

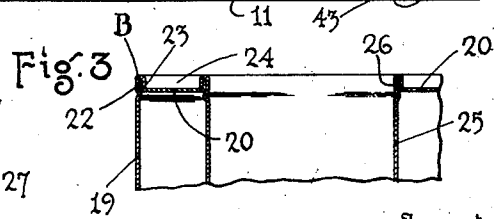
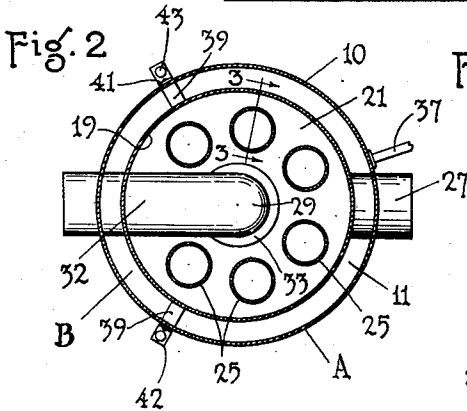
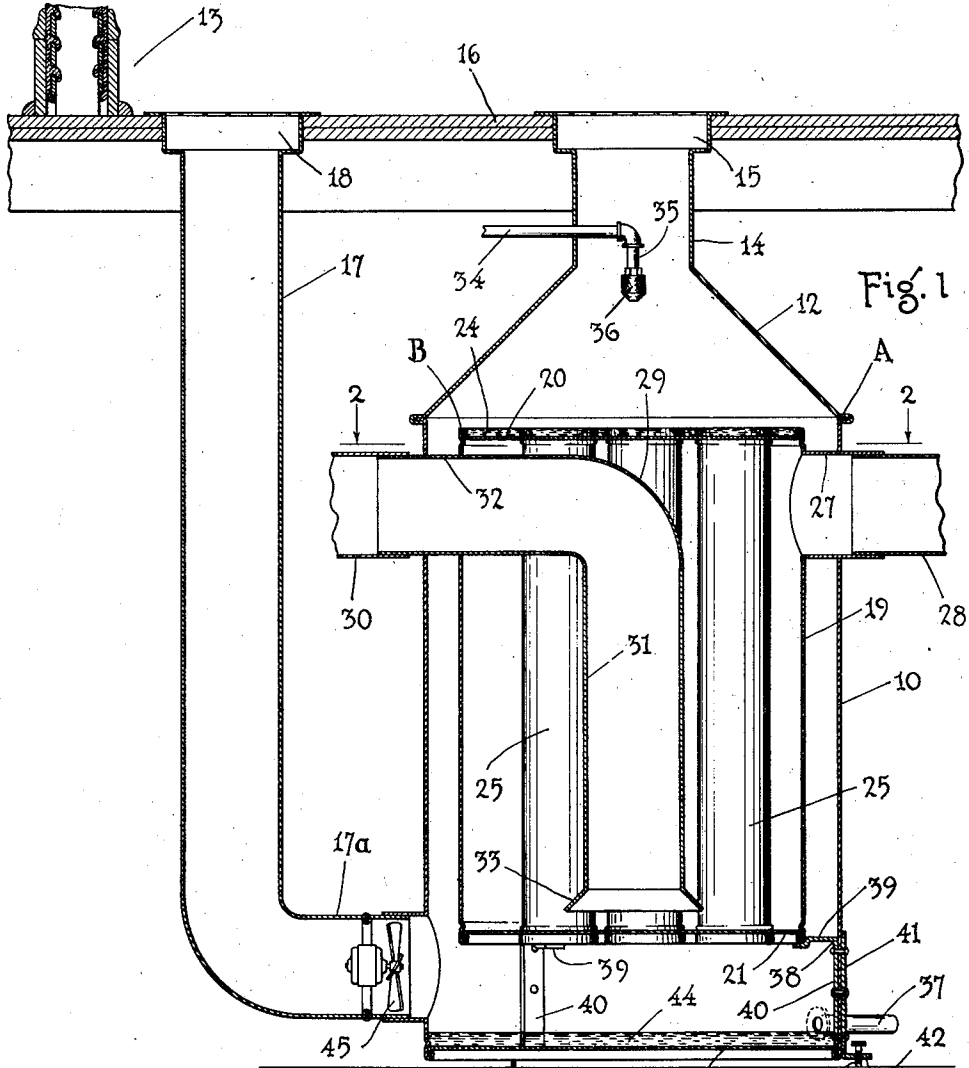
May 21, 1935.

