United States Patent [19]

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[11] **3,712,264**

[45] **Jan. 23, 1973**

[54] ROTATING PASTE DEPOSITER

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[22] Filed: **Sept. 16, 1970**

[21] Appl. No.: **72,693**

[52] **U.S. Cl.** **118/25,** 118/411, 222/547

[51] **Int. Cl.**.....**B05c 5/02**

[58] **Field of Search**.....118/25, 406, 411, 410, 13; 222/564, 547, 545; 18/12 A, 85 F; 107/1 D, 1 F, 14 R, 27 B, 52

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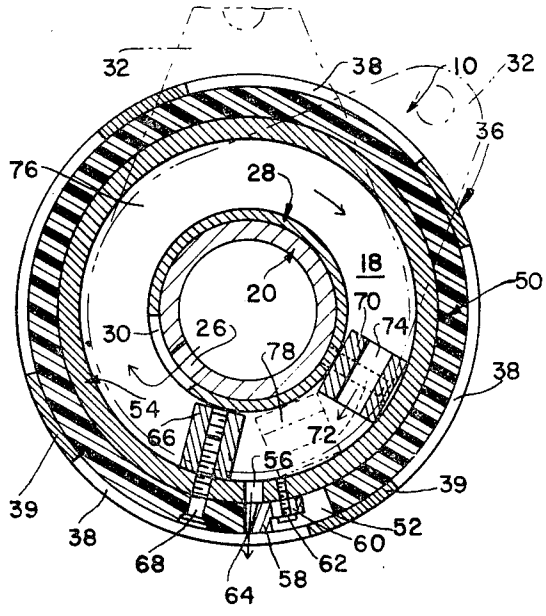
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[57] **ABSTRACT**

In a rotating paste depositer having an outer rotating cylinder with a plurality of cutouts forming outlets for depositing a fluid or pasty-like material on a comestible product, the outer cylinder rotates around a series of fixed inner cylinders having valves for control of the flow rate of the material to be deposited and having an inner chamber to equalize the pressure at the outlets. In the preferred form a secondary pressure means is contained within the inner chamber and rotates around a fixed cylinder to provide increased pressure at the outlet ports during the depositing cycle and to provide reduced pressure and positive shutoff when the material has been deposited on the product.

