No. 869,634. PATENTED OCT. 29, 1907.

W. S. HOGG.

WIRELESS TELEGRAPHY.

APPLICATION FILED FEB. 6, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

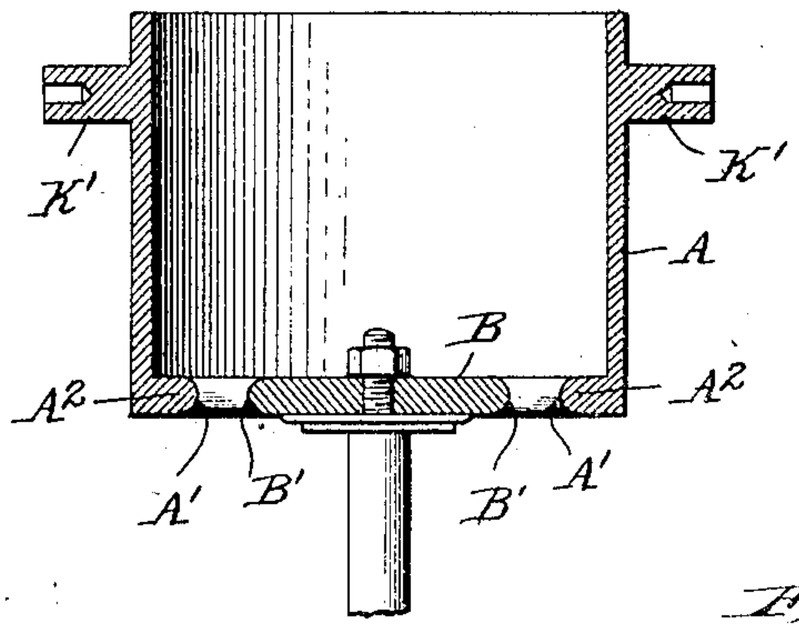
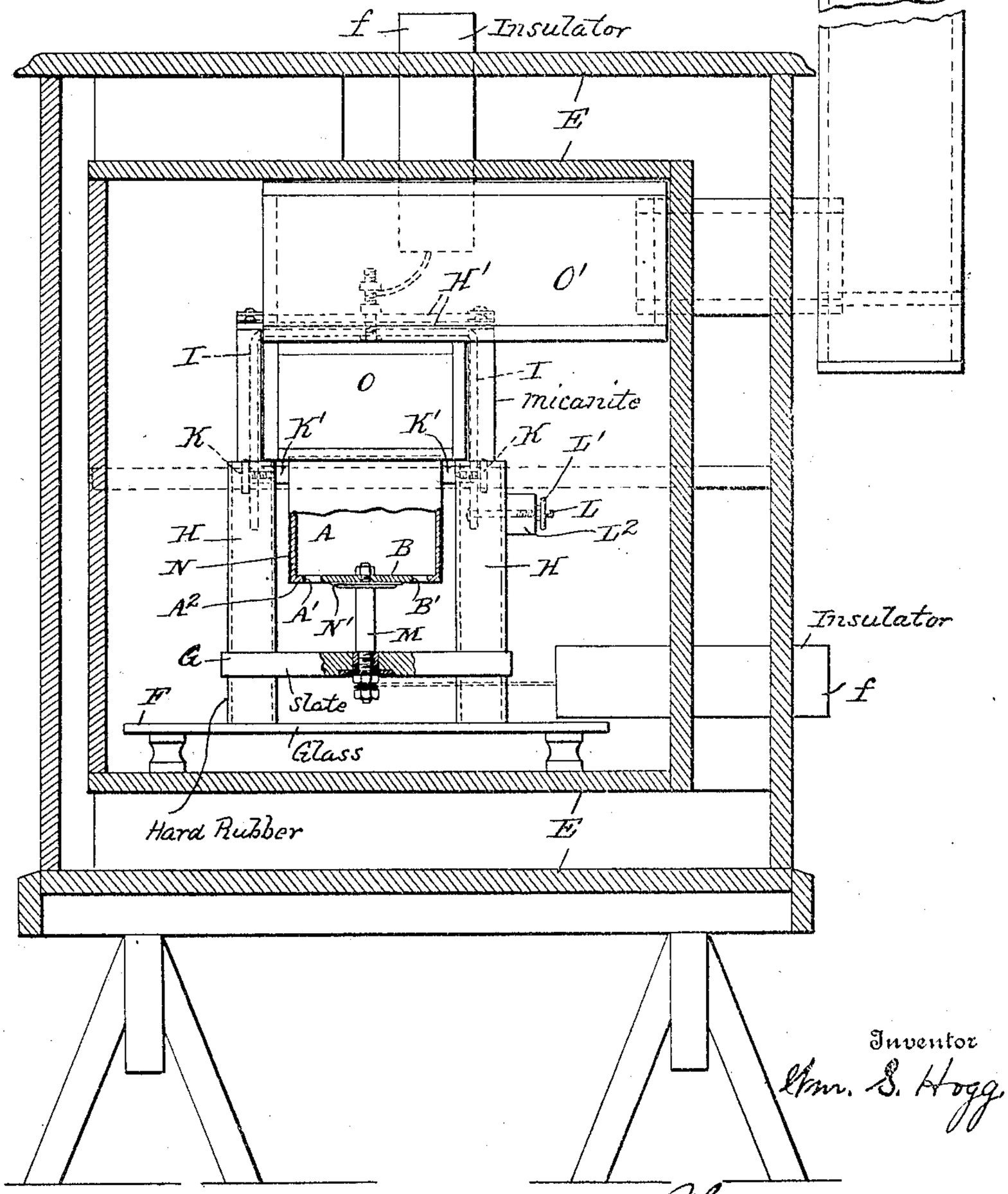


