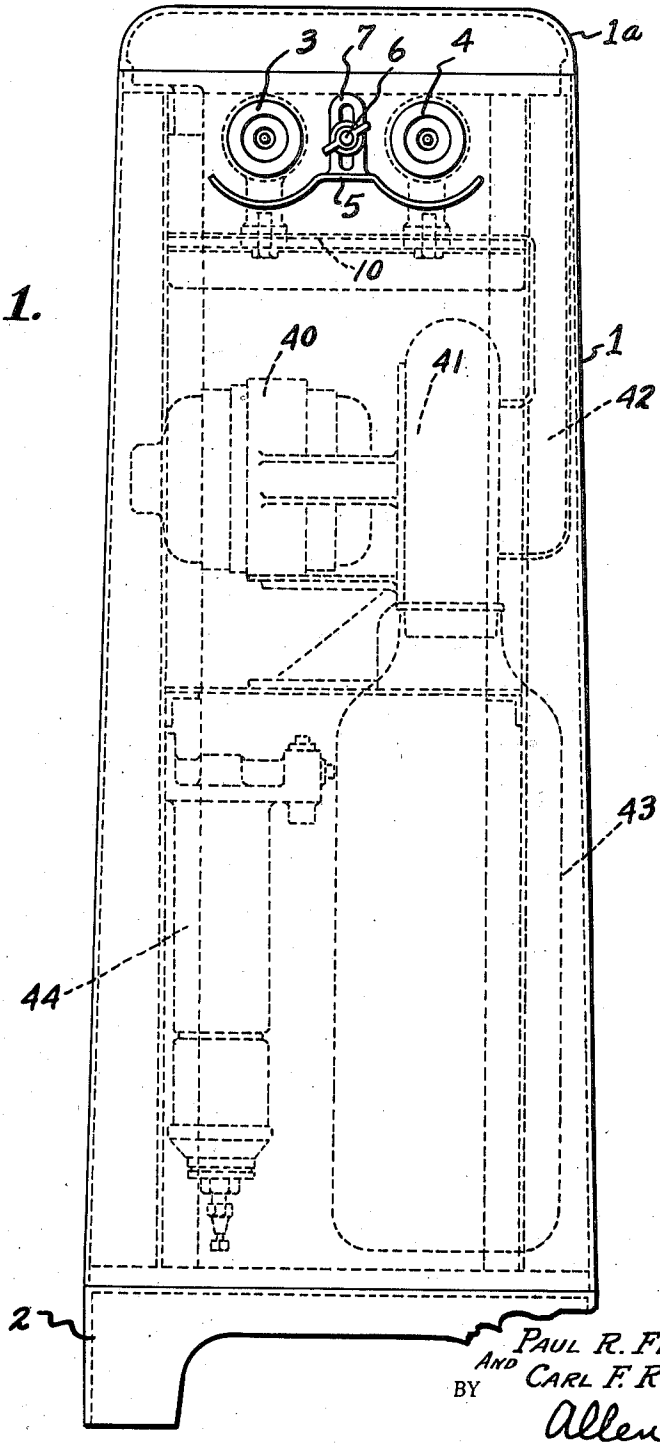
April 29, 1941. P. R. FECHHEIMER ET AL 2,240,069

BOTTLE CLEANING MECHANISM

Filed Jan. 3, 1936 4 Sheets-Sheet 1

FIG. 1.



