Oct. 15, 1929. C. A. MOORE 1,731,432

AIR CONDITIONING APPLIANCE

Filed Jan. 3, 1927

Fig. 2

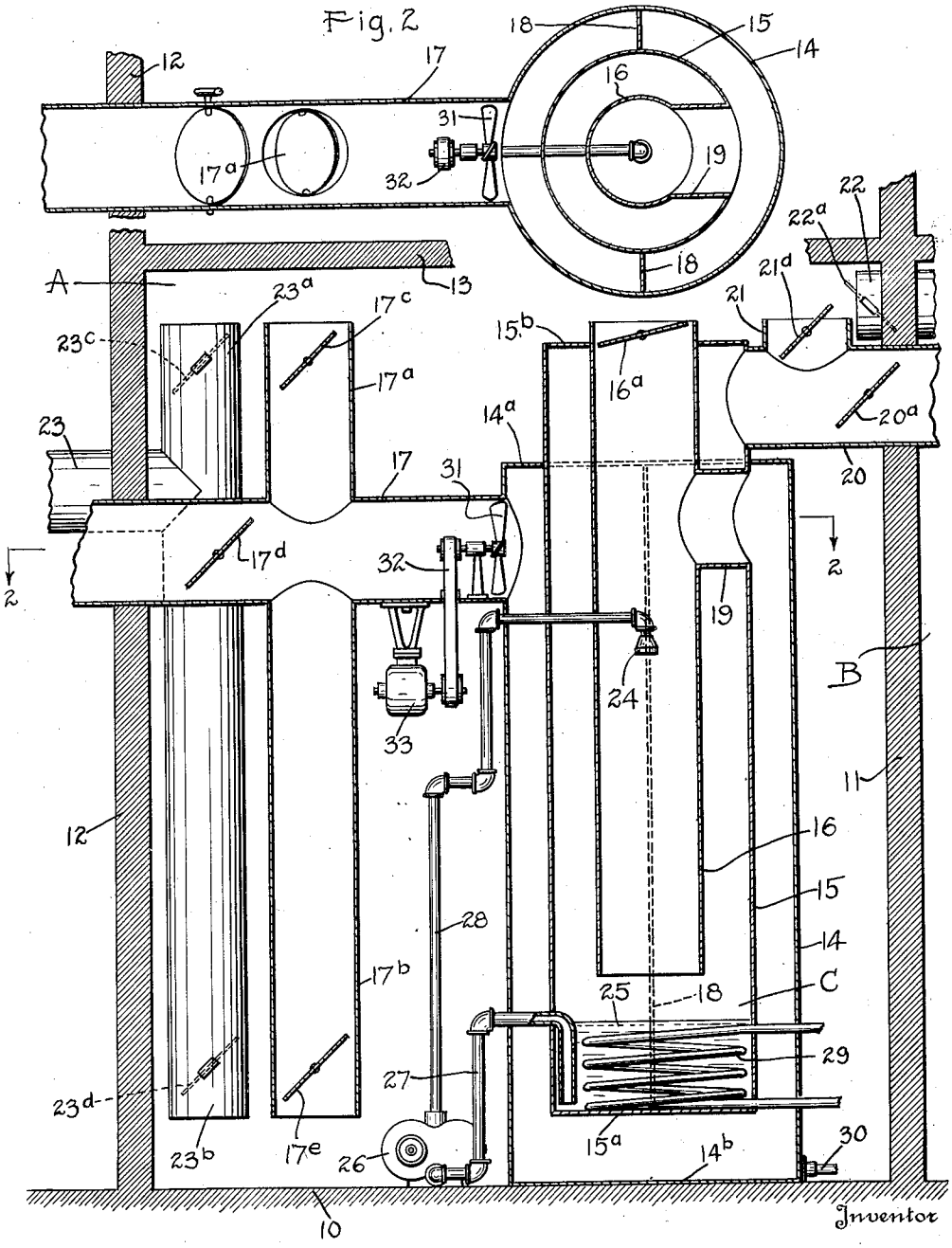


Fig. 1.

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AIR-CONDITIONING APPLIANCE

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My invention relates to improvements in air conditioning appliances, an object thereof being to provide a simple, durable and efficient appliance adapted to be placed in one room and to ventilate that room and remote rooms as well.

Another object is to supply an appliance, as above, the same being adapted to wash incoming and re-circulated air and to refrigerate the same or heat it as may be desired.

A further object is to provide an appliance wherein a spray is employed to affect the temperature of and circulate air in a room and, wherein, provision is made to gain the maximum temperature affecting benefit afforded by said spray.

An additional object of the invention is to provide an air conditioning appliance wherein a temperature affecting liquid is sprayed into a quantity of such liquid, the spray serving to drive air against the disturbed surface of said liquid and thereby promote the intimacy of contact betwen air and liquid.

