March 9, 1965 D. C. MOORE 3,172,276

FLUID CONTENT SENSING AND CONTROL MECHANISM FOR AUTOMATIC DRY CLEANING MACHINES

Filed Nov. 6, 1961 2 Sheets-Sheet 1

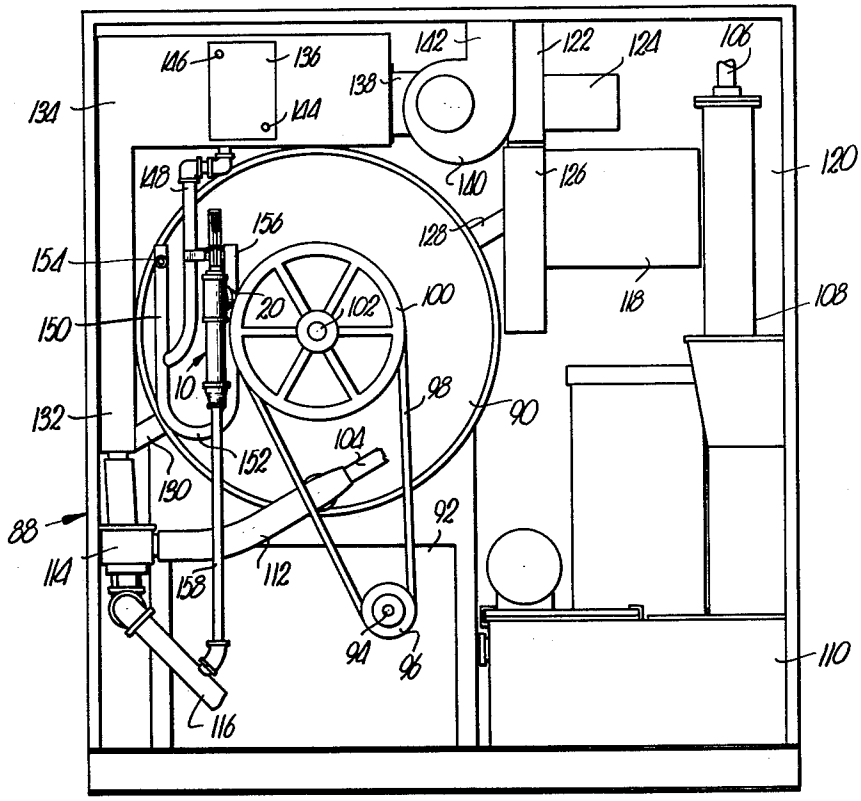


Fig. 1.

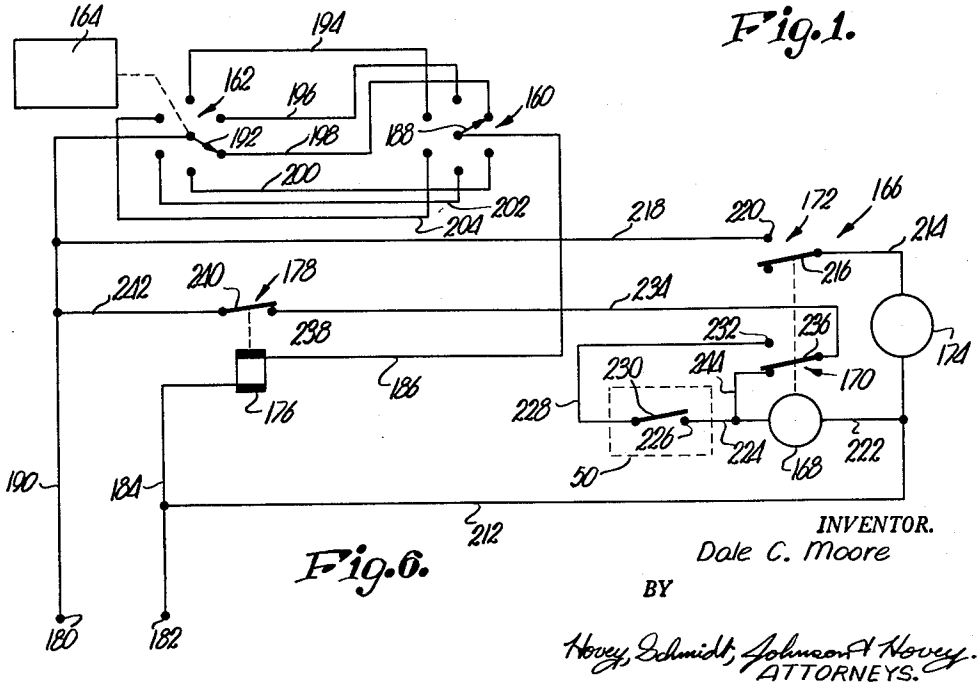


Fig. 6.

