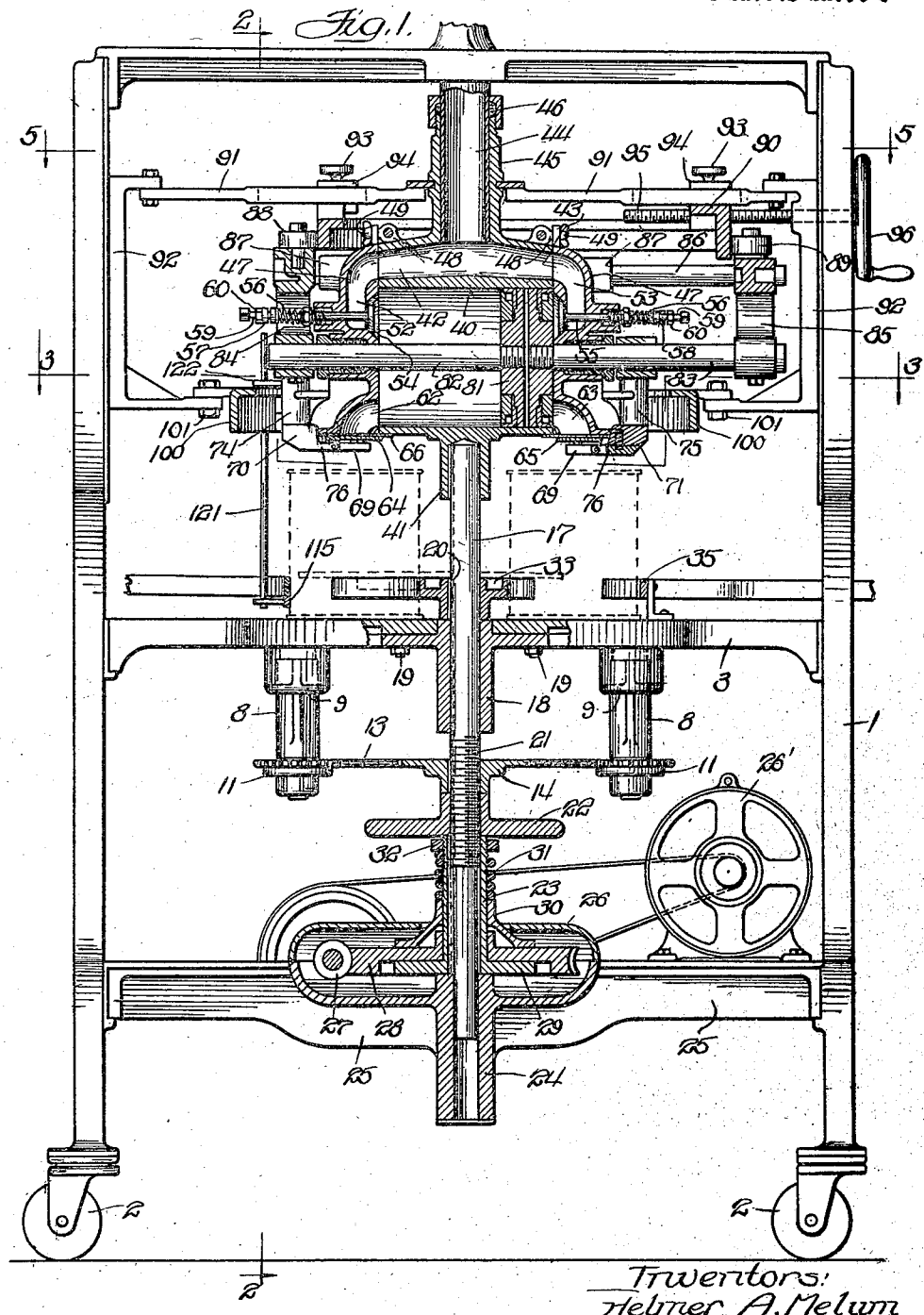
May 31, 1927. 1,630,960

H. A. MELUM ET AL

FILLING MACHINE

Filed June 22, 1922 4 Sheets-Sheet 1

Fig. 1.



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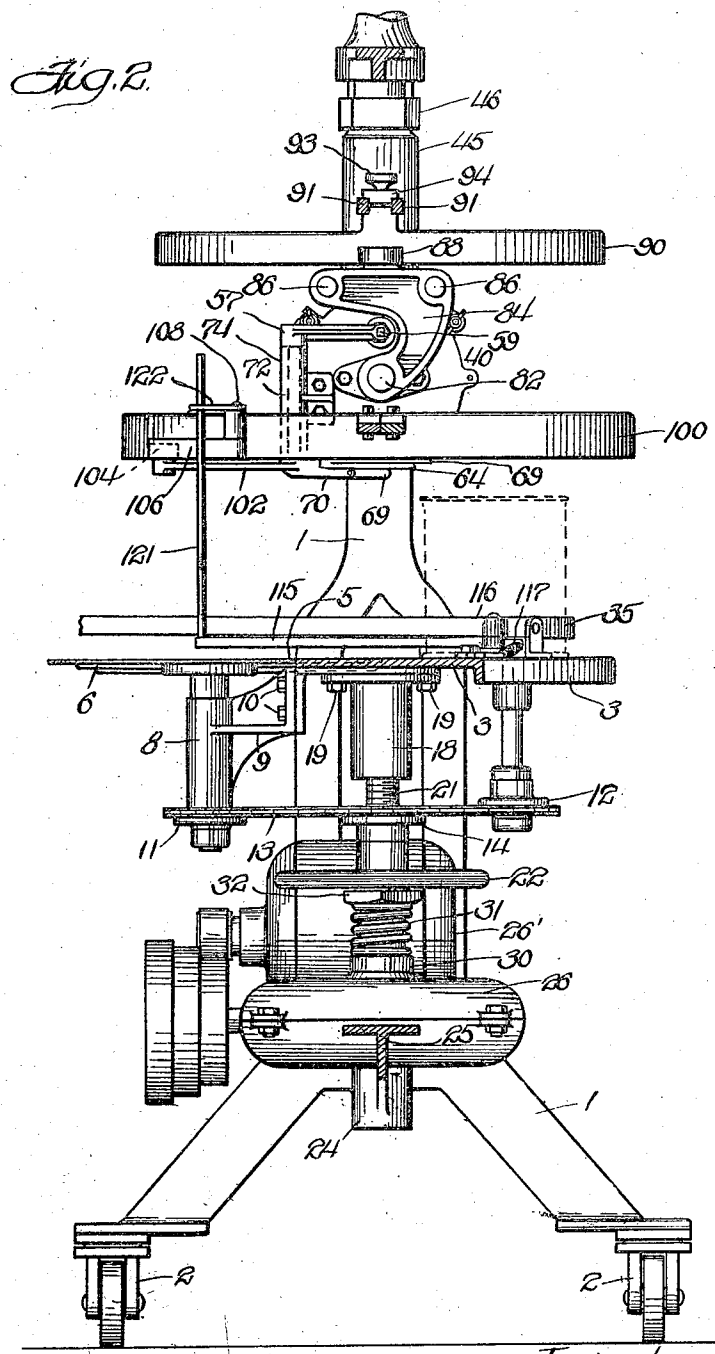
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FILLING MACHINE

