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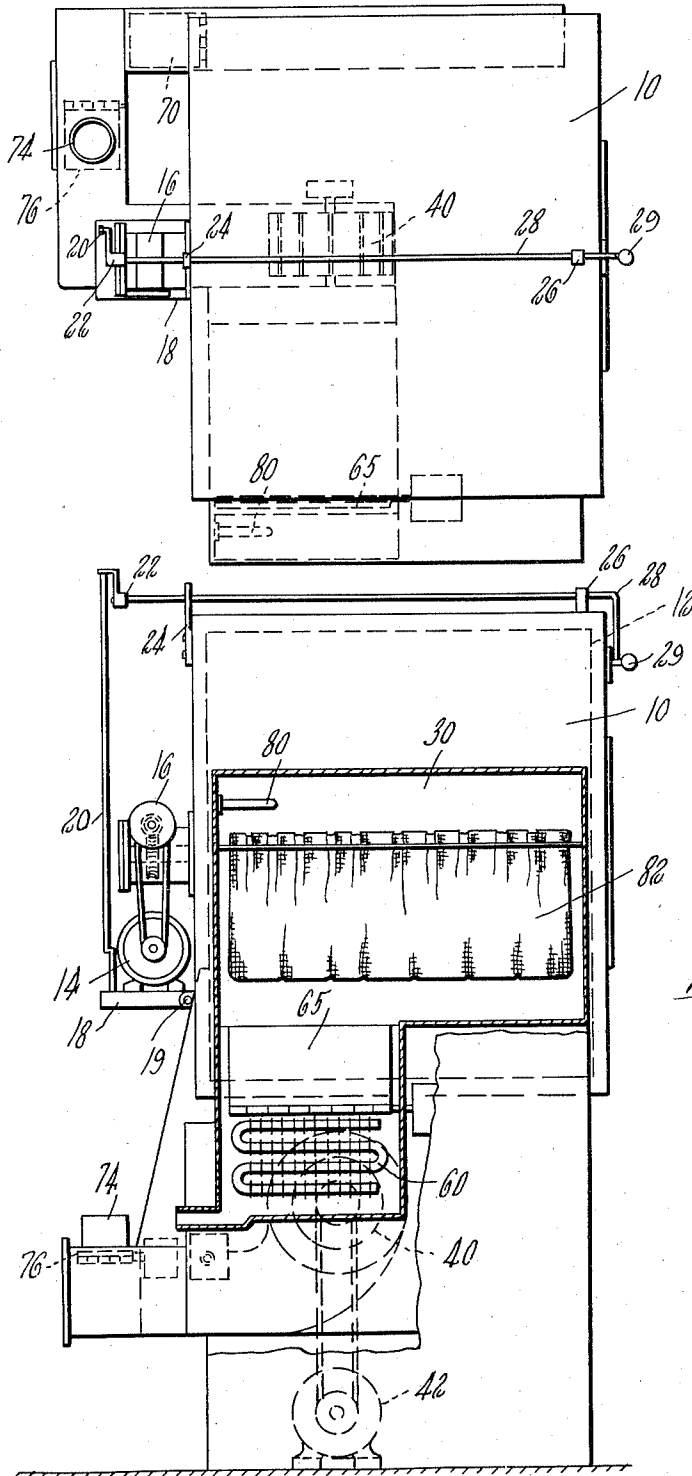
H. R. HOYT

