

April 12, 1960

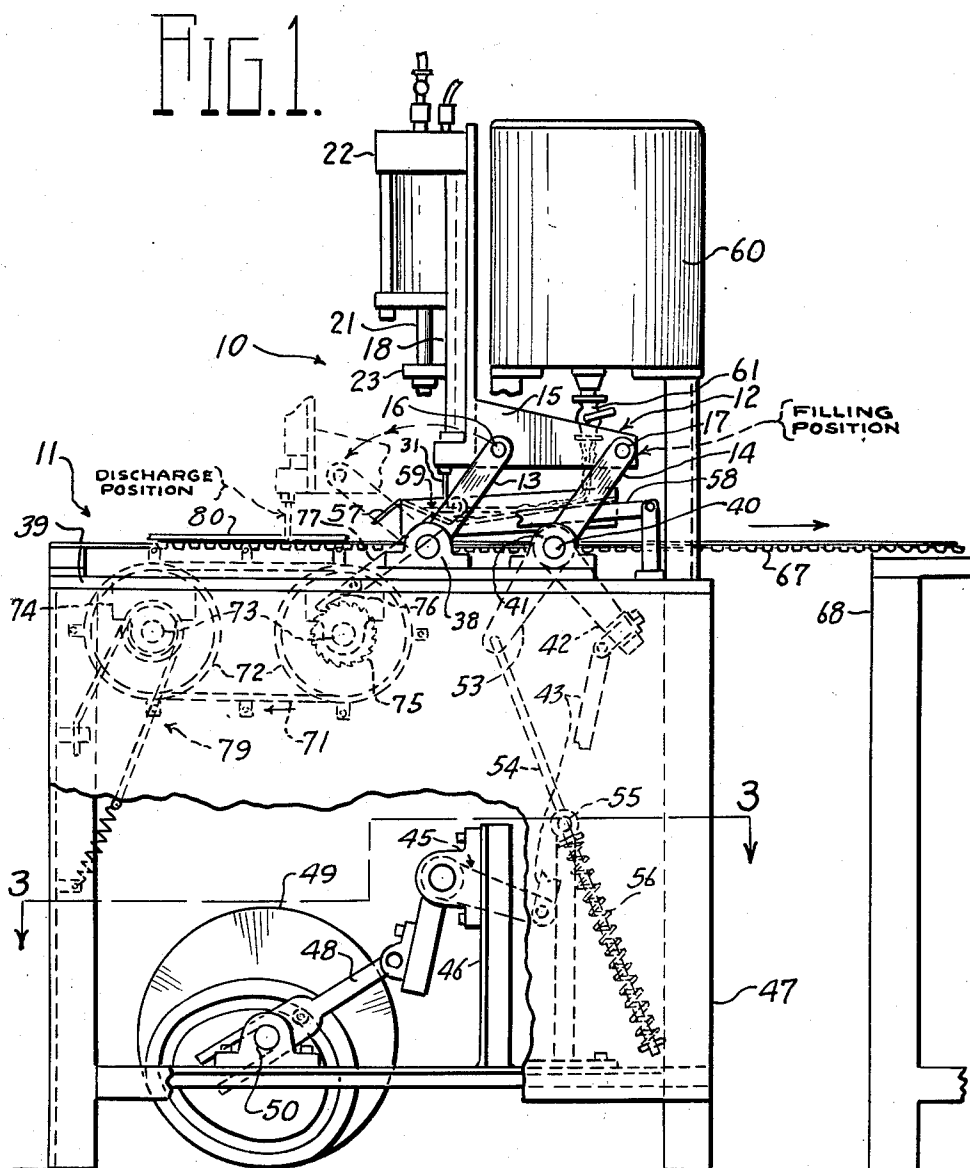
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2,932,330

MACHINE FOR FILLING CONTAINERS WITH MEASURED CHARGES

Filed May 9, 1957

5 Sheets-Sheet 1



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FIG. 4.

