

Jan. 14, 1941.

G. BINON

2,228,435

DISPENSER FOR VISCOUS LIQUIDS

Filed Nov. 10, 1937

2 Sheets-Sheet 1

Fig. 1.

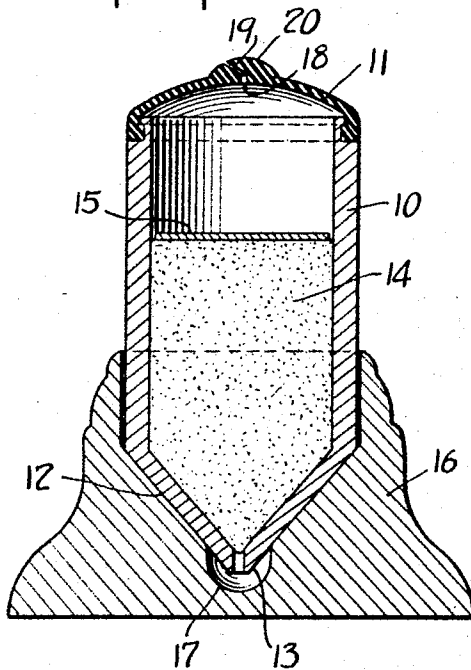


Fig. 3.

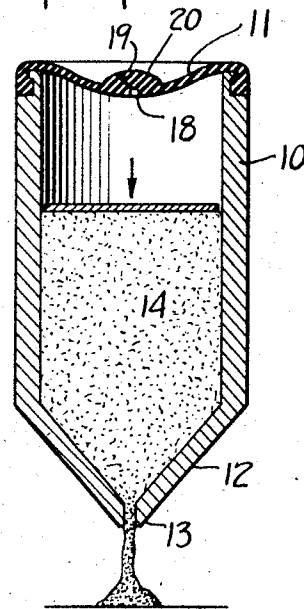


Fig. 2.

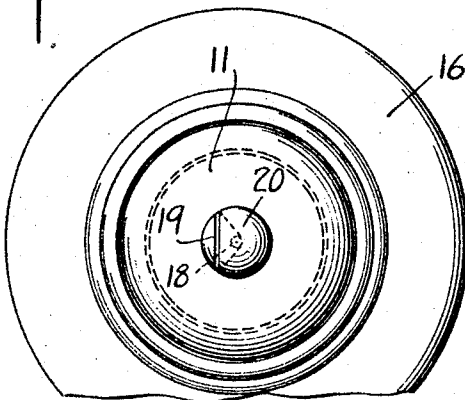


Fig. 4.

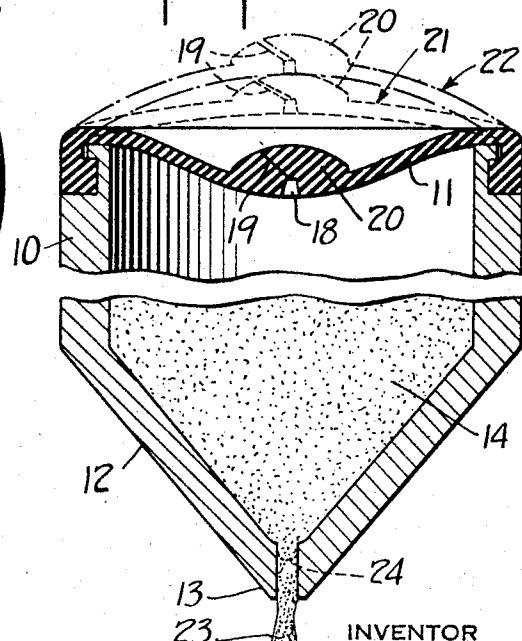
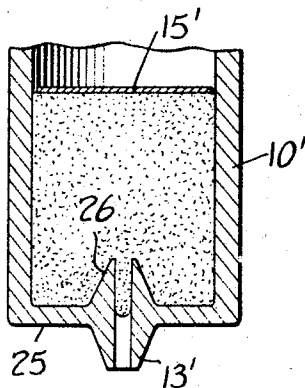


Fig. 5.



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Fig. 6.

