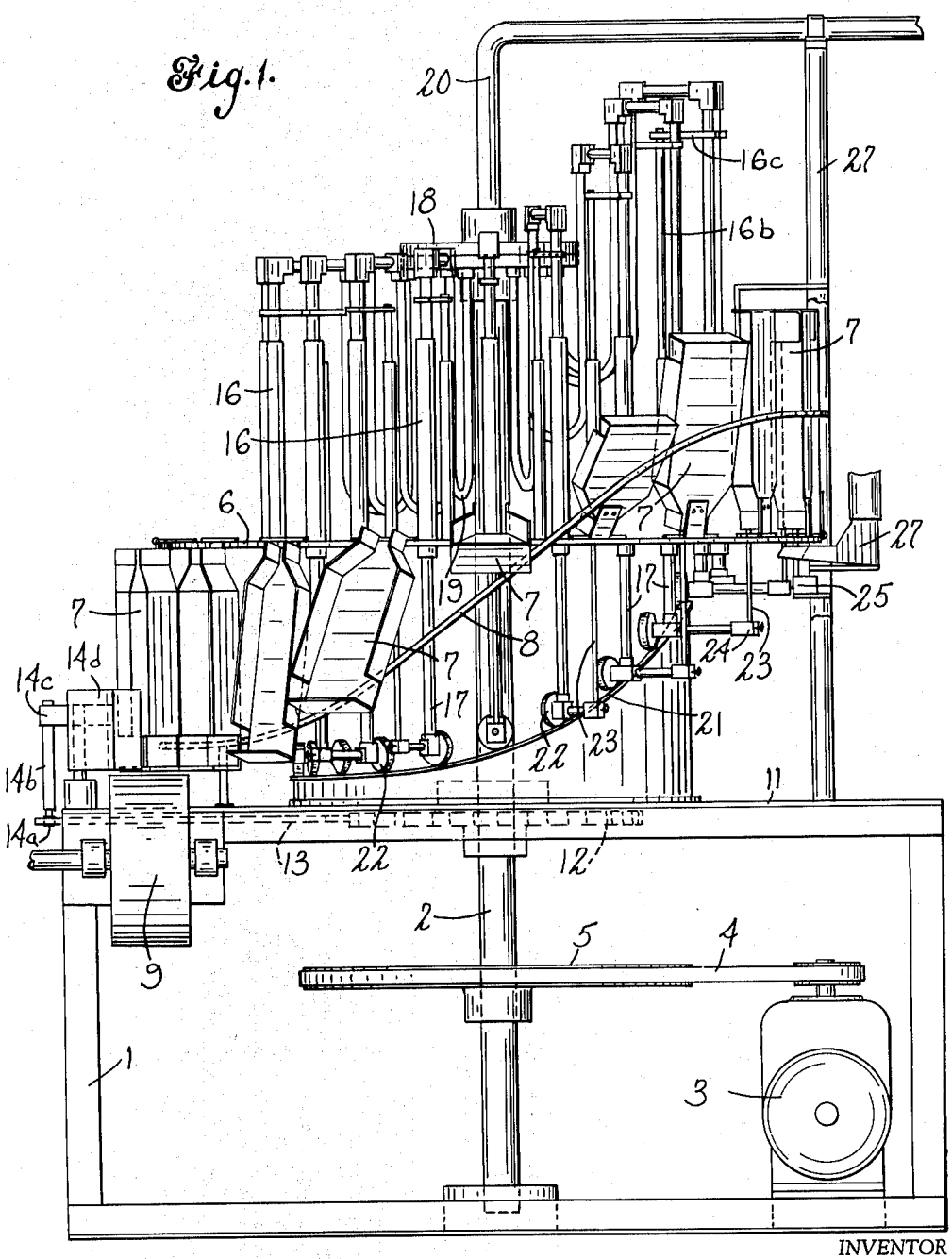
Jan. 4, 1966 T. M. SHEA 3,226,757

BOTTLE CLEANING MACHINE

Filed Feb. 27, 1964 4 Sheets-Sheet 1

Fig. 1.



