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T. W. CASE

1,724,872

PHOTO ACTIVE THERMOELECTRIC DEVICE

Filed Dec. 22, 1924

FIG. 1.

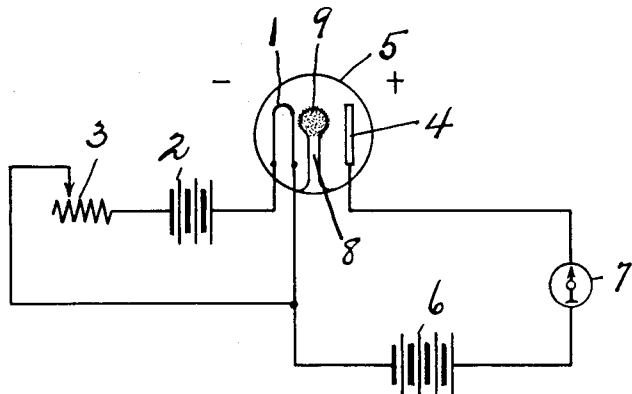


FIG. 2.

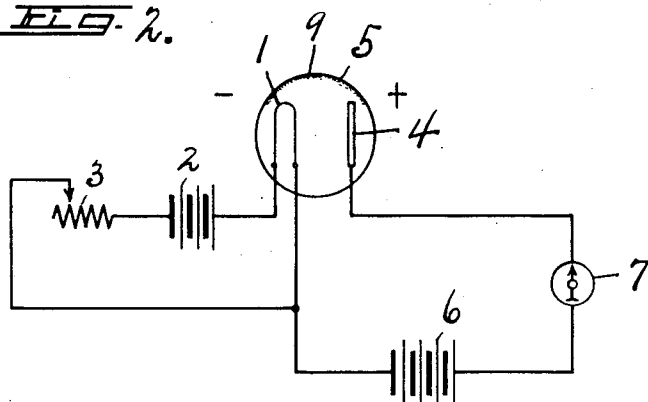


FIG. 3.

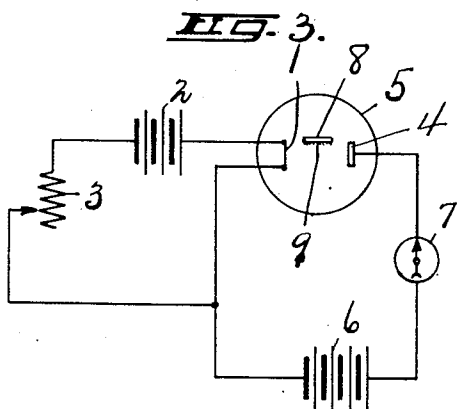
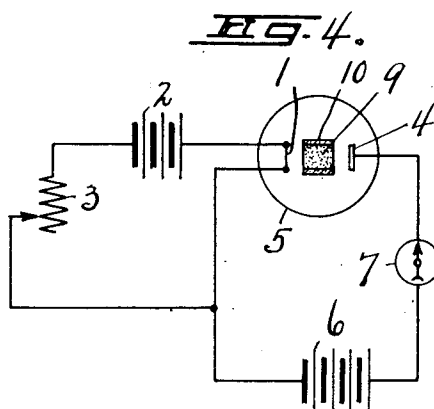


FIG. 4.



WITNESS

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THEODORE WILLARD CASE, OF AUBURN, NEW YORK, ASSIGNOR TO CASE RESEARCH LABORATORY INCORPORATED, OF AUBURN, NEW YORK, A CORPORATION OF NEW YORK.

PHOTO-ACTIVE THERMOELECTRIC DEVICE.

Application filed December 22, 1924. Serial No. 757,524.

This invention relates to a new photo-active thermo-electric device and the method of controlling a thermo-ionic current in a vacuum tube by a photo-active material, and more specifically the invention contemplates the control or variation of a thermo-electric current by means of a photo-electric material that emits electrons when subjected to light rays to thereby assist or counteract or partially counteract the flow of negative electrons from the cathode to the anode of a thermo-electric device, whereby a variation in the thermo-electric current is effected proportional to the intensity of the light rays to which the photo-active material is subjected and this application is a continuation in part of my application Serial No. 457,283 filed March 31, 1921, upon Light Reactive Apparatus, and I have elected to claim herein the device described solely when the photo-active material is mounted upon a non-conductor, and reference is hereby made to my co-pending application Serial No. 523,603 which contains the broad claims to the device herein described without regard to whether the photo-active material be on a conductor or a non-conductor.

The operation of the structure in accordance with the method hereinafter described is based upon a discovery of the existence of an effect of a photo-active material carried by a non-conductor, on a thermo-ionic current in a vacuum tube, whereby the intensity of the light to which the photo-active material is subjected may be determined.