9 Claims, 7 Drawing Figures



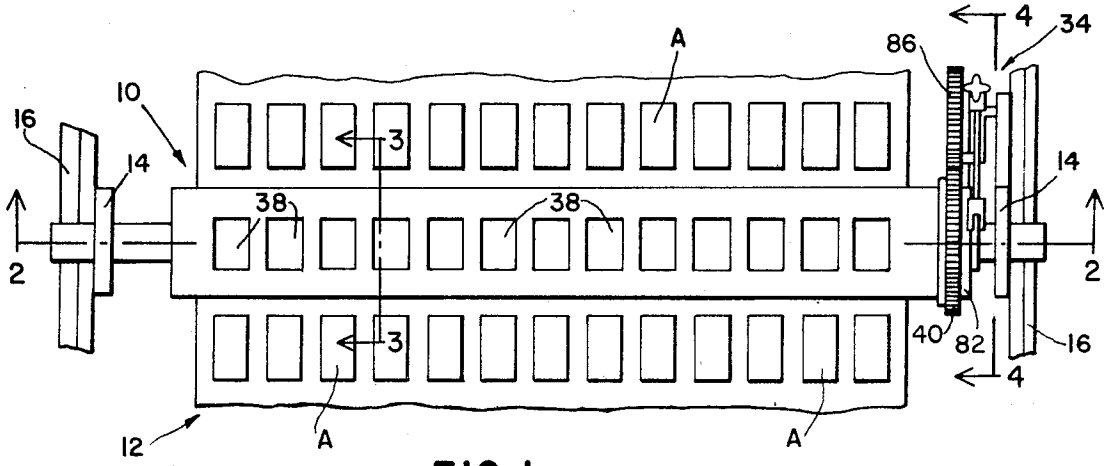


FIG. 1

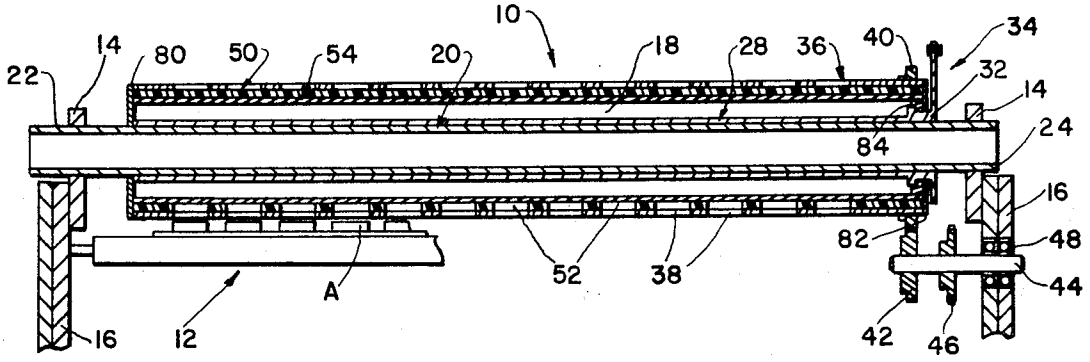


FIG. 2

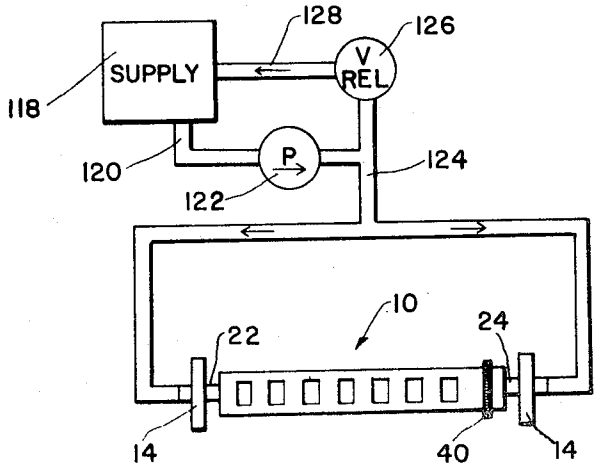


FIG. 5

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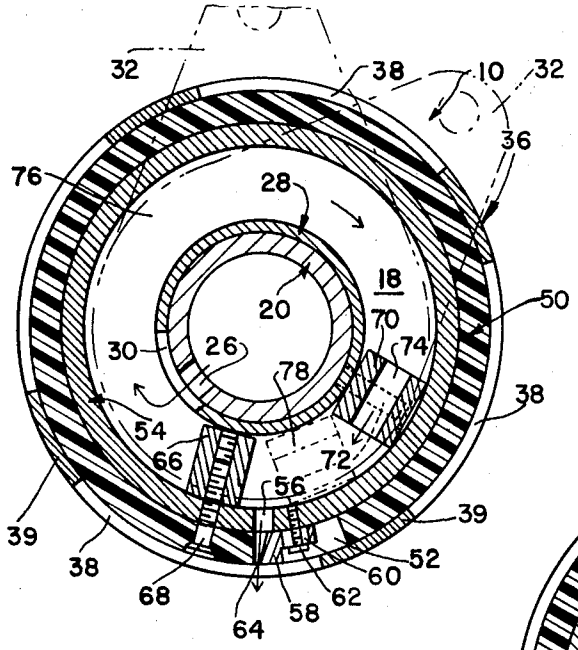


