T. L. TALIAFERRO.

VACUUM CAPPING MACHINE.

APPLICATION FILED JULY 9, 1919.

1,403,879.

Patented Jan. 17, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

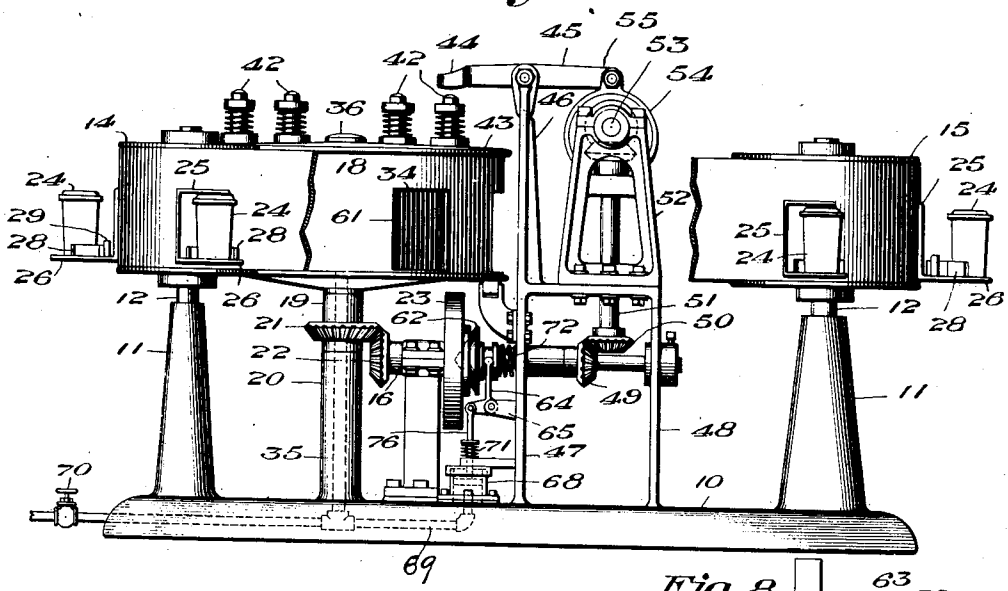


Fig. 8.