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BOTTLE CLEANING MECHANISM

Filed Jan. 3, 1936 4 Sheets-Sheet 2

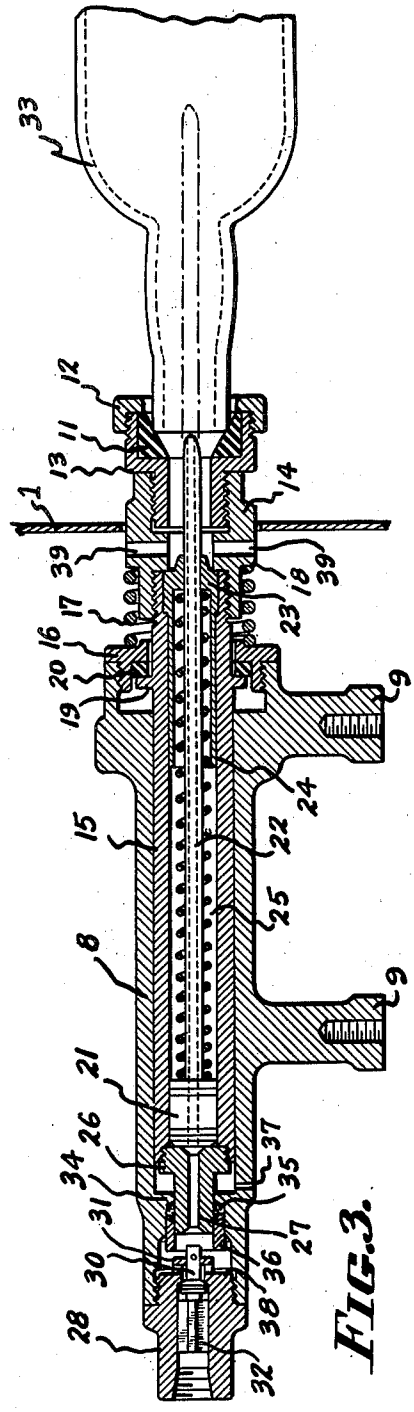


FIG. 3.

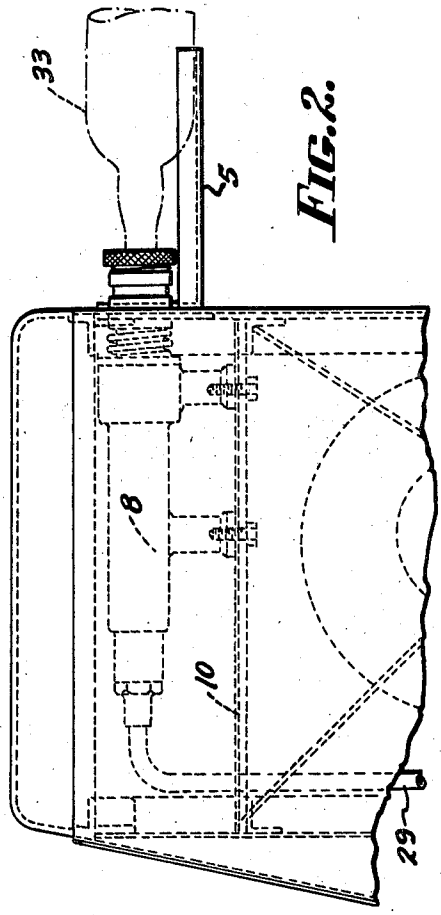


FIG. 2.

