

Jan. 10, 1933.

E. R. GILL, SR

1,894,035

ELECTRIC CURRENT RECTIFYING DEVICE

Filed Jan. 24, 1931

Fig. 1.

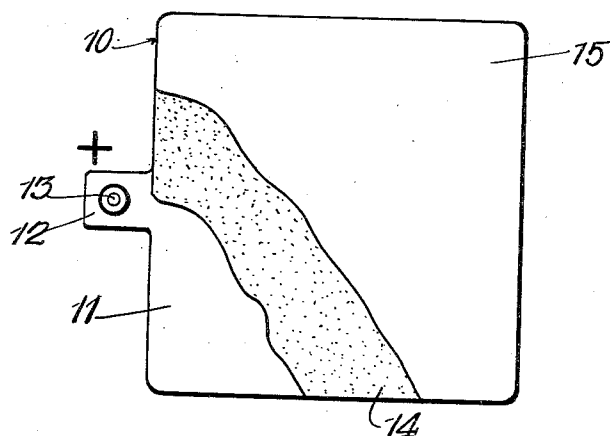
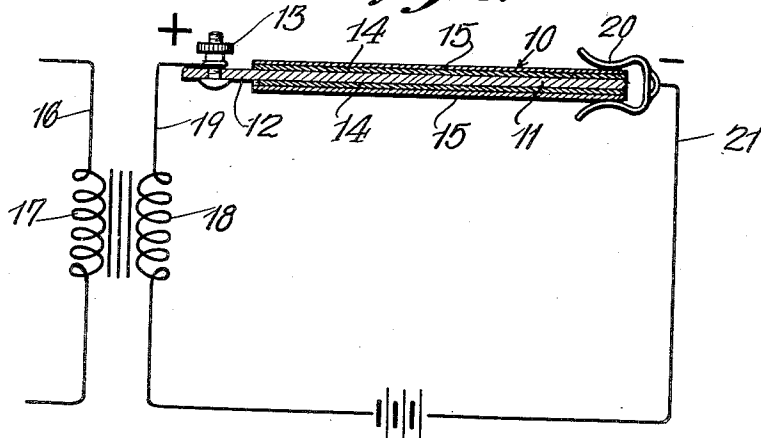


Fig. 2.



Inventor

EDWIN R. GILL, SR.

By

Fredrick W. Elg

Attorney

UNITED STATES PATENT OFFICE

EDWIN R. GILL, SR., OF YONKERS, NEW YORK

ELECTRIC CURRENT RECTIFYING DEVICE

Application filed January 24, 1931. Serial No. 510,989.

This invention relates to improvements in electric rectifying devices of the dry plate type for arrangement in electrical circuits to permit of the flow of current in one direction in the circuit, but to check or obstruct the flow of current in the opposite direction.

The primary object of the invention resides in a more efficient electrical rectifying device than those heretofore produced, as my improved device will afford the freest transmission of current in one direction, and will obstruct the flow of current in an opposite direction to a degree which is substantially nil, or to such an extent as to be unimportant to its successful commercial use.

I am aware that various attempts have been made in this art to produce a highly efficient electrical rectifying device using copper as a base, and although fairly successful devices have been constructed wherein a layer of cuprous and silver oxide is formed on the base of copper, nevertheless, I have found through experiments that a more practical device can be produced by forming an obstructing layer of reduced oxides consisting of cuprous, silver, and arsenic oxides.

Another object of the invention is to provide an electrical rectifying device formed of a base of alloy of copper, and arsenic in the natural state and original proportions, which is subjected to a bath of silver solution, and the treated substance further subjected to a process by which an obstructing layer of cuprous oxide, oxide of arsenic, and oxide of silver is formed upon either or both sides of the copper base.

While I have set forth several of the objects of my invention, further objects and advantages will be hereinafter appreciated as the following specification is read in conjunction with the accompanying drawing, in which:—

Figure 1 is a top plan view of my electric rectifying device or valve with certain layers of substances broken away.

Figure 2 is a vertical transverse sectional view therethrough but showing the device arranged in a portion of an electric circuit.

Referring to the drawing by reference characters, the numeral 10 designates my

improved electrical rectifying valve or device in its entirety which is constructed of a base of flat alloy of lake copper and arsenic 11. This base metal is used in its original and natural state and contains substantially the correct proportions of copper and arsenic as to insure the best results. The base may be of any desired shape, but in the drawing I have illustrated the same as substantially square in plan and provided with an ear 12 extending from one side thereof to receive and support an electrical binding post 13.

The base plate of alloy of copper and arsenic in its natural state is dipped into a bath of silver solution, such as cyanide of silver or the like, so that a coating of silver is formed upon opposite surfaces of the plate. After withdrawal of the silver coated plate from the bath of silver and the drying of the said surfaces, the same is placed in a furnace for heating and suspended in atmosphere to oxidize the surface of the alloy. The heat to which the plate is subjected should be of a temperature below the melting point of the alloy which is lower than copper alone. This heating operation causes the formation of an obstructing oxidized layer 14 upon the opposite surfaces of the plate and which consists of copper or cuprous oxide, oxide of arsenic, and oxide of silver.

