Dec. 23, 1941. L. THOMAS 2,267,346

ROTARY VALVE FOR RETORTS

Filed Oct. 31, 1939

Fig. 1.

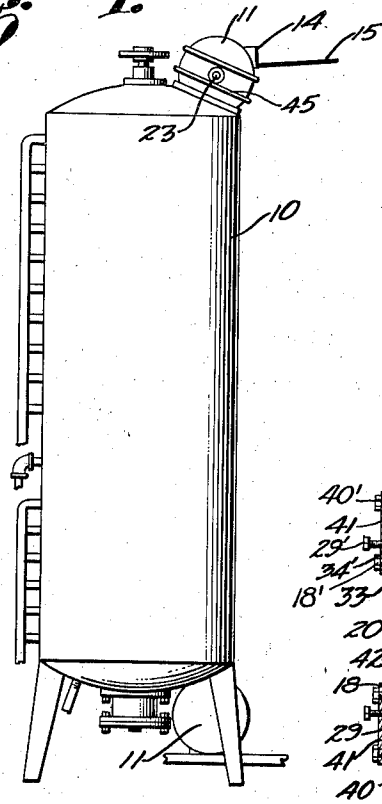


Fig. 3.

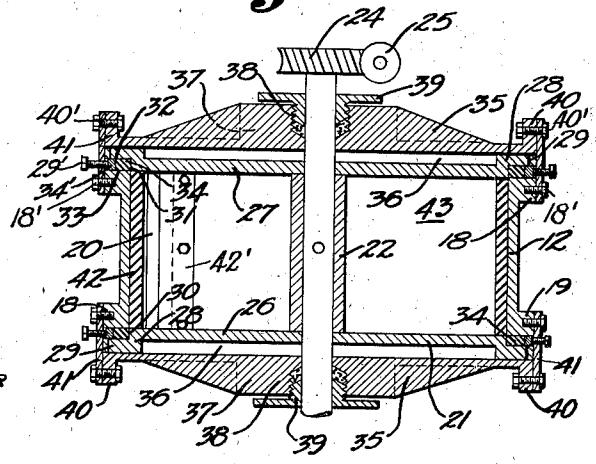
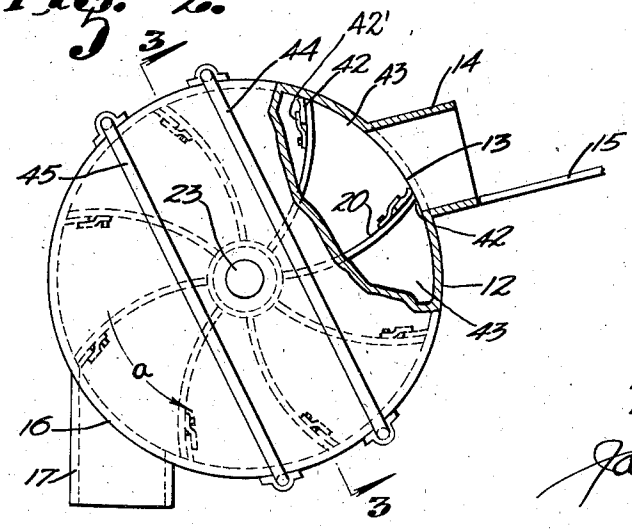


Fig. 2.



INVENTOR
LEE THOMAS
BY
James M. Abbett
ATTORNEY

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ROTARY VALVE FOR RETORTS

Lee Thomas, Long Beach, Calif.

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3 Claims. (Cl. 198—209)

This invention relates to canning machinery and the like and particularly pertains to a rotary valve for retorts.

In the operation of various machines embodying the use of a retort in which it is desirable to introduce articles into the retort and to withdraw them therefrom without disturbing the fluid pressure existing within the retort, such for example as in connection with cooking machinery as disclosed in my co-pending application Serial No. 278,627, entitled "Cooker," filed June 12, 1939, a valve is used to permit cans of food to be introduced into the retort and to be withdrawn therefrom, and during the intermediate interval the cans are subjected to a cooking action produced by steam under pressure. In such equipment the fluid pressure within the retort is materially greater than that of the atmosphere, and it is necessary therefore to provide valves through which the cans of material may pass and within which a seal will be created tending to progressively decrease the degree of pressure from the interior of the retort to the exterior thereof, and to seal the retort so that there will not be any loss of steam pressure as the cans pass through the valves and also to insure that heat is retained within the structure in the event heat is used. It is the principal object of the present invention, therefore, to provide a rotary valve structure mounted over and in communication with induction or eduction passageways of a closed compartment whereby articles may be introduced into the compartment and withdrawn without affecting the condition existing within the compartment whether it be at positive or negative pressure with relation to the surrounding atmosphere, and to furthermore progressively control the pressure and temperature prevailing within the valves, which valves may be easily assembled and effectively packed to prevent any fluid leakage.

