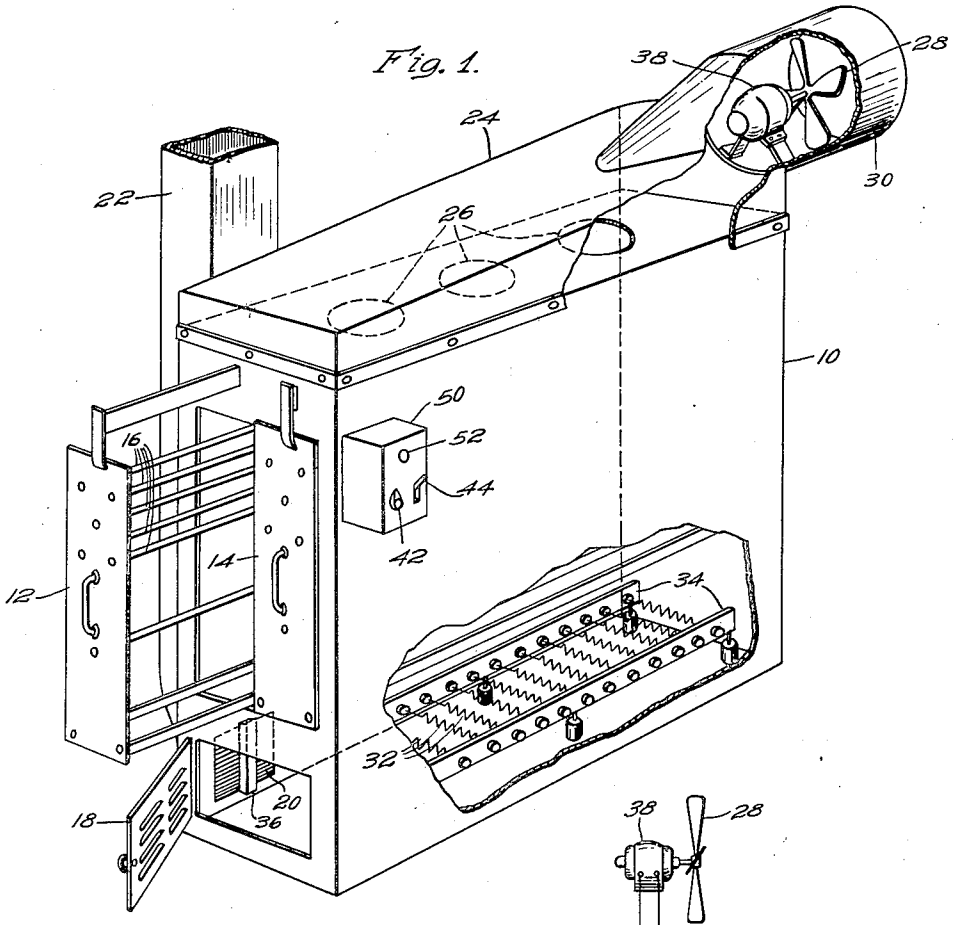
Aug. 11, 1936. A. BARNSTEINER 2,050,254

HUMIDITY REGULATED DRIER

Filed Feb. 14, 1934

Fig. 1.



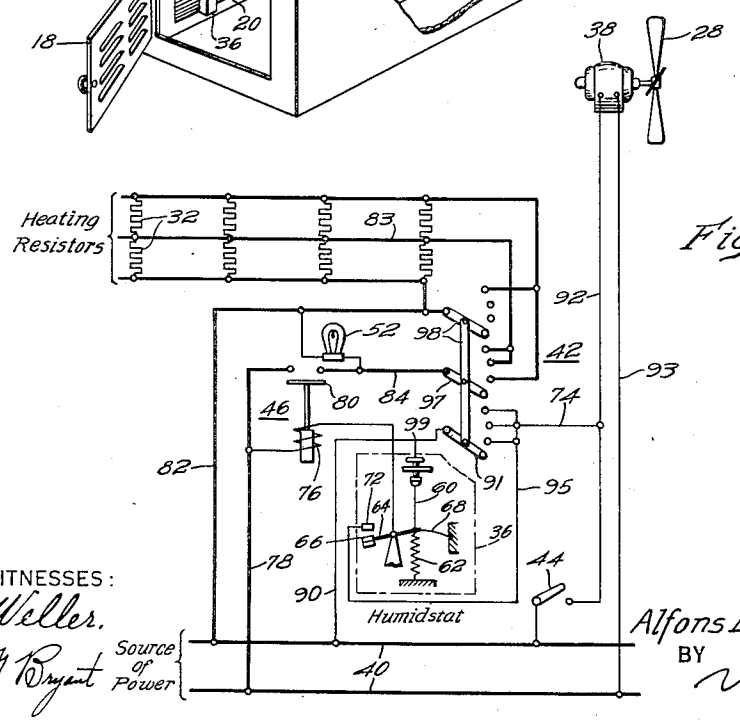


Fig. 2.

WITNESSES:

C. J. Weller.

C. J. Bryant

INVENTOR

Alfons Barnsteiner.

