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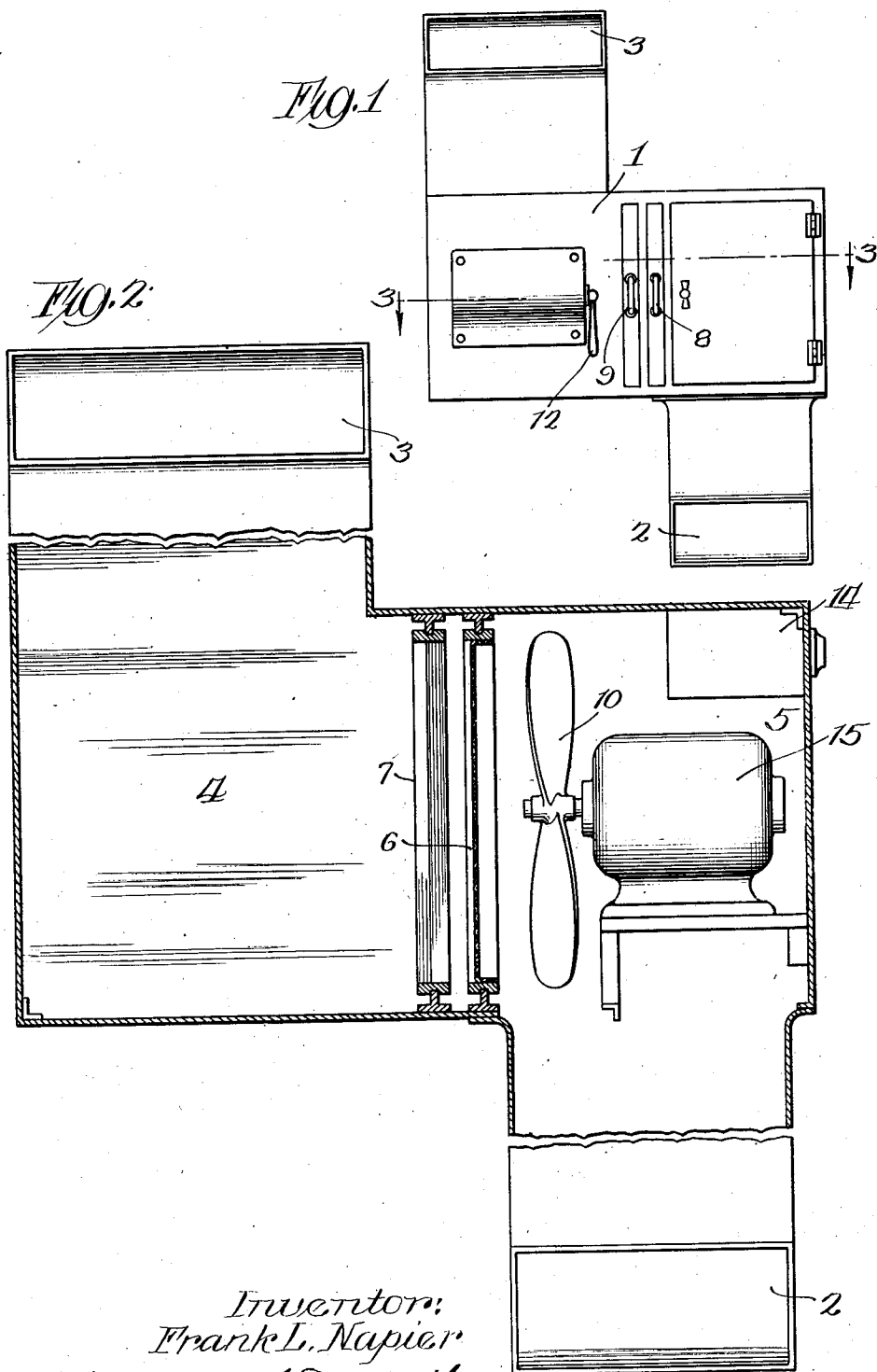
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METHOD AND APPARATUS FOR PURIFYING AIR

