E. GARRETSON.

ELECTRIC CURRENT RECTIFIER.

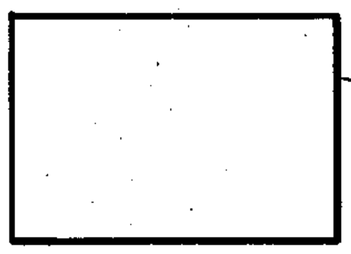
APPLICATION FILED SEPT. 10, 1908.

929,582.

Patented July 27, 1909.

2 SHEETS—SHEET 1.

Fig. 1.



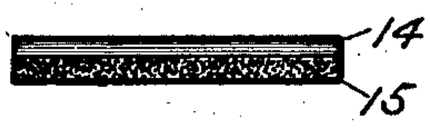


Fig. 2.

Fig. 3.

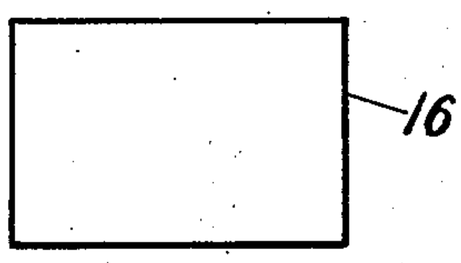
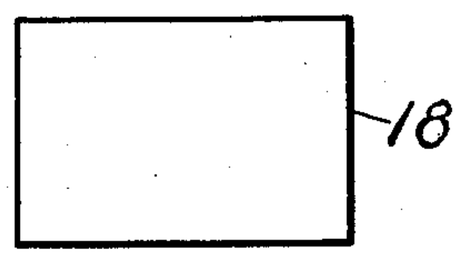


Fig. 4



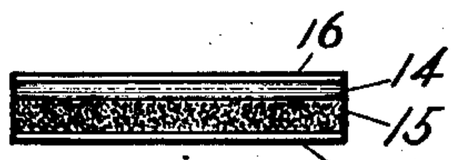


Fig. 5.

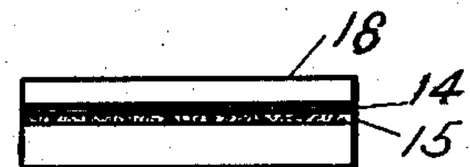
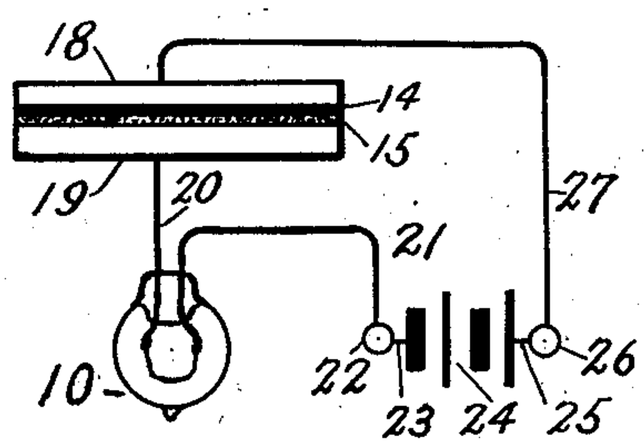


Fig. 6.

Fig. 7.



WITNESSES:

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Eugene Garretson

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2 SHEETS—SHEET 2.

