May 18, 1948. W. A. SPOFFORD 2,441,852

AIR CONDITIONING APPARATUS

Filed Dec. 12, 1946 2 Sheets-Sheet 1

Fig. 1.

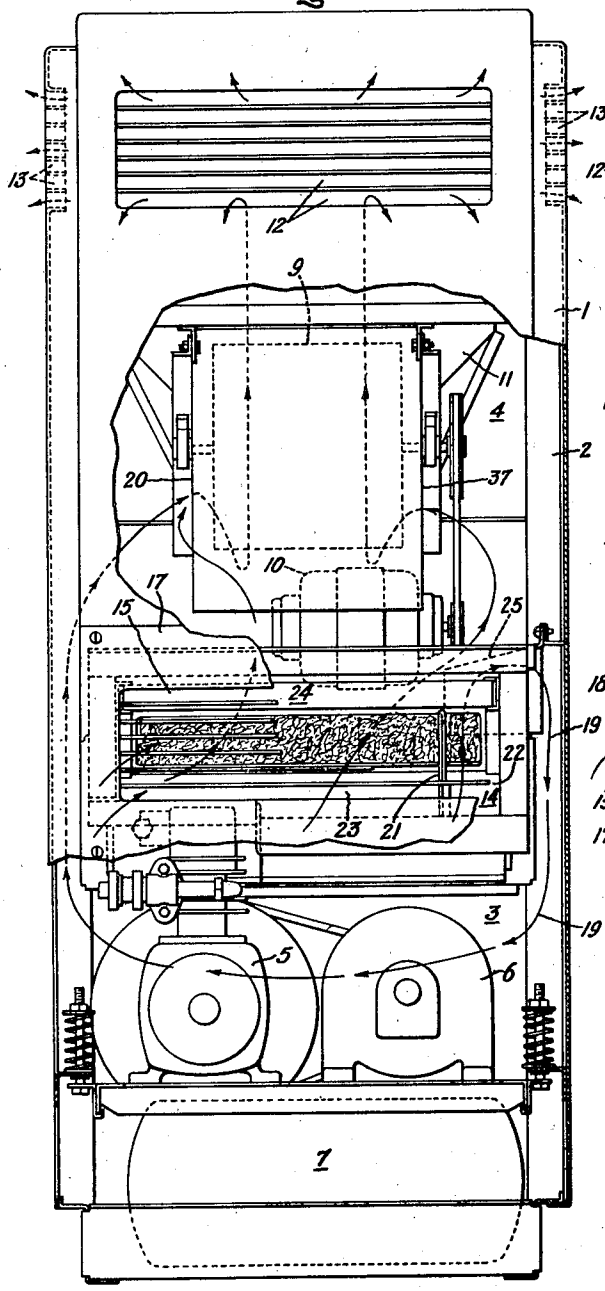
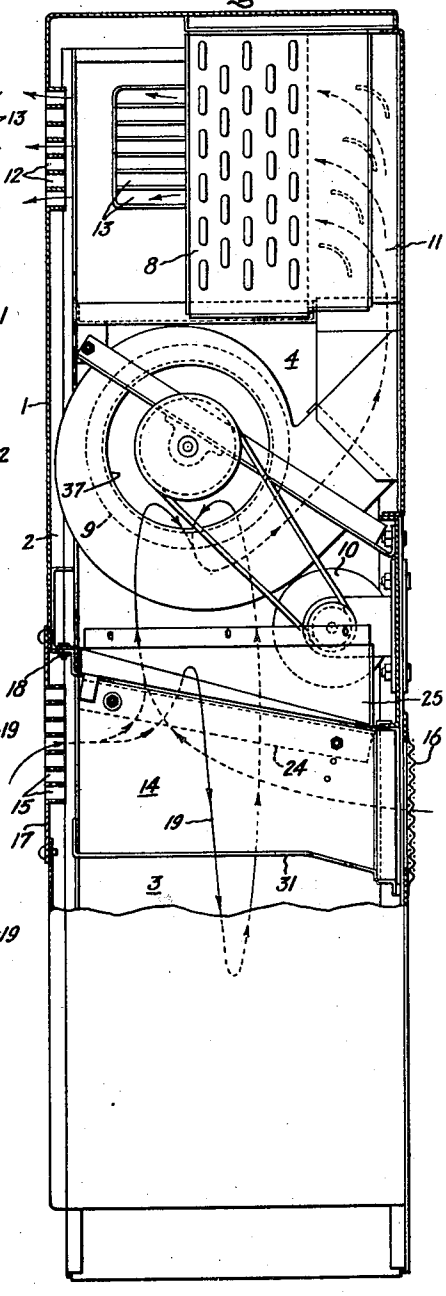


Fig. 2.



