April 9, 1929. J. M. McCLATCHIE 1,708,482

APPARATUS FOR FILLING CANS AND THE LIKE

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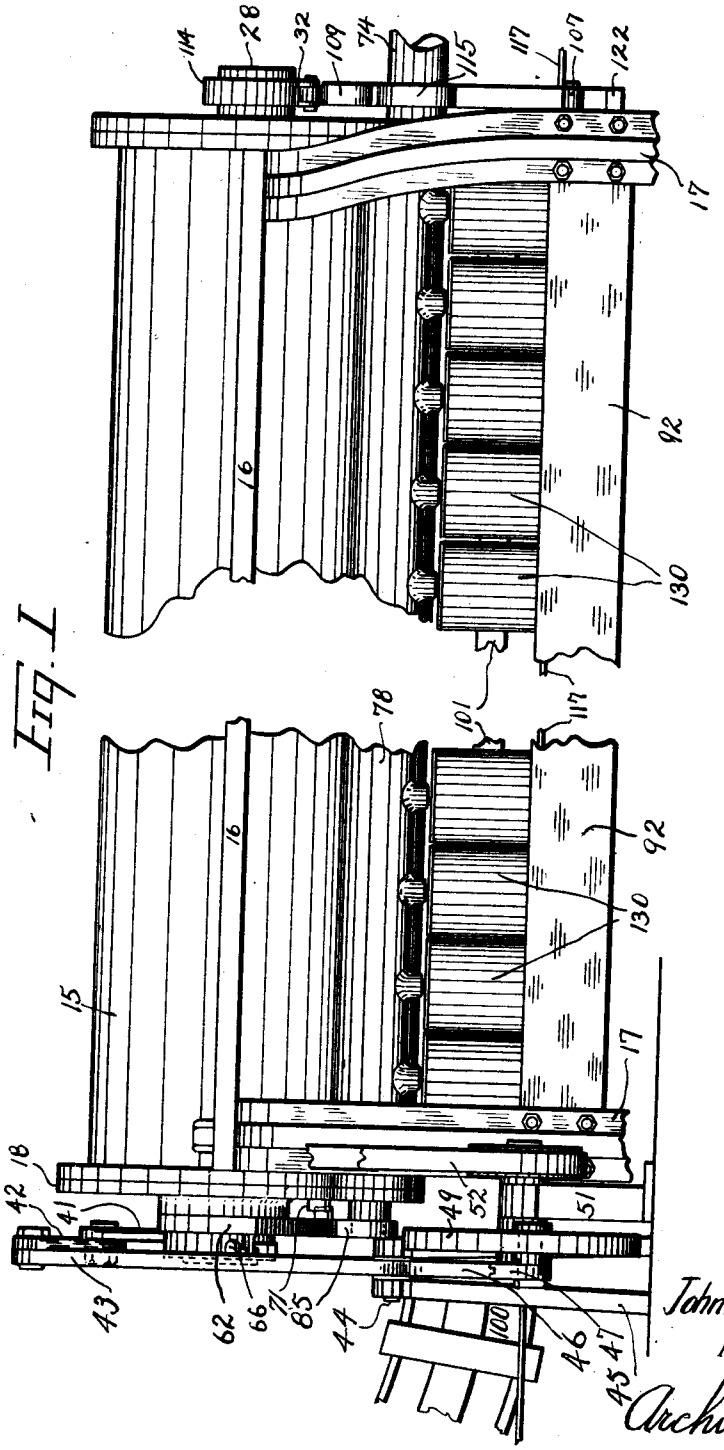

Fig. 1

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APPARATUS FOR FILLING CANS AND THE LIKE

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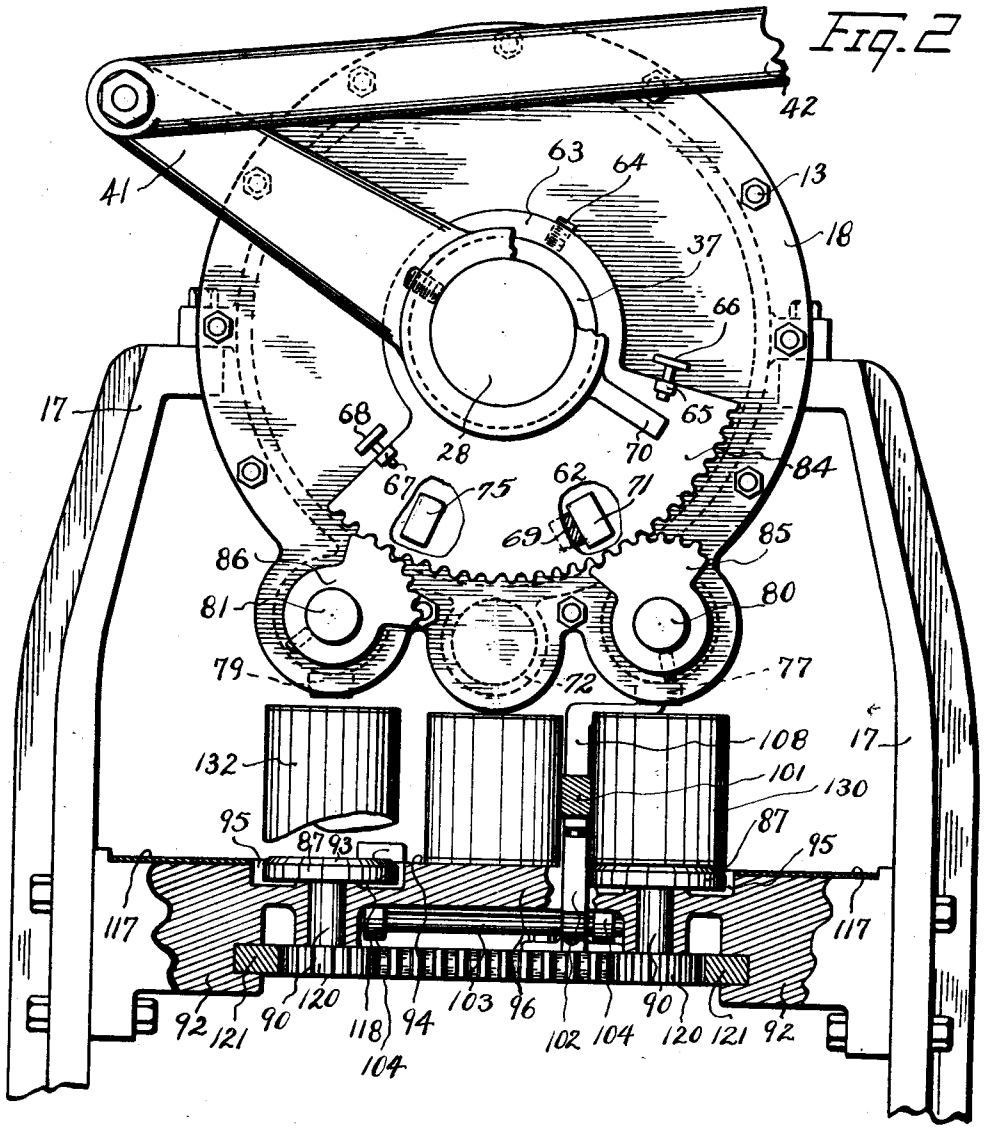
Fig. 2



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APPARATUS FOR FILLING CANS AND THE LIKE