Filed June 22, 1922 4 Sheets-Sheet 2

Fig. 2.



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May 31, 1927. 1,630,960

H. A. MELUM ET AL.

FILLING MACHINE

Filed June 22, 1922 4 Sheets-Sheet 3

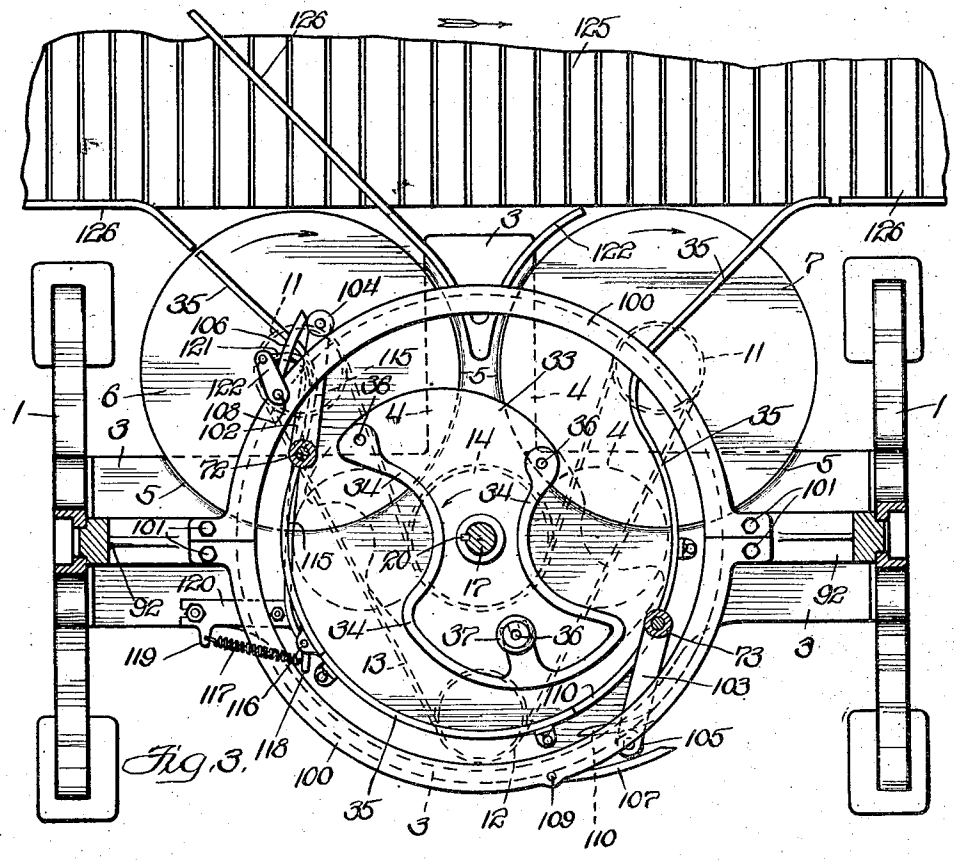


Fig. 3.

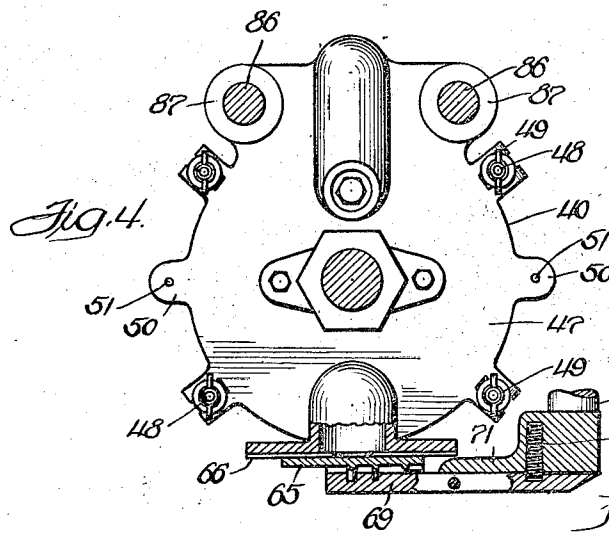


Fig. 4.