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2,002,019

AIR CONDITIONING APPARATUS

Filed Jan. 14, 1933



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UNITED STATES PATENT OFFICE

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AIR CONDITIONING APPARATUS

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Application January 14, 1933, Serial No. 651,661

8 Claims. (Cl. 257-167)

My invention relates to improvements in air conditioning apparatus for circulating, heating and humidifying air and pertains more particularly, to that type of such apparatus which serves in utilizing heat ordinarily lost in the stacks of heating plants.

An object of my invention is to provide a simple, durable and relatively inexpensive apparatus of the present character, which supplies warm, humidified air to a building space and circulates the same therein and which employs reclaimed heat in the heating and humidification of the air.

Another object of my invention is to provide an apparatus, as above, so constructed as to be especially effective in humidifying the air.

A further object of the invention is to provide an apparatus of the present character into which the gases of combustion from a heating plant are introduced, but which is so designed as to avoid retardation of the draft of such plant.

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 drawing, Fig. 1 is an elevational sectional view illustrating an apparatus embodying my invention, the same being shown in connection with a building space, the air of which is to be conditioned by said apparatus; Fig. 2 is a horizontal sectional view taken as on the line 2-2 of Fig. 1 and on a somewhat smaller scale than said Fig. 1, and Fig. 3 is a sectional view in detail, the same being taken as on the line 3-3 of Fig. 2.

Having reference to the drawing, it will be observed that the illustrated embodiment of my invention includes an outer casing A of sheet metal consisting of an upright cylindrical body 10 having a bottom 11 and a frusto-conical hood 12. This casing A, at its upper portion, communicates with the building space 13 which is to be supplied with conditioned air, such communication being had through a supply conduit 14 rising from the hood 12 and connecting with a register structure 15 in the floor 16 of the building structure. Said casing A, at its lower portion, communicates with the building space 13 through a return pipe 17 depending from a register structure 18 in the floor 13 and connecting at its lower end through a horizontal branch 17^a with the body 10 near the bottom 11.

Within the casing A is a cylindrical drum B of sheet metal, the same being supported on end with its cylindrical wall 19 spaced from the inner surface of the cylindrical body 10. This drum B

has upper and lower heads 20 and 21, the upper head 20 being formed with an upstanding marginal flange 22 over which the upper marginal portion 23 of the drum wall 19 is turned (Fig. 3). In thus joining the head 20 with the wall 19 of the drum, a shallow basin 24 is formed, the upper head 20 constituting the bottom of said basin and the turned over portion 23 of wall 19 constituting the sides of said basin. If desired, the lower head 21 may be connected with the wall 19 of the drum B in the same manner as said upper head 20. Spaced flues 25, extending longitudinally of the drum B and communicating with the interior of the casing A at the top and bottom of said drum, are provided. These flues are arranged in a series concentrically about the axis of the drum B, each flue consisting of a pipe, the upper end of which extends through an opening in the upper head 20 of the drum B. In forming this opening, it is cut smaller than the outer diameter of the pipe, the marginal portion of the head 20 about the undersized opening being thereafter turned up to form an upstanding annular flange 26 (Fig. 3), the internal diameter of which corresponds with the external diameter of the pipe 25. After fitting the pipe 25 into this flange 26, the margin of said pipe is rolled back over said flange, thus making a tight connection between pipe 25 and head 20 and at the same time forming a dam in the basin 24 about the mouth of the pipe, the height of such dam being equal to the height of the side wall of said basin. The lower end of each pipe 25 is suitably connected with the lower head 21 of the drum B, the connections, if desired, being made in the same manner as the above described connections between the upper ends of the pipes 25 and the upper head 20 of the drum B.

Extending through the body 10 of the casing A and connecting with the wall 19 of the drum B near the upper head 20 is an ingress thimble 27 through which hot gases of combustion are introduced into the drum B, such thimble 27, being connected with the smoke pipe 28 leading from a furnace. An egress elbow-pipe 29 conveys the combustion gases from the interior of the drum B to a pipe 30 connecting with the chimney of the building. This egress pipe 29 has a vertical branch 31 coaxially disposed with respect to the drum B and has a horizontal branch 32 axially aligned with the ingress thimble 27. The said horizontal branch 32 of the pipe 29 extends through the wall 19 of the drum B and the body 10 of the casing A. The vertical branch 31 of the pipe 29 opens at its lower end into the lower

portion of the drum B, a bell 33 being formed at said end of said branch 31. The relative spacing of the flues 25 of the drum B, as seen in Fig. 2, is such as to accommodate the horizontal branch 32 of the elbow-pipe 29 and, further, to leave the space between the ingress thimble 27 and the bend in said elbow-pipe 29 largely unobstructed. In thus leaving said space substantially clear, as mentioned, the upper portion of the pipe 29 is directly subjected to a substantial part of the hot gases entering the drum B through the thimble 27, the draft in the pipe 29 being thereby promoted with the result that the egress of the relatively cool gases from the lower portion of the drum B, through said pipe 29, is effectively stimulated.