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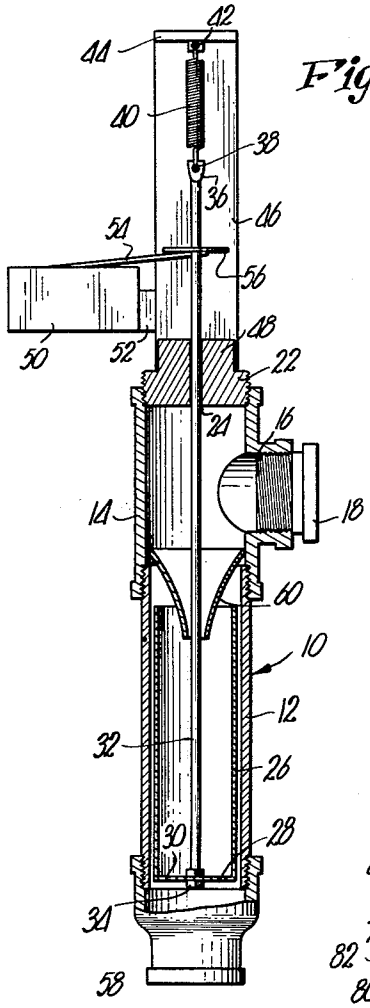


Fig. 3.

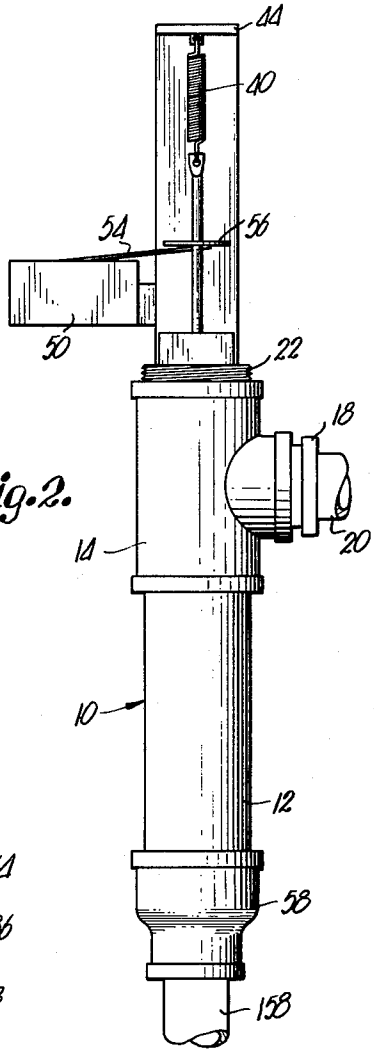


Fig. 2.

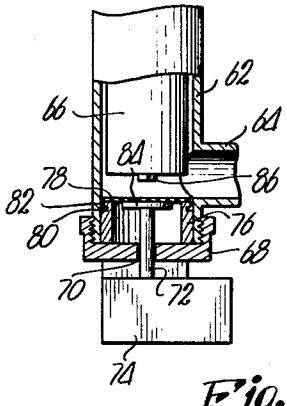


Fig. 5.

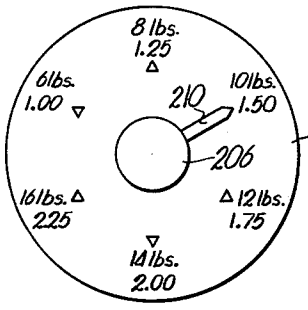


Fig. 4.

