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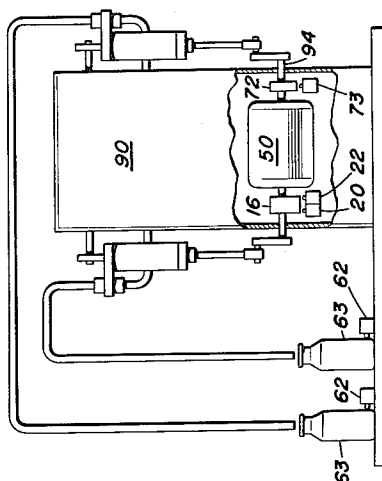


FIG. 2.

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FLUID FILLER RECYCLING CONTROL CIRCUIT

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This invention relates generally to fluid dispenser devices, and, more particularly, it pertains to a control circuit for automatically cycling a small capacity fluid dispenser a predetermined number of discharge cycles to charge a large container with fluid.

Automatic machinery has been developed for the filling of containers, in quantity, with a viscous fluid. It sometimes happens that a small capacity machine is available for use, but the job run involves containers of a size beyond its capacity. By repeated cycles, however, the small filling machine can be employed to advantage. A small precise filling machine, for example, has been described in applicant's U.S. Patent No. 2,807,213 entitled "Filling Machine," issued on September 24, 1957.

It is a primary object of this invention to provide means for increasing the functional capacity of a small filling machine.

Another object of this invention is to provide an adjustable control unit for cyclic fluid filling machinery which will automatically start when offered a complement of bottles, operate for a predetermined number of cycles at an adjustable controlled rate, and then stop itself accurately and quickly when the bottles are charged.

Still other objects of this invention are to provide control apparatus for use with cyclic fluid filling machinery which is economical to manufacture, efficient and reliable in operational use, and which is easy to maintain and install.

These and other objects and attendant advantages of the invention will become more readily apparent and understood from the accompanying specification and single sheet of drawings in which:

FIG. 1 is a schematic diagram of a control circuit incorporating features of this invention; and

FIG. 2 is an outline drawing, partly broken away, of a fluid filling machine as used with the control circuit of this invention.

Referring first to FIG. 2 of the drawing, there is shown therein a fluid filling machine 90 for small containers. In the preferred embodiment, the machine 90 is of the adjustable stroke piston type operated by a motor-driven shaft 94. A motor 50 is provided to rotate the shaft 94, and a pair of cams 16 and 72 are arranged to rotate on this shaft 84 and operate three microswitches 20, 22, and 73 all in cyclic relationship. A plurality of other microswitches 62, equal to the number of bottles 63 which are to be filled simultaneously, are arranged to sense the correct location and a full complement or plurality of bottles 63 in the filling area.

Referring now to FIG. 1, when all the bottles 63 are in place ready for filling with fluid, the plurality of bottle-operated microswitches 62, which are wired in series connection, complete a trigger circuit to a timer device 66. The timer 66 provides a short period of circuit closure which energizes an interlocking coil 68 of an interlocking relay 46 from a pair of A.C. power lines 17 and 18. This action moves and latches closed a normally open contact 48, routing the motor armature A of the motor 50 to the power line 18. The motor 50 is of the direct current type, and its field F is energized continuously through a rectifier 58 which provides direct current which is filtered by a capacitor 60.

A thyatron tube 52 is connected between the armature A of motor 50 and the other side of the power line 17 through a limiting resistor 54. This thyatron tube

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52 rectifies and controls the current for the armature A of motor 50 and thus the speed of operation of the filling machine 90. A filter capacitor 56 provides smoothing for the rectified current.

A speed control potentiometer 80 is used to shift the phase of AC grid drive coupled in to the thyatron tube 52 by a coupling capacitor 82 from one side of a filament transformer winding 84. The transformer winding 84 is part of a stepdown transformer 86 whose primary winding 88 is connected to the same power lines 17 and 18 which supply plate voltage through the resistor 54 for the thyatron tube 52.

Now, with the contact 48 closed as has been related, the motor 50 and shaft-driven cams 16 and 72 begin to turn. Microswitches 20 and 22 close to energize a time delay relay coil 24 and a stepper-actuating coil 28 of a reset type stepper relay 30. This action positions and closes the first of a series of contacts 32. The only purpose served by the time delay relay 24 is to protect the intermittent duty or stepper actuated coil 28. If contacts 22 remain closed for more than a few minutes, the circuit to intermittent duty or stepper actuated coil 28 is opened by contacts 26 of delay relay 24, thus preventing damage to duty coil 28.

