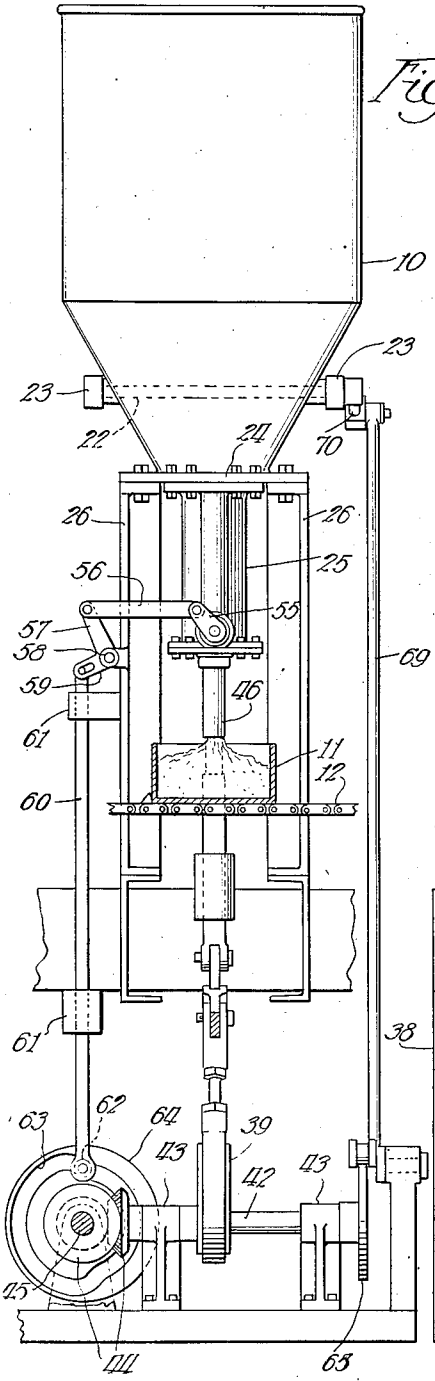
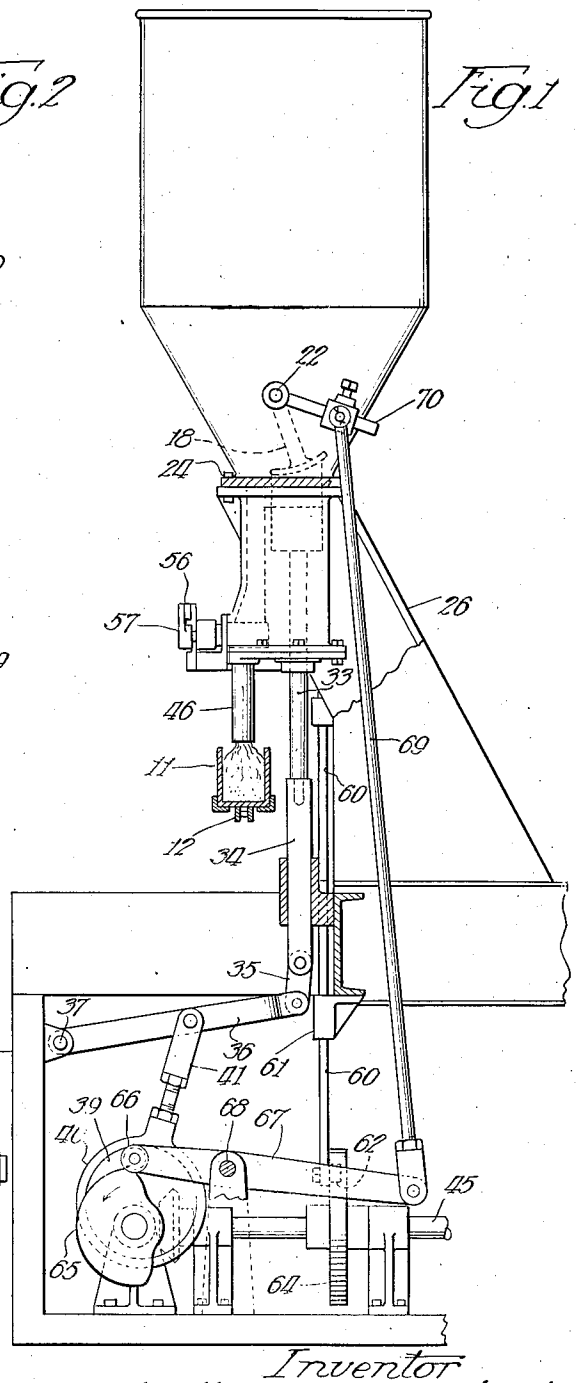
Aug. 10, 1943. W. F. LINSTEDT 2,326.302