FIG. 3

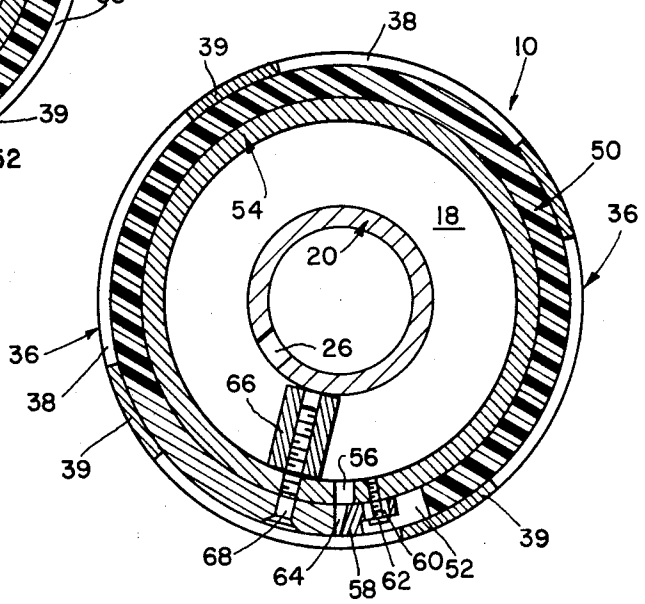


FIG. 6

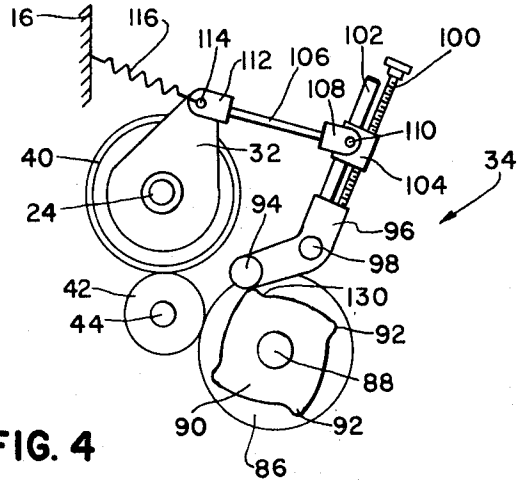


FIG. 4

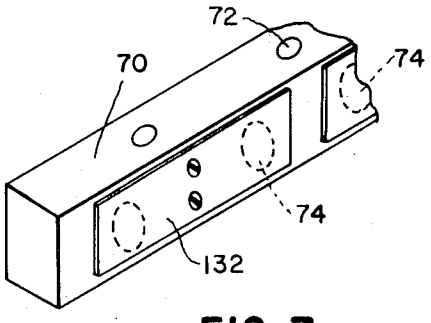


FIG. 7

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ROTATING PASTE DEPOSITER

BACKGROUND OF THE INVENTION

Rotary depositors are used for the automated deposition of fluid materials such as frosting, tomato paste and the like onto cakes, cookies and other comestible products. The fluid materials are most generally supplied to the depositor from a bulk supply source. In some cases the material is supplied from a hopper located above the depositor and relies upon gravity to deliver the fluid to the depositor. In other types of depositors the material is pumped under pressure from a source to the interior of the depositor where pressure forces it through the stencil cutouts onto the product.

In each of the above and in other types of rotary depositors there is a tendency for the fluid to surge out of the outlet openings at the beginning of the deposit cycle and to trail onto the product at the completion of the cycle because of pressure variations. When operating with low viscous fluids there is a tendency for the fluid to leak from the stencil openings at the completion of the deposit cycle spilling on the trailing edge of the product and onto the conveyor equipment. These problems are partially due to the non-uniform pressure distribution of the fluid at the outlets. The inherent disadvantages of rotary type valves also contribute greatly to these problems. Further, quite frequently the depositing follows the fluctuations of the manifold pressure.

The present invention, adaptable for use with both high and low viscous fluids, maintains uniform pressure along the stencil outlets, provides uniform distribution of the fluid on the product and provides a positive shutoff at the completion of each depositing cycle.

SUMMARY OF THE INVENTION

This disclosure relates to a rotary paste depositor for dispensing controlled amounts of a fluid material such as tomato paste or the like onto a cake, dough or other comestible product which moves below the apparatus.

The rotary depositor has a rotating outer cylinder or stencil with a series of patterned cutouts corresponding to the desired configuration of the material to be deposited on the product. The outer cylinder rotates around a series of intermediate cylinders which are fixed to a stationary inner cylinder. Fluid material is supplied at the ends of the fixed inner cylinder where it is distributed to an inner pressure equalization chamber formed between intermediate outer and inner cylinders. The outer intermediate cylinder adjacent the rotating cylinder has adjustable openings therein for each cutout in the outer cylinder so that the amount of fluid passing through the cutouts in the rotating cylinder may be controlled. Means are also provided within the pressure equalization chamber to provide an increased pressure at the outlet openings during the depositing cycle and to produce a rapid decrease in pressure after the depositing cycle is completed to prevent overflow and leakage of fluid material from the outlets while another product is being positioned for deposition of material.

Prior art devices of the rotating depositor type have most generally been useful only for depositing liquid material of relatively high viscosity such as icings, jams and cream. With the improvements of the present invention, it is now possible to handle low viscous fluids without overflow and leakage between the outer rotating cylinder or stencil and the inner cylinder. An unique inner pressure equalization and distribution chamber also makes it possible, once the outlet valves have been adjusted, to increase the rate of flow uniformly at the individual outlets by simply increasing the supply pressure.

