

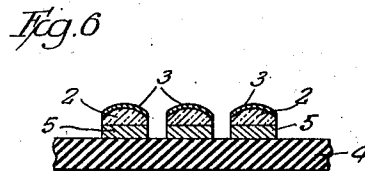
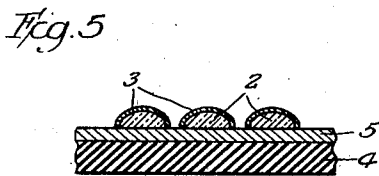
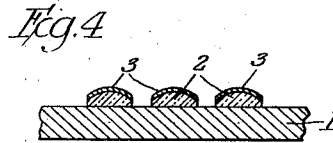
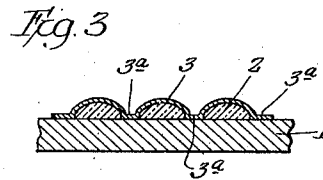
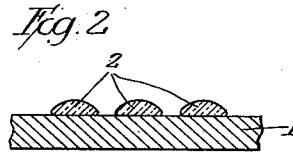
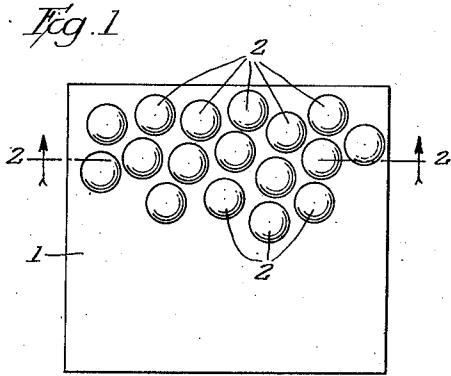
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PHOTOELECTRICALLY RESPONSIVE LAYER

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UNITED STATES PATENT OFFICE

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PHOTOELECTRICALLY RESPONSIVE
LAYER

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2 Claims. (Cl. 250-164)

The invention relates to improvements in photoelectrically responsive layers and in particular to a method of producing minutely subdivided photoelectrically responsive layers upon carriers of any desired kind. Photoelectrically responsive layers of this type are employed particularly in television transmitting (dissectors) tubes.

Owing to the resemblance which this minute subdivision has with the surface of screens as used in printing processes they are referred to as "screen" areas in the following specification.

Television tubes frequently are provided with extensive photoelectrically responsive areas, and it has been found that the efficiency of these areas is enhanced if the same are minutely subdivided, to resemble in appearance that of an extremely fine mesh screen. Whenever a point of light strikes a "dot" of this photoelectrically responsive screen area electrical charges are instantly set up with the magnitude of the electric charge dependent upon the intensity of the light. These charges are utilized for modulating the television transmitter.

The production of screen layers of photoelectrically responsive material heretofore was very difficult, because it is necessary to make the individual layer sections extremely small. One method used heretofore consists in this, that an extremely thin silver coating is deposited by vaporization upon a carrier of insulating material in such manner, that the silver particles do not form a closely coherent area. Such incoherent layer, however, can be produced only under conditions that the silver coating is extremely thin so as to be almost transparent. Obviously, the photoelectric efficiency of such layers is very poor, because the greatest amount of light passes unrestricted through the layer.

It is now an object of the invention to eliminate the disadvantages of the known methods of this type.

Fig. 1 illustrates diagrammatically and highly magnified a plan view of a carrier base provided with finely distributed selenium dots in accordance with the first method step of the present invention.

Fig. 2 is a cross-sectional view substantially along the line of 2-2 of Fig. 1.

Figs. 3 and 4 are cross-sectional views similar to Fig. 2 and illustrate additional steps of the method of the invention.

Figs. 5 and 6 illustrate two specific method steps in a modified method of the present invention.

The present invention makes use of the fact that selenium, particularly when in an extremely pure state, has a very high surface tension. It is possible to liquefy finely distributed selenium without the fine selenium droplets thus produced being of such low surface tension that they would immediately flow into each other.