FILLING MECHANISM

Filed Jan. 10, 1941 4 Sheets-Sheet 1





Inventor
William F. Linstedt
By: Sears, Pond & Anderson Attys

Aug. 10, 1943. W. F. LINSTEDT 2,326,302

FILLING MECHANISM

Filed Jan. 10, 1941 4 Sheets-Sheet 2

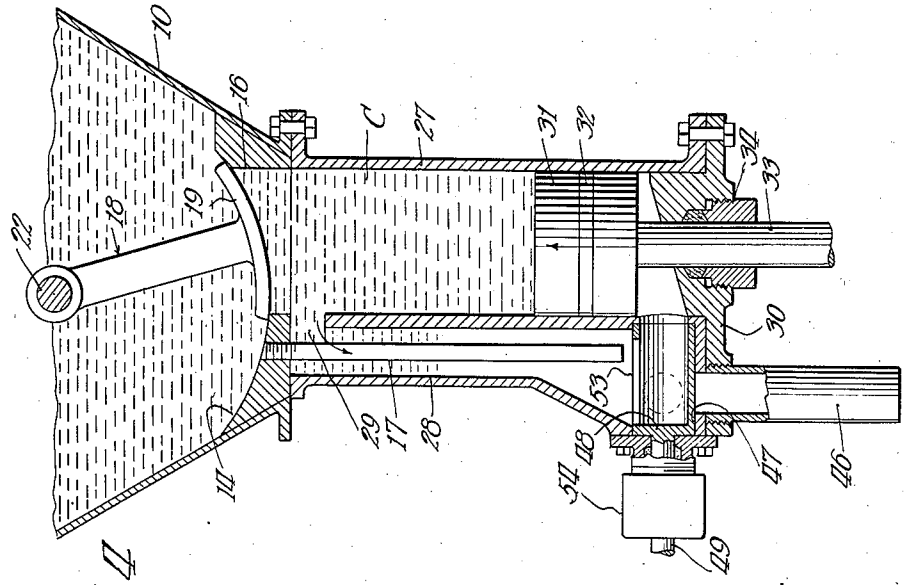


Fig. 4

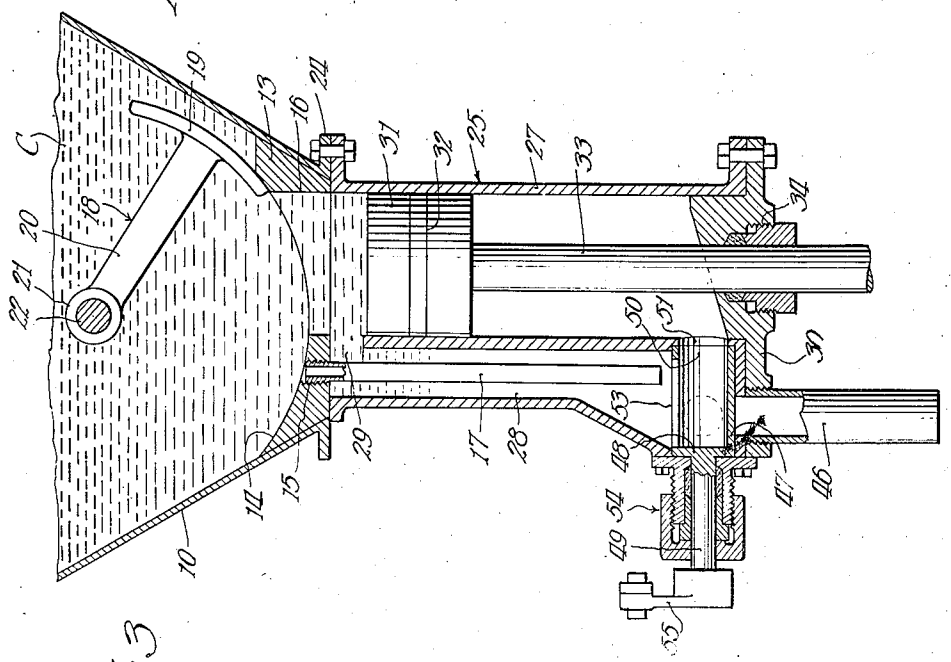


Fig. 3

Inventor
William F. Linstedt
By: Sloans, Pond & Anderson Attys.

Aug. 10, 1943. W. F. LINSTEDT 2,326,302

FILLING MECHANISM

Filed Jan. 10, 1941 4 Sheets-Sheet 3

Fig. 5.

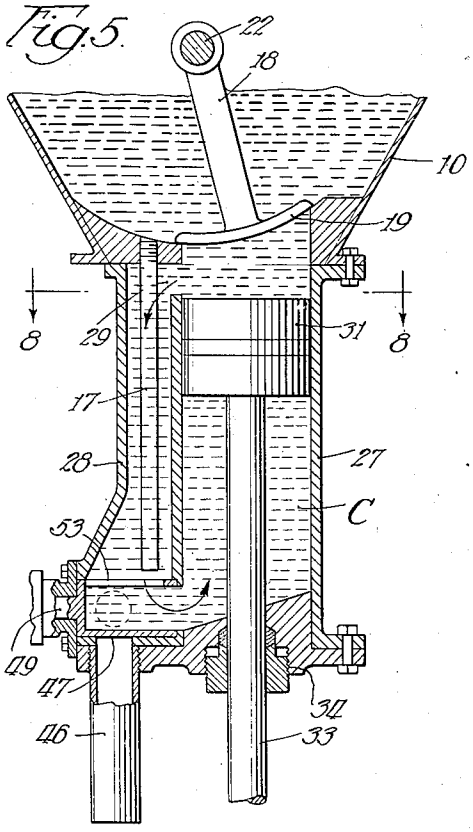


Fig. 6.

