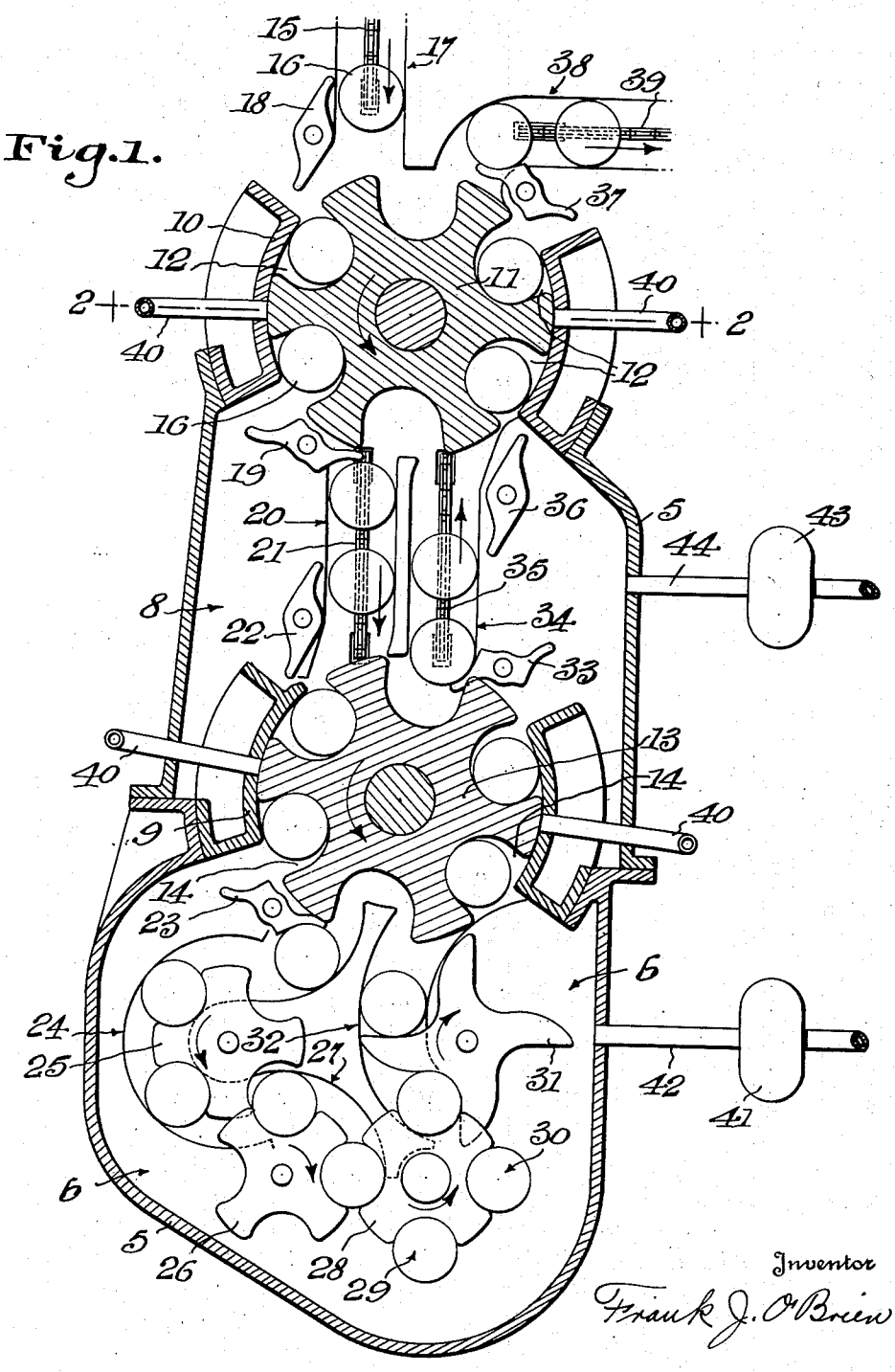
Feb. 1, 1944. F. J. O'BRIEN 2,340,341

CONTAINER VACUUMIZING AND CLOSING APPARATUS

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Fig. 1.



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Fig.2.

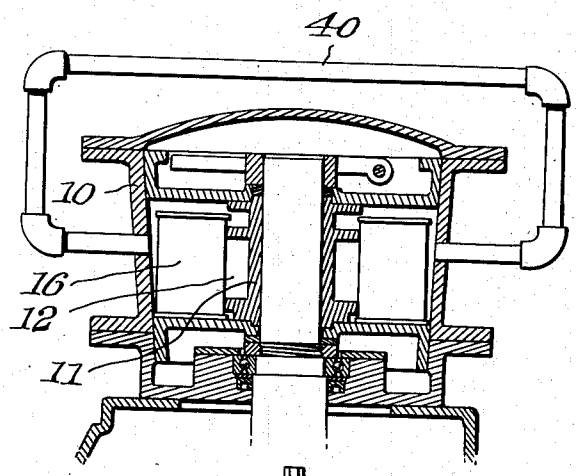


Fig.3.