Inventor:
Warren A. Spofford,

by Edwin L. Rich
His Attorney.

May 18, 1948. W. A. SPOFFORD 2,441,852

AIR CONDITIONING APPARATUS

Filed Dec. 12, 1946 2 Sheets-Sheet 2

Fig. 3.

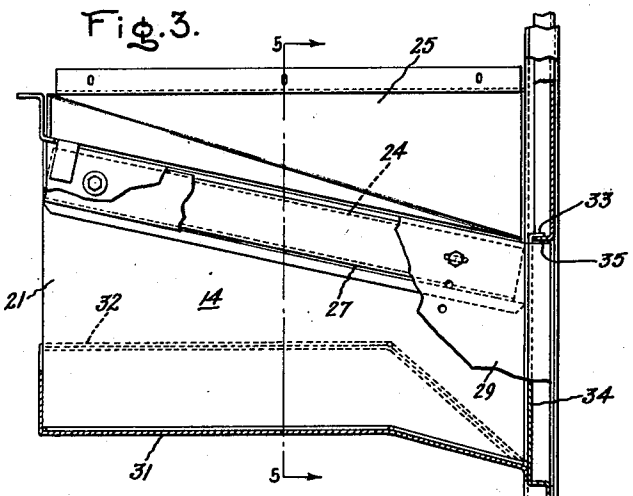


Fig. 4.

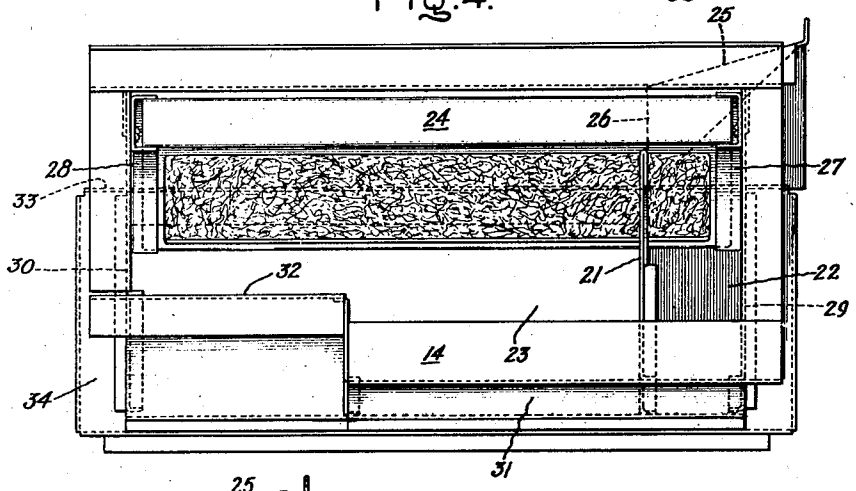
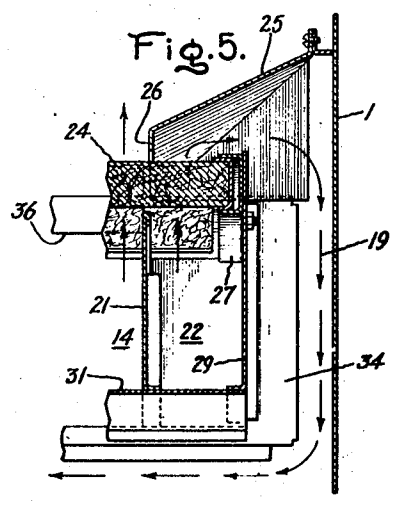


Fig. 5.



Inventor:
Warren A. Spofford,
by Edwin L. Rich
His Attorney.

