

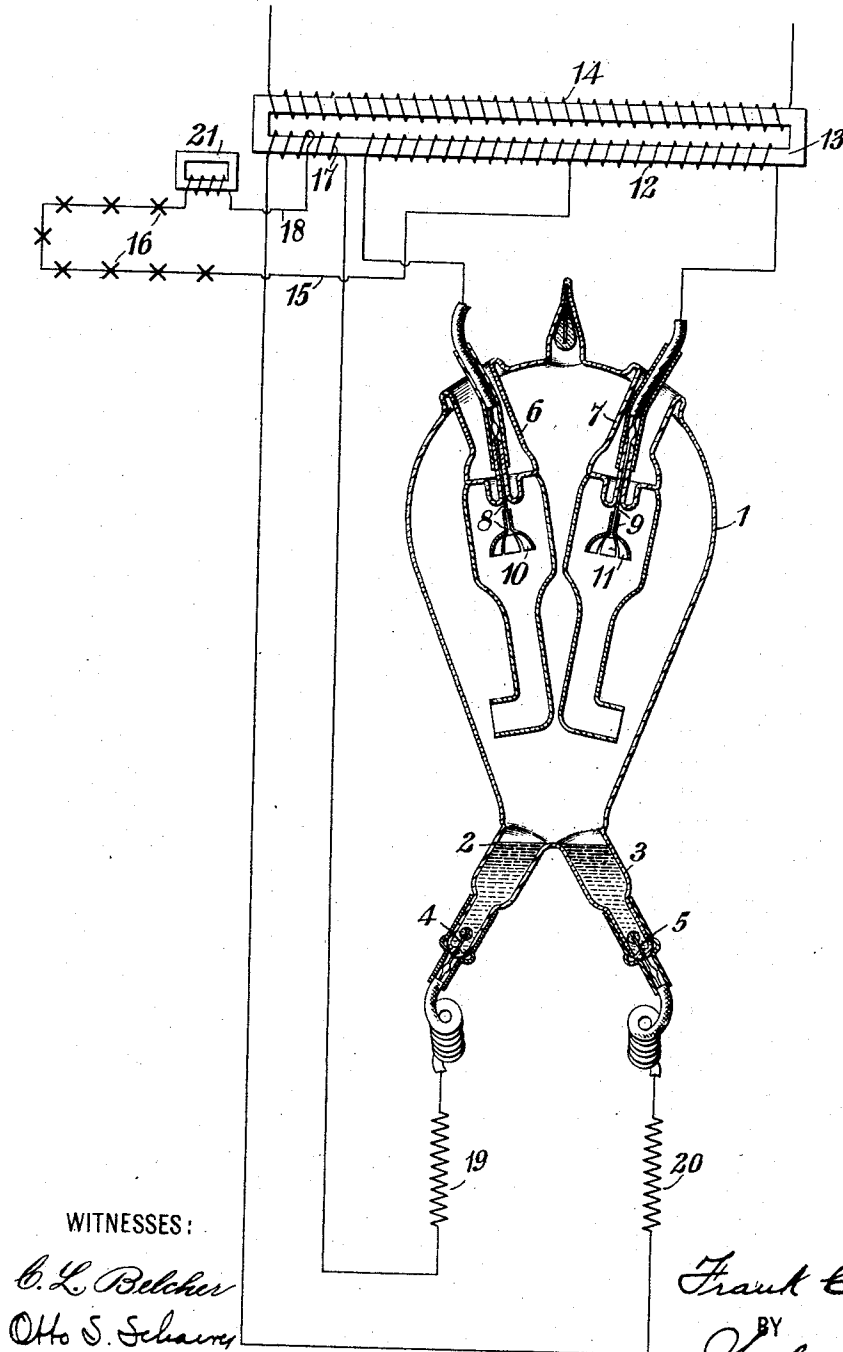
F. CONRAD.
MERCURY VAPOR RECTIFIER.
APPLICATION FILED SEPT. 20, 1906.

969,525.

Patented Sept. 6, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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Otto S. Schauer

