United States Patent

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[54] **CONTAINER WASHING INVERTING AND CONVEYING APPARATUS**
10 Claims, 13 Drawing Figs.

[52] **U.S. Cl.** **134/65,** 134/68, 134/134, 134/152, 198/33
[51] **Int. Cl.** **B08b 9/08,** B67c 1/06
[50] **Field of Search** 134/62, 65, 67, 68, 72, 134, 152

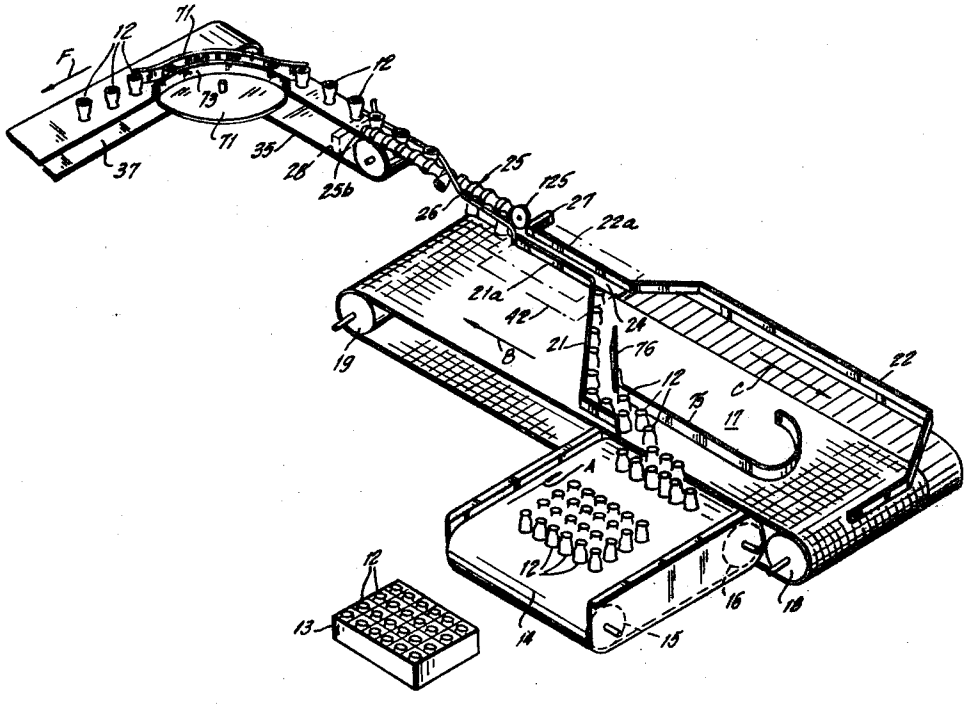
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ABSTRACT: Jars or containers are multiple loaded open end facing down on the upper flight of a meshlike conveyor belt which delivers the containers single-file to an inverting means. Prior to arriving at the inverting means the containers are flushed clean by water sprayed upward through the mesh conveyor and thereafter an airstream, also directed up through the conveyor, acts to dry the containers. The inverting means consists of a screw conveyor and twisted bar means which maintains the containers in operative engagement with the screw conveyor to guide each container for gradual pivoting 180° to a position wherein the mouth faces up at the time the container reaches the output end of the inverting means. In an alternate embodiment for handling straight sided containers, guide rail means is provided to hold each container as it is being moved by the screw conveyor and pivoted by the twisted rail.

