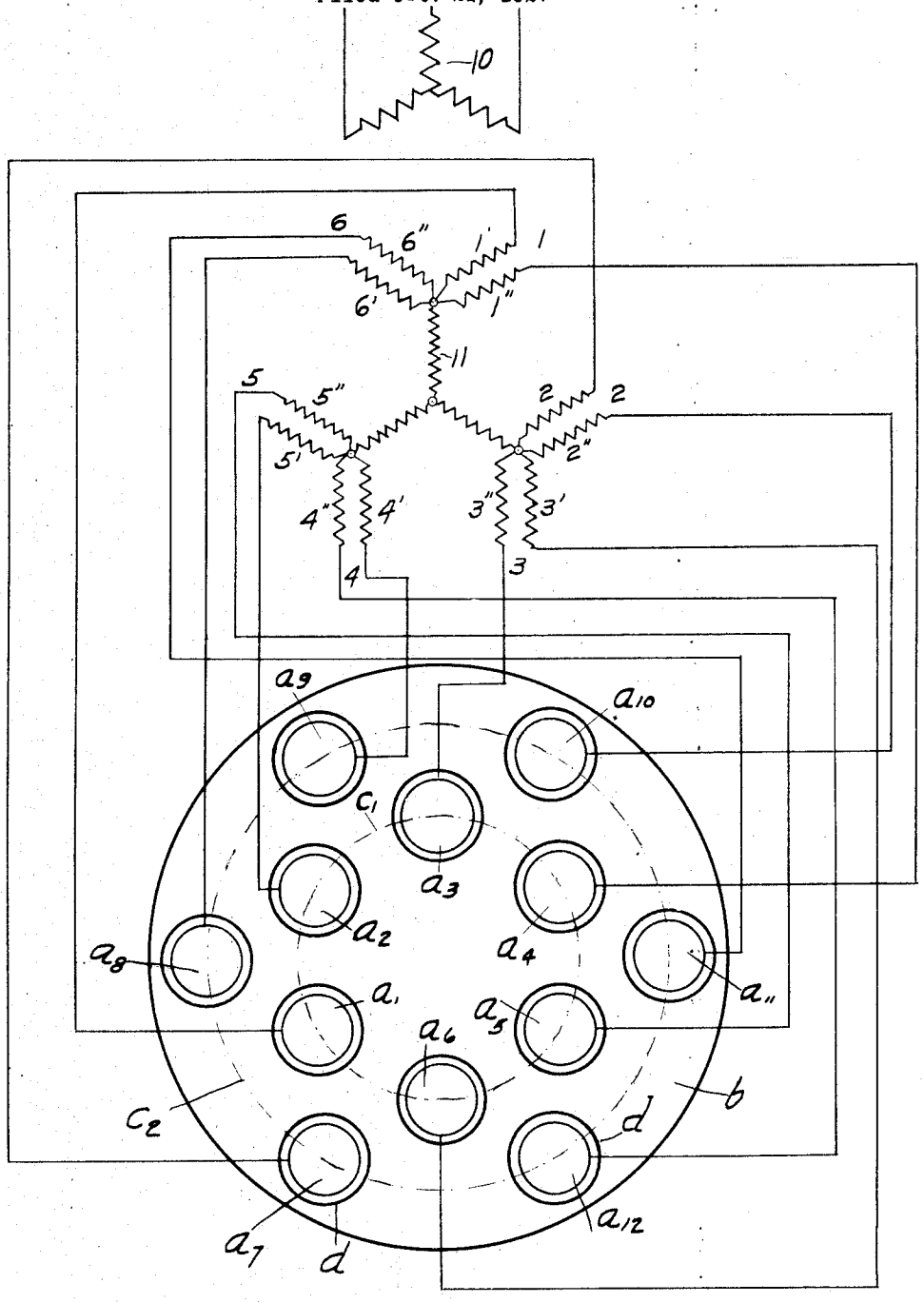
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M. SCHIESSER

RECTIFIER AND CONNECTION THEREFOR

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INVENTOR
MAX SCHIESSER
BY Alfred N. Dyson
ATTORNEY

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MAX SCHIESSER, OF BADEN, SWITZERLAND.

RECTIFIER AND CONNECTION THEREFOR.

