Sept. 18, 1951 C. J. FAVOT 2,568,278

ELECTRICAL WARM AIR RECIRCULATING ROOM HEATER

Filed March 30, 1949 2 Sheets-Sheet 1

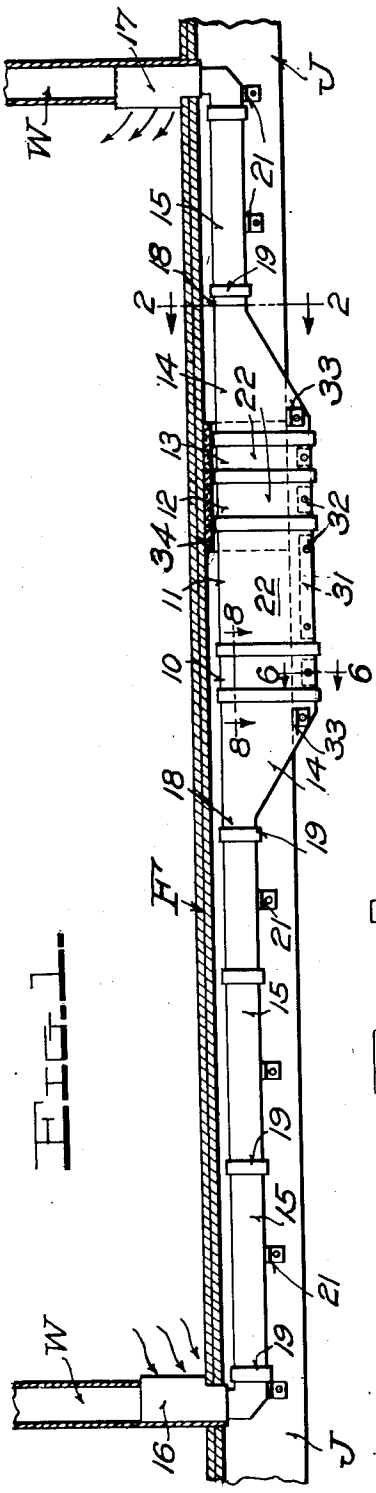


FIG. 1

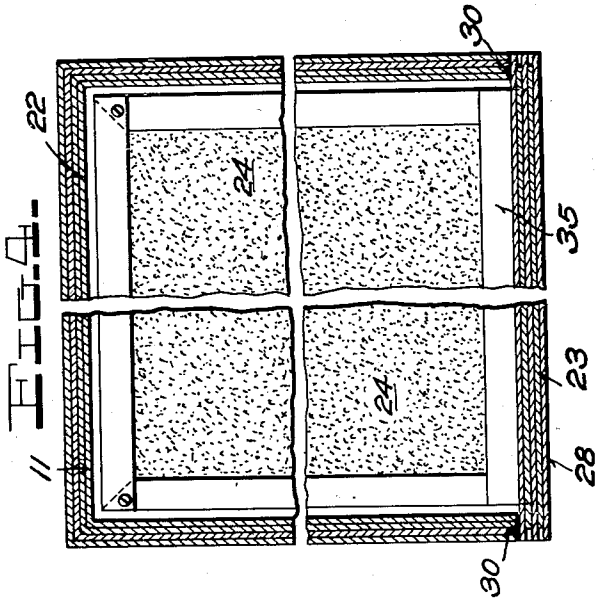


FIG. 4

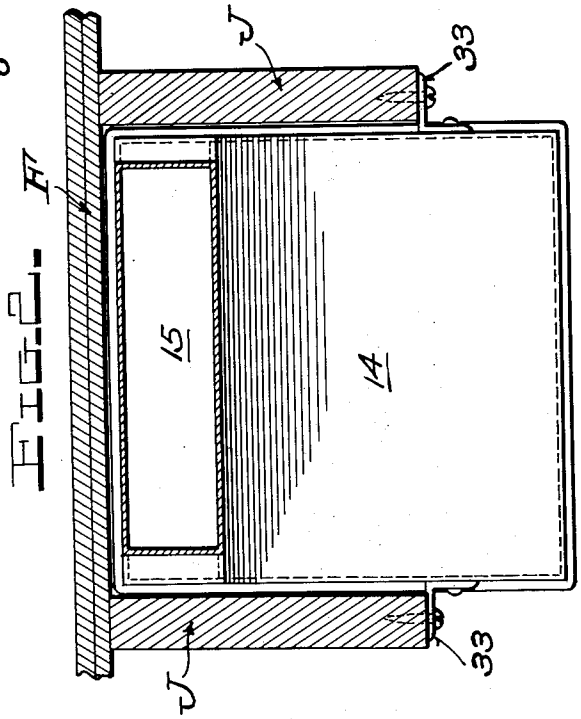


