

Oct. 1, 1957

J. G. ATTWOOD

2,808,124

APPARATUS FOR SUPPLYING DECONTAMINATED AIR

Filed Dec. 8, 1953

3 Sheets-Sheet 1

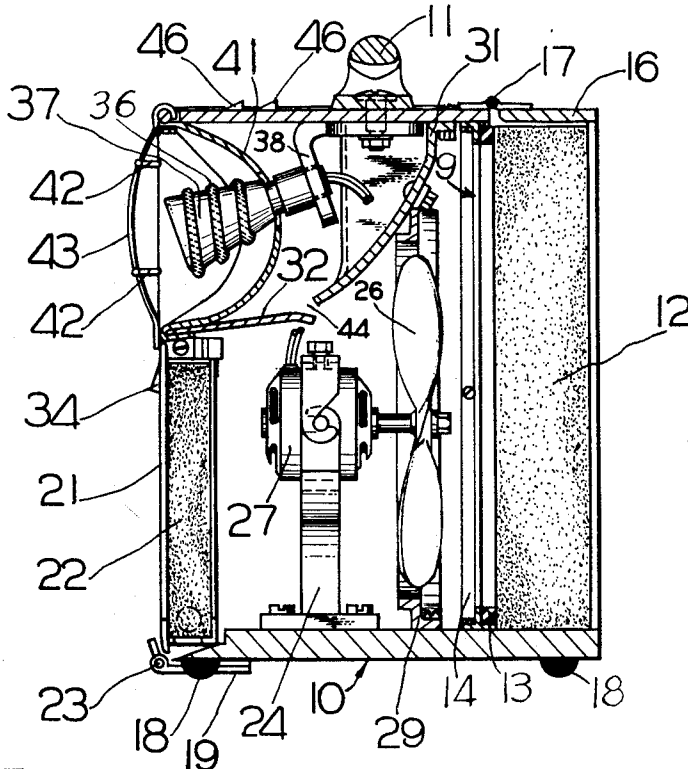


FIG. 1.

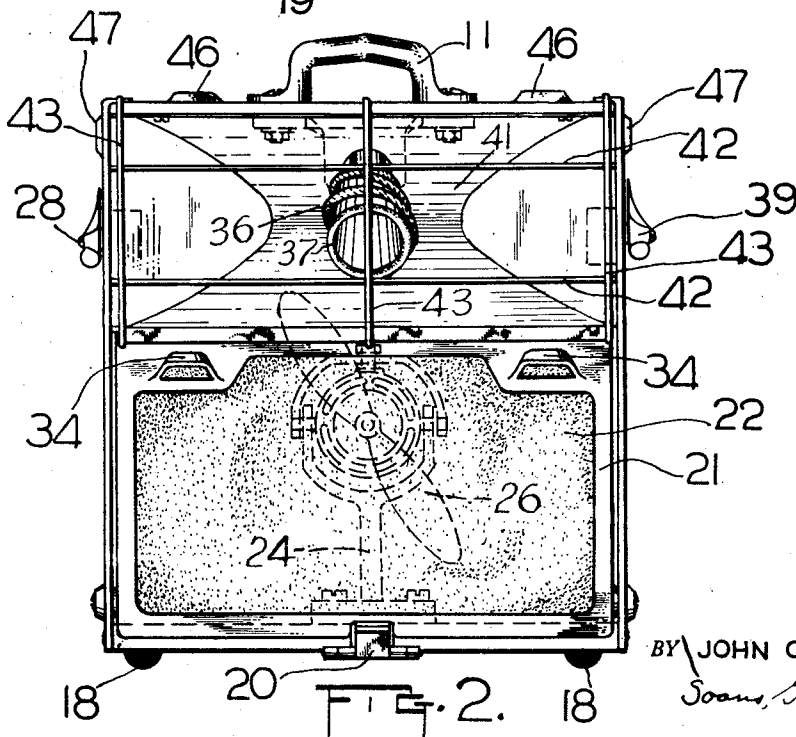


FIG. 2.

INVENTOR.

