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AIR CONDITIONING

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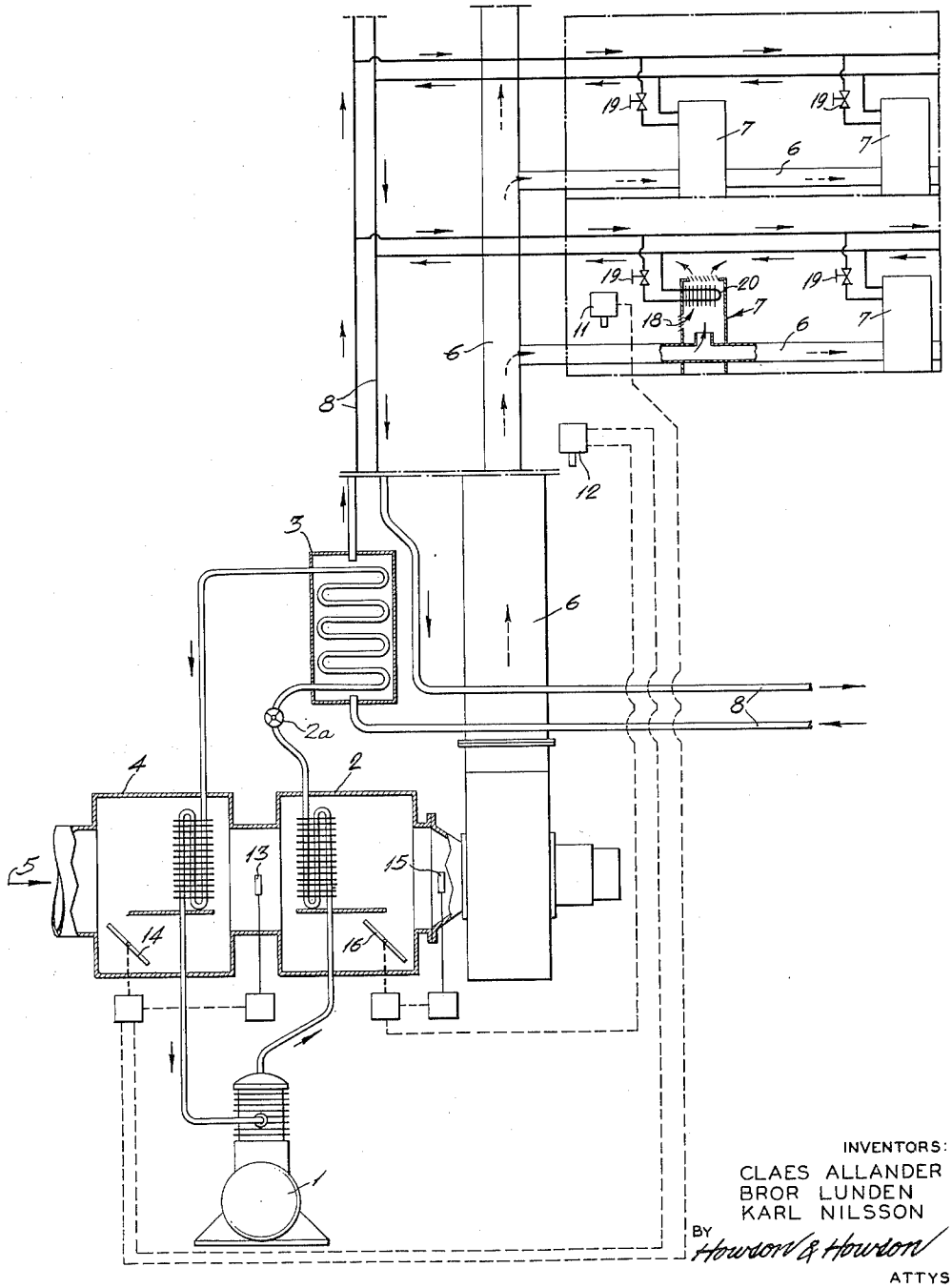

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AIR CONDITIONING

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1 Claim. (Cl. 62—90)

The present invention relates to a new and improved method for conditioning the ventilating air for rooms and similar spaces.

