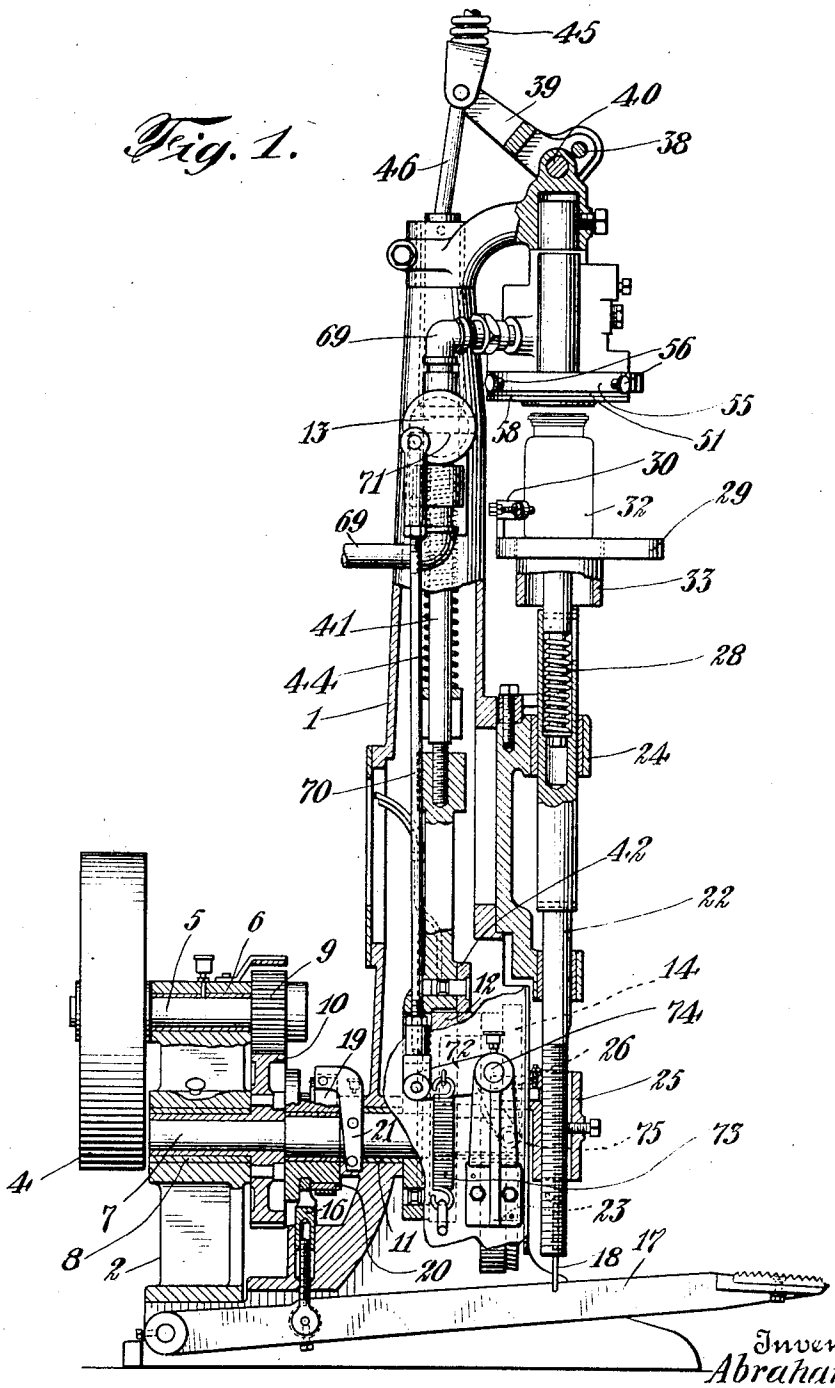
Jan. 12, 1932. A. PODEL 1,841,051

SEALING MACHINE

Filed Dec. 19, 1927 4 Sheets-Sheet 1

Fig. 1.



