

Sept. 5, 1939.

C. C. HEIN

2,172,200

CONTACT TERMINAL FOR RECTIFIER PLATES

Filed June 8, 1938

Fig. 1.

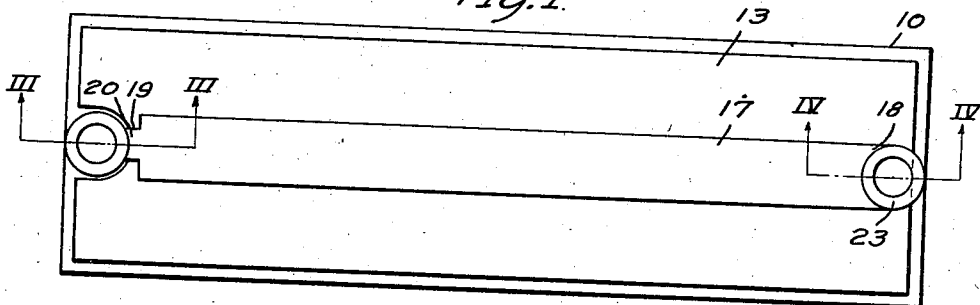


Fig. 2.

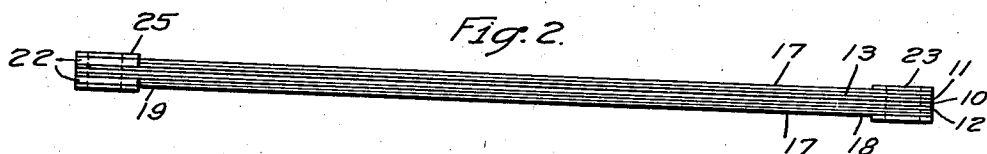


Fig. 3.

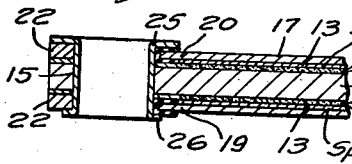


Fig. 4.

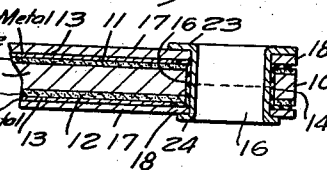


Fig. 5.

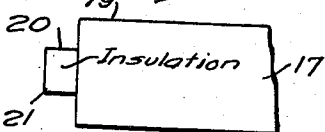


Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.

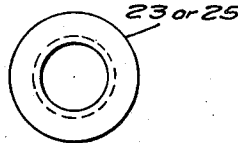


Fig. 11.

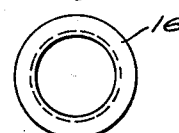


Fig. 10.

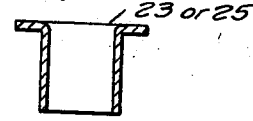
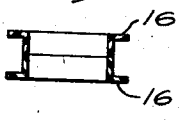


Fig. 12.



WITNESSES:

E. A. McElroy
R. W. Bailey

INVENTOR

Carl C. Hein.

BY

F. W. Lyle,
ATTORNEY

UNITED STATES PATENT OFFICE

2,172,200

CONTACT TERMINAL FOR RECTIFIER PLATES

Carl C. Hein, Forest Hills, Pa., assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

Application June 8, 1938, Serial No. 212,442

4 Claims. (Cl. 175-366)

My invention relates to contact rectifiers and especially contact rectifiers of large size.

An object of my invention is to provide effective contact terminals for large-size contact rectifier plates which will not interfere to any extent with the cooling of the rectifier.

Other objects and advantages of the invention will be apparent from the following description and drawing, in which:

Figure 1 is a top plan view of a preferred embodiment of my invention;

Fig. 2 is a side elevational view of the device of Fig. 1;

Fig. 3 is an enlarged cross sectional view taken on the line III—III of Fig. 1;

Fig. 4 is an enlarged cross sectional view taken on the line IV—IV of Fig. 1;

Fig. 5 is a top plan view;

Fig. 6 is a cross sectional view of the one end of the contact terminal;

Figs. 7 and 8 are a top plan view and a cross sectional view of the horseshoe washer disclosed in cross section in Fig. 3;

Figs. 9 and 10 are the top plan view and cross sectional view of the metal eyelet utilized in the contact assembly; and

Figs. 11 and 12 are the top plan view and cross sectional view of the insulating eyelet utilized in the contact assembly.

My invention particularly concerns making improved contact terminals to contact rectifiers having large rectifying areas. These contact rectifiers, especially of the copper oxide type, have been adapted for various uses requiring large amounts of current for various uses, such as electroplating and welding. For these uses of heavy current demands, numerous stacks of large copper plates are utilized and these plates are constantly cooled by fans when in operation. The individual plates have a large area generally from 30 to 50 square inches on each side of the plate for the rectifying area. My invention particularly concerns making a large area contact to the surface of such a plate without interfering with the cooling of the plate to any extent. In Figs. 1 and 2, I have disclosed a large area copper plate 10 having a copper oxide rectifying layer 11 and 12 on each side thereof. I preferably coat the oxide layer with a solution of graphite in water and then spray a metal over the surface to form a contact layer 13. Either the graphite solution or the sprayed metal may be used alone, but I prefer the combination of the two layers as being more satisfactory. The sprayed metal coating 13 may be of any low

melting alloy such as one composed of 37% by weight of lead and 63% by weight of tin.

