Dec. 29, 1931. D. HANDELAN 1,838,255

AIR CONDITIONING APPARATUS

Filed Feb. 11, 1926

Fig. 1

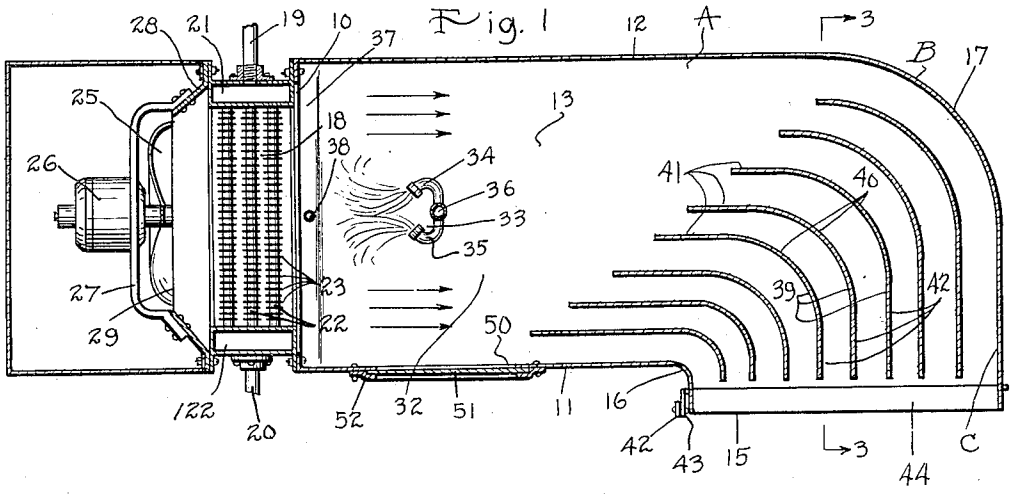


Fig. 2

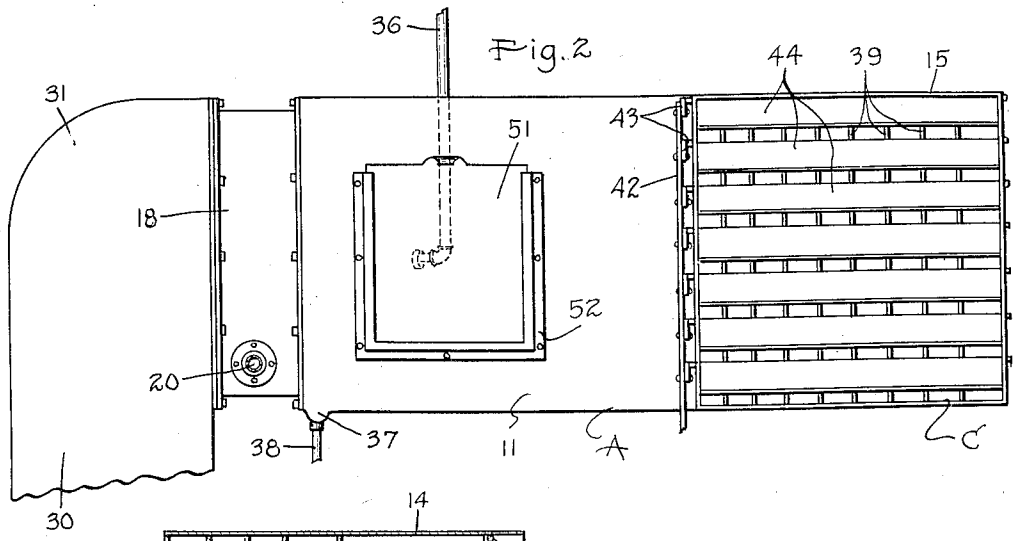
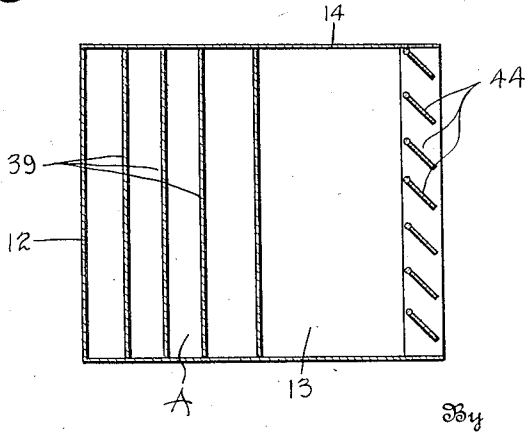