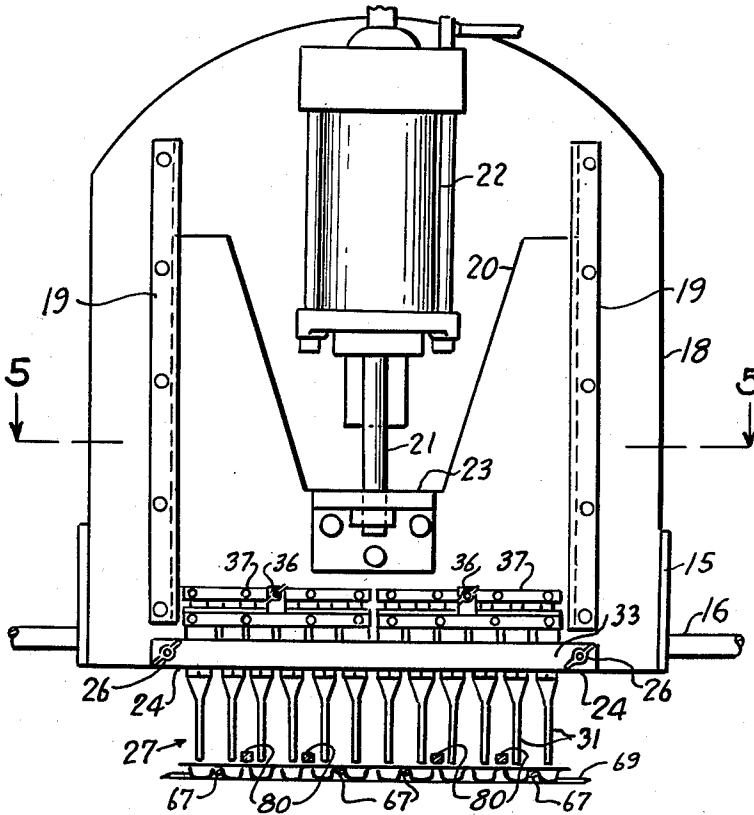
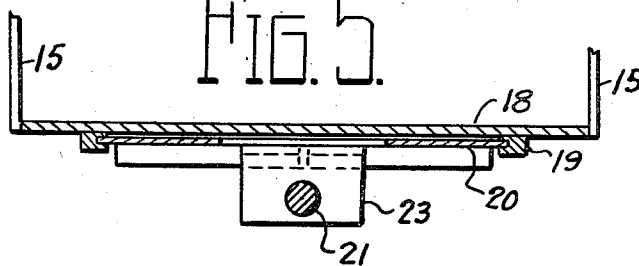


FIG. 5.



