Nov. 29, 1932. E. L. FONSECA ET AL 1,889,017

HUMIDIFYING APPARATUS

Filed July 27, 1929

Fig. 1

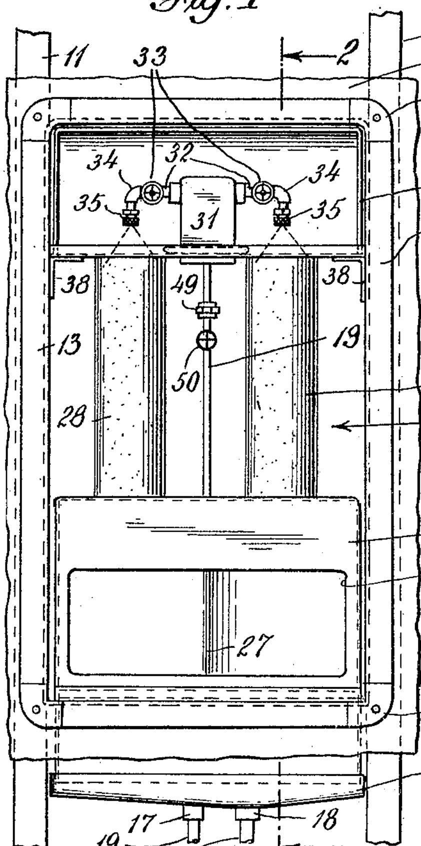


Fig. 2,

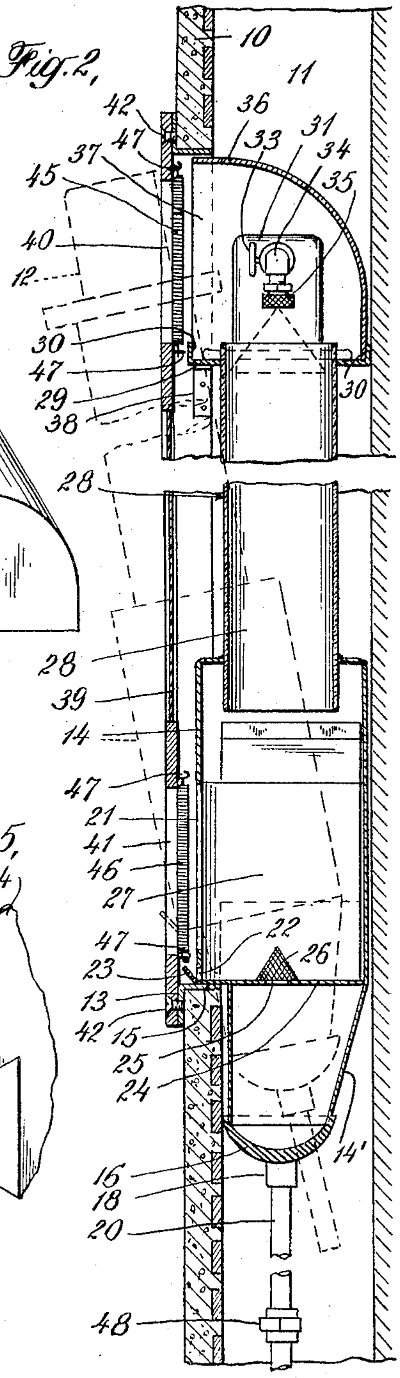


Fig. 4,

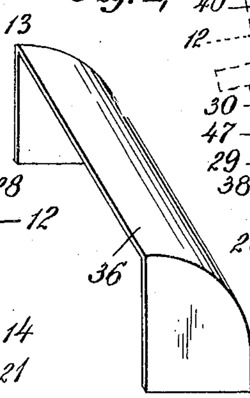


Fig. 3,

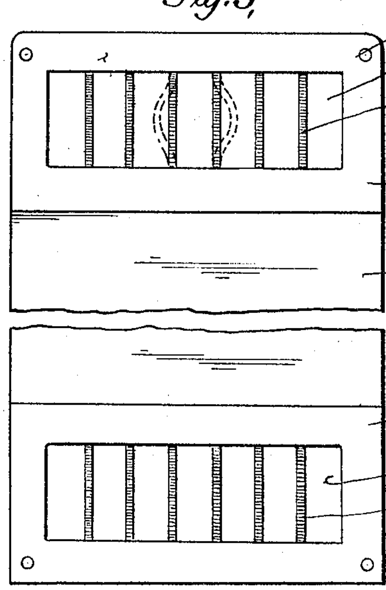
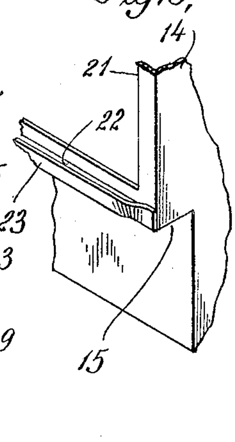


Fig. 5,



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UNITED STATES PATENT OFFICE

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HUMIDIFYING APPARATUS

Application filed July 27, 1929. Serial No. 381,572.