BY JOHN G. ATTWOOD

Soans, Glaser & Anderson

Oct. 1, 1957

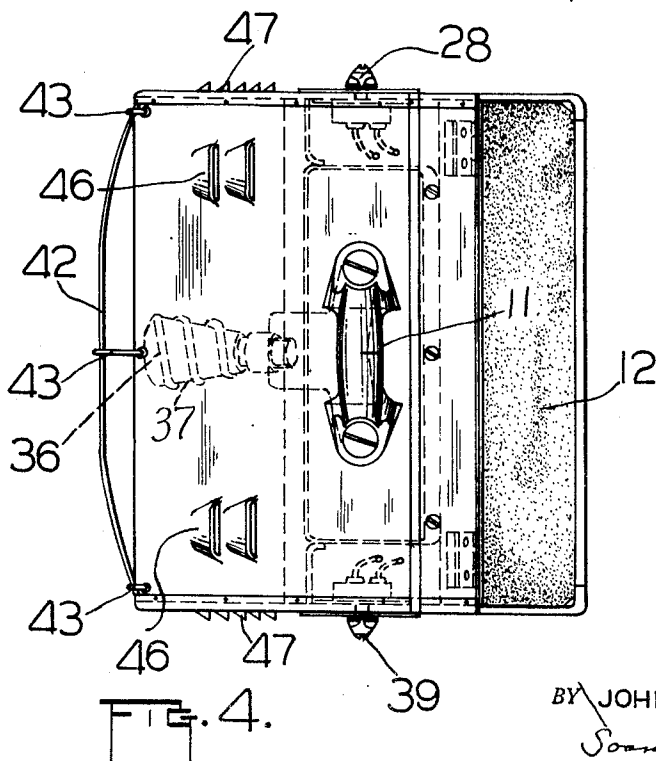
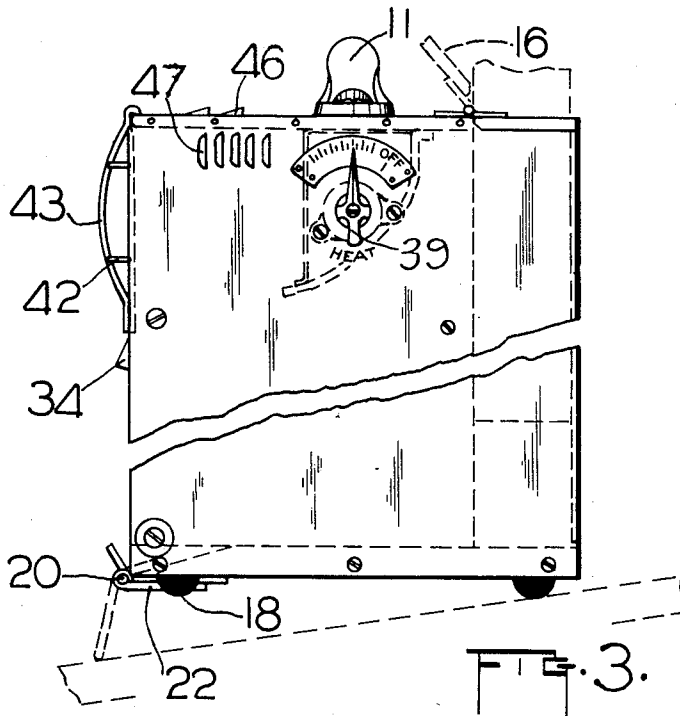
J. G. ATTWOOD

2,808,124

APPARATUS FOR SUPPLYING DECONTAMINATED AIR

Filed Dec. 8, 1953

3 Sheets-Sheet 2



INVENTOR.

