No. 842,320. PATENTED JAN. 29, 1907.

J. A. LANDSBERGER & W. C. BUHLES.

VACUUM SEALING APPARATUS.

APPLICATION FILED MAY 18, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

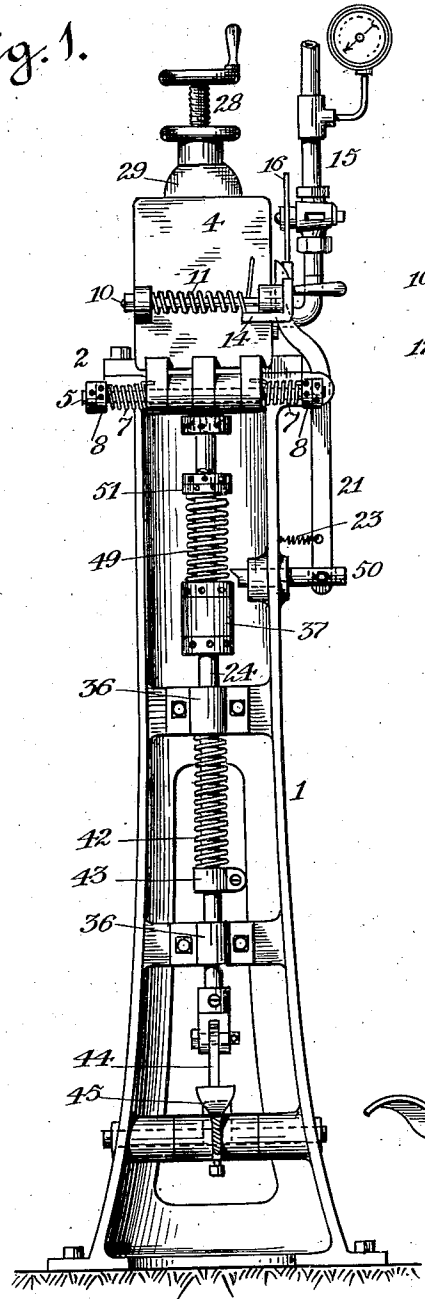
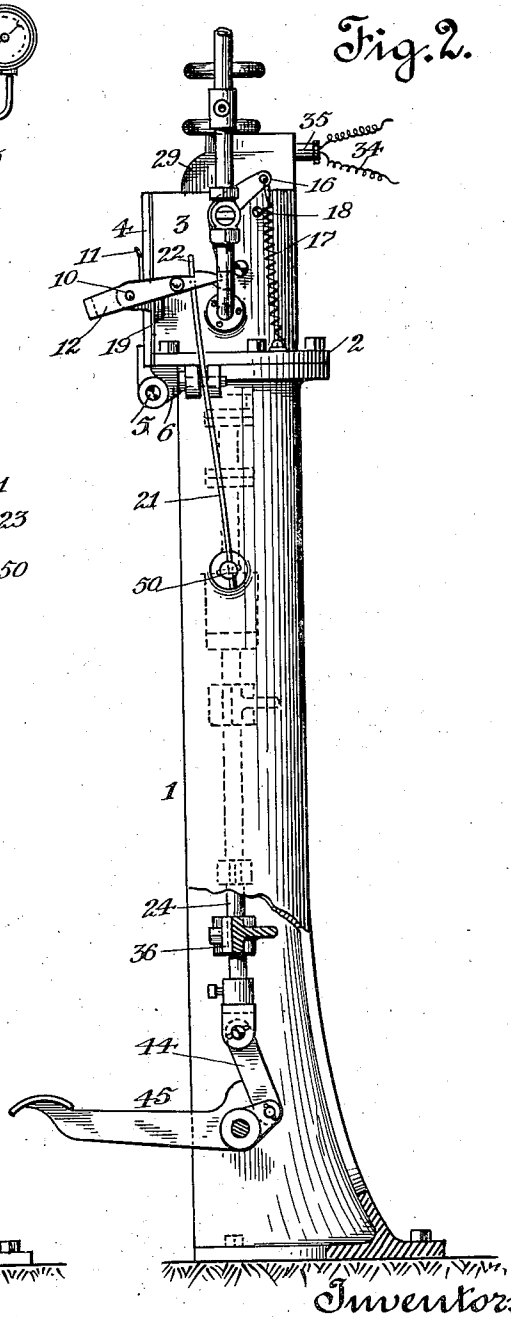


Fig. 2.



