

April 2, 1940.

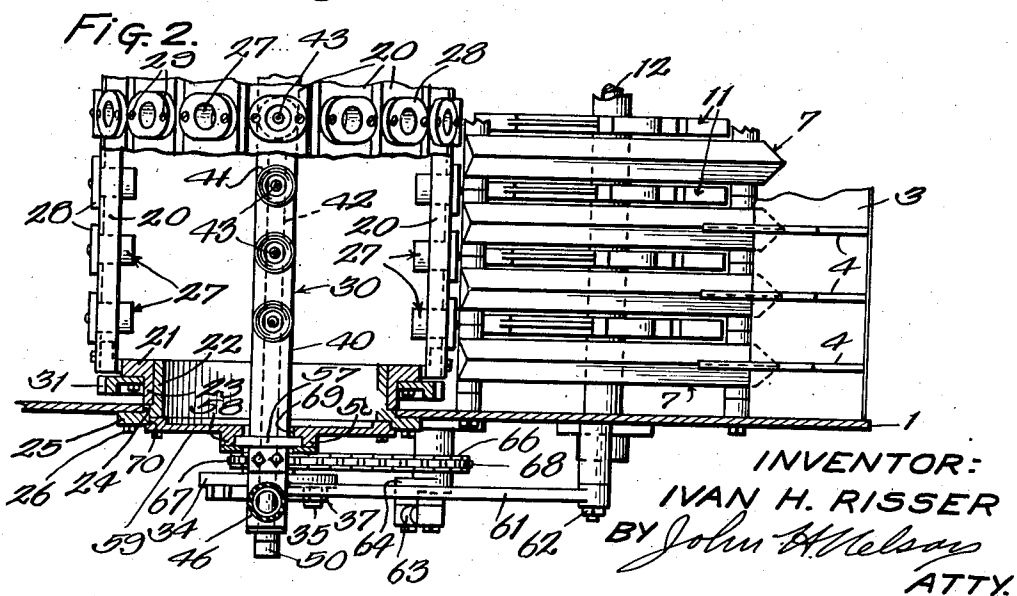
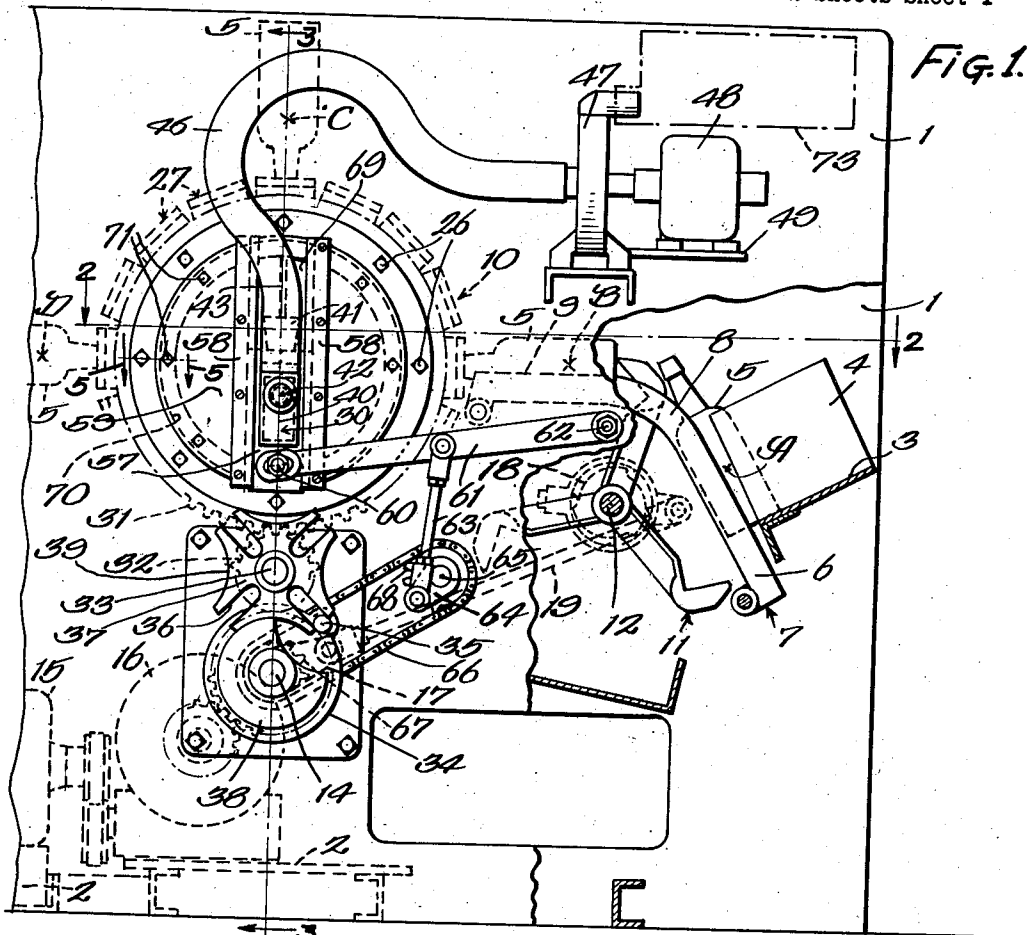
I. H. RISSE