2,910,783

SOLVENT RECLAIMER DRYING TUMBLERS

Filed May 7, 1957

4 Sheets-Sheet 1



Nov. 3, 1959

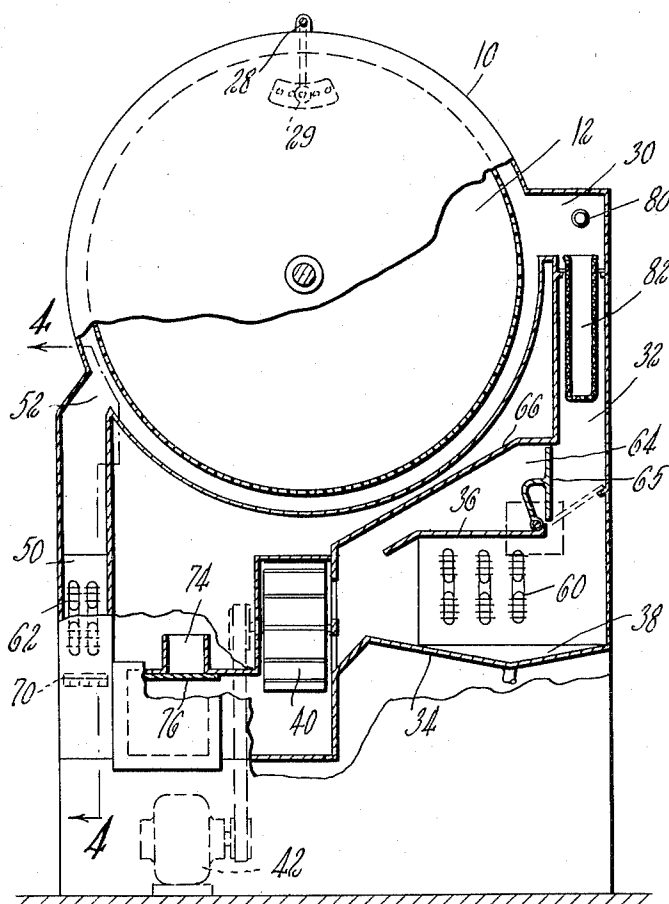
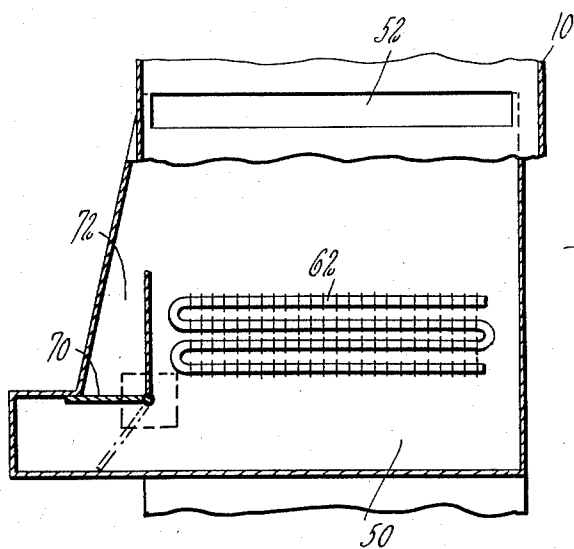
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Filed May 7, 1957

