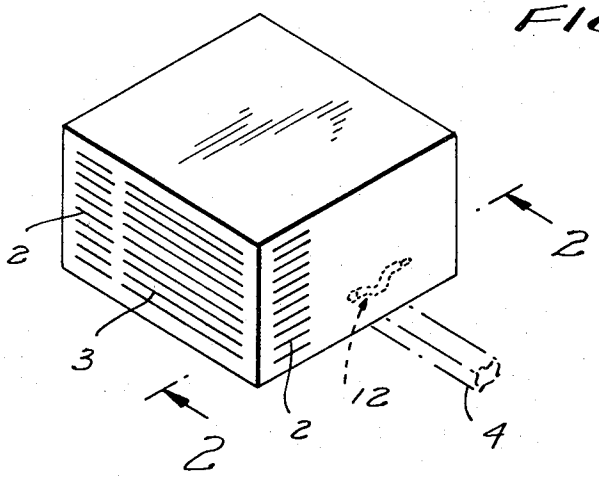
March 19, 1968 F. FEENEY ETAL 3,373,578

CONDENSATE DRAIN TUBE

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FIG. 1



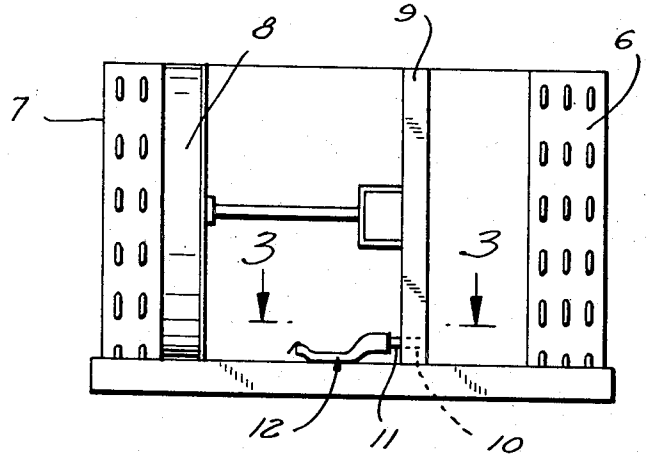


FIG. 2

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FIG. 3

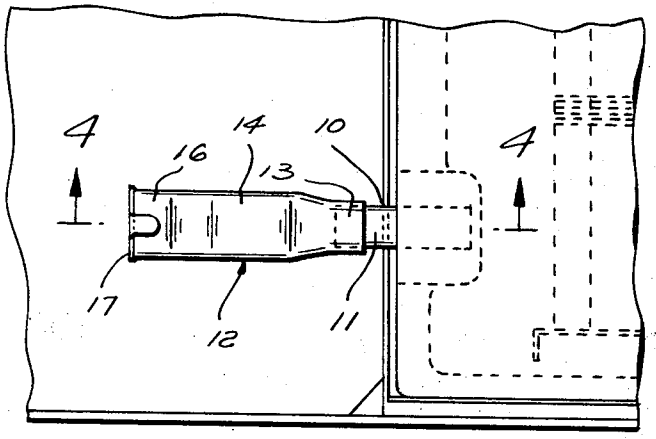
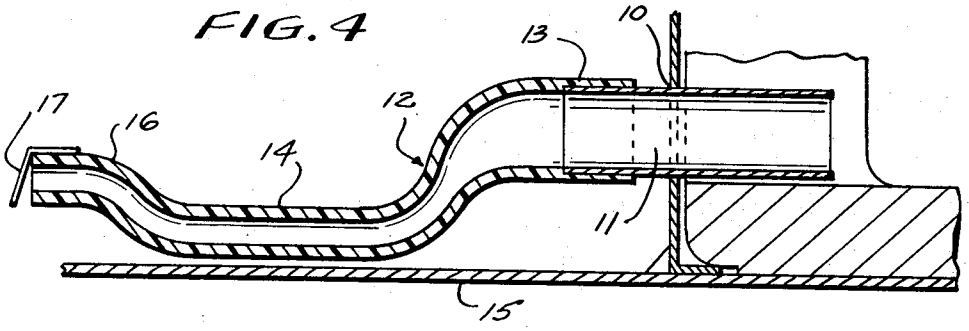


FIG. 4



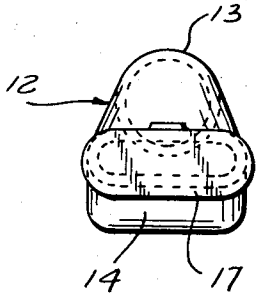


FIG. 5

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CONDENSATE DRAIN TUBE

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4 Claims. (Cl. 62—189)

ABSTRACT OF THE DISCLOSURE

An apparatus for transferring condensate from the room side to the outdoor side of a room air conditioner while preventing the transfer of air from the outdoor side to the room side. A condensate drain tube for passing condensate water from the room side to the outdoor side of a room air conditioner which, by means of a water seal and flapper valve, prevents the transfer of air from the outdoor side to the room side.

