W. A. LORENZ.

HERMETIC SEALING APPARATUS.

APPLICATION FILED APR. 5, 1907.

986,187. Patented Mar. 7, 1911.

2 SHEETS—SHEET 1.

Fig. 2

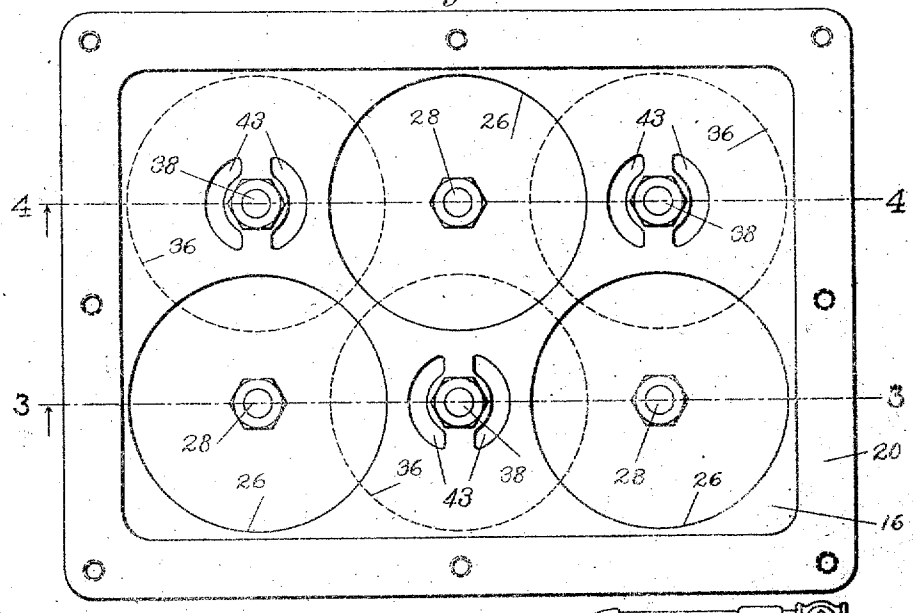

Fig. 1

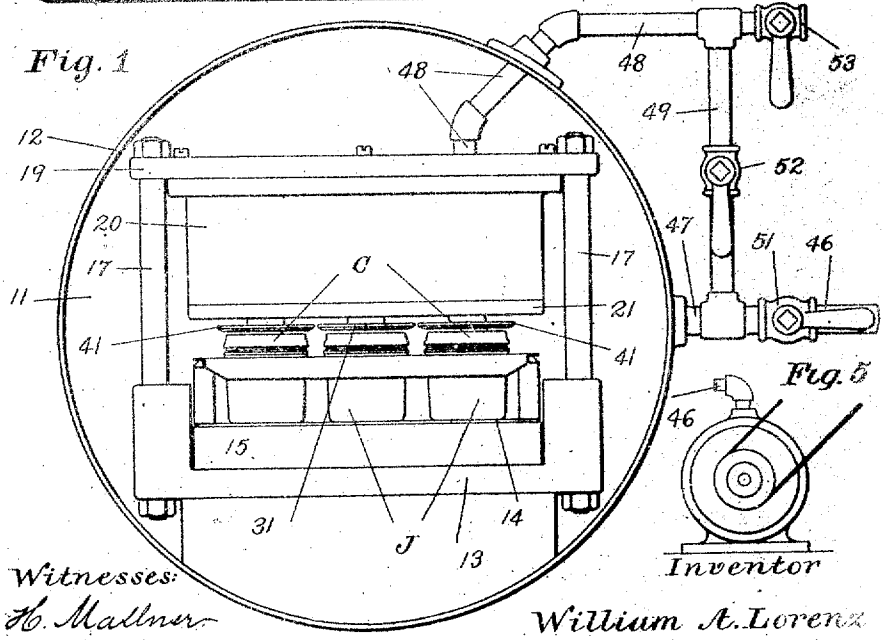

Fig. 5

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2 SHEETS—SHEET 2.