Filed Feb. 25, 1924

2 Sheets-Sheet 1



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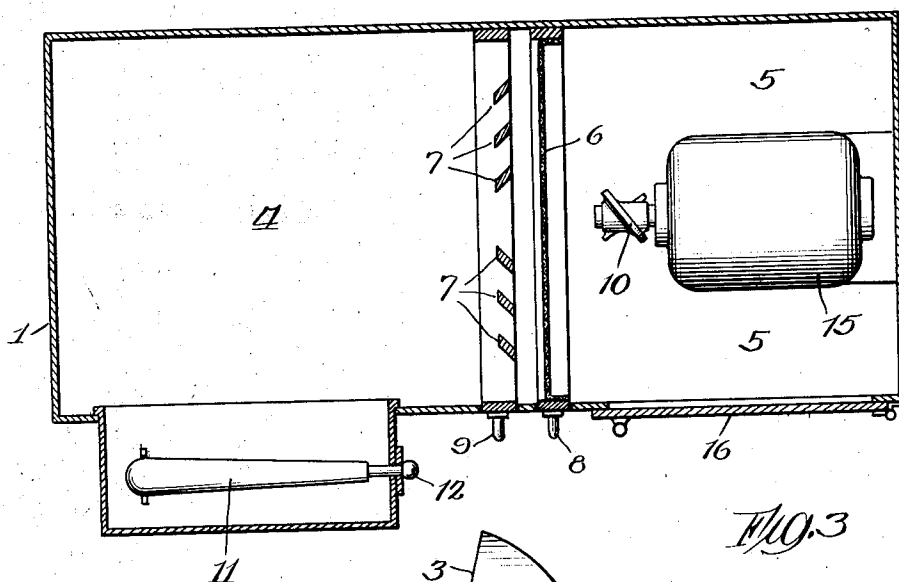


Fig. 3

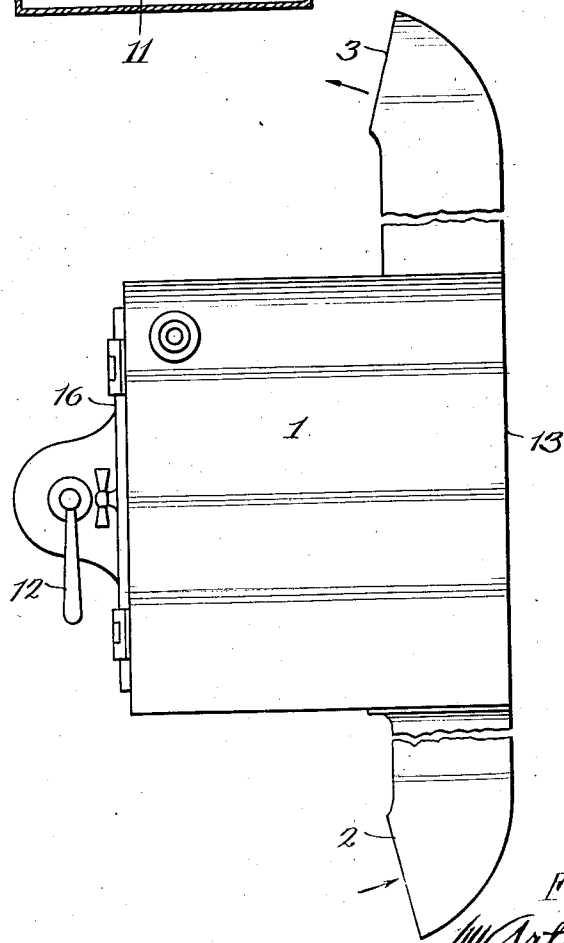


Fig. 4

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UNITED STATES PATENT OFFICE.

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METHOD AND APPARATUS FOR PURIFYING AIR.

Application filed February 25, 1924. Serial No. 695,003.

To all whom it may concern:

Be it known that I, FRANK L. NAPIER, a citizen of the United States, and resident of St. Joseph, Berrien County, Michigan, have invented a certain new and useful Improvement in Methods and Apparatus for Purifying Air, of which the following is a specification.

This invention relates to methods of and apparatus for purifying air to kill the germs therein.

In accordance with the invention, an electric lamp, of the mercury vapor type, is employed in position to project the ultra-violet rays thereof through a passing current of air, so that any germs in the air will be killed or destroyed. Circulation of the air through the apparatus is preferably accomplished by means of a fan or blower or other means for artificially creating a current of air past the position occupied by the ultra-violet ray lamp, whereby the motion of the air is sufficiently accelerated to accomplish the purification of the air quickly and in the desired manner. In addition, the electric lamp employed, and the method employed, creates or produces a certain amount of ozone, as a sort of by product, so that the process not only destroys the germs, but also revitalizes the air by the addition of more or less ozone thereto.

