

Oct. 27, 1931.

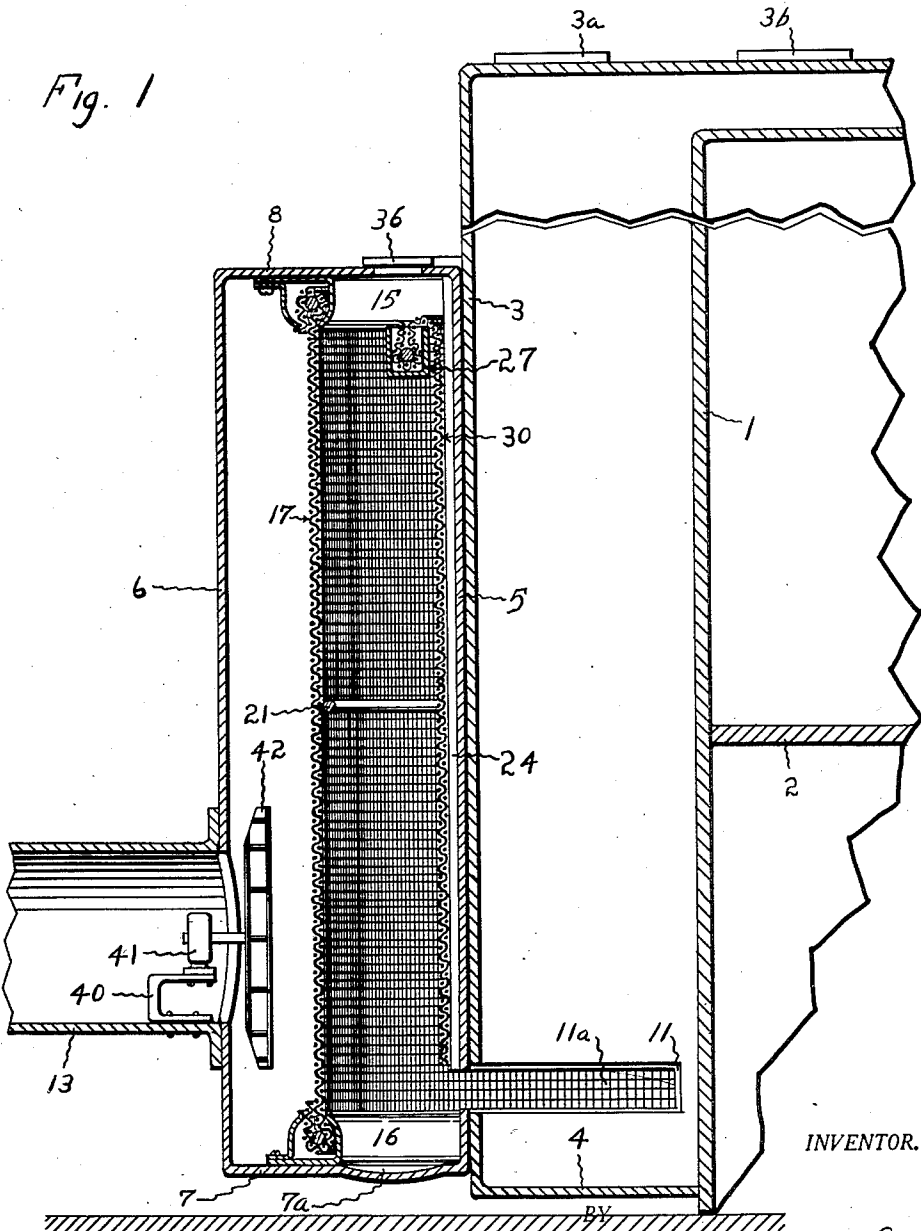
W. C. DENISON

1,829,341

AIR CONDITIONING DEVICE

Filed Jan. 11, 1930

3. Sheets-Sheet 1



INVENTOR.

William C. Denison
Hull Brook & West
ATTORNEY.

Oct. 27, 1931.

