E. E. LITTLEFIELD.

APPARATUS FOR ELECTRICALLY CHARGING FLUIDS.

APPLICATION FILED OCT. 24, 1916.

1,360,654.

Patented Nov. 30, 1920.

2 SHEETS—SHEET 1.

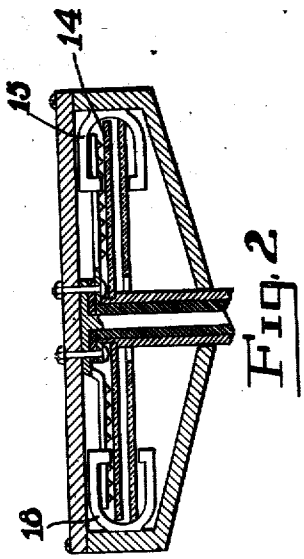

Fig. 2

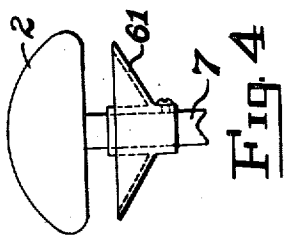

Fig. 4

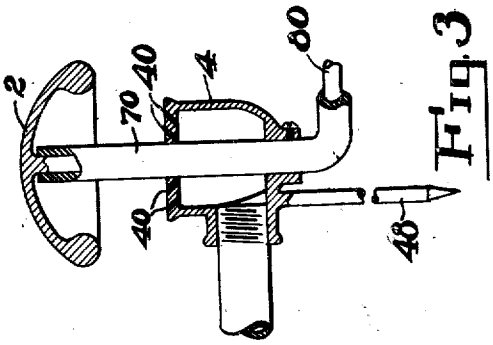

Fig. 3

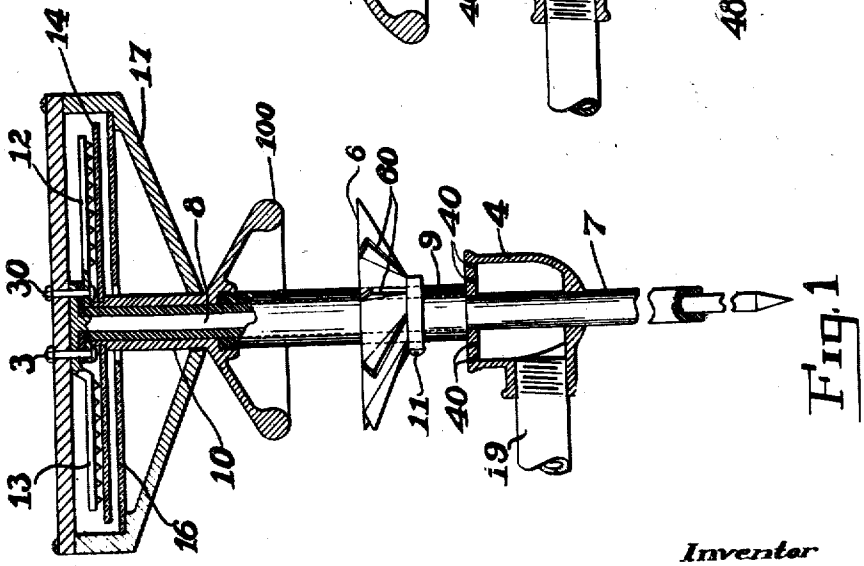

Fig. 1

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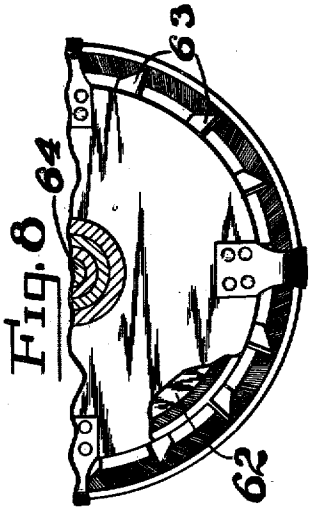