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Nov. 3, 1959

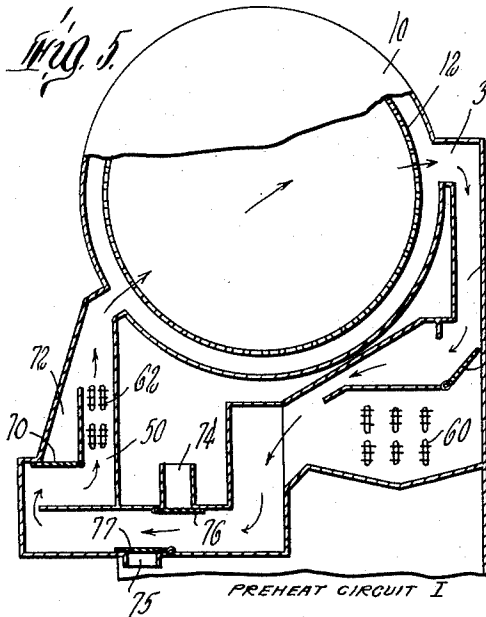
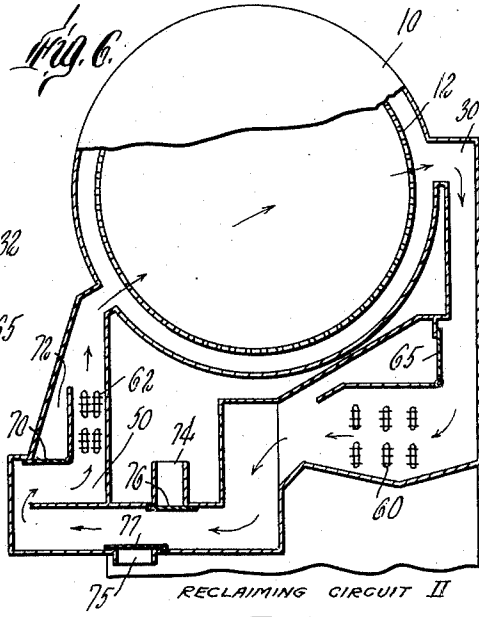
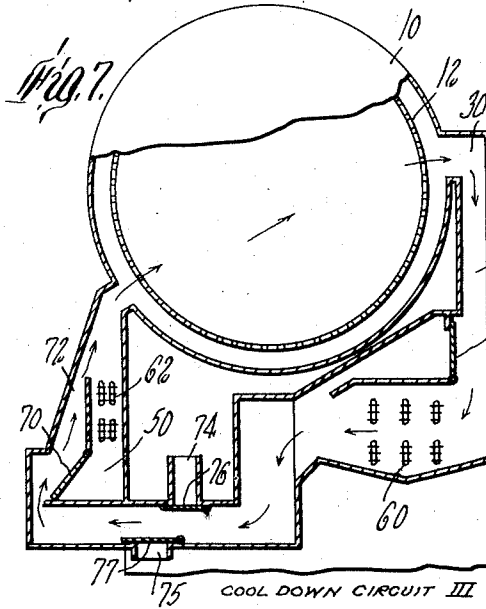
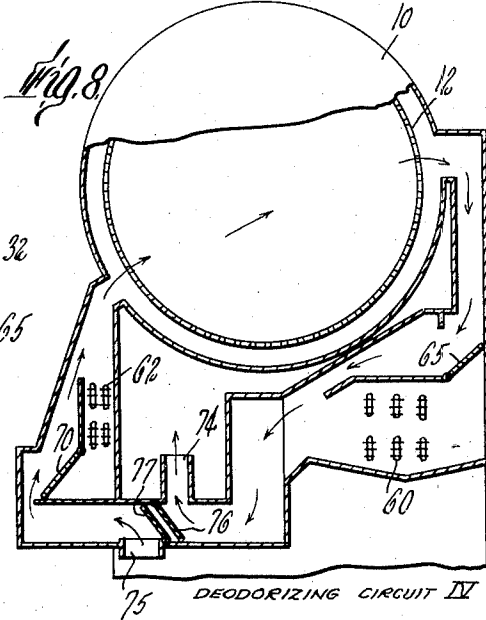
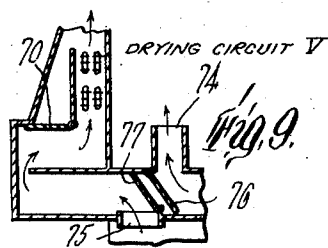
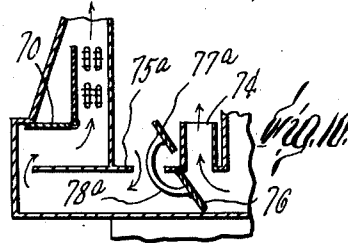
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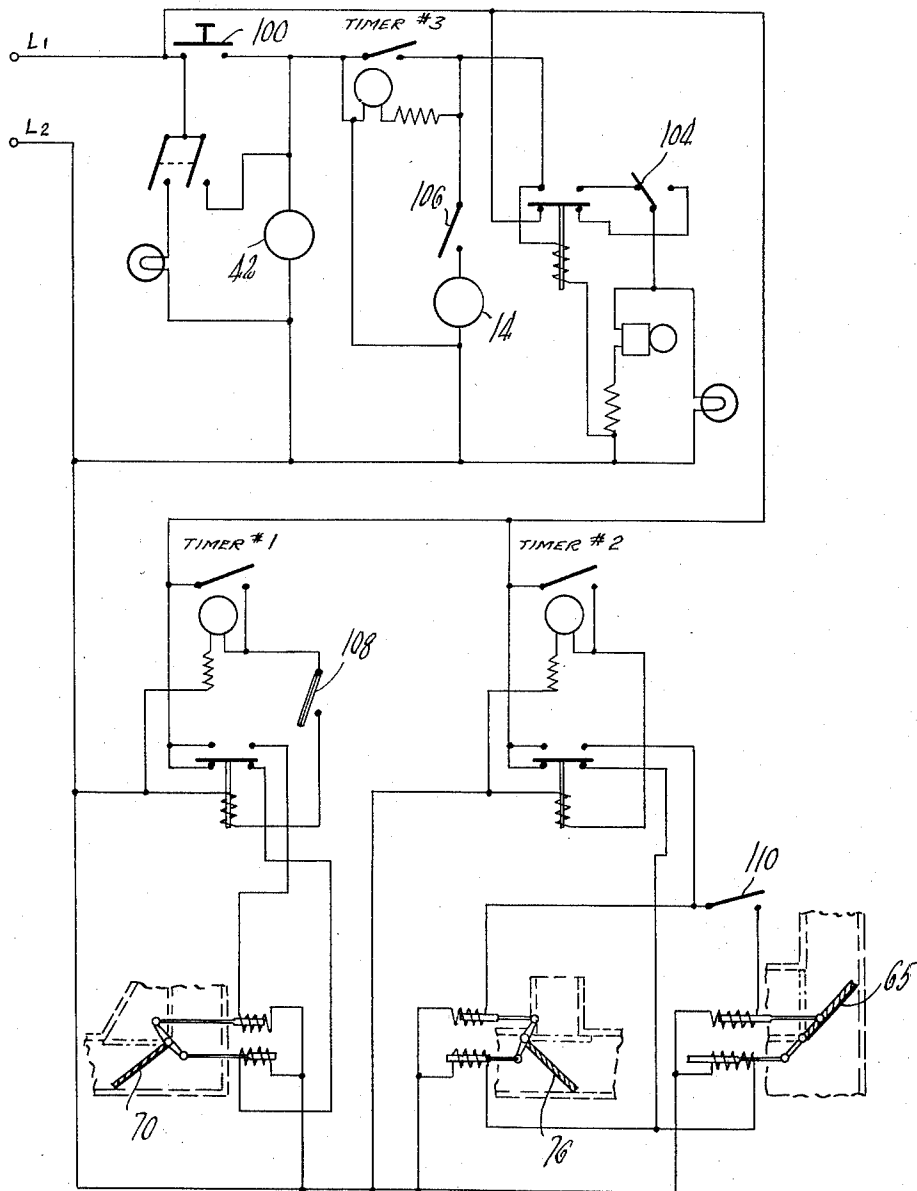