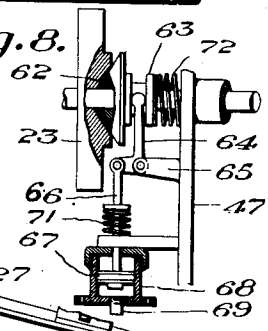


Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

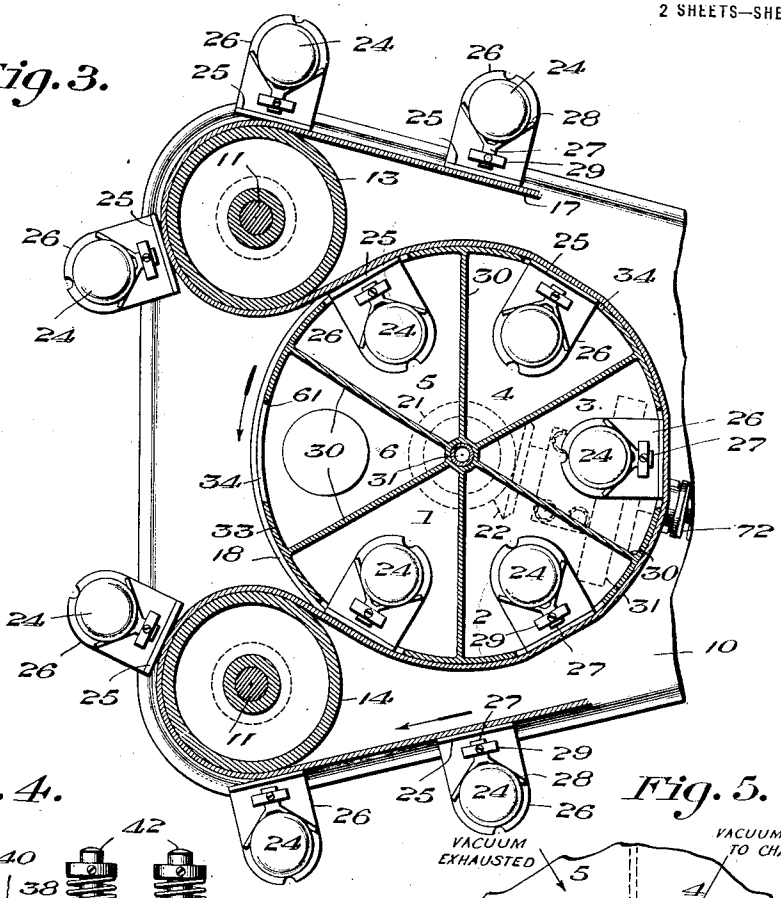


Fig. 4.

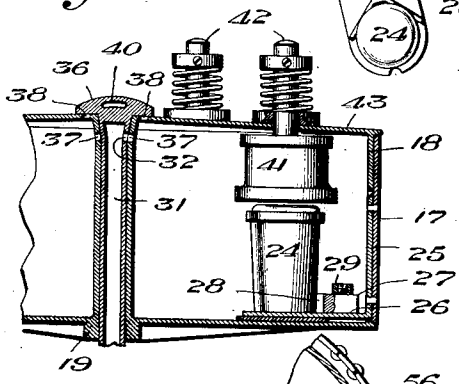
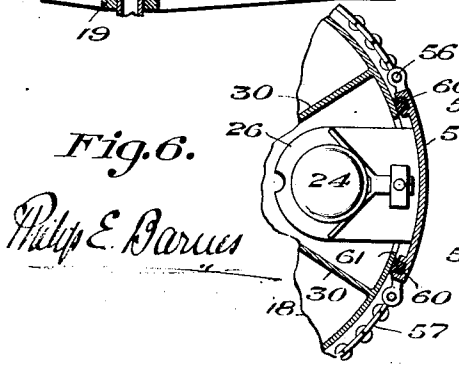
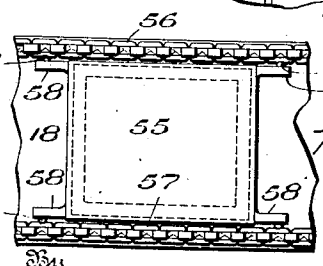


Fig. 5.

Fig. 7.

Fig. 6.





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VACUUM CAPPING MACHINE.

1,403,879. Specification of Letters Patent. Patented Jan. 17, 1922.

Application filed July 9, 1919. Serial No. 309,543.

To all whom it may concern:

Be it known that I, THOMAS L. TALIAFERRO, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Vacuum Capping Machines, of which the following is a description, reference being had to the accompanying drawing and to the figures of reference marked thereon.

The invention relates to new and useful improvements in vacuum capping machines, and more particularly to machines of this character which are provided with a plurality of vacuum chambers operating in succession to vacuumize the receptacles.

An object of the invention is to provide a machine of the above character having a plurality of traveling vacuum chambers held in fixed relation relative to each other with a traveling means movable in timing therewith for inserting the receptacles into said chambers in succession without transferring the receptacles from the supporting means therefor.

A further object of the invention is to provide a machine of the above character wherein the means for placing the receptacles in the vacuum chambers is constructed so as to close the vacuum chambers after inserting the receptacles therein.

A still further object of the invention is to provide a machine of the above character with a feeding means for the receptacles which is so constructed as to place a receptacle in a vacuum chamber before the vacuum is started therein and to remove the receptacle from said chamber after the vacuum has been released.

Another object of the invention is to provide a machine of the above type wherein the vacuum chambers are each formed with a vertical wall having an opening through which the receptacle may be inserted therein with an endless conveying means arranged to travel in a horizontal plane and having devices for supporting the receptacles and for closing the openings in the chambers.