Water is introduced into the casing A for humidifying the air therein, a water supply pipe 34 being provided, the same passing through the wall of the conduit 14 and being fitted with a depending extension 35 to which a nozzle 36 is applied. The spray from this nozzle is directed downwardly, the greater part thereof being caught in the basin 24 formed at the top of the drum B. Water overflowing from the basin 24 trickles down the outer surface of the wall 19 of the drum and down the inner surfaces of the drum flues 25, the drip from the drum being caught in the lower portion of the casing 10 and maintained at a predetermined level therein, a drain pipe 37, issuing from the casing body 10 at an elevation spaced from the bottom 11 of the casing, being provided to carry away any excessive accumulations of water in said casing.

The support for the drum B consists of a number of identical brackets 38 arranged within the casing A. Each bracket 38 is formed with a horizontal reach 39 forming a rest for the lower edge of the drum B and is also formed with a leg 40 disposed against the inner surface of the body 10 and riveted to a companion leg 41 disposed against the outer surface of said body. Each of said legs 41 is provided with an outwardly turned lug 42 in which a footing screw 43 is threaded. The screws 43, upon proper adjustment, level the appliance so that the overflow of water from the basin 24 will be substantially uniform about the outer surface of the drum wall 19 and the inner surfaces of the flues 25.

In operation, the hot gases from the furnace, in connection with which the appliance is used, pass into the drum B through the ingress thimble 27. Striking the elbow-pipe 29 and expanding in the upper portion of the drum, these gases heat said pipe and the head 20, wall 19 and flues 25 of the drum B. Settling within the drum, said gases are eventually drawn from the lower portion thereof into the egress pipe 29, which connects with the flue of the building, the updraft in the pipe 29 being effectively stimulated by reason of the direct heating of the upper portion of said pipe by the hot gases entering the drum. The upper head 20 of the drum B being the hottest part thereof, the shallow body of water in the basin 24 is subjected to heat in relatively high degree. Graduated in lesser degree the water is heated which overflows from said basin along the outer surface of the drum wall 19 and the inner surfaces of the flues 25. Air within the flues 25 and about the drum B is affected by heat from the drum and, in consequence, rises within the casing, passing through the spray from the nozzle 36 and finding egress from said casing into the building space above, through the conduit 14 and register structure 15, such air passing upwardly

through the casing A being replaced by returning gravitating air conducted into the lower portion of said casing through the return pipe 17. In passing into the casing A from said pipe 17, the returning air is passed over the body of water 44 at the bottom of said casing and through the drip from the wall 10 of the drum and the inner surfaces of the flues 25, whereby such air is to some extent washed and humidified. Upon ascending in the casing A this air, thus initially treated, is further conditioned by passing along the moist heated outer surface of the drum wall 19 and the moist heated inner surfaces of the flues 25 of said drum, this conditioning process consisting in the heating of the air and the further humidification thereof by the vapor generated from the water trickling down along the flues 25 and wall 19 of the drum B. Finally, the air is washed by the spray from the nozzle 36 and further humidified by vapor generated in the basin 24.

In employing the return pipe 17 to recirculate the air through the appliance, the air in the space 13 is effectively circulated therein. And to stimulate the circulation of air through the appliance and within said room space 13, a fan 45 may be installed in said return pipe, as shown in Fig. 1.

While it may be preferable in most cases to return air to the appliance from the building space which is being supplied with the conditioned air, it will be understood that air from any source may be introduced into the lower portion of the casing A.

The present invention is particularly advantageous in that it not only constitutes a medium in which heat, otherwise lost, is efficiently reclaimed, but also constitutes an instrumentality in which air, treated by such reclaimed heat, is efficiently humidified and cleansed and introduced into a building space.