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3,172,276

FLUID CONTENT SENSING AND CONTROL MECHANISM FOR AUTOMATIC DRY CLEANING MACHINES

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2 Claims. (Cl. 68—12)

This invention relates to fluid content sensing and control mechanism for machines adapted to clean textile materials, and particularly, to structure for assuring complete purging of dry cleaning solvent from clothes after the latter have been subjected to a cleaning operation by immersion in the solvent.

Dry cleaning machines have been in existence for many years wherein the clothes are immersed in a suitable solvent such as perchlorethylene and the clothes then agitated by tumbling in the solvent. For efficiency, most of these machines employ a rotatable drum adapted to receive the solvent and the materials to be cleaned, as well as control mechanism for directing the solvent into the drum followed by removal of the solvent at the conclusion of a timed cycle. Dry cleaning machines have recently been developed adapted for utilization in self-service agencies which do not require operator attention and are under the complete control of the individual employing the machine. In order to prevent the necessity of having an operator for the machines available, it is customary to utilize coin-operated control mechanism on the dry cleaning machines which requires that the customer insert proper coinage in the machine before the same is operable. Thereafter, insertion of the clothes into the drum of the dry cleaning machine, followed by closing of the door thereof, results in operation of the machine through an automatically controlled cycle.

Although machines of the type described above have enjoyed success, certain limitations have existed in the operation thereof because of the necessity of setting up prescribed time sequences in the operating cycle of the machine which is not under the control of the customer, and presenting customer selection of the time required to clean the particular clothes which he inserts in the drum. It has been common practice to set the time cycles of the cleaning operation at points where the same will assure proper cleaning of the clothes if of average weight and generally uniform soiled condition, but this does not take into account clothes of relatively high density and thickness as opposed to materials of synthetic fibers and of very light weight, nor the necessity of running the machine through a longer solvent purge cycle in certain instances to effect complete removal of the perchlorethylene or the like from the clothing. When heavy wool blankets or similar materials are placed in the drum, a longer purge cycle is required to effect complete removal of the solvent from the blankets than would be the case if relatively lightweight, synthetic resin fiber clothes are subjected to the solvent. Since it has been necessary to set up a prescribed solvent purge cycle in prior machines, customer dissatisfaction has been voiced because heavy woolen articles and the like oftentimes are removed from the machine having a distinct odor of the solvent therein, whereas, lightweight synthetic materials must undergo an extended treatment operation which would not otherwise be required. Additionally, the customer must pay the same price for both of the cleaning operations, whereas the commercial acceptability of the machines will be increased if provision could be made for cleaning at different price levels, depending upon the type of clothing and the weight of the articles subjected to the solvent.

It is, therefore, the primary object of the present invention to provide dry cleaning apparatus having novel control mechanism therein for operating the machine during the solvent purge cycle, to effect complete removal of solvent from the clothing regardless of the type or weight of the clothing in the drum, and independent of a timer unit forming a part of the mechanism and controlling the other operations during the cleaning cycle.

Another significant object of the present invention is to provide control mechanism as described which permits selection by the customer of a cleaning cycle corresponding to the weight of the articles which he wishes to clean and which is caused to operate through a solvent purge cycle, dependent upon the amount of solvent to be removed from the clothes after completion of the cleaning cycle.

Also an important aim of the invention is to provide fluid content sensing and control mechanism for automatic dry cleaning machines wherein is included structure for deactivating the timer unit forming a part of the machine and normally controlling the cyclic operation of the latter, to maintain the machine in the solvent purge cycle for as long as necessary to effect substantially complete removal of solvent from the clothes, while the latter remain in the rotatable drum.

In this respect, a further important object is to provide control mechanism as referred to above, wherein the means for maintaining the timer unit deactivated, is responsive to removal of solvent from the drum, thereby assuring complete displacement of solvent from the clothes and independent of a preselected time period as has been required in prior machines.

Also an important aim of the invention is to provide control structure for assuring complete removal of solvent from the clothes being cleaned in an automatic dry cleaning machine, wherein the structure for assuring complete purging of solvent from the clothes is of primarily mechanical construction and utilizing simple and inexpensive parts, thereby permitting automatic control of the purge cycle without the necessity of utilizing complicated and expensive electrical systems which would materially increase the initial cost of servicing the same.

