Feb. 6, 1951 S. S. JACOBS ET AL 2,540,120

APPARATUS FOR FILLING AND SEALING CONTAINERS

Original Filed June 10, 1941 2 Sheets-Sheet 1

Fig 1

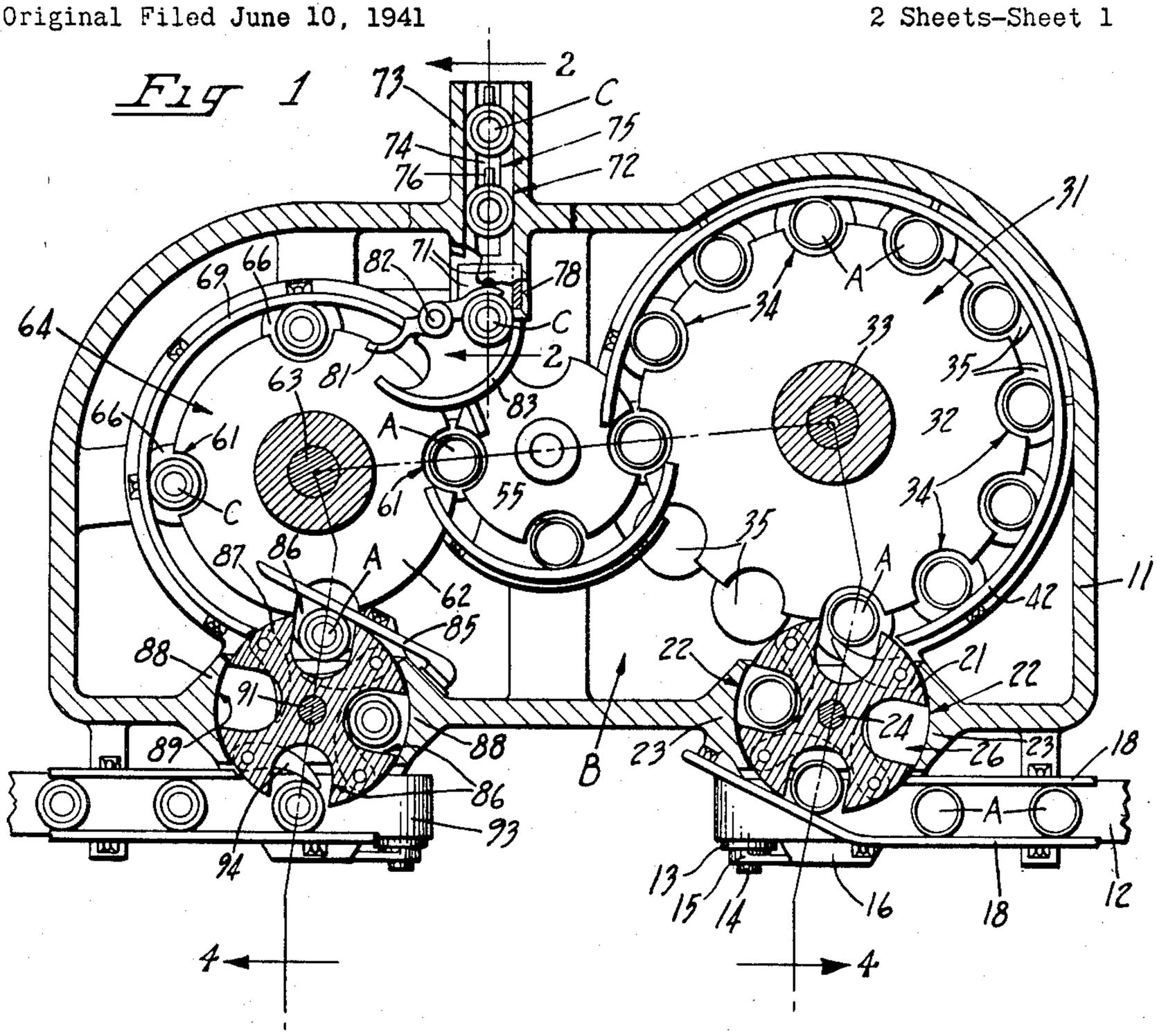


Fig 2

