

APPARATUS FOR FILLING CONTAINERS

This invention relates to apparatus for automatically filling containers, such as cannisters, with a liquid such as syrup or beer.

According to the present invention there is provided apparatus for filling containers, comprising a first intermittently driven conveyor, a second continuously driven conveyor, means for transferring an empty container from the first conveyor to the second conveyor when the first conveyor is stationary, means for stopping conveyance of an empty container on said second conveyor, means for lifting a stopped empty container off the conveying surface of the second conveyor and means for filling the lifted empty container, said lifting means being operative to lower a filled container back onto the second conveyor for further conveying of the container.

Preferably a control switch is located at the downstream end of the first conveyor and arranged to be actuated by a container when located in the region of the transfer means to stop conveying movement of the first conveyor.

The means for transferring a container preferably comprises a pusher plate movable by a piston and cylinder device to push a container off the first conveyor onto the second conveyor, and control switches actuated when the piston rod is retracted and when extended.

Preferably the means for stopping conveyance of an empty container on said second conveyor comprises an arm pivotally movable by a motor between an inoperative position in which arm lies clear of the conveying path and an operative position in which the arm extends across the conveying path.

The filling means preferably comprises a vertical filling tube, means for lowering the filling tube into a container and for raising the tube out of a container, and means are provided for detecting the level of liquid in a container supplied through the filling tube.

An embodiment of the invention will now be described, by way of an example, with reference to the accompanying drawings, in which:-

Figure 1 is a plan view of the apparatus according to the present invention,

Figure 2 is a transverse section through the intermittently driven conveyor,

5 Figure 3 is a transverse section through a guide rail of the intermittently driven conveyor,

Figure 4 is a side elevation of the transfer station,

Figure 5 is an end view of the transfer station,

10 Figure 6 is a transverse section through the continuously driven conveyor,

Figure 7 is a side view of part of the conveyor shown in Figure 6,

Figure 8 is a side elevation of the cannister lifting device,

Figure 9 is a side elevation of the filler tube and fluid level controller,

15 Figure 10 is an elevation of the filler tube carrier,

Figure 11 is a side elevation of the drip tray,

Figure 12 is a section through the drip tray, and

Figure 13 is a circuit diagram illustrating the control system.

20 The apparatus comprises a linear indexing conveyor 10, a transfer station 11 located at the downstream end of conveyor 10, a conveyor 12 extending normal to the conveyor 10, a cannister positioner and lifting device 13 and a filling device 14.

25 The linear indexing conveyor 10 comprises an endless stainless steel slat conveyor belt 15 mounted in a stand 16 and driven by a pneumatic drive motor 17 through a sprocket and chain drive transmission 18. Extending along each side of the belt 15 are guide rails 19 for guiding the cannisters as they are moved by the belt 15. The guide rails 19 are supported from the frame structure 20 of the conveyor 10 by brackets 21 which are adjustably mounted in support members 22. Located above the belt 15 at its
30 downstream end is a limit switch 23.

35 The transfer station 11 comprises a cannister transfer piston and cylinder device 24 which extends normal to the conveyor 10 and in-line with the conveying direction of the conveyor 12. The piston rod of the device 24 is connected to a plate 25 to which is connected one end of a rod 26. Fixed to the rod 26 is a limit switch 27 and fixed to the structure 28 which supports the piston and cylinder device 24 is a limit switch 29. The piston

and cylinder device 24 serves to push a cannister off the conveyor 10 onto the conveyor 12 as described hereafter.

5 The conveyor 12 is continuously driven and comprises an endless stainless steel slat conveyor belt 30 mounted in a stand 31 and driven by a variable speed D.C. motor 32 which has an independent 'on - off' switch 33. The motor 32 drives the conveyor belt 30 through a sprocket and chain drive transmission 34. The conveyor 12 is provided with guide rails 30 extending along each side of the belt 30. The rails 35 are adjustably mounted in a similar manner to rails 19.

10 Located at a position between the ends of the conveyor 12 is the cannister positioner and lifting device 13 and the filling device 14. The cannister positioner comprises an arm 36 which can be rotated between a position in which it extends above and across the conveyor belt 30 and a position in which it is located clear of the conveying path of the conveyor belt 30. The arm 36 is connected to a spindle 37 which is rotatably mounted in support structure 38 and is rotated by a pneumatic motor 39. Provided on the guide rail 35 is a limit switch 40. Located below the conveyor belt 30 is a pneumatic piston and cylinder device 41. The cylinder of the device 41 is movable and is connected via slide rods 42 to lifting beams 43 located on each side of the conveyor belt 30.

20 The filling device 14 is located in the same region as the cannister positioner and lifting device 13 and it comprises a filling tube 44 which is vertically movable by a pneumatic piston and cylinder device 45 and guided by vertical guide rails 46 provided on a stand 47. The movable cylinder of the piston and cylinder device 45 is provided with a limit switch 48 and fixed to the piston rod of the device 45 is a limit switch 49. The filling tube 44 has an inlet 50. Movable with the filling tube 44 is an ultrasonic level detector 51 which is screw-threaded at 52 and can thus be adjusted to varying heights. The filling device 14 also includes a drip tray 53 carried on a pivotable arm 54 which is moved by a piston and cylinder device 55.

