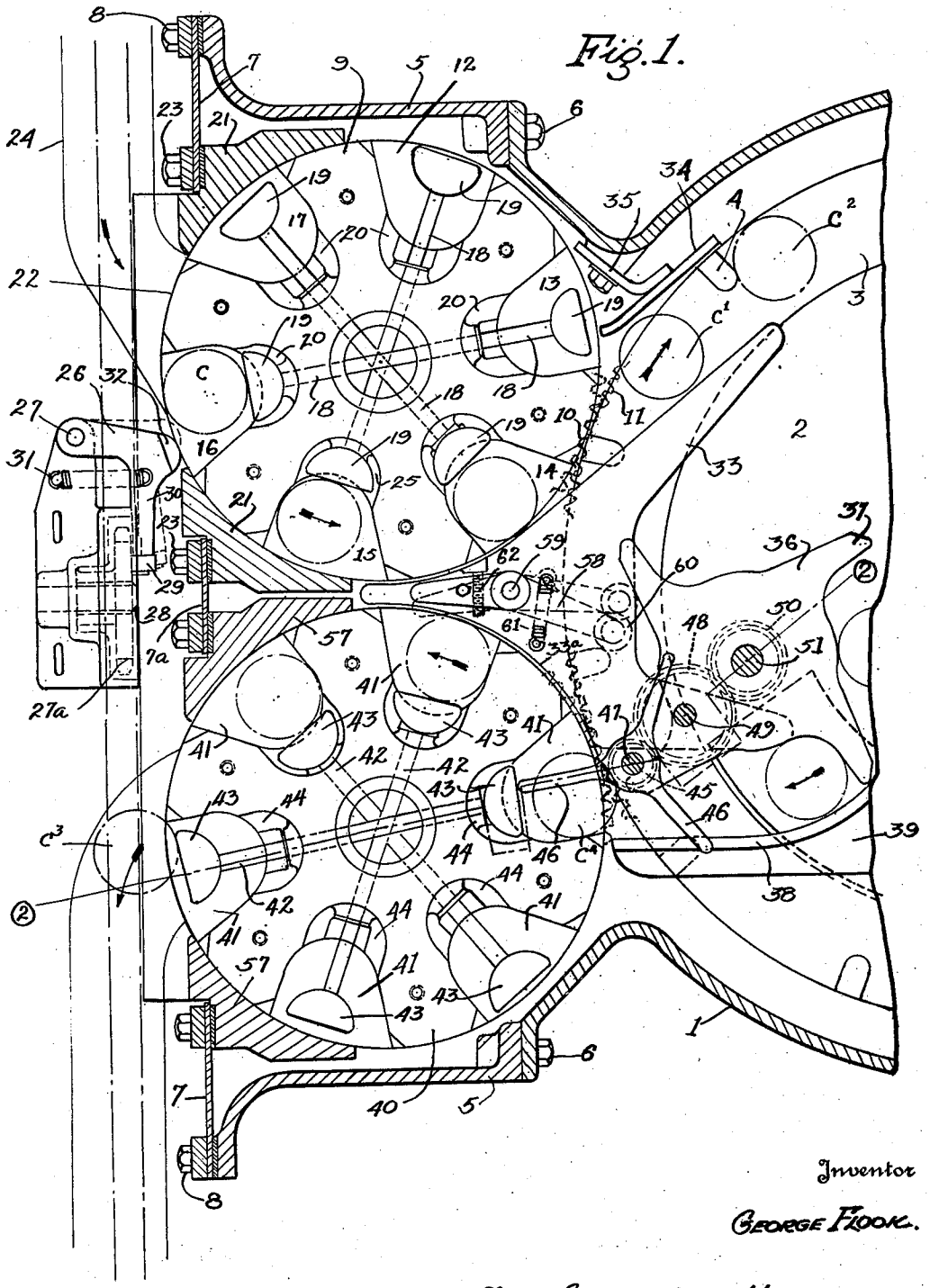
June 24, 1930. G. FLOOK 1,766,018

TRANSFER VALVE FOR VACUUM CLOSING MACHINES

Filed March 20, 1929 2 Sheets-Sheet 1

Fig. 1.



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Filed March 20, 1929 2 Sheets-Sheet 2

Fig. 2.