BY JOHN G. ATTWOOD  
Sons, Glaser & Anderson

Oct. 1, 1957

J. G. ATTWOOD

2,808,124

APPARATUS FOR SUPPLYING DECONTAMINATED AIR

Filed Dec. 8, 1953

3 Sheets-Sheet 3

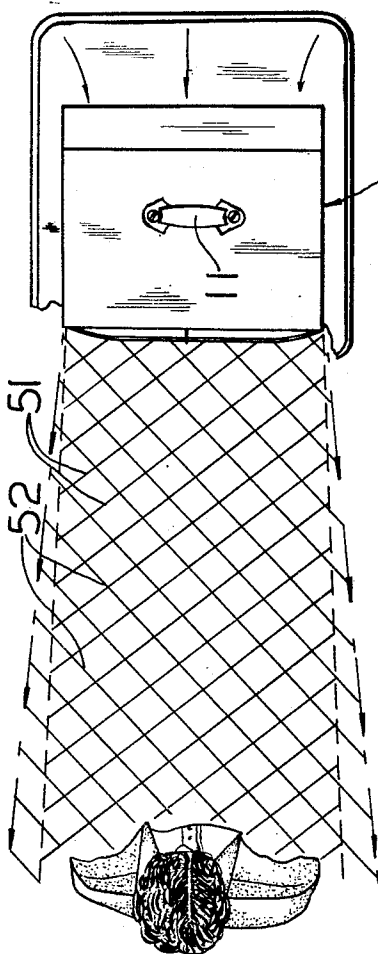


FIG. 5.

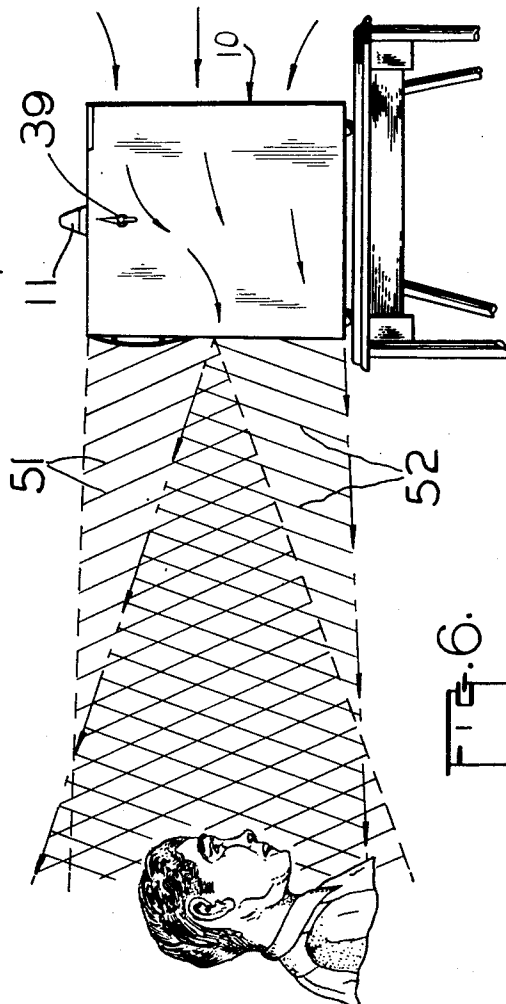


FIG. 6.

INVENTOR.

BY JOHN G. ATTWOOD.

*Soons, Gleister & Anderson*

1

2,808,124

## APPARATUS FOR SUPPLYING DECONTAMINATED AIR

John G. Attwood, Oak Park, Ill.

Application December 8, 1953, Serial No. 396,799

5 Claims. (Cl. 183—35)

The present invention relates generally to an apparatus for providing a filtered air stream for persons who are affected by air contaminated with such materials as pollen and dust.

Persons suffering from hay fever or other discomfort because of contamination in the air which they breathe, which often results from inflammation of the sinus, are frequently benefited by the use of efficient filtering systems capable of removing pollen, dust and other materials from the air which they breathe. It is, of course, important in such filtering systems to remove as much of the foreign materials from the air as possible, inasmuch as these materials may have more effect at certain times. Thus, during the time of the year when the air has a particularly high pollen content, the hay fever sufferer tends to be more sensitive to pollen in the air.

It is, of course, possible to secure some measure of relief by providing air conditioning for the person during the season during which the pollen count is at its highest. However, most air conditioning systems are expensive to install and to maintain. The need still remains therefore for an air conditioning arrangement which efficiently removes foreign materials such as pollen and dust from the air, and particularly, for a portable air conditioning system which can be readily moved from place to place.

The provision of a filtered air stream to the person suffering from breathing foreign materials from the air is not sufficient. The blowing of such a stream upon a person not only may cause discomfort but, in addition, may result in other respiratory difficulties, such as colds.

The principal object, therefore, of the present invention is the provision of an improved apparatus for relieving persons who suffer from the presence of foreign materials in the air which they breathe without causing secondary effects such as other respiratory difficulties.

Other objects of the present invention are to provide a simple but highly effective apparatus, in accordance with the principal object, which can be transported easily from place to place; which provides a filtered air stream without mixing with air outside the stream and without creating an uncomfortable feeling in the user.

