March 22, 1938. A. HORNER 2,111,892

TRANSFER VALVE FOR STERILIZATION APPARATUS

Filed Feb. 24, 1934

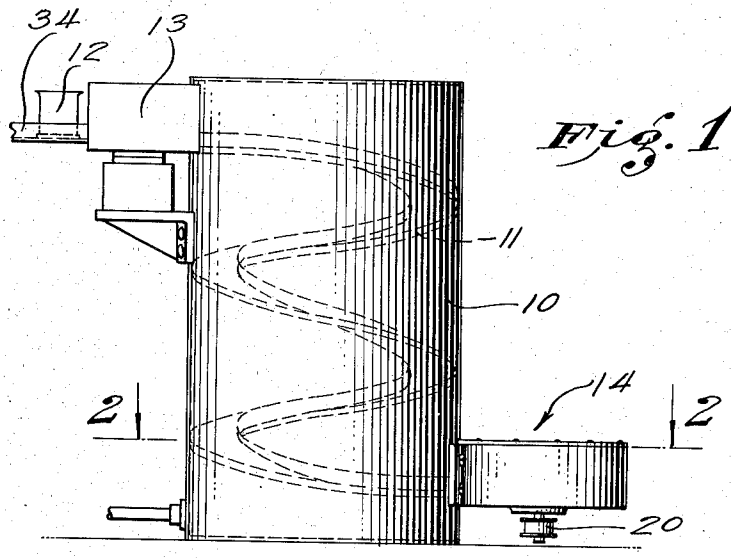

Fig. 1

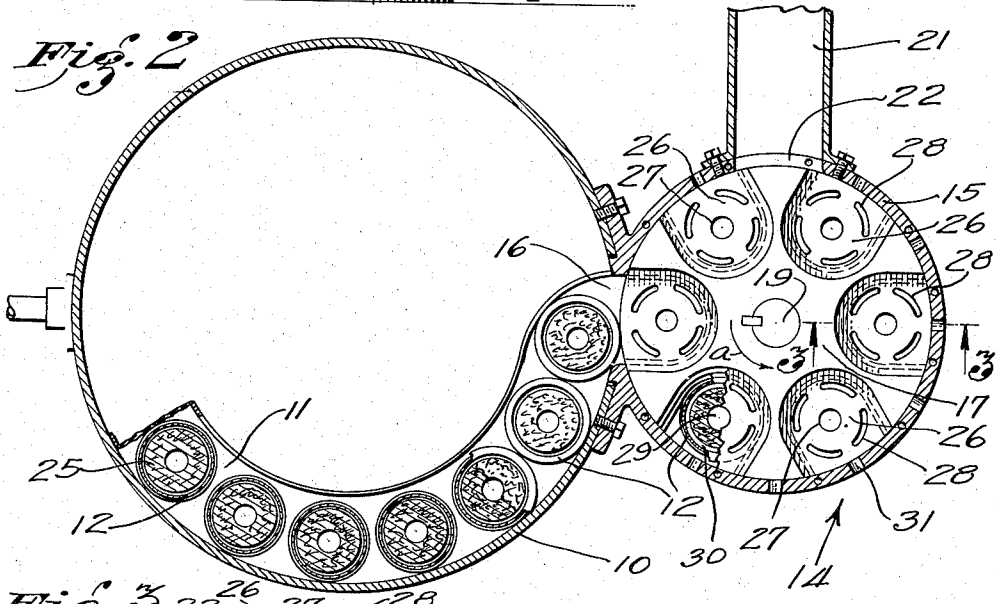

Fig. 2

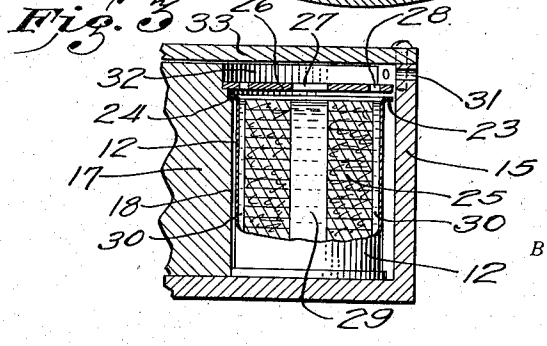

Fig. 3

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Patented Mar. 22, 1938 2,111,892