It is therefore an object of the present invention to provide apparatus for depositing semi-liquid material on a comestible product in a uniform manner.

It is also an object of this invention to provide a rotary depositor having an internal pressure equalization chamber.

A further object of the present invention is to provide an automatic pressure reduction means so that when the discharge openings are closed undesirable seepage of liquid material is avoided.

Still a further object is to provide a rotary depositor having individual valve arrangements for each stencil so that the flow of liquid may be equalized.

BRIEF DESCRIPTION OF DRAWINGS

The invention will now be described with reference to the accompanying drawings in which:

FIG. **1** is a top plan view of the novel depositor showing a conveyor carrying a plurality of articles to be coated positioned below the depositor;

FIG. **2** is a vertical cross-sectional view taken along line **2—2** of FIG. **1**;

FIG. **3** is an enlarged vertical cross-sectional view taken along line **3—3** of FIG. **1**;

FIG. **4** is an enlarged vertical cross-sectional view of the cam actuation mechanism taken along lines **4–4** of FIG. **1**;

FIG. **5** is a schematic view showing the supply system for the liquid material which is delivered to the rotary depositor;

FIG. **6** is a cross-sectional view similar to FIG. **3** showing an alternate construction; and

FIG. **7** is a view of the pressure assembly in the pressure equalization chamber showing an alternate construction.

PREFERRED EMBODIMENT

Referring now to the drawings and particularly FIGS. **1** and **2**, the novel rotary paste depositor is generally indicated by the numeral **10**. The depositor is fixedly supported above a conveyor assembly **12** in mounting supports **14** located at the ends of the depositor. The supports **14** are fixed to a framework **16** which supports the conveyor **12**, the depositor **10**, a cam mechanism **34** and the associated drive mechanism (not shown).

A plurality of equally spaced comestible articles A are carried on the conveyor assembly **12** and are arranged thereon to pass under the rotary depositor **10** in synchronization with the rotation of depositor **10**.

As best shown in FIGS. **2** and **3**, the depositor **10** comprises a plurality of cylinders **36**, **50**, **54**, **28**, and **20**, inwardly progressively in that order, located one within the other. Cylinders **28** and **54** are radially spaced as to provide a pressure equalization chamber **18** between them.

Cylinder **20** is a hollow innermost cylinder forming a manifold for the material to be deposited. It is fixed at its ends **22** and **24** in mounting brackets **14**. Cylinder

20 forms a manifold into which the fluid material is constantly being pumped from both ends as will be explained hereinafter in relation to FIG. 5. It has a series of openings 26 spaced along its length.

Cylinder 28 is mounted for oscillating, rotary movement around the inner cylinder 20. A plurality of elongated openings 30 are spaced along its length and are arranged to be in alignment with the openings 26 in the inner cylinder 20. Cylinder 28 has an arm 32 (FIG. 2) at its right end which is operatively connected to a cam mechanism 34 for providing the oscillating rotary movement as will be explained hereinafter. Spaced from cylinder 28 to provide a chamber 18 is the combination of interconnected cylinders 54 and 50 both fixed to the cylinder 20 by means of end caps 80 and 82.

Cylinder 54 located inside of and fixed to the support cylinder 50 provides the outer wall surface of chamber 18. Elongated openings 56 are provided spaced along the length of the cylinder and are arranged to be in substantial alignment with the openings 52 in the support cylinder 50.

The cylinder 50 made a self-lubricious resinous material (such as for example a material sold by E. I. du Pont de Nemours & Co. under the trademark Delrin) provides a bearing surface for the outer cylinder 36 to slidably rotate. Elongated slots 52 conforming generally to the width of the stencil openings 38 in the outer cylinder are provided along its length.

Cylinder 36 surrounds cylinder 50 and snugly fits thereabouts for rotatable sliding movement. It has a plurality of cutout portions or stencil openings 38 along its length of any desired size or shape to correspond to the stencilled pattern which is to be deposited on the comestible products A. Rotary motion is imparted to the outer cylinder 36 by means of a gear 40 which is fixed to the right hand end of the cylinder as viewed in FIG. 2. The gear and cylinder are driven by pinion gear 42 supported on and rotatable with drive shaft 44 which is driven through sprocket gear 46 connected to any suitable power source. Drive shaft 44 is mounted in bearings 48 in the framework 16 and also provides through the pinion 42 the driving force for the cam mechanism 34.

