

Aug. 28, 1945.

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2,383,735

RECTIFIER

Filed April 2, 1943

*Fig. 1*

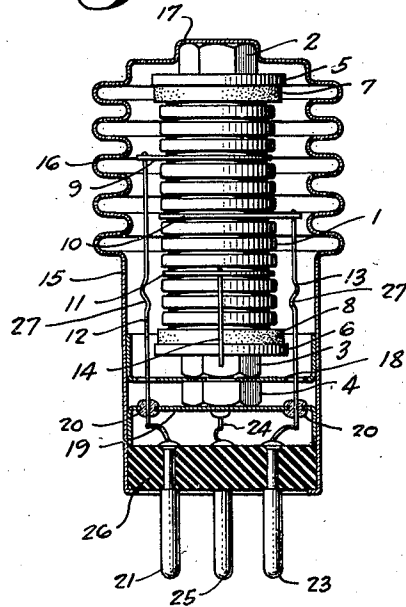
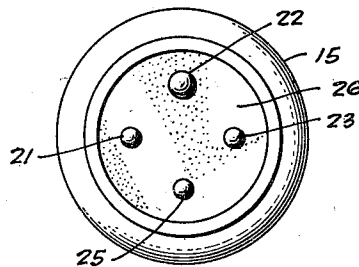


*Fig. 2*



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## UNITED STATES PATENT OFFICE

2,383,735

RECTIFIER

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Application April 2, 1943, Serial No. 481,523

4 Claims. (Cl. 175-366)

This invention relates to a rectifier of the dry disc type. This type of rectifier, as is well understood, is constructed of a series of elements placed in a stack upon a common support or core. The elements are made from cuprous oxide, selenium, cupric sulfide, or equivalent materials. The rectifying function is due to the fact that the transmission of current through such a stack can take place in but one direction. For full wave rectification, a bridge, similar to a Wheatstone bridge, may be formed by the use of sections of a common stack.

It is one of the objects of this invention to improve, in general, rectifiers of this type.

It is another object of this invention to increase the useful life of such rectifiers, and especially by providing a sealed container therefor.

Such a sealed container makes it possible to exclude air from the elements; and, since air usually carries constituents such as moisture, that have a harmful effect upon the rectifier, this exclusion is of considerable assistance in lengthening the life of the device.

But, in addition, the sealed container also makes possible the use of a dry, inert gas within the container, of such nature that it is conducive to long life of the rectifier.

Accordingly, it is another object of this invention to provide an inert, gaseous atmosphere for the rectifier discs.

It is still another object of this invention to provide a rectifier of this character that can be kept cool in operation, and especially by utilizing the exterior surface of the sealed container for transferring heat from the inside to the outside of the container. The use of the container as a radiator is facilitated by placing it in good thermal transfer relation to the core of the rectifier. Furthermore, by making the container of the kind that can expand, such as a corrugated bellows or siphon, additional advantages are secured. The corrugations provide a greater radiating surface; and the container, being readily conformable in length, can accommodate itself readily to change in size due to thermal expansion of those parts inside the container, and which are joined to the container.

This invention possesses many other advantages, and has other objects which may be made more easily apparent from a consideration of one embodiment of the invention. For this purpose, there is shown a form in the drawing accompanying and forming part of the present specification. This form will now be described in detail, illustrating the general principles of the inven-

tion; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of this invention is best defined by the appended claims.

Referring to the drawing:

Figure 1 is a view, mainly in longitudinal section, of a rectifier embodying the invention; and Fig. 2 is a bottom plan view thereof.

The rectifier elements in this instance are shown as a plurality of discs which form a stack. These discs may be appropriately supported in stack form by the aid of a central core passing through the central apertures of the discs 1. Preferably, the central core may be in the form of a bolt 2, held in tight relation to the discs by the aid of nuts 3 and 4, holding the stack in assembled relation. The core 2 is appropriately insulated from the discs. Washers 5 and 6 are provided on the top and bottom of the stack, and may be insulated therefrom as by the insulation washers 7 and 8.

The discs 1 are made from appropriate material, as heretofore explained, in order to obtain the desired rectifying action.

