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INSULATING AND AIR CONDITIONED BUILDING CONSTRUCTION

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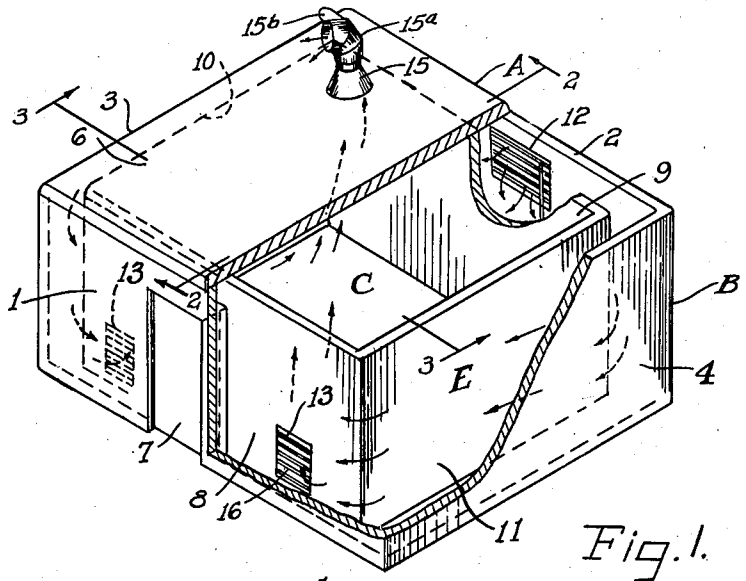

Fig. 1.

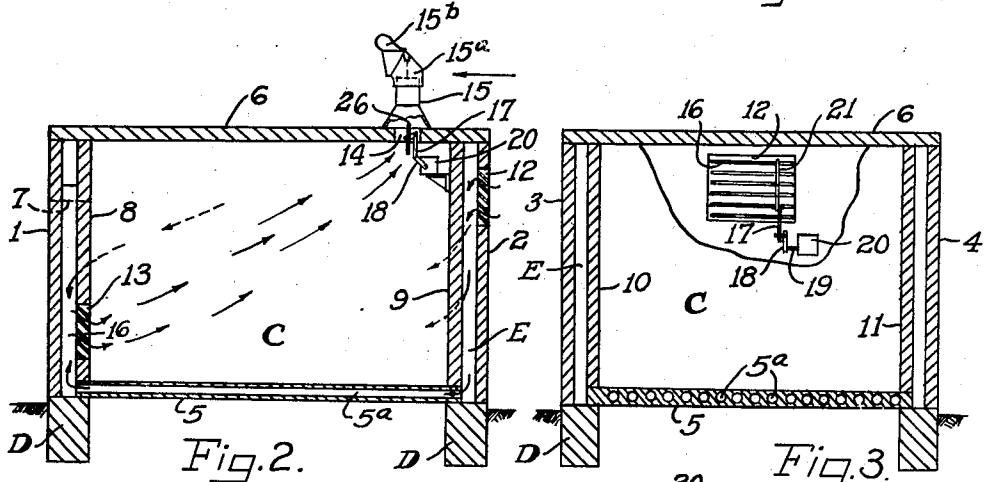

Fig. 2.

Fig. 3.

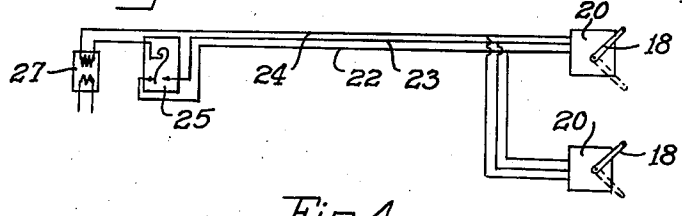

Fig. 4.

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INSULATING AND AIR-CONDITIONED BUILDING CONSTRUCTION

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6 Claims. (Cl. 98—31)

This invention appertains to the art of building construction and more particularly to the insulating and air conditioning of rooms or buildings.

One of the undesirable conditions often encountered in connection with building structures involves the tendency of the interior walls to sweat or become damp on account of the condensation of moisture thereon as a result of a differential in temperature between the air outside and the air inside of the room or other enclosure. Whenever the temperature of the walls or interior surfaces of a room or building is substantially higher or lower than the temperature of the air brought in contact therewith, the moisture in such air will be caused to condense and be deposited on such interior surfaces.

