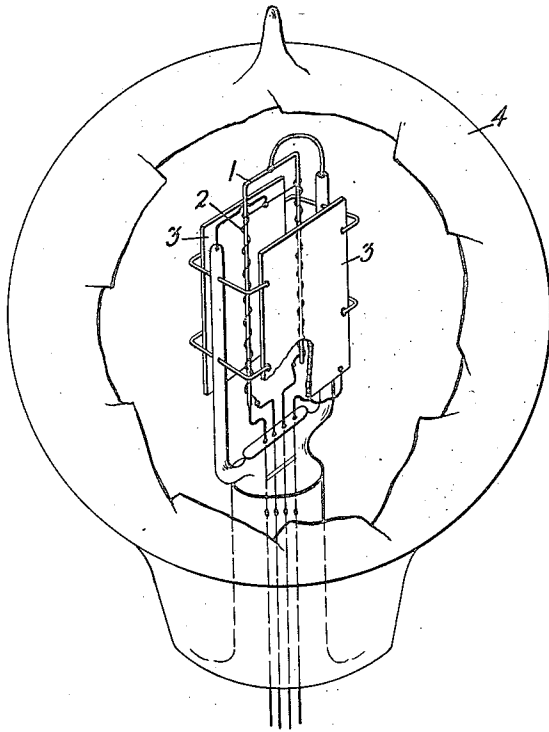


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THERMIONIC REPEATER.  
APPLICATION FILED SEPT. 23, 1914.

1,169,422.

Patented Jan. 25, 1916.



Witnesses:  
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# UNITED STATES PATENT OFFICE

ALEXANDER McLEAN NICOLSON, OF TARRYTOWN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WESTERN ELECTRIC COMPANY, INCORPORATED, A CORPORATION OF NEW YORK.

THERMIONIC REPEATER.

REISSUED

1,169,422.

Specification of Letters Patent.

Patented Jan. 25, 1916.

Continuation of application Serial No. 843,502, filed June 6, 1914. This application filed September 23, 1914. Serial No. 863,209.

To all whom it may concern:

Be it known that I, ALEXANDER McLEAN NICOLSON, a subject of the King of Great Britain, residing at Tarrytown, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Thermionic Repeaters, of which the following is a full, clear, concise, and exact description.

This application is a continuation of an application by this applicant, Serial No. 843,502, filed June 6, 1914.

The invention relates to thermionic repeaters such as audions, and its object is to improve the efficiency thereof.

It has been found that the closer the input electrode and the cathode are brought together, the stronger the electric field and the more efficient the control of the thermionic current. This is true whether the repeater be one, say of the audion type, having a high-voltage output or one having a high-current output. The bringing of these two elements into as close relation to each other as possible without permitting them to contact electrically is brought about, in accordance with the present invention, by arranging them on opposite sides of, and preferably touching the opposing surfaces of a dielectric film. Furthermore, the interposed film is greatly beneficial in that it enables the amplifying efficiency of the audion to be increased by permitting the input electrode to be insulatively supported in exceedingly close relationship to the cathode. It has also been found that in the high-current output audion, it is desirable that the cathode present a large active area and that the input electrode present minimum obstruction between the cathode and the input electrode. These desirable features may best be obtained by entwining the two elements as by winding a filament directly about the input electrode. The input electrode preferably consists of one or more wires having an insulating coating, and the insulating coating preferably consists of a thin film of nickelous oxid, such coating having been found in practice to be a good dielectric for the purposes of this invention.

The invention may be more readily understood by reference to the accompanying

drawing showing in perspective a high-current output audion embodying the invention.

Referring to the drawing, the input electrode is shown in the form of two parallel wires 1, 1 electrically connected together, or in other words, as consisting of a single wire bent into U shape to provide the two forks 1, 1. The two forks or wires 1, 1 are coated with a suitable dielectric, such, for example, as nickelous oxid, which has been found to be very satisfactory and efficient for this purpose.

In the case of the high-current output audion illustrated in the drawing, the cathode is a heated filament 2 entwined about the two forks or wires 1, 1, thus presenting a large, active area. The output electrode is in the form of two plates 3, 3 parallel to each other and to the plane of the two wires 1, 1 and upon opposite sides thereof. The two plates 3, 3 are electrically connected together, and since the audion shown is of the high-current output type, said plates are placed near to the filament. The input electrode, the output electrode and the filament are inclosed as usual in an evacuated bulb 4, and the leading-in wires of the aforementioned elements of the audion are sealed in said bulb. By thermionic repeater is meant a repeater depending for its operation upon electron discharge from a heated cathode.

The invention is illustrated and claimed herein as applied to the audion which is believed to be the best type of thermionic repeater. In its broadest aspect, however, the invention is not limited to the particular structure herein illustrated but may be found useful in modified forms or types of thermionic repeaters.

What is claimed is:

1. A thermionic repeater having its input electrode and cathode entwined.
2. A thermionic repeater having its cathode wound upon its input electrode.
3. A thermionic repeater having its cathode entwined upon its input electrode.
4. A thermionic repeater having its input electrode in the form of a wire and having its cathode entwined about said wire.
5. A thermionic repeater having its input

electrode in the form of a plurality of wires and having its cathode entwined about said wires.

5 6. A thermionic repeater having its input electrode in the form of a plurality of parallel wires and its cathode entwined about said wires.

7. A thermionic repeater having its input electrode coated with a dielectric and its  
10 cathode entwined upon said electrode.

8. A thermionic repeater having its input electrode coated with nickelous oxid and its cathode entwined upon said electrode.

9. A thermionic repeater having its input electrode coated with nickelous oxid and its  
15 cathode in contact with said coated electrode.

10. A thermionic repeater having its input electrode coated with an oxid and its  
20 cathode entwined upon said electrode.

11. A thermionic repeater having an input electrode and a cathode, one of said elements being coated with a dielectric and the other being entwined upon the former.

25 12. A thermionic repeater having an input electrode and a cathode, one of said elements being coated with an oxid and the other entwined upon the former.

30 13. A thermionic repeater having an input electrode and a cathode, one of said elements being coated with nickelous oxid and the other entwined upon the former.

14. A thermionic repeater having an input electrode and a cathode, one of said elements being coated with a dielectric and the other in contact with the coated element.

35 15. A thermionic repeater having an input electrode and a cathode, and an interposed separating film of non-conducting material in contact with both.

40 16. A thermionic repeater having an input electrode and a cathode, and an inter-

posed film of insulating material carried by one of said elements and with which the other element contacts.

45 17. A thermionic repeater having an input electrode and a cathode arranged so close together as to permit the interposition of a thin film only, and a thin insulating film between said input electrode and said  
50 cathode.

18. A thermionic repeater having an input electrode and a cathode arranged in close proximity and held out of electrical contact with one another by an interposed  
55 dielectric.

19. A thermionic repeater having an input electrode and a cathode in immediate proximity to each other, and one supported by but held out of electrical contact with  
60 the other by an interposed dielectric.

20. A thermionic repeater having an input electrode and a cathode, and a covering of insulating material carried by one of said elements and with which the other element  
65 contacts.

21. A thermionic repeater having its cathode arranged between its input and output electrodes, and an interposed dielectric between said cathode and said input electrode.  
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22. A thermionic repeater comprising an input electrode, an output electrode and a cathode, said input electrode and said cathode being separated by an interposed dielectric film only, and said output electrode and  
75 said cathode being separated by vacuous space.

In witness whereof, I hereunto subscribe my name this 22d day of September A. D., 1914.

ALEXANDER McLEAN NICOLSON.

Witnesses:

E. EDLER,

K. L. STAHL.