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F. BRUNKE

2,137,831

METHOD OF PRODUCING DRY PLATE ELEMENTS FOR SELENIUM RECTIFIERS AND THE LIKE

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Fig. 1.

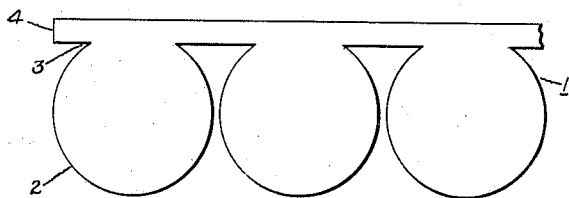


Fig. 2.

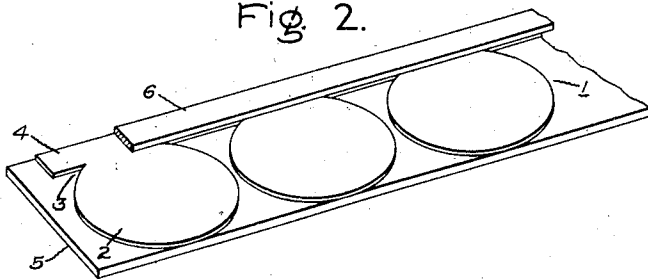


Fig. 3.

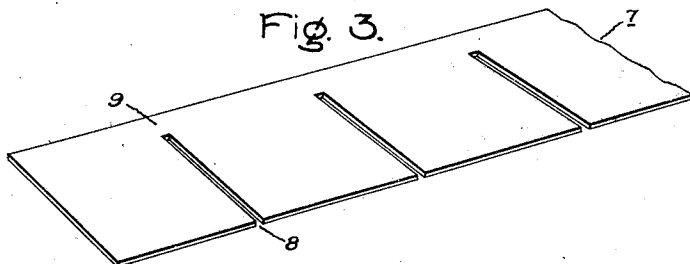
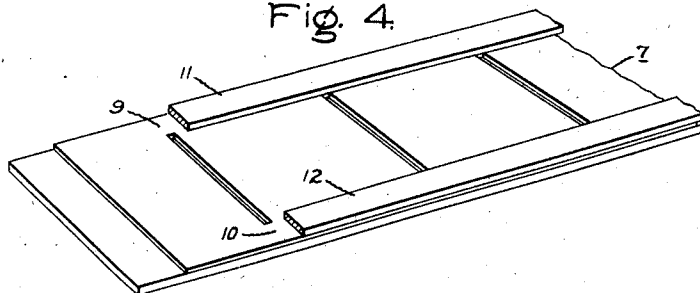


Fig. 4.



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METHOD OF PRODUCING DRY PLATE ELEMENTS FOR SELENIUM RECTIFIERS AND THE LIKE

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7 Claims. (Cl. 136—89)

My invention relates to dry plate elements for devices, such as rectifiers and light-sensitive cells, of the type wherein a semi-conductor material, for example selenium or a selenium compound, is deposited on a carrier electrode to form a semi-conductor layer thereon. The invention relates particularly to methods of producing dry plate elements, of the above character, in which the semi-conductor layer is formed on the carrier electrode by the vaporization process, i. e., by exposing the carrier electrode material to the vapor of a semi-conductor material.

The object of the invention is to provide an improved continuous vaporization process for producing such dry plate elements.

Usually heretofore, in utilizing the vaporization process for forming the above-mentioned dry plate elements, disks or plates of the required size for the finished carrier electrodes have first been stamped from carrier electrode material, the semi-conductor material then being applied to these electrodes. Difficulties have been encountered when the attempt has been made to render the above-mentioned vaporization method of forming the dry plate elements more practicable, commercially, by first depositing the semi-conductor material on a continuously moving band of carrier electrode metal or material and subsequently stamping the complete dry plate elements from the coated band. These difficulties arise from the fact that in cutting or stamping the individual dry plate disks or plates from the band of semi-conductor-coated carrier electrode metal, the semi-conductor coating or layer cracks off or is loosened from its supporting carrier electrode because of the mechanical strains set up during the stamping operation.

