United States Patent [19]

Lewis

[11] 3,795,352

[45] Mar. 5, 1974

[54] VALVE MEMBER FOR PRODUCT MATERIAL DEPOSITING APPARATUS

[75] Inventor: Robert A. Lewis, Sparta, N.J.

[73] Assignee: Henry Heide, Incorporated, New Brunswick, N.J.

[22] Filed: Mar. 15, 1973

[21] Appl. No.: 341,488

[52] U.S. Cl. 222/255, 137/609, 222/318

[51] Int. Cl. B67d 5/52

[58] Field of Search 222/255, 276, 318, 109; 137/609

[56] References Cited

UNITED STATES PATENTS

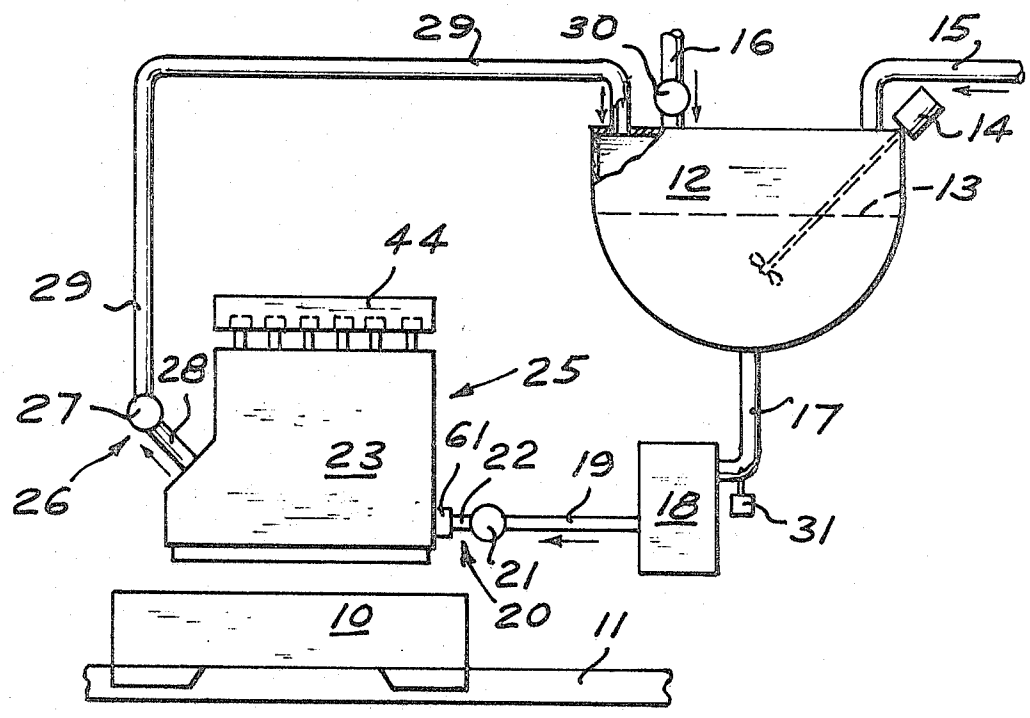
3,332,583	7/1967	Lewis	222/255
3,153,385	10/1964	Bowen	222/318 X
2,780,984	2/1957	Kleeman	222/318 X
2,771,225	11/1956	Perkins	222/255

Primary Examiner—Stanley H. Tollberg
Assistant Examiner—John P. Shannon
Attorney, Agent, or Firm—John J. Hart, Esq.

[57] ABSTRACT

The valve member is composed of a cylindrically-shaped body portion having an open longitudinally extending channel for conducting product material from a supply pipe to a discharge pipe and registerable in one rotative position of the valve member with a row of openings at the bottom of loading cylinders provided with pistons. The entry end of the channel is in communication with a product material supply pipe and the discharge end of the channel is in communication with a material discharge pipe. The valve body portion is also provided with a row of transverse passages which in another rotative position of the valve member connects the cylinder openings with product material discharge openings. The entry and discharge ends of the channel are configured to provide an uninterrupted free flow of product material from the supply pipe to the discharge pipe throughout the reciprocative movements of the valve member between the said two rotative positions.