The condition of sweating interior walls to which many building constructions are subject is particularly undesirable in connection with buildings designed to house delicate mechanical equipment, subject to be adversely affected by the presence of moisture, such for instance, as buildings employed as telephone exchanges wherein delicate mechanical and electrical equipment must of necessity be kept continuously in most efficient working order.

Various methods of dealing with the problem of preventing condensation of moisture on the interior walls of building structures have been heretofore proposed, involving the conditioning of the air introduced to the interior of such building structures by mechanical means, or under the control of a human agency. It is, however, one of the purposes of the present invention to deal with this problem in connection with unattended telephone exchanges and to this end a solution of the problem contemplating merely simple and readily adaptable changes in common building practice and not requiring the interposition of additional mechanical equipment or any human agency has been found to be highly desirable.

With the foregoing in view the objects of the invention may be briefly summarized as follows:

It is a primary object of the invention to provide a building construction designed to prevent the sweating of or the condensation of moisture upon the interior surfaces of the room or building.

Another principal object of the invention is to provide a building construction designed to equalize the temperature of the interior surfaces of a room or building and the temperature of the air brought into contact therewith.

A further principal object of the invention is to provide a building construction designed to pre-condition the air brought into contact with the interior surfaces thereof so that moisture in such air will not be caused to condense upon contact with such interior surfaces.

Still another principal object of the invention is to provide a building construction which will take advantage of natural phenomena for the accomplishment of the foregoing objects without the interposition of mechanical refrigeration or heating means.

Another object of the invention is to provide a building construction adapted to meet the requirements of varying conditions of different temperature ranges.

Another object of the invention is to provide a wall construction designed to function both in an insulating and air conditioning capacity.

Another object of the invention is to provide a wall construction designed to operate under certain conditions solely in an insulating capacity, and under other conditions both in an insulating and air conditioning capacity.

Aother object of the invention is to provide a building construction including a wall construction designed to function alternatively either solely in an insulating capacity or both in an insulating and air conditioning capacity under the control of, and to satisfy the requirements of, varying temperature conditions.

In carrying my invention into practice, the same contemplates, in general, the provision of a building construction comprising spaced enclosing walls so constructed as to provide a continuous passage therebetween of considerable extent, means enabling communication between said passage and the atmosphere and between said passage and the interior of the enclosure, means for producing a circulation of air from the outside through said passage between said walls, through said room or enclosure and thence to the outside, and means for closing off communication between the passage and the outside, between the passage and the interior of the room or enclosure, and between the interior of the enclosure and the outside, whereby the double wall construction will operate solely in an insulating capacity. The last means is preferably operable automatically by temperature controlled means to meet the requirements of different conditions existing under varying ranges of temperature, whereby the double walled construction may be caused to function solely in an insulating capacity or alternatively both in an insulating and air conditioning capacity.

Other objects, advantages and features of novelty will appear more fully as the description of the invention progresses in conjunction with the accompanying drawing, in which:

Figure 1 is a perspective view, partially in section, showing a room or building embodying the invention.

Figure 2 is a vertical sectional view of the room or building shown in Figure 1, the section being taken on the line 2—2 of Figure 1.

Figure 3 is a vertical sectional view of the room or building shown in Figure 1, the section being taken on the line 3—3 of Figure 1.

Figure 4 is a diagrammatic view showing the inter-relation between the various closures, the temperature controlled means for operating the same, and the source of power therefor.

Referring now to the drawing for a detailed description of the invention, the letter A generally designates a room or building comprising an outer enclosure generally designated by the letter B and an inner room or enclosure generally designated by the letter C. The building A is constructed upon a foundation D. The outer enclosure B includes the front wall 1, rear wall 2, side walls 3 and 4, floor 5, and roof 6. Communication from the outside to the interior of the room C is afforded through a doorway normally closed by a door 7.

The inner enclosure C includes the front wall 8, rear wall 9, side walls 10 and 11, and floor 5. It will be noted that the floor 5 is provided with cylindrical passages 5a extending longitudinally therethrough from one end to the other.

