Dec. 4, 1962 F. H. HEISS ETAL 3,066,830

DISPENSING MACHINE

Filed Feb. 24, 1958 5 Sheets-Sheet 1

Fig. 1

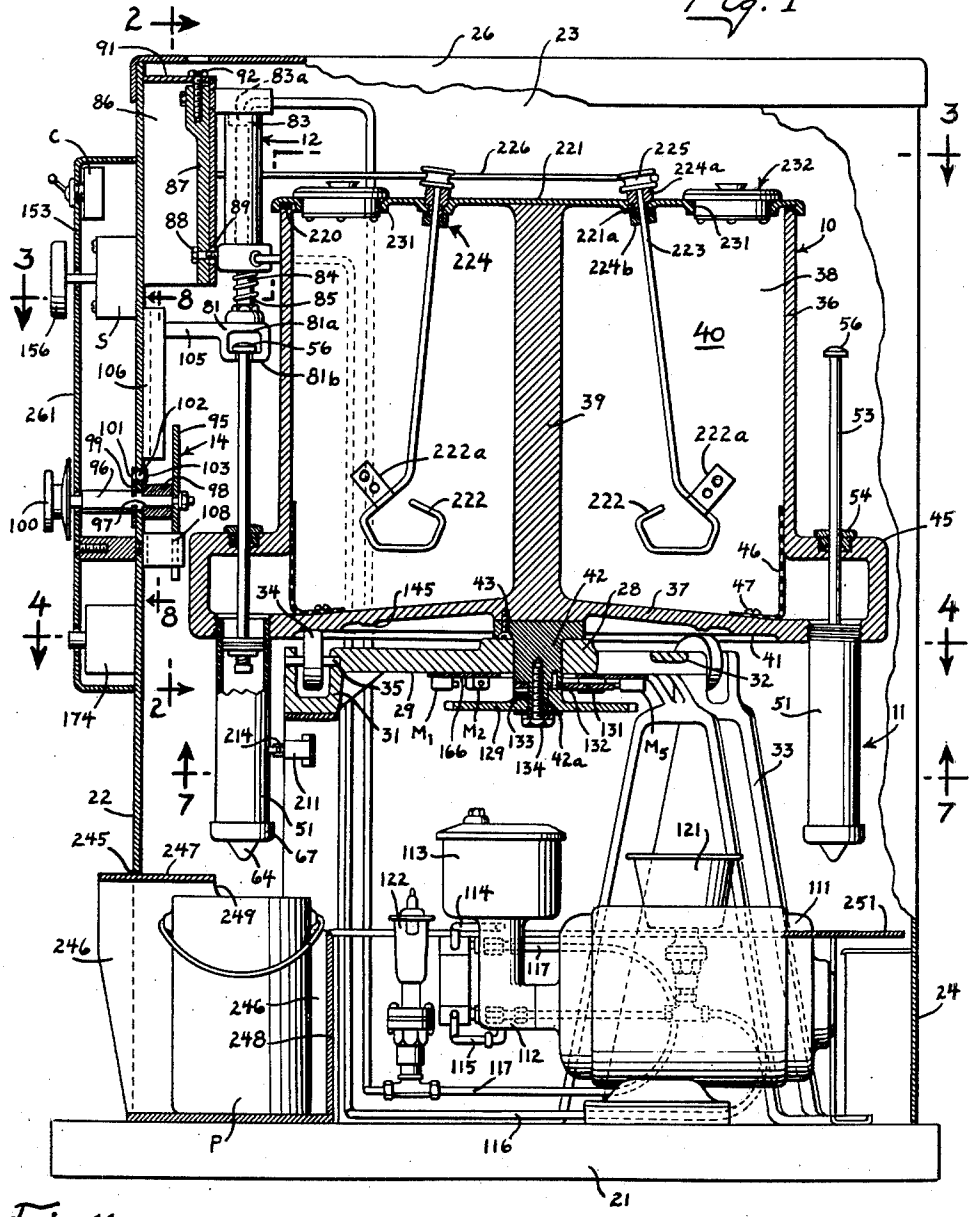
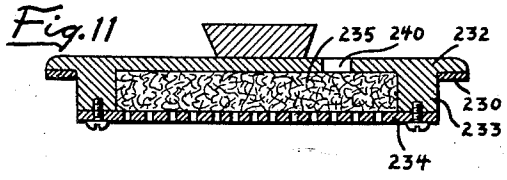


Fig. 11



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Dec. 4, 1962 F. H. HEISS ETAL 3,066,830

DISPENSING MACHINE

Filed Feb. 24, 1958 5 Sheets-Sheet 2

Fig. 2

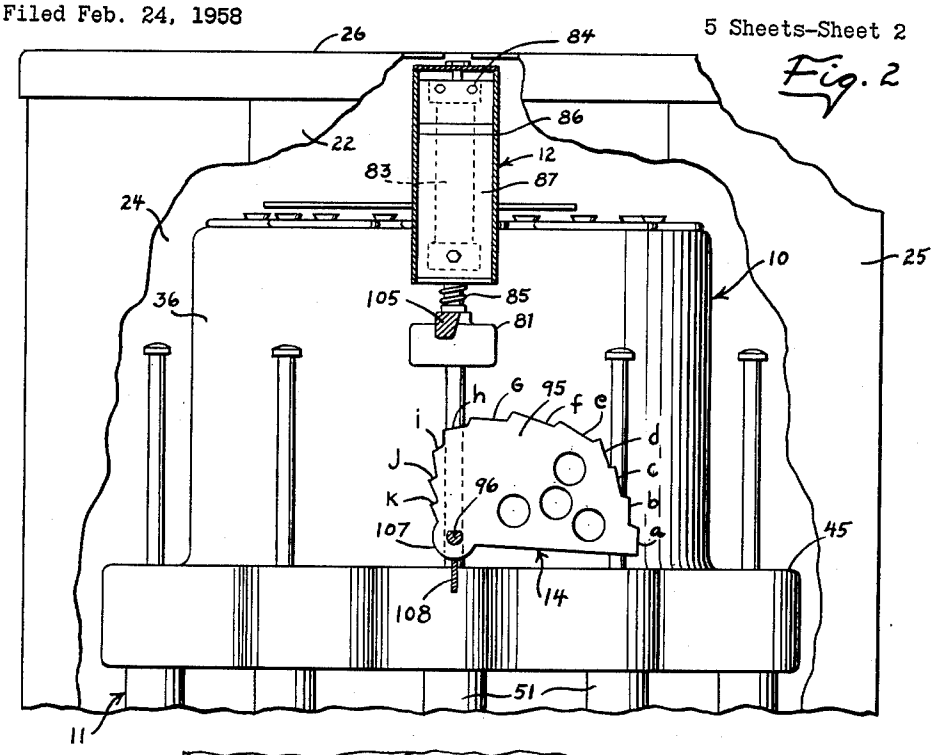
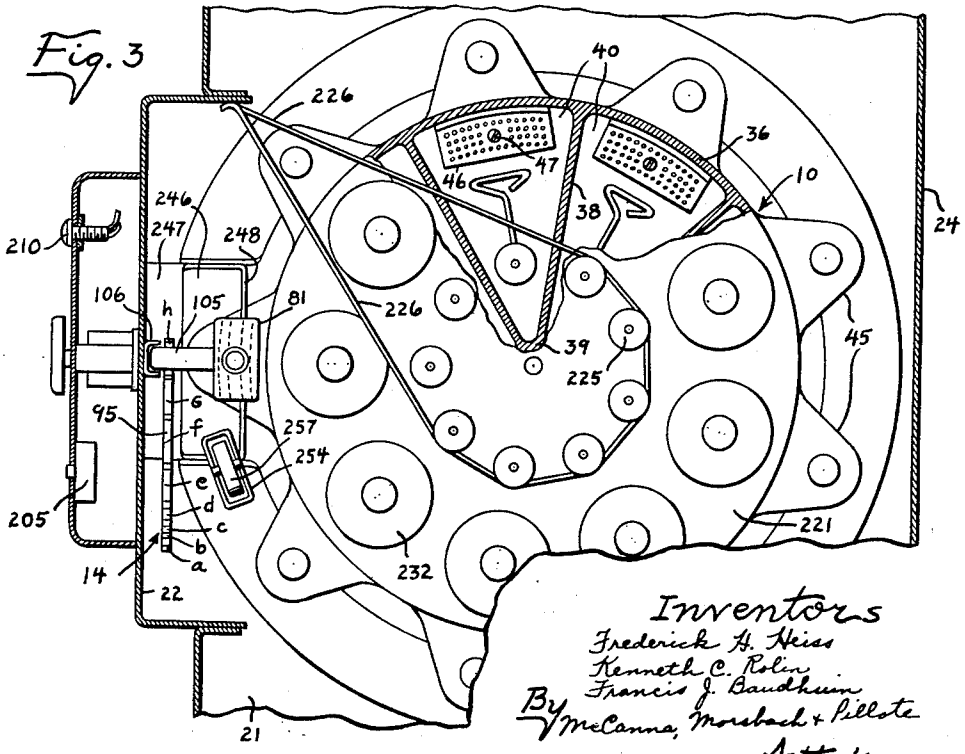