Witnesses.

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2 SHEETS—SHEET 2.

Fig. 3.

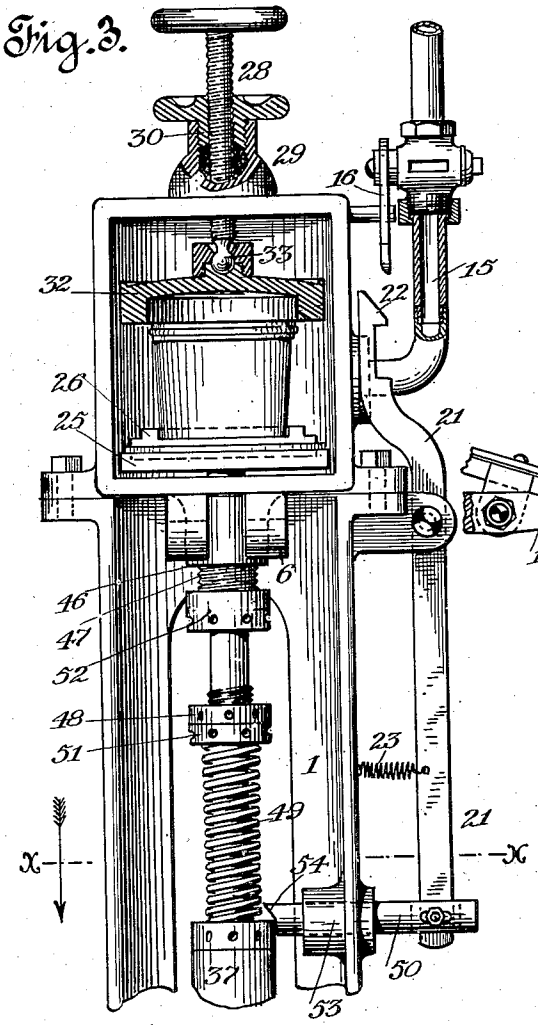


Fig. 4.

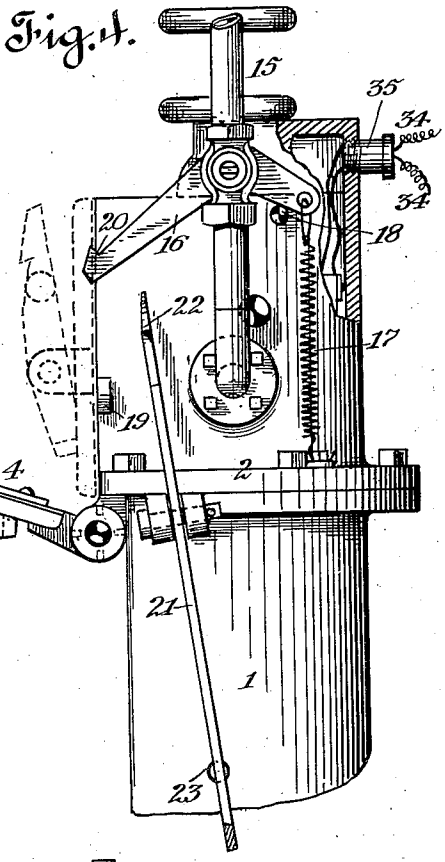


Fig. 5.

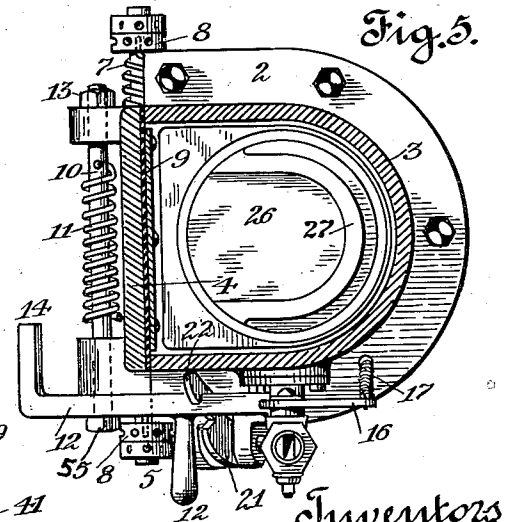


Fig. 6.