Another object of the invention is to condition the quantity of liquid into which the spray is projected, also to condition the liquid spray by refrigerating or heating said quantity of liquid, as desired, and by supplying the liquid for said spray from said quantity of liquid.

With the foregoing and other objects in view, which will appear in the following description, the invention resides in the novel combination and arrangement of parts and in the details of construction hereinafter described and claimed.

In the accompanying drawings, Fig. 1 is a view, mainly in vertical section, illustrating an appliance embodying the present invention and showing said appliance not only as employed for conditioning the air in a room in which the appliance is contained, but also as employed for conditioning the air in rooms other than said first room, and Fig. 2 is a view in horizontal section, the same being taken as on the line 2—2 of Fig. 1.

Referring to the drawings, it will be observed that I have illustrated a building structure including a floor 10, walls 11, 12 and ceiling 13, the same supplying rooms A and B. Said structure serves for the purposes of illustration to show the manner in which my improved appliance is employed. The appliance proper is illustrated in the room A of the building structure, which room may be employed solely to house the appliance or may be employed also as a storage room for produce or for other purposes.

The appliance includes an outer upright drum 14, an inner upright drum 15 jacketed by said outer drum and an upright tubular conduit 16 jacketed by said inner drum. The upper end of the inner drum 15 projects through the top 14^a of the outer drum 14, the bottom 15^a of said inner drum being spaced above the bottom 14^b of the outer drum 14. The conduit 16 is open at both ends thereof, the upper extremity of said conduit being projected through the top 15^b of the inner drum 15, while the lower extremity of said conduit is spaced considerably above the bottom 15^a of said inner drum. An air ingress duct 17 leading from the outside of the building structure, through the wall 12 thereof, connects with the outer drum 14 at the upper portion thereof. At either side of the connection between said duct 17 and drum 14 are upright baffle members 18, the same being interposed between the walls of the outer and inner drums 14 and 15 and reaching from the top 14^a of the outer drum 14 to the bottom 15^a of the inner drum 15. On the side of said baffle members 18 opposite the connection between said air ingress duct 17 and outer drum 14 is a nipple 19 fitted between the inner drum 15 and conduit 16, which nipple provides an air passageway from the upper part of the outer drum 14 to said conduit. Leading from the upper part of the inner drum 15 is a feed duct 20, the same extending through the wall 11 of the building structure into the room B therein. Said feed duct 20 is provided, within the room A, with an upwardly extended branch duct 21 opening near the ceiling of said room A. A return duct 22 extends through the wall 11 from said room B to the room A. An air egress duct 23 issuing from the room A, through the wall 12, is fitted with two branch ducts 23^a and 23^b, the former being

extended upwardly in the room and terminating near the ceiling 13 thereof, while the latter is extended downward and terminates near the floor 10 of said room. The air ingress duct 17, previously referred to, is also fitted with two branch ducts 17^a and 17^b, the former being extended upward and terminating near the ceiling of the room and the latter extended downward and terminating near the floor of the room.

Within the conduit 16 is a nozzle 24, the same being directed downwardly and located slightly beneath the nipple 19. The lower part of the inner drum 15 provides a tank or container C for a quantity of liquid 25, the surface of which liquid occupies a level slightly beneath the lower open end of the conduit 16. A pump 26 having an intake pipe 27, dipping into said liquid 25 in said tank, is also fitted with a feed pipe 28 connected with said nozzle 24. Coiled within the tank C in the liquid 25 therein is a pipe 29 through which a suitable temperature affecting medium is circulated.

Issuing from the outer drum 25 is a drain pipe 30 for condensation that may accumulate within said drum, said drain pipe preferably being connected with a conventional trap, not shown.

Within the air ingress duct 17, between the branch ducts 17^a, 17^b and the outer drum 14 is a blower fan 31, the same being driven by a belt 32 from a motor 33 suspended beneath said duct 17.

Dampers are provided in the appliance as follows: damper 23^c in branch duct 23^a, damper 17^c in branch duct 17^a, damper 17^d in air ingress duct 17 at a point between the wall 12 and branch ducts 17^a, 17^b, damper 23^d in branch duct 23^b, damper 17^e in branch duct 17^b, damper 16^a in conduit 16 above the nipple 19, damper 21^a in branch duct 21, damper 20^a in feed duct between wall 11 and said branch duct 21, and damper 22^a in return duct 22.

