BIOLOGICAL FILTER FOR THE
STERILIZATION AND ENRICHMENT OF A
GAS STREAM WITH NEGATIVE IONS

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References Cited
UNITED STATES PATENTS
2,418,339 4/1947 Ehrrott ......................... 55/279 X
2,553,711 5/1951 Jackson ......................... 21/83 X
2,785,769 3/1957 Pollock ......................... 55/6

ABSTRACT
A biological filter for the sterilization and enrichment of a gas stream with negative ions, wherein said filter comprises in combination, on the path of the gas molecules and in the direction of flow of the gas, a first separating electrode which is brought to a negative potential, a second extraction electrode which is brought to a positive potential and entirely covered with electric insulating material, an ultraviolet lamp for irradiating said gas stream and a third output electrode which is brought to a negative potential.

1 Claim, 3 Drawing Figures
BIOLOGICAL FILTER FOR THE STERILIZATION AND ENRICHMENT OF A GAS STREAM WITH NEGATIVE IONS

This invention relates to a biological filter for the sterilization and enrichment of a gas stream with negative ions, the filter being primarily intended to be fitted in ventilation sources in order to obtain an appreciable increase in the concentration of negative ions which are present in air with respect to the concentration of positive ions.

In fact, recent studies carried out by doctors and physiologists have served to demonstrate the considerable importance of the presence of negative ions in the atmosphere and more especially of negative oxygen ions in the case of air since they prove essential to biological and particularly human equilibrium. It is known at the present time, for example, that disorders as widely different in character as asthma, arthritis, some types of migraines or sick headaches, cancer and so forth appear much more frequently and more readily in persons who lead their daily lives in environments which have a low concentration of negative oxygen ions.

Generally speaking, the surrounding air contains a much higher proportion of positive ions than negative ions even in the zones in which the air is of high purity. Unfortunately, the processes of pollution by waste products discharged into the atmosphere from industrial sources bring about a considerable reduction in the number of negative oxygen ions which are present in the air breathed by human beings; and in some extreme cases such as the centers of large industrial towns, these negative ions are completely eliminated. The recent biological studies mentioned earlier now confirm the major disadvantages which arise from these conditions.

The precise aim of this invention is to provide a biological filter for counteracting the disastrous effects of pollution by means of a surplus of negative ions produced within a flowing gas stream, and especially an air stream for the ventilation of residential premises.

Said biological filter for the sterilization and enrichment of a gas stream with negative ions is essentially characterized in that it comprises in combination, on the path of the gas molecules and in the direction of flow of the gas, a first separating electrode which is brought to a negative potential, a second extraction electrode which is brought to a positive potential and entirely covered with electric insulating material, an ultraviolet lamp for irradiating said gas stream and a third output electrode which is brought to a negative potential.

In accordance with the invention, the first separating electrode which is brought to a negative potential with respect to the surrounding atmosphere carries out a first selection of the ions naturally contained in the gas stream to be enriched with negative ions by collecting the majority of the positive ions originally contained in said stream. The second extraction electrode which is located behind the first in the direction of flow of the gas stream is positively charged and, by virtue of the field produced, consequently constitutes the accelerating electrode for the few negative ions which have passed through the first electrode. In accordance with the invention, said second extraction electrode is electrically insulated over its entire surface, for example by means of a covering of plastic material of any suitable type, in order that said electrode may thus be prevented from collecting the few negative ions which pass through this latter. The ultraviolet lamp which is then encountered by the gas stream on its flow path causes on the one hand bacteriological sterilization and above all very strong ionization of the neutral molecules of said gas stream and this latter is thus abundantly seeded with positive and negative ions. The third output electrode is brought to a negative potential so that the positive ions produced within the gas stream by the ultraviolet lamp can be collected as they pass, there being allowed to remain only the negative ions which are then carried to the exterior by the gas stream.

The potential differences established between the three electrodes are not critical per se but an advantageous normal value can be within the range of 350 to 400 volts, for example, this being readily obtained by means of a domestic generator which operates from the mains supply system.

As has been explained earlier, the main advantage of said biological filter lies in the fact that it provides an effective means of combating air pollution and the resultant destructive action on the negative ions of oxygen which are essential for maintaining life in all its forms. The present invention accordingly finds a wide variety of applications in numerous fields such as science, agronomy, zoology, space technology, medicine, aesthetics, food science and so forth. One immediate and very important application of the biological filter in accordance with the invention consists in inserting said filter in the outer shutter of an air conditioning ventilator of the type employed for comfort control.

