

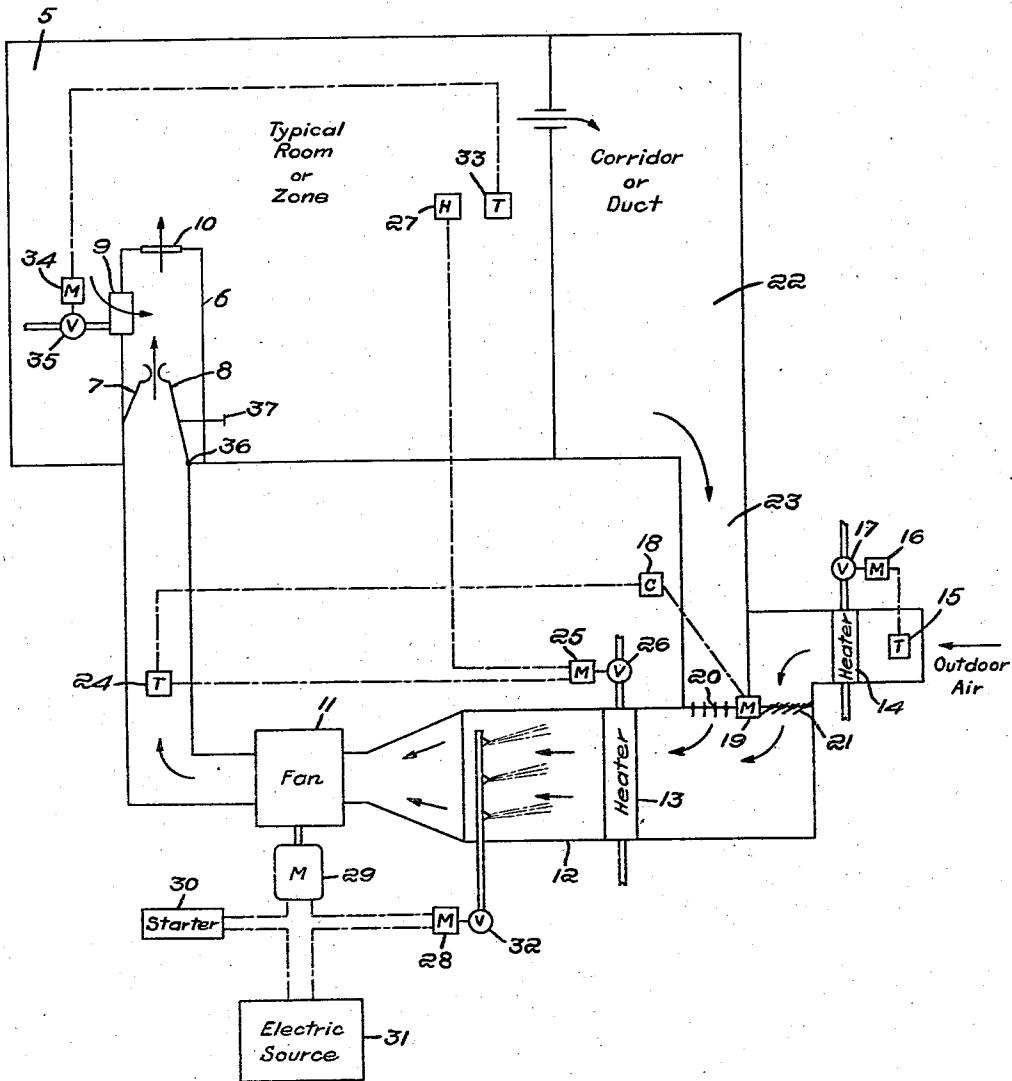
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AUTOMATICALLY CONTROLLED WINTER AIR CONDITIONING SYSTEM

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AUTOMATICALLY CONTROLLED WINTER
AIR CONDITIONING SYSTEMAmos C. Bartlett, Braintree, Mass., assignor to
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This invention relates to winter air conditioning systems and relates more particularly to automatically controlled heating and humidifying systems utilizing a central air heater and humidifier, and local recirculation units.