In accordance with my present invention these difficulties are obviated by the provision of a continuous vaporization process for forming the dry plate elements, whereby the carrier electrode is so protected during the continuous depositing of the semi-conductor material on the carrier electrode band that cracking off of the semi-conductor layer during the subsequent stamping operation is prevented.

My invention will be better understood from the following description when considered in connection with the accompanying drawing and its scope will be pointed out in the appended claims.

Referring to the drawing, Fig. 1 illustrates a band of carrier electrode material upon which a layer of semi-conductor material is to be de-

posited; Fig. 2 shows the band, illustrated in Fig. 1, in position, on a supporting plate, for depositing the layer thereon; and Figs. 3 and 4 illustrate an embodiment similar to that illustrated in Figs. 1 and 2 but in which the band of carrier electrode material is arranged for the production of dry plate elements of a different shape.

In the continuous vaporization process, as employed heretofore, for depositing the semi-conductor layer on the band of material from which the completed coated elements are later cut or stamped, the band is advanced in a usual manner along a suitable supporting plate or member and progressively exposed to the vapor of the semi-conductor material. In accordance with my invention, in order to avoid the cracking off and loosening of the layer when the elements are subsequently separated from the band, that face of the band upon which the coating material is progressively deposited is arranged in contact with a covering and protecting plate. The latter plate is so formed and arranged that as the band moves along to receive the semi-conductor coating, those portions of the band which will later be cut through to separate the complete coated elements from the band are protected from the vapor by the covering plate. These portions therefore do not receive a semi-conductor layer, and cracking off and loosening of the layer from the coated elements when they are stamped or otherwise separated from the band does not occur. A guide strip for holding the carrier electrode band in position on its supporting plate may in certain cases function as the above-described covering or protecting plate for the band.

The band from which the dry plate elements, comprising carrier electrodes and semi-conductor layers, are to be formed may be simply a uniform, unperforated strip of suitable width from which, after the coating is applied to the band by the vaporization process, the complete elements are stamped out entire. In this case, in accordance with my invention, the protecting plate, of suitable length for the purpose, would extend from side to side of the band of carrier electrode material and would be provided with a series of openings corresponding in size to the desired coated areas of the dry plate elements which are to be formed from the band, the protecting plate therefore taking the form of a template or stencil plate laid over the band of carrier electrode material.

It is of particular advantage, however, in the

practice of the method in accordance with my invention, to subject the band of carrier electrode material to a preliminary stamping process, before the application of the semi-conductor layer to the band, the preliminary stamping being such that only relatively small connecting portions of the band will remain to be cut through, after the application of the semi-conductor layer, to form the complete dry plate elements. Thus it will be understood that in Fig. 1, a band of carrier electrode material, designated by the numeral 1, has been subjected to a preliminary stamping process whereby a series of disks 2 have been formed complete except for relatively narrow portions 3 which remain to hold the disks on the edge portion 4 of the band.

Referring now to Fig. 2, in the process of depositing the semi-conductor layer, the band 1, already described in connection with Fig. 1, is slidably mounted on a supporting plate 5. A plate member, designated by the numeral 6, which may be formed integral with plate 5 or may be connected thereto in any suitable relation is arranged to cover the portion 4 of band 1 and preferably a small portion of each of the disks 2 at the line of connection thereof to the portion 4. The plate member 6 may be and preferably is, as in the present instance, a guide strip which functions to maintain band 1 in proper position on the supporting plate 5. In the operation of depositing the semi-conductor layer on the carrier electrode material, only the disk portions 2 of the band 1, up to a line on the disks adjacent to the inner edge of portion 4, receive the deposit, the remainder of the band being covered and protected by the combined guide strip and template member 6. After the forming of the semi-conductor layers is completed the disks 2 are cut or stamped from the band 1 along the line of connection of the disks with the edge portion 4. Since no coating has been formed along the latter line, cracking off and loosening of the coating from the carrier electrode material does not occur during the cutting off operation. Further, since the disks 2 have been formed complete by the preliminary stamping except for the relatively small connecting portions 3, the disks 2 can be separated from the band 1 very simply by cutting through the latter portions.