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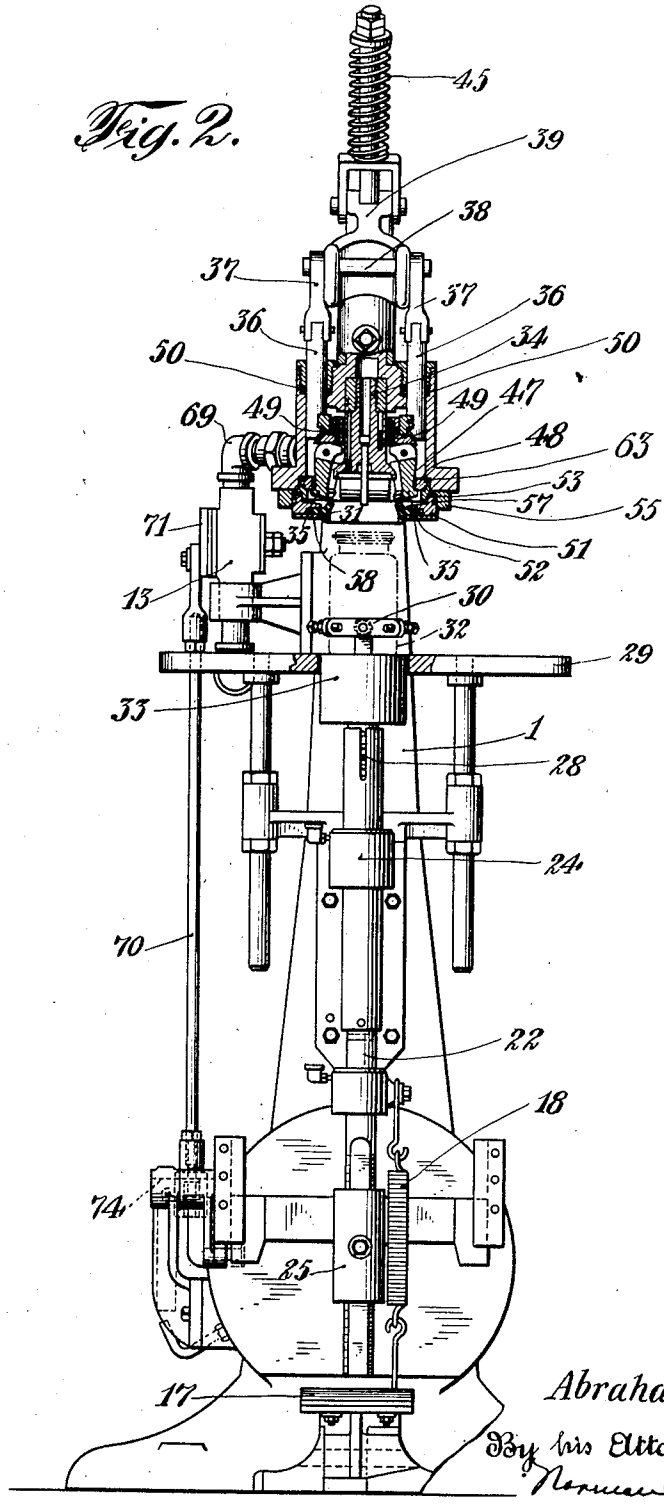
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SEALING MACHINE

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Fig. 2.



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SEALING MACHINE

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Fig. 3.