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This invention relates to improvements in rectifiers and connections therefor.

In the case of metal vapour rectifiers having a comparatively large number of anodes, it has been proposed to arrange the latter in concentric circles in the top plate or cover of the rectifier casing for the purpose of keeping the size of the casing within reasonable, practicable limits. The number of anodes in the outer circle was greater than the number of anodes in the inner circle in such proportion that the space or distance circumferentially between adjacent anodes in the outer circle was substantially the same and equal to such space or distance between adjacent anodes in the inner circle. In such arrangement, the inner anodes, that is, those in the inner circle, were inaccessible for the purpose of repairs, inspection or other work, it being necessary in such events to remove one or more of the outer anodes to gain access to the opposite inner anode. It has not been found practicable to increase the diameter of the rectifier casing by such an amount as to correspondingly increase the spacing of the outer anodes whereby access may be had to the inner anodes without removing one or more of the latter, for the reason that such an alternative would completely offset the advantages obtained by the concentric arrangement of the anodes.

One of the objects of the present invention, therefore, is to provide an improved rectifier having the same advantages as regards size of the casing and the number of anodes, as those constructed heretofore, and wherein the anodes are so arranged or disposed as to provide for accessibility to the inner anodes without making necessary removal or disturbing of any of the outer anodes, the improved arrangement also providing for proper spacing of the anodes with respect to each other for efficient operation.

Another object is to provide an improved rectifying system embodying a metal vapour rectifier and a supply transformer therefor, wherein the connections between the rectifier and its supply winding are such as to ensure uniform distribution of the arc throughout the entire rectifier chamber or casing.

Other objects and advantages will hereinafter appear.

According to the present invention, the anodes are arranged in concentric circles, these being two in number in the present embodiment shown, the number of anodes in the outer circle being the same as the number in the inner circle, whereby the distance circumferentially between adjacent anodes in the outer circle is appreciably greater than such distance between adjacent anodes in the inner circle. Complete accessibility to the inner anodes, without the necessity of removing or in any way disturbing the outer anodes, is obtained by increasing the diameter of the outer circle a relatively slight amount and, further, by so disposing the anodes that the radius passing through any one of the anodes in the outer circle bisects the angle formed by the radii passing through the respective two adjacent anodes in the inner circle.

For the purpose of illustrating the invention, one embodiment thereof is shown in the drawing, the latter comprising an outline plan view of a rectifier embodying the present improvements and a schematic layout of the present improved connections between the rectifier and its supply transformer.

Referring to the drawing, the anodes a_1, a_2, a_3, ... a_{12} are arranged in concentric circles c_1 and c_2 on the top plate or cover b of the rectifier cylinder, the anodes a_1 to a_6 being disposed in the inner circle c_1 and equal in number to the anodes a_7 to a_{12} which are disposed in the outer circle. As indicated in the drawing, the anodes in each circle are equally spaced circumferentially, each of the anodes in the outer circle being so disposed that the radius passing through the same bisects the angle formed by the radii passing through the respective two adjacent anodes in the inner circle. For example, the radius passing through anode a_9 in the outer circle bisects the angle formed by the radii passing through the anodes a_2 and a_3 in the inner circle. As a result of the foregoing construction or arrangement, it will be seen that the spaces between adjacent anodes in the outer circle are appreciably greater than the overall transverse dimension of each of the inner anodes, and that each of the inner anodes is disposed opposite the relatively wide space between the associated adjacent anodes in the outer circle, whereby complete access may be had to each of the inner anodes without removing or in any way disturbing any of the outer anodes, the present improved arrangement

at the same time providing for sufficient space between the various anodes for efficient operation of the rectifier.