2,196,027

CONTAINER CLEANING MACHINE

Filed May 19, 1937

2 Sheets-Sheet 1



INVENTOR:

IVAN H. RISSE

BY John H. Nelson

ATTY.

April 2, 1940.

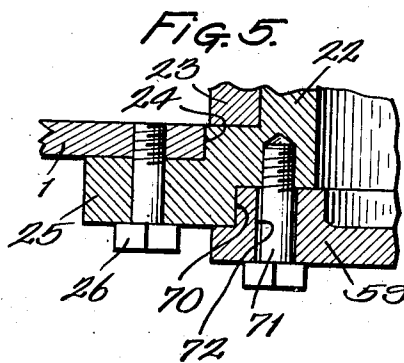
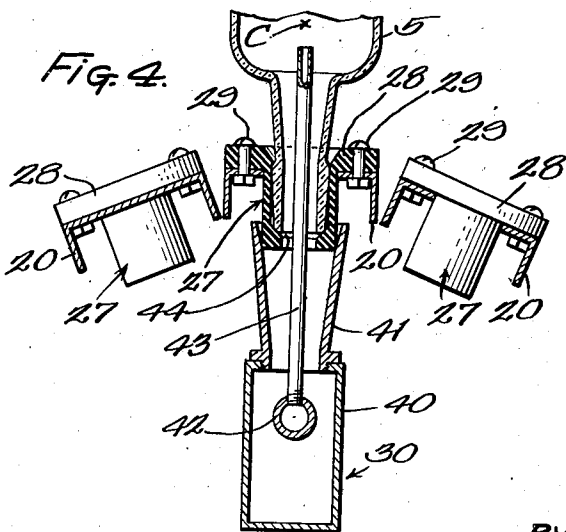
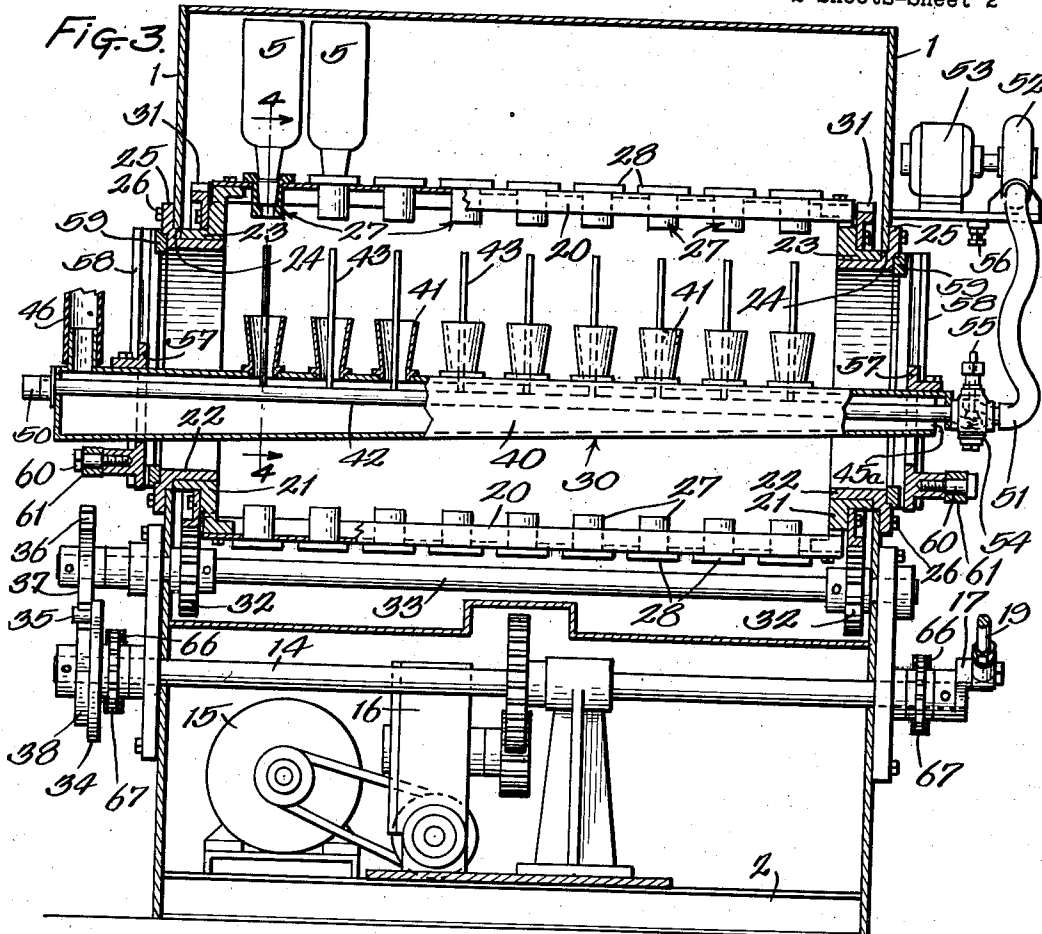
I. H. RISSE