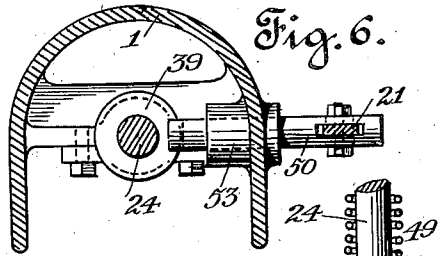
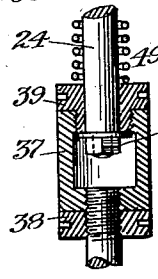


Fig. 7.



Witnesses.

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UNITED STATES PATENT OFFICE.

JULIUS A. LANDSBERGER, OF ALAMEDA, AND WILLIAM C. BUHLES, OF SAN FRANCISCO, CALIFORNIA, ASSIGNORS TO HERMETIC CLOSURE CO., OF CHICAGO, ILLINOIS.

VACUUM SEALING APPARATUS.

No. 842,320. Specification of Letters Patent. Patented Jan. 29, 1907.

Application filed May 18, 1905. Serial No. 261,050.

To all whom it may concern:

Be it known that we, JULIUS A. LANDSBERGER, a citizen of the United States, residing at Alameda, in the county of Alameda and State of California, and WILLIAM C. BUHLES, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Vacuum Sealing Apparatus, of which the following is a specification.

Our invention relates to apparatus for sealing cans, jars, or other receptacles *in vacuo;* and its principal objects are to provide means for preventing the application of pressure to the cap, cover, or other closure until after the receptacle has been exhausted; further, to provide means for preventing the readmission of air to the receiving-chamber containing the receptacle to be vacuum-sealed until after pressure has been applied to the cover for holding it securely in place and making an air-tight joint; further, to provide means for controlling and regulating the pressure to be so applied to the cover; further, to provide against the exertion of an excess of pressure upon either the receptacle or its cover; further, to provide means for exerting the requisite pressure with but slight effort upon the part of the operator; further, to provide means for locking and retaining in position the door-handle by which the vacuum-controlling valve-lever is operated after it has placed the valve in position to allow the vacuum to be applied and while the receiver is being exhausted; further, to provide improved means for causing the door of the receiver or vacuum-chamber to open automatically after pressure has been applied to the cover of the receptacle and air readmitted to said chamber; and in addition our invention provides a number of improved features and details of construction and arrangement all tending to the production of a simple, efficient, and easily-operated vacuum sealing apparatus.

An embodiment of our invention is hereinafter described and is shown in the accompanying drawings, in which—

Figure 1 is a front elevation of the entire apparatus. Fig. 2 is a side elevation. Fig. 3 is an enlarged elevation of the upper part of the supporting-frame with the door of the vacuum-chamber removed. Fig. 4 is an enlarged side elevation of the same parts with the door of the vacuum-chamber open. Fig. 5 is a cross-section of the vacuum-chamber looking downward. Fig 6 is a cross-section of the machine-standard on line $x\,x$ of Fig. 3. Fig. 7 is a detail vertical section of the coupling connecting the two parts of the rod by means of which the seat for the receptacle is raised and lowered.

The operative parts of the machine are supported by a frame or standard 1 of a convenient height and which is preferably a section of a hollow column, as shown, and is adapted to be bolted to a floor. The standard is flanged at the top to meet and support the base-flange 2 of the vacuum-chamber 3, the flanges being bolted together. The vacuum-chamber has an open front of rectangular shape and is closed at the sides and back, so that a tightly-fitting door 4 can complete the closure of said chamber. This door is fixed upon a rocking shaft 5, journaled in brackets 6 on the standard, and said shaft is provided with springs 7 and with adjustable nuts 8 for changing and regulating the torsional force of the springs, such springs being connected at both ends to said nuts and to the door and acting like a counterbalance in that they resist the swing of the opening door and form a yielding stop for it when fully opened. The closed door is rendered air-tight by a packing 9 of rubber or other suitable material secured to its inner side or edges, as shown in Fig. 5. Extending across the front of the door is a rock-shaft 10, journaled in brackets on the door and to which is secured one end of a torsion-spring 11, which encircles the rod and whose free end bears against or may be secured to the face of the door.