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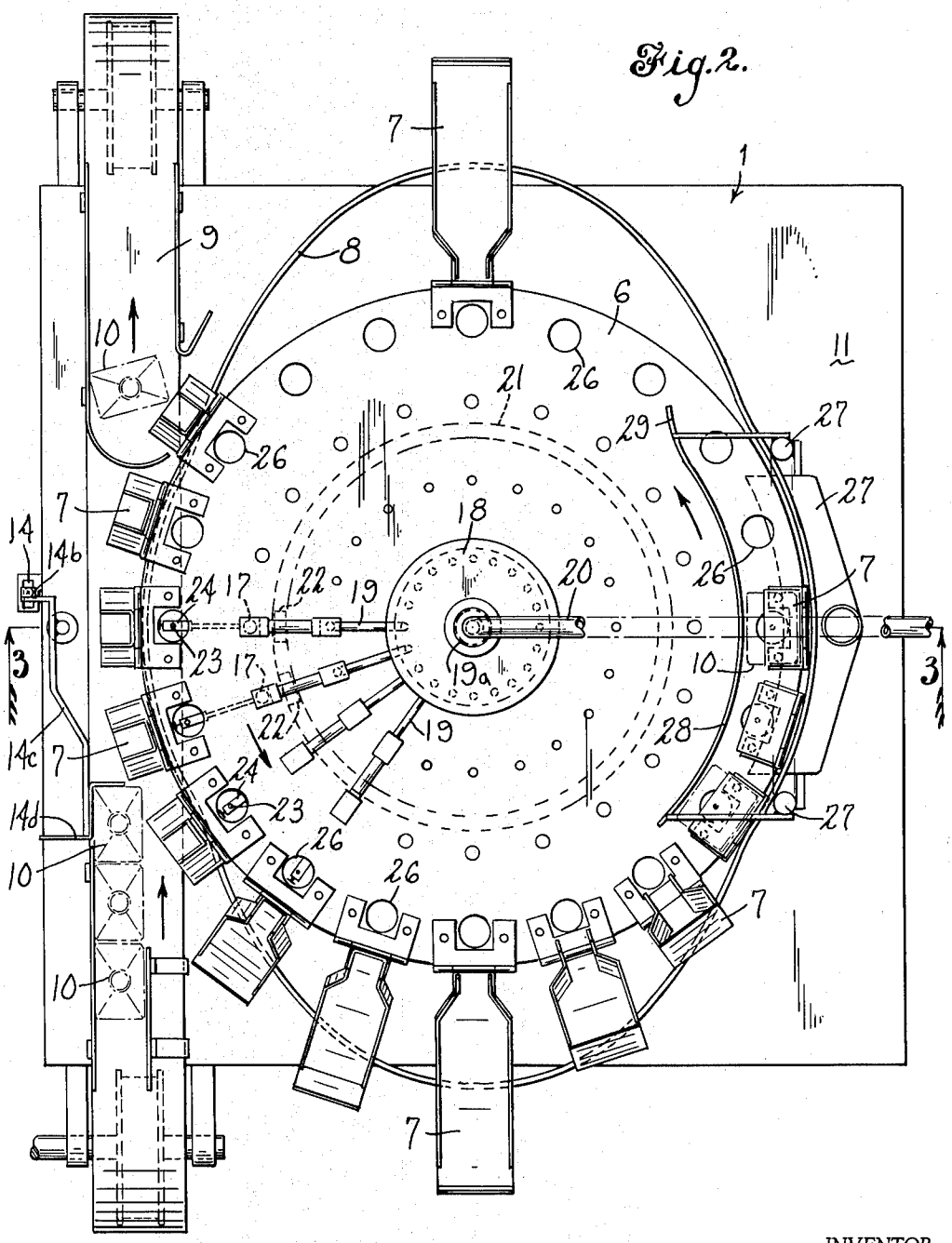
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BOTTLE CLEANING MACHINE

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Fig. 2.