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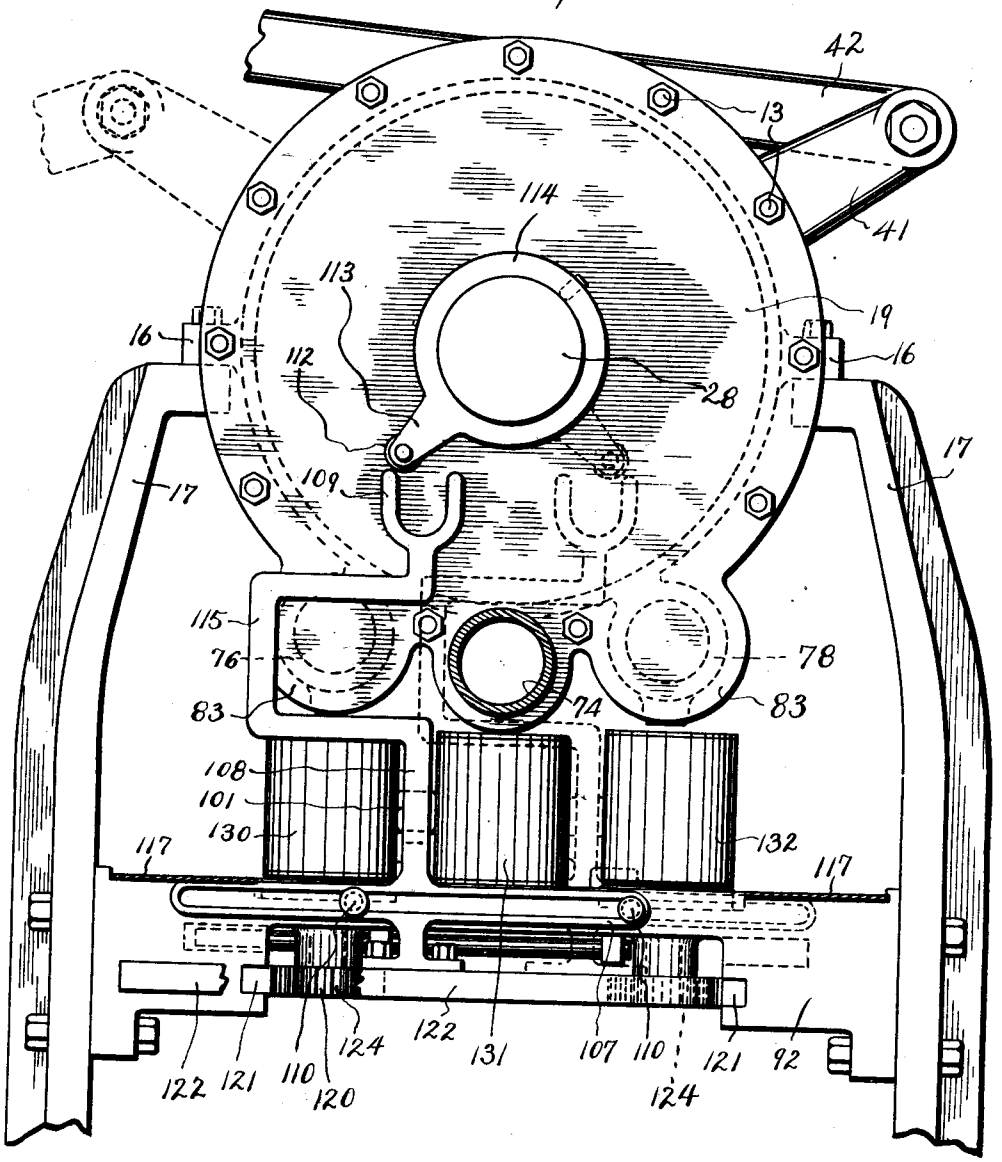
Fig. 3



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APPARATUS FOR FILLING CANS AND THE LIKE

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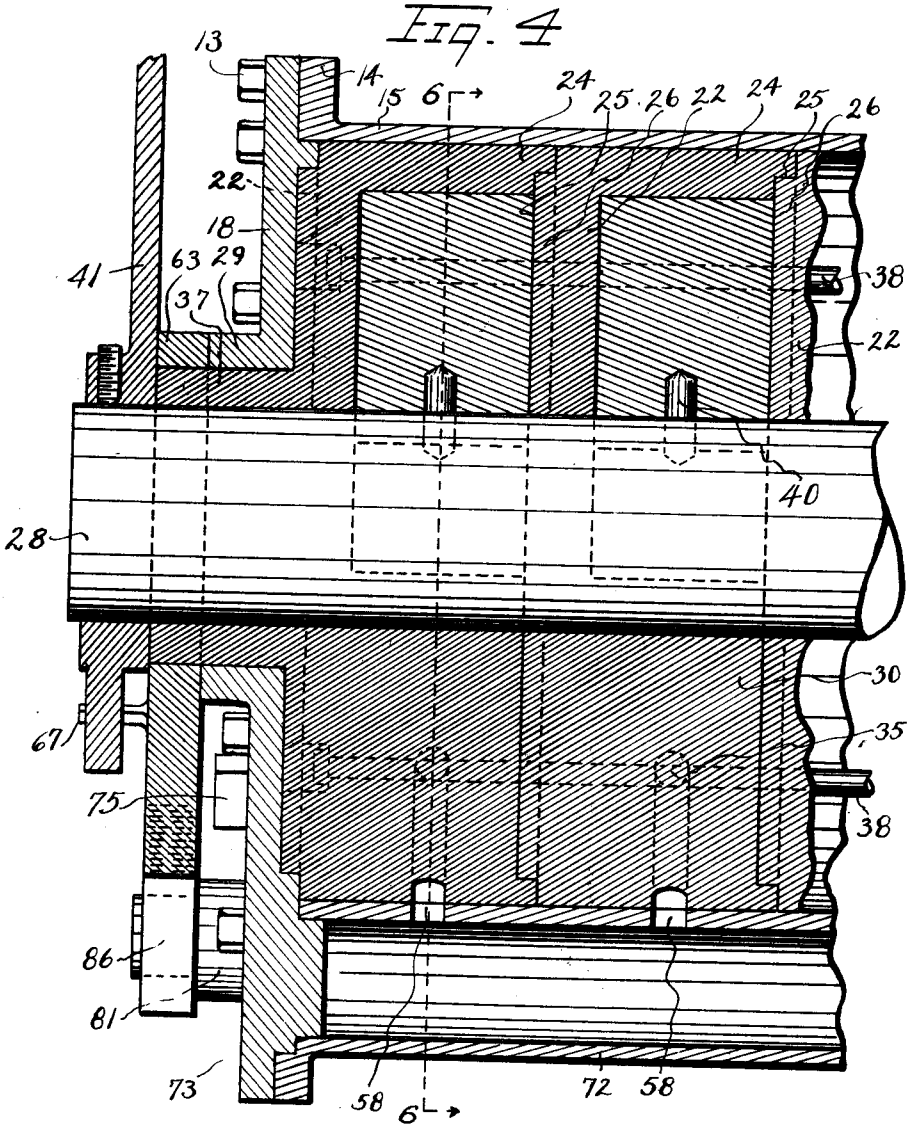
Fig. 4



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APPARATUS FOR FILLING CANS AND THE LIKE

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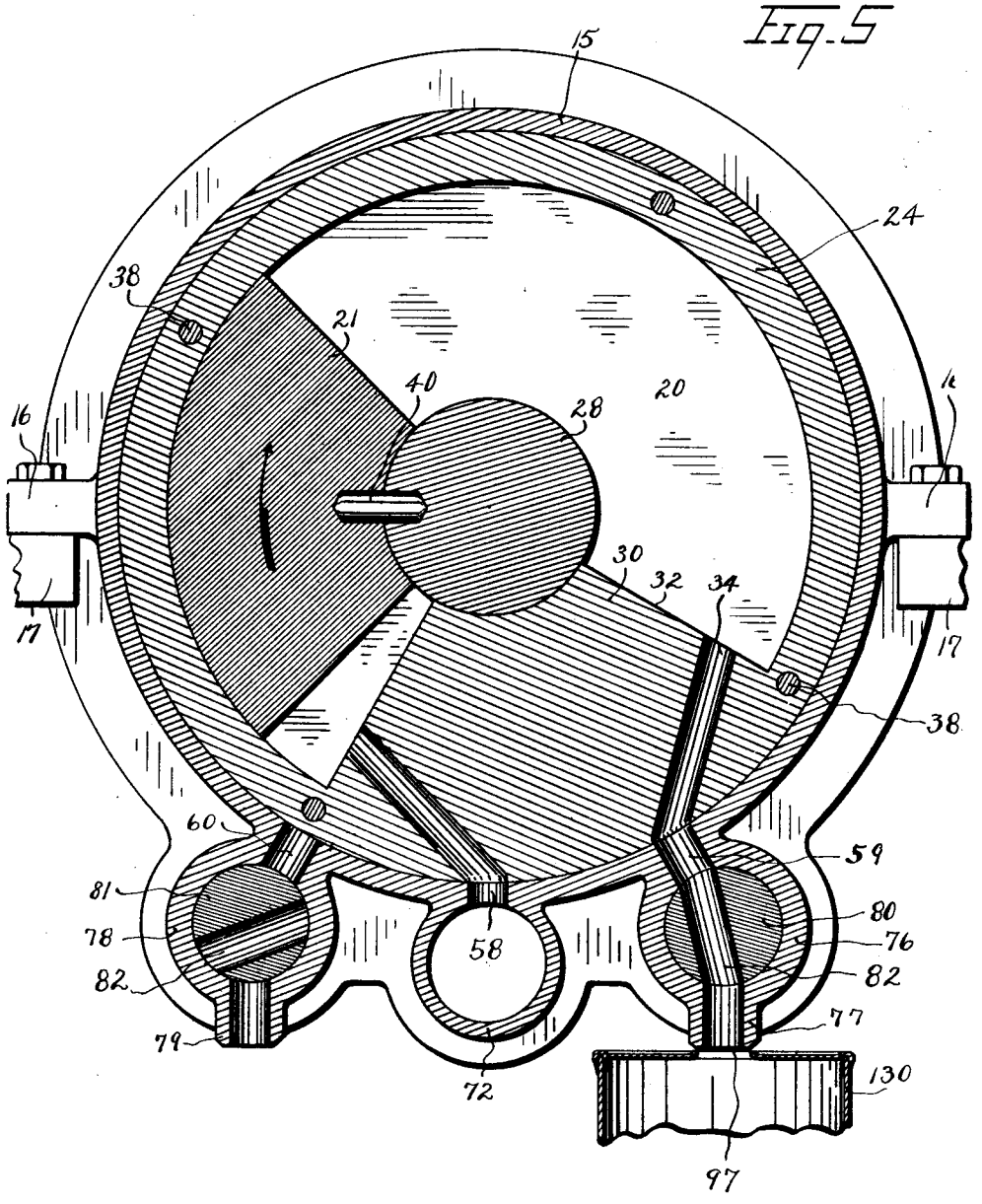
Fig. 5



