United States Patent [19]

Hunter

[11] **3,792,724**

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[54] **BAG FILLING MACHINE**

[75] Inventor: **Donald Arthur Hunter,** Mississauga, Ontario, Canada

[73] Assignee: **Delamere & Williams Company, Limited,** Toronto, Canada

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[52] **U.S. Cl.** **141/115,** 53/180, 141/286, 210/460, 222/109

[51] **Int. Cl.** **B67c 3/02**

[58] **Field of Search** ..... 141/59–61, 85–93, 141/115–127, 286, 392; 291/11 A, 13, 46, 47; 210/460; 53/180; 222/108–111, 118, 368, 424

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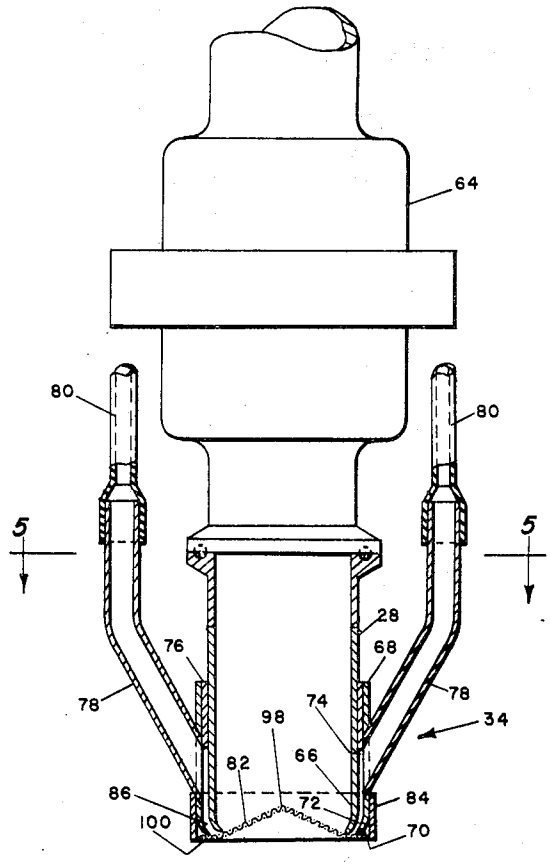
Primary Examiner—Houston S. Bell, Jr.

Attorney, Agent, or Firm—Robert T. Gammons, Dike, Bronstein, Roberts & Cushman

[57] **ABSTRACT**

A bag making and liquid filling machine characterized by a drip-free structure whereby to prevent contamination of the bag making material in an area where a heat seal is to be made.