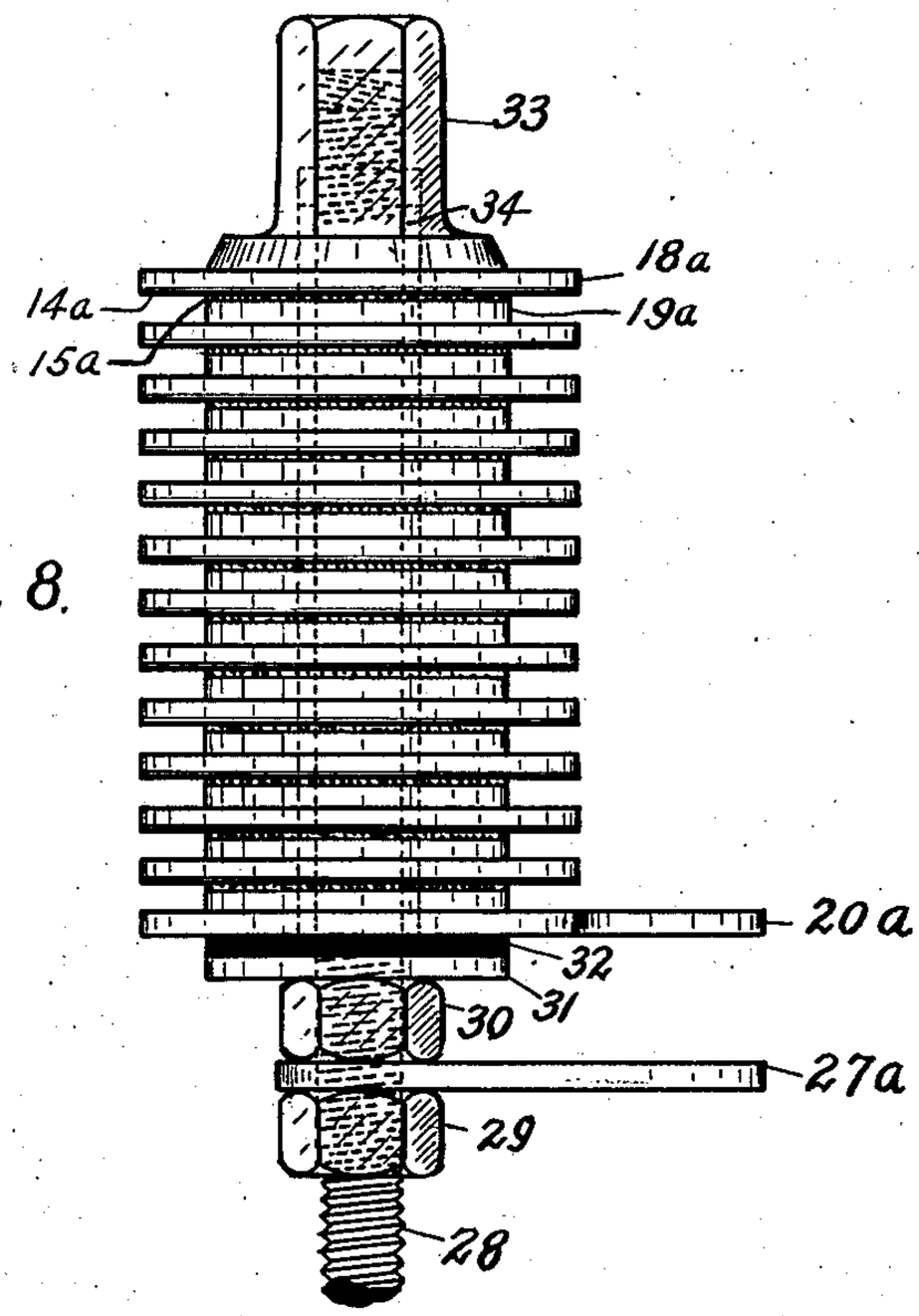

Fig. 8.

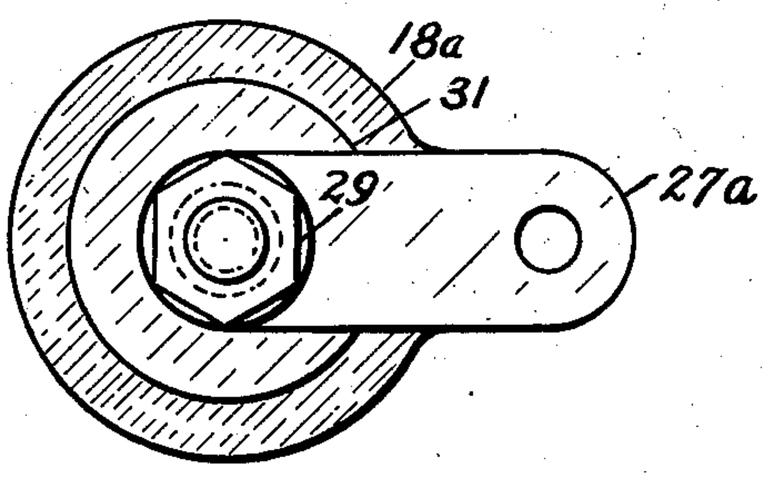

Fig. 9.