This invention relates to a humidifying apparatus and has particular reference to apparatus which will continuously refresh the air of a room by providing it with the proper degree of humidity, and which also purifies the air by washing it without requiring the introduction of outside air or positive air circulating means.

In a copending application, Serial No. 346,285, filed March 12, 1929 by Edward L. Fonseca and Edward McK. Hunt, there is disclosed a humidifying and air conditioning apparatus of the type described, over which the present invention provides certain improvements and modifications.

The principal object of this invention is to provide a humidifying apparatus of the type described which is inexpensive to manufacture, install, inspect and maintain, which has no moving parts, is fool-proof and not likely to get out of order during long periods of operation.

This and other objects are obtained in a preferred embodiment of the invention which comprises a main body shaped to fit through an opening in a wall between the studs thereof, this body being supported partly in this opening and partly behind the wall below this opening upon a ledge carried by the body and resting upon the lower edge of the wall opening. The body is emplaced in the wall by inserting the lower part of the body through the wall opening at an angle, lowering it into the space behind the wall until its ledge engages the lower edge of the opening, and then pushing the upper end of the body into the space between the studs, where it maintains a normally upright position. A removable hood is then placed on the body, which protects it from dust and plaster particles which fall between the walls. The opening in the wall is then covered by means of a panel, door or other decorative cover having louvre openings at the top and bottom, or the wall may be plastered over, leaving upper and lower louvre openings. In either of these arrangements, it is not necessary to remove the panel or other covering in order to inspect, clean, repair or adjust the apparatus, for the reason that the louvres are provided with relatively movable grill members, which may either be spread apart or removed so that an operator may insert his hand through the louvre opening to make adjustments, repairs or clean the apparatus.

The air is washed, humidified and, if desired, warmed or cooled by sprays of water or other liquid passing through vertically disposed tubes through which is induced a current of air which enters the upper louvre opening and emerges from the lower louvre opening, whereby the air of the room is continuously circulated, purified and refreshed without the addition of outside air. Because the hissing of the water emerging from the spray nozzles, although practically inaudible, may be objectionable, it is preferred that the tubes through which the liquid sprays pass be made of non-resonant material such as fibre or the like.

For a better understanding of the invention, reference is made to the accompanying drawing, in which

Figure 1 is a face view of the humidifying apparatus of this invention set into an aperture in a wall;

Fig. 2 is an enlarged vertical section through the apparatus as seen along the line 2—2 of Fig. 1;

Fig. 3 is a face view of the apparatus with the cover plate mounted thereover;

Fig. 4 is a perspective view of the removable hood of the apparatus; and

Fig. 5 is a fragmentary perspective view of the drip gutter of the apparatus.

In the drawing, numeral 10 designates the wall of a room in which the humidifying apparatus of this invention is to be mounted, the studs in the wall being designated 11. As shown in Figs. 1 and 2, the aperture cut in the wall between the studs 11 is less in length than the overall length of the humidifying apparatus identified by numeral 12. This wall aperture may be cut in an old wall already plastered over, or may be formed when building a new wall, the dimensions of the resultant recess being governed in width by the space between studs and in depth by the depth of the studs. Framing the aperture in the wall is a frame preferably made of

standard angle iron strips 13 fitted together with right angle corner strips 13′, as shown particularly in Fig. 1. These strips are secured over the edge of the cut plaster as shown in Fig. 2.

The unitary main body or casing 12 of the humidifying apparatus includes a lower header 14 of sheet metal such as copper, shaped with an inwardly-disposed ledge 15 adapted to cooperate with and rest upon the lower edge of the angle iron frame 13, whereby the main body or casing 12 of the apparatus is supported in a vertical position within the space between opposite surfaces of the wall 10. The lower portion of the header 14 projects downwardly below ledge 15, and is closed by an elongated cup-shaped sump casting 16 provided with bosses 17 and 18 for the intake and outlet pipes 19 and 20, respectively. The rear surface 14′ of header 14 is tapered inwardly as shown in Fig. 2 to facilitate the insertion of the main body or casing 12 of the apparatus at an angle in the manner shown in phantom in Fig. 2.

