No. 866,663. PATENTED SEPT. 24, 1907.

W. A. LORENZ.

VACUUM SEALING APPARATUS.

APPLICATION FILED DEC. 21, 1904.

2 SHEETS—SHEET 1.

Fig. 1

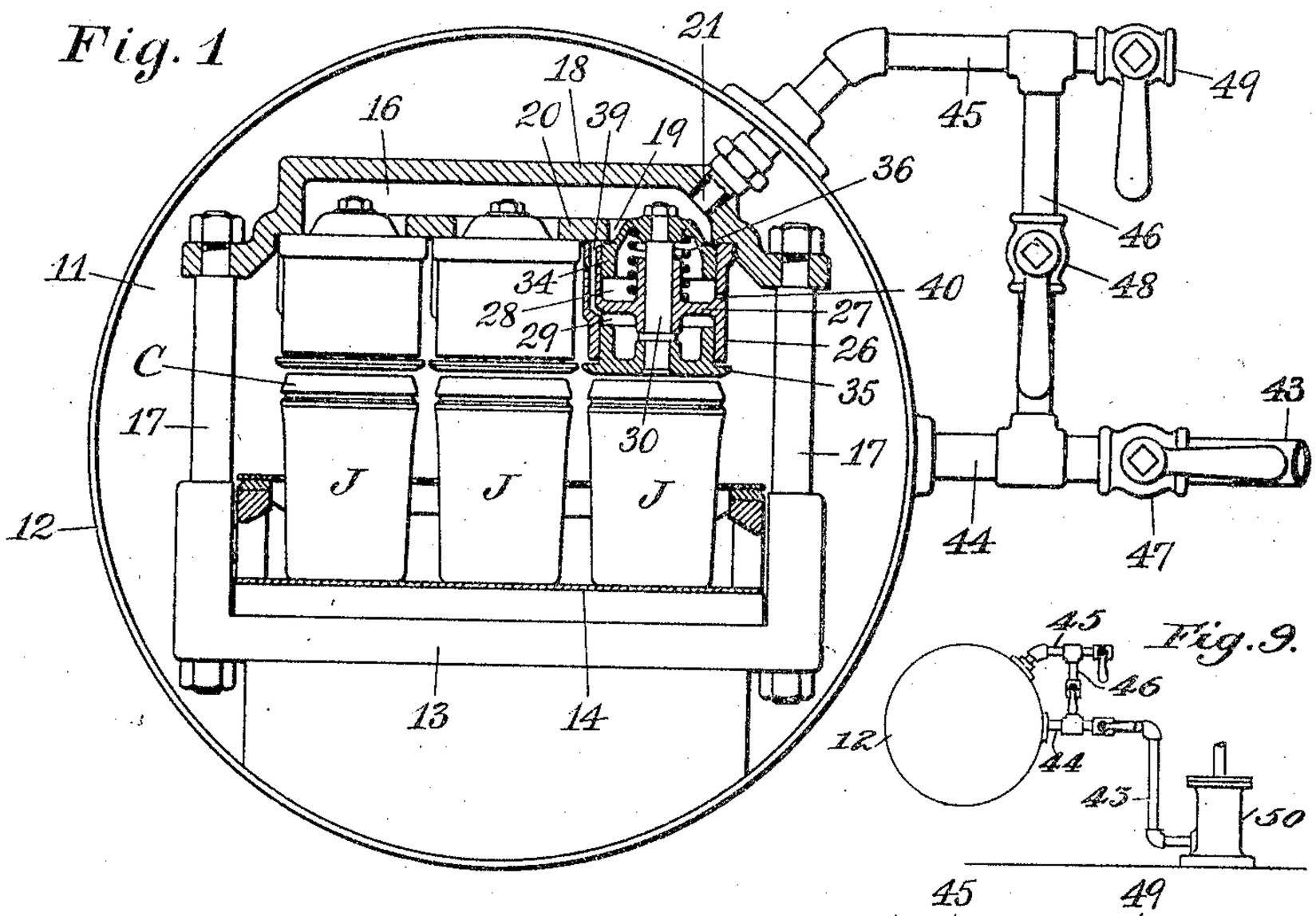

Fig. 2

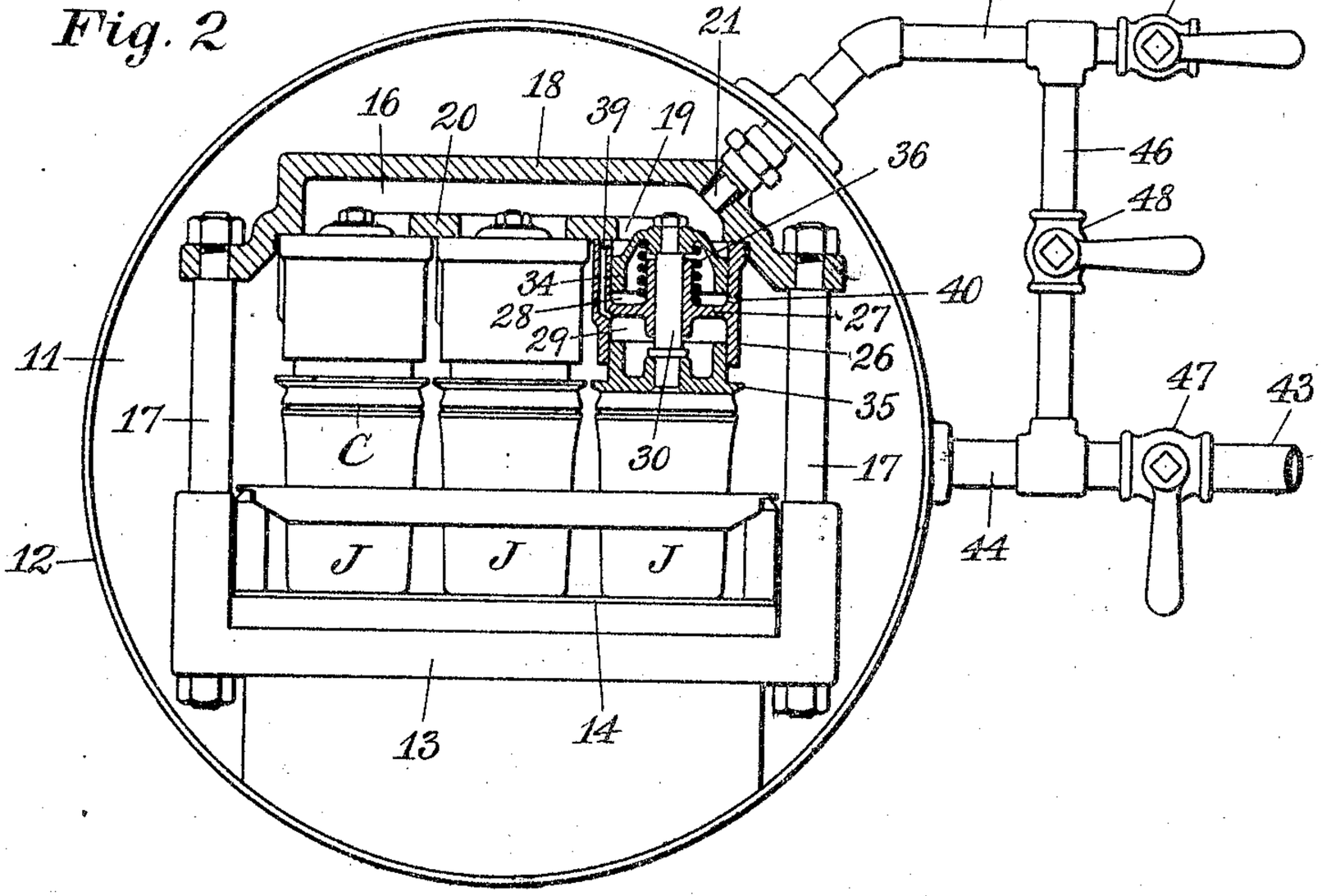

Fig. 3.

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2 SHEETS—SHEET 2.