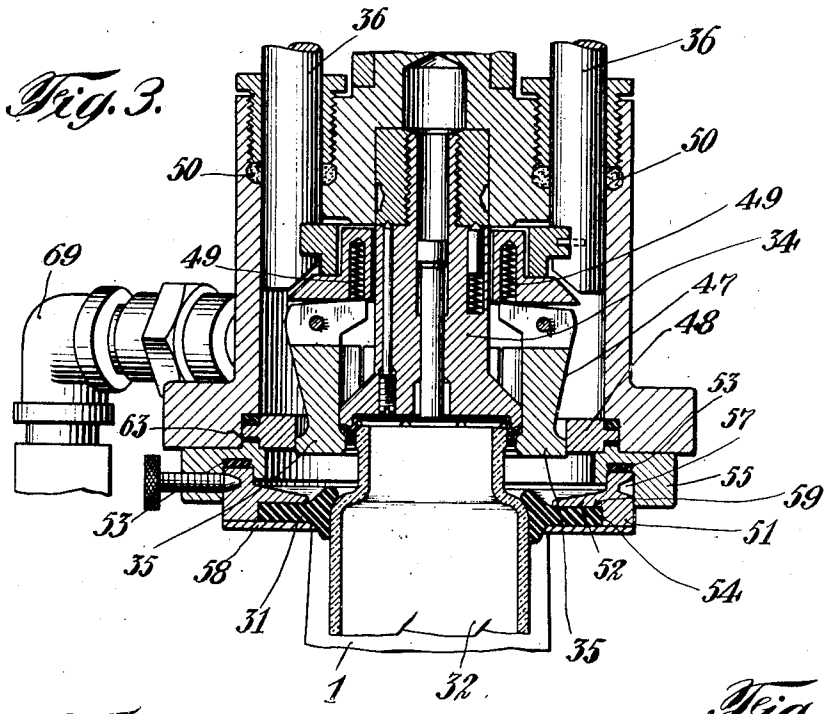


Fig. 4.

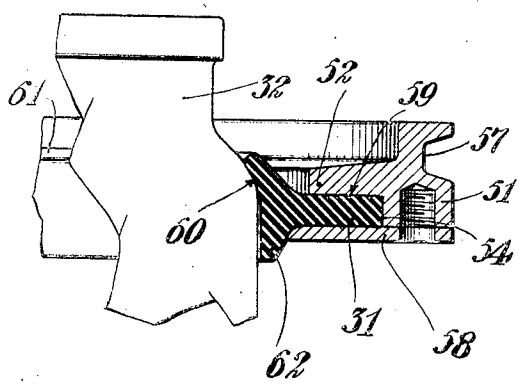
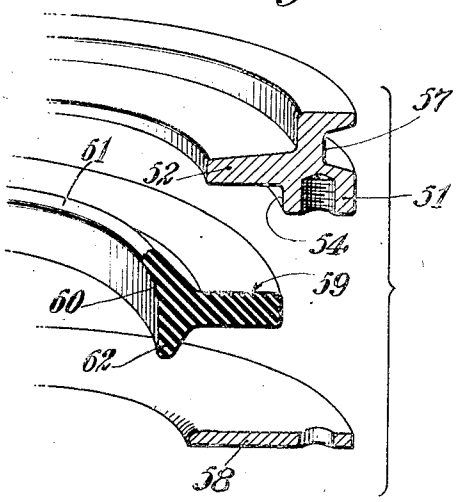


Fig. 5.



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Fig. 6.

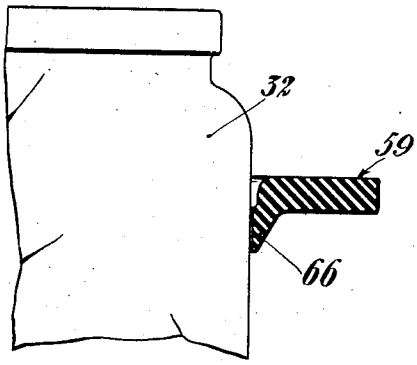


Fig. 7.

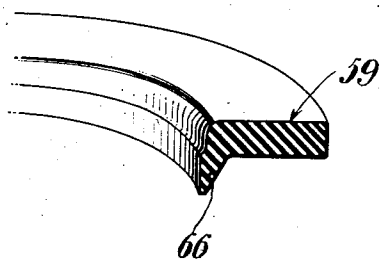


Fig. 8.