Fig. 8

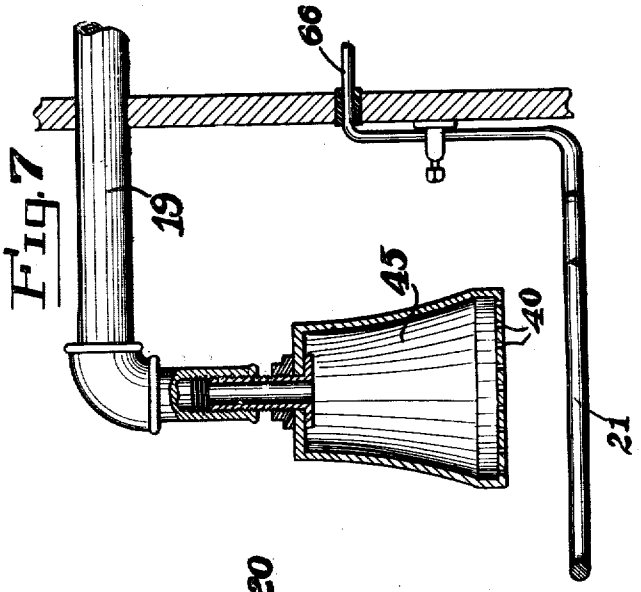

Fig. 7

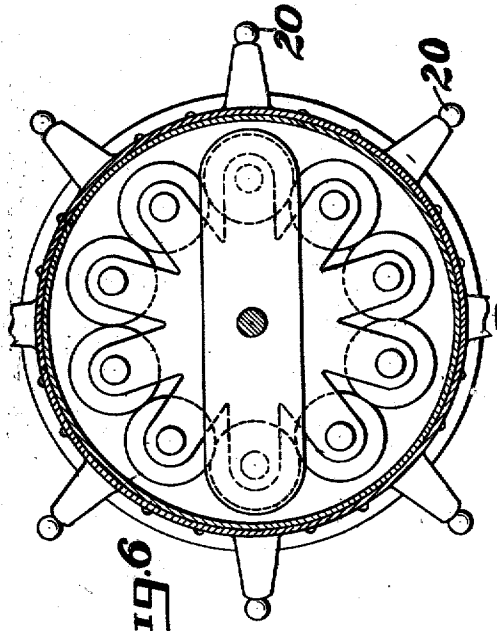

Fig. 6

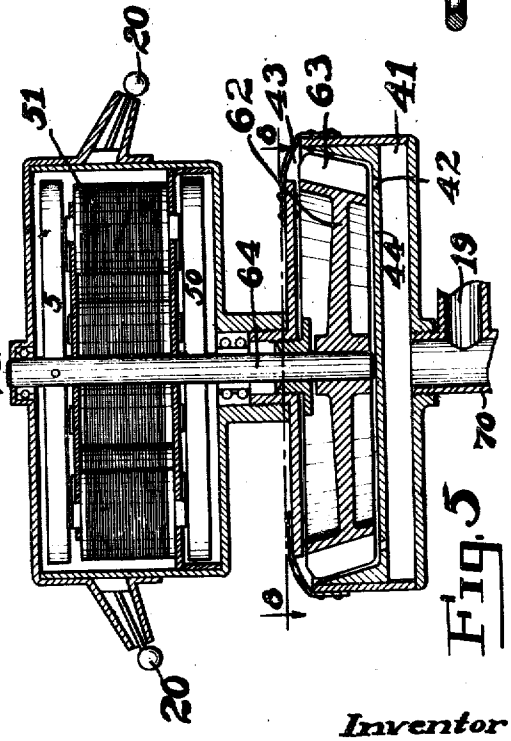

Fig. 5

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR ELECTRICALLY CHARGING FLUIDS.

1,360,654. Specification of Letters Patent. Patented Nov. 30, 1920.

Continuation of application Serial No. 482,599, filed March 10, 1909. This application filed October 24, 1916. Serial No. 127,338.

To all whom it may concern:

Be it known that I, EDGAR EARLE LITTLEFIELD, a citizen of the United States, and resident of the city of Seattle, county of King, and State of Washington, have invented certain new and useful Improvements in Apparatus for Electrically Charging Fluids, of which the following is a specification.

My invention relates to apparatus for giving fluids an electrical charge, of such character that when the fluid is discharged, as by spraying, the electrical charge will be carried to and deposited upon the objects upon which the fluid falls.

The object of my invention is to provide an improved apparatus for securing these results. In particular, I have employed these means to electrically charge fluids which are, or may be, applied to vegetation to thereby produce upon the vegetation the stimulating effect which electricity is known to have thereon and further to free it of fungous or insect pests when applied under suitable conditions.