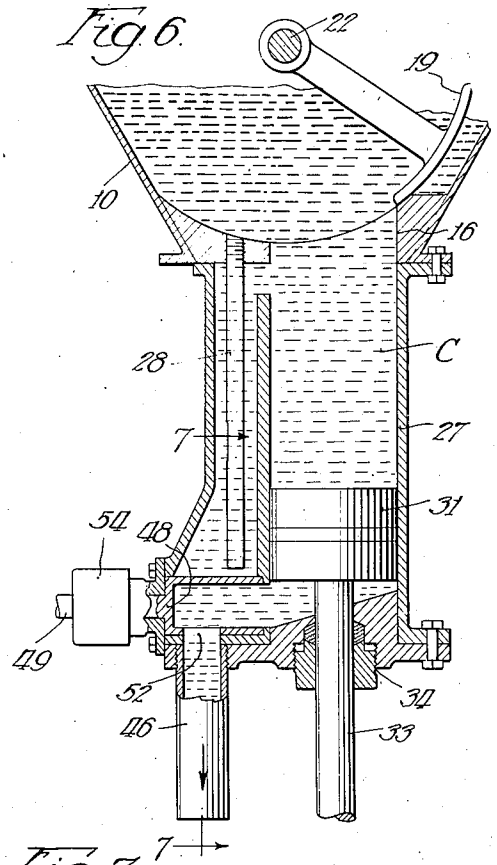


Fig. 7

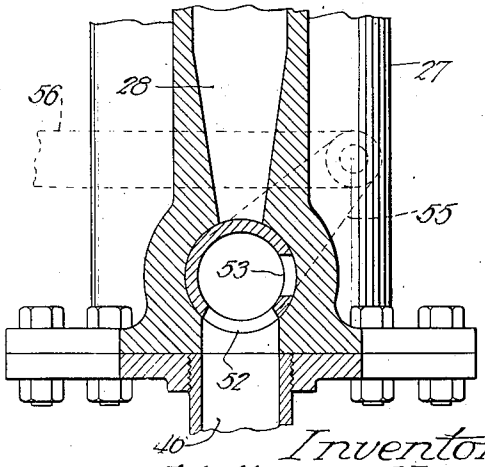
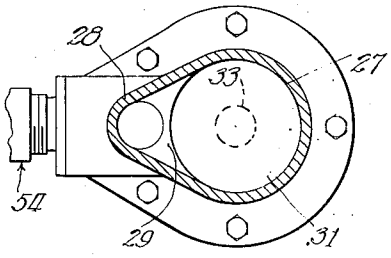


Fig. 8.



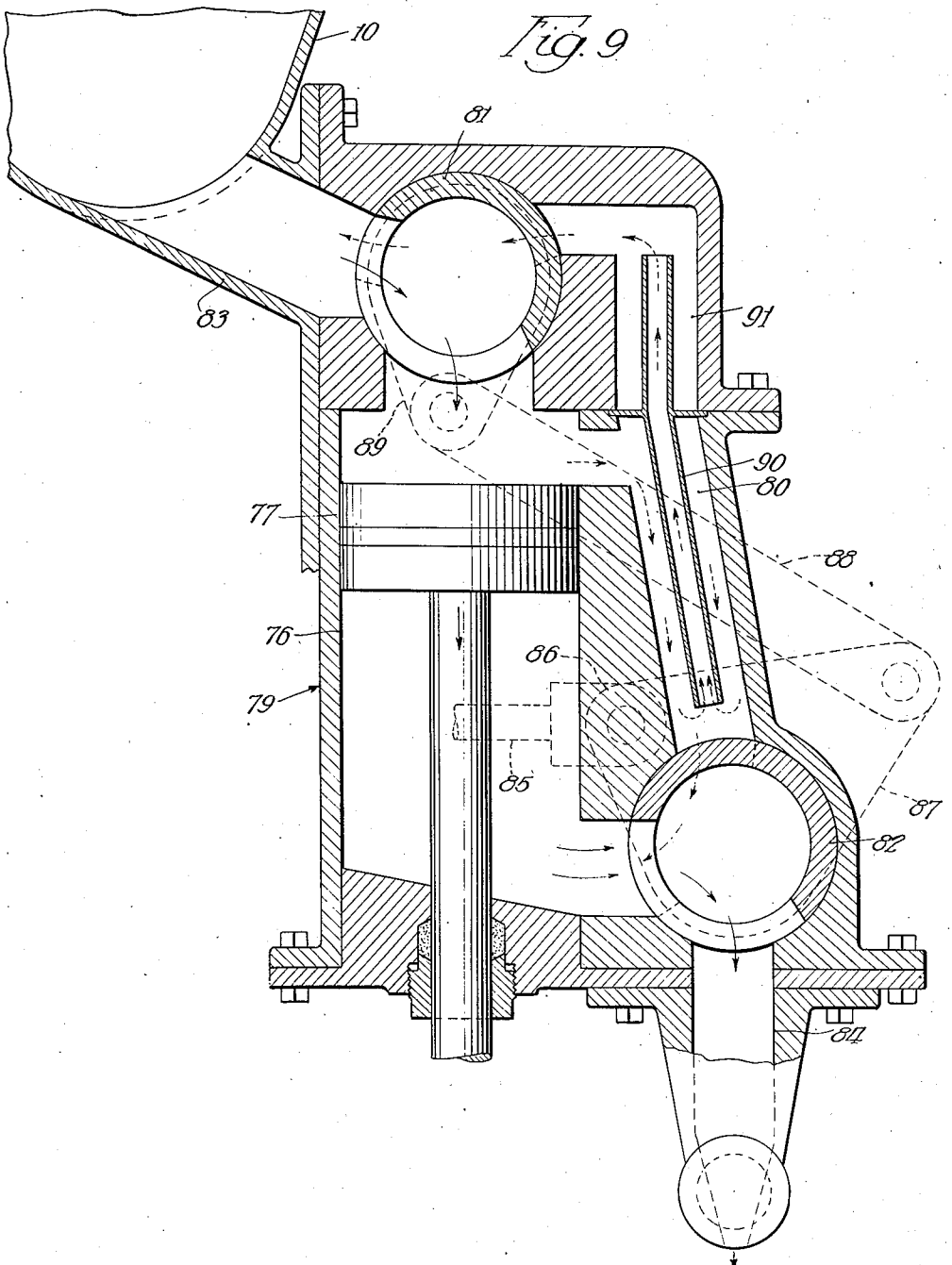
Inventor
William F. Linstedt
By: Strauss, Pond & Anderson Attys.