The front wall of header 14 is provided with a rectangular opening 21, and its lower edge terminates slightly above the ledge 15, leaving an elongated slit 22 as shown in Figs. 2 and 5. Mounted at an angle along the front edge of the casing 14 at ledge 15 and across slit 22 so as to form a gutter, is the sheet metal piece 23, shown particularly in perspective in Fig. 5, and which is bent inwardly at the ends and soldered or otherwise secured to the front surface of header 14. This gutter serves to collect the drip from the louvre which then flows through slit 22 into the interior of header 14.

The header 14 is provided with a bottom plate 24 having a discharge opening 25 which is covered by the screen cone 26 adapted to prevent the passage of grit or the like into discharge pipe 20. Also mounted in header 14 is a suitable baffle system 27, which is adapted to remove surplus water from the air flowing out of opening 21 and deflect this air in the proper direction through lateral opening 21.

Inserted through openings in the upper surface of header 14 are a pair of circular tubes 28. These tubes 28 are preferably made of non-resonant material, such as fibre or any other non-metallic material, or may consist of a metal tube coated with non-resonant material, whereby the vibrations which cause noise when the water spray flows therethrough are dampened. The upper ends of these tubes 28 are set in and carry a horizontal top plate having front, side and rear flanges 30.

Mounted upon horizontal plate 29 and partially inserted therethrough is the water filter 31, through the bottom of which passes the water intake pipe 19 and in opposite sides of which are mounted discharge pipes 32 equipped with shut-off valves 33 and carrying the elbows 34, to which are connected nozzles 35. Nozzles 35 are located axially of tubes 28, and are arranged to produce a fine conical spray of water in each tube 28, which closes the tubes 28, and in moving downwardly, creates a current of air through tubes 28, this air being washed and humidified at the same time as it passes through the spray.

Placed upon horizontal top plate 29 between the flanges 30 thereof, is hood 36 formed of sheet metal such as copper with an open bottom and front side and curved top, as shown in perspective in Fig. 4. This hood 36 is adapted to fit over the upper openings of tubes 28, and provide a lateral intake opening 37 communicating with the open ends of tubes 28. Hood 36 also serves to protect the apparatus against pieces of plaster, dirt and the like which fall between the walls, and is removable from top plate 29, merely resting between the flanges thereof. The main body or casing 12 of the apparatus is secured in its normal vertical position by means of brackets 39 attached to the under side of top plate 29 and adapted to be screwed to the inner edges of frame 13.

Mounted over the opening in the wall 10 and secured to the angle iron frame 13 is a suitable cover plate 39 having openings 40 and 41 registering with openings 37 and 21, respectively, of the apparatus 12. This cover plate 39 may be in the form of a door hinged at one edge, simply a cover plate secured to frame 13 by means of screws 42, a decorative panel, a mirror, or any other suitable covering which will serve the purpose. If desired, the openings 37 and 21 may be framed with separate frames 43 and 44, which are shown in Fig. 3 as parts of covering 39, and the space intervening between frames 43 and 44 may be plastered over permanently.

Although cover plate 39, including the frames 43 and 44, is adapted to be emplaced more or less permanently, access must be had to the interior of the apparatus 12 from time to time for cleaning, repair and adjustment. For example, valves 33, whereby the water spray produced by nozzles 35 may be regulated, are located immediately behind upper opening 37, with which opening 40 in frame 43 registers, and the screen cone 26 is arranged so that it may be removed and cleaned through opening 21, with which frame opening 41 registers. In order that such access may be had to these parts, the louvre grills 45 and 46 mounted across the openings 40 and 41 of frames 43 and 44, respectively, are made relatively movable. As an example of such relatively movable grills, tightly coiled springs are conveniently employed, these springs being secured upon hooks 47, mounted upon the rear surfaces of frames 43 and 44 along the upper and lower edges of respective louvre openings 40 and 41 thereof. These

coil spring grills 45 and 46 are spaced apart any convenient distance, are wound tightly so as to resemble rigid rods, and are preferably made of non-corrosive wire such as copper or brass, or are painted. In order to have access to spray-regulating valves 33, for example, the operator may thrust his hand between two adjacent grills 45, these grills yielding laterally as shown in phantom in Fig. 3, to permit this adjustment of valves 33. Similarly, grills 46 of lower louvre opening 41 may be spread apart for the same purpose. In many instances it will not be necessary to make all of the grills 45 and 46 relatively movable, in which case only a few of such spring grills need be supplied. Other alternative arrangements of relatively movable grills may be provided, such as making the grills 45 and 46 of rigid rods, which may be moved upwardly or downwardly in guides or removed entirely to permit access to the interior of apparatus 12. A valve 50 may shut off the water and the filter and nozzles may be removed as a unit by union 49.

