R. D. SMALL.

OZONIZER.

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978,786.

Patented Dec. 13, 1910.

Fig. 1.

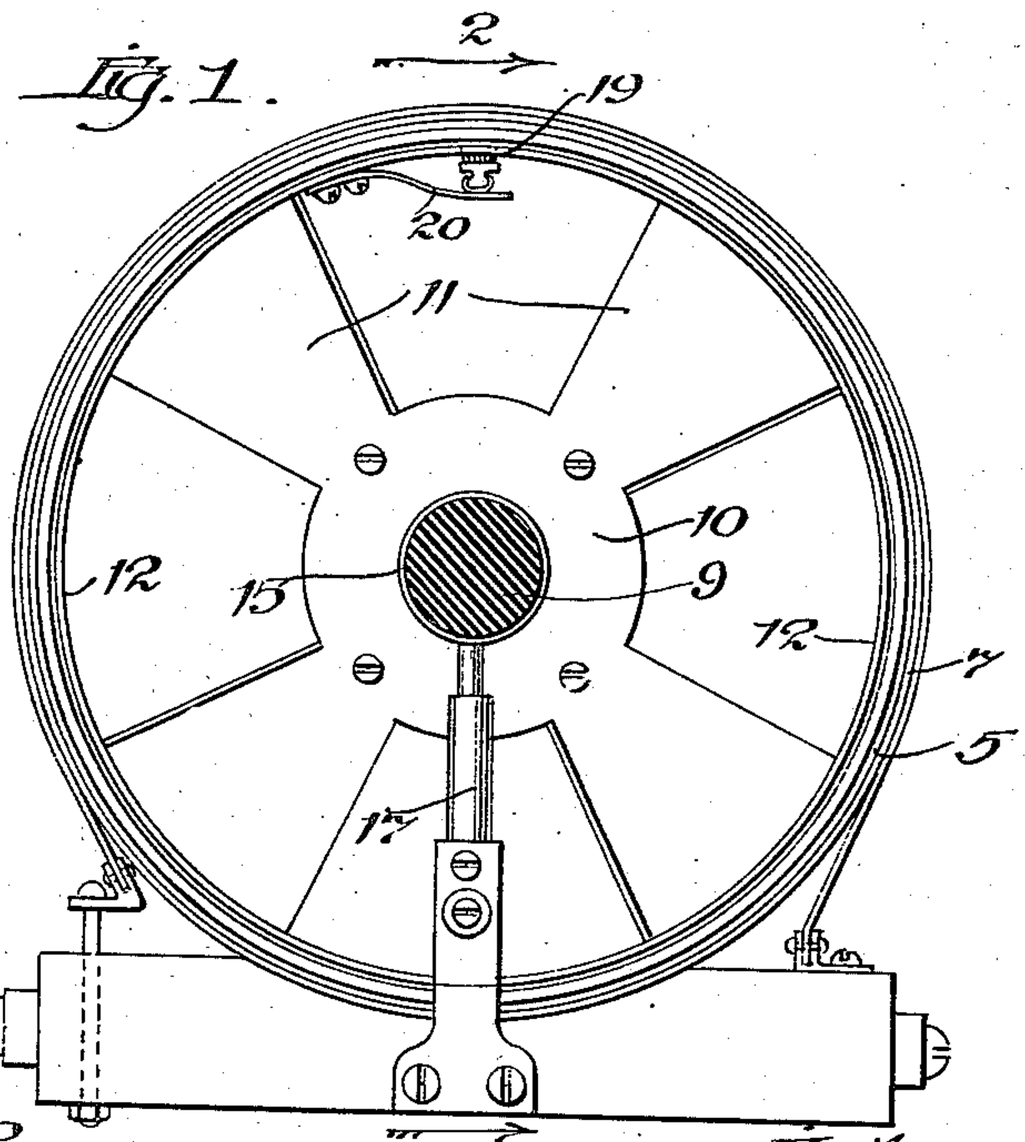

Fig. 2.

