

April 8, 1941.

C. E. JONES

2,237,831

BUILDING STRUCTURE AND AIR CIRCULATION THEREFOR

Filed Oct. 24, 1938

2 Sheets-Sheet 1

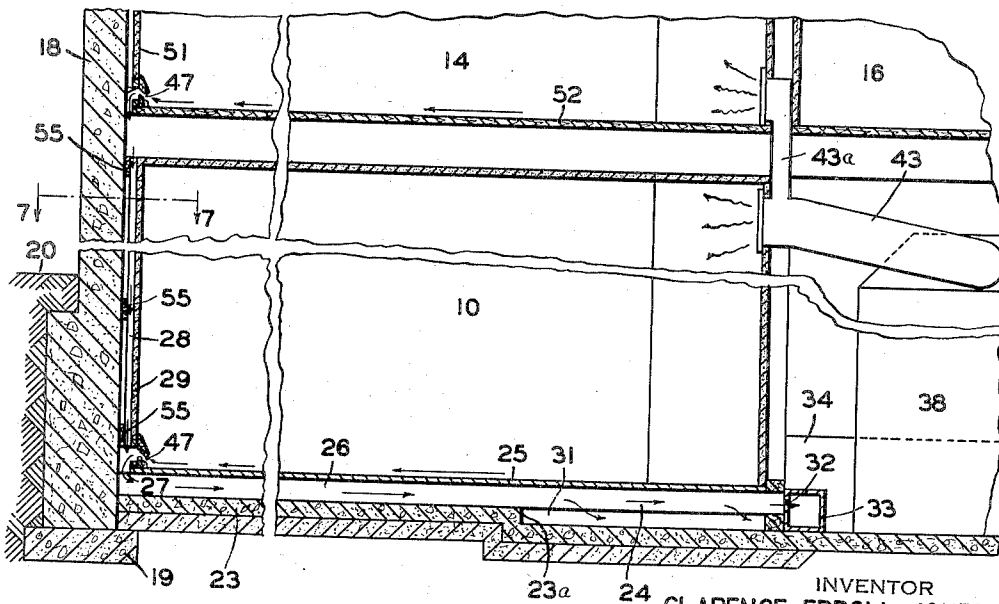
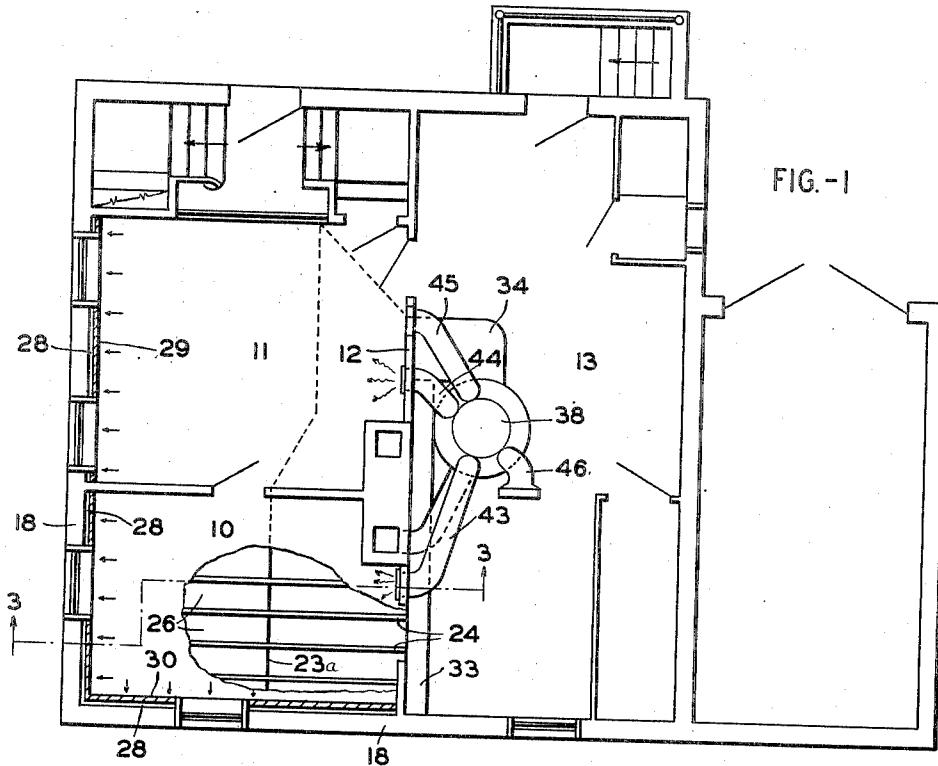


