main conveyer.

Describing this auxiliary conveyer in detail, 11^a designates a low platform which may be mounted directly upon and across one end of the platform 11, or form an angular extension of the latter. In bearings 79 above one end of the platform 11^a is a shaft 80 on which is mounted a sprocket wheel 81 that engages the lower end of a continuous sprocket chain 82. The upper end of the chain 82 passes over a similar sprocket wheel 83, which latter is fast on a

shaft 84 that is journaled in bearings 85 on the lower side of a suitable frame structure that extends lengthwise of the sprocket chain and comprises mainly a pair of parallel transversely connected angle bars 86, which latter are pivotally mounted at their lower ends on the shaft 80, and are supported adjacent to and inwardly of their upper ends by a pair of strut braces 87. The lower ends of the struts 87 are mounted upon an intermediate eccentric portion 88 of a transverse shaft 89 that is journaled in bearings 90 on the platform 11^a.

91 designates a crank-arm on one end of the shaft 89 that is used as a hand-lever for adjusting the eccentric portion 88 of the shaft 89 to raise or lower the upper end of the conveyer frame by means of the struts 87; the parts being secured in adjusted position by a set screw 92.

Hinged to the sprocket chain 82 by means of pivot pins 93 passing through cooperating lugs 94 and 95 on the chain and flights, respectively, are a series of flights or bottle-carriers 96, each having a narrow triangular form in side elevation, so that, when the lower side of the flight conforms to the inclination of the sprocket chain, the upper side of the flight is horizontal. Each flight is preferably hollow, as shown in Fig. 6, and the lower edges of its opposite sides slidably engage, during the working movement of the flight, a slideway conveniently formed by a pair of angle bars 97 that are supported from the main angle bars 86 by transverse connecting strips 98. Supported upon legs 99 from the platform 11^a, and extending beneath the lower limbs of the endless carrier is a lower slideway 100 upwardly curved at its upper and lower ends, and constituting a support and guide for the flights during their idle or return movement. By reference to Fig. 1 it will be observed that the trackway section 55 is cut away or notched at 55', and the upper end of the auxiliary conveyer last described is so located relatively to this point that each flight, as it reaches its uppermost position, enters the said notch with its upper surface flush with the trackway 55. This auxiliary conveyer is given an intermittent or step-by-step movement synchronous with the oscillating movements of the cradle 18 which delivers bottles upright thereto by the following mechanism. On one end of the rock shaft 22 (Fig. 1) is a crank-arm 101 that is connected by a pitman 102 with a wrist-pin 103 on a horizontal oscillating crank-disk 104. On the same crank-disk is a wrist-pin 105 that is connected by a pitman 106 with the lower end of a pawl carrier 107 that is loosely journaled on the shaft 84 of the upper sprocket 83 and carries at its upper end a gravity pawl 108, this latter successively engaging the suitably spaced teeth

of a ratchet disk 109 that is fast on the shaft 84.

The main conveyer, may, of course, be actuated from any suitable source of power, but preferably, and as herein shown, it is continuously driven from the same power that actuates the auxiliary mechanisms delivering the bottles thereto.

Referring to Figs. 1 and 3, 110 designates a shaft that may be driven from any suitable source of power but is preferably geared to turn in timed relation to the movement of the bottle-forming machine. This shaft carries a spur gear 111 that meshes with and drives a mating gear 112 fast on a countershaft 113 that carries the crank-disk 25. The shaft 110, through bevel gears 114 and 115, shaft 116, bevel gears 117 and 118, shaft 119, and bevel gears 120 and 121, drives the vertical shaft 49 and, through the sprocket 50 on the upper end of said shaft, the main conveyer chain.