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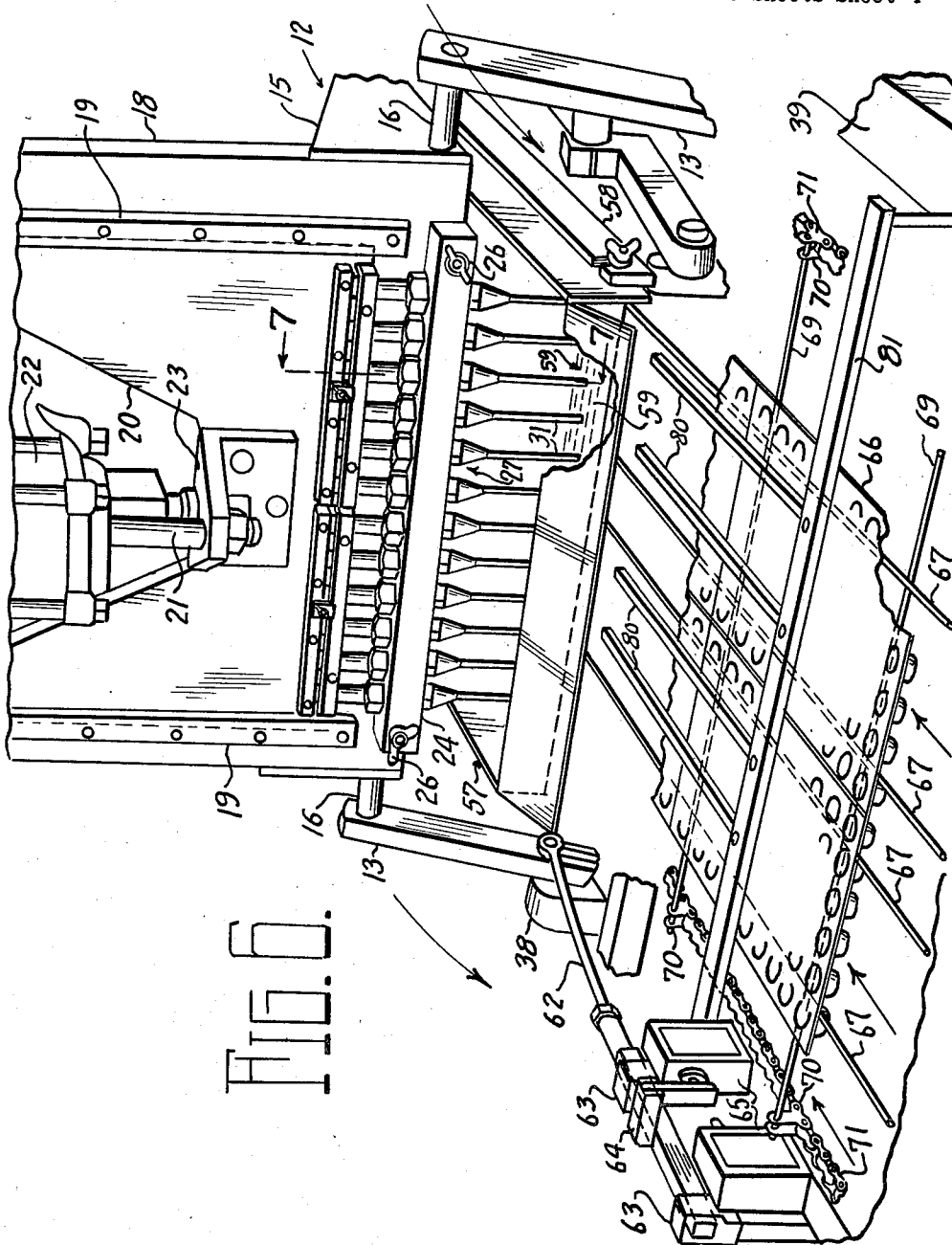


FIG. 6.

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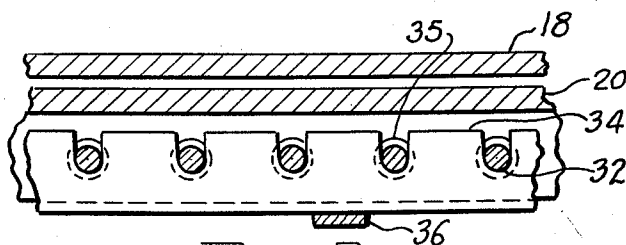
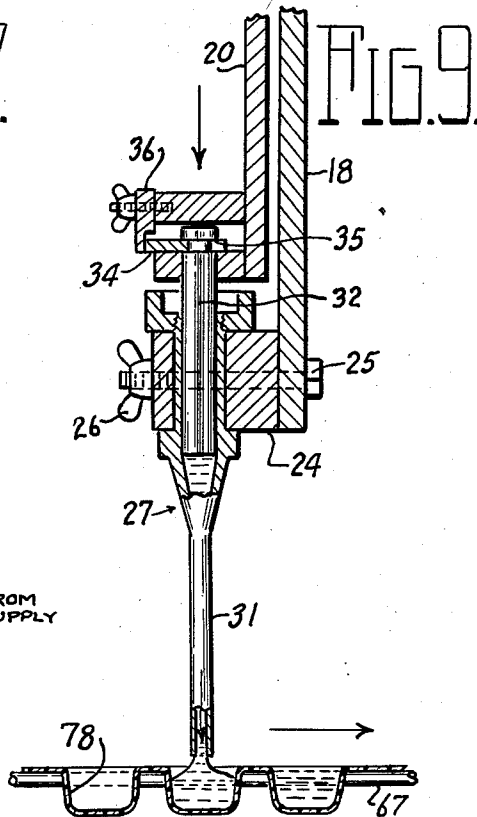
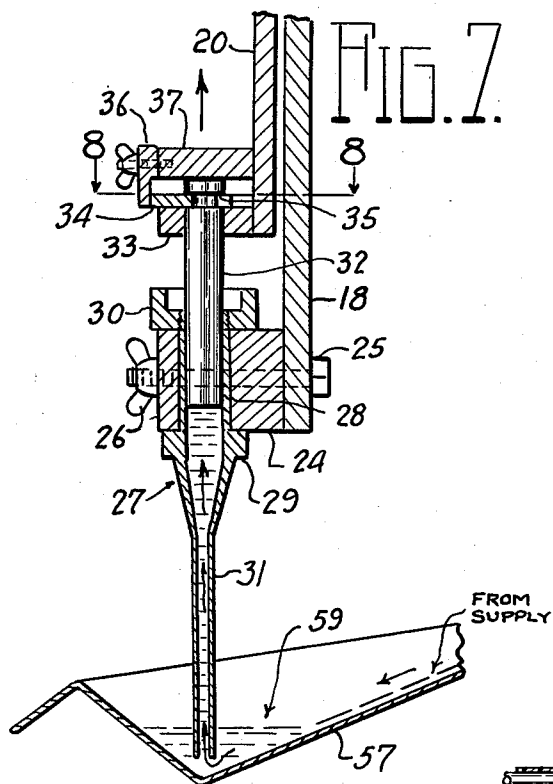