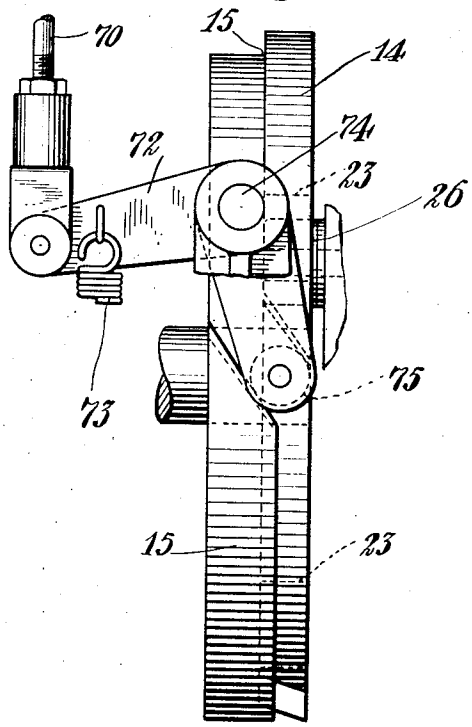
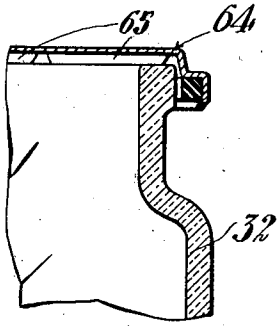


Fig. 9.



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UNITED STATES PATENT OFFICE

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SEALING MACHINE

Application filed December 19, 1927. Serial No. 241,070.

The present invention relates to sealing machines and more particularly to a vacuum sealing machine for exhausting the air from containers and hermetically sealing closures thereon.

It is well known that in canning and preserving, the products keep much better when sealed under a vacuum; that is, when the air is exhausted from the containers prior to the sealing operations. At the present time when various food products are packed in large quantities by packers, a rapid and effective way is desirable. Heretofore vacuum machines have been provided with chambers sufficiently large to enclose the entire container. A suitable door had to be opened and closed; in addition, the containers had to be placed within the chamber. Automatic operation of the door was not feasible, due to the fact that there was danger of the operator's hand being caught while placing the container within the chamber. The joint between the door and the chamber was frequently the source of leaks. An excessive amount of air had to be removed prior to each sealing operation due to the fact that the chamber was not completely filled by the container and because containers of different sizes were sealed in the same chamber.

Other machines have utilized sectioned gaskets for encircling the upper end of the container. With these, however, considerable pressure is applied radially inward on the container which may, in some instances, break the container. Further difficulty has been encountered in obtaining proper seals with such gaskets due to the joints between the respective sections. The wear on the parts is excessive and slight wear may occasion defective seals in a number of containers before the imperfection is discovered.

The present invention overcomes the above difficulties by providing a ring gasket through which the upper end of the container with the closure cap thereon is raised. The shape and form of the gasket is such that engagement with the shoulder on the container tends to produce a tight seal about the side wall thereof. The evacuation of the chamber above the gasket causes the external atmospheric pressure to press the gasket tightly against the side wall to hold it rigidly in position. Either one or both of these characteristics in the operation of the gasket is sufficiently effective to form an excellent seal. The two of them co-operating together minimize the danger of leaks between the gasket and the container. While the shape of the gasket is such as to be most effective with containers having shoulders thereon, it is nevertheless equally applicable to containers without shoulders and to containers polygonal in section or to panelled containers. The lower annular lip is adapted to close tightly about the container under the influence of atmospheric pressure and to conform to the shape of the container, irrespective of whether there is a shoulder or not.

An object of the present invention is to provide a vacuum sealing machine, simple and inexpensive in both construction and operation which will effectively exhaust the air from, and seal glass containers.

Another object of the invention is to minimize the space about the upper end of the containers so that the operation of the machine will be most efficient.

Another object of the invention is to eliminate the necessity for the manipulation of a door by the operator and thereby increase the speed of operation and decrease the labor required.

Another object of the invention is to provide an effective ring gasket for forming a hermetic seal about the upper end of a container and to minimize the wear on said gasket.

A further object of the invention is to provide a gasket which will be held firmly in position against the side wall of the container by the external atmospheric pressure occasioned by the evacuation of the air in the chamber above.

A still further object of the invention is to provide a ring gasket which will conform to irregularities in the shape of containers to form an effective seal about the side wall thereof.