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May 31, 1927. 1,630,960

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FILLING MACHINE

Filed June 22, 1922 4 Sheets-Sheet 4

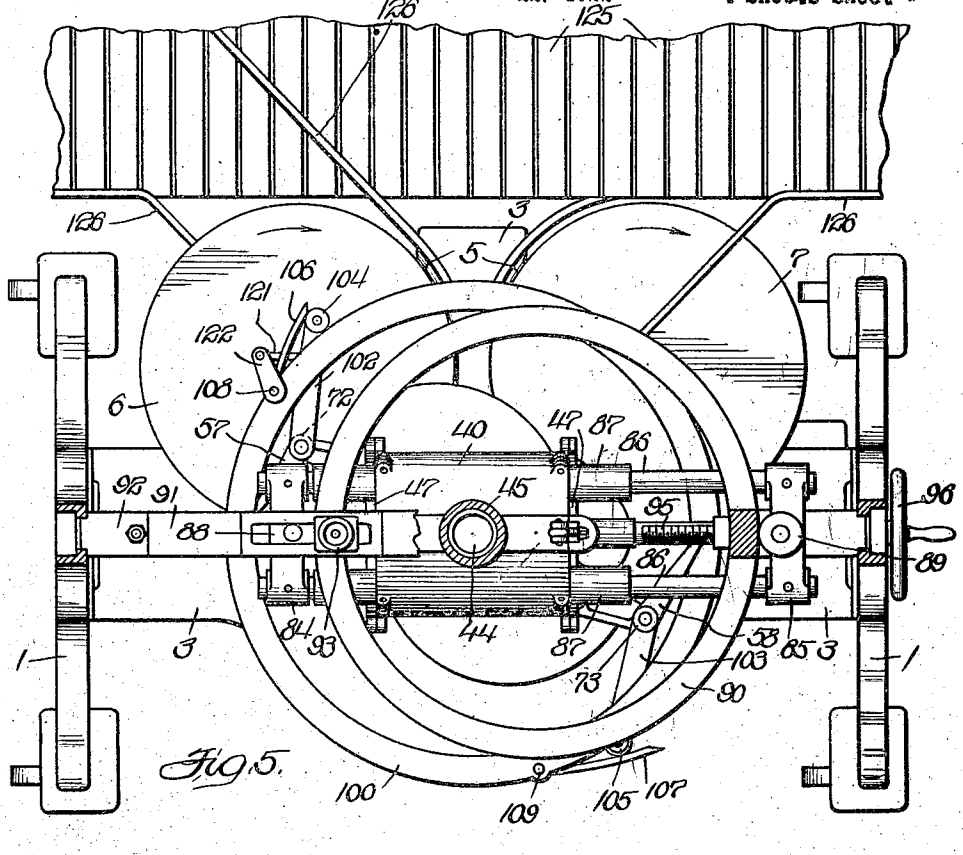


Fig. 5.

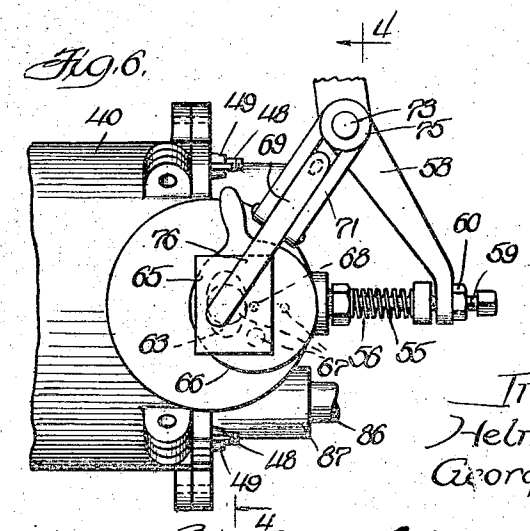


Fig. 6.

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UNITED STATES PATENT OFFICE.

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FILLING MACHINE.

Application filed June 22, 1922. Serial No. 570,099.

This invention relates to filling machines.

It will be explained as applied to the automatic filling of receptacles with paint.

One of the objects of the invention is to provide an improved filling machine.

Another object is to provide a machine which may be readily adjusted for the filling of receptacles of various sizes.

Another object is to provide a machine which will remove empty receptacles from a conveyor, fill the same and return the filled receptacles to the conveyor.

Another object is to provide a machine wherein the splashing and dripping of the fluid is reduced to a minimum.

Another object is to provide a machine possessing accurate volume measurement especially for viscous fluids such as paint.

Another object is to provide a machine wherein the receptacles are filled while in motion therethrough.

Another object is to provide a machine wherein the liquid chamber, passages, etc., may be readily, quickly and thoroughly cleaned to prevent the mixing of liquids of different characteristics.

Another object is to provide a machine wherein the measuring chamber is filled with fluid by gravity.

Another object is to provide a machine wherein a receptacle may be filled upon each stroke of a reciprocating piston.

Another object is to provide simple and adjustable valves for limiting the flow of fluid to the measuring chamber and insuring expulsion of the fluid from the measuring chamber into a receptacle and the positive shutting off of the flow from the chamber when the receptacle is properly filled.

Another object is to provide an improved control for preventing expulsion of fluid unless a receptacle is in position to receive the same.

Another object is to provide a machine wherein the filling operations are stopped immediately upon an interruption due to a catch in any part of the machinery.

Another object is to provide a machine which may be readily moved from place to place.

Another object is to provide a machine which is efficient, simple, reliable, inexpensive and of relatively light weight.

Other objects and advantages will hereinafter appear.

An embodiment of the invention is illustrated in the accompanying drawings, wherein

Fig. 1 is a front elevation of the machine partly in section.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a section on the line 3—3 of Fig. 1.

Fig. 4 is an enlarged section on the line 4—4 of Fig. 6.

Fig. 5 is a section on the line 5—5 of Fig. 1, and

Fig. 6 is an enlarged bottom plan of part of the cylinder showing the valve mechanism.

The machine has a pair of upright end frames 1 which support all of the mechanism between them. Each end frame spreads out laterally at its lower end and is provided with casters 2 whereby the machine may be readily moved about.

A can supporting platform 3 extends between and is rigidly secured to end frames 1. Platform 3 is somewhat T shaped in plan, as shown most clearly in Fig. 3. Toward the can receiving and delivering side of the machine, the upper face of platform 3 is slightly depressed to form a pair of ledges 4. The shoulders 5 of ledges 4 are curved to quite closely fit about part of the circumferential edges of a pair of circular rotatable tables 6 and 7, respectively. The top surfaces of tables 6 and 7 are flush with the top surface of platform 3 so that the cans may be readily transferred from one to the other, as will be hereinafter described.