W. C. DENISON

1,829,341

AIR CONDITIONING DEVICE

Filed Jan. 11, 1930

3 Sheets-Sheet 2

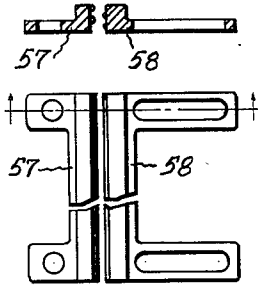


Fig. 3

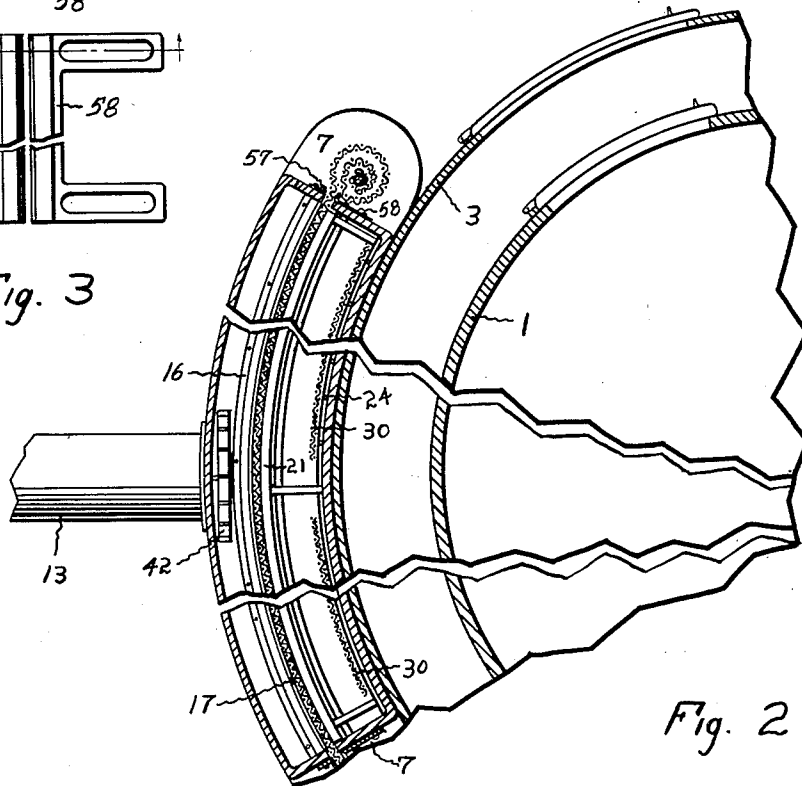


Fig. 2

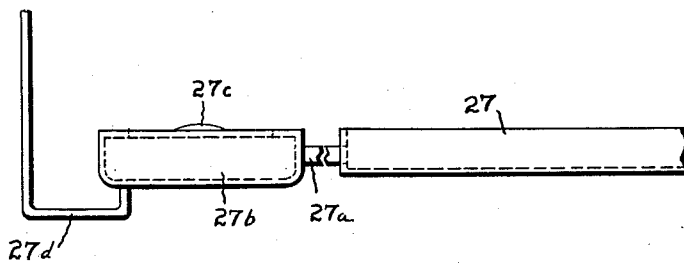


Fig. 4

INVENTOR.

BY *William C. Denison*
Hull Brook + West
ATTORNEY.

Oct. 27, 1931.