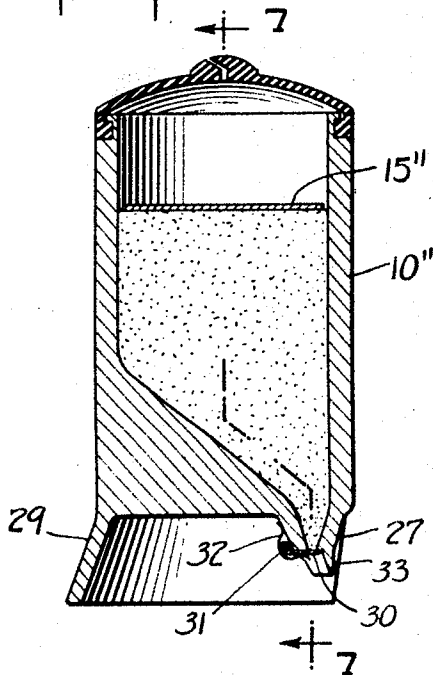


Fig. 7.

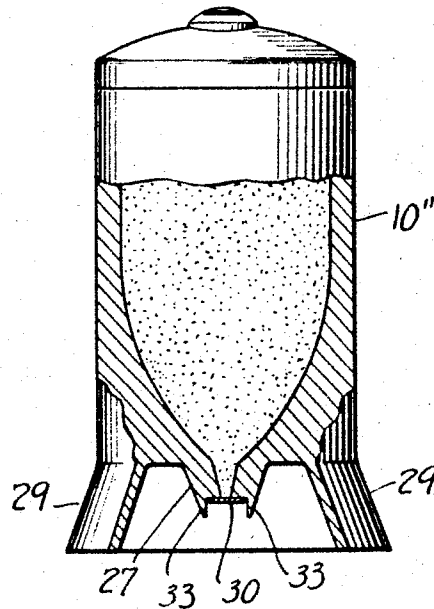
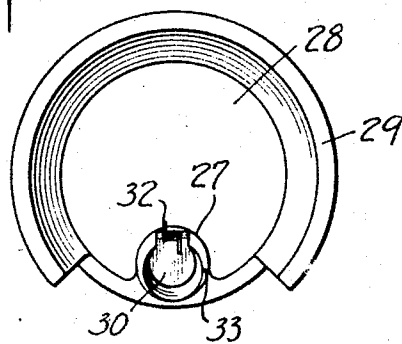


Fig. 8.



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DISPENSER FOR VISCOUS LIQUIDS

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Application November 10, 1937, Serial No. 173,750

9 Claims. (Cl. 221-76)

My present invention relates generally to dispensing devices, and has particular reference to the dispensing of viscous liquids, such as mustard.

The primary object of my invention is to produce an attractive and convenient unit for use in restaurants and cafeterias or in the home to permit of the sanitary accommodation of a supply of viscous liquid, such as mustard, and to permit desired quantities of the liquid to be expelled from time to time.

The present construction comprises an improved container with a narrowed outlet spout at the bottom, the spout being narrow enough to prevent flow of liquid out of the container during normal conditions, and the container being provided with a manually controllable means for at will increasing the pressure within the container and thereby causing a charge of the liquid to be expelled through the outlet spout.

My device is of the type in which a resilient diaphragm arranged in a wall portion of the container is adapted, upon inward deflection, to effect the desired increase of pressure within the container; and it is a further particular feature of my invention to improve the efficiency of operation by providing improved means for automatically venting the container above the liquid level during the latter part of the return movement of the diaphragm. In this way, the inward deflection of the diaphragm creates a predetermined increase of pressure which results in discharging a corresponding quantity of the viscous liquid; but on the return movement of the diaphragm only enough vacuum is produced to recapture the dripping from the outlet spout, whereby the ingress of air through the outlet spout is prevented.

In a preferred embodiment, the automatic venting means is associated with the diaphragm, itself, and comprises a normally open valve which is arranged to close at inward deflection of the diaphragm and adapted to open during its return movement.

The peculiar characteristics of this valve arrangement, and the uniquely advantageous operation which results therefrom, are special features of the present invention.

Another characterizing feature lies in the provision of a pressure-equalizing member floating on the liquid within the container.

Further novel features reside in the special arrangement of parts to support the container and to permit its use over protracted periods of time without impairment of the contents.