As before indicated, the appliance is adapted to condition air by heating, or refrigerating the same. Under heating steam, hot water or other suitable medium is circulated through the coiled pipe 29 in the liquid 25, while under refrigeration, a suitable refrigerating medium is circulated through said pipe. With the pump 26 in operation, liquid, heated or chilled as the case may be, is drawn from the tank C and fed to the nozzle 24 from which said liquid is sprayed downward through the open end of conduit 16 against the surface of the liquid 25 in said tank C. Said spray forces the air in the conduit 16 down through the stratum of splashing liquid at the surface of the quantity of liquid 25 in the tank C and drives said air upward through the drum 15 and out through the feed duct 20. Said air having been in intimate contact with the spray from the nozzle 24 and with the splashing liquid in the tank C is washed and heated or cooled according to the nature of the temperature affecting medium circulated in pipe 29. With the damper 16^a in casing 16 closed, and dampers 17^c and 17^e in branch ducts 17^a and 17^b closed, and damper 17^d in ingress duct 17 open, fresh air is supplied to the casing 16 above the nozzle 24, said air entering the duct 17 from the outside, thence passing downward in the outer drum 14 under the baffle members 18 and the bottom 15^a of the inner drum 15, thence passing upward in said outer drum 14 on the opposite sides of said baffle members 18, thence passing into casing 16 through the nipple 19.

With the damper 21^a in branch duct 21 closed and damper 20^a in feed duct 20 open, the conditioned air is impelled through said feed duct into the room B. With damper 22^a in return duct 22 open, air used in room B returns to room A through said duct 22. And with either or both of dampers 23^c and 23^d open, said used air may escape to the outside through egress duct 23 from the upper portion of room A or the lower portion thereof, or both.

To confine the action of the appliance, as above noted, solely to room A, the dampers 20^a and 22^a in feed and return ducts 20 and 22 are closed, while the damper 21^a in branch duct 21 is opened.

The blower fan 31 may be put into operation to aid the spray from the nozzle 24 in impelling the air through the appliance.

Partial re-circulation of air in the room A in greater or less degree may be effected by opening, more or less, one or the other or both of dampers 17^c and 17^e in branch ducts 17^a and 17^b and also opening damper 21^a in branch duct 21.

Re-circulation of air in room A, without ventilation, is attained upon the closing of damper 17^d in the ingress duct 17 and the closing of valves 23^c and 23^d in the branch ducts 23^a and 23^b. Under this condition, it will readily be comprehended that it may be preferred, when the blower fan 31 is idle, to open the damper 16^a in conduit 16 rather than to open either of the dampers 17^c and 17^e in branch ducts 17^a and 17^b.

The provision of the opposed branch ducts in connection with the egress duct 23 and with the ingress duct 17 is advantageous in that the warmer air at the ceiling of room A or the colder air at the floor may be ejected from the room, as selected, or re-circulated through the appliance, as selected.

The outer drum 14 with its baffle members 18 leads the air going to the conduit 16 in a circuitous path about the inner drum 15. This drum, heated or chilled by the liquid and air therein affects the air traveling in said path before said air is subjected to the spray, whereby the greatest benefit from said

liquid is derived. Said outer drum 14, jacketing the inner drum 15, shields the same and provides an accumulator for condensation occurring at its outer surface.

Changes in the specific form of my invention, as herein disclosed, may be made within the scope of what is claimed without departing from the spirit of my invention.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. In combination, an upright conduit, an inner drum jacketing the conduit and having an air egress opening at the upper part thereof, an outer drum jacketing said inner drum and having an air ingress opening at the upper part thereof, baffle members between the two drums, on either side of said ingress opening, providing an air passageway in the space between said drums extending downward from said ingress opening at one side of the baffle members and thence upward on the other side of said baffle members, said conduit communicating at its upper portion with said air passageway on the side of the baffle members opposite to the air ingress opening in said outer drum, said conduit opening at the lower portion thereof into the lower portion of the inner drum, a nozzle in the conduit directed to spray liquid downward therein, and means beneath the opening in the lower portion of the conduit for conducting away the liquid discharged from said nozzle.

2. In combination, an upright conduit, an inner drum jacketing the conduit and having an air egress opening at the upper part thereof, an outer drum jacketing said inner drum and having an air ingress opening therein, said outer drum communicating with the upper portion of said conduit at a point remote from said air ingress opening in said outer drum, said conduit opening at the lower portion thereof into the lower portion of the inner drum, a nozzle in the conduit directed to spray liquid downward therein, means beneath the opening in the lower portion of said conduit for conducting away the liquid discharged from said nozzle.

3. In combination, an upright conduit, an inner drum jacketing the conduit and having an air egress opening at the upper part thereof, an outer drum jacketing said inner drum and having an air ingress opening therein, said outer drum communicating with the upper portion of said conduit at a point remote from said air ingress opening in said outer drum, said conduit opening at the lower portion thereof into the lower portion of the inner drum, a nozzle in the conduit directed to spray liquid downward therein, and a drain for carrying away condensation accumulating between said drums.

