

[54] **FILLING APPARATUS FOR PASTY MEDIA,
PARTICULARLY FOR SAUSAGE MEAT**

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[58] **Field of Search**..... 138/31; 417/36, 44; 17/35,
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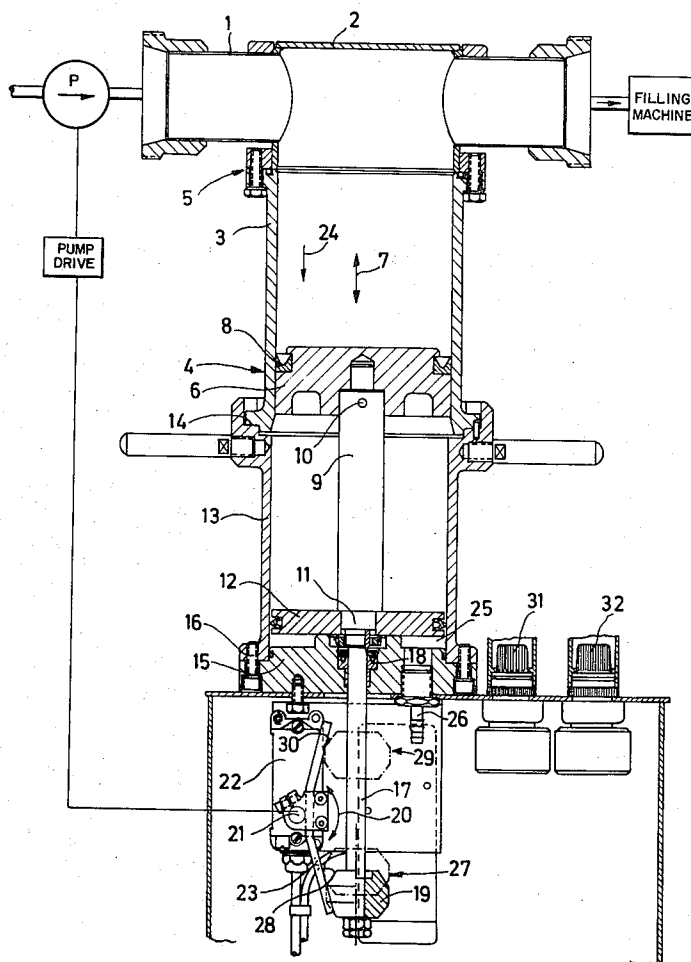
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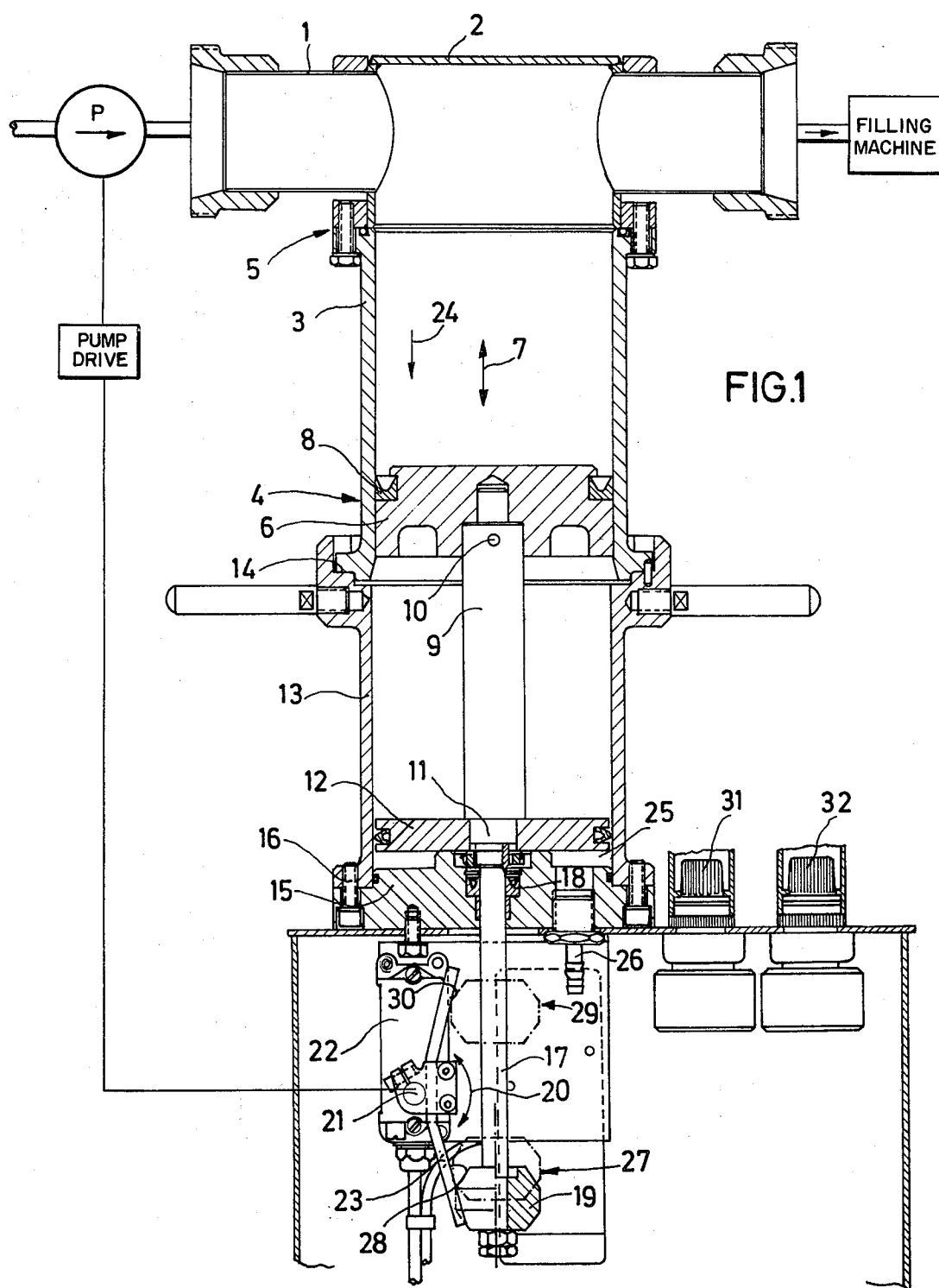
[57] **ABSTRACT**