Tables 6 and 7 are each mounted on a shaft which is journaled in a bearing 8 forming a part of individual brackets 9. Brackets 9 are rigidly secured to the underside of platform 3 by bolts 10. The shafts of tables 6 and 7 are each provided with a sprocket wheel 11. Platform 3 supports a journal mounting for an idler sprocket wheel 12. A

chain 13 interconnects sprocket wheels 11 and 12 and a driving sprocket wheel 14 so that counter-clockwise rotation of the driving sprocket wheel rotates tables 6 and 7 in a clockwise direction as indicated by the arrows.

The can filling and moving mechanism is operated through an upright, rotatable and axially adjustable shaft 17. Shaft 17 is braced and journaled by a bearing 18 which is bolted to the underside of platform 3 by bolts 19. The shaft is provided with a spline 20 and a threaded section 21. An adjusting hand wheel 22 engages threads 21 and is rotatable relative to the shaft. Hand wheel 22 rests upon the top of a rotatable sleeve 23 which is supported on the top of a hollow boss or pedestal 24. Pedestal 24 may be formed as an integral part of a cross beam 25 which extends between and is rigidly secured to end frames 1.

Beam 25 is constructed to form the lower section of a clutch housing which is closed by a cover 26. The cover and base of the housing are secured together by bolts as shown. Beam 25 carries a motor 26' which is belted to a worm 27 located within and journaled by the clutch housing. Worm 27 engages a worm wheel 28 which is rotatably and slidably mounted on sleeve 23. Sleeve 23 is feathered to shaft 17 so that the shaft may move axially therethrough and be turned thereby. One side of worm wheel 28 is countersunk and surfaced to form one element of a clutch. The other element of the clutch is a flange 29 on the lower end of sleeve 23. A somewhat conical pressure plate 30 bears downwardly upon worm wheel 28 under the force of a spring 31. A nut 32, which engages threads on sleeve 23 and may be adjusted up and down thereon, serves to regulate the friction between the clutch elements. Motor 26 drives worm 27 and worm wheel 28 and normally the friction between the clutch elements will cause the rotation of sleeve 23 and shaft 17. However, in the event of an excessive load on shaft 17, the clutch will slip and the drive will cease.

Sprocket wheel 14 is feathered to shaft 17 so as to be rotated thereby. The feathered connection allows the shaft to be moved axially through sprocket wheel 14 without affecting its position or drive. Thus, through the action of chain 13, shaft 17 rotates tables 6 and 7.

A can actuator 33 is feathered to shaft 17 so as to be rotated thereby but allow the shaft to be axially moved therethrough. It is supported above platform 3 by bearing 18. Actuator 33 is adapted to receive a can driving plate 34 which has two curved cam-like edges, as most clearly shown in Fig. 3, which alternately partly fit about the cans carried thereto by table 6, move the cans in a circle on platform 3 and deliver the same to table 7. Actuator 33 has three pins 36 projecting from its upper surface. Can driving plate 34 has three openings for fitting over these pins and is clamped in position by a threaded hand wheel nut 37. For different sized cans driving plates with larger or smaller curves may be clamped in position on actuator 33. A curved rail 35, adjustably bolted to the top of platform 3, keeps the cans in proper position as they are removed from a conveyor, carried around on the platform by actuator 33 and returned to a conveyor.

The can filling mechanism is primarily supported on the end of shaft 17. This mechanism has a metal cylinder 40 whose wall has a socket 41 fitting upon the top of shaft 17. Shaft 17 and cylinder 40 are keyed together so that the cylinder is rotated when the shaft turns. Cylinder 40 has a pair of inlet passages 42 and 43 which communicate with a supply pipe 44. Pipe 44 leads from a paint tank and slidably fits within a flange 45 of cylinder 40. A packing box 46 prevents leakage but allows the flange to be moved axially relative to the supply pipe.

The ends of cylinder 40 are closed by suitable metal heads 47. Cylinder 40 has a number of clamping screws 48 pivotally mounted on lugs located adjacent its opposite ends. The heads have corresponding slotted lugs for receiving screws 48, and wing nuts 49, threading upon the screws, clamp the heads in place. The heads may have other lugs 50 which have holes therein for receiving centering pins 51 which project from the cylinder.

Cylinder heads 47 have inlet ports 52 and 53 cored therein for continuing inlet passages 42 and 43, respectively. The lower ends of ports 52 and 53 are adapted to be closed by valves 54 and 55, respectively. The valves pass through suitable packing boxes in the heads. Each valve is biased to closed position by a coil spring 56. Valves 54 and 55 are opened by levers 57 and 58, respectively, as will be hereinafter described. The distance the valves are opened may be regulated by set screws 59 which are adjustably carried in the ends of levers 57 and 58. The adjustment is maintained by lock nuts 60.

Opposite cylinder heads 47 are cored to provide outlet ports 62 and 63, respectively. Outlet ports 62 and 63 are adapted to be closed by cut off valves 64 and 65, respectively. Each cut off valve seats and slides upon an adjustable disc 66, which is provided with a number of different size openings 67, and is tightly but adjustably clamped against a surfaced seat on the correspond-

ing cylinder head. Disc 66 is held against lateral movement by a pin 68 extending into a hole in cylinder 40. It may be rotated upon pin 68 to cause any one of its openings 67 to register with the outlet port. Each valve comprises a plate supported on the end of a pivoted arm 69. Lever 69 has a pair of holes for receiving pins on the valve plate to prevent the plate from turning. Arms 69 of the corresponding valves 64 and 65 are pivoted to arms 70 and 71 of bell crank levers 72 and 73, respectively. Levers 72 and 73 are journaled in brackets 74 and 75 which are respectively bolted to opposite cylinder heads. These levers are therefore rotated bodily with the cylinder. The valves are held biased against their seats by springs 76. Valves 64 and 65 are opened and closed alternately by the movement of bell crank levers 72 and 73 as will be hereinafter described.