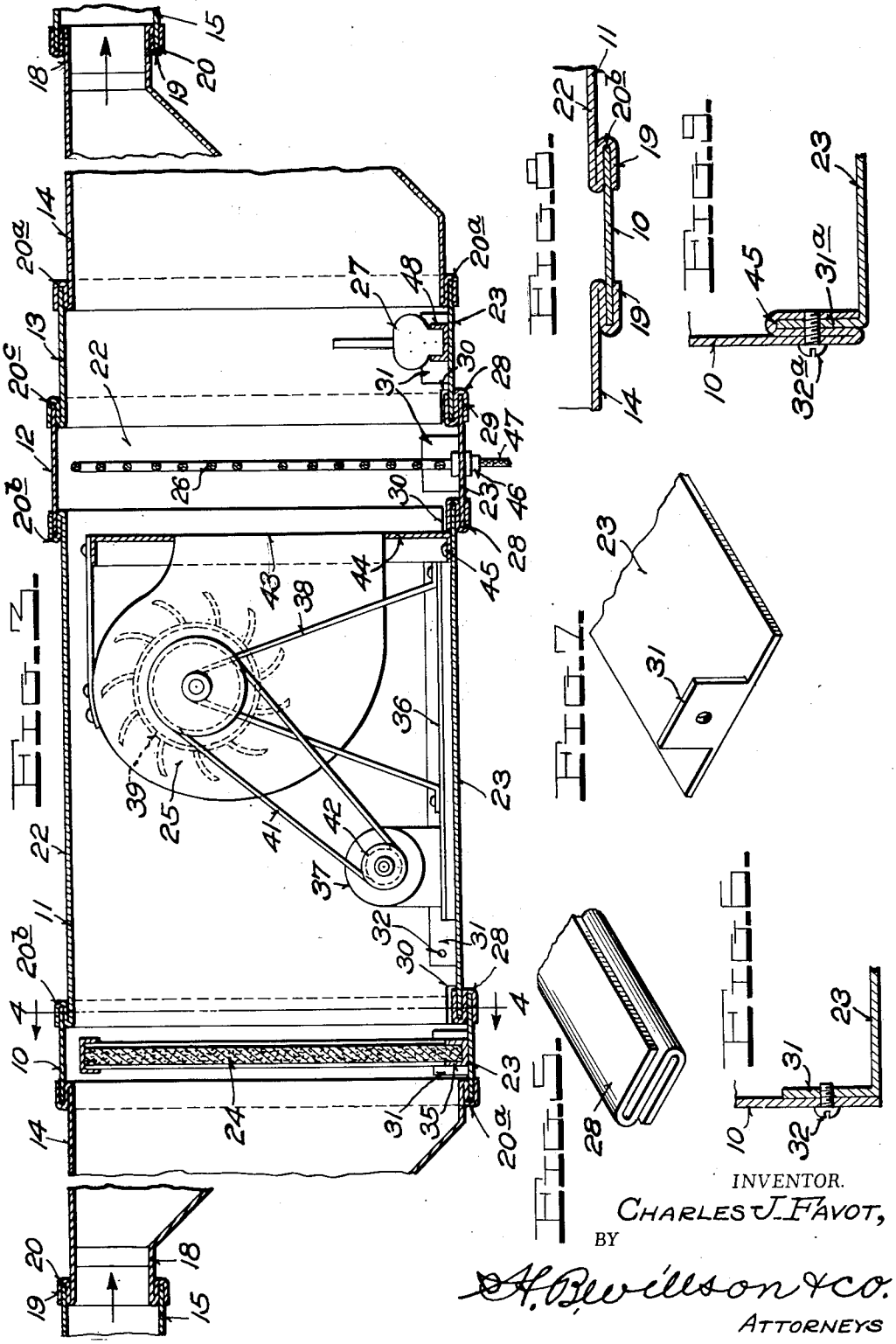
FIG. 2

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ELECTRICAL WARM AIR RECIRCULATING ROOM HEATER

Filed March 30, 1949 2 Sheets-Sheet 2



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Patented Sept. 18, 1951 2,568,278

