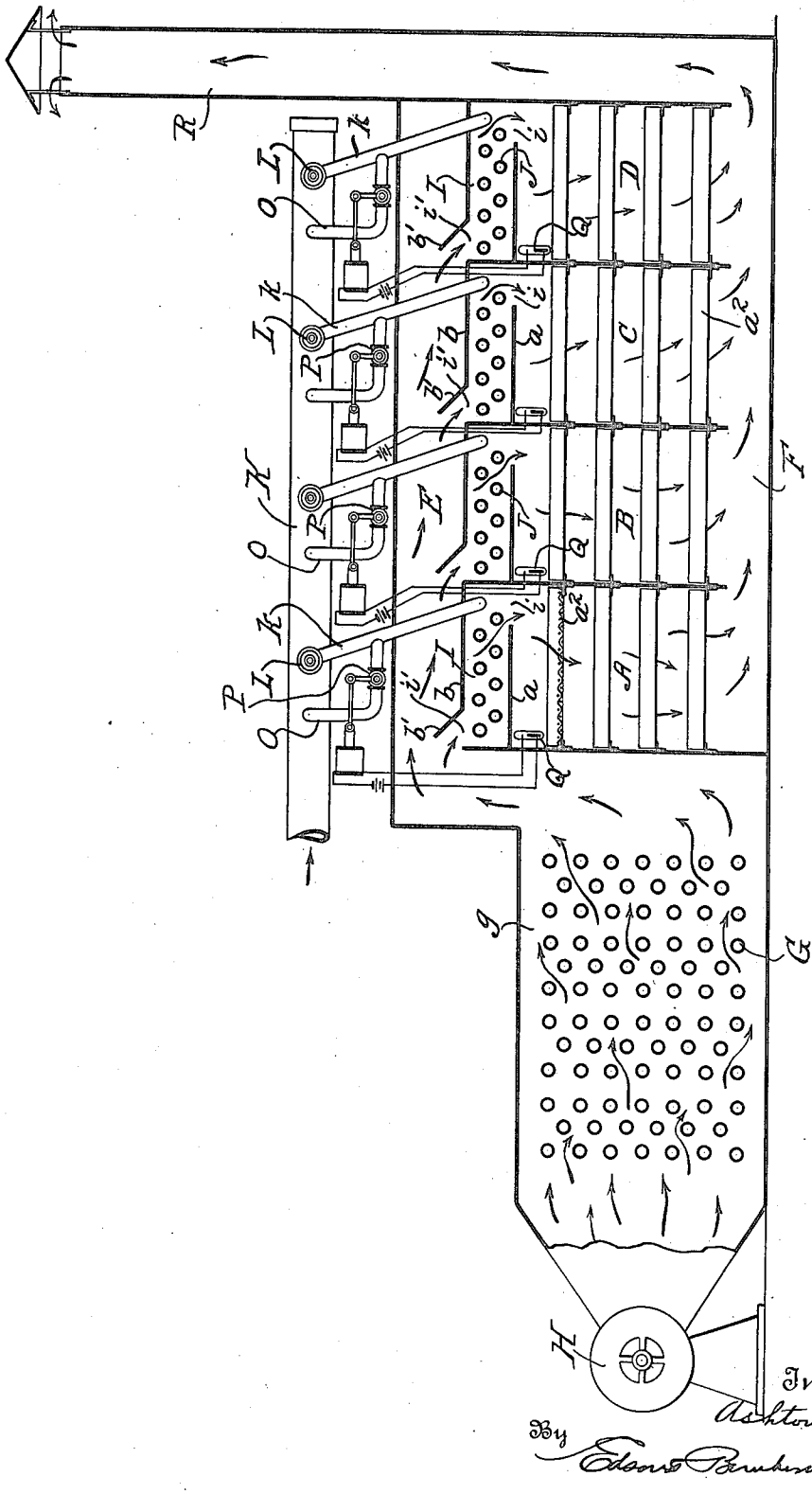
A. HARVEY.

EVAPORATOR.

APPLICATION FILED OCT. 22, 1915.

1,282,825.

Patented Oct. 29, 1918.



UNITED STATES PATENT OFFICE.

ASHTON HARVEY, OF GREENWICH, CONNECTICUT.

EVAPORATOR.

1,282,825. Specification of Letters Patent. Patented Oct. 29, 1918.

Application filed October 22, 1915. Serial No. 57,224.

To all whom it may concern:

Be it known that I, ASHTON HARVEY, a citizen of the United States, residing at Greenwich, county of Fairfield, and State of Connecticut, have invented a certain new and useful Evaporator, of which the following is a specification.

