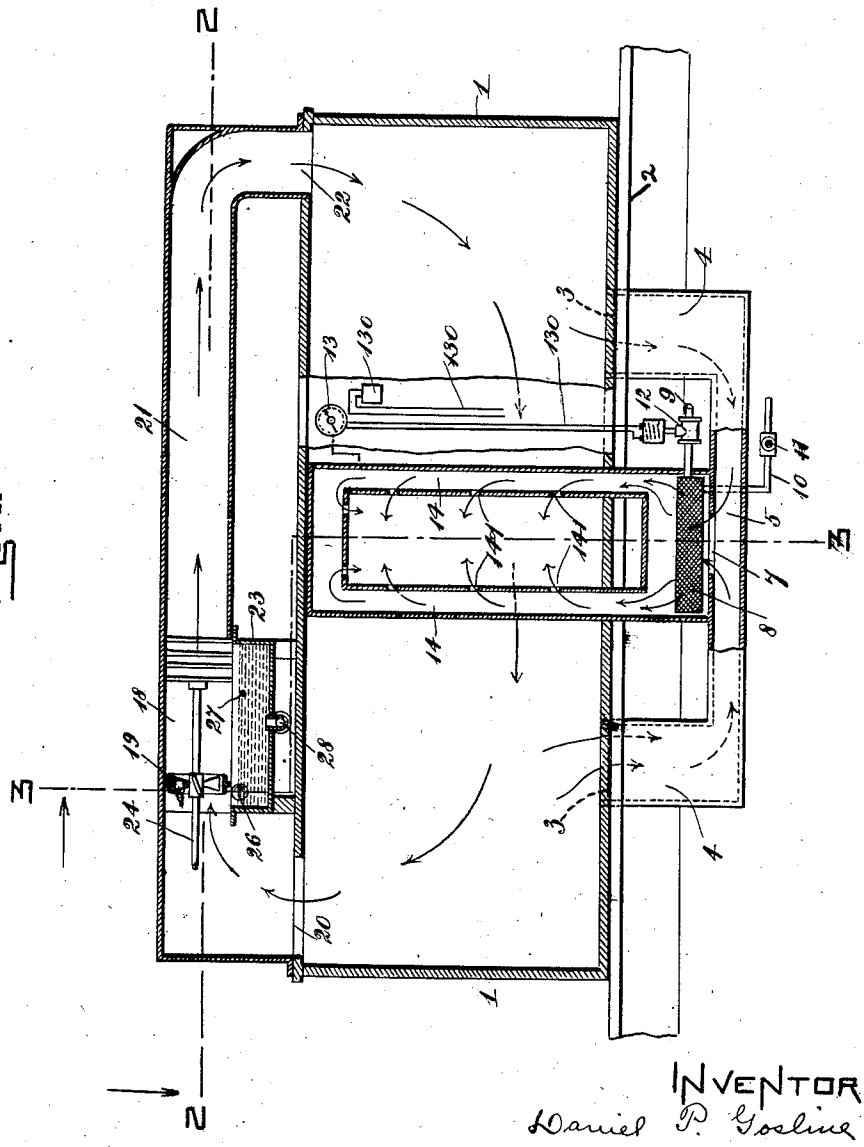
April 19, 1932. D. P. GOSLINE 1,854,789

TREATING MATERIALS WITH AIR

Filed Jan. 13, 1928 2 Sheets-Sheet 1

Fig. 1.



INVENTOR:
Daniel P. Gosline
By Cooke Hlayes
ATTORNEYS:

April 19, 1932. D. P. GOSLINE 1,854,789

TREATING MATERIALS WITH AIR

Filed Jan. 13, 1928 2 Sheets-Sheet 2

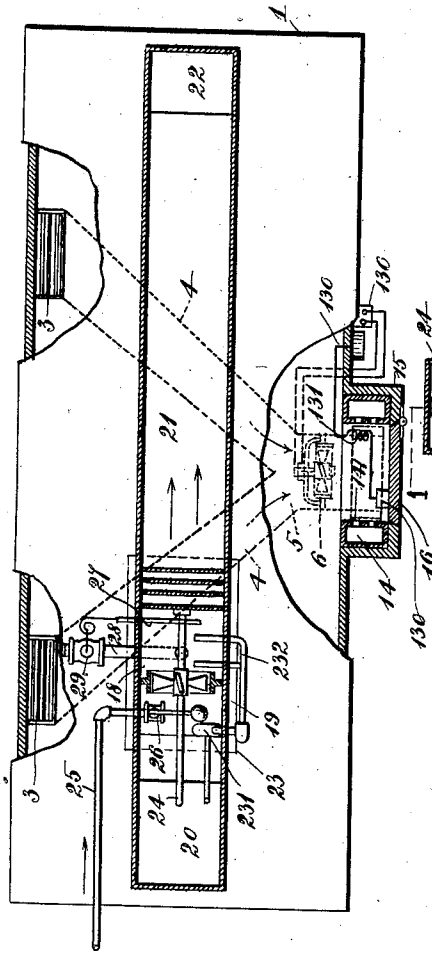


Fig. 2.