According to a known method it has hitherto been usual to cool and dehumidify outdoor air, having relatively high temperature and humidity, to a certain degree in a central air conditioning plant, from which plant said air then is distributed to the different rooms to be conditioned. At each distributing point there is arranged a room unit provided with cooling coils for the cooling of a mixture of primary pre-conditioned outdoor air and secondary recirculated room air to a desired room temperature. According to this method the outdoor air is cooled to a saturated state and said outdoor air having the dewpoint temperature is then distributed through a pipe system to the different rooms. As the temperature of the cooled air in this case will be below the dewpoint of the room to be conditioned and also will be below the dewpoint of the building elements surrounding the distributing pipe system for the cooled air, it has been necessary—in order to avoid condensation on the distributing pipes—to use pipes with double walls (jacketed pipes) and with intermediate insulation. According to this method it has also been necessary to equip the cooling coils in the different room units with draining means to remove water condensed in the room units.

The present invention is mainly characterized in that the outdoor air first is dehumidified to such a degree that its dewpoint will be below the dewpoint of the room air and that of the atmosphere surrounding the cool distributing pipes respectively and then before its distribution is reheated, in order to eliminate the risk of condensation on the pipes and make it possible to use single-wall pipes without any insulation. The dewpoint of the primary air is sufficiently low that the mixture of primary and secondary air has a dewpoint below the temperature of the cooling coils so that the separate cooling coils in the room units need not be provided with draining means for condensed water. At the same time it is also possible to gain the feature of a greater cooling capacity of the system as transmission losses in the distributing pipes can be eliminated.

The invention will now be described more in detail with reference to the drawing showing by way of example an apparatus for the performance of the invented method.

In the drawing 1 designates a cooling machine, for instance using Freon as cooling medium. 2 designates the condenser of the cooling machine and 3 and 4 designate the evaporator of the cooling system, the coils within condenser 2 and cooling machine 3 being connected through an expansion valve 2*a* of any preferred conventional construction, which expansion valve forms no part of the present invention. At the point 5 is supplied warm, moist outdoor air, which is cooled and dehumidified in the part 4 of the evaporator. The air is then conducted through the condenser 2 and through the pipe system 6 to the different supply points (the room units 7). Here the temperature of the air is adjusted before being

supplied into each room by an indirect heat exchange with a fluid, for instance water. This water for cooling purpose may be supplied through the pipe system 8 from the part 3 of the evaporator, but can of course also be taken from a separate source or from the main supply line for water.

The apparatus will function in the following manner. The air supplied at the point 5 is cooled and dehumidified in the evaporator 4 to such a degree that its dewpoint will be below the dewpoint in the rooms, to which the air is to be distributed and below the dewpoint of the air surrounding the distributing pipes. This may be done by suitable controls, for example dewpoint thermostats 11, 12 and 13 operating a damper 14 controlling a bypass through the evaporator 4. The particular controls illustrated in the drawing do not form a part of the present invention. The air is then conducted to the condenser 2 where it is heated to such a degree that there is no risk for water drops due to condensation on the pipes. This may be done by a thermostat 15 cooperable with the dewpoint thermostat 12 to operate a damper 16 controlling a bypass through the condenser 2. The particular controls illustrated in the drawing do not form a part of the present invention. Through the pipe system 6 the air is then conducted to the room units where the temperature of the air after its mixing with air from the room as indicated at 18 is adjusted to a suitable temperature by means of a valve 19 controlling a heat exchanger 20 using the fluid transported in the pipe system 8.

The apparatus can be varied in different ways within the scope of the invention. Thus it is not necessary to use a cooling device for the cooling, dehumidifying and reheating of the air. The cooling and dehumidifying of the air can for instance be performed by means of cool underground water and the reheating of said air can be performed by means of heated water.

What we claim is:

In the method of air conditioning a plurality of rooms and similar enclosed areas comprising the steps of pretreating outdoor air in a central air conditioning plant by cooling and dehumidfying the air, and then reheating the air approximately to the temperature of the room air, distributing said pretreated air through a duct system to individual room units, mixing said air with recirculated room air and passing said mixed air over a heat exchanger disposed in each room unit to individually control the temperature of said mixed air to be discharged into the rooms, the improvement comprising the step of cooling and dehumidifying the outdoor air in the central air conditioning plant to such a degree that its dewpoint is below the dewpoint of the atmosphere surrounding said distributing duct system and also sufficiently lower than the dewpoint of the recirculated air in each room unit to insure that the dewpoint of the mixed air will be below the temperature of the heat exchange medium used in said room units.

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