6 Claims, 8 Drawing Figures



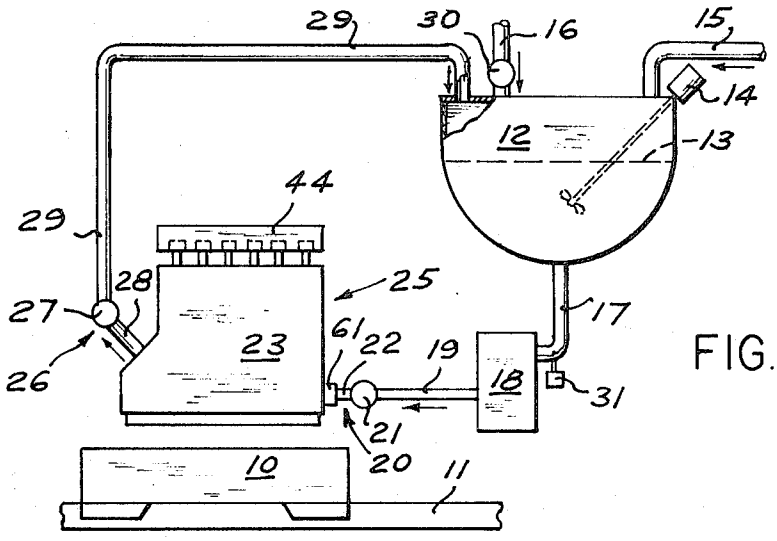

29
30
16
15
14
12
13
44
29
28
25
27
23
61
22
19
17
26
18
31
21
20
10
11

FIG. 1

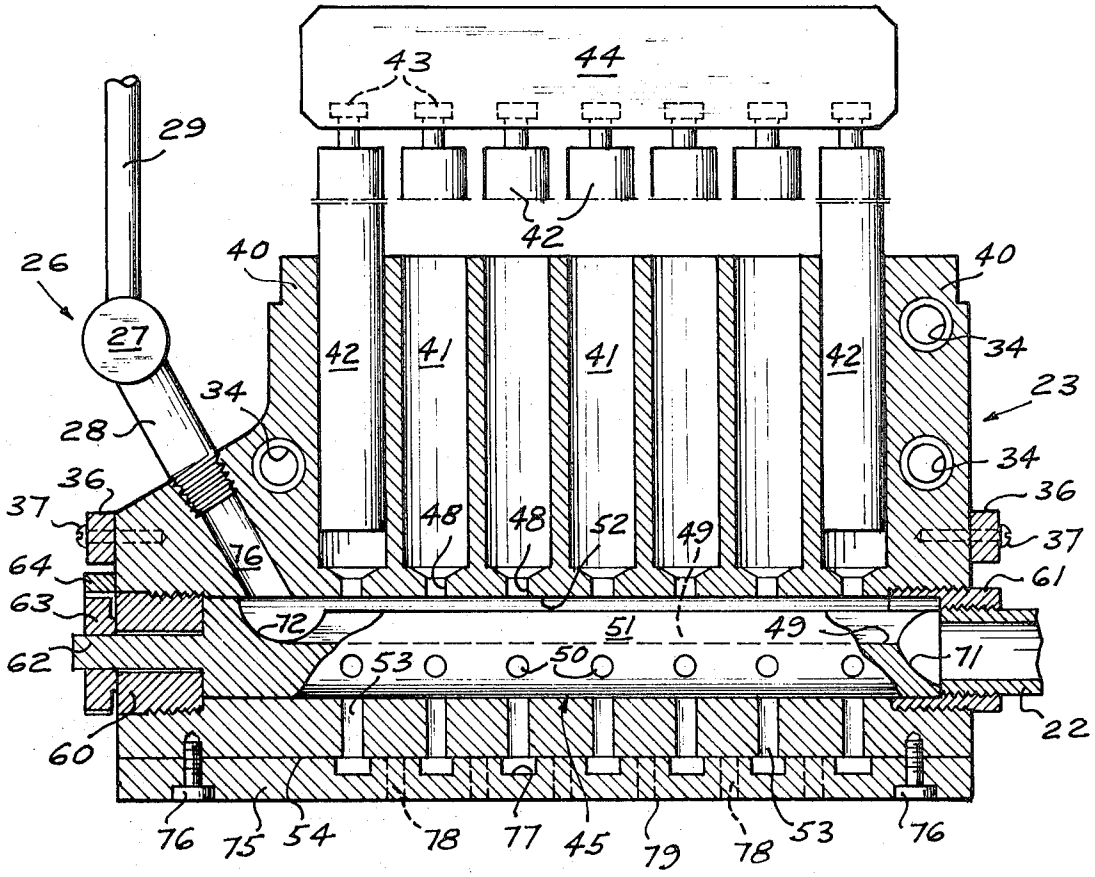

43
44
29
42
40
40
26
27
42
41
41
42
34
34
23
28
34
36
36
37
37
64
76
48
48
52
49
61
63
72
51
49
71
62
53
50
22
60
76
75
54
78
77
45
79
78
53
76

