H. E. BECK.

OZONIZER.

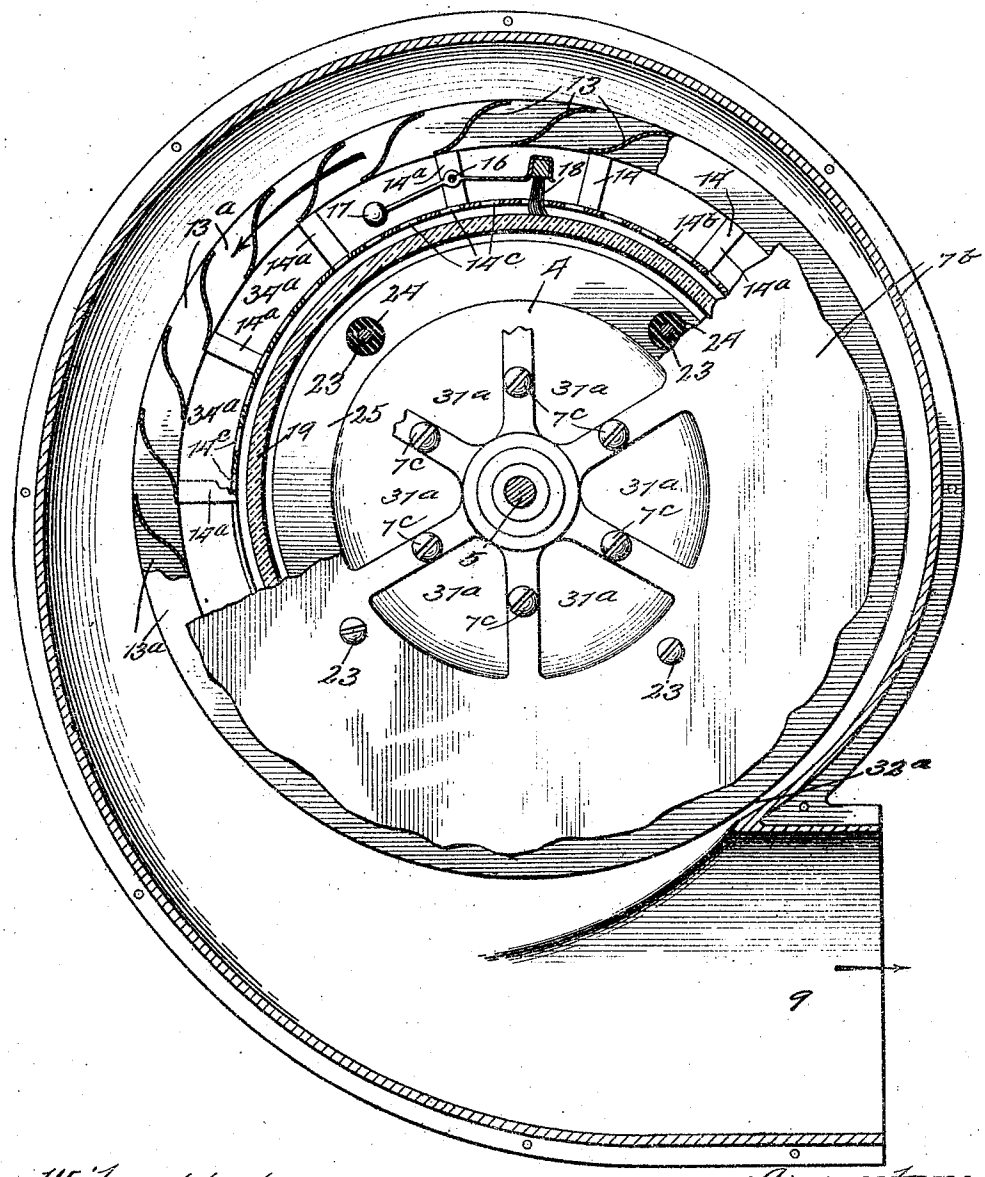
APPLICATION FILED JULY 25, 1911.

1,040,123.

Patented Oct. 1, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

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2 SHEETS—SHEET 2.

Fig. 2.

