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W. L. MORRISON

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AIR COOLING AND CIRCULATING DEVICE

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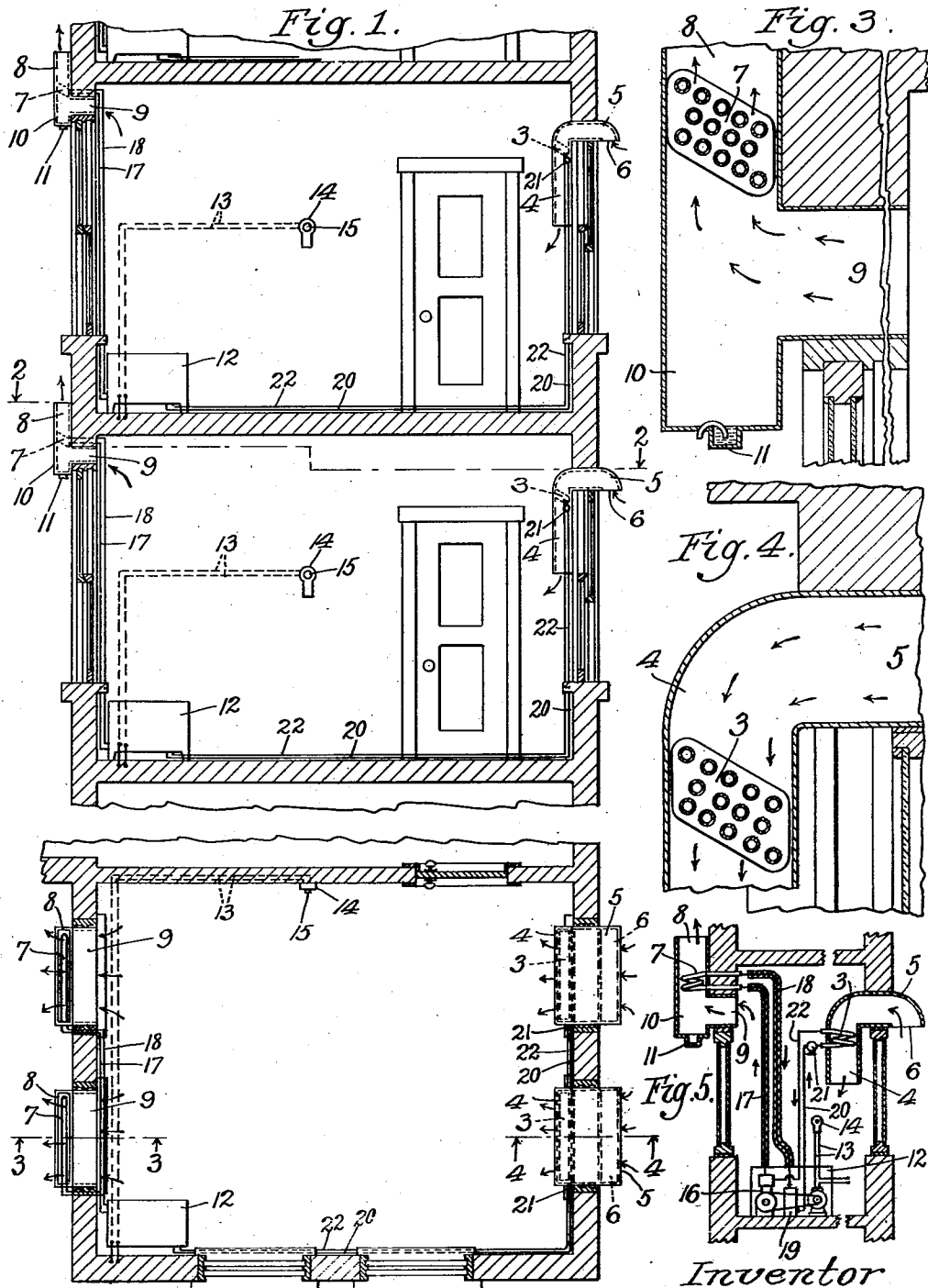


Fig. 2.

Inventor
Willard L. Morrison
by Parker T. Carter Attys.

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AIR COOLING AND CIRCULATING DEVICE

Willard L. Morrison, Lake Forest, Ill.

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8 Claims. (Cl. 62-129)

This invention relates to an air cooling and circulating device and has for an object to provide a new and improved device of this description.

The invention has as a further object to provide an air cooling and circulating device particularly adapted for use in connection with rooms in which human beings are received.

The invention has as a further object to provide such an air cooling and circulating device, wherein there is a refrigerating apparatus with a cooling element and a condenser element, and the two elements are utilized for producing a circulation of air through the room.

The invention has further objects which will be more particularly pointed out in the accompanying description.