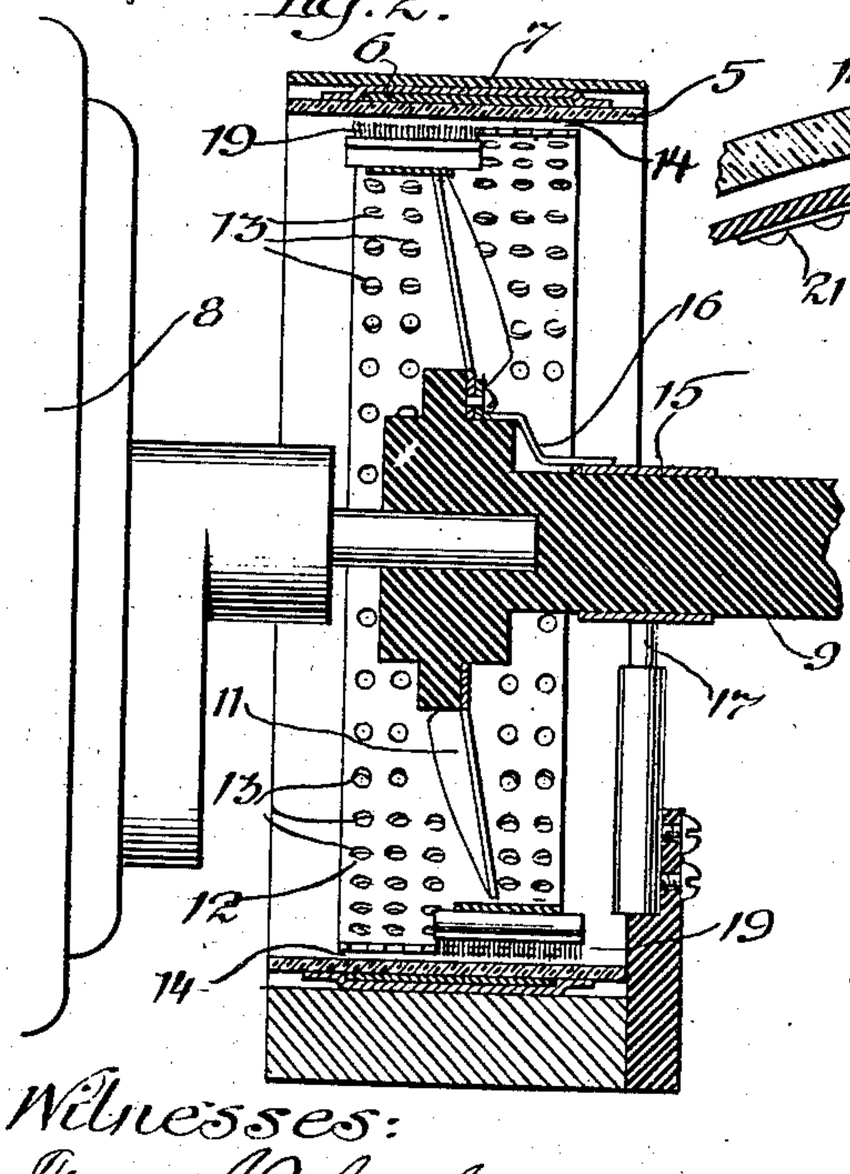

Fig. 3.

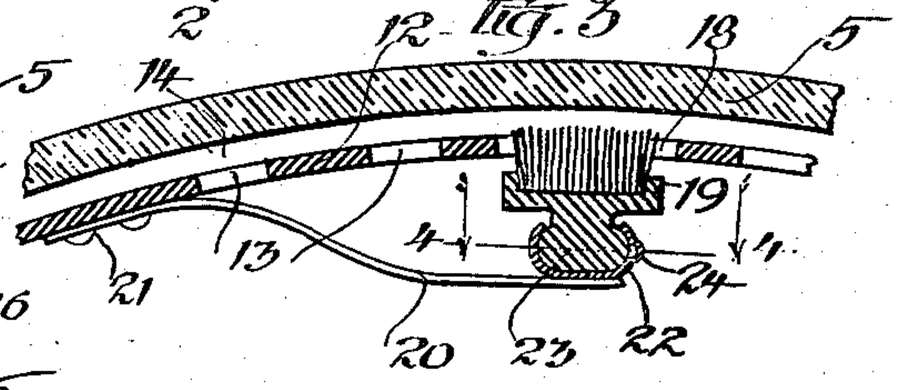

Fig. 5.

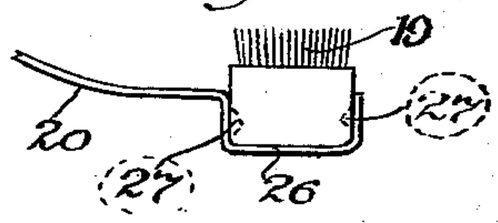

Fig. 4.

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UNITED STATES PATENT OFFICE.

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OZONIZER.