Also an important object of the invention is to provide control mechanism of the type referred to above which is adapted to be mounted on existing automatic dry cleaning machines without extensive modification of the latter being required.

Other important objects and details of construction of the present mechanism, as well as the advantages thereof, will be described or become obvious as the following specification progresses.

In the drawings:

FIGURE 1 is a rear elevational view of a dry cleaning machine having fluid content sensing and control mechanism thereon embodying the preferred concepts of the present invention, with certain of the components of the machine being removed to more clearly illustrate the present structure;

FIG. 2 is a fragmentary, enlarged, elevational view of the preferred sensing and control mechanism of the type illustrated in FIG. 1;

FIG. 3 is an enlarged, elevational view similar to FIG. 2 with the central portion thereof in vertical section to more clearly illustrate the components within the housing of the mechanism;

FIG. 4 is a fragmentary, elevational view of a control dial normally mounted on the front panel of the machine as shown in FIG. 1;

FIG. 5 is an enlarged fragmentary view of a modified form of the present invention and also in vertical section to show the modified components of the mechanism; and

FIG. 6 is a schematic representation of only a portion

of the circuitry forming a part of the automatic control unit of the dry cleaning machine.

The present invention provides fluid content sensing and control mechanism for automatic dry cleaning machines and includes an elongated tube adapted to be operably coupled to a receptacle on the machine for containing articles of clothing to be cleaned and solvent for cleaning the articles of clothing.

The tube is adapted to receive the solvent purged from the receptacle to direct the solvent toward a reservoir for subsequent use in the receptacle. A container is disposed within the tube across the path of flow of the solvent and an elongated rod is operably coupled with the container and disposed for movement longitudinally of the tube responsive to the content of solvent within said container. An electrical switching device is operably coupled with the rod to alternately open and close responsive to the movement of the rod in opposed directions. The container is provided with means for permitting the solvent to be removed therefrom at an extremely low rate and therefore, the sensing mechanism, including the container, the rod and the switching device, provides a means for controlling a timer mechanism operably coupled with the receptacle for actuating the latter and thus subjecting the articles of clothing to a number of cleaning operations including the purging of the solvent from the receptacle. Movement of the container and rod in one direction, opens the associated switching device to thereby interrupt the operation of the timer mechanism. Movement of the container and rod in the opposite direction, closes the switching device and thus operates the timer mechanism to thereby permit the cycle of operations of the machine to continue.

Fluid content sensing and control mechanism which forms the subject of this invention, is broadly denoted by the numeral **10** and one embodiment thereof is illustrated in FIGS. 2 and 3. Mechanism **10** includes a tube **12** providing a conduit for solvent in a manner to be described. A T **14** is threadably mounted at one end of tube **12** and is provided with a threaded opening **16** intermediate the ends thereof for threadably receiving a coupling member **18** mounted at one end of a pipe **20**. A plug **22** is threadably received within the end of T **14** opposite to the end receiving tube **12**, and plug **22** is provided with a central opening **24** therein which is substantially coextensive with the longitudinal axes of tube **12** and T **14**. An open top, cylindrical container **26** is normally positioned within tube **12** and disposed generally coaxially therewith. Container **26** is provided with a small opening **28** in the bottom **30** thereof offset from the longitudinal axis of the side wall of container **26**. An elongated rod **32** is secured to bottom **30** of container **26** by means of a pair of nuts **34** on opposed sides of bottom **30**, nuts **34** being threadably mounted on the proximal end of rod **32**.

Rod **32** extends through container **26**, through T **14** and through opening **24** of plug **22**. Rod **32** projects outwardly from plug **22** and is provided with a flat end **36** having an aperture **38** therein for receiving one end of an elongated coil spring **40** anchored at the opposite end thereof in an eyelet **42** rigidly secured and depending from a plate-like projection **44** secured to and extending outwardly from one end of a support plate **46**. The opposite end of support plate **46** is rigidly secured in any manner to plug **22** and, to this end, plug **22** is provided with a generally rectangular head **48** which presents a number of interconnected faces. The opposite end of support plate **46** is in engagement with one of the faces of head **48** and is secured thereto, preferably by welding. Since tube **12** and T **14** are normally disposed with their longitudinal axes disposed in a vertical direction, support plate **46** normally extends above plug **22**.