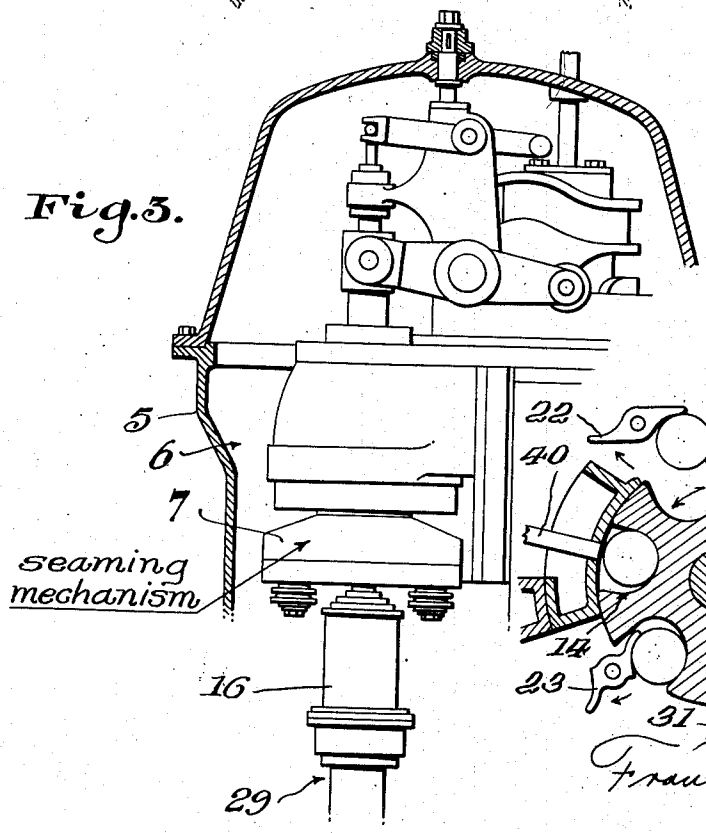
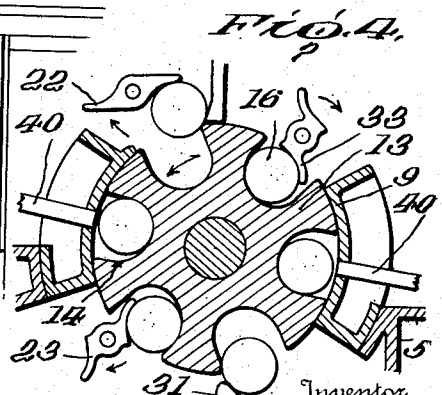


Fig.4.



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2,340,341

UNITED STATES PATENT OFFICE

2,340,341

CONTAINER VACUUMIZING AND CLOSING APPARATUS

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Application November 25, 1940, Serial No. 367,146

2 Claims. (Cl. 226—82)

The invention relates generally to apparatus for closely filled containers and primarily seeks to provide a novel apparatus for drawing a vacuum in the containers before sealing the same.

Apparatus for sealing filled containers in a vacuum have been provided heretofore, but such apparatus has been limited in efficiency because of employing container introducing media improper in design and arrangement, and faulty in that it served to admit large quantities of air at atmospheric pressure and made it difficult and sometimes impossible to maintain the desired vacuum in the container sealing chamber. The present invention seeks to provide an apparatus in which these objectionable conditions are avoided.

In its more detailed nature, the invention resides in the provision of a novel container vacuumizing and closing apparatus wherein is provided a container closing or sealing means, a vacuumizing chamber in which the sealing means functions, a pre-vacuumizing chamber leading to the vacuumizing chamber, a pocketed rotary valve forming a seal between said chambers and effective to deliver pre-vacuumized containers to the container sealing chamber and also to deliver sealed containers therefrom, and a pocketed rotary valve sealing the entrance into the pre-vacuumizing chamber and effective to deliver containers to the pre-vacuumizing chamber and also to deliver sealed containers therefrom.

Another object of the invention is to provide an apparatus of the character stated embodying separate pumps for evacuating the individual vacuumizing and pre-vacuumizing chambers, said pumps being effective to provide a slightly lower degree of vacuum in the pre-vacuumizing chamber than in the vacuumizing chamber.