4. In combination, an upright conduit, an inner drum jacketing said conduit and having an air egress opening at the upper part thereof, the bottom of said inner drum forming a container for a quantity of liquid, an outer drum jacketing said inner drum and having an air ingress opening therein, said outer drum communicating with said conduit at the upper portion thereof remote from said air ingress opening, said conduit having an opening at the lower portion thereof, bringing it into communication with the lower portion of the inner drum, a nozzle in the conduit directed to spray liquid downward therein, a pump for pumping liquid from the inner drum to said nozzle, and means for affecting the temperature of the quantity of liquid contained within the inner drum.

5. In combination, an upright conduit, an inner drum jacketing said conduit and having an air egress opening at the upper part thereof, the bottom of said inner drum forming a container for a quantity of liquid, an outer drum jacketing said inner drum and having an air ingress opening therein, said outer drum communicating with said conduit at the upper portion thereof remote from said air ingress opening, said conduit having an opening at the lower portion thereof, bringing it into communication with the lower portion of the inner drum, a nozzle in the conduit directed to spray liquid downward therein, a pump for pumping liquid from the inner drum to said nozzle, means for refrigerating the quantity of liquid contained within the inner drum, and means of egress from the space between said drums for condensation accumulating therein.

6. The combination with a structure providing adjacent rooms, of means for conditioning the air in said rooms, said means including, in one of the roms, an upright conduit, a drum jacketing said conduit, an air ingress duct communicating with the conduit at the upper portion thereof, a damper in said ingress duct, a fan in the ingress duct, between said damper and conduit to stimulate the flow of air through said ingress duct, a branch duct extending upward from the ingress duct, between said fan and damper, to a point near the ceiling of the room, a damper in said branch duct, a branch duct depending from the ingress duct, between said fan and damper, and opening near the floor of the room, a damper in said depending branch duct, said conduit having an opening at its upper portion bringing it into communication with the upper portion of the room, a damper to close said opening, said conduit also having an opening at its lower portion bringing it into communication with the lower portion of the drum, a nozzle located within the conduit for spraying a liquid downwardly therein, a feed duct leading from the upper portion of the drum to a second room, a damper in the feed duct, said feed duct having an opening therein

between said damper and said drum, said opening bringing the feed duct into communication with said first room, a damper to close said opening, a return duct leading from the second room to said first room, an egress duct leading from said first room to the outside, a branch duct extending upwardly from said egress duct and opening near the ceiling of the room, a damper in said upwardly extending branch duct, a branch duct depending from said egress duct and opening near the floor of the room, and a damper in said depending branch duct.

7. The combination with a structure providing adjacent rooms of means for conditioning the air in said rooms, said means including, in one of the rooms, an upright conduit, a drum jacketing said conduit, an air ingress duct communicating with the conduit at the upper portion thereof, a damper in said ingress duct, a fan in the ingress duct, between said damper and conduit, to stimulate the flow of air into and through said ingress duct, a branch duct taking off from the ingress duct between the fan and damper and opening into the room, a damper in said branch duct, said conduit having an opening at its lower portion bringing it into communication with the lower portion of the drum, a nozzle located within the conduit for spraying a liquid downwardly therein, a feed duct leading from the upper portion of the drum to a second room, a damper in the feed duct, said feed duct having an opening therein between said damper and said drum bringing the feed duct into communication with said first room, a damper to close said last mentioned opening, a return duct leading back into said first room and an egress duct leading from said first room to the outside.

8. The combination with a structure providing adjacent rooms, of means for conditioning the air in said rooms, said means including, in one of the rooms, an upright conduit, a drum jacketing said conduit, an air ingress duct communicating with the conduit at the upper portion thereof, a fan in the ingress duct to stimulate the flow of air into and through said ingress duct, said conduit having an opening at its lower portion bringing it into communication with the lower portion of the drum, a nozzle located within the conduit for spraying a liquid downwardly therein, a feed duct leading from the upper portion of the drum to an adjacent room, and a return duct leading back from said adjacent room to said first room.

9. The combination with a structure providing a room, of means for conditioning the air in said room, said means including an upright conduit, a drum jacketing said conduit, an air duct providing communication between the room at its lower portion and the conduit at the upper portion thereof, a fan in said duct to stimulate the flow of air therethrough, said conduit having an opening at its upper portion bringing it into communication with the upper portion of the room, a damper to close said opening, said conduit having an opening at its lower portion bringing it into communication with the lower portion of the drum, a nozzle located within the conduit for spraying a liquid downwardly therein, said drum having an opening in the upper portion thereof bringing it into communication with the room.

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

CHARLES A. MOORE.