An electrical switching device **50** is mounted by means of a coupling member **52** to support plate **46** on one face thereof. Switching device **50** is provided with an arm **54** which projects upwardly and outwardly therefrom and terminates adjacent the proximal portion of rod **32**. A disc **56** is carried by rod **32** for movement therewith and is disposed directly above the proximal end of arm **54**. Movement of container **26** and thereby rod **32** in a downward direction, causes arm **54** to move downwardly under the action of disc **56**. Conversely, upward movement of container **26** and thereby rod **32**, after the same have moved downwardly, permits arm **54** to shift to its normal or equilibrium position, it being clear that arm **54** is biased in an upward direction when viewing FIG. 3. A nipple **58** is threadably mounted on the normally lowermost end of tube **12** to permit coupling of the latter with a pipe in a manner to be described.

A funnel-shaped member **60** is normally disposed within T **14** and projects downwardly therefrom into tube **12** as is clear in FIG. 3. Rod **32** passes through the open ends of member **60** and is freely movable relative thereto. Member **60** directs fluid entering opening **16** of T **14** downwardly into container **26** through the open top thereof.

A second embodiment of the fluid content sensing and control mechanism is illustrated in FIG. 5 and includes a tube **62** which is provided with a laterally extending pipe **64** thereon at the normally lowermost end thereof. Tube **62**, like tube **12** of FIGS. 2 and 3, is adapted to be operably coupled to a T similar to T **14** for receiving fluid therein. In addition, a funnel-shaped member similar to member **60**, is adapted to be disposed adjacent the upper end of tube **62** for directing fluid into the latter and into an open top, cylindrical container **66** within tube **62** and disposed substantially coaxially therewith. A cap **68** closes the normally lowermost end of tube **62** and is provided with a central opening **70** for receiving a rod **72** operably coupled to a shiftable contact (not shown) of electrical switching device **74**. A cylindrical insert **76** is disposed within the tube **62** at the lowermost end of the latter and provides support means for a resilient diaphragm element **78** disposed within tube **62** in spaced relationship to the lowermost end thereof. Insert **76** is provided with an annular, recessed groove **80** for receiving the annular flange **82** integral with element **78**. As disc **84** is carried by the upper end of rod **72** and normally engages the underside of element **78**.

Movement of container **66** downwardly, causes a projection **86** on the bottom of container **66** to engage element **78** and to flex the latter to cause the downward movement of rod **72** and thus actuate switching device **74**. It is to be noted that container **66** is provided with a small opening in the bottom thereof similar to opening **28** of container **26** to permit fluid to gravitate from container **66** at a low rate of discharge.

Mechanism **10** is adapted to be operably coupled with dry cleaning apparatus broadly denoted by the numeral **88** which includes a receptacle **90** housing a perforated rotatable drum and drive means **92** for the drum, drive means **92** including an electric motor having a drive shaft **94** provided with a drive pulley **96** thereon. An endless belt **98** is trained over pulley **96** and a pulley **100** on a shaft **102** rigid to the drum in receptacle **90** to rotate the latter in one direction. Articles of clothing to be cleaned are disposed within the drum of receptacle **90** through a door (not shown) on the side opposite thereof illustrated in FIG. 1.

An inlet pipe **104** admits solvent to receptacle **90** such as perchlorethylene from the outlet **106** of a solvent filtering unit **108** operably coupled with a solvent reservoir **110** disposed adjacent drive means **92**. A discharge pipe **112** is operably coupled with receptacle **90** and permits the removal of solvent therefrom to a valve **114** and then to a pipe **116** for movement in any suitable manner toward reservoir **110**. A control box **118** is mounted on support structure **120** which also supports receptacle **90** and filter unit **108**. Control box **118** includes selectively actuatable timer mechanism operably coupled with drive means **92** and receptacle **90** for

actuating the latter through a cycle of operation to thereby subject the articles of clothing in the drum of receptacle 90 to a number of cleaning operations including the purging of solvent from the receptacle 90 through pipe 112.