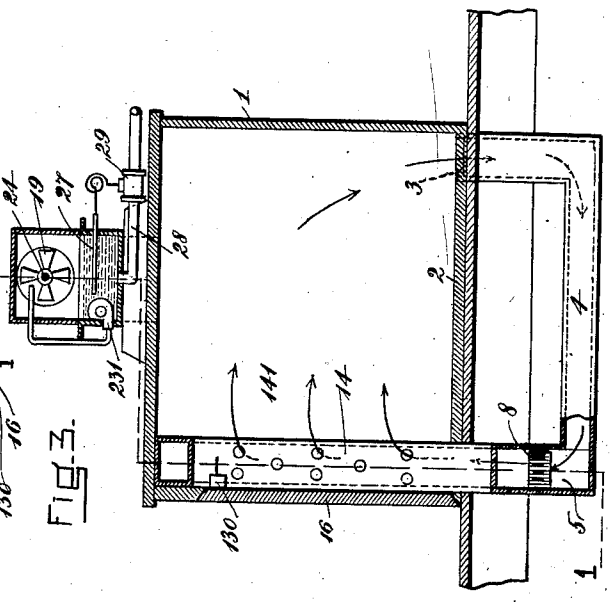


Fig. 3.

INVENTOR:
Daniel P. Gosline
By Cooke Hayes
ATTORNEYS:

Patented Apr. 19, 1932 1,854,789

UNITED STATES PATENT OFFICE

DANIEL P. GOSLINE, OF BOSTON, MASSACHUSETTS

TREATING MATERIALS WITH AIR

Application filed January 13, 1928. Serial No. 246,455.

My invention relates to the overcoming of serious defects now existing in air conditioning apparatus specially constructed for treating or conditioning various materials, some of which such as textiles, tobacco, leather for shoe making or in storage, must be submitted to high temperatures and high humidities to secure the desirable condition for manufacturing, while other classes of material, notably the drying of picture films, gelatine, glue, or certain chemicals, and such like, require relatively low temperatures with as low humidity as possible.

When material requires high humidity in its conditioning (often as high as 100% saturation) condensation and the consequent dripping of water on the material is bound to occur if the temperature drops a single degree. Such dripping discolors and spots the material so that it must be quickly removed to prevent complete loss. Materials requiring low temperatures and low humidities are spoiled if the conditioning process be interrupted or changed.

One especially disturbing factor is when outside or atmospheric air has permitted entrance to the contained air. At such time if there is a difference between the condition of the outside air and inside the room, it will be understood, unless prevented by some means, the opening of the door to the room for any purpose will allow a rush of colder air inward and produce condensation, or, on the other hand, low humidities may lose the proper condition in the room so that the material being treated is likely to be spoiled.

The object of my invention is to overcome the difficulty just referred to in a manner both responsive and sensitive and especially to safeguard an air-conditioned room the door of which is frequently and oftentimes carelessly opened or left open.

My invention will be understood by reference to the drawings, in which

Fig. 1 is a vertical section on line 1—1 of Fig. 3.

Fig. 2 is a horizontal section of line 2—2 of Fig. 1, and

Fig. 3 is a vertical cross section on line 3—3 of Fig. 1.

1 indicates the walls of a room designed to carry out my invention, these walls being insulated (not shown) in any desired way, 2 being the floor on which the room is set. 3 are registers or the like, through which air may be drawn down from the room for heating, and 4 are ducts which lead the air from these registers and join at 5 where a blower fan 6 of any ordinary construction, or the like, will draw the air down through the registers 3 into the ducts 4 and drive it through an opening 7 into a heating chamber containing the radiator 8 or the like, by which it may be heated, into ducts 14 and through openings 141 into the room. The radiator is of ordinary construction and is fed by a steam pipe 9 and has its return pipe 10 with a check valve 11 of any suitable type. 12 is an inlet valve for the steam supply and is of a kind well known, controlled by a thermostat 13 located on and near the top of the door or in other suitable place so that when the temperature of the room falls below a certain point, for example, when the door is opened the valve 12 controlled by the thermostat will open and allow steam immediately to pass into the radiator and a curtain of hot air to be thrown across the door. When the room has been sufficiently heated the thermostat 13 will cause the valve 12 to close, shutting off steam from the radiator. This same thermostat also may control the fan 6 so that at the time the steam is turned on at 9 a blast of air will be caused to pass up through the radiator well heated for the purpose.

Instead of using a steam radiator other means of heating the air blast may be used.

The thermostat and its connections are well known in the art and are therefore not described in detail. Its various parts are marked 130. 131 is a coiled tube, part of the thermostat which permits the door to be opened.

The ducts 14 carry the air which has passed through the radiator and distribute it through the openings 141 into what may be called a vestibule 15 in which is also located the door 16 suitably hinged and adapted to be opened when required to carry in or re-

move goods from the interior of the chamber.