I have also applied these means to charge fluids which are, or may be, used in connection with shower baths, or the like, to thereby apply the stimulating effect of electricity to the user.

While it would be desirable in many cases to use the fluid in a comparatively pure state I contemplate that advantage may be taken of the increased effect, in some cases, resulting from the employment of certain chemicals with which the fluid may be charged.

It is often desirable to charge fluids which issue, or are discharged, from a source having a grounded connection and, under such conditions, unless proper means are employed, the fluid can carry no appreciable charge. By means which I have employed the fluid may be charged by influence, or induction, in which case it may, or may not, have a grounded source, as the nature of the case may require.

This application is a continuation of my application, Serial No. 482599, filed March 10, 1909, and entitled Electric treatment of vegetation.

In the drawings I have shown forms of apparatus which may be employed in carrying out my invention and which are now preferred by me.

Figure 1 is a form of device, shown partly in sectional elevation, which is actuated by the fluid discharge.

Fig. 2 shows certain features as added to the device shown in Fig. 1.

Fig. 3 shows a form of apparatus, partly in section, by means of which a fluid may be charged with electricity supplied from any convenient independent source.

Fig. 4 shows a type of deflector which may be applied in combination with the form of device shown in Fig. 3.

Fig. 5 is an elevation and partial section of a type of device operating under the principles of an ordinary dynamic generator.

Fig. 6 shows an upper plan view of certain parts of the device shown in Fig. 5.

Fig. 7 shows modified forms of charging terminal and discharging device.

Fig. 8 is a section on line 8—8 of Fig. 5.

It has been found, as a result of scientific experiments, that water and other fluids may, when discharged as a spray, be charged with electricity, and it is generally recognized that electricity properly applied, has a beneficial and stimulating effect upon vegetation.

I have conceived the idea of charging water used to spray, or water, vegetation with electricity, whereby the vegetation so treated will be stimulated and its growth and physical condition and vigor be improved.

I also contemplate that the water may, when desired, be charged chemically with such substances as have been found to have a beneficial effect, either in stimulating plant growth, or by way of having an injurious effect upon the fungous or insect pests to which the vegetation may be subject.

By the employment of chemicals I am also enabled to increase the potential of a charge carried by the fluid, and by adding the electrical charge to the chemically charged fluid, the chemical action is increased.

By these means, either separately or combined, as may best fit the occasion, I am enabled to stimulate the growth of vegetation or free it of pests, or to do both at once.

In Fig. 1 I have shown a form of apparatus in which the fluid in being discharged, impinges upon a deflector, or similar device, which also acts as a motor and is operatively connected with an electric generator, the

product of which is transferred to the escaping fluid by which it is applied to the vegetation, or other object, along with the fluid.

In the practice of my invention the fluid may be supplied from any convenient source and while, in some cases, it might be desirable to use a source wholly insulated from a ground connection, I also contemplate that the source may be uninsulated from the ground connection, as, for instance, an ordinary hose connection with a water main.

Where it is desirable to use an insulated source, an insulated tank and conduit may be employed to deliver the fluid and the tank insulated from its source of fluid supply during the operation of the charging device.

In the device as shown in Fig. 1, the pipe 19 conveys the fluid to the discharging device 4, which breaks it up into a number of jets. This consists of a chamber closed at the top, but provided with discharge openings 40. Supported above the discharge chamber 4, in position to be engaged by the fluid discharge, is a deflector 6, which also functions as an impulse or impact motor. This deflector, as shown, consists of a cone having angularly disposed vanes 60, projecting from its surface in such position as to be engaged by the fluid discharge to thereby rotate the whole. This deflector may be of insulating material or not and of any convenient and suitable form, as the case may require. In this form of generator the essential thing is to use a device which is both a deflector and a power generator, so that the fluid, acting upon it, operates the generator. Provisions for axial adjustment may be provided, as a set screw 11.

In this form of device the deflector is mounted to turn on an insulating sleeve, or stem 7, or is in other ways electrically insulated from the chamber 4, and the pipes supplying the fluid. Preferably, this deflector is also insulated from the generating device, which result I have shown as being secured by mounting it upon a sleeve 9 of any suitable insulating material. These two parts are secured to turn together.

