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MACHINE FOR SUBJECTING AIR TO CERTAIN LIGHT RAYS.
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1,249,982.

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Fig. 2.

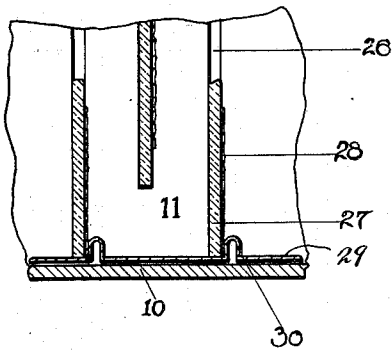


Fig. 3.

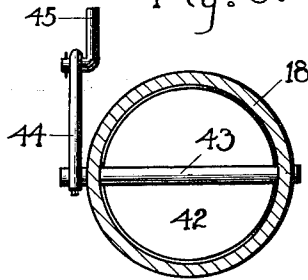


Fig. 5.

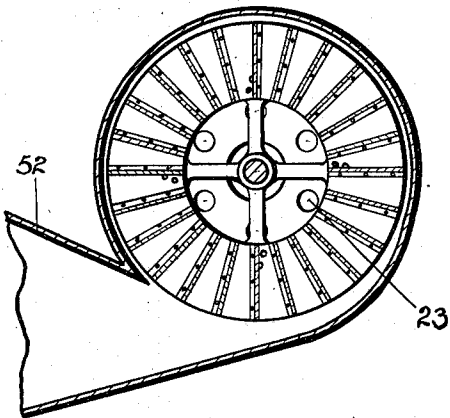
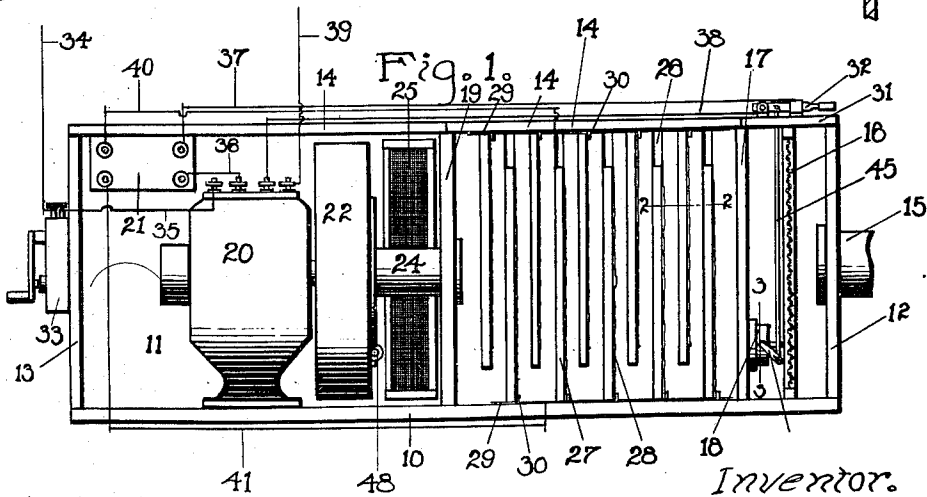
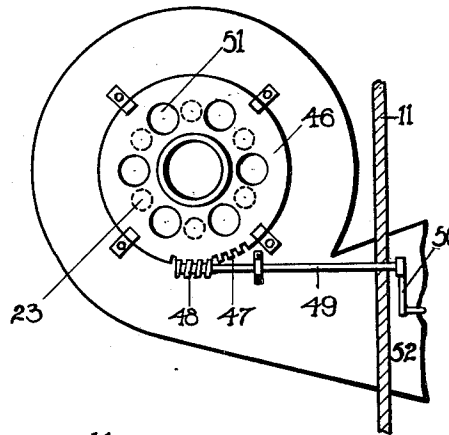


Fig. 4.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR SUBJECTING AIR TO CERTAIN LIGHT-RAYS.

1,249,982.

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To all whom it may concern:

Be it known that I, EDWIN M. MARKEL, a citizen of the United States, and resident of Des Moines, in the county of Polk and State of Iowa, have invented a certain new and useful Machine for Subjecting Air to Certain Light-Rays, of which the following is a specification.