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BOTTLE CLEANING MECHANISM

Filed Jan. 3, 1936 4 Sheets-Sheet 3

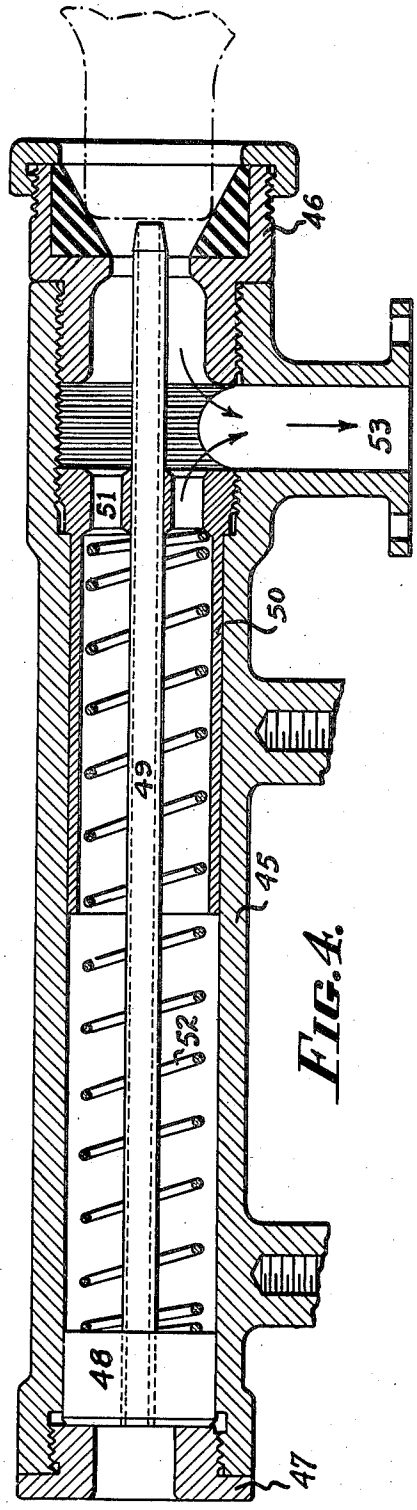


FIG. 4.

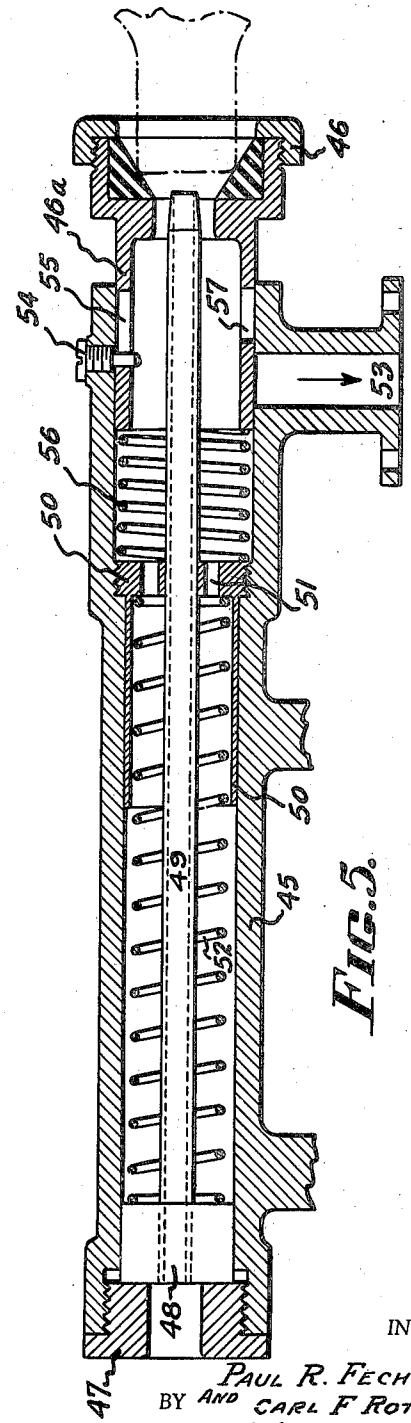


FIG. 5.