Fig. 3



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DISPENSING MACHINE

Filed Feb. 24, 1958 5 Sheets-Sheet 3

Fig. 4

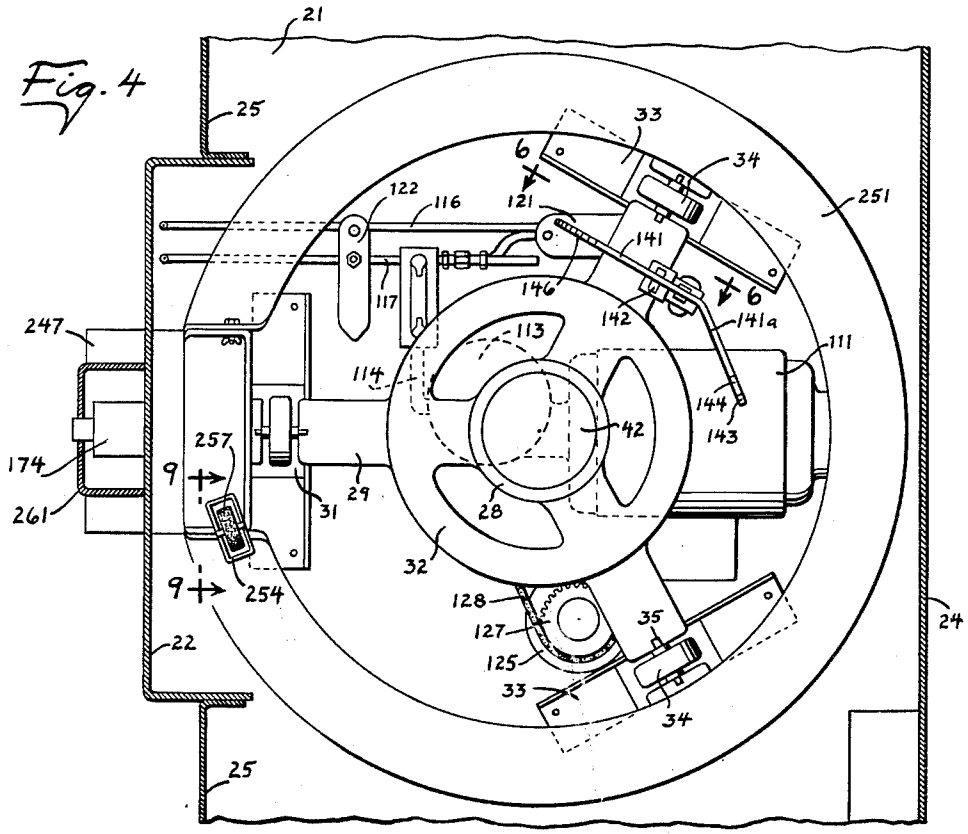


Fig. 5

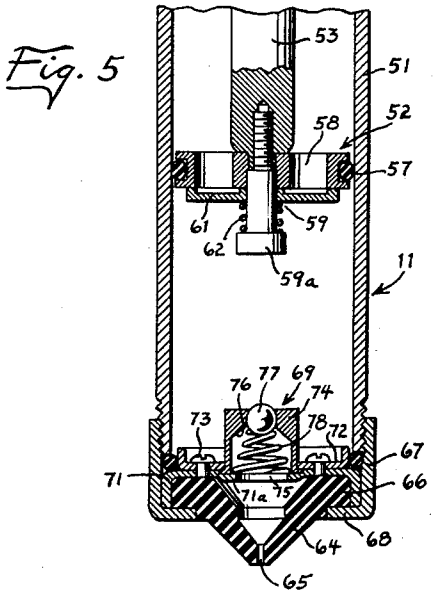
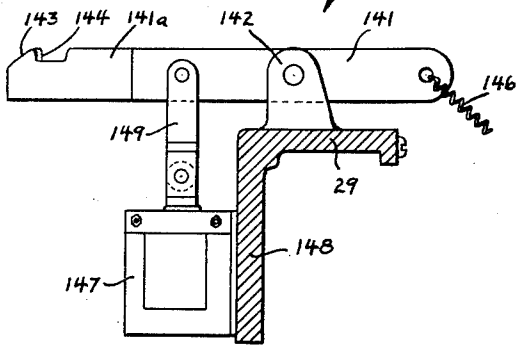


Fig. 6



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Dec. 4, 1962 F. H. HEISS ETAL 3,066,830

DISPENSING MACHINE

Filed Feb. 24, 1958 5 Sheets-Sheet 4

Fig. 7

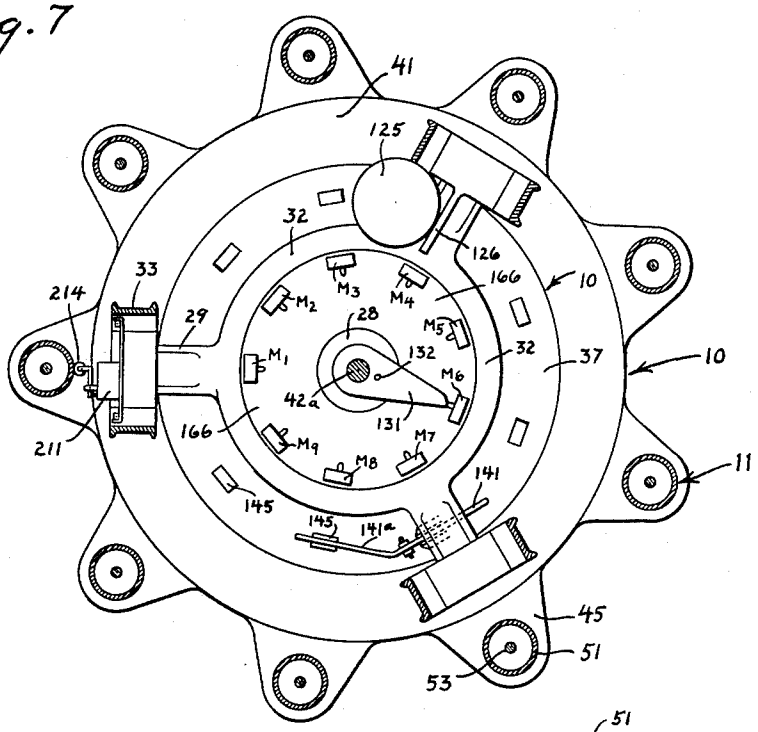


Fig. 8

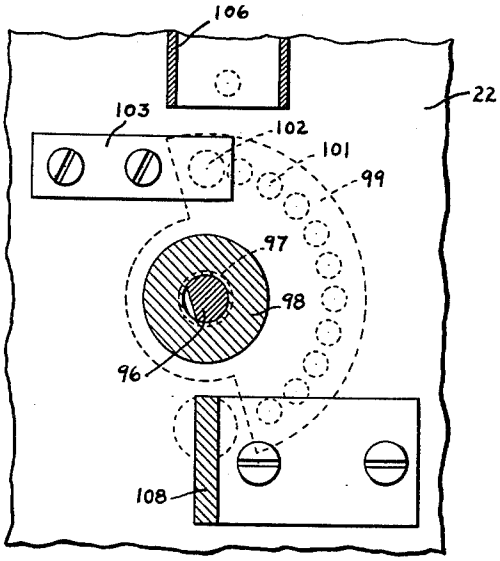
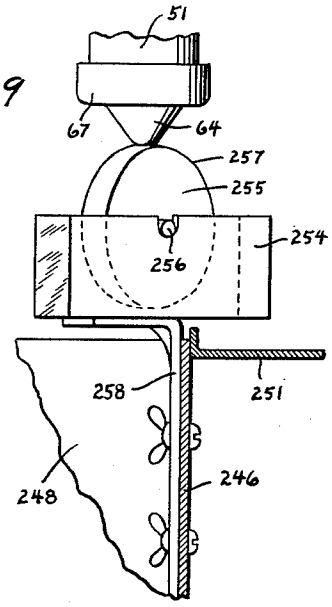


Fig. 9



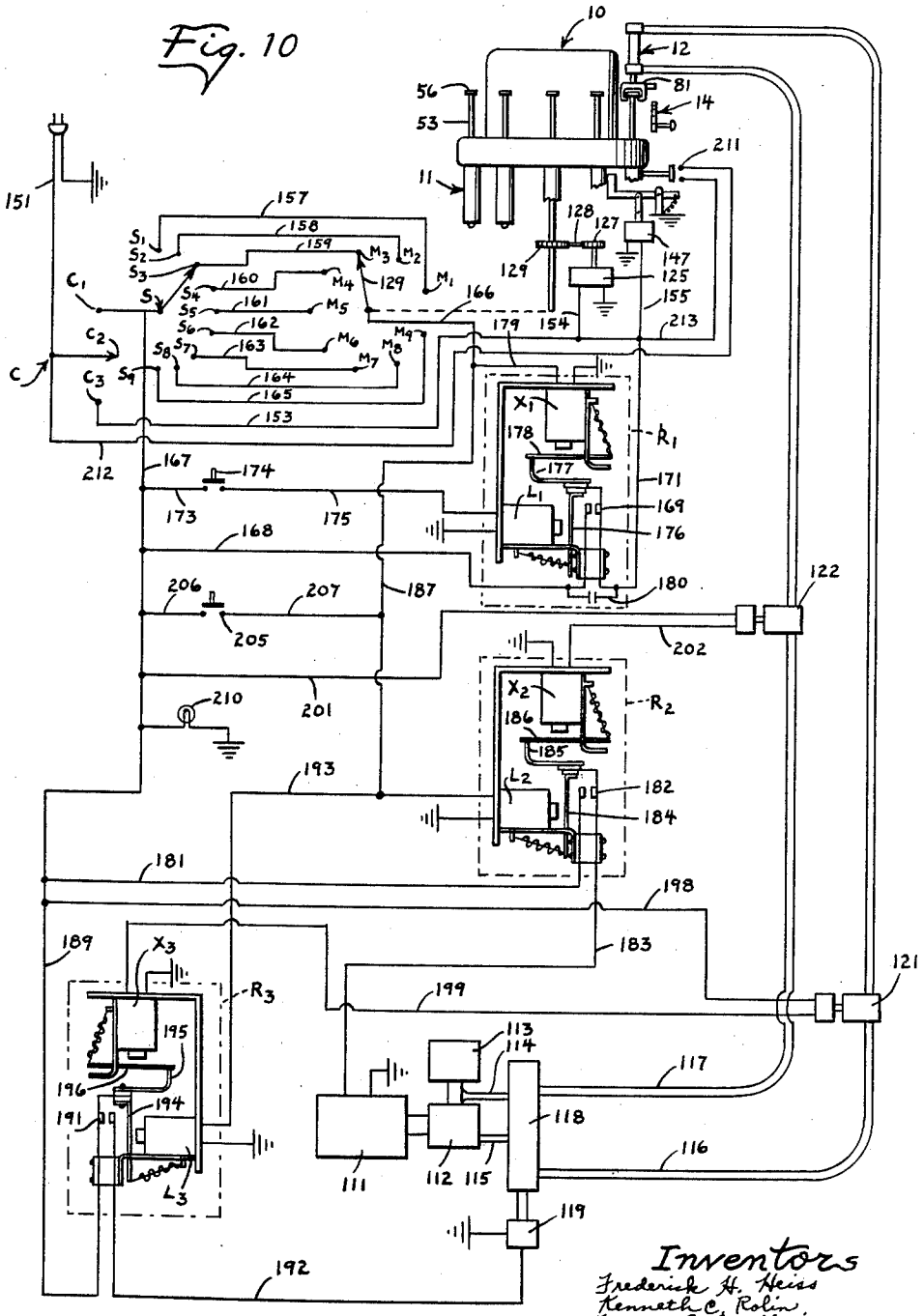
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DISPENSING MACHINE

