

**April 19, 1938.**

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**2,114,345**

# RADIO-FREQUENCY APPLICATOR WITH ELECTROSCOPIC CONTROL

Filed April 10, 1934

*Fig. 1*

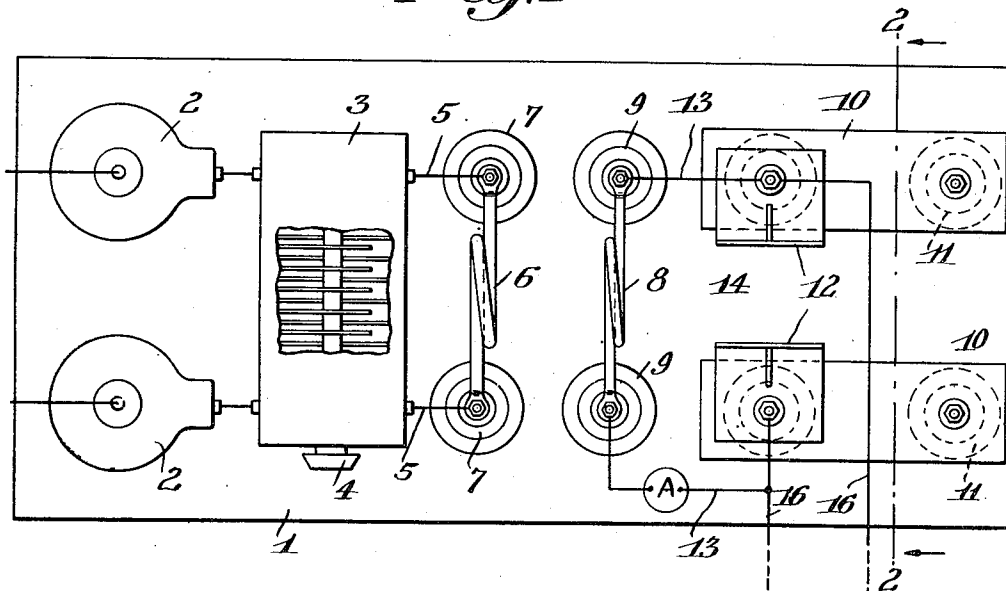


Fig. 3

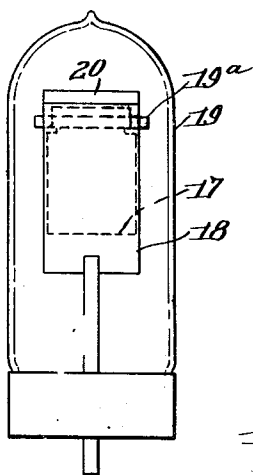
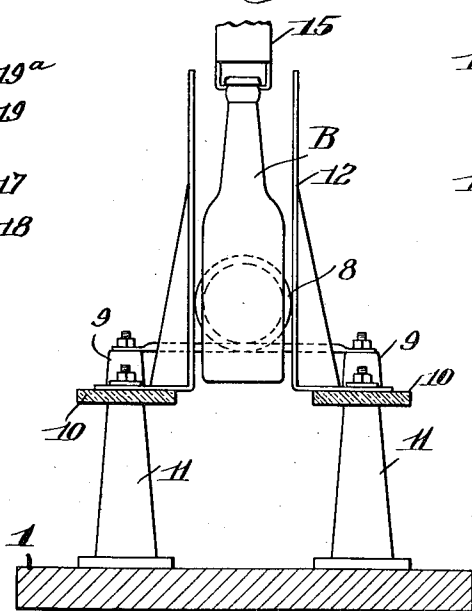


Fig. 2



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## UNITED STATES PATENT OFFICE

2,114,345

RADIO-FREQUENCY APPLICATOR WITH  
ELECTROSCOPIC CONTROL

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Application April 10, 1934, Serial No. 719,978

5 Claims. (Cl. 175—311)

My present invention relates to electrical de-  
vices and more particularly to the generation, use  
and control of radio frequency power, and it has  
for its object to provide an apparatus of this char-  
acter that will be simple in construction and  
operation and by means of which the radio-fre-  
quency power may be put to such uses as de-  
stroying bacteria and other small animate life.  
A further object of the invention is to provide  
automatic means for controlling radio frequency  
output from a generator through an output in-  
ductance element, preferably, to a field inductance  
correlated or coupled therewith whereby an elec-  
trostatic field maintained across the inductance  
may be regulated for the dissipation in matter  
placed therein of all electrostatic energy without  
changes of any consequence in the power derived  
from the radio-frequency generator.

To these and other ends, the invention resides  
in certain improvements and combinations of  
parts, all as will be hereinafter more fully de-  
scribed, the novel features being pointed out in  
the claims at the end of the specification.

In the drawing:

Fig. 1 is a top plan composite view of an appa-  
ratus constructed in accordance with and illus-  
trating one embodiment of my invention, parts  
thereof being conventionally illustrated and the  
view being partially diagrammatic to include in  
enlarged side elevation the compensating or con-  
trolling device for the electrostatic field of the  
capacity electrodes;

Fig. 2 is a transverse section taken on the line  
2—2 of Fig. 1, and

Fig. 3 is an elevation of the controlling device  
taken from another side.

Similar reference numerals throughout the sev-  
eral views indicate the same parts.