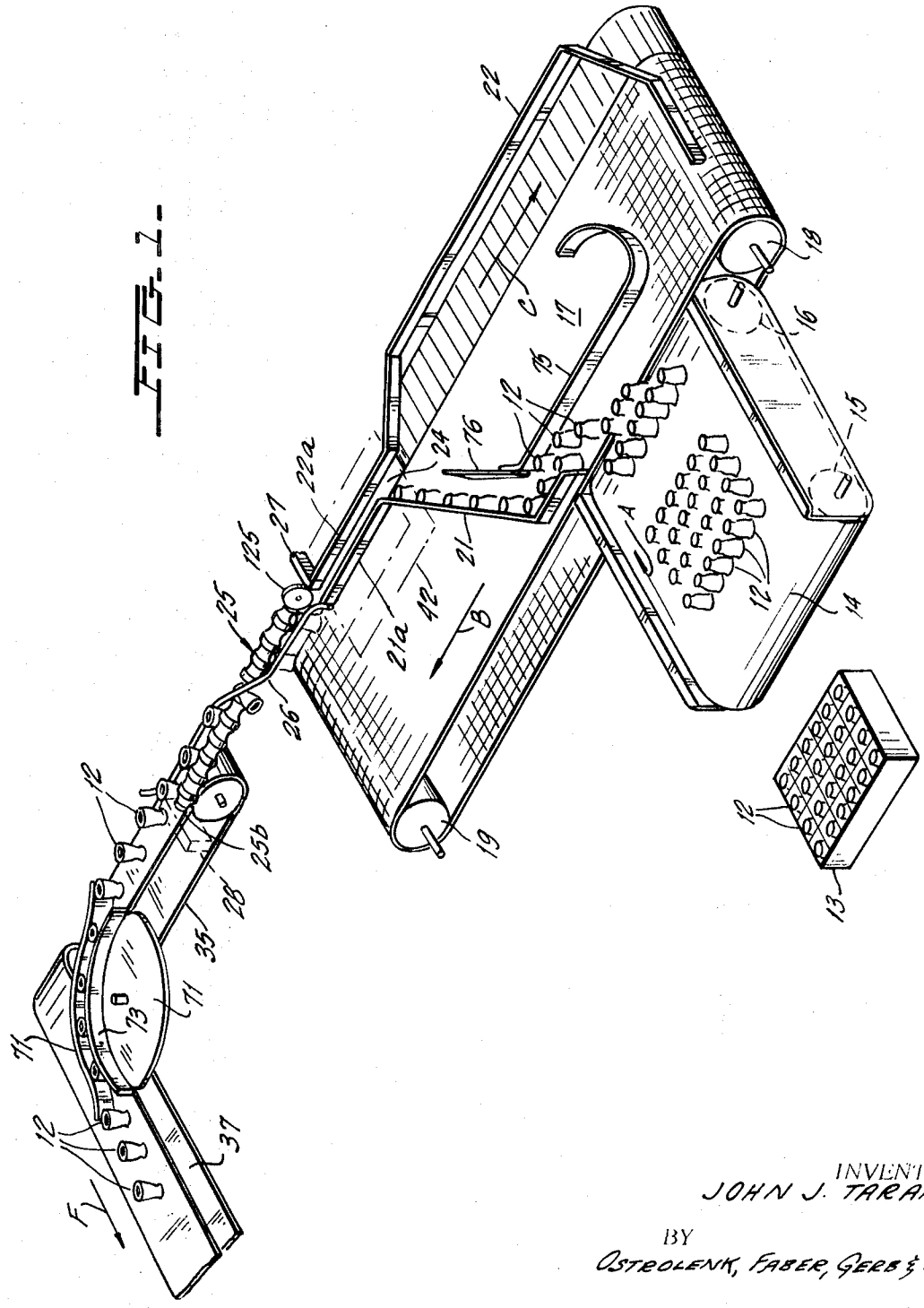


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FIG. 1.



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FIG. 2.