FIG.-3

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2 Sheets-Sheet 2

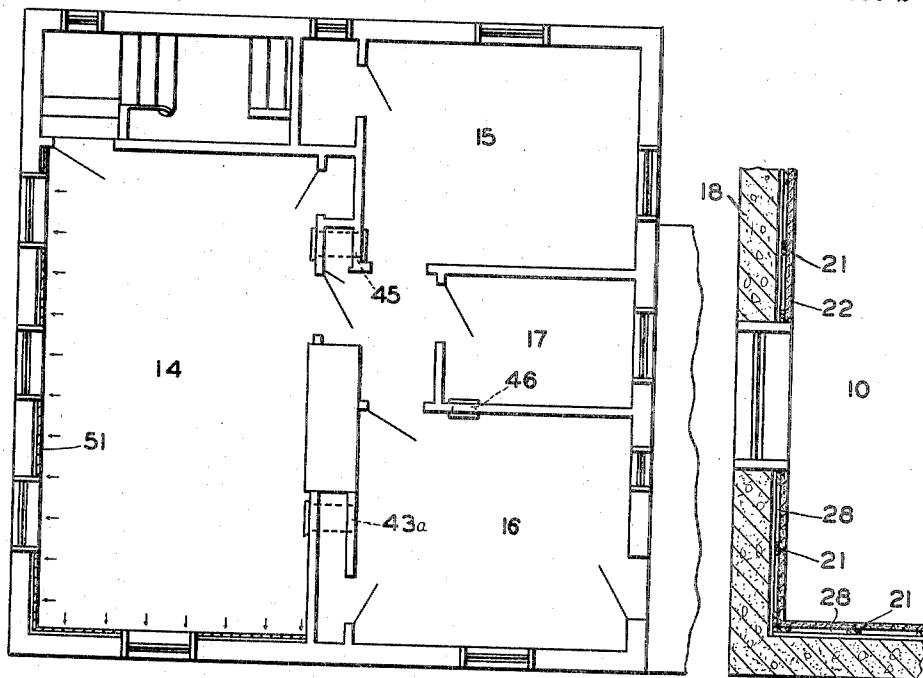


FIG.-2

FIG.-7

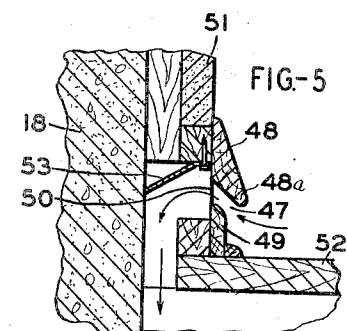


FIG-5

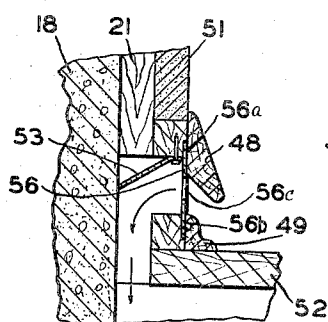


FIG.-8

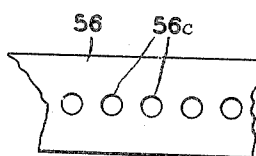


FIG.-9

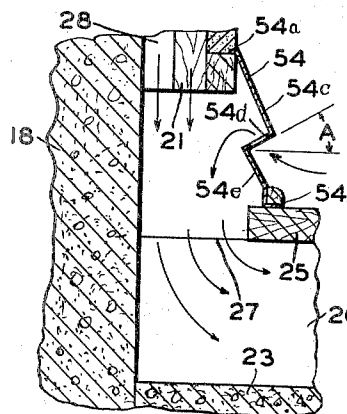


FIG.-6

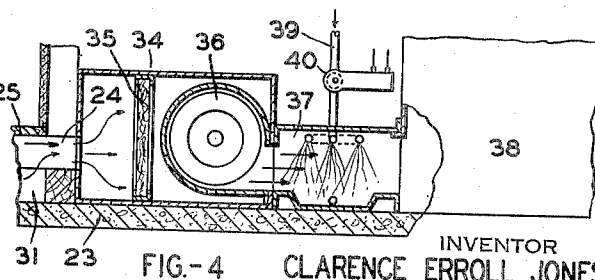


FIG.-4

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2,237,831

BUILDING STRUCTURE AND AIR
CIRCULATION THEREFOR

Clarence Erroll Jones, Euclid, Ohio

Application October 24, 1938, Serial No. 236,663

7 Claims. (Cl. 98—33)

This invention relates to a building structure and more particularly to an arrangement of a building structure which provides a novel air circulating system.

This application is a continuation in part of my copending application Serial No. 35,975, filed August 13, 1935.

One object of the invention is to provide air outlet means extending along substantially the entire length of certain walls of a room and a novel arrangement of air circulating passageways along the walls and beneath the floors of certain rooms in a building structure.

Another object of the invention is to provide an arrangement of air circulating passageways adapted to remove moisture from the walls or floors of certain rooms and return the air to the same or other rooms, utilizing the moisture picked up in connection with the control of the humidity of the circulated air.

A further object of the invention is to provide novel building elements adapted for use in certain portions of my improved air circulating system.

Other objects and purposes include special arrangements of the walls and floors of a building to provide air passageways and the combination of my improved air circulating system with various control equipment for regulating the air conditions in the building.