Fig. 3

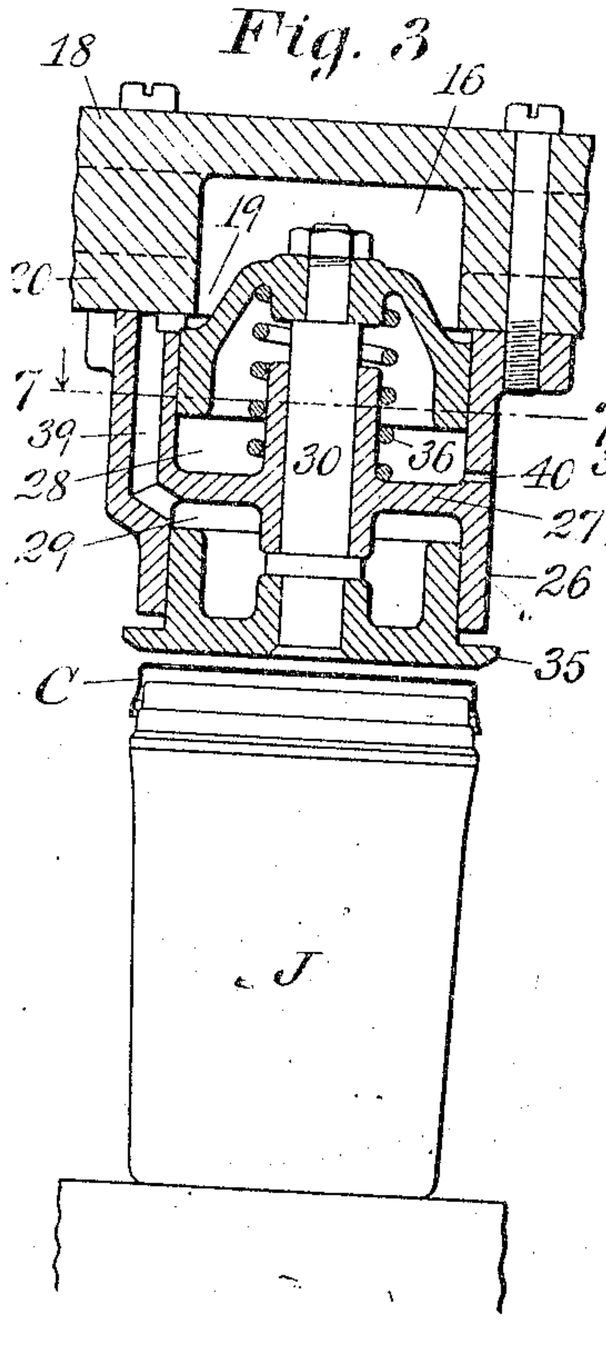


Fig. 4

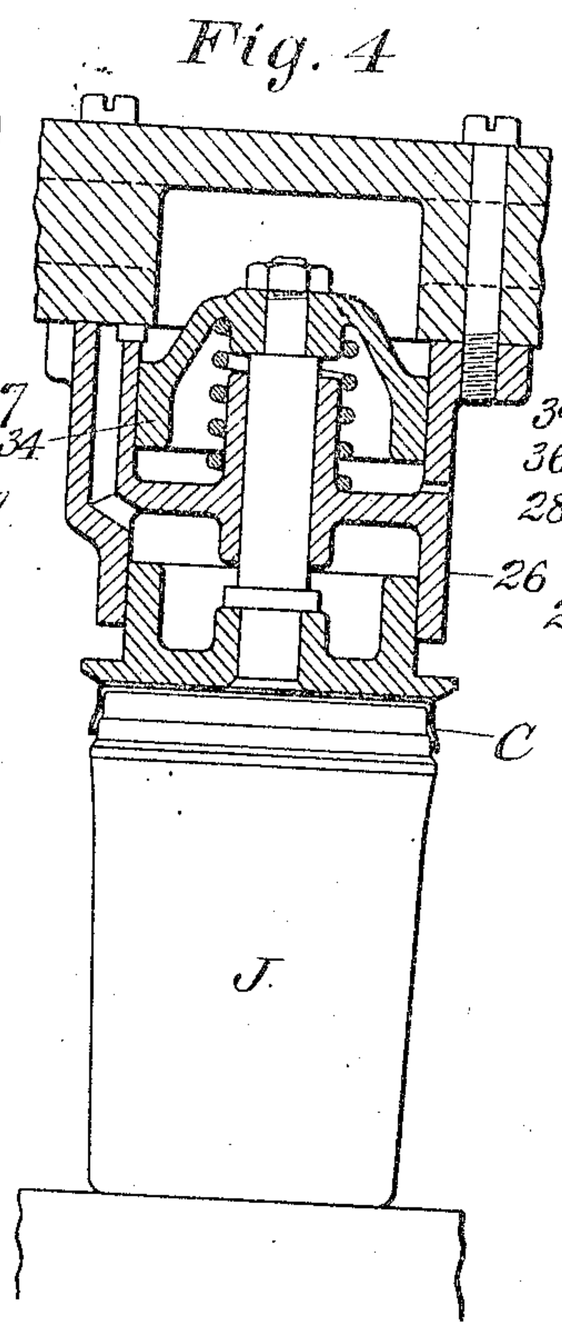


Fig. 5

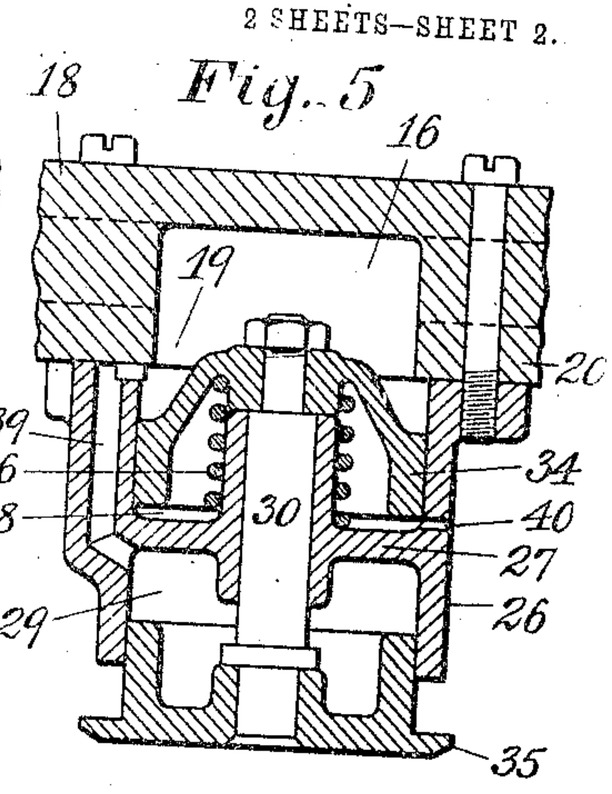


Fig. 6

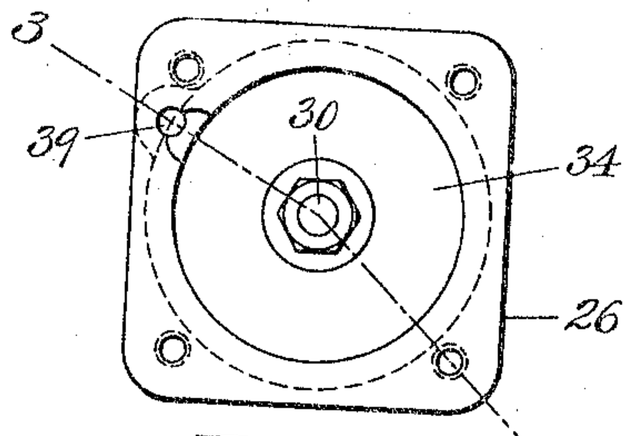


Fig. 7

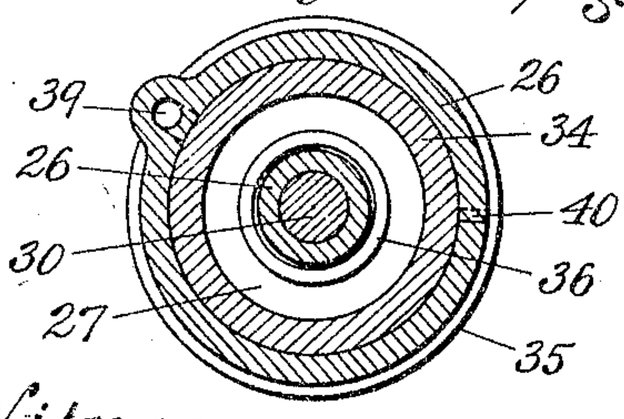
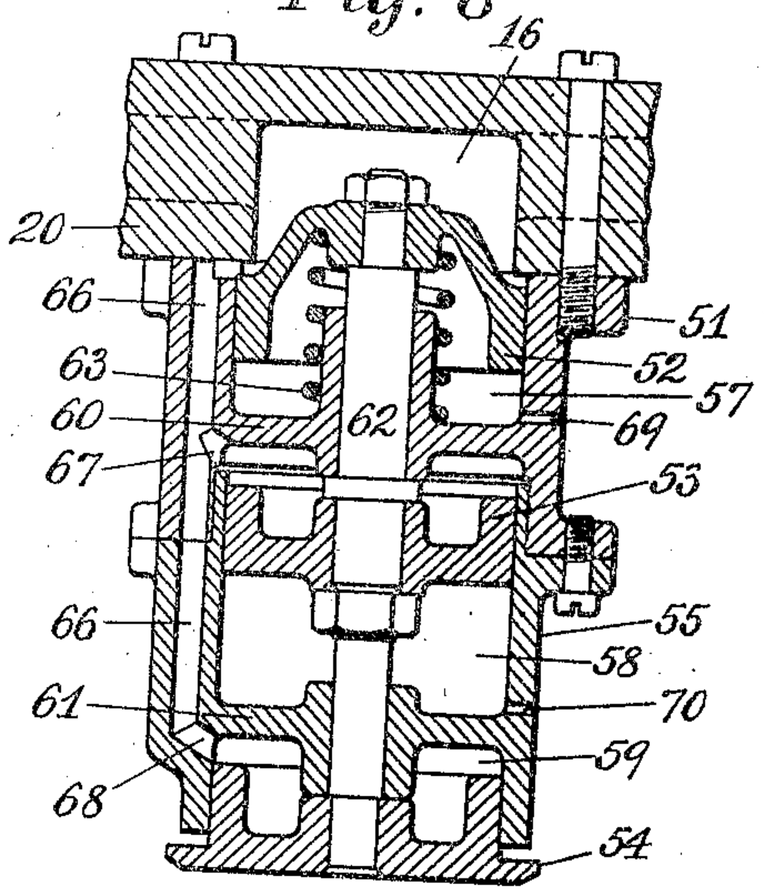


Fig. 8



Witnesses:
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Inventor
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By Wm. A. Howard Atty.

UNITED STATES PATENT OFFICE.

WILLIAM A. LORENZ, OF HARTFORD, CONNECTICUT, ASSIGNOR OF ONE-HALF TO BEECH-NUT PACKING COMPANY, OF CANAJOHARIE, NEW YORK, A CORPORATION OF NEW YORK, AND ONE-FOURTH TO WILLIAM H. HONISS, OF HARTFORD, CONNECTICUT.

VACUUM SEALING APPARATUS.

No. 866,663. Specification of Letters Patent. Patented Sept. 24, 1907.

Application filed December 21, 1904. Serial No. 237,802.

To all whom it may concern:

Be it known that I, WILLIAM A. LORENZ, a citizen of the United States, and resident of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Vacuum Sealing Apparatus, of which the following is a full, clear, and exact specification.

This invention relates to apparatus for hermetically sealing jars of the class in which the closure is ultimately held in place by the external atmospheric pressure due to a partial vacuum being formed within the jar.