UNITED STATES PATENT OFFICE

2,568,278

ELECTRICAL WARM AIR RECIRCULATING ROOM HEATER

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Application March 30, 1949, Serial No. 84,271

7 Claims. (Cl. 219—39)

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This invention relates to air heating and conditioning systems for a single room or other chamber in which the air is recirculated after being reheated and reconditioned by apparatus disposed beneath the floor of the room.

More specifically the invention relates to apparatus supported between floor joists and connected by ducts to spaced points of the room to be heated, the apparatus having means for withdrawing the air from one point and returning it to the other point after the air has been filtered, electrically heated and humidified, so that the room air will be continuously maintained at the desired temperature and in the desired condition.

The principal object of the invention is to provide a simple and practical electrical, warm air, recirculating room heater which may be easily installed at a relatively small expense and which if desired may be made entirely automatic in operation.

Another object of the invention is to provide an air heating and conditioning apparatus in which the different units such as the filter, the fan or blower, the electric heater and the humidifier may be of standard forms and easily serviced without disconnecting any of the air circulating ducts or casing sections or units.

Further objects and advantages of the invention will be set forth or understood from the following description of the preferred form of the invention in connection with the accompanying drawings in which:

Fig. 1 is a vertical section showing the apparatus beneath the floor of a room.

Fig. 2 is a section, on an enlarged scale, taken on line 2—2 of Fig. 1 looking in the direction of arrows.

Fig. 3 is a vertical longitudinal sectional view on an enlarged scale through the apparatus, parts being broken away.

Fig. 4 is a detail vertical cross sectional view taken on line 4—4 of Fig. 3 looking in the direction of the arrows, parts being broken away.

Fig. 5 is a detail perspective view of a portion of one of the interlocking and sealing slide bars used between contiguous drop bottoms of the units.

Fig. 6 is a detail section on line 6—6 of Fig. 1 showing one form of fastening for the drop bottoms of the units.

Fig. 7 is a detail perspective of one end of the drop bottom of the filter section.

Fig. 8 is a detail section on line 8—8 of Fig. 1, and

Fig. 9 is a detail sectional view of another form of fastening for the drop bottoms of the units.

In the drawings F denotes the floor of a room

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or other chamber to be heated and W two spaced walls or partitions. The floor is supported by the usual spaced joists J between two of which the air heating, conditioning and recirculating apparatus is mounted as shown in Figs. 1 and 2.

The apparatus comprises an air filter unit 10, a fan or blower unit 11, a heater unit 12, a humidifier unit 13, two reducer units 14, a plurality of pipes or ducts 15, an air inlet register 16 and an air outlet register 17. The two registers may be of any suitable construction and located at any two spaced points in the room, but as shown they are mounted in the opposite walls or partitions W and are connected by elbows to the pipes 15. These pipes may be the usual rectangular ducts now commonly used in air heating and conditioning systems for dwellings and other buildings, and may be supported in the usual manner beneath spaced floor joists.

The units 10, 11, 12 and 13 are arranged and connected as shown in Figs. 1 and 3, and their casings are preferably fourteen inches square so that they may be positioned between two joists J spaced sixteen inches on centers. The reducers 14 are therefore provided with small ends 18 that may be connected to the standard ducts 15 which are usually fourteen by three and one-quarter inches. These pipe or duct connections are preferably made with the telescoping joints shown at the ends of Fig. 3, the metal at the end of one section being folded at 19 to form a continuous seat or channel 20 to receive the end of the abutting section. The seats 20 may of course be channels in U-shaped strips suitably secured at the ends of the ducts or casing sections. If desired angle metal brackets 21 may be secured to the joists to support the ducts, and may also be secured to the ducts if desired.

The casing of each of the units 10, 11, 12 and 13 comprises an inverted U-shaped body portion 22 and a downwardly removable drop bottom 23 on which latter is supported the element within the casing such as the filter 24, the fan or blower 25, the heater 26 and the humidifier 27, so that when any of these elements is to be serviced it will not be necessary to disconnect and remove one or more of the body portions 22 of the casings of the units, the construction being such that one or more of the bottoms 23 may be readily disconnected and removed with the air treating element or elements thereon. While any suitable telescoping joints may be provided between the top and the depending side walls of abutting casing bodies 22 and also between the bodies 22 and the reducers 14, I preferably employ the slip joints shown in Figs. 3 and 8.

