

[54] **APPARATUS FOR DEPOSITING
 VISCOUS LIQUIDS**

480,068 8/1892 Bullard.....222/385
 2,230,540 2/1941 Klein.....222/385

[76] Inventors: **Christopher John Lewis Warren, 50,
 The Ridgeway; John William Mil-
 ross, 6 Tolpits Lane, both of Wat-
 ford, England**

Primary Examiner—Samuel F. Coleman
Assistant Examiner—Norman L. Stack, Jr.
Attorney—Kemon, Palmer & Eastabrook

[22] Filed: **Feb. 8, 1971**

[21] Appl. No.: **113,381**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 798,050, Feb. 10,
 1969, abandoned.

[52] U.S. Cl.222/385

[51] Int. Cl.B67d 5/50

[58] Field of Search ...222/384, 385, 380; 417/211.5,
 417/501; 239/571

[56] **References Cited**

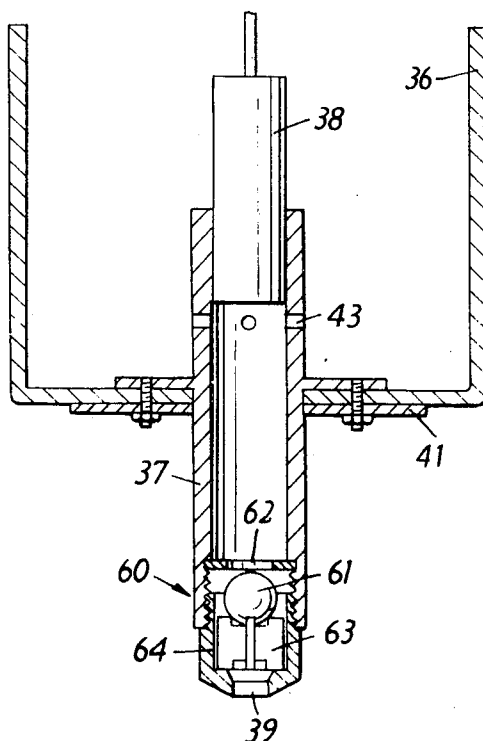
UNITED STATES PATENTS

2,064,402 12/1936 Bannister et al.222/385 X

[57] **ABSTRACT**

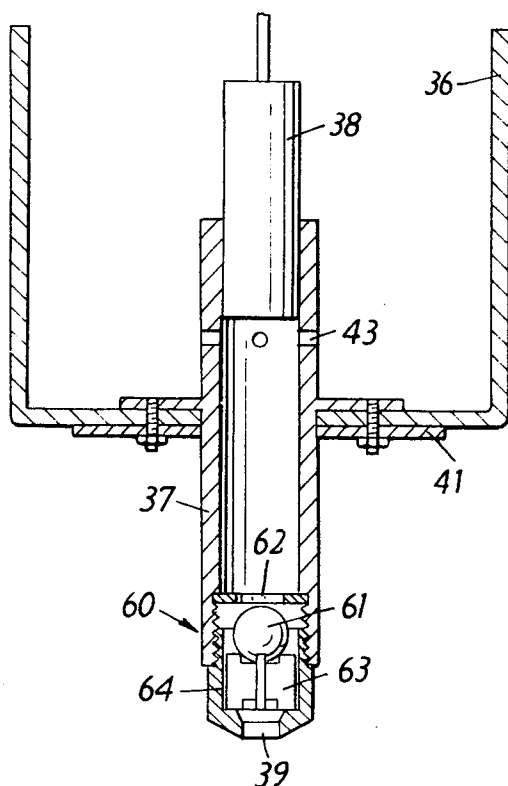
Toffee dispensing apparatus comprises a pump
 plunger reciprocable within a cylinder, the clearance
 between the plunger and cylinder being such that the
 liquid provides the sole sealing medium between the
 plunger and cylinder, and a discharge valve from the
 cylinder in which a valve member is movable verti-
 cally to seal a discharge aperture from the cylinder
 and is drawn against the aperture by suction, there
 being no external means biasing the valve member
 against the aperture.

8 Claims, 1 Drawing Figure



PATENTED MAR 27 1973

3,722,758



INVENTORS:

C. I. L. WARREN AND
J. W. MILROSS

Kennon, Palmer & Estabrook

APPARATUS FOR DEPOSITING VISCOUS LIQUIDS

This application is a continuation-in-part of our earlier application Ser. No. 798,050 filed Feb. 10, 1969 now abandoned.

This invention relates to the measuring and depositing of precise quantities of confectionery syrup.

Apparatus for use in depositing viscous sugar-confectionery syrup has been described in British Patent Specification No. 784,064 in which a cylinder pump is provided in association with a container for the repetitive delivery of precise quantities of the viscous liquid, the clearance between the plunger and cylinder of the pump being such that sealing between the plunger and the pump is effected solely by the viscous liquid, and the pump having a discharge nozzle containing a spring-loaded non-return discharge valve. However, when used with fat-containing materials such as toffee emulsion, it is found that at the temperature at which the material is sufficiently fluid to be pumped, the pressure produced within the cylinder of a pump as described in that specification, in overcoming the resistance of the spring-loaded non-return discharge valve, is sufficient to cause separation of fat from sugar.