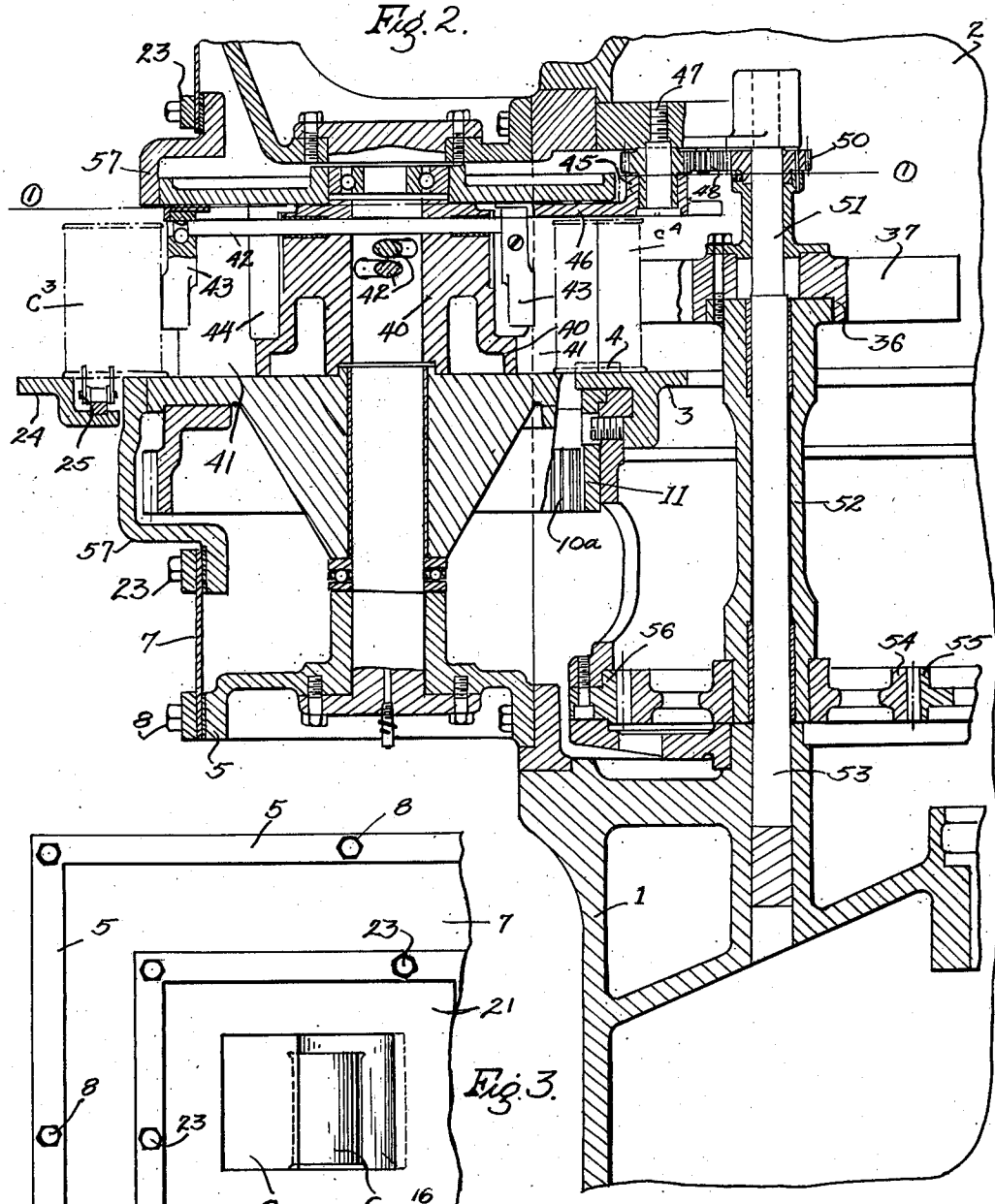


Fig. 3.

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UNITED STATES PATENT OFFICE

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TRANSFER VALVE FOR VACUUM-CLOSING MACHINES

Application filed March 20, 1929. Serial No. 348,648.

The invention relates to new and useful improvements in machines for closing containers in vacuum, and more particularly to a sealing valve for the machine for transferring the container to or from the vacuum chamber.

Considerable difficulty has been experienced in maintaining a running seal for the valve due to wear of the parts and the vacuum pull on the valve. An object of the present invention is to provide a machine for closing in vacuum with means whereby the pull of the vacuum chamber may be utilized for maintaining a sealing contact between the valve seat and a transfer valve which rotates about a fixed axis.