A still further object of the invention is to provide an apparatus for conditioning an air stream which includes means for filtering air to remove foreign materials and directing the filtered stream to the head of a user in substantially laminar flow and supplying concurrent heat in such amounts as to prevent discomfort.

In an improved device of the present invention, there can be provided a compact assembly including a filtering element capable of removing a substantial portion of the foreign materials, such as pollen and dust, present in the air, a fan operating at a low velocity which causes air to pass through the filter and at the head of the user in substantially laminar flow, and a source of radiant heat which is also directed at the head of the user but which does not heat the air. The source of radiant heat is arranged so as to cause the heat rays and air stream

2

to concurrently impinge upon the head of the user. The amount of radiant heat is preferably adjustable to suit the comfort of the user.

It will thus be seen that the air stream and source of radiant heat are in coacting relation. The moving air stream across the head of the user inherently causes some cooling of the user due to evaporation but the source of radiant heat makes up for this cooling so that the user suffers no discomfort with resultant difficulties such as colds. It will be apparent that the flow of air across the head of the user should be substantially uniform at all points in the stream and that the heat should be uniformly delivered to the head of the user. Furthermore, the flow should be substantially laminar flow to prevent mixing-in of the room air, i. e., unfiltered air.

The use of the apparatus of the invention thus permits a person to be comfortable in a room containing contaminated air without requiring filtering of all of the air in the whole room. Furthermore, the benefits of the invention may even be enjoyed in the out-of-doors or in rooms where outside air is freely admitted. No known previous device has been provided for relieving sufferers from contaminated air under such widely varying conditions.

It will be noted that the air is not heated and that the air is delivered to the user of the invention at room temperature and under existing humidity conditions. Of course, heating of the air would cause a decrease in humidity which might cause discomfort to the user. Satisfactory balancing of heat and humidity is not feasible and consequently is not satisfactory. Imbalance results in a heating or cooling of the user which tends toward discomfort.

A further description of the present invention will be made in connection with the attached sheets of drawings, in which:

Figure 1 is a view in elevation, and partially in cross section, illustrating one embodiment of the present invention;

Figure 2 is a front elevational view of apparatus of the invention;

Figure 3 is a side elevational view of the apparatus shown in the previous figures;

Figure 4 is a top plan view of the apparatus illustrated in Figures 1 to 3;

Figure 5 is a plan view of the apparatus in operation, illustrating schematically the path of the air stream and the radiant heat; and

Figure 6 is a side elevational view corresponding to the view shown in Figure 5.

The apparatus shown in the drawings comprises a frame 9 about which is disposed an open-ended, rectangular housing 10 which may be fabricated from sheet metal, wood, or other suitable material, the housing 10 being provided with a handle 11 to facilitate carrying the apparatus from room to room. The rear end of the housing 10 is open and of sufficient size to receive a rectangular filter element 12 capable of filtering foreign materials such as pollen and dust from the air. The filter 12 may be composed of fibrous materials, such as glass strands or the like, closely matted together to provide a porous filter element and the fibrous material may be impregnated, as desired. The filter 12 is secured against a resilient gasket 13 mounted on the periphery of a frame member 14. To facilitate removal of the filter 12, an access door 16 is provided in the top of the housing 10, the door being connected to the housing by means of hinges 17. The filter 12 may be conveniently removed by opening the access door 16, as shown in dotted outline in Figure 3, so that the filter 12 can be lifted out of the rear of the housing 10.

The base of the housing 10 is provided with rubber

feet or cushions 18 at each corner thereof to prevent a slipping of the unit and damage to the surface upon which it is set. The base of the housing 10 is also provided with a foldable leg 19 which is pivoted about a hinge 20, as shown best in Figure 3, so that the unit may be tilted or mounted in a horizontal position on a sloping surface by folding the leg 19 about the hinges 20.

A removable front plate 21 is provided at the front of the housing 10 for receiving a second filter element 22 which may comprise the same type of filter as employed in the filter element 12.