Fig. 11.

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SOLVENT RECLAIMER DRYING TUMBLERS

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Application May 7, 1957, Serial No. 657,547

2 Claims. (Cl. 34—45)

This invention relates to combination drying tumblers and solvent reclaimers of the type used in industrial fabric cleansing establishments after cleaning and extracting operations have been completed.

It is the primary object of this invention to provide improved and highly versatile equipment suited to all the requirements of a user of such equipment and performing cycles of

- I. Preheating;
- II. Solvent reclaiming;
- III. Cooling;
- IV. Deodorizing;
- V. Once through drying tumbling.

While individual manual settings are used for the cycles I and V, the apparatus performs all of steps II, III and IV automatically in sequence with single initial settings, as will be hereinafter described.

Embodiments of this invention include a rotatable perforated tumbler adapted to receive successive loads of fabric from which solvent is to be reclaimed, means for rotating the tumbler at speeds selected in accordance with the weight of the load, and an endless duct system which includes the tumbler in its circuit so that a stream of gaseous material may be driven through the tumbler. In accordance with the invention there are a variety of circuits, in addition to a normal solvent reclaiming endless closed circuit, which are also endless closed circuits, and others of which are not endless.

As in present day reclaimers, the primary closed circuit includes, in addition to the tumbler, a fan for creating a gaseous flow through the primary closed circuit, a heating unit for heating the flowing stream prior to its entry into the tumbler and a condenser coil for condensing solvent vapors after the stream leaves the tumbler and before it reaches the heating means on a succeeding circuit.

A preheat closed circuit is constituted of the same elements as the reclaiming circuit except the condenser coil is by-passed.

A cooling circuit is constituted of the same elements as the reclaiming circuit except that the heating unit is by-passed.

A deodorizing circuit is open to the atmosphere for the admission of fresh air through an inlet and exhaust thereof through an outlet on opposite sides of the tumbler and the same open-end circuit may constitute a once through drying circuit when the heater unit is partially or wholly cut into the deodorizing circuit.