25 The control system for the apparatus includes various valves which are shown in the control circuit diagram of Figure 13, and they will be described in the following description of the mode of operation of the apparatus.

30 Empty containers, such as cannisters, are placed on the conveyor 10 with their filling opening uppermost. The conveyor 10 is started and

conveys containers towards the transfer device 11. When the leading container makes contact with the limit switch 23 which produces a signal to stop the motor 17, the signal being applied to an AND gate 56 which has a signal from limit switch 29 applied to it. A signal is thus given to actuate a valve 57 which causes the piston and cylinder device 24 to be actuated and the plate 25 pushes the leading container onto the conveyor 12 which runs continuously and conveys the empty container to the position and lifting device 13. When the piston of the piston and cylinder device 24 reaches the end of its stroke, it causes the limit switch 27 to be activated. The valve 57 is then actuated to retract the piston rod of device 24 and the limit switch 29 is contacted to signal the conveyor 10 to convey another empty container.

When the piston rod of the device 24 is retracted and activates the limit switch 29, it also signals the positioner to be in place and a valve 58 is actuated to cause the motor 39 to be operated to pivot the arm 36 across the conveyor belt 30. The empty container conveyed by the conveyor 12 comes into contact with the arm 36 and in this position the container actuates the limit switch 40 which operates a valve 59 causing the piston and cylinder device 41 to be actuated to raise the members 43 which lift the empty container above the moving conveyor belt 30 to avoid undue sliding friction between the container and the belt 30. When the container has been raised a limit switch 60 is activated which sends a signal to a valve 61 which is actuated to cause the piston and cylinder device 45 to lower the filling tube 44 into the empty container. When the filling tube 44 reaches its lowered position it activates limit switch 49 which actuates a valve 62 which opens a filling valve (not shown) in the supply conduit to the inlet 50. Filling of the container then commences by means of a gravity feed from a storage tank (not shown) located above the conveyor 12. The level sensor 51 which is fixed close to the nozzle senses the level of the liquid in the container and when the level reaches a predetermined height the sensor 51 transmits a signal to a controller 63 which closes the filling valve. The valve 61 is then operated to cause the piston and cylinder device 45 to retract the filling tube 44 out of the container and the drip tray 53 is moved by the piston and cylinder device 55 via valve 64 to collect drips from the filling tube 44. Simultaneously the filled container is lowered back onto the conveyor belt 30 and the arm 36 is swung upwardly clear of the container

and the filled container is conveyed by the conveyor belt 30. When the filled container is lowered the limit switch 48 is activated and a signal is given to operate valve 57 to activate the piston and cylinder device 24 and another empty container is transferred from conveyor 10 onto conveyor 12 and the cycle is repeated. The control circuit includes an emergency stop valve 65.

The apparatus works fully automatically in a controlled sequence in which each working action controls the start of the next working action.

When the emergency stop valve 65 is operated, the whole of the apparatus is stopped. To avoid the apparatus being turned on again accidentally by an unauthorised person, the valve 65 locks itself under pressure. This locking can only be released by applying a twist to the head of the valve 65.

CLAIMS

1. Apparatus for filling containers, comprising a first intermittently driven conveyor, a second continuously driven conveyor, means for transferring an empty container from the first conveyor to the second conveyor when the first conveyor is stationary, means for stopping conveyance of an empty container on said second conveyor, means for lifting a stopped empty container off the conveying surface of the second conveyor and means for filling the lifted empty container, said lifting means being operative to lower a filled container back onto the second conveyor for further conveying of the container.
2. Apparatus as claimed in claim 1, in which a control switch is located at the downstream end of the first conveyor and arranged to be actuated by a container when located in the region of the transfer means to stop conveying movement of the first conveyor.
3. Apparatus as claimed in claim 2, in which the means for transferring a container comprises a pusher plate movable by a piston and cylinder device to push a container off the first conveyor onto the second conveyor, and control switches actuated when the piston rod is retracted and when extended.
4. Apparatus as claimed in any preceding claim, in which said means for stopping conveyance of an empty container on said second conveyor comprises an arm pivotally movable by a motor between an inoperative position in which arm lies clear of the conveying path and an operative position in which the arm extends across the conveying path.
5. Apparatus as claimed in any preceding claim, in which the lifting means comprises lifting bars extending along each side of the second conveyor and a piston and cylinder device for raising and lowering said bars.
6. Apparatus as claimed in any preceding claim, in which said filling means comprises a vertical filling tube, means for lowering the filling tube into a container and for raising the tube out of a container.



7. Apparatus as claimed in claim 6, in which means are provided for detecting the level of liquid in a container supplied through the filling tube.
- 5 8. Apparatus as claimed in claim 7, in which said level detecting means comprises an ultrasonic detector.
9. Apparatus as claimed in claim 7 or claim 8, in which the level detecting means is vertically adjustable.
- 10 10. Apparatus as claimed in any preceding claim, in which each conveyor comprises a slatted conveyor having a guide rail extending along each side, said guide rails being adjustably mounted to enable the distance between them to be adjusted to suit the width or diameter of the containers being handled.
- 15 11. Apparatus as claimed in any preceding claim, in which all of the piston and cylinder devices are pneumatic.
- 20 12. Apparatus for filling containers, substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.
-