Nov. 23, 1965 M. A. MENK ETAL 3,218,730

TERMINATION CONTROL FOR A CONDENSING CLOTHES DRYER

Filed June 14, 1962 4 Sheets-Sheet 1

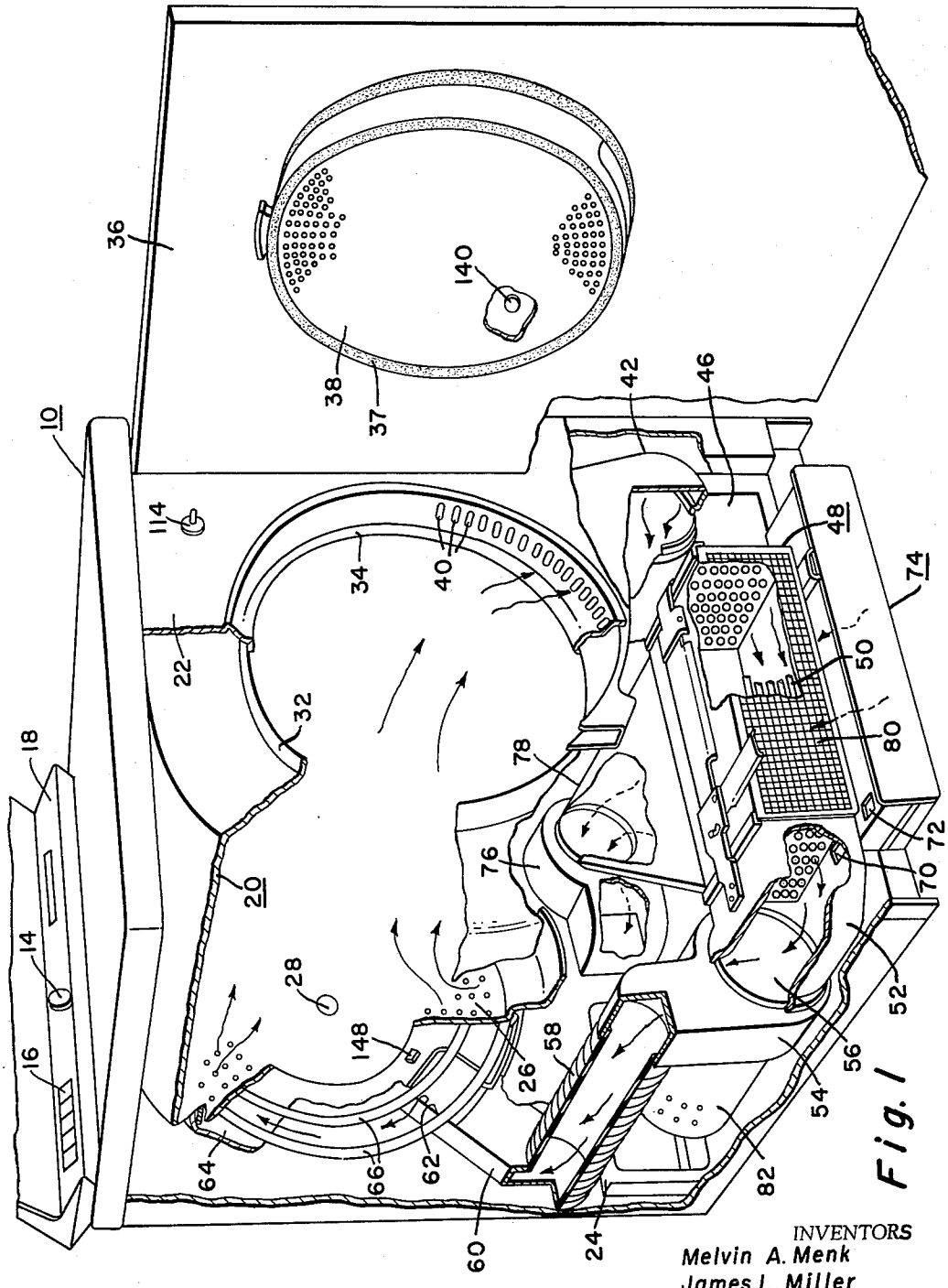

Fig. 1

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TERMINATION CONTROL FOR A CONDENSING CLOTHES DRYER

Filed June 14, 1962 4 Sheets-Sheet 2

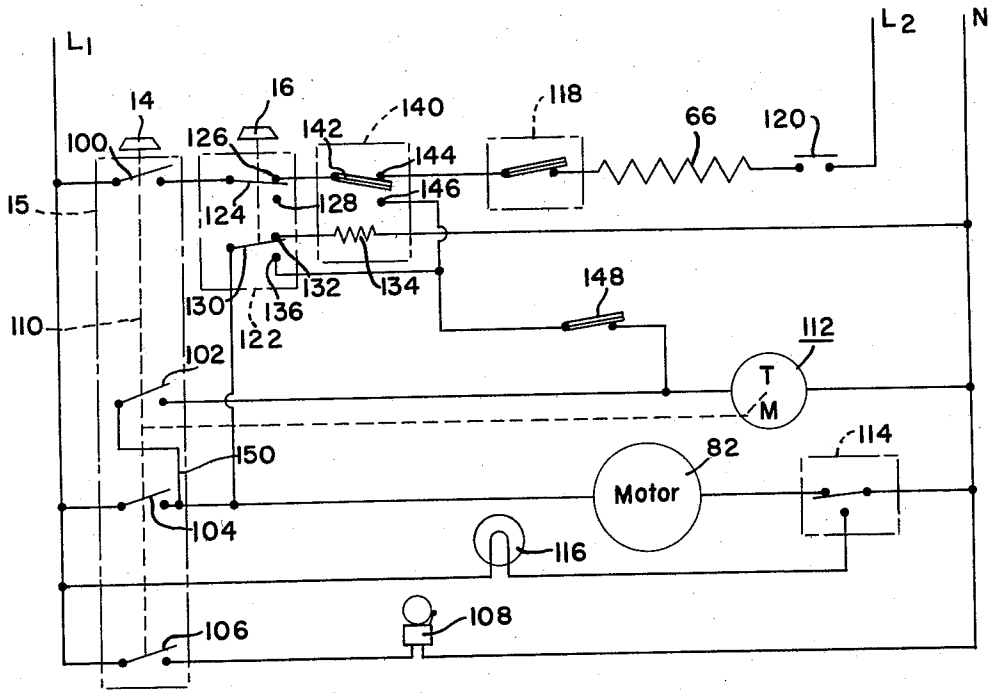

Fig. 3

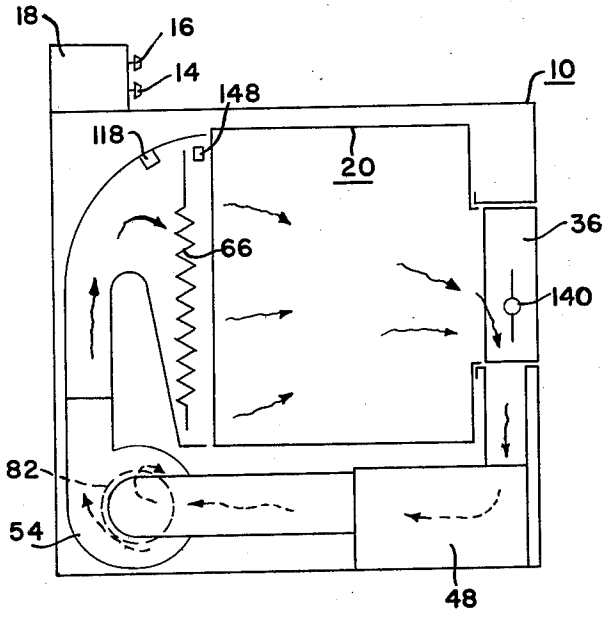

Fig. 2

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TERMINATION CONTROL FOR A CONDENSING CLOTHES DRYER

Filed June 14, 1962 4 Sheets-Sheet 3

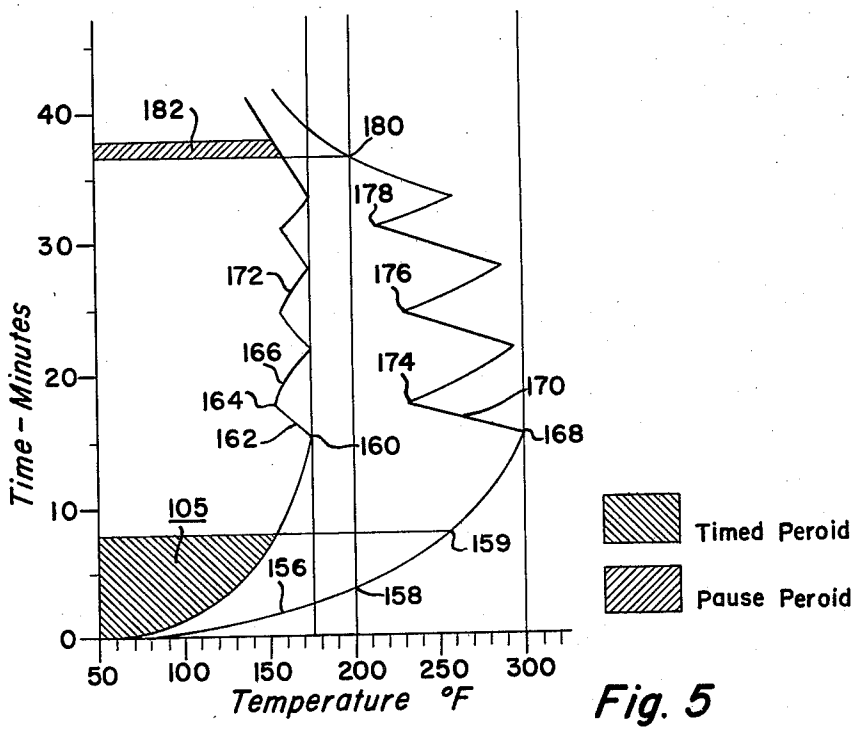

Fig. 5

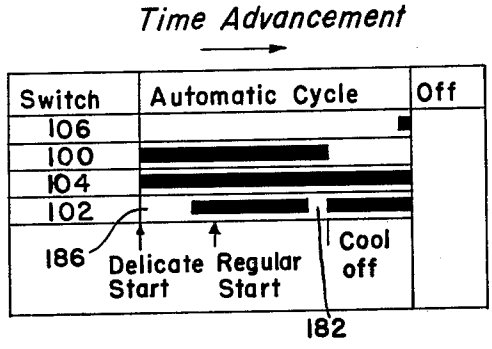

Fig. 4

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TERMINATION CONTROL FOR A CONDENSING CLOTHES DRYER

Filed June 14, 1962 4 Sheets-Sheet 4

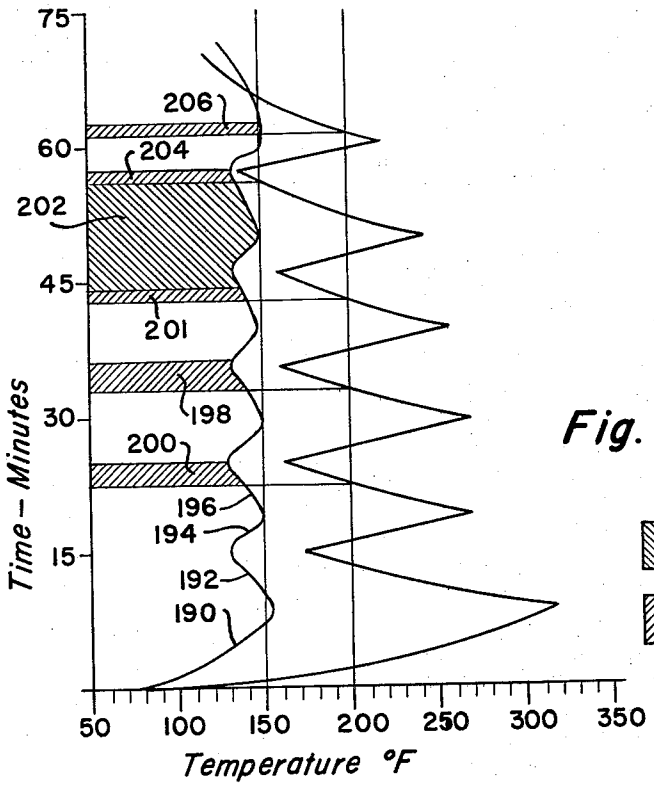

Fig. 6

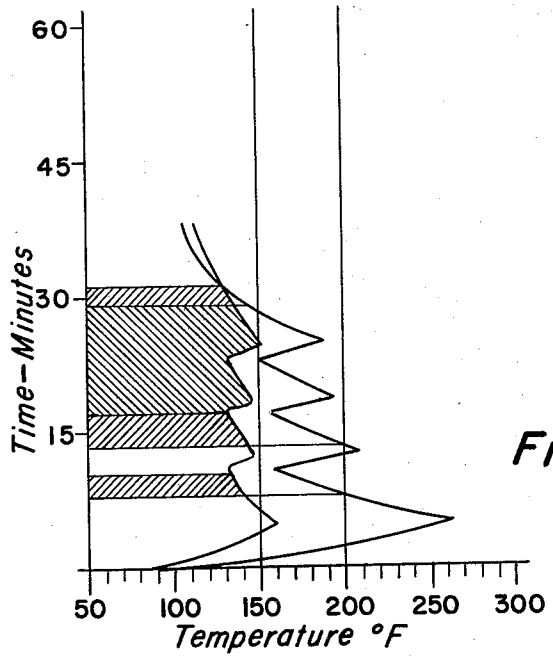

Fig. 7

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United States Patent Office 3,218,730 Patented Nov. 23, 1965

3,218,730

TERMINATION CONTROL FOR A CONDENSING CLOTHES DRYER

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Filed June 14, 1962, Ser. No. 202,486
12 Claims. (Cl. 34—45)

This invention relates to a domestic appliance and more particularly to an improved control arrangement for terminating a clothes drying cycle.

