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PHOTOCELL

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Fig. 1.

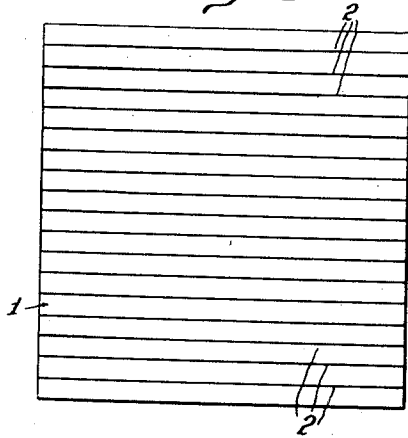


Fig. 2.

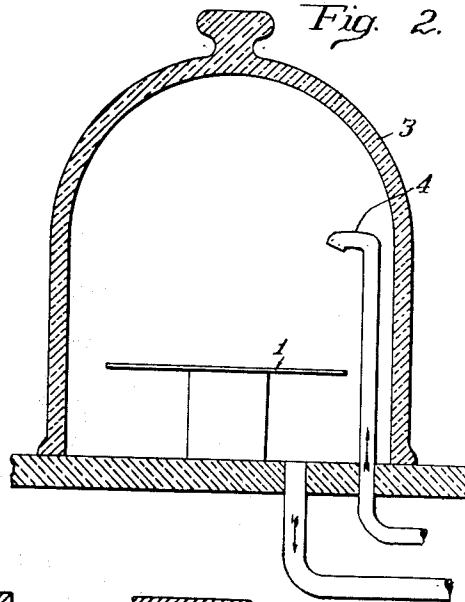


Fig. 3.

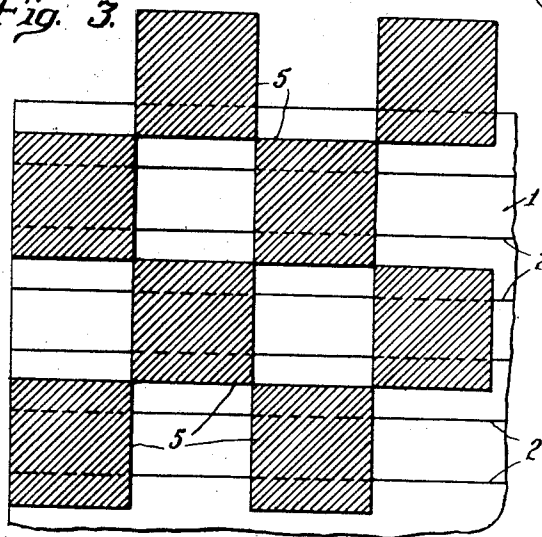
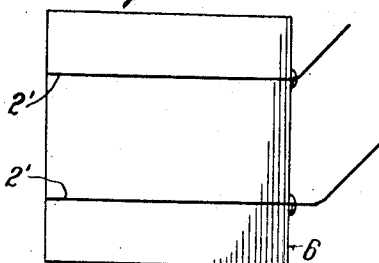


Fig. 4.



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PHOTOCELL

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This invention relates to improvements in photocells and more particularly to photo-sensitive or photo-conductive cells.

In making such cells heretofore it has been necessary to paint or draw on a base surface lines of silver, platinum, or other metal, before activation by lead sulfide or other semiconductors. Such operations in preparing the cells are slow and tedious, and require relatively large areas for producing the elements of the cell.

An object of this invention is to improve the process of making photocells of this character, to expedite the manufacture thereof, and to produce cells of relatively minute size.

A further object of the invention is to provide photo-conductive cells of the minute size which can be used in many installations where such cells have not been available for use heretofore.

These objects can be accomplished by applying the lines of conducting material onto a base surface, such as a flat surface, in close relation to each other. These lines may be applied by a photo-engraving process which enables the lines to be in close side-by-side relation, and to be relatively fine lines, much more compactly arranged than would be possible where they are painted or drawn by hand. Then, after sensitizing the lines by evaporating the semiconductive metal, such as lead sulfide, thoreum, Aquadag or the like thereon, the base surface can be cut out to form a multiplicity of minute photocells.