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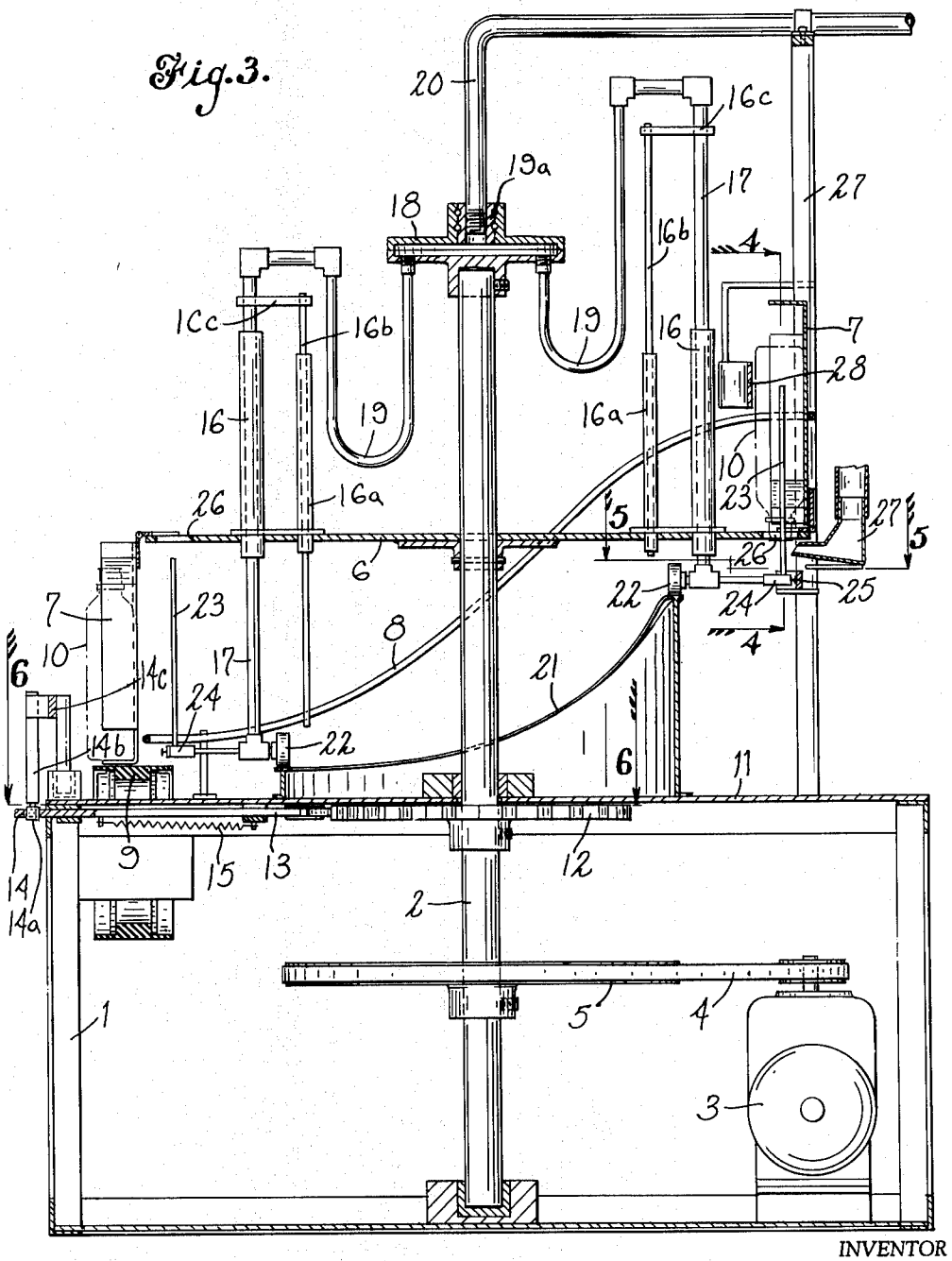
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BOTTLE CLEANING MACHINE

Filed Feb. 27, 1964 4 Sheets-Sheet 3

Fig. 3.