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APPARATUS FOR FILLING CANS AND THE LIKE

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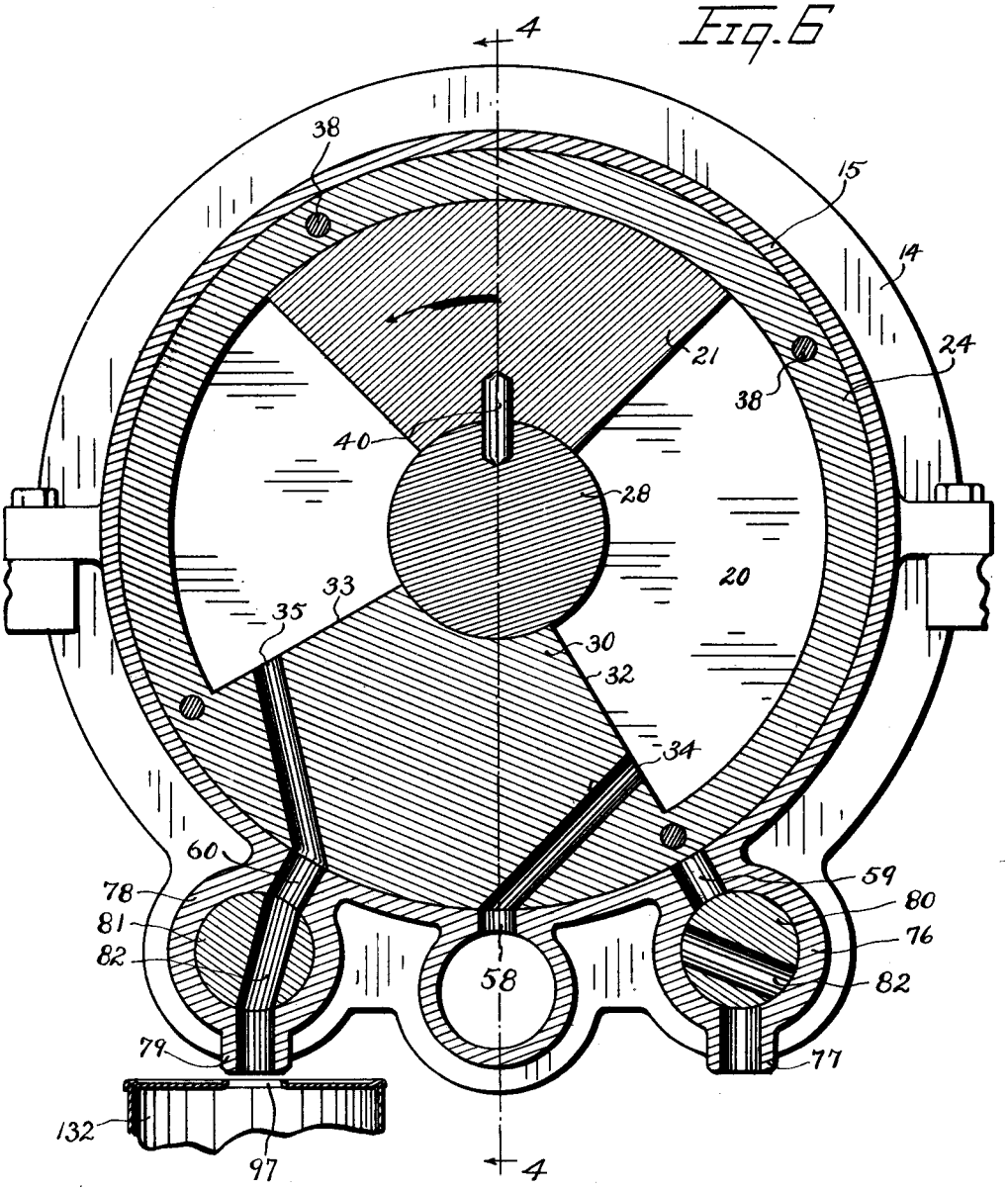
Fig. 6



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APPARATUS FOR FILLING CANS AND THE LIKE

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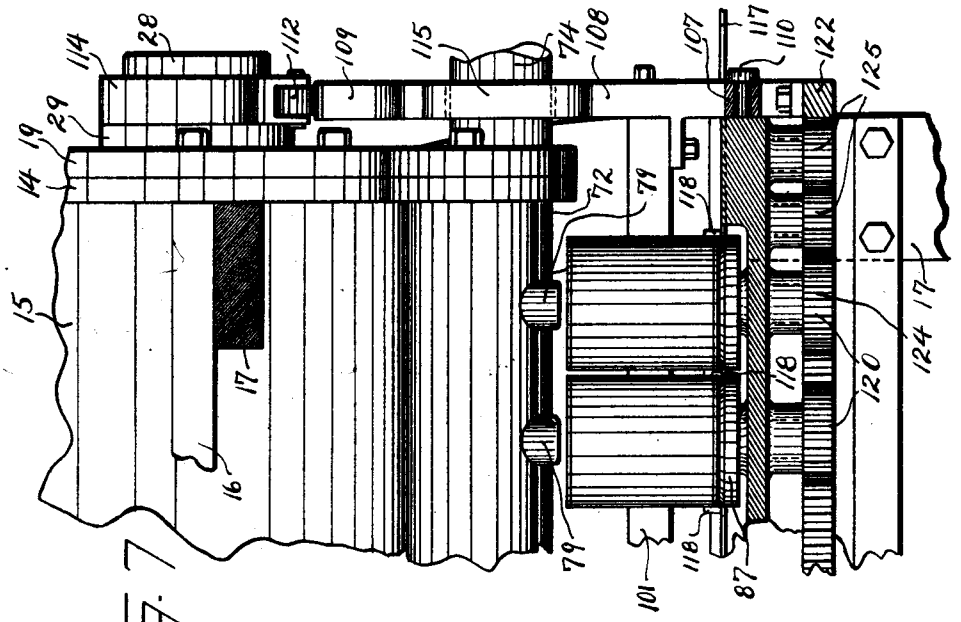

Fig. 7

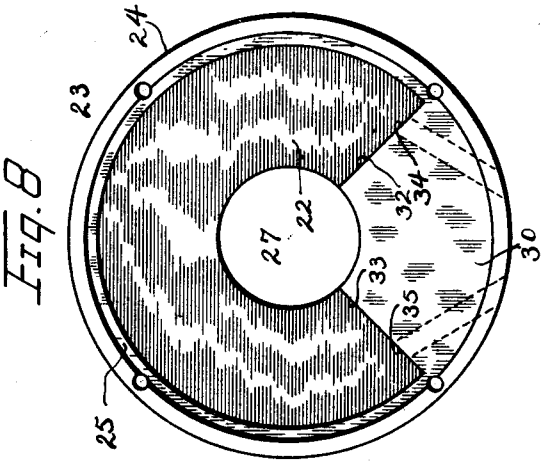

Fig. 8

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APPARATUS FOR FILLING CANS AND THE LIKE