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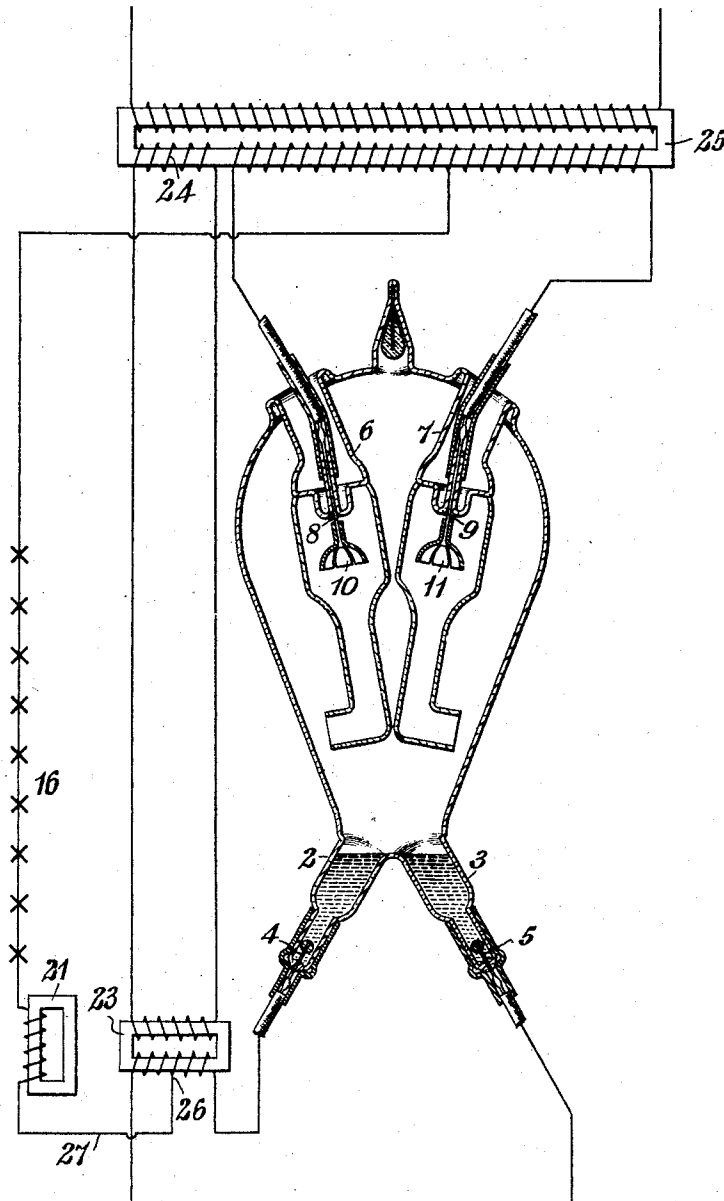
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2 SHEETS—SHEET 2.

Fig. 2.



WITNESSES:

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FRANK CONRAD, OF SWISSVALE, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

MERCURY-VAPOR RECTIFIER.

969,525.

Specification of Letters Patent.

Patented Sept. 6, 1910.

Application filed September 20, 1906. Serial No. 335,526.

To all whom it may concern:

Be it known that I, FRANK CONRAD, a citizen of the United States, and a resident of Swissvale, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Mercury-Vapor Rectifiers, of which the following is a specification.

My invention relates to rectifiers for alternating currents, and particularly to those in which a vapor is utilized as the rectifying agent.

The object of my invention is to provide a device, of the character indicated, of such a structure and to so arrange the circuit connections thereof that starting of the rectifying process may be effected readily and efficiently.

Considerable difficulty has been heretofore experienced in the starting of mercury vapor converters or rectifiers, the means usually employed for causing and facilitating starting comprising a pair of auxiliary positive terminals that are disposed in close proximity to the negative terminals and that are connected to a transformer winding, the middle or an intermediate point of which is connected through a resistance to the direct current distributing circuit. Starting of the rectifying process is effected by tilting the device and thereby causing some of the mercury to be spilled, from the projections or receptacles in which the auxiliary positive terminals are located, into the receptacle for the mercury that forms the negative terminal. The sparking which is thus caused to occur overcomes the initial high resistance of the device, and the circuit is soon established between the main positive terminals and the negative terminal of the device. It has been found, however, that starting is often delayed, because, at the instant of establishment of the circuit between the auxiliary positive terminals and the negative terminal, the currents do not agree in direction with the impulses in the main circuit of the device. According to the present invention, starting of the rectifying process may be effected without such delays as are incident to the operation of prior devices.

Figure 1 of the accompanying drawing is a sectional view of a device that is constructed in accordance with my invention, the circuit connections and arrangements be-

ing shown diagrammatically, and Fig. 2 is a similar view illustrating a modification of the invention.

The device comprises a receptacle 1 from which the air has been exhausted and that is provided, at its lower end, with two branches or protuberances 2 and 3 into which circuit terminals 4 and 5, respectively, project. The receptacle is provided, at its upper end, with two inwardly extending branches or arms 6 and 7 through the ends of which positive conductors 8 and 9, respectively, project, the conductors being provided with cup-shaped terminals 10 and 11. The branches 6 and 7 are provided, in the interior of the receptacle, with hook-shaped tubular extensions, as is usual in such devices. The cup-shaped terminal pieces 10 and 11 form the positive terminals of the device and are connected, respectively, to the terminals of secondary winding 12 of a transformer 13, primary winding 14 of which may be connected to any suitable alternating current circuit. The middle or other suitable intermediate point of the secondary winding 12 is connected to a conductor 15 of a distributing circuit that may supply arc lamps 16 or other suitable translating devices. The protuberances 2 and 3 are filled with mercury which forms two negative terminals for the device, and these terminals may be connected respectively to the terminals of an auxiliary secondary winding 17 for the transformer 13, the middle or other suitable intermediate point of which is connected to distributing circuit conductor 18. Suitable ohmic resistances 19 and 20 are interposed respectively between the negative terminals of the device and the terminals of the transformer winding 17, and an inductive resistance or choke coil 21 is placed in the conductor 18.

