

FIG. 1

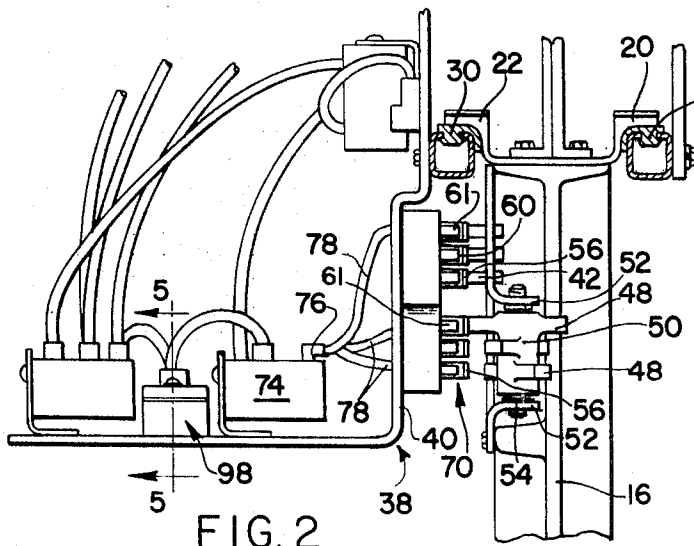


FIG. 2

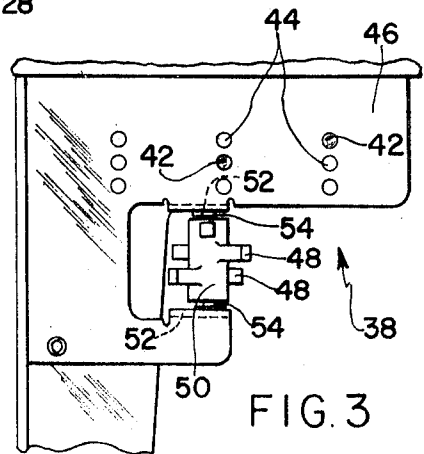


FIG. 3

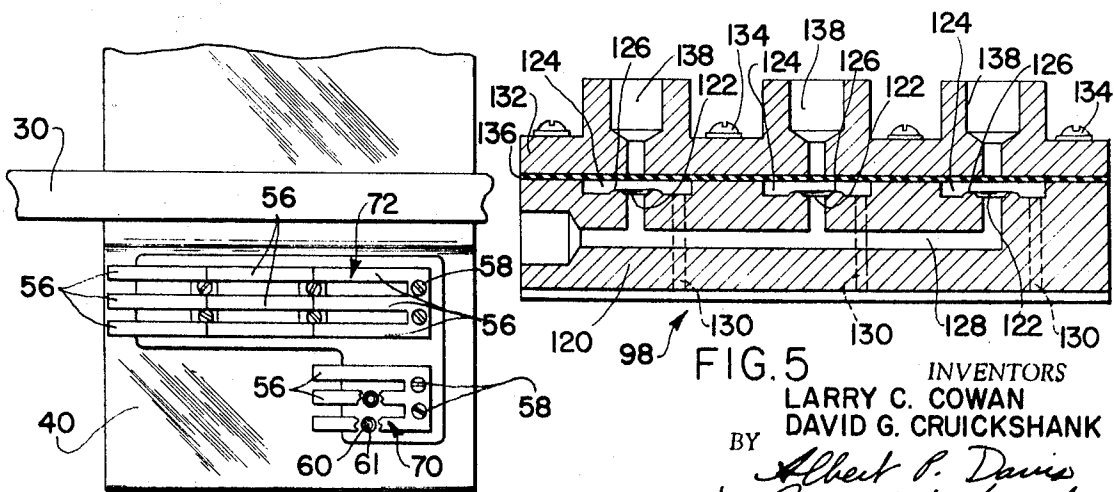


FIG. 4

FIG. 5

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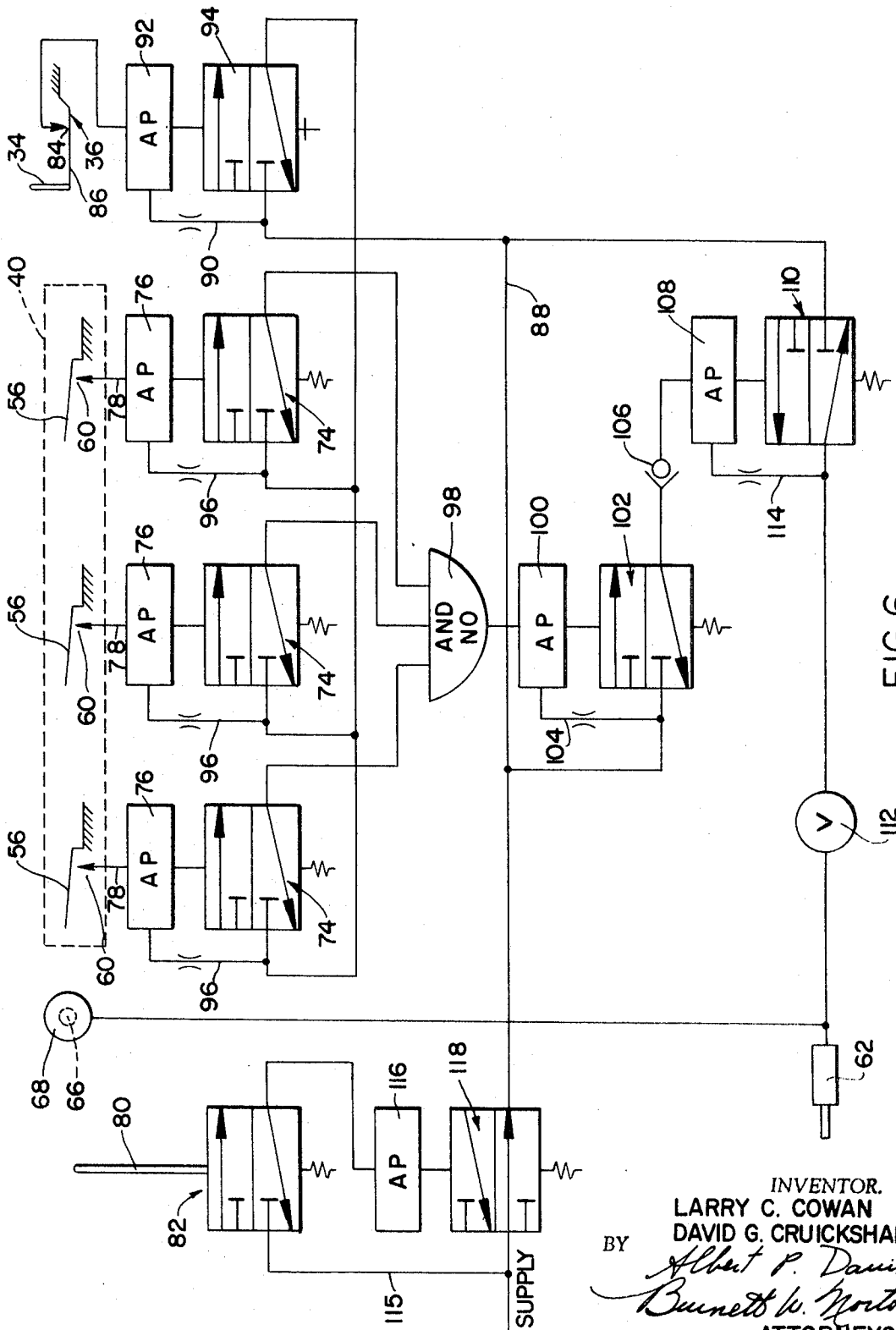


FIG. 6

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BOBBIN HANDLING SYSTEM

This invention relates to a bobbin handling system and, more particularly, to such a system having a fluid operated control actuated by bobbin carriers passing the control.

As used herein the term "bobbin" means a wound body of yarn or an article on which a body of yarn is or may be wound, so that the yarn may be readily moved from place to place. The term "filled bobbin" means a bobbin whether full or partially full of yarn. The term "yarn" is employed in a general sense to apply to all kinds of strand material, either textile or otherwise.

Bobbin handling systems have been proposed for handling various different types of bobbins including filled and empty bobbins. A system of this type is shown in a copending Leesona Corporation patent application by Charles W. Brouwer and Raymond V. Tata for a "Bobbin Handling System" U.S. Ser. No. 736,354, filed June 12, 1968. Automatic control of such systems may be of a mechanical or electrical nature, but both mechanical and electrical systems are relatively expensive and are unduly prone to be rendered inoperative by lint from the bobbins being handled, and from foreign matter in the air.

