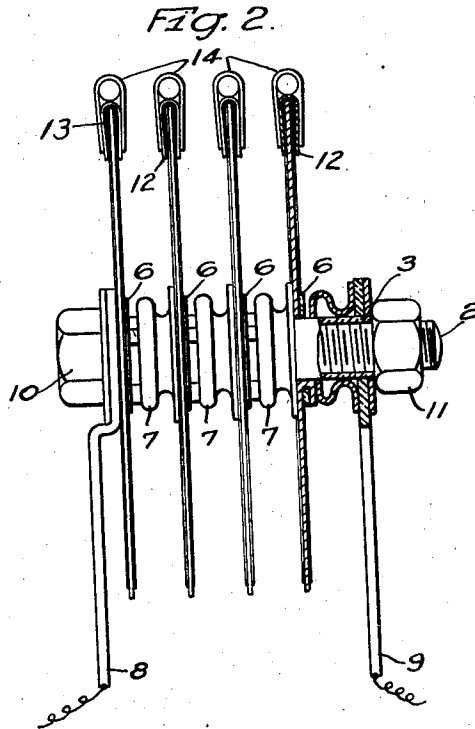
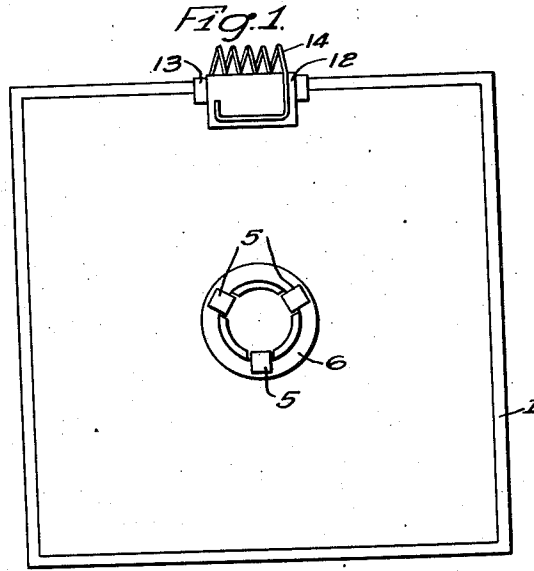


April 21, 1931.

W. AUMANN  
METAL OXIDE RECTIFIER  
Filed Jan. 20, 1930

1,801,836



INVENTOR  
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## UNITED STATES PATENT OFFICE

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## METAL-OXIDE RECTIFIER

Application filed January 20, 1930, Serial No. 421,986, and in Germany January 24, 1929.

My invention relates to alternating current rectifiers and particularly to rectifiers of the contact type.

One object of my invention is to provide a simple and convenient way of making suitable connections between a plurality of unit rectifiers, each consisting of an oxidized metal plate, and for mounting them in a sufficiently rigid structure on a central thru-bolt.

Another object of my invention is to provide a simple and convenient means for mounting a plurality of oxidized metal rectifier plates in such a way as to provide for readily dissipating heat generated by current flow through the rectifiers.

Another object of my invention is to provide a simple and convenient means for making contact between opposite faces of rectifier units comprising metal plates having oxide coatings on both sides.

Other objects of my invention will become apparent by reading the following description, taken in connection with the appended drawings, in which

Figure 1 is an end view in elevation of an assembly of rectifier plates embodying the principles of my invention, and

Fig. 2 is a view partly in side elevation and partly in cross-section of the assembly of Fig. 1.

It is now well known that the junction between metallic copper and an oxide coating formed on the surface thereof is uni-laterally conductive, and rectifiers comprising copper plates having such oxide layers on their surfaces have come into extensive commercial use. In order to obtain units of considerable current carrying capacity, the plates may be oxidized on both sides and conductive coatings applied to the exterior of the oxide; current may then flow inwardly from each conductive coating, through the oxide, to the mother copper.

In order to obtain sufficiently high rectified voltages for certain purposes it is desirable to connect a number of unit rectifiers of the type just described in series with each other. To do so it is necessary to make contact between the conductive coating of one

rectifier unit and the mother copper of the next unit in the series. My invention comprises a convenient method of doing this and of mounting the plates in a suitable structure.