The clothes drying art has been faced with the disadvantage of venting the moisture laden exhaust products from a dryer to the outside atmosphere. For those situations where construction or other problems prevent outside venting, a condensing clothes dryer has been provided of the type taught generally in the patent to Whyte et al. 3,032,887, issued May 8, 1962. The condensing dryer includes a recirculating drying air flow system for picking up moisture from the clothes and a condensing means such as a cooling air flow system which blows in counterflow heat transfer relationship to the recirculating air. Thus, the recirculating air picks up moisture in the tumbling drum and, while passing through the condenser, is cooled by the cooling air flow system to release the entrained moisture as condensate.

Various controls have been used with condensing dryers to automatically terminate the drying cycle and it is to an improved control for this result that this invention is directed.

Accordingly, it is an object of this invention to terminate the drying cycle of a condensing dryer automatically.

Another object of this invention is the provision of a control for a condensing dryer which uses the temperature of the heated inlet air to terminate the drying cycle.

A more specific object of this invention is the provision of a control which includes a drying cycle termination thermostat in the heater chamber ahead of the tumbling drum to operate a timer motor, a drying temperature control thermostat in the exhaust air from the tumbling drum having an ON position for energizing the heater and an OFF position in series with said drying cycle termination thermostat, said drying cycle termination thermostat acting to terminate the drying cycle by continuously operating the timer motor when the heater is deenergized and the temperature of the air in the heater chamber falls below a predetermined value.

Another object of this invention is the provision of a drying cycle termination control having a preset temperature for terminating the drying cycle of regular fabrics at one temperature, a cycling control for regulating the temperature during drying and means for relating said termination control to said cycling control for terminating the drying cycle of delicate fabrics at a temperature different from said preset temperature.

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

In the drawings:

FIGURE 1 is a fragmentary perspective view of a condensing dryer with parts broken away to show a recirculating air flow system and a cooling air flow system suitable for use with this invention;

FIGURE 2 is a schematic representation of the condensing dryer detailed in FIGURE 1;

FIGURE 3 is a schematic wiring diagram of the inlet air temperature termination control of this invention;

FIGURE 4 is a timer cycle chart showing the positions of the timer switches in FIGURE 3;

FIGURE 5 is a graphic representation of a REGULAR load of clothes (cottons, linens, etc.) being automatically dried in accordance with the teachings of this invention;

FIGURE 6 is a graphic representation similar to FIGURE 5 for a six pound DELICATE load of clothes (man made fabrics such as nylon, Acrilon, etc.); and

FIGURE 7 is a graphic representation for a two pound DELICATE load.

