United States Patent [19]

Flynn

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[54] **AIR CONDITIONER CONDENSATE DISPOSAL APPARATUS**

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[52] **U.S. Cl.** **62/280,** 62/279, 62/305

[51] **Int. Cl.** **F25b 47/00**

[58] **Field of Search** 62/279, 280

[56] **References Cited**

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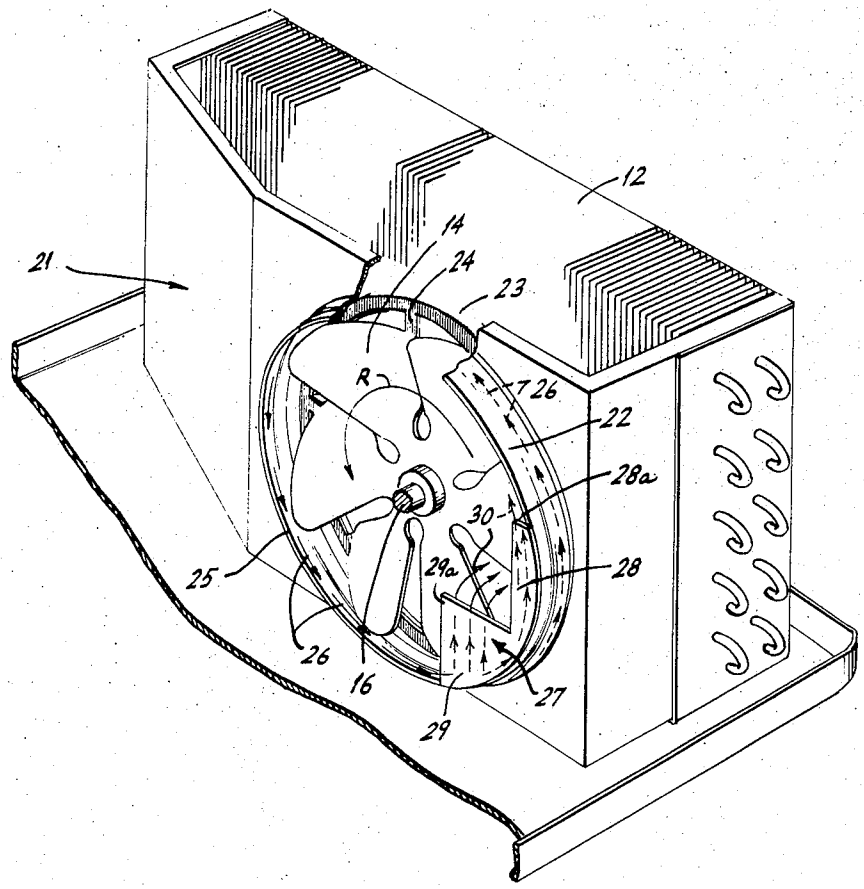
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[57] **ABSTRACT**

A window type air conditioner in which moisture derived from the evaporator is conveyed to a condenser-containing chamber for disposal therein, said chamber including a wall having an inlet ring which confronts a condenser fan and around the interior surface of which ring moisture circulates during operation of the apparatus. A retaining wall impedes flow of moisture out of the inlet ring in a direction upstream of the condenser fan, and an aspirator baffle means confronts the fan and projects radially inwardly of the inlet ring to establish a reduced pressure zone on the fan side of the baffle means. Moisture circulating in the inlet ring flows to the outer edge of said baffle means and thence across the baffle means to an inner edge thereof from which it is discharged and entrained in the condenser cooling air stream.