Background of the invention

In the operation of a room air conditioner, water condenses on the evaporator which is placed on the room side of the conditioner. The water must be disposed of and the disposal is normally accomplished by passing the water through the bulkhead or partition that separates the room side of the unit from the outdoor side. On the outdoor side, the water is normally placed in contact with a hot condenser coil where the water evaporates and is exhausted to the outside, employing the condenser fan. In order for the unit to properly operate, the bulkhead or partition must be airtight, preventing the passage of air to the room side. If air from the outdoor side is allowed to enter the room side, the effect of the air conditioning unit is lessened. Thus, in the summer hot unconditioned air enters the room, lessening the cooling effect. During the winter, cold drafts may be forced into the room, which, of course, is undesirable, and, if the air conditioning unit is of the heat pump type, lessens the effect of the heating operation. A further problem, often created by the suction of the blower or fan, is a negative pressure on the room side of the partition, preventing the discharge of water and causing a spillage into the room enclosure.

In the prior art devices the water condensing on the evaporator has been allowed to flow through an open pipe from the room side to the outdoor side. This type of system is illustrated, for example, in U.S. Patent No. 2,804,758—Smith et al. The described inefficiencies in operation resulted due to the back pressure of air from the outdoor side.

Brief summary of the invention

In accordance with the present invention, the bulkhead which separates the room side of the room air conditioner from the outdoor side is tightly sealed to prevent air leakage. An opening is formed in this bulkhead and the condensate drain tube of the present invention is fitted to that opening. The drain tube includes two portions for preventing the flow of air to the room side while allowing the discharge of condensate water. Condensate water flows through the opening in the bulkhead to an inlet portion of the tube and from there flows to a lower intermediate portion. The outlet portion of the tube is fitted with a flapper valve which will close when a positive pressure differential exists between the outdoor side of the room air conditioner and the room side to prevent the flow of air in that direction. The lower intermediate portion is below both the inlet and the outlet portions of the tube, while the outlet is at an intermediate level between the inlet and the lower intermediate portion. Water collects in the lower intermediate portion of the tube, forming a water seal which prevents the flow of air from the outdoor side to the room side, while allowing the passage of water when a positive head exists on the room side. The pressure of this positive head also forces the flapper valve open.

Brief description of the drawings

In the accompanying drawings:

FIG. 1 is a perspective view of a room air conditioner apparatus adapted for use with the condensate drain tube of the present invention;

FIG. 2 is a side elevational view along the line 2—2 of FIG. 1 showing the condensate drain tube in place;

FIG. 3 is an enlarged fragmentary plan view along the line 3—3 of FIG. 2 showing the condensate drain tube mounted on the bulkhead;

FIG. 4 is an enlarged sectional view along the line 4—4 of FIG. 3; and

FIG. 5 is an end view of the condensate drain tube from the outlet portion.

In the drawings there is illustrated a room air conditioner 1 with standard air inlet openings 2 and outlet opening 3 mounted, in this figure, upon a window sill or ledge 4. Within the air conditioning unit are located an evaporator 6 for cooling air to be fed to the room enclosure, a condenser 7 and condenser fan 8. Also shown are the bulkhead 9 for separating the room side of the air conditioner from the outdoor side, an opening 10 in the bulkhead wall, a drain pipe 11 tightly fitted into the opening and, fitted to the drain pipe, the condensate drain tube 12 of the present invention. A separate fan (not shown) is provided for circulation of air over the evaporator to the room side.

The condensate drain tube has an inlet 13 which is sized to tightly fit the drain pipe. The intermediate portion 14 of the tube is formed so as to be near or adjacent the base 15 of the room air conditioner unit, with the entire cross-sectional area of the intermediate portion placed below the cross-sectional area of the opening formed in the bulkhead. The outlet portion 16 of the condensate drain tube is at a level between that of the inlet and the intermediate portion. A flapper valve 17 is hingedly mounted to the opening of the outlet portion of the condensate drain tube.