Referring now to the drawing, Fig. 1 is a sectional view through a building showing the device as applied to the rooms thereof;

Fig. 2 is a sectional view taken on line 2-2 of Fig. 1;

Fig. 3 is an enlarged sectional view taken on line 3-3 of Fig. 2;

Fig. 4 is an enlarged sectional view taken on line 4-4 of Fig. 2;

Fig. 5 is a diagrammatic view showing the circulatory system utilized in the construction of Figs. 1 and 2.

Like numerals refer to like parts throughout the several figures.

Referring now to the drawing, wherein there is shown one form of the device, in this construction there is one or more admission openings, through which air is admitted to the room, and one or more discharge openings, through which air is discharged from the room, the number depending upon the size of the room and the conditions presented. These openings may be formed in any desired manner and for this purpose a part of the window openings may be used. In the construction shown, these openings are formed by lowering the upper sashes of the windows a sufficient amount.

In this construction there is illustrated in Fig. 1 a section through a portion of a building and there are shown separate rooms provided with one form of the air circulating and cooling device. In this construction the cooling element 3 is placed in a conduit 4 which has a portion 5 leading to the outside atmosphere and this portion preferably has its admission opening 6 located at the bottom so that rain will not enter. This conduit may be located at any desired points, and I have shown it as being lo-

cated at the window, the part 5 being inserted between the top of the window sash and the frame. I have also illustrated double windows in order to provide a better insulated room. The condenser element 7 is located in a conduit 8 which has a bent portion 9 communicating with the interior of the room. This conduit may be located in the window opening or at any desired point, and I have illustrated it as being arranged so that the portion 9 is above the tops of the window sash and the window frame. By arranging the conduits for the cooling element and the condenser element so that they may be easily and quickly inserted in the window openings, it will be seen that I provide a cheaper construction and a construction more easily installed than might otherwise be the case. In both conduits the parts 5 and 9 are arranged to extend across the window so as to form a tight joint or connection.

The conduit 8 is preferably on the exterior of the structure and its upper end is preferably open so that the air may easily pass out, and also so that rain may also enter the conduit to help cool the condenser element 7. The rain will not pass into the room, but will pass through the receptacle 10 and then out through the valve 11. The motor and compressor are located in a casing 12 which may be located at any suitable point, preferably in one corner of the room and which is preferably made sound proof. One of the conductors 13 for the motor may be run to a suitable point on the wall to a switch 14 which may be manipulated by means of the handle 15 or may be arranged to act automatically by a thermostat.

The condenser element is preferably located in a higher horizontal plane than the cooling element, so that in ordinary use there will be, as it were, two layers of air in the room, a layer of cold air in the bottom portion below the cooling element and a layer of warmer air in the upper portion above the cooling element, this layer of warmer air being tapped by the discharge opening through which the air is drawn by the condenser element. In the construction shown the air inlet has its upper portion above the cooling element and its lower portion encircling the cooling element.

Any suitable refrigerating apparatus may be used. As shown herein the refrigerating apparatus has a circulatory system which is diagrammatically illustrated in Fig. 5, wherein the refrigerant after leaving the compressor 16 passes through pipe 17 to the condenser element 7.

which may be a coil or any other desired form, where it is cooled by a current of air and passes by pipe 18 to the tank 19. The refrigerant then passes by means of pipe 20 to the expansion valve 21, and thence to the cooling element 3 which may be a coil or any other suitable element, where it cools the air. The refrigerant then passes by pipe 22 back to the compressor 16.

In the construction shown herein the cooling element 3 is located in proximity to the air admission opening and the condenser element 7 is located in proximity to the air discharge opening, the piping being arranged to permit the proper circulation of the refrigerant when the parts are in this position, as shown diagrammatically, for example, in Fig. 5.

It will be seen that by means of this arrangement the outside air is cooled by the cooling element 3 and drops down into the room, and the condenser element 7 heats the air in the conduit 8 and causes it to rise and produce a suction to draw air out of the room, the air leaving the room striking the condenser element so as to act to cool it. By means of this device the noise attending the use of a fan or the like for circulating air is done away with. It will be noted that in this construction there is a cooling element, which may be of any form, and that the upper end of the inlet for passing air to the cooling element is above said cooling element. The outside air passes downwardly and past the cooling element so as to be cooled and caused to drop by gravity into said room. I have found that with this arrangement substantially the same amount of change of temperature of the air is secured regardless of the temperature of the outside atmospheric air, thus requiring no complicated apparatus to secure this result. This cooled air drops down into the room and spreads out there-in and passes therealong at a comparatively slow flow and then passes out of the room, not being felt as a draft by the occupants of the room. The condenser element assists in the discharge of the air from the room. The outlet with the condenser element, associated with it, is located in the upper part of the room, where the outlet communicates with the layer of warm air in the room, and by properly disposing and positioning the cooling element and the condenser, it will be seen that the cold air is not discharged from the room but remains in the lower portion of the room, the warmer air at the upper portion being discharged through this outlet. It will further be seen that there is no direct draft from the air inlet to the air outlet due to the pulling action of the condenser, but that the cold air drops down in to the room and fills it up to a certain level, say that at which the cooling element is located, and that the air discharged from the room comes from this upper warmer layer of air, which has its air supplied itself from the cold air in the lower portion of the room.