FIG. 2

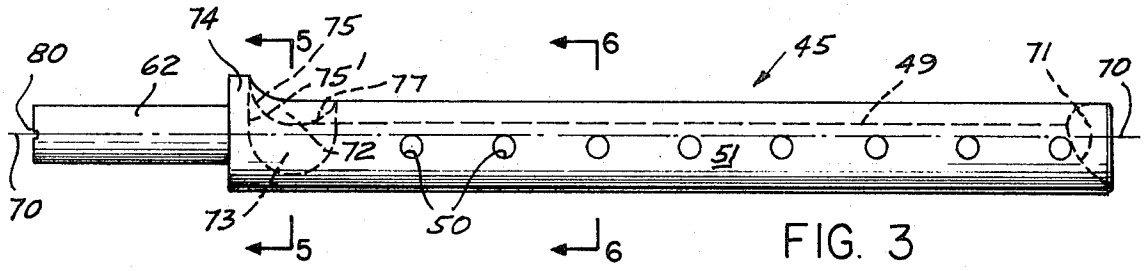


FIG. 3

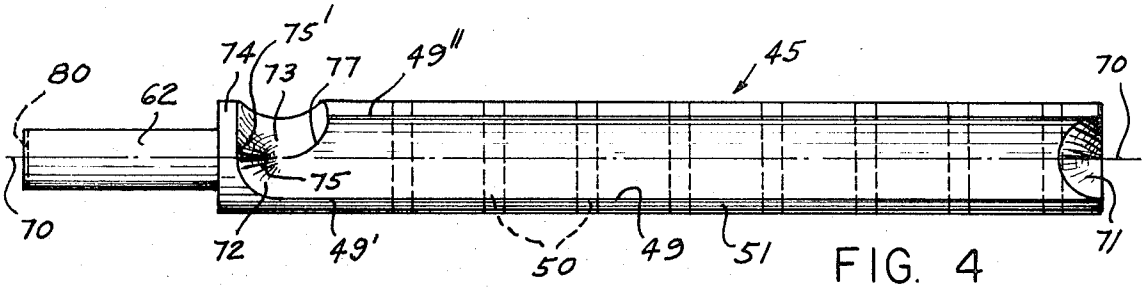


FIG. 4

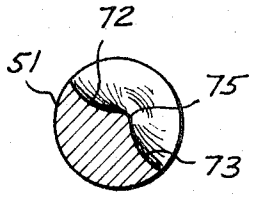


FIG. 5

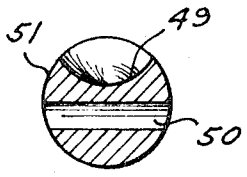


FIG. 6

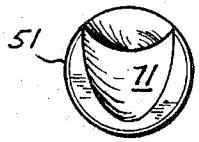


FIG. 7

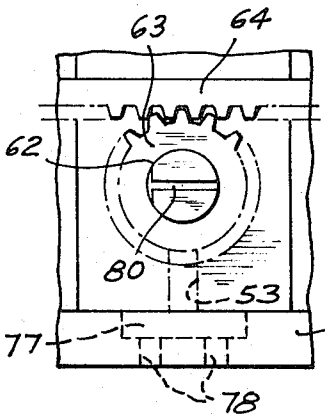


FIG. 8

VALVE MEMBER FOR PRODUCT MATERIAL DEPOSITING APPARATUS

THE INVENTION

This invention relates to apparatus for dispensing liquid and semi-liquid materials, such as for example, the dispensing of confectionary materials employed in making candy and pastries. The invention represents an improvement over the apparatus disclosed in U.S. Pat. No. 3,332,583 and wherein the product material is handled under pressure in a closed system, thereby enabling the handling of materials of a wide range of viscosities and the employment of the product material itself as the heating medium for the system.

There are many problems involved in the handling of liquid materials of the indicated type and while the apparatus of the aforesaid patent went a long ways toward the solution of many disadvantages inherent in existing apparatus for handling such materials, there still remains certain disadvantages in the use of such existing apparatus. For example, it was found that the construction of the valve member employed in such patented apparatus to control the supply of product to the cylinders of the row of pumps associated therewith and the discharge of the product from such pump cylinders, was such that it limited the number of such valve members and consequently the number of associated product pumps that can be employed in casting product pieces into a single product tray. Not only did the construction of said patented valve member limit the number of pumps that could be employed in a single operation for casting product pieces into a single product tray, but its construction also rendered it impossible to make cast pieces below a given size, thereby greatly reducing the production potential of the complete machine. Another disadvantage of such patented valve member is that it is a relatively expensive article of manufacture due to the precision with which it must be machined and the cost of installing the small discharge pipes in such valve member.