A main feature of the equipment is the inclusion of ducts by-passing both the heating unit and the condenser including control means cutting the by-passes into the circuit either together or separately. A further feature is the provision, in some cases, of control means for simultaneously opening or closing both the air inlet and outlet to break the closed circuit.

Control means for directing the path of gaseous flow through the fan through at least some of the different

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circuits is, in the preferred embodiment of the invention, automatically controlled for sequential operation.

An additional feature of the equipment is a thermostatic device which is inter-connected with the heating means for regulating the temperature of the air flow, such device being located for gauging the temperature of the gaseous stream near its egress from the tumbler.

The above objects and features of embodiments of the invention can be better understood when taken in connection with a description of a preferred embodiment of the invention shown in the accompanying drawings, wherein:

Fig. 1 is a plan view of a dryer of the invention showing location of certain of the parts in dotted lines;

Fig. 2 is a side elevational view partly in cross-section of the dryer shown in Fig. 1;

Fig. 3 is a rear elevational view partly in cross-section of the dryer in Figs. 1 and 2;

Fig. 4 is a cross-sectional enlarged detail taken along the line 4—4 of Fig. 3;

Fig. 5 is a diagrammatical view showing the parts in a position to provide a closed pre-heat circuit I;

Fig. 6 is a similar view to that of Fig. 5 showing a disposition of the moving parts to provide a closed reclaiming circuit II;

Fig. 7 is a similar view showing a disposition of the parts providing a closed cool down circuit III;

Fig. 8 is a similar showing a disposition of the parts providing an open deodorizing circuit IV;

Fig. 9 is a detail view showing a modification of the circuit shown in Fig. 8 by a different disposition of the heater damper to provide an open once through dryer circuit V;

Fig. 10 is a detail view showing a modification in the construction of the dampers of Fig. 8 controlling the air inlet and outlet operation for changing the apparatus from a closed circuit to an open circuit operation; and

Fig. 11 is a circuit diagram for providing the control means of the invention.

The structure includes an ordinary outside shell 10 providing a closed chamber for receiving a rotary tumbler basket 12 which is mounted in suitable bearings for rotation by a motor 14 operating through a Reeves or other variable pitch pulley 16 so that the speed of rotation of the basket 12 may be regulated.

Motor 14 is supported on a hinged platform 18 at the rear of the machine (Fig. 2), which is connected by a mechanical link 20 to a crank 22 fast on the rear end of a rod 28 extending across the top of the machine and carried by bearings 24 and 26. The forward end of rod 28 is bent downwardly and terminates in a handle 29 which can be oscillated to multiple fixed positions to control the angle of platform 18 and hence control the pitch of the Reeves pulley 16 and consequently the speed of the basket. Hence the speed may be reduced for light loads in order to obtain good tumbling action and increased for heavy loads in order to insure that the clothes will be carried upwardly and fall back in a tumbling path conducive to efficient and more uniform drying.

As shown in Fig. 3, there is an outlet 30 at one side of the basket chamber which leads to a downward duct 32 which turns underneath the basket to provide between walls 34 and 36 a condenser coil chamber 38. The outlet from the condenser chamber 38 leads to a fan 40 driven by a suitable motor 42 and the duct then passes towards a heating chamber 50 and thence upwardly into an inlet 52 back into the basket.

A condenser coil with suitable connections 60 is placed in the chamber 38 and a heater coil 62 with suitable connections is placed in the heating chamber 50.

Above the top wall 36 of condenser coil chamber 38 there is a further duct 64 provided by the wall 66. Com-

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munication of the duct 32 with the duct 64 is controlled by a damper 65 which is hinged so that it can pivot from a full line position of Fig. 3 to a dotted line position closing off condenser coil chamber 38 from duct 32, thus providing a condenser bypass through the duct 64.

Similarly as shown in Fig. 4 a damper 70 is interposed in advance of the duct leading to the heating chamber 50 and is operable from a full line position as shown in Fig. 4 to a dotted line position to provide a bypass through the bypass duct 72.