Cylinder 40 has a reciprocating piston 81 therein. Piston 81 may be composed of two similar piston heads into which are screwed a pair of piston rods 82 and 83. Piston rods 82 and 83 pass through packing boxes in opposite cylinder heads and are bolted into sockets in similar yokes 84 and 85. Yokes 84 and 85 also have guide rods 86 extending therebetween and bolted or otherwise secured thereto. Rods 86 slidably fit through holes in bosses 87 in both cylinder heads and assist in holding the piston heads in proper position.

Yokes 84 and 85 carry rollers 88 and 89 respectively. These rollers bear against the outer circumferential surface of a piston operating ring 90. Ring 90 is of L shaped cross section and is adjustably carried by bars 91. Bars 91 are bolted to the upper legs of brackets 92 which are slidably carried in guideways in the two end frames 1. Bars 91 are slotted and ring 90 is bolted thereto by threaded hand wheel bolts 93 and plates 94. An adjusting screw 95 threads through ring 90 and is provided with an adjusting hand wheel 96. Ring 90 is positioned eccentrically of the axis about which cylinder 40 rotates under the drive of shaft 17. Therefore, as the cylinder and yokes 84—85 and rollers 88—89 carried thereby are rotated, the rollers travel around the surface of eccentric ring 90 and piston 81 is reciprocated within the rotating cylinder. The length of the strokes of piston 81 depends upon the eccentricity of ring 90 and this may be varied by loosening bolts 93 and turning hand wheel 96.

The filling mechanism is under the control of the cans to be filled so that, if there is not a can in filling position, the cylinder does not discharge. Both the inlet and outlet valves are controlled by the cans. Inlet valve 54 and outlet valve 64 are actuated by the movement of bell crank lever 72. Similarly inlet valve 55 and outlet valve 65 are actuated by the movement of bell crank lever 73.

Brackets 92 have a stationary valve controlling ring 100 bolted thereto. Ring 100 is made in two sections which are independently secured to brackets 92 by bolts 101. The sectioning of this ring permits the independent removal of either cylinder head and the mechanism carried thereby. Arms 102 and 103 of corresponding bell crank levers 72 and 73 are provided with rollers 104 and 105, respectively, at their outer ends. When the cylinder rotates, rollers 104 and 105 are adapted to travel either entirely on the outer circumferential surface of stationary ring 100 or partly on the outside and partly on the inside thereof depending upon whether or not cans are being delivered to the machine. Small sections of the roller engaging surface of ring 100 are pivotally mounted to form an entrance gate 106 and an exit gate 107 for rollers 104 and 105. Gate 106 is hinged to the relatively rigid part of ring 100 by a pivot 108 and gate 107 is similarly hinged by a pivot 109. When gates 106 and 107 are swung outwardly into open position, as shown in Figs. 3 and 5, rollers 104 and 105, moving in an anti-clockwise direction about the axis of shaft 17 and cylinder 40, travel on the outside of ring 100 from gate 107 to gate 106. At gate 106, the same being open, the rollers are switched to the inside of ring 100 in which position they travel until gate 107 is reached. At gate 107 a cam 110 on the inside of the ring switches the rollers to the outside of the ring again. Thus gate 106, when it is open, serves to direct rollers 104—105 from the outside to the inside of ring 100, while gate 107 permits the rollers to pass from the inside to the outside of ring 100. When both gates are closed they serve to cause ring 100 to present a practically unbroken outer surface to the rollers and the rollers remain upon the outside.

When roller 104, for example, is switched from the outside to the inside of ring 100 at gate 106 bell crank lever 72 is rocked. The rotation of bell crank lever 72 through its arm 70 and lever 57 closes inlet valve 54 and opens outlet valve 64. These operations are so timed, relative to the rotation of cylinder 40, that piston 81 is on the point of beginning its stroke from right to left, as most clearly shown in Figs. 1 and 5, when valve 54 closes and valve 64 opens. As the cylinder continues to rotate, carrying roller 104 from gate 106 to cam 110 inside of the circle, the inlet and outlet valves are held closed and open, respectively, and piston 81 continues its stroke, forcing the paint out of the left hand chamber of the cylinder and through port 62 into the can therebelow.

During this part of the cycle of operations

roller 105 is travelling on the outside of ring 100 between gates 107 and 106 and inlet valve 55 is held open by lever 58 and outlet valve 65 is held closed by lever 71. The movement of the piston provides a chamber in the right hand end of cylinder 40 which chamber is filled by the gravity impelled flow of paint through passage 43 and port 53.

When roller 104 reaches cam 110 and is thereby switched to the outside of ring 100 bell crank lever 72 is moved in the reverse direction. This reverse movement of lever 72 closes outlet valve 64, which closes outlet port 62 and cuts off the stream of paint. The movement of lever 72 also causes the outer end of lever 57 to move inwardly to open valve 54.

During the remainder of the cycle, represented by one complete revolution of cylinder 40, piston 81 travels from left to right. Since inlet valve 54 is then open and outlet valve 64 is closed the chamber in the left end of cylinder 40 (created by the piston moving from left to right) is gravity filled with paint flowing through passage 42 and port 52. While the left hand chamber is thus filling roller 105 having been switched by gate 106 to the inside of ring 100 valves 55 and 65 are respectively closed and opened. The right hand chamber is thereafter exhausted by the left to right movement of the piston while the left hand chamber is filling.

In the event that cans are not delivered to the machine gate 106 remains closed and rollers 104 and 105 remain on the outside of ring 100. The rollers are confined to the outside of the ring because gate 107 is closed also. A lever 115 is hinged to rail 35 by a pivot 116. A spring 117 is connected to a rearwardly projecting lug 118 on lever 115 and to a lug 119. Lug 119 is on an extension 120 of rail 35. The normal position of the free end of lever 115 is such that when a can is moved by actuator 33 and carried around thereby on platform 3, the sides of the can force the lever outwardly about its pivot 116 against the tension of spring 117.