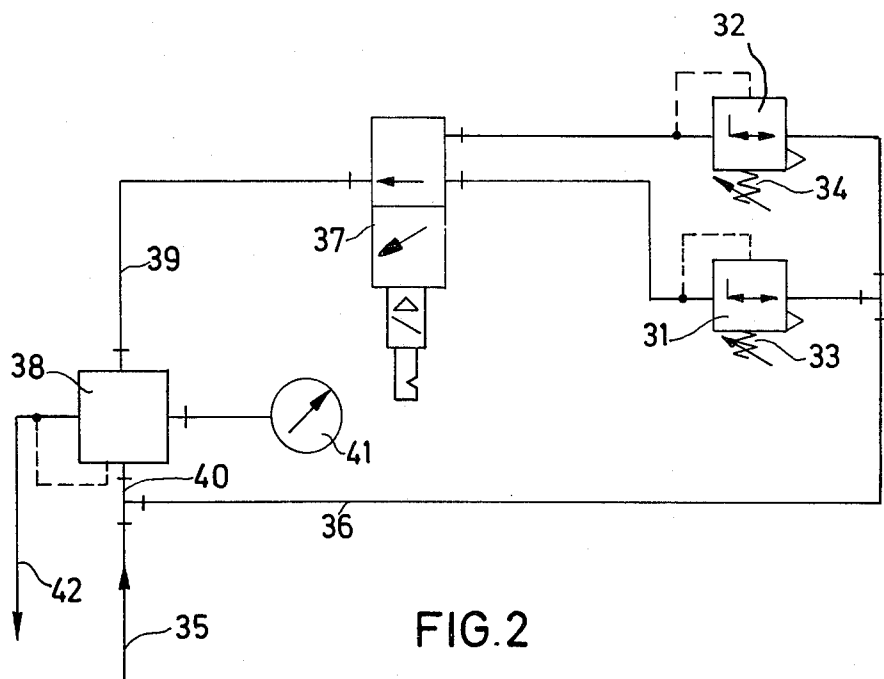
The apparatus includes a supply pipe adapted to con-