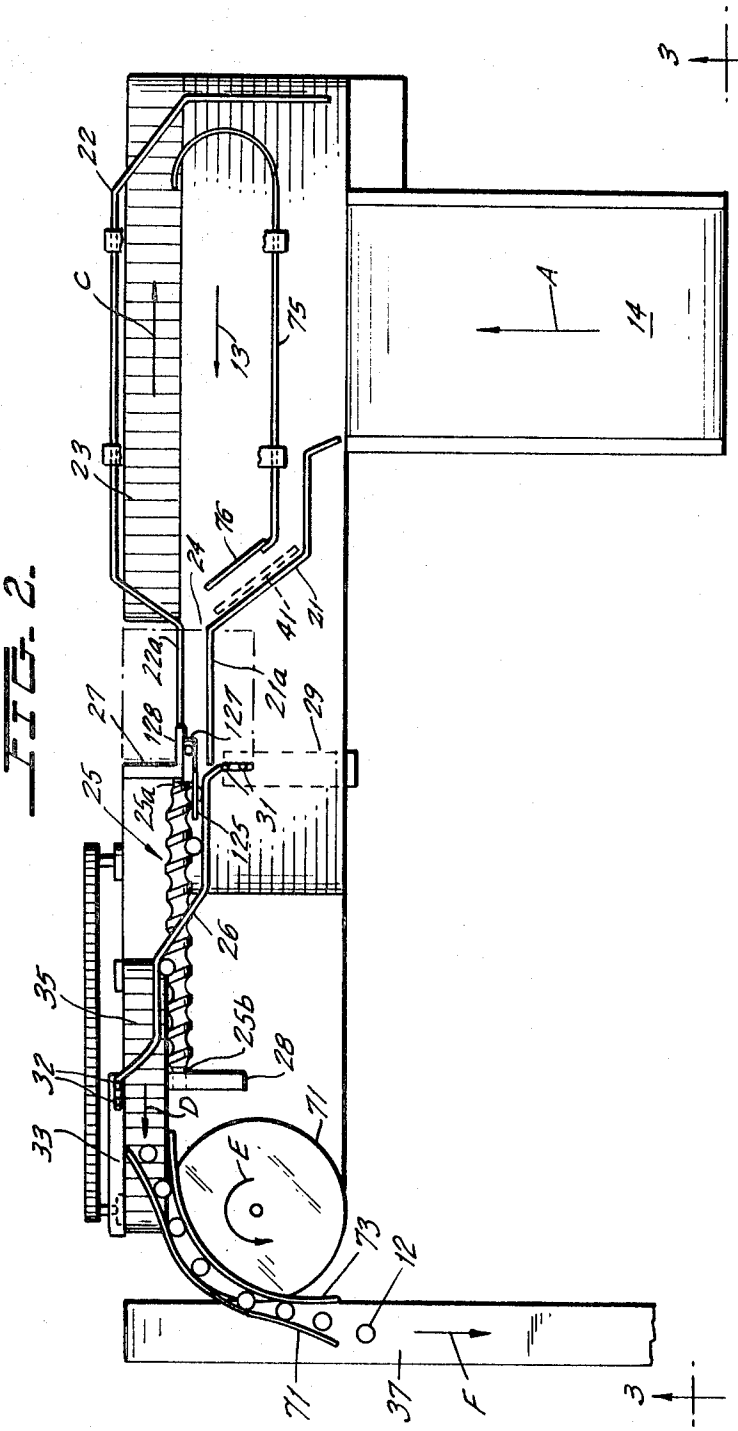
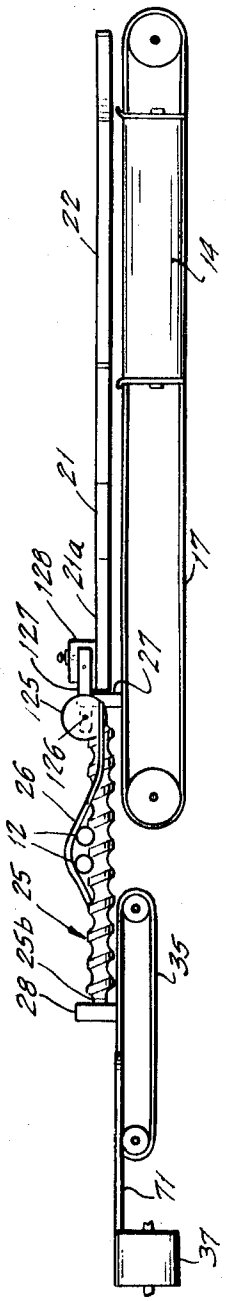


FIG. 3.

