

Title

Vehicular photoelectron air purifier

Background of the Present Invention**Field of the Present Invention**

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The present invention relates to a vehicular photoelectron air purifier, and more particularly, it relates to an air purifier with a replaceable UVC emitting light, which can eliminate virus, bacillus and mildew and etc. in the air through purifying the air by a polarization end ultraviolet ray, with a vehicular power supply besides the municipal power supply.

Description of Related Arts

Insufficient ventilation of indoor or an enclosed room readily makes the air dreggy and leads to the virus and bacillus propagated and spread. In a public and an air conditioning room, therefore, it is necessary to manually purify the air and eliminate virus and bacillus without delay for keeping fresh air in a given room or an area. In an air conditioning room during summer period, purification of indoor air is also a very important problem that is difficult to deal with. More and more attentions are drawn to indoor air purification due to wide diffusion of SARS virus. In a conventional method,

an ultraviolet light for eliminating bacillus may cause injure by irradiating human body. In addition, the present conventional ventilating and air conditioning equipment have no air purifying function, which generally are equipped with simple deducting and filtering devices, and it is not cost effective to replace one during mass production. In addition, insufficient ventilation of car, train, airplane, and ship department will also cause the same concerns as described and conventional methods are not sufficient to provide solution. Moreover, none of the present conventional air purifier provides any mean of replaceable UVC emitting device for consumer to replace any malfunction UVC emitting light.

Summary of the Present Invention

A main object of the present invention is to provide an air purifier with a replaceable UVC emitting light to overcome the defects in the prior art, and to provide vehicular photoelectron air purifier for purifying the air with high efficiency through the ultraviolet and through such way as combing the ultraviolet and the negative ion by a power supply powered of transportation vehicles such as cars and ships.

According to the present invention, there is provided a vehicle photoelectron air purifier in the form of a three-dimensional, square columnar housing, comprising

- an air inlet in a surface of the housing,
- an air outlet for passing purified air out of the housing,
- at least one extractor fan mounted close to the air outlet and arranged to draw air in through the air inlet, through the housing, and out through the air outlet,
- an air aggregator located between the air inlet and the extractor fan(s),

- a carbon filter mounted to filter air entering the purifier through the intake,
- at least one replaceable tube emitting ultraviolet radiation for generating anions, integrally mounted in the housing in the air flow between the air inlet and the air outlet,
- 5 - a carbon fibre wire located in the flow of the filtered air from the carbon filter, between the ultraviolet tube(s) and the air outlet, for generating negative ions in the filtered air,
- an electric circuit with a voltage transformer connected with an indicator light,
- a starter electrically connected via said electric circuit to the ultraviolet radiation
- 10 emitting tube(s),
- a switch on the housing connected via the electric circuit to the extractor fan(s),
- a plug on an electric cord electrically connected to said electric circuit for engaging with a socket for receiving electricity therefrom,
- a confluence compartment comprising an air collector between the air inlet and the
- 15 extractor fan(s) for directing filtered air to the carbon fibre wire and the ultraviolet radiation tube, and
- a dustproof cover for the housing.

Advantageously, the or each ultraviolet radiation tube is mounted at the centre of an

20 air-collecting wall of the confluence compartment.

The air purifier may comprise an assembly of replaceable ultraviolet radiation tubes having a predetermined size and shape which is identical to a predetermined size and shape of a rectangular chamber of the housing, whereby said assembly may be moved in and out of

said chamber so that a user may replace used and dirty ultraviolet radiation tubes by removing and inserting said assembly.

At least two extractor fans may be arranged in said square-columnar body abreast
5 along the liner direction of the ultraviolet radiation tube, and said air collector may be composed of a space surrounded by an air-collecting wall and a sheltering wall, and said ultraviolet tube may be fixed between a front and a rear portion of the sheltering wall whereby no light rays are radiated out of the purifier.

10 Advantageously, a support frame is mounted on a side inside said housing, an electronic converter and an electronic generator power supply are provided at an upper end thereof; and a power socket for connecting to a vehicle power supply or main power is provided on a side surface of said housing.

15 A quadrate hole may be located on a front end surface of said housing, in which a power supply switch for controlling said extractor fan and said ultraviolet radiation tube is arranged; and a hole may be located above said quadrate hole, in which, at least one LED, and preferably two LEDs of different colours, for indicating a function is provided.