A further object of the invention is to provide a machine of the above type wherein the wall of the vacuum chamber adjacent the transfer valve is provided with a flexible diaphragm section supporting the valve seat so that the pull of the vacuum chamber on said diaphragm will hold the valve seat against the transfer valve and thus maintain a sealing contact.

A further object of the invention is to provide a transfer valve for a machine for closing in vacuum with means whereby the container as it is forced into the receiving valve operates to eject a container from the opposite side of the rotating valve.

A further object of the invention is to provide a transfer valve of the above type for delivering containers to a vacuum chamber with means whereby the pull of the vacuum chamber may be utilized to aid in the removal of the containers from the valve into the vacuum chamber.

A further object of the invention is to provide a transfer valve of the above type for discharging containers from a vacuum chamber with means for insuring the ejection of all containers from the valve after the valve ceases to receive containers.

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:

Fig. 1 is a sectional view on the line 1—1 of Fig. 2.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1,

Fig. 3 is a front view of a portion of the machine showing the valve seat and support therefor.

The invention is directed to a vacuum closing machine and more particularly to the means for transferring the containers to be vacuumized and closed to or from the machine. A rotating valve is used for transferring the containers to the machine, which valve rotates about a fixed axis and is provided with a series of pockets adapted to compeltely house the containers and convey the same into the vacuum chamber. A similar valve is provided for discharging the closed containers from the vacuum chamber. These valves for transferring the containers are located within the casing or frame of the machine and within the vacuum chamber. The front wall of the machine adjacent the valve is provided with a flexible diaphragm and the portions of the casing forming the valve seats which make sealing contact with the valves are attached to and carried by this diaphragm. The valve seats and diaphragm are located at the outer side of the valves, and the diaphragm is subject to the pull of the vacuum chamber and this will hold the valve seats in sealing contact with the valves.

The containers are delivered in succession to the pockets of the receiving valve from a suitable conveyor. Means is provided for insuring the complete housing of the container in its pocket. The pockets are arranged in pairs which are diametrically opposed and associated with each pair of pockets is an ejecting rod carrying a head at each end thereof. This rod is arranged diametrically of the valve and is free to move endwise. The rod is of sufficient length so that when a container is placed in a pocket and engages the head and forces the head to the extreme inner end portion of the pocket, the head at the other end of the rod is moved to the extreme outer portion

of the pockets so as to eject any container contained in the pocket.

Furthermore, the suction pull of the vacuum chamber will operate on the rod and aid in the shifting of the rod to eject the container.

The containers after they are received into the machine are presented to a suitable closing means not shown and after they are closed they are then brought to a position where they are placed in the discharge valve. This discharge valve is equipped with similar rods and when a container is forced into the pocket at the inner side of the valve then, if there is a container in the pocket at the opposite side, the rod is pushed so as to eject said container from the pocket. Means is provided for mechanically forcing the rod so as to eject a container from the outer pocket provided no container is delivered to the inner pocket.

Referring more in detail to the drawings, the vacuum closing machine is only shown in part and consists of an enclosing casing 1 forming a vacuum chamber 2. In this vacuum chamber 2 is a rotating conveyor 3 which is in the form of an annular supporting ring. This ring is provided with spaced projections 4 against which the containers are placed and thus timed so as to be properly delivered to the closing machine. Attached to this main casing 1 and projecting outwardly therefrom is a valve casing 5. Said valve casing is bolted to the main casing by suitable bolts 6. This valve casing is provided with a relatively large opening at the front side thereof which is closed in part by a flexible diaphragm 7. The diaphragm is secured to the casing by suitable bolts 8. There are two openings in this diaphragm through one of which the containers are received, and through the other opening they are discharged. The portion 7^a of the diaphragm lies between the openings. Located within the valve casing is a rotatable valve 9 which is mounted to rotate about a fixed axis. The valve is provided with a gear 10 indicated diagrammatically in Fig. 1, which meshes with a gear 11 carried by the rotating conveyor 3 of the machine. The rotating valve 9 is provided with a series of pockets 12, 13, 14, 15, 16, and 17. These pockets are of sufficient size to receive a container and completely house the container. The pocket is shaped so that the container may be easily delivered thereto while the valve is rotating. The pockets may be said to be arranged in pairs and the pockets in each pair are opposed to each other, that is, the pockets 13 and 16 form one pair, the pockets 12 and 15 another pair, and the pockets 14 and 17 still another pair.