10 Claims, 5 Drawing Figures



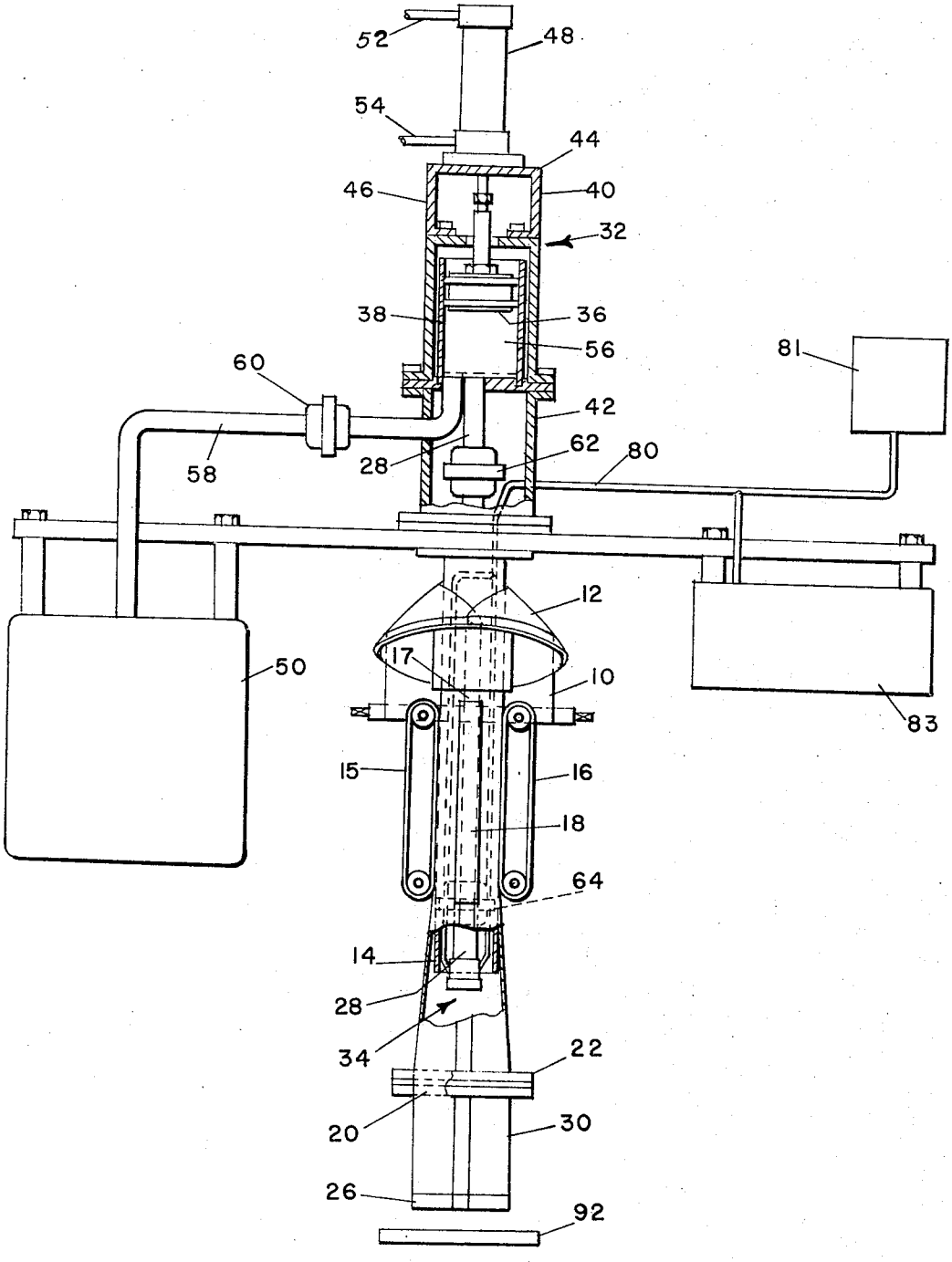

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Fig. 1

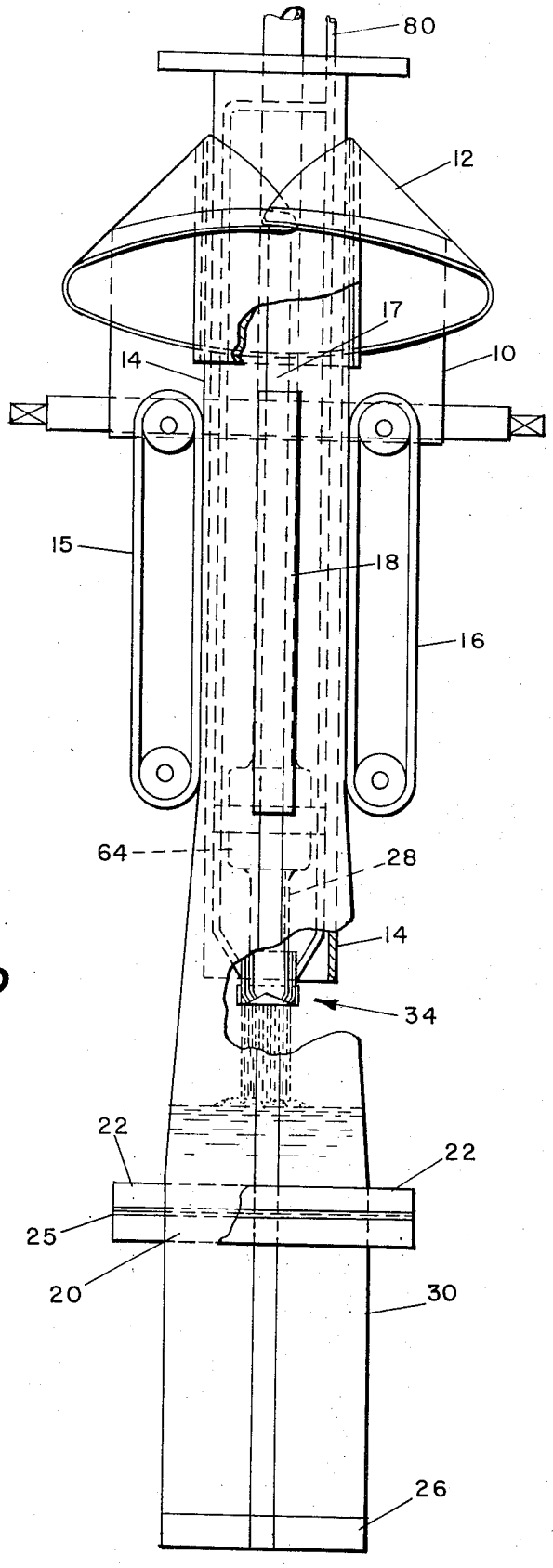


Fig. 2

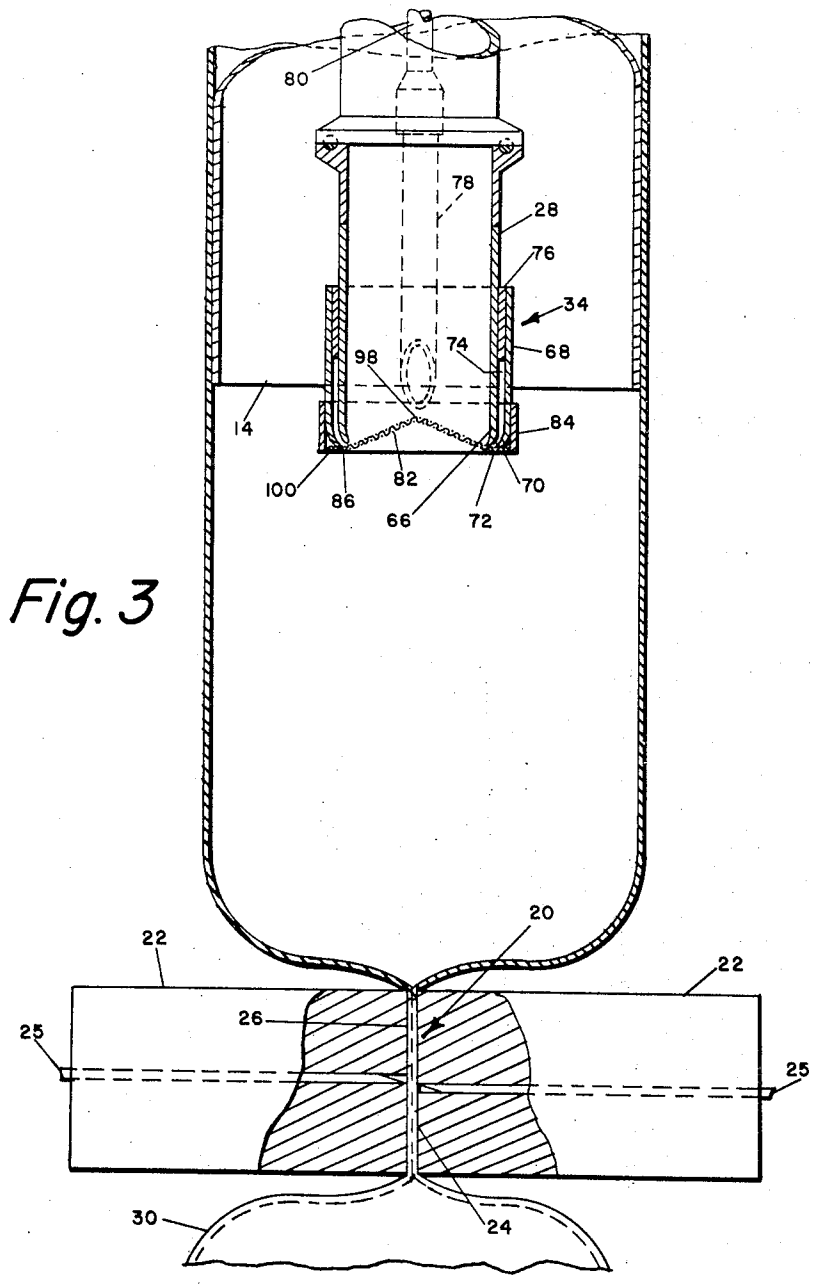


Fig. 3

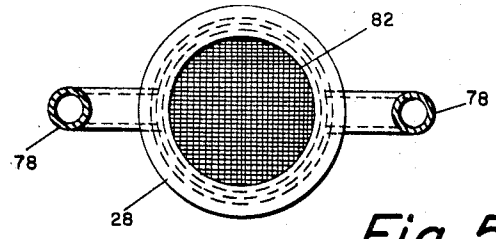


Fig. 5

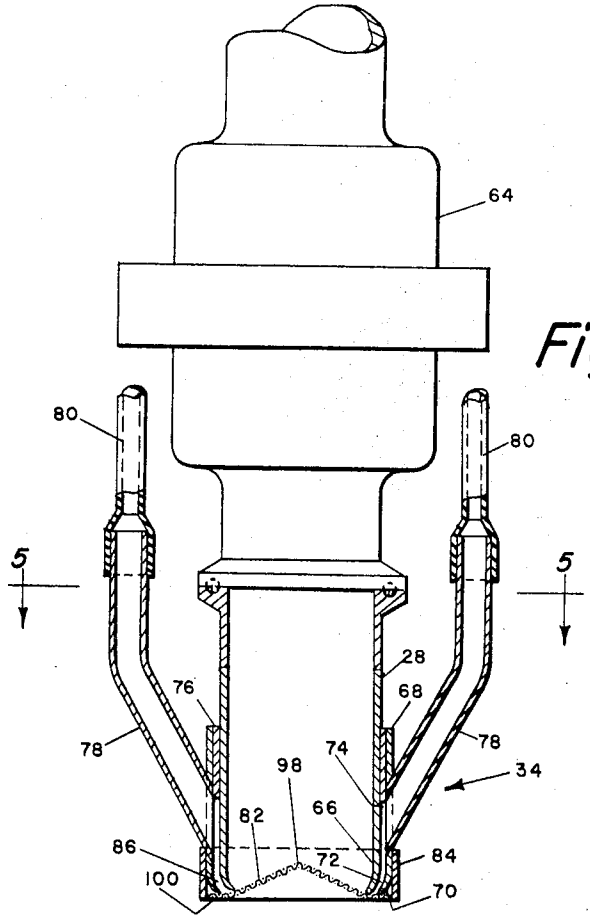


Fig. 4

BAG FILLING MACHINE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention resides in the field of bag making and liquid filling machines of the type wherein successive thermoplastic film bags are produced by the application of heat and pressure at spaced intervals, successive bags being provided with successive charges of liquid.

2. Description of the Prior Art

Prior to the present invention, the bag making and liquid filling machines of the type described have been employed for filling film bags with liquids whose characteristics were such that dripping from the outlet tube was negligible, or the nature of the liquid was such that any drip onto the confronting surfaces to be sealed did not interfere with the production of an efficient seal.