Lever 115 carries a rod 121 which slidably extends through an opening in one arm of a lever 122. Lever 122 is secured to pivot 108 to which gate 106 is also secured. Thus when a can rotates lever 115, as hereinbefore described, lever 122 is also rotated and gate 106 is opened with the result previously set forth.

In the event that cans are not received lever 115 is not moved outwardly and gate 106 remains closed. Thereupon until a can is received to operate lever 115, rollers 104 and 105 are confined to the outside of ring 100, both inlet valves 54 and 55 are held open by levers 57 and 58 and both outlet valves 64 and 65 are held closed by levers 70 and 71. In this condition the reciprocation of piston 81 merely alternately forces the paint back through ports 52 and 53 and allows the chambers formed in the opposite ends of the cylinder to fill. But no paint is allowed to escape through ports 62 and 63 until cans are again fed to the machine.

This action is of importance when the machine is to be used on various characters of paints in succession. A suitable cleaning fluid may be emptied into the cylinder through pipe 44, whereupon if no cans are fed to the machine, the reciprocation of piston 81 will force the cleaning fluid back and forth through the passages and chambers. After the walls are thoroughly cleaned the fluid may be run out of the outlet valves and the machine will be ready for use. Thus, with little trouble and loss of time, the machine may be used in quick succession on paints which for one reason or another should not be intermingled.

In order to adjust the machine for different heights of cans, hand wheel 22 is rotated to raise and lower cylinder 40 and the valve mechanism associated therewith. To adjust the machine for cans of different capacities, the eccentricity of ring 90 is varied to change the length of stroke of piston 81 and thus vary the volume discharged from the chambers formed on each side thereof.

The machine may be employed in connection with an automatic conveyor, such as an endless belt conveyor 125. Guiding rails 126, for guiding the cans to and from the conveyor may be carried by conveyor 125. The castors permit the machine to be readily moved about and placed in operative relation to the conveyor at any point.

Briefly summarized, the operation of the machine is as follows:

Empty cans are delivered by belt 125 to the receiving side of the machine. Guide rails 126 switch the empty cans from belt 125 to revolving table 6. Table 6 carries the cans into position to be grasped by the curved driving plate on actuator 33 which slides the cans, in proper spaced relation, around on platform 3 until they reach revolving table 7. Table 7 delivers the filled cans to conveyor 125.

While the cans are being moved by actuator 33 adjacent ones are filled by paint expressed from chambers formed in opposite ends of cylinder 40 by the reciprocation of piston 81. Cylinder 40 is continuously rotated by motor 26 and rollers 88 and 89 carried thereby are moved about the surface of eccentric ring 90. The eccentricity of this ring effects the reciprocation of piston 81 which is active in filling a can on each stroke. The cans carried forward by actuator 33 operate lever 115 and thereby control the position of gate 106 in ring 100. The rotation of cylinder 40 also carries

rollers 104 and 105 about ring 100. When gate 106 is open the rollers pass from the outside to the inside of the ring and effect the proper closing and opening of the corresponding inlet and outlet valves. When a roller reaches cam 110 it is switched to the outside of ring 100 and the corresponding inlet and outlet valves are respectively opened and closed. Should the delivery of cans to the machine cease, gate 106 is not opened and the inlet valves remain open and the outlet valves remain closed. The blade-like outlet valves cut off the flow and the wear thereon is compensated for by their springs which always maintain the same tightly against their seats. Should the machine become clogged for any reason the extra load produced thereby causes clutch 28—29 to slip and no damage will be done to the machine.

The fact that, when the filling operation has been started, air is practically excluded from the measuring chamber and passages lessens the tendency to splash when the outlet valves are opened. The plunger exhaustion of the measuring chambers insures accurate volume discharge of even extremely viscous liquids. The relatively tight fit between piston and cylinder walls insures that all of the fluid is expelled quickly so that the full volume is emptied into the cans.

Having described our invention what we claim as new and desire to secure by Letters Patent, is:—

1. A filling machine having a platform for supporting receptacles to be filled, an actuator for moving receptacles in a curved path over the platform, a liquid measuring cylinder having an inlet valve and an outlet valve adjacent each end, a piston adapted to reciprocate within the cylinder, means for rotating the cylinder and the actuator, and mechanism whereby the rotation of the cylinder reciprocates the piston and alternately operates the valves at opposite ends of the cylinder.

2. A filling machine having a cylinder for connection to a source of liquid supply, a piston movable in opposite directions within the cylinder, an inlet valve at each end of the cylinder for controlling communication to the cylinder, an outlet valve at each end of the cylinder and controlling communication therefrom, an actuator for positioning receptacles beneath the outlet valves, means for reciprocating the piston, and means for controlling the valves at opposite ends of the cylinder alternately so that fluid is received by and expressed from the cylinder on each stroke of the piston.

3. A filling machine having a cylinder for connection to a source of liquid supply, a piston movable in opposite directions within the cylinder, an inlet valve at each end of the cylinder and for controlling communication to the cylinder, an outlet valve at each end of the cylinder and controlling communication therefrom, an actuator for positioning receptacles beneath the outlet valves, means for reciprocating the piston, means for controlling the valves at opposite ends of the cylinder alternately so that fluid is received by and expressed from the cylinder on each stroke of the piston, and control means under the control of receptacles for stopping the operation of the valves as long as receptacles are not delivered to the machine.

4. A filling machine having a cylinder rotatable about an axis substantially perpendicular to its length and for interconnection with a source of liquid supply, an inlet valve and an outlet valve at each end of the cylinder, a piston movable in opposite directions within the cylinder, a relatively stationary ring mounted eccentrically of the axis of rotation of the cylinder, means carried by the cylinder and cooperating with the ring to reciprocate the piston, a second ring, and means cooperating with the second ring for controlling the valves at opposite ends of the cylinder alternately.