This invention is herein shown and described in connection with a vacuum apparatus or retort, in which this improved apparatus and the jars to be sealed are hermetically inclosed, with the jar closures resting loosely upon the jars. The air is then exhausted from the retort, and thus produces a vacuum around the outside as well as on the inside of the jars. The principal function of this invention as thus employed is to shut the closures, and to firmly seat them upon their respective jars while still *in vacuo*, and during the time that the atmospheric pressure is being readmitted around the jars, so as to preclude the readmitted air from reëntering the jars through the closures. It is considered advantageous to employ for this primary seating and holding operation a pressure considerably in excess of the pressure which will be subsequently exerted upon the cap by the atmosphere to subsequently maintain the seal. In order to utilize the atmospheric pressure and to augment its effect for this primary sealing operation, a plurality of pistons are employed for each jar, having an aggregate area considerably greater than the area of the cap or closure. It is desirable in apparatus of this character to arrange the jars as close together as possible in order to get as many of them as possible into a given space, thus reducing as far as possible the space which must be exhausted in order to seal a given number of jars. In the present arrangement, both the desired compactness of arrangement and the augmented pressure are secured, by employing a plurality of pistons for each jar, placing them one above the other in tandem arrangement. This enables the jars to be placed closely together in trays, while still employing a pressure which may be two or more times the ultimate pressure of the atmosphere upon the cap.

Figure 1 is a sectional end view of a jar sealing chamber showing the parts in position for exhaustion. Fig. 2 is a similar view and shows the position of the parts at the close of the cap pressing operation. Figs. 3, 4, and 5 are sectional side views on the line 3—5 of Fig. 6, of a presser in three different positions, Figs. 3 and 4 corresponding in position with Figs. 1 and 2 respectively, while Fig. 5 shows the presser at the extreme lower limit of its stroke. Fig. 6 is a top view of a detached presser. Fig. 7 is a top view of a detached presser in section on the line 7—7 of Fig. 3. Fig. 8 is a sectional side view of a modified form of presser. Fig. 9 is a view in reduced scale showing the air exhausting system.

The sealing chamber or retort 11 may be of any suitable form, but is preferably of a circular cross-section, inclosed by the shell 12 and supporting the jar base 13. It has a suitable opening for the admission and withdrawal of the jars, and is provided with a door by which it may be hermetically closed.

Where a number of jars are operated upon simultaneously, the temporary pressing means must be independently movable for each jar, in order to exert upon each one the desired amount of pressure despite variations in the heights of the individual jars due to inaccuracies of size, unavoidable in the commercial manufacture of the parts which comprise the sealed package.

Above the base 13, and supported by it on the posts 17 is the presser chamber 16 contained between the upper wall 18 and the lower wall 20. The lower wall is provided with holes 19 which extend through it and are equal in number to the jars which the chamber is adapted to seal at one time. Under each hole 19 is a presser cylinder 26 secured to the wall 20 and divided by the partition 27 into two open ended chambers 28 and 29, containing the pistons 34 and 35, respectively. The central part of the partition 27 forms the bearing for the piston rod 30 which has secured to it the two pistons 34 and 35. A spring 36 is preferably provided to hold the pistons in their upper position, as shown in Fig. 3. An air duct 39 connects the upper part of the chamber 29 above the piston 35 with the presser chamber 16, enabling the air pressure in that chamber to take effect upon both the pinions 34 and 35. A duct or vent 40 connects the bottom of the upper chamber 28 below the piston 34, with the jar chamber 11, to allow the escape of any air that may leak past the piston 34. The distance between the piston 35 in its upper position and the base 13 is such that the jars will pass freely under the piston 35 as the tray 14 is moved in or out of the chamber 11; and the pistons 35 are so disposed in regard to the jars and the tray 14 that each jar stands directly under a piston when the tray is pushed in to its proper position. It is the function of these presser pistons 34 and 35 to force the caps C down upon their respective jars J after exhaustion has taken place and before air is admitted to the jar chamber 11, thus preventing the entrance of any air into the inside of the jar through the closure joint, before the cap is finally held in place by the atmospheric pressure. The pistons 34 and 35 are moved downward by admitting air into the pressure chamber 16 before admitting it to the jar chamber 11,

thus establishing atmospheric pressure on the upper surfaces of the pistons 34 and 35 while a vacuum still exists below them. Each pair of pistons 34 and 35 being secured together by the piston rod 30 act together on the cap C, and exert upon it a pressure substantially double what it would be if the cylinder 26 contained but one piston. As the inside diameter of the presser cylinder as shown in the drawings, is nearly as great as the cap C, the pressure exerted upon the latter by two pistons 34 and 35 is nearly double that exerted thereon by the direct action of the atmosphere.