The object of the invention, therefore, is to provide a commercial method and apparatus for expeditiously and conveniently destroying the germs in the supply of air for houses, hospitals, offices and other places where it is important to have pure air, and where people are breathing the same air over and over again, thereby to insure against injury from the breathing of impure air.

It is also an object to provide certain details and features of construction and combinations tending to increase the general efficiency and the desirability of a method and apparatus of this particular character.

To the foregoing and other useful ends, the invention consists in the matters herein-after set forth and claimed, and shown in the accompanying drawings, in which,—

Fig. 1 is a front elevation of an air purifying apparatus embodying the principles of the invention.

Fig. 2 is a similar view, on a larger scale, showing certain portions of the apparatus in section, thereby to bring into view certain interior portions thereof.

Fig. 3 is a transverse section, on a larger scale, on line 3—3 in Fig. 1.

Fig. 4 is an end elevation of the said apparatus on the same scale as Fig. 2 of the drawings.

As thus illustrated, the invention comprises a box like body 1 of sheet metal or other material having a lower intake passage 2 and an upper outlet 3 for the purified air, the air entering at 2, passing through the apparatus, and then discharging at 3 after being purified. The body 3 is divided into two compartments 4 and 5 by the transverse screen 6 and by the deflectors or agitating means 7 arranged as shown within the hollow body. The screen and the deflecting means are preferably in the form of removable members having handles 8 and 9, respectively, whereby these two members can be pulled out and removed when such is necessary or desirable. An electric fan or blower 10 is provided within the body, of any suitable character, in position to draw the air in through the inlet 2 and force it through the screen and deflecting or agitating means within the body, and then out through the outlet 3 previously mentioned. The screen 6 serves to break up the air and serves to take out some of the dust floating in the air, and the obliquely arranged deflectors 7 produce a swirling motion of the air, so that the air is agitated and turned over and over in the chamber 4, before being discharged from the apparatus. A lamp casing is provided on the front of the chamber 4, in the manner shown, and a mercury vapor lamp 11 is provided in this casing, this lamp having a quartz bulb or bulb of other material which will allow the ultra-violet rays of the lamp to pass through, lamps of this kind being common and well understood. An exterior handle 12 is provided for turning the lamp around or adjusting it to any desired position.

Mercury vapor lamps of this character, for producing the ultra-violet rays, are common and well known, as stated, and have been used for various purposes. However, and so far as now known, no effort has been made to perfect a commercial method and appa-

ratus for the use of such a lamp in the purification of air for breathing purposes, in a house or hospital or office, or other place where pure air is important. The apparatus shown and described has a flat back 13 which can be applied to the wall of the room in which the air is to be purified, and any suitable means can be employed for thus supporting the apparatus against the wall. A rectifier 14 can be embodied in the apparatus, of any suitable character, to convert alternating current into direct current for the mercury vapor lamp. Current can be conducted to this rectifier, and to the motor 15 of the fan 10, by connections of any suitable or desired character.

When the fan and lamp are operated, and when the apparatus is suitably positioned in the room in which the air for breathing purposes is to be purified, the ultra-violet rays of the lamp will be projected through the swirling air in the chamber 4, and will destroy the germs which may be floating in the air. Particles of dust upon which the germs are carried are turned over and over, so that all sides of the particles are exposed to the rays of the lamp, thus insuring complete destruction of all germs carried in the air. The power of the lamp is sufficient, with a lamp of sufficient size and strength, to purify the air rapidly, notwithstanding that the air is being forced through the apparatus quite rapidly. Thus the air in the room will be drawn through the apparatus quite rapidly, and will be discharged in a purified condition, so that pure air for breathing purposes is insured, whereby the air may be breathed over and over again without danger to the persons occupying the room. Of course, fresh air will be admitted to the room, from time to time, in accordance with the method of purification involved in the invention, but the air confined in the room will not only be purified by the apparatus and method shown and described, but will also be revitalized by the addition more or less of ozone produced by the rays of the lamp thus projected through the current of air moving through the apparatus.

A door 16 may be provided on the front of the chamber 5, to afford access to the motor and fan, or for other purposes.