Associated with each pair of pockets is an ejector rod 18. This ejector rod is mounted to slide freely in the valve and is provided at each end with a head 19 which is rigidly secured to the rod. The valve is formed with a recess 20 at its inner side and the head 19 is adapted to fit in this recess when the container is moved into the pocket and this forces the head into its seat and the rod in an endwise direction.

When a container is moved into the pocket 16, for example, the rod is moved endwise by the container and this causes the head at the other end of the rod to eject a container from the pocket 13. As shown in the drawings, the container C has just been delivered to the pocket 16 and the container C′ has just been ejected from the pocket 13 by this inward movement of the rod 18 associated with this pair of pockets. Inasmuch as this head is of considerable size, when the pocket 16 moves past the valve seat and the opposed pocket moves so as to be open to the atmosphere, then the pull of the vacuum chamber on the pocket 16 will operate on the head associated with said pocket moving the same and forcing the container out of the pocket. The rod 18 moves freely in a passage through the valve which is packed so as to maintain a tight seal for the chamber.

Secured to the diaphragm at the intake opening is a casting which forms a valve seat for the valve 9. This valve seat is shown at 21 in the drawings. The valve seat is provided with an opening 22 through which the containers are passed into the pockets of the valve. The valve seat is bolted to the diaphragm 7 by suitable bolts 23. The pull of the vacuum chamber on this diaphragm 7 will draw this valve seat 21 against the face of the valve 9 thus maintaining a running sealing contact with the valve. This takes up any wear between the parts and enables the valve to be mounted so as to rotate in fixed bearings.

The containers are fed along a guideway indicated diagrammatically at 24 in Fig. 1 by a conveyor chain 25. The guideway is so shaped that the container is forced from the chain into a pocket of the valve. To insure that the container will be fully seated in the pocket before the pocket crosses the valve seat, a seating lever 26 is provided. This lever 26 is pivoted at 27 to a suitable bracket carried by the valve casing. Mounted for rotation in this bracket is a sprocket wheel 27^a which meshes with the conveyor chain and is driven thereby. On the face of this sprocket is a projecting cam 28. This projecting cam 28 is adapted to engage a roller 29 carried by the arm 30 formed integral with the lever 26. A spring 31 normally presses the roller 29 against the sprocket wheel and holds it in its retracted position. As the cam passes under the roller the lever will be moved so that the projection 32 carried thereby will engage the con-

tainer and insure that it is fully seated within the pocket.

A stationary guide 33 is provided which extends from a point adjacent the valve seat 21 to a position well over the conveyor 3. The containers are drawn by the suction pull out against this guide 33 and will move along the face thereof. A guide 34 is provided which is so positioned as to engage the container and retard its forward movement. This guide is carried by a bracket 35 which is capable of being adjusted so as to shift the position of the retarding guide.

After the container is transferred to the conveyor it is essential that it shall be placed against the projection 4 so as to be properly timed. As the container is carried along with the conveyor this guide 34 retards its movement and positions it against the projection. As shown in Fig. 1, the container C^2 has been retarded and placed against the projection 4.

The mechanism for closing the container has not been illustrated as any suitable mechanism may be used for this purpose, the invention being directed wholly to the means for transferring the container to or from the vacuum chamber. After the container is closed, it is received by a rotating discharge turret 36. This rotating turret 36 is provided with spaced fingers 37. The container is moved by one of the fingers along a guide rail 38 and off from a support 39 across the conveyor 3 and into a pocket of a discharge valve 40. This discharge valve is mounted to rotate about a fixed axis and is provided with a series of pockets 41 arranged in pairs similar to the pockets in the receiving turret. Associated with each pair of pockets is an ejector rod 42 carrying at each end thereof a head 43. Each pocket at its inner side is formed with a recess 44 in which the head may be housed.

Mounted on the frame of the machine is a rotating spider 45 which is provided with three arms 46. The rotating spider is attached to the hub of a gear carried by a stud 47 and this gear meshes with a gear 48 carried by a stud 49. The gear 48 meshes with a gear 50 carried by a sleeve 51 attached to the upper face of the turret 36. This turret 36 is secured to a sleeve 52 mounted to rotate about a supporting rod 53 carried by the frame of the machine. On this sleeve 52 is a gear 54 which meshes with a driven gear 55. The gear 54 also meshes with a gear 56 mounted on the support for the conveyor 3 and thus it is that the conveyor is rotated.