2,196,027

CONTAINER CLEANING MACHINE

Filed May 19, 1937

2 Sheets-Sheet 2



INVENTOR:
IVAN H. RISSE
BY *John H. Nelson*
ATTY.

UNITED STATES PATENT OFFICE

2,196,027

CONTAINER CLEANING MACHINE

Ivan H. Risser, Chicago, Ill., assignor to U. S. Bottlers Machinery Co., Chicago, Ill., a corporation of Illinois

Application May 19, 1937, Serial No. 143,440

5 Claims. (Cl. 15-14)

This invention relates to container cleaning machines, and particularly pertains to that class of machines having an endless intermittently driven conveyor for conveying transverse rows of inverted containers, such as bottles, through the machine step by step, and employing operated cleaning apparatus contained within the conveyor for cleaning the bottles internally when they approach a certain station.

10 The object of the invention is to provide such a machine of the simplest construction, which can be more easily and cheaply constructed than other machines now in use, which will be most satisfactory and efficient in operation, and which will not be liable to get out of order. A further object is to provide such a machine wherein the conveyor and cleaning apparatus is so arranged to permit removal of said apparatus from within the conveyor, so that inspection or replacement of parts of the conveyor or apparatus may be made and then reassembled expeditiously, with the assurance that the proper relation of the parts has been maintained.

Other objects and advantages will become apparent by reference to the specification and the accompanying drawings, in which:

Fig. 1 is a fragmentary side elevation of the machine of the invention, with its discharge end omitted, with parts broken away and other parts in section.

Fig. 2 is a fragmentary plan section of the machine, as taken substantially on the section line 2-2 of Fig. 1.

Fig. 3 is a vertical cross-section of the machine, as taken substantially on the section line 3-3 of Fig. 1.

Fig. 4 is an enlarged detail section, as taken substantially on the section line 4-4 of Fig. 3, with parts shown in changed position.

