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C. A. SEITZ ET AL
AIR CONDITIONING SYSTEM

1,951,997

Filed June 12, 1931

2 Sheets-Sheet 1

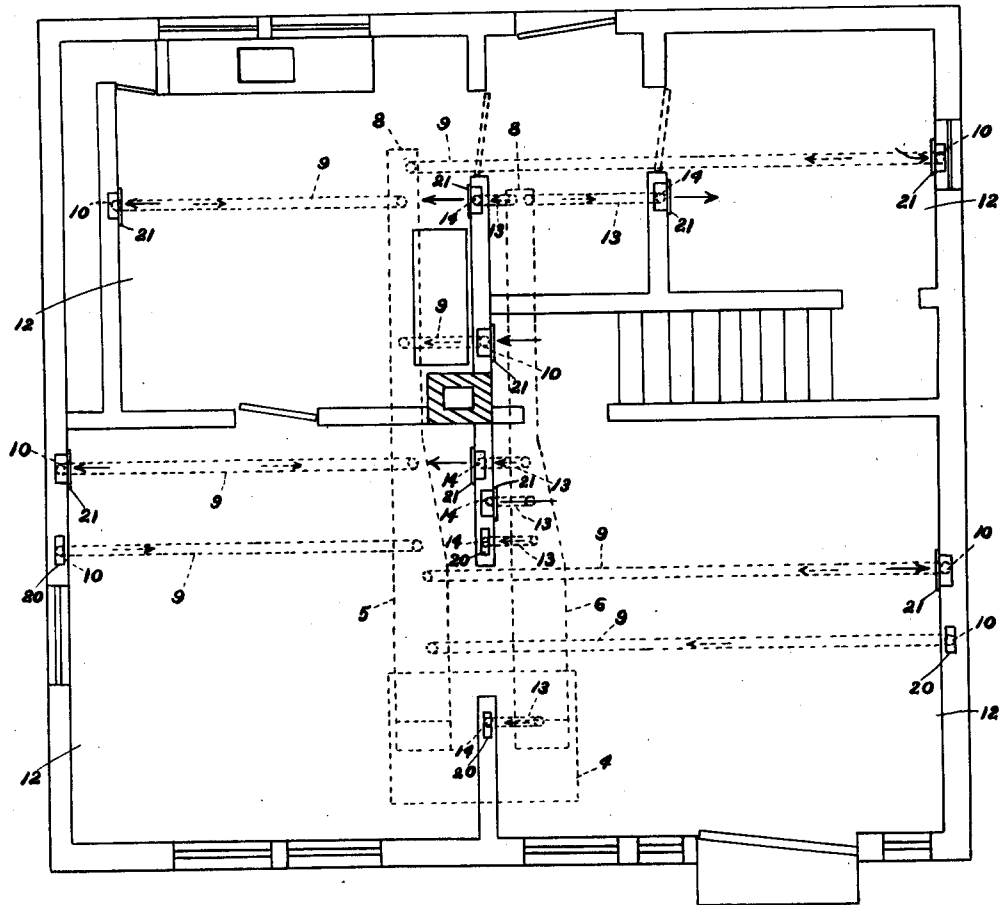


Fig. 1

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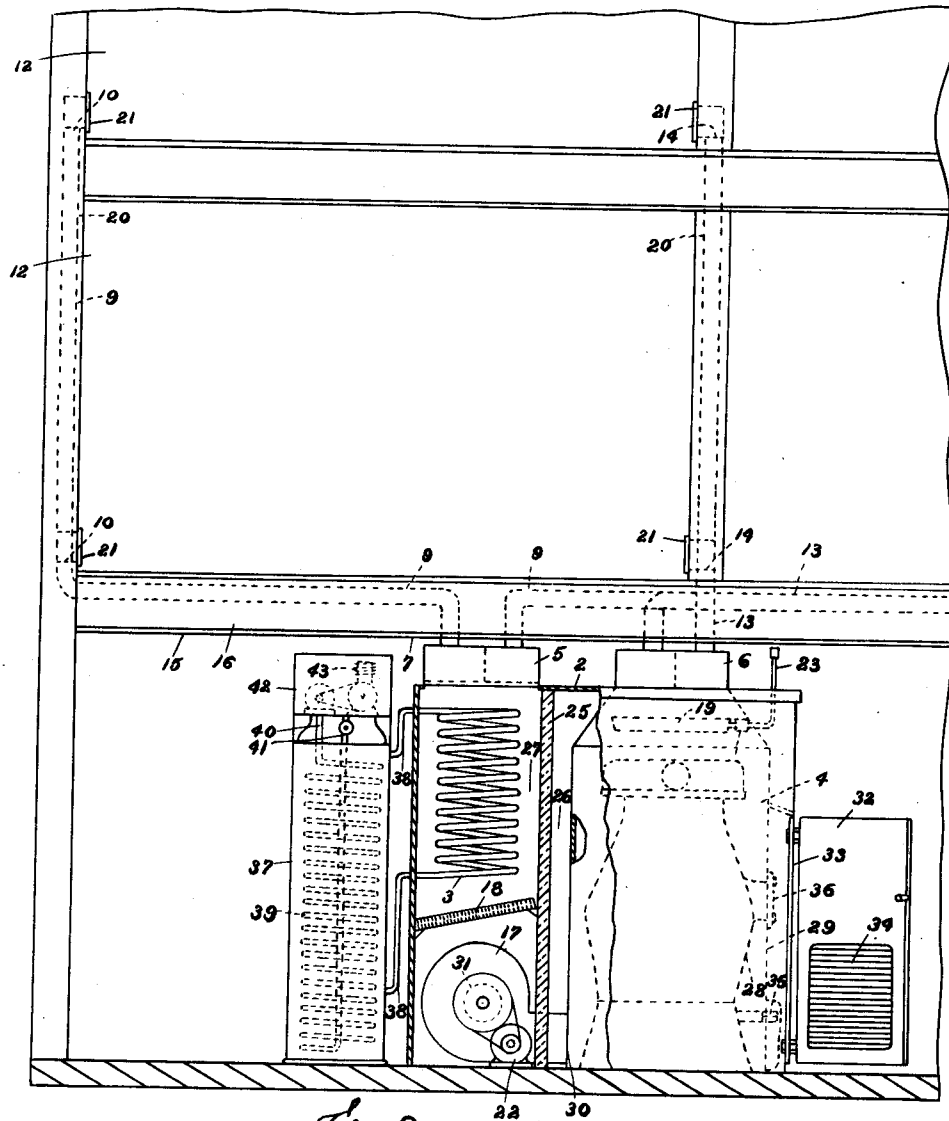


Fig. 2.

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UNITED STATES PATENT OFFICE

1,951,997

AIR CONDITIONING SYSTEM

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Application June 12, 1931, Serial No. 543,796

2 Claims. (Cl. 257—8)

This invention relates to an improved air conditioning system with means arranged in a novel fashion for efficient and economical heating or cooling of the rooms of a building.

5 Objects of the invention are to effect efficient and economical heating or cooling of a building, to minimize the loss of basement space, to provide a system that will not detract from the appearance of the basement and rooms in which the system is installed, to provide for proper circulation, humidification, and cleansing of the treated air, to effect a substantial reduction in undesirable radiation from the system into the basement, and to dispense with the use of the usual large and unsightly radiators and registers.

Another object is to provide for the use of basement spaces as proper living quarters or recreation rooms.

Further, it is an object of the invention to locate the termini of the warm and cool air ducts of the system in such a manner as to provide for uniformity of temperature in all parts of a given chamber.

More specifically, an additional object is to provide a heating system having what may be referred to as "a warm side" and "a cool side", whereby various of the foregoing advantages are secured.

The foregoing and other objects are attained by the means described herein and disclosed in the accompanying drawings, in which:

Fig. 1 is a plan view of a building floor, showing the arrangement of various elements of the improved air conditioning system.

Fig. 2 is a fragmental elevational view of the basement or furnace room and part of a first and second floor showing the improved air conditioning means arranged therein.

In general, the air conditioning means of the present invention comprises a casing 2 containing a refrigerating means 3 and warm air furnace 4, the casing being provided with a cool air inlet duct or passage 5 and a warm air outlet duct or passage 6. The two main passages or ducts extend outwardly from the casing along the basement ceiling 7, and said ducts preferably, though not necessarily, terminate at locations within the basement or furnace room, as indicated at 8, Fig. 1. The ducts or passages, it should be noted, may be gradually reduced in size or capacity in the direction of the termini, and they are of course suitably insulated to preclude radiation, as is common practice on all types of hot or cold fluid-conveying conduits.

For convenience of description, it will be as-

sumed that the device is in operation as an air heater, rather than an air cooler.