6 Claims, 3 Drawing Figures



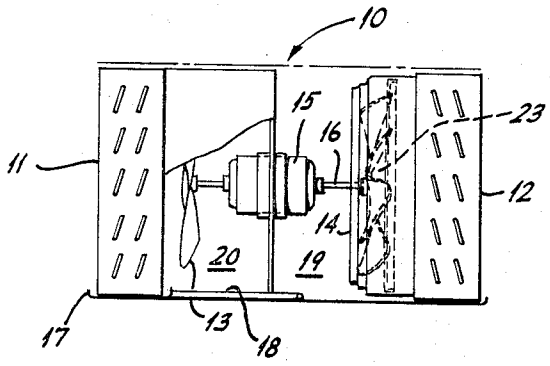
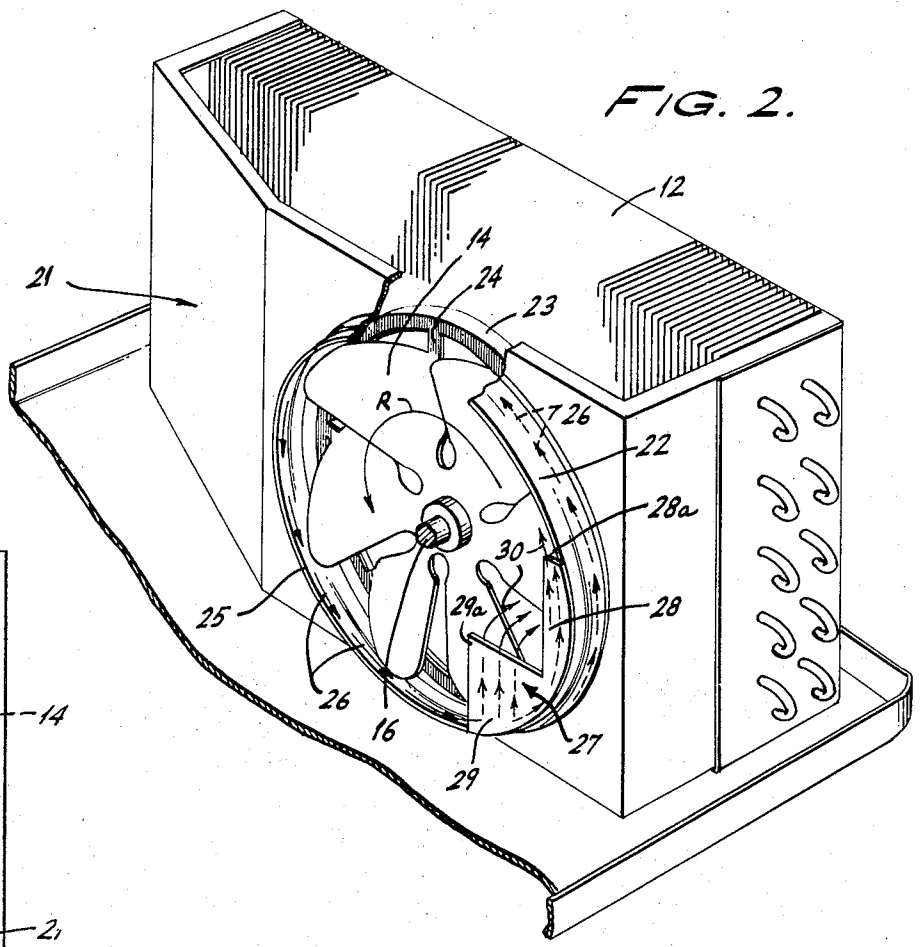


FIG. 1.

FIG. 2.



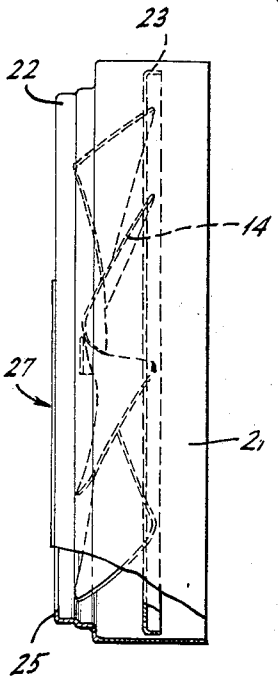


FIG. 3.

AIR CONDITIONER CONDENSATE DISPOSAL APPARATUS

BACKGROUND OF THE INVENTION

In certain window type air conditioners, particularly those which use a blade-tip-supported slinger ring as the primary means for disposing of condensate, a problem has been encountered in eliminating all of the condensate and preventing splashing, or "spitting," of particles of moisture out of the condenser cooling fan and thence through the air admission louvers without contacting the condenser. The problem arises from the fact that the pressure developed in the condenser plenum chamber has a tendency to force droplets of moisture back toward the fan from which it reaches the inside peripheral surface of the inlet ring portion of the fan shroud. Moisture reaching this surface may be forced back into the air flowing toward the fan, thereby interfering with complete and proper disposal of the condensate. This problem can be particularly troublesome when a machine of given construction and dimensions is modified to meet new, more demanding, design criteria. This frequently necessitates operation of the fans at higher speed with resultant forcing of water out of the slinger sump. A corresponding reduction in the rate of condensate disposal occurs.