Filed Feb. 24, 1958 5 Sheets-Sheet 5

Fig. 10



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3,066,830

DISPENSING MACHINE

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Filed Feb. 24, 1958, Ser. No. 717,017
18 Claims. (Cl. 222—135)

This invention relates to dispensing machines and particularly to a machine for dispensing fluid materials such as paint colorants, paints and the like.

It is the general object of this invention to provide a dispensing machine which is operable to accurately dispense selectively variable quantities of different paint colorants or paints to enable accurate and repetitive production of any preselected color.

Another object of this invention is to provide an apparatus for storing and dispensing drying-type paint colorants or paints and particularly to provide a dispensing mechanism in which the paint material is intermittently withdrawn and dispensed from a storage canister and a protective atmosphere is maintained in the canister to prevent deterioration of the paint material therein.

Another object of this invention is to provide a machine for dispensing predetermined selectively variable quantities of liquid materials in which the volume of material dispensed is substantially independent of the fluidity of the material and hence independent of the temperature at which the machine operates.

A more particular object of this invention is to provide a dispensing machine including a rotatable canister, a piston-type dispenser individual to each compartment in the canister, and an operating apparatus which can be preset to rotate the canister and position a selected dispenser at a dispensing station and to thereafter automatically reciprocate the piston of that dispenser through a predetermined selectively variable stroke whereby to dispense a preset quantity of a selected one of the materials in the canister.

A further object of this invention is to provide a dispensing mechanism in accordance with the foregoing object and having an improved operator including a fluid actuated piston and means for selectively and rapidly varying the stroke of the piston to control the amount of material dispensed from the respective dispensing mechanism.

A further object of this invention is to provide an improved mounting for the rotatable canister to prevent shifting thereof during operation of the dispensing mechanism to thereby assure accurate measurement of the quantity of material dispensed therefrom.

Still another object of this invention is to provide an improved arrangement for preventing dripping of the material from the several dispensing mechanisms, when the latter are not being operated to dispense material therefrom.

Yet another object of this invention is to provide a dispensing mechanism including a canister having a plurality of generally wedge-shaped compartments and an improved rotatable stirring arrangement for uniformly agitating the material in the compartments.

These, together with various ancillary objects and advantages of this invention will be more readily appreciated as the same becomes better understood by reference to the following detailed description when taken in connection with the accompanying drawings, wherein:

FIGURE 1 is a vertical sectional view taken on a plane through the center of the dispensing mechanism;

FIGURE 2 is a fragmentary front elevational view of the dispensing mechanism with parts broken away along

the section line 2—2 of FIGURE 1 and shown in section to illustrate details of construction;

FIGURE 3 is a fragmentary horizontal sectional view taken on the plane 3—3 of FIGURE 1, and with parts of the canister broken away and shown in sections to illustrate details of construction;

FIGURE 4 is a fragmentary horizontal sectional view through the dispensing machine, taken on the plane 4—4 of FIGURE 1, and illustrating the frame for rotatably supporting the canister;

FIGURE 5 is an enlarged fragmentary longitudinal sectional view through one of the piston-type measuring devices;

FIGURE 6 is an enlarged sectional view taken on the plane 6—6 of FIGURE 4 and illustrating the brake mechanism for stopping rotation of the canister;

FIGURE 7 is a horizontal sectional view taken on the plane 7—7 of FIGURE 1 and illustrating the underside of the canister and the support frame therefor, and with the drive gear for the canister removed to illustrate details of construction;

FIGURE 8 is an enlarged fragmentary sectional view, taken on the plane 8—8 of FIGURE 1, and illustrating details of construction of the volume control cam;

FIGURE 9 is an enlarged fragmentary sectional view, taken on the plane 9—9 of FIGURE 4, and illustrating the wiper arrangement for removing any drips forming on the tips of the dispensing mechanisms;

FIGURE 10 is a diagrammatic view illustrating the electrical and hydraulic controls for operating the dispensing mechanism, and

FIGURE 11 is an enlarged sectional view through one of the covers for the canister compartments.

In general, the dispensing mechanism of the present invention includes a canister 10 mounted for rotation about its axis and having a plurality of piston-type dispensing mechanisms 11 mounted thereon. A common operator 12 is mounted at one side of the canister and positioned so as to operate any selected one of the dispensing mechanisms 11 which is aligned therewith. In the preferred form of the invention, the common operator 12 is actuated hydraulically and a selectively adjustable stop mechanism 14 is provided for controlling the stroke of the operator to thereby selectively vary the quantity of material dispensed.

Referring more specifically to FIGS. 1–4 of the accompanying drawings, the dispensing mechanism includes a base 21 having a rigid panel 22 of generally U-shaped cross-section, affixed thereto and extending upwardly from adjacent the forward portion of the base. Spaced side walls 23, a rear wall 24 and front plates 25 are secured to the base 21 and to the front panel 22 to define an enclosure for the dispensing mechanism. A cover 26 overlies the front, side and rear walls of the housing.

The support frame for the canister 10 is best shown in FIGS. 1 and 4 and includes a spider-like member having a central hub 28 and a plurality of radially extending arms 29 which terminate at their outer ends in upwardly facing U-shaped portions 31. A reinforcing ring 32 is secured to the arms 29 and disposed concentrically of the hub 28. Each of the arms 29 is supported at its outer end by relatively diverging legs 33, which legs are affixed at the lower ends thereof to the base 21. A roller 34 is mounted in each of the upwardly facing U-shaped portions for rotation about a pin 35 which extends radially of the frame.

The canister 10 may conveniently be cast in one piece and includes a cylindrical side wall 36, a bottom wall 37 which is preferably inclined downwardly and outwardly from the central portion thereof, as shown in FIGURE 1, and a plurality of partitions 38 which extend from the cylindrical wall 36 inwardly and merge

in a central core 39 to thereby define a plurality of generally wedge-shaped compartments 40 in the canister. In the specific embodiment illustrated, nine separate compartments are provided in the canister, it being understood that a greater or lesser number may be provided if desired. The underside of the canister has a substantially flat track portion 41 adjacent the outer periphery thereof adapted to rest on the rollers 34 on the frame to be supported thereon. The canister is centered with respect to the rollers by means of a spindle 42 having the flanged upper end thereof affixed to the bottom of the canister as by fasteners 43. The spindle 42 is rotatably received in the hub 28 and means, to be described more fully hereinafter, is provided for rotating the spindle 42 to thereby rotate the canister.

A plurality of outwardly extending projections 45 are provided on the canister 10, adjacent the lower end thereof, which projections are hollow as best shown in FIGURE 1, and each communicates with a respective one of the compartments 40 in the canister. One of the dispensing mechanisms 11 is mounted on each of the projections 45 and extends downwardly from the canister. A generally L-shaped screen 46 is provided at the juncture of each of the projections 45 with the respective chamber in the canister and, conveniently, one leg of the screen may be fastened to the bottom 37 of the canister, as by a fastener 47 with the other leg extending upwardly therefrom and positioned to overlie the open end of the hollow projection 45. As is apparent from FIGURES 1 and 3, the upwardly extending leg of the screen 46 is shaped to conform to the curved outer wall 36 of the canister.

Each of the dispensing mechanisms 11 are the same and, as best shown in FIGURE 5, include a cylinder 51 which is threaded or otherwise rigidly secured to each of the projections 45, in communication therewith. A piston 52 is slidably disposed in the cylinder 51 and has a rod 53 connected thereto and extending upwardly through the respective projection 45 and through a seal 54 thereon. The upper end of the rod 53 terminates in a head 56. A valve is provided on the piston 52, which valve is arranged to close when the piston is extended for dispensing material from the cylinder, and to open when the piston is retracted to permit material from the respective compartment to flow thereby into the portion of the cylinder below the piston. In the preferred form illustrated in FIGURE 5, the piston 52 has a seal ring 57 disposed in a groove in the outer periphery thereof and a plurality of ports or openings 58 which extend therethrough. The piston is secured to the piston rod 53 by a stepped bolt 59 which is threaded into the end of the rod and which bolt has an elongated shank portion arranged to slidably support a valve disk 61. A spring 62 is disposed around the bolt 59 between the valve disk 61 and the head 59*a* of the bolt, to yieldably urge the valve disk to its closed position.

