Dec. 13, 1966 J. W. JACOBS ET AL 3,290,793

DRY CLEANER WITH REFRIGERATED SOLVENT RECLAIMING SYSTEM

Filed April 29, 1963 4 Sheets-Sheet 1

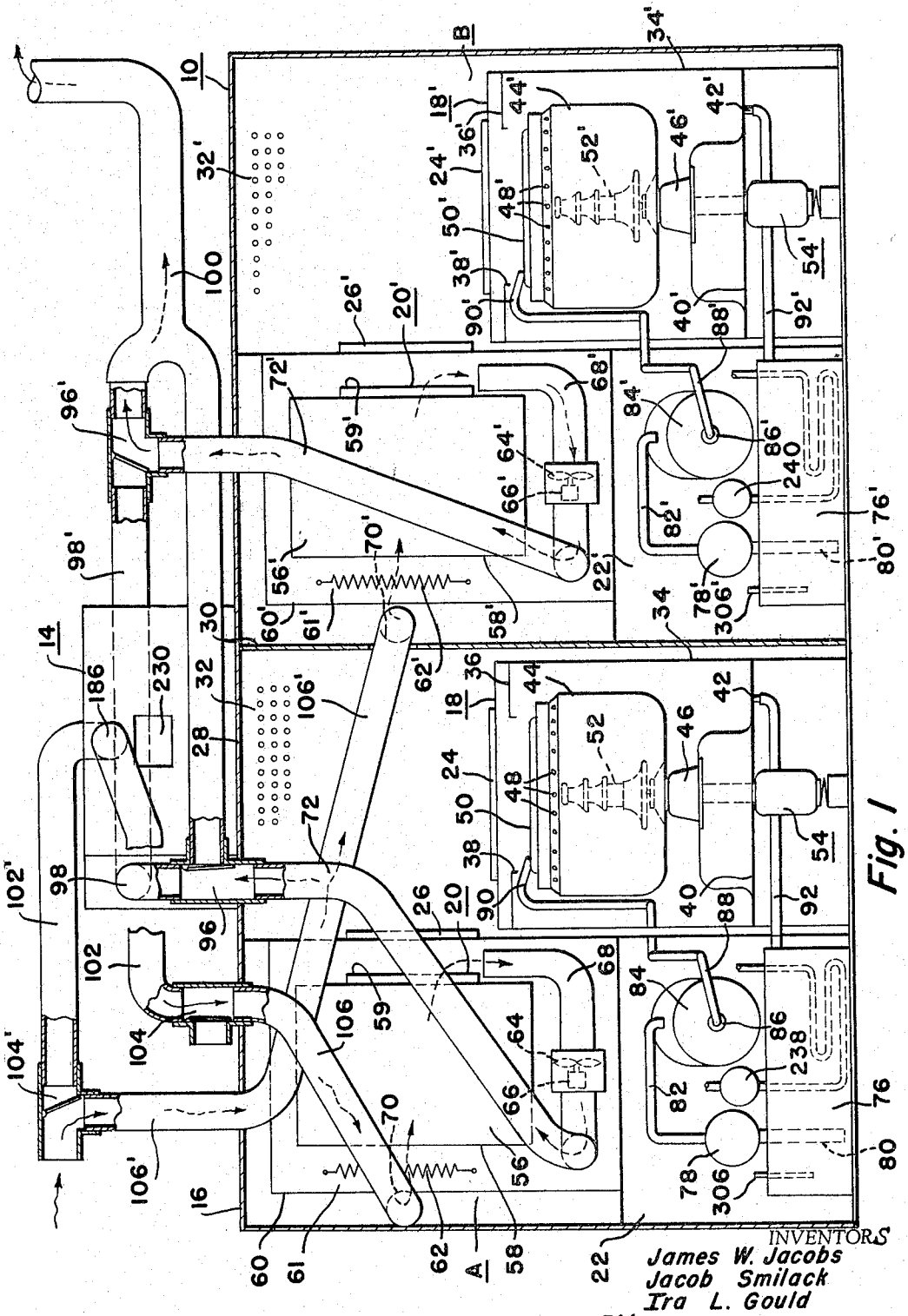


Fig. 1

INVENTORS
James W. Jacobs
Jacob Smilack
Ira L. Gould
BY J. C. Evans
Their Attorney