SUMMARY OF THE INVENTION

The present invention relates to a novel and improved bag making and liquid filling machine of the type which is particularly adapted for filling thermoplastic film bags with a multigrade or detergent lubricating oil whose characteristics are such that any inadvertent drip of oil onto the surfaces to be heat sealed would interfere with the production of an efficient heat seal. Provision is made in the present machine for preventing drip from the filling tube whereby to prevent interference with the heat sealing operation. The present invention is also provided with means for quickly and accurately measuring successive loads or charges of liquid and for depositing such charges under pressure into successive bags in a rapid and gentle manner, the outlet of the filling tube being of a structure such as to prevent any leakage or drip therefrom after the filling operation is completed.

Accordingly, the invention has for one object to provide a novel and improved filling machine having novel provision for preventing any drip or leakage from the filling tube after the filling operation is completed.

The invention has for another object to provide a novel and improved bag making and filling machine of the character defined having provision for measuring and depositing accurate loads into successive containers each cycle of operation in a simple and efficient manner.

The invention has for a further object to provide a novel and improved bag making and filling machine having provision for measuring and depositing under pressure in a rapid and gentle manner an accurate charge of liquid into successive bags each cycle of operation in a simple and efficient manner.

With these general objects in view and such others as may hereinafter appear, the invention consists in the filling machine and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings illustrating the preferred embodiment of the invention:

FIG. 1 is a front elevation of the present bag making and filling machine embodying the present invention;

FIG. 2 is a diagrammatic view in front elevation of the bag making apparatus;

FIG. 3 is a cross sectional view in side elevation of the outlet end of the filling tube showing a filled bag section, a bag section about to be filled and the transverse sealing apparatus;

FIG. 4 is a cross sectional view in front elevation of the structure shown in FIG. 3; and

FIG. 5 is a plan view cross section of the structure shown in FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention is embodied in a bag making and filling machine of a known type wherein the bag making material comprises a sheet material or thermoplastic film of a type capable of being heat sealed when confronting surfaces are pressed together with the application of heat and pressure to provide a seam. As diagrammatically illustrated in FIG. 2, in operation, the sheet material **10** is withdrawn from a supply roll, not shown, ad drawn over a shaping form **12** and about a cylindrical tube **14** in a manner such as to present the longitudinal edges of the film sheet or strip into overlapping relation. The tubular film material is advanced intermittently one bag length each cycle of operation by opposed driven belts **15, 16** and the overlapped portions **17** are sealed together to form a side seam by heating elements **18.** A transverse seal **20** is made in the tubular film by opposed heat sealing elements **22** which provide a top seal **24** for a previously filled bag and a bottom seal **26** for a succeeding bag when the transverse seal is severed medially thereof by cooperating cutter blades **25** carried by the sealing elements **22** as shown. The bag material is then advanced one bag length and the bag is filled with a charge of material through a filling tube **28** whereupon the bag is provided with a subsequent transverse seal and simultaneously severed from the tubular film to produce a filled and sealed bag **30** as shown.

The illustrated machine, as shown in FIG. **1,** is characterized by structure particularly adapted for packaging lubricating oil, such as detergent or multigrade motor oil, and includes novel piston type load measuring or charge forming means indicated generally at **32** and a filling tube **28** having a novel end structure **34** devised to reduce to a minimum any liability of drip from the filling tube after a measured charge has been deposited into the bag. The importance of the drip-free structure will be realized when it is considered that any oil which may drip onto the confronting surfaces of the material at the transverse seal area **20** might possibly interfere with the heat sealing operation to form an imperfect seal.

As shown in FIG. **1,** the novel measuring device consists of a piston **36** operating in a cylinder **38** which is enclosed in a casing **40** supported by a stand **42** attached to the frame of the machine. The piston rod **44** extends through the upper end of the casing **40** into a chamber formed by an extension **46** of the casing. The upper end of the piston rod **44** extends into an air cylinder **48** provided with upper and lower air pipes **52, 54** leading to a controlled source of compressed air and having provision for raising and lowering the piston **36** so as to provide sucessive measured loads or charges in timed relation to the operation of the bag making mechanism.

