COVER AND SERVING VALVE FOR FREEZERS

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4 Claims. (Cl. 137—375)

This is a continuation-in-part application of our co-pending U.S. application Serial Number 395,057, filed November 19, 1953, entitled, "Draw-off Plunger Valve for Receptacles," now abandoned.

This invention relates to freezers for ice cream, custard and the like of the type in which the frozen product is usually drawn off into an edible cup for immediate consumption. Continuous freezers of this general type usually comprise a horizontally disposed refrigerated cylinder and the fresh mix is introduced adjacent one end thereof in a substantially liquid state and drawn off through the other end of the cylinder as a frozen edible product. The invention relates more particularly to a cover for the "serving" or front end of such a refrigerated cylinder and also to the serving valve connected therewith.

The outer surface of many conventional doors or covers "sweat" with condensation, particularly on warm humid days when the product is sold at peak volume and the freezers run almost continuously. As a result they are unsightly and messy and the condensation and frost must be continually wiped off. These conventional covers are inefficient in that they permit considerable heat exchange which not only requires more refrigeration, but causes the product within the freezer adjacent the door to become too "wet." It is necessary that the product at the door is always at proper temperature in order that it "stands up" and can be formed into inviting and appealing "tops."

The beater within the freezer creates a discharge pressure for the product, i.e., it forcibly ejects the product through the serving valve. Thus a certain amount of pressure is exerted on the valve tending to force it to the open position. It is highly desirable to have a serving valve that can be shut by a simple pushing movement and still be securely held against this discharge pressure. Such a valve of course should also prevent melted mix from leeking or dripping at the draw-off.

It is therefore an object of the present invention to provide a particularly efficient, removable cover and serving valve arrangement for a freezer cylinder which overcomes the above mentioned difficulties.

It is a more specific object of the invention to provide a serving valve for a freezer which can be positively shut and locked by a simple pushing movement and yet unlocked and opened by a simple twisting motion.

It is another object of the invention to provide an insulated cover and serving valve for a freezer, said valve being of the piston type and which forces the unused product back into the insulated portion of the freezer. Such an arrangement insures proper temperature of the product at the cover and prevents melted mix within the valve.

It is another object of the invention to provide a serving valve for a freezer, said valve being of the true piston type which forms an efficient seal regardless of slight axial displacement.

It is a general object of the invention to provide an improved insulated and removable cover and serving valve arrangement which is highly efficient in performing its intended functions, easy and foolproof to operate, and easily and thoroughly disassembled and cleaned.

Other objects and advantages will become more apparent from the following detailed description, taken in conjunction with the attached sheet of drawings in which, by way of preferred example only, is illustrated the invention.

In the drawings:

Figure 1 is a perspective exploded view of a cover and serving valve made in accordance with this invention.

Figure 2 is an elevational, cross sectional view of the cover and serving valve shown in Figure 1 but assembled and secured to a freezer cylinder.

Figure 3 is a plan view of the piston type draw-off plunger shown in Figures 1 and 2.

Referring more particularly to Figure 2 of the drawings, a horizontally disposed freezer cylinder 10 has a jacket 11 welded thereto at 12 to form an annular chamber 13 through which refrigerant is passed in the well known manner. An ice cream or the like mix is introduced adjacent the rear end (not shown) of the cylinder and fed forwardly towards the front end 14 while being thoroughly beaten and aerated by the rotatable helical screws 15, 16 of the driven rotor. For a more complete description of the rotor and its function, if deemed necessary, reference may be had to the co-pending U.S. application of Louis A. M. Phelan, Serial Number 604,681, filed August 16, 1956, entitled "Freezer Mechanism," now Patent No. 2,810,557, issued October 22, 1957.

In accordance with this invention, a hermetically sealed and insulated cover 17 is provided for the front end of cylinder 10. When the entire unit is assembled within the cabinet 18, only the cover is exposed to view. The cover includes a disc shaped mounting plate 20 having a large hub portion 21 pressed therein. The hub extends from the center of the plate 20 and into the cylinder between the helical screws 15, 16. A retainer 22 extends through apertures 23, 24 in the end 25 of the hub and is externally welded thereon in sealing relationship. For a more complete description of this retainer and its function, reference may be had if desired to the above mentioned co-pending application.