After removing the oxidized plate from the heating furnace the same is quenched in a solution of alcohol and water to anneal the obstructing or rectifying layers 14 and to reduce a portion of the oxidized layers back to the metallic state as indicated by the numeral 15.

Although, I have shown and stated that both sides of the plate are subjected to the various steps in the process of forming the obstructing layers, only one side may be so treated if desired. However, during treatment of the surface or surfaces, the terminal ear 12 is not included as the same constitutes the positive pole of the device, while the negative pole consists of the outer surfaces thereof.

In Figure 2 of the drawing I have shown my improved electrical rectifying valve or

device 10 arranged in an electrical power circuit 16, in which an electrical transformer 17 forms a part. The secondary winding 18 of the transformer is connected to the plus terminal or ear 12 through a wire 19 and to a contact clip 20 by a wire 21. The clip 20 fits over one edge of the plate and has contact with the outer surfaces 15. By arranging the rectifying device in a circuit in the manner shown, I find that the obstructing layers 14 do not interfere with the free flow of current in one direction in the power circuit 16, but upon reversing of the flow, the obstructing layers formed of oxidized crystals of copper, arsenic and silver provide a high resistance to prevent a minimum return flow therethrough. In fact the amount of current passing through the plate in the direction restrained by said plate is of such insignificant amount as not to affect the practical purpose of the invention.

From the foregoing description, it will be seen that I have provided an electrical rectifying device in which a layer of reduced oxides is formed upon a metallic base and which consists of a mixture of cuprous or copper oxide, arsenic oxide, and silver oxide which I contend will produce more efficient results than those produced by devices of a similar nature. Furthermore, by using an alloy of lake copper and arsenic I am able to produce more uniformly responsive devices by a less expensive process.

Although, I have shown and described what I deem to be the general steps in my process, I wish it to be understood that various changes therein may be resorted to if desired to obtain more efficient results depending upon the quality of materials used, and I therefore do not restrict myself to anything less than the whole of my invention unless otherwise limited by the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:—

1. An electric current rectifying device comprising a plate of alloy of copper and arsenic, and an electric current obstructive layer of copper oxide, arsenic oxide, and silver oxide formed thereon.

2. An electric current rectifying device of the dry type adapted to permit free flow of current in one direction, but to obstruct the flow of current in reverse direction, said device comprising a base material of alloy of copper and arsenic and provided with an obstructive rectifying layer formed thereon and including copper oxide and arsenic oxide.

3. An electric current rectifying device of the dry type adapted to permit free flow of current in one direction, but to obstruct the flow of current in reverse direction, comprising a metallic alloy base of copper and arsenic formed with an obstructing layer of

copper oxide, arsenic oxide, and silver oxide.

4. An electric current rectifying device of the dry type adapted to permit free flow of current in one direction, but to obstruct the flow of current in reverse directions, comprising a metallic alloy base of copper and arsenic formed with an obstructing oxidized layer of copper oxide, arsenic oxide, and silver oxide, and a metallic surface formed from said alloy base over said oxidized layer.

5. The process of forming electric current rectifying elements, which consists in subjecting a metal alloy body of copper and arsenic to a bath of silver solution, and heating the body so subjected to form thereon an obstructing layer of copper oxide, arsenic oxide, and silver oxide.

6. The process of forming electric current rectifying elements which consists in subjecting a metal alloy body of copper and arsenic to a bath of silver solution, and heating the body so subjected to form thereon an obstructing layer of copper oxide, arsenic oxide, and silver oxide, and then reducing a portion of the oxidized surface back to a metallic state.

7. The process of forming electric current rectifying elements which consists in subjecting all but a small portion of a metal alloy body of copper and arsenic to a bath of silver solution, and heating the body so subjected to form thereon an obstructing layer of copper oxide, arsenic oxide, and silver oxide.

8. An electric current rectifying device of the dry type adapted to permit free flow of current in one direction, but to obstruct the flow of current in reverse direction comprising a metallic alloy body having a proportionate amount of copper and arsenic, and an obstructing layer of copper oxide, arsenic oxide, and silver oxide formed on all but a part of said body, the obstructing oxidized layer constituting one terminal of the device and the unoxidized portion constituting the other terminal.

9. An electric current rectifying device of the dry type adapted to permit free flow of current in one direction, but to obstruct the flow of current in reverse direction comprising a flat plate of alloy of copper and arsenic, and electric current obstructing layers of copper oxide, arsenic oxide, and silver oxide formed on opposite sides thereof.

In testimony whereof I affix my signature.
EDWIN R. GILL, Sr.