978,786. Specification of Letters Patent. **Patented Dec. 13, 1910.**

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To all whom it may concern:

Be it known that I, RALPH D. SMALL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements Relating to Ozonizers, of which the following is a specification.

This invention relates to an improvement in ozonizers of the general class which make use of a rotating electrode and it relates more particularly to ozonizers of the type shown and described in Letters Patent of the United States Nos. 951,443 and 969,547 granted to Oscar Linder on March 8, 1910 and September 6, 1910, respectively.

The general type of ozonizers to which this invention relates includes a stationary dielectric, a stationary electrode on one side thereof and a rotating electrode on the other side thereof and spaced away therefrom a suitable distance for the proper production of the electric discharge. In the patents above referred to use is made of a stationary dielectric preferably in the form of an annular ring surrounded on its exterior with a stationary electrode, the rotating electrode being placed within the annular dielectric, and preferably being in the form of a fan which will produce a current of air for removing the ozone as rapidly as produced. It is, of course, understood that the above mentioned patents are not restricted to the use of a dielectric which is surrounded on its exterior periphery with a stationary electrode although this is the preferred construction.

In Patent No. 969,547, above mentioned, use is made of a discharge shoe placed on each of one or more of the fan blades, its purpose being to increase the discharge area and at the same time prevent local heating of the parts and the formation of obnoxious gases by reason of a concentrated discharge.

In the present invention I provide a complete annular band surrounding all of the blades of the rotating electrode, or passing from one to the other so as to provide a complete ring electrode adjacent the dielectric. By this means I am enabled to further increase the discharge area, and at the same time largely increase the strength of the moving element, reinforcing it near its outer periphery where the stresses coming upon it are greatest. It will be understood that where a separate shoe is attached to each blade of the electrode the weight of the same is increased near its periphery, thus largely increasing the centrifugal force. In the present construction, however, the rotating discharge surface is in the form of a continuous band and therefore no centrifugal force is added to that which would otherwise exist in the rotating blades, and, in fact, the same are reinforced and strengthened. In the present case, also, I provide a plurality of perforations in the discharge band. These serve to break the continuity of the same, thus aiding in the discharge action and at the same time they provide means for insuring a thorough passage of the moving air through and around the points of discharge, and away from them, thereby insuring that the ozonized air shall be removed immediately after it has been formed and thus preventing the formation of obnoxious or undesirable gases and at the same time preventing the heating of the discharge surfaces.

It has heretofore been difficult to keep the dielectric surface clean and free from dust. This is particularly true where the ozonizers operate with a fairly concentrated electric discharge. This dust is found to interfere with the even and efficient operation of the ozonizer, so that its proper operation is interfered with and its efficiency reduced.

Another object of the present invention is to provide means for continuously cleaning the dielectric during operation and thus, and in other ways, to improve the discharge action.

Other objects and uses will appear from a detailed description of the invention which consists in the features of construction and combination of parts hereinafter described and claimed.

Referring now to the drawing, I show my invention as applied to an ozonizer of the general form shown and described in Letters Patent No. 969,547 above mentioned.

In the drawing Figure 1 shows a side view of the discharge elements as used with an annular dielectric, the rotating element being in the form of a fan and the rotating discharge band surrounding it being attached to the tips of the fan blades; Fig. 2 shows a cross-section of the ozonizer of Fig. 1 taken on the line 2—2, looking in the direction of the arrows; Fig. 3 shows a detail cross-section of one of the cleaning brushes

and a portion of the rotating dielectric and of the stationary electrode, the rotating element being at rest and the cleaning brush being in disengaged position; Fig. 4 shows a detail longitudinal section of the brush taken on the line 4—4 of Fig. 3, looking in the direction of the arrows, and showing the preferred type of locking device for holding the brush in position after it has been inserted; and Fig. 5 shows a modified form of brush holder.

In one embodiment of my invention I provide a perforated discharge band for encircling the tips of the blades of the rotating fan and suitably connected to them. I then attach one or more brushes to this band in proper position to clean the adjacent surface of the dielectric during operation.

Referring now to the figures, the numeral 5 designates the stationary dielectric which in the construction illustrated comprises an annular insulating plate. In its central portion this band is surrounded by a stationary electrode such as a strip of tin foil 6. An insulating cover 7 surrounds the tin foil and protects the same from injury as well as reducing the electric leakage.