I achieve the foregoing objects, and such other objects as may hereinafter appear or be pointed out, in the manner illustratively exemplified in the accompanying drawings, wherein—

Figure 1 is an elevational cross-sectional view through a preferred embodiment of the present invention;

Figure 2 is a fragmentary plan view of Figure 1;

Figure 3 is a view similar to Figure 1, illustrating one step in the operation of the device;

Figure 4 is an enlarged cross-section similar to Figure 3, illustrating the unique effect of the improved venting means;

Figure 5 is a fragmentary elevational cross-section showing a modification;

Figure 6 is a view similar to Figure 1, illustrating a modification;

Figure 7 is a cross-sectional view taken substantially along the line 7-7 of Figure 6; and

Figure 8 is a bottom view of the device of Figures 6 and 7.

For illustrative purposes I have shown a substantially cylindrical container 10 composed of any suitable material, preferably glass, the container having its upper edge suitably configured to receive a resilient diaphragm 11 presently to be described in greater detail.

In the embodiment of Figures 1-4, the lower portion of the container 10 is downwardly tapered, as indicated by the reference numeral 12, whereby a central narrowed, downwardly delivering, outlet spout 13 is formed at the bottom of the container. Within the container is an accommodated mass 14 of viscous liquid, such as mustard; and floating on the surface of the liquid is a pressure-equalizing member or disc 15 which is of any suitable material inert and unreactive with respect to the liquid 14.

I have also illustrated a support 16 adapted to stand upon a table and having a depression adapted to receive and accommodate the container 10 in substantially the manner shown in Figure 1. Within the depression of the support 16 I prefer to provide a small recess 17 arranged beneath the outlet spout 13 for collecting possible drippings from the spout. It should be noted, however, that the spout 13 is of sufficiently narrow character, with respect to the viscosity and nature of the liquid 14, to prevent any egress of viscous liquid by gravity through this spout under normal conditions.

The diaphragm 11 may be of any suitable material, preferably soft rubber or its equivalent,

and it is preferably arranged across the open upper end of the container 10 so as to constitute a top wall for the container. The diaphragm is also preferably removable with respect to the container so that the latter may be cleaned and refilled through the top.

In the preferred embodiment, the diaphragm is of a character which normally arches upwardly by a slight amount; and in the diaphragm, preferably at the center thereof, there is a relatively small opening 18. This opening is formed in the inner portion of a thickening of dome-like character, in which a diagonal slit 19 is provided, this slit communicating at its inner end with the opening 18. The portion of the diaphragm at one side of the slit, designated by the reference numeral 20, thus constitutes a sort of closure flap.

Under normal conditions, the upper portion of the container, i. e., above the level of the liquid, is vented to the atmosphere through the opening 18 and the slit 19, because the inherent resilience of the material of the diaphragm maintains the slit in slightly opened condition. However, the moment that pressure is exerted upon the closure flap 20 by the finger of a user for the purpose of deflecting the diaphragm inwardly into the position of Figures 3 and 4, the slit 19 is closed. As a result, the inward deflection of the diaphragm produces an increase of pressure within the container, thereby expelling a quantity of liquid out of the outlet spout, as indicated in Figure 3. It will further be observed that in order to close the slit 19 it is not necessary to press on the flap 20; the slit closes automatically merely as the result of inward deflection of the diaphragm as will be more fully explained in the next paragraph.

The unique and highly advantageous functioning of the present device, after the expulsion of liquid has been effected, is illustrated most clearly in Figure 4. The desired quantity of liquid having been expelled, the user withdraws his finger from the diaphragm and the latter proceeds to return to its normal position, due to its inherent resilience. During the initial part of this return movement the container remains sealed and unvented because the arrangement of the closure flap 20 is of such a character that the slit 19 remains closed. This condition obtains while the diaphragm is moving from the full-line position of Figure 4 to approximately the dotted position designated by the reference numeral 21. In this position, the inherent resilience of the diaphragm material causes the slit 19 to reopen, and during the latter part of the return movement of the diaphragm (i. e., from the dotted position 21 to the dot-and-dash position 22) the slit 19 is open and the container is thereby automatically vented. This action can be readily understood by considering the principles involved in the theory of flexures according to which there is a surface intermediate the upper and lower surface of the diaphragm, the elements of which will be neither tensioned nor compressed, and which therefore may be termed the neutral plane, while elements located to either side of said neutral plane will be either stretched or compressed according to the direction of flexure. It is obvious that when, as in Figure 4, the diaphragm is flexed inwardly, the upper portion thereof is under compression so that the slot will close. As the diaphragm moves to regain its normal contour the compression will be gradually reduced until when the normal

contour is regained both tensile and compressive stresses disappear.