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BOTTLE CLEANING MECHANISM

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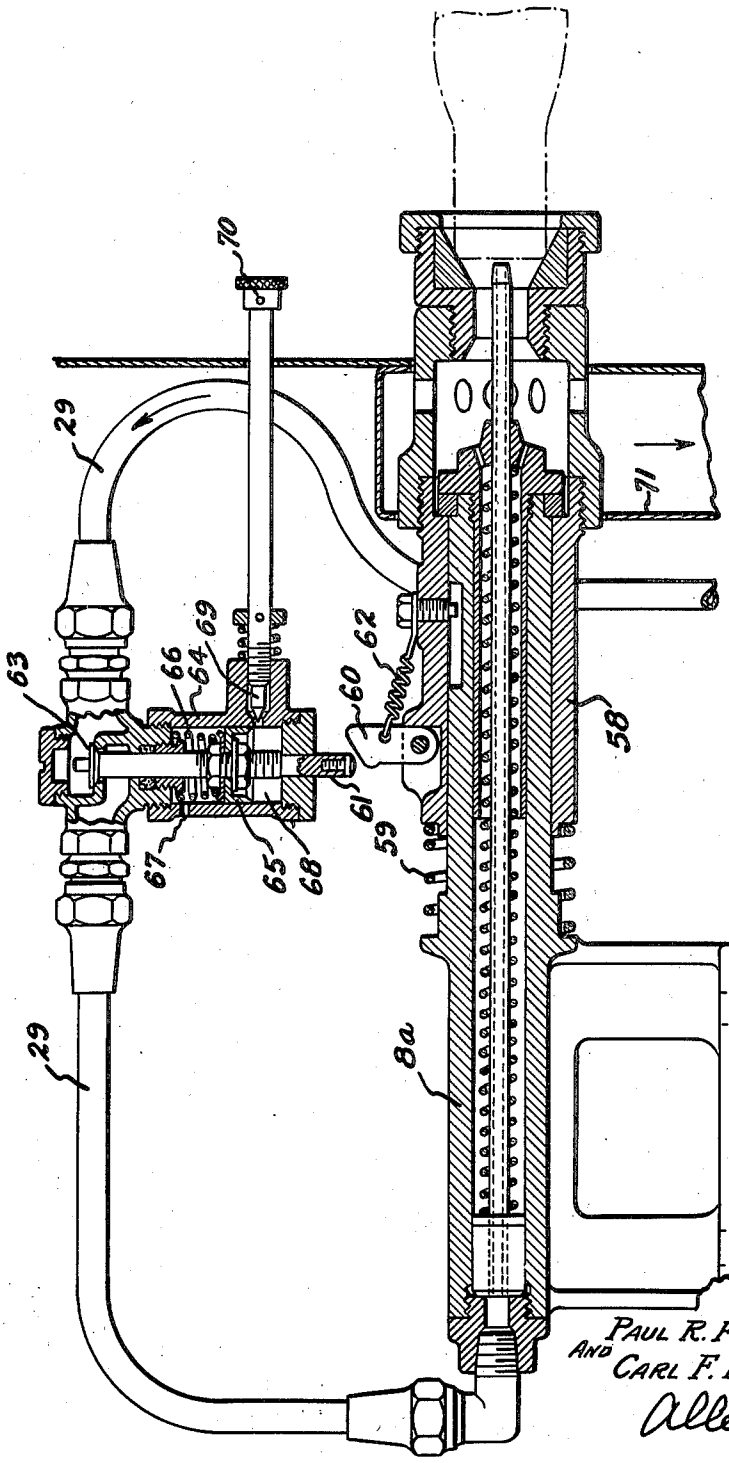


FIG. 6.

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UNITED STATES PATENT OFFICE

2,240,069

BOTTLE CLEANING MECHANISM

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Application January 3, 1936, Serial No. 57,379

6 Claims. (Cl. 15—20)

Our invention relates to a device for cleaning new bottles from their initial impurities, primarily, and has to do particularly, though not exclusively, with a relatively small installation which enables an operator to clean many more bottles per unit of time than he could otherwise, without the assistance of automatic machinery. By "initial impurities," we mean such impurities as saw-dust, bits of packing material, pieces of glass, and the like, which are likely to be found in fresh, unused bottles as they are received in cartons from the manufacturer. Such impurities may be cleaned from the bottles, and the bottles fitted for immediate use, by a jet of dry gas such as air.

So far as the positioning of bottles for a cleaning operation is concerned, it is an object of our invention to provide means which will assure the correct positioning of the bottle necks with the minimum of skill and care on the part of the operator, and means for automatically introducing into the bottles and through the necks thereof, a spout or nozzle which delivers the jet of dry gas.

