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SEAL FOR AIR CONDITIONED CHAMBER

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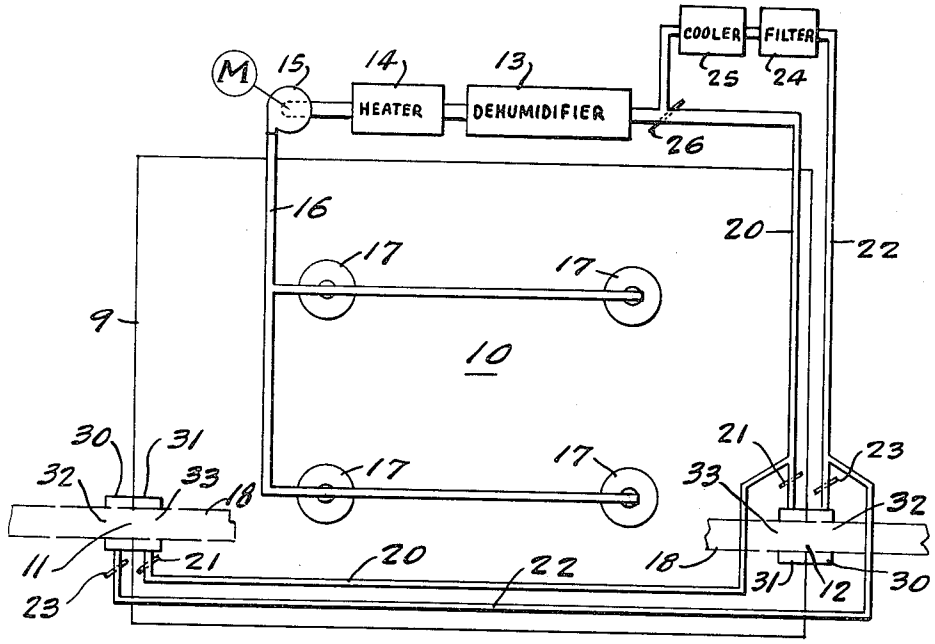


FIG-1-

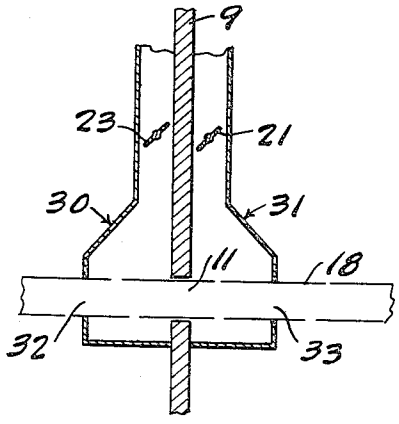


FIG-2-

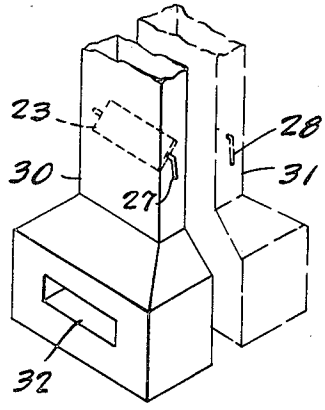


FIG-3-

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SEAL FOR AIR CONDITIONED CHAMBER

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5 Claims. (Cl. 34—77)

This invention relates to air conditioning, and more particularly to maintaining desired temperature and humidity conditions in a room having openings such as conveyor slots wherethrough infiltration of moisture laden air is undesirable.

It is customary in conditioning of rooms or chambers to maintain the space to be conditioned under a positive pressure relative to the surrounding space by addition of fresh air to the room so that movement of air will be generally outward. This is generally adequate where relatively small openings are involved, but where the openings are large, as for example when they are slots to accommodate conveyors for work passing into and from the room, the velocity of escaping air required to effectively maintain moisture conditions in the room becomes too great for reasonable capacity of dehumidification equipment.

The present invention provides improved control of room humidity and decreases the deleterious effects of slots and openings into the room, thus utilizing smaller capacity dehumidification equipment to do a superior job.

For a consideration of what I believe to be novel and my invention, attention is directed to the following portion of this specification, and the drawing and concluding claims thereof.

In the drawing,

Fig. 1 illustrates the preferred embodiment of the invention.

Fig. 2 shows a cross-sectional view of a detail of Fig. 1.

Fig. 3 shows an isometric view of the detail of Fig. 2.

Referring more particularly to Fig. 1, a chamber or room 10 to be conditioned is provided with a continuous type conveyor 18 indicated in outline, passing through inlet and outlet openings or slots 11 and 12 in passing into and from the room.

The room is conditioned by a dehumidifier 13 for cooling and dehumidifying air for the room, and a heater 14 is provided for such reheating of the dried air as is desirable. The dehumidifier is preferably of the type illustrated in Patent No. 2,420,993, and the heater 14 is primarily desired for winter heating and in many cases may be dispensed with unless extremely dry, warm air is desired in the room.

Air leaving the dehumidifier and heater is delivered by a fan 15 through an air delivery duct system 16 to a plurality of air distributors 17 for discharge into the room 10. To reduce the moisture and heat load on the dehumidifier 13 a considerable volume of air is recirculated from the room through the dehumidifier and back to the room, and a small proportion of fresh, or makeup air is added thereto to tend to maintain the room under relatively greater air pressure than its surroundings.