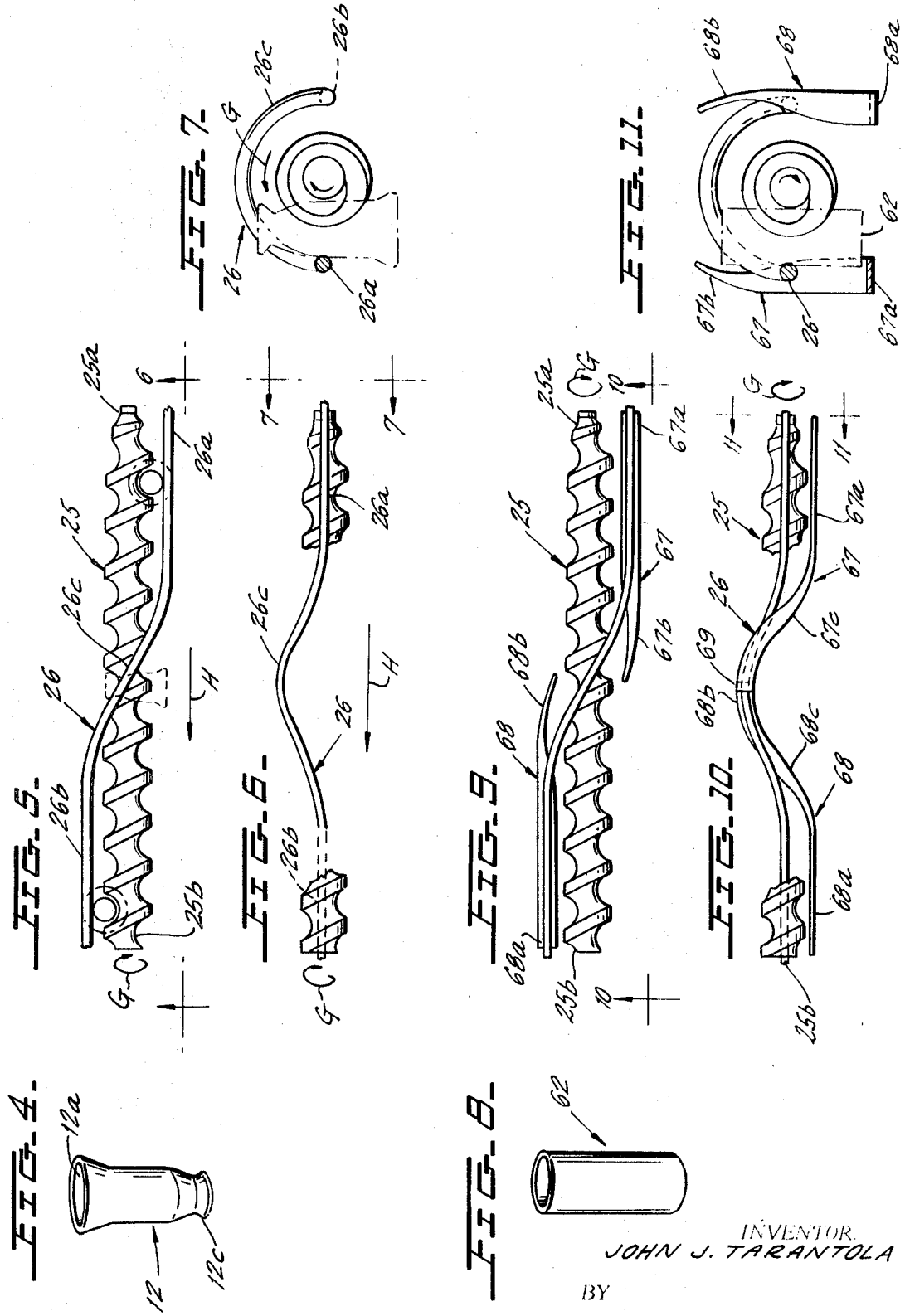


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FIG. 13.