In the drawings, Fig. 1 is a plan view of the lower floor of a house; Fig. 2 is a plan view of the upper floor of the same house; Fig. 3 is a sectional elevation taken along the line 3—3 of Fig. 1; Fig. 4 is a diagrammatic view of a portion of the air conditioning equipment; Figs. 5 and 6 are detail sectional elevations of certain novel building elements utilized in my improved air circulating system; Fig. 7 is a sectional view along the line 7—7 of Fig. 3; Fig. 8 is a modified baseboard construction; while Fig. 9 is a detail of a plate in the structure of Fig. 8.

While my invention is applicable to many sizes and styles of buildings, I have chosen to illustrate the same as embodied in a small residence but I do not desire to be limited to its application in this type of building structure but desire to claim the same broadly as determined by the scope of the appended claims.

The dwelling illustrated in Figs. 1, 2 and 3 is of a type which uses a shallow excavation for the basement whereby the rooms on the lower floor are only partly below grade, thus enabling me to use certain of those rooms for living rooms. Referring more particularly to Fig. 1, the plan shown provides a kitchen 10 and a dining room 11 separated by a partition 12 from a basement portion 13 which may be used for the air conditioning equipment, coal bin, laundry tubs, etc. The plan for the upper floor shown in Fig. 2 pro-

vides a living room 14, bedrooms 15 and 16 and a bathroom 17. The outer walls are exposed to extremes of heat and cold and have a tendency to absorb moisture and I provide an air circulating system utilizing hollow walls on the exposed faces of the building through which the air is circulated and from which I derive one or more of several advantages. In the first place, the air passageways form an insulation for the inner rooms. In the second place, the circulating air current removes the extreme heat or cold from the outer walls of the rooms and, in the third place, if the outer walls are moist the circulating air will pick up this moisture which prevents the damp walls sometimes found on the exposed sides of rooms and at the same time supplies moisture in the air circulating current in the living room space which is generally desirable when rooms are closed and provided with a heating system which dries out the air.