Referring more particularly to the drawings,  
1 indicates a base upon which is shown mounted  
at one end the tubes 2 and condenser 3 having  
the usual knob control 4 of a radio-frequency  
generator. The condenser is connected by wires 5  
with an output inductive element 6 in the form  
of a coil having its circuit-connected ends sup-  
ported on insulated standards 7 on the base.  
Opposite this coil is a similar inductive electro-  
magnetic field coil 8 similarly mounted on insu-  
lated standards 9. Beyond this are insulated  
tables 10 on the base supported by standards  
11 on which are arranged in spaced opposition  
to each other two capacity electrodes 12. These  
are, respectively, connected by wires 13 to the  
terminals of 8, whereby an electrostatic area or  
space 14 is created between the electrodes 12. Ar-

ticles or matter of any kind placed in this area  
are subjected to the capacity power to an extent  
that has been found to destroy bacteria and other  
small animate life. In the present instance, I  
have shown as an example a bottle of beer B  
occupying this area for pasteurization purposes.  
The beer or similar articles may be carried in  
procession through the area as a continuous  
treatment by a suitable overhead conveyor 15.

The interposition of a body B in the electro-  
static field area 14, of course, results in an inter-  
ference that alters the capacity of the electrodes  
12 which would ordinarily affect the power and  
be compensated for by readjustment of the out-  
put through condenser 3 to hold the power uni-  
form. This variable, however, is also contingent  
upon both the area and degree of separation of  
the electrodes 12 and is very sensitive to differ-  
ences in the mass of the interposed article B.  
It is not practicable to change either contingent  
condition to suit individual articles. I, therefore,  
provide another means of compensation that is  
automatic in operation and does not involve any  
change in the output or manipulation of the con-  
denser 3. This means consists, in the present  
instance, of the following:

Hooked up in parallel with the electrodes 12  
at a not too remote point through wires 16 is a  
pair of auxiliary electrodes 17 and 18 which I  
prefer to enclose in a vacuum tube 19. One of  
these, 17, has an outwardly curved transmitting  
face turned toward the other, as shown in Fig. 1,  
and is pivotally supported at 19<sup>a</sup> on a support  
20 so that it is free to swing toward and from  
electrode 18. The effect of the electrostatic action  
between the two being to draw them together  
and electrode 17 being free to swing and narrow  
the gap between it and electrode 18, when the  
capacity at 12 is increased through the presence  
of article B, electrode 17 compensates by swing-  
ing away from electrode 18 which is equivalent  
to electrodes 12 themselves being separated or  
their areas decreased. The curvature of element  
17 maintains a tangent line of radiating surface  
that is constant in relation to the surface at 18,  
whatever the degree of separation. Auxiliary  
electrodes 17 and 18 and support 20 constitute  
an electroscopic control unit.

With this arrangement, all electrostatic energy  
in the field area 14 is rendered constant and is  
available for dissipation in the matter repre-  
sented by article B, so eliminating the necessity  
of changes in the frequency of the radio fre-  
quency generator to balance the electrode  
capacity changes as the different articles pass

under treatment and resulting in a constant current flowing through the electrode 12, so that all articles are treated uniformly regardless of their mass.

5 I claim as my invention:

10 1. The combination with a radio frequency generator provided with an output inductance element, of a field inductance correlated with the latter, a pair of capacity electrodes in the circuit  
15 of the inductance having a uniformly maintained area and degree of separation in operation, and compensating means in parallel circuit therewith for maintaining uniform power between the field electrodes to overcome intermediate interference, said compensating means embodying a second pair of electrodes one of which  
20 is pivoted to move toward and from the other in response to the electrostatic stress existing between said second pair of electrodes and one of which is provided with a curved transmitting surface convexly opposed to the opposite electrode.

2. The combination with a radio frequency generator provided with an output inductance  
25 element, of a field inductance correlated with the latter, a pair of parallel surfaced capacity electrodes in the circuit of the inductance having a uniformly maintained area and degree of separation in operation at all times, means for introducing in succession a plurality of articles to  
30 be treated as separate bodies in the field between the two capacity electrodes, and an automatic compensating means in parallel circuit therewith for maintaining uniform power between the field  
35 electrodes to overcome intermediate interference of different degrees by the respective articles, said compensating means embodying a second pair of electrodes having a variable in the stated respects in which the first pair are uniform.

40 3. In a high-frequency field applicator, a source of high-frequency voltage, a pair of capacity plate electrodes connected to said source and spaced for the reception therebetween of objects to be treated, and an electroscopic control  
45 unit connected in parallel with said plate electrodes

and comprising a pair of fixed conducting plates mounted in mutual capacity relation and further comprising a movable conducting plate movably supported between said fixed plates by a  
5 first one of said fixed plates in electrical conducting relation with said first one of said fixed plates for variation of the position of said movable plate relative to said fixed plates responsive to the voltage applied to said fixed plates.

4. In a high-frequency field applicator, a source  
10 of high-frequency voltage, a pair of capacity plate electrodes connected to said source and spaced for the reception therebetween of objects to be treated, and an electroscopic control unit connected in parallel with said plate electrodes  
15 and comprising a pair of fixed conducting plates mounted in mutual capacity relation and further comprising an arcuate movable conducting plate member movably supported between said fixed  
20 plates by a first one of said fixed plates in electrical conducting relation with said first one of said fixed plates for variation of the position of said movable plate member relative to said fixed  
25 plates responsive to the voltage existing across said fixed plates, said arcuate member being positioned with its convex side toward the second one of said fixed plates.

5. In a high-frequency field applicator, a source  
of high-frequency voltage, a pair of capacity  
30 plate electrodes connected to said source and spaced for the reception therebetween of objects to be treated, and an electroscopic control unit connected in parallel with said plate electrodes and comprising a pair of fixed conducting plates  
35 mounted in mutual capacity relation, a first one of said fixed plates having a reentrantly bent-over terminal portion, said unit further comprising a movable plate member pivotally conductively supported by said bent-over terminal portion  
40 of said first one of said fixed plates between said plates for variation of the position of said movable plate member relative to said fixed plates responsive to the voltage existing across said fixed plates.

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