In order to start the device, the receptacle 1 should be tilted so as to spill some of the mercury from one of the protuberances 2 or 3 into the other. The arcing which ensues overcomes the initial high resistance of the device, and a circuit becomes established between positive terminals 10 and 11 and the one or the other of the negative terminals 2 and 3, it being immaterial which protuberance forms the negative terminal during continuous operation. Direct current is then caused to traverse one-half of the auxiliary winding 17 of the transformer in be-

ing supplied to the distributing circuit conductor 18. The resistances 19 and 20 serve to limit the amount of current which may traverse the local circuit that is established
 5 when the mercury is spilled from one of the protuberances 2 and 3 to the other, but since only one of the resistances is in circuit during continuous operation, no considerable energy losses result therefrom. The choke
 10 coil 21, because of its inductance, serves to prevent stopping or interruption of the rectifying process, and to be most effective, should be placed in series with the conductor that is connected to the negative terminals
 15 of the device, as indicated.

Instead of employing the resistances 19 and 20 to limit the amount of current in the local circuit established when arcing occurs between the negative terminals, a trans-
 20 former 23 of poor regulation may be interposed between the negative terminals of the device and auxiliary secondary winding 24 for the main transformer 25, the middle or another intermediate point of secondary
 25 winding 26 of which is connected to direct current supply conductor 27, as shown in Fig. 2.

I claim as my invention:

1. The combination with a current-recti-
 30 fying device comprising a receptacle having but two adjacent protuberances, of a conducting fluid contained in the protuberances and constituting negative terminals, positive
 35 terminals that project into the receptacle, and sources of alternating current connected, respectively, between the protuberances and between the positive terminals and having
 neutral points connected to the distributing circuit.

40 2. The combination with a current-rectifying device comprising a receptacle having but two adjacent protuberances, of a con-
 45 ducting fluid contained in the protuberances and constituting negative terminals, positive terminals that project into the recep-
 tacle, and transformer windings connected, respectively, between the protuberances and
 between the positive terminals and having intermediate points connected to a distribut-
 50 ing circuit.

3. The combination with a current-rectifying device having two positive and two
 negative terminals, of sources of alternating current connected, respectively, between
 55 the pairs of positive and negative terminals and having neutral points connected, respectively, to a distributing circuit.

4. The combination with a current-recti-

fying device having two positive and two
 negative terminals, of sources of alternating
 60 current connected, respectively, between the pairs of positive and negative terminals and
 having neutral points connected, respectively, to a distributing circuit, and current-
 limiting means interposed in the circuit be-
 65 tween the negative terminals and the corresponding source.

5. The combination with a current-recti-
 fying device having two positive and two
 negative terminals, of transformer windings
 70 connected, respectively, between the pairs of positive and negative terminals and having
 intermediate points connected, respectively, to a distributing circuit.

6. The combination with a current-recti-
 75 fying device having two positive and two negative terminals, of transformer windings
 connected, respectively, between the pairs of positive and negative terminals and hav-
 ing intermediate points connected, respec-
 80 tively, to a distributing circuit, and current-limiting means interposed between the neg-
 ative terminals and the corresponding transformer winding.

7. The combination with a current-recti-
 85 fying device comprising a receptacle having but two adjacent protuberances, of a
 conducting fluid contained in the protuberances and constituting negative terminals,
 positive terminals that project into the re-
 90 ceptacle, sources of alternating current connected, respectively, between the protuber-
 ances and between the positive terminals and having neutral points connected to the
 distributing circuit, and resistances inter-
 95 posed in the connections to the protuberances.

8. The combination with a current-recti-
 fying device comprising a receptacle having
 but two adjacent protuberances, of a con-
 100 ducting fluid contained in the protuberances and constituting negative terminals, positive
 terminals that project into the recep-
 tacle, two transformer windings connected,
 respectively, between the protuberances and
 105 between the positive terminals and having intermediate points connected to a distribut-
 ing circuit, and resistances interposed in the connections to the protuberances.

In testimony whereof, I have hereunto
 110 subscribed my name this 13th day of September, 1906.

FRANK CONRAD.

Witnesses:

OTTO S. SCHAIRER,
 BIRNEY HINES.