L. I. BLAKE.

IONIZER OR APPARATUS FOR PRODUCING GASEOUS IONS.

APPLICATION FILED NOV. 17, 1908.

913,941. Patented Mar. 2, 1909.

Fig. 1

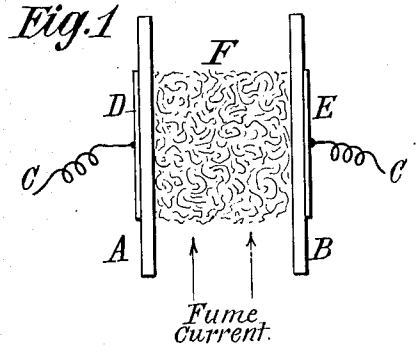


Fig. 2

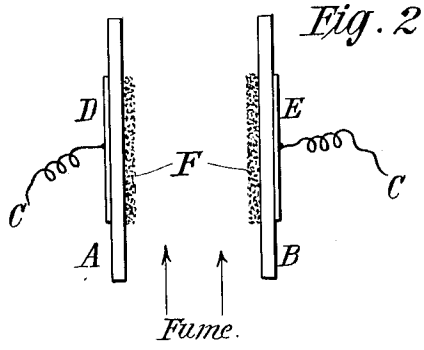


Fig. 3

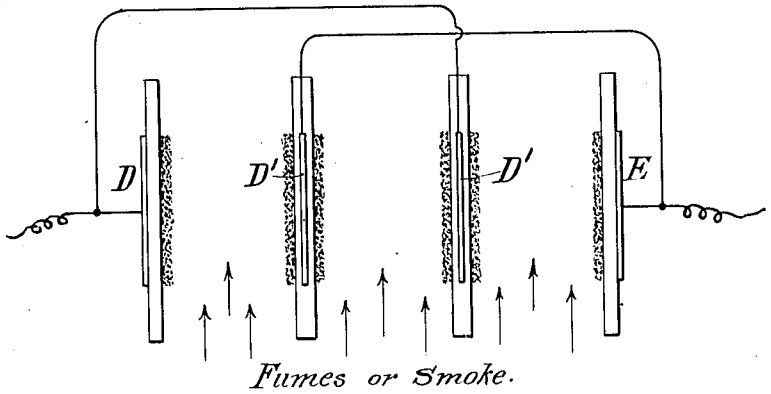
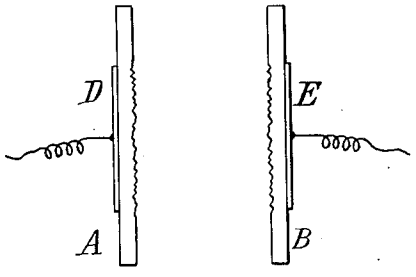


Fig. 4



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UNITED STATES PATENT OFFICE.

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IONIZER OR APPARATUS FOR PRODUCING GASEOUS IONS.

No. 913,941. Specification of Letters Patent. Patented March 2, 1909.

Application filed November 17, 1908. Serial No. 463,048.

To all whom it may concern:

Be it known that I, LUCIEN I. BLAKE, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have discovered a new and useful Improvement in Ionizers or Apparatus for Producing Gaseous Ions, of which the following is a specification, reference being had to the drawing accompanying and forming a part of the same.

The production of gaseous ions, has long been known by physicists, to accompany the processes of combustion in flames, and electrical discharges from points, but in both cases the ions are produced in relatively limited quantities and under such conditions as to render them to a greater or less extent inaccessible, and not satisfactorily available for commercial use or application.

In another application, Serial No. 433,382, filed May 16, 1908, I have described an improved process of rendering available by electrical means, the ions produced by combustion, but the apparatus upon which the present application is based constitutes an improvement upon my former invention and a further advance in the art, in that by its use I am enabled to produce these ions in almost unlimited abundance and under conditions which render them continuously accessible while they are still in the peculiarly active state which they exhibit at the instant of their generation, and before they can recombine to form neutral atoms, or attach themselves to neutral atoms or molecules to form molions. This transition stage, incident to generation, is, as is well known, the most effective for the practical utilization of the ion, but heretofore it has been difficult to take advantage of this fact, both because of the methods of generation resorted to, and the limited number produced thereby.

My present discovery dispenses entirely with flames and discharge points, and affords a more ready means of producing the ions in a way that renders them completely accessible and available while in their active electric state. The nature and scope of the discovery will be understood from the following considerations and general description.

It is well known that in electric condensers large quantities of static electricity are accumulated upon their plates, and powerful fields or regions of stress are set up within their dielectrics. If the condenser be of the gaseous type, that is to say composed of plates separated by strata of air or gas, this air is subjected to powerful electric stresses, and from the nature of the device the volume of air under stress may be large.

If the potential of the charging force be sufficiently high, disruptive discharges in the form of isolated sparks will take place between the condenser plates, but the attendant ionization of the air will be practically negligible in extent, as it is limited to the duration and path of the spark discharge. The plates may be so far separated that no discharge, in the form of sparks, brush or glow takes place between them, in which case no appreciable ionization of the gaseous dielectric occurs.

I have discovered that if, between the plates of a condenser of this kind, when separated even far beyond the limits of disruptive discharge, a solid dielectric in a fragmentary or filar form be interposed, intense and general ionization of the entire volume of intermediate gas takes place without disruptive discharge. For example, if between the glass or other insulating plates, separating or supporting the conducting elements of an air condenser, a material such as glass wool be loosely packed, the whole space between the plates glows, even in broad daylight, with a brilliant blue light, no disruptive discharge occurs at any point or at any time, and the entire volume of gas between the plates becomes a generator of ions.