The shaft or rod 10, as clearly shown in Fig. 5, is held in place by a nut 13 on one end and by the handle 12 on the other, the latter fitting over a square shoulder on the shaft and being secured thereto by the bolt-head 55.

The handle 12 has an extension 14 below the shaft, which is turned inwardly, so as to strike the door, thus acting as a stop to the backward movement of the handle and being normally pressed against the door by the re-

coil of the torsion-spring 11. The handle being thus pivoted to the door has an independent forward movement against the tension of the spring 11, the object of which will be hereinafter explained. Aided by the resistance of the spring 11, the operator is enabled to close the door easily and conveniently by means of the handle 12, the door being partly counterbalanced by the tension of the door-springs 7.

A pipe 15 enters the vacuum-chamber and is connected to any suitable means for producing a vacuum. In this pipe is a three-way valve controlling both the exhaust and the readmission of the air. An angular valve-lever 16 is secured to and extends on both sides of the shaft of the valve. One end of such lever is connected to a tension-spring 17, attached to the receiver, which normally keeps the valve closed to the vacuum and open to the outside air. The other end of said lever is in the path of the further movement of the door-handle after the door has been closed.

The valve is operated for the production of a vacuum in the receiver by the door-handle 12 in the following manner: After the operator has swung the door up to the closed position (indicated by the dotted line in Fig. 4) he continues the forward movement of the handle. The latter strikes the free end of the valve-lever and operates the valve so as to establish a vacuum within the receiver 3. The operation of a vacuum within the receiver of itself completes the air-tight closure of the door in consequence of the outer atmospheric pressure. The return movement of the valve-lever is limited by a stop 18, projecting from the structure, and the forward and downward movement of the door-handle is checked by the stop 19, projecting from the structure, and also by the notch, recess, or shoulder 20 on the valve-lever. When the forward movement of the door-handle has been completed, it rests on the shoulder 20 of the valve-lever and in this position is locked by a lever 21, pivoted to the main frame and having a beveled head and shoulder 22. A tension-spring 23 holds this beveled head normally in the path of the door-handle, which in its forward movement forces the lever 21 to one side and slips past the bevel. The shoulder 22 now springs back and engages the door-handle, locking it in this position, as shown in Figs. 2 and 5, the valve being open to the vacuum and the receiver exhausted. When the door-handle is released, the torsion-spring 11 causes it to spring back to its normal position, thus freeing the valve-lever, which in turn is drawn back by the tension-spring 17 to its initial position, thereby cutting off the vacuum and readmitting the atmosphere to the vacuum-chamber and also releasing the door.

Means are provided for releasing the door-handle, so that the door, being freed from outer atmospheric pressure and given impetus by the reaction of the compressed packing, can swing open of its own weight, which means will be described in connection with the mechanism for supporting and holding the receptacles in the chamber.

A vertically-movable rod 24 enters the vacuum-chamber from below and carries a plate 25, which is the support for the receptacle to be vacuum-sealed. This is countersunk to receive a molded rubber mat 26, formed with a horseshoe-shaped guide 27, (best shown in Fig. 5,) the latter facilitating the instant placing of the receptacle in proper position upon the elastic support. Entering the top of the chamber is a threaded rod 28, passing through a stuffing-box 29, and a tightening-gland 30 for compressing the packing. Inside the chamber is a presser-head 32, hung loosely from the rod by means of a ball-joint 33 and having a bell-shaped recess which fits over the cover of the receptacle. The ball-joint and bell-shaped recess enable the presser-head to center and adjust itself so as to be properly seated on said covers. The presser-head is heated electrically in the usual way by the circuit-wires 34, connected to any suitable source of electrical power and which are led into the chamber through a stuffing-box 35 and are terminally connected to said presser-head. The presser-head and the plate 25 form two members of a clamp, between which the receptacle, with a loose cover in place, is held when the rod 24 has been raised.