Fig. 3



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Patented Dec. 29, 1931 1,838,255

UNITED STATES PATENT OFFICE

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AIR CONDITIONING APPARATUS

Application filed February 11, 1926. Serial No. 87,549.

My invention relates to air conditioning apparatus and has for its object to provide a self-contained unit for heating, humidifying and recirculating the air of a room or building which will operate without appreciable resistance to the rapid circulation of the air.

Another object of the invention resides in providing a case having sidewalls and a top and bottom connected therewith, said case having an inlet at one end, and an outlet at its other end, disposed in one of the sidewalls thereof, said sidewalls being curved to form in conjunction with said top and bottom an elbow leading up to said outlet.

A still further object resides in providing spaced curved deflectors of substantially the same length within said elbow leading up to said outlet upon which the moisture laden air may impinge so as to remove the surplus water therefrom.

Other objects reside in the details of construction and the novel combination and arrangement of parts hereinafter described and claimed.

In the drawings illustrating my invention in one form:

Fig. 1 is a plan sectional view of an air conditioning apparatus illustrating an embodiment of my invention.

Fig. 2 is an elevational view of the structure shown in Fig. 1.

Fig. 3 is a cross sectional view taken on line 3—3 of Fig. 1.

In buildings and in rooms of existing buildings where it becomes impracticable to install heating, ventilating and air conditioning systems utilizing a central air circulating and conditioning apparatus my invention may be advantageously used due to the fact that each unit constructed in accordance with my invention forms a complete air conditioning unit which may be hung from the ceiling and situated wherever desired in the particular room to be heated and ventilated.

The apparatus embodying my invention consists primarily of a case A of rectangular cross section open at one end as indicated at 10 to form an air inlet. This case consists of sidewalls 11 and 12, a bottom 13 and a top 14 connected therewith as clearly illustrated in Figs. 1 and 3.

The case A is constructed with an elbow B connecting said case with an angular extension C of said casing issuing outwardly therefrom at right angles thereto. The end of this extension of case A is also open as indicated at 15 to form an air outlet which as will be noted extends at right angles to the air inlet 10 and due to the shortness of the branch C is formed substantially in the wall 11 of said case at the end thereof opposite the inlet 10. The elbow B and extension C are constructed by bending the sidewalls 11 and 12 at 16 and 17 and connecting the same to the top 14 and bottom 13 which are formed to fit said sidewalls and run parallel to one another throughout their full extent.

At the inlet 10 of case A is attached a heater 18 which may be a radiator of either the direct or indirect type or which may be any other suitable heating device through which the air may pass and which is arranged to give off heat to the air on its passage therethrough. For purposes of illustration I have shown a fin type of radiator comprising two headers 21 and 122 connected together by means of a number of tubes 22 which are arranged in spaced relation and have fins 23 for increasing the radiating surface thereof. The header 21 is connected to a suitable steam pipe 19 leading to the steam boiler of the building while the header 122 is connected to a return pipe 20 running back to the boiler. When air is forced through this radiator the same becomes heated by coming in contact with the fins 23 and the tubes 22 of said radiator entering the interior of case A at an increased temperature.