The piston **36** operates in a chamber **56** and is in communication with a supply pipe **58** which leads to a

source of supply of the liquid, such as a tank **50,** the supply pipe having a one-way valve **60** incorporated therein and arranged to permit passage of liquid upwardly into the chamber **56** but is arranged to prevent passage of liquid in the opposite direction. The chamber **56** is also in communication with the open upper end of the filling tube **28,** the latter being extended to accommodate the film bag making mechanism. The filling tube is provided with one or more oneway valves, herein shown as two valves **62, 64,** which are spring pressed to close and which are arranged to permit passage of liquid downwardly into the endmost bag section and which are automatically closed upon completion of the filling operation. Thus, in operation, when the piston **36** is drawn upwardly, the valves **62, 64** in the filling tube are closed and the valve **60** is opened by the suction to draw liquid from the tank **50** into the measuring chamber. As soon as the upward movement of the piston terminates the valve **60** closes, and upon downward movement of the piston **36,** the valves **62, 64** are opened by the pressure and a measured charge of liquid is deposited into the endmost bag.

From the description thus far, it will be seen that accurate measured charges of oil are produced and deposited into sucessive bags by novel mechanism capable of providing an exceedingly rapid filling operation, in the order of 1 U.S. or 1 Imperial quart per second without foam. Referring now to FIGS. **4** and **5,** the non-drip structure **34** formed at the outlet end of the filling tube **28** comprises a structure which includes an inwardly curved end portion **66** of the filling tube, a second tube **68** surrounding the lower end of the filling tube, also having an inwardly curved end portion **70** spaced from the curved end portion **66** and forming therewith an annular space **72** which extends upwardly into an annular space **74** defined by the outside diameter of the inner tube **28** and the inside diameter of the tube **68.** A cylindrical band **76** between the inner and outer tubes **28, 68,** respectively, serves to close the upper end of the annular space **72,** leaving the lower end of the annular space open to the atmosphere. A pair of opposed pipes **78** in communication with said annular space through the side wall of the outer tube **68** are connected by flexible conduits **80** to a source of suction of any usual or preferred construction, herein diagrammatically shown as comprising a vacuum pump **81.** Surplus material withdrawn by the pump may drain into an accumulating tank **83** as shown.

The lower end of the non-drip structure **34** comprises a conical screen **82** connected at the periphery of its base portion to the lower end of a circular band **84** which is fitted over the lower end of the outlet, the apex of the cone extending upwardly into the outlet of the filling tube **28** as shown. In practice, the mesh of the screen **82** is such that the oil will not pass through unless some form of pressure is behind it so that in operation, when the valves **62, 64** are closed at the end of a filling operation, any oil clinging to the inner sides of the tube **28** or any oil which remains on top of the screen **82** will flow into a peripheral area **86** defined by the ends of the curved portions **66** and **70** and the angular portions of the conical screen **82.** Any oil collected in the area **86** will be held in suspension or withdrawn upwardly by the suction in communication with the annular space **72, 74,** thus preventing any liability of drip from the outlet after the valves **62, 64** are closed.

From the above description, it will be seen that in operation, when the piston **36** in the measuring chamber **56** is moved upwardly, oil from the supply is drawn through the normally closed valve **60** by the suction created by the piston **36.** The travel of the piston is adjustable to accommodate different loads to be measured, and after the piston comes to rest, the latter is moved downwardly to effect opening of the normally closed valves **62, 64** and to pass the measured load through the screen **82** and into the endmost bag section with a pressure which may vary from 5 to 15 p. s i. during the filling operation. The bag material is then advanced one bag length whereupon the material is sealed transversely to provide a top seal for the filled bag **30** and a bottom seal for the succeeding bag upon severing the seal medially thereof. The filled bag **30** may rest on a platform **92** where it may be removed manually, or it may be deposited on a conveyer, not shown, to be transported to a packing area.