The invention adapts itself to various uses and objects and advantages other than those above described relate more specifically to the details of the structure and the method of operation of the same, all as will more fully appear from the following description taken in connection with the accompanying drawings, in which:—

Figure 1 is a diagrammatic illustration of an embodiment of the invention.

Figure 2 is a diagrammatic illustration of another embodiment of the invention.

Figure 3 is a diagrammatic illustration illustrating a top plan of Figure 1.

Figure 4 is an illustration similar to Figure 3 illustrating a modified form of non-conductor for supporting the photo-active material.

It is known that if a heated filament and a plate, or other anode be confined in spaced relation within a vacuum bulb or vessel, the heated filament being connected to the negative side of a suitable source of potential and the plate or other anode connected to the positive side of the source of potential, that a thermo-electric current will flow in the circuit so formed and from the plate to the filament, the negative electrons emitted by the heated filament constituting a current path for such flow between the plate and filament, and this invention takes advantage of that known operation of a device of the character described, in that a photo-electric material adapted to emit electrons under the action of light is placed within the vacuum bulb or vessel of such a structure in any suitable position therein, and upon a non-conducting portion thereof, to thereby control or vary the thermo-electric current in accordance with the intensity of the light rays to which the photo-active material is subjected.

The structure illustrated in Figure 1 comprises a cathode —1— of filamentary form, and a heating circuit therefor, including a source of potential —2— and a variable resistance —3—. The anode or plate —4— is disposed within the bulb —5— in a position spaced from the heated cathode —1—, and a high vacuum is preferably maintained within the bulb —5—. The cathode —1— and anode —4— are connected in circuit with a source of potential —6— and an indicating device, as for instance, a galvanometer —7—, the filament —1— being connected to the negative side of the source of potential, while the plate —4— is connected to the positive side of the source of potential.

For the purpose of controlling and varying the thermo-electric current adapted to flow in the circuit, including the cathode —1— and anode —4—, a photo-active material —9— such as sodium, potassium, barium sub-oxide, is disposed upon a glass or other non-conducting member —8— which

may be of any desired form and shape, and supports the photo-active material in a position adjacent the path of the electrons traveling from the cathode —1— to the plate —4—.

As shown in Figure 1, the support is, for instance, a glass pedestal having a plate-like portion at its top disposed at one side of the path of the electrons flowing from the heated filament to the anode —4—. The support for the photo-active material —9— is as stated, a non-conductor, and the photo-active material has no electrical connections, its operation being solely effected by the emission of electrons under the influence of light and in substantial accordance with the intensity of the light to which it is subjected, which electrons assist or counteract the electrons emitted by the cathode —1—, and render the space between the filament and plate more or less conductive, thereby effecting the current flowing in the circuit between the filament —1— and plate —4— in an extent proportional to the intensity of the light to which the photo-active material is subjected, and this variation in current may be indicated in any suitable manner, as by galvanometer —7—.

In Figure 2 instead of supporting the photo-active material —9— upon a non-conducting pedestal or support arising within the bulb —5—, the photo-active material is spread or placed upon a portion of the interior of the glass bulb —5—, the bulb itself constituting a non conducting support for the photo-active material, the operation being the same as in the construction shown in Figure 1.

In Figure 4 the non-conducting support for the photo-active material, instead of being shown in the form of a plate, as in Fig-

ure 1, is shown in the form of a glass or other non-conducting cylinder —10—, the opening through the cylinder permitting free passage of electrons from the heated filament to the plate —4—, in that the cylinder surrounds or substantially surrounds the path of the electrons traveling from the filament to the plate, and the light reactive material may be spread or otherwise placed or deposited upon the interior of the cylinder.

It will be obvious that altho I have shown and described specific forms of non-conductors for supporting the photo-active material and specific positions for its support, that I do not desire to restrict myself to the details of form or position of the electrodes in the structure illustrated, as the broad idea of the invention which resides in the control of a thermo-electric current by a photo-active material supported from a non-conductor is, so far as I am aware, novel, and various changes in the details of form and arrangement of the parts may be made without departing from this invention as set forth in the appended claim.

I claim:

A photo-active thermo-electric device comprising a glass bulb housing an anode and a cathode of filamentary form within the bulb, an insulating member positioned in the space between the cathode and the anode, and a photo-active material carried by the insulating member and adapted to vary the current which flows between the anode and the cathode independently of the cathode-heating means, and in substantial accordance with the intensity of the light rays to which it is exposed.

In witness whereof I have hereunto set my hand this 10th day of December, 1924.

THEODORE WILLARD CASE.