This invention is an evaporating apparatus for effecting the elimination of moisture from various substances, and it pertains, more particularly, to an improvement in machines of that kind embodying a series of chambers adapted to contain the material, or different kinds of material, to be treated by the circulation of heated air through said chambers and into contact with said material or materials.

In the operation of evaporating machines of this type, it is found desirable to subject similar materials present in two or more chambers to the action of air heated to different temperatures, in order that the results obtainable at such different temperatures on the same classes of material may be determined and compared for future use, etc. Furthermore, it is desirable during one operation of the machine to subject a given material in one compartment to air heated to a certain temperature, whereas other materials of different characters are required to be treated by air heated to different temperatures.

So far as I am aware no provision has been made in prior evaporators for heating to different temperatures the currents of air flowing into different chambers whereby the material present within said chambers are, at one operation of the machine, subjected to treatment by heated air currents the temperatures of which vary to an appreciable degree.

In a practical apparatus of this character, provision is made as usual for initially heating air as it enters the machine, which heated air is conducted by a feed duct or flue to independent chambers adapted to contain the material or materials to be treated.

The salient feature of my invention consists of heaters positioned in the path of the air currents as they flow from the feed duct into the separate chambers whereby said heaters impart additional heat to the air currents so as to raise the air to the different temperatures required or desired for the treatment of different batches of the same material or the various batches of different materials in the respective chambers.

Said heaters are usually supplied with steam from a header, the supply being under manual control or automatic control.

It is preferred to position the heaters in compartments provided at the upper ends of the material-containing chambers; to connect said heaters by separate feed pipes with the header; to provide said feed pipes with manually-operable valves; and to employ thermostatic valves in by-pass connections between the feed pipes and the header. But it will be understood that the various details may be modified or altered as found expedient by mechanics skilled in the art.

The drawing illustrates diagrammatically an evaporating apparatus embodying my invention.

A, B, C, D designate a series of chambers for containing the material or materials to be treated. As usual in this art, the chambers are provided with doors for obtaining access thereto, and are provided, also, with means of one form or another for supporting the material or materials in isolated batches and so that air is free to flow into contact with such batches, one form of the material-supporting means being shown as a tray or shelf a^2.

E is a feed duct or flue common to all the chambers, and F is an exit flue connected with said chambers, said flues E F being shown at the top and bottom, respectively, of the chambers, but of course this arrangement can be modified as desired or found expedient.

The feed duct is connected with a chamber g, within which are positioned preheaters G, such as steam coils or the like. A blower H forces air into the chamber g and into contact with the preheaters whereby the air is initially heated to a certain temperature preferably less than the temperatures at which the air is admitted to the separate chambers.

According to one practical form of my invention, each material chamber is provided at the top with partitions a, b, relatively spaced to form a compartment I, the latter being in communication with the chamber by an opening i and connected with

the feed duct or flue by an opening i', said openings being at the opposite ends of said compartment I in order that the air from the flue or duct E may flow through the compartment I, thence into the material chamber.

The partitions b are shown as having baffles b' extending into the flue or duct E for diverting some of the air into the compartments I.

Within the compartments I are the heaters or boosters J, the same being shown as steam coils, although it is apparent that other forms of heaters may be employed. Said heaters are of such capacity as to impart to the preheated air flowing through the compartments additional heat for the purpose of raising the temperature of the air to a desired degree or degrees. Thus, the heater or booster J for chamber A will, under some conditions, operate to heat the air to a temperature of 180° Fahrenhiet, whereas the heaters or boosters for the other chambers will increase the air to 200°, 212° and 220° Fahrenheit for the remaining chambers B C and D, respectively, although it is apparent that the described variation in temperatures is merely illustrative and can be modified or changed (increased or decreased) as required or as expediency may dictate. The heaters or boosters are, preferably, of different heating capacities for the proper performance of the functions of imparting within a given time increased temperature to the preheated air admitted to the different chambers.

For supplying live steam to the heaters or boosters J, a header K is employed, from which header is branched a series of feed pipes k which are connected separately to the heaters or boosters J, each feed pipe being provided with a manually operable valve L, whereby the steam supply to the heaters or boosters may be turned on or shut off as required.

In addition to the manually-operable valve L means are provided for effecting the automatic regulation of the steam supply to the heaters or boosters so that, after closing valves L when the machine is in operation, the temperature within each chamber is controllable without attention on the part of the workman to the end that the steam supply may be shut off in the event of the heat exceeding a predetermined temperature within the chamber or should the heat fall below the predetermined degree the steam will be supplied automatically to the heater, for the purpose of heating the air so as to restore the temperature desired or required to be maintained within the chamber. As shown, a by-pass O is connected to each branch pipe k and to the header K, each by-pass having a valve P operable by suitable means under the control of a thermostat Q, but normally the valve P is closed so that steam cannot pass through the by-pass to the heater.

