

1,431,146.

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UNITED STATES PATENT OFFICE.

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DRYING APPARATUS.

Application filed June 6, 1919. Serial No. 302,121.

To all whom it may concern:

Be it known that I, JOHN E. BOLLING, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Drying Apparatus, of which the following is a specification.

This invention relates to thermostatic control of dampers for regulating the humidity and temperature of air delivered to drying apparatus. The regulation is effected by controlling the relative quantities of recirculated air and supply of fresh air. The latter may vary in temperature and humidity within certain limits without interfering with the delivery of air, conditioned as desired, to the drying apparatus. The construction employed to effect the purposes of the invention is similar to that shown in applicant's copending application for patent, Serial No. 229,700, filed April 20, 1918, drying apparatus, but the arrangement is different in respect to the location of the thermostat. In the former case, the thermostat was subject to the temperature of air leaving the drying compartment and was located between the drying compartment and the controlled dampers. In the present case the thermostat is located between the air intake and the drying compartment and is sensitive to the air entering the washer humidifier and heater which are arranged between the thermostat and drying compartment.

The objects of this invention are to provide a simple and effective structure whereby the recirculation of air in the drying chamber, the discharge of used air, and the admission of fresh air for the purpose of maintaining a predetermined humidity are regulated by thermostatic means acting to utilize the used air for regulating the initial condition of the entering air.

The drawing is a diagrammatic view in side elevation of a drying apparatus constructed according to this invention.

A specific purpose for which the herein-described apparatus is particularly designed is the drying of fruits and vegetables, in order to render them less perishable and to reduce their bulk, but it is apparent that the invention is applicable to many other uses.

Referring to the drawing, a drying com-

partment 1 is shown having doors 2. The product to be dehydrated may be supported on removable trays 3 suitably supported or stacked on a truck 5 to provide air passages between the trays. Air is caused to enter the drying compartment by a power driven blower 6 which may be at either end of an air heating device 7 which may be of any usual construction and which communicates with the drying compartment 1 through the duct 8. A return conduit 9 provides communication between the drying compartment 1 and the blower 6. The conduit 9 is equipped with an air intake 10 and an air outlet 11. Regulation of the flow of air directly through the conduit or through the intake and outlet is accomplished by a system of dampers 12, 13, and 14 connected together by links and a lever 15. In the specific arrangement shown, the dampers always remain parallel.

The thermostatic diaphragm motor 16 is located in the return conduit 9 between the air intake and the blower and is connected with the dampers in such manner that a fall in temperature of the air passing through the return conduit results in the motor shifting the dampers toward their vertical positions. When the dampers are in the 45° position shown in the drawing, about half of the air passing through the drying room is recirculated. Fresh air enters the conduit 9 through the inlet 10 in amount equal to the amount of used air which is exhausted through the outlet 11. The damper 13 obstructs the direct flow of air along the conduit to an extent inversely proportionate to the obstruction of flow caused by dampers 12 and 14.

In the operation of the apparatus shown, the air may be delivered to the drying room at any desired temperature, but for any particular product, the temperature which experience indicates is best should be used and the air should enter the drying chamber at substantially constant conditions of heat and moisture. The evaporation of moisture from the product causes a fall in temperature of the air but the temperature of the outgoing air is always above that of the outside atmosphere.

The particular device shown is intended to maintain a constant temperature of the air entering the air conditioning apparatus without regard to humidity of such entering

air by controlling the relative proportions of the amount of air recirculated and the amount of fresh air admitted.

The thermostatic device is arranged so
 5 that the amount of air recirculated is cut down by closing of the damper 13, and corresponding opening of dampers 12 and 14 as the temperature rises above a predetermined value and vice versa. This method
 10 of control is applicable either with or without the use of a humidifier in conjunction with the heater. If a humidifier is placed at the fan inlet or between the blower and the heater, as at 17, then the humidification
 15 of the air or gas is controlled by the thermostat because the amount of water which such air will evaporate and carry is a function of its temperature.

A related apparatus showing a similar arrangement of dampers with a different location of the thermostatic motor is described
 20 in my copending application Ser. No. 229,700, filed April 20, 1918.

Although but one specific embodiment of
 25 this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined
 30 by the following claims.

I claim:

1. In an apparatus of the class described, a drying compartment, a conduit for conducting air to and from said compartment,
 35 said conduit being provided with an outlet for used air, an inlet for unused air, a damper in said conduit between said inlet and outlet, dampers in said inlet and outlet, and a thermostatic motor in said conduit be-
 40 tween said inlet and the point of entrance of

air from said conduit into the drying compartment, said thermostatic motor having connections for adjusting all of said dampers according to temperature changes in the conduit at the location of the motor. 45

2. In an apparatus of the class described, a drying compartment, a conduit for conducting air to and from said compartment, said conduit being provided with an outlet for used air, an inlet for unused air, a damper
 50 in said conduit between said inlet and outlet, dampers in said inlet and outlet, a heater in said conduit between said inlet and the point of entrance of air from said conduit into the drying compartment, and a thermo-
 55 static motor between said inlet and the heater, said thermostatic motor having connections for adjusting all of said dampers according to temperature changes in the conduit at the location of the motor. 60

3. The combination of air conditioning apparatus including a blower, a heater and a humidifier, the latter being located in advance, of the heater, a compartment connected with said conditioning apparatus for receiving air therefrom, a return duct connecting said compartment with said humidifier, means providing a fresh air inlet
 65 and a used air outlet, means controlling the respective amounts of air recirculating, entering said inlet and leaving said outlet, and thermostatic means sensitive to the temperature in said duct at a point between said air inlet and the humidifier for actuating
 70 said controlling means to maintain a substantially constant temperature of the air entering said humidifier. 75

Signed at New York, this 22nd day of May, 1919.

JOHN E. BOLLING.