If the capacity of the bottles 63 requires four strokes of the machine 90, a selector switch 34 is manually set up on its fourth position shown, which, in this case, connects to the fourth contact 32 of the plurality of stepper relay contacts 32. Thus, the motor 50 at this time receives no stop signal and at the end of one stroke, cam 16 opens and then recloses microswitches 20 and 22. Contact 26 drops back to a closed position, and the coil 28 becomes energized through the microswitch 22, with a second cycle of operation of the filling machine 90 and relay coil 24 then beginning. The second stepper contact 32 is now positioned and then similarly a third contact 32.

When the fourth stepper contact 32 is finally reached by the cycling as related, that is, after the beginning of the fourth stroke of the pumping machine 90, the circuit for a relay coil 36 is operated through circuitry established by the selector switch 34. A pair of normally open contacts 38 and 42 are closed by relay coil 36 to actuate a stepper relay reset coil 40 and an interlocking relay coil 44 of the interlocking relay 46. The stepper relay 30 snaps to its start position, and contacts 38 and 42 reopens, all as shown in FIG. 1.

The circuit for armature A of motor 50 is now transferred from contact 48 to a contact 70 in the interlocking relay 46 and the motor 50 finishes the fourth stroke of the filling machine 90 through running contact 76 in the cam operated microswitch 73.

As the stroke completes, the cam 72 snaps the microswitch 73 upwardly, disconnecting the power line 18 from the armature A of motor 50 and closing an electronic brake contact 74. This contact 74 places a resistor 78 in shunt across the armature A of motor 50, bringing it quickly to a halt without coasting into another cycle of operation. A new cycle of operation is initiated by the replacement of filled bottles 63 with empty ones and the reclosure thereby of the microswitches 62.

Obviously, many other modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. In combination, a reciprocating pump for receiving and dispensing fluid, drive means having a power source and a shaft cyclically coupled to said pump to cause reciprocation thereof, and apparatus to control the actua-

tion and duration of operation of said drive means to thereby cause delivery of a desired quantity of fluid by said pump, said apparatus including sensing means for detecting the correct location of at least one container in a filling area, a triggering circuit responsive to said sensing means for actuating said drive means, an adjustable cycle counter for selecting the number of cycles of operation of said drive means in accordance with the quantity of fluid desired, said cycle counter including means for counting said cycle of operation, means for signalling said drive means during each cycle of operation thereof to continue operation, and a first switch means to reset said triggering circuit during the final cycle of operation, at least one cam means mounted on the shaft of said drive means, a second switch means actuable by said cam means for providing cyclic impulse to said cycle counter, and a third switch means responsive to the resetting of said triggering circuit to be connected to said power source, said third switch means being actuable by said cam means to electrically connect said drive means through said cam means to said power source for the remainder of said final cycle of operation, whereby during subsequent cyclical operation of said drive means, said cam means operates on said third switch means to electrically disconnect said drive means from said power source to stop said drive means.

2. In combination, a reciprocating pump for receiving and dispensing fluid speed controlled drive means having a power source and a shaft cyclically coupled to said pump to cause reciprocation thereof, and apparatus to control the actuation and duration of operation of said drive means to thereby cause delivery of a desired quantity of fluid by said pump, said apparatus comprising sensing means for detecting the correct location of at least one container in a filling area, timer means respon-

sive to said sensing means for providing a triggering pulse, an impulse switching means responsive to said pulse to actuate said drive means, an adjustable cycle counter for selecting the number of cycles of operation of said drive means in accordance with the quantity of fluid desired, said cycle counter including means for counting said cycles of operation, means for signalling said drive means during each cycle of operation thereof to continue operation, means for resetting said cycle counter when the selected number of cycles have been reached, and a first switch means to reset said impulse switching means during the final cycle of operation, at least one cam means mounted on the shaft of said drive means, a second switch means actuable by said cam means for providing cyclic impulse to said cycle counter, and a third switch means responsive to the resetting of said impulse switching means to be connected to said power source, said third switch means being actuable by said cam means to electrically connect said drive means through said cam means to said power source for the remainder of said final cycle of operation, whereby during subsequent cyclical operation of said drive means, said cam means operates on said third switch means to electrically disconnect said drive means from said power source, and brake means actuated by said stopping means for preventing said drive means from coasting into another cycle of operation.

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