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UNITED STATES PATENT OFFICE.

EUGENE GARRETSON, OF BUFFALO, NEW YORK, ASSIGNOR OF THREE THIRTY-SECONDS TO WILLIAM P. MASHINTER, THREE THIRTY-SECONDS TO CLARENCE S. SIDWAY, THREE THIRTY-SECONDS TO JAMES D. ROBERTSON, AND THREE THIRTY-SECONDS TO WILLIAM E. ROBERTSON, ALL OF BUFFALO, NEW YORK.

ELECTRIC-CURRENT RECTIFIER.

No. 929,582. Specification of Letters Patent. Patented July 27, 1909.

Application filed September 10, 1908. Serial No. 452,427.

To all whom it may concern:

Be it known that I, EUGENE GARRETSON, of the city of Buffalo, county of Erie, and State of New York, have invented a certain new and useful Electric-Current Rectifier, of which the following is a full, clear, and exact description.

This invention relates to means for converting alternating into pulsating or direct currents and more specifically to means for distinguishing between the positive and negative waves of the alternating current with the effect of eliminating one and conducting the other.

I am aware of the fact that various forms of current rectifiers have heretofore been used but generally they have been either of the electrolytic type or of the mercury vapor type. In practical use it has been found that such rectifiers of either type are very fragile, of short life and difficult of operation, thus necessitating the exercise of the skill of a trained engineer to handle them. In producing my invention I have sought to overcome these objections and I have produced a device which is at once simple, portable, inexpensive and durable, and one which can be operated by any one with average intelligence. Moreover my invention is of comparatively small volume for its capacity and the many advantages resulting from the use of the same will be clear to those skilled in the art from the following description and accompanying drawings.

Referring to the accompanying drawings: Figure 1 is a plan view of an elementary form of my rectifier. Fig. 2 is an elevation of the same. Fig. 3 is a plan view of a modified elementary form of my rectifier. Fig. 5 is an elevation of the rectifier shown in Fig. 3. Fig. 4 is a plan view of a still different modified form of my rectifier. Fig. 6 is an elevation of the form of rectifier shown in Fig. 4. Fig. 7 shows an application of my rectifier in an electric circuit. Fig. 8 is an elevation of a combination of a series of my rectifier units. Fig. 9 is a plan view of Fig. 8 looking upwardly from the lower or terminal end.

Referring to the elementary form of my unit as shown in Figs. 1 and 2: 14 represents a plate or film of silver sufid and 15 is a plate or film of a metallic oxid or metallic oxids. These two plates or films are laid in electrical contact with each other.

Referring to the modified form of my unit shown in Figs. 3 and 5: 16 represents a plate or film of metal which is in electrical contact with 14 and with the purpose of making better electrical connection therewith and 17 represents a plate or film of metal in electrical contact with 15 used for a like purpose as the metal plate 16.

Referring to the modified unit shown in Figs. 4 and 6: 18 represents a plate of silver or silver alloy or other metal which has been silver plated upon the surface of which has been formed a plate or film of silver sulfid 14; and 19 represents a plate of metal or alloy upon the surface of which has been formed a film or plate 15 of metallic oxid or metallic oxids.

In Fig. 7 is shown the application in an electric circuit of the unit illustrated in Figs. 4 and 6. In this figure 24 represents a battery having terminals 22 and 26 in connection therewith by means of wires 23 and 25. The terminal 26 is connected by means of wire 27 to the silver plate 18. The other terminal 22 is connected by wire 21 to an electric lamp 10 which in turn is connected by wire 20 to the metallic plate 19.