20 In a preferred embodiment, the air purifier comprises an air exhaust frame trellis device with cambered surface structure located on a rear upper portion of said housing at said air outlet; an outer frame trellis device located at a front portion of said housing; an air intake frame trellis located at a rear portion of said outer frame trellis device; wherein said intake frame trellis device provides said air inlet and comprises a fixed dustproof frame, dustproof
25 net and the dustproof cover; wherein said ion discharging carbon fibre wire is fixed in a

centre portion of the front surface of said air exhaust frame trellis device; said ultraviolet radiation tube is mounted at said air outlet in said housing and lies in said air collector; and said extractor fan and an electric motor therefor are mounted close to the inner surface of the air intake frame trellis device.

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The air purifier may comprise an electronic converter, an electronic generator power supply, and a power line located at a lower portion in said housing; and a power socket for connecting to the vehicle power supply or mains power may be provided on a side surface of the housing.

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It will be appreciated that the ultraviolet radiation is very effective for eliminating viruses, bacilli and mildew from the air.

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The present invention employs said assembly of an assembly of replaceable ultraviolet ray radiation tubes to provide a mean of replacing used and dirty ultraviolet ray radiation tube for consumers without the hassle of open up said air purifier when replacing said used and dirty ultraviolet ray radiation tube.

Brief Description of the Drawings

FIG. 1 is a side section view of the present invention which shows the UVC emitting device.

FIG. 2 is a top section view of the present invention.

5 FIG. 3 is a side view of the present invention.

FIG. 4 is other side section view of the present invention

FIG. 5 is a rear section view of the present invention.

FIG. 6 is front view of the present invention.

FIG. 7 is an underneath view of the present invention.

10 FIG. 8 is another side view of the present invention.

FIG. 9 is a top view of the prevent invention.

FIG. 10 is an underneath view of the present invention.

FIG. 11 is a composite view of the present invention.

FIG. 12 is filter composite view of the present invention.

15 FIG. 13 is assembly of replaceable ultraviolet ray radiation tubes composite view of the present invention.

FIG. 14 is a detail section view of the present invention.

FIG. 15 is a detail top section view of the present invention.

Detailed Description of the Preferred Embodiment

20 A preferred embodiment of the present invention is a vehicular photoelectron air purifier, which mainly comprises a plurality rows of extractor fans, a plurality of polarization

end ultraviolet ray radiation tubes, an assembly of replaceable ultraviolet ray radiation tubes and a plurality of air collecting walls. When air is drawn by said extractor fan into said vehicular photoelectron air purifier, it will ignite said polarization end ultraviolet ray radiation tube to radiate a polarization end ultraviolet ray which can eliminate virus, bacillus and mildew in the air that flows through said tube. Said vehicular photoelectron air purifier is equipped with one air inlet and one air outlet. Said polarization end ultraviolet ray radiation tube is mounted at said air inlet inside of said main body, while said extractor fan is fixed at said air outlet. When air containing virus, bacillus and mildew is drawn in the body through said air outlet, flowing air can easily enter and traverse through said air outlet, said flowing air can easily enter and traverse through said air intake frame trellis device of said vehicular photoelectron air purifier and then reach said air exhaust frame trellis device so that the air containing virus, bacillus and mildew must contact with said polarization end ultraviolet ray radiation tube and thus said polarization end ultraviolet ray eliminates virus, bacillus and mildew contained in the air.

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Referring to FIG. 11, FIG. 12 and FIG. 15, it further discloses the composition of said preferred embodiment of said invention. Said vehicular photoelectron air purifier has a main body 1 with square-columnar structure, and an air exhaust frame ventilation grill device 2 is provided on a plane of a front portion of said body 1; air with the bacillus eliminated is exhausted through said air exhaust frame trellis device 2. An activated carbon fiber filter 5 is provided at a front portion of said body 1, which provides an air inlet and is used as a fixed ventilation turbine 6, electronic motor 7 and carbon fiber stripe 8; function indicating light 10 is kept close to the inner surface of said air exhaust frame ventilation grill device 2.

An assembly of an assembly of replaceable ultraviolet ray radiation tubes 22 comprises of a confluence compartment 20 wherein a carbon fiber strips 6 is affixed thereby provide a mean of eliminating virus; a guarding wall which is having indicial size and sharp of a pre-determined size and sharp of air confluence wall 24; a metal spring conductor 25 and metal conductors 21 are affixing onto a plurality of conductor compartments 26 therein an polarization end ultraviolet ray tube 14 integrally affixed in the front portion of said guarding wall 24. Said assembly 22 of replaceable ultraviolet ray radiation tubes is having a pre-determined size and sharp which is identical to a pre-determined size and sharp of a rectangular hold of main body 1 whereby said assembly 22 can affix onto thru said rectangular hold of main body 1 providing a mean of moving in and out chamber of said assembly which contributes a mean for consumer to replace used and dirty ultraviolet ray tube by taking out or moving is of said assembly.