The space between the inner enclosure C and outer enclosure B affords a passage E extending substantially entirely around the four walls 8, 9, 10 and 11 of the inner enclosure C, and together with the passages 5a through the floor 5, which passages at either end are in communication with the passage E, provides an insulating air space upon substantially five sides of the inner enclosure C.

The rear wall 2 of the outer enclosure B is provided with an opening 12 in communication with the outside, and the front wall 8 of the inner enclosure C is provided with openings 13 affording communication between the passage E and the interior of the inner enclosure C. An opening 14 is provided in the roof 6 affording communication between the interior of the enclosure C and the outside, through the ventilator 15 provided on the roof 6 over the opening 14. The ventilator 15 is of a common type, provided with a swiveling elbow 15a which is caused to turn about its mounting by variation in the direction of movement of atmospheric air currents acting upon the wind vane 15b.

Each of the openings 12, 13 and 14 are provided with motor-operated closures of a common type, comprising louvers 16 or a damper 26 mounted for pivotal movement adjacent the respective openings and adapted to be moved to open and closed positions by means of linkage 17, associated with bell cranks 18, connected with the operating shafts 19 of the respective electric motors 20 provided for the operation of each of the closures. As shown, the closure for the opening 14 consists of a pivoted damper 26, while the closures for the openings 12 and 13 each comprise a plurality of louvers 16 connected for simultaneous operation by linkage 21.

The electric motors 20 for operating the closures for the various openings 12, 13 and 14 are connected to a suitable source of current through the three wires 22, 23 and 24 through a suitable temperature controlled means, such as the thermostat 25, and a low voltage current source such as the transformer 27. The thermostat 25 will preferably be located within the room or inner enclosure C so that the operation of the closures 12, 13 and 14 will be controlled by variations of temperature within the said room or inner enclosure C.

In the use of my invention, it is to be noted that during the milder seasons of the year, particularly when the temperature outside of the building is above 32° F., it is desired to provide a circulation of air from the outside through the passage E, through the room C, and thence to the outside, as a result of which circulation any tendency of moisture to condense out of the air in the room C and be deposited upon the interior surfaces thereof will be substantially eliminated.

When, however, the temperature inside the room C becomes lower than 32° F., no condensa- of moisture in the air within said room can take place so that there will be no deposit of moisture on the interior walls of the room C when the temperature in the room is below 32° F. Under such condition, when the temperature inside of the room C is below 32° F., since no condensation of moisture can take place therein, there is no need for the circulation of air from the outside through the passage E, through the room C, and thence to the outside. In such event, therefore, it will be desirable to cut off the aforesaid circulation and avail of the double wall construction of my invention to provide a sealed air space insulating the interior of the room or enclosure C from the outside.

Having the foregoing in mind, the operation of my invention may be more particularly described as follows: The thermostat 25, located within the room C, will be set to operate the motors 20 when the temperature in the room C rises above, or descends to, 32° F., to open and close respectively the closures for the openings 12, 13 and 14.

Assuming that the temperature within the room C is above 32° F., the louvers 16 will be in open position to provide communication between the outside of the building and the passage E through the opening 12, between the passage E and the interior of the room C through the openings 13, and between the interior of the room C and the outside of the building through the opening 14 in the roof 6.

Under such condition, movement of the air outside of the building causes a vacuum to be created in the ventilator 15, resulting in withdrawal of air from the room C through the opening 14 in the roof 6 to the outside. This results in circulation of air from the outside through the opening 12, through the passage E, through the openings 13, through the room C, and thence through the opening 14 in the roof 6 and through the ventilator 15 to the outside, as indicated by the arrows in Figures 1 and 2.

Assuming a condition in which there is initially a sufficient differential between the temperature of the interior surfaces of the walls 8, 9, 10 and 11 and the temperature of the air coming into contact with said surfaces, which would otherwise cause condensation of moisture from such air upon said surfaces, the starting of the circulation just above described is designed to substantially eliminate any such condensation of moisture upon, or sweating of, the interior surfaces

of the said walls 8, 9, 10 and 11. The explanation of this result is believed to be about as follows: The temperature of the outside air, introduced to the passage E through the opening 12, will affect and be affected by the temperature of the walls 8, 9, 10 and 11 of the enclosure C while the air is passing through the passage E, so that when it enters the interior of the room C through the openings 13, its temperature will more nearly approximate that of the walls 8, 9, 10 and 11 so that when it comes into contact with the interior surfaces of said walls no condensation of moisture will occur.