As the bottle-pushing devices carried by the main conveyer chain 52 extend to some height above the conveyer chain itself, I provide means on each of the sections of the trackway for engaging the upper ends of these devices during their travel between adjacent corners of the conveyer and supporting them laterally, thus preventing them from tipping sidewise and exerting a twisting or warping tendency upon the conveyer chain. This means may conveniently consist, as best shown in cross section, Fig. 5, of a pair of angle irons 122 and 123 supported at a suitable height above the trackway by brackets 124, and forming between their depending webs channel ways 125 through which pass the upper ends of the bottle-pushing devices; the latter being preferably provided with rollers 69' on the reduced upper ends of the cam sleeves 69 to reduce friction.

The operation of the apparatus as thus far described is as follows: By means of the bottle-righting device the bottles are delivered successively from the bottle-forming machine in upright position onto the upper sides of the flights 96 of the auxiliary conveyer; it being noted that the upper end of the curved slideway 13 registers with the upper surface of the lowermost of the flights 96 of the auxiliary conveyer that are in bottle-carrying position. Synchronously with each upward swing of the cradle 18, the auxiliary conveyer is given a forward movement of one step, thereby bringing an empty flight 96 into bottle-receiving position, and advancing each of the previously deposited bottles on the conveyer by one step, whereby the foremost bottle on said auxiliary conveyer is brought to a position in line with the trackway 55, the upper surface of the flight 96 carrying the same being flush with the trackway 55. As soon as the

foremost bottle is thus positioned, one of the paddles 76 of the main conveyer engages the bottle laterally and pushes it along the trackway 55, around the sprocket wheel 50 and along the trackway 56 onto the foremost pan of the leer-carrier 43. The first bottle received on said pan is carried lengthwise of the latter until it is arrested by the opposite side wall of the leer or by an abutment block 126 secured to said side wall. Thereupon the bottle offers a resistance to the paddle, causing the latter to swing rearwardly, whereupon the cam sleeve 69 turns through an angle of approximately 90 degrees, the cam surface 71 of the same riding up over the cooperating cam surface 66 of the cam block 63, until the lower end of the extension 70 of the sleeve 69 rests upon the high horizontal side 64 of the cam block 63, the short cam surface 72 sliding down the cooperating cam surface 67, and causing the paddle to fully clear the bottle. The paddle and the sleeve 69 carrying the same retain this idle position until, during their further travel, the arm 77 strikes the rigid arm 78, and this restores the paddle to bottle-engaging position. The bottle that is being advanced by the next succeeding paddle or pusher is similarly advanced over the pan of the leer-carrier until it engages the previously deposited bottle, whereupon its paddle or pusher is similarly swung to idle position. This operation is continued with the successive bottles until the foremost pan of the leer-carrier has received a row of bottles extending substantially from end to end thereof. The leer-carrier is then given an advance movement to the extent of substantially the width of one row of bottles, and the described cycle of operations is repeated until the next row of bottles is deposited, and so on.

In order to render the apparatus entirely automatic, I have provided a mechanism whereby the motor of the leer-carrier is energized to step the latter forward to the extent of the width of one row of bottles upon the completion of the deposit of each complete row of bottles on the carrier. This mechanism is designed to operate in connection with an electric motor for actuating the leer-carrier, but it will be evident that mechanism similar in principle may be employed to control the movement of the leer-carrier whether driven by an electric motor or other independent motor or from the same source of power as that which operates the feeding-in-mechanism. Referring to Fig. 4, 127 designates a lever pivoted between its ends on a lug 128 mounted on the upper side of the overhead channel-guide for the bottle-pushers on the track section 56. One end of the lever 127 is bent downwardly into the channel forming a trip member 129. The other end of the lever 127 is loosely

pivoted at 130 to the adjacent end of a companion lever 131 also pivoted between its ends on a pivot lug 132. The opposite end of the lever 131 carries a thrust connection 133, including a compression spring 134, to a laterally extending lug 135 near the lower end of a pivoted contact arm 136, this latter carrying at its upper end a contact point 137.

On the shaft 119 which drives the main conveyer is a disk 138 on the periphery of which are a pair of copper rings 139 and 140 electrically connected by a short cross strip 141. The ring 140 is continuous, but the ring 139 is interrupted by a short strip 142 of fiber or other insulating material. 143 and 144 designate a pair of brushes that engage the rings 139 and 140, respectively.