5. A filling machine having a platform for supporting receptacles to be filled, a rotating table for delivering receptacles to the platform, an actuator for moving the receptacles over the platform, a rotatable cylinder, a piston adapted to reciprocate therein, an inlet and an outlet valve at each end of the cylinder, means for reciprocating the piston, and mechanism for successively closing and opening the valves at opposite ends of the cylinder during a complete reciprocation of the piston.

6. A filling machine having a platform for supporting receptacles to be filled, a rotating table for delivering receptacles to the platform, an actuator for moving the receptacles over the platform, a rotatable cylinder, a piston adapted to reciprocate therein, an inlet and an outlet valve at each end of the cylinder, means for reciprocating the piston, mechanism for successively closing and opening the valves at opposite ends of the cylinder during a complete reciprocation of the piston, and a controller influenced by the presence and absence of a receptacle in the machine and controlling the operation of said mechanism.

7. A filling machine having a rotatable cylinder, a piston adapted to reciprocate therein, an inlet and an outlet valve at each end of the cylinder, a normally stationary ring, a pivoted gate in the ring, means rotatable with the cylinder and bearing on the outside of the ring during an entire revolution when the gate is closed and bearing partly on the outside and partly on the inside of the ring when the gate is open, a cam for switching said means from the inside to

the outside of the ring, and mechanism affected by the switching of said means from the outside to the inside and from the inside to the outside of the ring and cooperating with the valves to control the same alternately at opposite ends of the cylinder.

8. A filling machine having a frame, a substantially vertical shaft rotatably supported by the frame, a cylinder rigidly carried by the shaft, a piston movable in opposite directions within the cylinder, means for reciprocating the piston while the same and the cylinder are rotating with the shaft, an inlet and an outlet valve at each end of the cylinder, valve actuating mechanism rotatable with the cylinder, and a control device for causing said mechanism to affect the valves at opposite ends of the cylinder alternately.

9. A filling machine having a rotatable cylinder, a piston adapted to reciprocate therein, an inlet and an outlet valve at each end of the cylinder, a relatively stationary ring, a pivoted gate in the ring, means rotatable with the cylinder and bearing on the outside of the ring during an entire revolution when the gate is closed and bearing partly on the outside and partly on the inside of the ring when the gate is open, a cam for switching said means from the inside to the outside of the ring, mechanism affected by the switching of said means from the outside to the inside and from the inside to the outside of the ring and cooperating with the valves to control the same alternately at opposite ends of the cylinder, and means affected by the presence and absence of a receptacle to be filled and accordingly controlling the position of the gate.

10. In a filling machine the combination of a platform for supporting receptacles to be filled, a rotatably and axially adjustable shaft passing through the platform, an actuator driven by the shaft and acting to move receptacles over the platform, a cylinder mounted on the shaft to rotate therewith and movable thereby to different positions above the platform to adjust the same for different height receptacles, a piston mounted in the cylinder, operative connections to reciprocate the piston upon the rotation of the shaft, an inlet valve and an outlet valve at each end of the cylinder, and valve operating mechanism for opening and closing the inlet and outlet valves at opposite ends of the cylinder alternately.

11. A filling machine having a platform for supporting receptacles to be filled, a rotatable and axially adjustable shaft passing through the platform, an actuator driven by the shaft and acting to move receptacles over the platform, a liquid measuring cylinder mounted on the shaft to rotate therewith and movable thereby to different positions above the platform to accommodate different size receptacles, a piston in the cylinder, means for causing the rotation of the shaft and cylinder to reciprocate the piston, an inlet valve and outlet valve at each end of the cylinder, valve controlling mechanism for opening and closing the valves at opposite ends of the cylinder alternately, and receptacle controlled means for governing the operation of the valve controlling mechanism.

12. A filling machine having a platform for supporting receptacles to be filled, a rotatable and axially adjustable shaft extending through the platform, a cylinder carried by and rotatable with the shaft, a piston within the cylinder, adjustable piston reciprocating means for moving the piston in the cylinder according to volume required, an inlet and an outlet valve at each end of the cylinder, valve mechanism for actuating the valves at opposite ends of the cylinder alternately, and an actuator operated by the shaft and adapted to move receptacles over the platform under the outlet valves.

13. A filling machine having a platform for supporting receptacles to be filled, a rotatable and axially adjustable shaft extending through the platform, a cylinder carried by and rotatable with the shaft, a piston within the cylinder, adjustable piston reciprocating means for moving the piston in the cylinder according to volume required, an inlet and an outlet valve at each end of the cylinder, valve mechanism for actuating the valves at opposite ends of the cylinder alternately, an actuator operated by the shaft and adapted to move receptacles over the platform under the outlet valves, and receptacle controlled means for holding both inlet valves open and both outlet valves closed when receptacles are not in the machine.

14. A filling machine having a platform for supporting receptacles to be filled, rotating tables for delivering receptacles to and from the platform, a rotatable and axially adjustable shaft extending through the platform and driving the tables, a cylinder carried by and movable with the shaft, a piston in the cylinder, mechanism for moving the piston, means for varying the reciprocation of the piston according to volume of material required, an outlet valve at each end of the cylinder, valve mechanism for alternately actuating the valves to close and open chambers formed by the reciprocation of the piston in the cylinder, and an actuator for moving receptacles over the platform and between the tables.

15. A filling machine having a substantially vertical shaft rotatable and axially adjustable, a cylinder rotatable and axially adjustable with the shaft, a piston in the

cylinder, means for reciprocating the piston during rotation of the cylinder to form chambers on opposite sides thereof, and receptacle controlled valve mechanism for controlling the filling of the chambers.