To supply the recirculated air and the fresh, or makeup air and yet most effectively control infiltration of air at the inlet and outlet conveyor slots 11 and 12 in the walls 9 of the room, streams of air are drawn from next adjacent the slots. An inner stream is drawn from next adjacent

the room side of the slots to the dehumidifier 13 by duct system 20 as air to be recirculated, and each intake for duct system 20 is controlled by an individual damper 21. An outer stream of air is drawn from next adjacent the inlet and outlet slots 11 and 12 by a duct system 22, each individual inlet thereto being controlled by a damper 23, and this air is passed through a filter 24 and a cooler 25 wherein it is brought to approximately the temperature of the recirculating air in duct system 20, and it is then mixed with the recirculating air by a proportioning damper 26 and passed into the dehumidifier 13.

The inlets to the duct systems 20 and 22 are hoods 30 and 31 disposed on either side of the wall 9 of the chamber 10 about the slots 11 and 12 and forming with the wall two exhaust plenum chambers intermediate 3 slots, including slots 32 and 33 in hoods 30 and 31. It is apparent that it is immaterial whether the hoods are disposed on either side of the slot 11 or both on one side thereof, the result being the formation of three axially aligned slots at the wall to accommodate the conveyor 18, and exhaust plenum chambers intermediate the slots.

An exhaust plenum chamber, as used in this description and in the appended claims, is a chamber intermediate two slots and surrounding one side of each of the slots to maintain around the periphery of each slot and throughout said exhaust plenum chamber a substantially constant pressure. This term thus describes a chamber formed by a hood for exhausting air entering the hood from a plurality of air inlets, or slots, in such a manner as to substantially eliminate any pressure effect at such inlets due to the velocity of air passing from the hood to exhaust.

A stream of air for recirculation is drawn into the inner slot 33 and passed through the dehumidifier and returned to the chamber 10. A stream of makeup air is drawn into the outer hood 30 and, after suitable cooling, is blended with the recirculating air stream. As shown both streams pass through the dehumidifier, or conditioner, 13, but obviously where conditions warrant it is adequate to admix the two streams just prior to discharge into the room. The makeup air stream is preferably cooled before admixing with the recirculating stream to remove the heat load of the fresh air before it is diluted with substantially conditioned air, heat removal being thus more efficient.

Since the room or chamber 10 is substantially closed except for the slots 11 and 12, the flow of makeup air is substantially equal to losses of air from the chamber primarily through the slots. Thus when about 50% of the air discharged into the room enters the recirculating stream in duct 20, 50% must also enter by way of duct system 22, and it will be obvious that a flow equal to that into duct system 22 must pass through the slots 11 and 12. Thus the net flow through the slots may considerably exceed the actual flow of makeup air entering the system because such makeup air is that which enters slots 32 of hoods 30, and an equal volume of air must escape from the chamber 10, either through the same slots 32 or by way of doors or other usual leakage.

With this novel duct system as shown, the room 10 is pressurized to the extent of the flow induced pressure loss through slots 33 of hoods 31 plus the net of the loss through slots 11 and 12 less the pressure rise through slots 32 of hoods 30. Where substantially all air loss from the room is through the conveyor slots the net loss of air through the outer slots 32 is zero, hence the room is pressurized by flow induced pressure rise in slots 11 and 12 and slots 33. It will be appreciated that such air loss as occurs from the conveyor slots tends to produce a locally drier, cooler source of "fresh air" for makeup air, and a relatively high degree of chamber pressurization is obtained which is out of proportion to the small volume of makeup air required by the system. In one case, in a room of 15,300 cubic foot volume with a fixed internal

load of heat and moisture, the infiltration load was controlled by control of slot conditions as herein described and was reduced to about 1550 B. t. u. of latent heat moisture load from 130 grains per pound outside air at 95° F. and 18.5 grains at 68° F. maintained conditions, this being a reduction of infiltration load of about 35% from the best known prior equivalent installations.

I claim:

1. In an air conditioning system for reducing infiltration of moisture through one or more slots in a wall into an air conditioned chamber next adjacent the wall the improvement which comprises a pair of hoods at each said slots and forming with the wall a pair of adjacent exhaust plenum chambers intermediate three axially aligned slots, exhaust ducts joining each hood, damper means for controlling flow of air in each duct, and means for conditioning air from said ducts and delivering it to the chamber.

2. The improvement according to claim 1 wherein said ducts constitute the only source of air to be conditioned for said air conditioning means.

3. An air conditioning system for controlling the humidity in a room having a slot in a wall constituting an access opening to the room comprising, in combination: inner and outer hoods adjacent said wall and having therein three axially aligned apertures of which said slot is one, said hoods forming between said apertures exhaust plenum chambers for receiving air entering thereinto through said apertures; an air inlet to said room for delivering conditioned air to the room; first duct means for delivering air from said inner hood to said air inlet; second duct means for delivering air from said outer hood to said air inlet; and dehumidifying means for conditioning air passing through at least one of said first and second duct means.

4. An air conditioning system according to claim 3 and comprising means for adjusting the relative air flows through said first and second ducts.

5. In an air conditioning system for reducing infiltration of air through a slot in a wall from an outer space on one side of said wall into an inner, air conditioned space on the other side of said wall, said slot being primarily for the passage of work therethrough, the combination comprising: a first hood forming a first exhaust plenum chamber adjacent the inner opening of said slot and containing a second slot between said first chamber and said inner, air conditioned space; a second hood forming a second exhaust plenum chamber adjacent the outer opening of said slot and containing a third slot between said second chamber and said outer space; an air inlet in said inner, air conditioned space for delivering air thereinto; first duct means for delivering air from said first hood to said air inlet; second duct means for delivering air from said second hood to said air inlet; and air conditioning means for conditioning air passing thrugh at least one of said first and second duct means.

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