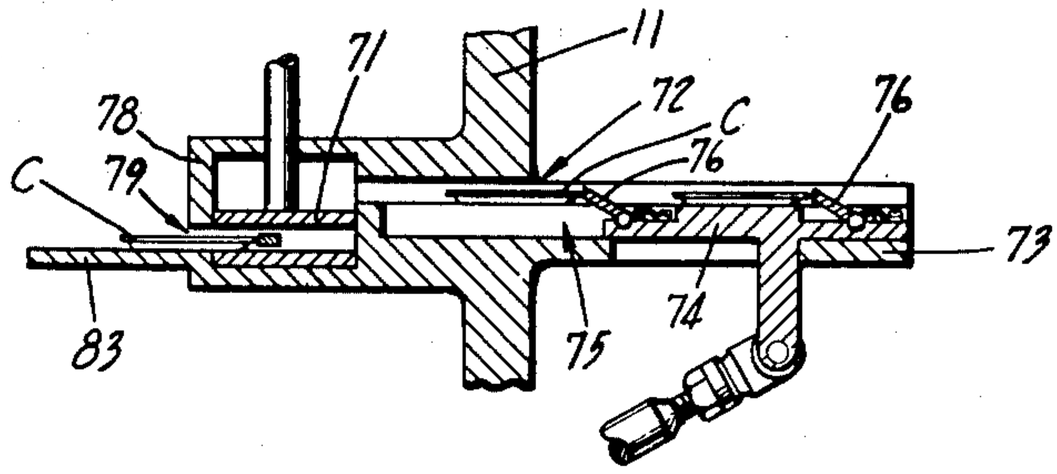
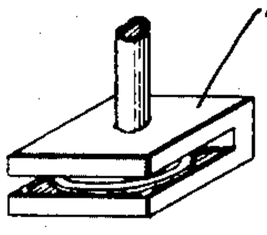


Fig 3



BY

INVENTOR.
Samuel S. Jacobs
Stellan Birkland
Ivan D. Thornburgh
Charles H. Erne
ATTORNEYS