Still another object of the invention is to provide a vacuum capping machine of the type above described wherein the vacuum chambers travel about one center and the endless conveying means for inserting the receptacles in said chambers and for closing the vacuum chambers travel about the same center for a portion only of the revolution of the vacuum chambers.

An additional feature of the invention resides in means to automatically stop the machine when the chamber in which the closing operation takes place has an insufficient vacuum therein to properly close the receptacle.

These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

In the drawings, which show by way of illustration one embodiment of the invention:—

Figure 1 is a side elevation of the apparatus, the endless conveyer being broken away at the center in order to show part of the closing mechanism and the openings in the periphery of the vacuum chamber through which the receptacles are inserted;

Fig. 2 is a plan view of the entire device;

Fig. 3 is a partial plan view of Fig. 1 with the top of the turret removed disclosing the receptacles on the endless conveyer within the vacuum chambers of the turret;

Fig. 4 is a section of the central vacuum valve and a vacuum chamber showing the sealing device in position over a receptacle;

Fig. 5 is a plan view of the central vacuum valve;

Fig. 6 is a fragmentary plan view of a modification of the receptacle feed showing the use of a chain provided with a receptacle support and vacuum chamber sealing means;

Fig. 7 is an elevation thereof; and

Fig. 8 is a detail view of the vacuum-operated clutch.

The invention resides broadly in a machine which is provided with a series of independent compartments having a fixed relation to each other and each of which may be formed into a vacuum chamber, wherein said vacuum chambers travel and are brought in succession one after the other in position to be closed. Cooperating with the traveling compartments forming the vacuum chambers is a feeding means which operates during the travel of said compartments to place in each compartment a receptacle to be put under vacuum and capped. This feeding means is constructed so as not only to place the receptacle in the compartment while said compartment is free from vacuum, but also to place the receptacle in

the compartment without any transfer of the receptacle from the supporting means which forms a part of the feeding mechanism for said receptacles. After the receptacles have been placed in the compartments, the latter are closed and are one after another put under vacuum.

Associated with each compartment is a closing head which is located within the compartment and which is capable of being operated by means outside of the compartment for forcing the cap onto the receptacle when under proper vacuum. Means is also provided for utilizing the vacuum in one chamber after the closing operation is completed for placing another compartment, which is approaching the sealing station, under partial vacuum, thereby reducing the power incident to the operation of the machine.

The feeding means which places the receptacles in the vacuum chambers is provided with means for closing the chambers after having inserted the receptacles therein, and this reduces to a minimum the number of parts of the machine and greatly simplifies the entire construction. Suitable means is provided for exhausting the air from the various compartments, and suitable valve mechanism is also provided for controlling the same so as to bring about gradually the vacuum in each compartment and in succession one after the other, and utilizing, as above stated, the vacuum in a chamber in which the closing operation has been completed to produce an initial vacuum in one of the chambers which is approaching the position in which it is closed.

The automatic stop mechanism for the machine is controlled by the source of vacuum and is so arranged as to shut off the power when the vacuum in the chamber in which the receptacle is to undergo the closing operation falls below a predetermined degree.

Referring more particularly to the drawings, it will be seen that the present embodiment of the invention comprises a base or standard 10 of any desired shape, preferably triangular, having upstanding supports 11 at each apex thereof, which supports provide bearings for an equal number of shafts 12 carrying on their upper ends freely rotatable guides or pulleys 13, 14 and 15. These pulleys have rather broad faces and are adapted to accommodate an endless band or conveying means in the shape of a belt or chain 17. Located intermediate these three rotatable guides is a turret mechanism comprising a drum 18 mounted to rotate on a shaft 19 having its bearings in a support 20 projecting upwardly from the triangular base 10. This turret is located in close proximity to the two rotatable guides 13 and 14 at the end of the triangular base, and the endless band is adapted to pass about the guide 13, then almost completely around the turret 18, around the second and third pulleys 14 and 15, and back to the first pulley 13 in an endless path.