A baffle or barrier member 66 (FIG. 3) is fixed to cylinders 50 and 54 and extends radially inwardly through chamber 18 to contact the movable cylinder 28. The baffle 66 extends along the length of the chamber and is fixed to the chamber outer wall cylinder 54 by screws 68 which also serve to fix cylinder 54 to the support cylinder 50 to prevent the cylinders 54 and 50 from moving with respect to each other.

A pressure assembly 70 is fixed to the movable cylinder 28 and extends radially outwardly through chamber 18 where it contacts the inner surface of cylinder 54. The pressure assembly 70 extends the length of chamber 18 and is fastened to the movable cylinder 28 by screws 72. A plurality of holes 74 are spaced along its length. The valve assembly 70 divides chamber 18 into two portions, a low pressure or entrance portion 76 and a variable pressure or exit portion 78, the function of which will be described in detail hereinafter.

The pair of end plates or end caps 80 and 82 prevent lateral movement of the cylinders and prevent leakage of the pressurized fluid contained in the chamber 18.

As best seen in FIG. 4, the cam mechanism for imparting oscillating motion to inner cylinder 28 and pressure assembly 70 is generally designated by the numeral 34. As described above, pinion gear 42 driven by drive shaft 44 provides the motive force to rotate the outer cylinder 36 through gear 40 and also provides for rotation of cam mechanism 34 through a gear 86 which is mounted for rotation on a shaft 88. Gear 86 is the same pitch as the outer cylinder gear 40 and rotates in a synchronized relationship therewith.

A cam 90 is fixed to the side of gear 86 in any convenient fashion and has a plurality of equally spaced lobes 92 which correspond to the number of stencils 38 radially spaced on the outer cylinder 36. A cam follower 94 is mounted on an arm 96 which is pivotally supported on a pivot pin 98. A shaft 102 extends upwardly from the arm 96 and has slidably mounted thereon an adjustable movable block 104. Adjustment screw 100 is threaded through block 104 and provides for adjustment of the block 104 along shaft 102. A connecting link 106 is pivotally connected at one of its ends 108 to block 104 by a pivot pin 110 and at its other end 112 by a pivot pin 114 to the flange or arm 32 which rotatably actuates movable cylinder 28. A tension spring 116 is connected to the arm 96 at one end and may be conveniently fixed to the supporting framework 16 to provide a bias to hold the cam follower 94 against the surface of cam 90.

By means of the above cam mechanism the arm 32 is rocked back and fourth in an oscillating motion which rotatably oscillates cylinder 28 and pressure assembly 70 in synchronism with the rotation of the stencil cylinder 36 so as to cause the material to be deposited to be forced through the stencil openings of cylinder 36 onto the spaced articles A located on the conveyor assembly 12.

The apparatus for maintaining a constant supply of pressurized fluid in the rotary depositor 10 is shown in schematic form in FIG. 5. A supply source 118 is connected by a conduit 120 to the inlet of a pump 122. The outlet of the pump 122 is connected by conduit 124 to a pressure release valve 126 and to both ends 22 and 24 of the manifold cylinder 20 of the rotary depositor 10. The fluid entering the depositor 10 is maintained at a constant pressure by relief valve 126. When the pressure delivered in conduit 124 to the depositor 10 exceeds a predetermined amount as determined by the setting of relief valve 126, the relief valve opens allowing the excess fluid to return through a conduit 128 to the supply source 118.

OPERATION

When the rotary depositor of the present invention is in operation, the fluid to be deposited is taken from the supply source 118 through conduit 120 to the pump 122 where it is forced under pressure through conduit 124 to the ends 22 and 24 of the manifold cylinder 20. As the cylinder 20 is filled, the pressure forces the fluid out of the opening 26 of the inner cylinder into section 76 of inner chamber 18. Because of the location of baffle 66 which forms a barrier, the fluid must first fill chamber 76 from whence it is forced through the

openings 74 in pressure assembly 70 to fill the variable pressure chamber 78. As illustrated by the arrows, the fluid is then forced from chamber 78 through openings 56 and 64 into the stencil cutout depositing area 38. As is readily apparent, as the outer cylinder 36 rotates, the comestible product A will be passing below the outlet port 64 and a layer of the fluid will be deposited on the product in accordance with the configuration of the stencil. Between each row of the product A on the conveyor 12, the depositing cycle is interrupted when the closed portion of the outer cylinder 36 passes over the outlet orifice 64 thus blocking the flow of fluid.

