Feb. 17, 1953 P. R. FECHHEIMER 2,628,382

SPOUT FOR AIR-CLEANING CONTAINERS AND MEANS FOR OPERATING IT

Filed March 6, 1946 2 SHEETS—SHEET 1

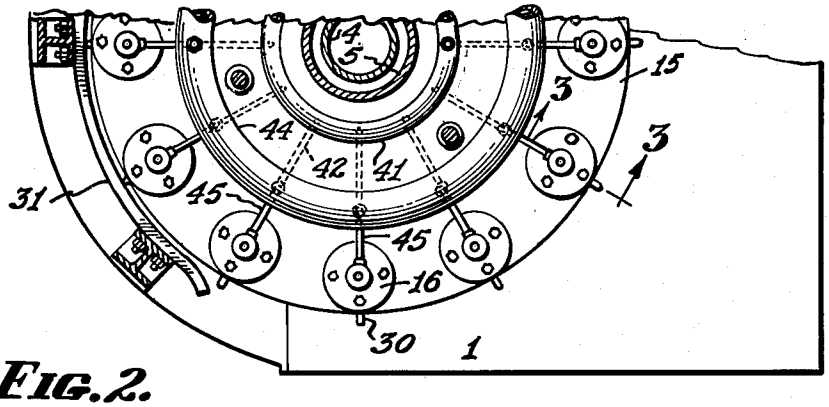

FIG. 2.

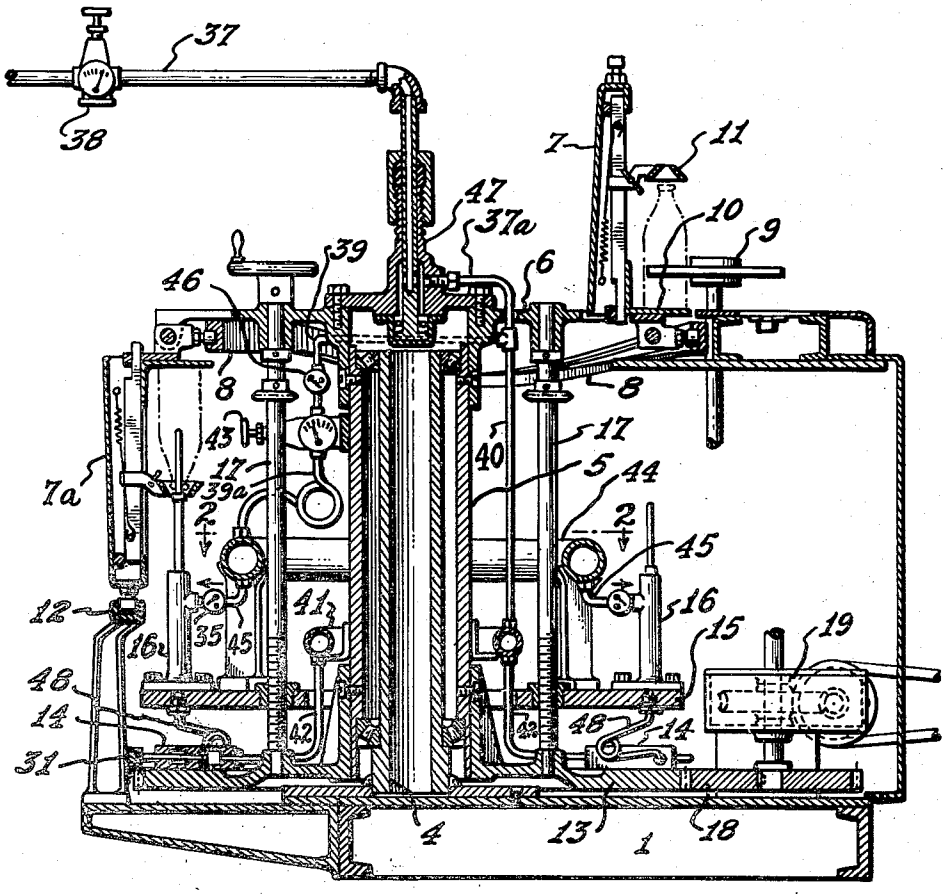

FIG. 1.

INVENTOR.
PAUL R. FECHHEIMER.
BY
Allen & Allen
ATTORNEYS.

