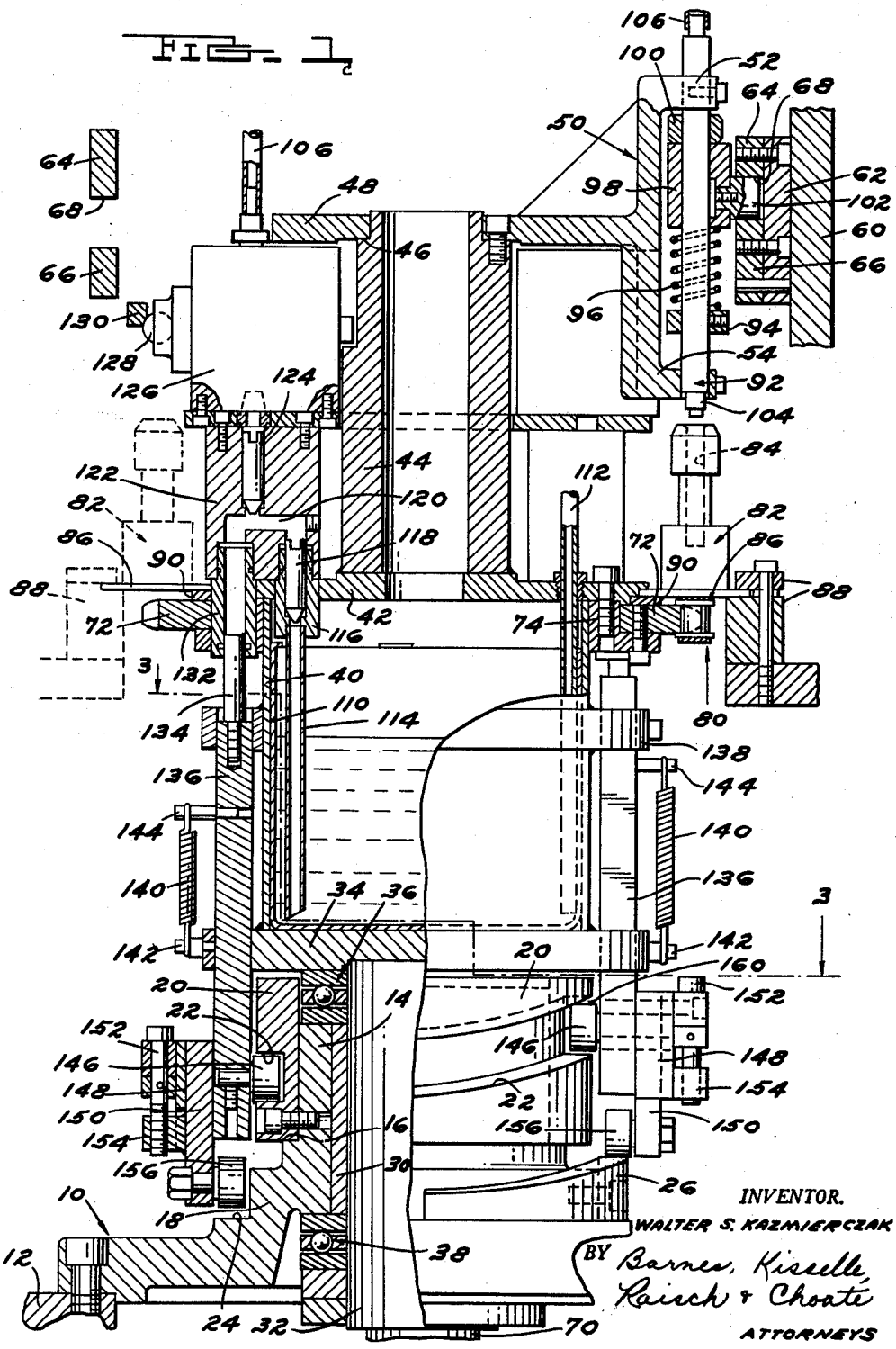
June 15, 1965 W. S. KAZMIERCZAK 3,189,062

FILLING MACHINE

Filed July 26, 1961 3 Sheets-Sheet 1

FIG. 1



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Filed July 26, 1961 3 Sheets-Sheet 2