This property of selenium is made use of by the present invention, for producing upon a carrier base innumerable point-like dots in extremely fine distribution. The base may be of conductive material, as for instance silver, or of non-conductive material. These dots are then rendered photoelectrically responsive by some subsequent treatment.

The selenium screens may be produced in various manners. It is for instance possible to mix the selenium with a floating agent, which may consist of any desired liquid, and to deposit the selenium from this mixture upon the carrier base. Another method, which may be used, consists in mixing finely divided selenium with a material which forms a paste with the selenium, and spreading this selenium containing paste upon the carrier base. The foreign material may then be removed from the selenium paste by steaming, dissolution, evaporation or the like.

A very practical method consists in depositing the selenium by condensation from vapor upon the carrier base. Contrary to expectation, it has been discovered that when employing the last named method, the selenium will not be deposited on the base in form of a coherent layer, but up to a substantial thickness of the layer it will be deposited in the form of small drops which are spaced from each other. Only when the selenium layer assumes a very great thickness the drops merge and form a coherent layer. In this respect selenium has similar properties as for instance mercury.

The Figs. 1 and 2 illustrate diagrammatically in a greatly magnified scale a carrier base consisting of a metal plate 1 provided with finely distributed selenium dots 2 produced in any one of the just described manners.

The conversion of these dot-like or screen-like selenium areas into photoelectrically responsive elements can be accomplished in various manners. It is for instance possible to make the selenium particles 2 themselves light sensitive by means of applying to the same a layer 3 of alkali or earth alkali metal respectively, for instance caesium. These metals may be applied to the selenium particles in a solution of liquid ammonia, liquid sulphur or the like, or the same

may also be deposited by vaporization. Those quantities of caesium or the like metals, which will be deposited upon the base between the selenium dots and are designated in Fig. 3 with 3^a are subsequently removed again, which may be done in a known manner by a heat treatment. Fig. 4 illustrates the finished photoelectrically responsive layer after removal of the selenium deposits 3^a from the base 1. The heating will be applied preferably to the bottom side of the base. Hereby the caesium, which is deposited between the selenium dots, will firstly vaporize, because it lies directly on the top face of the base. For vaporizing the caesium particles deposited upon the selenium dots the heat would have to be increased to higher degrees. This vaporization may therefore be suppressed by preventing the heating temperature from exceeding over a predetermined degree.

According to the modification illustrated in Fig. 5, the base 4 of the light sensitive layer 3 consists of insulating material provided with a conductive surface coating 5, for instance with silver. In such a case it is advisable to remove also the silver from those portions of the base which are not occupied by selenium droplets 2. This can be done for instance by etching. Fig. 6 illustrates such a modification.

The agent for etching may be e. g. sodium thiosulphate. The sodium thiosulphate will not corrode the selenium particles and the latter will therefore not be damaged. Other agents for etching are: ammonia sulpho cyanide, nitric acid etc.

The insulating carrier of the light sensitive layer may consist of glass, mica or other transparent material or if desired, of materials, which are not transparent.

What I claim as my invention is:

1. A method of producing a minutely subdivided photoelectrically responsive layer upon a carrier, including the steps of depositing unfused selenium particles finely distributed and separated from each other upon said carrier, subjecting said selenium covered carrier to the action of a photoelectrically responsive metal, and then removing the photoelectrically responsive metal from those portions of the carrier not covered by selenium particles, whereby only the individual selenium particles, owing to their coating of photoelectrically responsive metal, remain photoelectrically responsive.

2. A method of producing a minutely subdivided photoelectrically responsive layer upon a carrier of insulating material provided with a metallic coating, including the steps of depositing on the metallic coating of said carrier a screen-like layer composed of selenium dots, applying a layer of photoelectrically responsive metal to said selenium covered metallic coating, removing the photoelectrically responsive layer around said selenium dots, whereby only the selenium dots retain their photoelectrically responsive layer, and then removing the metallic coating from said carrier between said selenium dots.

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