Another object of our invention is the provision of a unitary bottle cleaning device of the character to which we have referred, which permits the ready and rapid cleaning of bottles when they are held in the hands of the operator. New bottles are ordinarily delivered in crates or cartons, which, when open, present the bottles in an up-side-down position. It is an object of our invention to provide a machine having cleaning means, to which the operator may readily present the bottles when they are withdrawn from the carton by hand in the natural manner. We have found that it is quite convenient for an operator to grasp a bottle in each hand, withdraw the bottles from the carton, turn them through an angle of substantially 90 degrees, present them to the cleaning device, and then turn them again through an angle of 90 degrees, so as to place them in a right side up position upon a suitable support, or upon a conveyor which will deliver them to filling means. These operations may be carried on in an easy, natural, and substantially continuous manner, and are preferred by most operators. As a consequence, we shall describe our invention in an embodiment in which the cleaning elements are located so as to require the presentation of bottles thereto in a substantially horizontal position; but it will be understood that there is no such limitation upon the operation of our mechanism, and that the cleaning devices may be disposed at any angle. In particular our mechanism is entirely operative for cleaning bottles in an upright position. Also, certain portions of the mechanism which we shall hereinafter describe and claim, have utility in mechanisms where the bottles are positioned or presented otherwise than by hand, and for treatment otherwise than by a blast of dry gas.

The object of our invention will be readily understood by those skilled in the art from the ensuing description, and are accomplished by that certain construction and arrangement of parts of which we shall now describe certain exemplary embodiments. Reference is made to the drawings, wherein:

Figure 1 is a vertical elevation of the front of our machine in the said exemplary embodiment.

Fig. 2 is a side elevation of the upper portion thereof.

Fig. 3 is a sectional view through one of the cleaning devices.

Fig. 4 is a sectional view of the modification of our invention wherein the blast of dry gas is produced from the normal atmospheric pressure by evacuating the bottle.

Fig. 5 is a sectional view of a modified form of the device of Fig. 4.

Fig. 6 is a sectional view of a device in which the duration of the cleaning treatment is automatically controlled.

In the particular embodiment, the general mechanism is contained in a cabinet or housing 1, the particular form or shape of which is not a necessary limitation upon our invention. The general configuration of the cabinet 1 and the feet 2 in an embodiment which we have found particularly advantageous, may be readily appreciated from a consideration of Figs. 1 and 2. Ordinarily we provide a top 1a for the cabinet which may be removable if desired. The cabinet is so arranged as to present at the front side a pair of cleaning mechanisms indicated generally in Fig. 1 at 3 and 4. We have shown two of these, since with bottles of ordinary size it will be convenient for the operator to present two bottles at one time, one in each hand. Of course more or fewer of the cleaning devices may be employed in any one mechanism. If large numbers are provided, the operator may require the assistance of some mechanism in presenting more than two bottles to be cleaned at one time.

A guide or rest means indicated at 5 in Fig. 1 may be provided if desired, and arranged for adjustable attachment to the housing by means of a wing nut 6, engaging a bolt and slotted mem-

ber 7 on the guide, but we have not ordinarily found this necessary.

Proceeding now to a particular description of the cleaning mechanism, we have indicated one of these devices in section in Fig. 3. It comprises a casing 8, having means 9 for attachment to a shelf or bracket 10, located in the casing of my machine.

Essentially, in the practice of our invention, we provide on the outside of the main cabinet of our machine a centering bell adapted to receive and position the necks of the bottles. Pressure on this bell has the effect of turning on a blast of dry gas. There is a nozzle, distinct from the bell, through which the blast is introduced into the bottle; and the effect of turning on the blast as aforesaid, is to cause this nozzle to be inserted into and through the neck of the bottle, so that the end of it lies beyond the shoulders thereof. Relief of the pressure on the centering bell has the effect of turning off the blast of gas, at least so far as the bottle itself is concerned; and we provide automatically operating means for withdrawal of the nozzle from the bottle. Hence the time of the operator is not consumed by a careful endeavor to place the bottles over a projecting nozzle or spout.

A characteristic arrangement for accomplishing the purposes which we have outlined is illustrated in Fig. 3, where the actual centering bell is indicated at 11 as a cylindrical member, having a conical bore, and held by means of a cap 12 in the belled end of a fitting 13. The centering bell may conveniently be made of some relatively resilient material which will minimize the chance of breaking or chipping the bottle necks. It will be understood, of course, that interchangeable bells may be provided for bottles having necks of different sizes or configurations; and in the construction shown such differently sized locating bells may be mounted in interchangeable fittings and caps. The fitting 13 is shown as screwed into a sleeve member 14, which is the part projecting through the wall 1 of the main casing of our machine. This fitting connects the bell proper with a cylindrical, hollow, slidable member 15, mounted for longitudinal reciprocation in the casing 8. The casing is provided with a cap 16 on one end as shown, and a compression spring 17 abuts this cap on one end, and on the other end abuts a shoulder 18 on the sleeve 14, so as to urge the sleeve and its associated parts to the right, as shown in Fig. 3. In order to limit the motion of the members in this direction, we provide the inner cylinder 15 with an annular boss 19, coacting with the cap 16. Between the cap and the boss, we may locate a ring 20 of resilient material to take up the shock of the return of the mechanism, as effected by the spring 17.