Aug. 10, 1943. W. F. LINSTEDT 2,326,302

FILLING MECHANISM

Filed Jan. 10, 1941 4 Sheets-Sheet 4

Fig. 9



Inventor
William F. Linstedt
By: Soans, Pond & Anderson Attys.

Patented Aug. 10, 1943 2,326,302

UNITED STATES PATENT OFFICE

2,326,302

FILLING MECHANISM

William F. Linstedt, Freeport, Ill., assignor to Kraft Cheese Company, Chicago, Ill., a corporation of Delaware

Application January 10, 1941, Serial No. 373,963

9 Claims. (Cl. 221—102)

This invention relates to improvements in filling mechanism and more particularly to an improvement in a pump mechanism especially adapted for use in the filling of containers with heavy viscous products, such as cheese, butter, and other food products in a molten state and other materials having similar characteristics governing the handling thereof in respect of its packaging.

The main objects of the invention are to provide an apparatus of the character indicated which will efficiently and effectively feed a predetermined quantity of material from a source thereof to a container or other packaging device; to provide such mechanism which will be relatively simple and which may be easily maintained and cleaned and which may be easily kept in sanitary condition for use in connection with the packaging of food products; and other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawings (four sheets) wherein there is illustrated a filling mechanism embodying a selected form of the invention.

In the drawings:

Fig. 1 is an end elevation;

Fig. 2 is a side elevation;

Fig. 3 is a section through the main elements of the filling mechanism;

Figs. 4, 5 and 6 are sections corresponding to Fig. 3 but showing successive steps in the operation of the mechanism;

Fig. 7 is a section on the line 7—7 of Fig. 6;

Fig. 8 is a section on the line 8—8 of Fig. 5; and

Fig. 9 is a section similar to Fig. 3 but showing a modified arrangement.

Referring now to the drawings, the improved mechanism comprises a hopper or other receptacle 10 for a quantity of material which is to be fed in measured amounts to a receptacle such as indicated at 11. In this instance, the apparatus is disclosed in connection with the packaging of cheese in a wooden or other suitable container of generally rectangular form. Containers such as indicated at 11 are adapted to be propelled step by step by means of a suitable conveyor 12 through the zone of operation of the filling mechanism, the means for actuating the conveyor being herein omitted since it forms no part of the present invention.

The hopper 10 is provided in its bottom portion with an end member 13 having an arcuate upper surface 14, a tapped opening 15 and another opening 16.

Within the hopper 10 there is pivotally mounted a valve member 18, the same comprising an arcuate plate portion 19, an arm portion 20 and a hub 21 which is mounted on a shaft 22. The shaft 22 is journalled in suitable bearings such as indicated at 23 provided outside of the hopper adjacent its opposite sides. Suitable stuffing boxes or other provision may be made to prevent leakage of the material from the hopper where the shaft 22 emerges therefrom. The curvature of the arcuate plate member 19 conforms to the curvature of the inner face 14 of the end member 13 and said valve member is adapted to be rocked from the position illustrated in Figure 3 wherein it is disposed at one side of the opening 16 to the position illustrated in Figure 4 wherein it closes said opening 16.

The lower end of the hopper 10 is provided with an external flange 24 for facilitating attachment to said lower end of the hopper, of a pump unit structure designated in its entirety by the reference numeral 25. The flange 24 is extended sufficiently to facilitate mounting of the hopper on supporting brackets such as indicated at 26 in Figures 1 and 2.

The pump unit 25 comprises a body, usually a casting, having therein a cylindrical chamber 27 and a conduit 28. The cylinder 27 is in alignment with the opening 16 of the hopper so as to communicate through said opening with the interior of the hopper.

The lower end of the pump structure is closed by a head 30, the same being bolted thereto as illustrated, suitable flanges being provided for that purpose.