Patented May 18, 1948 2,441,852

UNITED STATES PATENT OFFICE

2,441,852

AIR CONDITIONING APPARATUS

Warren A. Spofford, Glen Ridge, N. J., assignor to General Electric Company, a corporation of New York

Application December 12, 1946, Serial No. 715,799

7 Claims. (Cl. 62—129)

1

This invention relates to air conditioning apparatus and particularly to individual room air conditioning units.

It is an object of this invention to provide a room air conditioning unit including an improved air distributing and filtering arrangement.

Further objects and advantages of my invention will become apparent as the following description proceeds and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of my invention, reference may be had to the accompanying drawing in which Fig. 1 is a front elevation view partly in section showing an individual room air conditioning unit embodying the invention; Fig. 2 is a side elevation view partly in section of the unit shown in Fig. 1; Fig. 3 is an enlarged side elevation view of the air distributing assembly partly broken away; Fig. 4 is a front view of the assembly shown in Fig. 3; and Fig. 5 is a view on the line 5—5 of Fig. 3.

The air conditioning unit shown in Figs. 1 and 2 comprises an external cabinet or casing 1. The casing is of elongated upright form and the apparatus within the casing is mounted on a suitable framework 2 formed from angle iron or other suitable structural members. The interior of the casing is divided into two compartments, a machinery compartment 3 in the lower portion of the casing and an air circulating and cooling compartment 4 in the upper portion of the casing. A refrigerant condensing unit is arranged in the machinery compartment and comprises a compressor 5 driven by an electric motor 6 and arranged to supply compressed refrigerant through suitable connections (not shown) to a water cooled condenser 7 in the bottom of the compartment. The refrigerant liquefied in the condenser 7 is supplied through suitable conduits (not shown) in the usual manner to a refrigerant evaporator 8 in the upper portion of the compartment 4, and from which the vaporized refrigerant is returned to the compressor through a suction line (not shown). Air is drawn into the compartment 4 by operation of a centrifugal fan or blower 9 driven by a motor 10 and is discharged through a duct 11 and flows upwardly and through the evaporator 8 which is of the finned tube type. The air is discharged from the casing through front and side outlet openings 12 and 13 respectively, the path of the air being indicated by arrows.

In order to insure the desired distribution and

2

filtering of the air entering the casing 1, a removable partition assembly 14 is mounted in the cabinet between the compartments 3 and 4. Air enters the partition assembly 14 through a room or return air inlet 15 and through a fresh or ventilating air inlet 16, these inlets being on the front and back respectively of the casing 1. The partition assembly 14 may be removed from the cabinet by first removing a front panel 17 in which the inlet 15 is located, the partition assembly first being detached from the angle structure 2 by removing a plurality of nuts 18.

During the operation of the condensing unit, heat is generated by the compressor 5 and the motor 6. This heat is not directly removed by the water circulated through the condenser 7 and it is therefore necessary to provide some arrangement for removing heat from the compartment 3. This heat removal is accomplished by circulating a portion of the air to be conditioned through the compartment 3, as indicated by the arrows 19, the circulated air flowing through the compartment from right to left, as viewed in Fig. 1, and passing upwardly to the left of the partition assembly 14 into the compartment 4 where the air enters the scroll or housing of the fan 9 through its left-hand inlet indicated generally at 20. This air in passing through the machinery compartment absorbs heat and maintains the motor and compressor within the required range of temperatures. The partition assembly 14 is constructed with a divider or partition 21 near the right-hand end thereof which divides the assembly into two chambers, the right-hand chamber indicated at 22 being in open communication with the return air inlet 15 but being closed at the rear of the casing so that it is not open to the fresh air inlet 16. Thus all the air circulated through the machinery compartment 3 is room air. The left-hand chamber of the partition assembly indicated at 23 is open both at its front and back so that it is in open communication with both the fresh and room air inlets. All the air entering the casing 1 and flowing to the fan 9 and thence over the evaporator 8 and back to the room is cleaned by a single filter 24 which extends across the outlets of both chambers 22 and 23. The filter 24 may be removed from the partition assembly through the front of the cabinet after the panel 17 has been detached. Thus the filter may easily be replaced, and since a single filter is employed for both air circuits the single replacement provides fresh filter areas for both air circuits and makes it impossible to change the main air stream filter and not the

machinery compartment filter. The location of the filter and the air intake assembly assures filtering of all the air which passes to the fan 9 and thence over the evaporator 8. This minimizes the collection of foreign matter on the evaporator surfaces. Furthermore, since the intake air flowing through the compartment 3 is filtered, the collection of foreign matter on the surfaces of the condensing unit is minimized.

