

[54] APPARATUS AND PROCESS FOR PUMPING
GLUEY MATERIAL[76] Inventor: Sidney Rosen, 2701 Rockwood
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[58] Field of Search 417/430, 431, 432,
417/446, 519, 900, 522, 557, 437; 415/446, 900

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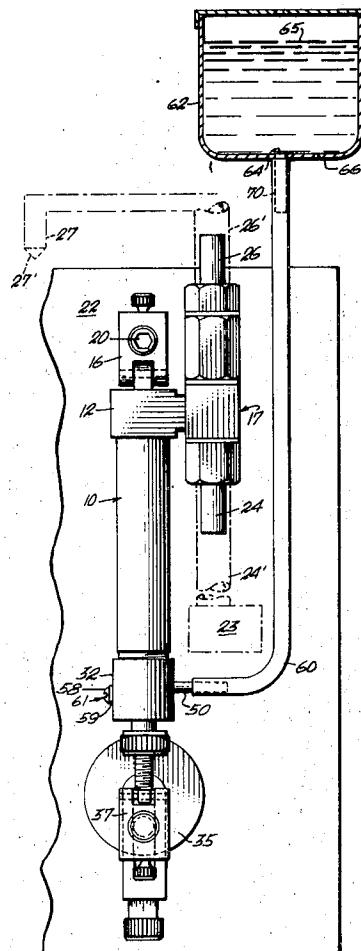
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[57] ABSTRACT

A pump for use in pumping gluey material and a process for pumping gluey material in which the pump includes a cylinder having a chamber through which gluey material is adapted to be pumped on one side of the piston head and a sealed chamber on the other side of the piston head in fluid communication with a solvent contained in a receptacle means normally arranged above the chamber through which the gluey materials are pumped to bathe the sliding surfaces and resist build-up of gluey materials tending to jam the pump. The pump also includes a bleed valve means for initiating operation of the apparatus and process and also a suck-back mechanism comprising a normally closed but partially opened one-way valve effective to work the discharged material during the aspirating stroke of the pump and to resist setting of the materials at the discharge station or a dispensing point to which the pump flows materials.

11 Claims, 2 Drawing Figures



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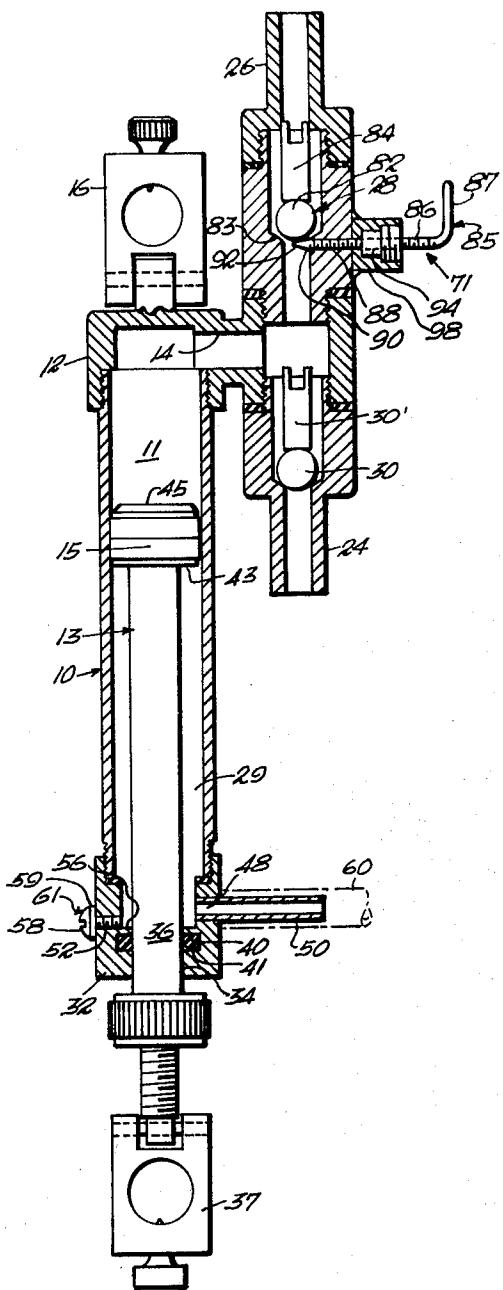
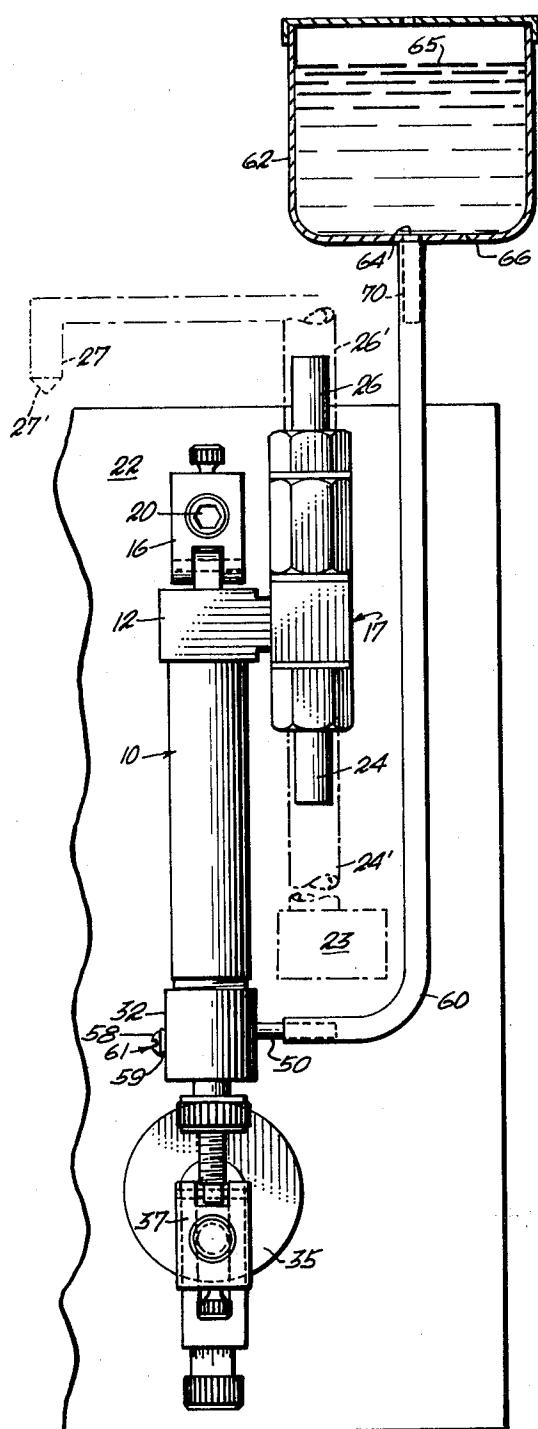