The rod 24 slides in guides 36 on the supporting-standard and is made in two parts, as especially illustrated in Fig. 7. Its lower part has an upper threaded end which is connected into the coupling 37. The coupling is adjustable on said lower section in order to give the whole rod the exact length required at any time and is held in adjustment by a nut 38. The upper end of the coupling is closed by a screw-cap 39, through which the upper rod-section passes loosely and in which it is held by a washer and a nut 41. The coupling can therefore move independently of the upper rod-section. Coiled upon the rod 24 is a return pressure-spring 42, held between one of the guides 36, and an adjustable collar 43, clamped upon the rod, which serves to return the whole rod to normal position after its upward movement. The lower rod-section is jointed at its lower end to a link 44, which is in turn jointed to the short end of the rocking treadle-lever 45. Thus a toggle is formed, which not only gives great power and insures an accurate vertical movement of the rod, but also starts the rod quickly upward and increases the leverage as the resistance caused by the compression of spring 49, hereinafter described, increases.

The upper section of the rod 24 is connect-

ed to the seat or support for the receptacle and passes into the bottom of the vacuum-chamber through a packing-gland 46. A follower 47, having an adjusting-head 52, is threaded into this gland in order to keep the packing under compression. The rod slides through the gland and follower. A pressure-spring 49 surrounds the rod, the lower end of which bears against the coupling 37 and the upper end against an adjustable collar 51, threaded on the rod and locked in adjustment by a nut 48. The collar 51 is used to regulate the resistance of the spring 49. When the treadle is depressed, the lower part of the two-part rod first moves up bodily, putting the return-spring 42 under compression. As the coupling 37 is loose with relation to the upper rod-section, the latter does not move until the resistance of spring 49 under compression compels it to do so, when it rises, together with the seat for the receptacle, and presses such receptacle into the concave upper presser-head. Since this motion is transmitted through the spring 49, the pressure increases gradually to its maximum, and it is evident that the pressing movement is completed without any sudden stop or jar, and consequently without danger of excessive pressure, should a receptacle be slightly above normal size, or injury to glass receptacles. The lever 21, which locks the door-handle, as before described, extends downwardly along the standard and is jointed at its lower end to a bolt 50, which has a sliding bearing in a guide 53 on the standard 1. The inner end of this bolt is formed in angular shape, its lower face being straight and its upper face being an inclined or beveled projection 54. The bolt 50 has a slot-and-pin connection to the lever 21 and can be adjusted at the point of connection, so as to accurately determine the position of its beveled face relatively to the coupling 37. With the parts in normal position with the door of the vacuum-chamber open the relation of this bolt to the rod 24 is such that the spring 23 can throw said bolt inwardly and above the projection formed by the coupling 37, thus locking the rod against upward movement. By the act of closing the door and of opening the valve to the vacuum, as before explained, the upper end of lever 21 is forced inward by the door-handle and while locking the handle is itself held by said handle. This movement of the lever 21 withdraws the bolt 50 to such an extent that the coupling 37 is clear of its flat end face, although the inclined projection 54 still remains in the path of the edge of the coupling. The rod 24 is thus unlocked, and the operator by depressing the treadle raises said rod and the receptacle-support and receptacle within the vacuum-chamber. The coupling 37, bearing upon the beveled face 54, forces the bolt outwardly, and the motion thereby communicated to the lever 21 causes the upper end of the latter to move inwardly and release the door-handle. It will be observed that the door-handle cannot be released until the coupling has risen beyond the vertical face of the bolt 50, and such face can be of any desired extent to accurately insure pressure to the receptacle and closure to form an initial air-tight joint, which remains intact until the reëstablishment of atmospheric pressure within the receiver makes it permanent, and hence the door must remain closed with the vacuum established until the required pressure has been exerted on the cover of the receptacle, at which time the coupling will have pushed the bolt 50 outwardly to the full possible extent. The locking of the rod 24 and the release of such rod by the means for controlling the door and valve prevent the operator from applying any pressure to the receptacle and closure until the vacuum has been fully established, and since the door-handle is not released until the pressure has been fully applied the readmission of air to the vacuum-chamber cannot take place until that time.