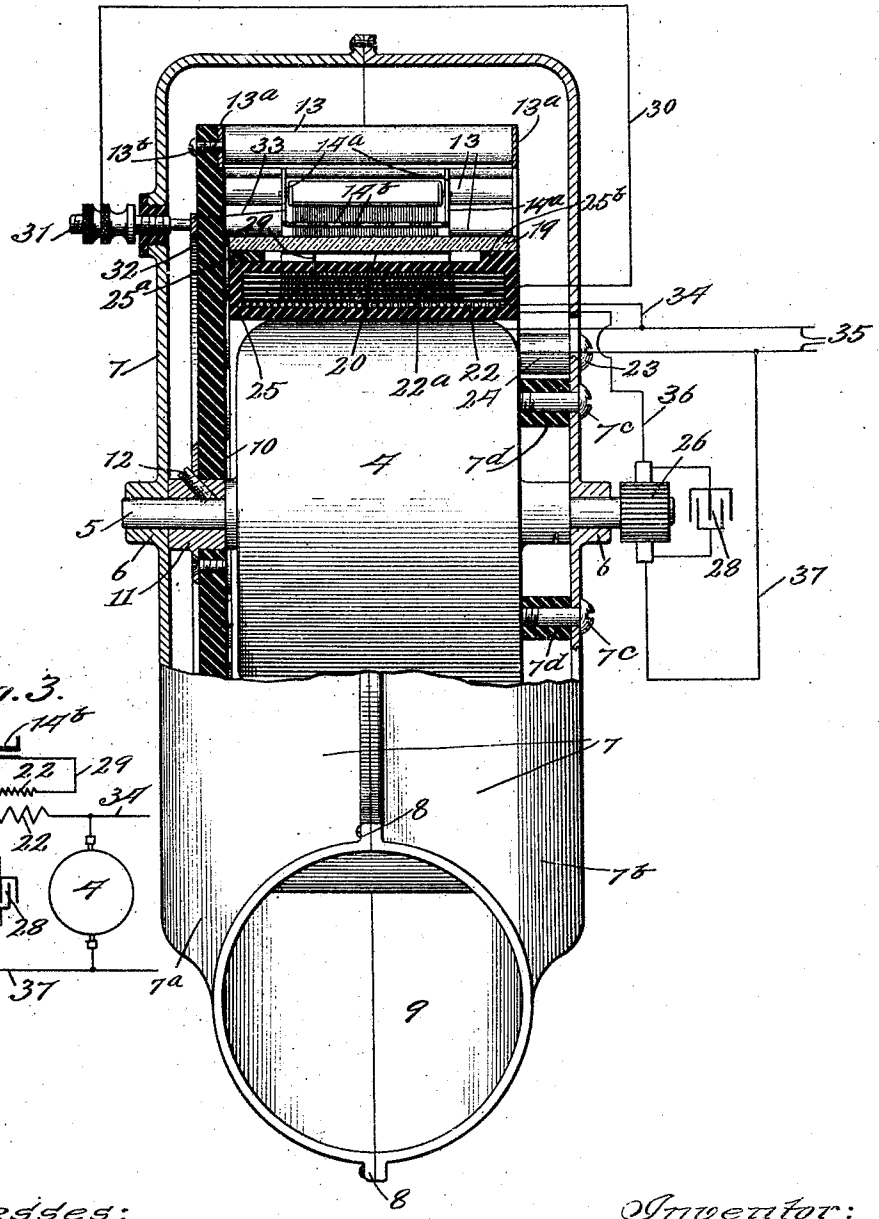

Fig. 3.

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UNITED STATES PATENT OFFICE.

HAROLD E. BECK, OF CHICAGO, ILLINOIS.

OZONIZER.

1,040,123. Specification of Letters Patent. Patented Oct. 1, 1912.

Application filed July 25, 1911. Serial No. 640,478.

To all whom it may concern:

Be it known that I, HAROLD E. BECK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois have invented new and useful Improvements in Ozonizers, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to improvements in ozonizers, my objects being to simplify the construction of such devices, to render them more compact than heretofore, to increase the efficiency thereof so far as the purification and ozonization effects on the air are concerned, and to provide a machine which in itself is capable of discharging a strong and powerful current of thoroughly purified and ozonized air which, if desired, may be delivered through a suitable system of pipes or tubes to the room or rooms, or places where it is intended to use the same.