It will be understood that the basic machine known in the trade as a "Rovema" milk filler is operated in successive timed cycles, each cycle including a bag forming, advancing and heat sealing operation, a load forming operation and a filling operation. In practice, the filling operation is timed to be completed in one second when a load of 1 Imperial or 1 U.S. quart is deposited into the container under pressure, the relatively large diameter filling tube and the small mesh screen effecting a gentle and foam-free flow such as to preclude any excessive pressure on the newly formed and still warm heat seals. The screened outlet also permits rapid filling in a gentle and efficient manner with a minimum of agitation.

As above stated, any liquid which may flow down the conical surfaces of the screen **82,** or down the inner surfaces of the filling tube **28** will collect at the base of the cone and be drawn upwardly through the opposed pipes **78** and flexible conduits **80.** The source of vacuum may comprise the motor driven pump **81** and any filling material drawn upwardly will be trapped in the receptacle indicated at **83.** In the illustrated embodiment of the invention, the vacuum is on continuously, but in practice, such action could be modified to apply suction only when the valves **62, 64** are closed. The conical screen **82** is provided with a small radius at its apex, as shown at **98,** and the base of the screen is extended laterally to provide a flat portion **100** connected to the underside of the ring **84.**

It will be observed that the filling sequence is such that after the endmost bag has been filled and the valves **62, 64** closed, the bag is advanced one bag section to present the following bag section in position to be heat sealed transversely and filled. Thus, during the bag film advancing operation, any drip of oil onto the confronting surfaces to be heat sealed would render it impossible to effect an efficient seal. The present drip-free structure permits a rapid and gentle filling operation and provides a structure capable of preventing drip so that a perfect heat seal between confronting film surfaces may be obtained.

Having thus described the invention, what is claimed is:

1. In a liquid filling machine, in combination, a filling tube, means for supporting a container to receive liquid from the filling tube, said filling tube having a drip-free outlet comprising a screen, an annular space in communication with the periphery of said screen, and suc-

tion means in communication with said space to effect suspension of any liquid gathered adjacent said periphery whereby to prevent drip from said outlet upon completion of a filling operation.

2. A liquid filling machine as defined in claim **1** wherein the outlet screen is conical in shape with the apex of the cone extending up into the outlet.

3. A liquid filling machine as defined in claim **2** wherein the outlet end of said filling tube is curved inwardly for cooperation with the base of said conical screen.

4. A liquid filling machine as defined in claim **3** which is particularly adapted for filling liquids having the viscosity of oil in a rapid and drip-free manner wherein the filling tube is of relatively large diameter conducive to a gentle and rapid filling operation.

5. A liquid filling machine as defined in claim **3** wherein the annular suction space is defined by the outside diameter of the filling tube and the inside diameter of an outer circular band attached to and concentric with said tube, the lower end of said band being also curved inwardly for cooperation with said screen.

6. A filling machine as defined in claim **5** wherein the base of said screen is connected to the lower end of a ring fitted over the end of said outer circular band.

7. In a filling machine, in combination, means for measuring successive charges of liquid to be deposited into successive containers, a filling tube having an outlet, said outlet having a drip-free structure comprising a conical screen, and suction means in communication with the marginal edge adjacent the periphery of said screen adapted to hold in suspension and to withdraw any liquid collected at said marginal edge upon completion of a filling operation.

8. A filling machine as defined in claim **7** wherein the measuring means includes a cylinder chamber and a piston movable in said chamber, an inlet pipe in communication with said chamber and connected to a source of supply, said inlet pipe having a one-way valve arranged to permit passage of liquid into the chamber only upon upward movement of the piston, said filling tube also being in communication with said chamber and provided with a one-way valve arranged to permit passage of liquid under pressure only upon downward movement of said piston.

9. In a liquid filling machine, in combination, a filling tube, means for supporting a bag to receive liquid from the filling tube, said filling tube having a drip-free outlet comprising a conical screen, an annular space in communication with the periphery of said screen, and suction means arranged to effect withdrawal of any liquid accumulated adjacent said periphery whereby to prevent drip from said outlet upon completion of a filling operation.

10. A liquid filling machine as defined in claim **9** wherein the conical screen is provided with a small radius at its apex, and has a lateral extension as its periphery providing an annular flat portion.

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