DRY CLEANER WITH REFRIGERATED SOLVENT RECLAIMING SYSTEM

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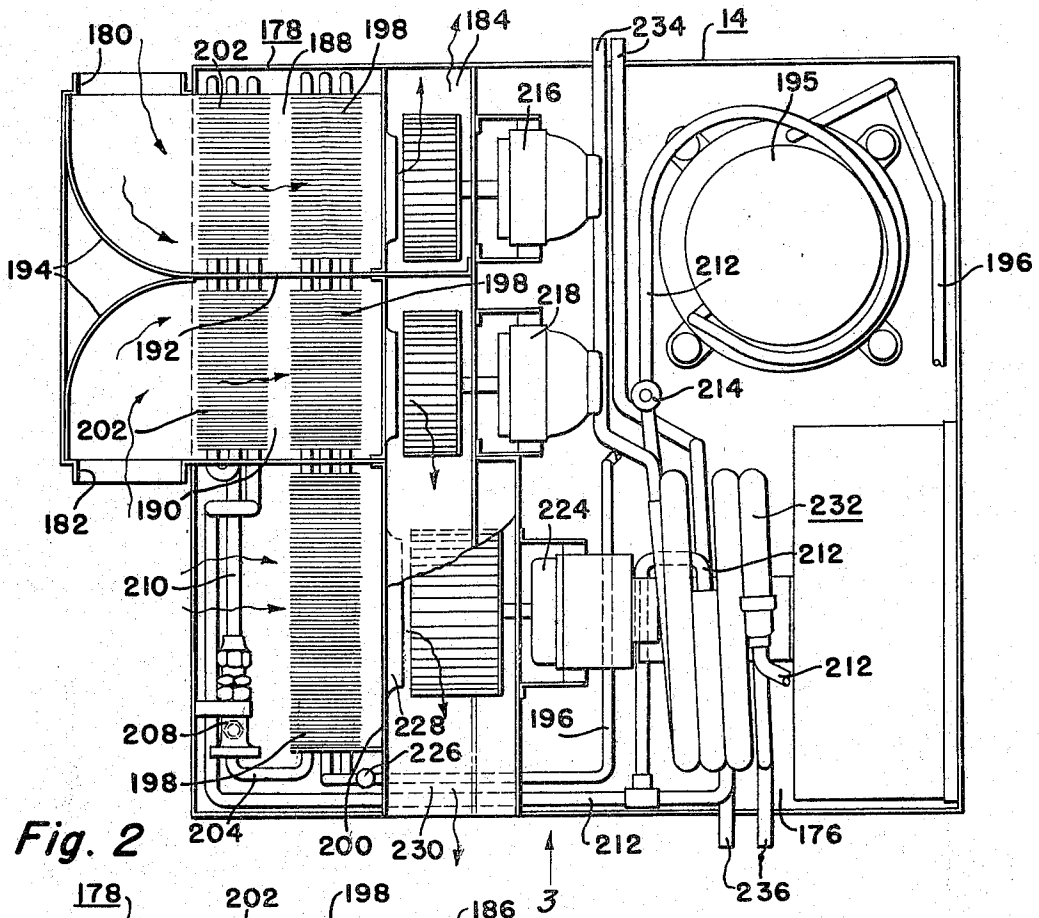


Fig. 2

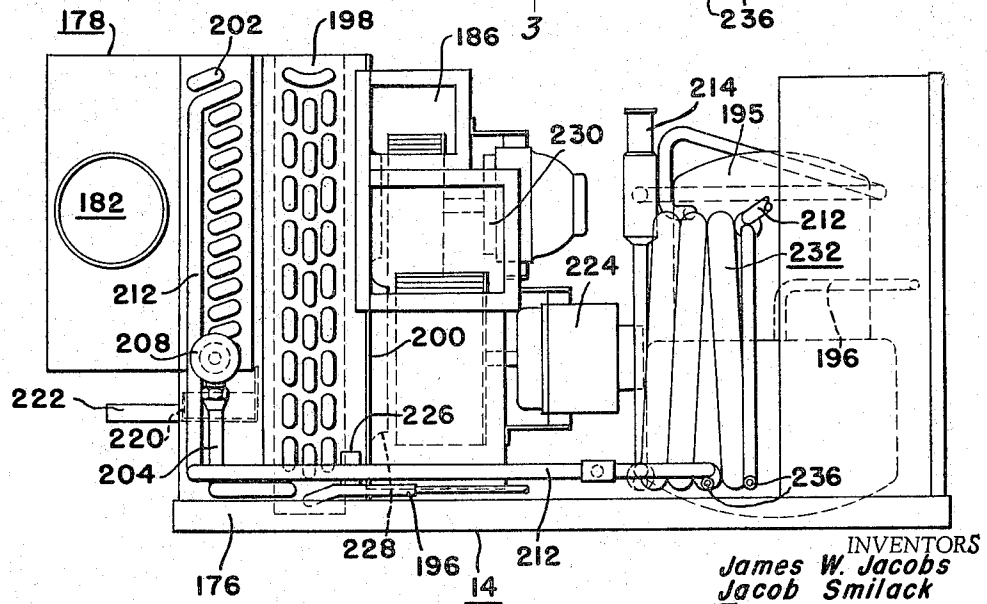


Fig. 3

INVENTORS
James W. Jacobs
Jacob Smilack
Ira L. Gould
BY J. C. Evans
their Attorney

DRY CLEANER WITH REFRIGERATED SOLVENT RECLAIMING SYSTEM

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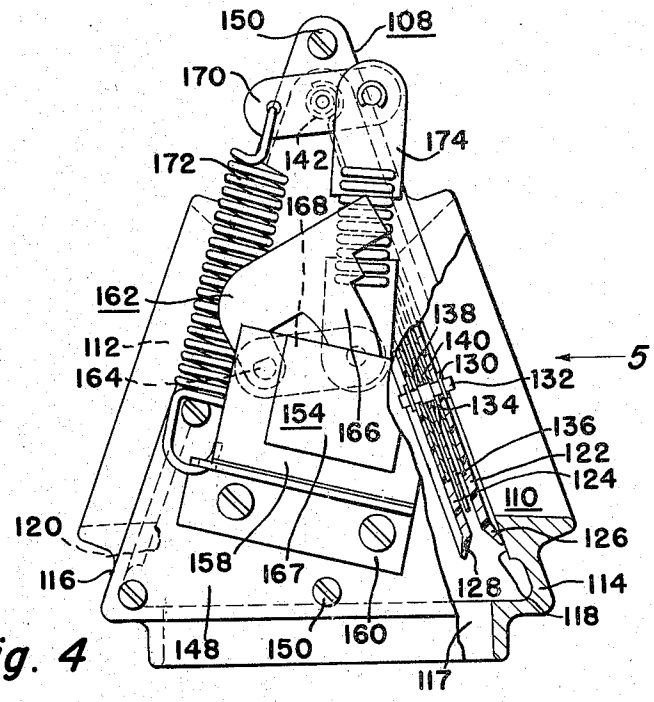