Within the cylinder 27 there is provided a piston 31, the same being provided with one or more piston rings such as indicated at 32 to prevent leakage around the piston. The piston is carried by the upper end of a piston rod 33 which is slidably supported in the end closure 30, a suitable stuffing box such as indicated at 34 being provided to prevent leakage from the cylinder 27 around said piston rod 33.

The piston rod 33 has its lower end connected by means of an extension rod 34 and a link 35 to the free end of an arm 36 which is pivotally mounted at its other end as shown at 37 in a bracket or similar part carried by a suitable frame structure designated in its entirety at 38. The arm 36 is rocked on its pivot mount 37 by suitable means, in this instance comprising an eccentric 39, an eccentric ring 40, and a connecting rod 41. The eccentric 39 is carried by a shaft 42 which is rotatably supported by suitable

bearings such as indicated at 43 and said shaft and eccentric are adapted to be continuously rotated as by means of a bevel gear connection indicated at 44 to a shaft 45 which may be driven continuously in any suitable manner. Continuous rotation of the eccentric 39 will serve through the described connections to effect constant and uniform rocking of the arm 36 and reciprocation of the piston 31 within the cylinder 27.

The conduit 28 communicates at its opposite ends with the respectively adjacent ends of the cylinder. Such communication is established at one end, in this instance the upper end, by means of a port 29 formed in the pump body. At the other end, such communication is established and controlled by means of a suitable valve structure which also establishes and controls communication with an outlet nozzle 46, the latter being suitably mounted in the end member 30. The valve structure referred to comprises a hollow cylindrical member 47, one end of which is closed as indicated at 48 and provided with a shaft extension 49. The other end of the hollow valve member 47 is open as indicated at 50 and communicates through an opening 51 (in the wall between the conduit 28 and cylinder 27) with the lower end portion of the cylinder 27.

Said valve member 47 is also provided with openings 52 and 53 (see Figure 7) which are respectively adapted to establish or shut off communication between the interior of the valve member 47 and the conduit 28 and discharge nozzle 46. The valve cylinder 47 is rotatably mounted in the lower end portion of the conduit 28 as clearly indicated in Figures 3 to 7, inclusive, and its shaft extension 49 is surrounded by a suitable bearing and stuffing box structure indicated in its entirety at 54 which will serve to prevent any possible leakage from within the conduit 28 around the outside of the rotary valve structure. The outer end portion of the shaft extension 49 is provided with an arm 55 rigidly secured thereto, the outer end of said arm being connected by means of a link 56 to the free end of one arm 57 of a bell crank which is pivotally mounted as indicated at 58 on a suitable lug or bracket carried by one of the hopper supports 26. The other arm 59 of the bell crank just referred to has its outer end operatively connected to a rod 60 which is vertically slidably mounted in suitable bearings such as indicated at 61 and its lower end provided with a roller 62 for cooperation with a cam track 63 in a cam disc 64. As best shown in Figure 1, the cam disc 64 is carried by the shaft 45 so as to be constantly rotated therewith. The cam track 63 is so shaped as to impart rocking movement to the bell crank arms 57 and 59 and oscillating movement to the valve cylinder 47 in predetermined, synchronized relation to the reciprocation of the piston 31.

The valve 18 is controlled by means of a cam 65 which acts against a roller 66 carried by one end of an arm 67 pivotally mounted as indicated at 68 intermediate its ends. The other end of the arm 67 is connected by means of a link 69 to an arm 70 which is mounted on an extension of the valve shaft 22.

A relief or vent pipe 17 is mounted in the opening 15 as by being threaded thereinto and said pipe extends downwardly and terminates in an open end adjacent the valve member 47.

In the operation of the device, the hopper 10 is filled with the material to be packaged, such material being in a molten but relatively heavy, viscous state so that it does not flow very freely. Assuming that the hopper 10 is filled when the piston 31 happens to be in an up position as shown in Figure 3, and the valve 18 in an open position as therein shown, the valve 47 will be in position establishing communication between the lower ends of the conduit 28 and the cylinder 27. On the next down stroke of the piston 31, the material such as a molten cheese designated C will be sucked or of its own weight will flow downwardly into the cylinder 27 on top of the piston 31 to fill said cylinder so that the condition illustrated in Figure 4 will be attained.

Air expelled from below the piston will follow the course of least resistance and will flow upwardly through the relief pipe 17 and into the hopper. Some air may also flow upwardly outside of the pipe 17 and find its way into the hopper and but little, if any, air will be found in the cheese content drawn into the cylinder 27.

The valve 18 is automatically closed when the piston 31 reaches the bottom of the cylinder 27 but the valve 47 remains unmoved with its opening 53 communicating with the conduit 28. The next movement of the piston 31 will be in an upward direction and will serve to force the material C from the cylinder 27 above the piston through the port 29, the conduit 28, and the valve 47 into the cylinder 27 below the piston 31, so that the condition illustrated in Figure 5 will result.