In school buildings, for example, in the past, several heating and ventilating systems have been used. The hot air furnace with air circulating fan was probably first. It was followed by the straight blast steam system which in turn was superseded by the so-called "split system." The unit ventilator followed next and is now probably the most popular system. Unit ventilators however draw in cold outdoor air at local points and although they purport to temper the air prior to discharge into the rooms, there is much objection to drafts.

This invention provides a winter air conditioning system utilizing local recirculation units of the ejector type which induce the flow of recirculated air at local points through ejector action, heated, humidified air being supplied from a central plant under static pressure to actuate the ejector. Such units are not only quiet in operation, but through their use no drafts are created for the outdoor air is heated at the central plant before delivery to the rooms. Differing from prior so-called air conditioning systems which were really only heating and ventilating systems, this invention also provides for simultaneous control of temperature, humidity, air motion and air purity.

An object of the invention is to supply heated and humidified outdoor air to local recirculation units for distribution and circulation.

Another object of the invention is to regulate the temperature and humidity of air at local points and supplied from a central point.

The invention will now be described with reference to the drawing which is a diagrammatic view of one embodiment of the invention.

The space 5 which may be one of a plurality of rooms or zones in a school or other building, contains the local ejector unit 6 which by way of example, may be of the type disclosed generally in the U. S. Patent No. 2,000,597 which issued May 7, 1935 on an application of R. E. Keyes, and which comprises a rectangular casing of sheet metal containing the longitudinally extending ejector nozzles 7 and 8, the finned tube heater 9 in a recirculated air inlet opening in a side wall of the casing, and the air discharge grille 10.

The central plant includes the fan 11, the air washer 12, the inner heater 13 and the outside

tempering heater 14. The fan 11 supplies the heated humidified air through the duct 15 to the unit 6.

In operation, the thermostat 15 exposed to outdoor air adjusts by means of the motor 16, the valve 17 in the steam line to the heater 14, and maintains steam in this heater when the outdoor temperature is 34° F. or below.

During warm-up periods, the control 18 which may be clock actuated, is adjusted to cause the damper motor 19 to close the outdoor air damper 21 and open the recirculated air damper 20. The fan 11 then draws recirculated air from the room 5, through the passage 22 and duct 23, the heater 13 and washer 12 and then through the supply duct 15 into the unit 6, where it passes between the ejector nozzles 7 and 8 and by ejector action induces the flow of room air through the local heater 9.

At the end of the warm-up period, the control 18 is adjusted to open the outdoor air dampers 21 and to close the recirculated air dampers 20. The duct thermostat 24 maintains the temperature of the primary air in the duct 15 at, for example 60° F., and does this by adjusting through the motor 25, the valve 26 in the steam supply line to the heater 13.

The local hygrostat 27 also adjusts the valve 26 for controlling the humidity of the air delivered to the local unit. By increasing the temperature of the air entering the washer 12 by adjustment of the heater 13, the relative humidity of the delivered air is increased. It is preferred that the thermostat 24 over-ride the hygrostat 27 in control of the valve motor 25 when the temperature of the delivered air has reached the control temperature of 60° F. to prevent overheating of the delivered air. Normally, the air in the duct 15 will be below 60° F., and the hygrostat 27 will control the humidity by adjusting the temperature of the heater 13. If however, the temperature in the duct 15 reaches 60° F., the thermostat 24 will act to lower the temperature of the heater 13 even if the hygrostat is not satisfied.

To prevent over-humidification when the fan 11 is not operating, the motor 28 in the circuit of the fan motor 29, its starter 30 and the electric source 31, closes the valve 32 in the water supply to the washer 12 when the circuit of the fan motor is open.

The local thermostat 33 maintains the desired local temperature by adjustment through the motor 34, of the valve 35 in the steam supply line to the local heater 9.