Fig. 4

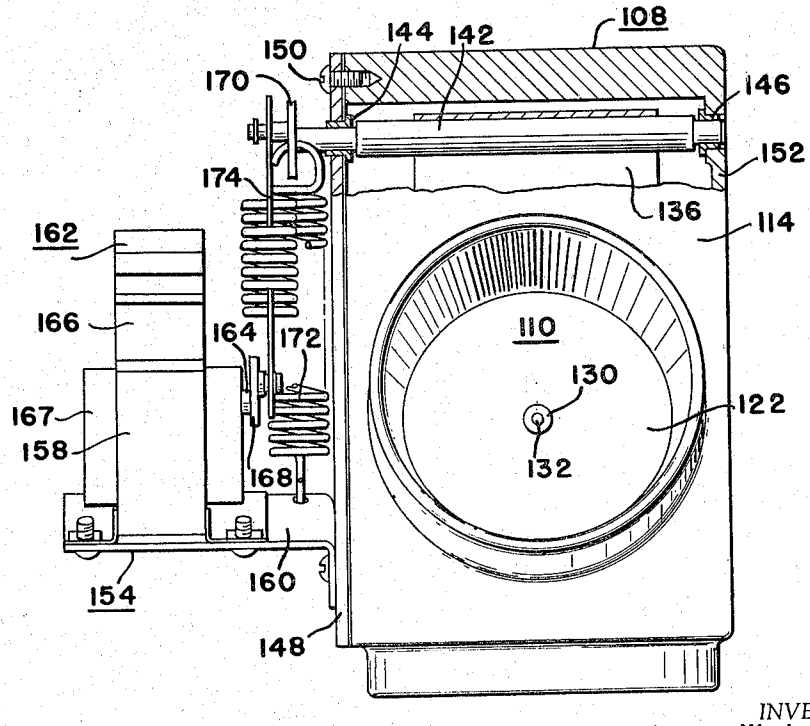


Fig. 5

INVENTORS
James W. Jacobs
Jacob Smilack
Ira L. Gould
BY J. C. Evans
Their Attorney

DRY CLEANER WITH REFRIGERATED SOLVENT RECLAIMING SYSTEM

Filed April 29, 1963 4 Sheets-Sheet 4

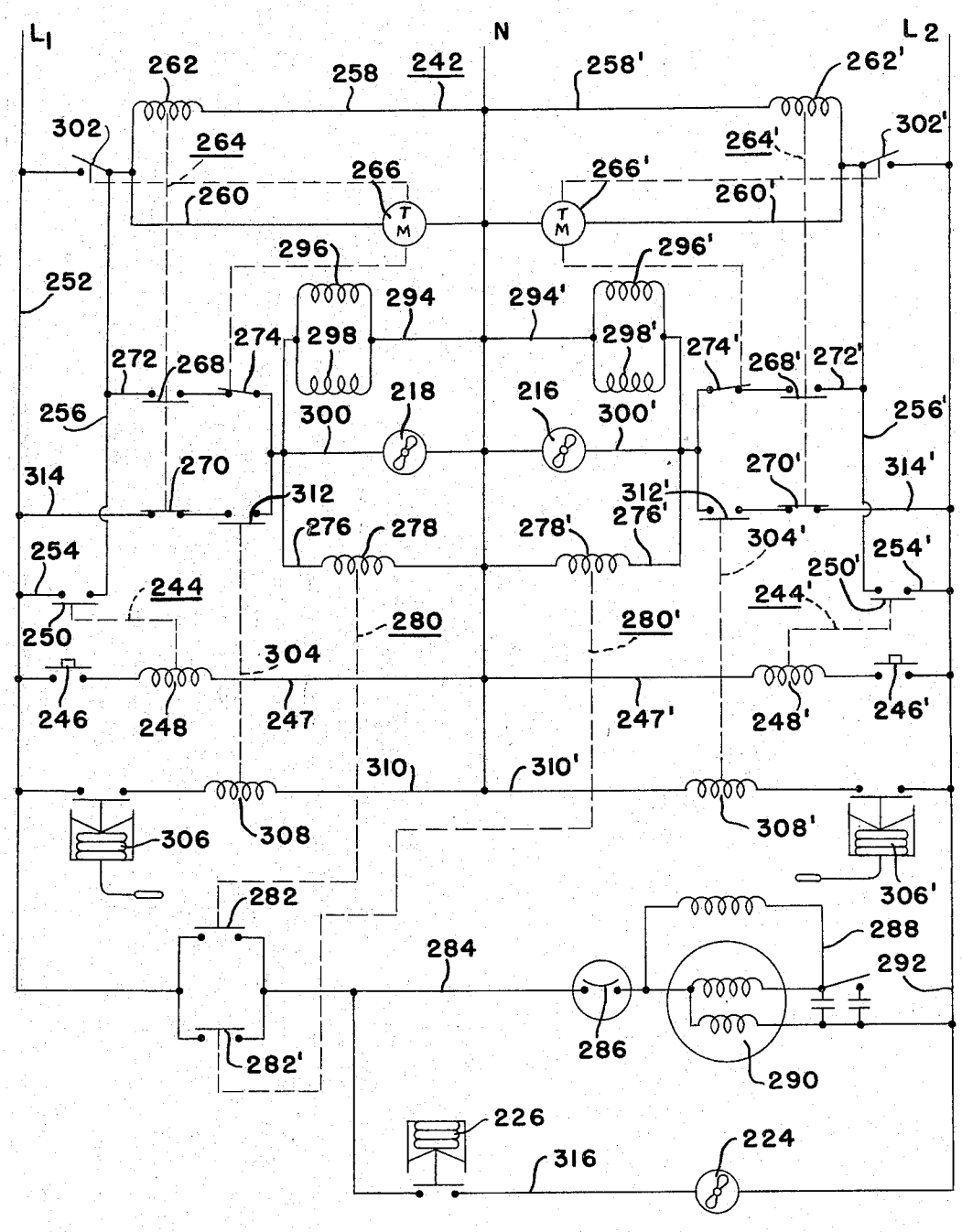


Fig. 6

INVENTORS
James W. Jacobs
Jacob Smilack
Ira L. Gould
BY J. C. Evans
Their Attorney