When working with low viscous fluids, there is often a certain amount of the pressurized fluid which spills onto the trailing edge of the product or falls onto the conveyor belt assembly prior to the entrance of the next product into the depositing cycle. To prevent such an undesirable overflow and leakage of material, the movable cylinder 28 and its associated pressure element 70 are utilized.

Referring specifically to FIGS. 3 and 4, as the outer cylinder enters the depositing cycle, the cam follower 94 is located at the lowest point on the cam surface 130. The movable cylinder 28 and its attached valve 70 then will be in a drawn back position from the outlet ports 56 and 58, as shown in phantom. As the outer cylinder 36 rotates just previous to depositing a layer of fluid, the cam follower 94 rides on the cam surface 90 thereby causing, through the action of the cam mechanism 34 and the flange 32, the movable cylinder 28 and its associated valve 70 to rotate in a clockwise direction to the position shown in solid lines. This rotation reduces the volume of chamber 78 and thereby effectively increases the pressure on the fluid in the chamber 78 as one row of stencil openings 38 gradually come into register with opening 64 and the fluid is forced through the openings 56 and 64. The increased pressure is a direct result of the additional surface area presented by the valve 70 as it reduces the volume of chamber 78 between the baffle 66 and the valve 70. As the depositing cycle is completed and land area 39 of the outer cylinder moves into position to close outlet port 64, the cam follower 94 is riding on the cam lobe 92. As the cam follower 94 passes over the lobe the tension spring 116 pulls the follower rapidly onto the lowest part of the cam surface 130. This action pushes flange 32 forward rapidly causing cylinder 28 and its associated valve 70 to rotate in a counterclockwise direction. This rapid rotation of valve 70 causes an instantaneous reduction in fluid pressure in chamber 78 and draws back the fluid from outlet port 64 as the land area 39 moves into a closed position. This causes a simultaneous increase in pressure in chamber 76 which pressure increase is compensated for by relief valve 126 (FIG. 5) which returns the excess fluid to the supply source 118 through conduit 128.

As a result of the function of this apparatus as just described, it will be evident that at the depositing or stencilling time interval an increased pressure results which very effectively forces the fluid through the stencilled openings 38 of the stencil cylinder 36. Further, the apparatus creates a slight negative pressure to shut off flow of the fluid immediately after stencil deposit of the fluid for one row of articles is completed. It also should be evident that the provision of the intermediate chamber 18 provides for a uniform pressure for each stencilling or depositing step providing a constant or uniform application of fluid material on the articles.

MODIFICATIONS

During the application of fluid having a relatively higher viscosity, it is possible to eliminate the inner intermediate cylinder 28, its associated valve 70 and the cam arrangement 34. Such a structure is shown in FIG. 6 wherein like parts carry the same reference numerals as those shown in FIG. 3. As shown in FIG. 6, chamber 18 is provided to receive the pressurized fluid from the hollow cylinder 20 through the openings 26 along its length. From the chamber the fluid is distributed to outlet ports 56 and 64 to the stencil openings. This provides a vastly improved distribution of the pressurized fluids over those devices shown in the prior art where the fluids flow directly from the inner cylinder to the stencil. In this embodiment as in the previous one described, the fluid must travel a substantial distance (more than 180°) before being forced through stencil openings. Thus, the pressure on the fluid forced through the stencil openings is more constant and uniform since it is not subjected as directly to the fluctuations in pressure within the manifold.

In yet another embodiment of the invention, spring valves 132, as shown in FIG. 7, may be placed over the holes 74 in the valve assembly shown in FIG. 3. The spring valves 132, while allowing fluid to pass from chamber 76 into chamber 78, will not allow the flow of fluid in a reverse direction. An even greater surface is presented to the fluid in chamber 78 and there is no backflow. Because of the spring valve 132, there is an even greater increase in fluid pressure in chamber 78 as the valve moves toward the baffle 66 closing chamber 78.

There is also a corresponding greater pressure decrease as valve 70 rapidly moves in a counterclockwise direction at the completion of the deposit cycle.