The effect of this automatic venting of the upper portion of the container during the latter part of the return movement of the diaphragm is to recapture the dripping from the outlet spout without at the same time drawing in an undesired quantity of air. That is, during the movement of the diaphragm from the full-line position of Figure 4 to the dotted position 21 a suction is produced which is just sufficient to withdraw into the container the depending or suspended dripping 23. This withdrawal is effected approximately to the dot-and-dash line 24. During the further return movement of the diaphragm, the venting of the upper portion of the container prevents the ingress of air through the outlet spout.

At this point it may be mentioned that, in the absence of the foregoing mode of operation, the introduction of air into the outlet spout would not only impair the quality of the liquid in the container by inducing a too rapid dehydration thereof, but it would also impair the subsequent liquid-expelling operation. Thus, in an extreme case, assuming that the diaphragm were unperforated, the inward and outward movements of the diaphragm would result in an initial expulsion of a quantity of liquid, followed by the intake of a quantity of air through the outlet spout. The next operation would discharge a smaller quantity of liquid, together with the air in the container, and on the return movement a further quantity of air would be drawn into the outlet spout. After two or three operations the deflection of the diaphragm would have hardly any effect at all so far as the expulsion of liquid is concerned.

In Figure 5 I have illustrated a modification in which the lower portion of the container 10' is not tapered, as in Figure 1, but is constituted of a bottom wall 25 arranged in a substantially horizontal plane. Where the bottom is thus arranged, it is desirable to provide a neck 26 projecting into the container in alignment with the outlet spout 13', otherwise the inevitable accumulation of the less viscous ingredients of the liquid along the peripheral portion of the flat bottom wall 25 would result in the loss of these ingredients; and this, in turn, would induce further accumulation of the less viscous ingredients along the bottom wall and further loss thereof. And ultimately the liquid in the container would become impaired through dehydration.

In Figure 5 I have again shown the pressure-equalizing member 15', and it will be understood that the upper portion of the device of Figure 5 may be constructed the same as in Figures 1-4.

In Figure 6 I have illustrated a modification in which a substantially cylindrical container 10'' is provided which also has a fluid receptacle therein tapered toward a restricted outlet spout 27 at the bottom, this spout being arranged near one side of the bottom wall 28. The container is in this case provided with a supporting base 29 which extends downwardly to a level below that of the outlet spout 27. I have illustratively shown the base 29 in the form of an integral peripheral foot with a gap in it, the outlet spout being positioned within this gap. As a result, the support 16 of Figure 1 may be dispensed with and the device may be stood upon a table, as shown in Figures 6 and 7.

In this embodiment, I have also shown the

possibility of providing a closure flap 30 for the outlet spout, this flap being desirable where the outlet spout is exposed to the air as distinguished from the confined position of the outlet spout in the assembly of Figure 1.

I have illustratively shown the flap 30 hingedly mounted, as at 31, in association with a spring 32 which normally urges the flap 30 into closed position. The spring 32 is purposely of so weak a character that it closes the flap only when there is no excess of liquid depending from the spout. Accordingly, the operation of the device as herein described in connection with Figure 4 remains unaffected by the presence of the closure flap 30, since the latter does not close until after the dripping has been recaptured by the return movement of the diaphragm.

In the embodiment of Figures 6-7 I have shown the outlet spout with a peripheral skirt portion 33, intended to facilitate the firm closing of the same by the flap 30.

In Figures 6 and 7 I have also shown the pressure-equalizing member 15', and the diaphragm is constructed the same as in Figures 1-4 and functions in the same way.

The purpose of the member 15 of Figure 1, the member 15' of Figure 5, and the member 15'' of Figure 6 is to distribute the pressure upon the liquid when the diaphragm is deflected inwardly. Without such a pressure-equalizing member there might be a tendency, because of the viscosity of the liquid, to develop a sort of vortex through the liquid, whereby the liquid near the walls of the container would not be so readily expelled.

While I have referred to the present device as being particularly adaptable for the dispensing of mustard, nevertheless it will be understood that the invention will have a far wider applicability. Not only could the device be used for the dispensing of other condiments, such as tomato ketchup and the like, but it might also be useful for the dispensing of viscous liquids or creams of unedible character for entirely diverse purposes. For example, the device might be useful for physicians in the dispensing of salves and the like, or by beauticians for the dispensing of creamy cosmetics.

It will also be understood that, with respect to certain phases of my invention, it is not essential that the container be cylindrical nor that the resilient diaphragm be mounted to constitute the top wall thereof.