The invention, in brief, is directed to a bobbin handling system having a fully automatic, stationary fluid operated control unit at bobbin receiving and dispensing stations, and actuators, one movable with each of a plurality of bobbin carriers, past the stations. The system keeps various types of bobbins separate. Such types may include bobbins having different colors of yarn wound thereon, or empty or filled bobbins, for example.

It is a primary object of this invention to provide a new and improved bobbin handling system having automatic fluid operated controls. A related object is provision of such a system having control actuators which cause fluid to be supplied to a fluid operated control unit and then discontinue supply of the fluid only when an actuator and a control are proximate each other. Another related object is provision of such a system in which the control unit has at least one normally opened bleed port and in which the actuator closes the bleed port under appropriate circumstances. Another related object is provision of such a system in which the control unit causes a change in the actuator to correspond to a change in the condition of apparatus associated with the actuator.

These and other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which:

FIG. 1 is a fragmentary, schematic elevational view of a preferred embodiment of the invention, with parts removed for clearer illustration;

FIG. 2 is an enlarged, fragmentary elevational view looking in the direction of the arrow 2 in FIG. 1;

FIG. 3 is an enlarged, fragmentary elevational view of an actuator shown in FIGS. 1 and 2;

FIG. 4 is an enlarged, fragmentary, elevational view of a control unit shown in FIGS. 1 and 2, with parts broken away for clearer illustration;

FIG. 5 is an enlarged, vertical sectional view taken generally along the line 5-5 in FIG. 2, with parts removed for clearer illustration; and

FIG. 6 is a diagram of the control unit and related controls.

Referring to FIG. 1 of the drawings, bobbin carriers 10 (only one being shown) each including wheeled trolleys 12 which are carried by an overhead conveyor track 14. Each carrier 10 has a generally vertical support 16, secured to a bucket 18, and parallel slides 20 and 22 (FIG. 2) which connect the trolleys 12. The carriers 10 are moved along the track 14 by a continuously operated drive chain 24 secured to the trolleys 12. As a carrier 10 approaches either a loading station 26 or receiving station (not shown) its slides 20 and 22 are received by fixed parallel guides 28 and 30, respectively, so that the carrier is supported vertically and horizontally by the guides to steady the carrier during actuation of the control

system and transfer, if any, of bobbins. When the carrier 10 is supported by the guides 28 and 30, the trolleys 12 are substantially out of contact with the track 14. One of the slides 22 is a component of an actuator 32 and as this slide moves along its guide 30 it contacts and depresses a mechanical operator 34 of a stationary control valve 36 at the station 26. Upon depressing the operator 34, operating fluid, usually compressed air, is provided to a control unit 38 having a control panel 40.

Other components of the actuator 32 also include a plurality of actuator fingers. With particular reference to FIG. 3 these fingers include one or more operatively stationary fingers 42, and, as illustrated, two fingers 42, one threadably received in each of selected threaded holes 44 in an actuator body 46. Combinations of these holes 44 may be provided with fingers to indicate the type of bobbin handled by the carrier. By way of example, the type of bobbin may be determined by the color of yarn on the bobbin, or by bobbin core size, and so forth, as circumstances warrant. The actuator fingers also include one of a plurality of adjustable fingers 48 on an adjustable member in the form of a cylinder 50. The fingers 48 are positioned so that only one finger is in an actuating position at any particular time. The adjustable actuator fingers 48 are formed integrally with and extend radially outwardly from the cylinder 50 which is rotatably mounted below the fixed fingers 42 and between opposed flanges 52 of the actuator body 46. Any suitable means, such as friction washers 54, or alternatively, resiliently pressed detents (not shown) may be provided for holding the cylinder 50 in adjusted position as the carrier moves along the track and as the adjustable finger 48 which is in the actuating position engages the control unit 38.

After the operating fluid has been supplied to the control unit 38, the stationary fingers 42 and the adjustable finger 48 in actuating position move across leaf spring closures 56 mounted, as by bolts 58, on the control panel 40. The closures 56 are associated, one with each of a plurality of sensor bleed ports 60 at the end of nozzles 61 extending outwardly from and formed integrally with a body portion of the control panel 40. If the fingers 42 and 48 are so positioned as to engage closures 56 which close all active ones of the sensor bleed ports 60 the control unit 38 is activated. When activated the control unit causes an operating mechanism, illustrated as a double acting cylinder 62, to either operate a latch 64 on the station hopper 26, if the hopper is ready to deliver bobbins to the carrier, or to open the bobbin carrier and release the bobbins to an associated station hopper (not shown). Activation of the control unit 38 also causes an abutment, in the form of a plunger 66 of a double acting cylinder 68, mounted on the guide 30, to be extended and engage the adjustable finger 48 which is in the adjusted position, and to rotate this finger so that the next following finger 48 moves into the adjusted position, to indicate the new condition of the carrier 10.