nect a filling machine to a filling pump supplying the filling machine. A buffer device is connected to the supply pipe and comprises a cylinder with a piston movable therein. One chamber of the cylinder communicates with the supply pipe, and the other chamber of the cylinder is subjected to a pressure which may be substantially constant or which may be selectively varied between two different values. The filling machine operates intermittently while the filling pump operates substantially constantly. During stoppage of the filling machine, the material delivered to the supply pipe is supplied to the buffer device against a constant pressure, and the operation of the pump may be automatically interrupted. When the filling machine starts again, the constant pressure forces the paste media from the buffer to the supply pipe for delivery to the filling machine, and the operation of the pump may be automatically restarted. Preferably, a higher constant pressure is supplied to the piston of the buffer cylinder when the buffer is delivering material to the supply pipe, whereas, at other times, the pressure on the piston is maintained at a lower constant value.

5 Claims, 2 Drawing Figures







FILLING APPARATUS FOR PASTY MEDIA, PARTICULARLY FOR SAUSAGE MEAT

FIELD AND BACKGROUND OF THE INVENTION

This invention relates to a filling apparatus for pasty media, particularly for sausage meat, of the type including a filling machine and a filling pump delivering the pasty media to the filling machine.

The filling pump pumps a continuous stream of pasty media to the filling machine, but the filling machine works only intermittently. Naturally, this results in pressure fluctuations and stoppages in the connecting path or pipe between the filling pump and the filling machine. In extreme cases, damage to one or the other or both of the units may result.

SUMMARY OF THE INVENTION

The objective of the present invention is to provide such a filling apparatus where such disturbances do not occur and where possible damage to either the filling pump or the filling machine, or to both, are thus excluded or prevented.

To solve this problem, in accordance with the invention, a buffer device is in a supply pipe or line between the filling machine and the filling pump. When the filling pump delivers more than can be processed instantaneously by the filling machine, this amount is received in the buffer device from which it can be removed later.

In a particularly preferred embodiment of the invention, the buffer device has a cylinder with a piston displaced therein against a particularly substantially constant counter-force, and one of the two cylinder chambers is connected through the supply pipe both to the pressure side of the filling pump and to the inlet of the sausage filling machine. The constant counter-force has the effect that the pressure in the connection between the pump and the filling machine is always constant, so that accurate portioning, as seen from this side, is not jeopardized.

In another embodiment of the invention, the piston is connected to an actuating element for a switch in the filling pump drive, the pump drive being stopped when the buffer cylinder is substantially filled and being started when the buffer cylinder is substantially empty. The excess amount delivered by the filling pump to the supply pipe and not received instantaneously by the filling machine enters the cylinder and displaces the piston against the counter-force acting on the opposite side of the piston. When the cylinder is filled, or substantially filled, and the piston is, for example, in its bottom end position, it actuates mechanically or in any way, a switch which interrupts the circuit of the pump drive. Subsequently, the force acting constantly on the piston pushes the latter up again and the media contained in the buffer device, or in the cylinder, is ejected into the supply pipe for delivery to the filling machine. When the piston has reached its upper, or substantially upper position, the switch is again returned into its starting position mechanically or in any other way and the pump drive is thus started.

It is certainly possible to disengage and engage a clutch between the pump drive and the pump, instead of shutting off the pump drive, responsive to the piston movement. In the same manner, the piston, instead of acting on an electric switch, can also act on any other switching or control mechanism which results, in the same manner, in an interruption of the media flow until

the buffer cylinder is emptied or partly emptied. In particular, it is possible to set a pump, having a variable output, and by pneumatic, electric, hydraulic or mechanical means, to zero delivery on the one hand, and to the desired delivery, on the other hand. The piston then could take over the adjustment either directly or indirectly by opening or closing a circuit or by varying a hydraulic or pneumatic control pressure.

The piston has applied thereto hydraulic pressure, or particularly pneumatic pressure, in accordance with another feature of the invention, for the production of the counter-force on its side remote from the pasty medium. The media to be filled is, for example, on the top side, and the hydraulic and pneumatic pressure is applied to the underside of the piston. Unless a flying or free piston is provided, the pneumatic or hydraulic pressure will be applied to the chamber cylinder receiving the piston rod.