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Fig. 9

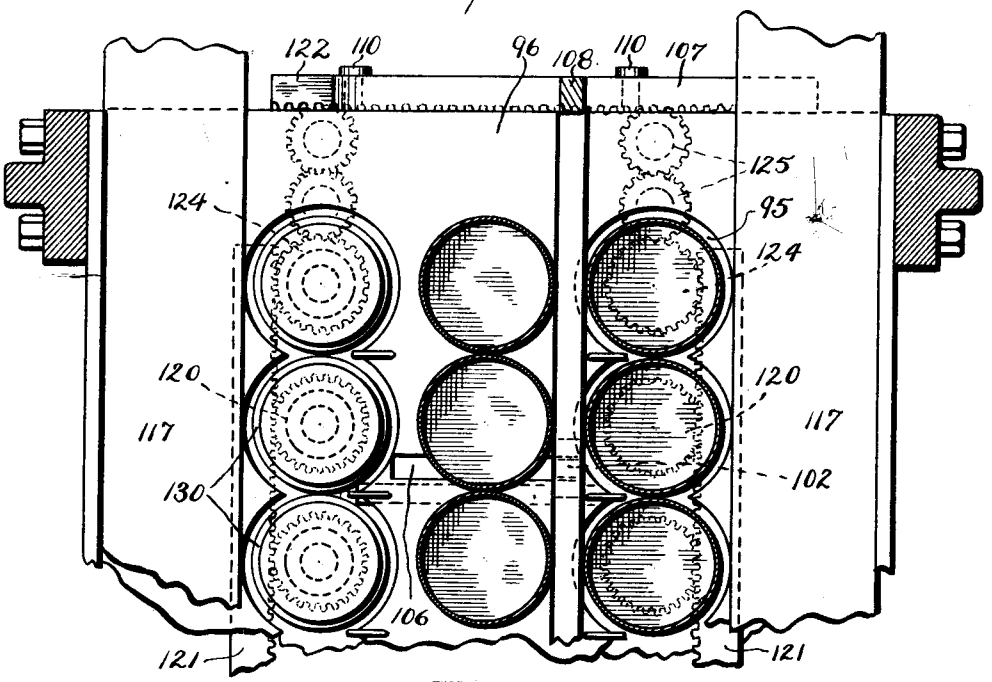
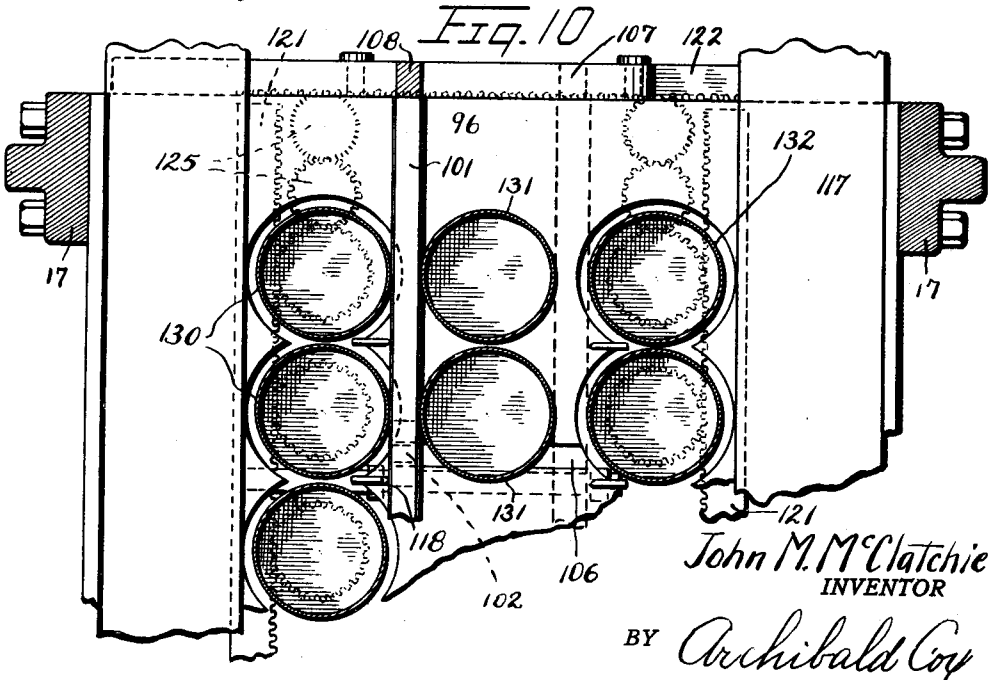


Fig. 10



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APPARATUS FOR FILLING CANS AND THE LIKE

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Fig. 11

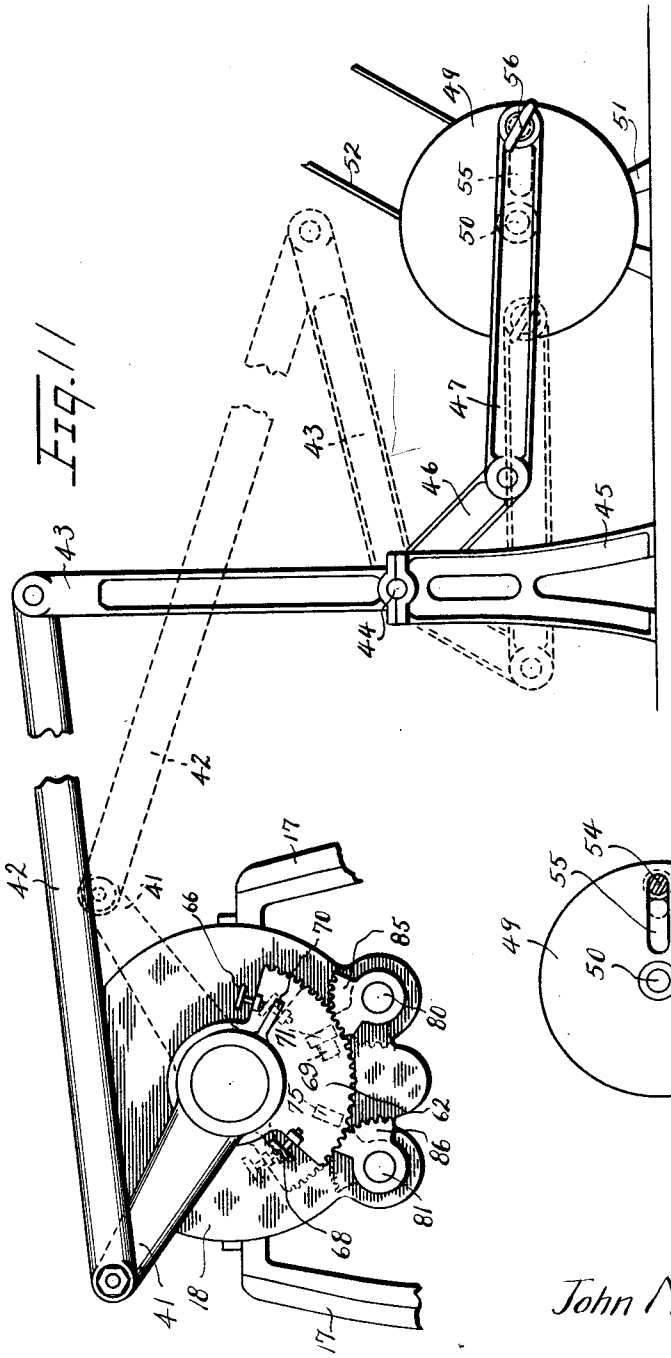

Fig. 12

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Patented Apr. 9, 1929. 1,708,482

UNITED STATES PATENT OFFICE.

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APPARATUS FOR FILLING CANS AND THE LIKE.

Application filed November 6, 1925. Serial No. 67,200.

The invention relates to an improvement in apparatus for filling cans and the like, and more particularly to an improvement in apparatus for automatically filling cans with predetermined amounts of condensed and evaporated milk, or other fluid or semi-fluid substances.

The general object of the invention is to produce an apparatus by which predetermined quantities of condensed and evaporated milk, or other fluid substances, may be more accurately and expeditiously introduced into cans or other containers than it has been possible to perform this operation with the filling apparatus heretofore used for the purpose.

A more specific object of the invention is to simplify the construction and arrangement of the parts of the filling apparatus so as to reduce the size of the apparatus and at the same time increase its capacity, efficiency and durability. The reduction of the size of the apparatus and the simplification of the parts thereof incidentally lessen the cost of production, which is an important feature of the present invention. A further object of the invention is to produce a can filling apparatus having provision whereby air spaces are eliminated from the cans during the filling operation, so that all the cans or other containers are completely and uniformly filled. These objects are accomplished in the improved apparatus for filling cans and the like hereinafter fully described and particularly pointed out in the appended claims.

The preferred form of the invention is illustrated in the accompanying drawings, in which Fig. 1 is a side elevation of the improved apparatus for filling cans and the like; Fig. 2 is a front end elevation, on an enlarged scale, of the apparatus shown in Fig. 1, with certain parts shown in section and other parts broken away; Fig. 3 is a view similar to Fig. 2, showing the apparatus in rear elevation; Fig. 4 is a section, on a still further enlarged scale, of the front end of the can filling mechanism, taken along the line 4—4 of Fig. 6; Fig. 5 is a transverse section through one of the units of the can filling mechanism, and showing the parts in position for filling the right hand row of cans; Fig. 6 is a view similar to Fig. 5, the section being taken on the line 6—6 of Fig. 4 and showing the parts in the act of filling the left hand row of cans; Fig. 7 is a detail in side elevation of a part of the rear end of the apparatus, with certain parts shown in section; Fig. 8 is a side elevation of one of the chamber units of the filling mechanism; Fig. 9 is a plan of a portion of the can supporting table and the parts connected therewith; Fig. 10 is a view similar to Fig. 9, with the movable parts in different position; Fig. 11 is a diagrammatic elevation of the means for actuating the can filling mechanism, which is shown in front end elevation; and Fig. 12 is a detail of the adjustable crank of the means for actuating the can filling mechanism.