FIG. 8.

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MACHINE FOR FILLING CONTAINERS WITH MEASURED CHARGES

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Application May 9, 1957, Serial No. 658,048

5 Claims. (Cl. 141-178)

This invention relates to a machine for filling containers with measured charges of liquid or liquid-like materials, such as pastes and powders.

The machine is particularly designed for the rapid filling of open topped containers, either individual containers arranged and transported in groups, or multiple pocket container blanks from which each container is severed after filling and capping. In describing the invention it will be illustrated as embodied in a design for the rapid and automatic filling of small plastic containers with a liquid. In the embodiment of the machine illustrated, the containers are formed by molding a sheet of plastic material to form, say, 36 individual pockets in a single blank arranged in a regular reticulated pattern and used commercially for containing small quantities of paints. In practice, after the multiple pocket blank is completely filled, it is covered with a flat cover sheet and the two sealed together around the margins of the pockets which are then severed, providing individual capped containers.

A machine embodying the invention, however, may also be used for automatically filling measured charges into separate individual containers. For example, the containers might be small jars which are positioned in a carrier in a geometrical arrangement and automatically moved through the machine to a loading station where the measured charges of liquid would be deposited in the jars in the same manner as the charges would be deposited if all of the containers were in a single blank.

The objects of the invention include the provision of a machine which will automatically measure each charge, withdrawing the charge from a constantly maintained supply of liquid material and depositing it in its own individual container, with the withdrawing and depositing movements of the measuring device synchronized with the mechanism for moving the containers to and from the loading station.

The objects of the invention and the mechanism by which they are carried out is more fully discussed and disclosed in the specification which follows and from the drawings, in which:

Fig. 1 is a view in elevation with parts broken away of a machine embodying the invention;

Fig. 2 is a plan view of the machine shown in Fig. 1;

Fig. 3 is a horizontal, sectional view taken along the line 3-3 of Fig. 1 and shown on a small scale;

Fig. 4 is a fragmentary view in elevation and on an enlarged scale of the device for withdrawing and depositing measured charges of material and a part of the mechanism for moving and actuating the devices;

Fig. 5 is a horizontal, sectional view taken along the line 5-5 of Fig. 4;

Fig. 6 is a fragmentary, perspective view, with parts broken away, showing the essential portions of the machine for moving the containers and withdrawing and depositing measured charges of material in synchronized relationship;

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Fig. 7 is a vertical, sectional view taken along the line 7-7 of Fig. 6 and shown on an enlarged scale, illustrating one of the material handling devices in loading position;

Fig. 8 is a fragmentary, horizontal, sectional view taken along the line 8-8 of Fig. 7;

Fig. 9 is a view similar to Fig. 7 but illustrating the device at filling position overlying the container loading station.