Fig. 5 is an enlarged detail section taken substantially on the section line 5-5 of Fig. 1.

The machine illustrated, forming one embodiment of the invention, includes a frame comprising interconnected side-frame members 1 in the form of laterally spaced upright plates suitably secured on a base frame-work 2.

Mounted on and extending between the side-frame members at the right hand end of the machine, as seen in Fig. 1, is an inwardly and downwardly inclined feed shelf 3 having partitions 4 spaced therealong forming passage-ways in which the containers or bottles 5 to be cleaned are placed in upright position to be urged by force of gravity to a transfer station A preparatory to being fed into the machine. At the station A, the

bottles are caused to lean against upwardly inclined guide portions 6 of guide rails 7, which are spaced in accordance with the spacing of the partitions 4, and which are arranged so that the bottoms of the bottles extend partly beyond the shelf so as to be engageable thereunder. The guide rails 7 continue upward from their portions 6 into curved portions 8 which continue inward of the machine into horizontal portions 9 for guiding the bottles to and cooperating to support them in horizontal position at the loading station B of an endless conveyor 10, to which station the bottles are elevated by suitable feeding means.

The feeding means includes a plurality of star wheels 11 mounted in spaced relation on a shaft 12 which is rotatably mounted in bearings in the side frames 1. The star wheels are so arranged and the shaft 12 is so intermittently driven that the arms of the wheels pass between the guide rails 7 upon each movement of the shaft and engage the bottoms of the bottles at the station A and elevate same along the guide rails to the station B. As seen in Fig. 1, the star wheels 11 are rotated in counter-clockwise direction, and are intermittently rotated by a power shaft 14 disposed below the conveyor 10 and rotatably mounted in bearings in the side frames 1. The power shaft is constantly driven by an electric motor 15 through intermediation of a speed reducer 16, with the power shaft being connected to the shaft 12 to intermittently advance same, in accordance with the spacing of the arms of the star wheels, by means of a crank 17 on the power shaft operating a ratchet device 18 on the shaft 12 through a connecting link 19.

The conveyor 10 is drum-shaped and comprises a series of circularly arranged equally spaced transverse cleats 20 mounted at their ends upon ring-like wheels 21, respectively, with the cleats being in the form of channel pieces arranged with their flanges extending inward of the conveyor. The wheels 21 are rotatably mounted, respectively, on centrally open bearings 22 secured on the side frames, with the bearings being arranged so that the axis of the conveyor will intersect the horizontal axes of the bottles at the station B. The bearings 22 are in the form of cylindrical sections upon which the hubs 23 of the wheels 21 are mounted for rotation, with the said sections extending through openings 24 in the side frames 1 and terminating in lateral flange portions 25 secured on the outer faces of the side frames by bolts 26.

Each cleat 20 is provided with a longitudinal row of bottle holders or bottle-neck-receiving

2

pockets 27 for supporting the bottles in inverted position upon the upper part of the conveyor, with the pockets of each row being spaced in accordance with the spacing of the bottles at the station B, so as to be capable of receiving the bottles at said station. The pockets are in the form of tubular sections of resilient material, such as resilient rubber, which extend through openings in the cleats toward the axis of the conveyor, and with each pocket having a lateral flange 28 at its receiving end secured to its cleat by bolts 29. Thus each pocket is capable of being flexed on the conveyor from a normal position to a tilted position by force of momentum imparted to a bottle in the pocket as same is intermittently advanced on the conveyor. This flexing action of the pockets effectively prevents breakage of the bottles at their neck portions because the vibratory action imparted to the bottles when conveyed is absorbed by the pockets as they are brought to rest after each movement of the conveyor.

The conveyor 10 is intermittently driven in counter-clockwise direction, as seen in Fig. 1, so that the transverse rows of pockets 27 are intermittently advanced into coaxial registration with the bottles at the loading station B, with the operation of the star wheels 11 being timed to feed the bottles into the pockets upon being advanced to said station.

