

May 15, 1951

R. D. TOUTON
AIR CONDITIONING APPARATUS

2,553,121

Filed June 22, 1946

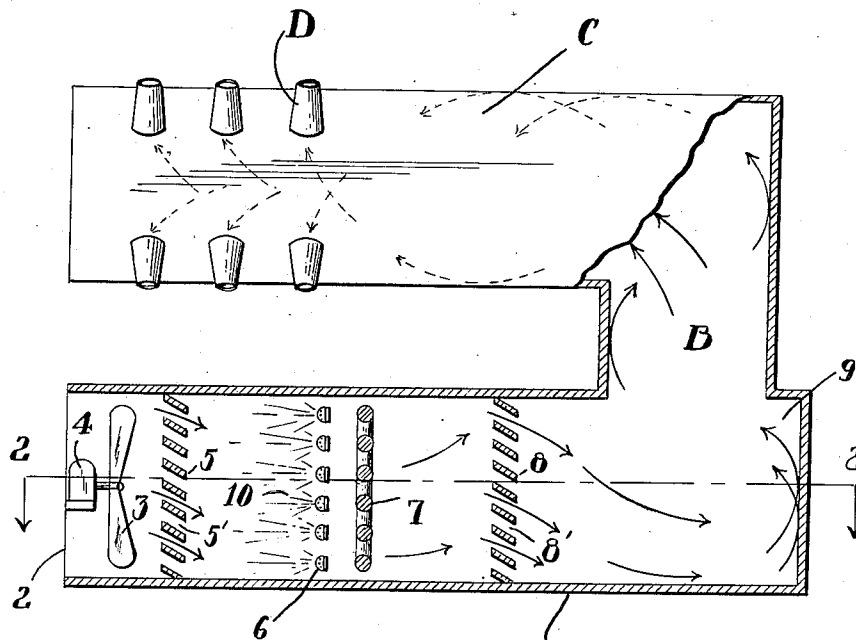


Fig. 1.

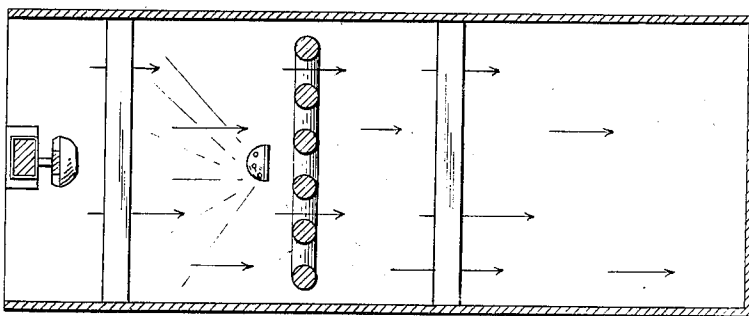


Fig. 2.

INVENTOR.
Rush D. Touton
BY
Burton Harding
ATTORNEYS

UNITED STATES PATENT OFFICE

2,553,121

AIR CONDITIONING APPARATUS

Rush D. Touton, Wynnewood, Pa., assignor to
Wurton Machine Company, Philadelphia, Pa.,
a corporation of Pennsylvania

Application June 22, 1946, Serial No. 678,569

1 Claim. (Cl. 183—21)

1

This invention relates to apparatus for the conditioning of air with respect to temperature and relative humidity and to method.

The apparatus according to this invention has proved to be of high efficiency in the conditioning of air especially where conditions of high relative humidity are desired, as, for example, in the conditioning of tobacco in connection with the manufacture of cigars.

The apparatus according to this invention has proved to be highly efficient in the provision of conditioned air at desired temperature and relative humidity at a less first cost and minimum operating cost in that the apparatus will be operated with a volume type fan rather than a pressure type, such as is usually demanded in apparatus of the type contemplated here.

Generally speaking, the apparatus according to this invention is so constructed that the water supplied will be in contact with the air over a long period, hence the amount of water required to be supplied to the air will be minimized; and so constructed that while initially the air to be conditioned will be supersaturated, the delivered conditioned air will not carry free moisture.

Having now indicated, in a general way, the nature and purpose of this invention, I will proceed, by way of illustration, to describe a preferred embodiment thereof with reference to the accompanying drawings in which:

Figure 1 is a plan view, partly broken away and partly in section, of a form of apparatus embodying this invention.

Figure 2 is a sectional view on line 2—2, Figure 1.

In the several figures A is a casing connected by a conduit B to a chamber C, provided with discharge nozzles D in its top.

The casing A is open at one end to provide an inlet 2 for air to be conditioned. Within the casing A at the inlet 2 is mounted a volume type fan 3 driven, for example, by a motor 4 to which the fan is directly connected.

In front of fan 3, extending from the top to the bottom of casing A and in spaced relation transversely is a series of baffles 5 which, respectively, extend at an angle to the longitudinal extension of the casing and form angular passages 5'.

Beyond the baffles 5 is a series of spray heads 6 positioned in the casing and supplied with water from any suitable source.

Adjacent to and beyond the spray heads 6 is a

2

coil 7, adapted to be supplied with a heating fluid, as steam, from any suitable source, and beyond which in turn is a second series of baffles 8 similar to and in similar arrangement with baffles 5 above described and forming angular passages 8'.