One of the most important problems in the use of apparatus of the type with which we are here concerned is that of sanitation, especially when the liquid material being handled is a food product. It has been found that the sanitary problem is directly tied in with the elimination of all obstacles to the free flow of the liquid through the apparatus even when the apparatus is not employed in the formation of the feed product from such liquid. This unobstructed flow of the liquid it has been found, is important also to the obtaining of a more uniform sized product. It has been further found that if the flow of the liquid through the apparatus can be made totally unobstructed, there are attained other advantages which would not otherwise be capable of being accomplished.

It is the primary object of this invention to provide a valve member of the indicated type having such improved construction that the dispensing apparatus in which it is employed will be enabled to attain a higher production potential, both with respect to the number and to the range of sizes of the pieces cast by such apparatus, then is now possible using known valve constructions.

Another object of this invention is to provide an improved valve member of the indicated type constructed to furnish at all times through the dispensing apparatus in which it is employed, a continuous unobstructed

laminar flow of a liquid or semiliquid material and such as will minimize the sanitation problem. Related objects of the invention are to provide an improved valve member which when employed in the dispensing apparatus will provide a continuous liquid flow of such nature that a more uniform sized product is capable of being produced and that leakage of the liquid material in the formation of such product is substantially reduced from what is normally encountered in existing dispensing apparatus.

A further object of the invention is to provide an improved valve member which will enable the production of a material flow in a dispensing apparatus of such nature that such flow will function to overcome certain mechanical inadequacies of the apparatus, will improve the operation of the apparatus, and will substantially reduce the possibility of air bubbles forming in the product.

A still further object of the invention is to provide an improved valve member of the indicated type which can be produced at a relatively low cost.

Other objects of the invention, as well as the advantages and features of novelty thereof will become more apparent from the following description when read in connection with the accompanying drawings, which illustrate by way of example, the adaption of the invention to the manufacture of candy. In the drawings:

FIG. 1 is a schematic view showing a closed system for depositing candy material in starch molds provided on trays;

FIG. 2 is a vertical sectional side view of one of the pump units in such system;

FIG. 3 is a side view of the valve member employed in such pump unit; the valve member being shown in position to supply product material to the pump cylinders;

FIG. 4 is a similar view of the valve member, but showing the latter rotated through ninety degrees to enable the pump to discharge the product material drawn into the cylinders thereof;

FIG. 5 is a vertical sectional view taken along the line 5—5 of FIG. 3;

FIG. 6 is another vertical sectional view of the valve member taken along the line 6—6 in FIG. 3;

FIG. 7 is a view of one end of the valve member shown in FIG. 3; and

FIG. 8 is an end view showing the other end of such valve member.

Referring more particularly to FIG. 1 of the drawings which illustrates a closed system of the type disclosed in said U.S. Pat. No. 3,332,583 for depositing candy material into starch molds formed in trays **10**. The trays **10** are carried by suitable conveyor mechanism, indicated generally by the numeral **11**, to different stations in the candy machine at which occur the required steps in the overall process of making the candy. The closed system shown is located at one of such stations and comprises a closed batch holding kettle **12** containing the product material **13** which is to be dispensed to the trays **10** and which is constantly agitated by a mixer **14** of known construction. The kettle **12** is a closed vessel that is heated in any suitable manner known in the art to maintain the product material at a proper temperature. The product material is fed into the kettle **12** through a conduit **15** which is connected to a suitable source of supply thereof such as a product cooker. Color and flavor is added to the cooked product mate-