The present invention contemplates the provision of a cylindrical housing within which a rotary conveyor is placed, said conveyor being formed with a central hub and a plurality of radially disposed blades between which articles may be placed and by which the space within the housing will be sub-divided into a plurality of moving compartments, the structure further contemplating means whereby the fluid pressure existing within the various compartments may be variably controlled in a manner to insure that whether the pressure within a retort associated therewith is at a higher or a lower pressure than atmospheric pressure the transfer of cans may be brought about without affecting said pressures.

The invention is illustrated by way of example in the accompanying drawing, in which:

Figure 1 is a view in side elevation indicating a possible application of the present invention.

Fig. 2 is an enlarged view in side elevation indicating the construction of the device.

Fig. 3 is an enlarged view in section through the structure as seen on the line 3—3 of Fig. 2 disclosing in detail the packing arrangement.

Referring more particularly to the drawing, 10 indicates a retort upon which valves 11 are mounted. The valve structure 11 disposed at the top of the retort in the present case is for the purpose of introducing cans into the retort. The valve structure 11 at the bottom of the retort is for the purpose of withdrawing cans therefrom. These valve structures are of the same construction, and Figs. 2 and 3 indicate their details. The valves include an outer substantially cylindrical wall 12 having an opening 13 therethrough. This opening is circumscribed by a tubular member 14 which provides a throat through which cans may pass from a runway 15. It is to be understood that the structure is of such a construction and design as to permit either a single can to pass through the throat 14 or a plurality of cans. At substantially the diametrically opposite side of the housing 12 is a throat 16 surrounded by a wall 17. As shown particularly in Fig. 3 of the drawing the opposite marginal edges of the housing 12 are formed with annular flanges 18 and 19 which extend outwardly. The width of the housing 12 is greater than that of blades 20 of the rotor 21 which is circumscribed by the housing 12. The blades 20 emanate from a central hub 22 mounted upon a shaft 23. The shaft 23 may be driven in any suitable manner, such for example as by the worm wheel 24 and a worm gear 25 in mesh therewith, as shown in Fig. 3 of the drawing. Disposed upon the shaft 23 and at opposite sides of the rotary conveyor 21 are conveyor end plates 26 and 27. These plates fit against the opposite parallel sides of the blades 20 and are secured to them and the hub so that the entire structure on the shaft rotates as a unit. The circumferential edges of the plates 26 and 27 of the conveyor 21 have laterally extending flanges 28 therearound. These flanges are formed with a circumferential lip 29. The lip is offset from the body of each of the end plates of the conveyor and thereby produces an angular recess 30 which is represented by a circum-

ferential face 31 and a flat face 32 normal to the body of the plate. The width of the blades 20 of the rotary conveyor are substantially the same as the width of the space between end plates 26 and 27 within the cylindrical housing 12. The circumferential face 31 of the two end plates 26 and 27 occur opposite the ends of the cylindrical housing 12, the faces 31 substantially aligning with the inner bore of the housing and the faces 32 lying in spaced planes at opposite ends of the housing. When so fitted the faces 32 are spaced from end faces 33 of the housing so that an annular packing member 34 may be disposed in this space to seal the same. The outer diameters of the flanges 18 on the housing and the outside diameter of the portions 29 of the end plates of the rotary conveyor agree. This makes it possible to place a split pressure ring 34' around the packing, cap screws 29' exert pressure on the rings to pack the joint tightly.

Mounted over the ends of the end walls 26 and 27 are housing end walls 35 which provide an outer covering for the ends of the housing 12 and cause a heat insulating space 36 to occur between the end walls 26 and 27 of the conveyor 21 and the ends of the housing. The housing end walls are formed with a central hub portion 37 which has a threaded bore 38 therein to receive a stuffing gland 39. The shaft 23 extends through the stuffing glands 39 at opposite sides of the machine. The outer edges of the housing end members 35 are fitted with lateral flanges 40. The outer diameters of the housing ends are the same as the outer diameters of the end walls of the conveyor and the housing flanges. These elements are circumscribed by bands 41 which tend to bind all of the members together and to hold them assembled and fluid-tight by the action of the bolts 40' and cap-screws 18'.

Mounted on the end of each of the blades 20 is a packing element 42 preferably formed of material such as used in making steam packing and the like, and which material rubs against the inner circumferential face of the housing 12 and forms a fluid seal therewith whereby the compartment 43 occurring between adjacent blades 20 will be substantially fluid-tight.

