Sept. 28, 1943. E. KIPPHAN ET AL 2,330,594

DRY RECTIFIER

Filed June 12, 1940

Fig.1

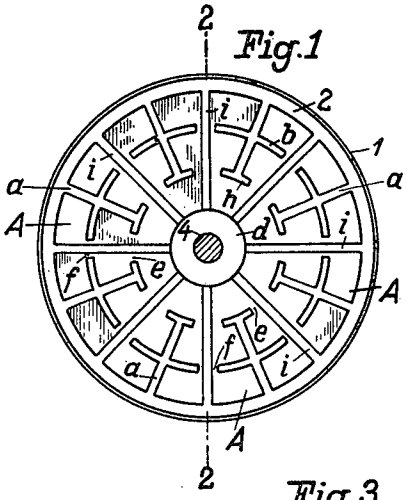


Fig.2

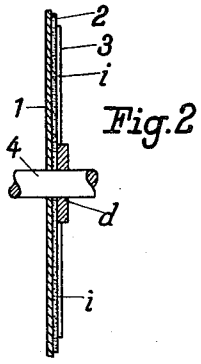


Fig.3

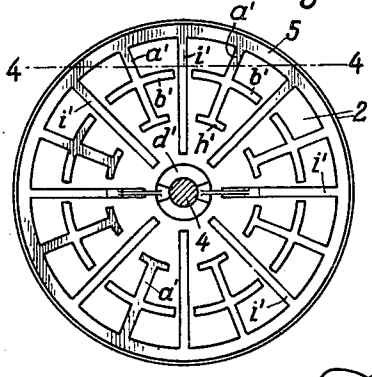


Fig.5

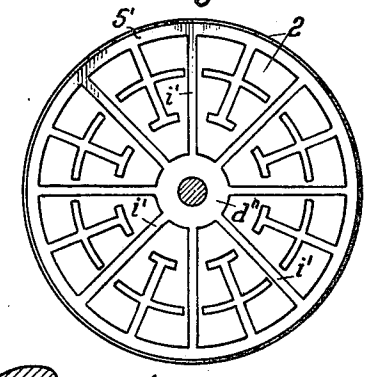
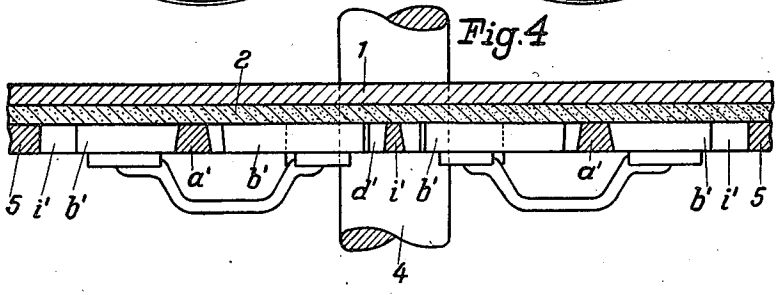


Fig.4



Inventors:
Erich Kipphan
Berta Siebert
by R. C. Hopgood
Atty

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DRY RECTIFIER

Erich Kipphan and Berta Siebert, Nuremberg, Germany; vested in the Alien Property Custodian

Application June 12, 1940, Serial No. 340,052
In Germany January 10, 1940

9 Claims. (Cl. 175—366)

This invention is concerned with valve discs for rectifying alternating currents and consists in certain features of novelty which will appear from the following description and be particularly pointed out in the appended claims, reference being had to the accompanying drawing, in which

Fig. 1 is an end view of a valve disc as provided by the invention, Fig. 2 shows a section on line 2—2 of Fig. 1, Fig. 3 is an end view that illustrates the use of a pattern plate employed in the manufacture of valve discs as provided by the invention, Fig. 4 shows a section taken on line 4—4 of Fig. 3 and drawn to a larger scale than this, Fig. 5 is a view similar to Fig. 3 and representing a modified form of the pattern plate there illustrated.

A metallic base plate 1, which is an electrode of the valve disc, carries a semi-conductor layer 2 produced on this plate or applied to it as a separate body, the latter process being adopted in the case of selenium as semi-conductor. Layer 2 is provided with a coating 3 of a suitable alloy, such as Wood's alloy, applied to it by the well known spraying operation, for example. This coating is the so-called counter-electrode. Between layer 2 and coating 3 the well known blocking layer forms, that is, a layer by which a voltage applied to the valve disc 1, 2, 3 is prevented in one direction from flowing through the disc.

It has been found that the specific current and voltage load capacities peculiar to these rectifiers are the smaller the larger the diameter thereof. This is true especially where the diameter is larger than 60 millimeters.

Investigations have shown this phenomenon to be due to the fact that the plate 1, layer 2 and coating 3 differ from each other as to the coefficient of expansion and hence cause the blocking layer to be injured when they expand and contract during operation. Such injury to the blocking layer entails that the resistance of the valve disc is increased in the traversing direction thereof while in the blocking direction the puncture strength is diminished. The rise of the resistance effective in the traversing direction adds to the losses that occur in the valve disc and thus acts to reduce the load capacity.