At 18 is shown what I have called an ebulator, or humidifier, such as is described in my United States Patent No. 1,606,363 of November 9, 1926. Its operation will be fully understood from my said patent and is therefore merely shown diagrammatically in the drawings. It comprises a fan 19 which draws the air up through an opening 20 in the top of the room and forces it through the ebulator and the duct 21 and down through the corresponding opening 22 at the further end of the room. It will be understood that there are provided at the water tank 23 the necessary pump 231 to pump the water from this tank and deliver it to apparatus 232 contained about the shaft 24 so that as the air is drawn up by the fan it will be struck by jets of water delivered from the tank 23 and will have the opportunity of absorbing all that it can therefrom, any surplus falling back into the tank. The tank water will become heated as it is repeatedly subjected to the influence of hot air passed through it and will in time approximate the temperature of the air, but ordinarily will not exceed it. If for any reason the temperature of the water appreciably exceeds that of the air, as for example by the heating of a bearing forming part of the operating mechanism, then in such case the water is apt to heat the air to a temperature above that desired to be maintained, and such tendency I have obviated in the following manner: The tank 23 is filled through the pipe 25 which is controlled by a ball cock mechanism 26 of the usual construction. There is, however, located in the water in the tank a thermostat 27 which is itself actuated by the temperature of the water in the tank. When the temperature of the water in the tank (and consequently the sprays) approaches the danger point when it would unduly affect the air, then a valve in the outlet pipe 28 is opened by the thermostat and an amount of hot water is let out from the tank 23. This of course causes the ball cock 26 to open and allow fresh supply of colder water or other liquid to flow into the tank through the pipe 25 until the temperature of the water causes the thermostat to close the valve 29. Thus the water in the tank 23 is prevented from becoming too hot. Experience will indicate the setting of the tank thermostat, this depending upon the desired temperature of air to be maintained.

In starting up one of these air conditioning machines or rooms, the heating apparatus, whether it be steam, hot water, or electric, is first turned on to warm the room several degrees above the required temperature when treating the material. The heating apparatus must be thermostatically controlled and when the thermostat shuts off the heat, the humidifier sprays are started, and a threefold result will be seen, first, the hot dry air of the room commences to circulate through the sprays and is somewhat saturated, second, the humidifier sprays are somewhat warmed, and third, the room temperature has been cooled a little because the hot air has been passed through the colder water sprays, consequently the heat control thermostat has turned on the heat supply to keep up the temperature of the room, this operation continuing until the stipulated relative humidity is built up in the room.

The prior warming of the room before the conditioner is started warms the cold surfaces of the room (whatever they may be) and the material therein. By this method of first warming the room and the "building up" of the humidity to the desired percentage of saturation as the air is passed through and through the sprays effectually prevents condensation or dripping in a room so treated.

Owing to the fact that the hot air delivery ducts are placed either side of the doorway so that the hot air delivered by them will cross blanketwise the entrance or vestibule into the room, any inrush of cold air into the heated room will be prevented when the door is open. Moreover, the thermostat which controls the heat of the room is located on the door and swings outwardly with it, thus placing it in a colder atmosphere so that it will respond very quickly and will start the fan used for delivery of the hot air blast immediately upon the opening of the door. On this account condensation inside the room will be prevented by any inrush of cold air which otherwise might be effected, owing to the fact that the air within the room is often humidified to a point approximating its saturation point and a variance of even one or two degrees might cause condensation.

It is evident to one skilled in the art that modifications of this apparatus may be made without departing from the spirit of my invention, by which the results above described may be secured, but I have found the above apparatus very effective and very useful in keeping certain goods, manufactured or in process of manufacture, in a desirable condition.

What I claim as my invention is:

1. In an apparatus for conditioning materials, the combination comprising a substantially airtight room with an entrance thereto and a door closing said entrance, an air duct located inside the room at the side of the entrance with outlets therefrom opening onto the entrance whereby air under pressure introduced into the duct will be ejected to blanket said entrance, an apparatus for supplying heated air under pressure to said room and connecting with said duct whereby heated air supplied to the room will be supplied by way of said duct, a thermostatic device connecting with said heating apparatus and

normally arranged inside the room adjacent said entrance whereby it will be influenced by atmospheric air when the door is opened to actuate said heating apparatus to supply heated air under pressure to said duct.

2. In an apparatus for conditioning material, the combination comprising a substantially airtight room with an entrance thereto and an outwardly opening door closing said entrance, an air duct located inside the room at the side of the entrance with outlet therefrom opening onto the entrance whereby air under pressure introduced into the duct will be ejected to blanket said entrance, an apparatus for supplying heated air under pressure to said room and connecting with said duct whereby heated air supplied to the room will be supplied by way of said duct, a thermostatic device connecting with said heating apparatus and normally arranged inside the room on said door whereby it will be influenced by atmospheric air when the door is opened to actuate said heating apparatus to supply heated air under pressure to said duct.

DANIEL P. GOSLINE.