16. In a filling machine the combination of a horizontally rotatable measuring cylinder adapted to be connected to a source of liquid supply, a piston mounted to reciprocate in the cylinder to alternately provide measuring chambers in opposite ends of the cylinder, means for reciprocating the piston during rotation of the cylinder, valves at each end of the cylinder to control the liquid flow to and from the chambers, valve operating mechanism to automatically actuate the valves at the ends of the piston strokes, and an actuator for causing receptacles to move in unison with the cylinder.

17. A filling machine having a cylinder for connection to a source of liquid supply, a piston mounted to reciprocate in the cylinder, adjustable driving means for reciprocating the piston through different lengths of stroke to form chambers of variable capacity at opposite ends of the cylinder and to eject the liquid therefrom, valves to control the flow of liquid to and from the chambers, valve operating mechanism for actuating the valves in alternation, and means in position to be engaged by receptacles to be filled and affected differently by the presence and absence of such receptacles and co-operating with the valve operating mechanism to permit and prevent the flow of liquid from the chamber.

18. A filling machine having a cylinder for connection to a source of liquid supply, a platform for supporting receptacles in filling position beneath the cylinder, a piston mounted to reciprocate within the cylinder to form measuring chambers alternately at opposite ends of the cylinder and to eject the liquid therefrom, adjustable driving means for reciprocating the piston through different lengths of stroke to vary the amount of fluid ejected, valves to control the flow of liquid to and from each chamber, valve operating mechanism for actuating the valves alternately, and receptacle controlled means for stopping and permitting the operation of said mechanism.

19. A filling machine having a platform for supporting receptacles to be filled, a cylinder mounted to rotate above the platform, a piston, means for reciprocating the piston within the cylinder and thus form measuring chambers on opposite sides of the piston, a liquid inlet valve at each end of the cylinder, a liquid outlet valve at each end of the cylinder, an actuator for moving receptacles along with the cylinder below the outlet valves thereof, and valve actuating mechanism for alternately operating the valves in pairs to alternately permit the filling and emptying of the chambers on opposite sides of the piston.

20. A filling machine comprising a cylinder, a receptacle platform, inlet and outlet valves at each end of said cylinder, means for actuating the valves at opposite ends of the cylinder alternately, an actuator adapted to move receptacles over the platform under said outlet valves, and receptacle-controlled means for holding both inlet valves open and both outlet valves closed when the receptacles are not in the machine.

21. In a filling machine the combination of a rotatable cylinder, a piston in the cylinder, means for reciprocating the piston during the rotation of the cylinder to form measuring chambers alternately on opposite sides of the piston, means for moving receptacles along with the cylinder, valves for controlling the flow of a fluid from the chambers on opposite sides of the pistons, and receptacle controlled mechanism for controlling the valves.

22. A filling machine comprising a rotatable cylinder, a piston adapted to reciprocate therein, an outlet valve at each end of the cylinder, a ring, and valve-controlling mechanism rotatable with said cylinder and co-operating with said ring to alternately close and open said outlet valves.

23. A filling machine comprising a receptacle support, a horizontally rotatable fluid measuring cylinder having an outlet at each end, a valve for each outlet, a piston mounted to reciprocate in the cylinder to alternately drive liquid through opposite outlets while the cylinder is rotating, mechanism for driving the piston, means for maintaining a receptacle in filling positions relative to one of the outlets of the cylinder, and valve actuating mechanism for opening a valve when a receptacle is in filling position.

24. In a filling machine the combination of a cylinder rotatable in a horizontal plane and having an inlet and an outlet adjacent each end, a piston mounted to reciprocate within the cylinder to form measuring chambers on opposite sides of the piston, means associated with the cylinder to effect the reciprocation of the piston when the cylinder is rotated, valves for controlling the flow of liquid to and from each chamber and means for moving receptacles in unison with the cylinder below the outlets thereof.

25. In a filling machine the combination of a cylinder mounted to rotate on a fixed axis at right angles to its bore, a piston in the cylinder, a stationary ring mounted eccentrically of the axis of rotation of the cylinder, means co-operating with the piston and the ring to reciprocate the piston when the cylinder rotates, and means for rotating the cylinder.

26. A filling machine having a platform for holding receptacles to be filled, an actu-

ator for moving the receptacles in a curved path over the platform, a rotatable cylinder, a piston movable back and forth through the cylinder to alternately expel fluid from one end of the cylinder and provide a chamber for fluid in the other end thereof, means for reciprocating the piston, outlets at opposite ends of the cylinder, valves for opening and closing the outlets, and means for alternately opening the valves while the corresponding outlets are above receptacles and closing the valves before the receptacles pass beyond the outlets.

27. In a filling machine the combination of a cylinder mounted to rotate on an axis at right angles to its bore, an outlet port and valve adjacent each end of the cylinder, a piston mounted to reciprocate within the cylinder and provide measuring chambers in opposite ends thereof, a stationary ring eccentric to the axis of rotation of the cylinder, means co-operating with the piston and the ring to reciprocate the piston when the cylinder rotates, a second ring, valve mechanism co-operating with the inlet and outlet valves and the ring to control the valves when the cylinder rotates, and driving means for rotating the cylinder.

28. In a filling machine the combination of a horizontally disposed cylinder rotatable about a vertical axis, a piston for the cylinder, means for rotating the cylinder about the vertical axis, means for reciprocating the piston during the rotation of the cylinder to alternately increase and decrease the chambers within the cylinder on opposite sides of the piston, inlet and outlet valves for each chamber, valve mechanism for alternately operating the valves for the chambers, and receptacle moving mechanism for carrying receptacles in step with the cylinder and below the outlet valves thereof.

In testimony whereof we hereunto set our hands.

HELMER A. MELUM.
GEORGE P. BERGER.

Certificate of Correction.

Patent No. 1,630,960. Granted May 31, 1927, to

HELMER A. MELUM ET AL.

It is hereby certified that error appears in the printed specification of the above-numbered patent requiring correction as follows: Page 7, line 36, claim 17, for the word "chamber" read *chambers;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of June, A. D. 1927.

[SEAL.]

M. J. MOORE,
Acting Commissioner of Patents.