In accordance with another feature of the invention, the hydraulic or pneumatic pressure is regulable, the pressure medium flowing to the cylinder of the buffer device through at least one adjustable pressure reducing valve. Such a valve provides an exactly regulated constant and particularly adjustable pressure, which assures a constant counter-force on the piston of the buffer device.

A further development of this embodiment consists in that the pressure medium, preferably compressed air, is fed to the cylinder of the buffer device selectively over one of two adjustable and preferably electrically controllable pressure reducing valves. This makes it possible to switch to the other reducing valve in case one valve fails or needs servicing. At the same time, there is another advantage when the pressure reducing valves are set to respective different pressure values, the valve with the lower pressure being connected to the buffer device in the filling phase of the cylinder thereof, and the valve with the higher pressure being connected to the cylinder of the buffer device in the emptying phase thereof. A higher pressure naturally exerts a greater force or counter-force on the piston of the buffer device. On the other hand, internal losses must be compensated during emptying of the buffer device. The two pressures can be selected so that the pressure is always the same at the inlet of the filling machine during filling of the buffer device, that is, with the pump delivery, and during the emptying of the buffer device with zero delivery of the pump. The pressure difference between the respective pressures of the two pressure reducing valves thus must be so selected that it is just sufficient to overcome the internal losses of the buffer device.

Another feature of the present invention is that the switch of the filling pump drive is simultaneously the reversing switch for the pressure reducing valves, the latter being designed as solenoid valves. The switch naturally must have several pairs of contacts, including both working contacts and rest contacts.

In another variation of the invention, the piston is connected, at its side remote from the media to be filled, to one end of a piston rod whose opposite end carries an auxiliary piston displaceable in the same cylinder or in an extension cylinder, and whose chamber remote from the piston has the pressure supplied thereto. Both the piston and the auxiliary piston, arranged coaxially thereto, are sealed from the cylinder or, in the case of a cylinder and an extension cylinder,

from their respective cylinders. Lubrication of the piston is not necessary as a rule, at least during the filling of sausage meat, because the latter can perform the lubrication. In the auxiliary piston, however, lubrication can be provided, particularly when it is operated by means of fluid pressure. The lubricant used for this purpose, however, must not be added to the filling media under any circumstances. Furthermore, the pressure medium, such as compressed air or oil under pressure, must be prevented from entering the cylinder chamber filled with the pasty medium. Since satisfactory stripping of the cylinder wall is not 100 percent assured, the last-mentioned requirement can be met by arranging the piston and the auxiliary piston sufficiently far apart that the auxiliary piston is never displaced over its entire displacement range along the part of the cylinder wall along which the piston of the buffer device slides. The cylinder chamber between the piston and the auxiliary piston can be provided with a corresponding ventilation system, if necessary. Another feature of the invention is that a control rod, extending in a sealed manner through the cylinder bottom is arranged in an extension of the piston rod, and particularly the free end of the control rod is designed as an actuating element for the switch of the filling pump drive. Approximately at the end of the downward and upward movement, the control rod turns or displaces an actuator of the switch or a transmission element arranged between the actuator and the control rod. The downward movement can be associated with a forward, and the upward movement of the control rod with a backward, rotation or displacement of the switch actuator or of the transmission element.

A particularly advantageous embodiment consists in that the free end of the control rod has a thickening, a lug, etc. which moves back and forth between two inclined flanks of a two-arm rocking lever, the axis of the rocking lever being connected with the switching mechanism or forming a part thereof.

An object of the invention is to provide an improved filling apparatus for pasty media, particularly for sausage meat.

Another object of the invention is to provide such a filling apparatus wherein pressure fluctuations are eliminated.

A further object of the invention is to provide such a filling operation in which damage to the filling machine, the filling pump or both is substantially prevented.