Clamping plates 42' hold the packing in position on the blades. In order to modify the pressures and temperatures existing in the various compartments 43 formed by the rotor and its housing fluid pipes 44 and 45 are employed. These pipes extend from points on one side of the rotor valve to points on the opposite sides and communicate with the interior of the housing. The pipes are spaced apart a distance slightly greater than the maximum width of the compartments 43 occurring between the blades 20. In the drawing it will be seen that the pipes 44 and 45 establish communication between the side wall of the housing occurring on one side of the valve with relation to the inlet and outlet ports and that the opposite ends of the pipes communicate with the housing on the diametrically opposite side of the valve.

In operation of the present invention the valve structure is assembled as here shown. It will be assumed that in describing the valve, as illustrated in Fig. 2, the opening 13 is an inlet opening and that the opening 16 is an outlet opening. It will further be assumed that the tubular wall of the throat 17 communicates with the retort 10 and that the fluid within the retort 10 is under a different pressure than atmospheric pressure. It may also be possible that different temperatures prevail. So far as the invention is concerned this pressure may be either positive or negative and will in any event create a differential in pressure between the inlet 13 and the outlet 16. The rotary conveying element 21 revolves in the direction of the arrow *a* indicated in Fig. 2. As a compartment 43 between adjacent blades 20 registers with the opening 13 in the housing cans will fall into the compartment. As the conveyor 21 continues to rotate in the direction of the arrow *a* the packing tip 42 on the blade will extend to a position beyond the blade where it will be in engagement with the inner cylindrical face of the housing 12. As the blades move to a position where adjacent blades will be at opposite ends of pipe 44 the compartment 43 will thus be placed in communication with a compartment 43 upon the substantially diametrically opposite side of the housing. Thus, any difference in fluid pressure or temperature between the compartments placed in communication by the pipe 44 will be equalized. In making further description of this operation the compartments 43 occurring between the discharge 16 and the opening 13 on the under side of the shaft 23 will be designated as empty compartments, and the compartments upon the diametrically opposite side of the shaft will be designated as filled compartments. Thus, it will be recognized that when the compartments 43 register with the discharge opening 16 the existing pressure or temperature within the retort 10 will be established within the registering compartment. This will be a materially different pressure than the atmospheric pressure prevailing at the opening 13 of the valve, and it will be evident that there will be a tendency to establish the prevailing pressure of the empty compartments within the filled compartments through the pipes 44 and 45. This insures that when the empty compartments 43 move to register with the opening 13 the pressure therein will be the same or slightly different from atmospheric pressure and that a desirable initial temperature will be provided. It will also be assured that when the compartments 43 move to register with the opening 16 the registering compartment will have a prevailing pressure or temperature substantially that existing within the retort 10. This will prevent any sudden change in pressure or temperature being exerted upon the products being carried into the retort, and will insure that the problem of maintaining the valve fluid-tight will be reduced to a minimum, and that there will not be any appreciable pressure or temperature loss when the compartments 43 are placed in communication with the atmosphere.

It will thus be seen that the structure here disclosed provides a valve structure of simple design which may be readily and effectively packed, will not readily leak due to wear of the parts and will permit products to be introduced into a zone of pressure or temperature differing from atmospheric pressure and temperature without pressure or heat loss.

It is to be understood that the valves here shown may be mounted at various other points and in various other positions than those shown in the drawing.

While I have shown the preferred form of my invention as now known to me, it will be understood that various changes may be made in combination, construction and arrangement of parts

by those skilled in the art, without departing from the spirit of my invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A valve structure of the character described comprising a substantially cylindrical housing having induction and eduction openings at points in the circumferential wall thereof, a rotary conveying element circumscribed by the housing, said conveying element having a central hub and radial blades thereon extending from the hub to the cylindrical wall of the housing, a shaft disposed concentrically of said housing and upon which the conveying element is mounted, end plates for said conveyor, said end plates fitting over the opposite ends of the cylindrical housing and forming a closure therefor, each of said plates being formed with circumferential flanges for overlapping the side wall of the housing and limiting the inner movement of the plates whereby the plates will form a circumferential seal with the inner face of the housing and the ends thereof, the end plates being formed with central openings through which the shaft extends, circumferentially disposed annular binding bands embracing the marginal flanges of the conveyor end plates and abutting against the housing whereby a seal will be created therebetween, and packing means disposed between the end faces of the housing and the faces of the flanges disposed on the conveyor end plates.

2. Same as 1, adding the following: . . . and means for tightening the packing.

3. Same as 1, adding the following: . . . said packing means being in the form of an annular ring disposed between the end plates of the rotary conveyor and the end faces of the housing, arcuate pressure elements bearing against the outer circumference of the ring and means for exerting pressure against said elements.

LEE THOMAS.