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DRY CLEANER WITH REFRIGERATED SOLVENT RECLAIMING SYSTEM

James W. Jacobs and Jacob Smilack, Dayton, and Ira L. Gould, Hamilton, Ohio, assignors to General Motors Corporation, Detroit, Mich., a corporation of Delaware

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3 Claims. (Cl. 34—76)

This invention relates to dry cleaner systems and more particularly to improved means for recovering cleaning solvent from such systems.

Self-service or other dry cleaning systems often include dryer means for removing substantially all of the cleaning solvent remaining in clothes following a cleaning operation. The dryer means vaporizes the solvent and then it is vented to atmosphere. The problem with such an arrangement is that the solvent vented to atmosphere often represents a substantial part of the solvent used in the cleaning operation. Such waste, therefore, can materially increase the operating costs of the dry cleaning system.

Accordingly, an object of the present invention is to reduce the cost of operating dry cleaning systems by including improved means in association therewith for reclaiming vaporized solvent vented therefrom.

A further object of the invention is the provision of an improved solvent reclaiming arrangement for association with a dry cleaning system including means for selectively reclaiming solvent and deodorizing clothes during dryer operation.

Still further objects of the invention are to provide an improved refrigerated vaporized solvent reclaiming unit for association with a dry cleaning unit; and to provide such a unit including means to increase the vapor solvent concentration in the vicinity of an evaporator portion of the unit for increasing the solvent extraction efficiency thereof.

Still another object of the present invention is to provide a refrigerated vaporized solvent reclaiming unit including an auxiliary cooling unit associated with the condenser portion of the recovery unit for maintaining a predetermined condenser pressure required for maximum evaporator efficiency during the reclaiming operation.

Yet another object of the present invention is to provide a compact refrigerated vaporized solvent reclaiming unit for recovering vaporized solvent from a dry cleaning system having a plurality of dryers.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of the present invention are clearly shown.

In the drawings:

FIGURE 1 is a diagrammatic view of a dry cleaning system including the present invention;

FIGURE 2 is a view in top elevation with parts broken away of a refrigerated solvent reclaimer unit;

FIGURE 3 is a view in side elevation looking in the direction of arrow 3 in FIGURE 2;

FIGURE 4 is a view in side elevation partially sectioned of a damper valve element of the present invention;

FIGURE 5 is a view in elevation looking in the direction of arrow 5 in FIGURE 4 with parts thereof being sectioned; and

FIGURE 6 is a schematic wiring diagram for controlling the present invention.

FIGURE 1 schematically illustrates a dual unit dry cleaning system **10** operatively associated with a refrigerated solvent reclaimer unit **14** constructed in accordance with certain of the principles of the present invention. The dual dry cleaning system **10** includes an outer cabinet **16** for partially enclosing two like dry cleaning units A and B of the type more detailedly set forth in the United States application of Jacobs et al., Serial No. 105,733, filed April 26, 1961, now abandoned, which application is incorporated by reference herein, with it being understood that the units are merely representative of a type of unit having a vented clothes dryer apparatus suitable for association with the improved venting and solvent reclaiming system of the present invention. Reference will primarily be directed toward unit A with like elements in unit B being designated with primed numerals in the drawings. Thus, unit A includes a clothes cleaner or agitating apparatus **18** and a clothes dryer or drying apparatus **20**. The clothes dryer **20** is elevated above the floor to provide for a solvent filter compartment cabinet **22** therebelow. It should be pointed out that the clothes cleaner **18** and clothes dryer **20** have access doors **24** and **26**, respectively, located in a confined area defined by a top wall **28** and a side wall **30** of the outer cabinet **16** with a perforate grill **32** at the rear of the confined space, in combination with any suitable exhausting arrangement, serving to withdraw fumes from the confined area whenever either access door **24** or **26** is opened.

For purposes of this specification, it will be sufficient to point out that the cleaner or agitating apparatus **18** includes a generally cylindrical and imperforate solvent container **34** with an upper portion **36** having an access opening **38** therein in axial alignment with the top access door **24**. A bulkhead **40** closes the lower end of the solvent container **34** and includes a drain **42** in the lowermost portion thereof. A generally cylindrical spin tub **44** is rotatably supported by a resilient inverted cup-like member **46** on the bulkhead **40** and includes a plurality of circumferentially arranged outflow ports **48** around an upper portion thereof. The tub **44** has a top access opening **50** therein axially aligned with the opening **38** and washer access door **24** immediately thereabove. Within the spin tub **44**, an agitator **52** is mounted for vertical reciprocation relative thereto. A motor driven actuating and spinning mechanism is shown generally at **54** to actuate or vertically reciprocate the agitator **52** during one phase of the operation thereof and to rotate or spin the tub **44** during another phase of the operation thereof. By way of suggesting one suitable agitating and spinning mechanism such as **54** but not by way of limiting this invention, reference may be had to the United States patent to Clark 2,422,395, issued June 17, 1947.