A better understanding of the invention will in any case be gained from a perusal of the following description which relates to one example of application of the biological filter according to the present invention, reference being made to the diagrammatic FIGS. 1 to 3 of the accompanying drawings, in which:

FIG. 1 is an exploded view of a biological filter in accordance with the invention;

FIG. 2 is a sectional view of one form of construction of the filter of FIG. 1, said filter being engaged within a flat metal casing;

FIG. 3 shows the application of the biological filter according to the invention to an apparatus for the production of conditioned air.

There is shown in FIG. 1 a flat gas stream 1 which flows in the direction of the arrow F under the action of a ventilator of a type known per se (not shown), which passes successively through the first separating electrode 2, the second extraction electrode 3, the ultraviolet lamp 4 and the third output electrode 5 and is then finally discharged to the exterior for use by living beings. In accordance with the invention, the electrodes 2 and 5 are of conductive metal and of any desired shape although a constructional design in the form of a grid is wholly suited to the result which is sought. In the non-limitative embodiment of FIG. 1, the ultraviolet lamp has the shape of an annular tube within which the gas stream passes. Also in accordance with the invention, the second electrode or extraction electrode 3 is wholly covered with an insulating plastic sheath 6. A direct-current supply source 7 of a type known per se and comprising the electronic equipment of the apparatus is adapted to carry the different electrodes 2, 3 and 5 at the desired potentials. In the exam-
ple of FIG. 1, the electrode 2 is brought by means of the conductor 8 to a negative potential of -200 volts; the extraction electrode 3 is brought by the conductor 9 to a positive potential of +200 volts and the third extraction electrode 5 is brought by the conductor 10 to a negative potential of -200 volts. The supply unit 7 also serves to supply electric power via the conductors 11 and 12 to the ultraviolet lamp 4.

There is shown diagrammatically in FIG. 1 by means of the signs + and - the relative proportion of the positive and negative ions which appear within the gas stream 1 progressively as this latter passes through the biological filter in accordance with the invention. Before passing into the apparatus, that is to say before reaching the electrode 2, the positive ions are distinctly predominant. Inasmuch as the grid 2 retains the greater part of said positive ions, the ionization is then much lower and essentially constituted by negative ions. At the moment of passing through the ultraviolet flux of the lamp 4, the gas stream is totally sterilized and again highly ionized, the third output electrode 5 retains the majority of the positive ions, with the result that the gas stream 1 is essentially seeded with negative ions as it leaves said electrode.

The sectional view of FIG. 2 shows the different elements of FIG. 1 in the real relative arrangement in which they are engaged within a flat casing 13. The electrodes 2, 3 and 5 as well as the ultraviolet lamp 4 are again shown in this figure. By virtue of this arrangement, the biological filter in accordance with the invention is particularly convenient to use since the assembly is presented in the form of a plate which can thus be readily placed on the path of a gas stream in order to enrich this latter in negative ions. This is the case, for example, with the example of construction of FIG. 3 in which is shown an apparatus 14 of known type for the production of conditioned air. The outlet shutter 15 of this apparatus has two guides, only one guide 16 being visible in FIG. 3, the plate 17 containing the elements of the biological filter of FIG. 2 being slidably engaged within said guides. In this mode of application of the invention, the conditioned air is impelled into the enclosure to be thermostatically controlled in a direction of flow which is indicated by the arrow F. The flow of conditioned air through said shutter 15 fitted with the generator 17 is alone sufficient to ensure substantial diffusion of negative oxygen ions within the thermostatically controlled premises, thus producing a beneficial action on living beings as already pointed out in the foregoing.

As is readily apparent, the invention is not limited in any sense to the different forms of construction which have been described only by way of indication and extends to all alternative forms which are within the capacity of any one versed in the art. As has already been explained earlier, the present invention has a very broad range of application which is not limited solely to the production of conditioned air enriched with negative oxygen ions.

By way of example, one application of particular interest is the ventilation of automobiles in which a biological filter according to the invention is placed in the ventilation circuit and thus provides passengers with the means for readily obtaining an atmosphere which is biologically pure and rich in negative oxygen ions.

What we claim is:

1. A biological filter for the sterilization and enrichment of a gas stream with negative ions, comprising on the path of the gas molecules and in the direction of flow of the gas, a first separating electrode at a negative potential -V, a second extraction electrode at a positive potential +V and entirely covered with electric insulating material, an ultraviolet lamp for irradiating said gas stream, a third output electrode at a negative potential -V, the three electrodes being conductive metallic grids, the second electrode being electrically insulated from the gas stream by a covering of plastic material, the ultraviolet lamp surrounding the gas stream and the value 2V being between 350 and 400 volts.

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