Upon the release of the door-handle the engagement between it and the valve-lever is broken by the action of the torsion-spring 11, which throws the handle to normal position with its extension 14 bearing against the front of the door. At the same time the spring 17 acts upon the valve-lever, which closes the valve to the vacuum-producing means and opens it for the admission of fresh air at normal atmospheric pressure to the vacuum-chamber, which completes the sealing of the receptacle. The weight of the door, aided to some extent by the expansion of its hitherto-compressed elastic packing, is sufficient to overcome the counterbalancing effect of the torsion-spring on its hinge-joint, and it therefore opens and swings out automatically, coming to rest noiselessly and without jar as soon as the torsional resistance exceeds its gravity. It may be stated here that a counterbalancing-weight secured to the rock-shaft of the door-hinge can be substituted for the torsion-springs shown.

The sequence of operations by which a receptacle is vacuum-sealed is as follows: The presser-head 32 is adjusted in the vacuum-chamber in proper relation to the height of the receptacle to be vacuum-sealed. The operator assembles a receptacle and its cover and places them upon the mat 26. He then swings the door to the closed position (shown in dotted lines in Fig. 4) and by continuing the forward movement of the handle 12 operates the valve-lever and locks the latter to the door-handle with the valve open to the vacuum-producing means. The vacuum is then established in the chamber and by its establishment the door is closed air-tight under the outer atmospheric pressure with its

packing under compression. The same motion of the door-handle which operates the valve-lever also forces back the lever 21, whose shoulder 22 slips over and locks the door-handle in engagement with the valve-lever. The bolt 50, which hitherto has been locking the vertical rod 24 and which is connected to the lower end of the lever 21, is partly withdrawn by the movement of the latter, freeing the vertical rod. The operator now depresses the treadle, raising the rod 24 and forcing the receptacle and its cover into the heated presser-head 32 and applying a yielding pressure transmitted through the spring 49, as before explained. In this vertical movement of the rod 24 its coupling 37 strikes the projecting beveled face 54 of bolt 50 and forces it outwardly sufficiently to effect the disengagement of the lever 21 from the door-handle, which springs back and releases the valve-lever. Instantly the spring 17 of the valve-lever acts, causing the valve to shut off the connection with the vacuum-forming means and to admit air to the vacuum-chamber, by which the seal is completed and the door released. The receptacle and cover are supposed to have a packing between them which is somewhat softened by heat and which hardens by cooling and forms an air-tight joint. The operator then releases the treadle and the return-spring 42 causes the rod 24 to descend. This frees the vacuum-sealed receptacle from the presser-head 32, and it is removed from its seat. As soon as the rod has descended the spring 23 pulls the lower end of the lever 21 inwardly, moving the bolt 50 into position above the coupling 37 and moving the upper end of lever 21 outwardly into the path of movement of the door-handle. All parts are now in normal position in readiness for the performance of the same sequence of operations upon another receptacle.

It will be particularly noted that no pressure can be brought upon the receptacle until the vacuum-chamber has been tightly closed and the vacuum established, and also that air cannot be readmitted until the pressure required to form an air-tight joint and prevent ingress of air to the receptacle has been brought upon the receptacle, as the coupling 37 must move upward a certain distance before it acts upon the bolt and causes the release of the valve-lever and door.

It is evident that the capacity of the receiving-chamber can be increased and the receptacle-support enlarged, so as to accommodate several receptacles, thus enabling a plurality of such receptacles to be vacuum-sealed simultaneously.

We do not limit ourselves to the specific constructions herein described, and shown in the drawings, as we desire to avail ourselves of such modifications and equivalents as fall properly within the spirit of our invention.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a vacuum sealing apparatus, means for subjecting an assembled receptacle and cover to a vacuum, means for subjecting said receptacle and cover to pressure while *in vacuo*, and means for preventing the application of such pressure until the vacuum has been established.

2. In a vacuum sealing apparatus, means for subjecting an assembled receptacle and cover to a vacuum, means for subjecting said receptacle and cover to pressure while *in vacuo*, means for readmitting air, and means for preventing the readmission of air until the receptacle and cover have been subjected to such pressure.

3. In a vacuum sealing apparatus, a receiver, a valve through which air is exhausted from and readmitted thereto, means for operating said valve, means for subjecting a receptacle and cover within the receiver to pressure, and a connection between the valve-operating means and the pressure-producing means whereby they are alternately locked and alternately released.