145 designates a switch controlling the circuit (not shown) of an electric motor (not shown) that drives the leer-carrier 43, said switch being shifted to circuit-closing position by an electro magnet 146.

147 designates a contact point that operates with the contact point 137, and 148 designates an electro magnet cooperating with an armature 149 on the contact-arm 136 to hold the circuit that energizes the switch magnet 146 closed at the points 137, 147, through the desired period, the contact-arm 136 normally tending to fall away from the contact point 147 by gravity.

150 designates a battery or other current generator. A circuit wire 151 connects contact point 147 with one pole of the battery 150. Circuit wire 152 connects the other pole of the battery 150 with one end of the winding of switch magnet 146. Circuit wire 153 connects the other end of the winding of switch magnet 146 with contact brush 144. Circuit wire 154 connects the other brush 143 with the lower end of contact-arm 136. The parts last described complete the energizing circuit of the motor switch magnet 146.

The holding circuit comprises circuit wire 155 leading from one pole of battery 150 to one end of the wiring of the holding magnet 148, circuit wire 156 leading from the other end of the wiring of the holding magnet into the circuit wire 153, wire 153, brush 144, ring 140, cross-strip 141, ring 139, brush 143, circuit wire 154, contact-arm 136, contacts 137 and 147 (at this time closed) and circuit wire 151 connecting contact point 147 with the other pole of the battery.

As the bottle-pushing device deposits the last bottle of the row on the foremost pan of the leer-carrier, its upper end (which is raised by the rearward swing of the pusher or paddle to idle position) wipes under and raises the trip 129, which latter has been cleared by all the previous bottle-pusher devices delivering bottles to the same row.

This, through the mechanical connections described, closes the energizing circuit of the switch magnet 146 at the contact points 137 and 147. This connection is timed to occur at the instant the brush 143 has just passed over the break or insulation 142 of the ring 139. The closing of the contacts 137, 147 also closes the holding circuit through the magnet 148, so that both the energizing circuit and the holding circuit are maintained closed during substantially one complete rotation of the timing disk 138; this period corresponding to the period during which the motor of the leer-carrier is energized to step the leer-carrier forward through the width of one row of bottles. As soon as the brush 143 again reaches and passes over the insulation or break 142, both circuits are broken, and the contact-arm 136 falls back, thus disconnecting the energizing circuit of the switch magnet 146 until another complete row of bottles has been deposited and the mechanical contact tripping mechanism is again actuated in the manner described.

The bottles or other glassware are, of course, removed manually from the rear end of the leer in the usual manner.

From the foregoing it will be apparent that the apparatus of my invention dispenses entirely with all manual operations in transferring the freshly made bottles or other glassware from the blowing and molding or other forming machine into the leer, requiring the presence of only a single attendant to keep the apparatus in proper running order, remove an occasional defective bottle, and attend to other occasional contingencies. The period of time occupied by the bottles in passing from the forming machine into the leer through the agency of the apparatus herein described insures a sufficient cooling of the bottles to prevent any danger of their sticking together when deposited in the leer side by side in the manner described.

I am aware that prior to my invention it has been proposed to transfer the bottles and like glassware from the melting pot to the front opening of the leer by an endless conveyer, and then manually push a row of bottles thus positioned in front of the leer-carrier from the conveyer onto the latter. Obviously, such an apparatus is not a complete and automatic instrumentality for delivering the freshly molded or blown glassware into the annealing leer.

By the apparatus of my invention all manual manipulation of the bottles, and the subsequent liability of accident resulting therefrom, is obviated, and uniformity in the character of the product is insured through an absolutely uniform treatment of all the bottles during the period between the forming and the annealing operations.

Numerous other practical benefits and advantages of my invention might be enumerated, and will be evident to those familiar with glass manufacture, but need not be further developed here. It will also be manifest to those skilled in the art that minor modifications and variations in the details of the apparatus shown and described may be made without involving any departure from the principle of the invention or sacrificing to any extent the benefits and advantages secured thereby. Hence, I do not limit the invention except as clearly specified in the appended claims.