For forcing the air through the apparatus I employ a fan 25 driven by an electric motor 26. This fan and motor are supported on a spider 27 which is attached to a funnel-shaped mounting 28 directly attached to the radiator 18. The fan 25 is positioned in a circular opening 29 in such mounting which causes the air to be drawn from without the fan and forced through the heater 18 and the case A. A downwardly extending duct 30 having an elbow 31 envelops the fan 25 and

motor 26 and is connected to the mounting 28 of said fan as shown in Fig. 1. This duct serves to pick up the lower strata of foul air from the portion of the room nearest the floor and to conduct it to the air conditioning apparatus proper.

Within the interior of the case A which forms a spraying or air washing chamber 32 and immediately rearwardly of the radiator 18 is positioned a spraying device 33 which consists of two nozzles 34 and 35 directed towards each other and pointed towards the radiator 18. These nozzles are connected to a water supply pipe 36 which extends out through the top 14 of case A and is connected to any suitable source of water supply. In operation, water passing through the spray 33 is vaporized and directed towards the radiator 18 in the opposite direction to the passage of the air therethrough. This causes the air as it passes through the chamber 32 to become thoroughly washed and laden with moisture. All the surplus water travels to one end of case A where it is collected by a trough 37 and conducted from the device by means of a drain 38. For installing and inspecting the spraying device 33 I provide a hand hole 50 in wall 11 of case A which is located directly opposite said spraying device. This hole may be closed by means of a slide 51 movable along a guideway 52 secured to said wall 11 along the marginal portions of the hole 50. By raising said slide access may be had to the interior of the chamber 32 through hole 50.

Within the portion of case A forming the elbow B and the angular extension C thereof are arranged a plurality of spaced deflector plates 39 which extend between the top 14 and bottom 13 of said case and are secured thereto. These deflectors are formed with a curved portion 40 connecting two tangential portions 41 and 42 situated at right angles to each other. It will be noted that the curvature of the curved portions 40 of these deflectors varies so that said deflectors are substantially equally spaced throughout their extent. The tangential portions 42 of these deflectors extend up to within a short distance of the outlet 15 making the same of increasing length from wall 11 to wall 12 as clearly shown in Fig. 1. At the same time the other tangential portions 41 of said deflectors are formed of decreasing length from wall 11 to wall 12 so that the total surface of each of the deflectors 39 is approximately the same.

The deflectors 39 serve a dual purpose. The air passing through the device being heated by the radiator 18 in passing along said deflectors causes the same to be heated to a degree of temperature considerably above that of the water sprayed into the air. These deflectors in turn transfer the heat given to them to the particles of water suspended in the air and coming in contact therewith causing the same to become more finely divided and vaporized. At the same time due to the abrupt change of direction of the moisture laden air in passing along said deflectors, the larger particles of moisture suspended in the air are precipitated against the curved portions 40 and the tangential portions 42 of said deflectors and whatever moisture is not vaporized thereby flows downwardly along said deflectors and along the bottom 13 into trough 37 where it may be conducted from the device through the drain 38. The air in passing through the spaces between the deflectors 39 is divided into strata, all of which are treated in substantially the same manner and subjected to substantially the same area of deflector surface. This has the effect of producing a uniform temperature and humidity in the outgoing air.

For regulating the flow through the outlet 15 I employ a number of louver slats 44 which are pivoted in the walls 11 and 12 of the extension C of case A at the ends thereof. These slats slope downwardly as shown in Fig. 3 so as to direct the discharged air downwardly into the room causing a complete circulation therein. The ends of said slats are connected in the usual way through crank arms 43 with a lever by means of which the same may be simultaneously moved to open or close the opening 15 as desired. It will be noted that these louver slats extend at right angles to the deflector plates 39 so as to maintain a uniform flow of air between all of said deflector plates regardless of the degree of opening through the outlet 15.

The invention is highly advantageous in that the same is simple and not apt to get out of order. Only a slight resistance is offered to the flow of air through the device so that the device has a large capacity and is hence capable of circulating large quantities of air. The air on leaving the apparatus is of uniform humidity freed from dust and other impurities. By regulating the flow of the steam to radiator 18 and the water to the spray 33 by means of valves not illustrated the degree of temperature and humidity may be varied to meet the requirements.