rial contained in the kettle 12 and properly mixed with the latter by the mixer 14. The complete product material is discharged at the bottom of the kettle into a suitable discharge conduit 17 that delivers the material to a pump 18 of known construction. The pump 18 delivers the product material into a pipe 19 which conducts the material under pressure to a distributing closed header generally designated 20. The header 20 may be composed of a closed transverse conduit 21 having connected thereto a plurality of pipes 22, each of which delivers the product material to one of a plurality of pump units 23 which form the composite pump construction generally designated 25. It will be understood that a tray 10 containing the mold forms is provided with a substantial number of rows of mold cavities extending in the direction of the feed of such tray and that each pump unit 23 will have a row of feed cylinders equal in number to the number of mold cavities in each row thereof. The composite pump 25 is constructed to provide one row of feed cylinders for each pair of adjacent rows of mold cavities in a tray 10 so that the composite pump is composed of a plurality of units 23 equal in number to one half the number of rows of mold cavities in the tray. The excess product material not deposited into the mold cavities in the trays flows without interruption through each pump unit 23 and is discharged therefrom into a collecting header generally designated 26 and like the header 20 may be composed of a transverse conduit 27 connected by a plurality of pipes 28 to the pump units 23. The product material discharged into the header 26 by the pump units 23 is consolidated into a single stream by such header and delivered to a return pipe 29 which conducts the discharged product material back to the batch holding kettle 12.

It will be understood from the aforesaid description of the closed system shown in FIG. 1, that the product material is handled with a minimum of exposure to pollution from the atmosphere. Furthermore, as there is a constant circulation of the product material within such closed system, the material is maintained constantly at a substantially uniform temperature throughout such system. This circulation is maintained uninterruptedly by the pump 18 without the aid of the composite pump construction 25.

Considering now FIG. 2 of the drawings, it will be noted that each pump unit 23, as in the construction shown in said U.S. Pat. No. 3,332,583, is composed of a housing 40 which is bored to provide a row of aligned cylinders 41 in each of which is mounted a reciprocating piston 42. As is usual with such pistons, they are provided at their upper ends with a head 43 to which is connected an operating member or crosshead 44 that is raised and lowered by suitable mechanism to raise and lower the entire row of pistons in properly timed relation to the movements of a valve member 45 located within the pump unit 23 and constructed in accordance with the present invention. The lower end of each of the cylinders 41 terminates in a reduced outlet opening 48 which in the reciprocating rotative movements of the valve member 45, registers alternately in timed relation with a channel or trough 49 provided in such valve member and one end of a discharge opening 50 also provided in the valve member 45. The body 51 of the valve member 45 snugly fits in a cylindrically-shaped bore 52 extending lengthwise of the pump unit 23 and formed in the housing 40 thereof below the aligned cylinders 41 which are in communication with such bore through the reduced outlet openings 48 thereof. Diametrically opposite the cylinder outlet openings 48 are provided in the bottom wall portion of the housing 40 a series of discharge passages 53 which are aligned with the outlet openings 48 and extend from the bore 52 to the bottom wall 54 of the housing 40. The channel 49 in the body portion 51 comes into registration only with the outlet openings 48 for the purpose of bringing the cylinders 41 into communication therewith. The discharge openings 50 which extend through the interior of the body portion 51 and completely through such body portion, when the valve member 45 is reciprocated to bring them into registry with the cylinder outlet openings 48, are also brought into registry with the discharge openings 53 in the bottom wall portion of the housing 40.

The valve body portion 51 is located in the bore 52 between two end coupling members 60 and 61 which fix the longitudinal position of such body portion in the bore so that the discharge openings 50 thereof properly register with the outlet openings 48 and the discharge openings 53 in the rotative reciprocating movements of the valve member. The end coupling members 60 and 61 are in threaded engagement with screw threads provided in the end portions of the wall of bore 52 and are adjustably secured therein so that the inner ends thereof engage the ends of the body portion 51 to function as stops for such body portion without preventing rotative movement thereof. The coupling member 60 is provided with a central passage through which extends a shaft member 62 integrally formed with the adjacent end of the valve body portion 51 which is closed. Mounted on the end portion of the shaft member 62 projecting beyond the coupling member 60 is a gear 63 that meshes with a rack 64 extending transversely of the units 23. As in the apparatus disclosed in the aforesaid patent, the rack 64 extends the combined width of the units 23 in the composite pump construction 25 and engages with each of the gears 63 of such units to simultaneously reciprocate the valve members 45 of all of such units.