Feb. 17, 1953

P. R. FECHHEIMER

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2 SHEETS—SHEET 2

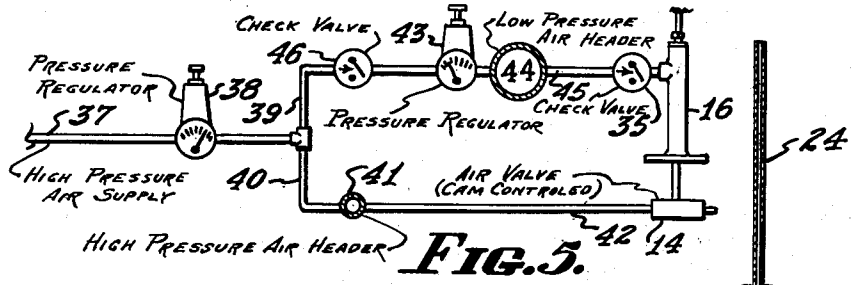

FIG. 5.

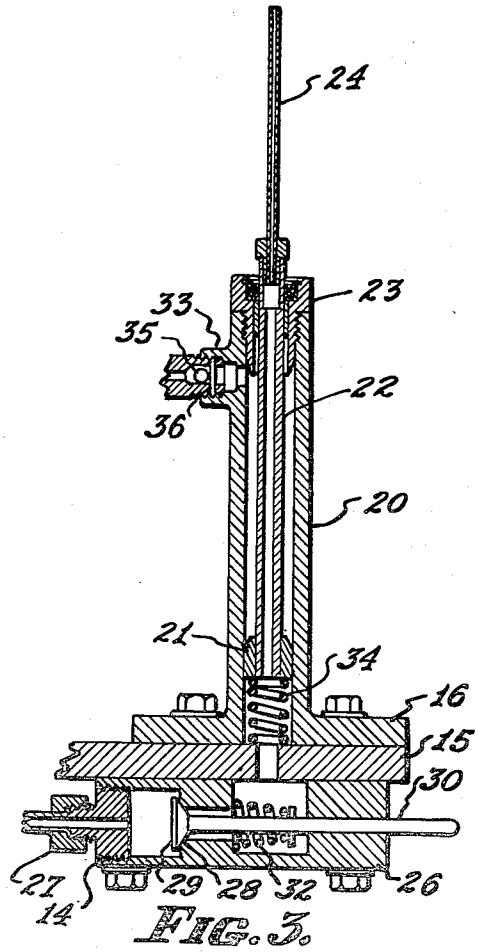

FIG. 3.

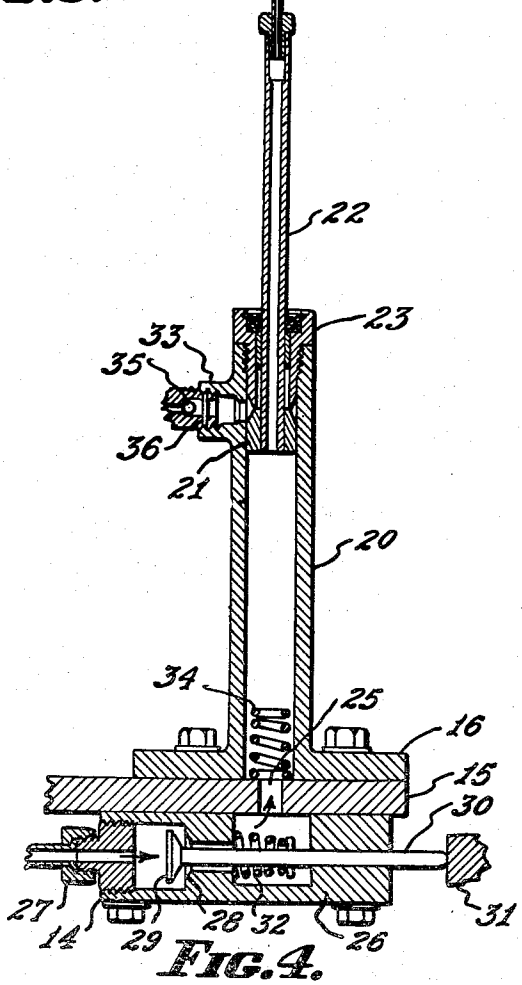

FIG. 4.

INVENTOR.
PAUL R. FECHHEIMER.
BY
Allen & Allen
ATTORNEYS.