SUMMARY OF THE INVENTION

The general objective of my invention is to eliminate the above mentioned problems by insuring complete entrainment of all of the moisture in the condenser cooling airstream thus enabling the air conditioner to run with a drier sump. Preferably, although not necessarily, I achieve this objective by utilizing a slinger ring as a primary means, for entraining moisture, in combination with an aspirator baffle which is disposed to serve as a water elevating pump which takes any excess moisture which may be circulating within the fan inlet ring and insures entrainment thereof in the condenser air stream. This baffle structure is carried as an extension of the inlet ring and projects radially inwardly thereof toward the axis of the fan. Preferably the baffle has two portions, one of which comprises means for lowering the pressure and raising the moisture to a free edge of said one portion. The other portion also performs this function to some extent, but is particularly useful in preventing splashing of the particles of moisture outwardly from the fan.

The apparatus is featured by being simpler, cheaper, and more effective than moisture eliminating apparatus previously used in this art. Also, rather than being spaced upstream of the inlet ring, like certain aspirators known in the art, the aspirator baffle of this invention forms a part of the shroud inlet ring and directly confronts the fan. Maintaining the baffle as close as possible to the fan blading has been found to achieve the greatest possible pressure reduction and thence to maximize the pumping and removal of excess moisture. Thus it eliminates the moisture before it can escape from the inlet ring and arrive upstream of the fan.

BRIEF DESCRIPTION OF THE DRAWING

In the accompanying drawing:

FIG. **1** is a somewhat diagrammatic view of a room air conditioner incorporating the invention;

FIG. **2** is a perspective view, on a larger scale, showing the condenser, its cooling fan, and the moisture entraining intrumentalities contemplated by this invention; and,

FIG. **3** is a side view illustrating certain details of the fan shroud and air inlet ring.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

With initial reference to FIG. **1**, there is diagrammatically illustrated at **10** an air conditioner of generally known type which includes an evaporator **11**, a condenser **12**, and evaporator and condenser fans **13** and **14**, respectively, arranged to be driven by an electric motor **15** through shafting shown at **16**. As is common in such apparatus there is included means which provides a sump under evaporator **11**, the sump being shown in simplified form at **17** in FIG. **1**. Moisture derived from the evaporator is collected in the sump, from whence it flows through a hose or pipe **18** into the condenser chamber **19** for disposal therein. It should be understood that a sump (not illustrated) would also underlie the condenser **12** and its fan **14**, and that the moisture would be collected in said sump for entrainment in the stream of condenser cooling air.

As appears to good advantage in FIG. **2**, the inner side of the condenser, that is the side which is presented toward the evaporator compartment **20**, is covered by shroud structure **21** which forms a plenum and which is provided with an aperture within which is disposed the condenser cooling fan **14**. The aperture is defined by an air inlet ring **22** which protects the fan and promotes flow of outdoor cooling air over the condenser. This air can be inletted to the machine in any suitable manner not shown.

As the primary means for entraining condensate in the condenser cooling air stream, I prefer to utilize a slinger ring **23** which is of known type, has angular cross section (FIG. **3**), and surrounds the periphery of the fan blading and is attached thereto through the agency of short extensions **24** which are formed integrally with the blades (see upper portion FIG. **2**). This slinger ring dips within the moisture collected beneath the condenser and fan, throwing the water outwardly into position in which it is entrained in the condenser cooling air derived from fan **14**. As noted above, in a system of this kind the pressure developed in the plenum tends to force moisture back from the slinger ring toward the fan from which it reaches the interior surface of the air inlet ring **22**. To prevent escape of this moisture upstream of the fan **14**, I have provided the inlet ring with an inturned peripheral flange **25** (see particularly FIG. **3**). This flange extends around the upstream edge of the inlet ring. By preventing escape of the moisture which reaches the inside surface of the inlet ring **22**, the apparatus promotes circulatory flow of moisture around the inside of the ring in the direction of rotation R of the fan **14**. This moving moisture has been indicated in FIG. **2** by arrows bearing the reference numeral **26**.