Further objects will appear from the detailed description and claims to follow, reference being had to the accompanying drawings illustrating one embodiment of my invention, in which—

Figure 1 represents a side elevation of my machine partly in section; Fig. 2 represents an end elevation of my machine partly in section; and Fig. 3 represents a simplified diagram of the electrical circuits.

Like numerals of reference indicate like parts in the several figures of the drawings.

Referring now to the drawings, 4 represents a motor preferably of the alternating current type, the shaft 5 of which is mounted in journals 6 forming a part of the shell or casing 7. Such motors as ordinarily constructed are provided within the casing with bearings for the shaft, and since the motor is itself supported from the casing these additional bearings 6 may be dispensed with if desired, but I prefer the arrangement shown. This shell or casing, which is made of any suitable material, preferably non-metallic, is of spiral form and preferably formed of two pieces 7^a and 7^b screwed together, as shown at 8, and having a discharge opening 9. The armature or revoluble member of the motor is fixed to the shaft 5, while the shell or casing and stationary member of the motor is secured to the shell or casing 7 by the screws 7^c, suitable insulating spacing sleeves 7^d being mounted on said screws inside the shell and between the motor and shell.

An insulating supporting disk 10 is rigidly mounted on the bushing 11 surrounding the shaft 5 and held in place by means of a set screw 12. At the outer periphery of this disk is mounted a circular series of fan blades 13, said blades being soldered, brazed or otherwise connected at their ends to metallic rings 13^a, the ring adjacent the disk 10 being secured to said disk by screws 13^b. On the inner periphery of this series of blades is mounted a circular frame 14 comprising the spider arm 14^a rigidly secured to the blades in any suitable manner and a perforated circular plate or shoe 14^b constituting one electrode of the machine. This plate or shoe 14^b may be supported independently of the blades of the fan, or otherwise, if desired. It will be noted that these members heretofore described consisting of the fan, frame and the perforated plate are secured to the insulating disk 10 and adapted to revolve with the shaft 5. Surrounding the motor and concentric therewith is a transformer box 25 of insulating material, preferably secured to the shell or casing 7 by screws 23 passing through the insulated spacing sleeves 24, or such supporting screws may be dispensed with and the motor alone be utilized for the support.

A glass cylinder 19 forming the dielectric of the machine is mounted on the outer surface of this transformer box 25, the inner edge of said cylinder at the right in Fig. 2 engaging with a concentric shoulder 25^b on the transformer box, and the corresponding edge at the left engaging with an insulating band or ring 25^a fitting between said glass cylinder and the box. This ring or band 25^a is slipped into position after the glass cylinder has been placed in position with its opposite edge engaging the shoulder of the transformer box.

On the inner surface of the glass cylinder and within the open space between it and the face of the transformer box is mounted a thin metallic film 20, preferably in the form of tin foil, and constituting the other electrode of the device. This tin foil is applied to the inner face of the cylinder before the latter is placed in position on the transformer box. By providing the removable

strip or ring 25ª, which is placed in position after the glass cylinder is in place, the tin foil is not scratched or scraped off in assembling.

One end of the transformer box, usually that at the left in Fig. 2, is removable (not shown) and within the box is placed a suitable transformer, consisting of a primary winding 22 of comparatively coarse wire and few turns, and a secondary winding 22ª of comparatively fine wire and a large number of turns.

One terminal of the secondary winding is connected in any suitable manner, as by a conductor 29, with the tin foil electrode; and the other terminal is connected in a suitable manner, diagrammatically indicated by a conductor 30, with the brush 31 of ordinary construction, mounted in a bushing in the shell and bearing at its inner end on the ring 32 carried on the outer face of the insulating disk 10. The ring 32 is suitably connected by a conductor 33 with the other electrode 14ᵇ.