Figs. 8 and 9 show a series of units such as are shown in Figs. 3 to 6 preferably circular in form and mechanically united as hereinafter described. When my units are united in series as shown in these figures the silver plate 18^a is as shown, preferably circular and made circumferentially larger than the metal plate 19^a. It will be noted that the silver plate 18^a, the sulfid plate or film 14^a, the metallic oxid plate or film 15^a and the metallic plate 19^a comprise one unit of the series shown. The advantage of having the plate 18^a larger than the plate 19^a resides in the fact that with this form of construction the heat radiating surface of the plate 18^a is thereby increased. Each other unit of this series is likewise constructed. These several units have central perforations through which a bushed bolt 28 passes. The bushing 34 around this bolt is made of insulating material. Over the upper end of the bolt 28 is fitted a nut 33 screw-threaded to the bolt and

makes electrical contact with the metallic plate 18ª. At the lower end of the series and in electric contact with the metallic plate 19ª is a metallic terminal 20ª which is insulated from the bolt 28 by means of the bushing 34 and insulating washer 32. A washer 31 is preferably placed in contact with the insulating washer 32 and all of the units and the parts above are suitably held in place preferably as shown by means of the nut 30 screw-threaded to the bolt 28. A metallic terminal 27ª is slipped over the bolt 28 and placed below the nut 30 and held in place by means of the nut 29 screw-threaded to the bolt 28.

Having thus described the several parts of the rectifier and shown the application of the same in two different ways, I will now describe the operation of these two illustrated applications and the principles, as I understand them, on which they work.

Referring first to the application of my units in an electric circuit as shown in Fig. 7: Assuming that the battery 24 is a suitable source of electric energy, the unit rectifier included in the circuit of this source of energy is so constructed that if from the source of energy positive current flows through the terminal 26 the unit rectifier will allow the passage of such current through it in the following circuit: through wire 27, silver plate 18, silver sulfid plate 14, oxidized plate 15, metallic plate 19, wire 20, electric lamp 10, wire 21, negative terminal 22, wire 23, back to the source of energy 24. This current will be sufficient to light the lamp 10 and but a negligible amount of energy will be lost in the circuit described since but slight resistance is afforded to the passage of the current in the direction described from the silver plate 18 to the metallic plate 19. If now we assume that the positive terminal of the source of energy be 22 then but a slight amount of current will flow through the circuit already described for the reason that the current when flowing from the metallic plate 19 upwardly to the silver plate 18 will meet with a comparatively high resistance and not sufficient current will flow through it to light the lamp 10. It will be clear that the condition of the lamp will thus indicate the polarity of the current flowing through the circuit described.

Referring now to the construction shown in Figs. 8 and 9 we assume that the terminals 20ª and 27ª are electrically connected in circuit with any suitable source of electric energy and assuming that if the terminal of the said source of energy which is connected to the terminal 27ª be positive then current will flow through the following circuit and will meet with but slight resistance: terminal 27ª, bolt 28, nut 33, silver plate 18ª, sulfid film 14ª, oxidized film 15ª, metallic plate 19ª, thence through the other similar plates of the remaining units of the series of units to the terminal 20ª which is connected to the negative pole of the source of energy back to the said source of energy. If, however, the said source of energy is reversed and the terminal which is connected to the terminal 27ª is the negative terminal of the source of energy then the current flowing through the circuit above described but in the reverse direction would meet with a high resistance and would be therefore comparatively slight. It will be seen that when current flows through the terminal 27ª when it is connected to the positive pole of the source of energy, it will flow through the circuit described and be sufficient to perform any desired electric function, while if current flows from the positive pole of said source of current first through the said terminal 20ª the current flow will be very slight and substantially negligible thus being insufficient to actuate an electric device placed in circuit therewith. Clearly then if the said source of energy be an alternating current it will be seen that a path of slight resistance will be afforded for the positive waves while a path of comparatively great resistance will be afforded for the negative waves and therefore the positive waves will predominate in strength and the resulting current flow through the circuit will partake of the characteristics of a positive pulsating or direct current.