The improved connections between the rectifier and the supply transformer therefor, whereby uniform distribution of the arc throughout the entire rectifier casing is ensured, will now be described. The supply transformer is shown as comprising the star-connected primary 10 and the secondary designated, generally, by the reference numeral 11. The secondary 11 is connected to provide the so-called double-fork or triple-Y connection to give six phases, but of course any other suitable connection might be adopted, depending on particular conditions and the number of phases desired. Adjacent anodes in the outer circle are connected to different phases of the transformer supply winding 11, while the particular anode adjacent to these anodes and which is in the inner circle is connected to a phase of winding 11 which is different from either of the phases to which the adjacent anodes in the outer circle are connected. For example, the adjacent anodes a_{10} and a_{11} in the outer circle are connected to different phases, anode a_{10} being connected to the winding 2'' of phase 2 and the anode a_{11} being connected to the winding 6'' of phase 6. The inner anode a_4 which is adjacent to the adjacent outer anodes a_{10} and a_{11} is connected to the winding 1'' of phase 1, this being a phase different from either of the phases 2 and 6. Furthermore, the diametrically opposite anodes in each circle are connected to the same phase of the transformer secondary or winding 11. For example, the diametrically opposite anodes a_9 and a_{12} in the outer circle are connected to the respective windings 4' and 4'' of phase 4, while the diametrically opposite anodes a_3 and a_6 in the inner circle are connected to the respective windings 3'' and 3' of phase 3, the diametrically opposite anodes a_2 and a_5 in the inner circle being connected to the respective windings 5' and 5'' of phase 5, and so on.

Each anode is enclosed by the usual cylindrical cooling jacket d, as indicated.

From the foregoing, it will be seen that an improved rectifier has been provided which has a comparatively large number of anodes and wherein the latter are so disposed as to avoid any appreciable increase in the size of the rectifier casing while at the same time permitting of ready access to the inner anodes without removal or disturbing of any of the outer anodes, and that improved connections have been provided between the rectifier and its supply transformer whereby uniform distribution of the arc throughout the entire rectifier casing is ensured.

While but one embodiment of the invention has been shown and described, it will be understood that various changes may be made without departing from the spirit of the invention or the scope of the claims.

The invention claimed is:

1. Rectifier apparatus having anodes arranged in circles substantially concentric with respect to each other, the anodes in one circle being disposed opposite the spaces between the respective adjacent anodes in the adjacent circle.

2. Rectifier apparatus having anodes arranged in substantially concentric inner and outer circles, the anodes in the outer circle being so disposed that radii passing through the same substantially bisect the angles formed by the radii passing through the respective adjacent anodes in the inner circle.

3. Rectifier apparatus having anodes arranged in circles substantially concentric with respect to each other and each containing the same number of anodes as the other, the anodes in each circle being equally spaced circumferentially, each of the anodes in the outer circle being so disposed that the radius passing through the same substantially bisects the angle formed by the radii passing through the respective two adjacent anodes in the inner circle.

4. In a rectifying system, rectifier apparatus having anodes arranged in circles substantially concentric with respect to each other, the anodes in one circle being disposed opposite the spaces between the respective adjacent anodes in the adjacent circle, and a polyphase supply transformer winding for said rectifier, adjacent anodes in one of said circles being connected to different phases of said winding, the respective anodes adjacent said last-mentioned anodes and which are in another of said circles being connected to phases of said winding different from each of said last-mentioned phases.

5. In a rectifying system, rectifier apparatus having anodes arranged in circles substantially concentric with respect to each other, the anodes in one circle being disposed opposite the spaces between the respective adjacent anodes in the adjacent circle, and a polyphase supply transformer winding for said rectifier, adjacent anodes in one of said circles being connected to different phases of said winding, the respective anodes adjacent said last-mentioned anodes and which are in another of said circles being connected to phases of said winding different from each of said last-mentioned phases, diametrically opposite anodes in each of said circles being connected to the same phase of said winding.

6. In a rectifying system, rectifier apparatus having anodes arranged in circles substantially concentric with respect to each other and each containing the same number of anodes as the other, the anodes in each circle being equally spaced circumferentially,

each of the anodes in the outer circle being so disposed that the radius passing through the same substantially bisects the angle formed by the radii passing through the respective two adjacent anodes in the inner circle, and a polyphase supply transformer winding for said rectifier, adjacent anodes in said outer circle being connected to different phases of said winding, the respective anodes adjacent said last-mentioned anodes and which are in said inner circle being connected to phases of said winding different from each of said last-mentioned phases, diametrically opposite anodes in each of said circles being connected to the same phase of said winding.

In testimony whereof I have hereunto subscribed my name this 7 day of October, A. D. 1927.

MAX SCHIESSER.