W. C. DENISON

1,829,341

AIR CONDITIONING DEVICE

Filed Jan. 11, 1930

3 Sheets-Sheet 3

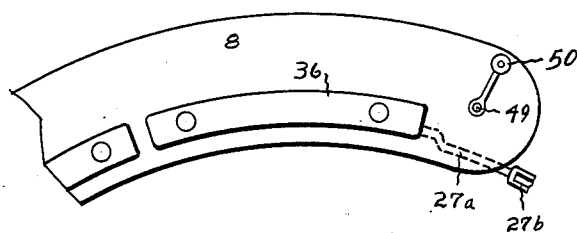


Fig. 5

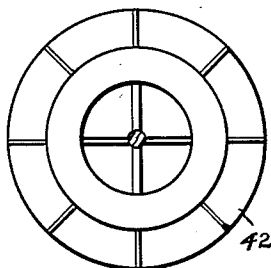


Fig. 7

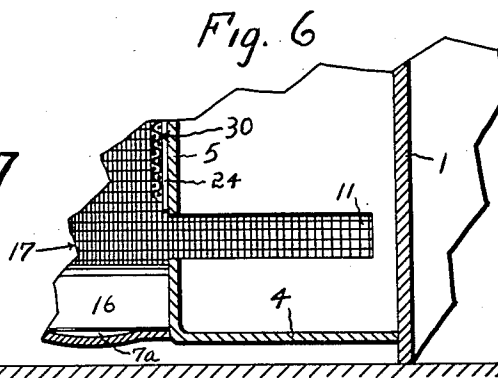


Fig. 6

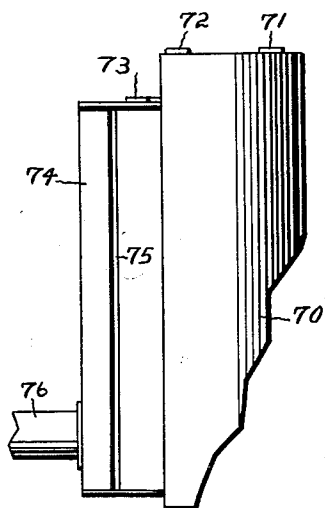


Fig. 8

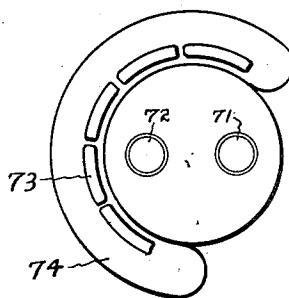


Fig. 9

INVENTOR.

William C. Denison

BY

Hull Brock + West

ATTORNEY.

UNITED STATES PATENT OFFICE

WILLIAM C. DENISON, OF CLEVELAND HEIGHTS, OHIO

AIR CONDITIONING DEVICE

Application filed January 11, 1930. Serial No. 420,242.

This invention relates to air conditioning means adapted to be used in private houses and other buildings such as stores, factories and the like. The principal object of the invention is to overcome the present unhealthful, uncomfortable and unsanitary atmospheric conditions which usually prevail in houses, stores and factories at the present time, and to accomplish this result by the provision of a simple, efficient and inexpensive apparatus, hereinafter described in detail.

I am aware that, prior to my invention, certain devices have been produced for air conditioning, but so far as I am aware there are none which give desirable results and which are at the same time sufficiently simple and efficient to warrant their general installation in places where such devices are desirable.

Ordinary hot air furnaces now in use are efficient in maintaining a comfortable temperature in well built houses especially when combined with automatic or thermostatically controlled means for governing the rate of fuel consumption.

It is one object of this invention to produce a device which can be used in connection with hot air heating installations already in use.

One of the principal evils which this invention is designed to overcome is that of low humidity which usually obtains in winter due to the drying effect produced on outside air when it is brought in and heated. It is well known that excessively dry air causes squeaking floors, loosening of furniture and any number of bodily ills, such as nose and throat irritations due to dehydrated mucous membrane, pulmonary disorders due to sudden changes of humidity inside and outside the building and predisposition to colds, grippe, influenza and similar infections.

These evils can be in a large measure overcome by the use of properly humidified air and it is a further object of this invention to provide a device which shall be of such simplicity of construction that it will be feasible for the ordinary householder to provide properly conditioned air. In addition to providing proper humidity conditions it is

also an object of this invention to overcome another important cause of discomfort and disease, namely, unclean or dusty air, which carries irritating dust particles and bacteria and also necessitates constant sweeping and dusting, all of which are largely unnecessary.

Other and more specific objects will become apparent as the description proceeds.

Referring to the accompanying drawings, Fig. 1 is a schematic vertical section taken through a hot air furnace to which has been attached the device which constitutes my improved air conditioning means; Fig. 2 is a horizontal section through said device taken above the bar 21; Fig. 3 is a detail view showing the fabric clamping means adapted to be attached to the end wall of the conditioning chamber; Fig. 4 is a detail view showing the trough for containing the water to be supplied to the humidifying fabric and showing schematically the float valve construction for maintaining the water supply therein; Fig. 5 is a fragmentary plan view of a portion of the conditioning chamber showing the openings for insertion of the humidifying fabrics, the pipe connecting the float valve to the humidifying trough and the crank 50 projecting from the rod 49 upon which the cleaning fabric is wound; Fig. 6 is a fragmentary view showing an alternative construction in which the wall 5 is eliminated; Fig. 7 is a rear elevational view of the fan 42; Fig. 8 is a fragmentary elevation of a modified form adapted for use without being mounted in connection with the furnace; and Fig. 9 is a top plan view of the construction shown in Fig. 8.