I have discovered that when a current is flowing from a body of silver sulfid into certain metallic bodies such as iron or an alloy such as brass or bronze, the surface of which has been oxidized, the said current encounters but little resistance in its path of flow but if the direction of the said current is reversed a comparatively large resistance is immediately built up in the path of flow. This is in contrast to the usual effect, it being characteristic that when most metallic bodies are arranged as described the amount of current flowing from one to the other is constant in strength regardless of the direction of flow of said current.

In other current rectifiers it is characteristic that no matter which way the current flow may take place it meets with a comparatively large resistance although such resistances may vary with the direction of flow and thus the resulting efficiency is comparatively small. In my rectifier, however, the resistance to the flow in one direction is but a negligible percentage of the resistance afforded when the flow occurs in the opposite direction. By reason of this characteristic of the units of my rectifier, I am able to determine the polarity of current passing through any electric circuit and I am also able to efficiently control the flow of current in any desired direction and thereby perform any desired function dependent on this principle in such circuit.

The many advantages resulting from the

application of my discovery to electric circuits will be clear to those skilled in the art and it will be seen that I am able to perform a great variety of functions not hitherto possible to be performed by means of the application of my principle in either of the ways herein shown and described or modifications thereof as applied to electric circuits in general. For example, by the use of my rectifier, I am able to charge a storage battery connected to a source of alternating current energy or by means of two of my rectifiers the units of which are oppositely disposed and placed in the two branches of a divided circuit I am able to selectively control and perform two opposite functions in such electric circuit by reversal of the polarity of current.

In my claims I have referred to "a body of silver" and it is to be understood that this phrase refers not only to a metallic body composed entirely of silver but also to any equivalents of such metallic body such as a silver alloy having a sufficient quantity of silver in its composition to perform the functions herein described which are performed by the body of silver. Moreover it is evident that a silver plated body would likewise perform the same functions as a body of silver provided the silver plate is sufficiently heavy to perform the functions herein described with reference to a body of silver. The scope of my claims is therefore such that either a silver alloy or a silver plated body is to be considered an equivalent of a body of silver.

Obviously my principle may be applied in a great many specifically different ways and I do not wish to be limited to the specific applications herein shown and described but it will be clearly understood that the method of operation and the functions performed and advantages gained by my invention will vary according to the specific purpose to which it is applied and still be within the scope of my invention and of the appended claims.

What I claim is:

1. An electric current rectifier comprising a body of silver sulfid and a body of metallic oxid in electrical contact therewith.

2. An electric current rectifier composed of a body of silver sulfid and a body of metallic oxids in electrical contact therewith.

3. An electric current rectifier composed of a body of silver sulfid a portion of the surface of which is metallic, and a body of metallic oxid a portion of the surface of which is metallic.

4. An electric current rectifier composed of a body of silver sulfid, a portion of the surface of which is metallic, and a body of metallic oxids, a portion of the surface of which is metallic.

5. An electric current rectifier composed of a body of silver a portion of the surface of which is sulfid, and a body of metal a portion of the surface of which is oxidized, the oxidized and sulfided portions of the two metallic bodies being in electrical contact with each other.

6. An electric current rectifier composed of a body of silver, a portion of the surface of which has been sulfided, and a body of alloy a portion of the surface of which has been oxidized the oxidized and the sulfided portions of the two bodies being in electrical contact with each other.

7. An electric current rectifier composed of a series of units and means for uniting said units so as to regulably control the contact pressure between the said series of units each unit of said series comprising a body of silver having a portion of its surface sulfided and a metallic body having a portion of its surface oxidized, the said sulfided and oxidized surfaces being placed in electric contact with each other.

In testimony whereof I have hereunto set my hand in the presence of two witnesses.

EUGENE GARRETSON.

Witnesses:

ETHEL A. KELLY,

J. WM. ELLIS.