The exit flue F connects with the chambers A D inclusive at the bottom thereof, and the outgoing air escapes through the stack or uptake R.

In operation, the material or materials are placed on the shelves or trays a^2, the doors to the chambers are closed, steam is supplied to the preheaters G, and the blower started for blowing air in the volume required into the machine. The air is raised to a desired temperature by flowing into contact with the preheaters G, thence the air flows through duct or flue E, compartments I, the treating chambers and the exit flue F to the stack or uptake, the heated air flowing into contact with the material or materials supported upon the trays or shelves for the purpose of absorbing moisture from said material and effecting the drying thereof.

With the valves L P closed, no steam is admitted to the heaters or boosters J, hence the air flowing through the chambers A to D inclusive will be at the temperature to which the air is initially heated by the preheaters G, minus the small percentage lost by radiation; but as already explained, it is frequently necessary to subject different batches of the same material within two or more of the chambers A B C or D to heated air the temperatures of which vary, say from 180° Fahrenheit to 220° Fahrenheit, or it may become necessary to treat in the separate chambers batches of different materials with air heated to different temperatures. The apparatus embodying the heaters positioned at the air inlets to the separate chambers, said heaters being under manual or automatic control, provides means whereby the temperature of the air flowing into the respective chambers is controllable to meet the requirements of the treatment to be accorded to the batches of material or materials. It is apparent that the heater J associated with chamber A may be brought into service for heating the air to a temperature of 180° Fahrenheit as it flows from flue E to chamber A. Further, the heaters J which coöperate with the other chambers B, C, D, are controllable by the valves L for heating the air to the temperatures necessary for treatment of the material or materials present in said chambers; thus the air flowing through chamber B may require to be heated to 200° Fahrenheit; in the case of chamber C, the air may be reheated to a temperature of 212° Fahrenheit, or in the case of chamber D the air is to be raised to a temperature of 220° Fahrenheit. Of course, the foregoing examples are illustrative only of the temperatures required.

When the machine is in operation, the

valves L may or may not be closed to shut off the steam supply to the heaters or boosters, but the temperature within the heaters will be maintained as required by the automatic operation of the thermostatically controlled valves P in the by-pass connections O between the header with the individual heaters or boosters.

Having thus fully described the invention, what I claim as new, and desire to secure by Letters Patent is:

1. An evaporating apparatus embodying a plurality of material-containing chambers, means for feeding heated air thereto, a plurality of separate heaters one positioned substantially at the air inlet to each of said chambers, and means whereby said heaters are controllable at will for heating to different appreciable temperatures the currents of air flowing into said separate chambers.

2. An evaporating apparatus embodying a plurality of material-containing chambers, means for feeding air to said chambers, means for preheating the air, a plurality of heaters independent of each other and one positioned substantially at the air inlet to each of said chambers, and means for controlling the flow of a heating medium to the separate heaters whereby the currents of preheated air flowing to said chambers may be reheated so that said separate air currents are heated to different temperatures as they flow into the independent chambers.

3. An evaporating apparatus embodying a plurality of material-containing chambers, a feed duct or flue for supplying preheated air to said chambers, heater-compartments intermediate the flue and said chambers, the inlet to each compartment being in communication with the flue or duct and the outlet from said compartment opening into one of the chambers, independent heaters positioned within said compartments, and means for controlling the flow of a heating medium separately to said heaters whereby the air currents flowing through said compartments are adapted to be reheated or boosted to appreciably different temperatures as they enter said compartments.

4. An evaporating apparatus embodying a plurality of material-containing chambers, a feed duct or flue for supplying preheated air to said chambers, a plurality of heaters independent of each other and positioned substantially at the air inlets to said chambers, a header having separate connections with said heaters, and means for controlling the flow of a heating medium from said header to the separate heaters whereby said heaters may be individually brought into service for reheating the air so that the air currents will be raised to appreciably different temperatures as such currents flow into the separate chambers.

5. An evaporating apparatus embodying a plurality of material-containing chambers, means for feeding air thereto, a plurality of heaters independent of each other and positioned substantially at the air inlets to said chambers, means for feeding a heating medium to said heaters, and means controllable at will for regulating the flow of the heating medium to the separate heaters whereby said heaters are operable individually for reheating to appreciably different temperatures the air flowing into the separate chambers.

6. An evaporating apparatus embodying a plurality of material-containing chambers, means for feeding air thereto, a plurality of heaters independent of each other and positioned substantially at the air inlets to said chambers, means for feeding a heating medium to said heaters, and thermostatically-controlled means the operation of which is dependent upon the temperatures prevailing in said chambers for regulating the flow of a heating medium to said individual heaters.

In testimony whereof I have signed my name to this specification.

ASHTON HARVEY.