Upon being fed to the conveyor 10, the bottles are advanced in transverse rows into an inverted position with their axes perpendicular to the horizontal and intersecting the axis of the conveyor, as at the station C, in cooperative relation with a cleaner head 30 which pneumatically removes dust or other foreign matter from the interior of the bottles while the conveyor is at rest. After being cleaned, the bottles are advanced on the conveyor until they assume a horizontal position as at the station D where they are or may be removed by hand or automatic discharging apparatus, not shown.

For driving the conveyor 10, intermittently, each wheel 21 thereof is provided with a concentric ring-shaped gear 31 which meshes with a smaller gear 32 secured on a shaft 33 located directly below the conveyor and being rotatably mounted in bearings in the side frames 1. The shaft 33 is intermittently driven, to intermittently advance the rows of pockets, by the power shaft 14 through the intermediation of a suitable Geneva motion connection. The said connection includes a crank-disc 34 secured on one end of the power shaft and having a crank pin 35 which, during a quarter of each revolution of the power shaft, is caused to enter and have sliding engagement within one of four radial slots 36 in the arms respectively of a star-shaped wheel 37 secured on one end of the shaft 33, and which is arranged to advance said shaft a quarter of a turn during its engagement with the crank pin. The wheel 37 is positively held after each advance of the shaft 33 by a concentric cam-dwell formation 38 on the crank-disc being snugly received within one of the peripheral concavities 39 in the wheel. The gears 31 and 32 are so proportioned that, upon each quarter turn of the shaft 33, the conveyor will be advanced an amount in accordance with the spacing of the rows of pockets thereof.

The cleaning head 30 comprises an elongated air-suction manifold 40 disposed within the conveyor and extending longitudinally thereof through. The said manifold is rectangular in

cross-section and along its top wall is provided a row of air-intake connections 41 in the form of upwardly flaring funnel-shaped extensions. The said extensions are spaced to be coaxial respectively with a row of pockets at the station C, and are of such size to tightly receive the free or lower ends of the pockets for providing a communicating connection between the pockets and the manifold during the cleaning operation, later described.

Extending freely and longitudinally within the manifold 40, and suitably secured thereto, is an air-pressure manifold 42, in the form of a pipe having vertically extending air-pressure nozzles 43 which freely project coaxially through the air-intake connections 41 to extend upward therefrom for directing jets of air under pressure into the bottles at the station C. To this end, the manifold 40 is mounted for movement to raised and lowered positions, and is so operated to cause the nozzles 43 to project into the bottles at the station C, and to cause the air-intake connections 41 to be pressed into engagement with the lower ends of the pockets supporting the bottles, after each advance of the conveyor as seen in Fig. 4.

Each pocket 27 is counter-bored to provide an internal conical seat 44 in the free end thereof upon which the mouth end of a bottle supported in the pocket is adapted to rest in sealed connection with the pocket when at the station C, with the neck portion of the bottle being slidably received within the enlarged bore portion 45 of the pocket so that the bottle may be easily fed into the pocket and removed therefrom. Thus the pockets provide seals between the bottles supported thereby and the air-intake connections 41 that are capable of being flexed into register with the air-intake connections when engaged thereby, in the event the pockets are slightly out of register with the connections when the cleaner head is raised, or in the event the pockets differ slightly in length.

The ends of the manifold 40 extend through the openings of the bearings 22 of the conveyor 10, with one end having a vent opening 45a adapted to be open to atmosphere, and the other end of the manifold being connected by a flexible conduit 46 with a source of vacuum comprising a vacuum pump 47 driven by a motor 48, with the pump and motor being mounted on a bracket 49 of one of the side frames 1. Thus suction will be established at the connections of the manifold 40 by force of air being drawn through the manifold from its vent opening. The vent opening 45a is slightly larger in area than any one of the connections 41, so that when the manifold is in raised position with its connections engaging the pockets, the velocity of the air passing through the manifold will be substantially greater than that of the air passing into the manifold through its connections, thus preventing the possibility of the manifold becoming clogged by dust or other foreign matter drawn from the bottles. To establish a substantially uniform degree of suction at the connections 41, within the manifold 40, said manifold is formed to gradually increase in area as it continues from its connection nearest its vented end to its connection nearest its other end.