The bottoms 23 of the units 10, 11, 12 and 13

overlap and are connected by removable slides 28 which seal the overlapped edges as seen in Fig. 3. As seen in Fig. 5 these slide bars are S-shaped in cross section being formed by bending the edge portions of rectangular strips of metal in opposite directions back upon the intermediate portion to form opposite facing longitudinal channels. These connecting and sealing slides extend the full length of the ends of the bottoms 23, and the lower ends of the side walls of the body sections are notched as at 30 to permit the slides to be inserted and withdrawn from either side of the units.

In order to remove the weight of the air treating elements 24, 25, 26 and 27 from the slides 28, the bottoms 23 of the units are provided at their ends with upwardly projecting lugs or flanges 31 which may be disposed against either the inner or outer faces of the depending side walls of the body sections 22 and which are secured to said walls by screws 32 or other removable fastenings as seen in Fig. 6. While the slides 28 may be used between the reducer units 14 and the filter and humidifier units 10 and 13, I preferably use the telescoping or slip joints previously described at these points. More specifically the large ends of the reducers 14 have channels 29a extending entirely around them to receive all four edges of the adjacent ends of the units 10 and 13. However these telescoped joints between the units 10 and 11, 11 and 12, and 12 and 13, extend only across the top and down the side walls of the body portions 22 of these units. As shown in Fig. 3 the fan unit 11 has channels 29b at both of its ends to receive the straight ends of the top and side walls of the units 10 and 12 respectively, while the humidifier unit 13 has a channel 29c to receive the straight edges of the top and side walls of the adjacent end of the heater unit 12. That arrangement in connection with the overlap of the bottoms 23 of the units, necessitates the removal of the bottom of the heater unit 12, before the bottom of the humidifier unit 13 may be disengaged from one of the channels 29 and then lowered. Likewise the bottom of the heater unit must be removed before the bottoms of the fan unit 11 and the filter unit 10 may be lowered.

Since the lower portions of the units 10, 11, 12 and 13 extend below the joist J, the S-shaped slides 28 may be readily removed, and after the proper fastenings 32 are removed, one or more of the bottoms 23 may be lowered with the air treating element or elements thereon for repairs or replacement, and may then be readily restored to their proper positions without disconnecting the body portions of any of the units or the reducers 14 or the ducts 15. In order to properly support the units from the floor joists I may use at suitable points angle brackets 33 which may be riveted or otherwise secured to the outer faces of the vertical walls of the body portions 22, these brackets being secured by screws or the like to the lower edges of the joists as shown in Fig. 2. I may also secure insulation boards 34 between the units and the floor and joists, especially at and adjacent the heater unit 12 as indicated in Fig. 1.

The air treating elements 24, 25, 26 and 27 are supported entirely on the bottoms 23 and may be of any standard or preferred construction. The elements 25, 26 and 27 may be automatically operated or controlled by well known means. The filter 24 preferably comprises a filtering element removably supported in a rectangular

channeled frame 35 secured to the bottom of the unit 10. The blower element 25 preferably comprises a base 36 secured to the bottom of the unit 11 and supporting a suitable electric motor 37 and bearing brackets 38 for the shaft of a squirrel cage type of fan 39 driven by a belt 41 from a variable speed pulley 42 on the motor shaft. The fan is within a casing 43 having an inlet on one side and a discharge which opens through a vertical plate or partition 44 secured at 45 to the bottom of the unit 11. The heater 26 is conventionally shown as an electrical heating element supported on suitable insulators 46 on the bottom of the unit 12, a conductor cord 47 passing through one of the insulators. The humidifier is also conventionally shown as of an evaporation plate type having a water pan 48 secured to the bottom of the unit 13. A constant water level in the pan may be maintained by a float operated valve controlling a water supply pipe, these parts being old are not illustrated.