The capacity of the cylinder portion 27 below the piston 31 is less than that of the upper portion owing to the presence of the piston shaft 33 in said lower portion. Hence it will be seen that the material fed from the upper portion of the cylinder to the lower portion thereof will be fed under pressure, it being observed that only limited relief is provided by the relief pipe 17. The pressure thus produced in the material incident to its transfer from the upper portion of the cylinder to the lower portion thereof tends to squeeze out any entrapped air and it has been found that there is a definite tendency for such entrapped air to leave the body of the material and flow upwardly in the relief pipe 17. Thus the material is substantially freed from entrapped air so that upon delivery to a container practically no entrapped air will be included.

At the start of the next downward movement of the piston 31, the valve 18 will again be opened and the valve 47 will be automatically turned to align its opening 52 with the discharge nozzle 46 and to shut off communication between the lower ends of the cylinder and conduit as shown in Figure 6. The material C within the cylinder 27 and below the piston 31 will then, upon downward movement of the piston, be discharged from the cylinder through the valve 47 and the nozzle 46. The nozzle 46 delivers the material to the container or receptacle 11 as clearly shown in Figures 1 and 2. While the piston 31 is moving downwardly and effecting discharge of material through the nozzle 46, a new charge of the material C is drawn through the valve opening 16 into the cylinder 27 on top of the piston 31. When the piston 31 next moves upwardly, the valve 18 will be closed as shown in Figure 5 and the material in the cylinder above the piston 31 will be forced through the port 29, the conduit 28 and valve 47 into the cylinder 27 below the piston 31. The valve 47 is of course automatically turned when the piston 31 begins its upward movement to again align its opening 53 with the conduit 28 to permit the last mentioned course of material from within the cylinder 27

above the piston 31 into the cylinder below the piston 31.

The pump mechanism continues to operate in the manner described, each down stroke of the piston serving to discharge a definitely measured quantity of material from the cylinder 27 through the nozzle 46 and to draw into the cylinder above the piston a new supply of the material.

Incident to the feeding of material from the cylinder portion 27 above the piston 31, any excess material which cannot be received within the conduit 28, the valve 47 and the portion of the cylinder 27 beneath the piston will be forced upwardly in the pipe 17 and returned to the main body of material in the hopper 10. It will be observed that the head of material within the pipe 17 is sufficient to insure travel of the material through the conduit 28 into the cylinder 27 below the piston rather than upwardly through the pipe 17. In other words, the head of material in the pipe 17 (including the effect of the restricted size of the pipe) prevents the material from following an upward course through said pipe instead of the described circulating course whereby it reaches the lower portion of the cylinder beneath the piston. Such head, furthermore, serves to insure complete filling of the cylinder 27 beneath the piston with consequent benefits in respect of expulsion of air and the accuracy of the measured quantity and weight of material delivered by the pump structure upon each downward stroke of the piston.

The cam track 63 which controls the valve 47 is so shaped as to effect adjustment of the valve in properly synchronized relation with the piston 31 and to hold the valve 47 in stationary position during the travel of the piston. Similarly, the cam 65 which controls the hopper valve 18 is so shaped and synchronized relative to the eccentric 29 as to operate the valve in the indicated movement to the piston. Suitable spring, weight or other means (not shown) may be provided for causing the cam roller 66 to follow the cam 65.

In a modified arrangement, the hopper valve 18 is eliminated and replaced by another valve which is incorporated in the pump mechanism unit proper. Such a modified arrangement is somewhat advantageous in that it avoids agitating the material in the hopper and in that cleaning of the structure is facilitated.

In the modified arrangement shown in Figure 9, a pump mechanism unit designated in its entirety by the reference numeral 75 embodies a cylinder 76, a piston 77 reciprocable within the cylinder, a by-pass or conduit 80, an upper rotary valve 81, and a lower rotary valve 82. In the modified arrangement, the rotary valve 81 controls communication between the cylinder and the hopper 10 which in this instance has an outlet spout 83 connected to the pump unit, suitable flanges such as indicated being provided for interattachment of the parts by means of bolts (not shown) or otherwise. The valve 82 controls communication between the cylinder 76, the by-pass 80, and a discharge outlet 84.

The piston 77 may be reciprocated by any suitable mechanism such as already described and the valves 81 and 82 may be interconnected and actuated by a single actuated connecting rod 85 which may be actuated by a cam or crank or other suitable means not shown. The actuating member 85 is pivoted as indicated at 86 to a portion of an arm 87 which is connected to the rotary valve body 82. Another portion of the arm 87 has pivoted to it one end of a link 88, the other end of which is pivoted to an arm 89 which is formed integral with or suitably connected to the rotary valve body 81.

In the arrangement shown in Figure 9, when the piston 77 is moved downwardly to discharge into a receptacle the material then located in the cylinder below the piston, the valves 81 and 82 are disposed in the positions shown. Accordingly, the material is forced from the cylinder below the piston through the rotary valve body 82 and into the discharge outlet 84, the valve body 82 during such time closing communication between the outlet or discharge end of the cylinder and the conduit 80. When the piston is moving downwardly, the valve body 81 is so disposed that communication is effected between the hopper 10 and the upper portion of the cylinder, so that a fresh charge of material may be drawn into the cylinder above the piston.

When the piston reaches its lowermost position, the valves 81 and 82 are turned so as to establish communication between the lower end of the cylinder and the lower end of the by-pass 80. The valve body 81 is turned so as to close communication between the upper end of the cylinder and the hopper but when the valve is so adjusted, it establishes communication between the upper end portion of the by-pass 80 and the hopper.

