

Aug. 6, 1940.

H. M. PATCH

2,209,999

SUMMER AIR CONDITIONING UNIT

Filed Jan. 10, 1938

2 Sheets-Sheet 1

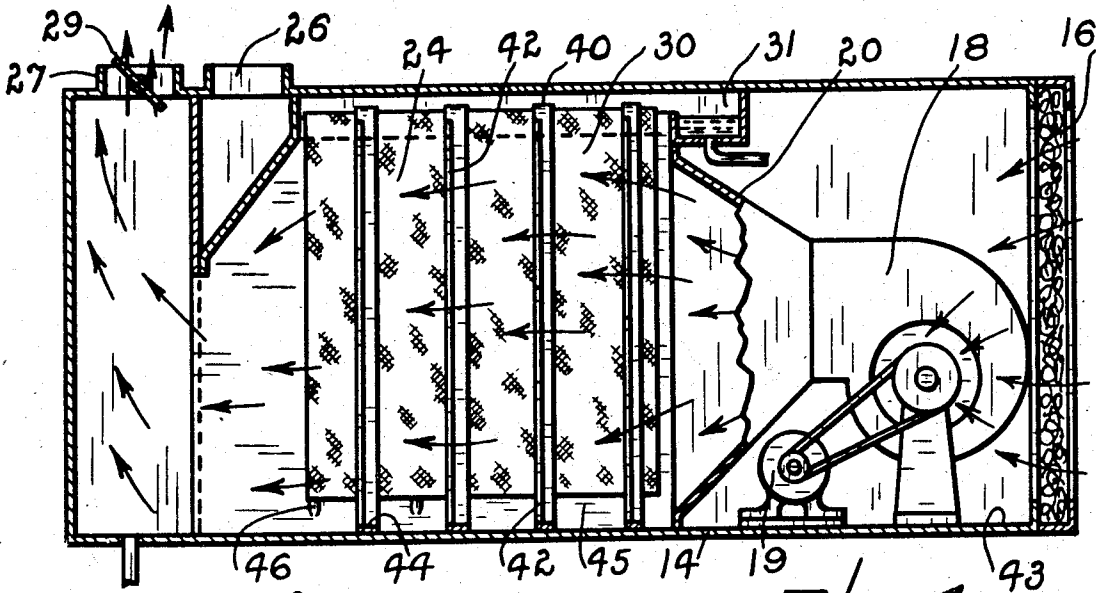


Fig. 1

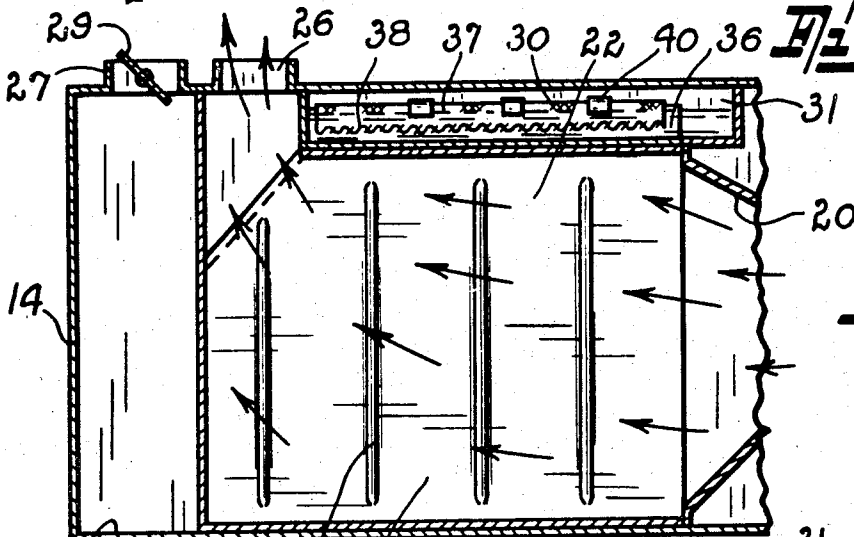


Fig. 2