UNITED STATES PATENT OFFICE

2,111,892

TRANSFER VALVE FOR STERILIZATION APPARATUS

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Application February 24, 1934, Serial No. 712,778

3 Claims. (Cl. 126—272)

The invention relates to a transfer valve for sterilization apparatus.

In the sterilization of food products in cans it is common to pass the cans containing products to be sterilized through a sterilization apparatus under conditions of high temperature and pressure. Under such conditions, however, it has been found that upon discharging the cans with their contents from the apparatus and under conditions of atmospheric pressure, sudden volatilization of the condensed water vapors in the can occurs. This produces a violent disturbance which deranges the product packed in the can, and may seriously injure this product so that it has no commercial value. It is the object of the present invention, therefore, to provide apparatus whereby when the can and its product emerge from a condition of high temperature and pressure to a condition of atmospheric pressure, the pressure may be gradually reduced, volatilizing the condensed water vapor in the can and insuring that the can will pass from the apparatus and into a zone of reduced pressure without injury to the contents of the can and without in any manner violently disturbing the can's contents.

In accomplishing my purpose, I use pressure apparatus and already existing can valve mechanisms, which valves are equipped with pockets conveying the can from a zone of high pressure to a zone of atmospheric pressure. However, it is necessary to provide such valves with means for gradually reducing this pressure, and with means for retaining the contents of the can within the can, and the present invention is more particularly concerned with this means.

Where liquids at high temperature and pressure have such pressure suddenly reduced, they volatilize with extreme rapidity, the gases passing to an exit by the shortest possible route. In so doing they disrupt the contents of the can which lie in the direct path of travel between the volatilizing liquid and its exit.

In accomplishing my purpose, the present invention contemplates that I provide each valve pocket with a grid situated above the can, and as close as possible to it, there being no other passageway from the section of the pocket below the grid to the section of the pocket above the grid other than through the apertures in the grid itself whereby the volatilizing liquid must rise vertically from all parts of the can, and having reached the part of the pocket above the grid may then be led in any convenient direction to the exterior of the valve. The speed with which the volatilization takes place is controlled by the size and number of exits provided.

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

Figure 1 is a view in side elevation showing the apparatus with which the present invention is concerned.

Fig. 2 is an enlarged view in horizontal section through the device as seen on the line 2—2 of Fig. 1.

Fig. 3 is a view in vertical section as seen on the line 3—3 of Fig. 2 and showing the relationship of the grid to the can and its contents.

Referring more particularly to the drawing 10 indicates a closed container within which a desired relatively high temperature and fluid pressure prevails. As here shown and indicated in dotted lines, a helical cam runway 11 is formed within the container so that cans 12 may pass therethrough along a prolonged path of travel while the contents of the cans are subjected to the sterilization action within the device. It will be understood that, in this particular instance, the upper caps of the cans have not been placed in position, thus insuring that the entire contents of the can will be subjected to the high sterilization temperature and pressure. A rotary gate valve 13 is disposed at the upper end of the can runway 11, and insures that cans may be drawn from a run of cans and thereafter successively introduced into the sterilization device without permitting the fluid from within the sterilization device to escape.