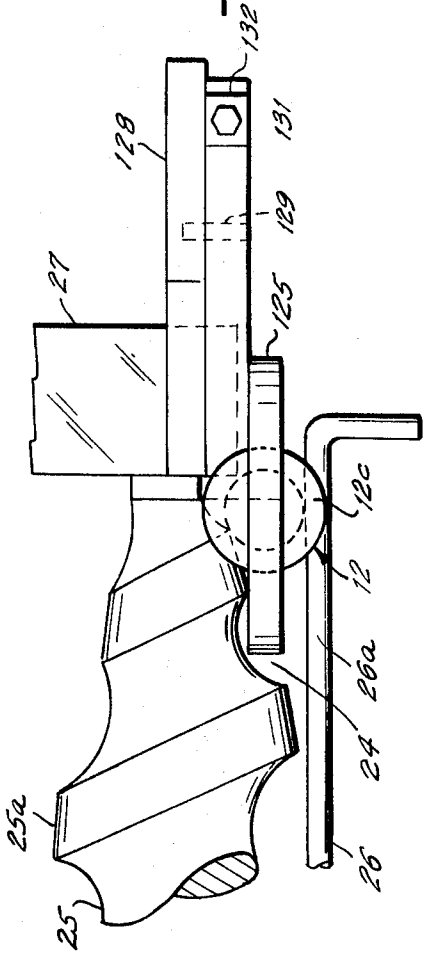
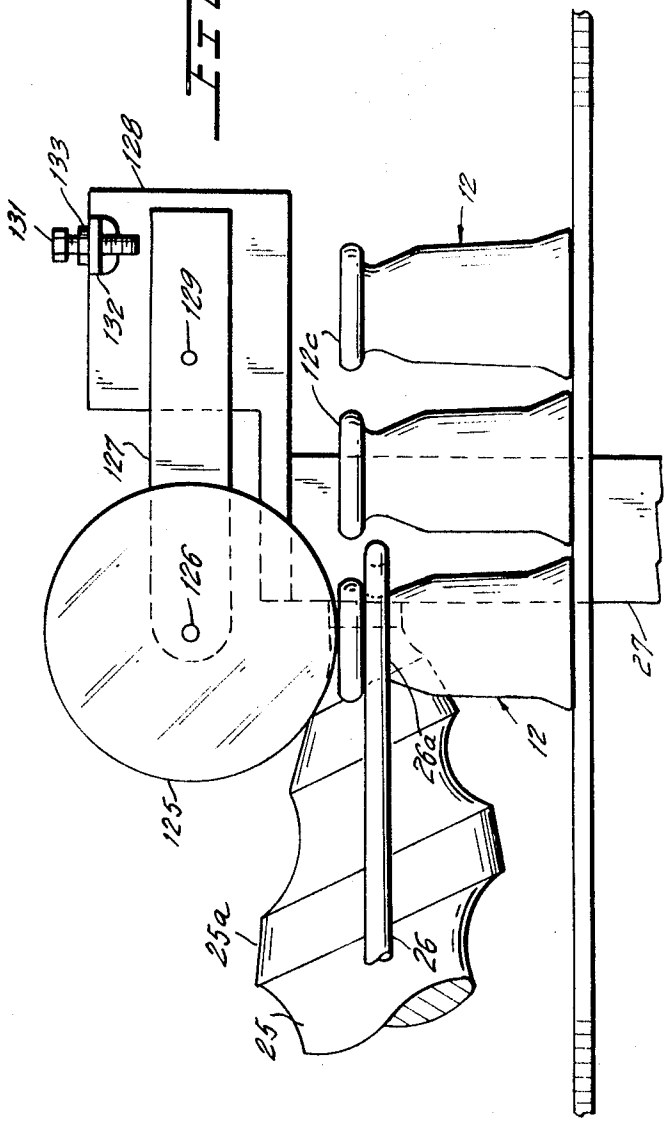


FIG. 12.



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CONTAINER WASHING INVERTING AND CONVEYING APPARATUS

This invention relates to container-handling apparatus and more particularly relates to novel apparatus and means for bulk-loading containers, cleaning them while they are in upside-down position, and thereafter while the containers are being conveyed in single file, inverting them to a position where they are right side up.

In the food processing and packaging field it has been found necessary to wash or flush containers immediately preceding filling thereof in order to insure that there is no foreign material in the container when food is placed therein. It has also been found that the flushing or washing operation is most efficiently carried out when the containers are inverted, that is, when the container mouth faces down. From the point where washing of the containers takes place to the point where the container is capped after filling thereof, all manual operations should be eliminated.

For the most part, prior art devices of this type consist of mechanisms that require manual loading of individual containers. In the limited number of prior art mechanisms adapted for bulk loading the handling of odd-shaped containers has been very troublesome. In particular, even bulk-loaded apparatus requires means for arranging the containers in a single row. For those containers in which the base is smaller than the open mouth end of the container, when the containers are bulk loaded right side up on a conveyor, random movement of the containers on the conveyor causes collisions which, because of the relatively small base, cause containers to tip over, fall on their sides, and break and/or jam the feeding mechanism.

The apparatus of the instant invention overcomes this difficulty of the prior art by providing a bulk-loaded apparatus that receives containers in inverted, or upside-down position so that they may be moved in a random manner without danger of tipping over even if the base is smaller than the mouth. While the containers are being moved into a single file arrangement, foreign matter is flushed out and a drying process takes place.

The washed containers are fed single file to a screw-type conveyor which, acting in conjunction with a stationary twisted bar, pivots the containers as they are being moved by the screw conveyor so that at the output of the screw conveyor the clean containers are right side up.

A screw conveyor and a single twisted bar are sufficient for inverting particular shaped fancy containers in which there is a depression around the container circumference. In addition, guide rail means are added for inverting containers that are uniform throughout the length thereof.

Accordingly, a primary object of the instant invention is to provide a novel process and novel apparatus for conveying and inverting containers.

Another object is to provide improved means for washing and conveying odd-shaped containers that are bulk loaded.

Still another object is to provide novel and simplified container inverting means including a screw conveyor and a cooperating twisted bar.

A further object is to provide novel and an improved container inverting mechanism including a screw conveyor which cooperates with a twisted bar and twisted rail means for inverting containers as they are being moved by the conveyor screw.