Referring to the drawings, the numeral 1 indicates the cylindrical wall of a firebox of an ordinary hot air furnace. A horizontal partition 2 may constitute the bottom of the firebox, provided with any suitable grates according to conventional construction. Arranged outside the wall 1 and concentric therewith is the conventional furnace shell 3 between which and the furnace the air to be heated passes. A bottom wall 4 serves to prevent air entering except through the conditioning means. Attached to the wall 3 of the furnace shell by any suitable means is an

annular wall 5 which taken in connection with the concentric wall 6 and top and bottom walls 7 and 8, and end walls, constitutes what I term a "conditioning chamber".

5 (This chamber may extend a greater or less distance around the furnace as desired.) An opening 11 is provided in the wall 3 to admit air from the conditioning chamber into the furnace shell and the wall 5 is slot-
10 ted above the bottom of the wall 6 to provide an air passage from the chamber into the furnace shell. The upper end of the furnace shell communicates with any suitable pipes (not shown) leading to the various
15 rooms to which air is to be furnished. The air pipe 13 communicates with some portion or portions of the house from which air is to be drawn and conditioned.

20 It is also within the contemplation of my invention to provide a connection from the air pipe 13 to the outside and to provide the same and the other supply pipes to the pipe 13 with valves so that air may be taken from inside or outside in any desired proportions,
25 thereby being able to take advantage of conditions outside and to admit conveniently a small amount of outside air to avoid the accumulation of carbon dioxide in the house.

30 Mounted in suitable holding devices 15 and 16 at the top and bottom respectively, is a dust removing means 17, which may consist of a strip of fabric such as cotton flannel, a number of sheets of porous paper or any other
35 suitable dust removing means. The retaining members 15 and 16 are continuous and extend the full length of the annular conditioning chamber. These preferably consist of a strip of sheet metal bent as shown to
40 provide a bulged portion for the reception of the edges of the screen 17. This screen in the preferred form consists of fabric having the edges hemmed and a wire, cord, or equivalent
45 member inserted into the hem to prevent the edge from escaping out of the retaining means 15 and 16. If the force of air against the member 17 is such as to require it, the screen may be supported by annular shaped
50 wire holding means 21, held in position by suitable supports attached by solder or the like. Attached to the wall 5 are ribs 24 which
55 extend outwardly therefrom at regularly spaced intervals such as may be found necessary to prevent the humidifying screen 30 from coming into contact with the wall 5. Attached to the wall 5 are suitable brackets
60 which support a trough 27 containing water. The trough 27 may communicate through a suitable pipe 27^a with a float valve chamber 27^b which is supplied by pipe 27^c communicating with the city water supply and controlled
65 by a float 27^e and any suitable valve construction controlled thereby. The fabric 30 which may have a weight attached to the edge thereof dips into the trough 27 and is held in position therein by said weight. The fabric 30

extends over the edge of the trough 27 and hangs in juxtaposition to the ribs 24 which are attached to the wall 5. This fabric will be kept moist by means of capillary attraction and will serve to evaporate a large quantity of moisture into the air by reason of being in close juxtaposition to the screen through which the air must pass. The humidifying screen 30 is held away from the wall 5 by means of the ribs 24 and thus allows the passage of air both through and adjacent to the humidifying fabric, as it passes toward the opening 11. Formed in the bottom wall 7 is a drip trough 7^a which may have a connection with the sewer. Covers 36 are provided for the introduction of the humidifying fabric 30. A weight may be provided at the bottom of each humidifying fabric 30 to hold the same in proper position.