It will be seen that injury to the blocking layer can be reduced by reducing the movements which layer 2 and coating 3 perform in relation to each other when acted upon by thermal influences. The invention described hereafter therefore provides for minimizing these movements. To such end the coating 3 is subdivided, as shown in Fig. 1 by way of example. The coating 3 is here composed of sector-shaped zones A separated from each other by radial gaps *i* and interconnected by a metal ring *d* which surrounds a central bore of the assembly 1, 2, 3, this bore being intended to receive a spindle 4 in well known manner. The zones A have radial gaps *a* and concentric gaps *b*, *h*. The gaps *h* are located between the gaps *b* and ring *d*. The metallic bridge parts *e* between the gaps *h*, *i* are in the direction of gap *h*, that is, in tangential direction, wider than are the bridge parts *f* between *b* and *h*, thus complying with the fact that the component currents flowing over the parts *e* to ring *d* are greater than those flowing over *f*. The zones A are in this way composed of sections which are yieldingly held together by the bridge parts *e*, *f*.

The gaps *i*, *a*, *b*, *h* should be as narrow as possible in order to minimize the consequential decrease of the current load capacity of the valve disc.

Valve discs so improved also have a voltage load capacity greater than in the case of prior constructions. Rectifiers composed of a number of such discs hence are suitable for the same operating voltage as rectifiers in which the number of valve discs is larger than in devices as provided by the invention. Therefore, with the same operating voltage rectifiers composed of the novel discs have an internal resistance smaller than that of rectifiers comprising discs of the old type. As a result the current load capacity in the case of the invention is greater than in prior devices.

In the case of a number of valve discs mounted serially on spindle 4 the ring *d* serves as a contact member for the base plate 1 of the next following valve disc. Instead of this ring, however, spring discs may be arranged in well known manner to contact with the coating 3 of one valve disc and with the base plate 1 of the next following valve disc.

The subdivided coating 3 may be manufactured by means of a metallic pattern plate 5, Figs. 3 and 4. This plate is applied to the semi-conductor layer 2, whereupon metal is sprayed against layer 2 and plate 5. The gaps *i*, *a*, *b*, *h* of the coating 3 are in this way produced by radial bars *i'*, *a'* and concentric bars *b'*, *h'* of the pattern plate. Preferably, as shown in Fig. 4 these bars are tapering toward the layer 2 in order that the gaps in the coating 3 become narrow enough.

Ring *d* may likewise be formed with the aid of the pattern plate 5, this having to such end a disc-shaped center portion *d'*, but may be arranged instead by an additional spraying operation for which the pattern plate 5' represented in Fig. 5 is suitable, as in this case the bars *i'* join the center portion *d''*.

What is claimed is:

1. A rectifier disc including a metallic base plate, a semi-conducting layer applied to said plate, and a subdivided metallic coating on the outer surface of said layer and in intimate contact with said layer, said plate and said coating being the electrodes of said rectifier disc, and said subdivided coating comprising zones each comprising yieldingly interconnected sections.

2. A rectifier disc including a metallic base plate, a semi-conducting layer applied to said plate and a sub-divided metallic coating on the outer surface of said layer and in intimate contact with said coating, said plate and said coating being the electrodes of said rectifier disc, and said sub-divided coating comprises zones, each comprising yieldingly interconnected sections which define radial gaps and concentric gaps.

3. A rectifier disk according to claim 1, in which the said sections are generally sector-shaped zones interconnected by a central metal ring.

4. A rectifier disc including a metallic base plate, a semi-conducting layer applied to said plate and a sub-divided metallic coating on the outer surface of said layer and in intimate contact with said coating, said plate and said coating being the electrodes of said rectifier disc, and said sub-divided coating comprises zones, each comprising yieldingly interconnected sections which are generally sector-shaped zones interconnected by a central metal ring and each provided with radial gaps and concentric gaps.

5. A rectifier disc including a metallic base plate, a semi-conducting layer applied to said plate and a sub-divided metallic coating on the outer surface of said layer and in intimate contact with said coating, said plate and said coating being the electrodes of said rectifier disc, and said sub-divided coating comprises zones, each comprising yieldingly interconnected sections which are sector-shaped interconnected by a central metal ring and each provided with a radial gap and concentric gaps of different diameters, whereby these zones are each composed of sections held together by bridge parts, these bridge parts being wider circumferentially the nearer they are to the central ring.

6. In the manufacture of rectifier discs according to claim 1 the method which includes applying a pattern plate to the outer surface of said semi-conductor layer and in then spraying metal against this layer and pattern plate.

7. In the manufacture of rectifier discs according to claim 1, the method that consists in applying a pattern plate to the outer surface of said semi-conductor layer, such pattern plate comprising bars and a disc-shaped center portion, in then spraying metal against said layer and pattern plate, this center portion being effective to leave a central zone of the said semi-conductor layer free from the metal applied to it by spraying, and finally in producing on this layer a central metal ring by an additional spraying operation.

8. A pattern plate for use in applying a sub-divided metallic coating to the semi-conducting layer of a rectifier disc, said pattern plate including bars tapering toward said layer.

9. A pattern plate according to claim 8, further including a disc-shaped center portion.

ERICH KIPPHAN.
BERTA SIEBERT.