These as well as other objects of this invention will become readily apparent after reading the following description of the accompanying drawings in which:

FIG. 1 is a perspective illustrating container cleaning and inverting apparatus constructed in accordance with the teachings of the instant invention.

FIG. 2 is a plan view of the apparatus of FIG. 1.

FIG. 3 is a side elevation of the apparatus of FIG. 2 looking in the direction of arrows 3,3 of FIG. 2.

FIG. 4 is a perspective of a container in which the base is smaller than the open throat end.

FIG. 5 is an enlarged plan view of the screw conveyor and guide bar of the apparatus, illustrated in FIGS. 1 through 3, for handling the container of FIG. 4.

FIG. 6 is a side elevation of the elements of FIG. 6 looking in the direction of arrows 6,6 of FIG. 5.

FIG. 7 is an end view of the elements of FIG. 7 looking in the direction of arrows 7,7 of FIG. 6.

FIG. 8 is a perspective of a container in which the base and open throat ends are of the same diameter, and the container body is of uniform diameter throughout the length thereof.

FIG. 9 is a plan view showing a modification of the structure illustrated in FIGS. 5 through 7 for handling the container of FIG. 8.

FIG. 10 is a side elevation of the elements of FIG. 9 looking in the direction of arrows 10,10 of FIG. 9.

FIG. 11 is an end view of the elements of FIG. 10 looking in the direction of arrows 11,11 of FIG. 10.

FIG. 12 is a side elevation of a hold back means for controlling initial engagement between a container and the screw conveyor.

FIG. 13 is a plan view of the elements shown in FIG. 12.

Now referring to the drawings and more particularly to FIGS. 1 through 7 thereof. The apparatus of the instant invention is intended to be bulk-loaded with fancy jars containers 12 (FIG. 4). Two dozen containers 12 are packed in carton 13 with the mouth or open end of containers 12 facing upward. Containers 12 are bulk loaded by inverting carton 13 and dumping the contents thereof on to input conveyor 14.

Conveyor 14 is a continuous belt guided by rolls 15, 16 and driven in the direction indicated by arrow A. Main conveyor belts 17, formed of a metal mesh, is guided by rolls 18, 19 and driven in the direction of arrow B, or at right angles to the direction of movement for input conveyor 14. Rails 21 and 75, both positioned above main conveyor 17, direct containers 12 to unscramble area 24 at the entrance to the single-file passage formed between rail sections 21*a* and 22*a*. Sectionalized spring finger 76 constituting an extension at the left end of rail 75 forms containers 12 into a single file as they enter area 24. Those containers 12 that do not move to the left of unscramble area 24 are forced on to recirculating conveyor 23 which carries containers 12 in the direction indicated by arrow C, where these containers engage the right-hand portion of rail 22 and are directed back to main conveyor 17 for a return journey to area 24. The relative speeds of conveyors 14, 17 and 23 are such that a fresh supply of containers 12 will always be in an unscramble area 24. Typically, main conveyor 17 operates at five times the speed of loading conveyor 14, and recirculating conveyor 23 operates at three times the speed of loading conveyor 14.

The inverted containers 12 are washed or flushed by jets of liquid directed upward by nozzles 41 through the mesh constituting the upper flight of main conveyor 17. The washed containers 12 moving in the passage between rail sections 21*a* and 22*a* are subjected to one or more airstreams for the purpose of removing all or substantially all liquid from the containers. Such airstreams are concentrated in the area bounded by the phantom region 42 and are directed upward through the upper flight of main conveyor 17. If it is desired to dry the exterior of containers 12 appropriately directed airstreams may be added.

Containers 12 moving along the passage formed by rail sections 21*a*, 22*a* are delivered to the input end 25*a* of conveyor screw 25 and are directed into the space between the thread convolutions by twisted bar 26. Input end 25*a* of screw 25 is journaled for rotation in frame extension 27 while output end 25*b* is journaled for rotation in frame extension 28. When viewed from input end 25*a*, conveyor screw 25 has a left-hand thread but is driven in a right-hand direction, as indicated by arrow G, in coordination with the movement of conveyor 17 by driving means well known to the art including gear means (not shown) mounted to frame extension 28. The input end of

guide bar **26** is fixedly but removably secured by screws **31** to bracket **29** extending over main conveyor **17** while the output end of guide bar **26** is fixedly but removably secured by screws **32** to frame bracket **33**.