I have illustrated the invention in connection with various kinds of room, but it will readily be seen that it is applicable to any room which is used by human beings.

I claim:

1. An air cooling and circulating device comprising a room, a refrigerating apparatus comprising a cooling element located near the ceiling of the room, said room having an air inlet with its upper portion above said cooling element and its lower portion encircling the cooling element, for passing air by gravity from outside of said room into contact with said cooling element so as

to cause said air to be cooled thereby and dropped by gravity into said room, the lower discharge end of said air inlet being located at a distance from the floor so as to provide a body of cool air between it and the floor for cooling the occupants of the room, said room having a discharge above the upper portion of the body of cool air, by means of which warm air is discharged from that portion of the air in the room above the body of cool air.

2. An air cooling and circulating device comprising a room, a refrigerating apparatus comprising a cooling element located above the bottom of the room and a condenser element, said room having an air inlet with its upper portion above said cooling element for passing air from outside of said room into contact with said cooling element so as to cause said air to be cooled thereby and dropped by gravity into said room, the upper end of said inlet being at an angle to the other portion and projecting through an open window in the room, said room having a discharge above the bottom thereof by means of which warm air is discharged therefrom, said condenser element being located in said discharge.

3. An air cooling and circulating device comprising a room, a refrigerating apparatus comprising a cooling element and a conduit having a downwardly projecting portion and a laterally projecting portion, the laterally projecting portion projecting through an opening connecting the interior of the room with air outside of said room, said cooling element being located in the downwardly projecting portion of the conduit and causing the air cooled thereby to drop by thermosyphonic action, the lower part of said cooling element substantially defining the upper limit of the cooled area of the room when the device is in operation.

4. An air cooling and circulating device comprising a room, a refrigerating apparatus comprising a cooling element located above the bottom of the room and a condenser element, said room having an air inlet with its upper portion above said cooling element for passing air from outside of said room into contact with said cooling element so as to cause said air to be cooled thereby and dropped by gravity into said room, said room having a discharge above the bottom thereof by means of which warm air is discharged therefrom, said condenser element being located in said discharge, both the cooling element and the condenser element being supported at the top of said room at separated points therealong.

5. An air cooling and circulating device comprising a room having an opening at the top through which air from outside of said room enters said room, a refrigerating apparatus comprising a cooling element mounted in position in said opening and above the floor of the room so that the air from outside of said room comes into contact with said cooling element so as to cause the air to be cooled thereby and dropped by gravity into said room, the opening through which the outside air passes being provided with a conduit which projects downwardly past said cooling element, said room also having a discharge for the air above the bottom thereof, the room acting as a duct to conduct the air from said cooling element to said discharge, said discharge comprising a conduit having two portions at an angle to each other, one portion being outside the room, the other portion projecting through a window opening in the room.

6. An air cooling and circulating device comprising a room having a window opening at the top through which air from outside of said room enters said room, a refrigerating apparatus comprising a cooling element mounted in proximity to said window opening, so that the air from outside of said room comes into contact with said cooling element so as to cause the air to be cooled thereby and dropped by gravity into said room, 5
10 said room also having a discharge for the air above the bottom thereof, a condenser element forming a part of said refrigerating apparatus and located in said discharge, the condenser element being located in a higher horizontal plane 15
15 than the cooling element.

7. An air cooling and circulating device comprising a room having a window opening at the top through which air from outside of said room enters said room, a refrigerating apparatus comprising a cooling element mounted in proximity to said window opening, so that the air from outside of said room comes into contact with said cooling element so as to cause the air to be cooled thereby and dropped by gravity into said room, 20
25 said room having a discharge for the air above the bottom thereof, said discharge comprising

a conduit having two parts at an angle to each other, one outside the room and one connecting with the room, a condenser element forming a part of said refrigerating apparatus and located outside of the room, said condenser element located in the portion of the conduit outside of the room, means for causing air from said discharge to come into contact with said condenser element so that said condenser element is used to assist in drawing air out of said room. 5
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8. An air cooling and circulating device comprising a room having a window therein with a sliding upper sash, a refrigerating apparatus comprising a cooling element, a conduit having a laterally projecting part and a downwardly projecting part, the laterally projecting part being removably hooked over the upper end of the upper sash when it is lowered sufficient for this purpose, the cooling coil being located in the downwardly projecting portion of said conduit, whereby the cooling element and conduit are held in position, said conduit conducting air from outside the room to the said cooling element, so that the cooling element cools it and causes it to drop by gravity into the room. 15
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WILLARD L. MORRISON.