Mounted on any suitable bracket 40 is a small motor 41 driving a fan 42. This fan is of a size to produce a suitable air pressure against the screen 17 and it has been found in practice that an air pressure of from .15 to .20 inches of water is suitable, producing a passage of air through the screen 17 of approximately 30 cu. ft. per minute per square foot. An important feature of this invention is the reduction to the minimum of the air pressure required by the use of a large area of screen and this large area is obtained without employing a device which requires a large amount of space for its installation by using a device made in annular shape to fit closely against the wall of the furnace shell.

It is also an important feature that a large area of humidifying fabric is exposed in close juxtaposition to the screening fabric.

As before stated, the screen means 17 is continuous and held in brackets 15 and 16. Each end of this fabric may extend through the end walls and be received in roll holders provided with central spindles 49 and cranks 50 which may be provided with ratchets, if desired to prevent retrograde movement and may be employed to stretch the screen in position. These roll holders are mounted as shown best in Figs. 2 and 5, on extensions of the top and bottom walls of the conditioning chamber. As shown best in Fig. 3, the fabric 17 extends through slots in the end walls and is clamped between the brackets 57 and 58. The bracket 57 is fixed and the bracket 58 is slidable on screws received in a slot therein. These brackets are provided with ribs as shown in Fig. 3 which form a firm air tight closure and hold the fabric 17 in stretched position.

In Fig. 6, I have shown a modified form which is like that shown in Fig. 2 in all respects except that the walls 3 and 5 are supplanted by the single wall 5.

In Figs. 8 and 9 I have shown schematically a modified form of my invention adapted for

use where no heating is employed. This device consists essentially in a device like that shown in Figs. 1 and 2 but having a single cylinder 70 provided with outlet pipes 71 and 72 substituted for the furnace and its shell.

Except as stated, this modification consists of the same construction as has already been described, the numerals 73, 76 indicating parts corresponding to those indicated by the numerals 36 and 13, respectively, in Fig. 1, 74 indicating the housing or conditioning chamber walls generally and 75 indicating a slot in the end wall of such housing.

While I have referred to the member 17 as a screen or fabric, I wish it to be understood that I am not limited to this type of screen but may employ any medium which will remove dust from the air and the same may rely upon a sieve or screening action or upon an electrical attraction due to a charge of static electricity on the member 17 created by air friction thereon or friction between the dust particles and fabric and thereby secure cleaning without relying entirely or even considerably upon sieve action. Such a dust removing means is advantageous in that it permits the use of larger interstices in the member 17 with the subsequent reduction of air friction and reduced power necessary for circulating the air. As mentioned before, this action may be secured by the use of cotton flannel and certain other fabrics.

In operation the air is drawn by the fan 41 through the pipe 13 from the house or other desired source of supply and passes into the conditioning chamber, through the air cleaning device 17, adjacent the humidifying fabric 30 and through the opening 11 into the furnace shell where it is heated by passing in close contact with the wall 1 of the firebox. It then passes to the various rooms where conditioned air is required. I have found that where the amount of air which comes into the house from the outside is small, after a desirable humidifying area has been established, which may be done by inserting or removing sections of the humidifying means, the humidity will automatically remain in the comfort zone under ordinary operating conditions. As the air tends to become drier a greater amount of water will be evaporated from the humidifying fabric and as the humidity increases a smaller amount of water will be so evaporated. Consequently a point of equilibrium will be reached which under ordinary conditions will remain within the comfort zone.

The operation of the device shown in Figs. 8 and 9 is substantially similar to that shown in Figs. 1 and 2 and the circulation of air is provided in an analogous manner.

The roll holders are suitable for containing a roll of screening fabric several times the length required to reach around the conditioning chamber if desired and a change of

cleaning fabric may be effected merely by loosening the screws which clamp the slides 58 in position after which the fabric can be rolled or unrolled by means of the cranks 50.

It will now be seen that the area of the screening fabric is sufficiently large that air may pass therethrough under the influence of the fan without encountering a resistance substantially greater than in the other regions which form part of the passage through which air passes to be conditioned and delivered. While there are differences in resistance to the passage of air in the various regions of this device, they are not great at the velocities of air which obtain in the device and the entire passage which is made up of the conditioning chamber and the means for supplying air thereto and delivering the same therefrom, and the said passage is free from regions of greatly increased resistance such as would be present if the area of the screen 17 were that of the cross section of the pipe 13 or of the same order of magnitude and sufficiently fine to effectively screen dust and the like from the air.