A machine embodying the invention may be functionally divided into two main portions, viz., a charge measuring and depositing mechanism generally indicated at 10 in Fig. 1 and a container moving mechanism generally indicated at 11 in Fig. 1. The charge measuring and depositing mechanism 10 comprises a carriage 12 mounted upon pairs of upwardly extending parallel links 13 and 14 for reciprocating movement between the "filling position" shown in solid lines in Fig. 1 and the "discharge position" shown in broken lines. The carriage 12 comprises two parallel frame members 15 which are supported by a main cross shaft 16 that is located near the front of the frame members 15 and is carried by the forward pair of parallel links 13 and a pair of stub shafts 17 which are studded in the rear of the members 15 and carried by the parallel links 14. The two members 15 are rigidly secured upon opposite sides of a transversely extending, upright plate 18 on which is secured a pair of spaced, vertical gibs 19. A U-shaped slide 20 is guided for vertical movement by the gibs 19 and is actuated by the piston rod 21 of an air cylinder 22 which is supported on the plate 18. The piston rod 21 is connected to the slide 20 by a bracket 23.

A mounting bar 24 (see also Figs. 7 and 9) is removably mounted at the lower edge of the plate 18 by bolts 25 having wing nuts 26 on their forward ends. The mounting bar 24 extends across the machine and is vertically bored for the reception of the individual cylinders of a plurality of filling devices generally indicated at 27.

Each of the filling devices 27 (Figs. 7 and 9) comprises a cylinder 28 having a lower flange 29 by which the device 27 is positioned in the bar 24, with the cylinder 28 extending upwardly through the bore in the bar 24 and locked in place by a locking nut 30 threaded on its upper end above the bar 24. Below the flange 29 the device 27 narrows and is formed into an elongated nozzle 31. Each of the devices 27 also comprises a piston 32 vertically slidable in its cylinder 28 with the upper end of the piston 32 yoked to a crossbar 33 at the bottom edge of the plate 20. The pistons 32 of a bank of devices 27 are removably yoked to the bar 33 by slotted keeper plates 34 removably engaged with tenons 35 cut at the upper ends of the pistons 32. The keeper plates 34 are held in position by retainers 36 removably secured on the front of crossbars 37 also mounted on the slide 20 but above the crossbars 33.

The mechanism just described, which supports the measuring and filling devices 27, is removable as a unit from the slide 20 and plate 18 by removing the keeper retainers 36 and the keepers 34 which allows the pistons 32 to drop down below the bars 33 and then removing the wing nuts 26 and sliding the bar 24 off the bolts 25. The entire mechanism can be replaced by a similar mechanism carrying filling devices in different capacity, number or spacing. The pistons 32 of the devices 27 can be removed to permit cleaning or clearing without removal of the devices 27 as a whole, by moving the slide 20 to its uppermost position, releasing the keeper plate 34 and allowing the pistons 32 to drop.

The carriage 12 is reciprocated between the "filling position" shown in solid lines in Fig. 1 and also shown in Figs. 6 and 7, and the "discharge position" shown in broken lines in Fig. 1 and also shown in Figs. 4 and 9,

by rocking the parallel links 13 and 14. The parallel links 13 are pivotally mounted in trunnions 38 mounted upon a main frame 39 of the machine and the links 14 are pivotally mounted by a rocker shaft 40 in similar trunnions 41. The rocker shaft 40 also carries a crank arm 42 connected by a pull rod 43 to a bell crank 45 mechanism pivotally mounted upon an upright 46 in the base frame 47 of the machine. The bell crank mechanism 45 is actuated through a connected rod 48 by a cam 49 mounted on a drive shaft 50 and rotated at standard speed by a motor 51 acting through reducer gears 52.

An overcenter device comprising an arm 53 mounted on the rocker shaft 40, a link 54, a rocking slide 55 and a coil spring 56 seats the carriage 12 at each limit of its stroke.