In the type of dwelling illustrated wherein certain of the rooms are at least partially below ground level my novel air circulating system is particularly useful in maintaining a dry condition of the outer walls and of the basement floors. As shown in the drawings, the outer wall 18 is of masonry, although it will be understood that the same principles are applicable to other styles of wall and, for instance, if the walls were of tile I might utilize passageways through the tile for the air circulation system. The walls 18 rest upon a footing 19 which is well below the ground level 20. Air passageways are provided in rooms 10 and 11 by means of furring strips 21 which are secured in vertical position to the wall 18 and carry on their inner surfaces the finishing wall 22. The lower floor comprises a sub-floor 23 of concrete, masonry or the like upon which rest sleepers 24 which carry the finish floor 25. Between the sleepers 24 are thus provided horizontally extending parallel passageways 26 which communicate at 27 with the vertically extending passageways 28 provided between the furring strips. This arrangement of the passageways 28 and 26 insures a substantially uniform air circulation along the walls 29 and 30 and a substantially uniform distribution of the air circulation beneath the floors of rooms 10 and 11. Where necessary or desirable air passageways are provided through strips 21 or between the strips and the wall as by the nailing strips 55 so as to equalize air flow along the entire wall and to insure a flow of air along portions of the wall above and below windows.

Means is provided for uniting the air currents from passageways 26 before they enter the air conditioning equipment and in the embodiment shown the sub-floor 23 is dropped at the point 23a so as to provide a space 21 below the sleepers 24. Air outlet from this space is provided at one

or more points 32 and a duct 33 is provided which leads to the air conditioning equipment which is indicated generally at 34.

My invention is useful wherever it is desirable to bring air downwardly along an outside wall 5 and then laterally beneath a floor which must be kept dry. For instance, it might be applied to a house set directly upon the ground without necessarily being a half-story below ground level. In any case, air on the way to the fan passes 10 evenly over an outside vertical wall and then between a floor and the damp ground so that the said wall and floor are kept dry.

Any suitable air conditioning equipment may be utilized with my air circulating system but 15 for illustrative purposes I have shown in Fig. 4 a filter 35, a fan 36, a spray chamber 37, and an air heating furnace 38. Water for the spray chamber is provided through a pipe 39 through which flow is controlled by a solenoid operated 20 valve 40. This valve is supplied with operating current from a suitable source of electrical supply and may be controlled by a humidostat located at a suitable position in one of the rooms and which may be adjusted for the humidity desired 25 in the rooms. The air passing through ducts 28, 29, 31, 32 and 33 passes through the air conditioning equipment 34 and is distributed through suitable conduits. For instance, conduit 43 supplies room 10 and through branch conduit 43a 30 supplies room 11. Conduit 40 supplies room 11; conduit 45 supplies rooms 14 and 15; while conduit 46 supplies rooms 16 and 17.

Means is provided for removing air from one of the rooms, for instance room 14, along sub- 35 stantially the entire outer walls thereof adjacent the floor. The means shown comprises a slotted opening or openings 47 which in the present instance is provided by a novel baseboard structure, three forms of which are illustrated in Figs. 5, 6 40 and 8. In Fig. 5 I have shown two molding members 48 and 49 extending along the room in the position of the usual baseboard, these strips being substantially parallel and spaced apart so as to provide an air outlet opening at 50. The 45 molding member 48 is secured to the wall 51 and the molding member 49 is secured to the floor 52. I find an additional advantage in this construction in that a relative separation between wall 51 and floor 52 does not draw the baseboard away 50 from the floor as so commonly occurs in other structures but instead merely changes slightly the opening 56. A deflector plate 53 is provided to close off the space between the furring strips upwardly from that point and to deflect the air 55 currents downwardly. A portion 48a of the member 48 extends outwardly and downwardly sufficient to mask the opening 56 from observation by a person in normal standing or sitting posture in the room so that the baseboard gives the ap- 60 pearance of a solid member.