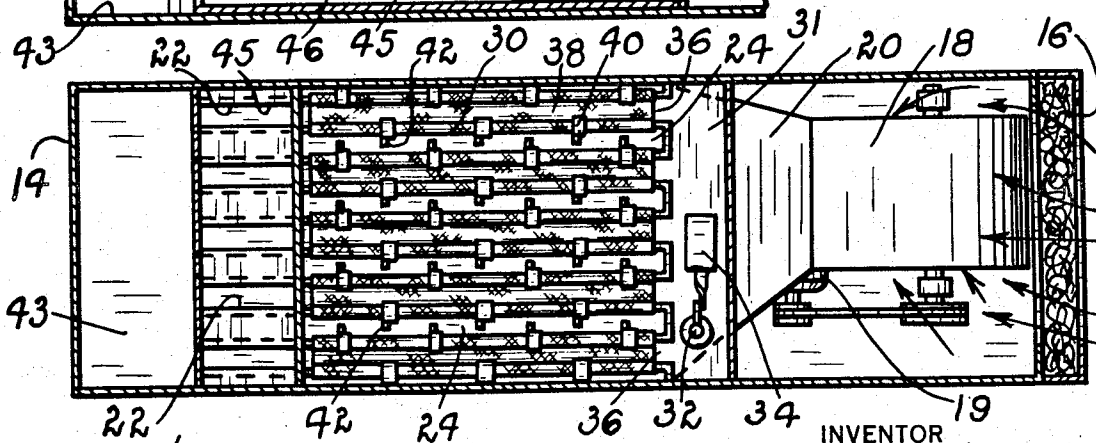


Fig. 3

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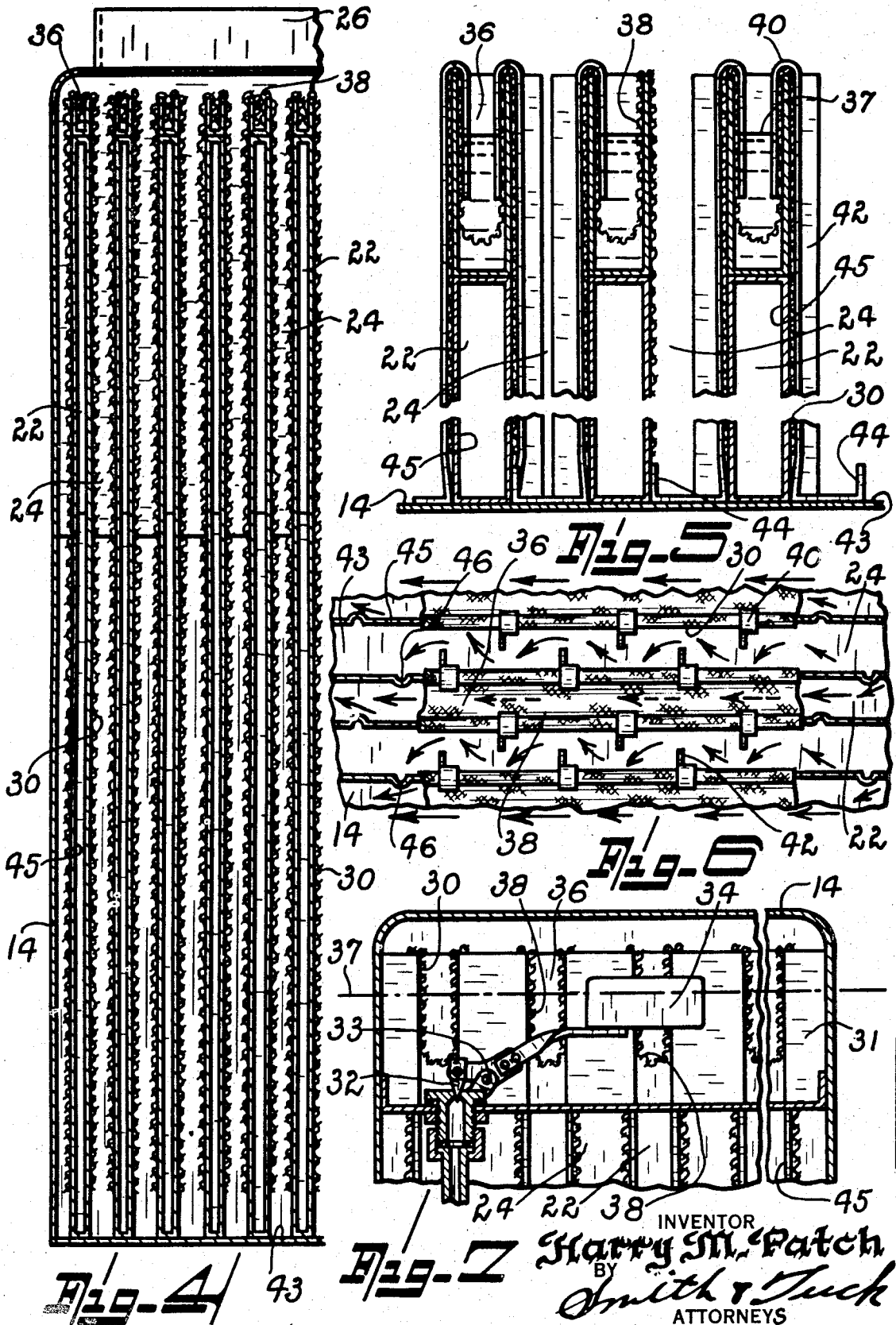
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SUMMER AIR CONDITIONING UNIT