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BOTTLE CLEANING MACHINE

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Fig. 4.

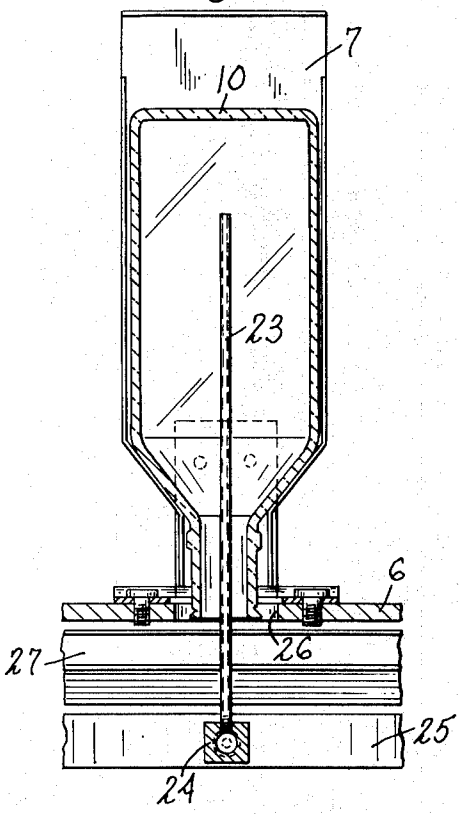


Fig. 5.

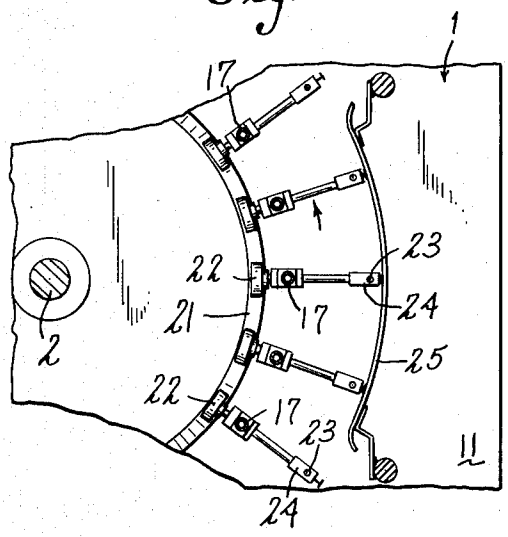
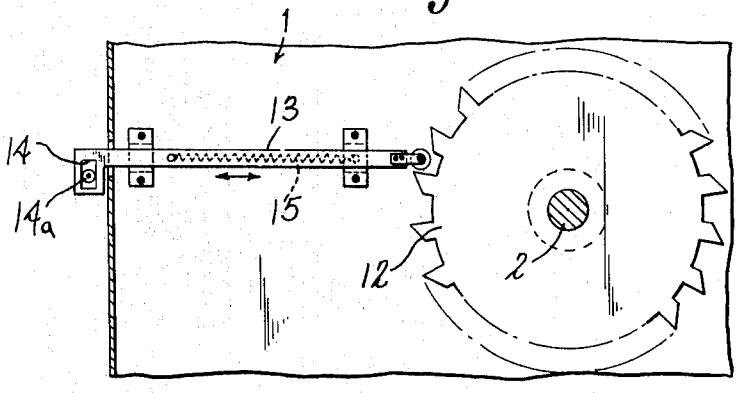


Fig. 6.



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United States Patent Office 3,226,757
Patented Jan. 4, 1966

3,226,757

BOTTLE CLEANING MACHINE

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Filed Feb. 27, 1964, Ser. No. 347,840
2 Claims. (Cl. 15—304)

This invention relates to a novel construction and method of cleaning the interior of bottles, particularly bottles designed to contain drug products such as pills, cough syrups, or the like.

During the course of shipment, foreign matter such as lint, particles of carton containers, and the like may find their way into the glass or plastic bottles which are eventually designed to contain pills or cough syrup or the like.