Within the housing 10 and secured to the frame 9 is a bracket 24 which supports a fan unit, including a fan blade 26 and a motor 27. The fan unit may be relatively small since the velocity of the air stream leaving the filter 22 should be relatively low, preferably in the range from about 20 to 100 feet per minute. However, an air stream should be delivered which has uniform velocity in all parts of the stream, at least across that portion which impinges upon the head of a user, and which is as non-turbulent as possible so as to prevent, insofar as possible, mixing in of the air around the stream.

The speed of rotation of the fan blade 26 may be controlled by a speed control adjuster 28 connected to the electrical circuit of the motor 27. As illustrated best in Figure 1, the fan blade 26 is disposed within an open bracket 29 secured to the base of the housing 10 and also to a curved baffle member 31 extending from the top of the housing 10. The curved baffle member 31 cooperates with a second baffle 32 to confine the flow of air established by the fan unit into a path transverse to the plane of the filter 22.

In order to assist in preventing mixing of air with the stream provided by the apparatus of the invention, an air curtain may be disposed about the stream. Such a curtain may comprise a high velocity stream which surrounds the stream directed at the head of the user. Such a high velocity stream should not impinge upon the person of the user as it may cause discomfort. Various ways of providing an air curtain may be employed. One way of providing the curtain is to design the filter element 22 so that it provides a greater resistance to air flow through its central portion than at its edges. This can be done conveniently by providing a thicker mat of the fibrous material at the central portion of the filter element 22 or by increasing the density of the filter in this area. Under these conditions, the air stream leaving the filter element 22 has a lower velocity in its central portion than it does around the edges, thereby providing a relatively quiescent air stream surrounded by bordering air streams of higher velocity. The velocity of the central stream is preferably in the aforementioned range of 20 to 100 feet per minute.

The effect of this arrangement is to provide, as pointed out, a curtain of air on the sides of the central stream and thereby minimize the possibility of contaminating the central stream, which is directed at the person, with the contaminated air about the stream. To aid in providing this curtain, the front plate 21 may be provided with louvers (not shown) to direct the curtain of air about the central portion of the stream.

In order to facilitate opening of the front plate 21, finger tabs 34 are provided.

In the embodiment shown in the drawings, the source of radiant heat comprises a spirally wound heating element 36 supported on a ceramic cone structure 37, and mounted in the housing 10 by means of a bracket 38. The amount of heat supplied by the heating element 36 is controlled by means of a rheostat 39 and the heating element may be turned on and off by a suitable switch. The heating element is preferably of the type which provides an adequate supply of radiant heat without operating above the point of incandescence so that no visible light is generated through its operation.

The heating element 36 operates in conjunction with

a curved reflector 41 which, of course, is located behind the heating element 36. The front of the heating element is protected by a frame structure including cross members 42 and vertical frame members 43, as best seen in Figure 2.

The reflector 41 is designed to deliver the heat substantially uniformly across the head of the user. Of course, a non-uniform heat distribution can be tolerated, provided however, that the air stream impinging upon the head of the user has the same non-uniformity. In other words, the radiant heat is arranged to make up for the loss of heat occasioned by the flow of air and the pattern of heat distribution should be correlated to the pattern of air distribution and should be so regulated that the user does not get any sensation of cooling or heating.

In order to cool the reflector 41, the baffles 31 and 32 may be provided with a small air space 44 between the baffles so that a small amount of air delivered from the fan unit passes against the rear of the reflector 41. To dissipate this heated air stream without having it come in contact with the main air stream, the unit may be provided with rearwardly facing louvers 46 at the top of the housing 10, and additional sets of rearwardly facing louvers 47 at the sides of the unit.

As has been pointed out, it is not desirable to heat the air because of the difficulty in eliminating the heating and cooling sensation. In addition, when the air is heated, it has a natural tendency to rise so that control of its direction is difficult. Accordingly, heating of the air should be avoided as much as possible.

In the operation of the unit, it is, as above noted, desirable that the low velocity air stream should not be heated before the air stream passes across the person's head. Radiant heat waves do not heat the air and it is not necessary that the air stream and heat waves be separated, though this is desirable to prevent heating of the air stream. The radiant heating element 36 and the reflector 41 are, therefore, positioned in such a manner as to direct the heat rays at an angle to the direction of movement of the air stream leaving the filter 22. This permits location of the heat source out of the air stream and is best illustrated in Figure 6 of the drawings in which the area of radiated heat is designated by the lines 51, and the extent of the air stream is indicated generally by lines 52. It will be seen that the two areas intersect to a substantial degree only in the region in the head of the user.