Considering now more particularly FIGS. 3 to 8 of the drawings which show in detail the construction of one of the valve members 45 embodying this invention, it will be noted that such valve member 45 is a unitary member that is preferably made from a single piece of non-corrosive material such as stainless steel, or a suitable plastic material. The valve member 45 is constituted of a solid body portion 51 and an integral shaft member 62 which projects from the discharge end of said body portion and on which is mounted its associated driven gear 63. The solid body portion 51 of each valve member 45 is generally cylindrically-shaped with a peripheral diameter exceeding that of the shaft member 62 and having a longitudinal axis aligned with that of the shaft member. The combined longitudinal axes of the body portion and shaft member constitute the longitudinal axis of the valve member which is indicated in the drawings by the line 70—70. Extending throughout substantially the entire length of the body portion 51 so as to be in communication with all of the cylinder outlet openings 48, is the channel or trough 49 which is defined by a recessed wall that is concavely-shaped in cross-section. The greatest depth of the channel 49 is slightly less than the radial dimension of the body portion 51 and such channel has a width between

the outer edges thereof approximating the length of a chord through two points spaced approximately 110° apart in the periphery of such body portion. The channel 49 therefore has a width substantially greater than the diameter of the cylinder outlet openings 48. This construction prolongs the suction time of the pump unit during the reciprocating movements of the valve member to an extent that two important advantages result therefrom. Firstly, due to the greater suction range created by the wide opening of the channel 49 any irregular or shortened stroke action which might occur in the operations of the rack bar 64 will be compensated for so that the pistons 42 will always be provided with sufficient suction time to enable them to assure an accurate full loading of the cylinders 41. This increased suction time, it has been found, also minimizes the possibility of the pistons 42 sucking air bubbles into the product material as it is being drawn up into the cylinders 41, thereby resulting in a better, more controllable product.

The entry end of the channel 49 is in communication with the discharge end of its associated supply pipe 22 through an entry chamber formed in the entry end of the valve body portion 51 by an arcuate crescent-shaped wall 71. The upper concave edge of the wall 71 is in juncture with the forward end edge of the channel 49 and such wall curves downwardly from such juncture towards the forward end face of the body portion 51 with the lower convex edge of such wall terminating at such forward end face. It will be observed in FIG. 2 of the drawings that the crescent-shaped wall 71 extends away from the channel 49 to the extent that the convex edge thereof at the forward end face of the body 51 has a radial dimension greater than the interior radial dimension of the supply pipe 22. There is accordingly no obstruction to the flow of the product material from the pipe 22 to the channel 49 no matter what the position of the valve member 45 in the bore 52.

The discharge end of the channel 49 terminates in a chamber formed by two arcuately-shaped walls 72,73 located adjacently to the discharge end of the body portion 51 and separated from the end face of the latter by a solid full cylindrical end portion 74 of such body portion. It will be noted that the walls 72,73 are disposed in radial side-by-side relation so that their inner arcuate edges are joined to form an arcuate ridge 75 substantially aligned with the bottom of the channel 49 and having a rounded or convex contour, in cross section, as is shown in FIGS. 3–5 of the drawings. The wall 72 is in alignment with and forms a concaved extension of approximately one half of the wall of channel 49, the outer edge of such wall at the periphery of the body portion 51 being continuous with one longitudinal side edge 49′ of channel 49 and curving thereform through an angle of approximately 90° to join the outer edge 75′ of the ridge 75. The wall 73 is in substantial alignment with the ends of the row of discharge openings 50 which cooperate with the cylinder openings 48. The outer edge of the wall 73 at the periphery of the body portion 51 is substantially semi-circularly shaped and extends from the outer edge 75′ of the ridge 75 in a semi-circular fashion to connect with the other longitudinal side edge 49″ of channel 49. The wall 73 inwardly of the ridge 75 joins the wall of the channel 49 in an arcuate edge 77 which joins with the inner end of the arcuate ridge 75. The edge 77 formed at the upper side of channel 49 is relatively sharp and then is progressively rounded as it meets with the inner end of the ridge 75. The ridge 75 and edge 77 form a generally longitudinally extending 180° concaved junction line between the wall 73 and the area defined by the wall 72 and the adjoining end of channel 49. Because of this construction, the chamber formed in the valve body portion by the two walls 72,73 will at all times maintain the channel 49 in communication with the lower end of an upwardly inclined passage 76 during the reciprocating movements of the valve member 45. It will be observed that in such reciprocative movements of the valve member the wall 72 will be in register with the lower end of passage 76 when the channel 49 is in communication with the cylinder openings 48, an shown in FIG. 2. When the discharge openings 50 in the valve body portion come into registry with the cylinder openings 48 during such reciprocating operation of the valve member, the wall 73 will be in registry with the lower end of passage 76. As is shown in FIG. 2, the passage 76 is formed in the pump housing 40 and extends upwardly from the bore 52 housing the valve member and is connected at its upper end to an associated header branch pipe 28.