The control 18 is actuated as described in the foregoing in the early morning for warm-up purposes. As illustrated, it is connected to the thermostat 24 and acts to prevent this thermostat from throttling the steam supply to the heater 13 during the warm-up period. Prior to the occupation of the building, at the conclusion of the warm-up period, the control 18 is actuated to close the recirculated air dampers 20 and to open the outdoor air dampers 21 whereby the air passing through the heater 13 and washer 12 is outdoor air to supply ventilation requirements. At the same time, it renders the thermostat 24 again effective to control the heater 13.

The nozzle 9 which may be pivoted in its lower portion at 36 is adapted to be adjusted as by the handle 37 to vary the nozzle spacing and accordingly the ejector action. Ordinarily after preliminary adjustment for taking care of individual local requirements, the ejector is not again changed unless the local requirements are changed.

While one embodiment of the invention has been described for the purpose of illustration, it should be understood that the invention is not limited to the exact apparatus and arrangement of apparatus illustrated, as modifications thereof may be suggested by those skilled in the art without departure from the essence of the invention.

What is claimed is:

1. An automatically controlled winter air conditioning system comprising a central unit including a humidifier and a heater in advance with respect to air flow, of said humidifier, a local recirculation unit including a local heater and an ejector for inducing the flow of local air in contact with said heater, means including a duct and a fan connecting said central unit and said ejector for supplying air under pressure to said ejector, means including a local thermostat for adjusting the temperature of said local heater, and means including a local hygostat for adjusting said first mentioned heater for adjusting the humidity of the air from said central unit.

2. An automatically controlled winter air conditioning system comprising a central unit including a humidifier and a heater in advance with respect to air flow, of said humidifier, a local recirculation unit including a local heater and an ejector for inducing the flow of local air in contact with said heater, means including a duct and a fan connecting said central unit and said ejector for supplying air under pressure to said ejector, means including a local thermostat for adjusting the temperature of said local heater, means including a local hygostat for adjusting said first

mentioned heater for adjusting the humidity of the air from said central unit, and means including a thermostat in said duct for adjusting said first mentioned heater for preventing the air in said duct from exceeding a predetermined temperature.

3. An automatically controlled winter air conditioning system comprising a central unit including a heater and a humidifier, a local recirculation unit including a local heater and an ejector for inducing the flow of local air in contact with said heater, means including a duct and a fan connecting said central unit and said ejector for supplying air under pressure to said ejector, means including a local thermostat for adjusting the temperature of said local heater, means including a thermostat in said duct and a local hygostat for controlling the temperature and humidity of the air from said central unit, means for alternatively supplying air recirculated from said local unit or outdoor air through said central unit, and a control for actuating said last mentioned means to discontinue the supply of outdoor air and for rendering said duct thermostat ineffective during warm-up periods and to initiate the supply of outdoor air, to discontinue the supply of recirculated air, and to render said duct thermostat effective at the conclusion of said warm-up periods.

4. An automatically controlled winter air conditioning system comprising a central unit including a humidifier and a heater in advance with respect to air flow, of said humidifier, a local recirculation unit including a local heater and an ejector for inducing the flow of local air in contact with said heater, means including a duct and a fan connecting said central unit and said ejector for supplying air under pressure to said ejector, means including a local thermostat for adjusting the temperature of said local heater, means including a local hygostat for adjusting said first mentioned heater for adjusting the humidity of the air from said central unit, means including a thermostat in said duct for adjusting said first mentioned heater for preventing the air in said duct from exceeding a predetermined temperature, means for alternatively supplying air recirculated from said local unit or outdoor air through said central unit, and a control for actuating said last mentioned means to discontinue the supply of outdoor air and for rendering said duct thermostat ineffective during warm-up periods and to initiate the supply of outdoor air, to discontinue the supply of recirculated air, and to render said duct thermostat effective at the conclusion of said warm-up periods.

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