Other and further objects of the invention will be obvious upon an understanding of the

illustrated embodiment about to be described, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment has been chosen for purposes of illustration and description and is shown in the accompanying drawings, wherein

Fig. 1 is a side elevational view of the machine with parts in section to illustrate the sealing mechanism;

Fig. 2 is a sectional view of the machine with parts in elevation;

Fig. 3 is an enlarged sectional view of the sealing mechanism, illustrating the position of the parts at completion of the sealing operation;

Fig. 4 is a detailed sectional view illustrating the position of the ring gasket when the container is raised sufficiently for the shoulder to engage the upper lip;

Fig. 5 is a partial perspective view of the ring gasket shown in Fig. 4 and the holding members therefor in unassembled position;

Fig. 6 is a detailed view of another form of ring gasket shown in relation to a container prior to the evacuation of the air from the vacuum chamber;

Fig. 7 is a perspective view of a portion of the rubber gasket shown in Fig. 6;

Fig. 8 is a detailed view of the cam utilized for operating the valve for controlling pressure in the vacuum chamber; and

Fig. 9 is a detailed view illustrating the buttons in the cap for facilitating the escape of air from the container.

Described generally, the present machine comprises a driving mechanism which operates in sequence the various elements of the machine. A suitable cam raises a table to carry the container thereon into firm engagement with a ring gasket when it is in sealing position. Thereafter a suitable valve is operated to exhaust the air in the chamber above the ring gasket, which causes the external atmosphere to force the ring gasket firmly against the side wall of the container to render the seal on the side wall of the container more effective. After the air has been exhausted, a sealing mechanism reforms the skirt of the cap to press the gasket tightly against the mouth of the container to form a hermetic seal. A valve operates then to admit air and the table is lowered to remove the container from the chamber.

Referring to the drawings, there is shown a framework comprising a vertical column 1 adapted to support the various elements of the sealing mechanism. At the bottom of the column and on one side thereof, a framework 2 is provided for supporting the driving mechanism. A pulley 4 is attached to a shaft 5 in bearing 6 to drive through gears 9 and 10, shaft 7, in bearing 8. It will be understood that the pulley 4 is merely illustrative of one form of drive, and that the sealing machine may be operated electrically by means of a suitable motor, if desired.

The shaft 7 extends through the bearing 11 in column 1, and has mounted thereon a cam 12 for operating the sealing mechanism and a cam 14 for raising the container supporting table. The cam 14 has a surface 15, as shown in Fig. 8, adapted to engage a rocker-arm for operating a valve 13 to control the vacuum in the chamber.

The gear 10 is connected to the shaft 7 through a clutch 16, which when in the position shown in Fig. 1 prevents the gear 10 from being effective upon the shaft. Any desired form of clutch may be utilized to effect the necessary operation. A treadle 17 is pivoted at one end and operatively connected at its center to the clutch member to pull it downwardly out of position to effect the sealing operation when the treadle 17 is pressed downwardly in opposition to a spring 18. In this manner the clutch is in effective position to connect the driving mechanism with the shaft 7 only when the treadle is pressed by the operator. In order to prevent the machine from running under its own momentum, a brake band 19 is secured about a collar 20 on the shaft and held in position by members 21.

Any suitable table mechanism may be provided for supporting and raising the containers but, as here shown, it comprises a rod 22 mounted in bearings 24 with its lower end threaded into a sleeve 25 which has a cam roller 26 attached thereto in engagement with a suitable groove 23 in the cam 14 to move positively a jar support 33 both upwardly and downwardly. The support 33 is adapted to pass through a suitable aperture in the stationary table 29 and its upper surface is flush with the table when in lowered position. The threaded sleeve permits adjustment in the height of the support to accommodate different sizes of containers. The upper end of the rod 22 is hollow to receive a coiled spring 28 through the intermediation of which the movable table 33 is supported. Suitable guides 30 may be provided for positioning the containers on the table. It will be understood that when the treadle 17 is operated, the cam 14 raises the support and container upwardly so that the container engages the ring gasket 31, which may be substantially Y-shaped in cross-section. The two legs of the Y preferably engage the shoulder of the container. The pressure of the container on the upper leg of the Y forces the lower leg of the Y inwardly to engage the side wall of the container, thereby to form a very effective seal thereabout.