A metallic sleeve 10 is secured to turn with the sleeve 9 and the deflector, and preferably is provided with a depending petticoat 100, or such other construction as may best serve as a discharging terminal for electrically charging the escaping fluid. The upper portion of the sleeve 10 is secured to the disk 14 through which means the latter is made to rotate with the deflector 6.

A current collecting device, herein shown as a comb 12, is mounted adjacent the disk at one side and a similar device 13 on the same side but distant from its companion comb. The comb 12 is in electrical contact with the sleeve 10 and through this with the discharge terminal 100. The comb 13 is insulated from the other comb and is in electrical connection with the spindle 8, which extends within the sleeve 7, and through which it may be grounded. As the discharged fluid forms into spray in the inducing field of the terminal 100 it receives an induced or bound charge which it may carry and deliver to an object at a distance from the charging device.

Under certain conditions the fluid, instead of receiving its charge by induction, may be charged by contact with the charging terminal. Where this is desired to be brought about the deflector is so formed and positioned that the fluid has freedom of contact with the terminal.

The electrical generator above described is preferably inclosed within a box, or casing, 17, to which the spindle 8 is preferably connected at its upper end through the insulating bolts, or screws, 3 and 30. These bolts, for which other means of an insulating character may be substituted, also secure other parts of the device. Within this casing and adjacent the rotatable disk 14, is the stationary disk 16 which constitutes a part of the generator. This disk 16 is of glass or other material having like electrical qualities, as is also disk 14. There are other details of a generator of this sort which I have not shown but which are recognized as being associated with such machines and forming component parts thereof.

In Fig. 2 I have shown how magnets may be associated with the foregoing described generator to overcome certain conditions, including in some cases atmospheric conditions, and to otherwise increase the effectiveness of the generator. This result may be accomplished by so positioning and securing the magnets 15 and 18 that their fields of force are cut by the rotating disk 14 and its armature and necessary associated parts. These means may also be associated with other generators of similar character, depending on the results to be obtained.

In Fig. 3 I have shown a form of device by means of which the fluid may be charged with electricity delivered from any convenient source, through conductor 80. This source may be of high frequency character and the supply may be developed in any convenient manner. The terminal 2 receives the inducing charges through the conducting stem which is insulated from the discharging device by the sleeve 70 which is snugly and adjustably fitted in the discharging device.

The chamber 4 is provided with discharge openings 40 which deliver the fluid in a path which is in the inducing field of the terminal 2. When desirable the terminal 2 may be coated or covered with such insulating material as has been found suitable for such purposes.

Fig. 4 shows how a deflector may be used in combination with the device shown in

Fig. 3. Its position may be adjusted as by set screw 11. If it is desired to charge the fluid by contact with the charging terminal the deflector may be so positioned as to make this possible.

Instead of the foregoing described devices, I may employ such an electrical generator as that shown in Fig. 5. In this case the fluid is made to actuate a rotatable member which, preferably, is in the form of a turbine 62, which has angularly placed blades 63, upon which impinge jets issuing from openings 42 in plate 44, which forms part of the wall of chamber 41. The fluid is then discharged as a spray through the large orifices 43, through the field electrically charged from discharging terminals 20.

This member, turbine 62, for which may be substituted any other suitable means, has rigid connection as by shaft 64, with the permanent magnets 5 and 50, which are rotated with reference to the field coils 51. While I have shown the magnets 5 as being rotatable it is also possible to secure like results by rotating an armature in the field of permanent magnets.

The discharging terminals may be of any suitable form or construction. In cases where grounding a part of the charge is found to be necessary, any convenient means may be employed for the purpose. The part 70 forms part of a closed chamber which may be a pointed closed tube and adapted to be inserted in the ground. It may also partly form the upper part of a standard.

In Fig. 7 I have shown modified forms of charging terminal and discharging device. As the jets of fluid issue from the insulated chambered head 45 through openings 40 they receive a charge from the annular charging terminal 21 which receives its charge from any convenient source of static charge 66. Though not entirely necessary, the head 45 is preferably made of earthenware or other insulating material and is adjustably supported by the supply pipe.

The foregoing constructions are shown and described in more or less rudimentary form and as instances of types of apparatus which may be employed and as illustrating the scope of my invention. It is evident that great variation in forms and construction of apparatus may be employed without departing from the spirit of my invention.

