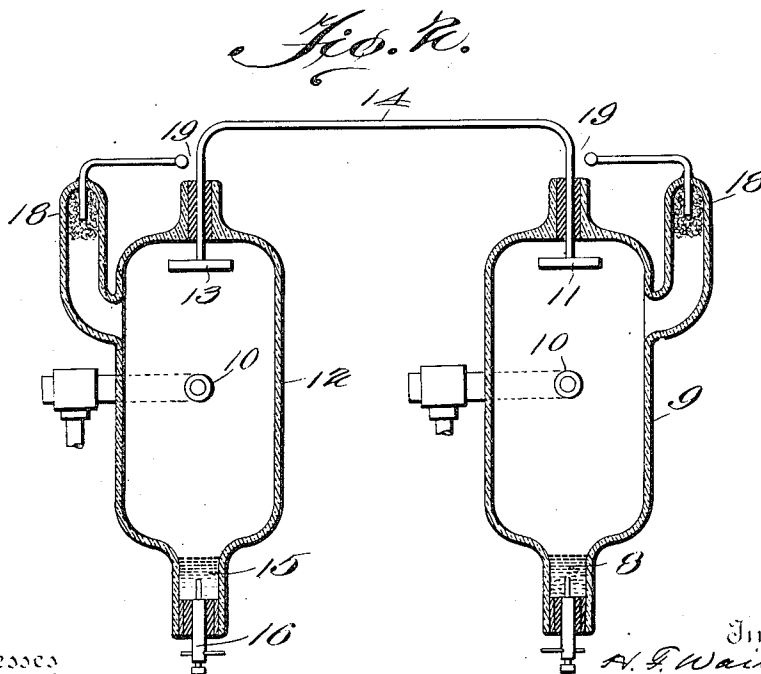
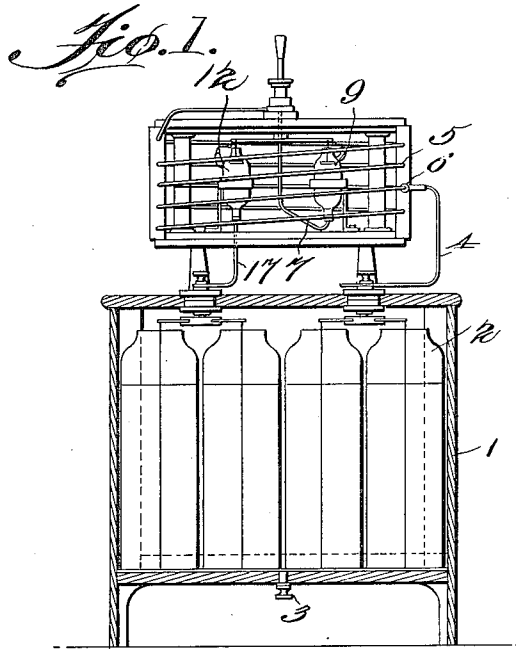


H. F. WAITE.
 VACUUM DISCHARGE GAP FOR PRODUCING ELECTRICAL OSCILLATIONS.
 APPLICATION FILED MAY 10, 1910.

981,503.

Patented Jan. 10, 1911.



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VACUUM DISCHARGE-GAP FOR PRODUCING ELECTRICAL OSCILLATIONS.

981,503.

Specification of Letters Patent.

Patented Jan. 10, 1911.

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To all whom it may concern:

Be it known that I, HARRY F. WAITE, a citizen of the United States, residing at Harrison, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Vacuum Discharge-Gaps for Producing Electrical Oscillations; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a vacuum discharge gap especially adapted for discharging the condenser used in wireless telegraphy circuits and has for its object the production of a discharge gap which will be certain in action, simple in construction, not liable to get out of order, and one which will produce substantially no noise while sending.

With these ends in view, the invention consists in the novel details of construction and combinations of parts, more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings, forming a part of this specification, in which like numerals designate like parts in all the views:—Figure 1, is a sectional elevational view showing my invention applied to a common form of sending apparatus; and, Fig. 2, is a sectional detail of the discharge gap detached.

1 represents any suitable form of casing, 2 any suitable condenser, 3 a connection between said condenser and a source of current, 4 a conductor leading from said condenser to the self induction coil 5 and provided with the adjustable contact 6.

7 represents a suitable connection between one end of the coil 5 and the mercury electrode 8 with which the vacuum chamber 9 is provided.

10 represents a suitable pipe for exhausting the chamber 9 and 11 an electrode at the other end of said chamber which is preferably made of iron.

12 is a vacuum chamber similar to the chamber 9, provided with an upper electrode 13 which is also preferably made of iron, and the two electrodes 11 and 13 are joined by any suitable conductor as 14.

15 represents a lower electrode of mercury in the chamber 12, and 16 a suitable connec-

tion therewith which is conveniently joined to the bar 17, as will be readily understood.

18 refers to a means for automatically maintaining the internal resistance of the vacuum discharge tube which may consist of an extension tube, the upper end of which contains any suitable and well known material which will give off a gas when an electric current is passed through it.

19 represents the place at which a spark gap is formed between the upper electrode of the vacuum discharge gap and the vacuum regulating means 18.

The operation of my invention is as follows:—When signals are to be sent the initial voltage is made sufficiently high to jump the gaps between the electrodes 8 and 11 and the electrodes 13 and 15 and with the result that substantially no noise is produced. That is to say, after the apparatus has once been put into operation there is a sufficient number of ions in the vacuum chambers 9 and 12 to render it a comparatively easy matter to send a condenser discharge through said vacuum chambers, thereby producing electric oscillations of sufficient volume to generate Hertzian waves and this discharge is found to be unaccompanied by any disagreeable noise or other objections such as are now experienced in the ordinary air spark gaps. Further, I do not find that these vacuum discharge gaps when once installed require the same annoying attention as to adjustment and other matters which the open air spark gaps require. In addition to this, by providing metal electrodes, such as 11 and 13, as well as the mercury electrodes, the sparks are always between metal, and never between metal, glass and metal, and, therefore, the apparatus is durable. This would not be the case were the sparks permitted to impinge upon glass during some portion of their path, as is sometimes done in vacuum apparatus.

It is obvious that instead of a pair of vacuum chambers, a plurality of pairs of vacuum chambers could be employed, for the same purpose, and also that those skilled in the art may vary the details of construction and the arrangement of parts without departing from the spirit of my invention, therefore, I do not wish to be limited to the features disclosed, except as may be required by the claims. It is also evident that this

device can be used in any line of electrical work where high frequency oscillations are desired.

What I claim is:—

5 1. A spark gap for wireless telegraphy comprising exhaust chambers provided with solid electrodes and with liquid electrodes, and series connections between a plurality of said chambers uniting their solid electrodes, substantially as described.

10 2. In a wireless telegraphic apparatus, the combination of a condenser; an adjustable inductance joined to said condenser; and a spark gap comprising exhaust chambers provided with solid electrodes and with liquid electrodes; and series connections between a plurality of said chambers uniting their solid electrodes, substantially as described.

3. In a wireless telegraphic apparatus, the combination of a condenser; an adjustable 20 inductance joined to said condenser; and a spark gap comprising exhaust chambers each provided with means for maintaining the vacuum substantially constant, and each chamber also provided with a solid electrode, 25 with a liquid electrode, and a series connection between a plurality of said chambers uniting their solid electrodes, substantially as described.

In testimony whereof, I affix my signature, in presence of two witnesses.

HARRY F. WAITE.

Witnesses:

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