

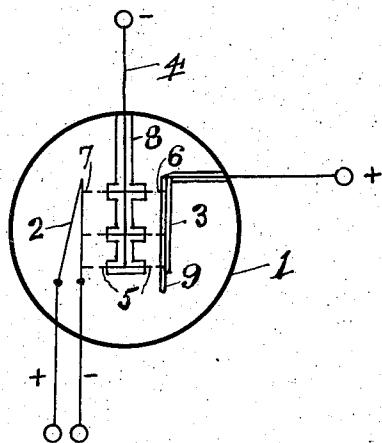
March 1, 1927.

1,619,318

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ELECTROSTATIC DETECTOR AND AMPLIFIER

Filed Jan. 19, 1920



Inventor

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## UNITED STATES PATENT OFFICE.

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## ELECTROSTATIC DETECTOR AND AMPLIFIER.

Application filed January 19, 1920. Serial No. 352,595.

This invention relates to improvements in the class of detectors known at present as Fleming and audion vacuum valves or rectifiers, and applies to both vacuum and air audions.

The primary object is to utilize the well known high electrical density of sharp points, and apply them for use in both two and three element gas vapor or gas tubes.

10 Another object is to insulate all of the grid but the sharp points so they will be more effective.

Still another object is to dispose these points so they will be parallel in the conductive medium, and to local currents traveling said medium.

With these and other objects in view my invention resides in the novel arrangement and proportioning of parts herein described and claimed.

## In the drawing:

The figure is a diagrammatic view of one embodiment of my invention.

In the drawing, a filament 2, a grid 4 and a plate 3 are enclosed by a casing 1 which is preferably of an insulating and transparent material.

25 A plurality of conducting members, preferably terminating in points 5, 6 and 7, are mounted in these three electrodes transversely thereof, the members on the adjacent electrodes being disposed in the same plane and extending toward each other whereby the said terminating points are in close proximity. The points 7 are connected

35 preferably to the negative side of the filament 2. The points 5 are connected electrically to the grid 4. The points 6 are connected to the plate. These points all lie in the same plane and are close to one another.

40 The grid is preferably insulated on the inside of the casing by glass 8 or other high resisting material, just the plurality of the needle points being exposed. Also the exposed area of the point like electrodes affects

45 the operation of the device. The grid wires may be fused in small glass tubes and leaving a plurality of points exposed to the conducting medium in the casing. This conducting medium may be a vapor, air or gas

50 above, at or below atmospheric pressure. Also in practice a plurality of these pointed grids and conductors may be used, extending

in all directions from the filament to the plate.

The points are preferably connected to the negative side of the filament because negative electricity is more easily repelled from a heated conductor than positive. When a high resistance is encountered, such as a heated vacuum space the positive electricity is held back. And for this reason the plate should be connected to the positive pole of high voltage battery. If used as an oscillation generator for wireless telephone and the grid is negative it will work better as negative electricity is repelled from a heated conductor and positive is attracted.

This device can be used as a detector, amplifier, oscillation generator, invisible arc, invisible spark gap, wireless telephone and similar purposes when the necessary circuits are established.

With this device all cold electrodes can be used and it will function as a two or three element tube, when a gaseous or a vapor conducting medium is used in the casing. And can be used with known circuits as a detector of weak currents, amplifier and oscillator. In practice the heating element, grid and plate can be termed electrodes. The positive electrode or plate is insulated by an insulating material 3 and 9, the plate 6' disposed insulated in between and the conducting points 6 extending from the plate through the insulation 9. This insulation should have a high resistance like that of glass. If used with a hot electrode there will be some conduction of the best insulator used here but these insulators will practically insulate from the electron flow, leaving only the points exposed to electrons, a greater efficiency of repelling same are obtained.

The points 5, 6 and 7 may be of any desired material, such as substances or coated with substances capable of emitting negative electrons at or near atmospheric temperature. High conductive gases or vapor are preferably used in the casing. As the conductivity of a tube increases, uniformity of tubes also increase, as well as their efficiency as a detector, oscillator and amplifier. The pointed electrodes increase the conductivity of a tube, by the laws of high electrical

density in repelling from the points electrons or ions of a like sign.

I believe I have made clear enough disclosure to render further description unnecessary to those skilled in the art.

What I claim as new is:

1. An electric device comprising an envelope, a plurality of relatively spaced electrodes enclosed therein and a plurality of 10 conducting members mounted in the electrodes transversely thereof, the members on the adjacent electrodes being disposed in the same plane and extending toward each other and terminating in points in close 15 proximity to each other.

2. An electric device comprising an envelope enclosing a filamentary electrode, a grid electrode having a plurality of discharge points disposed adjacent and at right 20 angles to said filamentary electrode, and an anode electrode.

3. An electric device comprising an envelope enclosing a hot filament electron emitting electrode, an anode electrode, and 25 a grid electrode having a plurality of discharge points lying in the same plane and disposed adjacent to said hot filament electron emitting electrode.

4. In an electrical device, an audion comprising a conducting medium of vapor, a 30 plate, grid and heating element forming three electrodes, all of said electrodes terminating in a plurality of points lying in the same plane and parallel to the local currents 35 passing through the conducting medium.

5. In an electrical device, having a plurality of electrodes disposed in a casing, said electrodes terminating in a plurality of points, a vapor conducting medium in said 40 casing, and all of the area of the electrodes insulated from the vapor except a portion of said points.

6. An electric device comprising an envelope enclosing a hot electron emitting 45 cathode electrode, an anode electrode, and a grid electrode terminating in a plurality of sharp-like points, all of said sharp-like points lying in same planes and disposed adjacent to said hot electron emitting cathode 50 electrode.

7. An electric device comprising an envelope enclosing cathode, grid and anode electrodes, said grid electrode terminating in a plurality of sharp like points, and said 55 sharp like points disposed adjacent to said cathode.

8. An electric device comprising an envelope enclosing a hot electron emitting electrode, a grid electrode and an anode electrode, said grid electrode terminating in a plurality of sharp like points and said sharp like points disposed at right angles to said hot electron emitting electrode.

9. In an electrical device, a filament, a plate and a grid disposed to operate as an audion, the grid being composed of a plurality of points and all of the area of the grid being insulated in the casing except said points.

10. In an amplifier, a tube having a gaseous and electron conducting medium within, a plurality of electrodes disposed in contact with the said conducting medium, one of said electrodes terminating in a plurality of conducting points, and all of the latter 75 electrode being insulated to the flexible conducting medium except the points.

11. An electric device comprising an envelope enclosing an electron emitting electrode, an anode electrode and a grid electrode, said grid electrode terminating in a plurality of sharp like points and said sharp like points lying in the same plane adjacent and at right angles to said electron emitting electrode.

12. An electric device comprising an envelope enclosing an electron emitting electrode, an anode electrode and a grid electrode, said grid electrode terminating in a plurality of sharp like points and all of said 80 grid electrode being insulated electrically to the electron flow except said sharp like points, whereby the high electrical density of sharp like points is utilized.

13. An electric device comprising a casing 95 enclosing a conducting medium, a hot electron emitting electrode, a cold electrode terminating in a plurality of sharp like points, and said cold electrode being insulated from the conducting medium except said sharp 100 like points, and a grid electrode disposed between said electrodes.

14. An electric device comprising a casing enclosing a conducting medium, a hot electron emitting electrode and a plurality of cold electrodes, and at least one of said cold electrodes terminating in a plurality of sharp like points and said electrodes being insulated from said conducting medium except said sharp like points.

In testimony whereof I affix my signature.  
FRANK E. SUMMERS.