As is shown more clearly in FIG. 3 of the drawings, the discharge openings 50 provided in the valve body portion 51 extend transversely of the longitudinal centerline 70—70 thereof and of the channel 49, and are located adjacently to and with respect to the bottom of such channel so that the two are on opposite sides of such centerline with the openings 50 in offset relation to the latter. As a result of this arrangement of the discharge openings 50, the ends of cylinder openings 48 and the bottom wall openings 53 adjoining the bore 52, are slightly arcuately-shaped to conform to the configurations of the associated ends of the discharge openings 50.

It will be understood from the aforesaid description of the valve mechanism in each pump unit 23, that the product material fed into such unit under pressure through the header branch pipe 22 flows through the coupling 61 in FIG. 2 and into the chamber defined by the wall 71 at the entry end of the valve body portion 51, thence through the channel 49 to the chamber formed by the walls 72, 73 at the discharge end of such body portion. From this latter chamber the product material flows up the passage 76 which conducts the product material into the associated header branch pipe 28 for return to the kettle 12. It will be noted that due to the fact that the product material is under pressure, as it flows through the channel 49, the hydraulic pressure exerted by such material on the engaged adjoining longitudinal wall portion of the bore 52 will maintain the body portion of the valve member pressed against the remaining wall portions of the bore 52 thereby reducing to a minimum the possibility of leakage of the product material from the channel 49 into the bore 52. This action will be continuous so long as the apparatus is in operation no matter what position the valve member 45 will have in its reciprocative movements since this flow will not be interrupted during the intervals it takes to the valve member 45 to move through its range of rotational movement in the operations thereof because of the configuration of the chamber defined by the walls 72,73 associated with the entry end of the passage 76. If the tolerances in the exterior dimensions of the valve member 45 and the interior dimensions of the bore 52 in which such valve mem-

ber is located, are made sufficiently close, such hydraulic pressure exerted by the product material on the bore wall and valve member will render the apparatus product-tight. In one of the positions of the valve member **45**, the channel **49** thereof will be in full registry with the outlet openings **48** of the cylinders **41**. During the period that the valve member is moving toward and away from such position with the channel **49** in communication with such openings, the pistons **42** are caused to move upwardly and under the combined suction action of such pistons and the pressure exerted on the product material, the latter will flow upwardly into the cylinders **41** so as to insure a fast, accurate loading of such cylinders. As previously pointed out this longer suction time that is made possible by the width of channel **49** provides a compensation for possible irregularities of operation of the valve actuating mechanism and the reduction in the possiblity of entrapment of air bubbles by the product material. As the volume of the flow of such material through the channel **49** of the valve member is greatly in excess of the volume needed to charge the cylinders, the flow thereof continues uninterruptedly, though at diminished volume, into the passage **76** during the charging of the cylinders **41**. When the pistons **42** reach their highest position, the rack bar **64** is actuated to rotate the valve member approximately 60° to bring the openings **50** in the body of the valve member **45** into registry with the cylinder outlet openings **48** and the discharge passages **53**. The pistons **42** are then actuated to force the product material out of the cylinders **41** and through the cylinder openings **48**, the valve openings **50** and the discharge passages **53**. The product material forced down through the discharge passages **53** by the descending pistons **42**, will be deposited in the trays **10** positioned on the conveyor **11**. During this operation, the flow of the product material continues uninterruptedly through the channel **49** of the valve member and through the chamber defined by the walls **72,73** into the passage **76**. The channel **49** provides no obstruction to such flow and can be made deep enough to permit the free flow of highly viscous product materials by offsetting the valve openings **50** from the longitudinal center-line **70—70** of the valve to the extent necessary to accomplish such flow. As shown in FIG. **3** the walls **72,73** are so configured that the discharge of the product material from the channel **49** into the passage **76** is facilitated.

As previously indicated, the product material circulatory system may be maintained in operation even though the pump is not operating to deposit such material in the trays **10**. When it is felt necessary to clean the valve members **45**, all that is necessary to do is to open the drain valve **31** to discharge any product material remaining in the batch holding kettle and after that has been done, to close drain valve **31** and open valve **30** on a pipe **16** connected to a suitable source of hot water or steam. The hot water may be fed into the kettle **12** until it fills the latter to about the extent normally used by the product material and retained in there until it is heated to the temperature desired. Then the heated water is pumped through the system in the same manner that the product material is in the use of the machine. During the pumping of the hot cleaning water the valve members **45** will be cleaned by the flow-through action of the product pump, while the cylinders and discharge tubes and passages are cleaned by piston action. After the system has been thoroughly washed, the drain valve **31** is again opened to discharge the cleaning water from the system.