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

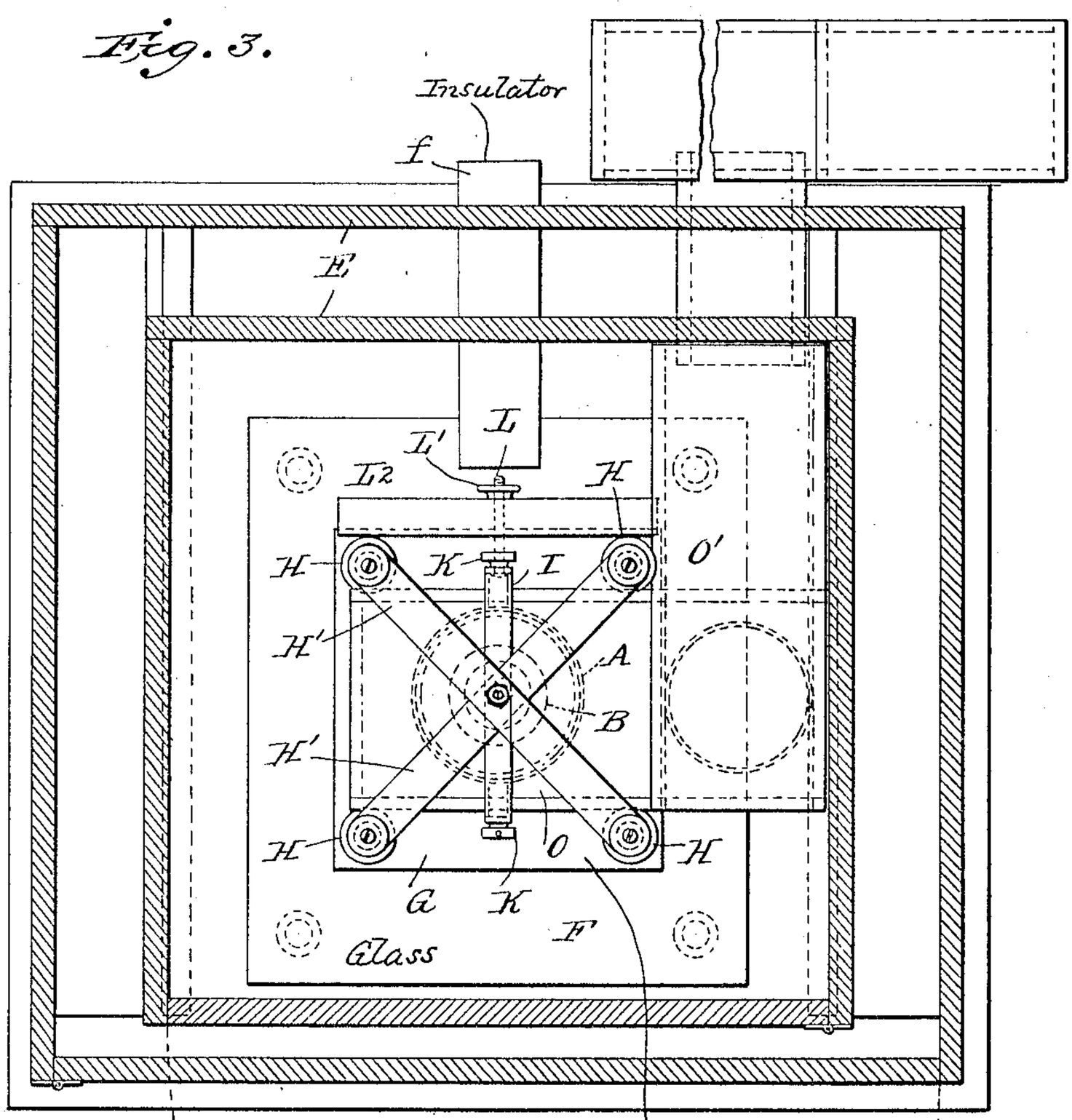
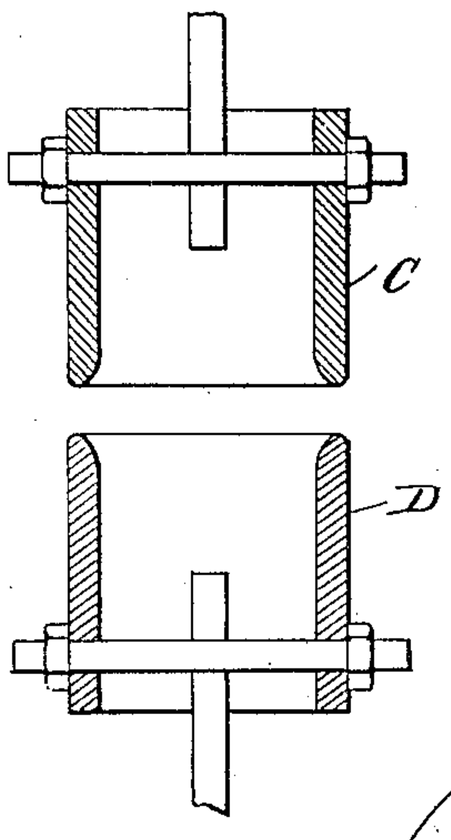