BY

W. O. R. Coley

ATTORNEY

Patented Aug. 11, 1936 2,050,254

UNITED STATES PATENT OFFICE

2,050,254

HUMIDITY REGULATED DRIER

Alfons Barnsteiner, Mansfield, Ohio, assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

Application February 14, 1934, Serial No. 711,181

2 Claims. (Cl. 34—19)

My invention relates to drying devices and it has particular relation to compartment or oven type driers which utilize circulations or changes of air to effect removal of moisture from materials placed therein.

In the operation of laundry driers, and other moisture-removing compartments of the type under consideration, I have discovered that when the humidity of the incoming air is below a certain value, as is the case on dry days, satisfactory results may be obtained by merely circulating the air through the clothes or other articles to be dried. However, when, as on damp days, the moisture content of the incoming air is above this value, a pre-drying of such air is essential for effective operation of the device.

While the use of electric and other heaters to effect such pre-drying has for some time been practiced, the fact that on dry days utilization of such heaters can be dispensed with has not been so generally taken advantage of. It will, however, be apparent that in the interests of economy the source of heat preferably should be brought into action only on damp days when pre-drying of the circulated air is essential.

In the laundry drier situation specifically mentioned, to expect the housewife to accurately judge of the humidity conditions in order to manually control the heaters is decidedly impractical. Means for automatically controlling these heaters in accordance with air humidity are, therefore, needed in this and other comparable applications. It is to the provision of such means that my invention is directed.

One object of my invention is to increase the economy of operation of compartment drying devices through which is circulated air of widely varying moisture contents.

Another object of my invention is to provide, in drying devices of the type under consideration, an air humidity responsive system for automatically controlling energization of the air preheaters.

My invention itself, together with additional objects and advantages thereof, will best be understood through the following description of a specific embodiment when taken in conjunction with the accompanying drawing, in which:

Figure 1 is a perspective view of a cabinet-type laundry drier to which the humidity-responsive heater control system of my invention is shown as being applied; and

Fig. 2 is a diagram showing one preferred manner in which the individual devices comprised by the equipment illustrated in Fig. 1 are interconnected to effect the desired automatic control functions.

While I am illustrating my invention as applied to an electrically heated laundry drier, it will be understood that it is equally applicable to driers of other types, such, for example, as oven or compartment devices of all kinds, whether of the extensible-rack, side-swinging door, or other construction. Its application is not restricted by the nature of the material to be dried, nor by the character of the source of air predrying heat or its method of adjustment.

Referring to the drawing, and particularly to Fig. 1 thereof, the laundry drier there shown is illustrated as comprising a sheet metal cabinet 10, which is provided with extensible rack units 12 and 14 adapted for independent withdrawal from the cabinet structure to permit the hanging, upon bar members 16 thereof, of clothes or other moisture carrying materials which it is desired to dry. When closed, these rack units effectively seal the cabinet from the entrance of air around the openings provided therefor.

In the end of the lower portion of the main cabinet 10 is installed an inspection door 18 shown in the open position. Inside of the door opening there is provided an air inlet duct 20 whch constitutes the terminus of a supply conduit 22 which may be arranged to supply air from any desired location, such, for example, as from the outside of the house or from some point in the laundry room. Over the top of the cabinet proper is positioned a discharge chamber or hood 24, by means of which air from the interior of the compartment may be drawn, by a motor-driven exhaust fan 28, through openings 26 and discharged to the outside through an outlet aperture 30.

With the extensible racks 12 and 14 and the door 18 closed, operation of this fan 28 thus draws air through the conduit 22 and past the damp articles suspended from the racks on the inside of the cabinet 10. In order to pre-heat the incoming air when it is sufficiently damp to make it necessary, there are provided in the lower portion of the drier cabinet 10 heating means in the form of electrical resistors 32 supported in any suitable manner, as by side members 34, suitably insulated from casing 10.

To automatically control the energization of these heaters in accordance with the humidity of the incoming air, I provide in the inlet duct 20 of the drier cabinet a humidostat 36 which is sensitive to the moisture content of the air flowing past it. This humidostat may be any one of a number of types well known in the art which

functions to actuate a set of electrical contacts when the air humidity increases or decreases beyond a predetermined value.

One preferred manner of interconnecting, in accordance with my invention, the devices which have just been described is shown diagrammatically in Fig. 2, in which a source of energization for the heating resistors **32**, the fan driving motor **38**, and the required control circuits, is represented by circuit conductors **40**. In the particular connection illustrated a main operation control switch **42** is utilized in the heater and the fan supply circuits, and an auxiliary switch **44** is also connected in the fan supply circuit for a purpose to be explained.

The switch **42**, which acts to adjust the heat intensity in addition to controlling the drier operation, may be a well known multi-position type represented in Fig. 1 as having an actuating knob which protrudes from the face of a small box-like structure **50** mounted on the drier cabinet **10**. This compartment additionally houses a control relay **46** which is connected in the heater circuit as shown in Fig. 2. It also provides a mounting for the auxiliary switch **44**, together with an indicating lamp **52** which may be arranged to light whenever the relay **46**, which is responsive to the humidostat **36**, is biased to the actuated or closed-circuit position.