Fig. 1

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APPARATUS AND PROCESS FOR PUMPING GLUEY MATERIAL

This invention relates to an improved pump especially useful in pumping gluey materials and to a process of pumping gluey materials.

In the past, there has been a problem occasioned in pumping gluey materials because such materials, in spite of adjustable pumps of close tolerances, tend to wend their way between the working parts and ultimately interfere with the planned and desired operation of the pumps. Also, in the past, when pumping relatively gluey material, such material tends to collect and form gummy masses at the discharge station of a system through which they are being pumped ultimately obstructing the discharge nozzle and requiring servicing.

It is, accordingly, an object of this invention to provide an improved pump for gluey material which includes means for bathing the co-acting cylinder and piston head surfaces with a solvent to resist such build-up, said pump including means defining a solvent bath chamber on the piston rod side of the piston head and a receptacle means with a duct communicating between the chamber which is of a length greater than the distance between the connection to the chamber and the intake of the pump, so that solvent in the receptacle will flow into the chamber when the piston is displaced.

It is another object of this invention to provide an improved process for pumping gluey material which includes the steps of flowing gluey materials to be pumped into a cylinder on one side of a reciprocating piston head and simultaneously flowing a solvent into and out of the cylinder on the other side of the piston head.

It is another object of this invention to provide a suck-back mechanism for the pump to flex and work the materials being pumped during the aspirating stroke of the pump to resist setting of the materials.

It is another object of this invention to provide an improved pump especially adapted for pumping gluey materials which includes a bleed valve means for priming the pump with solvent in the manner to be described.

It is a general object of this invention to provide an improved, inexpensive apparatus and process for pumping gluey materials.

In accordance with these and other objects which will become apparent hereinafter, the instant invention will now be described with reference to the accompanying drawings in which:

FIG. 1 is a schematic view illustrating the process of the instant invention and showing the pump; and

FIG. 2 is a partial elevation view partly in cross section of the pump shown in FIG. 1.

The pump as shown in FIG. 1 is adapted to operate on the type of filling machine shown in U.S. Pat. No. 2,807,213 dated Sept. 24, 1957 and is preferably of the type described in U.S. Pat. No. 2,907,614 dated Oct. 6, 1959, which is characterized by an exteriorly adjustable piston head assembly. In any event, the pump of the instant invention for use in the process described includes a cylinder 10 with a piston assembly 13 having a head 15 arranged for reciprocal movement therein. One end of the cylinder is closed by a cap member 12 having means such as the opening 14 for admitting and discharging gluey material being pumped to the interior pumping chamber or the upper end 11 of the cylinder

10, that is, the varying chamber above the piston head 15.