Within the inner cylinder 15, we provide a hollow piston 21, to which is attached a long, hollow spout or nozzle member 22. The right hand end of the cylinder 15 is shown as closed by a fitting 23, which forms a bearing for the nozzle member 22, and which may be provided with an extension 24 to limit the movement of the piston and nozzle to the right in Fig. 3. A compression spring 25 surrounds the nozzle 22, and abuts the fitting 23 on one end, and the piston 21 on the other.

The opposite end of the inner cylinder 15 is closed by a fitting 26, which has a central perforation 27, through which air may be admitted into the interior of the inner cylinder 15. The effect of such an admission of air will be not only to drive air through the spout or nozzle 22, but also to drive the piston 21 forward, so that the nozzle is caused to project a considerable distance beyond the locating bell 11.

For the purpose of admitting air to the device, a fitting 28 is threaded into the left-hand end of the housing or casing member 8, and not only provides means for the connection of an air conduit (29 in Fig. 2), but also contains a valve member 30, having a seat in the fitting 28, and a shank as indicated extending therebeyond. The shank of this valve member may be suitably guided as shown at 31, provision being suitably made for escape of air past the shank; and the valve stem may have fluted means 32 guiding the movement of the valve in the fitting 28, the fluting permitting passage of air past the means.

In the use of the device, the operator will present a bottle 33 so that its neck may be centered by the bell 11. Pressure on the bottle, transmitted by the parts heretofore enumerated, will cause the inner cylinder 15 to move to the left in Fig. 3, until the fitting 26 on the inner cylinder, contacts the shank of the valve 30 and thereby opens the valve. When this is done, the air entering the inner cylinder 15, through the fitting 26, will cause the spout or nozzle to be projected into the bottle 33, as shown in dotted lines in Fig. 3; and the air will come out into the bottle through the spout 22.

Since it is desirable not to have the pressure of the air counteract the pressure manually exerted by the operator in driving the cylinder 15 to the left, we provide a bearing for the fitting 26 in the housing or casing 8, as shown at 34, and provide also a gland comprising the packing 35, and a packing retaining member 36. Also, a relief opening 37 is provided in the housing or casing 8 so as to reduce any effect of air pressure upon the movements of the cylinder 15. The end of the valve stem or shank may be provided as at 38, with longitudinal and transverse passageways for air, so as to prevent a closing off of the opening 27 in the fitting 26.

It will be noted that the central opening of the sleeve 14, the fitting 13 and the centering bell 11 is substantially larger than the outside diameter of the nozzle member 22, so as to leave a space for the escape of gas from the bottle. We have shown at 39, openings through the sleeve 14, which openings may be connected by flexible conduit means (not shown) to a suction device so as to carry off the spent gas and its entrained impurities. The application of suction at this point permits the use of separating means for the impurities and prevents their being blown out into the room; but may be omitted, if desired. Another way of carrying off the impurities is described hereinafter.

In the body of our cabinet 1, we ordinarily provide an electric motor 40, connected to a suction fan 41, the inlet side of which may be connected in any way desired to the suction openings 39 in the sleeve 14. It will be noted in this exemplary embodiment, that these suction openings 39 are located inside the main housing 1, even when there is no bottle being pressed against the locating bell 11. As a consequence, if the partition member 10 closes off the upper part of my main cabinet fairly tightly, it is not necessary to make suction connections direct to the openings 39. Rather, the inlet side of the fan 41 may be connected by a conduit 42 merely to the upper

chamber of the main cabinet, which is closed off by the partition 10, and will effectively exhaust from the said upper chamber impurities which have been taken out of the bottles.