The clothes dryer **20** is a conventional horizontally rotatable type unit as taught in the patent to Whyte 2,843,945, issued July 22, 1958, and includes a tumbling drum **56** having a perforate rear wall **58** and a front access opening **59** in alignment with the dryer access door **26**. The drum **56** is enclosed by a dryer housing **60** which, in cooperation with the drum **56**, forms a space **61** having a heating element **62** therein disposed adjacent the perforate rear wall **58** adapted to be energized for drying clothes within the tumbling drum **56**. During operation of the heating element **62** and rotation of the tumbling drum **56**, air is circulated by a fan **64** driven by a motor **66** or connected to a conventional pulley system (not shown) for rotating the tumbling drum **56**. The fan **64** is communicated with the front access opening **59** of the tumbler drum **56** by an inlet duct **68** for circulating air from a vent opening **70** in the dryer housing **60** through the perforate rear wall **58** of the tumbling drum **56**, the access opening **59** therein and thence through the inlet duct **68** and out an exhaust duct **72** from the discharge side of fan **64**. The dryer **20** includes control means for initiating a predetermined drying cycle only after a wash cycle has been concluded, as more specifically set forth in the above-mentioned application of Jacobs et al.

A circulation system for a dry cleaning fluid or solvent, such as perchloroethylene (a somewhat toxic dry cleaning fluid) or Valclene, a non-toxic dry cleaning fluid (which is essentially a fluorinated hydrocarbon such as Freon 113 made by Du Pont Corporation), is illustrated in FIGURE 1 as including a sump **76**, a pump **78** having an inlet line **80** thereto communicating with the lower portion of the sump **76** for drawing liquid solvent therefrom and discharging it through a discharge line **82** communicating with a filter **84**. At one end of the filter **84** an outlet fitting **86** connects by way of a conduit **88** to the tub access opening **50** with a terminal portion **90** of the conduit **88** overlying the top of the spin tub **44**. Completing the solvent circulating system is a conduit **92** connecting the drain outlet **42** of the solvent container **34** to the sump **76**.

The fluid solvent circulation system operates as follows. The pump draws dry cleaning fluid or solvent from the sump **76** and discharges it through the filter **84** into the spin tub **44** and when the level of dry cleaning fluid within the spin tub **44** reaches the outlet ports **48** therein, it will overflow into the solvent container **34** and drain by gravity through the outlet opening **42** thereof through the return conduit **92** to the sump **76**.

Following a predetermined clothes cleaning cycle, the clothes are removed from the cleaner unit **18** through the access door **24** thereof and inserted through the access door **26** into the tumbling drum **56** of the dryer unit **20** and then suitable control means are actuated for energizing the heating element **62** and tumbling drum **56** to initiate the drying operation during which time liquid dry cleaning solvent in the clothes is vaporized and drawn therefrom through the exhaust duct **72**.

In accordance with certain of the principles of the present invention, the vaporized solvent that is drawn from the dryer unit **20** through the exhaust duct **72** is directed through the refrigerated vaporized solvent recovery unit **14** and thence back through the dryer unit **20** until a substantial portion of the vaporized solvent has been extracted from the dry cleaning system **10** during the drying cycle thereof. In the past, such vaporized solvent has often been vented directly to atmosphere during which time fresh air has been drawn through the dryer unit **20** for deodorizing the clothes therein. In the present invention, means are provided in association with the dryer for selectively communicating the dryer unit **20** with atmosphere following a predetermined reclaiming cycle in order to pass fresh air therethrough for deodorizing clothes therein.

More particularly, with reference to unit A, the system for reclaiming vaporized solvent from the dryer unit **20** and for deodorizing the dryer following a predetermined drying cycle includes connecting the terminal end of the exhaust duct **72** with one opening in a three-way damper valve assembly **96** that has a second opening therein communicating with a duct **98** for directing fluid flow into the reclaimer unit **14**. The valve assembly **96** has the third opening thereof communicating with a duct **100** for venting fluid to atmosphere. The system further includes a duct **102** from the unit **14** that communicates with one opening in a three-way damper valve assembly **104** having another of its openings communicating with a duct **106** for directing fluid through the opening **70** in the dryer housing **60**. The valve assembly **104** has its third opening in communication with atmosphere. The dryer unit **20'** of the B part of the dry cleaning system **10** is connected to the reclaimer unit **14** by a substantially identical duct and valve arrangement in which components like those connecting unit A to the reclaimer unit **14** are designated by primed numerals.

The damper valve assemblies **96**, **104** are selectively actuatable to either serially interconnect the dryer unit **20** with the reclaimer unit **14** or by-pass the reclaimer unit **14** and communicate the dryer unit **20** with atmosphere depending upon whether or not it is desired to reclaim vaporized solvent from the dryer **20** or deodorize clothes therein.

In accordance with other principles of the present invention, each of the three-way damper valve assemblies includes improved means for effectively sealing the reclaimer unit from atmosphere during both reclaiming and deodorizing cycles to prevent the escape of vaporized solvent therefrom. The improved damper valve assembly, as best illustrated in FIGURES 4 and 5, includes an open-ended tapered housing **108** having openings **110**, **112** in side walls **114**, **116**, respectively, thereof adapted to be communicated with ducts directing fluid between the reclaimer unit **14** and the dryer units **20**, **20'**. The housing **108** also has an opening **117** formed in the bottom thereof adapted to be communicated with atmosphere.

The damper valve assembly further includes a pair of spaced vlave seats **118**, **120** formed in the inside surface of the side walls **14**, **116**, respectively, in surrounding relationship with the openings **110**, **112** therein. The valve further includes a pair of substantially circular, dished-out sealing units **122**, **124** of a suitable resilient material, such as a polyurethane plastic, each having a tapered outer edge **126**, **128**, respectively, whereby each of the sealing units **122**, **124** will compress in tight sealing relationship with its respective valve seat when the tapered outer edge thereof is in engagement therewith.