Feb. 6, 1951 S. S. JACOBS ET AL 2,540,120

APPARATUS FOR FILLING AND SEALING CONTAINERS

Original Filed June 10, 1941 2 Sheets-Sheet 2

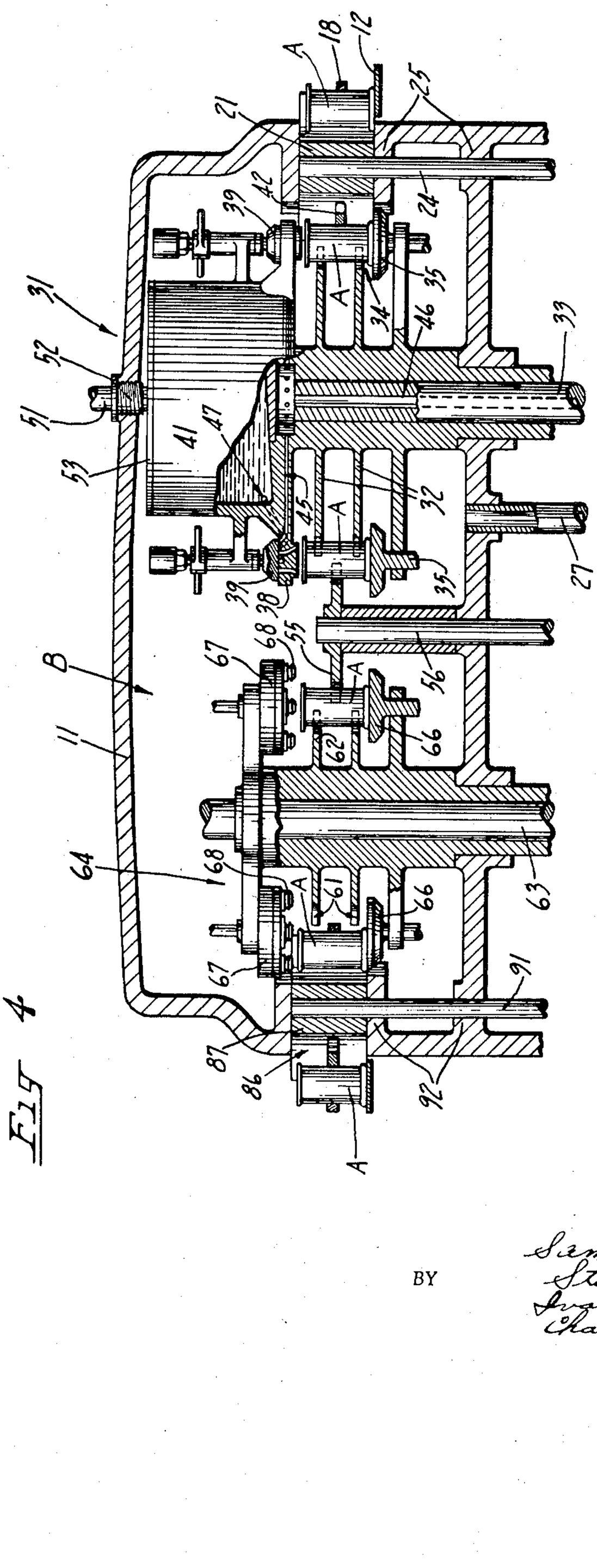


Fig 4

INVENTOR
Samuel S. Jacobs
Stellan Birkland
Ivan L. Thornburgh
Charles H. Esse
ATTORNEYS

BY

Patented Feb. 6, 1951 2,540,120

UNITED STATES PATENT OFFICE

2,540,120

APPARATUS FOR FILLING AND SEALING CONTAINERS

Samuel S. Jacobs, San Mateo, and Stellan Birkland, San Francisco, Calif., assignors to American Can Company, New York, N. Y., a corporation of New Jersey

Original application June 10, 1941, Serial No. 397,476. Divided and this application June 29, 1945, Serial No. 602,394

3 Claims. (Cl. 226—75)

1

The present invention relates to a machine for vacuum filling and sealing containers or cans and has particular reference to an organized apparatus for vacuum filling and vacuum closing containers at respectively different degrees of vacuum in the same fixed or stationary overall vacuum chamber. This is a division of my copending United States application Serial No. 397,476, filed June 10, 1941, on Method of Filling and Sealing Containers, now Patent 2,426,555, issued August 26, 1947.

In the filling and closing of cans under a vacuum it is usually desirable to obtain the highest possible degree of vacuum in the can prior to and/or during the filling operation. However, when this same can is closed and sealed as in a double seaming machine, it is desirable to reduce the vacuum in the can in order to prevent boiling over of the contents during the sealing operation. Such desirable conditions heretofore usually required separate filling and closing machines, or the separate drawing of the desired degrees of vacuum on the can for each operation, with the result that the time and cost of drawing these vacuums where unnecessarily great and the expense of separate machines and the floor space required for them unnecessarily large.

The instant invention overcomes these old disadvantages by providing a machine for vacuum filling and vacuum sealing such cans in two stages of vacuumization, both effected in the same fixed overall vacuum chamber, the chamber being maintained at the proper sealing vacuum and the can while in the chamber being separately exhausted to a higher degree of vacuum for the filling operation.

An object, therefore, of the invention is the provision of a machine for vacuum filling and vacuum sealing cans wherein the can is introduced into a chamber or region which is preferably maintained at a constant vacuum suitable for sealing and while in this region is separately vacuumized to a different degree for filling so that the proper vacuum will obtain in the can during the filling operation and also the desired different vacuum during the closing operation while maintaining the can in a single vacuumized region until its discharge.