For an understanding of the principles of the invention, reference is made to the following description of typical embodiments thereof as illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the Drawings:

FIG. 1 is a vertical longitudinal sectional view through filling apparatus embodying the invention; and

FIG. 2 is a schematic diagram of a pneumatic control circuit.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, a pipe line 1 connects a filling pump (not shown) to a filling machine (also not shown). On a branch 2 of pipe 1, there is attached a cylinder 3 of a buffer device 4, the flanged connection

being designated 5. In cylinder 3, of buffer device 4, there is arranged a piston 6 moving up and down in the direction of the double arrow 7, piston 6 carrying a sealing ring 8 bearing on the inner wall of cylinder 3.

A piston rod 9 is inserted from the bottom into piston 6 and secured therein, for example, by means of a pin 10. The free or bottom end 11 of piston rod 9 is arranged in an auxiliary piston 12, which thus has a coaxial relation to piston 6.

Auxiliary piston 12 moves up and down in an extension cylinder 13, also in the direction of double arrow 7, and extension cylinder 13 and cylinder 3 are interconnected by a flanged connection 14. It will be readily apparent that the cylinder 3 could be made integral with extension cylinder 13. With separate production, however, the inside diameter of extension cylinder 13 can be selected to be somewhat greater than that of cylinder 3, and the same holds true for piston 6 and auxiliary piston 12. The bottom 15 of cylinder 13 is secured thereto through a flange connection 16, although it could be made integral with extension 13 or with a unitary cylinder comprising cylinders 3 and extension 13.

Cylinder bottom 15 is traversed by a control rod 17 extending through a passage sealed by means of a sealing ring 18. At its free lower end, control rod 17 carries a lug 19 which is in the form of a cylindrical central section and two truncated cone end sections, lug 19 cooperating with a rocking lever 30 oscillating, in the direction of double arrow 20, about the axis 21 of a switch 22. In FIG. 1, the bottom end position of extension 19, and thus also of auxiliary piston 12 and of piston 6, is illustrated in solid lines, while the two switching positions of lug 19 are illustrated in broken lines. The operation of this arrangement will be described hereinafter.

When the filling pump delivers more pasty media to pipe 1 and branch 2 than the filling machine can eject instantaneously, the excess filling material escapes into cylinder 3 and displaces piston 6 downwardly in the direction of arrow 24. Cylinder chamber 25 of extension cylinder 13, or of a common cylinder of the buffer device 4 embodying the invention, is connected through a line 26 to a source of compressed air. This connection is shown schematically in FIG. 2, which will be described more fully hereinafter.

The pressure in cylinder chamber 25 is adapted to that in pipe line 1, that is, piston 6 and the parts connected thereto remain stationary, despite the pressure prevailing in cylinder chamber 25, when the filling machine can utilize fully the amount of pasty media delivered by the filling pump. With excessive delivery from the pump, the piston or the entire system displaced with it moves downwardly in the direction of arrow 24. As soon as lug 19 has reached the bottom broken line position 27, it presses against the flank 28 of rocking lever 23 and turns the latter clockwise. This has the result that a pair of contacts in switch 22 is opened to interrupt the supply of current to the pump drive motor. By shutting off the pump drive motor, further delivery of the pasty media stops. However, since the pressure in cylinder 25 is maintained and the filling machine continues to run, the pneumatic force acting on auxiliary piston 12 can take effect, pushing out the material accumulated in the interior of cylinder 3 through auxiliary piston 12, piston rod 9 and piston 6. As soon as lug 19 has reached the upper position indicated by the broken lines at 29, it strikes against the flank 30 of the other arm of rocking lever 23, and turns lever 23 coun-

terclockwise. The contacts of switch 22 are thus closed again and the drive of the pump is restarted.

During ejection of the pasty media from cylinder 3, the friction forces of piston 5, of auxiliary piston 12 and of piston rod 17 must be overcome. On the other hand, it is important for uniform portioning that the pressure in pipe line 1 is always kept constant. If the friction losses were not compensated, this would automatically be felt in a drop of the pressure in pipe line 1, which is undesirable, as mentioned above. It is thus necessary that the pressure in cylinder chamber 25 be higher, during emptying of the cylinder, then during filling of the cylinder, and this is attained in a manner which will now be described.