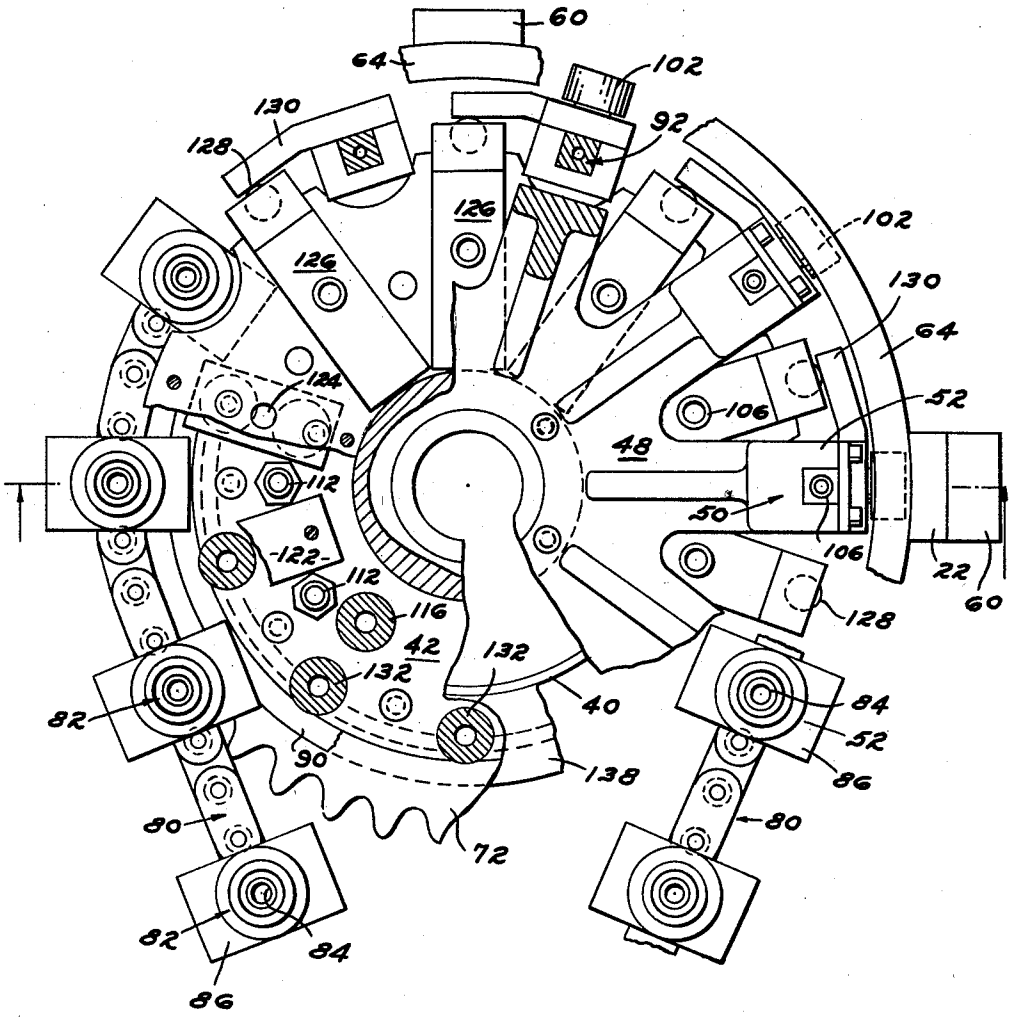

FIG. 2

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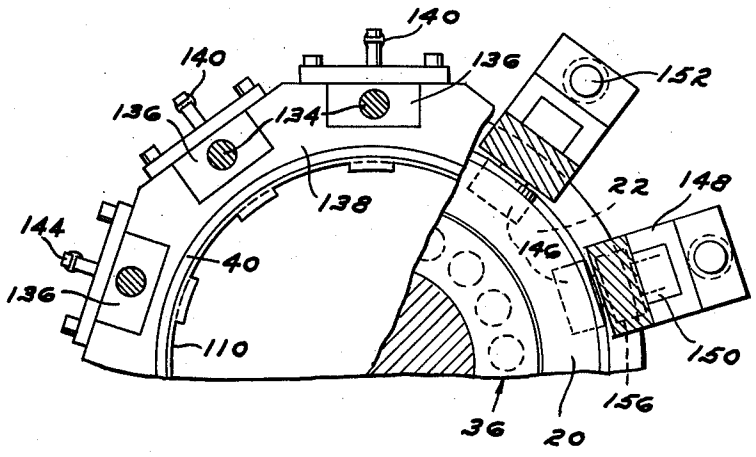
Filed July 26, 1961 3 Sheets-Sheet 3

Fig. 3



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FILLING MACHINE

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5 Claims. (Cl. 141—147)

This invention relates to a filling machine and more particularly to a machine for filling individual containers with a metered quantity of liquid.

In automatic filling machines where a plurality of stations carry each an individual container for filling, a situation frequently develops where the filling piston varies in its stroke to the extent that the quantities entering the various individual containers will not be equal.

It is an object of the present invention to provide a continuous filling mechanism wherein each particular station may have an individual adjustment. Thus, once the operation of the machine is calibrated, each station will deliver the identical quantity of liquid.