Each of the sealing units **122**, **124** is secured by means of a snap ring **130** to a pin **132** directed through an oversized opening **134** in a flapper supporting plate **136** whereby a slight pivotal movement is provided between the plate **136** and each of the sealing units **122**, **124** so there will be a self-centering of the units when they engage their respective valve seats. Spring washers **138**, **140** in surrounding relationship with the pin **132** on either side of the plate **136** hold the sealing units **122**, **124** in spaced relationship with the plate **136**.

The flapper supporting plate **136** has one end thereof secured to an actuatable arm **142** having the ends thereof supported in bearings **144**, **146** mounted in the upper end of a front access plate **148** secured to the housing **108** by suitable means such as screws **150** and a rear wall portion **152** of the housing **108**, respectively, whereby the arm **142** can be pivoted therein by actuating means including a solenoid actuating device **154** for pivoting the flapper supporting plate **136** until the sealing units **122**, **124** seat on their respective valve seats. The solenoid actuating device **154** is representatively shown as including a frame **158** supported on an angle element **160** secured to the access plate **148**. A core element **162** is secured to a pin **164** pivotally mounted in the frame **158** whereby a leg portion **166** of the core **162** is free to move into and out of a coil **167** depending upon the electrical energization thereof. The solenoid **154** further includes a link **168** secured on one end of the pin **162** directed outwardly of frame **158**. A link **170** connected to one end of the arm **142** has one end thereof connected to the angle element **160** by means of a spring **172** and has the opposite end thereof connected to the link **168** of the solenoid actuating device **154** by means of a spring-modulated link **174**. With this arrangement, depending upon the energization of the solenoid device either the spring **172** or the spring-modulated link **174** will act upon the link **170** to pivot the arm **142** and thereby resiliently bias one of the outer peripheral edges **126**, **128** of the sealing units **122**, **124** against its respective valve seat to assure a relatively tight seal thereacross for preventing the escape of vaporized solvent from the reclaimer unit **14**.

Referring now to FIGURES 2 and 3, the improved refrigerated solvent vapor reclaiming unit **14** is more particularly illustrated as including a base **16** for supporting the unit at a suitable location such as on top of the outer cabinet **16** of units A and B. The base **176** has an enclosed housing **178** at one end thereof having inlet openings **180**, **182** adapted to be connected to one end of the

connecting ducts 98, 98', respectively. Outlet openings 184, 186 are formed on either side of the enclosed housing 178 and are adapted to be connected to one end of the connecting ducts 102', 102, respectively. The inlet openings 180, 182 communicate with the outlet openings 184, 186 through substantially parallel passageways 188, 190 formed within the enclosed housing 178 by a wall 192 directed transversely thereof with fluid flow through the passageways 188, 190 being smoothly directed thereto from the inlet openings 180, 182 by a curved deflector plate 194 blocking communication therebetween. An electric motor driven refrigerant compressor 195 located on the opposite end of the base 176 from the enclosed housing 178 has a discharge line 196 directed outwardly thereof connecting to a condenser 198 located adjacent the end frame member 200 of the enclosed housing 178 immediately downstream of an evaporator unit 202 for receiving refrigerant from the condenser 198 directed thereto through a conduit 204 and an expansion device representatively illustrated as an expansion valve 208 connected to the evaporator by a conduit 210. Vaporized refrigerant from the evaporator 202 passes through a return tube 212 to the suction side of the compressor 195 in a conventional fashion. An evaporator pressure regulating valve 214 in the return tube 212 is provided to prevent a pressure in the evaporator that would reduce the temperature thereof to a point where it might frost up and consequently block fluid flow thereacross. During the operation of the refrigerant compressor 195, electric motor driven fan units 216, 218 having the impellers thereof located in each of the passageways 188, 190, respectively, will circulate air having vaporized solvent from the dryer units 20, 20' across the evaporator and condenser units 202, 198 during the reclaiming cycle portion of the operation of the system. The evaporator 202 serves as a cooling surface for condensing vaporized solvent in the fluid stream circulated thereacross by the fan units 216, 218. The solvent condensed on the surface of the evaporator unit 202 will collect in a pan 220 in the lower portion of the enclosed housing 178 with the pan having an outlet 222 connected thereto adapted to be connected to means including a suitable solvent-water separator (not shown) for returning the condensed solvent to the liquid solvent sump of the dry cleaning system.

In accordance with certain other of the principles of the present invention, the provision of circulation passageways 188, 190 formed by the wall 192 for directing flow from the dryers across only a portion of the evaporator surface results in a substantial percentage of vaporized solvent in the vicinity thereof even when only one dryer unit is connected in reclaiming cycle. Thus, extraction is maintained at an optimum level through all phases of operation of the dry cleaning system.

Another feature of the improved reclaimer is that any condensed cleaner solvent that is carried over by the circulation of fluid through the passageways 188, 190 is revaporized by the condenser 198 to be extracted from the dryer in a subsequent recirculation of the fluid stream therefrom across the evaporator 202.

In order to improve the extraction of vaporized solvent from the circulating fluid stream passing through the dryers during a reclaiming cycle, the reclaimer unit includes means for compensating for heat input from the reclaimer system into the fluid stream recirculating therethrough. More particularly, this compensation is provided by means of an auxiliary fan unit 224 for circulating air across an auxiliary condenser portion of condenser 198 when a predetermined pressure in the condenser 198 is sensed by a pressure switch 226. Thus, when the temperature of the recirculated air is raised to a predetermined value, the condenser pressure will increase to cause the pressure switch 226 to close a circuit for energizing the electric motor driven fan 224 to cause ambient air to be drawn through an inlet opening 228 in the enclosed housing 178 and passed through an exhaust opening 230 formed in the side thereof beneath the outlet opening 186. The air circulated across the auxiliary condenser portion of condenser 198 by the fan 224 will reduce the temperature of the refrigerant therein to overcome the heating effect of the wattage input of the reclaimer system.