At each end of the plate, but preferably symmetrically disposed within the plate, I provide two openings 14 and 15. An insulating eyelet, preferably of fish paper 16, whose shape is more particularly disclosed in Figs. 11 and 12, is inserted in the hole 14 and its flanges bent around the edges of the hole to completely cover the exposed copper part 10 of the plate. A long thin strip 17, preferably copper, has one end 18 having an opening therethrough of the same size as the hole 14. This strip is placed on the top surface with its opening coinciding with the opening 14, and a similar strip 17 is placed on the underside of the rectifier plate. The other end 19 of the strip terminates in the tap 20 that is covered with insulation 21 and this extends to the inner edge of the hole 15 in the plate. The under strip 17 likewise terminates in an insulating covered tab. This terminal strip is of relatively thin material both for the saving in cost of material and for the reduction of thickness so as to reduce the cross sectional area of the rectifier presented to the fan or blower used for ventilation. The terminal strip can also be flexed slightly to exert a slight pressure against the sprayed coating. The contact area can be relatively large and made to eliminate much of the point contact in devices of the prior art. The contact strip can be crimped at the edges or center if any strengthening is desired. At the end having the opening 15, a horseshoe washer 22, as disclosed in Figs. 7 and 8, is placed around the top and bottom of the hole 15 in order to hold the insulation covered tabs 20 in place. A metal eyelet 23 is then placed in the opening 14 and the bottom edges 24 are peened over to securely bind the terminal strips 17 to the plates at this end. A similar metal eyelet 25 is placed in the opening 15 at the other end of the plate and its bottom edge 26 is peened over to securely bind the terminal strips 17 and the horseshoe washer 22 to the contact rectifier. These metal eyelets are disclosed in their preferred shape in Figs. 9 and 10.

It will be noted from an examination of Figs. 1 and 2 that the terminal strip 17 makes an extensive surface contact with the sprayed metal coating 13 and this metal terminal strip has positive contact with the eyelet 23, as disclosed more particularly in Fig. 4. The metal eyelet 23 accordingly can act as the negative terminal for the contact rectifier and an electric terminal soldered, welded or otherwise secured thereto.

The metal eyelet 25 is insulated from the terminal strip 17 by the insulation and also by the absence of the oxide adjacent the opening 15 and makes contact with the copper 16 which is exposed in the central portion of the opening 15. The eyelet 25 accordingly acts as the positive contact to the rectifier and the circuit terminal may be secured thereto.

While I have disclosed the invention as applied to a copper oxide rectifier, the invention may be applied to contact rectifiers of other materials. The particular advantages of the contact terminals is a large reduction in cost due to the specific design utilizing very little material. The design is symmetrical both in regard to the mounting holes symmetrically placed and being within the area of the plate with a resulting reduction in overall volume. The narrow cross sectional area of the assembled plate will permit closer spacing of the plates with the further decrease in the volume occupied by a specific number of plates. The terminal strip is securely fastened to the plate and provides a constancy of contact resistance. If desired, protective coatings can be applied to the entire surface and edges.

While I have disclosed a preferred embodiment of my invention, it is apparent that many modifications may be made in the particular shape, arrangement and location of the various elements. Accordingly, I desire only such limitations to be imposed upon the following claims as is necessitated by the prior art.

I claim as my invention:

1. A contact rectifier comprising a metal plate, a layer making a rectifying contact with said metal plate on the surface thereof, said plate

having two spaced openings therethrough, a contact strip extending from one opening to the other, insulation about the metal plate at one opening and insulation about the strip at the other opening and fastening contact means through said openings, binding said strip, plate and layer.

2. A contact rectifier comprising a plate, a copper oxide layer on the surface of said plate, said plate having two openings therethrough, a contact strip extending from one opening to the other, insulation about the copper plate at one opening, insulation about the strip at the other opening and fastening contact means through said openings binding said strip, plate and layer.

3. A contact rectifier comprising a metal plate, a layer making a rectifying contact with said metal plate on the surface thereof, said plate having two spaced openings therethrough, a contact strip extending from one opening to the other, insulation about the metal plate at one opening, insulation about the strip at the other opening, and an eyelet through each opening binding said strip, plate and layer together.

4. A contact to a contact rectifier of a metal and a layer thereon comprising a flat strip of metal making a broad surface contact to said layer, said rectifier having an opening therethrough, the layer being absent from around said opening, said strip extending to said opening and having its end adjacent thereto covered with insulation, a horseshoe washer making contact with the metal around said opening and holding the end of the strip in place and an eyelet through said opening binding said strip washer and metal together.

CARL C. HEIN.