A blower 122 is mounted on structure 120 and includes a motor 124 for causing a current of air to pass into a housing 126 provided with a number of heating coils therein for heating the air as the same passes therethrough. A conduit 128 communicates the interior of receptacle 90 with the interior of housing 126 to permit heated air to pass into receptacle 90 under the action of blower 122. A conduit 130 is secured to receptacle 90 in circumferentially spaced relationship to conduit 128. Conduit 130 intercommunicates receptacle 90 with a vertical stack 132 which extends upwardly from valve 114.

A lint collector (not shown) is disposed within a housing 134 and condenser apparatus 136 is also disposed within housing 134. A conduit 138 interconnects housing 134 with the inlet side (not shown) of blower 122, and conduit 138 also houses gate structure to permit the shunting of air under pressure into and through a blower 140 mounted adjacent blower 122 for directing air upwardly through the outlet 142 thereof. A complete circuit for the air current created by blower 122 is, therefore, provided and extends from housing 126, through conduit 128, receptacle 90, conduit 130, stack 132, housing 134, conduit 138 and blower 122, returning to housing 126 from the outlet end of blower 122.

Condenser apparatus 136 is disposed across the path of flow of the air within housing 134 and is provided with pipe structure having an inlet 144 and an outlet 146 for conducting a coolant therethrough to cool the air passing through housing 134, it being clear that the heaters in housing 126 heat the air as the same pass toward conduit 128. Condenser apparatus 136 is provided with means for collecting the condensate formed as a result of the cooling action of apparatus 136 and the condensate, containing solvent as well as water, is passed through a pipe 148 downwardly from apparatus 136 toward and into one side 150 of a U-tube 152. Since the solvent which is utilized with apparatus 88 has a specific gravity generally greater than the specific gravity of water, the water rises in side 150 and is drawn off through an opening 154 in any suitable manner. Mechanism 10 which forms the subject of this invention, is operably coupled with the side 156 of U-tube 152 by virtue of pipe 20 illustrated in FIGS. 1 and 2. The solvent which is disposed within tube 152, rises in side 156 and passes laterally through pipe 20 and into T 14 for gravitation into container 26.

A pipe 158 is secured to nipple 58 and to pipe 116 at respective ends thereof as illustrated in FIG. 1, and pipe 158 is disposed for conveying fluids passing through tube 12 toward and into pipe 116.

The schematic wiring diagram of a portion of the control mechanism for apparatus 88 is illustrated in FIG. 6 and includes a selective switching device 160 operably coupled with a stepper mechanism 162 which is operably coupled with coin-actuated mechanism 164. Timer mechanism, broadly denoted by the numeral 166, is utilized for actuating apparatus 88 and includes a timer motor 168 and at least a pair of switches 170 and 172 operably coupled with a conventional drum member secured to motor 168 in operating relationship thereto. The drum is provided with cam means engageable with the shiftable portions of switches 170 and 172 to shift the latter in directions opposite to the directions in which the shiftable members are biased. In addition, a drive motor 174 is operably coupled with timer mechanism 166 and forms a part of the drive means 92 for actuating apparatus 88. A relay coil 176 is coupled with switching device 160, stepper mechanism 162 and timer mechanism 166, and is provided with a switch 178 which is actuated when relay coil 176 is energized.

Terminals 180 and 182 are adapted to be operably coupled to a source of power such as an alternating current main and a lead 184 interconnects terminal 182 with one side of the relay coil 176. A lead 186 connects coil 176 with the shiftable pole 188 of switching device 160. A lead 190 interconnects terminal 180 with the shiftable pole 192 of stepper mechanism 162. It is noted that a number of leads 194, 196, 198, 200, 202 and 204 interconnect corresponding terminals of switching device 160 and stepper mechanism 162. Coin mechanism 164 is operably coupled with shiftable pole 192 of stepper mechanism 162 and shifts the latter to the appropriate terminal responsive to the reception of coins of a predetermined amount in mechanism 164. Shiftable pole 188 is adapted to be operably coupled to a knob, shown in FIG. 4, which in turn is associated with a dial 208 mounted on the front of apparatus 88. Knob 206 is provided with a pointer 210 extending radially therefrom in the direction of one of any number of circumferentially spaced indicia on dial 208 to indicate the location of shiftable pole 188 with respect to the various contacts of switching device 160.