The improved apparatus for filling cans and the like illustrated and described herein is particularly adapted for filling tin cans with either condensed or evaporated milk. The invention is not to be restricted to this use, however, since it is also adapted for use in introducing a predetermined quantity of any kind of fluid or semi-fluid substance into any kind of container. Accordingly it will be understood that the terms can or cans, and milk, are used as terms of description and not of limitation and that they are generic of any kind of container and fluid or semi-fluid.

The improved apparatus for filling cans as illustrated in the drawings comprises a can filling mechanism by which the milk is accurately measured and introduced into the cans, means for placing the empty cans in position to be filled and for moving the filled cans into position to be removed from the apparatus, and means for agitating the cans during the filling operation to eliminate air spaces therefrom, so that all the cans will be completely and uniformly filled.

The can filling mechanism comprises an elongated cylindrical casing or shell 15 provided on its outer lateral sides with the fins 16 by which it is supported on the upper ends of the uprights or standards 17 rising from the floor of the room in which the apparatus is located. The front and rear ends of the cylindrical casing 15 are closed by the covers 18 and 19 respectively, which are secured to the flanged parts 14 of the casing by the cap screws 13.

Rotatably supported within the casing 15 is a series of filling units, each of which constitutes a double acting pump which is

arranged to receive or take in a predetermined quantity of milk and to introduce it into a can. Each filling unit comprises an arc- or elongated sector-shaped chamber 20 and a sector-shaped piston 21 mounted to oscillate in the chamber 20. The chamber 20 is formed in a cup-shaped member 23 consisting of a disk or plate 22 integral at its periphery with a ring or cylinder 24 rotatably mounted in the casing 15. The open end of each cup-like member 23 in which the chamber 20 is formed is closed by the outer surface of the disk 22 of the next succeeding filling unit, as clearly indicated in Fig. 4. The free edge of each ring or cylinder 24 is provided with an annular recess 25 which fits snugly over a cylinder projection 26 on the outer surface of disk 22 of the succeeding member 23. The disks 22 of the cup-shaped members 23 are provided with central aligned holes 27 by which the members 23 are loosely supported on a shaft 28 extending throughout the length of the casing 15 and supported at each end in the annular flanges 29 extending outwardly from the end covers 18 and 19.

Each chamber 20 is thus formed on one side by the inner surface of a disk 22, on the other side by the outer surface of the disk 22 of the next succeeding member 23, at its center by the shaft 28 and around its outer edge by the ring or cylinder 24. Extending into each chamber 20 from the ring or cylinder 24 of each member 23 is a sector-shaped block 30, the inner edge of which loosely bears against the shaft 28. The sides 32 and 33 of the block 30 form the two ends of the chamber 20. In the sector-shaped block 30 are two openings or conduits 34 and 35 which lead from the ends 32 and 33, respectively, of the chamber 20 to the outer surface of the periphery of the ring or cylinder 24, and through which the milk is fed into and discharged from the chamber. All the cup-shaped members 23 are alike in construction except the first one which abuts against the front cover 18. This first cup-shaped member is provided with a forwardly extending annular flange 37 which is loosely embraced by the annular flange 29 of the front plate 18. The whole series of cup-shaped members 23 are held rigidly together by the longitudinally extending rods 38 received in equally spaced aligned holes in the peripheries of the rings or cylinders 24.

The chambers 20 of the filling units, formed as described above, constitute fluid tight enclosures in which the sector-shaped pistons 21 are arranged to oscillate. The pistons 21 are of such size in cross section that they completely fill (with only enough clearance for movement) the cross section of the chambers 20. Accordingly when the pistons move in either direction they force the milk from that part of the chamber into which they are moving, and create a vacuum in that part of the chamber from which they are moving so that it may be filled with a fresh supply of milk.

Each sector-shaped piston 21 is secured by means of a pin 40 to the shaft 28. Oscillatory movements are imparted to the shaft 28 by means of an arm 41 secured to the end of the shaft 28 extending forwardly beyond the front end of the cover 18. The outer end of the arm 41 is pivotally connected by means of a link 42 with the outer end of the arm 43 of a bell-crank lever journaled at 44 in the upper end of an upright or standard 45. The other arm 46 of the bell-crank lever is connected by means of a crank arm 47 with a crank disk 49 journaled at 50 in the standard 51. Power is supplied to drive the crank disk 49 from a belt 52. The outer end of the crank arm 47 is adjustably connected with the crank disk 49 by means of a bolt 54 which passes through a radial slot 55 in the crank disk. By loosening the nut 56 of the bolt 54 the position of the bolt in the slot 55 may be adjusted, thereby regulating the amount of oscillatory movement imparted to the arm 41 and shaft 28, and so to the pistons 21 mounted on the shaft 28. This shortening and lengthening of the oscillatory movement of the pistons 21 controls the amount of milk delivered by the pistons at each actuation thereof.

The milk is fed into the chambers 20 through a series of inlet ports 58 in the underside or bottom of the casing 15 and located in substantially the vertical plane of the axis of the shaft 28. When the pistons 21 are moving in a clockwise direction (viewing Figs. 2 and 5) the milk is discharged from the chambers 20 through a series of outlet ports 59 located in the bottom of the casing 15 to the right of the inlet ports 58; and when the pistons 21 are moving in a counter-clockwise direction (see Fig. 6) the milk is discharged from the chambers 20 through a series of outlet ports 60 located in the bottom of the casing 15 to the left hand of the inlet ports 58. The outlet ports 59 and 60 are spaced substantially equi-distant from the inlet ports 58.

When the pistons 21 are moving in a clockwise direction, the conduits 34, located in the ends of the chambers 20 toward which the pistons are moving, are connected with the outlet ports 59. At the same time the conduits 35, located in the ends of the chambers 20 from which the pistons are moving, are connected with the inlet ports 58. Conversely, when the pistons 21 are moving in a counter-clockwise direction the conduits 35 are connected with the outlet ports 60, whereas the conduits 34 are connected with the inlet ports 58. The means for oscillat-

ing the cup-shaped members 23, to shift the position of the conduits 34 and 35 with respect to the inlet and outlet ports in timed relation with the oscillating movements of the pistons 21, comprises a sector-shaped plate 62 provided with a hub portion 63 which is secured to the front end of the annular flange 37 of the first cup-shaped member 23 by the set screw 64. The hub 63 of the plate 62 is located between the forward end of the annular flange 29 of the front plate 18 and the rear side of the hub portion of the arm 41.

On the right hand lateral edge of the plate 62 (viewing Fig. 2) is a forwardly projecting lug 65 in which is threaded a stop screw 66; and on the left hand lateral edge of the plate 62 is a forwardly projecting lug 67 in which is threaded a stop screw 68. Projecting radially from the hub of the arm 41 (and on the side opposite the arm 41) is a lug or dog 70 which is adapted to engage with the stop screw 68 toward the end of the clockwise oscillation of the arm 41 and the pistons 21, and to engage with the stop screw 66 toward the end of the counter-clockwise oscillation of the arm 41 and the pistons 21. When the dog 70 engages either with the stop screw 68 or the stop screw 66 it moves the plate 62 and the cup-shaped members 23 synchronously with the pistons 21. When the pistons 21, moving in a clockwise direction, have reached or nearly reached the right hand end walls 32 of the chambers 20 the dog 70 engages with the stop screw 68, the members 23 are thereby oscillated to shift the conduits 34 from connection with the outlet ports 59 to connection with the inlet ports 58; and synchronously therewith, the conduits 35 are shifted from connection with the inlet ports 58 to connection with the outlet ports 60. Conversely, when the pistons 21, moving in a counter-clockwise direction, reach or nearly reach the end walls 33 of the chambers 20 the engagement of the dog 70 with the stop screw 66 causes the members 23 to be oscillated to shift the conduits 35 from connection with the outlet ports 60 to connection with the inlet ports 58; and synchronously therewith, the conduits 34 are shifted from connection with the inlet ports 58 to connection with the outlet ports 59.

By regulating the positions of the stop screws 66 and 68, the time of engagement therewith by the dog 70 is advanced or retarded. By advancing the time of engagement of the dog 70 with the screws 66 and 68, by turning the screws in a clockwise direction in their supporting lugs, the cup members 23 are caused to move synchronously with the pistons 21 proportionately sooner. Thus the space to be left between the ends of the chambers 20 and the advancing side of the pistons 21 is widened so that less milk is discharged. On the other hand, when the engagement of the lug 70 with the screws 66 and 68 is retarded, by turning the screws in a counter-clockwise direction in their supporting lugs, the synchronous movement of the members 23 with the pistons 21 is proportionately retarded, and the space to be left between the ends of the chambers 20 and the advancing sides of the piston 21 is lessened, so that a greater quantity of milk is discharged from the chambers. It is thus seen that the quantity of milk discharged at each oscillation in one direction of the pistons 21 is roughly regulated by shifting the position of the bolt 54 in the slot 55 of the crank disk 49 and that accurate regulation thereof is effected by turning the stop screws 66 and 68 in the proper direction.

