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DEVICE FOR DISSOCIATING THE ELECTRIC CHARGES OF A GAS OR OF A GASEOUS MIXTURE

Filed Jan. 31, 1941

Serial No. 376,930

2 Sheets-Sheet 1

Fig. 1.

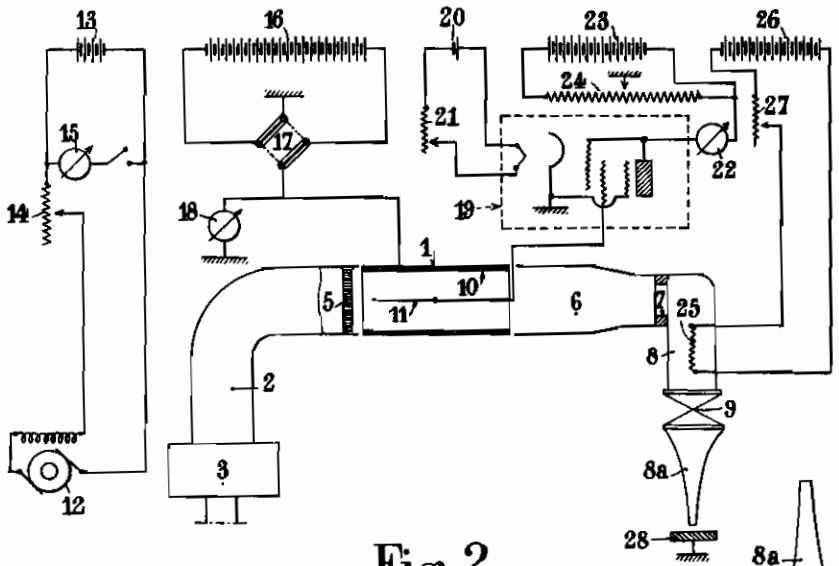
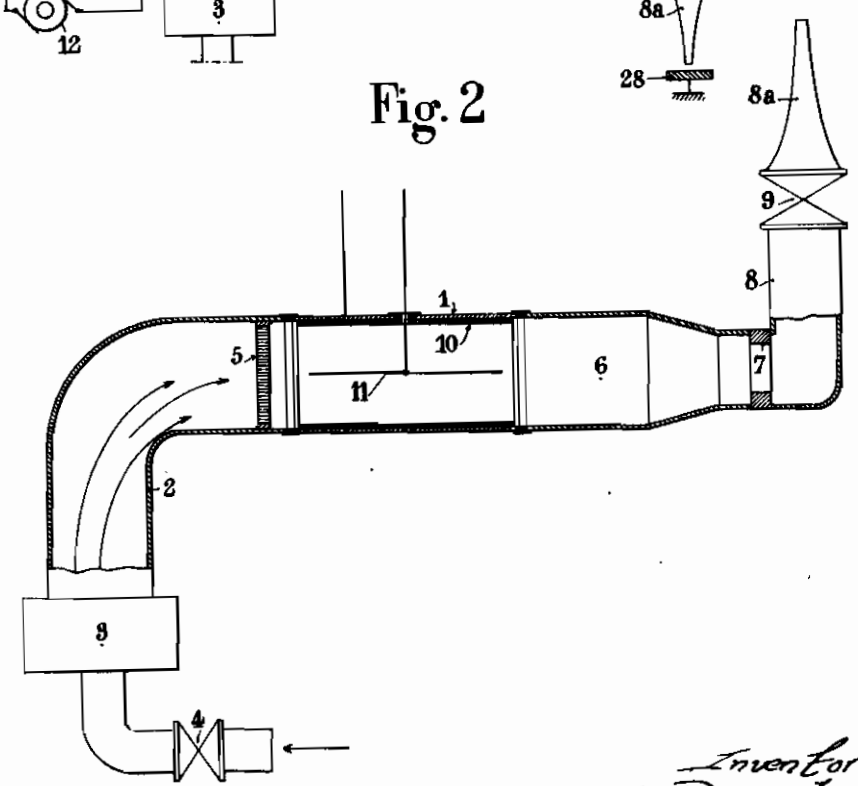