4. In an apparatus for sealing receptacles *in vacuo*, a vacuum-chamber, a door for closing the same, a valve for exhausting air from and readmitting it to the same, a door-handle adapted to lock the valve during the creation and existence of the vacuum, and means for locking the door-handle.

5. In an apparatus for sealing receptacles *in vacuo*, a vacuum-chamber, a door for closing the same, a valve for exhausting air from and readmitting it to the same, a valve-lever, a door-handle adapted to engage with the valve-lever during the creation and existence of the vacuum, and means for locking the door-handle in engagement with the valve-lever.

6. In an apparatus for sealing receptacles *in vacuo*, a vacuum-chamber, a door for closing the same, a valve for exhausting air from and readmitting it to the same, a door-handle adapted to lock the valve during the creation and existence of the vacuum, and means for automatically locking and releasing the door-handle.

7. In an apparatus for sealing receptacles *in vacuo*, a vacuum-chamber, a door for closing the same, a valve for exhausting air from and readmitting it to the same, a valve-lever, a door-handle adapted to lock the valve-lever during the creation and existence of the vacuum, and means for locking the door-handle and for releasing the door-handle and valve-lever.

8. In a vacuum sealing apparatus, a vacuum-chamber, a door for closing the same, a support for receptacles within said chamber, a vertically-movable rod connected to said support, a valve for exhausting air from and

readmitting it to the vacuum-chamber, a pivoted door-handle adapted to engage the valve-lever, and a lever having at one end means for locking said door-handle and at the other end means for locking said rod.

9. In a vacuum sealing apparatus, a vacuum-chamber, its door, an air exhaust and admission valve, a vertically-movable support for receptacles to be vacuum-sealed, and a connected mechanism for locking said door in closed position and for locking said support when the door is open.

10. In a vacuum sealing apparatus, a vacuum-chamber, a door for closing the same, an air-valve, a pivoted door-handle for operating said valve, a latch-lever in the path of the door-handle for locking said handle, a vertically-movable rod, a support for receptacles carried thereby, and a locking device for said rod connected to said latch-lever.

11. In a vacuum sealing apparatus, a supporting-frame, a vacuum-chamber, a valve for exhausting air from and readmitting it to said chamber, a vertically-movable support for receptacles, and a pivoted lever having separate means for alternately locking said valve and said support; said support being free when said valve is locked and vice versa.

12. In a vacuum sealing apparatus, a vacuum-chamber, its door, a lever for locking the door, a vertical rod entering the vacuum-chamber and carrying a receptacle-support, a projection from said rod, and a bolt connected to the door-locking lever for stopping and releasing said projection.

13. In a vacuum sealing apparatus, a vacuum-chamber, means for controlling the production of a vacuum therein, means for applying pressure upon a receptacle and cover therein, means for simultaneously locking the vacuum-controlling means and freeing the pressure-applying means, and for alternately and simultaneously freeing the vacuum-controlling means and locking the pressure-applying means.

14. In a vacuum sealing apparatus, and in combination a receiver, a door for closing the same, a valve for exhausting air from and readmitting air to the same, a door-handle adapted to operate the said valve, devices for applying pressure upon a receptacle and cover while *in vacuo* within the receiver, and a connected mechanism including means for locking and releasing the door-handle and means for locking and releasing the pressure-applying devices; all constructed and arranged for the performance of the following sequence of operations: the operation of the valve by the movement of the door-handle in one direction and the consequent creation of a vacuum within the closed receiver; the locking door-handle and valve and the simultaneous release of the pressure-applying devices; the application of pressure to the receptacle and cover *in vacuo;* the automatic release of the door-handle and valve, their return to normal position and the readmission of air to the receiver; and the return of pressure-applying devices to normal position and their relocking in such position.

15. In a vacuum sealing apparatus, a receiver adapted to contain a receptacle and its cover, vacuum-controlling means, pressure-applying means, and movable connections between said means for locking and releasing them alternately, said connections including a bolt having an end formed with vertical and inclined faces; the said bolt being arranged in such relation to the pressure-applying means as to lock and release the same and to transmit through said connections motion derived from contact of the pressure-applying means with said inclined face, thereby releasing the vacuum-controlling means.