The milk is fed through the inlet ports 58 into the chambers 20 from a conduit or chamber 72 which may conveniently be formed integral with the lower side of the casing 15. The forward end of the conduit 72 is closed by a plug 73 which extends rearwardly from the lower part of the front cover 18. The rear end of the conduit 72 is connected by means of a pipe 74 with a convenient source of milk which forces the milk into the conduit 72 under pressure. Although the vacuum created in the ends of the chambers 20 from which the pistons 21 are moving is sufficient to draw the milk into the chambers, it is considered desirable to assist the action of the vacuum by forcing the milk into the conduit 72 under pressure.

When the conduits 34 and 35 have been moved into alinement with the ports 59 and 58, respectively, they are prevented from movement beyond this position in a counter-clockwise direction by the engagement of the lug 69 projecting rearwardly from the rear face of the plate 62 with a stop 71 projecting forwardly from the front face of the plate 18. And when the conduits 35 and 34 have been moved into alinement with the ports 60 and 58, respectively, they are pevented from movement beyond this position in a clockwise direction by the engagement of the lug 69 with a stop 75 projecting forwardly from the front face of the plate 18. The stops 71 and 75 are spaced substantially equi-distant from the vertical plane passing through the axis of the shaft 38, and the lug 69 is spaced substantially equi-distant from the screws 66 and 68. It is necessary to provide the stops 71 and 75 in these positions because the pressure exerted by the incoming milk against the piston 21 and against the segment 30 is greater than the pressure exerted against the segment 30 by the piston 21 through the milk being discharged from the chamber 20. A six foot head of milk gives substantially four pounds pressure per square inch on the

piston 21. This pressure is also exerted against the segment 30, holding the cups 23 against either the stop 71 or the stop 75 and maintaining the conduits 34 and 35 in alinement with their respective ports. When the conduits 34 and 35 are in alinement with their discharge ports 59 and 60, the milk tends to flow down out of the chambers 20 by gravity. Hence it will be understood that the pressure exerted on the segments 30 by the pistons 21 through the discharging milk tending to move the cups in the direction of travel of the pistons 21 is less than the pressure exerted against the segments 30 by the incoming milk holding the cups 23 against either the stop 71 or the stop 75. Thus when the lug 69 has been moved into engagement with either the stop 71 or the stop 75 at the end of the oscillatory movement of the cups 23 bringing the conduits 34 and 35 into alinement with the corresponding inlet and discharge ports, the cups remain in this position until the next oscillatory movement of the arm 41 in the opposite direction.

The outlet ports 59 discharge into a conduit 76 connected with the lower side of the casing 15 and extending throughout the length thereof. In the underside of the conduit 76 is a series of discharge openings or nozzles 77. In like manner the outlet openings 60 discharge into a conduit 78 extending throughout the length of the casing 15 and in the underside of which is a series of outlet openings or nozzles 79. Rotatably mounted in the conduit 76 is an elongated valve member 80, and rotatably mounted in the conduit 78 is a similar elongated valve member 81. The valve members 80 and 81 are provided with the transverse passageways 82 which are adapted, when the valve members 80 and 81 are properly positioned, to connect the outlet ports 59 and 60 with the discharge openings or nozzles 77 and 79. The rear ends of the conduits 76 and 78 are closed by covers 83 which are integral with the rear cover 19 of the casing 15.

The valve members 80 and 81 extend forwardly beyond the forward ends of the conduits 76 and 78, and on the forward extremities thereof are mounted the segmental gears 85 and 86, respectively, which are arranged to mesh with the segmental gear section 84 formed on the arc-shaped lower edge of the plate 62. The connection between the valve members 80 and 81 and the cup-shaped members 23 is such that as the latter are oscillated to shift the position of the conduits 34 and 35 with respect to the outlet ports 59 and 60 and the inlet ports 58, the valve members 80 and 81 are synchronously rotated. When the members 23 are moved in a clockwise direction to disconnect the conduits 34 from the outlets 59 and connect them with the inlets 58 and to disconnect the conduits 35 from the inlets 58 and to connect them with the outlets 60, the valve member 80 is turned to break the connection between the outlets 59 and their nozzles 77, whereas the valve member 81 is turned to establish a connection between the outlets 60 and their nozzles 79. Reverse action of the parts takes place when the cup members 23 are moved in a counter-clockwise direction.

The problem of introducing such substances as condensed and evaporated milk into tin cans without any drip is solved in the apparatus of the present invention by interposing the valve members 80 and 81 in the discharge openings from the chambers 20. By moving the passageways 82 in the valve members 80 and 81 out of alinement with the outlets 59 and 60 and their nozzles when the conduits 34 and 35 are disconnected from the outlets 59 and 60, the milk remaining in the outlets 59 and 60 and in the passageways 82 is prevented from dripping out through the nozzles 77 and 79. Consequently only the very small quantity of milk in the passageways of the nozzles 77 and 79 can fall toward the cans when the conduits 34 and 35 are disconnected from the outlet ports 59 and 60. As a result of this construction, when the discharge of milk through the outlet ports 59 and 60 is cut off, the milk passing from the nozzles 77 and 79 lessens to a distinct point which is received within the openings in the cans and after that there is absolutely no drip from the nozzles.

During the filling operation the cans to be filled are held in position under the nozzles 77 and 79 by cylindrical supports which are located directly under their respective nozzles. Each support 87 is provided with a vertically arranged pin 90 journaled in the platform 92 extending throughout the length of the apparatus and secured at intervals along its lateral edges to the standards 17. The beveled upper part 93 of each can support projects upwardly beyond the upper surface 94 of the platform 92, and the cylindrical part of each can support is received in a longitudinal groove 95 extending throughout the length of the platform. This construction is such that when the cans are moved into position over the supports 87 the edges of the cans will ride up over the beveled portion of the supports. According to the present practice obtaining in the manufacture of tin cans the bottom ends thereof are depressed and are provided with a beveled edge. The size of the beveled upper ends of the supports 87 is such that the cans are centered in position thereon with the central holes 97 in the tops of the cans directly under the openings in the nozzles 77 and 79.

The cans to be filled are fed onto the

middle or receiving section 96 of the platform 92 by way of the front end of the apparatus from a chute or hopper, the lower end of which is indicated at 100 in Fig. 1. When the requisite number of cans have been properly positioned on the middle portion 96 of the platform they are moved as a whole laterally onto the right hand or left hand row of supports 87 and are then filled with milk.

The means for shifting the row of cans from the receiving middle part 96 of the platform onto the supports 87 comprises a longitudinally extending bar 101 mounted on a series of uprights 102 slidingly supported at their lower ends on cross bars 103 secured at their outer ends in lugs 104 depending from the underside of the middle portion 96 of the platform. The middle portion 96 of the platform is provided with laterally extending slots 106 in which the uprights 102 travel. The bar 101 is moved laterally in both directions by means of a vertically arranged arm 108 located at the rear of the apparatus and to which the rear end of the bar is secured. The lower end of the arm 108 is provided with a laterally-elongated slotted base 107 which loosely engages and is supported by the pins 110 projecting rearwardly from the platform 92. The upper end 109 of the arm 108 is formed as a U, the upwardly projecting arms of which are adapted to be engaged by a roller 112 mounted on the outer end of an arm 113 projecting radially from a collar 114 secured to the rearwardly projecting part of the shaft 28. The middle portion 115 of the arm 108 is offset so as to clear the pipe 74.

Assuming that the apparatus has been set up for operation and that no cans have as yet been fed into it: A predetermined number of cans are fed from the hopper or chute 100 along the length of the receiving section 96 of the platform 92. When the row of cans on the receiving part of the platform have come to rest, the oscillation of the shaft 28 causes the roller 112 to enter the U-shaped portion 109 of the arm 108 and move the bar 101 laterally to push the cans from the receiving part of the platform onto one of the rows of supports 87. Immediately the bar 101 comes to rest another batch of cans is fed onto the receiving part of the platform from the hopper or chute 100. Then while the filling mechanism is operating to fill the row of cans positioned on the first series of supports 87 the bar 101 is actuated to push the cans just deposited on the platform onto the other row of supports 87. As the bar 101 comes to rest at the end of this stroke a third batch of cans is delivered from the chute 100 onto the receiving part of the platform.

The apparatus is now filled to its capacity with cans. On the first series of supports 87 is a row of filled cans, the filling having been accomplished while the bar 101 was pushing the second row of cans from the receiving part of the platform onto the other series of supports 87. On the second series of supports 87 is a row of empty cans, and on the receiving part of the platform is a row of cans which have just been fed into the apparatus. On the next lateral movement of the bar 101 (which is now in its original position), the row of cans being pushed onto the first series of supports 87 displace the row of filled cans, and move them onto either of the two conveyor belts 117 supported on the longitudinal margins of the platform 92. The conveyor belts 117, of which only portions are indicated in the drawings, may be of the usual endless belt type driven from any convenient source of power. The construction of the U-shaped part 109 of the arm 108 and its arrangement relatively to the oscillation of the roller 112 are such that at the end of each lateral movement of the bar 101 the roller 112 is disengaged from the U-shaped part 109 of the arm 108 long enough to permit the fresh supply of cans to be fed onto the receiving part of the platform. This will be clearly understood without further explanation by a consideration of Fig. 3. The cans pushed from the receiving part of the platform onto the supports 87 are guided onto the supports 87 by means of the short guide pieces 118 rising from the platform at the inner lateral edges of the recesses 95.