In filling position, as shown in Figs. 1, 2 and 6, the carriage 12 is above and extends across a material supply pan 57 removably supported between a pair of arms 58 and extending rearwardly between the parallel links 13 and 14. The pan 57 is inclined downwardly in a forward direction so that a pool of material, generally indicated at 59, is maintained at a position such that the lower ends of the nozzles 31 dip beneath the surface of the pool 59 in loading position. The supply of material in the pool 59 is kept relatively constant by allowing new material to flow from a supply tank 60 (Fig. 1) through a valve 61 onto the rear of the pan 57.

A control arm 62 (Fig. 6) is pivotally connected to one of the forward parallel links 13 and slides through a pair of guide blocks 63 mounted on the frame 39, carrying a finger 64 for the alternate closing of a pair of limit switches 65 also mounted on the frame 39. The limit switches 65 control the actuation of the air cylinder 22 so that when the carriage 12 reaches filling position the air cylinder 22 is actuated to pull upwardly on its piston rod 21, lifting the slide 20 and the pistons 32 of the devices 27 to load a measured quantity of material from the pool 59 into each of the nozzles 31. Conversely, when the carriage 12 reaches the discharge position shown particularly in Fig. 9, the other one of the limit switches 65 is closed to actuate the air cylinder 21 to thrust its piston rod 21 downwardly, moving the slide 20 and pistons 32 downwardly to discharge the measured quantity of liquid material from each of the nozzles 31. As will be explained below, at this point in the operation, the next series of open, unfilled containers is positioned beneath the nozzles 31 at this time.

In the embodiment of the invention illustrated in the drawings, the container positioning mechanism generally indicated at 11 is designed for moving multiple pocket blanks such as the blanks 66 (Fig. 6), each of which is shown as being six pockets wide and six pockets long for a total of 36 pockets per blank. This particular size, shape and arrangement is, of course, only illustrative. The individual blanks 66 are manually positioned upon spaced, parallel guide rods 67 which extend longitudinally through the machine beneath the pan 57, the carriage 12, and the material supply tank 60 and may continue beyond the machine (Fig. 1) to an inspection table 68 or to a machine for automatically covering the filled pockets in the blanks 66. The blanks 66 are intermittently moved along the rods 67 by means of feeder bars 69 mounted in extension ears 70 of a pair of drive chains 71. Each one of the drive chains 71 is mounted in a pair of sprockets 72 that are carried by shafts 73 rotatably supported in trunnions 74 by the frame 39.

The chains 71 are driven through the medium of a ratchet and pawl mechanism comprising a ratchet wheel 75 (Fig. 1) mounted upon one of the shafts 73 and engaged by a pawl 76 on the end of a link 77 that is pivotally connected to one of the forward parallel links 13. Upon each rocking movement of the parallel link 13, the pawl 76 moves forward, engages and returns, rotating the ratchet wheel 75 and sprocket 73 and moving the bars 69 and the blanks 66 a distance sufficient to carry

a row of filled pockets away from beneath the nozzles 31 in discharge position and to move the next series of empty pockets, for example the pockets 78 (Fig. 9), to the loading station. A friction brake generally indicated at 79 in Fig. 1 engages one of the shafts 73 to hold the container conveying mechanism and the containers at the loading station and to prevent inadvertent reversal of their movement during the return stroke of the pawl 76 over the ratchet wheel 75.

When the carriage 12 is swung to filling position the nozzles 31 are moved to overlie the series of pockets or containers in the blanks 66 which were just previously moved to the loading station. One of the limit switches 65 is closed, actuating the cylinder 22 to thrust the pistons 32 downwardly and discharge the material into the pockets as shown in Fig. 9. The main drive cam 49 continues to rotate, having a rest during the discharge interval, and then acts through the linkage to swing the carriage 12 back to loading position. This return movement of the parallel links 13 drives the chains 71 and moves the next row or group of containers to the loading station.

The container blanks 66 are held down on the guide bars 67 and in engagement with the drive bars 69 by a plurality of hold-down fingers 80 (Fig. 6) extending from a strut 81 along above the guide bars 67.