One terminal of the primary winding of the transformer is connected, as diagrammatically indicated, by a conductor 34 with one side of the power circuit 35, while its other terminal is connected as by a wire 36 or other conductor with one brush of a rotary make and break device 26, the segments of which are or may be mounted on an extension of the armature shaft 5, the opposite brush of said device being connected by a suitable conductor 37 with the opposite side of the power circuit 35. A suitable condenser 28 is connected around the make or break device 26 to prevent sparking. The power circuit 35 leads directly to the motor, and is of the ususal type of alternating current circuit for lighting purposes.

In the operation of my device the motor is started by the switch (not shown) and the current flows also through the primary winding of the transformer and the make and break device, the sparking being taken care of by the condenser 28. The induced current of high voltage set up in the secondary winding of the transformer flows through the wire 29 to the tin foil electrode 20 and by way of wire 30 to the perforated plate 14ᵇ forming the other electrode. At these electrodes the sparking or arcing occurs, passing apparently across the air gap between the dielectric 19 and the electrode 14ᵇ. This operation is practically continuous, resulting in a multitudinous series of practically invisible sparks or a bluish glow across the air gap around the whole circle of the air gap, which is continually being brought into contact with the fresh air drawn in from the side of the casing through the openings 31ª and forced by the action of the fan blades rapidly around the interior of the casing and out by way of the discharge opening 9. As clearly shown in Fig. 1, the available air space commences at a point 32ª and is practically *nil* but enlarges until it attains the area of the discharge opening 9. It is thus evident that by operating the motor, the fan draws in and discharges under pressure a large amount of air; the air thus discharged practically all passing through, around and between the electrodes which produces a comparatively great amount of ozone, thereby purifying and charging the air with ozone. Owing to the construction of the fan any desired pressure may be imparted to the air current discharged, and it may be conducted from the machine by any suitable system of piping without the necessity of employing other fan or pressure creating device.

It is evident, of course, that the rapid revolution of the fan blades which force the air out in the direction indicated tends to form a vacuum between the inner edges of the blades and the outer surface of the perforated plate, that is, in the spaces 34ª between the frame supports, thus insuring that a sufficient quantity of air will be subjected to the ozonizing influence of the electric sparks.

The brush 18, passing through a suitable slot in the plate 14ᵇ, has its supporting lever pivoted at 16 to the arms 14ª, which lever is weighted at its opposite end 17. The outer surface of the dielectric or glass cylinder 19 is thus kept free from the dust or dirt which would naturally settle thereon, and which, owing to the action of the electric arc, is liable to carbonize and cake on the outside of the glass. The centrifugal force exerted on the ball or weighted end 17 of the lever lightly forces the brush inwardly and causes it to bear against the face of the cylinder with just sufficient force to remove the dust, dirt and carbon and at the same time without undue wear upon the bristles.

My device is one that is of very simple construction, can be readily assembled and disassembled and possesses no complicated parts that are liable to get out of order. Any ordinary motor can be used and the blades of the fan, while shown at certain angles and in certain positions, may, of course, be varied to meet the exigencies of the case. So, also, the peculiar shape of the casing itself. I do not limit myself to such configuration, as other shapes may be used, by means of which the beneficial results attained by my device may also be attained.

While I have shown the conductors in a more or less diagrammatic form for the sake of clearness, it will be understood by those skilled in the art that in practice they may be of any desired construction and arrangement to accomplish the purposes intended. For example, the connection of the

conductor 29 to the tin foil electrode may be any that is readily connected or disconnected when it is desired to assemble or disassemble these parts. Likewise, the conductors 30, 34, 35, 36, 37, etc., may be rigid connections suitably protected and fixed in position on or about the casing or framework and leading to suitable terminals, all as well understood in the art. The condenser 26 is of the desired type and capacity and supported on the casing or otherwise as desired.

Various changes and modifications within the scope of the appended claims may be made. If the apparatus be employed in a system where the current of air in the pipes is sufficient to rotate the fan, the motor, of course, need not be employed.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is—

1. In an ozonizer, a source of high-voltage electric current, a rotary fan adapted to maintain a continuous flow of air, a continuous electrode secured to the inner periphery of and adapted to revolve with said fan, a second continuous electrode, a thin dielectric interposed between said electrodes and in close proximity to one of them and extending over the entire area of discharge.