In accordance with this invention and with reference to FIGURE 1, a condensing type clothes dryer **10** is illustrated. The clothes dryer **10** is comprised of an enclosing casing on the top of which is a control housing **18**. The housing **18** supports a control knob **14** which may be selectively positioned for initiating and controlling the drying cycle in accordance with the teachings of this invention and a knob **16** for setting the type of fabric to be dried and thus the temperature to be maintained during the drying cycle. A tumbling drum **20** is disposed within the casing and interposed between a front bulkhead **22** and a rear bulkhead **24**. The tumbling drum **20** is comprised of a perforated rear wall **26** which is rotatably supported on a stub shaft **28** journalled on the rear bulkhead **24**. Further, the tumbling drum **20** includes a cylindrical access collar **32** which is relatively rotatably supported by a front port blade **34** carried on the front bulkhead **22**. The access opening formed by the collar **32** is closed by a door shown at **36**. On the door is a lint collecting housing **38** which projects into the access opening collar **32** of the tumbling drum when the door is closed, an annular seal **37** engaging the port plate to force all air leaving the tumbling drum to travel through the lint collecting housing.

The recirculating air flow system is defined by perforations **40** in the front port plate **34** which open into a front duct **42**. This front duct opens into an inlet header **46** for a heat exchanger or condenser, shown generally at **48**. The condenser **48** is comprised of a plurality of slightly leftwardly sloping tubes **50** which interconnect the inlet header **46** with an outlet header **52**. A recirculating air blower **54** has its inlet **56** connected to the outlet of the outlet header **52** and impels air through a flexible conduit **58** to a rear duct **60** behind the rear bulkhead **24**. The rear duct has an opening **62** through the rear bulkhead **24** into an annular chamber formed by a generally channel-shaped annular pan **64** fastened to the front side of the bulkhead **24**. The annular channel or heater housing provides the means for enclosing and supporting the annular heating elements **66** in juxtaposition to the perforated rear wall **26** of the tumbling drum.

Thus, recirculating drying air is impelled by the blower **54** through the flexible conduit **58** to the rear duct **60**. From the outlet opening **62** in the rear duct **60**, air enters the heater chamber formed by the channel pan **64**. The air is heated by the heating element **66** and enters the tumbling drum **20** through the perforations in the drum wall **26**. Moisture is entrained from the clothes in the tumbling drum and this moisture laden air flows out of the drum by way of the access opening collar **32** and the lint collecting housing **38** into the front duct **42** by way of the port plate openings **40**. This air is channeled through the inlet header **46** for the condenser **48** and through the tubes **50** into the outlet header **52**. While traveling through the condenser tubes, moisture is deposited therein by the cooling air flow system which will be described next following and this moisture flows by gravity into the outlet header where an opening **70** channels the moisture to a mating opening **72** and a removable substantially enclosed envelope-like condensate container **74**.

The cooling air system for the condenser **48** is comprised of a cooling air blower **76** connected by way of a fan-shaped duct **78** to the rear side of the condenser tubes **50**. The blower **76** is effective to draw air through a screened opening **80** at the front of the condenser tubes, over the outside of the condenser tubes and into the duct **78**, from which point the air is impelled to the atmosphere. This relatively cool air will cool the condenser tubes **50** and cause condensation of moisture from the recirculating air therein.

A single prime mover or motor **82** is effective through a belt and pulley system (not shown) behind the rear bulkhead **24** to rotate the tumbling drum **20** and to drive the cooling air blower **76** and the recirculating air blower **54**.

The two air flow systems have been shown by arrows in FIGURE 1—the solid arrows indicating the recirculating air flow and the dashed arrows indicating the cooling air flow for the condenser **48**.

Turning now to FIGURE 2, the inlet air temperature dryer termination control of this invention will be described—components in FIGURE 2 carrying the same reference numeral as their counterparts in the detailed version of FIGURE 1. The basic relationship of the condensing dryer components shows the tumbling drum **20** in a recirculating air stream initiated by the blower **54**. Diposed in the recirculating air stream on opposite sides of the tumbling drum is the heater **66** and the condenser **48** which may be either air cooled as shown in FIGURE 1 or water cooled. The condenser removes the moisture from the recirculating air stream which has been picked up from the clothes in the tumbling drum **20** and also reduces the air temperature when the clothes are dry from about 170° F. at the inlet of the condenser to about 130° F. at the condenser outlet. This pronounced temperature differential is used to advantage in the automatic control of this invention as will be understood more fully hereinafter.

The schematic wiring diagram for controlling the automatic drying cycle of the condensing drying **10** is illustrated to FIGURE 3. The control circuit includes a power supply L_1, L_2 and a neutral line N. Disposed in intercepting relationship to the various dryer componets is a timer **15** having its control knob **14** exposed on the console of the dryer and enclosing a plurality of cam actuated switches, such as **100** in the heater circuit, **102** in the timer motor circuit, **104** in the circuit for the main motor **82** and **106** leading to an alarm **108** which may be sounded to signal the end of the automatic drying cycle. The various timer switches **100**, **102**, **104** and **106** may be sequentially operated by a timer shaft **110** incrementally advanced or rotated whenever a timer motor **112** is energized. Other components in the drying circuit may include a door switch **114** having a position in series with the main motor **82** when the door is closed and a position in series with a lamp **116** when the door is opened. In the heater circuit there are various safety features such as a high limit control **118** which opens if temperatures exceed a safe level within the dryer and a centrifugal switch **120** which closes whenever the prime mover or motor **82** is satisfactorily in operation.