The focusing of the heat rays upon the user substantially eliminates the sensation of a draft caused by the air stream being blown through the filter. The adjustment of the amount of heat by means of the rheostat 39 will provide the most comfort when the heat supplied from the heating element 36 is substantially equal to the heat lost by the person due to the presence of the moving air stream.

The apparatus of the invention may be modified to recirculate air through the filter, as desired. This permits more effective use of the filters and the manufacture of a more compact unit.

The present invention provides a compact, readily portable unit which is inexpensive to manufacture and to maintain, which is capable of a wide range of adjustment to suit the needs of the user and which provides a simple but effective means for supplying streams of filtered air at maximum comfort to the user. It will be seen that the unit can be used in open or closed rooms, as well as the out-of-doors. This wide adaptability for providing comfort to persons who suffer from contaminated air is believed to be wholly new.

It will be evident from the foregoing description that various modifications can be made to the illustrated structure without departing from the scope of the above invention.

5

I claim:

1. Apparatus for supplying decontaminated air comprising, in combination, filter means for removing contaminating materials from an air stream, means for directing a stream of air through said filter means and toward a point spaced from the apparatus, a source of radiant heat disposed out of the air stream, and reflector means around said source of radiant heat to direct the heat in converging relation with respect to said air stream so that said air stream and the heat from said source are coincident at a point spaced from the apparatus, said reflector means, said source of heat, and said air directing means being positioned to substantially prevent heated air from mixing with said air stream.

2. Apparatus for supplying decontaminated air comprising, in combination, filter means for removing contaminating materials from an air stream, means for moving an air stream through said filter means and toward a point spaced from said apparatus in substantially laminar flow, a source of radiant heat out of the air stream, and reflector means around said source of radiant heat to direct the heat in converging relation with respect to said air stream so that said air stream and said heat are coincident at a point spaced from the apparatus, said reflector means, said source of heat, and said air directing means being positioned to substantially prevent heated air from mixing with said air stream.

3. Apparatus for supplying decontaminated air comprising, in combination, filter means for removing contaminating materials from an air stream, means for moving an air stream through said filter means and toward a point spaced from said apparatus in substantially laminar flow, a source of radiant heat disposed above said air stream so as to prevent the heating of the air stream, and reflector means around said source of heat, said reflector being formed to direct the heat in converging relation with respect to said air stream so that said air stream and said heat are coincident at a point spaced from the apparatus, said means for moving the air and said heat reflector means being arranged to direct

6

air and heat to said point in predetermined and related amounts.

4. Apparatus for supplying decontaminated air comprising, in combination, filter means for removing contaminating materials from an air stream, means for moving an air stream through said filter means and toward a point spaced from said apparatus in substantially laminar flow, a source of radiant heat out of and above the air stream, reflector means disposed around the source of heat, said reflector means being parabolic in shape to direct the heat in converging relation with respect to said air stream so that said air stream and said heat are coincident at a point spaced from the apparatus, and means for adjusting the amount of air relative to the amount of heat.

5. Apparatus for supplying decontaminated air comprising, in combination, filter means for removing contaminating materials from an air stream, means for moving an air stream through said filter means and toward a point spaced from said apparatus, said means for moving the air stream being arranged to provide air in laminar flow and of substantially uniform velocity throughout a predetermined cross-sectional area, a source of radiant heat out of the air stream, and reflector means around said source of heat for directing the heat in converging relation with respect to said air stream so that said air stream and said heat are coincident at a point spaced from the apparatus, said heat reflector means being positioned above and being formed to deliver heat at said spaced point in uniform amounts throughout said predetermined cross-sectional area.

## References Cited in the file of this patent

## UNITED STATES PATENTS

|           |         |               |
|-----------|---------|---------------|
| 1,979,538 | Fisher  | Nov. 6, 1934  |
| 2,167,122 | Metcalf | July 25, 1939 |
| 2,415,621 | Arnhym  | Feb. 11, 1947 |

## FOREIGN PATENTS

|         |               |               |
|---------|---------------|---------------|
| 610,353 | Great Britain | Oct. 14, 1948 |
| 634,785 | Great Britain | Mar. 29, 1950 |