In communicating relationship with the interior of the cool air duct or passage 5, is a series of branch pipes or conduits indicated at 9, each of which branch pipes has a terminus 10 located in a room or chamber such as 12. Similarly, the interior of the warm air duct or passage 6 has communicating therewith a series of branch pipes or conduits 13 having termini 14 located in the rooms or chambers 12. The branch pipes or conduits may conveniently be supported in the spaces between rafters and studding of the building, and they are preferably so supported in order to utilize any slight heat radiating therefrom, to warm the floor and walls rather than the basement interior. Where conditions will permit, the basement ceiling may be provided with suitable boarding or plaster ceiling means 15 that may be attached to the rafters 16, thereby concealing the branch pipes and increasing their efficiency as warm or cold air conveying conduits.

Any suitable means, such as a blower or fan 17, may be provided for effecting a circulation of air from the furnace 4, through the warm air duct 6 and its branch pipes, through the rooms or chambers 12, and back to the furnace by way of the cool air return ducts or passages 9 and 5. Although the air moving means 17 is shown herein located so as to suck the air from the cool air passage 5, for effecting the desired air circulation, it is to be understood that the air moving means may be associated with the warm air duct or located within the furnace casing, if desired. The blower 17 may be operated by an electrical motor 22.

Any approved type of air filtering means may be provided in connection with the system for removing dust and lint from the circulated air, and such means is illustrated conventionally at 18. In order to humidify the circulated air, a suitable air moistening means may be provided in the system. Although there is shown in the drawings a water pan 19 for purposes of humidification, it is to be understood that the humidifier may be of any other suitable type. As indicated herein, the humidifier is supplied with water from a suitable source or main 23, the flow of water to the humidifier being thermostatically or otherwise automatically controlled by an automatically operating valve 24.

The efficiency of the system is greatly increased by locating the termini of the cool and warm air branch conduits in the following manner. It should be noted that the cool air branch conduits

are located at or near the floor line, in or adjacent to those walls of the building which are exposed to the weather, whereas the warm air branch conduits are located in or adjacent to the interior walls or partitions of the building interior, at or near the floor line. Also, wherever practicable, the cool air return conduits are located adjacent to windows, doors or other openings so that cool currents of air that leak into the rooms through cracks around the doors and windows, will be taken in without creating drafts. These locations of the warm and cool air termini of the branch pipes favor a complete circulation of air in the room, and assure an evenness of temperature between points at the ceiling line, breathing line, and the floor line. The termini of the branch pipes, and the pipes as well, may be small in diameter due to the provision of the forced circulation of air, wherefore the termini may be provided with small, neat and inconspicuous grilles or ventilator covers 21.

The branch pipes which serve the upper stories of a building are installed between the vertical studding of the walls, the plan of the foregoing paragraph being carried out as to their location relative to the exposed walls and the comparatively warmer partition walls. The branch pipes serving the upper floors are indicated by the character 20.

The air-carrying capacities of ducts and branches on the cool side of the system is approximately equal to those on the warm side thereof. The ducts and branch pipes may be made small, due to the provision of forced or mechanical circulation of air, wherefore it is readily understood that the efficiency of the system is increased because all radiating surfaces are materially reduced. It may be desirable in some installations to introduce into the cool air duct a certain amount of outside air, but this would in no manner affect the general arrangement set forth herein.

The above described system provides a definite controllable means for forcing warmed, cleaned, and humidified air into every room and a definite means for withdrawing the cooler air from points of exposure in the rooms. Furthermore, by reason of the novel location and arrangement of the branch pipes and grilles, the temperature at all points within each room is maintained substantially uniform. The system as a whole effects a saving in operation cost due to the low rate of radiation loss in the system. The furnace preferably is thermostatically controlled.

As is clearly indicated in Fig. 2 of the drawings, the casing 2 is divided, by the insulating wall or partition 25, to provide a furnace compartment 26 and a refrigerator compartment 27. In the compartment 26 is the warm air furnace 4 which comprises the usual fire pot 28 surrounded by the spaced housing 29 whereby circulated air is directed against the fire pot. The interior of the housing 29 communicates, at its top end, with the duct 6, and at its bottom the housing is in communication with the outlet 30 of the blower or air moving means 17. Said top end of the housing 29 is commonly known as the bonnet, dome, or cap of the heater. The inlet 31 of the blower is in communication with the refrigerator compartment 27, and thereby the compartment 27 is connected with the interior of the furnace housing 29, but not with the furnace compartment 26. The interior of the compartment 26 is rendered accessible by means of the vertically hinged doors 32 and 33, each of which is provided with louvers

34 for admitting air to the furnace fire pot. The grate shaker 35 and the access openings 36 of the furnace are accessible through the doors 32 and 33, but the circulation of air in the system is in no manner affected by opening and closing of the doors.