In addition to the foregoing, the novel automatic dryer control of this invention includes a fabric selector switch **122** which may be set through knob **16** or push buttons for a REGULAR drying cycle or a DELICATE drying cycle depending on the type fabric to be dried. More particularly, the cycle selector switch **122** includes a main heater switch **124** having a first position contact **126** whenever any heat is required in the drying cycle (knob **16** set for either REGULAR or DELICATE) and a second position contact **128** when NO HEAT is desired. The cycle selector also includes a switch **130** having a first position contact **132** in series with a biasing heater **134** (knob **16** set for DELICATE) and a second position contact **136** for by-passing the biasing heater **134** (knob **16** set for REGULAR).

The automatic control circuit includes an exhaust air thermostat or cycling control **140** which may be positioned on the door **36** in the path of air leaving the tumbling drum through the lint collecting housing. This cycling control includes a temperature responsive switch **142** having a first position contact **144** in series with the main heater **66** and a second position or back contact **146** connected through an inlet air thermostat or termination control **148** to the timer motor **112**. The switch **142** is selectively heat biased in order to provide a low temperature range for DELICATE fabrics (142° F.–150° F.) when the selector switch **130** is engaged with contact **132** and a high temperature range for REGULAR fabrics (170° F.–177° F.) when the switch **130** is moved to contact **136**. Assuming a REGULAR cycle, for instance, the switch **142** engages the contact **144** when the temperature of air leaving the tumbling drum is below approximately 170° F. to energize heater **66**. On the other hand, the switch **142** engages the back contact **146** when the exhaust air temperature exceeds approximately 177° F. Thus, the switch **142** moves between contacts **144** and **146** to maintain a predetermined temperature within the tumbling drum.

The inlet air thermostat or termination control switch **148** has an open position so long as the temperature of the air entering the tumbling drum is above 210°. However, the switch **148** remains closed whenever the inlet air temperature is below 200° F. With the foregoing components, the control cycle for a DELICATE or REGULAR drying cycle will be described next following.

General

On the Automatic drying cycle of this invention, the user sets the timer knob **14** to either DELICATE or REGULAR and the Fabrics control knob **16** for the type of material being dried. This indirectly establishes the drying time and temperature. The Automatic drying cycle is based on temperature and, on the DELICATE setting, the timer runs only when the heater element is off and the cycle termination switch **148** is closed or when timer switches **102** and **104** are closed.

Regular load drying cycle

Referring to FIGURES 3, 4 and 5, a REGULAR drying cycle will be initiated when the cycle control knob **14** is manipulated to position the contacts as shown at the REGULAR start indicator in FIGURE 4. At the same time, the operator will operate the selector switch **122** by manipulating the control knob **16** to position the switch **124** on contact **126** and the switch **130** on contact **136** for the REGULAR fabric drying temperature. As the timer is advanced to the REGULAR start position, timer switches **100**, **102** and **104** are closed. Thus, the main motor **82** is energized through timer switch **104** to start the rotation of the tumbling drum **20** and the recirculation blower **54**. At the star of a drying cycle, the temperature of the recirculating air would be below the temperature setting of the selector switch **124** and the temperature cycling control switch **142** will engage the contact **144** to energize the heater **66**. As aforesaid, the centrifugal switch **120** will be closed when the main motor **82** is running. Note also that the termination control switch **148** which is measuring drum inlet air temperature is closed at the start of the cycle since the initial temperatures of the recirculating air are below 200° F.

The timer motor **112** will be energized from L_1 through the timer switch **104**, jumper line **150**, timer switch **102**, the timer motor **112** to the other side of the line N. As the automatic cycle advances, and with reference to FIGURE 5, the temperature at the exhaust air thermostat or cycling control switch **140** is shown by the curve portion **154** and the temperatures occurring at the inlet air thermostat or termination control switch **148** are evidenced by the curved portion **156**. Note that the tem-

peratures at both the inlet and the exhaust are increasing as would be expected with the heater **66** energized. At a point **158**, the termination control switch **148** opens to break the shunt or parallel path through the temperature selector switch **130** and the timer switch **104**; and the timer motor **112** is then energized solely through the timer switch **102**. The temperature of the recirculating air at the outlet of the tumbling drum continues to increase to a point **160**, at which point, the temperature of the air coming out of the tumbling drum exceeds 177° so that the switch **142** moves to its position in engagement with the back contact **146**. This deenergizes the heater **66** and the recirculating air temperature starts to cool along the curve portion **162** until a curve point **164** is reached, at which point, the switch **142** again moves into engagement with the contact **144** to reenergize the heater **66** along a curve portion **166**. Thus, the heater **66** is energized and deenergized while the REGULAR clothes load is being dried—each period of heater energization being progressively shorter as the clothing gives up its moisture and, thus, its latent load to the recirculating air stream.