Between the fan 40 and the heating chamber 50 there is also an exhaust outlet 74 and an air intake 75 with associated dampers 76 and 77, respectively, which are pivoted for movement from positions closing the outlet and inlet, respectively, to positions extending across and closing off communication from the fan 40 to the heating chamber inlet.

There is also provided as shown in Fig. 3 a temperature control feeler bulb 80 which extends into the basket outlet duct 30 and a lint bag 82 suspended in the duct 32, to filter lint during all circuit operations.

By referring to Figs. 5 through 9 one can understand the damper operation which provides the various circuits.

Fig. 5 shows pre-heat circuit I. Here damper 65 is moved to the bypass position and heater damper control 70 is closed. Dampers 76 and 77 are both closed so that when the fan is operated the flow of air through the closed circuit is as shown by the arrows going from the basket bypassing the condenser, to the fan then through the heating coil and back to the basket chamber, all in a closed circuit.

Fig. 6 shows the normal closed reclaiming circuit II. Here both the bypass dampers 65 and 70 are closed as are the outlet and inlet dampers 76 and 77. As the arrows show in Fig. 6, the air then passes in a closed circuit through the condenser coil, the fan and the heater in succession, back to the basket chamber.

Fig. 7 shows a cool down circuit III. Here the condenser bypass damper 65 is closed and the heater bypass damper 70 is open. The air flow as shown by the arrows is hence from the basket through the condenser coil to the fan and thence directly back to the basket chamber without going through the heating coil chamber 50.

Fig. 8 shows the deodorizing open circuit IV. Here both bypass dampers 65 and 70 are open as are outlet and inlet dampers 76 and 77. The air flow is shown by the arrows, the air coming in inlet 75 bypassing the heater, through the basket, bypassing the condenser and thence out the outlet 74.

The once through drying circuit V is illustrated by Fig. 9, all the dampers being in the same locations as those shown in Fig. 8 except for the heater bypass damper 70 which is in closed position so that the air proceeds from the inlet 75 through the heating coil to the basket, bypasses the condenser, and thence goes out the outlet 74.

Fig. 10 shows a modified structure wherein the inlet 75a is located in such manner that the damper 77a therefor is connected directly to outlet damper 76 by an arm 78a.

Since the pre-heat circuit of Fig. 5 and the once through drying circuit of Fig. 9 are special circuits which are not used by all dry cleaning establishments or which may be used only periodically by owners of the equipment, the controls as shown in the drawings provide for automatic sequential operation of only circuits II, III and IV. Operation with circuits I or V is provided by manual setting as are initial settings for the automatic II, III, IV operation.

As shown in Fig. 11 lines lead from a power source through a manually operated fan switch 100 which controls the operation of the fan motor 42.

Three timers are provided, timer No. 1 controlling the heater damper 70, timer No. 2 controlling the condenser bypass damper 65 and timer No. 3 controlling the basket motor 14. Thus timer No. 1 controls the opera-

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tion of the relay No. 1 which cuts in and out two separate coils of the heater bypass motor operating damper 70. Similarly, timer No. 2 controls the operation of a relay No. 2 which cuts in and out two separate coils of a condenser motor operating the condenser bypass damper 65. Timer No. 3 cuts in and out the basket motor and controls a relay No. 3 which has connections for providing a buzzer and signal light which gives visual and aural indication of operation or non-operation of the basket motor, depending upon which way the switch 104 is set.

A door switch 106 is provided to insure that the basket motor circuit will be open whenever the shell door is open.

A temperature control switch 108 is interposed in the relay circuit of timer No. 1 so that despite the control of timer No. 1, the heater bypass damper 70 will be moved to open full-line position whenever the thermostatic control indicates an excess heat, in which case the temperature control switch 108 will be opened as shown, thus causing the heater bypass motor to open the bypass damper no matter what the condition of the timing operation. The thermostatic control thus overrides the timer No. 1 control.

Fig. 11 shows the circuit connection only to the exhaust damper 76, it being understood that the circuit may simultaneously operate the inlet damper 77. Thus the dampers 76 and 77 are controlled, as is the condenser bypass damper 65, by relay 2, these three dampers all being closed in one position of relay 2 and all being opened in the other position. Hence, relay 2 opens and closes all three of these dampers simultaneously. However, a manual switch 110 is interposed in the condenser motor circuit so that the condenser bypass damper 65 may remain in open position while dampers 76 and 77 are maintained in closed position in order to establish the pre-heat circuit I of Fig. 5.