The sealing mechanism comprises an upper stationary die 34 against which the closure on the container is pressed when the container is raised to sealing position. The lower die

35 is formed with segmental jaws and is attached to the lower ends of the vertical rods 36 which in turn are connected by members 37 to pin 38. The lever 39, pivoted by means of a pin 40, is adapted to raise and lower the rods 36 to operate the segmental jaws 35. The mechanism for effecting this operation comprises a rod 41 extending through the column 1 with a cam roller 42 at the lower end thereof riding upon the cam 12. The cam roller 42 is held resiliently against the cam by a spring 44 which raises and closes the lower die 35 by pressing downwardly the rod 41 when the dwell in the cam reaches the cam roller 42. As the jaws move upwardly, the outer curved surface 47 thereof engages the ring 48 to press these jaws inwardly in opposition to the springs 49 to engage the bead in the skirt of the cap and press it against the upper die to force the gasket against the container.

The rods 36 are provided with packing glands 50 to form an air tight chamber about the sealing mechanism. The bottom of the chamber is provided with an annular ring 51 having an inwardly extending flange 51, the under side of which is cut away at 54 to seat the outer periphery of the ring gasket 31. The ring 52 may be secured in any suitable manner to the telescoping ring 55, for example, by means of thumb-screws 56 and ring groove 57. The joint between the two rings is made air tight by means of the gasket 53. The ring 55 is secured to the bottom of the chamber by means of suitable screws not shown, and engages the gasket 63 to prevent leakage therebetween. On the lower side of the ring 51 is a washer or ring 58 suitably attached to clamp the outer periphery of the gasket 31 tightly against the inner flange of the ring 51.

While various forms of ring gaskets may be used, the preferred embodiment comprises a gasket made of rubber or the like with a laterally extending peripheral part 59 of substantial width to permit firm engagement by the rings 51 and 58 so that it may be held rigidly in position. The width of the gasket and the character of the material forming the gasket is such that there is a slight flexibility permitting the gasket to adjust itself to the container. The inner periphery or opening through the gasket is tapered inwardly toward the top so that the internal diameter of the aperture is substantially smaller at the top than at the bottom thereof. The intermediate portion is curved as shown at 60 to conform generally to the shape of the shoulder of the container. When the container is forced through the gasket the surface thereof first engages the upper inwardly projecting part 61, which has the smaller diameter, and further upward movement of the container presses this part upwardly and outwardly which in turn forces the lower lip 62 inwardly against the side wall of the container.

It is not necessary, although it is desirable, that the seal be extremely tight about the container for, when the air is exhausted from the chamber, the external atmospheric pressure presses upwardly and inwardly on the lower part of lip 62 of the gasket to hold it rigidly against the container.

Another form of gasket is shown in Fig. 6. This gasket likewise has a wide outer periphery 59 adapted to be clamped as described hereinbefore with reference to the gasket 31. The effective part of this ring gasket for engagement with the container comprises a lower lip 66 slightly larger in diameter than the external diameter of the container. This lip telescopes loosely about the container but when the air is evacuated from the chamber above, the gasket is forced upwardly and inwardly under the pressure of the external atmosphere, which forces it firmly into engagement with the side wall of the container to form an effective seal thereabout.

When the air is exhausted from the vacuum chamber, the container itself, since it encloses a substantial portion thereof, is forced with considerable pressure against the stationary sealing die 34. It has been found that with a plain cover portion, the cap is pressed so tightly against the mouth of the container that the proper vacuum is not produced within the container. This difficulty is overcome by a series of buttons 65 pressed into the cover portion of the cap 64 to cushion the effect of the pressure applied thereto in addition to forming air channels between the cap and the container 32 prior to the sealing operation so that the air may be freely removed therefrom, as shown in detail in Fig. 9.