Patented Feb. 17, 1953

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UNITED STATES PATENT OFFICE

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SPOUT FOR AIR-CLEANING CONTAINERS AND MEANS FOR OPERATING IT

Paul R. Fechheimer, Cincinnati, Ohio, assignor to The Karl Kiefer Machine Company, Cincinnati, Ohio, a corporation of Ohio

Application March 6, 1946, Serial No. 652,443

6 Claims. (Cl. 15—304)

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My invention relates primarily to means for cleaning bottles or other containers by blowing foreign particles from them with air or other dry gas. In my Patent No. 2,298,475 issued Oct. 13, 1942, I have shown a machine in which bottles are placed in moving holders which, in their course of their travel, are swung through 180° about horizontal pivots whereby to invert the bottles. During the time the bottles are inverted, air nozzles are projected into them through their mouths, and the release of air within the bottles effectively cleans them.

In this case I have shown my novel spouts and appurtenances applied to a machine for a similar purpose, it being understood that they may be otherwise used and that they have utilities for other purposes.

One of the objects of this invention is the provision of a novel spout together with a certain appurtenances coacting to project the spout nozzle and release gas under pressure through it and thereafter to retract the nozzle, through the action of the gas itself, and upon the actuation of a single valve.

It is an object of my invention to provide a spout in which the nozzle and plunger are effectively cushioned at the ends of their path of movement.

It is an object of my invention to provide a structure having these advantages but which is nevertheless simple and inexpensive to construct and positive and safe in operation.

It is an object of my invention to provide a structure which will retain certain operating characteristics for an interval in spite of failure of the source of supply of gas under pressure, and which possesses the safety characteristics hereinafter set forth.

It is also an object of the invention to provide a machine in which my novel spouts and appurtenances are incorporated.

These and other objects of my invention which will be mentioned hereinafter or will be apparent to one skilled in the art upon reading these specifications, I accomplish by that construction and arrangement of parts of which I shall now describe the aforesaid exemplary embodiment. Reference is made to the accompanying drawings wherein:

Figure 1 is a vertical sectional view, of semi-diagrammatic character, through the machine.

Figure 2 is a partial horizontal sectional view taken along the line 2—2 of Figure 1.

Figure 3 is a sectional view of a spout assembly taken along the line 3—3 of Figure 2, except-

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ing, for simplicity, the valve means is shown mounted on the table supporting the spouts.

Figure 4 is a similar view showing the nozzle in extended condition.

Figure 5 is a diagrammatic representation of a spout and appurtenances.

Referring to Figure 1, on the bed of the machine a vertical column or standard 4 is mounted. A larger column or standard 5 is supported by and rotatably journaled on the first standard. An upper table 6 is mounted on the standard 5. To this table a series of container holders 7 are pivoted on horizontal pivots so that the holders may be swung from the upright position shown at the right of the figure, to the inverted position shown at 7a at the left. The position of the several holders is determined by a stationary cam track 8.

The bottles, shown in dotted lines, may be delivered to the holders by a star-wheel device 9 or otherwise as desired. Each holder has a base or platform 10 upon which a bottle may rest and a hollow means 11 for engaging the neck or mouth of the bottle and holding it to the base. For further details of suitable holders, reference may be made to my Patent No. 2,298,475. The holders may be held firmly in the inverted position by a cam 12 as shown.

The rotatable standard 5 also carries a lower table 13 upon which valve means 14 for the spouts are mounted. There is also an intermediate table 15 upon which the spouts, generally indicated at 16, are mounted. This intermediate table is preferably arranged so as to be adjustably movable vertically, by means 17 or their equivalent, so as to accommodate bottles or containers of different sizes. It will be understood that the holders are also adjustable for the same purpose.

The standard 5 and the several tables are arranged to be rotated. This may be done in various ways. I have shown the lower table 13 provided with gear teeth meshing with a pinion 18 on a gear reduction mechanism 19 which is driven by a prime mover (not shown).

The nature of my spout mechanism is shown in Figures 3 and 4; but here, for simplicity the valves 14 are shown mounted upon the same table 15. This is a construction which may be adopted for machines in which the adjustability feature mentioned above is not desired. Each spout has a cylinder body 20 with a base fastened to the table. A piston 21 is slidable in the cylinder, and is provided with a hollow stem or rod 22 slidable through a suitable packing or

gland in a cylinder head 23. The actual nozzle is shown as a hollow member 24 attached to the stem.