Referring to Figs. 1 and 2, copper plates 1 are oxidized on both sides by heating in air in the manner described in the U. S. Patent No. 1,640,335 to L. O. Grondahl. A central hole is then punched in the plate leaving three inwardly extending lugs 5, from which the oxide coating is removed by abrasion or by pickling in sulphuric acid. Alternatively, the central hole and lugs 5 may be punched before oxidation of the plate, in which case the oxide may similarly be removed from the lugs 5. According to still another variation of the treatment the lugs may be prevented from oxidation by suitably covering them during the heating period. The surface of the oxidized plates may then be Schoop-sprayed with tin or some other suitable metal; or may be covered with metal by electro-plating; or may be reduced to the metallic condition by quenching while still hot in transformer oil or other reducing liquids by methods now well known in the art. The lugs 5 are then bent over toward the face of the oxide being held separate therefrom by an insulating washer 6.

It will usually be found desirable to leave a margin around the exterior and interior peripheries of the oxide coatings free from conductive coating to insure that the latter does not make contact with the interior mother copper.

A through bolt 2 is provided with an insulating sleeve 3 and as many rectifier units of the type just described as may be desired is assembled on the thru-bolt 2. Between each pair of plates is placed a collar 7, which may be of brass and of such form as to be somewhat elastic, one face of the collar 7 making contact with the lugs 5 of one plate, and the other face making contact with the conductive coating on the nearer side of the next plate. Contact for circuit connections is made to the two end plates of the series by suitable connecting plates 8 and 9 which are insulated

from the head 10 of the thru-bolt and the nut 11 by insulating washers.

In order to make conductive contact between the conductive coatings on the opposite faces of each plate, a U-shaped metal member 12 is spanned about the edge of each plate 1, being insulated from the copper interior of the plate by an insulating sheet 13, and being held firmly in position by a spring member 14.

The rectifier plates thus assembled are held firmly in position by tightening the nut 11 of bolt 2 to compress the spring collar 7 in suitable amount.

In accordance with the patent statutes, I have described one particular embodiment of the principles of my invention, but other methods of applying these principles will be readily apparent to those skilled in the art. I, accordingly, desire that the following claims shall be given as broad interpretation as is permissible in view of the prior art.

I claim as my invention:

1. A contact rectifier comprising a metal base coated with a compound thereof on each face and having a central hole, an insulating washer surrounding said central hole and held in place by projections from said metal member.

2. A contact rectifier comprising a plurality of metal plates, each plate having a face covered with a compound thereof, and having a central hole surrounded by an insulating washer held in place by projections from said metal plate.

3. A contact rectifier comprising a plurality of metal plates, each plate having a face covered with a compound thereof, and having a central hole surrounded by an insulating washer held in place by projections from said metal plate, an insulated thru-bolt projecting through the holes in said plates and metallic spacers connecting the aforesaid projections of one plate with the compound on the surface of the next plate.

4. A contact rectifier unit comprising a copper plate oxidized on each face, a conductive coating covering a portion of the surface of said oxide, a hole in said plate, and an insulating washer surrounding said hole and held in place by copper projections from said plate.

5. A rectifier comprising a plurality of units, each unit comprising a copper plate oxidized on its faces and having a conductive coating covering a portion of each oxidized face, a hole in each plate, an insulating washer surrounding each hole and held in place by copper projections from its adjacent plate, an insulated thru-bolt projecting through the holes in the respective plates, and metallic spacers interconnecting the aforesaid projections of one plate with the conductive coating of the adjacent plate.

6. A rectifier comprising a plurality of

units, each unit comprising a copper plate oxidized on the face and having a conductive coating covering a portion of each oxidized face, a hole in each plate, an insulating washer surrounding each hole and held in place by copper projections from its adjacent plate, an insulated thru-bolt projecting through the holes in the respective plates, metallic spacers interconnecting the aforesaid projections of one plate with the conductive coating of the adjacent plate, and means for interconnecting the two conductive coatings on the opposite faces of each plate.

7. In a rectifier of the contact type comprising a metallic plate coated on each side with a compound thereof, means for interconnecting the compounds on opposite faces of said plate comprising a sheet of insulating material bent over the edge of said plate, a metal sheet bent around said insulating material and spring means holding said metal sheet firmly in contact with the opposite faces of said plate.

8. In a contact rectifier comprising a copper plate oxidized on each side and having a conductive coating on the surface of the oxide on each side of said plate, means for interconnecting said conducting coatings comprising a sheet of insulating material bent around the edge of said copper plate, and a metallic sheet bent about said insulating sheet and adapted to make contact with each conductive coating.

In testimony whereof, I have hereunto subscribed my name this 20th day of December, 1929.

WILLY AUMANN.