Another object is the provision of such a machine for filling and sealing cans wherein the vacuumization of the cans can be effected while the can side walls remain unsupported.

Still another objective of the invention is the provision of a simple, compact and efficient machine which is adapted to take the place of separate filling and closing machines and is more economical in initial cost, upkeep and floor space and specially suited for use by small packers.

2

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a horizontal section through a machine embodying the instant invention, with parts broken away;

Fig. 2 is an enlarged sectional detail of a cover feed device, taken substantially along the line 2—2 in Fig. 1, with parts broken away;

Fig. 3 is a perspective view of a valve part of the cover feed shown in Fig. 2, with a cover in place for feeding; and

Fig. 4 is a composite longitudinal section taken substantially along the broken line 4—4 in Fig. 1, with parts broken away.

As a preferred embodiment of the instant invention, the drawings illustrate a vacuum filling and sealing machine in which empty or partially filled cans A are introduced into a substantially hermetic chamber B providing an interior overall region which is maintained under a constant partial or relatively low vacuum. The product being filled determines what degree of vacuum is used, some products like peaches requiring very little vacuum in this low vacuum stage. As an example of low vacuum for products which are best canned in an initial higher vacuum than that used for peaches, 22 inches may be mentioned. An empty can or a partially filled can received into such a vacuumized region or chamber is accordingly exhausted of its air to the extent of the vacuum in the region or chamber.

The interior of such a received and low vacuumized can thereupon is sealed off from the vacuum of the chamber and a relatively high vacuum is drawn on the interior of the can. Approximately 29 inches may be given as a figure for the can vacuumized at 22 inches. Thus the vacuum in the can need be increased only seven inches of vacuum and since the difference between the two pressures is so small the can side walls need no support against injury or collapse. While under this high vacuum the can is filled with its contents, or if already partially filled the filling is completed. After filling, the temporary seal of the can is broken or released and the interior of the can is thus again subjected to the vacuum condition of the chamber. A permanent cover or sealing closure is then positioned on the filled can

and is sealed in place, preferably by double seaming. Sealing of the can is followed by its discharge from the chamber to any suitable place of deposit. The feeding of the can or container and sealing closure into the partially vacuumized chamber and the discharge of the filled and sealed container is accomplished in a substantially air tight manner which insures a constant vacuum in the chamber without appreciable infiltration of air.

Such a manner of filling and sealing cans under a two-stage or different degree vacuumizing process makes it possible to fill the can under the highest vacuum obtainable and after filling to immediately seal the can while in the same chamber at a properly reduced vacuum which prevents boiling over of the contents of the can. The proper head space in the can is thus maintained and the time and cost of pulling separate vacuums on the can and in different machines are reduced.

In this vacuumizing and filling machine the stationary chamber or region B is enclosed and defined by a casing 11 (Figs. 1 and 4) which constitutes the fixed main frame of the machine. The empty or partially filled cans A to be filled and sealed are received in spaced and timed order on a continuously moving endless belt 12 which operates over a pulley 13 carried on a shaft 14 journaled in bearings 15 formed on an extension 16 of the casing 11. Guide rails 18 disposed adjacent the belt, maintain the moving cans in line on the belt.

The feed-in belt 12 terminates adjacent a constantly rotating substantially air-tight entrance valve 21 which is located in an opening 22 adjacent a valve seat 23 formed in the casing 11. This valve seals off the opening in the casing while permitting cans A to be passed therethrough into the chamber B. The valve is mounted on a vertical shaft 24 which is journaled in bearings 25 formed in the casing. The shaft is rotated in any suitable manner in time with the other moving parts of the apparatus. The valve is formed with spaced pockets 26 which are carried by the rotating valve into the path of the cans on the belt 12. Thus the transfer of the cans individually into the chamber B is effected.

As hereinbefore mentioned, the chamber B is or may be maintained under a vacuum of approximately 22 inches. This vacuum is drawn from any suitable source by way of a pipe 27 (Fig. 4). The chamber end of this pipe is threaded into the bottom of the casing 11.

