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L. LEVY

CURRENT RECTIFIER

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Fig. 1

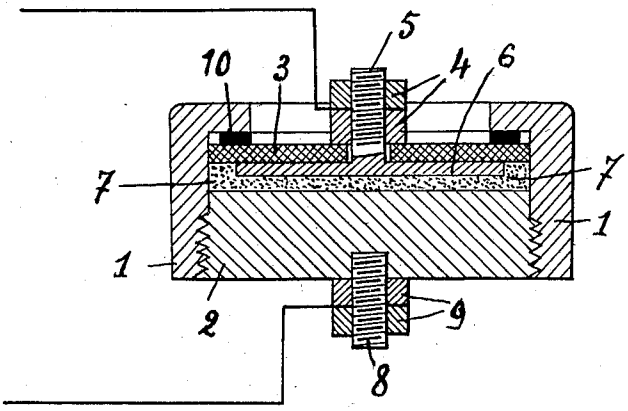
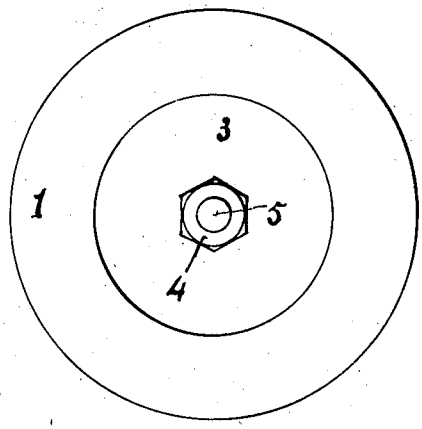


Fig. 2



Inventor
Lucien Levy,
By Henry Orth Jr
Atty.

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LUCIEN LEVY, OF PARIS, FRANCE.

CURRENT RECTIFIER.

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This invention relates to alternating current rectifiers and has for its object an improved rectifier of this kind and the application thereof, to wireless telegraphy and telephony and other analogous uses.

Rectifiers constituted by a strip of aluminium in contact with cuprous sulphide are already known. For one direction of the current, the aluminium becomes sulphuretted and as aluminium sulphide is a non-conductor of electricity, the contact presents a very great resistance. On the other hand, in the reverse direction, the contact presents only a small resistance cuprous sulphide being a very good conductor. This arrangement allows large low tension currents to be easily rectified.

These devices, however, are open to the drawback of having a poor efficiency and to fail in rectifying the current after working for a very little time. The cause of this resides in that particles of cuprous sulphide become attached to the aluminium at certain points, and that one has then instead of an aluminium-sulphide contact with cuprous sulphide, a cuprous sulphide contact with cuprous sulphide which does not rectify. It has been thought probable that the adherence of the cuprous sulphide with the aluminium was due to the fact that, owing to the aluminium being oxidized or undergoing oxidization under the action of the air existing between the grains of sulphide, copper aluminate, which is a conductor, and a sulphuretted gas, are produced.

According to this invention, I provide a rectifier or valve comprising an electric contact between aluminium and a suitable sulphide or oxide surrounded by a sulphuretting atmosphere.

Such a valve is capable of working without interruption. Its principal feature is that the presence of air or oxide capable of affecting the aluminium is avoided by the use of a sulphuretting atmosphere surrounding the contact.

Owing to the small resistance of the contact between the aluminium and cuprous sulphide in the direction of the current, it is possible in this manner to heat several thermionic valve filaments in parallel, instead of in series, as is necessary with electrolytic valves. This is a new result and an important improvement since the invention is henceforward applicable to the existing apparatus for wireless telephony and telegraphy without any modification whatever of this apparatus. Besides, the present rectifier is much more convenient to transport and more reliable in working than the electrolytic rectifiers.

Referring to the appended drawings which illustrate as an example a particular manner of carrying out this invention:—

Fig. 1 represents in section a valve element, according to this invention.

Fig. 2 represents a plan.

The apparatus is constituted by a copper cup 1 provided with a screwed copper plug 2 and inside which is disposed an insulating circular disc 3, of bakelite for instance, under which is secured, by means of the nut 4 and of the aluminium threaded stud 5, an aluminium disc 6 of smaller diameter than the insulating disc 3. Electric connections with the plug and the cup are made by means of the threaded stud 8 screwed on the said plug and provided with nuts 9, and by means of the stud 5 provided with the nuts 4, respectively.