The object of my invention is to provide an electrical machine of simple, durable and inexpensive construction, for subjecting air to violet and ultra-violet light rays for purifying the air and for producing ozone by the passage through the air of a brush electrical discharge generated in the machine.

A further object is to provide such a machine having a plurality of plates arranged therein in staggered relation, for causing the air to travel in a crooked path, whereby all of the air will be thoroughly subjected to the light rays.

A further object is to provide in such a machine a plurality of glass plates covered with powdered iron made to adhere to the glass plates by means of a suitable binder, the iron coating being preferably terminated short of those ends of the glass plates around which the air travels.

A further object is to provide in such a machine suitable means for mounting the plates and for connecting them in an electric circuit.

A further object is to provide in such a machine a valve controlled inlet opening and an electric circuit including the metal coatings on the plates, with a single switch for simultaneously controlling the electric circuit and the valve in the inlet opening.

Still a further object of my invention is to provide a machine of the kind mentioned, comprising a unitary structure having a single receptacle containing the plates hereinbefore mentioned, and containing also a blower and suitable electrical mechanism.

Still a further object is to provide such a unitary structure having the plates arranged between the partitions provided with inlet and outlet openings, the outlet opening connecting with the interior of the blower, said blower having a valve controlled opening for admitting auxiliary air thereto.

My invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims,

and illustrated in the accompanying drawings, in which:

Figure 1 shows a side elevation of the interior of my improved machine, one side of the receptacle being removed.

Fig. 2 shows a vertical, sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 shows a vertical sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 shows a rear end elevation of the blower, illustrating the construction and operation of the damper mechanism, and

Fig. 5 shows a vertical, sectional view through the blower.

In the illustration of my invention shown in the accompanying drawings, I have used the reference numeral 10 to indicate generally the bottom of a receptacle having the side walls 11, the rear end wall 12, the front end wall 13 and the removable cover members 14.

Mounted in the rear end wall and communicating with the interior of the receptacle is an intake pipe 15. Spaced from the rear end wall 12 is a screen 16, arranged so that all air admitted to the interior of the receptacle through the pipe 15 must pass through the screen, thereby removing the larger particles of dirt from the air. Spaced from the screen 16 is what I shall call a dividing partition 17. Mounted in the partition 17 is a tube 18 communicating with the interior of the receptacle on both sides of said partition 17. Spaced from the partition 17 a considerable distance toward the front of the receptacle, is a partition 19. Between the partition 19 and the front wall 13 is a compartment.

In the forward compartment just mentioned are located a rotary converter 20, a coil 21 and a blower 22 operatively connected with the blower 20. The blower 22 has a suitable casing, in one side wall of which are a plurality of openings 23. A tube 24 is mounted in the partition 19, and communicates with the compartment between the partitions 17 and 19 and with the interior of the blower.

In one of the side walls 11 of the forward compartment is an opening covered by a screen 25. The compartment between the partitions 17 and 19 is provided with upright grooves or slots 26, arranged in opposite pairs in its side walls to receive the glass plates 27. The grooves 26 are so arranged that each alternate pair of such

grooves extends to the bottom of said receptacle and each other alternate pair terminates short of the bottom of the receptacle, so that the plates 27 when placed in the
 5 grooves, are staggered, each alternate plate extending to the bottom of the receptacle while the other alternate plates terminate short of the bottom, as shown in Fig. 1. The plates which extend to the bottom of the receptacle terminate at their upper edges
 0 short of the top of the receptacle, as illustrated.

On the rearward surface of each glass plate 27 is a coating 28 of powdered iron
 5 which is made to adhere to its plate by a suitable binder such as shellac. Each coating 28 terminates short of the free edge of the plate on which it is secured, as clearly illustrated in Fig. 1, for purposes which will
 0 be hereinafter mentioned.

Extending along the bottom of the receptacle is a copper strip 29, having upward extensions 30 at suitable intervals, adapted to engage and contact with the coatings 28 of
 5 the receptacle plates 27.

On the lower surface of the removable cover member above the plates 28 is a similar copper strip 29 having upward extensions 30 adapted to serve the same function
 10 as those already described.