Fig. 3

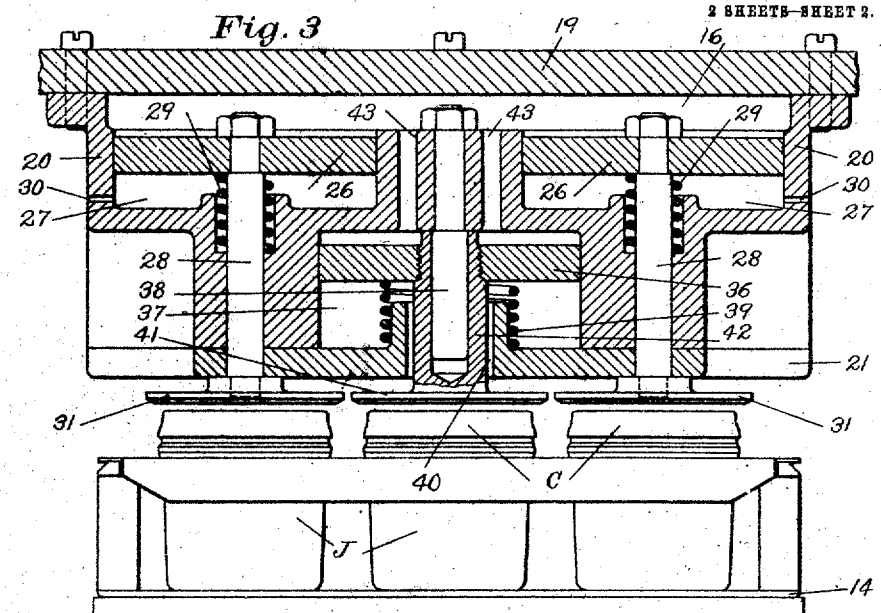
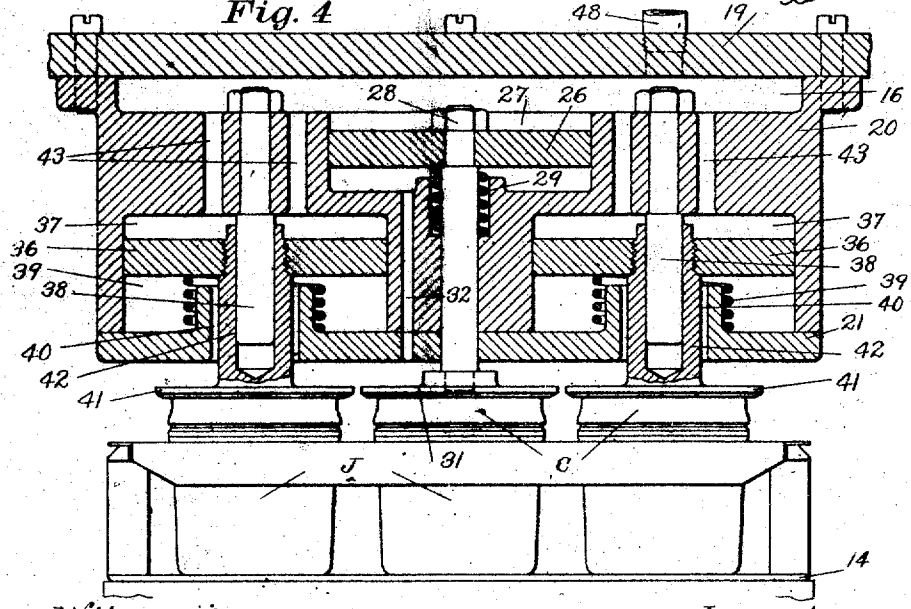


Fig. 4



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UNITED STATES PATENT OFFICE.

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

HERMETIC-SEALING APPARATUS.

986,187. Specification of Letters Patent. Patented Mar. 7, 1911.

Application filed April 5, 1907. Serial No. 366,483.

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 Hermetic-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 chamber 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 after the desired vacuum is obtained, and to firmly seat them upon their respective jars while still *in vacuo*, holding them thus while readmitting atmospheric pressure around the jars, so as to preclude the readmitted air from reëntering the jars through the closure joints. 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 ultimately maintain the seal. In this invention the atmospheric pressure is utilized for this initial sealing of the jars, and to augment its effect for this operation, a piston is employed for each jar which has an area considerably greater than the area of the cap or closure. It is desirable in apparatus of this character to place the jars as close together as possible in order to get as many of them as possible into a given area, thus reducing to a minimum the space which must be exhausted in order to seal a given number of jars. In the structure herein shown, both the desired compactness of arrangement and the augmented pressure are secured by providing each jar with a piston of larger diameter than the jar and placing these pistons in different planes so that they may overlap each other. This arrangement permits the jars to be placed closely together while still employing an augmented atmospheric pressure which may be much greater than the ultimate pressure of the atmosphere upon the cap.