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A power switch 11 is available on an upper part of a electronics circuit board 9 which is for protecting and fixing electronic generator of power supply; A hole 39 is provided at a rear portion of said body 1 and is used for fixing assembly of replaceable ultraviolet ray radiation tubes 22 that is for consumer to replace used or dirty a polarization end ultraviolet ray radiation tube 16. There is a hole 15 above a led indicator 16, which is used for fixing LBDs 10 that is provided for indicating functions.

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In practice, referring to Fig 4, 5, & 9, when said vehicular photoelectron air purifier is operated, air containing virus, bacillus and mildew is drawn by said ventilation turbine 6

into said air collecting wall in said main body 1 through said inward fan grill 4, so flowing air can easily enter said air collecting wall and then reaches said air exhaust frame ventilation grill device 2. Said polarization end ultraviolet ray radiation tube 14 is provided in a center portion of said air collecting wall, this means that when air containing virus, bacillus and mildew flows and enters said air collectors 18 and 19, and then enter into a confluence compartment 20 between said polarization end ultraviolet ray radiation tube 14 and said air collecting wall 19, said polarization end ultraviolet ray radiation tube 14 will radiate polarization end ultraviolet ray so as to eliminate virus, bacillus and mildew contained in the air; then purified clean and fresh air is, by said extractor fan 10, exhausted out of the air exhaust frame trellis device 2.

A sheltering walls 21 are provided at a front portion and a rear portion of said air collecting wall 18 for prohibiting user's eyes from injure by said polarization end ultraviolet ray radiating to the outside of said body 1.

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An input power of the present invention is, through switch 20, as shown in Fig 9, and through a full wave band rectifying circuit, supplied to the extractor fan via the speed control circuit, and operate a full wave rectifying circuit of said polarization end ultraviolet ray radiation tube 15 via a DC-AC converting circuit. This structure details of an electronic circuits in said vehicular photoelectron air purifier belongs to the prior art, therefore it is omitted here.

Said vehicular photoelectron air purifier of this invention is light and convenient for

user's carrying (a train or car plug is necessary) so that user can breathe in clean and fresh air free from virus, bacillus and mildew in various places, and thus the respiratory infectious disease can be effectively prevented.

5 FIG. 1 and FIG. 2 show a detailed structure of said an assembly of replaceable ultraviolet ray radiation tubes for said photoelectron air purifier. Referring to FIG. 11, said vehicular photoelectron air purifier has a main body 1 with square-columnar structure, and an air exhaust frame trellis device 2 is provided on a plane of a front portion of said body 1; air with the bacillus eliminated is exhausted through said air exhaust frame trellis device 2.

10 A air intake frame trellis device 5 is provided at a rear portion of said body 1, which provides an air inlet and is used as a fixed dustproof frame 6, dustproof net 7 and dustproof cover 8; an extractor fan 10 is kept close to the inner surface of said air exhaust frame trellis device 2.

15 Referring to Fig. 5, an electronic converter is available on an upper part of a support frame 9 which is for protecting and fixing electronic generator of power supply; a power supply socket 3 is provided on side of said body 1 and provides a connection to a vehicular power supply or the municipal power supply to the user.

20 Referring to Fig. 15, a quadrate hole 13 is provided at a front portion of said body 1 and is used for fixing a switch 15 that is for controlling functions of an extractor fan 10 and a polarization end ultraviolet ray radiation tube 14. There is a hole 16 above said switch 15, which is used for fixing LBDs 17 that is provided for indicating functions.

Referring to Fig. 4 & Fig. 11, in practice, when said vehicular photoelectron air purifier is operated, air containing virus, bacillus and mildew is drawn by said extractor fan 10 into said air collecting wall 18 in said main body 1 through said dustproof net 7, so flowing air can easily enter said air collecting wall 18 and then reaches said air exhaust frame trellis device 2. Said polarization end ultraviolet ray radiation tube 16 is provided in a center portion of said air collecting wall 18; this means that when air containing virus, bacillus and mildew flows and enters said air collectors 18 and 19, and then enter into said air inlet 20 between said polarization end ultraviolet ray radiation tube 16 and said air collecting wall 19, said polarization end ultraviolet ray radiation tube 16 will radiate polarization end ultraviolet ray so as to eliminate virus, bacillus and mildew contained in the air; then purified clean and fresh air is, by said extractor fan 10, exhausted out of the air exhaust frame trellis device 2.