Where desired the charge may be supplied from an independent source and applied to charge a fluid as it is applied to the vegetation in the form of a stream.

Under different conditions different intensities and character of charge may be used and any suitable means employed to apply it, as for instance, such means as might include, or be associated with, a high frequency generator, or a transformer, or the like.

I have also found that an inducing charge alone may be employed to form a fluid into spray. I have found that where a jet of fluid issues under the influence of an inducing field of force the charge has the effect of forming the fluid into spray. This effect may be used either alone or in combination with deflecting means.

The inducing terminals described in the foregoing should be so formed that the induced charge delivered to the fluid is substantially the maximum charge capable of being delivered by the charging terminal. In other words, the form and construction is such that the fluid receives a charge from that surface, or part, of the inducing terminal which is capable of delivering the most effective charge. Where a convective charge is employed the form of the terminal may be modified to meet the requirements.

It is evident that with my invention various fluids may be electrically charged and the charged fluid applied in many different ways. It may also be used in electrostatic separation, and the like, and for purposes of atomization.

I contemplate using either relatively pure or chemically charged liquids with this device. By chemically charging the liquids an insecticide or a fungicide may be used. The effect of the electrical charge upon the chemical, it is believed, will intensify its action.

What I claim as my invention is:

1. The combination with a liquid discharging device of means actuated by said discharge to electrify the liquid discharged.

2. The combination with a liquid discharging device of a generator of electric charge actuated by the liquid discharged and means for electrically charging the discharged liquid from said generator.

3. The combination with a liquid discharging device of a rotary electric generator and means for electrically charging the liquid discharged from said liquid discharging device.

4. The combination with a liquid discharging device of means actuated by the discharged liquid to generate an electric charge and means for applying the electricity thus generated to induce a charge in the discharged liquid.

5. The combination with a device for discharging fluid upon vegetation, of a generator of electromotive force operated by the discharge of the fluid and connected to electrically charge the discharged fluid.

6. The combination with a fluid discharging device, of a rotatable deflector actuated by the discharge of fluid, and an electric generating device operated by said deflector and feeding its charge into the fluid discharge.

7. The combination with a fluid discharging device, of a rotatable member actuated by the fluid discharge, a static electric gen-

erator having one part thereof turned by said member, said generator being connected to discharge the electricity generated thereby into the fluid discharge.

8. The combination with a fluid spraying device, of means for giving the spray a bound charge of electricity, said means including a rotatable electrically charged terminal in inductive relation with the fluid discharge.

9. The combination with a fluid discharging device and means for electrically charging the fluid, of means for generating electricity actuated by the fluid and connected with said fluid charging means.

10. A fluid supply having an uninsulated source, means for dispersing the fluid, and means without the path of the fluid for giving the particles of said fluid an electric charge.

11. An apparatus for electrically charging a fluid comprising a fluid conduit and a spray device supplied thereby and means for giving the fluid an electric charge through a dielectric as it is discharged in the form of spray.

12. A fluid spraying device comprising, a source of fluid, a spray producing member, a charging terminal disposed centrally of and adapted to inductively charge the spray, and means for charging said terminal.

13. A device for applying electric charges to a fluid spray comprising, a source of fluid, a spray forming device, means for inductively charging the particles of the spray, said means being insulated from the spray device.

14. A device for applying electric charges to a fluid spray comprising, an uninsulated source of fluid, a spray forming device, and means for applying electric charges to the particles of the spray through a dielectric.

15. A means for applying a bound electric charge to vegetation comprising, means for discharging a fluid in the form of spray, and means for inductively charging said fluid with electricity.

16. A device for electrically charging a fluid spray having a charge inducing member spaced at a distance from the path of the spray.

17. A fluid spraying device for electrically charging a fluid spray having a member which is spaced from and adapted to form a field of force in the path of the fluid spray.

18. A device for electrically treating vegetation comprising a spray device having means for electrically charging the spray through a dielectric.

19. As an article of manufacture, a device for electrically charging fluid vapor or spray including an uninsulated source of fluid and means for projecting a field of force into the path of the fluid.

Signed at Seattle, Washington, this 19th day of October, 1916.

EDGAR EARLE LITTLEFIELD.