In Fig. 9 is shown a modified form of fastening between the ends of the unit bottoms 23 and the side walls of the body portions of the casing sections 22 which may be used instead of the fastening means shown in Fig. 6. In that view a side wall is shown with a longitudinally extending, downwardly facing channel 45 to receive a flange 31a. Suitable screws such as the one shown at 32a secure the flanges in the channels at each end of a bottom section of a unit.

The operation will be apparent from the foregoing in connection with the drawings in which the arrows indicate the direction of the air circulation when the apparatus is in use. If the rooms of a house are heated in this manner no chimney is needed and no space in the basement is needed for a central heating plant. Each room may be maintained at a constant and desired temperature with the air in proper condition. The cost of installation is relatively low and the various units may be serviced quickly, easily and at small expense. When the invention is used there is no danger of combustible fuel fumes.

From the foregoing, taken in connection with the accompanying drawing, it will be seen that novel and advantageous provision has been made for carrying out the objects of the invention, and while preferences have been disclosed, attention is invited to the possibility of making variations within the scope of the invention as claimed.

I claim:

1. The combination with a room having a floor supported by spaced joists, of an elongated air treating and circulating housing arranged between two of said joists and having its opposite ends connected to spaced points in said room, said housing comprising a pair of reducer ducts between which are arranged a plurality of duct-sections, each of the latter comprising an inverted U-shaped body and a bottom detachably secured to the body and completely removable therefrom in a downward direction, the bottoms of said duct-sections being disposed below the bottoms of said joists, and air treating units in said duct-sections and supported on said bottoms for downward removal with said bottoms, one of said units being a power driven blower for circulating air through said housing.

2. The combination with a room having a floor supported by spaced joists, of an elongated air treating and circulating housing arranged between two of said joists and having its opposite ends connected to spaced points in said room,

said housing comprising a pair of reducer ducts between which are arranged an air filter unit, a power driven blower unit, an electric heater unit and a humidifier unit, each of said units having a downwardly removable bottom disposed below the bottoms of said joists, and means for supporting said housing between said joists.

3. The combination with a room having a floor supported by spaced joists, of an elongated air treating and circulating housing arranged between two of said joists and having its opposite ends connected to spaced points in said room, said housing comprising a pair of reducer ducts between which are arranged an air filter unit, a power driven blower unit, an electric heater unit and a humidifier unit, each of said units having a downwardly removable bottom disposed below the bottoms of said joists, and brackets secured to the opposite sides of said housing and to the bottoms of said joists to support said housing from said joists.

4. The combination with a room having a floor supported by spaced joists, of an elongated air treating and circulating housing arranged between two of said joists and having its opposite ends connected to spaced points in said room, said housing having a plurality of downwardly removable bottom sections, and a plurality of air treating elements in said housing supported entirely by said bottom sections and removable from said housing when said bottom sections are dropped, said elements including a power driven blower for circulating the air and an electric heater for heating the circulated air.

5. The combination of a room having a floor supported by spaced joists, of an elongated air treating and circulating housing arranged between two of said joists and having its opposite ends connected to spaced points in said room, said housing comprising a plurality of connected and communicating units each of which comprises an inverted U-shaped body section having its side walls projecting below said joists and a removable bottom section supported from said side walls, the adjacent edges of contiguous bottom sections being in overlapped relation, S-shaped sealing strips slidably and removably engaged with the overlapped edges of said bottom sections and disposed below the bottoms of said joists, brackets connected to said joists and to the depending side walls of said body sections for supporting said units from said joists, an air circulating element supported on one of said bottom sections and an air treating means supported on another of said bottom sections, said elements being removable from the units of said housing with said bottom sections.

6. For use in an electrical warm air recirculating room heater for mounting between a pair of floor supporting joists, an elongated housing comprising a pair of reducer duct sections at the ends of a plurality of communicating air-treating-unit duct sections, the latter having a height greater than that of floor joists and bottoms for supporting air treating units, one of which may be a power driven blower for circulating air through the housing, said communicating unit duct sections having body portions of inverted U-shape in cross section closed by said bottoms, said bottoms having vertical flanges overlapping the depending sidewalls of said bodies, and fastening elements for detachably fastening the flanges to said body side walls for complete detachment in a downward direction of said bottoms from said bodies.

7. The structure of claim 6 together with channelled, detachable sealing strips slidably engaging the contiguous ends of adjacent bottoms of said communicating unit duct sections, said strips being detachable from said bottoms by sliding them transversely thereof.

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