As shown in Fig. 4, sheltering walls 5 is provided at a front portion and a rear portion of air collecting wall 6 for prohibiting user's eyes from injure by said polarization end ultraviolet ray radiating to the outside of said body 1.

An input power of the present invention is, through said switch 15 and through a full wave band rectifying circuit, supplied to the extractor fan via the speed control circuit, and operate a full wave rectifying circuit of said polarization end ultraviolet ray radiation tube 15 via a DC-AC converting circuit. This structure details of an electronic circuits in said vehicular photoelectron air purifier belongs to the prior art, therefore it is omitted here.

CLAIMS

1. A vehicle photoelectron air purifier in the form of a three-dimensional, square columnar housing, comprising
 - an air inlet in a surface of the housing,
 - an air outlet for passing purified air out of the housing,
 - at least one extractor fan mounted close to the air outlet and arranged to draw air in through the air inlet, through the housing, and out through the air outlet,
 - an air aggregator located between the air inlet and the extractor fan(s),
 - a carbon filter mounted to filter air entering the purifier through the intake,
 - at least one replaceable tube emitting ultraviolet radiation for generating anions, integrally mounted in the housing in the air flow between the air inlet and the air outlet,
 - a carbon fibre wire located in the flow of the filtered air from the carbon filter, between the ultraviolet tube(s) and the air outlet, for generating negative ions in the filtered air,
 - an electric circuit with a voltage transformer connected with an indicator light,
 - a starter electrically connected via said electric circuit to the ultraviolet radiation emitting tube(s),
 - a switch on the housing connected via the electric circuit to the extractor fan(s),
 - a plug on an electric cord electrically connected to said electric circuit for engaging with a socket for receiving electricity therefrom,
 - a confluence compartment comprising an air collector between the air inlet and the extractor fan(s) for directing filtered air to the carbon fibre wire and the ultraviolet radiation tube, and
 - a dustproof cover for the housing.
2. An air purifier according to claim 1, wherein the or each ultraviolet radiation tube is mounted at the centre of an air-collecting wall of the confluence compartment.
3. An air purifier according to claim 1, comprising an assembly of replaceable ultraviolet radiation tubes having a predetermined size and shape which is identical to a predetermined size and shape of a rectangular chamber of the housing, whereby said

assembly may be moved in and out of said chamber so that a user may replace used and dirty ultraviolet radiation tubes by removing and inserting said assembly.

4. An air purifier according to claim 1 or claim 2, comprising at least two of said extractor fans arranged in said square-columnar body abreast along the linear direction of the ultraviolet radiation tube, wherein said air collector is composed of a space surrounded by an air collecting wall and a sheltering wall, and said ultraviolet tube is fixed between a front and a rear portion of the sheltering wall whereby no light rays are radiated out of the purifier.
5. An air purifier according to any one of the preceding claims, wherein a support frame is mounted on a side inside said housing, an electronic converter and an electronic generator power supply are provided at an upper end thereof; and a power socket for connecting to a vehicle power supply or mains power is provided on a side surface of said housing.
6. An air purifier according to any one of the preceding claims, wherein a quadrate hole is located on a front end surface of said housing, in which a power supply switch for controlling said extractor fan and said ultraviolet radiation tube is arranged; and whereby a hole is located above said quadrate hole, in which, at least one LED for indicating a function is provided.
7. An air purifier according to claim 6, comprising two LEDs of different colours.
8. An air purifier according to any one of the preceding claims, comprising an air exhaust frame trellis device with cambered surface structure located on a rear upper portion of said housing at said air outlet; an outer frame trellis device located at a front portion of said housing; an air intake frame trellis located at a rear portion of said outer frame trellis device; wherein said intake frame trellis device provides said air inlet and comprises a fixed dustproof frame, dustproof net and the dustproof cover; wherein said ion discharging carbon fibre wire is fixed in a centre portion of the front surface of said air exhaust frame trellis device; said ultraviolet radiation tube is mounted at said air outlet in said housing and lies in said air collector; and said

extractor fan and an electric motor therefor are mounted close to the inner surface of the air intake frame trellis device.

9. An air purifier according to any one of claims 1 to 3, comprising an electronic converter, an electronic generator power supply, and a power line located at a lower portion in said housing; and wherein a power socket for connecting to the vehicle power supply or mains power is provided on a side surface of the housing.