At the rearward end of the receptacle is a fixed cover member 31 upon which is supported a switch 32. Suitably mounted, preferably on the forward portion of the receptacle, is a rheostat 33. Connected with the
 15 rheostat 33 is a feed wire 34. A wire 35 leads from the rheostat 33 to the converter 20. A primary circuit wire 36 leads from the converter 20 to the coil 21. A primary
 40 circuit wire 37 leads from the coil 21 to the switch 32, and a similar wire 38 leads from the switch 32 back to the converter. A return wire 39 is connected with the converter.

A secondary circuit wire 40 leads from
 45 the coil to the copper strip 29 on the cover member 14 above the plates 27, and another secondary circuit wire 41 leads from said coil 21 to the lower strip 29.

Mounted in the tube 18 is a damper valve
 50 42 having a stem 43 on which is an arm 44. Pivoted to the arm 44 is a link 45 extending upwardly from the fixed cover member 31 and pivoted to the movable part of the switch 32. The switch 32 and the damper
 55 valve 42 and their connecting mechanisms are so arranged and constructed that when the switch is closed the damper valve is open, and vice versa.

The casing of the blower 22 in one side
 60 wall thereof around the opening communicating with the tube 24 is provided with a plurality of openings 23, hereinbefore mentioned.

Rotatably mounted on the outer surface
 65 of said wall of said casing is a disk 46 hav-

ing at its periphery teeth 47 adapted to mesh with a worm 48 formed on a rod 49. The rod 49 extends through the side wall 11 of the receptacle and has on its outer end a
 70 crank handle 50.

In the disk 46 are a plurality of spaced openings 51, so arranged that in one position of the rotation of the disk 46 they may be brought to register with the respective
 75 openings 23, while in another position of said disk the openings 23 are closed or covered by the disk 46. The disk 46, it will be understood, is manipulated by means of the crank handle 50 from outside the receptacle.
 80

In this connection it may be mentioned that the blower 20 has a discharge pipe 52, shown in Figs. 4 and 5, which leads through the wall of the receptacle and is designed to communicate with a room or with a suitable
 85 air conducting pipe or otherwise.

I will now describe the practical use of my improved machine. Assuming that it is desired to thoroughly or completely ozonize
 90 air passing through the machine, the handle 50 is operated to close the openings 23. The switch 32 is closed, thereby simultaneously opening the damper valve 43. A circuit will be then closed through the rheostat 33, the wire 35, the converter 20, the wire 36, the
 95 coil 21, the wire 37, the switch 32, the wire 38, the converter and the wire 39.

A secondary circuit will be closed through the wire 40, the upper copper strip 29, the respective coatings 28, the spaces between
 100 the plates, the lower copper strip 29, and the wire 41.

It will be understood that the closing of the secondary circuit will cause a blanket or sheet of violet and ultra-violet rays between the successive plates. The air drawn
 105 through the compartment which contains the plates is drawn around the free edges of the plates in a zig-zag path and is repeatedly passed through the violet and ultra-violet rays, being thus thoroughly subjected to such rays, whereby a portion of the oxygen in the air is changed to the form of ozone.
 110

By means of the rheostat the intensity of
 115 the current may be regulated for thereby treating the air less thoroughly, it might be said, to the light rays, and as a result producing a smaller proportion of ozone compared to the volume of air passing through
 120 the machine than is produced when a more intense current is used.

There are a great variety of uses to which ozone and ozonized air may be put, and I will not herein attempt to set forth such
 125 uses in detail.

In explaining the operation of my machine, however, it may be mentioned that if my machine is used for ventilation and furnishing fresh ozonized air, and under some
 130

circumstances, it is not desirable to ozonize the air, then the switch 32 may be opened, thereby closing the damper valve 42, and if the crank 50 is then manipulated to bring the openings 51 to register with the openings 23, air will be drawn through the blower.

The various features of construction herein described have a large number of advantages, some of which will now be referred to. It is well known that where air is constantly drawn through a compartment having anything therein in the nature of the baffle plates, such air will tend to deposit dirt on such plates. So in the use of my machine the passage of the air in its zig-zag path around the plates 27 will rapidly deposit dirt on the coatings 28.

I have provided the screen 16 to prevent the admission of the larger particles of dust or dirt into my machine, but it is obvious that the screen would not prevent the passage of fine dust, tobacco smoke and the like. I have, therefore, provided my receptacle with the removable cover member 14 above the plates 27, and have formed the receptacle with the slots or grooves 26 so that the plates 27 may be quickly and easily removed for repairing, cleaning or replacing them, and may be as easily reassembled.