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Application January 10, 1938, Serial No. 184,295

3 Claims. (Cl. 62—139)

My present invention relates to the art of air conditioning equipment and more particularly to a summer air conditioning unit.

This invention relates specifically to an air cooler in which fibrous material is saturated with water or other volatile liquids and air under forced draft is passed over the water soaked fabric, evaporating the water, after which that current of air is normally discharged to atmosphere. During the evaporation of the liquid a second stream of air is passed through tubes made of metal or fabric which have been cooled as a result of the evaporation process and the air thus passing through these tubes has its temperature substantially reduced.

It is a well known hygienic fact that the temperature drop, between an air conditioned room and the normal temperature outside that room to which a person may have been previously subjected, should not exceed more than eight to fifteen degrees. This drop in temperature can be accomplished and controlled by the simple equipment shown and described in this present disclosure.

It has further been found that by passing air through evaporation cooled tubes, no appreciable change is made in the absolute humidity of the air. If, however, it becomes desirable to increase the water content of the air, a portion or all of the air stream used to evaporate the water, used for cooling purposes, can be introduced into the dry air stream to build up the desired degree of humidity.

It is well known that many devices for cooling air by the evaporation of water have been created in the past; those observed, however, have not lent themselves to economical manufacture and too often their complicated constructions have made them impractical for installation for general use in small homes, buildings, vehicles, and the like.

In my present design I have provided a simple means of assuring ample saturation of the fabric used by easily controlled means; further my equipment is so arranged that a single fan most effectively forces both the wet and dry air through my cooler.

For certain installations draft produced by other means than a fan may be used particularly in vehicles where actual draft is available.

Further, I have provided means to insure the repeated impingement of the air against the cooling surfaces.

Other and more specific objects will be apparent from the following description taken in

connection with the accompanying drawings, wherein:

Figure 1 is a vertical, sectional view of my device, taken through one of the wet air passageways.

Figure 2 is a fragmentary view taken in the same sense as Figure 1 but with the cutting plane passing through one of the dry air passageways.

Figure 3 is a sectional view, in top plan, showing the means for saturating the fabric used in the water evaporating passageways.

Figure 4 is a cross-sectional view in elevation showing the arrangement of the alternately disposed dry and wet air passageways.

Figure 5 is an enlarged sectional view, with the center portion broken away, taken in the same general sense as Figure 4, but showing the passageway and fabric covering in greater detail.

Figure 6 is a fragmentary, top plan view, partly in section, showing the dry and wet air circulation of my device.

Figure 7 is a fragmentary view, in elevation, showing the water supply means for saturating my fabric tube covering.