The turret or drum 18 may be rotated in any desired manner; preferably by being driven directly from the main drive shaft 16, as shown in the drawings, wherein the bevel gear 21 fixed to the turret shaft 19 meshes with and is adapted to be turned by a bevel gear 22 fixed on one end of the horizontally arranged main driving shaft 16 which in turn is driven by the driving pulley 23. Instead of driving the turret, it may be rotated by frictional engagement with the surface of the belt in which case one or more of the guides 13, 14 and 15 would have to be positively driven by suitably geared connectons to the main drive shaft. If desired, both turret and guides may be positively driven.

The endless band 17 constitutes means for feeding receptacles 24 to the rotating drum or turret 18 and to this end the outside face of the band is provided at proper intervals with a plurality of L-shaped brackets 25 of glass, metal or any desired material attached thereto in any desirable manner. The base 26 of each bracket projects at right angles to the face of the band and is provided with a centering device in the form of a lug 27 having two projecting arms 28 adapted to receive therebetween the receptacles to be sealed for centering the same. The lug 27 has adjustment endwise through a block 29 mounted on the bracket base. Obviously any construction of bracket may be used and any type of centering device may be substituted.

The rotatable turret 18 is provided with a series of vertical, radially arranged, vanes 30, dividing the drum into a traveling series of independent sealing compartments or vacuum chambers 1, 2, 3, 4, 5 and 6, held in fixed relation to each other. In order that the receptacle 24 may be inserted in these vacuum chambers in succession without transferring the receptacles from their supporting brackets 25 on the endless conveyer 17, the peripheral ball 33 of each chamber is provided with an opening 34 of sufficient size to admat a bracket 25 and its receptacle 24 carried by the traveling belt 17; and the rotation of the turret and belt are so timed that, as the brackets 25 travel around the guides 13, 14 and 15, each one in turn enters into a corresponding compartment of the turret and on a complete rotation thereof is discharged and continues its travel around with the belt to receive another receptacle to be closed. The belt, which is made of rubber or any like material, is adapted to make an air-tight connection with the periphery of the turret to seal

the peripheral openings 34 of the vacuum chambers enclosing the brackets and receptacles on the endless band as it passes about the turret.

For the purpose of withdrawing air from these separate vacuum chambers, there is provided a pipe connection 35 to a vacuum pump or other suitable air exhausting mechanism. As shown in Fig. 1, this pipe 35 projects from the base upwardly through the drum support 20, the turret shaft 19 and extends into the axis of the turret to form a bearing therefor, the end thereof being in the form of a stationary valve 31 having an enlarged mushroom-shaped head 36 extending through the top of the turret. Within the drum the pipe 35 is formed with a radial slot 32 providing an inlet port to register with small ports 37 in the side walls of each compartment as the drum rotates relative to the pipe. Preferably the radial slot 32 is of such width as to register with two inlet ports 37 of two adjoining compartments, such as 2 and 3, Fig. 5 thus affording a simultaneous exhaustion of the air therefrom. Ports 38 are also arranged in the top walls of each compartment and each such port 38 is adapted to register successively with a port 39 in the top of the enlarged head 36 of the valve as the drum revolves, so that the vacuum in each compartment is placed in communication with the atmosphere.

The central controlling valve 31 is also provided with means for utilizing the vacuum in one chamber after the closing operation is completed therein for placing another compartment which is approaching the closing position under partial vacuum. For this purpose, the enlarged head 36 is also provided with an interior cross passage 40 adapted to connect the exhaust ports 38 arranged in the tops of two opposed compartments. As shown in Fig. 7, this passage 40 is illustrated as putting the vacuum chambers 1 and 4 in communication. In such position of the turret, chamber 4 has finished its sealing operation and the vacuum therein is no longer of use, while the chamber 1 has just been closed by the belt and is at atmospheric pressure. By interconnecting these chambers, the vacuum in chamber 4 is divided between the two, thus initiating a vacuum in the first chamber without the expense of additional power. It is also apparent that other arrangements of valve mechanism for exhausting the air from these chambers are within the contemplation of the invention.