Referring to FIG. 2, the compressed air does not flow directly to cylinder chamber 25, but is supplied alternately through two pressure reducing valves 31 and 32 set to respective different pressures. In the specific embodiment illustrated, a starting pressure of 2.5 excess atm. (3.5 atmospheres) is provided for pressure reducing valve 31, and a starting pressure of 3 excess atm. (4 atmospheres) for pressure reducing valve 32. Consequently, the compressed air is fed to cylinder chamber 25, during the filling phase, through pressure reducing valve 31 and, during the emptying phase through pressure reducing valve 32. Each valve has a respective setting mechanism 33, 34. The pressure reducing valves are electromagnetically controllable, as mentioned above. The opening and closing of the circuits is effected likewise by means of switch 22 and control rod 17, and thus by the piston of the buffer device. Switch 22 therefore must have a corresponding number of contacts to open and close the circuits of these pressure reducing valves.

Compressed air is fed to the two pressure reducing valves 31 and 32 through the line 35 and 36, the preliminary pressure being 6 excess atm. (7 atmospheres), for example. A distributing slide valve 37 connects pressure reducing valve 31 and pressure reducing valve 32 alternately with a known relay valve 38. The supply line to relay valve 38 is indicated at 39. The switching of distributing slide valve 37 likewise can be effected electrically by switch 22, which can be provided with an additional pair of contacts for this purpose. However, the switching also can be effected in other ways, for example, pneumatically. Relay valve 38 receives, at the same time, the preliminary pressure (6 excess atm.) from line 40 and, in addition, it is connected to a manometer 41. A connecting line 42 extends from relay valve 38 to cylinder chamber 25, or to line 26, shown in FIG. 1. The pipe lines indicated in FIG. 2 by broken lines serve special control purposes whose details are not essential for the invention, and these pipe lines can also be omitted.

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. In filling apparatus for pasty media, particularly for sausage meat, having a supply pipe adapted to connect

a filling machine to a filling pump having a pump drive, the improvement comprising, in combination, a buffer device connected to said supply pipe to receive pasty media supplied in excess of the amount used; said buffer device comprising a cylinder and a piston reciprocable in said cylinder and dividing said cylinder into two chambers; one of said chambers being connected to said supply pipe; means applying a substantially constant force to said piston opposing movement of said piston away from said supply pipe; said means applying a substantially constant force to said piston comprising means applying a substantially constant fluid pressure to that side of said piston remote from the pasty medium; and at least one adjustable pressure reducing valve operable by said piston in accordance with the direction of movement thereof and regulating the fluid pressure applied to said piston to provide a relatively higher pressure during emptying of said cylinder and a relatively lower pressure during filling thereof.

2. In filling apparatus for pasty media, particularly for sausage meat, having a supply pipe adapted to connect a filling machine to a filling pump having a pump drive, the improvement comprising, in combination, a buffer device connected to said supply pipe to receive pasty media supplied in excess of the amount used; said buffer device comprising a cylinder and a piston reciprocable in said cylinder and dividing said cylinder into two chambers; one of said chamber being connected to said supply pipe; means applying a substantially constant force to said piston opposing movement of said piston away from said supply pipe; said means applying a substantially constant force to said piston comprising means applying a substantially constant fluid pressure to that side of said piston remote from the pasty medium; and two selectively operable adjustable pressure reducing valves connected in parallel and operable alternately by said piston to regulate the application of fluid pressure to said piston.

3. In filling apparatus for pasty media, the improvement claimed in claim 2, in which said pressure reducing valves are electrically controllable; the fluid pressure medium being constituted by compressed air.

4. In filling apparatus for pasty media, the improvement claimed in claim 3, in which said pressure reducing valves are set to respective different pressure values; the valve with the lower pressure valve being operable to control the fluid pressure applied to said piston during filling of said cylinder, and the valve set to the higher pressure value controlling the fluid pressure supplied to said piston during emptying of said cylinder.

5. In filling apparatus for pasty media, the improvement claimed in claim 4, including a pump drive controlling element; said piston being connected to said controlling element to deactivate said pump drive when said cylinder is substantially filled and to reactive said pump drive when said cylinder is substantially empty; said pressure reducing valves being solenoid-operated valves; said control element further constituting a reversing switch operable to selectively energize a respective pressure reducing valve during filling and emptying of said cylinder.

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