It will be seen therefore that the invention contemplates a method of purifying the air for breathing purposes in a room by circulating the air through a passage or chamber wherein the passing or moving air is subjected to the action of the ultra-violet rays of a mercury vapor lamp, circulation being artificially maintained by proper means, thereby to rapidly destroy the germs and purify the air, before the latter is discharged back into the room for breathing purposes. The invention contemplates suitable ap-

paratus, in a practical and commercial form, for practicing the process, but said apparatus may be of any suitable or desired form, without departing from the spirit of the invention, inasmuch as the invention is not limited to the exact construction shown and described.

Of course, the casing of the apparatus and the enclosure for the lamp must be made of material which will not permit passage therethrough of the ultra-violet rays of the light, as this would endanger the sight of people in the room, and might cause other trouble. It is well known that the ultra-violet rays will pass through certain materials, but will not pass through other materials, and the apparatus should be so constructed that the ultra-violet rays will act freely upon the germs carried in the air passing through the apparatus, but will not escape from the apparatus, and any suitable material can be employed for the box-like enclosure which will prevent the ultra-violet rays from passing through or escaping outside of the apparatus.

What I claim as my invention is:

1. The method of purifying air in a room for breathing purposes, comprising the artificial circulation of the air under confinement from the room and through the apparatus and back into the room, and the subsection of the confined and moving air to the ultra-violet rays of a mercury vapor lamp preventing any electrical discharge through the air passing said lamp, thereby to destroy germs in the circulating air, before discharging the air back into the room for breathing purposes.

2. The method as specified in claim 1, comprising the breaking up and deflecting and agitating of the air while passing in front of the lamp, thereby to insure turning around or turning over of the particles of germ laden dust and to insure the exposing of all the germs to the rays of the lamp.

3. The method as specified in claim 1, comprising the exerting of circulating pressure on the air in the path of circulation thereof, thereby to cause the air to pass the point of purification rapidly and continuously before being discharged back into the room.

4. Apparatus for purifying air in a room for breathing purposes, comprising an intake and an outlet for the air, means intermediate said inlet and outlet to cause circulation of the air through the apparatus so that the air will be rapidly drawn from the room and passed through said apparatus and back into the room, and means intermediate of said inlet and outlet in the form of a mercury vapor lamp to project ultra-violet rays through the passing air, preventing any electrical discharge through the air from said lamp, thereby to destroy the

germs floating in the air, whereby the air will be discharged back into the room in a purified condition for breathing purposes.

- 5 5. A structure as specified in claim 4, said air circulating means comprising an electrically operated fan or blower disposed in position to draw the air in through said inlet and then force it out through said outlet.
- 10 6. A structure as specified in claim 4, comprising a screen through which the air is compelled to pass before being subjected to the action of said ultra-violet rays.
- 15 7. A structure as specified in claim 4, comprising means between said lamp and the said air circulating means to break up the current of air and cause germ laden particles of dust to revolve in a manner to expose all the germs to the action of said rays.
- 20 8. A structure as specified in claim 4, comprising air deflecting and agitating means to cause the turning around and turning over of particles of germ laden dust while passing the position of said lamp, thereby to insure exposure of all the germs to the action of said rays.
- 25 9. A structure as specified in claim 4, in combination with an air screen between said lamp and the air circulating means, and
- 30 air agitating means between the screen and the lamp, whereby germ laden particles of

dust are turned around or revolved to expose all the germs to the action of said rays.

10. An apparatus for purifying air, embodying an air-treatment casing having an inlet and also an outlet, means for continuously throwing ultra-violet light rays across said treatment chamber, means for causing a continuous current of air to be drawn into said inlet and forced through said treatment chamber and out at said outlet, and means located between the treatment chamber and said air-current-producing means for imparting to the air as it passes through the treatment chamber in front of the ultra-ray-producing means a swirling action, for the purpose set forth.

11. A self-contained apparatus for purifying air in a room for breathing purposes, consisting of a casing divided into two compartments by air-swirling means, a motor-driven fan in one of said compartments arranged to drive air through the air-swirling means into the other compartment, means for throwing violet-rays across this latter compartment while the air is in swirling motion, this latter compartment being provided with an upwardly-directed outlet for the treated air, said motor chamber being provided with an air-inlet at its bottom.

FRANK L. NAPIER.