For performing the closing operation, there is arranged in each compartment any type of closing mechanism. In the present case it takes the form of a closing head 41 provided with a spring-pressed plunger 42 projecting outwardly through the top 43 of the turret and adapted to be pressed downwardly at the proper time by means of the end 44 of an overhanging lever 45 pivoted on the arm of a standard formed by the upstanding legs 47 and 48 projecting from the base 10. The lower portion of these legs is provided with a bearing for the main drive shaft to which is affixed the bevel gear 49 meshing with a similar gear 50 on the end of a vertical shaft 51 which has its bearings in a bracket 52 bolted to the standard. This bracket carries a horizontal shaft 53 geared to the vertical shaft 51 and provided with an eccentric 54 adapted to reciprocate the other end 55 of the sealing lever 45. For purpose hereinafter set forth, there is preferably provided means to independently throw out the drive to this eccentric which may take any convenient form, such as a clutch for connecting the bevel gear to the main drive shaft.

To prevent the apparatus from closing receptacles when an insufficient working vacuum is created in a particular chamber as it arrives at the closing station, the machine is provided with a vacuum-controlled stop mechanism. As shown in Fig. 1, the lateral face of the driving pulley 23 on the main drive shaft is provided with one member 62 of a friction clutch, while splined on the drive shaft 16 is the other clutch member 63 adapted to be slid thereon by means of a shipper lever 64 pivoted to an arm 65 integral with the support 47. The free end of the lever is connected to a piston rod 66, the piston 67 of which works in a vacuum cylinder 68 suitably attached to part of the supporting leg 47 which is provided with the usual opening to the atmosphere. The cylinder 68 is connected by means of a conduit 69 to the vacuum pipe 35 which in turn is provided with a cut-off valve 70. Surrounding the piston rod is a spring 71 adapted to normally hold said piston and rod in upper position so that the clutch is normally out against the action of a suitably weaker spring 72, shown herein as surrounding the main drive shaft 16 and adapted to assist in forcing the clutch to engaging position. It is apparent that any type of clutch and any arrangement thereof for accomplishing the same function may be used. It is also apparent that there may be a similar automatic or hand-operated clutch connection for throwing out of operation the closing mechanism 45 in lieu of or together with the turret drive.

In Figs. 6 and 7 there is illustrated a modification of the endless conveyer, wherein there are provided separate doors 55 for closing the openings in the vacuum chambers. These doors to which the receptacle brackets are attached are carried by upper and lower endless chains 56 and 57. These chains are adapted to pass around the guides and turret in an endless path, just like the integral belt of the preferred construction.

The doors are of any suitable material and are formed with lateral arms 58 provided with upstanding lugs 59 engaging in a suitable perforation in the chain link. Each door is provided on its inner face with means for positively sealing the opening in the peripheral wall of the vacuum chamber. For this purpose, the door is grooved on each of its four sides to seat a gasket 60 which projects beyond the inner face of the door and overlaps the edges 61 of the openings in the chambers when the door is in closed position. Obviously, other constructions of sealing means may be used.

Operation.

The receptacles to be closed, after being fed in any desired manner to the brackets 26 and properly centered, pass continuously in the direction of the arrows shown in Fig. 1 into the rotating turret 18. The first compartment is there given a preliminary partial vacuum by being connected by means of the cross passage 40 in the valve head 36, with the compartment 4 in which the closing operation has just been completed. The continuously moving turret has now arrived at station marked 2, the valve slot inlet 32, Figs. 4 and 5, is then so located as to connect such compartment with the vacuum pipe 31 and the vacuum is further completed. Upon further rotation of the turret, the compartment is still kept in communication with the vacuum pipe to complete the vacuum, the receptacle now being in the closing position. The closing operation is performed by means of the lever end 44 depressing the closing head 41. In this connection, it might be stated that because of the progressive vacuumizing action and the uninterrupted rotation of the turret, there is no delay in the closing function and the same is accomplished immediately the receptacle arrives in position. Concurrently with the closing of the receptacle, the turret passes on to station 4, where the vacuum therein is transferred in part through the valve passage 40 to the new chamber 1. Still further rotation of the turret takes the old chamber to station 5 where it is connected with the atmosphere, and a further rotation withdraws the completely closed receptacle from the turret, whence the closed receptacle may be withdrawn from the endless conveyer by any suitable device.