Fig. 2



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by: Glascock Downing & Seibold
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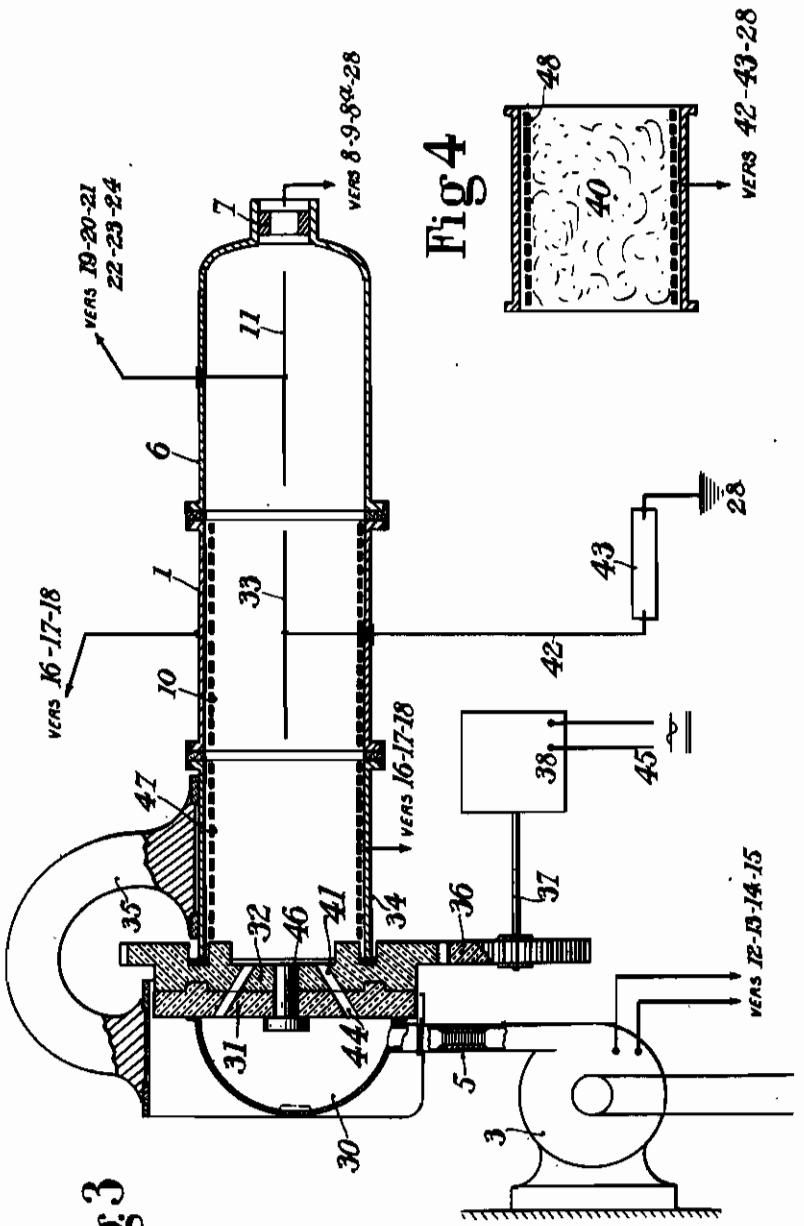

Fig 3

Fig 4

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ALIEN PROPERTY CUSTODIAN

DEVICE FOR DISSOCIATING THE ELECTRIC CHARGES OF A GAS OR OF A GASEOUS MIXTURE

Aristide Peycelon and Paul Malsallez, Paris, France; vested in the Alien Property Custodian

Application filed January 31, 1941

The present invention has for object a device serving to dissociate the electric charges of a gas or of a gaseous mixture in order to obtain an outflow of gas solely constituted by well defined positive or negative charges for any industrial and biological utilisation.

This device comprises a chamber through which the gas or mixture of gases passes at a definite speed, for instance under the action of a pump or turbine the speed of which is adjustable, and in which it is subjected to a continuous action for dissociating the electric charges existing in the midst of said gas or mixture of gases at the moment it is measured.

Said dissociation can be caused for instance under the action of the α particles of radium or of any other physical element allowing the electric structure of a gaseous molecule to be modified.

The device comprises for that purpose various adjusting and control means.

Furthermore, it essentially comprises means for producing in the dissociating chamber an electric field of definite direction and potential in order to impart to the positive or negative charges formed a speed of suitable magnitude.

Fig. 1 illustrates a general view of the device.

Fig. 2 shows, on an enlarged scale, the dissociating chamber with the apparatus placed at its inlet and at its outlet.

Figs. 3 and 4 show two embodiments of the device according to the invention.

1 designates a cylindrical chamber having conducting walls. One of its ends is connected by a conduit 2 to the delivery of a turbine 3 which is fed from one or more sources of gas and through the medium of one or more cocks 4 serving to adjust the outflow and the feed pressure. A filtering partition 5 prevents foreign bodies from entering the chamber 1. The other end of the latter is electrically insulated from the chamber 6 arranged as an extension thereof and connected through the medium of a diaphragm 7 to an outlet pipe 8 with a cock 9 and nozzle 8a the shape of which can vary according to the applications. The diaphragm 7 and the cock 9 cooperate for adjusting the outflow of the gas.