The refrigerant return tube 212 is coiled rearwardly of the motor driven fan 224 to form a solvent chiller 232 in heat transfer relationship with looped lines 234, 236 communicating with pumps 238, 240, respectively, for circulating a coolant in sumps 76, 76' to thereby maintain the solvent in the cleaning cycle at a predetermined desired temperature.

The operation of the improved refrigerated solvent reclaimer unit will now be explained more fully with reference to FIGURE 6 wherein an electrical control circuit 242 is illustrated for controlling the solvent reclaiming and deodorizing cycles of the dry cleaning system 10. The operation of the cleaning and drying units 18, 20 of unit A of the system 10 are controlled by any suitable control circuit, for example, the control circuit set forth in detail in the above-mentioned Jacobs et al. patent whereby the tumbling drum, heater, and dryer fan components of the dryer units are continuously energized during the reclaiming and deodorizing cycles to be discussed.

The reclaimer control circuit 242, more particularly, includes identical circuits for each of the units A and B, with a portion of the circuit for controlling, reclaiming and deodorizing of the dry cleaning unit A being specifically set forth and the like portion of the circuit for controlling the dry cleaning unit B being designated by like primed numerals in the drawings, it being understood that the operation thereof is like that of unit A. The circuit 242 is electrically connected to a suitable power source, such as a conventional three-wire source of 240 volt, 60 cycle current that has wires L1, L2 and a neutral wire N with 120 volt current being present across L1–N and L2–N and 240 volt current being present across L1–L2.

When clothes are initially placed in dryer 20 the reclaiming control circuit for unit A is initially energized by means of a holding relay 244 actuatable by a dryer push-button switch 246 in a conductor 247 between L1 and N. The switch 246 is operatively a part of the dryer control circuit of the Jacobs et al. arrangement serving to start tumbling of the dryer drum 56, heating of heater 62 and the fan 64. When the switch 246 is closed a potential is produced across an actuating coil 248 of the relay 244 to close a switch portion 250 thereof. This completes a circuit from L1 through conductors 252, 254 and thence across the closed contacts of the switch 250, a conductor 256 and parallel conductors 258, 260 to the neutral wire N. Completing the aforesaid circuit energizes an actuating coil 262 of a chill relay 264 and further energizes a timer motor 266 electrically connected in the conductor 260. Energization of the actuating coil 262 operates a normally open switch portion 268 and normally closed switch portion 270 of the relay 264 whereby the switch 268 closes to complete a circuit from L1 through conductors 252, 254, switch 250, conductor 256, a conductor 272 electrically connected to the conductor 256 and to the switch 268, a closed timer motor switch 274 and thence through a conductor 276 electrically connected to the wire N. This energizes an actuating coil 278 in conductor 276 of a reclaimer unit relay 280 for closing a switch portion 282 thereof.

When the switch 282 of the reclaimer unit relay 280 is closed, a circuit is completed between lines L1, L2 through conductor 252, the closed switch 282 and thence through a conductor 284 electrically connected through an overload relay 286 and starting relay 288 of a motor 290 for driving the refrigerant compressor 195 and thence through a conductor 292 electrically connected to the line L2. Closing the chill relay switch 268 also completes a circuit from L1 through conductors 252, 254, closed switch 250, conductors 256, 272, closed switches 268, 274 and

thence through a conductor 294 electrically connected to the neutral wire N through damper relays 296, 298 to energize solenoid coils for controlling damper valve assemblies such as that illustrated in FIGURES 4 and 5. Energization of the damper relays 296, 298 will condition the damper valve assemblies into positions illustrated best in FIGURE 1 wherein the reclaimer unit 14 is serially connected to the dryer unit 20 by means of the inlet ducts 102, 106 and the exhaust ducts 72, 98. Concurrently with energization for conditioning of the damper valve assemblies, current passes from the conductor 272 through a conductor 300 electrically connecting the fan motor 218 to the neutral wire N whereby the motor 218 will drive the impeller associated therewith for drawing a fluid stream from the exhaust duct 72 through the three-way valve assembly 96, the duct 98 and thence through the opening 182 into the closed housing 178, the passageway 190 and thence out the outlet 186 of the reclaimer unit to be returned through the duct 102, three-way valve assembly 104 and duct 106 into the dryer unit 20. As the fluid is circulated through the circuit by the fans 64 and 218, the refrigerant compressor 195 is driven by the motor 290 to lower the temperature of the evaporator unit 202. Following a predetermined period of time the heated fluid circulating through the drum and the tumbling action thereof will increase the solvent concentration in the fluid stream to a point where the cool surface of the evaporator will begin to condense solvent therefrom.

Following the initial energization of the timer motor 266, a switch 302 thereof closes to electrically connect the conductor 252 to the conductor 256 to thereby maintain energization of the chill relay 264, timer motor 266, damper relays 296, 298, fan motor 216 and reclaimer unit relay 278 following release of the push-button 246 and de-energization of the holding relay 244 that opens the switch 250 so that the reclaimer unit will complete its cycle of operation.

Once the timer switch 302 has closed, the reclaiming cycle will continue for a predetermined period of time as controlled by the timer motor switch 274. Following a predetermined desired period for reclaiming vaporized solvent from the dryer unit 20, the timer motor 266 will open the switch 274. When the switch 274 is opened, the damper relays 296, 298, fan motor 216, and reclaimer unit relay 280 are concurrently de-energized. This conditions the three-way damper valve assemblies so that they seal off the reclaimer unit 14 and communicate the dryer 20 with atmosphere for deodorizing clothes following the reclaiming cycle.