The conduit B connects casing A with chamber C laterally and the casing A extends beyond the point of entry of conduit B to form a trap 9.

As will be obvious, the supply of water to the spray heads 6 and the supply of heating fluid to the coil 7 may be controlled to provide air at any desired condition for discharge from nozzles D, by any suitable form of temperature and humidity responsive devices placed in the locus of use of the conditioned air.

As illustrative of the use of the form of apparatus above described, for example, in the conditioning of tobacco with use of an apparatus such as is shown and described in U. S. Patent No. 2,151,947, dated March 28, 1939, to Rush D. Touton, the fan 3 will be started, water supplied to the spray heads 6 and, for example, steam will be supplied to the coil 7.

Air, whether fresh or to be recirculated, will be drawn through inlet 2 and, by the fan, forced through the angular passages formed between baffles 5, through the spray 10 from spray heads 6, about the coil 7 and through the angular passages formed between the baffles 8.

The direction of the air on passage through the angular passages from between baffles 8 will be angular to the longitudinal extension of the casing, or such that it will impinge against the side wall of the casing and will thereby be diverted into the trap 9 with impingement on the end wall of the casing.

From the trap 9 the air will pass through conduit B into the chamber C, from which it will be discharged through nozzles D.

The air, as it passes through the spray 10 from the spray heads 6, will pick up moisture largely in the form of free moisture or become supersaturated. As the air carrying free moisture passes about coil 7, heat therefrom will very effectively vaporize some but not all of the free moisture. The air still in contact with, or carrying free moisture, will then pass between baffles 8, which will act to remove further free moisture, but the air will still carry, or be in contact with free moisture, further quantities of which will be removed by the impingement of the air against the side wall of the casing and the pocketing of the air in the trap 9. The air

3

entering chamber C through conduit D will carry some free moisture which will settle out in the casing before discharge of the air through nozzles D.

In operation of the apparatus described, more particularly according to the method of this invention the water from spray heads 6 will be in such quantity and at such temperature as to cool entering air, which picked up heat at the point of use, to a temperature below its dew point with loss of moisture from the air. The thus overcooled air will be supplied with free moisture by the sprays and will then be heated by the coil 7 to the desired temperature and with desired vaporization of free water. By example, if the entering air be at say 80° F. and have a dew point of about 78° F. and the air discharged from nozzle D be desired to have a temperature of say 76° F., then the temperature of the water from sprays 6 will be about 50° F. and the volume will be sufficient to bring the air temperature down to about 72° F.

It will be appreciated that depending upon ultimate relative humidity desired, less than all of the spray heads 6 may be used, provision being made for manually or automatically cutting some of them out. Where certain spray heads 6 are cut out when proceeding according to the method of this invention, the temperature and volume of the water issuing from the spray heads in operation will necessarily be adjusted to perform the desired total cooling on that portion of the air passing through the spray from the heads in operation.

It will now, it is believed, be appreciated that the air undergoing conditioning in the apparatus described is first supplied with free moisture then heated with vaporization of some of the free moisture and then kept in contact with free moisture over a relatively long course allowing the desired increase in relative humidity, while gradually or step by step removing free moisture in increments with removal of any balance of free moisture before discharge of the air for use.

The baffles 5 serve the purpose of preventing water spray from the spray heads 6 from blowing back in the event that the fan 3 stops while water is issuing from the spray heads 6.

As has been indicated, the arrangement and type of elements of the apparatus, such as the baffles 8, which offer little resistance to the passage of the air, the provision of the trap 9, which, serving to remove free moisture, does not restrict the flow of the air, and of the chamber

4

C, are such that a minimum effort fan, as a volume type, may be used and less water is demanded than is required in other types of apparatus because the air is in contact with free moisture, which is removed gradually in steps, over a longer course and hence for a longer time than in other types of apparatus.

In use of the apparatus according to this invention for the treatment of tobacco variously, as, for example, shown by U. S. Patent No. 2,151,947, it may be desirable that the air issuing from nozzle D carry some free moisture or be somewhat supersaturated. In such case, desired supersaturation may be provided by changing the angle of the baffles 8 and thereby straightening the path of the air and consequently the time of contact of air with the water, and causing less impingement of the air against the side wall of the casing and less entrapment thereof in the trap 9.

What I claim and desire to protect by Letters Patent is:

Apparatus for the conditioning of air with respect to temperature and relative humidity, which comprises an elongated casing having an inlet for air in one end and an outlet for air spaced from the end thereof opposite the inlet, a fan positioned adjacent the inlet for flowing air through the casing, means within the casing beyond the fan for the supply successively of free moisture and then of heat to air flowing through the casing, a series of angularly arranged baffles extending vertically in the casing and positioned between the means for the supply of heat and the outlet opening, an elongated chamber extending in substantial parallelism with said casing, outlet openings in said chamber, an inlet opening in the chamber at one end and a conduit connecting said inlet opening with the outlet opening in the casing.

RUSH D. TOUTON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,023,260	Luehrs et al.	Apr. 16, 1912
1,861,158	Hilger	May 31, 1932
2,019,525	Dooley	Nov. 5, 1935
2,262,542	Bahnson, Jr.	Nov. 11, 1941
2,239,595	Cummings, Jr.	Apr. 22, 1941