Incident to the upward movement of the piston, the new charge of material in the cylinder above the piston will, of course, be forced around through the by-pass 80 and the valve 82 into the lower portion of the cylinder. Excess material will find its way upwardly through a relief pipe 90, the lower end of which is preferably located near the surface of the valve body 82 and the upper end of which is located near the valve body 81 in an extension 91 of the by-pass 80. The extension 91 communicates with the by-pass 80 only through the restricted relief tube 90, so that a predetermined amount of pressure will be required to force the excess material from the by-pass 80, through the tube 90 into the by-pass extension 91, and thence back to the hopper. The pressure so developed serves, as before stated, to insure complete filling of the cylinder portion below the piston and to eliminate air from the material.

In the modified arrangement shown in Figure 9, both valves are embodied in a unitary pump structure which is bodily removable from the mechanism for cleaning purposes. It is a relatively simple matter to substitute a previously claimed duplicate structure for one which is removed so that loss of time incident to cleaning of the structure may be maintained at a minimum.

The described structure embodies no mechanism of such small size or intricate formation as to be difficult to produce or maintain, but, instead, all parts are of relatively simple form and the various openings of adequate size so that the structure may be easily cleaned and maintained in a sanitary condition; hence the structure is well adapted to the feeding of materials such as food products for packaging. Changes in the details of construction may, of course, be made without departing from the principles of invention, the scope of which should be determined by reference to the following claims which should be construed as broadly as possible consistent with the state of the art.

I claim:

1. In apparatus of the class described, the

combination of a cylinder, a piston reciprocable in said cylinder, a conduit establishing communication between the opposite ends of said cylinder, a discharge nozzle communicating with one end of said cylinder, means communicating with the other end of said cylinder for supplying material to be fed, valve means controlling communication between said cylinder, said supply source, said conduit and said discharge nozzle so as to cause material to be fed from the cylinder on one side of said piston to the cylinder on the opposite side thereof when the piston is moved in one direction and discharged through said nozzle from the cylinder on one side of said piston and drawn into the cylinder on the opposite side of the piston when the piston is moved in the other direction, a piston rod connected to said cylinder and extending out of the discharge end of said cylinder, and means for receiving material displaced by said piston rod when the material is fed from the receiving end of said cylinder to its discharge end.

2. In apparatus of the class described, the combination of a cylinder, a piston reciprocable in said cylinder, a conduit establishing communication between the opposite ends of said cylinder, a discharge nozzle communicating with one end of said cylinder, means communicating with the other end of said cylinder for supplying material to be fed, valve means controlling communication between said cylinder, said supply source, said conduit and said discharge nozzle so as to cause material to be fed from the cylinder on one side of said piston to the cylinder on the opposite side thereof when the piston is moved in one direction and discharged through said nozzle from the cylinder on one side of said piston and drawn into the cylinder on the opposite side of the piston when the piston is moved in the other direction, a piston rod connected to said cylinder and extending out of the discharge end of said cylinder, and means for receiving material displaced by said piston rod when the material is fed from the receiving end of said cylinder to its discharge end, said last mentioned means comprising an auxiliary conduit communicating with said first mentioned conduit and of such restricted size as to require at least limited compression of the material to cause the same to pass into said auxiliary conduit.

3. In apparatus of the class described, the combination of a cylinder, a piston reciprocable in said cylinder, a conduit establishing communication between the opposite ends of said cylinder, a discharge nozzle communicating with one end of said cylinder, means communicating with the other end of said cylinder for supplying material to be fed, valve means controlling communication between said cylinder, said supply source, said conduit and said discharge nozzle so as to cause material to be fed from the cylinder on one side of said piston to the cylinder on the opposite side thereof when the piston is moved in one direction and discharged through said nozzle from the cylinder on one side of said piston and drawn into the cylinder on the opposite side of the piston when the piston is moved in the other direction, a piston rod connected to said cylinder and extending out of the discharge end of said cylinder, and means for receiving material displaced by said piston rod when the material is fed from the receiving end of said cylinder to its discharge end, said last mentioned means comprising an auxiliary conduit communicating with said first mentioned conduit, said auxiliary conduit being such as to retard the passage of the displaced material therethrough, said auxiliary conduit having its upper end in communication with said source of supply so as to return displaced material to said source.

4. In apparatus of the class described, the combination of a cylinder, a piston reciprocable in said cylinder, a conduit establishing communication between the opposite ends of said cylinder, a discharge nozzle communicating with one end of said cylinder, means communicating with the other end of said cylinder for supplying material to be fed, valve means controlling communication between said cylinder, said supply source, said conduit and said discharge nozzle so as to cause material to be fed from the cylinder on one side of said piston to the cylinder on the opposite side thereof when the piston is moved in one direction and discharged through said nozzle from the cylinder on one side of said piston and drawn into the cylinder on the opposite side of the piston when the piston is moved in the other direction, a piston rod connected to said cylinder and extending out of the discharge end of said cylinder, and means for receiving material displaced by said piston rod when the material is fed from the receiving end of said cylinder to its discharge end, said last mentioned means comprising an auxiliary conduit communicating with said first mentioned conduit and with said source of supply, and said valve means comprising means for stopping communication between said auxiliary conduit and said supply source when the piston moves in material-discharging direction.