It is believed sufficient to say that this retainer acts to create the desired turbulence within the cylinder. A plurality of circumferentially spaced apertures 26 extend through the plate 20 adjacent its outer edge. The cover also includes a cap or outer wall 28 which is of dish-shaped configuration and is spaced a distance from plate 20. The outer wall has a generally axially extending peripheral flange 30, which extends axially toward plate 20, a radial flange 31, and a lip portion 32 extending over the edge of plate 20. The lip 32 is welded to plate 20 all around its circumference to form an air-tight seal. Radial flange 31 also has a plurality of circumferentially spaced apertures 33 which register with apertures 26. The edges of the mating apertures 26, 33 are welded together to form an air-tight seal. The outer wall is pressed into shape from a sheet of steel, preferably stainless steel, and has a series of recesses 34 in alignment with its apertures to admit the fastening means 35. The fastening means are provided to facilitate easy and quick removal of the cover assembly from the freezer cylinder for cleaning and inspection purposes. Large nut members 36 are threadedly engaged in the bolts 37 which extend through the apertures in the cover and are in turn threadably engaged in the ring 38 welded to the cylinder. The cover assembly can be readily removed from the cabinet and cylinder when the four large nuts 36 are unscrewed.
non-metallic ring 40 is set into the inner wall of plate 20 and acts as a seat for the front edge of the cylinder to form a leakproof seal therebetween.

A serving valve 41 is provided for the cover and extends outwardly from the lower side thereof. The valve includes a generally horizontally positioned discharge tube 42 which passes through the plate 20 and the outer wall 28, and is welded thereto at 43 and 44 respectively. It will be noted that the space between the plate and outer wall is thus completely sealed. An insulating material 46 is inserted within this space through the apertures in the hub 21 before the retainer 22 is inserted and welded therein. The hermetically sealed cover prevents any moisture from reaching the insulation and thereby rendering it waterlogged.

The discharge tube has an outlet 48 extending downwardly from its lower side and is of sufficient diameter to permit free flow of the product when the valve is open. An elongated piston 50 is provided which has a diameter only slightly less than the bore of tube 42 so as to form a snug sliding fit therewith. As shown by the full lines of Figure 2, the inner end 52 of the piston is located within the cover 17 when the valve is in the closed position. A sealing means in the form of a flexible O-ring 54 is seated in the piston adjacent its inner end. Thus the O-ring 54 is in contact with the uniform bore of the tube regardless of axial displacement of the piston, for example, when the piston is in the full line position shown in Figure 2 (locked position) or when it is pushed still farther into the tube when the operator has just closed the valve. When the piston is withdrawn outwardly to the position shown in dotted lines in Figure 2, the product is free to flow through the outlet 48.

As shown best in Figure 3, the piston 50 has a generally axially positioned slot 56 in its periphery and adjacent the upper side of the piston. The slot terminates at its inner end in a stop portion 57. At its outer end the slot has an intermediate inclined portion 58 and an enlarged offset locking portion 59. A pin 60 extends through the tube 42 and into the slot. The pin is held on the tube by the spring clip 62 and is easily removed therefrom to permit the piston to be completely withdrawn from the tube for cleaning purposes.

When the piston is in the position shown by the dotted lines of Figure 2 the product is forced out of the cylinder by the revolving paddles 66, 68 of the screws. In this connection the large hub 21 serves an important function in that it reduces the cross-sectional area of the front end of the cylinder and makes the paddles more effective in forcing the product out of the serving valve with the required pressure. In other words, it defines a path of movement for the product being moved by the paddles and prevents the product from simply being "pushed aside" by the paddles.

The piston is prevented from being completely withdrawn by the pin 60 which bears against the stop portion 57 of the slot.