In particular accordance with this invention, means is provided to re-entrain this moisture in the condenser cooling air and thereby to dispose of the same completely. This is accomplished by the use of a baffle structure which juts into the eye of the fan, that is extends radially inwardly of the inlet ring **22**. This baffle structure is shown at **27** in the drawing and comprises an upper portion **28** and a lower portion **29** each of which has an apex **28***a* and **29***a*, which projects radially

inwardly of the ring **22.** Thus each baffle portion has an upper edge which terminates in the said apex and from which edge is discharged moisture in the manner now to be described. Due to the impedance which the baffle structure presents in the air flow path, a zone of lower pressure is formed behind each baffle portion. The resultant lowered atmospheric pressure forces the water circulating downwardly within the ring **22,** and toward the baffle structure, to a position in which it crosses the rear surface of the baffle and is carried upwardly thereacross to the free edges which terminate in the mentioned apexes. Water breaks free from these free edges, as represented by arrows shown at **30** in the drawing, and impingement of such water on the rotating blades of the fan **14** breaks the droplets of water into a spray which is mixed with the air in the condenser plenum and is carried onto the condenser **12,** where it is dissipated in the hot air passing through the condenser under the action of the fan.

It is to be noted that while the invention in its broader aspect is not limited to baffle structure of any particular shape, it is preferred that this structure comprise the two generally triangular portions described. Also, in order to take advantage of the natural tendency of the water to circulate downwardly around the inlet ring **22** in the direction of rotation of the fan, it is preferred that the baffle structure be located in the lower right-hand quadrant of the eye of the blower, as it is seen in FIG. **2.** That is, the baffle structure is located in that lower quadrant in which the water is first caused to flow upwardly as it circulates within the inlet ring. This results in maximum benefit from the zone of low pressure developed behind the baffle and immediately ahead of the fan blade.

I claim:

1. In air conditioning apparatus of the type in which moisture derived from an evaporator is conveyed to a condenser-containing chamber for disposal therein by entrainment in the air which cools the condenser, said chamber including a wall having an aperture defined by a peripheral inlet ring and confronting a condenser fan which feeds condenser cooling air through said inlet ring, and in which apparatus moisture reaches the inside surface of said inlet ring and may thence flow upstream of the condenser fan reversely toward the evaporator, the improvements which comprise: means extending peripherally around at least a portion of said inlet ring and defining a retaining wall impeding flow of moisture in a direction upstream of the condenser fan, whereby moisture is induced by the fan to circulate about the interior surface of said ring downwardly in one lower quadrant of the ring and upwardly in an adjacent lower quadrant; and baffle means confronting the fan and projecting radially inwardly of the ring and establishing a reduced pressure zone on the fan side of said baffle means, the reduced pressure causing moisture circulating in said ring to flow to an outer edge of said baffle means and thence across the baffle means for discharge therefrom and entrainment in the condenser cooling air stream.

2. Apparatus in accordance with claim **1** and further characterized in that said baffle means is carried by the inlet ring and projects radially inwardly of the ring as an extension thereof.

3. Apparatus in accordance with claim **1,** and in which said baffle means is carried by the inlet ring and comprises a pair of upper and lower contiguous portions, projecting radially inwardly of the ring as extensions thereof, said lower portion projecting inwardly a distance greater than the inward projection of said upper portion.

4. Apparatus in accordance with claim **3,** and in which each of said upper and lower portions is of generally triangular shape with an apex projecting inwardly of the ring.

5. Apparatus in accordance with claim **1,** and in which said baffle means lies in that lower quadrant of said ring in which the water is caused to circulate upward.

6. In air conditioning apparatus of the type in which moisture derived from an evaporator is conveyed to a condenser-containing chamber for disposal therein by entrainment in the air which cools the condenser, said chamber including a wall having an aperture defined by a peripheral inlet ring and confronting a condenser fan which feeds condenser cooling air through said inlet ring, and in which apparatus moisture reaches the inside surface of said inlet ring and may thence flow upstream of the condenser fan reversely toward the evaporator, the improvements which comprise: primary means for entraining water in the air which cools the condenser, said primary means comprising a slinger ring which is carried by and surrounds the periphery of the fan, moisture entrained by said slinger ring having a tendency to reach the interior surface of said inlet ring around the interior surface of which it circulates under the influence of said fan; and secondary moisture entrainment means comprising baffle structure confronting the fan and projecting radially inwardly of the ring as an extension thereof, said baffle structure establishing a reduced pressure zone on its fan side, the reduced pressure causing moisture circulating in said ring to flow to an outer edge of said baffle structure and thence across the baffle structure for discharge therefrom and entrainment in the condenser cooling air stream.

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