In the illustrated embodiment there are three active ones of the bleed ports 60, including one active port in a lower group 70 (FIG. 4) of the sensor bleed ports 60 which is closed responsive to an appropriate one of the adjustable fingers 48 being in the actuating position. There are two active ports 60 in an upper group 72 of sensor bleed ports 60 and these two active ports are actuated only by correspondingly positioned stationary fingers 42.

Details of the circuit will be described with reference to a pneumatic circuit although other suitable fluids may be used. The control unit 38 includes three air piloted sensor valves 74 (only one being visible in FIG. 2), each valve having its air pilot 76 vented through a tube 78 which is in manually interchangeable communication with selected ones of the sensor bleed ports 60. More particularly, any two of the valves 74 have their air pilots 76 vented through two ports 60 in the upper group 72 to indicate bobbin type. The other sensor valve 74 has its air pilot 76 vented through a port in the bottom group 70, to indicate whether the station is to deliver bobbins, or to receive either filled or empty bobbins.

After the carrier 10 moves past the control unit 38, its slide 22 depresses mechanical actuator 80 of a valve 82 to discontinue the supply of operating fluid to the control unit, thus saving on the expendable fluid.

The pneumatic diagram, FIG. 6, in general, incorporates pneumatic symbols adopted by the American Standards Association and the Joint Industrial Conference. The valve 36 which is operated by the slide 22 for initiating supply of air to the control unit 38 may take the form of normally closed bleed port 84 and a leaf spring closure 86 which is depressed by the actuator 34 to vent pilot air which is normally supplied from a supply line 88 through a restricted line 90 to an air pilot 92 of a normally closed shut-off valve 94. Thereupon, this valve opens for passage of supply air from the supply line 88 to the control unit 38. With the valve 94 open, air from the supply line provides pilot air through restricted conduits 96 to the air pilots 76 of normally closed sensor valves 74. When valve 94 is open it also supplies air to inlets of the sensor valves 74. As previously noted, the air pilots 76 are vented through the tubes 78 to selected active ones of the sensor bleed ports 60. The active sensor bleed ports 60 now eject air outwardly and against and around the closures 56 and against the actuator 32 on the carrier 10 as it passes by. If the actuator 32 causes all the closures 56 of the active sensor bleed ports 60 to close, the associated air pilots 76 are actuated to open their valves 74 for the passage of supply air to a normally opened AND gate 98 (FIG. 5) which thereupon stops venting pilot air from an air pilot 100 of a normally closed shut-off valve 102, to open this valve. The air pilot 100 is provided with pilot air through a restricted line 104 from the valve inlet which is provided with air from the supply line 88. Upon opening of the valve 102, pilot air is provided through a check valve 106 to an air pilot 108 of a normally closed vented valve 110 to open this valve which then pass air from the supply line 88. With the valve 110 open, air is provided to an externally operated valve 112, which is open only if the station is ready to deliver or receive bobbins. If the externally operated valve 112 is open then supply air is provided to operate both the adjusting cylinder 68 to reset the adjustable finger 48 on the actuator 32 and to operate the operating cylinder 62. As the actuator 32 passes the control unit, the active bleed ports 60 again open resulting in the AND gate 98 opening and therefore the valve 102 closing and cutting-off pilot air to the air pilot 108 of the valve 110. To prevent the valve 110 from closing, a restricted bleed 114 is provided from the outlet of the valve 110 to the air pilot 108.

As the actuator slide 22 continues to move along the guide 30, it depresses the mechanical actuator 80 of the normally closed valve 82 and opens this valve to air through a line 115 from the supply line 88 and the valve passes the air to the air pilot 116 of a normally open vented valve 118 in the supply line 88 downstream of the line 115 to the manually actuated valve 82. Upon actuation of the air pilot 116 the valve 118 closed, stopping flow of supply air to the remainder of the system and vents the system including the actuating cylinder 68 and the operating cylinder 62, until the air pilot 108 of the valve 110 is vented so that the valve 110 closes to continue to vent the cylinders 62 and 68.