The details of construction of the partition assembly 14 are more clearly shown in Figs. 3, 4 and 5, in which the partition assembly is shown in its position within the casing but with the nuts 18 and the adjacent portion of the structure 2 not shown. In order to provide a return path for the air passing upwardly from the compartment 22 through the filter 24, a baffle 25 is secured to the cabinet structure above the partition assembly and directs the air discharged from the right end of the filter 24 toward the right and thence downwardly into the machinery compartment, as indicated by the arrows 19. The downward passage for the air is provided by the space between the right end of the partition assembly 14 and the side wall of the casing 1. The baffle 25 has its left-hand edge portion indicated at 26 lying closely adjacent the top of the filter 24, and since the upper edge of the partition 21 lies closely adjacent the lower surface of the filter 24 a path through the right-hand edge of the filter is provided for filtering the air flowing from the chamber 22. The by-passing of air through the filter itself between the top of the partition 21 and the lower edge 26 of the baffle is negligible. In order that it may be readily removed, the filter 24 is mounted in channels or slides 27 and 28 secured to the right and left end walls 29 and 30 of the partition assembly 14. The lower wall of the partition assembly indicated at 31 is provided with a raised portion 32 toward the left-hand side of the assembly which provides the additional height of the compartment 3 required to accommodate the compressor 5.

When it is desired to remove the partition assembly from the cabinet after the nuts 18 have been removed, the assembly may be drawn forward so that a flange 33 formed on the rear wall 34 of the partition assembly is disengaged from a horizontal flange 35 on the rear wall of the casing. The rear wall 34 of the partition assembly is the wall which closes the rear of the compartment 22 and is provided with an opening 36 registering with the fresh air inlet opening 16.

During the operation of the air conditioning unit illustrated, when there is demand for cooling, the motors 6 and 10 are started and air is circulated through the unit and is cooled by the absorption of heat as it passes over the surfaces of the evaporator 8. The operation of the fan 9 causes air to flow from both the chambers 22 and 23 through the filter 24, the air drawn from the chamber 23 being a mixture of fresh air and recirculated air and flowing directly upwardly both to the left-hand inlet 20 of the fan and to the right-hand inlet indicated as 37. Air flowing upwardly through the filter 24 from the chamber 22 is directed by the baffle 25 to flow downwardly, as indicated by the arrows 19, and flows through the compartment 3 where it absorbs heat generated by the compressor 5 and motor 6. This air then flows upwardly between the left-hand wall 30 of the partition assembly and the side wall of the casing 1 and enters the compartment 4 about the fan 9, substantially all

of this air entering the left-hand inlet 20 of the fan. All the air discharged from the chambers 22 and 23 passes through the filter 24; this single filter element thus serves to clean the air in both air paths and makes it unnecessary to replace a plurality of filters. This arrangement of the filter insures cleaning of air received both from the return air inlet and from the fresh air inlet while preventing the passage of any of the unclean air over the working parts of the apparatus.

From the foregoing it will be realized that there has been provided a simple and effective arrangement for removing heat generated in the machinery compartment of an air conditioning apparatus while assuring adequate cleaning of all the air passing through the apparatus and while assuring the replacement of the filtering surfaces in all paths of the apparatus at a single operation.

While the invention has been described in connection with a particular form of air conditioning unit, other applications will be apparent to those skilled in the art. It is not, therefore, desired that the invention be limited to the particular construction illustrated and described, and it is intended by the appended claims to cover all modifications within the spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A room air conditioning apparatus comprising a casing having a machinery compartment and a blower compartment therein, said casing having a room air inlet and a ventilating air inlet, means providing two inlet air chambers between said compartments, one of said chambers communicating with both said inlets and the other of said chambers communicating substantially only with said room air inlet, said one chamber having an outlet communicating with said blower compartment and said other chamber having an outlet communicating with said machinery compartment, and a single air filter element extending over both said outlets for filtering all the air discharged from said two chambers.