In the construction illustrated a suitable motor 8 drives an insulating hub 9 which in turn carries the rotating electrode 10. In the construction illustrated the latter comprises a fan whose blades 11 serve to throw a current of air and are surrounded by the discharge band electrode 12. The latter is suitably attached to the tip of each blade and is provided with a plurality of air holes 13 which permit air to freely circulate all around the band electrode and to freely enter the space 14 between the electrode and the dielectric. A slip ring 15 is suitably connected to the rotating electrode as by a wire 16 and receives its supply of current through a brush 17.

It will be seen that the construction above illustrated and described provides an extremely simple means for obtaining a large discharge surface properly ventilated to prevent the accumulation of ozonized air in any one place, thus insuring a free and continuous removal of ozone.

I will now describe the preferred form of cleaning device. This comprises essentially one or more small brushes flexibly supported by the rotating electrode in position to properly clean the dielectric when the electrode is rotating. In the construction illustrated I provide a transverse slot 18 in the rotating electrode through which may project a brush 19. The latter is supported by means of a spring bracket 20 rigidly secured at one end 21 to the electrode. At its free end this bracket carries a transverse slotted member 22 into which may be slid a bead 23 of the brush. The latter may be held in position merely by the friction of the bead within the slotted member, or other separate means may be provided. In the construction illustrated in Fig. 4 I provide an indentation 24 in one side of the slotted member into which a button 25 of the bead may seat when the brush is slid into position. Obviously, any other suitable construction may be adopted for holding the brush in place.

The brush is normally held away from the dielectric as illustrated in Fig. 3. As soon, however, as the rotating electrode attains the necessary speed the brush will be thrown out by means of centrifugal force into contact with the dielectric which it will thereafter sweep and thus maintain clean. As soon as the speed of the electrode falls sufficient the brush will again be drawn back from the dielectric.

It is preferable to provide two brushes spaced diagonally opposite from each other and each one of a length slightly greater than one-half of the width of the rotating electrode band. When this construction is adopted the slots 18 do not have to extend clear across the entire width of the electrode band and thus the latter is not completely severed. Furthermore, the centrifugal forces of the rotating element are thus equalized and a perfectly balanced machine results.

In Fig. 5 I show a modified form of brush holder in which the end of the spring arm 20 is bent into a U shape 26 for receiving the body of the brush. Each side of the U is provided with an indentation 27 for holding the brush in place. This construction is a very simple one, it being made from a single piece of material, and can be very cheaply produced.

I claim:

1. In an ozonizer the combination of a stationary dielectric, a stationary electrode on one side thereof, a rotating electrode on the other side thereof, and means for continuously cleaning the dielectric during the operation of the ozonizer, substantially as described.

2. In an ozonizer the combination of a stationary dielectric, a stationary electrode on one side thereof, a rotating electrode on the other side thereof, a cleaning device for the dielectric, and means for maintaining the cleaning device in engagement with the dielectric during the operation of the ozonizer and out of engagement with the dielectric when the ozonizer is not in use.

3. In an ozonizer the combination of a stationary dielectric, a stationary electrode on one side thereof, a rotating dielectric on the other side thereof, and a cleaning device attached to the rotating dielectric in a manner to be thrown into engagement with the dielectric by centrifugal force during operation of the ozonizer, substantially as described.

4. In an ozonizer the combination of a stationary dielectric, a stationary electrode on one side thereof and a continuous rotatable perforated electrode on the other side thereof, substantially as described.

5. In an ozonizer the combination of a stationary dielectric, a stationary electrode on one side thereof, a rotating fan electrode on the other side thereof, and a continuous perforated discharge band attached to the tips of the fan and providing a discharge surface, substantially as described.

6. In an ozonizer the combination of a stationary dielectric, a stationary electrode on one side thereof, a continuous perforated rotating discharge electrode on the other side thereof, and means for creating an air draft through the perforations during operation of the ozonizer to carry off the ozonized air, substantially as described.

7. In an ozonizer the combination of a stationary dielectric in the form of a continuous annular band of insulating material, a stationary electrode surrounding a portion of the exterior surface thereof, a rotating fan electrode within the dielectric, and a continuous perforated discharge band attached to the tips of the fan blade in position to create an electrical discharge through the dielectric to the stationary electrode, substantially as described.

8. In an ozonizer the combination of an annular stationary dielectric, an electrode band surrounding a portion of the exterior surface thereof, a rotating fan electrode within the dielectric, a continuous discharge band surrounding the tips of the fan blades, and a pair of oppositely disposed cleaning brushes attached to the rotating electrode band in position to clean the inner surface of the dielectric, substantially as described.

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