It may therefore be seen that I have provided a new and novel pressurized rotary depositor having an inner chamber to equalize the fluid pressure at the outlet orifices; that has individually adjustable outlet orifice openings and that provides a positive shutoff to the flow of pressurized fluid at the completion of each deposit cycle.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows.

1. In a rotating depositor having a plurality of concentrically arranged cylinders, one of said cylinders being a manifold with exit opening means and another a rotating stencil having a plurality of axially extending rows of openings of a predetermined arrangement, the improvement comprising: said stencil cylinder being spaced outwardly of said manifold cylinder a sufficient distance to provide a chamber intermediate said manifold cylinder and said stencil cylinder; chamber forming means between said manifold and stencil cylinders providing a chamber, said means having a row of openings provided to register with said rows of openings of said stencil cylinder at predetermined rotatable positions thereof; and barrier means in said chamber extending in a direction between said

manifold cylinder and said stencil cylinder, said barrier being located in a circumferential position between the row of openings of said chamber forming means and the exit opening means of said manifold cylinder whereby fluid to be deposited has to travel in said chamber at least more than 180°.

2. The rotating depositor of claim 1 in which is provided a pressure member extending radially inwardly from said rotating cylinder and dividing said chamber into two compartments, said pressure member having openings therein providing flow of fluid between said compartments, said pressure member when moving in one direction toward the openings of said chamber forming means creating a greater than manifold pressure on the fluid within the compartment immediately adjacent said chamber openings of said forming means and when moving in a direction away from said openings of said chamber forming means creating a lesser than manifold pressure in said compartment adjacent said openings of said chamber forming means.

3. The rotating depositor of claim 2 in which the pressure member is moved by a cam actuated lever arm driven in synchronism with the rotating stencil cylinder.

4. The rotating depositor of claim 2 in which there is provided check valve means for said openings in said pressure member whereby fluid is only permitted to flow from the compartment adjacent the exit opening means of said manifold cylinder into the compartment adjacent the said openings of said chamber forming means.

5. In a rotating depositor having a plurality of concentrically arranged cylinders, one of said cylinders being a manifold with exit opening means and another a rotating stencil having a plurality of axially extending rows of openings of a predetermined arrangement, the improvement comprising: said stencil cylinder being spaced outwardly of said manifold cylinder a sufficient distance to provide a chamber intermediate said manifold cylinder and said stencil cylinder; chamber forming means between said manifold and stencil cylinders providing a chamber, said means comprising two spaced cylinders respectively abutting each of the manifold cylinder and stencil cylinder and having a row of openings provided to register with said rows of openings of said stencil cylinder at predetermined rotatable positions thereof.

6. The rotating depositor of claim 5 in which is provided a barrier member in said chamber adjacent said openings of said chamber forming means; a pressure member located on the opposite side of said chamber openings from said barrier member and extending radially inwardly from said rotating cylinder dividing said chamber into two compartments, said pressure member having openings therein providing flow of fluid between said compartments, said pressure member when moving in one direction toward the barrier member and said openings of said chamber forming means creating a greater than manifold pressure on the fluid within the compartment immediately adjacent said chamber openings of said forming means and when moving in a direction away from said openings of said chamber forming means creating a lesser than manifold pressure in said compartment adjacent said openings of said chamber forming means.

7. The rotating depositor of claim 6 in which there is provided check valve means for said openings in said pressure member whereby fluid is only permitted to flow from the compartment adjacent the exit opening means of said manifold cylinder into the compartment adjacent the said openings of said chamber forming means.

8. A depositor having a manifold and a movable stencil member; a chamber means located between said manifold and said stencil member; said manifold having a manifold exit opening means; said chamber means having at least one chamber exit opening; said stencil member having at least one stencil opening positioned to be in register with said chamber exit opening in one position of said stencil member and out of register therewith in another position of said stencil member; and a movable pressure member extending in a direction between said manifold and said stencil member and dividing said chamber into two compartments; said pressure member having openings therein providing flow between said compartments; said pressure member when moving in one direction toward the openings of said chamber means creating a greater than manifold pressure on the fluid within the compartment immediately adjacent said chamber openings and when moving in a direction away from said chamber openings creating a lesser than manifold pressure in said compartment adjacent said chamber openings.

9. The depositor of claim 8 in which there is provided check valve means for said openings in said pressure member whereby fluid is only permitted to flow from the compartment adjacent the exit opening means of said manifold cylinder into the compartment adjacent the said chamber openings.

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