Because of the wide temperature range of air that may be caused to flow through the system, ordinary refrigerating means cannot be satisfactorily and economically employed for cooling or conditioning the air during the summer season. To provide for proper cooling of the air, while the blower is in operation, the refrigerator chamber or compartment 27 has disposed therein the refrigerator pipe coil 3 through which may flow a cooling medium, such as a brine, alcohol solution or the like, with which the reservoir or tank 37 is filled. The pipes 38 provide a means for conveying the solution to and from the coil 3. In the tank or reservoir 37 is a coil of piping 39, the ends 40 and 41 of which have connection with a refrigerating unit 42 which if desired may be located atop the tank 37. The refrigerating unit may be of the usual type employing a motor operated compressor 43 or other means for effecting a cooling of the pipe coil 39. The reason for the efficient and satisfactory operation of the cooling device is that its primary cooling coil 39, instead of being directly subjected to widely varying temperatures in the compartment 27, is subjected always to the nearly constant or slowly changing temperature of the solution in tank 37 brought about by the air of the system striking the coil 3.

It will be observed that the air conditioning unit of this invention is so constructed as to reduce to a great extent the undesirable losses which heretofore resulted from the use of elements having large radiating surfaces, and that there has been provided a practical and very efficient means for at all times conditioning the air of a building, and during all seasons of the year, without the installation of separate air conveying pipes for the heating and cooling of the air to be treated.

It is to be understood that the invention is not to be restricted to the type of humidifier, filter, and air moving means disclosed, and that various other modifications and changes in structural details of the device may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What is claimed is:

1. A closed or recirculating air conditioning system for buildings having rooms and a basement compartment, said system comprising in combination an air heating means having a bonnet associated therewith, a single enlarged air mixing delivery duct of capacity sufficient to carry the entire hot air output of the air heating means, said single enlarged duct being in communication with the bonnet and projecting therefrom in a straight line substantially horizontally adjacent to the ceiling of the basement compartment and terminating therein, a series of individual small diameter pipes communicating with the uppermost region of the air delivery duct for conveying heated air to the individual rooms of the building, said individual pipes being disposed within those walls of the building which provide partitions for the rooms, the termini of such pipes being located at the floor line, a second enlarged elevated duct providing a single air return means having substantially the same carrying capacity as the single

delivery duct and paralleling the first duct and likewise having a terminal end in the basement, an air cooling compartment having an open upper portion communicating with said second duct at a location on the same level as the single delivery duct, the cooling compartment having an opening at its bottom communicating with the air heating means, a series of individual small diameter pipes connected to the elevated horizontal air return duct at intervals for exhaust of air from the individual rooms, said last mentioned pipes being located within those walls of the building which have one face exposed to the weather, the terminal ends of said pipes being located at the floor line, and means for effecting positive circulation of air through the system.

2. A closed or recirculating air conditioning system for buildings having rooms and a basement compartment, said system comprising in combination an air heating means having a bonnet associated therewith, a single enlarged air mixing delivery duct of capacity sufficient to carry the entire hot air output of the air heating means, said single enlarged duct being in communication with the bonnet and projecting therefrom in a straight line substantially horizontally adjacent to the ceiling of the basement compartment and terminating therein, the cross-sectional area of the

duct being reduced in a direction away from the bonnet, a series of individual small diameter pipes communicating with the uppermost region of the air delivery duct for conveying heated air to the individual rooms of the building, said individual pipes being disposed within those walls of the building which provide partitions for the rooms, the termini of such pipes being located at the floor line, a second enlarged elevated duct providing a single air return means having substantially the same carrying capacity as the single delivery duct and paralleling the first duct and likewise having a terminal end in the basement, an air cooling compartment having an open upper portion communicating with said second duct at a location on the same level as the single delivery duct, the cooling compartment having an opening at its bottom communicating with the air heating means, a series of individual small diameter pipes connected to the elevated horizontal air return duct at intervals for exhaust of air from the individual rooms, said last mentioned pipes being located within those walls of the building which have one face exposed to the weather, the terminal ends of said pipes being located at the floor line, and means for effecting positive circulation of air through the system.

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