2. In an ozonizer, a source of high-voltage electric current, a rotary fan adapted to maintain a continuous flow of air, a continuous electrode secured to the inner periphery of and adapted to revolve with said fan, a stationary continuous electrode, a stationary thin dielectric interposed between said electrodes in close proximity to one of them and extending over the entire area of discharge.

3. In an ozonizer, a source of high-voltage electric current, a rotary fan adapted to maintain a continuous flow of air, a continuous electrode secured to the inner periphery of and adapted to revolve with said fan, a stationary continuous electrode, a stationary thin dielectric interposed between said electrodes in contact with the outer face of said stationary electrode and extending over the entire area of discharge.

4. In an ozonizer, a source of high-voltage electric current, a rotary fan adapted to maintain a continuous flow of air, a continuous electrode secured to the inner periphery of and adapted to revolve with said fan, a stationary continuous electrode, a stationary thin dielectric interposed between said electrodes in contact with the outer face of said stationary electrode and extending over the entire area of discharge.

5. In an ozonizer, a source of high-voltage electric current, a rotary fan adapted to maintain a continuous flow of air, a frame extending inwardly therefrom, a continuous electrode comprising a perforated metallic plate mounted on said frame and adapted to revolve with said fan, a stationary continuous electrode, a stationary thin dielectric interposed between said electrodes in close proximity to one of them and extending over the entire area of discharge.

6. In an ozonizer, a source of high-voltage electric current, a rotary fan adapted to maintain a continuous flow of air, a frame extending inwardly therefrom, a continuous electrode comprising a perforated metallic plate mounted on said frame and adapted to revolve with said fan, a stationary continuous electrode, a stationary thin dielectric interposed between said electrodes in contact with the outer face of said stationary electrode and extending over the entire area of discharge.

7. In an ozonizer, a source of high-voltage electric current, a rotary fan adapted to maintain a continuous flow of air, a continuous electrode mounted on the inner periphery of and adapted to revolve with said fan, a stationary continuous electrode, a stationary thin dielectric interposed between said electrodes in close proximity to one of them and extending over the entire area of discharge, and means for keeping the outer face of said dielectric free from foreign matter.

8. In an ozonizer, a source of high-voltage electric current, a rotary fan adapted to maintain a continuous flow of air, a continuous electrode mounted on the inner periphery of and adapted to revolve with said fan, a stationary continuous electrode, a stationary dielectric consisting of a thin glass cylinder interposed between said electrodes in close proximity to one of them and extending over the entire area of discharge, and means for keeping the outer face of said dielectric free from foreign matter.

9. In an ozonizer, a source of high-voltage electric current, a rotary fan adapted to maintain a continuous flow of air, a continuous electrode mounted on the inner periphery of and adapted to revolve with said fan, a stationary continuous electrode, a stationary thin dielectric interposed between said electrodes in close proximity to one of them and extending over the entire area of discharge, and means for keeping the outer face of said dielectric free from foreign matter, said means comprising a brush adapted to be thrown by the revolution of said fan into contact with the outer face of said dielectric.

10. In an ozonizer, a source of high-voltage electric current, a rotary fan adapted to maintain a continuous flow of air, a continuous electrode mounted on the inner periphery of and adapted to revolve with said fan, a stationary continuous electrode, a stationary dielectric consisting of a thin glass cylinder interposed between said electrodes in close proximity to one of them and extend-

ing over the entire area of discharge, and means for keeping the outer face of said di-electric free from foreign matter, said means comprising a brush adapted to be thrown by the revolution of said fan into contact with the outer face of said dielectric.

11. In an ozonizer, the combination with a blower type of fan having a surrounding casing and an air inlet and air discharge orifice in said casing, of means for producing an electric discharge within said casing in the path of the current of air therethrough, said means including an electrode mounted on the inner periphery of said fan.

12. In an ozonizer, the combination with a blower type of fan having a surrounding casing provided with a central air inlet and a circumferential discharge outlet, of means for producing an electric discharge within said casing in the path of the current of air therethrough, said means including an electrode mounted on the inner periphery of said fan.

13. In an ozonizer, a motor, a continuous transformer surrounding said motor, a continuous di-electric surrounding said transformer, an electrode interposed between said transformer and di-electric, a rotary blower type of fan revolving outside of said di-electric and adapted to maintain a continuous flow of air, and a second electrode mounted on said fan.