When the draw is completed the operator simply pushes the piston directly inwardly. This movement usually is rapid and forceful and the piston thus forces the product in the tube back into the cylinder and well within the insulated cover. The last portion of this piston travel causes the inclined portion 58 of the slot to bear against the pin 60 which causes the piston to rotate slightly about its longitudinal axis. This rotational movement brings the offset locking portion into axial alignment with the pin. The pressure of the product within the cylinder acting on the end 52 of the piston forces the inner end of the locking portion against the pin which prevents further outward movement of the piston.

To open the valve for another draw the operator simply twists the knob 64 to the left (when facing the freezer), the slot 56 is thus aligned with the pin, and the knob 64 is then pulled forwardly to cause the stop portion 57 to bear against the pin.

By positioning the slot 56 on the top of the piston and making the piston fit snugly in the tube, leakage and consequent dripping at the draw-off is prevented. The product flows automatically in the slot.

Because the piston has kept all of the product within the cold insulated area, it is never too "wet" but remains frozen and at the proper temperature so as to "stand up" for good forming of the cone, particularly the top. The product located close to the inner wall of the cover is kept at the required degree of coldness and continuous high efficiency and minimum running time of the refrigerating apparatus is assured.

It should be understood that it is not intended to limit the invention to the above described forms and details, and that the invention includes such other forms and modifications as are embraced by the scope of the appended claims.

We claim:

1. A cover and serving valve arrangement for a freezer cylinder including, a plate, an outer wall spaced from said plate and mounted thereto, the space between said plate and outer wall being of sufficient diameter to permit free flow of the product into the cylinder; a generally horizontally positioned discharge tube which passes through said plate and extends outwardly therefrom; and a piston having a generally axially positioned slot in said periphery and adjacent the upper side of the piston, said slot terminating at its inner end in a stop portion and at its outer end in an intermediate inclined portion and an enlarged offset locking portion, means for positioning the piston so as to be in a discharge position and a closed position, means for positively holding said piston in said closed position in which said sealing means is located within said insulated space, said sealing means extending radially outwardly from the periphery of said piston so as to be in said sealing engagement with said tube.

2. A serving valve and insulated cover arrangement for a freezer comprising, a uniform bore tube passing through said cover and extending therefrom, an outlet in said tube, a piston slidable in said tube between closed and discharge positions, said piston having an inner end located within said cover and in the closed position, said sealing means being carried by said piston adjacent said end and extending radially outwardly from the periphery of said piston to form a sliding seal between said piston and tube, said piston having a generally axially positioned slot in its periphery, said slot extending through said insulated space, said slot including an intermediate inclined portion and an offset locking portion, a pin carried by said piston for positioning the piston so as to be in a closed position when in said cover, said pin being carried by said piston and said sliding means being carried by said piston.

3. A serving valve and a cover for a freezer comprising, a generally horizontal and uniform bore tube, said tube extending through said cover, an outlet extending downwardly from said tube, a piston slidable in said tube between closed and discharge positions and having an inner end, said inner end adapted to be positioned within the cover when in the closed position, said sealing means being carried by said piston and tube, said piston having a generally axially positioned slot in its periphery, said slot being an intermediate inclined portion and an offset locking portion, means for positively holding said piston in said cover, the slot including an intermediate inclined portion and an enlarged offset locking portion, a pin carried by said tube and engageable in said slot whereby when said piston is pushed towards the closed position said pin will bear against said inclined portion to turn said locking portion for engagement with said pin.

4. A cover and serving valve arrangement for a freezer cylinder including, a plate, an outer wall spaced from said plate and mounted thereto, the space between said plate
and said outer wall being an insulated space, a uniform bore discharge tube passing through said plate and wall and extending outwardly therefrom, an outlet in said tube, a piston slidably in said tube between closed and discharge positions and having an inner end which is located in said space when in the closed position, sealing means carried by said piston adjacent said inner end and extending radially outwardly of the periphery of said piston so as to be in slidable sealing engagement with said tube regardless of the axial position of said piston therein, said piston also having a generally axially positioned slot in its periphery, said slot having an inclined portion and an enlarged offset locking portion, and a pin carried by said tube and extending into said slot whereby when said piston is pushed towards the closed position said pin will bear against said inclined portion to turn said locking portion for engagement with said pin.

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