By way of example, let it be assumed that the temperature of the walls 8, 9, 10 and 11 of the enclosure C is lower than the temperature of the air outside of the building and the differential in temperature is such that if the outside air were brought immediately in contact with the interior surfaces of the walls 8, 9, 10 and 11, the moisture in such air would be caused to condense and be deposited upon the inner surfaces of the walls 8, 9, 10 and 11. The outside air, however, instead of being brought immediately into contact with the inner surfaces of the walls 8, 9, 10 and 11 is first introduced through the opening 12 into the passage E, and passes therethrough to the openings 13 before entering the room C. The temperature of this outside air as it passes through the passage E will be lowered by contact with the outer surfaces of the walls 8, 9, 10 and 11, and, likewise, the higher temperature of this outside air, passing through the passage E, will tend to raise the temperature of the walls 8, 9, 10 and 11, so that by the time this outside air arrives at the openings 13, and enters the room C, its temperature will have been somewhat reduced and the temperature of the walls 8, 9, 10 and 11 will have been somewhat raised, so that the respective temperatures of the air and of the walls will tend to become equalized.

Furthermore, of course, assuming there is a sufficient differential between the temperature of the outside air and the temperature of the walls 8, 9, 10 and 11, as the outside air is caused to pass along the passage E, any tendency of the moisture therein to be condensed as a result of contact with the colder walls 8, 9, 10 and 11 will cause this moisture to become deposited upon the outer surfaces of said walls, so that when this outside air enters the room C a certain amount of moisture will have been removed therefrom which would otherwise be caused to be deposited upon the interior surfaces of the walls 8, 9, 10 and 11 had it not been removed prior to entrance of the air into the room C.

Still assuming the condition of the example given, and assuming that when the circulation was started moisture from the outside air was caused to be deposited upon the outer surfaces of the walls 8, 9, 10 and 11, as the circulation continues and the temperature of said walls is raised, it may rise sufficiently above the condensation point, or dew point, to become dissipated as a result of continued circulation of the outside air through the passage E by evaporation.

The foregoing description and explanation has reference to the operation of the invention under a condition when the temperature in the room C is above 32° F., so that the respective closures at the openings 12, 13 and 14 are open to permit the circulation of air from the outside through the room C. Now when the temperature in the room C descends to 32° F., since no moisture can condense in the room C under such condition, there is no longer any need for the circulation of air from the outside through the room C as above described.

As above mentioned, the thermostat control 25 is set to operate the motors 20 when the temperature in the room C descends to, or rises to, 32° F. Assuming, therefore, the condition under which the closures at the openings 12, 13 and 14 are open, and the temperature in the room C lowers to 32° F., the thermostat 25 will at such time initiate operation of the motors 20 to cause the louvers 16 at the openings 12 and 13, and the damper 26 at the opening 14, to be moved to closed position, thereby sealing the air in the passage E and closing off communication between the interior of the room C and the outside through the opening 14. The double wall construction of the invention now functions solely in an insulating capacity providing a sealed air space substantially around five sides of the inner enclosure or room C, protecting the latter from extereme drops in temperature in the colder seasons of the year so as to require only a small application of heat in the room C, if any.

The openings 12, 13 and 14, being closed under the condition just described, whenever the temperature in the room C rises to 32° F., the thermostat 25 will initiate operation of the motors 20 causing the louvers 16 at the openings 12 and 13, and the damper 26 at the opening 14, to be moved to open position enabling the circulation of air from the outside through the room C, as previously described, so long as the temperature in the room C remains above 32° F.