In the modified baseboard shown in Fig. 6 a continuous strip is provided of any suitable material which will hold its form and preferably is made of metal. This member 54 may be pro- 65 vided with a bent portion 54a by which it is secured to wall 29 and another bent portion 54b by which it is secured to floor 25. The baseboard member extends downwardly from its upper edge along the portion 54c, then inwardly along the portion 54d in a plane which extends at an angle 70 A not substantially greater than 30° with the floor line. From this point the member has a portion 54e which extends on down to the floor. Through the portion 54d are provided openings 75

for the outlet of air from the room. With the arrangement shown these openings in the portion 54d are not noticeable by a person standing or sitting in normal posture in the room. The construction of this baseboard 54 permits vertical extension thereof if relative separation takes place between the floor and wall to which it is fastened, and this without changing the area of the openings in the portion 54d.

In Fig. 8 is still another modification having most of the advantages of the baseboard of Fig. 6 and showing that the entire baseboard need not be of flexible sheet material. In Fig. 8 a thin metal plate 55 is secured to the side wall at 56a and forms a sealed connection at 56b. This plate has a longitudinally extending line of perforations at 56c calculated to give the air circulation required in the room. A baseboard finishing strip 60 of wood or the like is secured to the wall along the upper edge of plate 55 and extends outwardly and downwardly so as to conceal openings 56c from persons in the room. A finishing strip 60 may be provided at the bottom also. The plate 55 is allowed to slip at 56b so that it permits the necessary play between the walls and floor under normal shrinkage of the building members without affecting the total area of openings 56c, as it is vital in the circulating system that these openings remain constant.

With the building structure arranged as shown and described and with the air conditioning equipment connected with the air passageways as thus described, air from room 10 passes outwardly through openings 47 along the baseboards of the walls 51 and passes downwardly through the vertical passageways 20 and thence along the horizontal passageways 26. At the same time air from rooms 10 and 11 passes outwardly through similar baseboard openings and joins the current from the upper rooms which passes to the air conditioning equipment as already described. It will be understood that the humidity of the air in the rooms 10, 11 and 14 will be controlled by the humidostat 41 which operates the valve 40 in the usual manner. If the walls of rooms 10, 11 and 14 or the floors of rooms 10 and 11 are subject to moisture the air currents will remove excess moisture and the humidostat 41 will cut down the supply of water through conduit 39 by the control of valve 40. On the other hand if the walls and floors of the rooms are dry, the humidostat will control the valve 40 to supply the proper moisture required in the living rooms. Temperature control equipment has not been illustrated as the use of the same along lines analogous to the humidifying equipment shown is well known but such equipment would also be subject to the varying temperature of the air passing through the ducts 28 and 29 and the control would be modified to the extent that the air was cooled or heated in passing through those ducts. For instance, in summer the walls and sub-floor below ground level are generally considerably cooler than the atmosphere and air, cooled by contact with these parts, may be recirculated in the living rooms. In like manner, in winter the temperature of those parts of the structure below ground may be above atmospheric temperature and assist in maintaining the desired degree of heat in the living rooms.

It will be understood that this equipment may also be installed in rooms 15, 16 and 17 in a manner analogous to that already described in connection with room 14 but such equipment is not 75 illustrated here.

It will be noted that, in the system of passageways 47-28-26-31-32-33, the narrowest point is the opening or openings 47. I utilize the size of this opening as a control point for the system. The total air handled is calculated for a given size of fan and a given area of the opening represented at 47. The other ducts, particularly 28, 26 and 31 have a greater area than the opening or openings 47 to insure an equalization of suction throughout the system and to reduce the rate of air flow through those larger passageways. The same is true of the openings at 54d in Fig. 6 and the openings 56c in Figs. 8 and 9. They are the most restricted point in the system and remain constant throughout the life of the installation.

I find that an air circulating system using an opening or openings extending along a great length of wall space so distributes the air that drafts are not apparent in the room. The construction shown also utilizes an old and well known type of building construction to provide air circulating passages without extra cost and without loss of habitable space.