One preferred form of heater-control humidostat (device **36**) is diagrammatically represented in Fig. 2 as comprising a moisture sensitive element **60** which may be in the form of a strand of human hair or other material having the characteristic, when placed under tension, of appreciably lengthening when the moisture content of the surrounding air is raised, and of contracting when the moisture content of the air is reduced. In the illustrated device, the required tension is supplied by means of a spring **62**. Actuated by these changes in length of the element **60** is a centrally pivoted lever **64** carrying on one end a contact member **66** which when the element **60** contracts is biased, through a toggle arrangement completed by a flat spring **68**, to a lower position, and when the element **60** expands is biased upwardly into engagement with a stationary contact member **72**. Calibration of the instrument may be changed by adjusting a tension screw **99**.

In the operation of the complete automatic control system shown in Fig. 2, movement of the blades of the switch **42** upwardly from the "off" position shown to its first operative position energizes the motor **38**, which drives the fan **28**, to draw air through the drying compartment. The motor energizing circuit may be traced from the upper power source conductor **40**, through conductor **90**, the blade **91** of switch **42**, conductors **74** and **92**, the motor **38**, and conductor **93** back to the lower power source conductor **40**.

If the air entering the compartment, which air flows past the humidostat **36**, is of a proper degree of dryness, the humidostat contact members will remain in the disengaged position illustrated. The circuit for the actuating winding of relay **46** being incomplete, no energization of the heating resistors can, under these conditions, be effected.

However, if the incoming air contains above a predetermined amount of moisture, the element **60** of the humidostat expands and contact member **66** is actuated upwardly into engagement with member **72**, thereby completing an actuating circuit for relay **46**. This circuit may be traced from the upper power source conductor **40** through the fan motor control blade **91**, conductor **95**, contact members **72** and **66**, the actuating winding **76** of relay **46**, and conductor **78**, back to the lower power source conductor **40**.

Thus energized, relay **46** actuates its contact member **80** upwardly and completes an energizing circuit for the heating resistors **32**, which circuit may be traced from the upper power source conductor **40** through conductor **82**, the resistors **32**, the blade **97** of the heat adjusting control switch **42**, conductor **84**, the relay contact member **80**, and conductor **78**, back to the lower power source conductor **40**. Thus energized, the resistors produce heat to pre-dry air in the drier cabinet.

In the particular circuits shown, the intensity of heat produced by the resistors depends upon the position of the blades **97** and **98** of adjusting switch **42**. As the proper position will in general depend upon the amount of clothes which are introduced into the drier cabinet and also upon other comparable conditions, the setting can best be determined by experimentation.

When the switch blades are actuated to the first operative position, there is set up a circuit for the heating resistors **32** which, upon the actuation of relay **46**, causes them to produce a low value of heat, the sections above and below the conductor **83**, in the diagram, being energized in series by the power circuit **40**. Actuation of the switch to the second operative position increases the heat intensity by placing full voltage across the lower resistor sections, and when the blades occupy the top or third operative position, both the upper and lower resistor sections are energized by full voltage and hence produce their maximum output. The illustrated switch connection will thus be recognized as comprising a well known series-parallel arrangement of resistor sections.

When it is desired merely to opeate the fan and thereby draw air from the laundry room through the drier for discharge to the outside to effect ventilation only, the switch **42** is placed in the lower or "off" position illustrated, in which no energization of the resistor is possible, and the auxiliary switch **44** is closed to independently complete the fan motor circuit.

As before mentioned, the indicating lamp **52** lights whenever the relay **46** is biased to the actuated position, and thereby indicates when the incoming air circulated by the fan **28** is sufficiently damp as to require the use of the pre-drying heaters **32**. It will be noted that heater energization or lamp indication can be effected only when the exhaust fan motor is energized. This particular precaution is believed of value, inasmuch as heater operation in the absence of air circulation would subject clothing within the cabinet to danger from burning due to accumulation of heat in the unventilated closed compartment.

Although I have shown and described a certain specific embodiment of my invention, I am fully aware that many modifications thereof are possible. My invention, therefore, is not to be restricted except insofar as is necessitated by the prior art and by the scope of the appended claims.

I claim as my invention:

1. In a drier adapted to remove moisture from articles placed therein by effecting a circulation of air past and through said articles, the combination of means for heating the fresh air which is taken into the drier, and a humidostat, placed

in the path of said indrawn fresh air in advance of its contact with the said heating means or the said articles, for controlling the operation of said heating means.

2. In a drier adapted to remove moisture from articles placed therein by effecting a circulation of air past and through said articles, the combination of an electric heater positioned within the drier to raise the temperature of the fresh air drawn therein, a source of energization for said heater, a humidostat placed in the path of said indrawn fresh air to be sensitive to the moisture content thereof before the air contacts the said heater or the said articles, and means controlled by said humidostat for completing a connection of the heater with its source of energization when the said moisture content exceeds a given value.

ALFONS BARNSTEINER.