I have also provided the peculiar arrangement of the copper strips 29 with their projecting members 30, whereby a contact like that of a knife switch is made between the projections 30 and the coatings 28, the parts being so arranged that the connections are easily and readily made when the plates are installed in position in their proper compartment, and the proper cover member 14 is properly placed.

I have provided means for automatically connecting the switch and the damper valve which controls the air inlet to the compartment having the plates, and in connection therewith have provided the damper member 46 so that when it is not desired to ozonize the air passing through the blower and yet it is desirable for some reason to operate the blower, air may be supplied to such blower through the screen 25 without directing any air through the compartment having the plates. There are several reasons for such construction.

I thus avoid the drawing of unnecessary quantities of air around the plates whereby they might rapidly become dirty and require cleaning.

I reduce the burden on the motor by drawing the air directly from outside the receptacle instead of through the long and tortuous path around the plates 27.

I use powdered iron held on the plates by suitable binder, and have found the glass plates with the powdered iron very satisfactory for this purpose. The powdered iron with a proper cement produces a large

amount of ultra-violet rays which are more destructive to bacteria, than violent rays. The iron coating is made to terminate short of the free edges of the plates in order to prevent the formation of an arc from one plate to another, and also to allow a freer air passage around the edges of the plates.

It might be mentioned in this connection that I have made my machine as a complete unit in which the operative parts are contained within a single receptacle which can be readily and easily transported from place to place and installed in theaters, cars, or wherever desired.

It will, of course, be understood that one or more of such units could be connected with suitable ventilating pipes or the like for handling any desired quantity of air.

Some changes may be made in the construction and arrangement of the various parts of my improved machine without departing from the essential features and purposes of my invention, and it is my intention to cover by the patent to be issued hereon, any modified forms of structure or use of mechanical equivalents which may be reasonably included within the scope of my claims.

I claim as my invention:

1. In a machine of the class described, a receptacle, a plurality of non-conducting plates arranged within said receptacle, arranged to permit air to pass around their edges, said plates having on their corresponding faces coatings of powdered iron, said coatings terminating short of the free edges of the non-conducting plates, whereby no arc can be formed except through the non-conducting plates.

2. In a device of the class described, a receptacle having inlet and outlet openings, a plurality of non-conducting plates arranged in said receptacle with opposite staggered edges spaced from the walls of the receptacles, suitable coatings on corresponding faces of said plates, a fan casing adjacent to said outlet opening, a tube leading from said casing to said openings, a fan in said casing, a receptacle for said pump casing, said casing having an extension extending through the wall of said last named receptacle, an adjustable closure device mounted on said pump casing, and an air inlet opening in the wall of said second receptacle.

3. In a device of the class described, a receptacle having compartments, one of said compartments having inlet and outlet openings, a screen within said last named compartment adjacent to the inlet opening, non-conducting plates within said last named compartment, having their opposite edges staggered and spaced from the wall of the compartment, suitable coatings on said plates, a fan casing in the other compartment, a tube leading therefrom to said out-

let opening, a passage leading from said fan casing through the wall of said second compartment, said second compartment having an air inlet opening through its wall, said
5 fan casing having an opening, an adjustable closure device for the opening in said fan casing, and means for operating said fan and for connecting said casing in an electrical circuit.

- 10 4. In a machine of the class described, a receptacle having spaced partitions each provided with an opening, the walls of said receptacle in the compartment formed between said partitions being provided on opposite sides with grooves, glass plates slidably received in said grooves, said plates being successively, alternately arranged with
15 their lower edges adjacent to the lower wall

of the receptacle, and with their upper edges adjacent to the upper wall of the receptacle, 20 whereby air passing through said compartments will pass around the free edge of one plate, then will pass over substantially the entire face of the next plate before passing around the free edge of said next plate, said 25 plates having coatings of powdered iron, means for connecting the alternate plates in two series for connecting said series with a source of electrical energy, a compartment adjacent to said last described compartment, 30 of which one of said partitions forms an end wall, a screen in said last described compartment, said last described compartment having an inlet opening.

Des Moines, Iowa, January 16, 1917.

EDWIN M. MARKEL.