When this spider 45 is rotated the arm 46 comes into contact with the head 43 in one of the pockets and moves the rod outwardly so as to eject the container from the outer pocket associated with this rod. As shown in Fig. 1 of the drawings, the finger 46 is moving the rod for ejecting the container C^3 at the same time a container C^4 is being delivered into the pocket 41. The spider is so positioned as to move over the top of the containers. Associated with the valve 40 is a valve seat 57 which is similar in construction to the valve seat 21. This valve seat 57 is likewise secured to the diaphragm 7 and the pull of the vacuum chamber on the diaphragm maintains this valve seat 57 in running sealing contact with the valve 40. The valve seat 21 and the valve seat 57 are separated by the portion 7^a of the diaphragm and, therefore, these two valve seats are independently movable to a sufficient extent to make running sealing contact with their respective valves. In order that the container may be fully seated in the pocket before it passes the valve seat a placing lever 58 is provided. This lever is pivoted at 59 and is provided with a roller 60 which is so positioned as to be engaged by the projections 4 on the conveyor 3. The inner ends of these projections are rounded and the roller makes contact therewith and rolls over the same. This swings the lever to the dotted line position in Fig. 1 and causes the outer end thereof to engage the container and force the same well into the pocket so that the container will not strike the edge of the valve seat. A spring 61 connected to the lever 58 normally swings the outer end of the lever away from the valve and a stop screw 62 limits the movement of the lever. The valve 40 is provided with a gear 10^a which meshes with the gear 11.

The container after it is discharged from the valve 40 is again taken up by the conveyor 25 and carried along a suitable guideway as indicated diagrammatically in Fig. 1. The operation of the transfer valve is thought to be obvious from the above description. The containers are fed in succession into the pockets of the receiving transfer valve and fully seated therein. This is done while the container is passing the opening 22 between the valve seats. When the pocket reaches the inner side of the inner valve 21 it is open to the vacuum chamber and the pull of the vacuum chamber will draw on the head carried by the ejecting rod and thus force the container out against the guide and onto the conveyor. The placing of a container in the opposed pocket will further insure that the rod is moved so as to eject the container from the valve onto the conveyor in the vacuum chamber. The retarding guide engages the container and places the same against a timing projection so that it is properly positioned for delivery to the mechanism which receives and closes the container. After the container is closed it is then received by the ejecting turret which positively places the container in a pocket of the discharge transfer valve.

The ejecting rod is positively moved to place the head thereof in its seat and thus permit the free placing of the container in the pocket. The guide 33 is provided with a guiding face 33ª associated with this discharge turret and this retains the container in the pocket.

When the lever 58 operates on the container to fully house it within the pocket both heads of the ejecting rod 42 are subjected to the vacuum pull and the container will not be disturbed by the action of the vacuum pull on the rod.

When the container reaches the discharge opening between the valve seats 57, 57 it is positively ejected by the ejecting rod, which is moved by the spider arm.

It will be apparent that I have provided a transfer valve wherein the pull of the vacuum chamber is utilized for discharging the containers from the pockets of the receiving valve and at the same time similar devices are operated by mechanical means for ejecting the containers from the discharge valves. It will also be noted that while the valves rotate about fixed centers the valve seats cooperating with the valves are attached to a section of the casing which is in the form of a flexible diaphragm and so disposed relative to the valves that the pull of the vacuum chamber will maintain said valve seats in sealing contact with the valve, taking up all wear and any inaccuracies in the machining of the parts. While I have shown independent receiving and discharge valves it will be understood that from certain aspects of the invention certain features thereof may be used in conjunction with a single valve and that the construction of the valve may be widely varied without departing from the spirit of the invention as set forth in the claims. It will also be understood that other types of ejecting means may be used in connection with the valves and that the details of construction may be widely varied within the scope of the appended claims.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The combination of a casing having a vacuum chamber and a rotary transfer valve for transferring containers to or from said chamber, said casing having a valve seat contacting with the valve, and a diaphragm section supporting said seat, said seat being disposed relative to said valve so that the vacuum pull on the diaphragm holds said seat in sealing contact with the valve.

2. The combination of a casing having a vacuum chamber and a rotary transfer valve for transferring containers to or from said chamber, said valve having pockets therein in which a container may be completely housed, said casing having a valve seat contacting with the valve, and a diaphragm section supporting said seat, said seat being disposed relative to said valve so that the vacuum pull on the diaphragm holds said seat in sealing contact with the valve.