Figure 1 is a front view of a jar sealing chamber with the door removed, showing the parts in position for exhausting. Fig. 2 is a top view of the presser chamber of the apparatus with the upper wall removed. Fig. 3 is a front view of the presser chamber in section on the line 3—3 of Fig. 2, the parts being shown in position for exhausting. Fig. 4 is a front view in section on the line 4—4 of Fig. 2, and shows the parts in their position at the close of the initial sealing down operation. Fig. 5 is a side view in reduced scale, of a form of exhausting apparatus for exhausting the air from the sealing chambers.

The jar or sealing chamber 11 may be of any suitable form, but is preferably of a circular cross-section, inclosed by the shell 12 and containing the jar supporting base 13. It has a suitable opening for the admission and withdrawal of the jars, and is provided with a door (not shown) by which the opening may be hermetically closed.

Above the base 13, (Fig. 1,) and supported by it on the posts 17 is the presser chamber 16, (Fig. 3) contained between the upper wall 19 and the lower wall 20. The lower wall is provided with a series of cylindrical chambers 27, the upper ends of which are open to the presser chamber 16. In each of these chambers is a piston 26, secured to a piston rod 28, which extends downwardly through the lower wall of the presser chamber and is provided at its lower end with a presser 31 within the jar chamber 11. A spring 29 yieldingly supports the piston in its uppermost position. A small air duct 30 connects the lower part of the chamber 27 below the piston 26 with the jar chamber 11, thus providing for the same air pressure below the piston 26 as that in the chamber 11.

The wall 20 of the presser chamber is also provided with a series of downwardly facing cylindrical chambers 37, alternating in position with the chambers 27. Each chamber 37 contains a piston 36 secured to a stem

42 appurtenant to a jar presser 41. Openings 43 (Figs. 2, 3 and 4) contact each chamber 37 with the presser chamber 16, thus providing for the same air pressure above each piston 36 as that in the presser chamber 16. The lower wall 20 of the presser chamber is provided with a cap 21, in which are formed openings 40 through which the piston stems 42 extend, each stem being enough smaller than its opening 40 to permit the free passage of air and thus provide for the same air pressure on the under side of the piston 36 as that of the jar chamber 11. Each piston 36 is mounted for sliding movement upon a rod 38 secured to the upper part of the wall 20, and is yieldingly supported in its upper position by a spring 39. The tension of the springs 29 and 39 is preferably only sufficient to overcome the weight and the sliding friction of the respective pistons.

The cylindrical chambers 27 and 37 are arranged in different planes, which permits them to be placed alternately in overlapping positions, as shown by the circles in Fig. 2. This enables the area of each piston 26 and 36 to be much larger in diameter than its respective presser 31 and 41; while still allowing those pressers to be placed in the same plane and close to each other.

The jar chamber 11 (Fig. 1) is connected with any suitable air exhausting apparatus, one form of which is shown in Fig. 5, through the pipes 46 and 47 controlled by the cock 51, and the presser chamber 16 is connected with the exhaust pipe 46 by the pipes 48 and 49. A cock 52 in the pipe 49 opens and closes communication between the two chambers, and a cock 53 controls communication with the atmosphere.

In order to register the jars J beneath the respective pressers they are preferably placed in a removable tray 14 which rests upon the base 13, filling pieces 15 of suitable thickness being employed when required, to bring the tops of various sizes of jars to the proper height relative to the pressers 31 and 41.