In installing the apparatus in the wall 10 of a building, the recess in the wall is framed with frame 13 in the manner described. The unitary main body or casing 12 of the apparatus, which includes all parts except the hood 36, is then inserted into the wall recess at an angle as shown in phantom in Fig. 2. It is then temporarily blocked up above the lower edge of frame 13 so as to leave a space through which the pipes 19 and 20 may be screwed into bosses 17 and 18, respectively. After being so connected, the main body or casing 12 is let down until ledge 15 thereof engages and rests upon the lower edge of frame 13. While in this position, the upper end of the main body or casing 12 is pushed inwardly into the recess of the wall and the brackets 39 screwed to frame 13. The hood 36 is then placed upon top plate 29 between the flanges 13. Connections are then made to intake pipe 18 and drain pipe 19 by means of unions 48, these connections being made at some distances below the floor of the room in which the apparatus is mounted, such as in the basement or the like. Then the cover plate 13 equipped with the louvre frames 43 and 44 is mounted over the apparatus, or the louvre frames 43 and 44 alone are mounted in place so that the louvre openings 40 and 41 register with the openings 37 and 21, respectively, of the casing 12. The space intervening between louvre frames 43 and 44 may then be plastered over or otherwise covered.

In operation, the water to nozzles 35 is turned on by means of valves 33 and regulated thereby to produce a spray of the proper velocity to obtain the required air change produced by the sprays of nozzles 35 passing downwardly through tubes 28. After passing through tubes 28 the water impinges upon baffle 27 and flows away through drain cone 26, opening 25 in bottom plate 24 and drain pipe 19. The current of air drawn from the room through louvre opening 40, pipes 28 and discharged through louvre opening 41, is humidified and washed, and is cooled to a slight degree, depending upon the temperature of the water used. If the air is to be cooled considerably, the water may be refrigerated, and if the air is to be warmed, the water may be heated before being distributed to the nozzles 35. The grills 46 in lower louvre opening 41 collect a certain amount of water from the air flowing out of louvre opening 41, and this water, and such other water as is deposited upon the front of lower header 14, flows downwardly and drips into gutter 23, from which it flows through slit 22 into the sump 16 of lower header 14.

It will be seen that this invention provides a humidifying apparatus which is readily installed in the wall of a building, whether a new building or an old building, without great labor or requiring especial skill. The parts of the apparatus are few in number, viz., before assembly, are only three in number including the main body or casing 12, the hood 36, frame 13 and the cover plate 39, in addition to a few screws and the like. The apparatus is very efficient for conditioning the air of a room by recirculating it again and again, while washing it and humidifying it automatically without requiring any attention beyond occasional inspection. The non-resonant tubes 28 minimize the noise of the water spray, so that the aparatus is not noticeable because of noise, nor is it noticeable because of objectionable appearance, but, on the contrary, may be constructed and arranged to be decorative and generally pleasing in appearance.

We claim:

1. In a humidifying apparatus, the combination of a casing adapted to be inserted in and removed at will from a recess in a wall, a ledge thereon adapted to engage the wall and forming the sole support for the casing, separate air passages communicating with the interior of the casing, and liquid spray means in said casing for creating a current of air into one of said openings, through said casing and out of the other of said openings.

2. In a humidifying apparatus, the combination of a casing adapted to be inserted in and removed at will from a recess in a wall, a ledge formed intermediate the ends of said casing adapted to engage the wall and forming the sole support for the casing, said casing having spaced air intake and air outlet openings communicating with the interior thereof located at one side of said ledge, and liquid spray means in said casing for creating a current of air into the intake opening, through said casing and out of the outlet opening.

3. In a humidifying apparatus, the combination of a casing adapted to be inserted in a recess in a wall, a ledge formed intermediate the ends of said casing adapted to cooperate with the wall for supporting the casing, a hood for said casing forming an upper intake opening, said casing having a lower outlet opening, and liquid spray means in said casing creating a current of air into said hood intake opening, through said casing and out of said outlet opening, said hood being removable to permit insertion and removal of said casing from the recess.

4. In a humidifying apparatus, the combination of a casing adapted to be inserted in a recess in a wall, said casing having an open top end, a hood removably mounted over the open end of said casing and having a louvre opening, said casing having a louvre opening spaced below said hood louvre opening, and liquid spray means in said casing for creating a current of air into the hood louvre opening, through said casing and out of the lower louvre opening, said hood being removable to permit insertion and removal of said casing from the recess.