A suitable compound 7 adapted to constitute with aluminium a rectifying contact is compressed between the disc 3 and the plug 2. This compound which is a copper salt is obtained as follows:

Copper sulphide is first obtained under a suitable form. To this end, the copper and the sulphur are heated in approximately molecular proportions in a glass flask, there being, however, a slight excess of sulphur in order to ensure the complete transformation of the copper to sulphide; the sulphide is then ground in a mortar so as to constitute a powder the grains of which are of the order of 0.2 millimetres in diameter; this powder is passed through a sieve so as to eliminate any particle of metallic copper. The essential feature of the invention resides in that this powder is made into a paste by mixing it with a liquid which may be either a mineral or vegetable oil or a suitable liquid organic compound, preferably a sulphuretting liquid, such as sulpho-hydrate of ammonia or a solution of sodium sulphide.

This paste is introduced between the aluminium disc 6 and the copper plug 2 and is strongly compressed between them.

The aluminium surface itself must be subjected to a special treatment which consists in a very careful polishing of the face and of the edge in contact with the sulphide. This polishing must preferably be per-

formed immediately before the assembling of the valve, in order to avoid the oxidation of the aluminium.

The apparatus must be so constructed as to be gas tight, so that a gaseous pressure caused by the vaporization of the sulphuretting liquid may be produced inside the apparatus. An annular joint 10 is provided for this purpose between the cup 1 and the insulating disc 3.

The semi-liquid paste having been introduced between the aluminium cup and the copper plug, it is sufficient to tighten the latter in order that the excess of liquid should escape by the joint between the copper and the bakelite.

The elevation of temperature caused by the passage of the current vaporizes a portion of the liquid and it is evident that the liquid could eventually be replaced by a gas under pressure, for instance sulphuretted hydrogen.

The arrangement so constructed constitutes a valve permitting one to easily rectify large currents at low voltages, and which will be much more convenient to use in practice than valves containing a liquid.

It is also possible to apply the above described device to construct a condenser by making the two electrodes of aluminium by replacing for instance the copper pieces 1 and 2 of Fig. 1 by pieces of aluminium. The condensers so obtained may be used in wireless telegraphy or telephony to establish low tension filters in combination with rectifiers of the kind described.

What I claim and desire to secure by Letters Patent of the United States is:

1. A current rectifier comprising a copper plug screwed in a copper cylinder constituting an electrode, a nonconducting element forming the cylinder bottom, an aluminium electrode fixed upon said nonconducting cylinder bottom, a paste consisting of a sulphide moistened with a sulphuretting liquid capable of producing a sulphuretting atmosphere and means to compress the paste between the two electrodes.

2. A current rectifier comprising a copper cup, a copper plug screwed in said cup and constituting an electrode, a nonconducting element forming the cylinder bottom, an aluminium electrode fixed upon said nonconducting cylinder bottom and compressed between the electrodes a metal sulphide with means to produce a sulphuretting atmosphere.

3. A current rectifier comprising a copper cup, a copper plug screwed in said cup and constituting an electrode, a nonconducting element forming the cylinder bottom, a gas tight joint between said insulating cylinder bottom and the edge of the cup, an aluminium electrode fixed upon said nonconducting cylinder bottom and a metal sulphide compressed between the two electrodes and including means to produce a sulphuretting atmosphere.

4. A current rectifier comprising a copper cup, a copper plug screwed in said cup and forming an electrode, means to fix said electrode-plug to a current lead, a nonconducting element forming the cup bottom, a gas tight joint between said nonconducting bottom and the cup, an aluminium electrode fixed upon said nonconducting cup bottom, means to fix another current lead to said aluminium electrode, and a metal sulphide mixed with a sulphuretting compound compressed between the two electrodes.

5. A current rectifier comprising an aluminium electrode and a copper electrode in combination with a conducting sulphide mixed with a sulphuretting liquid compressed between the electrodes.

In testimony that I claim the foregoing as my invention, I have signed my name.

LUCIEN LEVY.