An object of this invention is to provide dispensing apparatus having a discharge valve which requires less pressure within the cylinder of the pump, whereby this objection is overcome,

Another difficulty with the apparatus described in the said specification is that "tails" are sometimes formed on the dispensed measures of material which may set as projections on the material which, apart from the adverse effect upon appearance, are liable to tear wrapping paper when the products are intended to be wrapped. In an extreme case with a very viscous, but flowable, material, such as boiled sugars, the material being dispensed may follow the contour of the spring, usually a helical spring, employed to load the non-return discharge valve and emerge, for example, as a worm-shaped thread, which does not set into the desired shape for wrapping.

Another object of this invention is to provide dispensing apparatus which does not form tails on the dispensed measures of material.

U.S. Pat. No. 2,064,402 to Bannister, et al., describes a pump for the emulsification of butter and milk to produce artificial cheese. However, the pump of Bannister, et al., requires a restricted passage at the outlet to achieve emulsification, and a restricted passage would, of course, lead to a pressure build-up in the pump. In dispensing sugar-confectionery syrup it is essential that there is no pressure build-up which would cause separation of the fat from the sugar, since any fat separation may result in rancidity in the finished product, and thus the pump of Bannister, et al., is unsuitable for the accurate dispensing of precise quantities of sugar-confectionery syrup.

SUMMARY OF THE INVENTION

The pump of the present invention is provided with a discharge valve including a valve member moveable in a valve housing between an upper position in which it seals against a valve seat formed in the bottom of the pump cylinder and a lower position in which it rests on a support member in the housing. The valve member is not biased by any external means but moves upwardly

to seal against the valve seat due to suction caused by the pump plunger and transmitted through the liquid being pumped. Due to the upwards travel of the valve member at the commencement of each suction stroke there exists a slight time lag during which the liquid in the interior of the valve housing is sucked upwards to break tails on the dispensed volumes of syrup. During each discharge stroke the valve member rests on the support member and a substantially unrestricted flow passage is provided through the valve seat and past the valve member and the support member to an outlet.

BRIEF DESCRIPTION OF THE DRAWING

Other objects and advantages of the invention will become apparent from the following description taken with reference to the accompanying drawing, which is a sectional view of a container and discharge valve therefor embodying the invention for dispensing precise quantities of hot liquid toffee or other sugar-confectionery syrup.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The apparatus illustrated comprises a container 36 and a pump fixed in the bottom of the container, the pump has a cylinder 37 with four entry ports 43 in the wall of the cylinder 37 and within and communicating with the interior of the container 36. A discharge valve 60 is outside the container 36 permitting the discharge of syrup from the cylinder 37. A plunger 38 has a clearance fit within the cylinder 37 such that the syrup provides the sole sealing medium between the plunger 38 and the cylinder 37, as described in said British Specification No. 784,064.

The discharge valve 60 comprises a valve member constituted by a ball 61. The ball 61 is located in a valve housing formed by a lower extension of the cylinder member 37 and an end member 64 which screws into the extension. The end member 64 retains a support member for the ball 61 in the form of a so-called stool 63. A valve seat 62 defines a substantially unrestricted circular aperture which effects communication between the interior of the cylinder 37 and the interior of the valve housing, and the ball 61 is permitted a limited vertical movement between the valve seat 62 and the stool 63. The end member 64 includes an outlet aperture 39 at the lower end.

The plunger 38 is reciprocated by a drive motor (not shown) located outside the container. When the plunger is being reciprocated by the motor, on each suction stroke (i.e., upwards as seen in the drawing) the discharge valve 60 closes and a partial vacuum is formed in the cylinder, in a manner to be described below, and the entry ports 43 are uncovered by the plunger and the viscous syrup flows from the container 36 into the interior of the partially evacuated cylinder 37. On each discharge stroke of the plunger 38 the entry ports 43 are covered by the plunger 38 and the syrup within the cylinder 37 is forced by the plunger 38 from the cylinder 37 through the discharge valve 60 and passes out through the outlet 39.

During the first part of each suction stroke the plunger 38 draws by suction on the syrup retained within the valve housing, and the ball 61 is drawn upwards by that syrup into sealing arrangement with the

seat 62 to close the aperture. With this arrangement there is a slight time lag between the beginning of the suction stroke and the moment when the aperture is effectively sealed by the ball 61. Thus there is a slight upwards movement of syrup in the whole of the discharge valve 60 at the commencement of each suction stroke, which has the effect of breaking "tails" attached to the previously dispensed measure of toffee, which would otherwise set as projections on the pieces of toffee and be liable to tear wrapping paper. The height of the stool 63 can be adjusted to vary the travel of the ball 61, and for the purpose interchangeable stools of different heights are provided.