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 an apparatus of the character described, an upright casing having an opening at the lower portion thereof for the ingress thereto of air to be conditioned and having an opening at the upper portion thereof for the egress of conditioned air, an upright drum within the casing between said openings and spaced from the sides of said casing, said drum having upright flues therein, the top of the drum forming a basin and the upper ends of the flues forming dams about the mouths thereof co-extensive in height with the height of the sides of said basin, a nozzle above the drum for discharging a spray of water downwardly into the basin through the path of the air ascending in the casing, said basin providing for the overflow of water therefrom down the outside of the drum and down the inner walls of said flues, a conduit for admitting hot gases into the drum, said conduit extending through the wall of the casing and connecting with the drum at the upper portion thereof, a second conduit for the egress of gases from said drum, said conduit comprising an elbow-pipe, one branch thereof being horizontally disposed in axial alignment with said ingress conduit and extended through the walls of said drum and casing, the other branch of said pipe being vertically disposed co-axially of the drum and opening at its lower end within the lower portion of said drum, the flues in the drum

being relatively disposed to provide an unobstructed passageway between the mouth of the ingress conduit and the upper portion of said egress conduit.

2. In an apparatus of the character described, an upright casing having an opening at the lower portion thereof for the ingress thereto of air to be conditioned and having an opening at the upper portion thereof for the egress of conditioned air, an upright drum within the casing between said openings and spaced from the sides of said casing, the top of the drum forming a basin, a nozzle above the drum for discharging a spray of water downwardly into the basin, said basin providing for the overflow of water therefrom down the outside of the drum, a conduit for admitting hot gases into the drum, said conduit extending through the wall of the casing and connecting with the drum at the upper portion thereof, a second conduit for the egress of gases from said drum, said conduit comprising an elbow-pipe, one branch thereof being horizontally disposed and extended through the wall of said drum at the upper portion thereof and through the casing, the other branch of said pipe being vertically disposed and opening at its lower end within the lower portion of said drum, said egress conduit being located in the direct path of the gases entering the drum through the ingress conduit.

3. In an apparatus of the character described, an upright casing having an opening at the lower portion thereof for the ingress thereto of air to be conditioned and having an opening at the upper portion thereof for the egress of conditioned air, an upright drum within the casing between said openings, said drum having upright flues therein, the top of the drum forming a basin and the upper ends of the flues forming dams about the mouths thereof, a nozzle above the drum for discharging a spray of water downwardly into the basin, said basin providing for the overflow of water therefrom down the inner walls of said flues, a conduit for admitting hot gases into the drum, and a second conduit for the egress of gases from said drum.

4. In an apparatus of the character described, a casing having an opening at the lower portion thereof for the ingress thereto of air to be conditioned and having an opening at the upper portion thereof for the egress of conditioned air, a drum within the casing between said openings, said drum having an air passageway therethrough for conducting air from the lower portion of said casing to the upper portion thereof, the top of the drum forming a basin, a nozzle above the drum for discharging a spray of water downwardly into the basin, said basin providing for the overflow of water therefrom along said drum into said air passageway, a conduit for admitting hot gases

into the drum, and a second conduit for the egress of gases from said drum.

5. In an apparatus of the character described, a casing having an opening at the lower portion thereof for the ingress of air thereto to be conditioned and having an opening at the upper portion thereof for the egress of the conditioned air, a drum within the casing about which the air in said casing ascends, an ingress conduit for conducting hot gases into said drum, and an egress conduit for conducting gases from the drum, said drum being formed to provide a basin at the top thereof, a nozzle disposed to direct a spray of water through the path of said ascending air and into the basin, said basin providing for the overflow of water therefrom downwardly along the outer sides of said drum.

6. In an apparatus of the character described, a casing having an opening at the lower portion thereof for the ingress thereto of air to be conditioned and having an opening at the upper portion thereof for the egress of conditioned air, a drum within the casing spaced from the sides thereof, means for directing water into contact with the drum, an ingress conduit for admitting hot gases into the drum at the upper portion thereof, and a conduit for the egress of gases from the drum, said conduit extending upwardly from the lower portion of said drum and being subjected to the heat within the drum at its upper portion.

7. In an apparatus of the character described, a drum constituting a passageway for hot gases and having an air conduit therein for conducting air upwardly therethrough, a casing structure superimposing said drum and communicating with said conduit, said structure having an outlet for the egress of air therefrom, said drum having an upper head providing an evaporating surface, a water spray in the casing structure for treating the air therein and for supplying water to said evaporating surface, said drum being formed to cause the water to flow from said surface and trickle downwardly along the inner surface of said air conduit, and means for catching and draining away any surplus water not evaporated in its descent along said surface of said conduit.

8. In an apparatus of the character described, a drum constituting a passageway for hot gases, said drum having an air conduit therein for conducting air upwardly therethrough, means for feeding water into said conduit to cause the water to trickle downwardly along the inner wall thereof, means for catching and draining away the surplus water not evaporated in its descent along said conduit, said water feeding means constituting a spray to which the air ascending from said air conduit is subjected.

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