In order to eliminate air-pockets from the cans during the filling operation a rotary motion is imparted to the cans by which the milk being introduced into the cans is caused to pile up on the interior of the side walls of the cans under the action of centrifugal force. This causes a depression in the center of the mass of milk being introduced into the cans. Consequently when the milk reaches the top of the cans the air therein has been forced toward the central opening in the top or cover of the cans so that as the last of the stream of milk enters the cans it occupies the central depression in the mass of milk in the cans and thereby completely fills the cans, leaving no air space whatever therein. By reason of this mode of operation it is possible to employ cans made exactly to size, thereby effecting a considerable saving in material, since formerly in order to get the requisite quantity of milk into the cans it was necessary to make the cans a little oversize.

Each can support 87 is rotated by means of a gear 120 mounted on the lower end of the pin 90 on the upper end of which the can support is mounted. Each series of gears 120 is in mesh with an elongated rack 121 loosely mounted in a longitudinal groove in the platform 92, as clearly indicated in

Fig. 2. Reciprocatory movements are imparted to the racks 121 to rotate the can supports 87 in one direction and then in the other by means of a rack 122 supported at the rear end of the apparatus from the lower side of the base 107 of the arm 108. Interposed between each rearmost gear 124 of the two series of gears 120 and the rack 122 are two idler gears 125 which communicate reciprocatory movements from the rack 122 through the gears 124 to the racks 121. It is thus seen that while the arm 108 and the parts connected with it are being moved laterally by the oscillations of the arm 113 the can supports 87 are rotated.

The mode of operation of the various parts of the improved apparatus for filling cans has been described in connection with the description of the construction thereof. The mode of operation of the apparatus as a whole is described as follows:—It is assumed that the apparatus has been in operation for some time. Referring to Figs. 3, 9 and 10 it will be understood that when the bar 101 has completed a lateral movement in one direction, for example, toward the left, viewing Figs. 3 and 10, thereby placing the rows of cans 130 in position on the left hand series of supports 87 and displacing therefrom the row of cans which have just been filled, the roller 112 on the end of the arm 113 passes out of the U-shaped portion 109 of the arm 108, thereby permitting the bar 101 to remain stationary momentarily. The continuous travel of the left hand conveyor belt 117 carried away the filled cans immediately they were deposited thereon. The momentary dwell of the bar 101 is sufficient to permit a fresh supply of empty cans 131 to be run onto the receiving part 96 of the platform 92 from the hopper or chute 100. Thereupon the return oscillation of the arm 113 will again bring the roller 112 in engagement with the U-shaped part 109 of the arm 108 to carry the bar 101 toward the right, and with it the row of cans 131 to position them on the right hand series of supports 87, at the same time displacing the row of filled cans 132 and discharging them onto the right hand conveyor belt 117.

Turning now to Figs. 2, 5 and 6 it will be understood that while the bar 101 is moving to the left, viewing Fig. 2, (to the right viewing Fig. 3) the pistons 21 are turning in a clockwise direction (as shown in Fig. 5), to fill the row of cans 130 with milk; and conversely, that when the bar 101 moves toward the right (to the left viewing Fig. 3) the pistons 21 are turning in a counter-clockwise direction (as shown in Fig. 6), to fill the row of cans 132. As the pistons reach the end of their oscillation in the clockwise direction, the dog 70 encounters the stop screw 68 to turn the members 23 and thereby disconnect the conduits 34 from their outlet ports 59 and connect them with the inlet ports 58, at the same time disconnecting the conduits 35 from the inlet ports 58 and connecting them with their outlet ports 60. Conversely, as the pistons reach the end of their oscillation in the counter-clockwise direction, the dog 70 encounters the stop screw 66 and thereby turn the members 23 to disconnect the conduits 35 from their outlet ports 60 and connect them with the inlet ports 58, at the same time disconnecting the conduits 34 from the inlet ports 58 and connecting them with their outlet ports 59. When the members 23 are turned to shift the positions of the conduits 34 and 35, as just described, the valve members 80 and 81 are turned either to connect the outlet ports with their discharge openings or to disconnect them therefrom. While the pistons are moving in either direction to discharge the milk from that part of the chambers 20 into which they are advancing, a fresh supply of milk is fed into that part of the chambers from which the pistons are moving.

While the cans are being filled the lateral actuation of the arm 108 by the oscillation of the arm 113 causes the racks 122 and 121 to be reciprocated, whereby a rotary motion is imparted to the cans on the supports 87. The result is that as the milk descends into the cans the centrifugal force imparted to it by the rotating cans causes it to build up on the interior walls of the cans and reach the outer part of the under surface of the tops of the cans before it reaches the central part of the under surface of the tops of the cans. Thus the air pocket in the depressed central portion of the milk is forced out through the central openings in the tops of the cans as the last part of the streams of milk descend into the cans. As a result all the cans are uniformly filled up to the top cover and air spaces are thus completely eliminated from the cans.

Having thus described the invention what I claim as new is:—

1. An apparatus for filling cans and the like comprising, a cylindrical casing, a series of filling units located in the casing, each filling unit consisting of a cup-shaped member rotatably mounted in the casing, a sector-shaped piston rotatably mounted in the chamber formed in the cup-shaped member, and a sector-shaped block projecting from the rim of the cup-shaped member toward the center thereof, the sides of said block forming the ends of said chamber, a shaft extending through the series of filling units and to which the pistons are secured, each end of the chamber being provided with a conduit passing through the block, two outlet ports in the casing, one for each conduit, an inlet port in the casing means for mov-

ing the cup-shaped member to connect one conduit with its outlet port and the other conduit with the inlet port and vice versa, means for moving the piston toward the conduit connected with its outlet port, means for introducing fluid into the chamber through the conduit connected with the inlet port, and means for positioning the cans to be filled under the outlet ports.

2. An apparatus for filling cans and the like comprising, a cylindrical casing, a shaft extending axially throughout the center of the casing, a series of filling units located in the casing, each filling unit consisting of a cup-shaped member rotatably mounted in the casing and of which the disk is loosely mounted on the shaft, a sector-shaped piston mounted in the chamber formed by the cup-shaped member and secured to the shaft, and a sector-shaped block extending from the rim of the cup-shaped member and loosely engaging the shaft at its inner end, the sides of the block forming the ends of the chamber, each end of the chamber being provided with a conduit extending through the block, two series of outlet ports in the casing providing one outlet port for each conduit, a series of inlet ports in the casing providing one inlet port for each pair of conduits, means for actuating the shaft, stops connected with the cup-shaped members adapted to be engaged by a lug connected with the pistons, a lug connected with the pistons adapted to engage the stops whereby, when the pistons approach the ends of the chambers, the cup-shaped members are moved to shift the positions of the conduits with respect to their outlet ports and the inlet ports, and means for positioning the cans to be filled under the outlet ports.

3. An apparatus for filling cans and the like comprising, a cylindrical casing, a shaft extending axially throughout the length of the casing, a series of filling units located in the casing, each filling unit consisting of a cup-shaped member rotatably mounted in the casing and of which the disk is loosely mounted on the shaft, a sector-shaped piston rotatably mounted in the chamber formed by the cup-shaped member and secured to the shaft, a sector-shaped block extending from the rim of the cup-shaped member to the shaft, the sides of the block forming the ends of the chamber, each end of the chamber having a conduit passing through the block, two series of outlet ports in the casing providing an outlet port for each conduit, a series of inlet ports in the casing providing an inlet port for each pair of conduits, a conduit connected with each series of outlet ports and having a series of discharge openings in the underside thereof, a valve member provided with passageways located in each outlet conduit, a conduit connected with the series of inlet ports through which fluid is fed into the chamber, means for actuating the shaft, stops connected with the cup-shaped members adapted to be engaged by a lug connected with the pistons when the latter approach the ends of the chambers, a lug connected with the pistons adapted to engage the stops whereby the cup-shaped members are moved to shift the positions of the chamber conduits with relation to their respective outlet ports and the inlet ports, connections between the cup-shaped members and the valve members whereby the passageways therein are alternately connected with their respective outlet ports and disconnected therefrom, and means for positioning the cans to be filled under the discharge openings in the outlet conduits.