Supposing then it is desired to have first a preheat cycle. This is accomplished by placing switch 110 in open position. Fan switch 100 is then closed. Timer No. 1 is then set and this will energize the circuit to close the heater bypass damper 70. Timer No. 2 is then set causing intake and exhaust dampers to close but leaving condenser bypass damper 65 open because of the open circuit through switch 110. Timer No. 3 is then set which causes the basket to rotate and the signal circuit to function.

At the end of the predetermined time the timers operate the relays to change the circuits to cause all the dampers to return to open position, where they remain until the alternative circuits are again closed.

Assuming now that automatic sequential operation for successively reclaiming, cooling down and then deodorizing is desired, switch 110 is closed. If it is intended that the entire three cycles take 20 minutes, including 15 minutes of reclaiming, three minutes of cooling down and two minutes of deodorizing, set timer No. 1 for 15 minutes, timer No. 2 for 18 minutes and timer No. 3 for 20 minutes. As a result, all the dampers will be closed and maintained in closed position as shown in Fig. 6 for a period of 15 minutes until timer No. 1 operates relay No. 1 to open heater bypass damper 70 and convert the circuit to the cool down circuit III of Fig. 7. At the end of 18 minutes, timer No. 2 operates to actuate relay No. 2 which will cause dampers 65, 76 and 77 all to open simultaneously, thus converting to the condition of Fig. 8 and providing the deodorizing circuit IV which will be maintained for a period of two minutes at which time, timer No. 3 will interrupt the basket motor operation and give the signal for completion of the three-cycle operation.

The drying circuit V of Fig. 9 may be utilized by setting timer No. 1 which causes the heater bypass damper to close; timer No. 2 is left in zero or off position so that dampers 65, 76 and 77 all remain in the open position;

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and timer No. 3 is set for the time of the basket rotation. During any of these operations the switch 108 will be opened if the temperature of the air emerging from the basket exceeds the setting of the thermostatic control.

I claim:

1. In solvent reclaiming apparatus having a rotary tumbler, means for rotating said tumbler and an endless duct system for directing an air stream in a closed circuit through said rotating tumbler and including in said circuit in series a condenser, a fan and heating means, in combination, a branch duct bypassing said heating means, a damper associated with said branch duct, means for maintaining said damper normally closed during a solvent reclaiming cycle, a thermostatic control in said closed circuit adjacent the outlet of air from said tumbler, and means connecting said control with said heater bypass damper for opening said damper so that the heating means will be at least partially bypassed whenever, during a solvent reclaiming cycle, the temperature of the air stream emerging from said tumbler exceeds a predetermined value as measured by said thermostatic control.

2. In solvent reclaiming apparatus having a rotary tumbler, means for rotating said tumbler and an endless duct system for directing an air stream in a closed circuit through said rotating tumbler and including in said circuit in series a condenser, a fan and heating means, in combination, a branch duct bypassing said condenser, a branch duct bypassing said heating means, dampers associated with both said branch ducts for selectively bypassing air driven by said fan through said closed circuit around said condenser and heating means, means for maintaining said condenser bypass damper closed and

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said heater bypass damper normally closed during a solvent reclaiming cycle, a thermostatic control in said closed circuit adjacent the outlet of air from said tumbler, and means connecting said control with said heater bypass damper for opening said heater bypass damper so that the heating means will be at least partially bypassed whenever, during a reclaiming cycle, the temperature of the air stream emerging from said tumbler exceeds a predetermined value as measured by said thermostatic control, an air inlet to said circuit in advance of said heating means, an air exhaust from said circuit on the opposite side of said tumbler from said heating means, dampers for closing and opening said air inlet, and said air exhaust, timing means, and means actuated by said timing means for sequentially opening said heating means bypass damper upon completion of a reclaiming cycle to initiate a cooling cycle and for thereafter automatically simultaneously opening said condenser bypass, air inlet and air exhaust dampers to initiate a deodorizing cycle, and means actuated by said timing means for controlling said tumbler rotating means to stop the rotation thereof after the completion of the deodorizing cycle to permit reloading of said tumbler.

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