5. In a humidifying apparatus, the combination of a casing adapted to be inserted in a recess in a wall, said casing having an opening in its upper end, a hood removably mounted over said opening and having a lateral opening communicating therewith, said casing having a lateral opening communicating with the interior thereof and spaced below said hood lateral opening, movable grills over said lateral openings, and liquid spray means in said casing for creating a current of air into one of said lateral openings, through said casing and out of the other of said lateral openings, said hood being removable to permit insertion and removal of said casing.

6. In a humidifying apparatus, the combination of a casing adapted to be inserted in a recess in a wall, a ledge formed intermediate the ends of said casing adapted to cooperate with the wall for supporting the casing, said casing having upper and lower openings communicating with the interior thereof, a hood removably enclosing the upper opening and having an opening communicating with the upper casing opening, grills mounted over the hood and lower casing openings, and liquid spray means in said casing for creating a current of air into the hood opening and out of the lower casing opening, said hood being removable to permit insertion and removal of said casing from the recess.

7. In a humidifying device, the combination of a casing having spaced openings, a frame surrounding each opening, a plurality of coiled springs stretched across each frame to form a grill, whereby access may be had to the interior of the casing by bending said springs apart, and liquid spray means in said casing for creating a current of air into one of the openings, through said casing and out of the other opening.

8. In a humidifying apparatus adapted to be inserted in and removed at will from a recess in the wall, the combination of a lower header having a lateral discharge opening, a ledge on said header below said opening adapted to engage the wall and forming the sole support for the apparatus in the wall recess, at least one tube extending upwardly from said header and discharging therein, a hood enclosing the upper end of said tube and having a lateral opening, a liquid spray device in said tube for creating a current of air into the hood lateral opening, through said tube and out of the header lateral opening.

9. In a humidifying apparatus adapted to be inserted in a recess in the wall, the combination of a lower header having a lateral discharge opening, a ledge on said header below said opening adapted to cooperate with the wall for supporting the apparatus in the wall recess, at least one tube extending upwardly from said header and discharging therein, a plate mounted upon the upper end of said tube, a filter mounted upon said plate, a water pipe discharging into said filter, a nozzle connected to the filter for directing a spray downwardly through said tube, a hood removably mounted upon said plate and having a lateral intake opening communicating with the upper end of said tube, whereby a current of air is created by the water spray into the hood lateral intake opening, through said tube and out of the header lateral discharge opening.

10. In a humidifying apparatus, the combination of a supporting frame adapted to be mounted in a recess in a wall, a casing adapted to be inserted in the frame and extend below the lower edge thereof, a ledge on said casing cooperating with the lower edge of said frame for supporting said casing in a vertical position, said casing having an intake opening adjacent the upper edge of said frame and an outlet opening adjacent the lower edge of said frame, and liquid spray means in said casing for creating a current of air into the intake opening, through said casing and out of said outlet opening.

11. In a humidifying apparatus, the combination of a supporting frame adapted to be mounted in a recess in a wall, a casing adapted to be inserted in the frame and extend below the lower edge thereof, a ledge on said casing cooperating with the lower edge of said frame for supporting said casing in a vertical position, said casing having an intake opening adjacent the upper edge of said frame and an outlet opening adjacent the lower edge of said frame, a removable hood for said casing having an opening communicating with the intake opening, means for removably securing said hood to said

frame, and liquid spray means in said casing for creating a current of air into the intake opening, through the casing and out of the outlet opening.

12. In a humidifying apparatus adapted to be inserted in an aperture in a wall, the combination of a frame adapted to be secured to the wall to frame the aperture therein, a casing having air intake and air outlet openings adapted to be inserted bodily into the aperture, a ledge on said casing adapted to cooperate with said frame for supporting said casing in said aperture, and means for inducing a current of air through said casing and said openings therein.

13. In a humidifying apparatus adapted to be inserted in an aperture in a wall, the combination of a frame adapted to be secured to the wall to frame the aperture therein, a casing having air intake and air outlet openings adapted to be inserted bodily into the aperture, a ledge on said casing adapted to cooperate with said frame for supporting said casing in said aperture, means for inducing a current of air through said casing and said openings therein, and a cover plate removably mounted on said frame for covering the aperture and casing therein, said cover plate having openings adapted to register with the openings in said casing.

In testimony whereof I affix my signature.
EDWARD McK. HUNT.

In testimony whereof I affix my signature.
EDWARD L. FONSECA.

In testimony whereof I affix my signature.
MARVIN C. BARNUM.