A lead 212 is connected to lead 184 and also to one side of drive motor 174. A lead 214 interconnects the opposite side of motor 174 with the shiftable pole 216 of switch 172. A lead 218 interconnects the stationary pole 220 of switch 172 with lead 190. A lead 222 interconnects one side of timer motor 168 with lead 212, and a lead 224 interconnects the opposite side of timer motor 168 with the stationary pole 226 of switching device 50, operably mounted on mechanism 10. A lead 228 interconnects the shiftable pole 230 of device 50 with the stationary pole 232 of switch 170, it being clear that pole 230 is operably coupled with arm 54 for movement toward and away from pole 226. A lead 234 interconnects shiftable pole 236 of switch 170 with the stationary pole 238 of switch 178. The shiftable pole 240 of switch 178 is connected to lead 190 by a lead 242.

In operation, the customer or operator of apparatus 88 utilizes the latter by inserting clothes to be cleaned within the drum housed within receptacle 90. The door of receptacle 90 is then closed and the articles of clothing are then confined within the drum and disposed for tumbling therewithin in solvent which is directed into receptacle 90 to a predetermined level. Since the drum is perforated, the solvent passes also into the drum, as well as receptacle 90.

After the door of apparatus 88 has been securely closed, the customer or operator selects the proper weight of clothing to be cleaned by manipulating knob 206 until pointer 210 coincides with the proper weight of the clothing which was previously determined by weighing the clothing on scales provided adjacent apparatus 88. Pointer 210 also indicates the amount of money to be deposited within mechanism 164 and, when this amount has been deposited within mechanism 164, stepper mechanism 162 is actuated to swing shiftable pole 192 toward one of the terminals so that shiftable poles 188 and 192 are interconnected by one of the leads 194 to 204 inclusive. For instance, if knob 206 is set so that pole 188 is placed in contact with the terminal connected to lead 198, the stepper mechanism 162, when actuated with the proper coins inserted in mechanism 164, causes pole 192 to shift into contact with lead 198. When this occurs, coil 176 is energized through the following circuit:

Terminal 182, lead 184, coil 176, lead 186, pole 188, lead 198, pole 192, lead 190 and terminal 180.

When coil 176 is energized, pole 240 of switch 178 shifts into contact with pole 238 and timer motor 168 is energized through the following circuit:

Terminal 182, lead 184, lead 212, lead 222, motor 168, lead 244, pole 236, lead 234, switch 178, lead 242, lead 190 and terminal 180.

The energization of timer motor 168 immediately causes pole 216 of switch 172 to contact pole 220 and thus energize the drive motor 174 through the following circuit:

Terminal 182, leads 184 and 212, motor 174, lead 214, switch 172, leads 218 and 190 and terminal 180.

Energizing of motor 174 causes the drum within receptable 90 to rotate and, it is to be noted at this juncture that a number of other components in the nature of switching devices operably interconnecting blowers 122 and 140, as well as heaters, pumps and dampers, are placed in operable relationship with timer motor 168.

The solvent is admitted into receptacle 90 through pipe 104 and the clothing within the drum is subjected to a number of cleaning operations with the solvent and following the use of the solvent, the latter is purged from receptacle 90 through pipe 112 by suitable pump mechanism, and blower 122 is energized, as well as the heaters within housing 126, to direct heated air into receptacle 90 through conduit 128 and out of receptacle 90 through conduit 130. The purpose of the heated air is to remove the solvent from the clothing after the solvent has drained from receptacle 90.

The solvent evaporates within the confines of receptacle 90 under the influence of the heated air and, therefore, the solvent is removed from the clothing. The air and solvent vapor pass outwardly of receptacle 90 through conduit 130, upwardly through stack 132 and through condenser apparatus 136 which condenses the vapor and the moisture in the air. The condensate of water and solvent gravitates through pipe 148 and enters U-tube 152 at side 150 of the latter. The solvent is drawn off from side 156 into mechanism 10 and flows into container 26 through funnel member 60. Container 26 then fills to a certain level with solvent since the solvent cannot gravitate through opening 28 fast enough to prevent the gravitation of container 26 under the influence of the solvent contained thereby. Downward movement of contanier 26 causes rod 32, and thereby arm 54, to shift downwardly, thus opening switching device 50 and maintaining pole 230 out of contact with pole 226.