A can A introduced into the chamber B is received in a rotating can filling mechanism generally indicated by the numeral 31. By way of example, the cans A are shown as being filled with liquid contents and for purposes of illustration the drawings illustrate a liquid filling mechanism of the character disclosed in United States Patent 2,124,581, issued July 26, 1938, to R. Luthi on Can Filling Machine.

Such a filling mechanism includes a rotatable turret 32 which is mounted on a stationary hollow post 33. The turret is formed with a plurality of pockets 34 spaced around its periphery. Below each pocket there is a lifter plate 35 which is vertically movable in a well known manner and which receives and supports a can A which is advanced by the entrance valve 21 when the plate passes adjacent the valve. Above each turret pocket there is a vacuumizing and filling head 38 having a rotatable valve 39. These heads are secured to a tank or reservoir 41 in which the liquid to be filled into the cans is retained. The tank is carried on the turret and rotates therewith.

Hence when a can A is received in a pocket 34 of the turret it rests upon a lifter plate 35 and the latter carries the can around with the turret in a circular path of travel. A curved guide rail 42 disposed adjacent the periphery of the turret holds the can in its pocket. During this travel the lifter plate raises the can into engagement with the head 38 directly above and this closes off the interior of the can from the low vacuum of the chamber B.

While in this position the interior of the can is further vacuumized to the higher vacuum of 29 inches hereinbefore mentioned. This is brought about by a turning of the valve 39 which turning may be effected in any suitable manner such as that disclosed in the above Luthi patent.

The valve 39 is formed with suitable ports which are brought into registry with other ports in the filling head 38. One of these filling head ports communicates with a passageway or port 45 (Fig. 4) in the bottom wall of the tank and this passageway communicates with a bore 46 formed in the stationary post 33. This bore leads from any suitable source of the higher vacuum. Hence when the valve 39 is in the proper position the interior of the can is in communication with the source of the higher vacuum and the can is accordingly vacuumized to correspond with the higher vacuum. In case the can is partially filled, as for example with sliced peaches, pineapple or other desired solid product, the interstices of such products are also freed of air by this higher vacuum.

Immediately after such a separate vacuumizing of the interior of the can A, the latter is filled with its liquid contents. This is effected by another turning of the valve 39 which brings certain ports therein into registry with ports in the filling head 38 communicating with a passageway 47 which leads from the interior of the tank 41. When the valve is in this position, liquid from the tank flows through the passageway 47, valve 39, and filling head 38 into the can until the latter is filled.

When the can is filled the valve 39 is again turned to a position which cuts off the ports in the filling head and brings the interior of the can into communication again with the lower vacuum pressure in the chamber B, thereby equalizing the pressure inside and outside of the container. The lifter plate 35 thereupon moves down and carries the filled can down to its original level during which time it remains exposed to the low vacuum within the chamber B.

Liquid drained out of the tank 41 is replenished by way of an inlet pipe 51 which leads from any suitable source of supply of the liquid. This pipe extends down through a stuffing box 52 in the top of the casing 11 and the inner end of the pipe is secured to a cover 53 on the tank 41.

A filled can A is removed from the turret 32 of the filling mechanism 31 by way of a star wheel 55 (Figs. 1 and 4) which is disposed adjacent the periphery of the filling turret 32. This star wheel is mounted on a vertical shaft 56 in the casing 11 and may be rotated in any suitable manner in time with the other moving parts of the apparatus. The star wheel propels the cans along a reversed curved path of travel and positions them into spaced pockets 61 of a rotating turret 62 mounted on a shaft 63 of a conventional can closing mechanism 64.

A can deposited in a pocket 61 of the turret 62 is received on a vertically movable lifter pad 66 disposed below the pocket. The can thus supported is in line with an overhead closing or seaming head 67 (Fig. 4) having seaming rollers 68. There is one of these lifter pads and one of these seaming heads for each turret pocket and the heads are rotated in any suitable manner.