Such an arrangement of the three-way damper valve assemblies is illustrated in FIGURE 1 reference being made now to unit B. In unit B the damper valve 104' is positioned so that fresh air is drawn from atmosphere through the inlet duct 106', the tumbling drum 56', and thence through the duct 68', fan 64', exhaust duct 72', and thence through the three-way valve 96' into the atmospheric vent 100. Suitable control means in the system for controlling the dry cleaning units A and B are conditioned so that the tumbling drum 56', heater 62' and fan 64' remain energized following the reclaiming cycle whereby heated fresh air is circulated through the drum 56' for a predetermined period of time for deodorizing the clothes therein.

A further feature of the control circuit 242 is the provision of a solvent cooling thermostat relay 304 therein for controlling the cooling of the liquid solvent in the sump 76 at a predetermined desired temperature during periods in which the reclaimer unit is not removing solvent from the dryer units.

For example, during the cleaning cycle of the dry cleaning operation, the temperature of the solvent in the sump increases due to the wattage input to the cleaner drive system. Referring now to unit A, such a temperature increase is controlled by a thermostatic switch 306 located in heat transfer relationship with the solvent in the sump 76. On the occurrence of a predetermined sensed temperature the switch 306 closes to complete a circuit through an actuating coil 308 of the cooling thermostat relay 304 that is located in a conductor 310 electrically connected between L1 and N. The energized actuating coil 308 will close a switch 312 to complete a circuit from line L1 through conductor 252, a conductor 314, the normally closed switch 270 of the chill relay 264, the closed switch 312, and thence through the conductors 294, 300, 276 for energizing the damper relays 296, 298, the fan motor 216 and then reclaimer unit relay 278 whereby the compressor motor 290 of the reclaimer unit 14 is energized to cause the chilling coil 232 to reduce the temperature of coolant passing through lines 234 to thereby cool solvent in sump 76 under the cylical control of thermostat 306 independently of the reclaimer cycle.

A further feature of the control circuit 242 is the provision of the high-pressure switch 226 in a conductor 316 eletcrically connecting the fan 224 between lines L1, L2 during periods in which the pressure in the condenser 198 is increased above a predetermined desired level. The fan 224 draws cooling air across a portion of the condenser 198 to thereby decrease the pressure therein for maintaining optimum evaporator efficiency in the reclaiming unit 14.

From the above described operation, it will be appreciated that the dry cleaning units A and B can be concurrently operated in a reclaiming cycle or can be selectively arranged to reclaim vaporized solvent from one of the dryers while the other of the dryers is being deodorized or the system can be conditioned so that only one of the units is being reclaimed and deodorized while the other of the units is idle.

While the embodiments of the present invention as herein disclosed constitute preferred forms, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. In a dry cleaner system the combination of, a plurality of dryers, a refrigerant system including an evaporator for condensing vaporized solvent and a condenser, conduits for connecting said dryers in parallel across said refrigerant evaporator and condenser, means including said conduits for circulating fluid streams through said dryers and across said refrigerant evaporator and condenser, first and second fan means for drawing the fluid streams from said dryers across said refrigerator evaporator and condenser, means forming a plurality of separate passageways across said refrigerant evaporator and condenser each communicating with one only of said dryers and each having one of said fan means therein for maintaining a desired concentration of vaporized solvents in the vicinity of said evaporator to increase extraction of solvent from the recirculating stream, a third fan means, a switch responsive to a predetermined pressure in said refrigerant condenser for actuating said third fan means for circulating ambient air across said condenser to maintain the pressure therein at a predetermined level, actuatable valve means operatively associated with said conduits for selectively communicating said dryers with said refrigerant evaporator and condenser and atmosphere, and means for actuating said valve means to provide a predetermined solvent reclaiming and deodorizing cycle in the operation of said dryers.

2. In a dry cleaner system the combination of, a dryer, a refrigerant system having an evaporator for condensing vaporized solvent from said dryer and a condenser, a housing for enclosing said evaporator and condenser having inlet and outlet openings therein, means including conduits for circulating a fluid stream through said dryer, actuatable valve means operatively associated with said conduits for selectively communicating said dryer with atmosphere and with said inlet and outlet openings in said enclosed housing including a pair of valve seats, a flapper plate having sealing units on either side thereof dished out to form a relatively yieldable outer periphery compressi-

ble against said spaced apart valve seats for preventing fluid leakage between atmosphere and said enclosed housing, and means for actuating said flapper plate to provide predetermined solvent reclaiming and deodorizing cycles in the operation of said dryer.

3. In a dry cleaner system the combination of, a dryer, means including conduits for circulating a fluid stream through said dryer, a refrigerant system having an evaporator for condensing vaporized solvent from said dryer and a condenser, a housing for enclosing said evaporator and condenser having inlet and outlet openings therein, means including conduits for circulating a fluid stream through said dryer, a valve assembly including a housing having a first opening therein communicating with atmosphere, a second opening therein communicating with said conduits, and a third opening therein communicating with one of the openings in said enclosed housing, a pair of valve seats formed in the inside surface of said valve housing, said valve assembly further including a flapper plate having dished-out sealing units on either side thereof, each including a yieldable outer periphery compressible on one of said valve seats, a pin secured to said sealing units having a portion thereof supported by said flapper plate for pivotal movement relative thereto sufficient to produce a self-centering of each of said sealing units on its respective valve seat to compress the outer peripheries of said sealing units on said respective valve seats to prevent fluid leakage between said enclosed housing and atmosphere, and means for actuating said flapper plate to provide predetermined solvent reclaiming and deodorizing cycles in the operation of said dryer.

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FREDERICK L. MATTESON, JR., *Primary Examiner.*

WALTER A. SCHEEL, *Examiner.*

W. PRICE, C. R. REMKE, *Assistant Examiners.*