Provision is made for admitting gas under pressure to the cylinder 20 below the piston. This is shown in Figures 3 and 4, as a perforation 25 in the table 15, leading directly to the valve mechanism 14. In Figure 1 the valve mechanisms are located upon a different table, and a connection is made by flexible conduit as will later be described. The valve mechanism itself is shown as a hollow body 26, closed at one end, and having a connection 27 at the other to a conduit for supplying the gas under pressure. The body has a valve seat 28 against which a valve head 29 may operate. A stem 30 for the head passes through the closed end of the body and is actuated by a cam 31. The stem and head may be biased to the closed position by a spring 32.

Assuming a connection to a source of gas under pressure, it is evident that when the valve is opened as in Figure 4, gas will be admitted beneath the piston forcing it upwardly and extending the stem 22 and nozzle 24 as shown. It will also be evident that, since the piston, the stem and the nozzle are hollow or perforated, a blast of the gas will be released at the upper end of the nozzle. The extension of the stem and nozzle, as will be seen in Figure 1, results in projecting the nozzle into the properly located bottle or container, well beyond its shoulders. The release of the blast of dry gas within the container cleans it as has been described. These operations occur in timed sequence in the machine.

The nozzle and stem must be lowered and withdrawn from the container in a positive fashion and in timed sequence prior to the re-inversion of the container. Also the movements of the piston must be buffered at the ends of its stroke. I have found that it is disadvantageous and uncertain to attempt to rely upon spring means within the cylinder 20 for the return of the piston, stem and nozzle, in view of the long stroke involved. Instead, I make a gas connection as at 33 to my cylinder 20 above the piston at its highest point, so that, by admitting gas under pressure I may force the piston down. Moreover, providing the gas admitted through the valve mechanism 14 is at a sufficiently higher pressure, it will force the piston 21 upwardly against a lower pressure of gas above the piston. Hence it becomes possible to provide a continuously effective low-pressure gas connection at 33, and this connection does not have to be positively valved.

The return stroke of the piston may be buffered by a short spring 34 in the cylinder 20; and Figure 3 shows the piston at the end of the return stroke. For buffering the out-stroke of the piston, I find that I may employ the gas above it by providing the gas connection 33 with a check valve. This may be in the form of a simple ball check valve as indicated at 35, there being a retainer 36 for the ball. In this fashion I not only prevent forcible impact of the piston 21 against the cylinder head 23, but insure a positive return of the piston under gas pressure.

Figure 5 is diagrammatically illustrative of my gas connections, a spout 16, its valve 14 and various appurtenances. A conduit 37 from a source of gas under somewhat higher than operating pressures is provided with a pressure regulating valve 38 acting to cut down the pressure to that desired for operating the piston on its up stroke and for releasing the blast of gas in the container. The conduit is branched at 39 and 40. The

latter branch goes to a "high pressure" header 41, from which lines 42 lead to the various valves 14.

The branch conduit 39 is provided with another pressure regulating valve 43, operating to cut down the pressure of the gas which will be used above the piston in accordance with the relationship discussed above, and is connected with the "low pressure" header 44. From this header lines 45 lead to the various cylinders 16, and these lines contain the check valves used for buffering and indicated diagrammatically at 35.

The pressure reducing valves which I have provided make possible a close adjustment of effective pressures above and below the piston so that the force with which the nozzle is projected can be controlled. Thus, while providing for a positive projection of the nozzle, I can so limit its force that, should the nozzle meet an obstruction such as a misaligned container or bottle, the movement of the nozzle will be arrested without damage either to the container or the nozzle itself.

In machines of the character herein described, wherein a series of operations are carried on in timed sequence, it will be understood that the nozzles must be withdrawn from the containers before the containers are re-inverted, since otherwise the nozzles or the containers or both, will be damaged. Thus it becomes desirable to provide means for the positive retraction of the nozzles even though the supply of gas under pressure should fail at the source. I accomplish this by making my low pressure header 44 of relatively large internal capacity, and by providing a check valve 46 ahead of it in the branch conduit 39. Thus, should the pressure fail in conduit 37, there will remain, in header 44 acting as a reservoir, sufficient gas under pressure to insure the return of all projected nozzles in the machine.