10 illustrates the dissociating element which is constituted, in this example, by a sleeve placed within the chamber 1 concentrically with its walls and in mechanical and electrical contact with the latter, said sleeve being covered with a radio-active substance for instance.

A wire 11, perfectly insulated from the walls of said chambers is arranged according to the axes of chambers 1 and 6.

The electric assemblage comprises, in this example:

An electric motor 12 for actuating the turbine 3, a source of current 13, a rheostat 14 for adjusting the power of said motor and a voltmeter 15 for the control;

A source of current 16, one of the poles of which is connected to earth, and the other to the wall of the chamber 1, through the medium of a reversing switch 17, so that the chamber can be brought to a positive or negative potential at will; a voltmeter 18 indicates the value of said potential;

A thermionic valve device 19 only partly shown, serving to measure the electric dissociation of the gaseous molecules; the filament of said valve is connected to a battery 20 of 6 volts for instance, through the medium of a rheostat 21, one of the grids is connected to the wire 11, another is connected, through the medium of a milliamperemeter 22, to a pole of a battery 23 of 120 volts, the other pole of which is connected to earth through the medium of an adjusting potentiometer 24;

An adjustable heating device comprising a resistance 25 which is placed in the pipe 8 for heating the issuing gases, a battery 26 feeding said resistance and a rheostat 27 adjusting the intensity of the heating current.

28 designates the object to be treated, of organic or other origin, which is to be subjected to the action of the jet of gas, said object being connected to earth.

The gases or gaseous mixtures used, delivered by the turbine 3 into the conduit 2 and passing through the filter 5, reach the chamber 1, brought to a certain potential relatively to the earth potential; they are then subjected to the action of the dissociating element 10 in such a manner that, according to the polarity applied to the chamber 1, only electric charges of the same polarity as that of chamber 1 remain in the gas or gaseous mixtures. The speed of displacement of said charges is proportional to the magnitude of the potential applied to the chamber 1 relatively to the earth potential. The reversing switch 17 allows of reversing the polarities used.

The intensity of the dissociation can be measured, at every instant, by means of the thermionic valve device 18 the operation of which is proportional to the quantity of the charges dissociated and to their polarity relatively to the

earth potential, which charges are collected by the wire 11.

Owing to this control means and to the adjusting rheostat 14 the outflow of the positively or negatively charged gases issuing from the nozzle 8a can be exactly adjusted according to requirements. On the other hand, their temperature can be adjusted by means of the rheostat 27.

It is to be understood that the invention is not limited to the embodiment above described and that, without prejudice to its principle, the various members illustrated may be replaced by any other substantially equivalent members; for instance, the batteries or cells can be replaced by a source of alternating current, in this latter case with the aid of rectifiers; use can be made of any dissociating means other than radio-active substances, the device 19 can be replaced by any other control or optical, sonorous or like recording device.

It is to be noted that two or a plurality of devices according to the invention may be used simultaneously, one supplying the positive charges, another the negative charges, so that a mixture of gases containing positive and negative charges in an exactly determined proportion can be caused to act on the object to be treated.

The improvements which will be described hereinafter are intended, firstly, as in the preceding case, to form in the midst of the apparatus, positive or negative charges arising from solid, liquid or gaseous bodies and to eject them so that they can be utilised; secondly, to obtain solid, liquid or gaseous products, arising from elements which have an initial chemical composition different from that which these same elements would have after they have been exposed to the action of suitable physical agents. The products which have just been mentioned are obtained either by mechanical action, friction for instance, or by physico-chemical action, which implies a transformation of the atomic structure under the influence of certain definite radiations and electric potentials, as well as under the influence of suitable magnetic fields of definite value and direction. They are chemically pure, possess a chemical constitution different from the body which gave rise thereto and a predetermined polarity.

In Fig. 3, 1 is the dissociating chamber of cylindrical shape, which has for instance a radio-active film 10 in electric connection with the elements 16, 17 and 18. 3 designates the circulating system of the gaseous stream, comprising a turbine or any other device electrically connected at 12—13—14 and 15. 5 designates a filter. 6 is a control chamber in which is arranged an electrode 11, suitably insulated and electrically connected to the members 19, 20, 21, 22, 23, 24 and to 8, 8a, 9 and 28. 7 designates the member for adjusting the gaseous outflow to be used. 28 is an earth connection.