A can A thus received in the closing mechanism 64 is carried around a circular path of travel by the turret 62. A curved guide rail 69 disposed adjacent the periphery of the turret retains the cans in their pockets. While the cans are moving along this path of travel sealing closures or covers C are deposited thereon.

The can ends C preferably are introduced into the low vacuum chamber B by way of a valve 71 (Figs. 1 and 2) disposed adjacent an opening 72 in the casing 11. The entering sealing closures or can ends are fed along a runway 73 on the casing 11 by a reciprocating feed bar 74 which slides in a groove 75 formed in the runway. Feed dogs 76 in the feed bar advance the can ends through the opening 72 in the casing and place them in the valve 71.

The valve 71 reciprocates vertically within a housing 78 located inside the vacuum chamber B and is formed on the casing 11 adjacent the opening 72. Adjacent the bottom, the housing is formed with a slot 79. When the valve is in its uppermost position it aligns with the opening 72 for the reception of a can end C while blocking off communication between the opening and the slot 79 to prevent the entrance of the outside air into the vacuum chamber B. After receiving a can end, the valve moves down in its housing into alignment with the slot 79 while still blocking off the entrance of air by way of the opening 72.

While the valve is in this lowered position a two finger star wheel 81 mounted on a shaft 82 sweeps the can end C from the valve 71 and propels it along a curved runway 83. This runway guides the can end toward a moving can A in the turret 62 and at the terminal end of the runway the can end slides into position on and engages the top of the can.

As soon as a can receives its cover or sealing closure it is lifted into its corresponding closure or seaming head 67 and the cover is thereupon permanently secured to the can. Lifting of the can is effected by the lifter pad 66 on which it rests and this lifting and the closing of the can is performed while it is carried around its forward travel by the rotating turret 62.

At the completion of the can closing operation, the lifter pad 66 moves down and thus returns the can to its original level in time to engage against a stationary ejecting rail 85 which ejects the closed can from the closing turret 62. This rail is secured to the inside of the casing 11 and projects inwardly into the path of travel of the cans in the turret.

The ejected closed can A is received in a pocket 86 of a rotating valve 87 disposed in a valve seat 88 formed in the casing 11 adjacent a can discharge opening 89 therein. The valve is mounted on a vertical shaft 91 journaled in bearings 92 in the casing 11 and is rotated in any suitable manner in time with the other moving parts of the apparatus.

The rotating valve 87 carries the closed can out of the vacuum chamber B and brings it adjacent a discharge endless belt conveyor 93 disposed outside the casing 11. Fingers 94 pivotally

mounted in the valve push the closed can out of its turret pocket 86 and position it on the belt conveyor. The conveyor carries the can to any suitable place of deposit and this completes the operations of filling and sealing the can under the desired vacuum conditions.

From the foregoing disclosure it will be seen that in thus cooperatively arranging both the vacuum filling and vacuum closing mechanisms in a common chamber or housing and in providing air-tight can in-feed and can out-feed valves and an air-tight can end in-feed valve, the whole chamber or housing can be maintained under any desired degree of vacuum, preferably at a relatively low vacuum, while the interior of the can just before filling may be further vacuumized through the filling head without disturbing the lower vacuum in the housing. This novel combination of features has a number of economical, structural and operative advantages, which are briefly summarized as follows:

It simplifies construction and eliminates a great many parts and operations heretofore found necessary, for instance, it eliminates a plurality of individual vacuum chambers. It also eliminates mechanical supports for the can bodies to keep them from collapse while under high vacuum.

It conserves considerable floor space in the canning plant and provides, especially the small canner with a machine combination which is much more economical in original cost, in operation and in upkeep, than the separate vacuum fillers and vacuum closing machines heretofore used.