The sealing chamber is connected with a suitable exhaust apparatus 50 through the pipes 44 and 43 controlled by the cock 47; and the presser chamber 16 is also similarly connected through the opening 21 and the pipes 45 and 46. A cock 48 opens or closes communication between the two chambers and a cock 49 controls communication with the atmosphere.

The operation of the parts is as follows:—The jars J with the caps C loosely placed thereon are loaded into the tray 14 and placed in the sealing chamber 11 with the caps C directly beneath their respective presser pistons 35. The door in the sealing chamber 11 is now hermetically closed, after which the cock 49 is closed and the cocks 47 and 48 opened, thus connecting both chambers 11 and 16 with the exhaust apparatus as shown in Fig. 1. After the desired degree of vacuum has been obtained the cocks 47 and 48 are closed and the cock 49 opened (Fig. 2) thus reëstablishing atmospheric pressure in the chamber 16 while still excluding it from the chamber 11. This causes the pressure to act on the upper sides of the pistons 34 and 35 and forces them downward, as the vacuum still exists on the under sides of both pistons, the pressure exerted on the cap C when it is acted upon by the piston 35 being substantially double the atmospheric pressure which finally holds the cap in place. The valve 48 is now opened thus admitting air into the chamber 11, and releasing the pressure on the pistons which now move upward under the influence of the springs 36, the atmospheric pressure retaining the cap C in its pushed down position, except for the slight rise due to the diminished pressure on the elastic gasket beneath the cap. The extra pressure thus exerted upon the closure before its final retention in place by the atmospheric pressure, serves to straighten the cap in case it has become misplaced or tipped, and also to seat the closure firmly in the position in which it will finally rest. For example, it has been found in practice that a jar which may have an atmospheric pressure of 100 pounds on its cap after sealing, is more liable to be sealed effectually if the cap is subjected to a temporary pressure of say 150 pounds before being finally left to the influence of the atmosphere alone.

It is obvious that it is not essential for the two pistons to be of the same diameter. In Fig. 8 is shown a modified form of presser having three pistons 52, 53 and 54 secured to a piston rod 62 and fitted to a cylinder formed, for convenience in manufacture, in an upper and lower part 51 and 55. The cylinder is divided by the partitions 60 and 61 into three chambers 57, 58 and 59, containing respectively the three pistons 52, 53 and 54. The upper part 51 of the cylinder is secured to the lower wall 20 of the presser chamber 16 and a duct 66 formed in the cylinder wall leads from the presser chamber 16 to the upper part of the cylinder chambers 58 and 59 by means of the ducts 67 and 68. The chambers 57 and 58 are connected near their lower ends with the main sealing chamber 11 by the ducts 69 and 70. A spring 63 returns the piston to their upper position after they have been operated.

During the exhausting operation the air is drawn from the tops of the chambers 58 and 59 through the ducts 66 and 67 and from the bottom of the chambers 57 and 58 through the ducts 69 and 70. Upon the readmission of air to the presser chamber 16, the lower piston 54 will be forced downward on the cap below it with a pressure equal to the combined pressure on the three pistons 52, 53 and 54. It is obvious that more than three pistons may be thus combined and that it is not essential that they should all be of the same size.

I claim as my invention:—

1. In jar sealing apparatus, the combination of a jar chamber, a jar presser, a plurality of connected pistons for operating the presser, means for exhausting air from the chamber and from both sides of each piston, and means for readmitting air to one side of each piston, while maintaining a substantial degree of vacuum on the other side of each piston.