A dispensing nozzle and a check valve are provided at the lower end of the cylinder 51 and arranged so as to minimize, if not prevent, dripping of liquid from the cylinder, when material is not being dispensed therefrom. In the embodiment illustrated, the nozzle 64 has a somewhat conical configuration and has a dispensing opening 65 adjacent the apex thereof. The nozzle has an outwardly extending rim 66 thereon and a cap 67 is threaded on the lower end of the cylinder and has an inwardly extending flange 68 adapted to underlie the rim 66 to retain the same on the cylinder. A check valve 69 is mounted in the cylinder above the dispensing opening 65, which check valve is arranged to open when pressure is applied to the material in the cylinder during a dispensing operation, and to close when the piston is retracted to its initial position. Conveniently, the check valve may be mounted on a bracket including a first flanged disk 71, dimensioned to surround the rim 66 on the nozzle and to be snugly received within the threaded cap 67, and a second relatively smaller flanged disk 72 disposed in back-to-back relation with the first-mentioned flanged disk and secured thereto as by fasteners 73. A valve body 74 is mounted in a central opening in the flanged disk 72 and has an outwardly extending flange on the lower end thereof received between the flanged disk 72 and the offset portion 71*a* on the flanged disk 71. The latter disk has an opening 75 therein which communicates with the passage 76 in the valve body. A ball-type check valve 77 is disposed in the valve body, to seat thereagainst, and a spring 78 is interposed between the ball and the offset portion 71*a*, to yieldably urge the ball to its closed position. As is apparent, the ball check valve 77 will not open until the pressure thereabove is sufficient to overcome the spring 78. The strength of the spring is selected so as to be at least sufficient to prevent the ball valve from opening under the pressure exerted thereon by the column of material and the piston disposed thereabove. However, when the piston is extended by the application of pressure to the piston rod 53, the pressure exerted by the liquid in the cylinder on the ball valve is sufficient to overcome the spring and permit the material to flow through the check valve.

In accordance with the present invention, a single or common operator 12 is provided for reciprocating each of the pistons 52 of the several dispensing mechanisms 11. The operator includes a fixed jaw 81 having an anvil 81*a* arranged to engage the upper side of the heads 56 on the piston rods, and inwardly extending fingers or flanges 81*b* which are spaced from the anvil 81*a* a distance greater than the axial depth of the head 56 and which fingers are arranged to underlie the head 56 and engage the same when the jaw is retracted. The fingers 81*b* are spaced apart a distance sufficient to loosely receive the rod 53 therebetween so that the heads 56 on the rods may pass through the jaw 81 between the anvil 81*a* and the fingers 81*b*, as the canister is rotated.

In the preferred form of the invention, an operator 12 is fluid-operated and includes a cylinder 83 having a piston or plunger 83*a* (not shown) slidably disposed therein and operatively connected by means of a piston rod 84 to the jaw 81, to extend and retract the latter. The piston 83*a* on the up-stroke thereof is arranged to engage the head on the upper end of the cylinder 83 to be stopped thereby, as shown in FIG. 1, and a spring 85 is interposed between the jaw and the lower cylinder head to yieldably urge the piston 83*a* and jaw 81 downwardly a short distance after the fluid pressure at the underside of the piston is shut off at the completion of the retraction stroke of the piston, to thereby provide a slight clearance between the fingers 81*b* and the underside of the heads 56, on the piston rods. This permits the heads 56 on the piston rods to pass freely through the jaw 81 when the canister is hereafter rotated. The cylinder 83 is preferably mounted for limited adjustment in a direction parallel to the direction and movement of the jaw 81, to permit adjustment of the initial position of the jaw 81. For this purpose, there is provided a generally U-shaped mounting bracket 86 which is affixed to the backside of the front panel 22. An adjusting bar 87 is slidably disposed on one side of the U-shaped bracket 86 and is secured to the cylinder 83 located at the other side of the bracket, by bolts 88 which extend through elongated openings 89 in the web portion of the bracket. A plate 91 overlies the top of the U-shaped bracket and a bolt 92 is rotatably supported on the plate 91 and threadedly received in the bar 87 to effect raising and lowering of the latter as the bolt 92 is turned relative thereto.

The mechanism 14 for selectively adjusting the stroke of the jaw 81 includes a cam plate 95 which is non-rotatably mounted on a shaft 96. The shaft 96 is loosely received in an opening 97 in the front panel 22 for rotary and limited radial shifting movement relative thereto and a spacer block 98 is disposed on the shaft between the panel and the cam plate to maintain the latter in spaced

relation to the panel. An index plate 99 is non-rotatably affixed to the shaft 96, at the outer side of the front panel 22, and has a plurality of spaced openings or recesses 101 therein, as is best shown in FIGURE 8. A ball-type detent 102 is mounted in the front panel and yieldably urged by a spring 103 into the recesses 101 to thereby permit stepwise adjustment of the shaft 96. The cam plate 95, as best shown in FIGURE 2, has a plurality of surfaces or stops, designated *a*—*j*, extending substantially tangentially thereof and disposed at progressively increasing radial distances from the axis of the shaft 96. The jaw 81 has a finger 105 thereon which is guidably received in a channel 106 on the backside of panel 22 and arranged to engage the periphery of the cam plate 95. As is apparent, the stroke of the jaw 81 can be selectively varied by merely rotating the cam plate 95.

Advantageously, the cam stops *a*—*j* are so arranged that 1/16 ounce, 1/8 ounce, 1/4 ounce, 3/8 ounce, 1/2 ounce, 3/4 ounce, 1 ounce, 1 1/2 ounces, 2 ounces, 3 ounces and 4 ounces will be dispensed from the preselected measuring cylinder when the cam surfaces *a*—*j* are respectively positioned in the path of the jaw finger 105. This arrangement facilitates coloring of the different size containers namely pints, quarts and gallons. As will be noted, certain cam stops are arranged so as to effect dispensing of quantities which are two or four times the quantities dispensed at other stops. Thus, the amount dispensed at stop "*b*" will be twice that dispensed at stop "*a*" and at stop "*c*" will be twice that at stop "*b*" and four times that at stop "*a*." The other stops are similarly related so that for one size container one stop such as "*a*" will be used to produce a certain color in a pint container while a different stop such as "*b*" will be used for quarts and a third stop such as "*c*" for gallons. It is further contemplated that the present machine be used in conjunction with a "tube" type coloring system wherein the colorants are packaged in disposable tubes of different sizes. Such tubes are provided in graduated sizes corresponding to certain of the quantities enumerated above and in order to enable production of at least certain shades with either tubes or with the machine, the cam stops *a*—*j* are preferably arranged so as to dispense only 95% of the quantities above specified since approximately only 95% of the colorant can be removed from the tube.

As is shown in FIGURE 2, the cam plate 95 has an arcuate surface 107 disposed concentric with the shaft 96 and arranged to engage a support bracket 108 which is rigidly secured to the front panel 22. Thus, as the jaw is extended, the finger 105 thereon engages one of the surfaces *a*—*j* and moves the cam plate 95 downwardly a slight amount until the arcuate surface 107 thereon firmly engages the support bracket 108, at which time further downward movement of the jaw is prevented.

As is apparent, the stroke of the dispenser piston 52 and hence the amount of material which can be dispensed during each operation, can be varied over a wide range. In accordance with the present invention, the hydraulic apparatus 13 for actuating the fluid operator 12, is arranged so as to apply fluid to one side of the plunger to extend the same and, to immediately reverse the application of fluid pressure on the plunger when the finger 105 on the jaw emerges the cam 95, to thereby effect return of the piston rod to its initial position to complete the dispensing cycle without any lost time. Thus, the dispensing cycle will be completed in a relatively shorter time, when only a small amount of material is dispensed from one of the dispensers 11, than when a large amount of material is dispensed therefrom.

More particularly, the hydraulic apparatus includes an electric motor 111 which drives a pump 112, of any suitable construction. The pump has an inlet communicating with a fluid reservoir 113 and a fluid return line 114 communicates with the pump inlet and reservoir 113. A fluid discharge line 115 communicates with the discharge side of the pump. Fluid under pressure from the pump 112 is supplied through conduits 116 and 117 to the fluid operator 12, to effect operation thereof, and a four-way valve 118 is interposed between the fluid return and discharge lines 114 and 115 and the conduits 116 and 117, to reversibly control the flow of fluid through the last-mentioned conduits. The four-way valve may be of any conventional construction which is operative in one position thereof, to connect the discharge and return lines 115 and 114, respectively, to the conduits 116 and 117 to extend the jaw 81 and, in the other position thereof, to respectively connect the discharge and return lines 115 and 114 with the conduits 117 and 116 to retract the jaw 81. A solenoid 119 is provided for operating the four-way valve 118. For reasons set forth more fully hereinafter, a normally-open pressure-operated switch mechanism 121 is provided in the conduit 116 and arranged to be closed when the pressure in the conduit exceeds a preselected value, a similar normally-open pressure-operated switch mechanism 122 being provided in the conduit 117 and arranged to close when the pressure in that conduit exceeds a preselected value. A control circuit, to be described more fully hereinafter and including the pressure-operated switch mechanisms 121 and 122, is arranged to automatically energize the motor 111, when a selected dispensing mechanism 11 is brought into operative relation below the fluid operator 12, to thereby extend the jaw 81 and dispense material from the machine. When the finger on the jaw engages the adjustable stop mechanism 14, the control circuit is operative to actuate the four-way valve 118 to reverse the application of fluid pressure to the actuator 12 and thereby return the jaw and the dispenser rod 53 to its initial position.