While I have shown my improved conditioning device as being curved or angular in shape, it is to be understood that certain important features of my invention may be embodied in a device not so curved. For example, a chamber having straight walls corresponding to 5, 6, 7 and 8 of Fig. 1 may be constructed having instead of the air inlet 13 a plurality of small openings in the front wall 6, and a wall may be placed parallel to the rear wall thus defining a passage between the rear wall and said last wall which may communicate with any suitable outlet pipe or pipes in connection with which a circulating means may be provided. Such a device is adaptable for being placed in rooms out of contact with any heating means and employed for cleaning and humidifying the air heated by other and independent means. The inlet and outlet openings in such a construction will of course be so placed with respect to the floor and ceiling of the room to insure proper air circulation.

The term "chamber" is to be understood as referring to the member 5 in the modification of Fig. 1, and member 3 in the modification of Fig. 6 and the member 70 in the modification of Fig. 8, also to have reference to any member bearing the same or substantially the same functional relation to the filter and humidifying means in any other embodiment of my invention as these members do in the particular illustrative embodiments disclosed.

While I have shown and described certain illustrative embodiments of my invention, I wish it distinctly understood that the same is susceptible of being carried out in various forms within the scope of the appended claims and that my invention is limited only by said claims.

Having thus described my invention, what I claim is:

1. An air conditioning appliance including an air conduit, an air chamber and an air filter in said chamber through which all air conditioned by the device must flow, said filter being of considerable area whereby air will be delivered therethrough at a low velocity, and said appliance including a humidifying fabric in close juxtaposition to said filter and means for causing air to pass through said filter and then adjacent said humidifying fabric, the area of said humidifying fabric being of the same order of magnitude as that of said filter.

2. An air conditioning appliance comprising a substantially annular shell having one or more inlets for air and one or more outlets, a substantially annular air conditioning chamber encircling said shell and connected therewith, a substantially annular air filtering fabric disposed within said air conditioning chamber and through which the air to be conditioned must pass, means detachably securing said filtering fabric in place and a fan causing the air to be conditioned to pass therethrough, a sectional humidifying means including separate sections of fabric also disposed within said air conditioning chamber in close proximity to said filtering fabric whereby the air passing through said screen will impinge thereagainst, the humidifying fabric being of substantially the same aggregate size and shape as said filtering fabric, the said air conditioning chamber, said filtering fabric and humidifying fabric being of relatively large area so that the air will be delivered therethrough at a relatively low velocity and effectively filtered and humidified.

3. An air conditioning device for circulating, cleansing and humidifying air in houses, apartments, and analogous places, including; a passage, said passage having one or more enlarged regions; a large area filter extending across an enlargement of said passage for removal of dust or the like from air passing therethrough; a large area, moist surface, humidifying means in an enlargement of said passage for humidification of air passing therethrough; means for forcing air first through said filter and then along the moist surface of said humidifying means at a predetermined, desirable rate; and means for supplying water to said humidifying means; said filter being of such size that when air is forced through said passage at said rate, the passage of air through said filter shall not exceed approximately thirty cubic feet per minute per square foot, said humidifying means presenting for contact with air traversing said passage a moist area of the same order of magnitude as the area of said filter.

4. An air conditioning device for circulating, cleansing and humidifying air in houses,

apartments, and analogous places, including; a passage, said passage having one or more enlarged regions; a large area, high resistance, porous paper filter extending across an enlargement of said passage for removal of dust or the like from air passing therethrough; a large area, moist surface, humidifying means in an enlargement of said passage for humidification of air passing therethrough; means for forcing air first through said filter and then along the moist surface of said humidifying means at a predetermined, desirable rate; and means for supplying water to said humidifying means; said filter being of such size that when air is forced through said passage at said rate, the passage of air through said filter shall not exceed approximately thirty cubic feet per minute per square foot, said humidifying means presenting for contact with air traversing said passage a moist area of the same order of magnitude as the area of said filter.

In testimony whereof, I hereunto affix my signature.

WILLIAM C. DENISON.