In a preferred embodiment, the member 12 is hingedly connected to a member 16 which is pivotally supported upon a stationary arbor 20 carried on a suitable supporting housing 22. Connected with the opening 14 is a valve housing 17, with an intake nipple 24 and an associated intake pipe 24', shown in phantom, in fluid communication therewith, and an outlet nipple 26 in fluid connection with an associated outlet pipe 26', also shown in phantom, which leads to a dispensing station means 27, shown schematically.

In the illustrated embodiment, the direction of flow of the fluid is controlled by the ball type valve means 28 and 30 within the valve housing 17, see FIG. 2. It is seen that, as the piston reciprocates, discrete charges of material will be drawn into the pumped out of the valve assembly nipples from a reservoir, 23, shown schematically in fluid connection with the intake pipe 24' to the station 27.

The lower end 29 of the cylinder comprises a bath chamber for a solvent for the gluey material, using the word "solvent" in a broad sense to denote a material which will remove deposits of the material being pumped, as will be explained. The lower end portion 29 of the column of the cylinder 10 is closed as by the collar 32 with an axial through bore 34 to accommodate the cyclical pumping motion of the driven rod 36 of the piston assembly 13, to the distal end of which means 37 are provided to connect to a driving means, such as a crank arm 35. Sealing means comprising an O-ring 40 are arranged in circumposed relation about the rod in a seat 41. By reason of this structure, it is seen that there is defined a bath chamber 29 in the column of the cylinder beneath the head 15, that is, on the bathed side 43 thereof as opposed to the pumping side 45 thereof.

The bath chamber 29 is provided with an inlet port 48 within which a fitting 50 is secured in fluid tight relation and through which a solvent is supplied to the bath chamber in a manner now to be described. As seen in FIG. 1, to the fitting 50 a pipe or duct 60 is connected which leads to a solvent reservoir 62 positioned above the upper limit of the travel of the piston head 15. As shown, this receptacle has an opening 64 in the lower portion or floor 66 which is provided with a fitting 70 which is receivable within the terminal end of the duct 60.

In pumping gluey materials, when the piston is moved away from the upper end of the cylinder 10, the gluey material is drawn in through the intake pipe 24' as the valve means 30 opens overcoming the weight 30' normally urging the ball into the seated engagement or valve closed attitude shown in FIG. 2. When the piston is moved in an opposite direction, the gluey material is forced through the substantially one-way valve means 28 which opens in response to the pumping action. In this manner, the pumped material is flowed by successive strokes of the piston assembly 13 through the outlet pipe 26' to the station 27 whereupon it is discharged from a nozzle 27', the delivery being in discrete pulses or amounts of material to be discharged in seriatum from the nozzle 27', the separate delivered amounts being related to the amount of displacement of the piston head with each stroke.

It will be seen that as the piston reciprocates, the bath chamber is cyclically enlarged and contracted; and that

the solvent 65 contained within the receptacle will by cyclically drawn from and returned to the receptacle through the duct 60 to bathe the inner surface of the cylinder in the bath chamber 29 and thereby resist the tendency of the gluey material to collect and eventually interfere with the ultimately jamb on the piston head surfaces and the confronting cylinder surface.

Bleed valve means 61 are provided in the lower portion of the bath chamber 29 and, as shown, comprise a threaded, through hole 52 in the collar adjacent the floor 56 of the chamber 29, which hole is normally closed by a headed screw 58 which is provided with a binder head washer 59. In initiating the operation described above, the screw 58 is withdrawn and the piston head is moved to the lower extremity of the stroke so that the air may be evacuated from the chamber 29 and be replaced by the solvent.

As can be appreciated, especially when pumping materials which have a tendency to set or become gummy when exposed to air, the nozzle 27' or discharge point at the station 27 is often characterized by a droplet when material is not actually being delivered which eventually sets or develops into a gummy material which may block or tend to block the opening. To obviate this objectionable result, a suck-back mechanism 71 which is adjustable is preferably provided and will now be described. Referring first to the substantially one-way valve 28 in the valve housing 17, which is seen to include the ball 82 urged by a weight 84 into closing relation of the opening at a seat 83, an adjustable member or key 85 is provided to vary the degree of closure of the one-way valve so that it is normally slightly ajar, that is, not fully but substantially closed. The key illustrated in the preferred embodiment comprises a threadable shaft 86 having a handle 87 whereby it is adapted to be traveled into and out of the line of travel of the ball 82 through a threaded socket 88, the end 90 of the member 86 being provided with a cam surface 92 to engage the surface of the ball 82. It is thus seen that by manipulating the key 86, the amount of normal ajarness may be regulated. A suitable packing material 94 is arranged in circumposed relation about the shaft 86 of the key 85 within the mounting means 98.