In general, it will be understood that changes in the details, herein described and illustrated for the purpose of explaining the nature of my invention, may be made by those skilled in the art without departing from the spirit and scope of the invention as expressed in the appended claims. It is, therefore, intended that these details be interpreted as illustrative, and not in a limiting sense.

Having thus described my invention, and illustrated its use, what I claim as new and desire to secure by Letters Patent is—

1. An operating diaphragm for dispensers for viscous liquid having venting means in the form of a relatively narrow slit in the diaphragm disposed above the neutral surface of flexure of said diaphragm, said slit being normally open and being adapted to close as a result of the compression of the parts above said neutral surface on inward movement of the diaphragm, and in which the slit is disposed in a plane inclined to the vertical axis of the diaphragm so that

on pressing against the outer wall of the diaphragm over the slit, the slit will be closed.

2. A liquid dispenser comprising a container having a restricted outlet spout opening downwardly from its bottom, a manually controllable resilient diaphragm in a wall portion of said container adapted, upon inward deflection, to increase the pressure within the container for expelling a charge of liquid through said spout, and closure means on said diaphragm operable to remain closed for a portion of the distance traveled by said diaphragm, while returning from deflected position to its normal position, and to then open and vent the said container.

3. A liquid dispenser comprising a container having a restricted outlet spout opening downwardly from its bottom, a manually controllable resilient diaphragm in a wall portion of said container for increasing the pressure within said container to expel a charge of liquid through said outlet upon the deflection of said diaphragm, and means in said diaphragm comprising a normally open valve including a portion manually operable for closing said valve and deflecting said diaphragm.

4. A liquid dispenser comprising a container having an opening in the bottom thereof, a resilient diaphragm in a wall portion of said container adapted, upon inward deflection thereof, to increase the pressure within said container, means on said diaphragm including an opening normally communicating with the interior of the container and a resilient closure flap over said opening for closing said valve by the inward deflection of the diaphragm and opening said valve during the return movement of said diaphragm to its normal position.

5. A liquid dispenser comprising a container having a spout opening downwardly from the bottom thereof, a manually operable diaphragm in a wall portion of said container adapted upon inward deflection to increase the pressure within the said container for expelling liquid through said spout, and a normally open valve including an opening in the diaphragm, an outwardly opening resilient closure flap extending over said opening for closing said valve, upon being manually engaged in the operation of deflecting said diaphragm, and for opening said valve during the return movement of said diaphragm to its normal position.

6. A liquid dispenser comprising a container having an outlet spout opening downwardly in the bottom thereof, a resilient diaphragm in the top wall of said container having a vent opening therein, a normally open resilient closure flap integral with said diaphragm and disposed over said opening for simultaneously sealing said opening and deflecting the said diaphragm to increase pressure for ejecting a charge of liquid through said outlet spout, upon pressure being applied to said flap; the said flap being operable, by the deflection in said diaphragm, to remain in closed position during a portion of the movement of said diaphragm towards its normal position for effecting a sucking action within said container and thereby withdraw liquid depending from said spout, and to open during the latter part of the said movement of the diaphragm to prevent the sucking of air into said container.

7. A viscous liquid dispenser comprising a container having a discharge spout opening downwardly from the bottom thereof and a resilient diaphragm constituting its upper wall, means including an opening for admitting air into said

container when the diaphragm is in its normal position and means integral with the diaphragm comprising a member for manually closing said opening upon deflection of said diaphragm.

- 5 8. A viscous liquid dispenser comprising a container, a resilient depressible diaphragm forming a wall of said container, a restricted outlet spout communicating with the bottom of said container, and means on said diaphragm comprising a valve
10 having a member for closing the same upon inward deflection of said diaphragm to produce pressure in said container for ejecting an amount of liquid therefrom; said member being operable, by the deflection in said diaphragm, to remain
15 closed for the first part of the movement of said diaphragm towards its normal position and to be opened during the latter part of said movement.

9. A liquid dispenser comprising a container having a downwardly opening spout in the bottom thereof and a manually operable diaphragm forming a portion of the wall of said container, said diaphragm comprising a projection upon the outer surface thereof having a slit normally opening into said container, a portion of said projection acting to close said slit upon inward deflection of said diaphragm by pressure on said projection, and to retain said slit in closed position, during the return movement of said diaphragm towards its normal position, until the said diaphragm has first traveled a portion of the distance of said movement.

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