It makes it possible to draw a vacuum of different degrees during the filling and closing operations without exposing the cans to atmosphere at any time.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

We claim:

1. Apparatus for vacuum filling and vacuum sealing containers, comprising in combination, a casing enclosing a substantially air-tight chamber, valve means in a wall section of said casing for passing unsealed containers into said chamber and for discharging sealed containers therefrom, means for vacuumizing said chamber and the interior of containers therein to a desired degree of vacuum, a rotatable filling turret having a plurality of pockets located in said vacuumized chamber for receiving unsealed containers to be filled, means rotatable with said filling turret for further vacuumizing the interiors alone of the containers and for filling a product into the higher vacuumized containers while they are in the turret pockets, a rotatable closing turret having a plurality of pockets in said vacuumized chamber for receiving from said filling turret said further vacuumized and filled containers, means including a valve in a wall section of said casing for passing container covers into said vacuumized chamber and for depositing them in place on said filled containers in said closing turret pockets, and a container closing head disposed in alignment with each of said closing turret

pockets for sealing said covers onto the filled containers while in said closing turret pockets and while under the lower vacuum condition in said chamber.

2. Apparatus for vacuum filling and vacuum sealing containers under respectively different degrees of vacuum, comprising a casing defining a closed overall chamber for simultaneously holding and treating a plurality of containers, means for maintaining a constant relatively low partial vacuum in said chamber, valve means for successively introducing unsealed containers in a continuous procession into said chamber to expose the container interiors to the chamber vacuum, filling means in said chamber including means for initially temporarily sealing from the chamber vacuum the interiors of the unsealed partially vacuumized containers while the exteriors of the containers are exposed to the chamber vacuum, said filling means further including means for drawing a higher degree of vacuum on the thus temporarily sealed container interiors prior to the containers being filled by said filling means while their thus higher vacuumized interiors are maintained temporarily sealed from the relatively lower chamber vacuum, said sealing means being thereafter operative to unseal and expose the filled higher vacuumized container interiors to the relatively lower chamber vacuum to substantially equalize the reduced pressure to which the container interiors and exteriors are subjected, means in said chamber for receiving from said filling means and finally hermetically sealing the filled interiorly vacuumized containers while their exteriors are maintained in contact with the chamber vacuum, and valve means for progressively discharging the hermetically sealed containers from said chamber without appreciably disturbing the constant partial vacuum maintained therein, both of said valve means for respectively introducing and discharging containers operating simultaneously with said filling means and said final hermetic sealing means.

3. Apparatus for vacuum filling and vacuum sealing containers under respectively different degrees of vacuum, comprising a fixed casing defining a closed overall chamber for simultaneously holding and treating a plurality of containers, means for maintaining a constant partial vacuum condition in said chamber, valve means for successively introducing unsealed containers and sealing closures in a continuous procession into said chamber thereby exposing the container interiors to the partial chamber vacuum, filling means in said chamber including means for initially temporarily sealing from the chamber vacuum the interiors of the unsealed partially vacuumized containers while the exteriors of the containers are exposed to the chamber vacuum, said filling means further including valve controlled means for establishing a different degree of vacuum within the temporarily sealed container interiors as compared to the constant partial vacuum prevailing on the container exteriors prior to the containers being filled by said filling means while their differently vacuumized interiors are maintained temporarily sealed from the constantly maintained partial chamber vacuum, said temporary sealing means being thereafter operative to unseal and expose the filled container interiors to the relatively different chamber vacuum to substantially equalize the reduced pressure to which the container interiors and exteriors are subjected and thus prevent boiling over of the container contents, means in said chamber for removing the filled containers from said filling means, sealing means in said chamber for receiving from said removing means and hermetically sealing said closures onto the filled interiorly vacuumized containers while their exteriors are maintained in contact with the chamber vacuum, and valve means for progressively discharging the hermetically sealed containers from said chamber without appreciably disturbing the constant partial vacuum maintained therein.

SAMUEL S. JACOBS.
STELLAN BIRKLAND.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,607,269	Malmquist	Nov. 16, 1926
1,933,462	Troyer et al.	Oct. 31, 1933
2,302,693	Hoar	Nov. 24, 1942
2,426,555	Jacobs et al.	Aug. 26, 1947