The canister 10 is rotated by means of a motor 125 (see FIGS. 4 and 7) conveniently mounted on a pad 126 depending from one of the radially extending arms 29 of the support frame. The motor drives a gear 127 which is drivingly connected by a chain 128 to a gear 129 on the lower end of the spindle 42. As shown in FIGURE 1, the spindle 42 has a reduced diameter extension 42*a* thereon and a switch actuating arm 131 is disposed on the reduced diameter extension and non-rotatably keyed thereto by a pin 132. The gear 129 underlies the arm 131 and is non-rotatably connected to the spindle by a set screw 133. A cap screw 134 is threaded into the spindle and serves to retain the gear 129 and operating arm 131 in assembled relation thereto.

A brake mechanism is provided for stopping rotation of the canister. As best shown in FIGURES 4 and 6, the brake mechanism includes a lever 141 mounted for vertical pivotal movement on ears 142 carried by one of the radially extending arms 29 of the support frame. The arm has an offset portion 141*a* thereon, which portion has a beveled nose 143 and a notch 144 in the upper side thereof shaped to receive the lugs 145 on the underside of the canister (see FIGURES 1 and 7). A spring 146 is attached to the lever 141 and arranged to yieldably urge the portion 141 upwardly against the underside of the canister to lock the latter against rotation when one of the lugs 145 drops into the notch 144. An electro-responsive means such as a solenoid 147 is provided for selectively releasing the brake and, as shown in FIGURE 6, the solenoid is mounted on a pad 148 carried by the arm 29 of the frame and has the armature thereof connected by a link 149 to the lever 141.

The control circuit for operating the canister drive motor 125, the brake solenoid 147, and the hydraulic apparatus including the motor 111 and valve operating solenoid 119, is diagrammatically illustrated in FIGURE 10. In general, the control circuit is arranged to automatically rotate the canister to bring a preselected one of the several dispensing mechanisms 11 to a dispensing station and thereafter operate the hydraulic apparatus to extend and retract the dispenser operating rod 53. In order to simplify the drawings, one line of the two-wire system has been indicated as grounded, it being under-

stood in practice that a separate ground wire is provided.

More particularly, power is supplied from a line 151 to a multiple position control switch C having contacts C1, C2 and C3. The contact C3 is connected by conductors 153 and 154 to the canister drive motor 125 and through conductor 155 to the brake operating solenoid 147 to thereby energize the drive motor and rotate the canister and to simultaneously energize the solenoid to release the brake. The canister will continue to rotate so long as the switch is in engagement with contact C3 and an apparatus to be described more fully hereinafter, is provided in each of the several compartments of the canister and arranged to agitate or stir the material therein, in response to rotation of the canister.

The other contact C1 of the control switch is connected to a selector switch S, also conveniently mounted on the front panel 22 and having an operating knob 156 thereon arranged to enable movement of the switch between the different rotative settings thereof. The selector switch S has a plurality of contacts S1—S9 corresponding in number to the number of different compartments in the canister. Each of the contacts S1—S9 is connected, through a conductor 157—165, respectively, to one terminal of a respective one of the precision switches M1—M9. These switches are conveniently mounted in an annular bank on a support plate 166 affixed to the underside of the arms 29 of the frame, as shown in FIGURES 1 and 7, with the operating plungers thereof disposed in the path of movement of the arm 151, carried by the canister drive spindle 42, so that the switches are sequentially operated as the canister is rotated. The other terminal of each of the switches M1—M9 are electrically connected together to a common conductor 166. As is apparent, a circuit is completed from the selector switch S to the common conductor 166 when the arm 129 on the canister engages that one of the switches M1—M9 which is connected to the contact S1—S9 which is engaged by the selector switch. These precision switches M1—M9 are so positioned as to be engaged by the arm 129, when a respective one of the dispensing mechanisms 11 is disposed at a dispensing station, and, in accordance with the present invention, provision is made for interrupting rotation of the canister when a preselected dispensing mechanism reaches the dispensing station.

In order to dispense material from a preselected canister, the control switch C is preset to its vend position (engaging contact C1) and the selector switch S is positioned to engage a selected one of the contacts S1—S9 corresponding to the color to be dispensed. When the control siwtch engages contact C1, a circuit is established to the canister drive motor 125 and the brake solenoid 147 through conductors 167 and 168, normally open contacts 169 of latching relay R1 and through conductor 171 to conductors 154 and 155 which lead to the motor 125 and solenoid 147, respectively. The contacts 169 of the relay R1 are arranged to be closed by means of the latching solenoid L1, on the relay R1, which solenoid is energized through conductors 167 and 173, normally open dispense switch 174 and conductor 175. When the normally open dispense switch 174 is closed, the solenoid L1 is energized, whereupon the armature 176 thereof is moved toward the left as viewed in FIGURE 10, to close the contacts 169 and move the latch finger 177 thereon to its latched position wherein it overlies the end of the armature 178 on the release solenoid X1. The canister drive motor 125 will therefore remain energized to rotate the canister until the control arm 129 engages that one of the precision switches M1—M9 corresponding to the canister selected on the selector switch S. At that time, a circuit is completed to the common conductor 166 and conductor 179 to the release relay X1, thereby energizing the latter and releasing the latch finger 177 on the latch relay L1. The contacts 169 thereupon open and deenergize the canister drive motor 125 and brake solenoid 147 to stop rotation of the canister. A condenser 180 is connected across the contacts 169 of the relay, to minimize arcing of the contacts.

Provision is also made for energizing the pump motor 111, as soon as rotation of the canister is stopped. As is also shown in FIGURE 10, the pump motor 111 is energized through conductors 167, 181, the normally open contacts 182 of latching relay R2, and conductor 183. The normally open contacts 182 are adapted to be closed by a latching solenoid L2, which, upon energization, moves the armature 184 thereof to the left as viewed in FIGURE 10 to close the contacts 182 and move the latch finger 185 thereon into its latched position over the end of the armature 186 of the release solenoid X2. The latching solenoid L2 is energized from the common conductor 166 through conductor 187 so as to thereby close the contacts 182, when the control arm 129 engages a preselected one of the percision switches M1—M9. This energizes the hydraulic motor 111.

As previously described, the motor 111 is arranged to drive the pump 112 and supply fluid under pressure to the operator 12 to extend the jaw 81 until the finger 105 thereon engages the cam stop 14. The four-way valve 118 which controls the flow of fluid between the return and discharge conduits 114 and 115 and the conduits 116 and 117, is operated when the finger engages the cam stop to reverse the application of fluid pressure on the hydraulic operator 12 to thereby retract the same to its initial position.

In the specific embodiment illustrated, the four-way valve 118 is normally in a position to establish communication between the discharge line 115 and the conduit 117 and between the return line 114 and the conduit 116, and provision is made for energizing the solenoid 119 when the preselected canister reaches a dispensing station, to apply fluid under pressure from the pump to the conduit 116 and thereby move the jaw 81 downwardly in a dispensing stroke. More specifically, the solenoid 119 is energized through conductors 167 and 189, normally open contacts 191 of the relay R3, and conductor 192. The relay R3 includes a latching solenoid L3 for closing the contacts 191, which latching solenoid is energized through the common conductor 166 of the precision switches M1—M9, conductor 187 and conductor 193. Thus, when the preselected canister reaches the dispensing station, the latching solenoid L3 is energized to attract the armature 194 thereof and move the latch finger 195 thereon over the end of the armature 196 of the release relay X3. The relay R3 remains in its latched position until the finger 105 on the operating jaw 81 engages the cam stop 14. At that time, the pressure in the conduit 116 builds up to a preselected value and operates the pressure switch mechanism 121.

The pressure switch 121 is normally open and is adapted upon closing to supply power by way of conductors 167 and 198, pressure switch 121 and conductor 199 to the release relay X3, to energize the latter and release the latch finger 195. The contacts 191 thereupon open and deenergize the valve operating solenoid 119 and permit the valve 118 to return to a position in which it communicates the discharge and return lines 115 and 114 with the conduits 117 and 116, respectively. This reverses the flow of fluid to the operator 12 and moves the latter in a direction to retract the jaw 81 to its initial position. As the jaw 81 approaches its raised position, it engages the spring 85 and compresses the same until the fluid operator piston 83*a* engages the upper head or stop on the cylinder 83. The spring 85 is selected so that the force required to compress the same is insufficient to actuate the pressure switch 122 until the piston 83*a* strikes the fixed upper stop (the upper cylinder head). At that time, the pressure in the conduit 117 builds up to a preselected maximum pressure to operate the pressure switch 122. The switch 122 is normally open and is connected in series with conductors 201 and 202 to supply power from conductor 167 to the release solenoid X2. Closing

of the pressure switch 122 energizes the release solenoid X2 and attracts the armature 186 thereof to thereby release the latch finger 185 and permit the contacts 182 of relay R2 to open. This deenergizes the hydraulic drive motor 111.