The cooperation of twisted bar **26** and conveyor screw **25** serves to gradually invert containers **21** so that at output end **25***b* of conveyor screw **25** open container throat **12***a* faces up. The upright containers **12** are moved away from conveyor screw **25** by belt **35** having its upper flight moving in the direction of arrow D. Belt **35** feeds containers **12** to turntable **71** which acts in cooperation with spaced arcuate guide rails **72, 73** to deliver upright containers **12** to output conveyor **37** moving in the direction of arrow F.

As best seen in FIGS. **5** through **7** guide bar **26** is provided with end portions **26***a*, **26***b* extending substantially parallel to the longitudinal axis of screw **25** and lying in a horizontal plane passing through such longitudinal axis. The intermediate portion **26***c* connecting end portions **26***a* and **26***b* is provided with a twist or reverse curve which extends over screw **25**. Bar **26** at intermediate portion **26***c* thereof extends into depression **12***b* immediately above base **12***c* of container **12**.

As previously noted, conveyor screw **25** is provided with a single right-hand thread rotated in a left-hand direction as indicated by arrow G. Thus, each container **12** in the space between screw threads is moved from right to left, as indicated by arrow H, by screw conveyor **25**. Guide bar **26** is positioned to maintain containers **12** in the space between convolutions of the screw thread. At the same time that conveyor screw **25** is moving a container **12** the latter is being pivoted in a right-hand direction about the longitudinal axis of screw **12** through the cooperation of guide bar **26** at intermediate portion **26***c* and screw **25** so that each container **12** which is inverted (mouth facing down) at input end **25***a*, **26***a*, is pivoted 180° as it moves along the length of screw **25** and at output end **25***b*, **26***b* such container **12** is upright (mouth facing up).

While the mere combination of screw **25** and guide bar **26** is sufficient to rotate and maintain control of odd-shaped containers **12**, by virtue of the irregular exterior surface thereof providing depression **12***b* for guide bar **26**, for handling straight-sided containers, such as container **62** of FIG. **8**, guide rails **67, 68** must be added (see FIGS. **9** through **11**). Each of the guide rails **67, 68** is provided with a respective horizontal section **67***a*, **68***a* and a respective vertical section **67***b*, **68***b*. Twisted intermediate section **67***c* provides a gradual transition between sections **67***a* and **67***b* while twisted transition section **68***c* forms a gradual transition between sections **68***a* and **68***b*.

Horizontal sections **67***a* and **68***b* lie below guide bar **26** and screw **25**. Horizontal section **67***a* extends downstream from input end **25***a* and is adapted to support containers **62** in up-side-down position. Vertical section **67***b* extends downstream to a point slightly past the center of screw **25**. Vertical section **68***b* extends downstream from a point slightly on the upstream side of the center of screw **25** so that there is a slight overlap **69** between vertical sections **67***b* and **68***b*. Horizontal section **68***a* extends downstream to the output end **25***b* and is adapted to support containers **62** in their upright positions.

In operation, gravity acts to hold each container **62** against guide rail **67** as container **62** is being twisted substantially 90° through the cooperation of the upstream half of guide rail intermediate portion **26***c* and conveyor screw **25**. The slight overlapping of vertical sections **67***b*, **68***b* at region **69** assures a smooth transfer of container **62** at a time when it is passing through the 90° region of pivoting motion. Thereafter, gravity forces container **62** to rest against guide rail **68** and through the cooperation of the downstream half of intermediate portion **26***c*, output end **26***b* of guide bar **26**, and conveyor screw **25**, container **62** arrive at output **25***b* in upright position.

It is noted that conveyor screw **25** is tapered down slightly at input end **25***a* to provide for smooth engagement of containers **12** by screw conveyor **25**. To further improve smoothness of engagement between containers **12** and screw **25**, gravity biased holddown wheel **125** (see FIGS. **12** and **13**) is provided to engage bases **12***c* of inverted containers **12** as these containers are initially engaged by screw **25**.

Holddown wheel **125** is freely rotatable on horizontal pin **126** at the left end of arm **127**, the latter being pivotally mounted on horizontal pin **129** located at a point intermediate the ends of arm **127**. Pin **129** extends from bracket **128** secured to frame extension **27**, and pin **126** is located in a plane at right angles to the axis of screw **25** and approximately halfway into the initial pocket of screw **25** formed between frame extension **27** and the screw convolution nearest thereto. Screw **131**, extending through the horizontal leg of bracket **132** secured to bracket **128**, constitutes an adjustable stop engageable with the right end of arm **127** to limit counter-clockwise pivoting thereof. Lock nut **133** maintains screw **131** in adjusted position.