It is a further object of the invention to provide a machine for controlling a filling stroke wherein a primary cam can control the stroke for general operation and a secondary cam can provide a micrometer adjustment for compensation of individual variation.

Other objects and features of the invention relating to details of construction and operation will be apparent in the following description and claims.

Drawings accompanying the disclosure and the various views thereof may be briefly described as:

FIGURE 1, a sectional view of the machine showing the relationship of the various parts.

FIGURE 2, a top view of the machine with some portions broken away.

FIGURE 3, a sectional view of the machine on line 3—3 of FIGURE 1.

Referring to the drawings:

A base 10 having a suitable fastening flange is bolted down to a proper machine support 12. This base has an upstanding supporting collar 14 which enlarges to a shoulder 16 and to a second shoulder portion 18. Around the collar 14 resting on the shoulder 16 is a circular cam plate 20 having a cam groove 22. Below the shoulder portion 18 on a ledge 24 is a second supplemental cam 26.

Within the collar 14 is a sleeve bearing 30 which mounts a rotating column 32 carrying a load plate 34. Load-thrust bearing assemblies 36 and 38 support a vertical load. On the plate 34 is mounted and welded a cylindrical housing member 40 which in turn supports a horizontal plate 42 serving as a mount for a further vertical column 44. On the top of the column 44 on a shoulder 46 is a top supporting plate 48 having a plurality of supporting brackets 50 each with an outwardly extending horizontal arm 52 and 54. Surrounding the plate 48 and the arms 50 is a stationary mounting means 60 having a circular mounting ring 62 on which is mounted two cam bars 64 and 66 which create between them a cam groove 68.

The driving means for the entire body assembly is accomplished through a drive shaft 70 shown at the bottom of FIGURE 1, this drive being accomplished through suitable power force and gearing (not shown).

A sprocket 72 is associated with the rotating body assembly above described, this being mounted below the outside edge of plate 42 in connection with a flanged ring 74. Associated with this sprocket 72 is a link chain 80 which carries at regularly spaced intervals a plurality of container holders 82, each having a recess 84 to hold a container to be filled. The chain 80 engages the teeth

of the sprocket 72 and also carries spaced plates 86 at each container holder, these plates serving as guides for the holders 82 by reason of engagement with a stationary track 88 outside the rotating assembly and riding on a projecting flange 90 above the sprocket. As shown in FIGURE 2, the container holders 82 are distributed around the sprocket and turned with the rotating assembly in the filling cycle.

The brackets 50 carry a filling nozzle 92 slidably disposed in the arms 52–54 and controlled through a collar 94 which is urged into a downward position by a spring 96 acting against a cam carrier block 98. A stop collar 100 is also mounted on the nozzle 92. The cam block 98 carries a cam roller 102 which operates in the groove 68 previously described to control the position of the nozzle relative to the container in the registering holder 82. Thus, as the assembly rotates relative to the cam 64–66, the nozzle will be raised and lowered from contact with the top of a container in the opening 84. A suitable no-container no-fill tip 104 can be provided on the nozzle. Thus, the assembly is provided with a plurality of nozzles 92 to register with each container holder as it revolves on the sprocket 72.

Each nozzle 92 is connected through a suitable flexible tube 106 to a pumping system. Within the cylindrical housing 40 is a liquid container 110 which has an overflow pipe 112. This container has a plurality of supply pipes 114 each of which extend upwardly to a valve block 116 containing an inlet check valve 118. The check valve is suitably constructed to admit liquid when opened to a chamber 120 in a block 122 which contains an outlet check valve 124.

Above the outlet check valve is a valve housing 126 containing a valve actuated by a ball 128 riding on a cam rail 130. This valve is simply an open-and-close valve which leads to the supply pipe 106 connected to the nozzle 92. Below the block 122 and connected with the chamber 120 is a cylinder insert 132 suitably mounted through the plate 42 and the ring gear 72. This cylinder contains a piston 134 which is actuated by a vertical plunger 136 slidably supported in a ring 138 mounted on the outside of cylindrical housing 40. The plungers 136 are also slidable through the plate 34 and a spring 140 anchored to the plate 34 at one end and to the plunger 136 at the other and through suitable pins 142 and 144 respectively serves to hold the piston in a downward position. On the plungers 136 is a cam roller 146 riding in the circular cam groove 22 for the basic vertical motion of the plungers and the pistons. On each plunger 136 is also a cam block 148 shaving a slide 150 which is vertically controlled by a fine adjustment screw 152 operating in a threaded lug 154. Slide 150 has a cam follower 156 which can run on cam 26 described above as a supplemental cam. This supplemental cam is positioned circumferentially at the final stages of the fill cycle or path for purposes to be pointed out below.

It will be noted that there is clearance at 160 between the top of the cam roller 146 and the groove 22 so that if necessary the cam 26 can control independently the vertical plungers 136 at this point in the travel.