As is apparent from FIGURE 1, as the jaw 81 is raised, the fingers 81*b* thereon engages the underside of the head 56 to raise the piston rod 53. However, when the motor 111 is deenergized to interrupt delivery from the pump 112, the pressure at the underside of the piston in the hydraulic operator 12 will be decreased, due to a slight leakage within the system. The spring 85 will therefore be effective to move the head 81 downwardly a short distance to disengage the fingers 81*b* from the head 56 on the piston rod. Consequently, when the head 81 is in its normal or initial position, the anvil 81*a* and the fingers 81*b* are spaced slightly from the upper and lower sides respectively of the head 56. Consequently, the canister can be freely rotated with the heads on the piston rods passing through the jaw 81. The friction of the rods 53 in the seals 54 therefor and the pressure exterted on the piston heads 52 by the fluid in the cylinders 51 is sufficient to maintain the rods in their raised position until the succeeding acuation thereof by the operator 12. Although there is some lost motion between the jaw 81 and the head 56 disposed therein, it is apparent that this lost motion does not affect the accuracy of the dispensing operation. The stroke of each of the rods 53 for any preselected setting of the cam plate 14 will be the same, provided the vertical depth of the heads 56 is the same.

Provision is made for enabling dispensing of an additional quantity from a canister at the dispensing station, after the completion of the initial dispensing operation therefrom, and without requiring rotation of the canister to again bring the same dispensing mechanism into position at the dispensing station. This is effected by the provision of a normally open repeat switch 205 which is connected through conductors 206, 207 and 187 to the latching solenoid L2 of relay R2. This effects closing of the contacts 182 to thereby energize the pump drive motor 111. In addition, the repeat switch 205 establishes a circuit through conductors 207, 187 and 193 to the latching solenoid L3 of relay R3. This closes the normally open contacts 191 and energizes the valve operating solenoid 119 to move the valve 118 and connect the discharge line 115 thereof with the conduit 116. The fluid operator 12 is thereafter extended and retracted in the manner previously described to dispense a quantity of material from the canister determined by the setting of the adjustable cam stop 14. A pilot light 210 is connected to the conductor 167 to be energized whenever the control switch C is in its vend or dispense position.

Since the release solenoid X1 of relay R1 is energized to stop the drive motor and apply the brake, as soon as the arm 129 engages the precision switch corresponding to the preselected colorant, it is apparent that the canister can stop in a position in which the arm remains in engagement with the precision switch. However, so long as the arm engages the precision switch and completes a circuit to the common conductor 166, the release solenoid X1, the latching solenoid L2 and the latching solenoid L3 remain energized. In order to prevent the several different types of malfunctions which could occur due to the arm remaining in engagement with the precision switch when the canister stops, provision is made for continuing rotation of the canister after the preselected precision switch is engaged by the arm 129, and until it moves out of engagement therewith. This is effected by the provision of a jog switch 211.

The jog switch 211 is normally open and controls the application of power from the power supply conductor 151, through conductor 212, switch 211 and conductor 213 to the canister drive motor 125 and brake solenoid 147. Any suitable means may be provided for operating the jog switch while the control arm remains in engagement with one of the precision switches, and, as shown in FIGS. 1 and 7, the jog switch is mounted on one of the pair of depending legs 33 and has an operator 214 positioned to be engaged by one of the dispensing mechanisms 11 each time the control arm engages one of the precision switches M1—M9. Conveniently, the jog switch operator 214 may be arranged to engage that dispensing mechanism 11 which is located at the dispensing station to continue the energization of the canister drive motor 125 and brake solenoid 147, until after the control arm 129 has moved out of engagement with the preselected precision switch.

Provision is made for agitating the material in the several compartments 38 in the canister. As best shown in FIGURES 1 and 3, the compartments 38 are generally wedge-shaped and a top 221 is removably attached to the top of the canister to overlie the compartments 38 therein. An agitating or stirring device 222, preferably having one or more vanes 222*a* thereon, is disposed in each of the compartments and is supported by a rod or shaft 223 which is rotatably supported in a bearing 224 on the top 221. Because of the wedge-shaped configuration of the compartments, some difficulty is encountered in adequately stirring all of the material therein to maintain a uniform consistency throughout the compartment. It has been found advantageous to support the shafts 223 relatively closer to the apex of the wedge-shaped compartments and to extend the shafts downwardly and outwardly so that the stirring mechanism on the lower portion thereof will extend into the relatively wider portion of the compartment. This may conveniently be effected by forming an inclined well portion 221*a* in the top 221 in registry with each of the compartments in the canister, with upper and lower bearing members 224*a* and 224*b* threadedly interconnected and disposed on opposite sides of the top to be supported by the inclined portions 221*a* thereof in a downwardly and outwardly extending position as shown in FIGURE 1. Pulleys 225 are provided on the upper ends of each of the shafts 223 and a stationary, preferably resilient belt 226 is entrained around the pulleys at one side of the canister, as shown in FIGURE 3, and the end portions of the belt affixed to a stationary part of the dispensing mechanism, such as the upwardly extending front panel 22. As is apparent from FIGURE 3, each of the pulleys 225 will engage the belt 226 only during a portion of each revolution of the canister so that the corresponding agitators will be rotated intermittently as the canister is rotated. This not only provides an improved agitation of the material in the compartments 38, but also provides a simple means for operating the agitators or stirrers and, in such a manner that the cover 221 can be readily removed for cleaning and the like.

The top 221 is preferably sealed to the canister by a seal ring 220 and has a plurality of filler openings 231 therein, one for each of the compartments of the canister, to enable replenishing of the material in the canisters without requiring removal of the cover 221. Removable covers 232 (best shown in FIG. 11) are provided for covering each of the openings 231 to thereby completely enclose the compartments 38 in the canister.

Since the colorant is intermittently withdrawn from compartments, it is necessary to vent the same to the atmosphere to prevent the formation of a vacuum therein. For reasons set forth hereinafter, the covers are sealed to the top 221 by seal rings 230 and a vent opening 240 is provided in each of the covers to admit air thereinto.

The colorants to be dispensed from the machine are preferably in a readily flowable liquid form and, in order that the colorants not adversely affect the drying characteristics of the base paint, when the colorants are added thereto, the colorants are preferably of the so-called "drying-type' colorants. Such colorants, in general include the coloring pigment, a suitable drying-type oil such as linseed maleaic oil and a thinner such as min-

eral spirits to produce the desired flow characteristics. Such drying-type colorants, however, tend to evaporate and also to "skin-over" when exposed to air. This changes composition of the colorant and increases the quantity of pigment per unit volume and hence the coloring value of the colorant.

Thus, in order to permit accurate and repetitive reproduction of preselected colors, it is necessary not only to accurately control the quantity of colorant dispensed, but also to control the composition of the colorant to maintain a uniform coloring value per unit volume. For this purpose, provision is made for maintaining an atmosphere above the colorant in each compartment to prevent drying of the oils in the colorant and evaporation of the thinner used therein. This is conveniently effected by the provision of a receptacle at the underside of the cover and overlying the vent opening 240 therein for receiving an absorbent material 235 impregnated with a mixture for maintaining a protective atmosphere in the compartments. This mixture includes an anti-oxidant, for example butyryl doxime, methyl ethyl ketoxime, iso amyl phenol, guaiacol, etc. to prevent drying of the oils in the colorant and a thinner such as mineral spirits for maintaining a saturated atmosphere in the canister compartment and thus prevent evaporation of the colorants. As best shown in FIG. 11, the receptacle is conveniently formed at the underside of the cover by a flange 233 and a perforate grid 234 which is attached to the flange. As is apparent, the impregnated pad 235 overlies the vent opening 240 in the cover so that any air which enters the compartment must pass through the pad and be treated thereby. In addition, it is to be noted that the open area of the grid 234 is large as compared to the vent opening so that the mixture can readily evaporate from the pad into the respective compartment in the canister to maintain a proper atmosphere therein.

The material to be dispensed is adapted to be dispensed directly from the mechanisms 11 into the receptacle such as the pail P. As shown in FIGURE 1, an opening 245 is provided in the front panel 22 below the lower end of the dispensing mechanism 11 and a shield including opposed side walls 246, a top wall 247 and a rear wall 248 is disposed around the opening 245 and extends into the housing to a position below the dispensing mechanism to define a dispensing station. An opening 249 is provided in the top wall 247 and side wall 246 to permit dispensing of material from the mechanism 11 into the receptacle P disposed in the shield.

Although the check valve assembly 69 prevents the material in the cylinder 51 from dripping out of the nozzle 65, when the dispensing mechanism is not in operation, a small amount of colorant or paint may collect around each of the dispensing openings 65 in the nozzles 64 and drip therefrom. An annular drip plate 251 is supported at the ends thereof on the side walls 246 of the shield and underlies the tips of the nozzle 64 to collect any material which may drip therefrom. In addition, a wiper is provided for removing the excess material from the tips of the nozzles. This wiper includes a small receptacle 254 (see FIGS. 3, 4 and 9) adapted to contain a mineral-type solvent and having a roller 255 disposed therein and rotatably supported on trunnions 256. An absorbent cover 257 is provided on the roller and arranged to engage the tips of the nozzle 64, as the canister is rotated, so that the roller is rotated through a part of a turn each time one of the nozzles 64 wipes thereacross. The colorant collected on the nozzle is wiped onto the roller 255 and conveyed thereby into the mineral solvent in the receptacle 254, which solvent dissolves the colorant from the roller and permits the pigment to fall into the bottom of the receptacle. Conveniently, the receptacle 254 is removably supported on a bracket 253, herein shown attached to one of the side walls 246 of the shield. Preferably, the bracket supports the receptacle in a position such that the roller extends tangentially of the circle described by the tips of the nozzle, as the canister is rotated.