Referring to Figures 1 and 2, I prefer to bring the gas conduit to a fitting 47 at the top of the column 5. This fitting can rotate with respect to the conduit without destroying the gas-tightness of the connection between the two. A supplementary conduit 37*a* leads from the fitting 47 to the point where the conduits 39 and 40 branch from it. The conduit 40 leads to the "high pressure" header 41 which is in the form of an annulus or a curved pipe, which may be mounted upon the column 5 if desired. The leads or conduits 42 pass from the header to the various valves 14. Since these valves are located on the lower table 13 while the spout cylinders to which they will be connected are located on the movable intermediate table, I use for these connections coiled metal tubing or other flexible tubing, indicated at 48.

The branch connection 39 is provided with the check valve 46 and is connected to the pressure regulating valve 43, which may be mounted on the column 5. The low pressure header 44 is conveniently mounted on the movable intermediate table 15 so that it may be connected with the spout cylinders by the tubes 45. It will be noted that the header 44 is likewise of annular shape but the annulus is substantially larger in diameter and the internal diameter of the tubing from which it is made is larger than in the case of the high pressure header 41, for the purpose above set forth. Since the header 44 is movable with respect to the pressure regulating valve 43, I connect the two together by means of coiled metal tubing as at 39*a*, or by means of other flexible tubing.

Modifications may be made in my invention without departing from the spirit of it.

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

1. In a movable spout mechanism, branch conduits from a source of gas under pressure, one of said conduits being connected to a valve mechanism, a cylinder, a piston having a hollow rod passing therethrough and through one end of said cylinder, a connection between said valve mechanism and the opposite end of said cylinder, a pressure reducing means in the other of said branch conduits and a connection between said pressure reducing means and said cylinder at the opposite side of said piston, whereby to return said piston under reduced pressure, a reservoir means in said last mentioned connection, and a check valve in said last mentioned branch conduit on the side of said reservoir opposite said cylinder for maintaining sufficient gas under pressure in the reservoir to insure return of the piston should the source of gas pressure fail.

2. The structure claimed in claim 1, wherein a pressure regulating means common to said branch conduits is located between said conduits and said source of gas under pressure.

3. In a movable spout mechanism, branch conduits from a source of gas under pressure, one of said conduits being connected to a valve mechanism, a cylinder, a piston having a hollow rod passing therethrough and through one end of said cylinder, a connection between said valve mechanism and the opposite end of said cylinder, a pressure reducing means in the other of said branch conduits and a connection between said pressure reducing means and said cylinder at the opposite side of said piston, whereby to return said piston under reduced pressure, a reservoir means in said last mentioned connection, and a check valve in said last mentioned branch conduit on the side of said reservoir opposite said cylinder for maintaining sufficient gas under pressure in the reservoir to assure return of the piston should the source of gas pressure fail, in combination with a machine having a rotating column, a lower table mounted on said column, a table adjustable toward and away from said lower table, said cylinder being mounted on said last mentioned table, said valve mechanism being mounted on said lower table, and the connection between said valve mechanism and said cylinder being a flexible connection.

4. In a movable spout mechanism, a machine

comprising a rotatable column, movable spout mechanisms mounted for rotation with said column, said movable spout mechanisms each comprising a cylinder, a piston in said cylinder and a hollow piston rod passing through said piston and through an end of the cylinder, a valve mechanism and a connection between the valve mechanism and the opposite end of said cylinder, each cylinder having a check valved gas inlet beyond its piston at the end through which said piston rod passes, a fitting at the top of said column, a gas connection to said fitting, a branched conduit leading from said fitting, one of said branches connected to a header which in turn is connected to the said several valve mechanisms, the other of said branches having a check valve and a pressure reducing valve, which in turn is connected to an annular header of large capacity, and connections between said last mentioned header and the check valved inlets to said cylinders.

5. The structure claimed in claim 4 in which said column supports an upper table, a lower table and an intermediate adjustable table, in which said cylinders are mounted upon the intermediate table, the connections between said cylinders and said valve mechanisms being flexible connections, in which said last mentioned header is mounted on said intermediate table, and in which said connection between said last mentioned header and said pressure reducing valve is a flexible connection.

6. The structure claimed in claim 5 wherein said upper table is provided with invertible holders for containers, which holders when inverted present said containers to said cylinders in such position that nozzles on said hollow piston rods may be projected into said containers for the release of gas therein.

PAUL R. FECHHEIMER.

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