The air-pressure manifold 42 has one end closed as at 50, with its other end extending through the vent opening of the manifold 40 and being connected by a flexible conduit 51 with a source of air-pressure comprising a pres-

sure pump 52 driven by a suitable motor 53, diagrammatically shown in Fig. 3. A common type of plunger operated valve is provided in the inlet end of the manifold 42, as seen at 54, for controlling the flow of air in the manifold, so that air will be admitted to the nozzles thereof when they approach their raised position within the bottles at the station C. To this end, the valve has a spring-pressed valve operating plunger 55 normally maintaining the valve closed when the cleaner head is in lowered position, with the plunger arranged to be depressed for opening the valve when the head is in raised position by engaging a stationary stop 56 mounted on one of the side frames 1.

For mounting the manifold 40 for movement to raised and lowered positions, each end of the manifold projects through and is secured on a centrally open cross-head 57 which is mounted for vertical reciprocation between gibs or guide-ways of spaced guide portions 58 of a bracket 59 detachably mounted on each bearing 22 of the conveyor 10. Each cross-head has a sliding pivotal connection, as at 60, with the free end of a horizontally disposed lever 61 fulcrumed at 62 on each side frame 1, with the levers being oscillated in unison, to effect the raising and lowering of the cleaner head, by having operable connection with the power shaft 14. To this end, each lever is pivotally connected with one end of a connecting link 63 whose other end is pivotally connected with a crank 64 secured on each end of a jack shaft 65 rotatably mounted in bearings in the side frames 1. The jack shaft 65 is driven in unison with the power shaft, so as to effect the raising and lowering of the cleaner head in proper timed relation with movement of the conveyor, through the intermediation of a pair of sprocket chains 66 which are trained over pairs of sprocket wheels 67 and 68 respectively secured on the power shaft and jack shaft.

Each bracket is in the form of a disc with a central slot 69 between its guide portions 59, through which slot the manifold 40 projects for movement to raised and lowered positions. Each bracket is snugly received within a concentric annular depression or recess 70 in the outer end of each bearing 22, with the brackets being secured to the bearings by bolts 71 which freely pass through bolt holes 72 in the brackets to be threaded into the bearings. The bolt holes 72 are slightly larger in diameter than the bolts 71, so that, by loosening the bolts, the brackets may be slightly rotated on the bearings 22 for adjusting the nozzles 43 and the connections 41 of the cleaner head in register with the pockets at the station C of the conveyor.

The openings of the bearings 22 are of such size as to permit the removal of the cleaner head therethrough from within the conveyor, in order that the cleaner head and the conveyor may be inspected for repair from time to time with the least amount of effort.

The cleaning operation is as follows.

With the cleaner head in raised position and in engagement with the pockets at the station C, air is admitted into the bottles from the nozzles 43 under pressure of the pump 52, and then is caused to circulate through the bottles in the pockets and out through the necks thereof and into the connections 41 at a velocity practically dependent upon the pressure of the pump, without being influenced by suction in the manifold 40 until entering therein, because of the vent-

opening provided in the end of the manifold. Thus air is positively forced into the bottles and positively withdrawn therefrom without the possibility of suction in the manifold 40 so countering the pressure of the pressure pump as to limit the area in which the air will circulate in the bottles, and whereby the removal of dust or other foreign matter from the bottles is assured.

It may be stated that the capacity of the pressure pump 52 is such that it will not overcome the pull of the vacuum pump 47 upon the manifold 40 during the cleaning operation and cause the dust or foreign matter removed from the bottles to be blown out through the vent-opening of the manifold.

To prevent contamination of the cleaning operation by dust or other foreign matter ejected from the exhaust port of the vacuum pump 47, any form of a dust collecting trap may be attached to the exhaust port, such as that diagrammatically illustrated at 73, and may be in the form of a cloth bag or the like.

The bottle feeding or loading means herein disclosed forms generally the subject-matter of my Patent No. 2,128,192 of August 23, 1938.

The rubber bottle holders or pockets herein disclosed form generally the subject-matter of my Patent No. 2,105,795 of January 18, 1938.