A mass of fragmentary or filar conductors or metallic points between the glass plates will result in the production of disruptive discharges and will not effect this ionization, or if the condenser plates be entirely of metal, and a fragmentary or filar dielectric, such as glass wool, be interposed between them, no ionization will occur, because disruptive discharges will pass between the metal plates. On the other hand, solid dielectrics, wholly or or partly composed of fragments, grains or threads become prolific ionizers in a powerful electric field. This I have confirmed by many experiments. Efforts and experiments made with a view to turning this phenomenon to practical account have led to further important and useful discoveries. For example, I have found that the gas or air

must be continually renewed, so rapid and intense is the production of ions, and that the latter may be continually blown out for use outside the condenser plates. This discovery I have utilized by discharging or feeding the gas, ionized by the above described means, into vapors or suspended particles to cause the rapid aggregation and deposition of the same upon proximate surfaces. I have further discovered that if a vapor or a particle laden gas be made to flow through the interstices of the solid dielectric and between the condenser plates, the ions will cause the vapors or particles to be rapidly deposited upon the dielectric surfaces, and, in fact, upon all other neighboring surfaces with which the vapors or particles may come in contact.

Experimental investigations of the phenomenon of ionization by means of an interstitial dielectric, have led to the further discovery that it is not necessary that the fragments or threads of the dielectric should be contiguous or fill, even loosely, the whole space between the condenser plates. If the surface of each plate is covered with or composed of a layer of fragments or filaments of a solid dielectric, such as quartz or glass, the whole gaseous space between the plates becomes uniformly and continually ionized, and filled with intense blue light, apparent even in broad day light.

The above described means, so far as may be done without going into mere self suggestive details, is illustrated in the accompanying drawing, in which—

Figure 1 is a diagrammatic illustration of an ionizer constructed according to my invention. Figs. 2 and 3 are similar illustrations of modified forms of the same, and Fig. 4 a view of a modified form of plate.

Referring to Fig. 1, A and B are the dielectric plates of an ordinary air condenser, adapted to be charged to opposite potential by a suitable source of electro motive force connected by wires C, C, to the condenser armatures or conducting terminals D, E, attached to plates A, B. Between the plates A and B is the solid dielectric F, in a fragmentary or filar form, such, for example, as glass wool. In Fig. 2, the same arrangement of plates is shown, but in this case the fragmentary dielectric, such as finely divided quartz, fragments or filaments of glass or the like is merely attached to the surface of plates A and B, being caused to adhere thereto by any suitable cement, or by mechanical means.

In Fig. 3 a multi-cellular ionizer is shown. This comprises plates A and B, with their attachments as shown in the other figures, with a plurality of intermediate plates G, H, each composed of glass or similar plates inclosing conducting plates D′ by which they are charged. Between the oppositely charged plates is placed the fragmentary or filar dielectric F, and, as above stated, this may be done by applying layers of the same to the surfaces of the plates.

From the nature of the case it is manifest that in lieu of interposing the solid dielectric in a fragmentary or filar condition between the plates, in the way directed, the same results will be secured by using dielectric plates the surfaces of which are themselves of the same general character as the applied layers or coatings. This may be accomplished by such treatment of the surfaces as will impart to them the necessary roughened or fragmentary character. Such a plate is shown in Fig. 4, K indicating the roughened surface. This improved ionizer lends itself readily to many useful applications in the arts. As it may be constructed so that practically the whole space between the plates offers no obstruction to the passage of gas, smoke or fumes, the latter may be caused to pass through it with unimpeded velocity while being subjected to its ionizing action. This means of producing and maintaining an extensive and uniform ionizing region, wholly accessible and useful, essentially transforms the whole powerful and extended electro-static fields of gaseous condensers into ionizing fields, and thus takes advantage, not only of the large quantity of static electricity, accumulated according to the principles of condensers, but also of the large quantities of gas available between their plates for ionization.

The device may be placed in any smoke-stack or flue through which pass fumes or vapors, and by a proper disposition of the plates afford a practically unobstructed passage for the flow of the whole volume of such fumes, which being subjected to an intense ionizing action will be continually deposited on the surfaces of the plates and other adjacent surfaces, and removed therefrom by any suitable means. I have found that this ionizer may be run continuously without over-heating or deterioration of the fragmentary dielectric, and with a very small consumption of electric energy. The materials used and specific construction adopted may be greatly varied. I have, for instance, employed with very good results condenser plates four inches apart, charged by a source of alternating current of 48,000 volts, but complete ionization may be effected by plates so closely placed that the voltage between them may be as low as 10,000 volts.

Where necessary to use condenser plates capable of resisting high temperatures, they may be made of such materials as mica, and the character of the fragmentary dielectric will also depend upon like conditions of use. I have employed particles or fragments of quartz or glass, and glass wool, and also a layer of sand for this purpose, and I have found that even silk or woolen cloth cover-

ing the opposing faces of the condenser plates will fill the space between the plates with ionizing blue light, while the cloth is not heated sufficiently to burn.

What I claim is:

1. An ionizer composed essentially of a fragmentary or filar dielectric in an electric field.

2. An ionizer composed essentially of glass wool in an electric field.

3. An ionizer comprising in combination the plates of a gaseous condenser, and a solid dielectric in a fragmentary or filar form interposed in the space between said plates.

4. An ionizer comprising in combination a plurality of dielectric plates adapted to be charged alternately to opposite potentials, and a solid dielectric in fragmentary or filar form applied to the opposing surfaces of said plates.

5. An ionizer consisting of dielectric plates adapted to be charged to opposite potentials, separated by air spaces and having fragmentary or filar opposing surfaces.

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Witnesses:

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