The operation of the suck-back mechanism described is such that, with each aspirating stroke of the piston assembly, there will be a small suction force exerted through the pipe 26' which will be exerted at the discharge point 27' to suck, and by so doing, flex any droplet tending to form between the pumping strokes to continually work the material and prolong and enlarge the time within which any tendency to set of the material being pumped would result in a jamming action at that point. It will be seen that the amount of the suck-back action may be controlled by threadable adjustment of the key 86.

It will be apparent that in using the term "gluey" materials of a heavy, sticky or viscous consistency are referred to which are relatively viscid; and the term "solvent" is intended to designate a thinner or liquid to soften or dissolve any accumulation of the gluey material exposed to the solvent material.

In the past, U.S. Pat. No. 1,415,617 has been known in the art to be for the same objective generally as this disclosure. However, in that patent the solvent is piped through the piston rod into a restricted area just below the piston seal rings. There is very little if any circulation of the solvent in such a structure and the quantity

5 of solids could easily build up in the area below the piston rings. The design of the prior art patent will, therefore, prevent the dilution of any of the adhesive product that might find its way below the piston seal rings in contradistinction to the structure of this disclosure. In this design the entire space between the piston and the piston guide is filled with the solvent liquid. As the piston reciprocates back and forth, the solvent is filled and emptied from the space, providing complete circulation of the solvent and effectively clearing the inner surface of the cylinder walls.

What is claimed is:

1. In a pump including a reciprocal piston assembly having a head and a cylinder snugly circumscribed about said head when in operation and means closing both ends of the cylinder defining a first pumping chamber on one side of the head and a second chamber on the other side of said head, and said pump having a flow path into and out of the pumping chamber, the improvement comprising,

sealing means and a port at one end for said second chamber,

a receptacle for a solvent to be positioned above said head with an opening in the lower portion, and exterior duct means in fluid communication between the receptacle opening and the port of the second chamber,

whereby in reciprocating action of the piston head solvent in the receptacle will be cyclically flowed into and out of the second chamber to bathe the cylinder surfaces traversed by the piston head travel.

2. The improvement as set forth in claim 1 wherein bleed valve means are arranged in said second chamber.

3. The improvement as set forth in claim 1 wherein the piston assembly includes a piston rod extending through said chamber and the sealing means are arranged intermediate said rod and said cylinder.

4. The improvement as set forth in claim 1 wherein a nipple is provided at said port, said nipple being sized fluid tight interconnection with said duct means.

5. The improvement as set forth in claim 1 wherein said pump includes a one-way valve in said discharge path in a normally substantially closed attitude.

6. The improvement as set forth in claim 2 wherein said pump includes a one-way valve in said discharge path in a normally substantially closed attitude.

7. The improvement as set forth in claim 5 wherein means are provided to vary the normal position of said one-way valve.

8. The improvement as set forth in claim 7 wherein said one-way valve includes a member to block fluid flow through said valve and a seat, and means normally urging said valve into nesting relation on said seat to block said valve, and said means to vary the normal position of said one-way valve comprises a key adapted to be traveled intermediate said member and said seat, said key including a cam surface to engage said member to vary the normal opening between said seat and said member.

9. In a pump including a cylinder and a piston assembly having a head at all times within said cylinder and a rod at all times extending from one end of the cylinder, guide means intermediate the rod and the cylinder and a valve housing including a portion closing the other end of the cylinder and defining an intake and

discharge path for materials being pumped and a one-way normally substantially closed valve means in the discharge path of the pump including a member movable into and out of a position substantially blocking flow through said discharge path, the improvement comprising suck-back adjustment means to vary the normal position of said member.

10. The device as set forth in claim 9 wherein said guide means spans the other end of said cylinder and includes sealing means to define a fluid tight bath chamber on the rode side of said piston, a port in said

cylinder communicating with said bath chamber adjacent said guide means, and a receptacle for a solvent including a duct with one end connected to the lower portion of said receptacle and the other end adapted to connect to said port and said duct means being of a length greater than the distance from said duct to said portion closing the other end of the cylinder.

11. The improvement as set forth in claim 10 wherein bleed valve means are arranged in communication with 10 said bath chamber at said other end.

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