5. In apparatus of the class described, the combination of a cylinder, a piston reciprocable in said cylinder, a conduit establishing communication between the opposite ends of said cylinder, a discharge nozzle communicating with one end of said cylinder, means communicating with the other end of said cylinder for supplying material to be fed, valve means controlling communication between said cylinder, said supply source, said conduit and said discharge nozzle so as to cause material to be fed from the cylinder on one side of said piston to the cylinder on the opposite side thereof when the piston is moved in one direction and discharged through said nozzle from the cylinder on one side of said piston and drawn into the cylinder on the opposite side of the piston when the piston is moved in the other direction, a piston rod connected to said cylinder and extending out of the discharge end of said cylinder, and means for receiving material displaced by said piston rod when the material is fed from the receiving end of said cylinder to its discharge end, said last mentioned means comprising an auxiliary conduit communicating with said first mentioned conduit and with said source of supply.

6. In apparatus of the class described, the combination of a cylinder, a piston reciprocable in said cylinder, a conduit establishing communication between the opposite ends of said cylinder, a discharge nozzle communicating with one end of said cylinder, means communicating with the other end of said cylinder for supplying material to be fed, valve means controlling communication between said cylinder, said supply source, said conduit and said discharge nozzle so as to cause material to be fed from the cylinder on one side of said piston to the cylinder on the opposite side thereof when the piston is moved in one direction and discharged through said nozzle from the cylinder on one side of said piston

and drawn into the cylinder on the opposite side of the piston when the piston is moved in the other direction, a piston rod connected to said cylinder and extending out of the discharge end of said cylinder, and means for receiving material displaced by said piston rod when the material is fed from the receiving end of said cylinder to its discharge end, said last mentioned means comprising an auxiliary conduit disposed within said first mentioned conduit and having one end communicating with the interior of the first mentioned conduit adjacent its connection with the discharge end of the cylinder, the other end of said auxiliary conduit being connected to said supply source adjacent the receiving end of the cylinder.

7. In apparatus of the class described, the combination of a cylinder, a piston reciprocable in said cylinder, a discharge nozzle communicating with one end of said cylinder, a supply source communicating with the other or receiving end of said cylinder, piston actuating means comprising a rod connected to said piston and extending out of the discharge end of said cylinder, a conduit extending between the opposite ends of said cylinder, valve means controlling communication between said supply source and the receiving end of said cylinder, and a second valve means controlling communication between the other end of said cylinder and said discharge nozzle and between the discharge end of said cylinder and said conduit, means for actuating said valves to, at one time, establish communication between the opposite ends of said cylinder respectively with said supply source and said discharge nozzle while also closing communication between the discharge end of said cylinder and said conduit, and at another time, to close communication between said supply source and discharge nozzle with the cylinder while establishing communication between the opposite ends thereof through said conduit.

8. In apparatus of the class described, the combination of a cylinder, a piston reciprocable in said cylinder, a discharge nozzle communicating with one end of said cylinder, a supply source communicating with the other or receiving end of said cylinder, a piston actuating means comprising a rod connected to said piston and extending out of the discharge end of said cylinder, a conduit extending between the opposite ends of said cylinder, valve means controlling communication between said supply source and the receiving end of said cylinder, a second valve means controlling communication between the other end of said cylinder and said discharge nozzle and between the discharge end of said cylinder and said conduit, means for actuating said valves to, at one time, establish communication between the opposite ends of said cylinder respectively with said supply source and said discharge nozzle while also closing communication between the discharge end of said cylinder and said conduit, and at another time, to close communication between said supply source and discharge nozzle with the cylinder while establishing communication between the opposite ends thereof through said conduit, and restricted flow means connected to the discharge end portion of said cylinder for permitting the escape from the volume of material fed to the discharge end portion of the cylinder, of any amount of such material in excess of the capacity of said discharge end portion of the cylinder, the restricted character of said means serving to cause compression of the material remaining in the delivery end portion of the cylinder.

9. In apparatus of the class described, the combination of a cylinder, a piston reciprocable in said cylinder, a discharge nozzle communicating with one end of said cylinder, a supply source communicating with the other or receiving end of said cylinder, a piston actuating means comprising a rod connected to said piston and extending out of the discharge end of said cylinder, a conduit extending between the opposite ends of said cylinder, valve means controlling communication between said supply source and the receiving end of said cylinder, a second valve means controlling communication between the other end of said cylinder and said discharge nozzle and between the discharge end of said cylinder and said conduit, means for actuating said valves to, at one time, establish communication between the opposite ends of said cylinder respectively with said supply source and said discharge nozzle while also closing communication between the discharge end of said cylinder and said conduit, and at another time, to close communication between said supply source and discharge nozzle with the cylinder while establishing communication between the opposite ends thereof through said conduit, and restricted passage means connected to the discharge end portion of said conduit for permitting the escape from the volume of material fed through said conduit to the delivery end portion of the cylinder, of any amount of such material in excess of the capacity of said discharge end portion of the cylinder, the restricted character of said passageway serving to cause compression of the material fed to the delivery end portion of the cylinder.

WILLIAM F. LINSTEDT.