At the lower end of the container 10, a gate valve structure 14 is provided. This valve constantly seals the lower end of the container 10 and at the same time permits the open cans and their contents to be discharged from the container. As has been previously explained, the cans and their contents are subjected to a relatively high temperature and pressure while they are within the container 10, and it has been found that when the cans are subsequently withdrawn from the sterilization device and into a zone of normal room temperature and atmospheric pressure sudden volatilization of the condensed water vapors and other liquid in the can occurs. This in effect produces an explosion which not only disturbs the arrangement of the material packed in the can, but often violently expells it from the can. In an effort to create a gradual transition of the can from the zone of high temperature and pressure to a zone of room temperature and atmospheric pressure, I pass the can through a conduit disposed between the zone of high pres-

sure and temperature and the zone of normal temperature and pressure. The conduit is provided with a series of openings communicating with the atmosphere and by which the air within the conduit is gradually modified as to temperature and pressure. This tends to reduce objectionable disturbance of the contents of the can due to volatilization of the liquid within the can. In practicing this invention, however, it has been found that volatilization of the liquids tends to occur in a direct path from the bottom of the can to the openings in the conduit, rather than in any uniform manner throughout the contents of the can. The common method now used in processing food products for sterilization is to take the food product in an open can and containing condensed water vapor at high temperature and to move the can from a zone of high steam pressure to atmospheric pressure, thus producing the volatilization of the liquids in the can. This produces an objectionable disturbance within the packed contents of the can regardless of the degree of violence of the action, and in the present structure, I have provided means whereby the volatilization action may be uniformly controlled throughout the contents of the can, and the path of such volatilization force directed vertically through the product and from the mouth of the can in a manner to create a minimum objectionable disturbance. Such results are obtained by the construction of the can eduction gate 14 which comprises a substantially circular housing 15 having an open side communicating with an eduction throat 16 of the main shell of container 10, and with which said eduction throat the can runway 11 communicates. Disposed within this housing and substantially fitting therein with a running fit, is a rotary star wheel 17 formed with a plurality of pockets 18 into which the cans 12 are positioned as the pockets are successively presented to the end of the runway 11. The star wheel is mounted upon a vertical shaft 19 suitably driven by a pulley 20 or other power transmission means. A can outlet runway 21 communicates with a throat 22 in the side wall of the housing 15 and directly communicates with the atmosphere. The depth of each of the pockets measured horizontally is substantially equal to the diameter of the can. These cans are usually formed with an outwardly flaring lip 23. A recessed shoulder 24 is formed adjacent the upper end of each can pocket 18 to accommodate the flared edge of the mouth of the can.

In practicing the invention a product is placed in the cans. For example, as shown in Fig. 3, the product is slices of pineapple indicated at 25, which has been placed in the can in its sliced condition, and with the slices disposed flat and superposed upon each other. Disposed above each pocket and directly over the flared mouth of the can is a gride plate 26. This plate is suitably perforated to permit the escape of the products of volatilization from the can. In the case of pineapple, it is preferable to form a central opening 27 through the grid plate with a plurality of arcuate openings 28 arranged therearound. The plate forms a seal with the can pocket and the circumscribing wall of the housing. The central opening substantially registers with an opening 29 which would occur through the center of the packed slices of pineapple and which opening represents the space previously occupied by the core of the pineapple. A circumscribing space 30 occurs between the outer circumference of the pineapple and the inner wall of the can. The arcuate openings 28 in the grid plate 26 stand in substantial register with this space, thus, it will be seen that any fluids which might be expelled from the can would have a tendency to move vertically and to escape through the openings superposed above the spaces 29 and 30 in the can. This insures that the fluid expelled from the can would move along the spaces rather than endeavor to seek a transverse path through the material packed in the can as would be the case in the event the grid 26 was removed and the entry of air to and from the cans was only permitted through the exhaust passageways 31 formed in the side wall of the housing 15. These passageways as shown in Fig. 2 of the drawing are disposed radially and occur at intervals throughout the length of the wall of the can, extending from the throat 16 to the throat 22. Fig. 3 shows that the passageways 31 are preferably disposed to communicate with the space 32 which occurs between the upper face of the grid 26 of star wheel 17 and the cover plate 33 of the housing 15. In the event that other products are being treated in the cans 12 it may be desirable to rearrange the perforate area of the grid plates 26 in definite relationship to the manner in which the material is packed in the can, and the resulting occurrence of voids throughout the pack, thus it will be evident that in packing such products as string beans, or shelled peas and the like, a foraminous or reticulated grid might be used to advantage. In any event, however, the grid is designed to confine the material within the can during the possible period of volatilization and to establish the paths of travel along which the products of volatilization will move through the pack and exit from the can.