From the foregoing it will be apparent that the building construction of my invention functions in a dual capacity to provide an air conditioned passage surrounding the enclosure C for the conditioning of air introduced from the outside to the interior of the room C, and for conditioning the walls of the room C so as to eliminate condensation of moisture on the interior of said walls, when the temperature conditions are such that a condensation of moisture might otherwise occur; and also the building construction of my invention is operative automatically under the control of temperature conditions to function in an insulating capacity with reference to the room C when the temperature conditions therein are such that condensation of moisture on the interior walls thereof would not take place.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a building construction of the class described, in combination, a room or enclosure, a second enclosure surrounding the first and defining a closed passage extending around said room, said second enclosure having an opening affording communication from the space between said enclosures to the outside of the second enclosure, said first enclosure having an opening affording communication from the space between said enclosures to the interior of said first enclosure, a means of communication from the interior of the first enclosure direct to the outside of the second enclosure, and means for causing outside air to be introduced into the space between said enclosures through the first opening and to circulate through said space to the interior of said first enclosure through said second opening, thence from the interior of said first enclosure to the outside through said means of communication, combined with closures for said openings and said means of communication, and

temperature controlled means for operating said closures to open and close the same in accordance with variations in temperature within said first enclosure, whereby when the temperature in the latter rises above a pre-determined point said closures will be operated to open the same enabling operation of said first means and when the temperature in the first enclosure descends to said predetermined point said closures will be operated to close the same to seal the air in the space between said enclosures to thereby provide an insulating air space surrounding said first enclosure.

2. In a building construction of the class described, in combination, an enclosure comprising spaced inner and outer walls, a floor, and a roof, a conduit leading from the interior of said room direct to the outside of the building, means for withdrawing air from the interior of said enclosure through said conduit, said outer wall having an opening affording communication from the space between said walls to the outside, said inner wall having an opening affording communication from the space between said walls to the interior of said enclosure, the space between said walls affording a continous passage for air between the openings in the inner and outer walls, closures for each of said openings operable alternately to open the same to afford continuous passage of air from the outside through the space between said walls through the interior of said enclosure, thence through said conduit to the outside and to close said openings to substantially prevent passage of air from or to the interior of said enclosure, and to substantially seal the air in the space between the walls when the openings are closed, combined with temperature controlled means operable in accordance with variations in temperature within the interior of said enclosure to open and close said closures.

3. In a building construction of the class described, in combination, a room or enclosure, an enclosed passage (spaced walls) extending around the outside of said room and communicating with the interior of the room and with the outside of the building, closures at the points of communication of the passage with the interior of the room and with the outside of the building, said closures being operable, when closed, to seal said passage, thereby preventing movement of air therefrom, a conduit leading from the interior of said room direct to the outside of the building, and means operable when said closures are open for inducing circulation of air from the outside of the building through said passage through the interior of the room, thence through said conduit to the outside of the building, and temperature controlled means for operating said closures to open and close the same in accordance with variations in temperature within said room.

4. In a building construction of the class described, in combination, a room or enclosure, an enclosed passage (spaced walls) extending around the outside of said room and communicating with the interior of the room and with the outside of the building, closures at the points of communication of the passage with the interior of the room and with the outside of the building, said closures being operable, when closed, to seal said passage, thereby preventing movement of air therefrom, a conduit leading from the interior of said room direct to the outside of the building, and means operable when said closures are open for inducing circulation of air from the outside of the building through said passage through the interior of the room, thence through said conduit to the outside of the building, and temperature controlled means operable to open and close said closures.

5. In a building construction of the class described, in combination, a room or enclosure, an enclosed passage (spaced walls) extending around the outside of said room and communicating with the interior of the room and with the outside of the building, said closures being operable, when closed, to seal said passage, thereby preventing movement of air therefrom, a conduit leading from the interior of said room direct to the outside of the building, a closure for said conduit, and means operable when said closures are open for inducing circulation of air from the outside of the building through said passage through the interior of the room thence through said conduit to the outside of the building, and temperature controlled means for operating said closures to open and close the same in accordance with variations of temperature within said room.

6. In a building construction of the class described, in combination, a room or enclosure defined by spaced inner and outer walls, the spaced walls affording a closed passage extending substantially entirely around said room, said passage communicating with the interior of said room and with the outside of said building and affording contact of air in said passage with substantially the entire area of said inner walls of said room, a conduit leading from the interior of said room direct to the outside of the building, closures at the points of communication of said passage with the interior of the room and with the outside of the building, said closures being operable when closed to seal said passage thereby preventing movement of air therefrom, and means operable when said closures are open for inducing circulation of air from the outside of said building through said passage through the interior of the room thence through said conduit to the outside of the building, combined with temperature controlled means for operating said closures to open and close the same in accordance with variations in temperature within said room.

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