Simultaneously with the cycling of the heater **66** and, more specifically, at a point **168** which coincides with the point **160** on the exhaust air temperature curve, the temperatures of the recirculating air at the inlet of the tumbling drum start to cycle in response to the on-off operation of the heater **66**. Thus, when the heater is off and the exhaust air is falling as at curve portion **162**, so also does the air temperature fall off at the inlet of the tumbling drum as evidenced by curve portion **170**. Since the heater is energized for progressively shorter periods (curve portion **166** spans a greater period of time than curve portion **172**), it would be natural to expect that the temperature gradient of the inlet air adjacent the heater would fall off gradually. This is evidenced by the fact that inlet air temperature curve points **174**, **176** and **178** are progressively lower and are approaching the 200° F. point **180**, at which time, the termination control switch **148** will close.

The foregoing explanation of FIGURE 5 shows the various temperature variations wihch occur at the cycling control **140** and the termination control **148** throughout the entire automatic drying cycle. It is necessary now to return to FIGURE 4 to explain the interplay between the thermostatic controls **140** and **148** and the timer motor **112**. It can be seen that the timer switches **100**, **102** and **104** remain closed for a timed period **105** from start up until the timer switch **102** opens to initiate an indefinite pause period **182**. This timed period **105** of approximately eight minutes built into the timer is shown by upwardly leftwardly diagonal shading in FIGURE 5. Once timer switch **102** opens at the end of this timed period, the energization of the timer motor **112** is under the sole control of the series arranged termination control **148** and the timer motor switch **104** through the fabric selector switch **130** engaged on contact **136**. In other words during the REGULAR drying cycle, the cycling control switch **142** on its back contact **146** does no more than parallel the circuit to the termination control **148**. Thus, from the inlet air curve point **159** to the curve point **180** the termination control **148** remains open and the timer motor **112** deenergized. As soon as the curve point **180** is reached, the termination control switch **148** closes and the timer motor **112** will be reenergized to advance the automatic cycle through the pause period **182**. At its first timer pulse after reenergization, the timer motor cam shaft **110** will open the timer switch **100** to deenergize the heater circuit while maintaining closed the timer switch **104** to continue the recirculating air in a COOL-OFF period to lower the temperature of the fabric to a point suitable for handling. The timer motor switch **102** will be closed for the duration of the cool-off period. The REGULAR drying cycle will be terminated at the conclusion of the cool-off period when the timer switch **106** is closed to energize the alarm **108** after which timer switches **102**, **104** and **106** will be opened to terminate the drying cycle.

Delicate load drying cycle

Using FIGURES 3, 4 and 6 for the operational timer sequence of the condensing dryer, assume that a DELICATE setting on the Timer and on the Fabrics control has been made. The switches **104** and **100** of the timer are closed but switch **102** for the timer motor is open. Referring back to FIGURE 3, note that the circuit from L_1 through the timer switch **100**, the fabrics control switch **126**, cycling control switch **142**, limiter control **118**, heater element **66** and centrifugal motor switch **120** to L_2 is complete when the motor comes up to speed. In normal operation on DELICATE, current is supplied from timer switch **104** through the internal circuit switch **130** of the Fabrics control to the heater or resistor **134** in the cycling control to cause the control switch **142** to open sooner than its normal air operating temperature. Note: The resistor **134** is not energized on the high temperature or REGULAR fabric settings and the cycling control **140** regulates the dryer as though it were a normal 177° F. thermostat.

When the clothes load gets up to heat, approximately 150° F. air temperature, bimetal disc switch **142** closes on its back contact **146**—approximately 177° F. ±5° disc temperature at rated 240 volts due to the additional heat being supplied by the resistor **134**. Current then flows through to the termination control and, if the switch **148** is closed, current is supplied to the timer motor to advance the timer. Due to the long heat period **190** of the first cycle the termination control switch **148** will more than likely remain open during the entire heater element OFF period **192** of the first cycle (FIGURE 6) and the timer will not advance. During the second heater element ON period **194**, less heat is required to bring the load up to heat. This allows the terminating control area at the rear of the tumbling drum to cool more rapidly so that switch **148** can close to advance the timer during the second element OFF period **196**. Note: Timer advance is shown by two differently shaded areas in FIGURES 6 and 7; one type of shading indicates pause periods of indefinite duration while the timer is under the combined control of the termination control switch **148** and the cycling control switch **142**; another type of shading indicates programmed or timed periods when the timer motor is energized continuously through the timer switch **102**.

As the DELICATE clothes load dries and progressively less heat is required to bring the dryer up to temperature, the terminating control area remains cooler and the timer will advance for longer periods, i.e., shaded area **198** is longer than shaded area **200**. Once the timer advances through the pause period **186**, using up the last of the four minute interval built into the timer pause period as at **201**, the timer switch **102** is closed to drive the timer motor continuously for approximately 12 minutes and the heater element cycles OFF and ON as required during this timed period **202**. At the end of the timed period, the timer switch **102** open again and current must again be supplied through switch **142** and contact **146** of the heat control and through the termination control **148** to drive the timer approximately one minute. In FIGURE 6 this second one minute pause period is made up of shaded sections **204** and **206**. When the second pause period **182** is used up, timer switch **102** then closes to drive the timer through approximately a 7 minute cool-off period. Heater element switch **100** in the timer is open during this cool-off period.

FIGURE 7 is a graphic representation showing the drying cycle characteristics for a two pound DELICATE load. The foregoing explanation for the six pound DELICATE load should provide adequate background for a complete understanding of FIGURE 7.