The operation of the apparatus 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 31 and 41. The door in the jar chamber 11 is now hermetically closed, after which the cock 53 is closed, and the cocks 51 and 52 opened, thus connecting both the chambers 11 and 16 with the exhaust apparatus as shown in Fig. 1. After the desired degree of vacuum has been obtained, the cocks 51 and 52 are closed and the cock 53 opened, thus readmitting atmospheric pressure in the presser chamber 16; while still excluding it from the jar chamber 11. This causes the atmospheric pressure to act on the upper sides of the pistons 26 and 36. In the arrangement herein shown the area of each piston 26 and 36 is nearly double that of the cap C, hence the pressure exerted on the cap C is nearly double the atmospheric pressure which will finally hold the cap in place. The valve 52 is then opened, thus admitting the atmospheric pressure into the jar chamber 11, from which the pressure, entering through the ducts 30 and openings 40 counteracts the pressure on top of the pistons which now move upward under the influence of the springs 29 and 39, the atmospheric pressure retaining the caps C in their pushed down position, except for the slight rise which may occur, due to the diminished pressure on the elastic gasket beneath the cap. The extra pressure thus exerted upon the cap before its final retention in place by the atmospheric pressure is considered advantageous, since it not only more certainly straightens the cap in case it has become misplaced or tilted, but by forcing the gasket hard down upon its sealing seat it crowds it farther into the space between the cap and the jar and spreads it over a greater area of the sealing seat, thus settling it 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 lbs. before being finally left to the holding down influence of the atmosphere alone.

It is obvious that the area of the pistons may be varied considerably according to the pressure which it is desired to exert upon the caps prior to their final retention in place by the atmospheric pressure.

I claim as my invention:

1. In jar sealing apparatus, the combination of a jar chamber, means for supporting jars in close order in the chamber, and independently movable pressers for the respective jars, provided with pistons of larger area than the jars, and having the said areas overlapping each other.

2. In jar sealing apparatus, the combination of a jar chamber, means for supporting jars in close order in the chambers, a plurality of independently movable pressers for the respective jars situated in a common plane, and pistons operatively connected with the said pressers, the pistons being of larger area than their respective pressers, and having the said areas overlapping each other.

3. In jar sealing apparatus, the combination of a jar chamber, a plurality of independently movable pressers each having an operating piston of greater diameter than the center distance between the pressers,

means for exhausting air from the chamber and from the pressure surfaces of the pistons, and means for readmitting air to one side of each piston.

4. In jar sealing apparatus, the combination of a jar chamber, a plurality of independently movable pressers, a corresponding plurality of operating pistons for the pressers disposed in a plurality of planes, each piston being of greater area than its presser, means for exhausting air from the chamber and from one side of the pistons, and means for readmitting air to one side of each piston.

5. In jar sealing apparatus, the combination of a jar chamber, a plurality of independently movable pressers, a corresponding plurality of operating pistons for the pressers disposed in a plurality of planes, each piston being of greater area than its presser, means for exhausting air from the chamber and from the pressure surfaces of the pistons, 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.

6. In jar sealing apparatus, the combination of a jar chamber, a plurality of yieldingly supported pressers, an operating piston for each presser, of greater diameter than the center distance between 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.

7. In jar sealing apparatus, the combination of a jar chamber, a series of resiliently supported pressers, a corresponding series of operating pistons for the pressers disposed in different planes with their respective areas overlapping, each piston being of greater area than its 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.

8. In jar sealing apparatus, the combination of a jar chamber, a series of independently movable jar pressers each having an operating piston of greater diameter than the center distance between the pressers, 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.

9. In jar sealing apparatus, the combination of a jar chamber, a plurality of independently movable jar pressers, a corresponding plurality of operating pistons for the pressers disposed in different planes with their areas overlapping each piston being of greater area than its 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.

10. In jar sealing apparatus, the combination of a jar chamber, a presser chamber, a wall between the two chambers provided with a plurality of pistons, the pressure areas of which overlap each other, a corresponding plurality of pressers of smaller area than the pistons and operably connected thereto, means for exhausting the air from both chambers, and from both sides of the pistons, and means for readmitting air to the presser chamber and to one side of each piston.

11. In jar sealing apparatus, the combination of a jar chamber, a presser chamber, a wall between the two chambers provided with a plurality of pistons disposed in different planes, and having their pressure areas overlapping each other, a corresponding plurality of pressers of smaller area than the pistons and operably connected thereto, air passages between the presser chamber and one side of each piston, air passages 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 plurality of resiliently-supported pistons disposed in different planes, and having their pressure areas overlapping each other, a corresponding plurality of pressers of smaller area than the pistons, and operably connected thereto, air passages between the presser chamber and one side of each piston, air passages 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.

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