The semiconductor coating can be covered, if desired, with a transparent covering material such as varnish, plastic, etc., to protect the same during the treating operation and preparation of the individual cells.

The invention is illustrated in the accompanying drawings in which:

Fig. 1 shows the base material having lines applied thereto by photo-engraving or otherwise;

Fig. 2 shows diagrammatically the activation and protection of the base;

Fig. 3 shows the step of cutting out the individual cells by a stamping or punching operation; and

Fig. 4 is a plan view of a completed cell thus formed.

Referring to Fig. 1, I have shown a base surface which can be either flat or curved, as desired, and may be made of any suitable insulating material, preferably a thin sheet. It is possible to use glass, mica, or other substances suitable for the purpose, which should have a surface capable of receiving the lines to be applied thereto in close relation, but may be either smooth or ground.

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A series of lines, generally designated at 2, are applied to the surface 1 of a suitable conducting material, such as silver, platinum, tungsten or the like. It is preferred that these be applied by a photo-engraving process because this enables the lines to be located in very close side-by-side relation, much more so than would be possible if these were drawn or painted by hand. However, the lines can be applied by evaporating the metal onto the surface through a stencil provided with spaced slots, or by silk-screening or printing process.

After thus forming the lines on the base 1, the latter is placed within a bell jar 3, or other suitable chamber, which may be evacuated and within which the sensitizing material is discharged. Any of the known or usual materials for this purpose may be employed, such as lead sulfide, thoreum, Aquadag, silicon, germanium, etc. and which covers the surface of the base 1 over the metal lines 2 as well as the spaces therebetween. These semiconductors may be used either singly or combined in proper proportions to produce the spectral response desired. Where used in multiple, these may be evaporated or otherwise applied individually or combined.

Thereafter it is preferred to coat the surface with a suitable protective material such as transparent insulating material such as varnish, resin or plastic, which may be applied by dipping or by a nozzle 4 located within the bell jar 3. This coating material will cover the surface of the semiconductor material on the base 1 and protect the latter in the subsequent operations without interfering with its effectiveness in use.

Thereafter the bell jar 3 is opened and the base 1, if made in multiple size, is cut up into individual cell elements. This may be accomplished by an assembly or punch or die elements, generally indicated at 5 in Fig. 3, which will sever the base 1 into a multiplicity of minute elements. The punch or die elements 5 should be so disposed as to cross a pair of adjacent metal conductor lines, as indicated in Fig. 3, preferably slitting the base midway between a pair of said lines 2. This produces a segment of the base, having a pair of conductor lines 2 extending across the same, as indicated at 2' in Fig. 4, where the individual cell element is designated generally at 6, which results from the stamping out of the treated base in the manner described. This stamping process preferably cuts the base into equal sized cells, a multiplicity of which may be formed from a single sheet, in the manner described although these may be either square, rectangular, or of any other shape.

A portion of the covering material, such as plastic or varnish, may be stripped off at the ends of the conductor lines 2' to provide for electrical connections therewith, or the entire covering material may be removed, especially if the cell is to be used in vacuum.

It is possible to produce in this way very simply and inexpensively a multiplicity of minute photocells without the slow and laborious method of drawing or painting the conductor lines on the base surface and, at the same time, cells of very much smaller size can be used due to the small area required where the lines are applied in the manner described, especially by printing or photo-engraving the lines on the base surface.

While the invention has been illustrated and described in certain embodiments, it is recognized that variations and changes may be made therein without departing from the invention as defined in the claims.

I claim:

1. A method of making a photocell, comprising applying to a base a series of lines of conductive material, activating the material with a semiconductor, and separating the base into a multiplicity of individual cells each of which has at least a pair of said lines extending along the surface thereof.

2. A method of making a photocell, comprising applying a multiplicity of lines of conductive material onto a surface in side-by-side relation, sensitizing the surface thereof with a semiconductor, and separating the base into segments along lines located between adjacent pairs of the first-mentioned conductor lines.

3. A method of making a photocell, comprising applying a multiplicity of lines of conductive material onto a surface in side-by-side relation by printing, sensitizing the surface thereof with a semiconductor, and separating the base into segments along lines located between adjacent pairs of the first-mentioned conductor lines.