In this manner, a continuous series of receptacles is rapidly passed through the vacuumizing and closing operations and it will be noted that because of the manner of gradually exhausting the air from the receptacle as it passes to the closing device, by the time the receptacle arrives at this station it is in the proper state of vacuum and it is not necessary to delay the action of the closing as is common at the present time. Furthermore, by means of a connection between that compartment in which the closing operation has been completed and in which the vacuum is no longer useful and one of the compartments approaching the closing position, such latter compartment is given a preliminary vacuum without any expenditure of power by the vacuum pump.

In case the vacuum in the chamber in which the closing operation takes place should fall below the required degree, because of a leak therein or some other defect in working, the piston 67, which is normally drawn down under the action of the required degree of vacuum, will be forced upwardly under the action of the spring 71, thereby oscillating the lever 64 to the right to disconnect the source of power and stop the rotatable turret. The defect having been remedied, it is only necessary to reopen the valve 70 in the vacuum conduit 35, whence the air exhausting apparatus will immediately begin the vacuumizing action. When the required degree of vacuum has been reached, the piston 67 will again be drawn down to start the machine.

It will be obvious that minor changes in the details of construction and the arrangement of parts may be made without departing from the spirit of the invention as set forth in the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters-Patent is:—

1. A continuously operating apparatus for closing receptacles in vacuum comprising in combination, a traveling series of independent chambers having a fixed relation to each other, common means for positioning receptacles into and for closing said chambers, means for vacuumizing said chambers, and means for closing said receptacles while so vacuumized.

2. A continuously operating apparatus for closing receptacles in vacuum comprising in combination, a rotating turret provided with a plurality of chambers having a fixed relation to each other and having openings for the insertion of receptacles, conveying means for closing said openings and for positioning the receptacle to be closed in said chambers, means for vacuumizing said chambers, and means for closing said receptacles while vacuumized.

3. A continuously operating apparatus for closing receptacles in vacuum comprising in combination, a moving series of independent chambers, means for feeding receptacles to said chambers, means for gradually and successively vacuumizing said chambers, means for closing said receptacles while in said vacuum chamber, and means for connecting a vacuumized chamber with a chamber of said series which is approaching said closing means for creating a partial vacuum therein.

4. A continuously operating apparatus for closing receptacles in vacuum comprising in combination, means for progressively vacuumizing a series of chambers containing receptacles to be closed, means for closing said receptacles while vacuumized, and means for releasing said vacuum in said chamber after closing into a preceding chamber of said series to start the vacuum therein.

5. A continuously operating apparatus for closing receptacles in vacuum comprising in combination, a rotating turret provided with a plurality of chambers having a fixed relation to each other and having openings for the insertion of receptacles, an endless conveying means traveling circumferentially of said turret for closing said openings and provided with receptacle holders adapted to enter said openings and travel with said chambers, means for vacuumizing said chambers, and means for closing said receptacles while so vacuumized.

6. A continuously operating apparatus for closing receptacles in vacuum comprising in combination, a traveling series of separate chambers having a fixed relation to each other and provided with openings, a movable series of receptacle carriers cooperating therewith to place receptacles through said openings in said chambers and provided with means for closing said chambers, means for vacuumizing said chambers, and means for closing said receptacles while vacuumized.