In the subsequent discharge stroke of the plunger 38, the ball is forced downwards by the syrup to its lowermost position, in which it rests in a centralizing rest 65 provided on the upper surface of the stool 63. The ball 61 and the valve housing are of such sizes that there is provided a large clearance therebetween which forms a substantially unrestricted flow passage for syrup to flow from the aperture in the seat 62 to the outlet 39.

The stool has a cruciform cross-section so that four large passages are provided past it through the valve housing to the outlet.

It is preferable that the ball 61 should have a specific gravity which is substantially the same as, or even slightly less than, that of the material being pumped, since the ball is then more easily drawn upwards towards the valve seat 62 at the beginning of each suction stroke, yet is still easily displaced downwards by the pressure at the commencement of each discharge stroke. The ball is therefore made of polytetrafluoroethylene, since it has a specific gravity approaching that of liquid toffee, although balls made of other materials, such as stainless steel, have been used.

The apparatus is used to dispense toffee at a temperature of approximately 210° to 220° F. In order to maintain the toffee at this temperature, a heater 41 is fixed to the bottom of the container 36, which is lagged. Separation of the sugar-fat emulsion happens easily at these temperatures if excessive pressure is applied to the emulsion. Such separation does not occur at temperatures below about 180° F, but the toffee is then too viscous to pump.

During the discharge stroke of the plunger 38 little or no pressure is built up within the cylinder 37 since, unlike the valve described in British specification No. 784,064, there is no spring which has to be overcome, and unlike the valve described in U.S. Pat. No. 2,064,402, there are no restricted passages for the pumped material.

The apparatus has also been used to pump caramel and boiled sugars with success. When pumping caramel, it has been found desirable to extend the end member 64 by means of a nozzle, for example, by fixing an elongated pipe or spout to the end member 64. When caramel was deposited directly into a mould cup from the outlet 39 it was found to spread up the sides of the cup so that the top surface of the caramel was of concave meniscus shape. Utilizing a longer nozzle, it was found that a convex meniscus was formed, which is preferable when wrapping. Also, when caramel is being pumped, it is preferable to raise the mould upwards towards the end of the pipe until the pipe is within the

mould cup and virtually remains in contact with the dispensed material.

Utilizing the elongated nozzle for boiled sugars, it was, however, found that the boiled sugar drips to a limited extent from the end of the nozzle during the suction stroke of the pump. The apparatus was therefore used without a pipe or spout. With this apparatus, boiled sugars with less than 2 percent moisture content can be successfully pumped repetitively in accurately metered quantities.

The apparatus described may be modified in many ways without departing from the scope and spirit of the following claims.

We claim:

1. Apparatus for repetitively depositing precise quantities of confectionery syrup, said apparatus including a container and a pump, said pump comprising: a cylinder having an entry port in the wall thereof in communication with the interior of said container; a discharge valve permitting flow of syrup from said cylinder to an outlet; and a reciprocatory pump plunger which has a clearance fit within said cylinder whereby said syrup provides the sole sealing medium between said plunger and said cylinder; and said discharge valve comprising: a valve housing at the bottom end of said cylinder; said valve housing terminating in an outlet aperture; a valve seat defining a substantially unrestricted aperture therein between said cylinder and the interior of said housing; a support member within said valve housing positioned below said valve seat and arranged to overlie said outlet aperture; a valve member normally positioned upon said support member within said housing; said support member maintaining said valve member in spaced relation with respect to said valve seat and said outlet aperture; said valve member being freely vertically movable with said syrup between an upper position in which said valve member closes said aperture and a lower position in which said valve member engages said support member, said housing said valve member and said support member defining when said valve member engages said support member a substantially unrestricted flow passage for said syrup leading from said cylinder to said outlet, and said support member being spaced from said valve seat to define a predetermined travel for said valve member such that at the commencement of each suction stroke of said plunger there is slight upward movement of said syrup in said housing to break tails on the dispensed volume of syrup.
2. Apparatus as set forth in claim 1 wherein said support member has the shape of a cruciform in cross section to insure an even flow of said syrup in an axial direction of said housing and through said outlet aperture.
3. Apparatus as claimed in claim 1, wherein said valve seat defines a substantially circular aperture and said valve member has a spherical end for sealing said aperture on each suction stroke of the pump.
4. Apparatus as claimed in claim 3, wherein said valve member is a sphere.

5

- 5. Apparatus as claimed in claim 1 wherein said valve member is made of polytetrafluoroethylene.
- 6. Apparatus as claimed in claim 1, wherein said valve member is made of stainless steel.
- 7. Apparatus as claimed in claim 1, wherein the

6

- specific gravity of said valve member is substantially the same as that of said syrup.
- 8. Apparatus as claimed in claim 1, wherein said discharge valve is positioned outside said container.

* * * * *

10

15

20

25

30

35

40

45

50

55

60

65