As a washed container **12** approaches input end **25***a* of screw **25** container base **12***c* is engaged above by holddown wheel **125** which rides along the upper surface of the inverted container base **12***c* and is thereby lifted to pivot arm clockwise to a position where arm **127** is spaced from stop screw **131**. This permits a gravity biasing force acting through holddown wheel **125** to exert a downward force on the inverted container **12**. Such force is of sufficient magnitude to overcome any tendency of container **12** to become wedged between the high point of screw **25** and bar **26**.

The flexibility of the apparatus previously described should now be apparent in that the handling of materially different sizes and/or shapes of containers is readily achieved by merely changing one or more of the conveyor screw, the guide bar, and the guide rails as required.

Thus, it is seen that the instant invention provides a simplified structure for handling irregularly shaped, as well as regularly shaped containers, during a washing process and up to the time that the containers are to be filled. In particular, apparatus described in the instant specification lends itself to bulk loading of unwashed containers and utilizes a simple screw conveyor cooperating with readily changeable guide means to effect 180° pivoting of containers, after washing thereof, to an upright position for filling such containers.

Although there has been described a preferred embodiment of this novel invention, many variations and modifications will now be apparent to those skilled in the art. Therefore, this invention is to be limited, not by the specific disclosure herein, but only by the appended claims.

I claim:

1. Container conveying, washing and inverting apparatus including inverting means having an input end and an output end, a main conveyor having an upper surface for supporting containers delivered thereto, with each container standing on end and having its open mouth facing downward, and means cooperating with said main conveyor for delivering containers standing on end with their open mouths facing downward in single file to said input end; said inverting means including a screw conveyor, means for rotating said screw conveyor, and a guide means, said screw conveyor having a thread spacing adapted to receive containers delivered to said input end, a holddown means exerting a downward force on inverted containers at said input end during initial engagement of these containers by said screw conveyor; said guide means cooperating with said screw conveyor to capture containers therebetween as rotation of said screw conveyor is effective to move such containers horizontally along said screw conveyor to issue from said output end in single file; one end of said guide means being at one side of said screw conveyor in the region of said input end and the other end of said guide means being at the other side of said screw conveyor in the region of said output end; said guide means also having an intermediate portion extending over said screw conveyor at a region intermediate the ends thereof, whereby each container being moved horizontally by said screw conveyor on said one side thereof is forced to pivot about the rotational axis of said screw conveyor to a position at said other side of said screw conveyor in which the open mouths of the containers are facing upward; said main conveyor comprising a mesh structure; washer means for delivering a washing liquid upward through said mesh structure to wash containers thereon.

2. Apparatus as set forth in claim 1 in which the guide means includes a bar which is curved at said intermediate portion; said screw conveyor having a rotational direction that is the same as the direction of pivoting for said containers; said screw conveyor being threaded opposite to said rotational direction when said screw conveyor is viewed looking downstream from the upstream end thereof.

3. Apparatus as set forth in claim 2 in which the guide means also includes first and second rails, each of said rails having a horizontal section and a vertical section joined by a partially twisted transition section, said first rail being on said one side of said screw conveyor which the horizontal section of said first rail being in said region of said input end, said second rail being on said other side of said screw conveyor with the horizontal section of said second rail being in said region of said output end, said transition sections positioned in the region of said intermediate portion.

4. Apparatus as set forth in claim 3 in which end portions of said transition sections extend above said screw conveyor and overlap one another.

5. Apparatus as set forth in claim 1 in which the guide means includes a bar having a reverse curve therein at said intermediate portion.

6. Apparatus as set forth in claim 5 in which both ends of said bar are below the top of said screw conveyor.

7. Apparatus as set forth in claim 1 including means fixedly mounting all elements constituting said guide means.

8. Apparatus as set forth in claim 1 in which there is a loading conveyor for simultaneously receiving a plurality of containers with their open mouths facing downward and delivering these containers to said upper surface of said main conveyor; and driving means for operating said loading conveyor at a slower speed than said main conveyor.

9. Apparatus as set forth in claim 1 in which there is a means located downstream of said washer means for directing an airstream through said mesh structure to dry containers thereon, and an output conveyor which removes containers issuing from said output end after being inverted by said inverting means.

10. Apparatus as set forth in claim 1 in which the holddown means comprises a wheel freely mounted upon a horizontal axis and biased downward into engagement with containers at said input end.