I claim—

1. In an apparatus for the manufacture of bottles and similar glassware, the combination with a leer having an endless carrier, of a single continuous trackway for said glassware extending from a point outside the leer through a side wall of the latter to and substantially flush with one edge of the leer-carrier, an endless conveyer chain operating over said trackway, and yieldable flights carried by said conveyer chain serving to engage bottles set on said trackway and push the same over the latter onto the forward end of said leer-carrier.

2. In an apparatus for the manufacture of bottles and similar glassware, the combination with a leer having an endless carrier, of a trackway for said glassware extending from a point outside the leer through a side wall of the latter to and substantially flush with one edge of said leer-carrier, a portion of said trackway of reduced width also extending across the receiving end of the leer in front of the leer-carrier, an endless conveyer chain mounted on rollers traveling over said trackway, and yieldable flights carried by said conveyer chain serving to engage bottles set on said trackway and push the same over the latter onto the forward end of the leer-carrier.

3. In an apparatus for the manufacture of bottles and similar glassware, the combination with a leer having an endless carrier, of a trackway for said glassware extending from a point outside the leer through a side wall of the latter to and substantially flush with one edge of the leer-carrier, an endless conveyer chain operating over said trackway, vertically pivoted flights carried by said conveyer chain serving to engage bottles set on said trackway, and means for maintaining said flights engaged with said bottles while pushing the latter over said trackway, said means being yieldable to allow said flights to swing rearwardly out of the path of the bottles upon the arrest of the latter within the leer.

4. In an apparatus for the manufacture of bottles and similar glassware, the combination with a leer having an endless carrier, of a trackway for said glassware extending

from a point outside the leer through a side wall of the latter to and substantially flush with one edge of the leer-carrier, an endless conveyer chain operating over said trackway, flights pivotally mounted on said conveyer chain and serving to push bottles along said trackway and onto the leer-carrier, and cams also mounted on said conveyer chain yieldably opposing a backward swinging movement of said flights during the engagement of the latter with the bottles.

5. In an apparatus for the manufacture of bottles and similar glassware, the combination with a leer having an endless carrier, of a trackway for said glassware extending from a point outside the leer through a side wall of the latter to and substantially flush with one edge of the leer-carrier, an endless conveyer chain operating over said trackway, flights pivotally mounted on said conveyer chain serving to push bottles along said trackway and onto the leer-carrier, cams mounted on said conveyer chain yieldably opposing a backward swinging movement of said flights during the engagement of the latter with the bottles, and means for automatically restoring said pivoted flights to bottle-engaging position relatively to said trackway during their idle or return travel.

6. In an apparatus for the manufacture of bottles and similar glassware, the combination with a leer having an endless carrier, of a trackway extending from a point outside the leer through a side wall of the latter to and substantially flush with one edge of the leer-carrier, an endless conveyer chain operating over said trackway, yieldable flights mounted on said conveyer chain serving to push the bottles along said trackway and onto the leer-carrier, and mechanism operating to deliver freshly made bottles from the bottle-forming machine successively to a fixed point on said trackway in the path of movement of said flights.

7. In an apparatus for the manufacture of bottles and similar glassware, the combination with a leer having an endless carrier, of a trackway extending from a point outside the leer through a side wall of the latter to and substantially flush with one edge of the leer-carrier, a main conveyer chain operating over said trackway and having yieldable flights serving to push the bottles along said trackway and onto the leer-carrier, an auxiliary conveyer at one end intersecting said trackway and provided with a series of bottle-carriers operating to successively deliver freshly made bottles from a bottle-forming machine to said trackway in the path of movement of said flights, means for imparting a continuous travel to said main conveyer chain, and means for imparting an intermittent travel to said auxiliary conveyer.