In the past it has been the practice of the pharmaceutical industry to perform a final cleaning operation on containers designed to house drug products before the containers are actually filled. This operation has generally consisted in a manual device whereby bottles are manually positioned upon a rack or similar device over jets designed to produce a blast of air in order to remove and eliminate any foreign matter which may remain within such containers as a result of shipping and storage conditions.

In accordance with the present invention, a means has been devised whereby bottles or containers intended for the dispensing and consumption of drug products are thoroughly and completely cleaned for the reception of any particular or specific drug, tablets or liquids.

Accordingly an object of the invention is to provide a means and machinery whereby drug containers are automatically voided of all foreign material.

Another object of the invention is to provide a means which supplants the currently available devices for voiding drug containers of foreign matter before they are actually filled with drugs which are to be taken internally into the human system.

A further object of the invention is to provide a bottle cleaning machine which is essentially automatic and wherein the containers to be internally cleaned need only to be fed upon an automatic conveyor whereupon they are (1) fed into the bottle cleaning apparatus, (2) automatically and continuously internally cleaned and (3) automatically delivered upon a continuously operating conveyor device for filling and packaging.

In general, this machine and method comprises the inclusion of a rotary turntable having a series of bottle holding devices or buckets pivotally mounted around the periphery of the turntable and an endless conveyor which feeds a series of bottle successively into these buckets or bottle holders while in an upright position as the turntable moves slowly in a counterclockwise direction.

As the turntable moves in this fashion, a circular fixed cam device successively raises the bottle holders and bottles and moves them into an inverted position.

Also mounted on the turntable, concentrically and closer to the center thereof, are a series of vertical tubes connected by hose means with a central source of air supply. These vertical tubes are provided with upwardly directed jets and move, along with the bottle holders and bottles, in a counterclockwise circular direction and on a cam which is below the turntable. This cam is designed to elevate the series of air jets into the interior of the bottles while they are in the inverted position, as explained before, and to automatically blow a jet of air into the inverted bottles, while in this position, to remove dust and any other foreign matter from the interiors of the containers or bottles. Optionally and preferably there is provided a vacuum device disposed adjacent the mouths of the inverted bottles to simultaneously, along with the air jets, remove from the area any dust or foreign matter that may be dislodged or displaced by the air jets into an exhaust device.

Referring to the drawings, it will be observed that:

FIGURE 1 is a side elevation showing in general the arrangement of the device which comprises the subject matter of my invention;

FIGURE 2 is a plan view from above showing the arrangement of the turntables, the cams, the automatic feeding mechanism and other details of the device comprising the subject matter of my invention;

FIGURE 3 is a vertical section taken on the line 3—3 of FIGURE 2 showing specifically the bottle elevated and inverting and blowing devices which constitute the subject matter of the present invention;

FIGURE 4 is a sectional detail showing the inversion of a jet blower into an inverted container;

FIGURE 5 is a sectional plan view taken on the line 5—5 of FIG. 3 illustrating the air jet release station encountered in an area of container travel path;

FIGURE 6 is a sectional detail on the line 6—6 of FIGURE 3 showing the arm and ratchet arrangement for moving containers entering the turntable into the pivoted bottle holders constituting a portion of the bottle holding and treating mechanisms.

The invention comprises in its broadest aspect a method for cleaning containers, particularly medicinal containers, which comprises automatically delivering the containers to a turntable, means for inverting the containers into an upright position and means cooperative therewith for delivering an air blast into the containers while they are maintained in a substantially inverted or vertical position. The invention also contemplates means cooperative with said last mentioned means for producing an evacuation adjacent to the mouths of the containers while in such an inverted position and essentially simultaneously with the delivery of air jets into the said inverted containers.

The invention also contemplates the apparatus and means associated therewith for accomplishing the aforesaid objectives and end results.

Referring specifically to the drawings and with particular references to FIGURE 1 thereof, it will be observed that the machinery contemplated by this invention employs a frame **1**, a central shaft **2** mounted in said frame **1**, rotatably disposed therein and driven by a motor **3**, belt **4**, shive **5** mounted fixedly on said central shaft **2** and a turntable **6** likewise fixedly mounted on the central shaft **2** for rotation simultaneously therewith.