At 30 is shown a delivery chamber which is provided with screens adapted to canalize the gaseous outflow. For that purpose, a fixed partition 31 carries channels 44 and supports, through the medium of the spindle 46, a rotating plate 32 perforated with channels 41 identical to the channels 44.

33 designates an insulated electrode electrically connected by 42 to the source of electric energy 43. The chemical nature of said electrode is function of the results to be obtained.

34 illustrates a fixed chamber for regularizing the gaseous outflow, and which may be provided with a radio-active film 47.

The elements 34, 31 and 30 are suitably connected by a fixed support 35.

A toothed crown wheel 36 mounted on a shaft 37 produces the rotation of the plate 32. A timed relay 38, operating under the action of direct or alternating current 45 controls an electric motor, or a clockwork, or a pneumatic or hydraulic device, not shown, which actuates the plate 32 through the medium of members 36 and 37 and can actuate or not the circuits 16, 17, 18, during a predetermined time.

In Fig. 4, 40 designates a chamber filled with a liquid or with solid bodies in suspension, or with a gas or a gaseous mixture; said chamber is provided with a radio-active film 48 subjected to a certain potential by 42—43 relatively to earth 28. Said device 40 can be mounted in the place and stead of chamber 1 of Fig. 1.

The chambers 1, 34, 40 can also be filled with a gas or gaseous mixture the atomic structure of which is to be modified by the processes used for solid or liquid bodies. The source of electric energy 43 is adapted to bring the electrode 33 and chamber 40 to a certain potential of definite value and polarity relatively to the carth potential.

The operation takes place as follows:

The timed relay 38 controls at predetermined and definite intervals of time the rotation of plate 32 opposite the fixed partition 31. This rotation is adapted to put the channels 41 and 44 in or out of communication, that is to say to prevent or allow the passage of the gaseous stream coming from the turbine 3.

This gaseous stream passes through the filter 5, proceeds towards the chamber 34 for adjusting the outflow, then towards the physico-chemical transformation chamber 40 or 1, and from there, it reaches the control chamber 6.

When passing through the chamber 34 the gas is subjected to a first action of radiations arising from the radio-active film 47. When passing through chamber 1 or 40 it is subjected to a second radio-active action which completes and terminates the transformation of the charges by imparting thereto a definite polarity. Moreover, in said chamber 1, the electrode 33 brought to a certain potential by the source of energy 43 (which potential can be positive or negative) being subjected to radiations emitted by the radio-active film 10, a physico-chemical transformation of the surface of the electrode results therefrom. The products of this transformation, the nature of which will be function of the initial chemical composition of said electrode, will be of negative or positive polarity according to the polarity of the potential applied to said chamber 1. This transformation takes place during the obturation of the channels 44 by the rotation of plate 32 provided with the channels 41. The duration of the obturation which has just been mentioned, will be function of the initial chemical nature of the electrode 33 and can therefore vary according to the results to be obtained and the elements used. Said obturation period, that is to say of transformation of the surface of electrode 33, will be adjusted through the medium of the timed relay 38. As soon as the communication between chamber 30 and chamber 34 is re-established, fresh gaseous elements arising from the turbine 3 will take the place of the preceding ones and the first will be ejected in order to be

used, at the same time as the products obtained from the physico-chemical transformation.

When chamber **40** of Fig. 4 is substituted for chamber **1** of Fig. 1, physico-chemical transformations similar to those to which the gases and solids are subjected in the apparatus of Fig. 1, are produced in the liquids or other bodies in suspension in said chamber **40**. Said products will also be brought to positive or negative potentials according to the polarity of the film **48** relatively to the earth potential. The ejection will take place as in the case of chamber **1**.

It is to be understood that said physico-chemical transformation can be a surface or a complete transformation according to the conditions of operation.

In chambers **1** or **40** within which the desired physico-chemical transformations take place, it is advantageous in certain cases to introduce a heating resistance, not shown. This resistance, electrically raised to a suitable temperature produces a mechanical atomization of the electrode, which has the effect of increasing the rapidity of the physico-chemical transformation under the action of the rays from the radio-active film. The products of said physico-chemical transformation are of negative or positive polarity according to the polarity of the potential applied to chamber **1** or **40** and are ejected towards the exterior, to be used, as indicated in the preceding paragraphs.

On the other hand, the electrode to be heated can be mounted in a separate compartment, the atomized particles being sent into the radio-active chamber in order to enter into the predetermined circulation, after the chamber **6** has been controlled by the electrode **11**.

It is to be noted that all these devices can constitute a portable unit for any industrial, biological or other utilisation.

It is to be understood that the shape, mutual locations, dimensions of said devices can be modified without affecting the principle of the invention which constitutes in itself a new industrial product.

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