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. An air conditioning apparatus comprising an elongated case, a heater situated at one end of said case having a plurality of closely spaced conductors, a sprayer situated within said case adjacent said heater adapted

to direct a spray of water against the conductors of said heater, and a fan adjacent said heater on the other side thereof adapted to force air through said heater in opposition to the direction of travel of the spray from said sprayer, said fan having a mounting, said fan and mounting completely covering the conductors of said heater and preventing the passage of water through said heater.

2. An air conditioning apparatus comprising an elongated case formed with spaced side walls and a top and bottom connected therewith, said case having an inlet at one end and an outlet along one of the side walls of said case at the end opposite said inlet, said side walls of said case being curved at their ends opposite said inlet to form together with said top and bottom an elbow leading to said outlet, a plurality of deflectors within said elbow arranged in spaced relation, said deflectors having curved portions conforming with the curvature of said elbow and tangential portions at the ends of said curved portions leading up to said outlet, and tangential portions at the other ends of said curved portions directed toward said inlet, said last named tangential portions varying in length in inverse ratio to the radii of said curved portions.

3. An air conditioning apparatus comprising an elongated case formed with spaced side walls and a top and bottom connected therewith, said case having an inlet at one end and an outlet along one of the side walls of said case at the end opposite said inlet, said side walls of said case being curved at their ends opposite said inlet to form together with said top and bottom an elbow leading up to said outlet, a plurality of curved deflectors within said elbow arranged in spaced relation and leading up to said outlet, said deflectors having tangential portions at the ends of the curved portions, said tangential portions on one side of said curved portions progressively increasing in length, and upon the other side of said curved portions progressively decreasing in length.

4. An air conditioning apparatus comprising a case, a heater situated at one end of said case comprising a plurality of closely spaced conductors, a sprayer situated within said case adjacent said heater adapted to direct a spray of water against the conductors of said heater, and a fan adjacent said heater on the other side thereof, said fan substantially covering said heater and being adapted to force air through said heater in opposition to the direction of travel of the spray from said sprayer, the blades of said fan serving to directly strike particles of water passing through said heater and forcing the same back into said case.

5. An air conditioning apparatus comprising an elongated case forming a spraying chamber and having an air inlet at one end, said case being provided with an elbow at the other end and having an air outlet, said outlet extending angularly with respect to said air inlet and a plurality of curved deflector plates in said elbow following the direction of curvature thereof for removing surplus water from the air passing through said case, said deflectors being arranged in vertical relation and being mounted upon the bottom wall of the case and a drain in said bottom wall for removing water from said elbow collected by said deflector plates.

6. An air conditioning apparatus comprising an elongated case forming a spraying chamber and being formed with a bend, and a plurality of vertically disposed water eliminating plates situated within said case at said bend and having portions extending in the direction of travel of the air upon leaving the bend.

7. In an air conditioning apparatus, a case forming an air passageway, said case having a straight portion and a curved portion communicating therewith, the air traveling from said straight portion to said curved portion, means for spraying water into the air in the straight portion of said case, and a plurality of curved deflectors in the curved portion of said case following the curvature thereof for removing a portion of the water from the air leaving the straight portion of the case.

8. An air conditioning apparatus comprising a straight case forming a spraying chamber and having an air inlet at one end, said case being provided with an elbow at the other end having an air outlet, said outlet extending angularly with respect to said air inlet and a plurality of curved water eliminating plates in said elbow, following the direction of curvature thereof for removing surplus water from the air passing through said case.

9. An air conditioning apparatus comprising a straight case forming a spraying chamber and having an air inlet at one end, said case being provided with an elbow at the other end having an air outlet and a plurality of curved water eliminating plates in said elbow, following the direction of curvature thereof for removing surplus water from the air passing through said case.

In testimony whereof I affix my signature.

DANIEL HANDELAN.