It should now be seen that an improved automatic control has been provided for a condenser dryer. Throughout the time that air is being recirculated to dry the clothes, a condenser is effective to remove the moisture from the air and to cool the recirculating air as it gives up its heat of condensation. The pronounced cooling effect afforded by a condenser in the recirculating air stream when the clothes load is dry and the progressively decreasing heating effect of the heater throughout the drying cycle combine to effect an improved termination control which very accurately senses the proper end point dryness of the clothes load. Further, a circuit arrangement has been taught which will permit a single termination control to terminate drying cycles for different loads at different temperatures.

While the embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows.

1. In combination with a condensing clothes dryer having means defining a recirculating air stream, means for condensing moisture from said recirculating air stream, means for tumbling clothes in said recirculating air stream, heating means on the upstream side of said tumbling means for heating said recirculating air stream and blower means for initiating said air stream, a control circuit comprising timing means for sequentially controlling said heating means and said blower means in a programmed drying cycle of predetermined duration including a timer motor to advance said drying cycle, first switch means thermally responsive to the temperature of said recirculating air stream on said upstream side of said tumbling means and in series electrical flow relationship with said timer motor for energizing and deenergizing said timer motor, said first switch means having a closed position for energizing said timer motor when the temperature of said recirculating air stream at said first switch means is below a first predetermined value and an open position for deenergizing said timer motor when the temperature of said recirculating air stream is above said first predetermined value, second switch means thermally responsive to the temperature of said recirculating air stream on the downstream side of said tumbling means and manually selectively electrically connected to a portion of said timing means and in selective series electrical flow relationship with said first switch means or said heating means, said second switch means having a first position in series with said heating means when the temperature of said recirculating air stream at said second switch means is below a second predetermined value to heat said recirculating air to dry the clothes and a second position in series with said first switch means when the temperature of said recirculating air stream at said second switch means is above said second predetermined value to condition said timer motor to advance said drying cycle, said drying cycle being terminated in a time interval longer than said predetermined duration of said programmed drying cycle when said first switch means remains in said closed position due to the action of said condensing means and said second switch means moves to said second position to energize said timer motor until said portion of said timing means deenergizes said control circuit.

2. In combination with a condensing dryer having means defining a recirculating air stream, means for condensing moisture from said recirculating air stream, means for tumbling clothes in said recirculating air stream, and heating means on the upstream side of said tumbling means for heating said recirculating air stream, a control circuit comprising timing means for sequentially controlling said heating means in a programmed drying cycle of predetermined duration including a timer motor to advance said drying cycle, first switch means thermally responsive to the temperature of said recirculating air stream on said upstream side of said tumbling means and in series electrical flow relationship with said timer motor for energizing and deenergizing said timer motor, said first switch means having a closed position for energizing said timer motor when the temperature of said recirculating air stream at said first switch means is below a first predetermined value and an open position for deenergizing said timer motor when the temperature of said recirculating air stream is above said first predetermined value, second switch means thermally responsive to the temperature of said recirculating air stream on the downstream side of said tumbling means and electrically connected to a portion of said timing means and in alternating series electrical flow relationship with said first switch means or said heating means, said second switch means having a first position in series with said heating means when the temperature of said recirculating air stream at said second switch means is below a second predetermined value to heat said recirculating air to dry the clothes and a second position in series with said first switch means when the temperature of said recirculating air stream at said second swtich means is above said second predetermined value to condition said timer motor to advance said drying cycle, said drying cycle being terminated in a time interval longer than said predetermined duration of said programmed drying cycle when said first switch means remains in said closed position due to the action of said condensing means and said second switch means moves to said second position to energize said timer motor until said portion of said timing means deenergizes said control circuit.

3. The combination of claim 2 including manually selectable means interposed between another portion of said timing means and said first switch means for bypassing said second switch means to condition said timer motor for energization in response to said first switch means and said another portion of said timing means.

4. In combination with a condensing fabric dryer having means defining a recirculating air stream, means for condensing moisture from said recirculating air stream thereby to cool said air stream, means for tumbling fabric in said recirculating air stream, heating means on the upstream side of said tumbling means for heating said recirculating air stream and blower means for initiating said air stream, a control circuit comprising timing means for sequentially controlling said heating means and said blower means in a programmed drying cycle of a first predetermined duration for delicate fabrics including a timer motor to advance said drying cycle, first switch means thermally responsive to the temperature of said recirculating air stream on said upstream side of said tumbling means and the downstream side of said condensing means and in series electrical flow relationship with said timer motor for energizing and deenergizing said timer motor, said first switch means having a closed position for energizing said timer motor when the temperature of said recirculating air stream at said first switch means is below a first predetermined value effected by the cooling of the recirculating air stream as it passes through said condensing means when the clothes are dry and an open position for deenergizing said timer motor when the temperature of said recirculating air stream is above said first predetermined value, second switch means thermally responsive to the temperature of said recirculating air stream on the downstream side of said tumbling means and the upstream side of said condensing means, said second switch means being electrically connected to a portion of said timing means and in selective series electrical flow relationship with said first switch means or said heating means, said second switch means having a first position in series with said heating means when the temperature of said recirculating air stream at said second switch means is below a second predetermined value lower than said first predetermined value to heat said recirculating air to dry the clothes and a second position in series with said first switch means when the temperature of said recirculating air stream at said second switch means is above said second predetermined value to condi-

tion said timer motor to advance said drying cycle, said drying cycle being terminated when said first switch means is in said closed position simultaneously with said second switch means in said second position to energize said timer motor until said portion of said timing means deenergizes said control circuit.