4. An apparatus for filling cans and the like comprising, a cylindrical casing, a shaft extending axially through the center of the casing, a series of filling units mounted in the casing, each filling unit consisting of a cup-shaped member, the disk of which is loosely mounted on the shaft, the open face of each cup-shaped member abutting against the outer side of the disk of the next succeeding cup-shaped member, a sector-shaped piston movably mounted in the chamber formed in the cup-shaped member and secured to the shaft, a sector-shaped block projecting from the rim of the cup-shaped member to the shaft, the sides of the block constituting the ends of the chamber, a conduit leading from each end of the chamber through the block, two series of outlet ports in the lower side of the casing providing an outlet port for each conduit, a series of inlet ports in the lower side of the casing providing an inlet port of each pair of conduits, a discharge nozzle for each outlet port and spaced apart therefrom, two valve members, each of which has a plurality of passageways adapted to connect the outlet ports with their discharge nozzles, means for actuating the shaft, means connected with the cup-shaped members arranged to be engaged by means connected with the shaft when the pistons approach the end of their travel in either direction to shift the position of the conduits relatively to the outlet ports and the inlet port, means connecting the chambers with the valve members so that the latter will be moved simultaneously with the chambers to connect the passageways in one valve member with their outlet ports and discharge nozzles and disconnect the passageways of the other valve member from their outlet ports and discharge nozzles, and means for positioning the cans to be filled under the discharge nozzles.

5. An apparatus for filling cans and the like comprising, an elongated casing having two series of discharge nozzles spaced apart and extending along the underside thereof, can filling means including a shaft located

in the casing for alternately discharging fluid through the two series of discharge nozzles, a platform extending under the casing and having its middle portion adapted to receive a supply of cans to be filled, and means actuated by the shaft for removing the cans on the receiving part of the platform and positioning them under the rows of discharge nozzles alternately.

6. An apparatus for filling cans and the like comprising, an elongated casing having on its underside two spaced rows of discharge nozzles, can filling means located in the casing for discharging fluid through the two rows of nozzles alternately, a platform extending under the casing and having its middle portion adapted to receive the cans to be filled, means actuated from the filling means and arranged when it moves in one direction to displace the cans on the receiving part of the platform and position them under one row of nozzles, and when it moves in the other direction to displace the cans from the receiving part of the platform and position them under the other row of nozzles, and conveyors onto which the filled cans are pushed by the cans being placed under the nozzles.

7. An apparatus for filling cans and the like comprising, a casing having on the underside thereof two rows of discharge nozzles, can filling means mounted in the casing for discharging fluid through the rows of nozzles alternately, two rows of can supports located under the nozzles and corresponding thereto, a receiving platform between the rows of can supports, a longitudinally extending bar actuated by the can filling means and arranged to move laterally over the receiving platform to remove the cans therefrom and place them on the supports, and conveyors onto which the filled cans are pushed by the cans being placed on the supports.

8. An apparatus for filling cans and the like comprising, an elongated cylindrical casing having on its underside two spaced rows of discharge nozzles, a shaft extending axially throughout the center of the casing, a series of can filling units mounted in the casing and arranged to be actuated by the shaft, each filling unit being arranged to discharge fluid through each pair of discharge nozzles alternately, means for supplying the filling units with fluid, a platform extending under the casing and having its middle section adapted to receive in successive rows the cans to be filled, two rows of can supports located under the two rows of discharge nozzles and corresponding thereto, and a longitudinally extending bar actuated from the shaft and arranged to move laterally in both directions over the receiving part of the platform to displace the cans therefrom and position them on the supports.

9. An apparatus for filling cans and the like comprising, an elongated cylindrical casing, a shaft extending axially throughout the center of the casing, means for oscillating the shaft, a series of can filling units located in the casing and operatively connected with the shaft, said casing being provided on its underside with two spaced rows of discharge nozzles through which the filling units discharge fluid alternately, means for supplying the filling units with fluid, a platform extending under the casing, the middle section of the platform serving to receive successive rows of cans to be filled, a row of rotatable can supports under each row of discharge nozzles, a bar extending longitudinally of the casing and arranged to move laterally in both directions over the receiving part of the platform, means whereby the bar is intermittently actuated from the shaft to displace the cans from the receiving part of the platform and position them on the supports, and connections between the can supports and the shaft whereby the can supports are rotated during the filling operation.

10. An apparatus for filling cans and the like comprising, an elongated cylindrical casing having on its underside two spaced rows of outlet ports and a row of inlet ports between the two rows of outlet ports and spaced equal distances therefrom, a shaft extending axially throughout the center of the casing, a series of can filling units located in the casing, each filling unit consisting of a cup-shaped member the disk of which is loosely mounted on the shaft, each cup-shaped member forming with the outer side of the disk of the next succeeding cup-shaped member a chamber, a sector-shaped block extending from the rim of each cup-shaped member to the shaft, the radial sides of the block forming the ends of the chamber, a sector-shaped piston located in each chamber and arranged to travel from one end of the chamber to the other and in the reverse direction, each piston being secured to the shaft, a conduit leading from each end of the chamber through the block, each conduit corresponding to an outlet port, means for actuating the shaft, means connected with the cup-shaped members adapted to be engaged by means connected with the pistons whereby, when the pistons approach the ends of the chambers the cup-shaped members are moved to shift the positions of the conduits relatively to the outlet ports and the inlet ports, an inlet conduit extending along the bottom of the casing and into which the inlet ports open, an outlet conduit extending along each side of the bottom of the casing and into which the

outlet ports open, a row of discharge nozzles in the bottom of each outlet conduit, each discharge nozzle corresponding to an outlet port, a valve member located in each outlet conduit and having passageways corresponding to the outlet ports, connections between the cup-shaped members and the valves whereby the valves are actuated to connect the outlet ports with their discharge nozzles and to disconnect them therefrom, a platform extending under the casing and having a middle portion adapted to receive rows of cans to be filled, a bar extending longitudinally of the casing and arranged to move transversely in both directions over the receiving part of the platform, a row of rotatable can supports under each row of discharge nozzles, connections between the bar and the shaft whereby the bar is intermittently actuated to displace the rows of cans from the receiving part of the platform and position them on the supports, and connections between the rotatable can supports and the shaft whereby the can supports are rotated during the filling operation.

11. An apparatus for filling cans comprising, a cylindrical casing having an inlet port and two outlet ports, a shaft passing axially through the casing, a cylindrical chamber movably mounted in the casing and loosely engaging the shaft, a sector-shaped block fixed in the chamber, the radial sides of the block constituting the ends of the chamber, said chamber being provided at each end with a conduit which passes through the block to the periphery of the chamber, each of said conduits being adapted to register with an outlet port and with the inlet port, a sector-shaped piston movably mounted in the chamber and fixed at its inner end on the shaft, means for oscillating the shaft, two stops connected with the chamber, and a lug connected with the piston adapted to engage the stops to move the chamber in the direction of travel of the piston to shift the position of the conduits relatively to the ports.

12. An apparatus for filling cans comprising, a cylindrical casing having an inlet port and an outlet port, a shaft passing axially through the casing, a cylindrical chamber movably mounted in the casing and loosely engaging the shaft, a block projecting into the chamber from the periphery thereof to form end walls for the chamber, said block being provided with a conduit passing from the interior of the chamber to the periphery thereof and adapted to register with the ports, a piston movably mounted in the chamber and fixed to the shaft, means for oscillating the shaft, and cooperating means connected with the shaft and with the chamber to cause the chamber to move in the same direction of travel as the piston to shift the position of the conduit relatively to the ports.

13. An apparatus for filling cans comprising, a casing provided with an inlet port and two outlet ports, a chamber movably mounted in the casing and having at each end a conduit adapted to register with an outlet port and with the inlet port alternately, a piston located in the chamber, means for actuating the piston, two stops connected with the chamber, and a lug connected with the piston adapted to engage one stop when the piston travels in one direction to move the chamber to shift the conduit at the end of the chamber toward which the piston is moving from registry with its outlet port into registry with the inlet port, and adapted to engage the other stop when the piston travels in the opposite direction to move the chamber to shift the conduit at the end of the chamber toward which the piston is moving from registry with its outlet port into registry with the inlet port.

14. An apparatus for filling cans comprising, a casing provided with an inlet port and an outlet port, a chamber movably mounted in the casing and having at one end a conduit adapted to register with the inlet port and with the outlet port, a piston located in the chamber, means for actuating the piston to discharge the contents of the chamber when the conduit registers with the outlet port, and cooperating means connected with the piston and with the chamber to cause the chamber to travel in the same direction as the piston to disconnect the conduit from the outlet port and move it into registry with the inlet port.

15. An apparatus for filling cans and the like comprising, a casing having an inlet port and an outlet port, a chamber movably mounted in the casing and having a conduit adapted to register with the inlet port to admit fluid into the chamber and with the outlet port to discharge fluid from the chamber, a piston located in the chamber, means for actuating the piston, and cooperating means connected with the piston and with the chamber whereby when the piston is traveling toward the outlet port the chamber is moved to shift the conduit from registry with the outlet port into registry with the inlet port.

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