All of the manually operated controls for the dispensing mechanism are conveniently mounted at the front side of the housing, and behind a cover panel 261. As shown in FIGURES 1 and 3, the cam operating knob 100, the selector switch knob 156, the control switch C, the dispense switch 174, the repeat switch 205 and the pilot light 210 are all conveniently located at the cover panel 261.

From the foregoing it is thought that the operation of the device will be readily understood. After the device has been idle for a prolonged period, it is desirable to agitate the material in the compartments 38, and for this purpose the control switch C is turned into engagement with contact C3 thereof to establish a circuit to the canister drive motor 125 and brake solenoid 147 to thereby rotate the canister. As the canister rotates, the pulleys 225 engage the belt 226 and are rotated thereby to agitate the material in the compartments. When the control switch is moved into engagement with contact C2, power to the drive motor 125 and brake solenoid through conductor 153 is interrupted. However, if the arm 129 is in a position to engage any one of the precision switches M1–M9, the jog switch 211 operates to complete a circuit to the drive motor and brake solenoid to continue rotation of the canister until the arm 129 moves out of engagement with that precision switch. This prevents accidental dispensing from the canister corresponding to that precision switch when the control switch is thereafter moved to its dispense position engaging contact C1, as would otherwise occur if the selector switch S happened to be positioned on the contact corresponding to that precision switch.

In order to dispense material from a selected compartment, the selector switch S is moved into engagement with a contact such as S3 corresponding to the color to be dispensed and the cam plate 95 is rotated by the knob 100 to a preset position corresponding to the amount of material to be dispensed. The control switch C is then rotated to its vend position, in engagement with contact C1, and the dispense button 174 is operated. Operation of the dispense button energizes the latching solenoid L1 and closes contacts 169 to establish a circuit to the canister drive motor and to the brake solenoid 147, to thereby rotate the canister. When the selected canister reaches the dispensing station, the control arm 129 engages a precision switch, such as M3 which is electrically connected to the corresponding contact S3 of the selector switch and establishes a circuit to the release solenoid X1 of the relay R1. This also operates the latching solenoids L2 and L3 of the relays R2 and R3 to thereby energize the pump motor 111 and the valve operating solenoid 119, whereby fluid under pressure is delivered from the pump through the conduit 116 to extend the jaw 81. The canister does not stop immediately upon energizing of the release solenoid S1 but continues to rotate so long as the jog switch 211 is energized. After the control arm 129 has moved out of engagement with the corresponding precision switch, the jog switch opens and permits the drive motor 125 to stop. Simultaneously, the brake solenoid 147 is deenergized and the brake applied to lock the canister in the preset position. If the canister were allowed to stop while the control arm engaged one of the precision switches M1–M9, then circuit to the solenoids L2 and L3 should be mometarily established if the selector switch were moved across the contact S1–S9 corresponding to that one of the precision switches, as would tend to occur during resetting of the selector switch. This would operate the pump 111 and dispense the wrong colorant. The jog switch, however, prevents this faulty operation by continuing rotation of the canister until the control arm moves away from the adjacent precision switch.

When the finger 105 on the jaw 81 engages the cam, the pressure in conduit 116 builds up and operates the switch 121. This operates the release solenoid X3 and deenergizes the valve operator 119 to permit the valve to return to its original position and supply fluid under pressure to the conduit 117. The fluid operator is then operated to retract the jaw 81. As will be noted, this arrangement rapidly reverses the direction of movement of the piston and thus relieves the pressure on the colorant below the piston and terminates the flow through the nozzle 64 as soon as the piston completes its dispensing stroke. This provides a relatively sharp cut-off of the dispensing flow and hence permits more accurate measurement. The jaw is retracted until it engages and compresses the spring 85 and, when the piston 83*a* engages the upper head on the cylinder 83, the pressure builds up to operate the pressure switch 122. At that time, the release solenoid X2 is operated to deenergize the pump motor 111. Spring 85 is then effective to move the jaw 81 downwardly a short distance to provide clearance for the piston rod heads 56.

We claim:

1. A dispensing machine comprising a frame, a carrier mounted on said frame for rotation about an upright axis and having a plurality of separate compartments, a plurality of measuring cylinders mounted on the carrier and each communicating with a respective one of said compartments, said cylinders each having a dispensing opening therein and a piston movable to dispense material through said opening, a rod on each of said pistons extending outwardly of the cylinder and having a head on the outer end thereof, a fluid operator mounted on said frame including a plunger and a jaw attached to said plunger positioned to receive said heads as said carrier is rotated, means for rotating said carrier to selectively position one of said heads in said jaw, a fluid pump having first and second conduits connected to said operator to apply fluid under pressure to relatively opposite sides of said plunger, valve means in said conduits operable to apply fluid under pressure selectively to said first and second conduits, means for operating said pump to apply fluid pressure to one of said conduits and move a selected one of said pistons toward said dispensing opening to dispense material from the respective cylinder, selectively adjustable stop means for limiting movement of said jaw, a first pressure responsive means in said first of said conduits operative in response to engagement of said jaw with said stop means for operating said valve means to apply fluid pressure to said second of said conduits, and a second pressure responsive means in said second of said conduits operative in response to return of said jaw to its initial position for stopping said pump means.

2. A machine for dispensing small measured quantities of paints, colorants and the like comprising a plurality of liquid reservoirs mounted for rotation about a common axis to enable advancement of any selected one of the reservoirs to a dispensing station, an individual dispensing pump for each reservoir having an inlet connected to a respective reservoir and an outlet, each pump having a reciprocable pump operator for dispensing liquid from the pump outlet in proportion to the movement of the operator, a common pump drive at the dispensing station having a reciprocable member engageable only with the pump operator at the dispensing station for positively moving that operator from an initial position to an extended position and for also positively moving that operator from the extended position back to the initial position each time said member is reciprocated, a first adjustable stop means engageable with said member for limiting movement of the operator toward said extended position, and a second stop means engageable with said member for limiting movement of the operator back to said initial position to assume returning of each of the operators to the same initial position.

3. The combination of claim 2 wherein said adjustable stop means includes a rotatable cam member mounted for rotation about an axis transverse to the direction of movement of said reciprocable member and said rotatable cam member is mounted for limited shifting movement in a direction transverse to its axis of rotation, said cam member having a surface concentric with the axis of rotation thereof, and a support bracket engageable with said surface to limit shifting movement of the cam member during dispensing.

4. A liquid dispensing machine comprising a plurality of liquid reservoirs mounted for rotation about a common axis to enable advancement of any selected one of the reservoirs to a dispensing station, an individual dispensing pump for each reservoir having an inlet connected to a respective reservoir and an outlet, each pump having a reciprocable pump operator for dispensing liquid from the pump outlet in proportion to the movement of the operator, a common pump drive at the dispensing station including a reciprocable member and means for extending and retracting said member, said member being engageable with the pump operator at the dispensing station for positively moving the operator from an initial position to an extended position and for also positively moving that operator from the extended position back to the initial position each time said member is reciprocated, a first adjustable stop means engageable with said member for limiting movement of the operator toward said extended position, means for limiting the pressure applied to said reciprocable member to a preselected maximum during extension of the member, and a second stop means engageable with said reciprocable member for limiting retraction of the members and assure returning of the pump operator to the same initial position.

5. The combination of claim 2 wherein said common drive means includes a fluid operated plunger, means for applying fluid under pressure to one side of the plunger to move the operator from said initial position to said extended position, and means operative when the pressure at said one side of the plunger reaches a preselected value incident to engagement of said reciprocable member with said first stop means for applying pressure to the other side of said plunger to retract the operator.

6. A liquid dispensing machine comprising a plurality of liquid reservoirs mounted for rotation about a common axis to enable advancing of any selected one of the reservoirs to a dispensing station, an individual dispensing pump for each reservoir having an inlet connected to a respective reservoir and an outlet, each pump having a reciprocable pump operator for dispensing liquid from the pump outlet in proportion to the movement of the operator, a head on each of the pump operators movable in a circular path as the reservoirs are rotated, a common pump drive at the dispensing station including a reciprocable member having a jaw thereon positioned in the path of movement of said heads and shaped to permit the heads to pass therethrough as the reservoirs are rotated, means for extending and retracting the jaw, means on the jaw engageable with the pump operator at the dispensing station for positively moving that pump operator from an initial position to an extended position and for also positively moving that operator from the extended position back to said initial position each time the jaw is extended and retracted, a first adjustable stop means engageable with said reciprocable member to limit extension of said pump operator, and a second stop means engageable with said reciprocable member to limit retraction of the pump operator and assure returning of the pump operators to the same initial position.

7. The combination of claim 6 wherein said common drive means includes a fluid operated plunger, means for applying fluid pressure to one side of the plunger to move the operator at the dispensing station from said initial position to said extended position, and means operative when the pressure at said one side of the plunger reaches

a preselected value incident to engagement of said reciprocable member with said first stop means for applying pressure to the other side of the plunger to retract the operator.

8. The combination of claim 7 including means for terminating the application of fluid pressure to said other side of the plunger when the plunger engages said second stop, and means yieldably urging said plunger away from said second stop to provide clearance between said jaw and the heads on the pump operators as the reservoirs are rotated.

9. The combination of claim 7 including means operative when the pressure at said other side of the plunger reaches a preselected value incident to engagement of said reciprocable member with said second stop means for terminating the application of fluid pressure to said other side of the plunger, and means yieldably urging said plunger away from said second stop means to provide clearance between the jaw and said heads as the reservoirs are rotated.