5. The combination of claim 4 including means for by-passing said second switch means to condition said timing means for sequentially controlling said heating means and said blower means in a programmed drying cycle of a second predetermined duration shorter than said first predetermined duration for regular fabrics.

6. In combination with a condensing dryer for moist fabric having means for agitating said fabric, means defining a recirculating air flow including said agitating means, means upstream from said agitating means for heating said recirculating air flow, means defining a cooling air flow in heat transfer relationship to said recirculating air flow for condensing moisture from said recirculating air flow, means for actuating said agitating means and inducing said air flows, and drying cycle control means having timer switch means for starting and automatically stopping said heating means and said agitating and inducing means, said control means including a timer motor for operating said timer switch means, a first increasing temperature responsive switch means in said recirculating air flow downstream from said agitating means and in series electrical flow relationship with a portion of said timer switch means, said first switch means having a first position in series with said heating means and a second position, a second decreasing temperature responsive switch means in said recirculating air flow upstream from said agitating means and in series with said timer motor and said first switch means in said second position, said drying cycle being advanced only when said portion of said timer switch means, said first switch means in said second position and said second switch means are in electrical supply relationship to said timer motor.

7. In combination with a condensing dryer for moist fabric having means for agitating said fabric, means defining a recirculating air flow including said agitating means, means upstream from said agitating means for heating said recirculating air flow, means defining a condenser in heat transfer relationship to said recirculating air flow for condensing moisture from said recirculating air flow, means for actuating said agitating means and inducing said air flows, and drying cycle control means having timer switch means for starting and automatically stopping said heating means and said agitating and inducing means, said control means including a timer motor for operating said timer switch means, a first increasing temperature responsive switch means in said recirculating air flow downstream from said agitating means and upstream from said condenser and in series electrical flow relationship with a portion of said timer switch means, said first switch means having a first position in series with said heating means and a second position, a second decreasing temperature responsive switch means in said recirculating air flow upstream from said agitating means and downstream from said condenser and in series with said timer motor and said first switch means in said second position, said drying cycle being advanced only when said portion of said timer switch means, said first switch means in said second position and said second switch means are in electrical supply relationship to said timer motor.

8. In combination with a condensing dryer for moist fabric having means for agitating said fabric, means defining a recirculating air flow including said agitating means, means upstream from said agitating means for heating said recirculating air flow, means defining a condenser in heat transfer relationship to said recirculating air flow for condensing moisture from said recirculating air flow, and drying cycle control means having timer switch means for starting and automatically stopping said heating means, said control means including a timer motor for operating said timer switch means, a first increasing temperature responsive switch means in said recirculating air flow downstream from said agitating means and upstream from said condenser and in series electrical flow relationship with said timer switch means, said first switch means having a first position in series with said heating means and a second position, a second decreasing temperature responsive switch means in said recirculating air flow upstream from said agitating means and downstream from said condenser and in series with said timer motor and said first switch means in said second position, said drying cycle being advanced only when said timer switch means, said first switch means, said first switch means in said second position and said second switch means are in electrical supply relationship to said timer motor.

9. In combination, casing means defining a fabric drying chamber having an inlet and an outlet, means connected to said inlet and said outlet to form a closed circuit duct system, means for recirculating air in said duct system, means adjacent said inlet to said drying chamber for heating said air to a first or second temperature to vaporize moisture from said fabric in a drying cycle, means for selecting said first or second temperature, means in said duct system for condensing said moisture from said recirculating air, power supply means, timer means for completing a power circuit to said power supply means and operable by a timer motor to interrupt said power circuit, and means for controlling said timer motor to terminate said drying cycle, said last named means including a termination control switch in said recirculating air at said inlet and in series with said timer motor, said termination control switch having a closed position when the temperature of said air at said inlet is at a predetermined value higher than either said first or second temperature, a cycling control switch in said recirculating air at said outlet and in series with said timer means, said cycling control switch having a first position in series with said heating means to dry said fabric when the temperature of said air is below said preselected temperature and a second position in series with said termination control switch to condition said timer motor for connection to said power circuit to operate said timer means when said termination control switch is closed and the temperature of said air is above said preselected temperature.

10. The combination of claim 9 wherein said temperature selecting means includes means connectable to said power supply means and in series with said termination control switch for by-passing said cycling control.

11. In combination, casing means defining a fabric drying chamber having an inlet and an outlet, means connected to said inlet and said outlet to form a duct system including a condenser, means for recirculating air in said duct system through said condenser, means adjacent said inlet to said drying chamber for heating said air to a first or second temperature to vaporize moisture from said fabric in a drying cycle, means for selecting said first or second temperature, power supply means, timer means for completing a power circuit to said power supply means and operable by a timer motor to interrupt said power circuit, and means for controlling said timer motor to terminate said drying cycle, said last named means including a termination control switch in said recirculating air on the downstream side of said condenser at said inlet and in series with said timer motor, said termination control switch having a closed position when the temperature of said air at said inlet is at a predetermined value higher than either said first or second temperature, a cycling control switch in said air on the upstream side of said condenser at said outlet and in series with said timer means, said cycling control switch having a first position in series with said heating means to dry said fabric when the temperature of said air is below said preselected temperature and a second position in series with said termination control switch to condition said timer motor for connection to said power circuit to operate said timer

means when said termination control switch is closed and the temperature of said air is above said preselected temperature.

12. The combination of claim **11** wherein said temperature selecting means includes connectable to said power supply means and in series with said termination control switch for by-passing said cycling control.

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