8. In an apparatus for the manufacture

of bottles and similar glassware, the combination with a leer having an endless carrier, of a trackway extending from a point outside the leer through a side wall of the latter to and substantially flush with one edge of the leer-carrier, a main conveyer chain operating over said trackway and having yieldable flights serving to push the bottles along said trackway and onto the leer-carrier, an inclined auxiliary conveyer at its upper end intersecting said trackway and provided with a series of stepped bottle-carriers operating to successively carry up and deliver freshly made bottles from a bottle-forming machine to said trackway in the path of movement of said flights, means for imparting a continuous travel to said main conveyer chain, and means for imparting an intermittent travel to said auxiliary conveyer.

9. In an apparatus for the manufacture of bottles and similar glassware, the combination with a leer having an endless carrier, of a trackway extending from a point outside the leer through a side wall of the latter to and substantially flush with one edge of the leer-carrier, a main conveyer chain operating over said trackway and having yieldable flights serving to push the bottles along said trackway and onto the leer-carrier, an inclined auxiliary conveyer at its upper end intersecting said trackway and provided with a series of stepped bottle-carriers operating to successively carry up and deliver freshly made bottles to said trackway in the path of movement of said flights, means for imparting a continuous travel to said main conveyer chain, means for imparting an intermittent travel to said auxiliary conveyer, and a bottle-righting apparatus receiving freshly made bottles directly from a bottle-forming machine and delivering them upright successively onto the lower end of said auxiliary conveyer.

10. In an apparatus for the manufacture of bottles and similar glassware, the combination with a leer having an endless carrier, of a main conveyer for the bottles to be annealed extending across the receiving end of the leer, said main conveyer including automatic means for effecting delivery of the bottles onto the leer-carrier, an auxiliary conveyer operating to successively deliver freshly made bottles from a bottle-forming machine to said main conveyer, means for imparting a continuous travel to said main conveyer, means for imparting an intermittent travel to said auxiliary conveyer, and means automatically tripped into action by said main conveyer for effecting a movement of the leer-carrier at predetermined intervals during the travel of said main conveyer.

11. In an apparatus for the manufacture of bottles and similar glassware, the com-

5 combination with a leer having an endless carrier, of a trackway extending from a point outside the leer through a side wall of the latter to and substantially flush with one
10 edge of the leer-carrier, a main conveyer chain operating over said trackway and having yieldable flights serving to push the bottles along said trackway and onto the leer-carrier, an auxiliary conveyer at one end intersecting said trackway and provided with
15 a series of bottle-carriers operating to successively deliver freshly made bottles from said bottle-forming machine to said trackway in the path of movement of said flights, means for imparting a continuous travel to
20 said main conveyer chain, means for imparting an intermittent travel to said auxiliary conveyer, and means automatically tripped into action by the flights of said main conveyer chain for effecting a movement of the leer-carrier at predetermined intervals during the travel of said main conveyer chain.
25 12. In an apparatus for the manufacture of bottles and similar glassware, the combination with a leer having an endless carrier, of a trackway extending from a point outside the leer through a side wall of the latter to and substantially flush with one

edge of the leer-carrier, a main conveyer chain operating over said trackway and
30 having yieldable flights serving to push the bottles along said trackway and onto the leer-carrier, an inclined auxiliary conveyer at its upper end intersecting said trackway and provided with a series of stepped bottle-carriers operating to successively carry
35 up and deliver freshly made bottles from a bottle-forming machine to said trackway in the path of movement of said flights, means for imparting a continuous travel to said main conveyer chain, means for imparting an intermittent travel to said auxiliary conveyer, a bottle-righting apparatus receiving
40 freshly made bottles directly from a bottle-forming machine and delivering them upright successively onto the lower end of said auxiliary conveyer, and means automatically tripped into action by the flights
45 of said main conveyer chain for effecting a movement of the leer-carrier at predetermined intervals during the travel of said main conveyer chain.
50

CARL S. DAYTON.

Witnesses:

F. E. FITZGIBBON,
E. RADEBAUGH.