Another object of the invention is to provide an apparatus of the character stated in which opposite sides of the respective rotary sealing valves are cross-connected so that container discharging pockets at one side of the valves will cross-connect with container infeeding pockets at opposite sides and tend to partially evacuate said cross-connected container infeeding pockets.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more fully understood by following the detailed description, the appended claims, and the several views illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a diagrammatic horizontal sectional view taken through the pre-vacuumizing and vacuumizing chambers of an apparatus embodying the invention.

Figure 2 is a fragmentary vertical cross section taken on the line 2—2 on Figure 1.

Figure 3 is a fragmentary vertical cross section taken at one of the seaming stations.

Figure 4 is a fragmentary horizontal sectional view illustrating one of the pocketed rotary valves disposed with two of its diametrically opposite pockets in registry with the cross connection piping.

In the somewhat diagrammatic illustration herein made of one embodiment of the invention, there is included a main housing or casing 5 intended to exclude air at atmospheric pressure and to provide a filled container vacuumizing chamber 6 within which any suitable container closing or sealing mechanism generally designated 7 is mounted, and a pre-vacuumizing chamber 8 leading toward said vacuumizing chamber. The container closing mechanism 7 preferably takes the form of a double seaming mechanism such as that disclosed in the U. S. Letters Patent to Nelson Troyer 1,983,252, issued on Dec. 27, 1934, but, as previously stated, any form of vacuumized container sealing means can be employed within the scope of the present invention.

A rotary valve casing 9 is disposed between or at the juncture of the pre-vacuumizing chamber 8 and the vacuumizing chamber 6, and a similar rotary valve casing 10 is disposed at the entrance into the pre-vacuumizing chamber 8. The casing 10 houses a rotary valve 11 equipped with a plurality of equidistantly spaced peripheral pockets 12, and a similar rotary valve 13 equipped with peripheral pockets 14 is mounted in the valve casing 9. The valve 11 serves to seal the chamber 8 against ingress of air at atmospheric pressure from without the casing 5, and the valve 13 serves to seal the chambers 8 and 6 against free communication one with the other.

Containers which have been filled and which have covers loosely applied or clinched thereon are delivered to the apparatus by any suitable feeding means diagrammatically indicated at 15. These filled containers, designated 16, are fed along a delivery way 17 into the path of movement of a timing rotor 18 which delivers them, one by one, into the receiving pockets 12 of the valve 11. The valve 11 thus serially delivers filled containers 16 into the apparatus for being vacuumized therein without introducing any air at atmospheric pressure other than the relatively small amount which surrounds the containers in

the restricted peripheral pockets 12 which they substantially fill.

As each filled container 16 is delivered inside the pre-vacuumizing chamber 8, it is stripped from the respective valve pocket by a stripping rotor 19 and delivered onto a guide or feed way 20 along which it is carried by a suitable conveyor 21. Containers fed along on the conveyor 21 are individually picked up by the timing rotor 22 and delivered into the receiving pockets 14 in the rotary valve 13. The valve 13 seals the passageway between the pre-vacuumizing chamber 8 and the vacuumizing chamber 6 and permits a carrying over into the vacuumizing chamber 6 of only a very small portion of the rarified atmosphere of the pre-vacuumizing chamber 8 which surrounds the containers in the pockets 14 of the valve 13 by which said containers are delivered to said vacuumizing chamber.

As each container 16 is delivered into the vacuumizing chamber 6 it is stripped from the respective valve pocket 14 by a stripping rotor 23 and presented in a feed way or guide 24 in which it is conveyed by a suitable transfer wheel 25 and delivered thereby to another transfer wheel 26 which feeds it over a feed way or guide 27 into a receiving pocket of a closing turret 28. The closing turret is moved to present the containers at first and second operation seaming stations respectively designated 29 and 30 for having the covers or end closures double seam secured onto the containers.

After the containers have been pre-vacuumized in the chamber 8, vacuumized in the chamber 6, and sealed at the stations 29 and 30 in the manner hereinbefore described, they are stripped from the closing turret 28 by a stripping and timing star 31 which cooperates with a guideway 32 in again delivering said containers into the pockets 14 of the valve 13.

The sealed containers are thus returned from the vacuumizing chamber 6 to the pre-vacuumizing chamber 8 by the valve 13, a suitable stripping rotor 33 serving to strip the sealed containers from the valve pockets and deliver them into a receiving guide way 34 along which they are conveyed, by a suitable conveyor 35, through the pre-vacuumizing chamber 8 toward the valve 11.

As the sealed containers again approach the valve 11 they are picked up by a timing rotor 36 and moved into the receiving pockets 12 in said valve. The sealed containers are stripped from the pockets of the valve 11 by a stripping rotor 37 which delivers them to a guideway 38 to be carried off on any suitable feed-away conveyor 39.