The outlet side of the fan 41 is connected to an air separator such as a cloth bag 43, which also may be contained within the main cabinet.

We currently provide also an air filter of usual type indicated generally at 44 in the main housing, connected by the conduit 29 to the cleaning members 3 and 4, and adapted for connection to a suitable compressor which will usually be located elsewhere.

Figs. 4 and 5 show modifications of our structure adapting it for use in a cleaning method wherein the blast of dry gas is released in the bottle by rapidly exhausting the bottle and permitting the air to enter it through the nozzle under atmospheric pressure. A simpler type of mechanism may be used such as that shown in Fig. 4, where the casing 45 has the bell mechanism indicated generally at 46, threaded therein, and immovable. The rear end of the casing member 45 is closed by a perforated nipple 47 acting as a stop for the plunger 48 to which the nozzle 49 is attached. A fitting 50 perforated as at 51 forms an abutment for one end of the compression spring 52, the spring abutting against the plunger 48 at its other end. The fitting 50 also provides a stop as shown, for limiting the forward travel of the nozzle. The interior of this apparatus is provided with an exhaust port indicated at 53, and to this port a vacuum pump is connected. So long as no bottle is presented to the bell mechanism 46, air will simply be exhausted through the bell. When, however, the neck of a bottle is caused to close the bell, the lowering of pressure in the interior of this apparatus causes the normal atmospheric pressure, effective upon the plunger 48 through the nipple 47 to drive the plunger forward, causing the nozzle to enter the bottle. So long as the bottle is held against the bell, air under atmospheric pressure will be released therein as a blast from the end of the nozzle 49.

Fig. 5 shows a modification of this apparatus wherein the bell is not connected to the vacuum or exhaust line until a bottle is presented thereto. This is of advantage in some instances in permitting the creation of a high degree of vacuum in a tank connected to the exhaust apparatus whereby the in-rush of air into the bottle is initially accentuated. In Fig. 5 like parts have been given like index numerals. This device differs from the device shown in Fig. 4 in that the bell has a shank member 46*a* slidably mounted within the casing 45. A set screw 54 the end of which engages a slot 55 in the shank may be employed to limit the movement of the bell, while a compression spring 56 may be used normally to urge the bell to the right in this figure. The shank 46*a* has a port 57 adapted to register with the exhaust port 53 only when the bell is positioned to the left, as when a bottle neck is presented thereto. Thus the exhaust port 53 is normally closed and is opened to the interior of the bell only when the bell is positioned inwardly.

When using a blast of dry gas at greater than atmospheric pressure, it becomes a matter of economy in many instances, to control the duration of time during which the super-atmospheric blast of gas is applied to the bottle. To this end we have shown a modification of our apparatus in Fig. 6, where provision is made for automatically turning off the blast of gas after the elapse of a predetermined time interval. The general mechanism is analogous to that shown in Fig. 3 excepting that the member moved by the bell (in this instance indicated at 58) is mounted externally of the main casing 8*a* and is urged to the right by the coil spring 59. The member 58 bears a trigger 60 which acts upon the plunger 61 of a dash pot valve located in the air line 29. The action of the trigger 60, which may be controlled by a spring 62, is such that after it actuates the plunger 61 it passes therebeyond and does not serve to retain the plunger in open position. The plunger operates a valve 63 in the air line 29 as indicated, and a small dash pot 64 is attached to the valve, there being a valve piston 65 attached to the plunger. A coil spring 66 tends to urge the plunger to closed position. A relief port is provided as shown at 67. When the plunger is depressed air is entrapped in the dash pot portion 68 and the escape of this air delays the closing of the valve 63. The duration of closing may be controlled by a needle valve 69 having an operating shank and lever or knob 70 extending through the face of the cabinet. In this apparatus when a bottle neck is presented to the bell and positioned thereagainst, the air valve is opened, the nozzle is introduced to the bottle and the blast of dry gas released therein. The dash pot valve, however, operates to shut off the blast of gas and to cause the nozzle to be withdrawn after the expiration of a predetermined interval of time. This not only conserves power used to compress the gas, but also tends to speed up the operator by indicating to him the proper duration of a cleaning treatment.