In the operation of the device, it will be seen that when a suitable power source is rotating the column 32, the entire assembly including the sprocket 72 will rotate. This will carry the chain 80 around from a point where it can pick up containers in the recesses 84. As the container holders 82 move around, the guide plates 86 enter the groove formed in the support 88 and also ride on the flange 90 to guide the containers around the path of travel. The plungers 134 in the down position, as shown at the left-hand side of FIGURE 1, have pulled in a charge of fluid from tank 110 through the inlet pipe 114 and the valve 118. As each filling station moves around

the assembly, it will be seen that the nozzle 92 will be projected downwardly toward the container by reason of the cam follower 102 acting in groove 68. At the same time, the plunger 136 is raised to move the piston 134 upwardly in the cylinder 132. This discharges a metered quantity of liquid into the container 84.

It is possible, if all parts are made exactly right, that cam 22 can provide adequate control for each discharge piston. Experience has shown, however, that such accuracy is practically impossible. By observation, when the machine is operated, some of the stations do not fill the respective containers quite as much as others. When very small diameter containers are involved, such as are used for pharmaceuticals, the difference is critical. In such cases, each particular plunger can receive an individual boost from the supplemental cam 26 by pre-adjustment of the follower 156 to compensate for lack of sufficient stroke from cam 22. The machine is first cycled to determine the need for the individual settings and then it may be run continuously and compensation is automatic. Thus, at the final fill position, each particular plunger can be adjusted and controlled by the cam 26 independently of the follower 146. If any particular plunger and filling station is not metering an exact quantity in movement on the cam track 22, it can be accurately controlled by the micrometer adjustment through the cam follower 156 rolling on the short supplemental cam 26.

Thus, for exact metering, it will be seen that each station is controlled in its position by the rotating flange 86. Each nozzle is brought down to contact with the container in the holder 82 by the cam 102 and each plunger 134 is controlled broadly in its motion by the roller 146 in track 22. As the fill reaches its completion, the fine control of the fill plunger 134 can be handled by the roller 156. Thus, in a continuous filling device which is constantly cycling, it is possible to have each station individually controlled at the critical point to insure accurate and consistent results throughout the cycle.

I claim:

1. A device for continuous filling of a plurality of containers comprising a plurality of metering pumps mounted in a defined path, means for moving a plurality of containers into a registering relationship with each of said pumps, a nozzle to relate to the opening of a container in said container holders associated with each of said metering pumps, an actuator on each of said pumps, and means for controlling said actuators during the concurrent path of motion between said pumps and said containers comprising a plurality of cam followers on each actuator, one being finely adjustable relative to the other, and a plurality of cam tracks along said path, one being coextensive with said path and positioned to control the major portion of the motion of said actuators throughout the filling cycle and one being positioned co-extensively with said path and said first cam track at the final stage of the filling to cooperate with one of said cam followers to accurately position the actuators as the fill of each container is completed while the other cam follower is shifted out of contact with said first cam.

2. In a continuous filling apparatus for individual containers, a rotating body, a container for liquids mounted on said body, a plurality of filling units mounted on said body connecting to said container, a metering actuator associated with each of said filling units mounted to rotate with said body, a discharge nozzle associated with each of said filling units mounted on said body, means for associating a plurality of container holders with said filling units adjacent said nozzles during the rotation of said body, means for controlling the position of said actuators to insure accurate metering of liquid into said containers through said nozzles comprising a cam control for said actuators including cam followers on each actuator and a circular cam track for imparting a motion to said actuators, and a supplemental control for said actuators which includes a second cam follower, means for adjusting said second cam follower in a fine adjustment relative to each said actuators, and a supplemental cam surface paralleling the first cam surface at one stage thereof adjacent the final filling portion of said cam to insure an accurate fill.

3. A device as defined in claim 2 in which said body carries a sprocket co-axial therewith, and means supporting a plurality of container holders engageable with said sprocket to position a plurality of container holders adjacent the respective filling units during a continuous operation, said container holders being actuated by said sprocket in response to rotary motion of said body.

4. A device as defined in claim 2 in which a nozzle of each filling unit is actuated to a filling relationship to a container by a cam follower on said nozzle acting in a stationary cam track surrounding said body.

5. A device as defined in claim 4 in which guide means on said body and guide means adjacent said body are provided in opposed relation to each other to position container holders relative to said body during a portion of a concurrent motion between said container holders and said body when in rotation.

References Cited by the Examiner

UNITED STATES PATENTS

1,499,366	7/24	Hansen	141—147 XR
1,506,851	9/24	Martin et al.	222—309 XR
2,362,793	11/44	Ayars	141—128
2,563,863	8/51	Nordquist	141—147
2,837,127	6/58	Luther	222—168.5 XR

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