2. In jar sealing apparatus, the combination of a jar chamber for receiving a series of jars, a corresponding series of independently movable jar pressers located adjacent to their respective jars, a plurality of operating pistons for each presser, means for exhausting air from the chamber and from both sides of each piston, and means for readmitting air first to one side of each piston, and then to the jar chamber and to the other side of each piston.

3. In jar sealing apparatus, the combination of a jar presser, a plurality of pistons connected therewith and arranged in tandem relation, means for exhausting the air from beneath the pistons, and means for admitting atmospheric pressure above the pistons, while maintaining a substantial degree of vacuum beneath the two pistons.

4. The combination with an exhausting and sealing apparatus for jars, of a resiliently supported jar presser, a plurality of pistons connected therewith, and means for admitting atmospheric pressure to one side of each piston to operate the presser, while maintaining a substantial degree of vacuum on the other side of each piston.

5. The combination with an exhausting and sealing apparatus for jars, of a resiliently supported jar presser, a plurality of pistons secured together and to the presser in tandem relation, and means for admitting atmospheric pressure to one side of each piston to operate the presser, while maintaining a substantial degree of vacuum on the other side of each piston.

6. In jar sealing apparatus, the combination of a jar chamber, a resiliently supported jar presser provided with a plurality of operating pistons, means for exhausting atmospheric pressure from the chamber and from both sides of each piston, and means for admitting atmospheric pressure to one side of each piston, while maintaining a substantial degree of vacuum on the other side of each piston.

7. In jar sealing apparatus, the combination of a jar chamber, a series of resiliently supported pressers, a plurality of operating pistons for each presser, means for exhausting atmospheric pressure from the chamber and from both sides of each piston, and means for readmitting atmospheric pressure to one side of each piston, while maintaining a substantial degree of vacuum on the other side of each piston.

8. In jar sealing apparatus, the combination of a jar chamber, independently movable jar pressers, a plurality of operating pistons for each presser, means for yieldingly sustaining the pressers, means for exhausting air from the chamber and from both sides of each piston, and means for readmitting air to one side of each piston, while maintaining a substantial degree of vacuum on the other side of each piston.

9. In jar sealing apparatus, the combination of a jar chamber, a presser chamber, a wall between the two cham-

bers, supporting a jar presser having a plurality of pistons, means for exhausting air from both chambers and from both sides of each piston; and means for readmitting air to the presser chamber and to one side of each piston while maintaining a substantial degree of vacuum on the other side of each piston.

10. In jar sealing apparatus, the combination of a jar chamber, a presser chamber, a wall between the two chambers supporting a plurality of pistons, one side of each piston having air communication with the presser chamber, and the other side of each piston having air communication with the jar chamber, means for exhausting both chambers, and means for readmitting air to the presser chamber.

11. In jar sealing apparatus, the combination of a jar chamber, a presser chamber, a wall between the two chambers provided with a cylinder divided into a plurality of compartments, each containing a piston, a piston rod to which the pistons are secured, a jar presser operated by the pistons, means for establishing air communication between the presser chamber and one side of each piston, means for establishing air communication between the jar chamber and the other side of each piston, means for exhausting both chambers, and means for readmitting air to the presser chamber.

12. In jar sealing apparatus, the combination of a jar chamber, a presser chamber, a wall between the two chambers provided with a cylinder divided into a plurality of compartments each containing a piston, a piston rod to which the pistons are secured, resilient means for supporting the pistons, a jar presser operated by the pistons, means for establishing air communication between the presser chamber and one side of each piston, means for establishing air communication between the jar chamber and the other side of each piston, means for exhausting both chambers, and means for readmitting air to the presser chamber.

13. In jar sealing apparatus, the combination of a jar chamber, a presser chamber, a cylinder divided transversely into a plurality of compartments, one of which is open to the jar chamber, and the other of which is open to the presser chamber, a piston in each compartment, a piston rod common to all the pistons, a jar presser secured to one of the pistons, means for establishing air communication between the presser chamber and one side of each piston, means for establishing air communication between the jar chamber and the other side of each piston, means for exhausting both chambers, and means for readmitting air to the presser chamber.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM A. LORENZ.

Witnesses:
JAS. W. GREEN,
W. H. HONISS.