In the device shown in Fig. 6, an exhaust hood 71 immediately surrounding the ports in the bell mounting is connected to the exhaust fan, and is used instead of the structure shown in Fig. 2, where the entire upper portion of the cabinet above the platform 10 becomes the exhaust hood.

Modifications may be made in our invention without departing from the spirit thereof. Also it will be clear that my mechanism may be used with fluids other than dry gas.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In a cleaning device for bottles or like containers, a centering bell against which the neck of a bottle may be placed and which centers the bottle neck over a central perforation in said bell, means for mounting said centering bell slidably so that when a bottle neck is brought against said bell and moved further said bell may move with it, an elongated nozzle member having an end normally lying substantially within said central perforation in said centering bell, means for projecting said elongated nozzle member through said perforation and into said bottle through the neck thereof, means for releasing a blast of fluid in said bottle through the said nozzle member, and control means for said two last mentioned means, said control means arranged for automatic actuation upon movement of said centering bell.

2. In a cleaning device for bottles or the like, a casing, a tubular member slidably mounted in said casing, a perforated piston in said member, a hollow nozzle attached to said piston and communicating with the perforation therein, a centering bell for the neck of a bottle, said bell being attached to said slidable member and having a central perforation, the end of said nozzle nor-

mally lying substantially within said central perforation, and means effective upon movement of said member (caused by placing the neck of a bottle against said bell with force enough to move said bell) to admit fluid under pressure behind said piston so as to project said nozzle into said bottle through the neck thereof, said fluid escaping through said nozzle and being released inside said bottle so as to clean it.

3. In a cleaning device for bottles or the like, a casing, a member slidable in said casing, a perforated centering bell mounted on said member, said centering bell adapted to receive and center the neck of a bottle presented thereto, said bell and said slidable member being movable under force applied to said bell, a hollow nozzle slidably mounted within said member, the end of said nozzle lying normally substantially within the perforation in said centering bell, means actuated by movement of said slidable member to project said nozzle into said bottle through the neck thereof and to release in said bottle a blast of fluid through said nozzle for cleaning said bottle, and resilient means for urging said slidable member in a direction opposite to the direction of said first mentioned movement thereof, whereby upon removal of a bottle the blast of fluid is discontinued, and automatically acting means for retracting said nozzle.

4. In a device for cleaning bottles or the like, a cleaning device having a bell provided with a central aperture, a support for said device presenting said bell in a position of accessibility for the ready manual presentation thereto of a neck of a bottle, said bell being movable upon the exertion of pressure thereagainst by means of said bottle, a nozzle in said device adapted to pass through said aperture and having its outer end normally terminating inwardly of the plane of the mouth of said bell, and means responsive to movement of said bell to project said nozzle therethrough into said bottle, and to release a blast of fluid through said nozzle.

5. In a cleaning device of the character described, a casing, a cylinder therein, a member including a bell slidably mounted in said cylinder, means adapted to connect one end of said cylinder and said bell to an exhaust means, the other end of said cylinder being connected to atmosphere, a piston slidably mounted in said cylinder, a nozzle having its outer end normally within said bell, and its inner end connected to and through said piston to atmosphere, means in connection with said bell for opening the interior of said bell to said exhaust upon movement of said bell, and means whereby when said bell is moved, said nozzle will be projected from said bell under atmospheric pressure.

6. In a device for cleaning bottles and the like, a casing, a bell slidably mounted with respect to said casing, a nozzle slidably mounted with respect to said casing and said bell, and having its outer end normally within said bell, a fluid pressure line connected to said nozzle, an automatically closing valve in said line, means for momentarily connecting said bell and said valve upon movement of said bell, and means operative upon movement of said bell to project said nozzle through said bell whereby a stream of fluid is admitted to a bottle presented against said bell, and whereby said valve closes automatically after a predetermined time interval.

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