It will be observed by reference to Figures 1 and 2 of the drawings that the opposite sides of each of the valve casings 9 and 10 are cross-connected, as at 40, so that as each in-feeding valve pocket registers with the cross-connecting piping 40 at one side of the valve it will be brought into open communication with an out-feeding pocket at the opposite side of the valve (see Figures 2 and 4), and the purpose of this cross-connecting of pockets will be described later.

A vacuum pump 41 is connected through a line 42 with the vacuumizing chamber 6, and a vacuum pump 43 is connected by a line 44 with the pre-vacuumizing chamber 8. The pump 41 is effective to draw a 29½" vacuum in the vacuumizing chamber 6, and the pump 43 is effective to draw a vacuum of slightly lesser degree, namely, 27" at the pre-vacuumizing chamber 8. Because of the differential in pressures in the respective chambers 6 and 8, and between the pre-vacuumizing chamber 8 and atmosphere in advance of the valve 11, it will be obvious that a given pocket of either of the valves 11 and 13 at the out-feeding side thereof, while passing the respective opening in the cross-connection piping 40, will contain therein a pressure less than the pressure in the pocket communicating with the piping 40 at the opposite side of the same valve. Thus as each valve pocket at the out-feeding side of a given valve passes the respective cross-connection piping 40 it will draw air from and tend to partially evacuate said opposite valve pocket.

By positioning the valves 11 and 13 in tandem in the manner illustrated in Figure 1, and by causing each thereof to simultaneously feed filled containers into and sealed containers from the respective chambers 8 and 6, means is not only provided for sealing the passageways from atmosphere and from each other in a manner for effecting a very efficient two stage vacuumizing of the containers, but since the valve pockets at the entrance into and discharge from each valve casing are substantially filled by in-feeding and out-feeding containers, very little interchange of unbalanced pressures is permitted and the desired vacuum volumes in the respective chambers 8 and 6 is easily maintained.

It is known that to exhaust or attenuate one cubic foot of air from atmospheric pressure to 27" of vacuum, the air would have to be expanded to ten times its volume, whereas to exhaust or attenuate one cubic foot of air to 29½" of vacuum, the air would have to be expanded sixty times. The advantage of vacuumizing the containers in two separate stages in the chambers 8 and 6 by vacuum treatments in distinct, successively increasing degrees, each vacuum stage being attained by use of a distinct pump, will be obvious. By use of the separate pump 43 and the attainment of a 27" vacuum therewith, nine-tenths of the air is exhausted at the 27" vacuum in the chamber 8, leaving only one-tenth of the air to be exhausted in the main vacuum chamber 6 in order to reach the 29½" of vacuum desired in said chamber 6. Therefore, with the specific arrangement of parts illustrated in Figure 1, employing the two pumps 43 and 41, the pumps have a combined capacity of only one-quarter of what would be required to initially provide a vacuum of 29½" in a single chamber and by use of a single pump.

No attempt is made herein to illustrate in detail the method of mounting, or the driving connections for, the rotary valves, the conveyors, or the timing and transfer rollers, because all of these parts, in structure and mounting, are conventional and well known, and it is considered unnecessary to encumber this disclosure with specific illustration and description thereof.

It is of course to be understood that the details of structure and arrangement of parts may be variously changed and modified without departing from the spirit and scope of my invention.

I claim:

1. In apparatus of the character described a container pre-vacuumizing chamber, a container vacuumizing and closing chamber having a vacuum therein higher than the vacuum obtaining in said pre-vacuumizing chamber and being disposed close to said pre-vacuumizing chamber and closed against ingress of outside air and also against infeeding and outfeeding of containers except through said pre-vacuumizing chamber,

container closing means in said vacuumizing and closing chamber, a single rotary pocketed valve for feeding unclosed containers into and closed containers from the pre-vacuumizing chamber, means for feeding unclosed containers to said valve, means for feeding closed containers from said valve, a second single rotary pocketed valve for feeding unclosed containers from the pre-vacuumizing chamber to the vacuumizing and closing chamber and closed containers from the vacuumizing and closing chamber back into said pre-vacuumizing chamber, means for moving the unclosed containers from said second valve to the closing means and closed containers from the closing means back to said second valve, and means for moving unclosed containers from the first mentioned valve to said second valve and closed containers from said second valve to said first mentioned valve through said pre-vacuumizing chamber.

2. Apparatus as defined in claim 1 in which there is included, an individual pump of a capacity for drawing a vacuum of approximately twenty-seven inches in said pre-vacuumizing chamber, and a second individual pump of a capacity for drawing a vacuum of approximately twenty-nine and a half inches in the vacuumizing and closing chamber, the combined capacity of said two pumps being only a fraction of the capacity necessary in a single pump capable of evacuating a chamber comparable to said vacuumizing and closing chamber to an extent sufficient to provide therein a vacuum of approximately twenty nine and one half inches.

FRANK J. O'BRIEN.