

May 9, 1939.

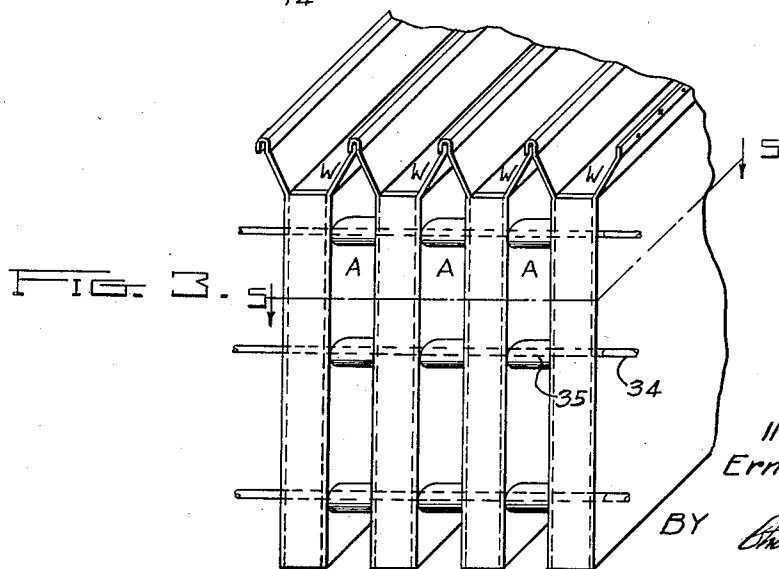
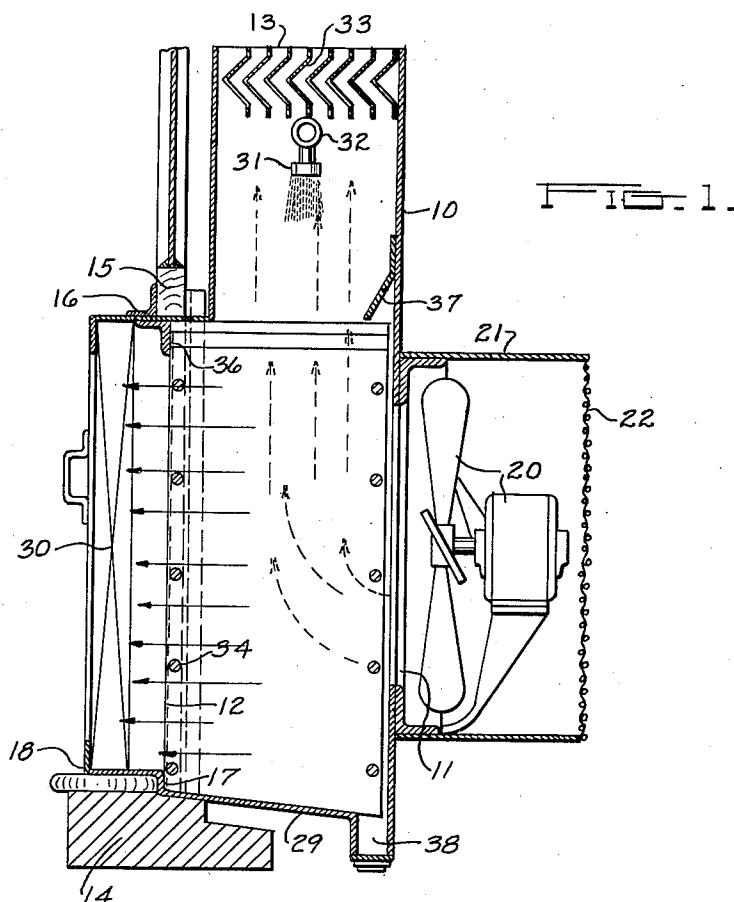
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2,157,531