In operation of the present invention, cans are fed from a runway 34 into the valve 13 after having been previously filled with the product, and with the mouths of the cans uncapped. The cans then pass along the runway 11 within the sterilizer 10, and eventually reach the throat 16 where they are successively positioned within the pockets 18 of the star wheel 17. As the cans reach these pockets, the star wheel moves in the direction of the arrow "a", as indicated in Fig. 2, causing the cans to assume positions in the separate pockets beneath the grid plates 26. The cans successively pass with the star wheel along the wall section of the housing 15 where communication between the pockets and the exterior of the housing is established through the exhaust passageways 31. These passageways may be of any desired area, and will permit a restricted equalization of atmospheric pressure and temperature within the housing. This will tend to bring about volatilization of material within the cans, and as this takes place, there will be a movement of the fluid within the cans toward the openings 31 and the area outside of the housing where normal atmospheric pressure and temperature prevails. The fluids in their movement, however, must pass upwardly through the openings in the grid plates 26, and due to the position of these openings the direction of the travel will be controlled, whereby a minimum of disturbance of the contents of the can will occur, and in addition the grid plates will act to retain the contents of the can within the can.

As the can moves toward the outlet 22 in the housing 15, the internal pressure and temperature of the product within the can will have been sufficiently modified to insure that the contents

of the can will be substantially at rest when ejected from the star wheel 17 and into the runway 21.

It will thus be seen that by the use of the apparatus here disclosed, it is possible to properly sterilize food products in open cans, thus insuring thorough sterilization, and maintaining other characteristics of the product which add to its appearance, edibility and preservation, while insuring that the can may be subsequently withdrawn from the sterilizing apparatus and thereafter kept without danger of loss of material from the can or disturbance of the material within the can due to any accompanying volatilization of the fluids therein contained.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of the apparatus of this invention without departing from the spirit thereof, and that the apparatus of the present invention includes all such changes, modifications, substitutions and equivalents as come within the scope of the appended claims.

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

1. A transfer valve for sterilization apparatus by which open cans of food products are transferred from a compartment under pressure in excess of atmospheric pressure to the atmosphere, which comprises a housing, can feed means contained within the housing and by which transfer of the cans is effected from the pressure compartment to the atmosphere, said housing being provided with means for progressively relieving the fluid pressure within the can along the path of travel of the cans from the compartment to the outside thereof, and means disposed directly over the open tops of the cans whereby the escape of fluids from the cans will be permitted without allowing the escape of the solid contents thereof.

2. A transfer valve for removing open cans containing food products from a pressure chamber within which a pressure in excess of atmospheric pressure exists to the atmosphere which valve comprises a housing, conveying means therein for the cans, said housing being provided with means for relieving the fluid pressure within and surrounding the cans progressively as the cans move along the conveying means, and grid members over the cans for permitting equalization of fluid pressure within and without the cans as they move through the housing.

3. A transfer valve through which an open can containing food products passes in exit from a compartment having a fluid pressure therein in excess of atmospheric pressure to a zone of lower fluid pressure which comprises a housing through which the open cans pass in exit from the compartment, conveying means for moving the cans through the housing, said housing being provided with means for gradually relieving the fluid pressure from that of the fluid pressure in the compartment as the cans move to the zone of lower fluid pressure, and grid members disposed over the mouths of the cans as they pass through the housing to retain the solid products within the cans, and whereby the pressures within and without the cans may become equalized as the cans pass through the valve housing.

ALBERT HORNER.