Having thus described my invention, I claim:

1. In apparatus of the class described, means to support a plurality of containers, and means for circulating air through the supported containers to clean same including an elongated air-suction manifold having a row of air-intake connections spaced therealong arranged and adapted to be connected with the containers respectively to withdraw air therefrom, a source of vacuum connected with one end of the manifold to establish a suction in the connections, and the manifold having its other end provided with an opening open to atmosphere and being greater in area than that of any one of the connections for causing air to flow through the manifold from said opening at a greater velocity than that of the air being drawn into the manifold through the connections from the containers for preventing cloggage of the manifold by foreign matter drawn therein from the containers.

2. The combination with a conveyor arranged to convey a bottle with an extended neck in inverted position to a given station and having an open-ended pocket adapted to snugly receive the neck of the bottle, said pocket being of resilient material and arranged to have sealing engagement with the neck of the bottle and to be capable of tilting on the conveyor from a normal position by force of momentum imparted to the bottle therein upon said movement of the conveyor, of means for circulating a fluid cleaning medium through the bottle to clean same when at said station including a reciprocable fluid-conducting member arranged and adapted to have sealing engagement with the bottom end of the pocket to conduct the fluid from the bottle therein and to hold the pocket in its normal position on the conveyor during the cleaning operation.

3. The combination with a conveyor arranged to intermittently advance a succession of bottles with extended necks in inverted position to a given station and including open-ended pockets adapted to snugly receive the necks of the bottles, each pocket being of resilient material and arranged to have sealing engagement with the neck of the bottle therein and to be capable of

- tilting from a normal position on the conveyor by force of momentum imparted to the bottle upon each movement of the conveyor, of means for circulating a fluid cleaning medium through a bottle to clean same when at said station including a reciprocable fluid cleaner head arranged at the station having a nozzle movable to a position centrally within the bottle for directing the fluid therein and a fluid-conducting member connected with the head arranged and adapted to have sealing engagement with the bottom end of the pocket to conduct the fluid from the bottle therein and to hold the pocket in its normal position central with the nozzle.
4. The combination with a conveyor arranged to intermittently advance a succession of bottles with extended necks in inverted position to a given station and including open-ended pockets adapted to snugly receive the necks of the bottles, each pocket being of resilient material and being formed and arranged to have sealing engagement with the neck of the bottle therein and to be capable of tilting from a normal position on the conveyor by force of momentum imparted to the bottle upon each movement of the conveyor, of means for circulating a fluid cleaning medium through the bottle to clean same when at said station including a fluid cleaner head movable to raised and lowered positions below the pocket at the station and having a nozzle arranged to enter the bottle central therewith for directing the fluid into the bottle and having a funnel-shaped fluid-conducting member arranged to engage over the bottom end of the pocket to conduct the fluid from the bottle therein and to hold the pocket central with the nozzle when the head is in its raised position.

5. The combination with a conveyor arranged to convey a succession of transverse rows of bottles with extended necks in inverted position to a given station and having open-ended pockets adapted to snugly receive the necks of the bottles, said pockets being composed of resilient rubber and being formed and arranged to have sealing engagement with the necks of the bottles therein and to be capable of tilting from a normal upright position on the conveyor by force of momentum imparted to the bottles therein upon said movement of the conveyor, of means for circulating air through a row of bottles when at the said station including an elongated air-suction manifold arranged under the pockets at the station, said manifold being movable to raised and lowered positions and having a row of funnel-shaped air-intake connections adapted and arranged to engage over the lower ends of the pockets respectively to withdraw the air from the bottles and to hold the pockets in their normal positions on the conveyor when the manifold is in its raised position, a source of vacuum connected with one end of the manifold to establish a suction in the connections, and the manifold having its other end provided with an opening open to atmosphere and being greater in area than that of any one of the connections for causing air to flow through the manifold from said opening at a greater velocity than that of the air being drawn into the manifold through the connections from the bottles for preventing cloggage of the manifold by foreign matter drawn therein from the bottles.

IVAN H. RISSER.