3. The combination of a casing having a vacuum chamber, a rotary transfer valve for transferring containers to or from said vacuum chamber, said valve having a plurality of pockets adapted to receive and completely house containers, and means for removing the container from the pocket, said casing having a valve seat contacting with the valve, and a diaphragm section supporting said seat, said seat being disposed relative to said valve so that the vacuum pull on the diaphragm holds said seat in sealing contact with the valve.

4. The combination of a casing having a vacuum chamber and a rotary transfer valve for transferring containers to or from said chamber, said valve having a plurality of pockets adapted to completely house the containers, and means for removing said containers from the pockets, said casing having a valve seat contacting with the valve and formed with an opening through which the containers are fed to or discharged from the pockets, and a diaphragm section surrounding said valve seat and supporting the same so that the vacuum pull on the diaphragm holds said seat in sealing contact with the valve.

5. The combination of a casing having a vacuum chamber and a rotary transfer valve for transferring containers to or from said chamber, said casing having a valve seat contacting with the valve and provided with an opening through which the containers are fed to or discharged from the valve, and a diaphragm section surrounding the valve seat and supporting the same, said valve seat being disposed relative to the valve so that the vacuum pull on the diaphragm holds said seat in sealing contact with the valve.

6. The combination of a casing having a vacuum chamber, a valve for transferring containers to or from said chamber, means for supporting said valve whereby the same rotates about a fixed axis, said casing having a movable valve seat contacting with said valve and having an opening therethrough through which the containers are fed to or discharged from the valve, and means for yieldingly holding said valve seat in contact with said valve.

7. The combination of a casing having a vacuum chamber, a valve for transferring containers to or from said chamber, means for supporting said valve whereby the same rotates about a fixed axis, said casing having a movable valve seat contacting with said valve and having an opening therethrough through which the containers are fed to or

discharged from the valve, means for yieldingly holding said valve seat in contact with said valve, and means whereby the vacuum pull of the vacuum chamber is utilized to maintain said valve seat in contact with the valve.

8. The combination of a casing having a vacuum chamber, a valve for transferring containers to or from said chamber, means for supporting said valve whereby the same rotates about a fixed axis, said casing having a movable valve seat contacting with said valve and having an opening therethrough through which the containers are fed to or discharged from the valve, means for yieldingly holding said valve seat in contact with said valve, means whereby the vacuum pull of the vacuum chamber is utilized to maintain said valve seat in contact with the valve, and means whereby the pull of the vacuum chamber may be utilized for removing the containers from the valve into the vacuum chamber.

9. The combination of a casing having a vacuum chamber, a transfer valve for transferring containers to or from said chamber, means for supporting said valve whereby the same rotates about a fixed axis, said casing having a valve seat engaging the outer face of said valve and having an opening through which containers are fed to or discharged from said valve, and a diaphragm section supporting said seat, said valve having a series of pockets adapted to completely house the containers, said pockets being arranged in pairs diametrically of the valve, and means associated with each pair whereby a container entering one pocket of a pair ejects the container from the other pocket of said pair.

10. The combination of a casing having a vacuum chamber and a rotary transfer valve for transferring containers to said chamber, said valve having a series of diametrically opposed pockets for completely housing the containers, a passage in the valve connecting the diametrically opposed pockets, a rod in said passage having sealing contact therewith, a head at each end of the rod whereby the suction pull of the vacuum chamber on the head will move the rod and cause the container to be ejected from the pocket.

11. The combination of a casing having a vacuum chamber, a rotary valve for transferring containers to said chamber, said casing having a valve seat contacting with the outer face of the valve, said valve having a series of pockets arranged in pairs diametrically of the valve, a rod associated with each pair of pockets and mounted for free movement in the valve, said rod extending from one pocket to the diametrically opposed pocket, a head at each end of the rod, the pockets having recesses at their inner faces to house said heads, said rod being of sufficient length so that when a container is forced into one pocket the rod is moved thereby so as to eject the container from the other pocket.

12. The combination of a casing having a vacuum chamber and a rotary transfer valve for transferring containers to said chamber, said valve having a series of diametrically opposed pockets for completely housing the containers, a passage in the valve connecting the diametrically opposed pockets, a rod in said passage having sealing contact therewith, a head at each end of the rod whereby the suction pull of the vacuum chamber on the head will move the rod and cause the container to be ejected from the pocket, said casing having a valve seat adapted to contact with the outer face of said valve, said valve seat having an opening therethrough through which the containers are fed to the pockets of the valve, and means engaging the container for forcibly placing the container completely within the pocket before said pocket passes the valve seat.

In testimony whereof, I affix my signature.

GEORGE FLOOK.