COMFORT COOLING UNIT

Filed April 30, 1936

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

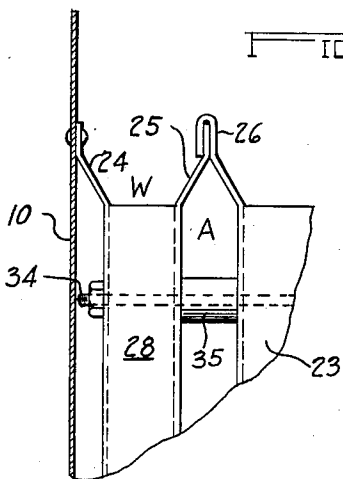
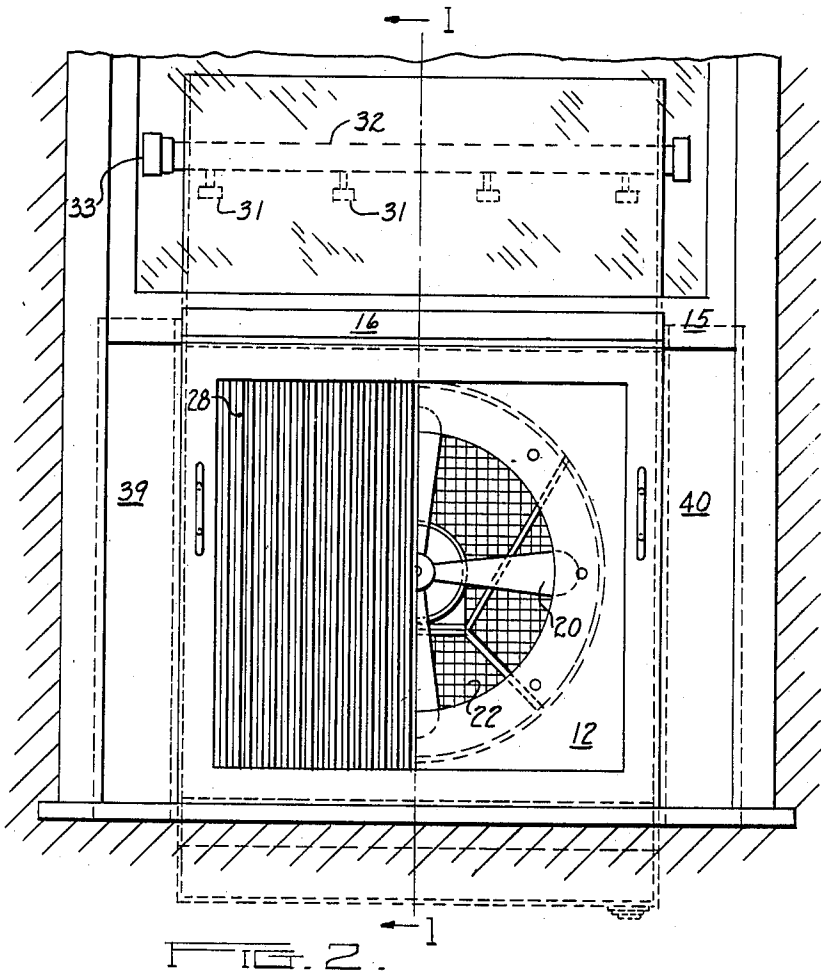


FIG. 4.

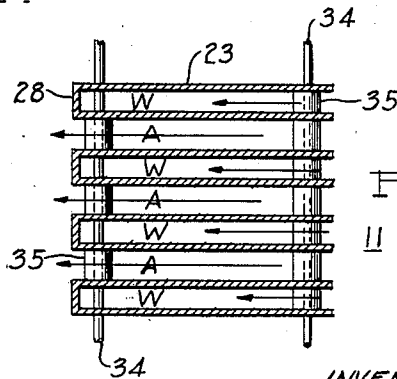


FIG. 5.

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UNITED STATES PATENT OFFICE

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COMFORT COOLING UNIT

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Application April 30, 1936, Serial No. 77,241

1 Claim. (Cl. 62—139)

This invention relates to air cooling units for comfort cooling in summer and is especially adapted for use in connection with the comfort cooling of homes, offices, churches, theaters or other inhabited places.

In many localities in the temperate zone there is, as a rule, in the summer a sufficient difference between the dry bulb temperatures and the corresponding wet bulb temperatures to provide a desirable gradient for heat transfer work without any need for altering or varying the moisture content of the air or for resorting to refrigeration. For example, under one set of conditions if the dry bulb temperature is 102° with a corresponding wet bulb temperature of about 78°, there is a difference of 24° available for air conditioning operations. If the air is cooled to within 5° of the wet bulb temperature, that is, to about 83° and the moisture content maintained the same although the relative humidity will change if this air is discharged into a room and an active circulation is maintained, the occupants will experience a high degree of comfort.

It is not necessary from the standpoint of human comfort to maintain constant indoor temperatures with widely varying dry and wet bulb temperatures. The human body does not respond properly to such conditions. Much can be accomplished in cooling air for human comfort by evaporative cooling with water at atmospheric pressures. It is, of course, possible to obtain temperatures considerably below the dew point with evaporative cooling of water under pressure considerably below atmospheric pressure but this entails expensive air and vapor handling equipment.

One object of this invention is to provide a low cost air cooling unit that employs no expensive refrigeration apparatus and that can be operated during the hot summer months at a relatively low cost while yet providing necessary air movement and decreased temperature of the air for comfort conditions. Another object of this invention is to provide an air cooling unit which is adapted to be positioned in a window opening of an enclosure and to be readily removable therefrom when occasion warrants. A further object of this invention is to cool the conducting plates close to the wet bulb temperature by evaporating water on one of their surfaces at atmospheric pressures and to cool a second air stream by passing it in thermal contact with the plates.