Pivotally mounted on the said turntable **6** are a series of bottle holding devices **7** as will be clearly apparent from FIGURES 1, 2 and 3 of the drawings in particular. A substantially oval rail cam device **8** is positioned partially below and partially above the turntable **6** carrying the pivoted bottle holding devices or buckets **7** so, as will be readily apparent, as the turntable rotates in a counterclockwise direction as indicated in FIGURES 1, 2 and 3, the bottle holding devices are moved counterclockwise from an upright to an inverted position as clearly illustrated in the drawings. For example, as shown in FIGURE 1, the bottle holding devices to the left are in an upright position but as the turntable **6** moves in a counterclockwise direction, these bottle holding devices move up the cam rail **8** or into an inverted position as clearly illustrated to the right of FIGURE 1 of the drawings.

The containers are fed into the turntable **6** and into the bottle containers or buckets **7** automatically by an endless conveyor **9**, shown in plan view in FIGURE 2, and in elevation in FIGURE 1, driven by means not particularly shown or illustrated. These means, however, move with relation to the movement of the turntable **6** so that the containers **10** arrive at the station of entrance in timed

relationship with the counter rotarial movement of the turntable 6.

The movement of the endless conveyor 9, along with its train of bottles 10, is synchronized with the rotary movement of the turntable 6 so that, as will be understood, a bottle 10 is presented in sequence to each bucket 7 as each bucket 7 reaches the loading station. Mounted below the lower shelf 11 on the rotatable shaft 2 is a ratchet 12 which cooperates with an arm 13 at the end of which is a bottle pusher designed to push or jog the bottles successively into the bottle holders 7 as they are successively presented to the loading station, as illustrated in FIGURE 3. In an opening 14 is a cam follower 14*a* on the bottom end of a rod 14*b* secured at its upper end to a lever 14*c*. The lever 14*c* is pivoted to the frame part 11 as will be more clearly recognized from FIGURES 1 and 2. Also mounted at the other end of the lever 14*c* is a flange arrangement 14*d*, whereby as each bottle 10 encounters the inner end of the flange 14*d* and is moved into a bottle holder 7, the outer end of the flange 14*d* will move into a position barricading the forward movement of the succeeding bottle or container.

It will be understood that as the rotary turntable 6 presents successively bottle holders 7 to the loading station that the ratchet 12 and arm 13 will actuate the lever 14*c* to move successively the bottles 10 from the conveyor 9 into their respective bottle holders mounted upon the turntable 6.

As shown in FIGURE 6, this bottle pusher is normally retracted by a spring device 15.

Circumferentially mounted on the turntable 6 are a series of sleeves 16, adjacent to the bottle holders or buckets 7. Slidable within these sleeves 16 are a series of air tubes 17 which are connected with a manifold 18 by flexible hoses 19 as will be readily understood. Also mounted upon the turntable 6 is a secondary sleeve 16*a* and accompanying rod and connector 16*b* and *c* which stabilize the air tube 17 and roller 22 with relation to the turntable 6. This manifold 18 rotates with the central shaft 2 and is connected through an air seal 19*a* with a central air supply tube 20.

A second inner cam 21 is stationarily mounted on the shelf or base 11, and, mounted on the lower ends of the air tubes 17, are rollers 22 which travel along the upper surface of the stationary cam 21 as the turntable 6 moves in a counterclockwise direction. Also mounted at the lower ends of the air tubes 17 are jet tubes 23 extending vertically, each provided with a spring release valve device 24. Mounted fixedly and stationarily on the frame 11 is a segmental valve release cam or device 25, more particularly shown in FIGURE 5, in such a position as to be encountered by the spring press valve release devices 24.