It will be observed that since the channels **49** are practically open trenches and are connected by the enlarged end chambers defined by the wall **71** and the walls **72,73** to the inlet end outlet passages, there are provided easy paths of flow for the cleaning agents and the product material through the several pump units. As previously indicated the volume of flow of the materials that may be handled by the channels **49** may be varied by changing the location of the discharge openings **50** relative to the valve centerline **70—70** and changing the depths and widths of the channels. The aforesaid end chambers permits of a continuous unobstructed laminar flow of cleaning agents and product materials no matter what position the valve members are in in their associated bores **52**. This makes possible the continuous unobstructed flows of product materials through the pump units without dange of producing a false back pressure, whether or not the units are calling for product material to be converted into products. When the units are calling for material the totally unobstructed flow pattern of such material permits a ready filling of the pump cylinders and consequently the production of a more uniform sized product. In order that an operator of the apparatus may never be in doubt as to what position a valve member **45** is in for cleaning or manufacturing operations, the outer face of the shaft member **62** associated therewith is provided with a suitable indicator in the form of a suitably configured slot **80** to show the position of the discharge openings **50** regardless of the position of the valve member in the bore **52** (note in FIGS. **3, 4** and **8** of the drawings.) The slot **80** is so configured that the operator can readily determine whether the discharge openings **50** are in correct position with relation to the cylinder openings **48** and the discharge passages **53** for discharge of the product material from the cylinders **41** to the trays **10**.

While I have hereinabove described by way of example a preferred embodiment and usage of my invention, it will be apparent to those skilled in the art that it may be advantageously employed for other uses and that changes and modifications may be made therein without departing from the spirit of the invention or the scope of the appended claims.

What is claimed is:

1. A valve member for product material depositing apparatus composed of a housing provided with a row of cylinders, each having a bottom opening and a piston mounted for reciprocating movement therein, and provided with a circular chamber located below said cylinders and having its longitudinal axis extending in parallelism with a horizontal line passing through the centerlines of the row of cylinders, the bottom openings of said cylinders being in communication with said chamber, the housing also being provided with a row of discharge openings equal in number to said bottom openings along the length of and communicating with the circular chamber, and said apparatus including first means in communication with one portion of the circular chamber for continuously supplying product material, and second means in communication with another portion of the circular chamber, in spaced relation to said one portion thereof, for discharging excess product material, the valve member being locatable in said circular chamber and having a substantially cylindrical

body portion extending between said first and second means and provided with an open longitudinally extending channel for conducting product material from said first means to said second means, said valve member being rotatable to one position in the circular chamber to bring said channel into registry with the cylinder bottom openings, a row of passages equal in number to said bottom and discharge openings extending transversely through said body portion and arranged along a line spaced from and parallel to said channel, said valve member being rotatable to another position in the cylindrical chamber to bring the ends of said passages into registry with said bottom and discharge openings, the entry and discharge portions of said channel being configured to enable an uninterrupted free flow of product material from said first means to said second means throughout the reciprocative rotative movements of said valve member between said one and other positions.

2. A valve member as defined in claim **1**, in which said open channel is formed by a recessed, concavely-shaped wall having a width between the outer edges thereof substantially greater than the diameter of said bottom openings.

3. A valve member as defined in claim **1**, in which the entry portion of said channel comprises an arcuate crescent-shaped wall, the upper concave edge of which is in juncture with the forward end edge of the main portion of said channel and the lower convex edge of which terminates at the forward end face of said body portion, said wall forming an enlarged entry chamber having a radial dimension greater than the radial dimension of the discharge end of said first means.

4. A valve member as defined in claim **1**, in which the discharge portion of said channel comprises two arcuately-shaped walls disposed in radial side-by-side relation so that their inner edges join to form an arcuate ridge in substantial alignment with the bottom of the main portion of the channel, and the outer edges thereof extend to the periphery of the valve body portion, one of said walls being in alignment and forming an extension of the channel wall, and the other of said walls being in substantial alignment with said row of passages.

5. A valve member as defined in claim **1**, in which said row of passages are offset from the longitudinal centerline of said valve body portion and such centerline is located between said row of passages and the bottom of said channel.

6. A valve member as defined in claim **1**, in which said body portion has a shaft member integrally connected thereto and the outer end face of which is visible when said valve member is assembled in said apparatus, said end face of said shaft member being provided with means to indicate at all times the position of said valve member relative to the bottom openings of said cylinders.

* * * * *