16. In a vacuum sealing apparatus, a vacuum-chamber, a support for a receptacle therein, a vertically-movable rod connected to said support, a projection from said rod, a locking-bolt having an end formed with vertical and inclined faces, and adapted to normally act as a stop for said projection, and means for moving said bolt so as to remove its vertical face from the path of said projection and to leave its inclined face in said path.

17. In a vacuum sealing apparatus, a receiver, vacuum-controlling means, pressure-applying means, and a lever having at one end a device for locking and releasing the vacuum-controlling means, and at the other a device for locking and releasing the pressure-applying means.

18. In a vacuum sealing apparatus, a receiver, vacuum-controlling means, pressure-applying means, a lever having at one end a device for locking and releasing the vacuum-controlling means, and at the other end a device for locking and releasing the pressure-applying means, and a spring connected to said lever for restoring it to and tending to maintain it in its normal position.

19. In a vacuum sealing apparatus, a supporting-frame, a receiver, a door for the same, a door-handle, a vacuum-controlling valve, a lever pivoted to the main frame and having at one end a shoulder adapted to engage the said door-handle, a support for receptacles within the receiver, a vertically-movable rod connected thereto, a bolt connected to the other end of said lever and a guide-opening in the supporting-frame for said bolt.

20. In an apparatus for sealing receptacles *in vacuo* a vacuum-chamber, a swinging door therefor, a valve for controlling the exhaustion of air from and admission of air to the said chamber, means carried by the door, for operating said valve, and means for locking said operating means.

21. In an apparatus for sealing receptacles *in vacuo*, a vacuum-chamber, a swinging door therefor, a valve for controlling the exhaustion of air from and admission of air to the said chamber, means, carried by the door, for controlling said door and operating said valve, and means for locking said controlling and operating means.

22. In an apparatus for sealing receptacles *in vacuo*, a vacuum-chamber, a door for the same, a valve for exhausting and readmitting air from and to the same, a lever for controlling the door, a lever, operated by the door-controlling lever, for opening the valve for the production of a vacuum, and means for locking the door-controlling lever.

23. In an apparatus for sealing receptacles *in vacuo*, a vacuum-chamber, a door for the same, a valve for exhausting and readmitting air from and to the same, a handle carried by the door, a valve-opening lever operated by said handle, and means for locking the door-handle.

24. In an apparatus for sealing receptacles, *in vacuo*, a vacuum-chamber, a door for the same, a valve for exhausting and readmitting air from and to the same, a valve-lever, a handle journaled on the door and adapted to operate said valve, and means for locking the handle and thereby locking the valve-lever.

25. In an apparatus for sealing receptacles *in vacuo*, a vacuum-chamber, a door for the same, a valve for exhausting and readmitting air from and to the same, means for controlling the door which means also control the opening of said valve for the production of a vacuum, and means for locking said controlling means.

26. In an apparatus for sealing receptacles *in vacuo*, a vacuum-chamber, a door for the same, a valve for exhausting and readmitting air from and to the same, a valve-lever, a handle journaled on the door, and having a movement of its own independently of the door, whereby after the door has been closed the said handle can continue its movement and operate the valve-lever and means for locking said handle.

27. In an apparatus for sealing receptacles *in vacuo*, a vacuum-chamber, a door for the same, a valve for exhausting and readmitting air from and to the same, a valve-lever movable in one direction for opening said valve and having a spring for returning it automatically in the other direction, a handle on the door for operating said valve-lever, means for locking said door when it has operated the valve-lever, means for releasing said door, and a spring for retracting said door-handle.

28. In a vacuum sealing apparatus, a vacuum-chamber, a support for a receptacle, and a rubber mat attached to said support and having a U-shaped guide-rim.

29. In a vacuum sealing apparatus, a vacuum-chamber, a support for a receptacle therein, a rod connected to said support, a coupling having a removable cap in which said rod is loose, a collar on said rod, a pressure-spring on said rod between said cap and said collar, a second rod fixed in said coupling, and means for moving said second rod; the second rod and coupling moving independently of the first rod until a sufficient compression of the spring compels the transmission of motion to said first rod and said support.

In testimony whereof we have affixed our signatures, in presence of two witnesses, this 5th day of May, 1905.

J. A. LANDSBERGER.
WM. C. BUHLES.

Witnesses:
L. W. SEELY,
M. R. SEELY.