10. A liquid dispensing machine comprising a plurality of liquid storage reservoirs mounted for rotation about a common axis to enable advancement of any selected one of the reservoirs to a dispensing station, a measuring cylinder connected to each reservoir for rotation therewith and each having a piston therein movable from an initial position to a displaced position and back for dispensing a quantity of material proportional to the distance between said initial and said displaced positions, a rod connected to each piston and having a head on the outer ends thereof movable in a circular path as the reservoirs are rotated, a common pump drive means at the dispensing station, said drive means including a jaw normally positioned to span said path of movement of said heads when the pistons are in said initial position thereof, said jaw being dimensioned to loosely receive said heads as the reservoirs are rotated and having a first jaw face engageable with the heads to move the pistons from said initial to said displaced position when the jaw is moved away from its normal position and a second jaw face engageable with said heads to move the pistons from the displaced position back to said initial position each time the jaw is returned to its initial position, said drive means including selectively operable means for reciprocating said jaw, and stop means engageable with said drive means for stopping said jaw in said normal position thereof to thereby assure accurate return of the piston to said initial position thereof.

11. A liquid dispensing machine comprising a plurality of liquid storage reservoirs mounted for rotation about a common axis to enable advancement of any selected one of the reservoirs to a dispensing station, a measuring cylinder connected to each reservoir for rotation therewith and each having a piston therein movable from an initial position to a displaced position and back for dispensing a quantity of material proportional to the distance between said initial and said displaced positions, a rod connected to each piston and having a head on the outer ends thereof movable in a circular path as the reservoirs are rotated, a common pump drive means at the dispensing station, said drive means including a jaw normally positioned to span said path of movement of said heads when the pistons are in said initial position thereof, said jaw being dimensioned to loosely receive said heads as the reservoirs are rotated and having a first jaw face engageable with the heads to move the pistons from said initial to said displaced position when the jaw is moved away from its normal position and a second jaw face engageable with said heads to move the pistons from the displaced position back to said initial position each time the jaw is returned to its initial position, said drive means including selectively operable means for reciprocating said jaw, stop means engageable with said drive means for stopping said jaw in said normal position thereof to thereby assure accurate return of the piston to said initial position thereof, and interlock means for preventing rotation of the reservoirs when the jaw moves the piston at the dispensing station out of said initial position thereof to thereby assure return of the pistons to their initial position prior to rotation of the reservoirs.

12. A liquid dispensing machine comprising a plurality of liquid storage reservoirs mounted for rotation about an upright axis to enable advancement of any selected one of the reservoirs to a dispensing station, an upright measuring cylinder connected to each reservoir for rotation therewith and each having a piston slidable therein along an upright path from an initial position to a displaced position and back for dispensing a quantity of material proportional to the distance between said initial and said displaced position, a rod on each piston having a head on the outer end thereof movable in a circular path as the reservoirs are rotated, a common pump drive means at the dispensing station, said drive means including a jaw normally positioned to span said path of movement of said heads when the pistons are in said initial positions thereof, said jaws each having an upper face engageable with the head at the dispensing station as the jaw is moved downwardly and spaced fingers extending inwardly below the head and engageable with the underside of the head as the jaw is moved upwardly to positively return the piston heads to said initial position each time the jaw is returned to said normal position thereof, and stop means engageable with the common drive means for stopping said jaw in said normal position thereof to thereby accurately position the pistons at their initial positions, said drive means including means operable to move said jaw from said normal position thereof to a selectively variable displaced position and back to said normal position.

13. A machine for dispensing paints, colorants, and the like having a liquid vehicle and a pigment suspended in the vehicle comprising, a stationary support, a plurality of colorant storage reservoirs arranged in an annular pattern, means mounting said reservoirs on said support for rotation about a common upright axis to enable advancement of any selected one of the reservoirs to a dispensing station, an individual dispensing pump for each reservoir having an inlet connected to the respective reservoir and an outlet for dispensing measured quantities of colorant from the reservoirs, an elongated stirrer in each reservoir, means rotatably supporting said stirrers adjacent one end of the respective reservoir, a pulley on each of said stirrers, the set of said pulleys being arranged in a circle about the axis of rotation of said reservoirs, a resilient belt having end portions fixed to said stationary support outside the circle of said set of pulleys, said belt having the intermediate portion thereof extending only part way around the circle of said set of pulleys and said end portions extending generally tangent to said circle of said set of pulleys whereby each pulley engages the belt during only a portion of each revolution of the reservoirs to thereby intermittently rotate each stirrer as the reservoirs are rotated.

14. A machine for dispensing paints, colorants and the like having a liquid vehicle and pigment suspended in the vehicle comprising, a stationary support, a plurality of colorant storage reservoirs arranged around a common axis, means mounting said reservoirs on said support for rotation about said common axis to enable advancement of any selected one of the reservoirs to a dispensing station, an individual dispensing pump for each reservoir having an inlet connected to the respective reservoir and an outlet for dispensing measured quantities of colorant from the reservoirs, said reservoirs each having a filler opening in the upper end thereof arranged in a circle about said common axis, an elongated stirrer in each reservoir, means rotatably supporting the stirrers adjacent the upper end of the respective reservoir for rotation about an axis inclined to said common axis, the upper ends of said stirrers being arranged in a circle about said common axis spaced radially from the filler openings in the res-

ervoirs, and a resilient belt having end portions fixed to said stationary support outside the circle of the set of pulleys and extending generally tangent to said circle, said belt having the intermediate portion thereof extending part way around the set of pulleys whereby each pulley engages the belt during only a portion of each revolution as the reservoirs are rotated.

15. A machine for dispensing selectively variable quantities of paints, colorants and the like comprising, a plurality of storage reservoirs, a plurality of pump cylinders each having an inlet adjacent one end communicating with a respective one of said reservoirs and an outlet, a piston in each cylinder, means for extending and retracting said piston, means for selectively changing the stroke of said piston to vary the quantity of material dispensed from said cylinder, valve means controlling flow from said reservoir to said cylinder at the underside of the piston therein operable to open for flow from the reservoir to the cylinder and to close to prevent return flow, said cylinder having a downwardly tapered nozzle at the lower end thereof, for directing liquid from the cylinder into a container therebelow, said nozzle having a normally-open restricted dispensing opening at the lower end thereof and being formed of a resilient material to yieldably constrict the size of said dispensing opening.

16. A machine for dispensing selectively variable quantities of paints, colorants and the like having a liquid vehicle and suspended pigment comprising, a plurality of storage reservoirs, a plurality of pump cylinders each having an inlet adjacent the upper end communicating with a respective one of the reservoirs and an outlet at the lower end thereof, a piston in each cylinder, means for extending and retracting said piston toward and away from said outlet means for selectively changing the stroke of said piston to vary the quantity of material dispensed from the cylinder, said piston having a port therein, valve means on the piston operative to close said port when the piston is moved toward said outlet to force material from the cylinder through the inlet and to open when the piston is moved away from said outlet to permit material in the cylinder above the piston to flow therethrough, a downwardly tapered nozzle at the lower end of said cylinder for directing material from the cylinder into a container therebelow, said nozzle having a normally-open restricted dispensing opening at the lower end thereof and being formed of a resilient material to yieldably constrict the size of said dispensing opening, and check valve means in said cylinder above said dispensing opening in said nozzle movable downwardly in the direction of liquid flow to said dispensing opening to its open position, and means yieldably urging said check valve means to its closed position, and stirrer means in said reservoirs for agitating the material therein prior to the material entering said dispensing cylinders.

17. A machine for dispensing selectively variable quantities of paints, colorants and the like comprising, a plurality of refillable liquid reservoirs for different paint materials mounted for rotation about a common axis to enable advancement of any selected one of the reservoirs to a dispensing station, an individual dispensing pump for each reservoir movable with the reservoir into a dispensing position at the dispensing station, said dispensing pumps each having an inlet connected to the respective reservoir for withdrawing material from the reservoir and a dispensing outlet, said pumps each including a reciprocable pump operator movable through a dispensing cycle from an initial to a displaced position and back to withdraw a charge of material from the respective reservoir and dispense a quantity of material through the dispensing outlet in proportion to the movement of the pump operator, a common pump drive at the dispensing station having a reciprocable member and means for driving the reciprocable member through an operating cycle from a start position to a moved position and back to the start position, said member being engageable with the pump operator at the dispensing station to move the pump operator through its dispensing cycle and positively move the operator from its initial position to its displaced position and back during each operating cycle of the member, stop means engageable with said movable member to stop the same at said start position, and interlock means for preventing rotation of said reservoirs when said member is out of said start position thereof to thereby assure return of the pump operator to its initial position.

18. A liquid dispensing machine comprising a plurality of liquid reservoirs mounted for rotation about an upright axis to enable advancement of any selected one of the containers to a dispensing station, said reservoirs each defining a main liquid storage chamber having a laterally projecting chamber adjacent the lower end, said laterally projecting chambers each having spaced top and bottom walls and communicating with a respective main chamber, a piston cylinder attached to the bottom wall of each laterally projecting chamber and extending downwardly therefrom, said cylinder having an inlet at its upper end communicating with said laterally projecting chamber and an outlet at its lower end, a piston in said cylinder for dispensing liquid from the cylinder, a piston rod attached to each piston and extending upwardly through said laterally projecting chamber and through said top wall thereof, a common pump drive at said dispensing station alongside said reservoirs, said drive having a reciprocable dispensing member disposed alongside said reservoirs and engageable with the piston rod at the dispensing station for reciprocating the piston, said piston having a port extending therethrough and valve means controlling flow through said port operative to close the port when the piston is moved toward said outlet and to open the port when the piston is moved away from said outlet.

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