While the embodiment of the invention described contemplates the filling of multiple container blanks, individual containers such as small jars may also be filled on a machine embodying the invention by positioning them in carriages similar to the blanks 66 or by modifying the drive mechanism to provide troughs through which the small jars are slid by fingers extending upwardly from the drive bars 69 through slots in the bottoms of the parallel troughs. In such a machine there would be one trough and one filling device 27 for each file of individual containers.

In addition to the rapid filling of the individual containers, each with a measured charge of a liquid or a semi-liquid, a machine according to the invention is particularly useful in handling small quantities of oil paints. The action of drawing the measured charge into and out of the filling devices 27 through the small nozzles 31 is effective to homogenize the pigment and carrier so that a smoother mixture of ingredients is fed into each of the individual containers.

1. In a machine for filling open topped containers with measured charges of liquid material, in combination, an open topped liquid supply pan, means for moving said containers in geometrically arranged groups to and away from a loading station, a similarly arranged group of filling nozzles, each of said nozzles comprising an open ended cylinder and a piston reciprocable therein, means for relatively moving said group of nozzles as a group and said supply pan between a filling position with said nozzles overlying said supply pan and the open ends of said cylinders beneath the surface of the liquid supply in said pan and a discharge position with said nozzles located laterally of said supply pan with the open ends of said cylinders above said containers at said loading station, means for reciprocating said pistons and drive mechanism for actuating said means for relatively moving said group of nozzles and said supply pan and for actuating said piston reciprocating means in timed relation to the movement of said containers to and away from said loading station.

2. A material measuring mechanism for a machine for filling open topped containers with measured charges of liquid material, said mechanism comprising, an open topped material supply pan, a carriage, means for reciprocating said carriage between a position overlying said pan and a position at a container loading station, a plurality of individual container filling devices supported on said carriage, each of said devices comprising a pump cylinder having a downwardly extending open ended

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tubular portion and a piston reciprocable in said cylinder, a common drive member for said pistons, removable engagement means for coupling said pistons and said drive member and means for reciprocating said drive member relative to said carriage.

3. Mechanism according to claim 2 in which said drive member comprises a pair of vertically spaced bars having vertical openings through which the upper ends of said pistons extend, said pistons having tenons near their upper ends and said engagement means is a slotted keeper plate engageable with all of said tenons and removably positionable between said bars.

4. A machine for filling open topped containers with measured charges of liquid material comprising, in combination, means for moving said containers in step-by-step progression along parallel paths leading to a loading station, an open topped liquid supply pan mounted near said station, a carriage, a plurality of individual container filling devices mounted on said carriage in an arrangement according to the arrangement of said containers at the loading station, each of said devices having a downwardly extending open ended cylinder and a piston vertically reciprocable therein, a yoke for all of said pistons together, means on said carriage for vertically moving said pistons in unison, means for reciprocating said carriage between a filling position overlying said supply pan with the lower ends of said cylinders immersed in the liquid therein and a discharge position with the lower ends of said cylinders closely overlying the containers in the loading station, and means timed by the arrival of said carriage at said filling position and at said discharge position for actuating said piston moving means.

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5. A material measuring mechanism for a machine for filling open topped containers with measured charges of liquid material in which the containers are serially moved in groups of uniform number from parallel files to a filling station, said mechanism comprising a similarly numbered group of individual container filling devices mounted on a reciprocating carriage in a row and spaced according to the spacing of a group of said containers at said filling station, a closed bottom, open topped, liquid, supply pan, mechanism for reciprocating said carriage and group of devices mounted thereon to a first position over said supply pan in which said position said devices are inserted into said pan and immersed in the liquid therein and a second position in which said carriage is reciprocated with filled devices and said devices are positioned over said respective containers at a container filling station, and drive mechanism for actuating said filling devices when in said first position for drawing charges of liquid from said pan and discharging said charges into said containers when in said second position, said drive mechanism including means for moving the containers to be filled to said filling station operating in synchronism with the said actuating mechanism for the filling devices.

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