The exhausting mechanism may be of any suitable character but is here shown comprising the valve 13 in the exhaust line 69 which is connected to any suitable mechanism for producing a vacuum therein. The valve 13 is preferably a three-way valve; that is, when in one position, the vacuum chamber is connected to the exhausting mechanism and when in another position is shut off from the exhausting mechanism and opened to the atmosphere, whereby the vacuum in the chamber is quickly broken. A rod 70 is eccentrically connected at its upper end to the cylindrical part 71 of the valve 13 with its lower end connected to the rocker arm 72 pivoted at 74. The other end of the rocker arm has a cam-roller 75 held in engagement with the surface of the cam 14 as shown in Fig. 8 by the spring 73. The cam surface is such that the valve is operated in proper sequence, when the shaft 7 is rotated.

In operating the machine an operator places a container, having a closure resting loosely thereupon, on the table 29. The

guides 30 on the table correctly position the container on the movable support 33. Thereupon the operator presses the treadle 17 downward to operate the clutch so that the shaft 7 is rotated by the gear 10. The first operation of the machine is to raise by means of the cam 14, the support and the container thereon, until the container is pressed firmly against the upper sealing die 34, and the ring gasket 31 is in engagement with the side wall of the container. The upper lip of the gasket is pressed upwardly by the container, thereby forcing the lower lip into contact with the straight portion of the side wall to form a tight seal; thereby rendering the atmospheric pressure more effective in holding the ring gasket against the container. The cam 14 then operates, through the rod 70, the valve 13 for connecting the chamber above the ring gasket with a suitable vacuum. As the air is removed from the vacuum chamber the ring gasket is forced by the atmosphere tightly against the side wall of the container and the container itself is pressed against the upper sealing die. The buttons 65 in the cover portion of the cap not only form a cushion between the die and the mouth of the container but also provide channels for the free passage of air from the container. The sealing mechanism operates through cam 12, rod 41, springs 44 and 45, rod 46 and the pivoted lever 39 to raise the vertical rods 36 and the attached lower sealing die 35. The movement of the die 35 upwardly causes the outer curved surface thereof which is in engagement with the ring 48 to force the jaws inwardly and to press the bead of the cap between the upper and lower dies to force the gasket into sealing relation with the container. Thereafter the valve 13 is operated, as previously described, to cut off the vacuum and to open the vacuum chamber to atmosphere. The supporting table and the jar thereon are then lowered by means of the cam 14. This cycle is repeated as one jar after another is placed on the table.

It will be seen that the present invention provides a machine which is simple in construction and effective in operation. The amount of air required to be exhausted in each sealing operation is reduced to a minimum. The seal about the side wall of the container is doubly secure since the upward movement of the vessel and the external atmospheric pressure are both effective in pressing the gasket against the container. The wear on the gasket is practically eliminated and in any event the ring gaskets are relatively inexpensive and may be removed and replaced with little effort. Suitable changes may be made for different sizes of containers and the machine generally accommodates itself to commercial variations in the sizes of containers and is fully capable of withstanding the rough usage to which it may be subjected.

As various changes may be made in the above embodiment without departing from the spirit of the invention it is to be understood that all matter herein set forth is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. In a vacuum sealing machine, the combination of a member for forming a hermetic seal about the upper end of a container having a substantial shoulder thereon, said member comprising a ring gasket having a downwardly extending lip with the internal diameter at the upper part of the gasket less than the internal diameter of the lower lip part thereof, whereby when the shoulder of the container engages the upper part of the ring, the lower lip part will be pressed into engagement with the side wall of the container.

2. In a vacuum sealing machine, the combination of a sealing chamber, a ring gasket extending inwardly at the lower end of the said chamber, said gasket having a downwardly extending lip, means for raising the container with a closure cap thereon through said gasket until the straight side wall thereof is adjacent said lip, and means for exhausting the air from said chamber whereby said lip, under the force of the external atmospheric pressure, is pressed tightly against said container to form a hermetic seal therewith.

3. In a vacuum sealing machine, the combination of a sealing chamber, an inwardly extending ring gasket having a downwardly extending lip adapted to telescope about the side wall of a container attached to the mouth of said chamber, means for raising the upper end of a container with a closure thereon through said gasket whereby the said lower lip will be constricted about said container by means of the upward pressure on the container and by means of the evacuation of the chamber.