A preferred embodiment of this invention is illustrated in connection herewith wherein like numerals represent corresponding parts in the vari-

ous figures and in which Fig. 1 is a vertical section of one embodiment taken on the line 1—1 of Fig. 2. Fig. 2 is a front elevation showing the apparatus in position for use, portions of the same being shown in different planes to illustrate the construction. Fig. 3 is a perspective view of a portion of the heat conducting plates on a considerably enlarged scale. Fig. 4 is a front view of a portion of these plates showing the manner of their construction and connection and on a larger scale. Fig. 5 is a horizontal section on the line 5—5 of Fig. 3, likewise being on an enlarged scale.

Considering the drawings in greater detail, Figs. 1 and 2 illustrate a comfort cooling unit installed in a window opening. The apparatus comprises a housing 10 having an inlet opening 11 and a plurality of outlet openings 12 and 13. The cabinet or housing is arranged to set upon the window sill 14 and to be held in place by the window sash 15 through the intermediation of the angle iron member 16 which is secured at the top of the housing adjacent the outlet 12 and is so arranged to allow the window to drop in behind it. This construction in cooperation with the stepped portion 17 allows the housing to be placed in a window opening without danger of its dropping out. If additional securing means are desired, they can be provided by securing a member at the bottom of the housing 18 and allowing it to extend inside of and over the window sill 14. The inlet opening 11 is provided with means for effecting the passage of air through the housing and is shown as a motor driven fan 20. The fan is securely mounted adjacent the inlet and is provided with a protection shield 21 having a screen 22 to keep out foreign objects. Interposed within the housing and arranged to provide a passageway connecting the inlet 11 with the outlets 12 and 13 are a plurality of heat conducting plates 23. These plates are constructed in the form of deep channels as shown in Fig. 4 and Fig. 5 having upwardly extending flange portions 24 and 25, the adjacent flange portions 25 and 26 being arranged to overlap and be interlocked so as to close the passageways A formed between adjacent plates. These plates are so arranged as to provide a plurality of passageways A and W which are in direct communication with the air inlet 11, the alternate passages W being closed at their ends by the connecting portions 28 of the channels and open at their top whereby to provide an air passage from the inlet 11 to the outlet 13. The alternate passageways A are open adjacent the inlet 11 and the outlet 12 but are closed at

the top by the interlocked flange portions 25 and 26 and at the bottom by the bottom portion 29 of the housing. As a result of this construction, the air stream entering the housing from the outside of a building or enclosure is divided into two separate air streams, one portion flowing toward the outlet 23 and the other portion flowing toward the outlet 12. The air from this latter outlet enters the enclosure and passes through a filter 30.

At the top of the housing is positioned a plurality of water spray devices 31 supplied by a common supply pipe 32 which is arranged to be connected to a suitable source of water supply. Under some circumstances, this may be an ordinary garden hose. Above the spray nozzles 31 is positioned an appropriate eliminator 33. It will thus be observed that air entering the passages W follows the direction of the dotted arrows and is contacted with a water spray resulting in the evaporation of water into this air stream and the cooling of the heat conducting plates 23. This air stream into which the water is evaporated is vented to the outside through the outlet 13. The air stream passing on the opposite side of the plates 23, namely, in the passages A, is cooled and cleaned and then introduced into the space of occupancy. The cooling plates are secured together by means of the bolts 34 and the separators 35. The space above the top of the enclosure portions 28 is closed by the angle member 36 so that air from the two streams cannot intermix. The water spray is prevented from entering the motor housing by means of the baffle 37 and excess water is carried off from the drain 38. If the housing is made of standard construction, side plate members 39 and 40 can be provided to seal off any space between the

housing and the window opening in which it is positioned.

Although this apparatus has been described in connection as applied to a window opening, it is equally feasible and practicable to insert it in a duct system and thereby cause the cooled air to flow through the ducts instead of directly into the enclosure. In view of the arrangement of the parts, it is quite clear that no moisture will be added to or extracted from the air flowing in the passages A but that this air will be lowered sufficiently for comfort conditions if it is kept in active circulation. It is also readily apparent that the saturated air from the unit is conducted outside of the enclosure.

Although a specific embodiment of this invention has been illustrated and described, variations within the true spirit and scope of the same are intended to be covered by the appended claim.

What I claim is:

In an apparatus of the class described, in combination, a casing adapted to fit an opening in the wall of a building, a series of substantially vertical plates extending longitudinally of the casing and dividing it into separate air passages, all of said passages having openings at their outer ends, alternate ones of said passages having openings at their inner ends, and the other passages having openings at the top of the casing leading to the outer atmosphere, means for spraying an evaporative liquid into said other passages through the openings at the top of the casing, an outlet at the bottom of the casing for draining off surplus liquid, and means at the outer end of the casing for introducing air from the atmosphere into all of the passages.

ERNEST F. FISHER.