In Figs. 3 and 4 the arrangement and operation is essentially the same as for the embodiment described in connection with Figs. 1 and 2. In the embodiment illustrated in Figs. 3 and 4, however, the preliminary stamping operation is arranged with the production of dry plate elements of rectangular form in view, instead of the disk form illustrated in Figs. 1 and 2. Thus in Fig. 3 the band, designated by the numeral 7, is stamped with a series of transverse slots 8 which extend entirely through one side of the band, leaving only an edge portion 9 similar to edge portion 4 of Figs. 1 and 2, it being understood that the portion 9 is covered, during the vaporizing operation, by a combined guide strip and template member similar to member 6 of Fig. 2. As illustrated in Fig. 4 an edge portion 10 may also be left on the opposite side of band 7, the opposite edge portions 9 and 10 being covered during the vaporizing operation by combined guide strip and template members 11 and 12 similar to member 6 of Fig. 2.

My invention has been described herein in connection with particular embodiments for purposes of illustration. It is to be understood, however, that the invention is susceptible of various

changes and modifications and that by the appended claims I intend to cover any such changes and modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. The method of producing dry plate elements by the continuous vaporization process wherein a moving band of carrier electrode material is exposed to the vapor of a semi-conductor material to form a coating on said band, and wherein individual dry plate elements are subsequently separated from said coated band, which includes protecting from said vapor the portions of said band which are to be cut through when said elements are subsequently separated from said band.

2. The method of producing dry plate elements by the continuous vaporization process wherein a band of carrier electrode material moving continuously along a support and maintained in position thereon by a guide member is exposed to the vapor of a semi-conductor material to form a coating on said band, and wherein individual dry plate elements are subsequently separated from said coated band, which includes protecting from said vapor by said guide member the portions of said band which are to be cut through when said elements are subsequently separated from said band.

3. The method of producing dry plate elements by the continuous vaporization process wherein a moving band of carrier electrode material is exposed to the vapor of a semi-conductor material to form a coating on said band, and wherein individual dry plate elements are subsequently separated from said coated band, which includes initially removing portions of said band to reduce in extent the portions thereof required to be cut through in the subsequent separation of said elements from said band, and protecting from said vapor the portions of said band remaining to be cut through in said subsequent separation of said elements from said band.

4. The method of producing dry plate elements by the continuous vaporization process wherein a band of carrier electrode material moving continuously along a support and maintained in position thereon by a guide member is exposed to the vapor of a semi-conductor material to form a coating on said band, and wherein individual dry plate elements are subsequently separated from said coated band, which includes initially removing portions of said band to reduce in extent the portions thereof required to be cut through in the subsequent separation of said elements from said band, and protecting by said guide member the portions of said band remaining to be cut through in said subsequent separation of said elements from said band.

5. The method of producing dry plate elements by the continuous vaporization process wherein a moving band of carrier electrode material is exposed to the vapor of a semi-conductor material, and wherein individual dry plate elements are subsequently separated from said coated band, which includes subjecting said band to a preliminary stamping to form therein a series of blanks for said elements attached together along at least one edge of said band, and protecting from said vapor the portions of said band along said edge which are to be cut through when said elements are subsequently separated from said band.

6. The method of producing dry plate elements by the continuous vaporization process wherein

a band of carrier electrode material moving continuously along a support and maintained in position thereon by a guide member extending along an edge thereof is exposed to the vapor of a semiconductor material to form a coating on said band, and wherein individual dry plate elements are subsequently separated from said coated band, which includes subjecting said band to a preliminary stamping to form therein a series of blanks for said elements connected together along said edge, and protecting from said vapor by said guide member the connecting portions between said blanks along said edge.

7. The method of producing dry plate elements by the continuous vaporization process wherein

a moving band of carrier electrode material moving continuously along a support and maintained in position thereon by guide strips extending along opposite edges thereof is exposed to the vapor of a semi-conductor material to form a coating on said band, and wherein individual dry plate elements are subsequently separated from said coated band, which includes initially subjecting said band to a stamping operation to form therein a series of blanks for said elements connected together along said edges, and protecting from said vapor by said guide strips the connecting portions between said blanks along said edges.

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