

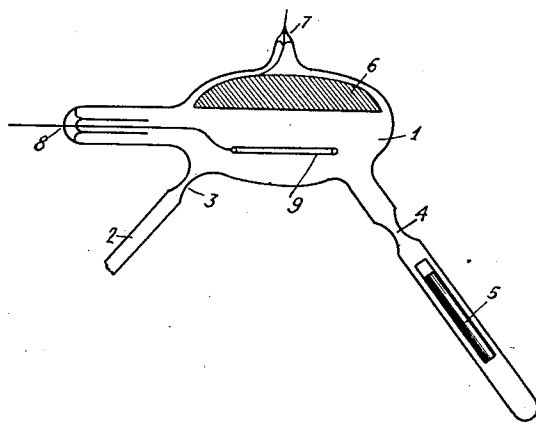
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PHOTO-ELECTRIC TUBE

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PHOTO-ELECTRIC TUBE

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The object of my invention is to produce a photo-electric cell of increased sensitivity. It is well known that alkali metals can be used for the photo-sensitive electrodes, and
5 that the cells so made are filled with rare gases at reduced pressure. It has also been suggested to use caesium or rubidium for these photo-sensitive electrodes. However, the handling of such easily oxidizable alkali
10 metals is rather difficult and dangerous, not to speak of the fact that they are quite expensive, with the result that rubidium or caesium cells were found to be very costly, and their manufacture was attended with great
15 difficulty.

According to my invention, these drawbacks are obviated for the reason that the said alkali metals are added only in comparatively small proportions to another basic
20 metal, for instance, potassium, which can be handled more easily and which is less costly. Experiments have shown that good action is realized by adding from 3 to 4% of caesium to the potassium as basic or fundamental material. The addition is effected, for instance,
25 by preparing the charge in the proper proportions and placing it in an appendage containing the two alkali metals and distilling it over into the discharge vessel as illustrated
30 by the accompanying drawing.

Now making reference to the accompanying drawing 1 denotes the cell vessel provided with the tube 2 leading to an exhaust pump of any desired character. The portion of
35 the tube 2 shown as 3 is the last sealing point of the tube. In the appendage or extension 4 of the cell vessel 1 is placed the potassium-caesium or potassium-rubidium amalgam or alloy which has previously been absorbed in
40 a glass tube 5 and which is to be distilled over into the externally cooled silver coat 6 of the cell wall. The alkali glass cartridge 5 is preferably of tubular shape so that it may easily be fitted into the appendage 4. The
45 silver coating 6 of the cell wall is provided with a lead-in wire 7 to which the negative lead may be connected. After covering the silver coating 6 with the alkali-metal alloy, the portion 6 will constitute the photo-active
50 electrode. The annular anode member 9 is

connected with the positive lead-in wire 8 in any appropriate manner and this lead-in wire as is the case with the lead-in 7 is appropriately such as is well known in the art of constructing vacuum tubes.

Small additions of a mixture of caesium and rubidium, preferably in proportion to their atomic weights, to potassium, or to the well-known readily fusible alloy of potassium and sodium have also been found very ef-
60 ficient.

The treatment of the photo-electrically sensitive surface in the cell (purification, hydration, evacuation, etc.) is accomplished according to well-known methods. It has been
65 found that a filling of rare gas under reduced pressure is particularly suitable. Especially very pure helium is advantageous, since by means of helium it has been found possible to raise the critical potential at which the
70 glow-discharge in the cell is initiated, to a comparatively high value, with the result that considerable acceleration potentials for the photo-electrically produced electrons can be
75 worked with. Accordingly, I may term the caesium and rubidium, or the like, "accelerators."

The action of an addition in relatively small quantities of photo-electric accentuating metals which may include caesium and
80 rubidium, or both, to the basic metal, looked at from a chemical viewpoint, consists in that the speed of oxidation of the addition metals is markedly diminished, whereby their dangerousness, ignitibleness, reactivity, etc.,
85 are correspondingly reduced. From a physical viewpoint, apart from an increase in photo-electric sensitivity, it has also been observed that the limit of the photo-electric effect is shifted in the direction of the longer
90 waves, and this feature can also be usefully employed. Also small additions of other photo-electric accentuating metals such as zinc, or cadmium, furthermore mercury, produce a favorable effect.

While I have defined my invention in the claims as directed to the use of caesium in connection with the basic alkali-metal which forms the electrode, it is to be understood that it is fully within the scope of my disclosure to
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include the use of such other metals as rubidium, zinc, cadmium or mercury with the basic alkali-metal so as to considerably aid the photo-electric effect.

5 Having described my invention, I claim:

1. A photo-electric cell provided with a light sensitive cathode and an anode member, said light sensitive cathode being formed of an alkali metal to which a very small portion of caesium is added for the purpose of accentuating the photo-electric effect and raising the critical potential at which glow discharge is started.

2. A photo-electric cell, comprising, a light sensitive cathode member formed of an alkali metal including potassium and a small percentage of caesium, and an anode member for cooperating with said cathode.

3. The photo-electric cell claimed in claim 2 in combination with a filling highly purified helium gas.

4. A photo-electric cell, including, an air tight envelope filled with highly purified helium gas, a photo sensitive cathode member positioned within said envelope, said cathode being formed of a potassium alloy including three percent caesium, and an anode member also positioned within said envelope for cooperating with said cathode.

5. In a photo-electric cell, a cathode formed of a photo-electric element and a small percentage of caesium for serving as an accelerator.

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