Detailed description of the invention

In operation water condensing on the evaporator will collect on the room side of the air conditioner and will flow to the opening formed in the bulkhead. The water will then flow into the condensate drain tube and will first fill the intermediate portion which is at the lowest level. As the head of water builds further, the pressure will force the water through the tube, opening the flapper valve, and discharging the water into the outdoor side of the room air conditioner, where it can be evaporated and exhausted by the condenser fan. It is important that the intermediate portion of the tube be placed low enough that a water seal is formed.

Any material can be used to form the condensate drain tube so long as the flapper valve can be hingedly mounted to the outlet end to provide an airtight seal. Preferably, the drain tube is formed of a relatively hard rubber, so as to maintain its shape, and the flapper valve is formed of a soft rubber. In this manner, the hinge of the flapper valve can be formed integrally with the flap and a positive, airtight seal formed under proper pressure conditions. It should be understood, however, that the drain tube can be formed of a metal, such as copper, and that the flapper can be similarly formed with a

gasket material provided so as to insure an airtight seal when the flapper valve is closed.

The intermediate portion of the tube is formed at a level sufficiently below the inlet to the condensate drain tube that a water seal is formed. The length of this intermediate portion is not critical and, therefore, it is desirable, for reasons of economy, that it be as short as possible within the limitations of forming the tube with the material employed. A length of approximately one-third the overall length of the condensate drain tube, as shown in the drawings, is easily formed when the tube is made of a material such as a relatively hard rubber. The outlet portion of the condensate drain tube and the flapper valve are formed so as to be above the normal water level in the outdoor side of the room air conditioner. Thus, the flapper valve is free to move regardless of conditions in that compartment.

When the pressure on the room side of the air conditioner is lower than that on the outdoor side, the flap is held shut by the pressure differential. The condensed water formed on the room side will then fill the intermediate portion of the tube. As this water head builds further, a point is reached where the water head exceeds the air pressure differential and this will force the hinged flapper valve open, allowing the water to be discharged. During periods when the air conditioner is not operated, water is retained in the lower intermediate portion of the tube and acts as a barrier to the admission of air. Should this water evaporate due to excessive heat near the tube, or due to normal atmospheric conditions, then the flapper valve will act to prevent air from passing from the outdoor side to the room side, when the outdoor side pressure is greater as the flapper valve preferably is designed fora normally closed position.

Thus, a means has been shown for positively sealing the room side portion of a room air conditioner against air flow from the outdoor side, while allowing the passage of condensed water from the room side to the outdoor side. This means includes a double seal for preventing the air flow, the double seal including water trapped in a lower intermediate portion of the tube and the hinged flapper valve. The sealing means, however, provide no impediment to the flow of water from the room side when the head has built sufficienty, thus precluding a water overflow or spillage into the room.

With respect to mounting the condensate drain tube, the opening in the bulkhead need not be fitted with a drain pipe, but rather, a flanged pipe nipple can be fitted to the bulkhead on the outdoor side. Similarly, other means can be provided for tightly fitting the condensate drain tube to the opening in the bulkhead.

While specific structures and materials have been shown and described they should not be considered as limiting in any way the full scope of the present invention as covered in the appended claims.

We claim:

1. In a room air conditioner which comprises a room side, an outdoor side having a fan for exhausting air to the atmosphere, and a bulkhead separating said room side from said outdoor side, the improvement which comprises a means for passing water from the room side to the outdoor side through the bulkhead while preventing the passage of air from the outdoor side to the room side, said improvement comprising a tube fitted to an opening in the bulkhead and having:

(a) an inlet portion for receiving water from said room side through said opening;

(b) an intermediate portion formed lower than said inlet portion;

(c) an outlet portion formed at a level between said inlet portion and said intermediate portion; and

(d) a flapper valve hingedly mounted to cover the outlet of said outlet portion.

2. The condensate drain tube of claim 1 wherein the outlet of said outlet portion is above the normal water level on the outdoor side of said room air conditioner.

3. The condensate drain tube of claim 1 wherein said flapper valve is formed so as to be normally closed.

4. The condensate drain tube of claim 1 wherein said tube is formed of a relatively hard rubber and said flapper valve is formed of soft rubber.

References Cited

UNITED STATES PATENTS

2,728,206	12/1955	Newton	62—288
2,767,558	10/1956	Wallenbrock	62—288
2,956,416	10/1960	Taylor	62—285
3,271,972	9/1966	Knight	62—285

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