When the purging of the solvent from receptacle 90 begins, switch 170 opens and, since switching device 50 is normally closed, timer motor 168 continues to be energized.

As pointed out above, heated air then begins to blow into receptacle 90 to remove the solvent from the clothing and to remove the solvent vapors remaining within receptacle 90. As solvent begins to fill container 26, timer motor 168 is still energized, but when enough solvent has been deposited within container 26, the same moves downwardly to open switching device 50 and thereby break the circuit supplying electrical power to timer motor 168. When this occurs, motor 168 is deenergized and remains de-energized until container 26 moves upwardly, due to the gravitation of solvent from container 26 through opening 28. When this occurs, it is evident that solvent in liquid or vapor form has sufficiently been removed from receptacle 90 to allow the continuation of the cleaning cycle of operations of timer mechanism 166. Thereupon, container 26 rises under the influence of the restoring force of spring 40 and pole 230 once again contacts pole 226 to thereby energize timer motor 168 through the following circuit:

Terminal 182, leads 184, 212 and 222, motor 168, lead 224, switching device 50, lead 228, switch 170, lead 234, switch 178, leads 242 and 190 and terminal 180.

After the cycle of operation of timer mechanism 166 has ceased, the customer then is permitted to open the door of apparatus 88 to remove the clothing therefrom and, in doing so, actuates a damper situated within conduit 138 to shunt the current of heated air passing through receptacle 90 from blower 122 into blower 140 and upwardly through outlet 142 of the latter. This is to prevent the blast of heated air in the face of the customer when the door of apparatus 88 is opened.

It is evident that mechanism 10 provides an effective means for determining the content of solvent remaining within the clothing, and also the content of solvent vapor remaining in receptacle 90. By virtue of the aforesaid construction, it is not necessary to segregate the clothing as to absorbent characteristics or types of material since the heated air continues to be forced into receptacle 90 so long as receptacle 26 is at the lower limit of its path of travel. Since solvent may be removed much easier from some fabrics than from others, it can be seen that there is no need to direct the heated air into receptacle 90 for a predetermined length of time which may in some cases be too long so as to tie up the machine and cause an unnecessary expenditure of electrical power. In other cases, it may well be that the materials or fabrics making up the clothing have high absorbent characteristics so that a predetermined length of time during which heated air may be directed into receptacle 90, may not be enough time to remove all of the solvent from the clothing. By the use of the present apparatus, these problems are eliminated since the heated air continues to be directed into receptacle 90 for a time directly proportional to the flow of solvent from receptacle 90.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In automatic dry cleaning apparatus having actuatable receptacle means for receiving a solvent adapted to clean articles of clothing disposed therewithin and operable timer mechanism having means thereon for driving the latter to thereby actuate said receptacle means and thus subject said articles to a number of successive cleaning operations including purging of solvent from said receptacle means, the improvement of which comprises means for interrupting the operation of said timer mechanism during the solvent purging operation, said means including:

a stationary tube adapted to be operably coupled with said receptacle means for receiving the solvent purged therefrom;

actuatable, normally closed switching means carried by said tube and adapted to be operably coupled with said driving means for normally maintaining the latter in an energized condition;

an open top container within the tube and disposed in relatively close proximity thereto and being spaced therefrom for rectilinear movement relative to the tube in one direction to a predetermined position under the influence of the solvent entering said tube, said container having a bottom provided with an opening therein having a reduced cross section with respect to the cross section of the open top of said container, the opening being disposed for permitting the gravitation of solvent from said container at a rate less than the rate at which solvent enters said container, said switching means being normally disposed below said container and provided with a stationary pole and a shiftable pole, the latter having an arm thereon; and

means on said tube and engageable with said arm for moving said shiftable pole out of electrical contact with said stationary pole when said container moves toward said position.

2. In automatic dry cleaning apparatus as set forth in claim 1, wherein said means for moving said shiftable pole comprises a flexible diaphragm element within said tube and below said container, and a rod secured to said shiftabie pole and extending upwardly therefrom, said rod terminating below said element and being disposed for moving said shiftable pole out of electrical contact with said stationary pole when said element is flexed under the influence of the downward movement of said container.

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