2. A room air conditioning apparatus comprising a casing having two compartments therein, partition means between said compartments for providing two air inlet chambers, means for supplying room air and fresh air to one of said chambers and for supplying substantially only room air to the other of said chambers, a blower in one of said compartments arranged to withdraw air from said one chamber and to discharge the air from said casing, means connecting the other of said chambers in communication with the other of said compartments, means providing communication between said other compartment and said one compartment whereby the operation of said blower draws air from said other chamber through said other compartment, and a single air filter element extending across the outlets of both said chambers for filtering all the air admitted to said compartments.

3. A room air conditioning apparatus comprising a casing having two compartments therein, partition means between said compartments providing a first inlet chamber in communication with one of said compartments and a second inlet chamber in communication with the other of said compartments, means for supplying room air and fresh air to said first chamber and for supplying substantially only room air to said second

chamber, means forming a passage around said partition means for connecting said compartments, means including a blower in said one compartment for circulating air from said passage and first chamber through said one compartment and out of said casing, and a single air filter element extending across both said chambers for filtering all air removed from said chambers and admitted to said compartments.

4. A room air conditioning apparatus comprising a casing having a machinery compartment and a cooling compartment, partition means between said compartments for providing first and second air inlet chambers having outlets communicating respectively with said cooling and machinery compartments, a refrigerant condensing unit arranged in said machinery compartment, a refrigerant evaporator arranged in said cooling compartment, means providing a passage connecting said machinery compartment and said cooling compartment, means including a blower for circulating air from said passage and from said first chamber over said evaporator and for discharging the air from said casing, said blower producing a flow of air from said second chamber through said machinery compartment to remove heat from said condensing unit, and a single filter element extending across the outlets of both said chambers for filtering all the air admitted to said compartments.

5. A room air conditioning apparatus comprising a casing having a machinery compartment and an air cooling compartment, a partition assembly detachably mounted in said casing between said compartments, said assembly including wall portions forming first and second chambers having discharge openings on the side of said assembly toward said cooling compartment, said casing having a first inlet opening for admitting air to both said chambers and a second inlet opening for admitting air to said second chamber, said assembly forming two air passages laterally of said chambers one of the passages providing communication between said compartments and the other between said machinery compartment and said first chamber, a fan in said cooling compartment for withdrawing air from said one passage and from said second compartment, a baffle secured within said casing between said cooling compartment and said first chamber for directing air from said first chamber into said one passage whereby air from said

first chamber flows through said machinery compartment and through said one passage into said cooling compartment.

6. A room air conditioning apparatus comprising a casing having a machinery compartment and an air cooling compartment, a partition assembly detachably mounted in said casing between said compartments, said assembly including wall portions forming first and second chambers having discharge openings on the side of said assembly toward said cooling compartment, said casing having a first inlet opening for admitting air to both said chambers and a second inlet opening for admitting air to said second chamber, said assembly forming two air passages laterally of said chambers one of the passages providing communication between said compartments and the other between said machinery compartment and said first chamber, a single removable filter element extending across the discharge openings of both said chambers, a fan in said cooling compartment for withdrawing air from said one passage and from said second compartment, and a baffle secured within said casing between said filter and said cooling compartment for directing filtered air from said first chamber into said other passage whereby filtered air from said first chamber flows through said machinery compartment and through said one passage to said cooling compartment.

7. A room air conditioning apparatus comprising a casing having a machinery compartment and a cooling compartment, removable partition means between said compartments for providing first and second air inlet chambers having outlets communicating respectively with said cooling and machinery compartments, a refrigerant condensing unit arranged in said machinery compartment, a refrigerant evaporator arranged in said cooling compartment, means providing a passage connecting said machinery compartment and said cooling compartment, means including a blower for circulating air from said passage and from said first chamber over said evaporator and for discharging the air from said casing, said blower producing a flow of air from said second chamber through said machinery compartment to remove heat from said condensing unit, and filtering means extending across the outlets of said chambers for filtering the air admitted to said compartments.

WARREN A. SPOFFORD.