7. A continuously operating apparatus for closing receptacles in vacuum comprising in combination, closing means, means for positioning a series of receptacles to be closed, means for feeding receptacles to said positioning means, said feeding and positioning means cooperating to form a closing chamber, and means for vacuumizing said chamber.

8. A continuously operating apparatus for sealing receptacles in vacuum comprising a plurality of traveling vacuum chambers held in fixed relation to each other, traveling receptacle supporting means movable in timed relation therewith and adapted to insert receptacles into said chamber in succession without transferring the receptacles from the supporting means.

9. A continuously operating apparatus for sealing receptacles in vacuum comprising a plurality of traveling chambers, each adapted to receive a receptacle therein, means traveling in timed relation therewith for inserting the receptacles into said chambers, said means being adapted to close the vacuum chambers after inserting the receptacles.

10. A continuously operating apparatus for sealing receptacles in vacuum comprising a series of vacuum chambers, each adapted to receive a receptacle to be vacuumized and sealed, said chambers traveling about one center, and endless conveying means for inserting the receptacles in said chambers and for closing the same thereafter, said conveying means traveling about the same center for a portion of the travel of said vacuum chamber.

11. In a machine for closing receptacles, a chamber to be vacuumized, means for vacuumizing said chamber, means in the chamber for pressing the closure to the receptacle therein, power driven means for operating said pressing means, and means for automatically stopping the operation of said pressing means when the vacuum in said chamber falls below a predetermined degree.

12. A continuously operating apparatus for closing receptacles in vacuum comprising in combination, a traveling series of separate chambers, power driven means for feeding receptacles thereto, means for successively vacuumizing said chambers, power driven means for closing said receptacles while so vacuumized, and means for disconnecting said feeding and closing means from said source of power when the vacuum in said chamber containing the receptacle to be closed falls below a pre-determined degree.

13. A continuously operating device for closing receptacles in vacuum comprising in combination, a turret rotatable about one center and constituting a plurality of traveling vacuum chambers held in fixed relation to each other, an endless conveying means for inserting the receptacles into said chambers and for closing the vacuum chambers adapted to travel about the same center for a portion of the revolution of said turret, said conveying means being adapted to rotate said turret.

14. A continuously operating device for closing receptacles in vacuum comprising a rotatable turret having a plurality of separate vacuum chambers, the peripheral walls of said chambers being formed with openings therein to receive receptacles to be closed in said chambers, a conveying means to carry the receptacles thereon and arranged to make peripheral contact with said turret to first introduce the receptacles into said chambers and to thereafter seal said chambers.

15. An apparatus for closing receptacles in vacuum comprising in combination, a plurality of independent chambers, means for successively vacuumizing said chambers, means associated with each chamber for closing a receptacle, and means for connecting a vacuumized chamber with a chamber about to be vacuumized for producing a partial vacuum therein.

16. A continuously operating apparatus for closing receptacles in vacuum compris-

ing in combination, a traveling series of separate chambers having a fixed relation to each other and movable in a common plane only, means for feeding receptacles thereto, said means traveling substantially parallel with the line of travel of said chambers during at least a portion of the feeding operation, means for vacuumizing said chambers, and means for closing said receptacles while so vacuumized.

17. A continuously operating apparatus for closing receptacles in vacuum comprising in combination, a traveling series of separate chambers having a fixed relation to each other, and movable in a common plane only, means traveling tangentially relatively to the line of travel of said chambers for feeding receptacles thereto, means for vacuumizing said chambers, and means for closing said receptacles while so vacuumized.

18. A continuously operating apparatus for closing receptacles in vacuum comprising in combination, a series of separate chambers traveling only in a common plane and having openings for the insertion of receptacles, means for feeding receptacles into said chambers through said openings, said means traveling substantially parallel with the line of travel of said chambers during at least a portion of the feeding operation, means for vacuumizing said chambers, and means for closing said receptacles while so vacuumized.

In testimony whereof, I affix my signature.

THOMAS L. TALIAFERRO.