Referring to FIG. 5, the normally opened AND gate 98 comprises a valve body 120 having a plurality of bleed ports 122, and herein three such ports, each opening into a chamber 124 and surrounded by an outwardly protruding annulus 126. Each port 122 communicates with a passage 128 supplied with a pilot air from the air pilot 100. This pilot air normally passes through the ports 122 and the chambers 124 and into venting conduits 130 opening into the chambers. A head 132 of the gate is secured to the body 120, as by bolts 134, with a diaphragm 136 clamped between the head 132 and the body 120 and extending across the chambers 124. The head has three passages 138 opening against the diaphragm 136, one of these passages directly above each of the ports 122. The outlets of the three sensor valves 74 are connected, one to each of the passages 138, and when any of the sensor valves 74 are

open the corresponding port 122 opening into the chamber 124 is closed by engagement of the diaphragm 138 with the annulus 126. When all three ports 122 are closed, pilot air from air pilot 100 is no longer vented and the air pilot 100 of the valve 102 is actuated to operate the valve, as previously discussed.

While this invention has been described with reference to a particular embodiment in a particular environment, various changes may be apparent to one skilled in the art and the invention is therefore not to be limited to such embodiment or environment except as set forth in the appended claims.

What we claim is:

1. A system for handling different types of bobbins, comprising, stations, at least one for transferring each of the different types of bobbins fluid operated means controlling the transfer of said bobbins, one for each of said stations, and each said control means including normally inactive sensors for indicating the type of bobbin handled by the station, normally closed fluid supply means, one for each of said control means, and actuable for supplying operating fluid to the associated control means, conveyor means having carriers for said bobbins, said carriers being mounted for movement past said stations, and actuation means, one on each of said carriers, each said actuating means actuating said supply means of a station to supply said operating fluid to the associated control means only while the associated carrier is proximate the station.

2. A system as set forth in claim 1 in which each said actuating means includes actuator means for operating said sensors to activate said control means only when the type of bobbins and the conditions of the carrier and the station associated with the control means are compatible.

3. A system as set forth in claim 2 in which at least one of said actuator means is adjustable to correspond with the condition of the associated carrier to transfer bobbins, and said control means includes means for adjusting said adjustable means responsive to a change in said condition when particular ones of the associated sensors are operated to activate to control means.

4. A system as set forth in claim 3 in which the adjustable actuator means includes a member having a plurality of actuators, one for closing each of particular ones of said sensors, when the particular actuator is in an actuating position, means mounting said member for movement to position any one of said actuators in said actuating position, and said control means includes means operable for moving said member to position another of said actuators in said actuating position only when particular ones of said sensors are closed to activate said control means.

5. A system as set forth in claim 4 in which the mounting means rotatably mounts said member, and said actuators are fingers extending generally radially outwardly from said member.

6. A system as set forth in claim 5 in which the moving means comprises an abutment, and means mounting said abutment for movement into the path of travel of said adjustable actuator when the control means is activated.

7. A system as set forth in claim 6 in which at least one of said actuators is positioned operatively stationary in a selected position on said actuating means, and said actuating means having means for mounting the operatively stationary actuator in various selected positions.

8. A system as set forth in claim 7 in which said sensors comprise normally open bleed means for said operating fluid, said control means provides means including said bleed means for cleaning at least a portion of said control means and said actuating means when said fluid supply means is actuated, said fluid supply means includes first means operable for so supplying said fluid to said control means and second means operable for stopping the supply of said fluid to said control means, and said actuating means operates said first means and then said second means as the associated carrier is passing said control means.

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9. A system as set forth in claim 2 in which at least one of said actuators is positioned operatively stationary in a selected position on said actuating means, and said actuating means having means for mounting the operatively stationary actuator in various selected positions.

10. A system as set forth in claim 1 in which said sensors comprise normally open bleed means for said operating fluid, and said control means provides means including said bleed means for cleaning at least a portion of said control means and

said actuating means when said fluid supply means is actuated.

11. A system as set forth in claim 1 in which said fluid supply means includes first means operable for so supplying fluid to said control means and second means operable for stopping the supply of said fluid to said control means, and said actuating means operates said first means and then said second means as the associated carrier is passing said control means.

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