4. In a vacuum sealing machine, a ring gasket adapted to form a seal about the side wall of a container, said ring gasket being substantially Y shaped in cross-section, the top of the Y engaging the side wall of the container and the straight portion of the Y being clamped to hold the gasket in position.

5. In a vacuum sealing machine, the combination of a vacuum chamber, a ring gasket at the lower side of said chamber, the outer periphery of the gasket being clamped in position, the upper part of said gasket extending inwardly whereby the container when raised through said gasket engages the upper part of the ring to press the lower part of the ring firmly against the side wall thereof.

6. In a vacuum sealing machine, the combination of a sealing chamber, a sealing gasket adapted to engage the side wall of a con-

tainer to close said chamber, the upper part of said gasket projecting inwardly to be engaged by the container to force the lower part thereagainst, whereby said gasket is held against the said wall of the container by the upward pressure of the container and by the external atmospheric pressure, and devices for exhausting the air from said chamber.

7. In a vacuum sealing machine, the combination of a sealing chamber, and a sealing gasket adapted to engage the side wall of a container to close said chamber, the upper part of said gasket projecting inwardly to be engaged by the container to force the lower part thereagainst.

8. In a vacuum sealing machine, the combination of a resilient ring member having a laterally extending flange and a transversely extending portion, a member adapted to clamp the flange of said ring against said chamber, means for raising the upper end of a container with a closure thereon through and against said ring to engage the upper part of said transverse portion and to force the lower part thereof against the side walls of the container, to close said chamber, and co-operating sealing members adapted to engage and reform the skirt of said closure to seal it to said container.

9. In a vacuum sealing machine, the combination of a sealing chamber, a ring gasket having a relatively thin outer periphery and a transverse portion inclined inwardly at the upper part thereof adapted to engage the shoulder protion of a container, an opening in said ring leading to said chamber, means for securing the outer periphery of said gasket to said chamber, means for raising the upper end of a container with a closure thereon through said ring gasket to engage said gasket and close said chamber about the upper end of the container, means for exhausting the air from the chamber, and co-operating metallic dies for reforming the skirt of the closure and for sealing said closure to said container.

10. In a vacuum sealing machine, the combination of a sealing chamber, a gasket having upwardly and downwardly extending parts adapted to fit about the upper end of a container to be hermetically sealed thereagainst, the upper part of said gasket projecting inwardly to be engaged by the container to force the lower part against said container, means for exhausting the air from said chamber above said gasket, an upper die in said chamber adapted to fit against the upper part of the closure, and segmental jaws in said chamber for co-operating with said upper die to seal said closure on a container.

11. A detachable member for a vacuum sealing machine comprising, a metallic ring having an inwardly extending flange, a Y-shaped ring gasket having a part thereof resting against said flange, and a second ring adapted to clamp said gasket in place.

12. In a vacuum sealing machine, the combination of a sealing chamber, a ring member having a radially inwardly extending flange, means for securing said ring member to said sealing chamber, a sealing gasket having annular upwardly and downwardly extending parts adapted to engage the side wall of a container to close said chamber, the upper part of said gasket projecting radially inward to be engaged by the container to force the lower part of said gasket against the side wall of the container, said gasket having a part thereof resting against the flange of said ring member, and a second ring member adapted to clamp said gasket in place.

13. In a vacuum sealing machine, the combination of a sealing chamber, a sealing gasket adapted to engage the side wall of a container to close said chamber, and means for securing the outer peripheral portion of said gasket to said sealing chamber, said gasket having a transversely extending portion at the inner periphery thereof, the upper part of said transverse portion projecting radially inward to be engaged by the container and to force the lower part of said transverse portion against the container.

14. In a vacuum sealing machine, a gasket member for forming a hermetic seal about the upper end of a container having a shoulder thereon, said member comprising an outer peripheral flange portion for securing said member to said sealing machine and an inner peripheral portion disposed transversely to said flange portion, the upper part of said transverse portion extending further radially inwardly than the lower part thereof, whereby when the shoulder of the container engages the upper part, the lower part is adapted to be pressed against the side wall of the container.

New York, N. Y., Nov. 14, 1927.

ABRAHAM PODEL.