14. In an ozonizer, a motor, a continuous transformer surrounding said motor, a continuous di-electric surrounding said transformer, an electrode interposed between said transformer and di-electric, a rotary blower type of fan revolving outside of said di-electric and adapted to maintain a continuous flow of air, and a second electrode mounted on the inner periphery of said fan.

15. In an ozonizer, a motor, a continuous transformer surrounding said motor, a continuous di-electric surrounding said transformer, an electrode interposed between said transformer and di-electric, a rotary blower type of fan revolving outside of said di-electric and adapted to maintain a continuous flow of air, and a second electrode comprising a continuous perforated sheet mounted on the inner periphery of said fan.

16. In an ozonizer, a rotary fan having transverse blades, a continuous electrode located within the inner edges of said blades and revolving with said blades, a second continuous electrode within said first named electrode, and a thin di-electric interposed between said electrodes.

17. In an ozonizer, a rotary fan, a continuous electrode revolving with said fan, a second continuous electrode, a thin di-electric between said electrodes and located contiguous to the second electrode, a brush mounted on a pivotal arm to revolve with the fan, and a weight connected with the arm to cause the brush to bear upon the exposed face of the di-electric by centrifugal action when the fan is rapidly rotated.

18. In an ozonizer, the combination with a source of high voltage electric current, of a rotary fan, an electrode located within the inner periphery of and rotating with the fan, a second electrode, and a thin di-electric interposed between said electrodes.

19. In an ozonizer, the combination with a blower type of fan having a casing and an air inlet and air discharge opening in said casing, of means for producing an electric discharge within said casing in the path of the current of air therethrough, said means including an electrode distinct from but mounted to rotate with the said fan.

20. In an ozonizer, the combination with a blower type of fan having a casing and an air inlet and air discharge opening in said casing, of means for producing an electric discharge within said casing in the path of the current of air therethrough, said means including an electrode distinct from but secured to the blades of said fan and revolving therewith.

21. In an ozonizer, the combination with a blower type of fan having a casing and an air inlet and air discharge orifice in said casing, of means for producing an electric discharge within said casing in the path of the current of air therethrough, said means including an electrode mounted within the inner periphery of and rotating with the said fan.

22. In an ozonizer, the combination with a rotary fan, of an electrode revolving with said fan, a second electrode, a thin di-electric between said electrodes, and a brush mounted on a pivoted arm to revolve with said fan and weighted to cause the brush to bear upon the adjacent face of the di-electric by centrifugal action when the fan is rapidly rotated.

23. In an ozonizer, the combination with a motor, of a transformer surrounding said motor, a di-electric surrounding said transformer, an electrode interposed between said transformer and di-electric, and a second electrode mounted to rotate with said fan.

24. In an ozonizer, the combination with a motor, of a transformer surrounding said motor, a di-electric surrounding said transformer, an electrode on each side of said di-electric, and a fan having its blades arranged to revolve around the outside of said di-electric and electrodes.

25. In an ozonizer, the combination with a fan, of a pair of electrodes and a thin di-electric between said electrodes mounted within the inner periphery of said fan, and a suitable source of current for said electrodes.

26. In an ozonizer, the combination with a fan, of a pair of electrodes with a thin di-

electric interposed therebetween mounted within the inner periphery of said fan, and a transformer located within the said electrodes and di-electric.

27. In an ozonizer, the combination with an annularly arranged transformer, of a pair of annularly arranged electrodes with an interposed di-electric therebetween outside of said transformer, and a fan having its blades arranged in a circular series outside of said electrodes.

28. In an ozonizer, the combination with a fan, of a casing therefor, a motor located within the inner periphery of the fan blades and connected with the fan to drive the same, and means for producing an electric discharge within the casing in the path of the air current therethrough.

29. In an ozonizer, the combination with a motor, of a pair of annular electrodes with an interposed di-electric arranged outside of said motor, and a fan driven by said motor for producing a current of air about the electrodes.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

HAROLD E. BECK.

Witnesses:
MABEL REYNOLDS,
ROBERT LEWIS AMES.