4. A method of making a photocell, comprising applying a multiplicity of lines of conductive material onto a surface in side-by-side relation by photo-engraving, sensitizing the surface thereof with a semiconductor, and separating the base into segments along lines located between adjacent pairs of the first-mentioned conductor lines.

5. A method of making a photocell, comprising applying lines of a conductor material to a flat surface by photo-engraving process with the lines in close side-by-side relation, sensitizing the lined surface of the base in a vacuum with a semiconductor, and severing the base between pairs of said conductor lines into a plurality of cell elements each of which has at least a pair of said lines extending thereover.

6. A method of making a photocell, comprising applying lines of a conductor material to a flat surface by silk-screening process with the lines in close side-by-side relation, sensitizing the lined surface of the base in a vacuum with a semiconductor, and punch-cutting the base along lines between pairs of said conductor lines separating the base into a multiplicity of cell elements, each of which has a pair of said conductor lines extending thereover.

7. A method of making a photocell, comprising applying lines of a conductor material to a flat surface by photoengraving process with the lines in close side-by-side relation, sensitizing the lined surface of the base in a vacuum with a semiconductor, coating the sensitized surface with

a transparent material, removing the base, and severing the base into a multiplicity of cell elements between adjacent pairs of said conductor lines.

8. A method of making a photocell, comprising applying conducting lines to a non-conducting surface in close spaced relation, applying by evaporation one or more semiconductors to the non-conducting surface, and thereafter applying a transparent insulating material over the semiconductor on said surface.

9. A method of making a photocell, comprising applying conducting lines to a non-conducting surface in close spaced relation, applying by evaporation one or more semiconductors to the non-conducting surface, and thereafter applying a transparent insulating material over the semiconductor on said surface, and cutting the surface into individual units each of which has a pair of conducting lines extending thereover.

10. A method of making a photocell, comprising applying conducting lines to a non-conducting surface in close spaced relation, applying by evaporation one or more semiconductors of the class consisting of lead sulfide, germanium, silicon, thoreum and Aquadag to the non-conducting surface, and thereafter applying a transparent insulating material over the semiconductor on said surface.

11. A photocell comprising a thin non-conducting sheet having conducting lines extending thereover covered by a semiconductor, and a transparent insulating material covering the semiconductor material.

12. A photocell comprising a relatively thin nonconducting sheet having conducting lines ruled thereon and covered with semiconductor material, said sheet having a transparent insulating material forming a continuous coating thereover and over the conducting lines and semiconductor material.

13. A photocell comprising a relatively thin non-conducting sheet having conducting lines applied thereon and covered with at least two semiconductors applied simultaneously to the sheet, said sheet having a transparent insulating material over the coated surface thereof forming a transparent capsule thereover.

14. A photocell comprising a thin non-conducting sheet having conducting lines applied to a surface thereof and covered with a film of semiconducting materials, and a transparent plastic coating sealing the conductor materials on said surface.

15. A method of making a photocell comprising applying a plurality of lines of conducting material onto an insulating surface by evaporation of a conductor, sensitizing the surface thereof with a semiconductor, and separating the base into segments each of which has at least a pair of said lines extending along the surface thereof.

16. A method of making a photocell comprising applying a plurality of lines of conducting material onto an insulating surface by evaporation of a conductor through a stencil, sensitizing the surface thereof with a semiconductor, and separating the base into segments each of which has at least a pair of said lines extending along the surface thereof.

17. A method of making a photocell comprising applying a multiplicity of lines of conducting material onto an insulating surface by evaporation of said conductor material through a stencil, sensitizing the surfaces between said lines with a semiconductor in a vacuum, applying a trans-

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parent insulating coating over the semiconductors, and separating the base into segments each of which has at least a pair of said lines extending along the surface thereof.

18. A method of making a photocell comprising applying a multiplicity of lines of conducting material onto an insulating surface by evaporation of said conductor material through a stencil, sensitizing the surfaces between said lines with a semiconductor in a vacuum, applying a transparent insulating coating over the semiconductors, and separating the base into segments

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along lines located between adjacent pairs of the first-mentioned conductor lines each of which has at least a pair of said lines extending along the surface thereof.

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