In the present instance, the stack comprises four sections of three discs each, the sections corresponding to four arms of a bridge, which may be joined in an electric circuit to provide full wave rectification in a manner that is now well understood. In order to facilitate the connection of these bridge arms into an appropriate circuit, use is made of the intermediate conducting plates 9, 10, and 11, disposed between the adjacent sections of the stack. For completing these connections, four leads, 12, 13, 14, and 24, are utilized. Leads 12, 13, and 14 are shown as appropriately connected to the terminal plates 9, 10, and 11, respectively. The fourth lead, 24, extends along the concealed side of the stack 1, and is electrically connected to both ends of the stack.

The rectifying stack comprising the discs 1 is enclosed in an atmosphere of inert gas, sealed in a container. The container is formed substantially entirely by the thin metallic wall 15, which is of general circular configuration. It is provided with a longitudinal series of annular corrugations 16, and may be made of a good heat conducting metal, such as copper. The upper portion of the conductor 15 is shown as providing a wall 17 that may be welded to the head of the core bolt 2. In this way the sealed container 15 is placed in good heat transfer relationship with the core of the rectifier.

In order to provide efficient heat transfer between the lower end of the stack and the sealed container 15, use is made of the flanged plates

18 and 19. These plates 18 and 19 have flanges that are telescoped with the tubular bottom portion of the container 15. These flanges may be welded to the inside of the container. The plate 18 is shown as disposed between the nuts 3 and 4 of the core; and the lower plate 19 is shown as disposed immediately below the lower nut 4.

The sealed container 15 is preferably filled with an inert, dry gas, as heretofore mentioned. Such gas is chosen as has no chemical reaction with the material out of which the discs 1 are made. This gas may be under pressure, in order to increase the heat transferring property of the atmosphere surrounding the rectifier stack. This supplements the direct transfer of the heat at the points of metallic contact between the sealed container 15 and the core upon which the stack is disposed.

The seal is maintained by the lower plate 19. Connections 12, 13, 14, and 24 pass through the insulation sealing bushings 20 disposed in the lower plate 19.

The deep corrugations 16 permit the sealed container 15 to expand and contract with temperature changes without disturbing the effective thermal contact between the container and the core of the stack. Thus, any difference in the coefficient of expansion of the sealed container 15, on the one hand, and the stack structure on the other hand, can cause no material strain on the junctions between these elements.

As shown in Figs. 1 and 2, the lower ends of the connections 12, 13, 14, and 24 are connected to the prongs or posts 21, 22, 23, and 25. These prongs are supported in and extend below an insulation base 26 disposed within the container 15. The lower edge of the container 15 may be crimped underneath the supporting base 24 in order to hold this base firmly in place against the lower edge of the flange on plate 19.

As usual, the prongs 21, 22, 23, and 25 may have different diameters, to ensure that the pronged base 26 will be received in a receptacle only in one definite position.

Since the heat generated during the process of rectifying may be considerable, expansion and

contraction of the stack 1 is to be expected. To ensure against the imposition of undue stresses upon the leads 12, 13, 14, and 24, these leads may be made so that they may be easily elongated as by the aid of convolutions, such as 27, illustrated most clearly in Fig. 1.

In operation, the rectifier structure is inserted into an appropriate socket, the prongs 21, 22, 23, and 25 thereby making appropriate connection with a circuit in which the rectifier is to be included. The sealed container 15 ensures against rapid deterioration of the rectifier; and, by virtue of the convolutions 16, efficient radiation of the heat developed during operation is ensured. In addition, these convolutions permit the container 15 to actuate itself to varying temperature requirements.

What is claimed is:

1. In a rectifier structure, a stack of contacting rectifying elements, a support for the stack and a sealed container for said stack and secured to the opposite ends of the support, said container being corrugated to permit its ready accommodation to expansion and contraction of the support.

2. In a rectifier structure, a stack of contacting rectifying elements, a support for the stack, and a sealed heat conducting container in which the stack is enclosed, said container being in thermal transfer relation to said support and having a corrugated wall.

3. In a rectifier structure, a stack of contacting rectifying discs, a core upon which the discs are supported, and a metallic, corrugated container sealed to exclude air from the stack, and in heat transferring contact with the opposite ends of the core.

4. In a rectifier structure, a stack of contacting rectifying discs, a core upon which the discs are supported, a metallic, corrugated container sealed to exclude air from the stack, and in heat transferring contact with the opposite ends of the core, and an inert gas under pressure enclosed in said container.

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