Referring to the drawings, throughout which like reference characters indicate like parts, numeral 14 designates the main housing of my unit. It may be formed of any suitable material, preferably sheet metal and provides the supporting means and housing for the various items making up my complete air conditioning unit. On the right of Figures 1 and 3 is disposed a replaceable filter unit 16 which may be of any desired conventional type. Fan 18, which may be driven by any suitable source of power as the electric motor 19, draws air through filter 16 and discharges it out through the funnel-like discharge passageway 20. The air thus delivered is divided between the alternately disposed dry air passageway 22 and the wet air passageway 24, the dry, cooled air being forced out discharge opening 26 and the wet air out discharge opening 27.

The amount of air passing through the wet air passageways, which causes the evaporation of the water, may be controlled by adjusting damper 29 so that the desired drop in temperature may be controlled within the unit, it being evident, it is believed, that the more air circulated over the water evaporating means, the greater will be the evaporation and, consequently, the greater the drop in temperature.

To facilitate cooling I have provided fabric, or fibrous material, of an absorbent character as a lining for the wet air passageway. A preferred form of fabric is one which will readily conduct

water after the order of candlewicking. Water is supplied to the covering 30 by providing a reservoir 31 in which water is maintained at a constant level by the means most fully illustrated in 5 Figure 7. This consists of a valve at 32 which is pivotally supported at 33 and controlled by a float 34. The fabric coverings 30 are folded down into a plurality of troughs 36 so that they are below the water level indicated at 37, in Figure 7, 10 and, following the principles of the transfer of water by wicking, the entire length of covering 30 will be saturated with water. The loop as 38 in the fabric sheet may be held under the surface of the water in troughs 36 by any convenient 15 means, one of which is illustrated in Figure 5 in which a U-shaped member 40 is bent over the material so as to hold it in its desired position. In the present form I have found it convenient to form the U-shaped bends 40 as part of deflectors 20 42 which are disposed at frequent intervals throughout the length of the air passageways, to create turbulence and deflect the air passing through the device from one wall to the other and thus assure intimate contact between the air 25 stream and the surfaces. These members are preferably of angle cross section and extend entirely down to the floor 43 of housing 14 so as to permit of accurate positioning along the entire surface, the lower ends being formed after the showing of Figure 5 at 44. Accurate placement 30 of the deflectors is assured in this manner and, while serving their purpose of creating turbulence in the air passing through the passageway 24 they also serve to hold the fabric in close engagement with the walls 45 of the dry air pas- 35 sageway 22. Adequate impingement is assured in the dry air passageways 22 by deforming the side walls as by the vertically extending ridges shown at 46.

40 The foregoing description and the accompanying drawings are believed to clearly disclose a preferred embodiment of my invention but it will be understood that this disclosure is merely illustrative and that such changes in the invention 45 may be made as are fairly within the scope and spirit of the following claims.

I claim:

1. An air conditioning unit consisting of a plurality of vertical alternately disposed dry and wet air passageways, liquid supply troughs disposed above each dry air passageway, liquid absorbent wall coverings for each wet air passageway arranged to draw liquid from said troughs along their entire upper margin, power operated means for forcing air through said dry and wet air passageways, means for uniting the air from 10 the dry air passageways into a common dry air discharge opening and means for uniting the air from the wet air passageways into a common wet air discharge opening.

2. The combination with a housing having an air intake chamber and a fan-blower at one end, a plurality of longitudinally disposed, upright alternately dry and wet air passageways, and a funnel shaped fan casing opening to all of said passageways, of a water-supply trough closing the top portion of each dry passageway, absorbent wall-coverings for each wet-air passageway adapted to draw water from the troughs, spaced upright air-deflectors arranged in staggered formation in each passageway, a wet-air outlet 25 chamber at the other end of the housing communicating with said wet-air passageways and means for controlling outlet of wet-air from said chamber, and a dry-air outlet chamber located between the wet-air chamber and said troughs 30 communicating with the dry-air passageways.

3. An air conditioning unit comprising a plurality of vertical alternately disposed dry and wet air passageways, and power operated means for forcing air through said dry and wet passageways, a water supply trough located over each dry passageway, liquid absorbent wall coverings for each wet air passageway arranged to draw water from said troughs, an upright transversely extending partition forming a wet air outlet 40 chamber communicating with the wet air passageways, and said dry air passageways also having an outlet chamber between said partition and said troughs.

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