What I claim is:

1. An air circulation system for a building comprising, two rooms, one above and one at least partly below ground level, said lower room having an outer masonry wall and an inner finishing wall and furring strips separating said walls, whereby said spaced walls and furring strips provide vertically extending ducts along said wall, said lower room having a subfloor and a finished floor and sleepers separating said floors, whereby said spaced floors and sleepers provide horizontally extending ducts along said floor, said vertical and horizontal ducts being arranged with a passageway between them, air outlet means from said upper room communicating with said vertical ducts, and means for withdrawing air from said horizontal ducts and returning said air to said upper room.

2. An air circulation system as in claim 1, in which said horizontal ducts lead to a common duct, and a fan and conduits are arranged to withdraw air from said common duct and deliver said air to said upper room.

3. An air circulation system for a building having at least one room in contact with the ground, said one room having a double wall structure comprising an outer wall subject to moisture and an inner finished wall spaced therefrom and providing a passageway extending over substantially the entire area of said outer wall which is subject to moisture, said room also having a floor structure comprising an inner finished floor spaced from the ground and providing a second passageway extending over substantially the entire area of the under side of said floor, said wall structure and floor structure having meeting edges, there being air conducting communication between said passageways along substantially the entire length of said meeting edges, heating means for said air system, means for introducing air from said building into said first named passageway along a line substantially parallel to and remote from said meeting edges, means for removing air from said second passageway along an edge of said floor structure substantially parallel to and remote from said meeting edges and for conducting said air to said heating means, and means for returning said heated air to said building.

4. An air circulation system for a building comprising a room having a floor and walls, a

baseboard formed of flexible sheet material secured along its upper edge to a wall and along its lower edge to a floor of said room, said baseboard being provided with openings evenly spaced along its length for air circulation purposes, duct means communicating with said baseboard openings, fan means for exhausting air from said room through said openings and through said duct means, said baseboard openings being more restricted than any point in said duct means, said duct means providing a suction reservoir on the fan side of said baseboard sufficient to insure substantially uniform suction along said openings, whereby with a given fan means air circulation is of predetermined velocity along said baseboard independent of relative movement between said wall and floor of said room during the life of the building.

5. An air circulation system for a building having at least one room having an outer wall subjected directly to ground moisture, said one room having a wall structure comprising an inner finished wall spaced from said outer wall so as to form a passageway extending over substantially the entire area of said outer wall subject to ground moisture, said room having other walls not subject to ground moisture, heating means for said air system, means for moving air from said building through said passageway and to said heating means, said passageway being arranged to receive air from said building along substantially the entire length of one edge of said wall structure and to deliver air along substantially the entire length of the edge of said wall structure opposite the air receiving edge, and means for returning said heated air to said building, whereby said heated air is forced to pass in a uniformly distributed manner over said outer moist wall and the moisture there picked up is returned to said building.

6. An air circulation system for a building comprising a room having a floor and walls, a baseboard including a sheet in sealed relation between a wall and the floor of said room and permitting relative movement between them, said sheet being provided with openings evenly spaced along its length for air circulation purposes, duct means communicating with said baseboard openings, fan means for exhausting air from said room through said openings and through said duct means, said baseboard openings being more restricted than any point in said duct means, and said duct means providing a suction reservoir on the fan side of said baseboard sufficient to insure substantially uniform suction along said openings, whereby with a given fan means air circulation is of predetermined velocity along said baseboard independent of relative movement between said wall and floor of said room during the life of the building.

7. In an air circulation system for a building having a hollow wall space wherein air is circulated from a room of said building into said wall space along a length of baseboard, a baseboard construction comprising an elongated plate extending longitudinally of said baseboard and having a longitudinally extending line of perforations for air circulation therethrough, said plate being secured along one of its longitudinal edges to said baseboard, and means sealing the other longitudinal edge of said plate to said baseboard in a manner permitting some relative movement.

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