Fixedly mounted upon the base 11 through rod supports 27 is a guide or cam plate 28 which serves to maintain the bottle holders and bottles in an inverted position during the jet cleaning operation and at end of said guide or cam plate 28 is an outwardly turned portion 29 which serves the purpose of reinverting the bottle holders and bottles 7, 10 onto the sloping end portion of the cam 8 to their normal upright position as shown more particularly in FIGURE 2 of the drawings.

From the foregoing, it will be appreciated that in operation of the machine, which I have described herein, bottles are fed consecutively and in series into the machine by the conveyor belt 9, as the turntable 6 moves in a counterclockwise direction, pushed into the bottle holder 7 by the pushing device 14, and moved into an inverted position as clearly illustrated in FIGURES 1, 2 and 3 of the drawings. Of course, the jets 23 and the sliding tubes 17 which furnish the jets 23 with air move also in a counterclockwise direction along with the bottle holding devices 7. As the bottles and bottle holding devices move into vertical position, the jets are moved upwardly as the rollers 22 for each of the jets move onto the upper surface of the stationary cam 21 and as will be seen in FIGURE 3 of the drawings, the jets are consecutively moved into the bottles 10 as they are in the inverted position. In the rotary movement of the turntable 6, the spring valve devices 24 encounter the segmental valve release 25, as shown particularly in FIGURES 3 and 5, thereby releasing a blast of air through the jets 23 into the interior of the bottles 10 while so inverted.

The turntable 6 is provided with a series of openings 26 adjacent the position occupied by the mouth of the bottles 10 when they are inverted as clearly illustrated in FIGURE 2 so that the jets at the blowing or cleaning station extend through these openings and well up into the interior of the bottles. Mounted below these openings is a vacuum device or manifold 27, as shown in FIGURE 3 of the drawings, in such a manner that as the jets 23 move into operative position and release a blast of air into the interior of the bottles, this vacuum device removes from the area any dust particles or other foreign matter that may be blown out of the bottles by the air jets 23.

Although the invention has been described with respect to a specific embodiment, it is understood that various and sundry changes may be made in the specifically illustrated mechanisms without departing from the spirit and scope of the invention as described in the appended claims.

What I claim is:

1. An apparatus for cleaning containers having a reduced neck portion (or shoulder) comprising in combination (1) a frame, (2) a table rotatable with respect to said frame, (3) means for rotating said table, (4) a plurality of container-receiving receptacles freely pivotally mounted on said table and movable therewith for holding the containers, said container-receiving receptacles being open on one side and having a narrow neck portion and of a shape to generally conform to the shape of the container in an upright position, (5) conveyor means for continuously feeding containers in an upright position into the open sides of the container receptacles on a horizontal plane, (6) fixed cam means in the path of the container-receiving receptacles for directly contacting said container-receiving receptacles for inverting said receptacles and the containers as the table rotates, (7) air jet means supported by said table and movable therewith for applying a blast of air into the interior of the containers while inverted, (8) means for retaining the containers in the container-receiving receptacles while in an inverted position, and (9) further means for reinverting said containers into an upright position and for moving them away from the rotatable table.

2. An apparatus for cleaning containers having a reduced neck portion (or shoulder) comprising in combination (1) a frame, (2) a table rotatable with respect to said frame, (3) means for rotating said table, (4) a plurality of container-receiving receptacles freely pivotally mounted on said table and movable therewith for holding the containers, said container-receiving receptacles being open on one side and having a narrow neck portion and of a shape to generally conform to the shape of the container in an upright position, (5) conveyor means for continuously feeding containers in an upright position into the open sides of the container receptacles on a horizontal plane, (6) fixed cam means in the path of the container-receiving receptacles for directly contacting said container-receiving receptacles for inverting said receptacles and the containers as the table rotates, (7) air jet means supported by said table and movable therewith for applying a blast of air into the interior of the containers while inverted, said air jet means including a cam follower and a cam positioned on said housing to engage said last-mentioned cam follower to position the air jet means with respect to the inverted containers, thereby permitting a blast of air to be projected into the

containers while in an inverted position, and (8) further means for reinverting said containers into an upright position and for moving them away from the rotatable table.

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