Fig. 4.



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WIRELESS TELEGRAPHY.

No. 869,634. Specification of Letters Patent. Patented Oct. 29, 1907.

Application filed February 6, 1907. Serial No. 356,055.

To all whom it may concern:

Be it known that I, WILLIAM S. HOGG, commander in the United States Navy, now stationed at Pensacola Navy Yard, Florida, have invented a certain new and useful Improvement in Wireless Telegraphy; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

The objects of this invention are to enable continuous sending to be maintained without weakening of the signals and to increase the sending range of a plant of given power or what is equivalent thereto to enable intelligible signals to be transmitted a given distance with less power than heretofore.

It is well recognized that a sharp, clean and uniform sparking action across the spark gap is one of the principal, if not the most essential, requirement to be maintained, in any successful sending where the capacity or power of the sending station is taxed, in order to reach the receiving station with intelligible signals.

The present invention relates particularly to the spark gap portion of the apparatus.

In the accompanying drawings—Figure 1 is a vertical section through the preferred form of a pair of electrodes or terminals between which the spark gap is formed. Fig. 2 is a somewhat similar section but with the mountings for the electrodes and casing in elevation and with the side of the casing removed. Fig. 3 is a top plan view of the parts shown in Fig. 2, the top of the casing being removed. Fig. 4 is a diagrammatic section showing a modified arrangement of electrodes.

Like letters of reference in the several figures indicate the same parts.

The electrodes between which the spark gap is formed are, in accordance with the present invention, of such character that any increase in resistance at the point where the sparking or current flow is taking place will of itself, and automatically, cause the sparking point or place between the electrodes to shift to a point or place between the electrodes, where the resistance corresponds to the normal resistance of the gap. Further, they are of such form that this action may be continued indefinitely and whenever the normal resistance increases for any cause, as for instance from the heating of the air or metal, change in surface tension or changed electro static conditions which may be brought about by the action of the current, but which alters the normal resistance conditions at the sparking point between the electrodes.

In the most simple arrangement the electrodes should have their proximate or terminal spark edges of highest potential extended and parallel to each other and with uniform normal resistance conditions throughout, whereby sparking may take place at any one of an infinite number of points with equal facility and upon the slightest change in conditions at that point may shift to a different point, where conditions are normal.

In the preferred form, one or both of the electrodes have the terminal or sparking edge of highest potential endless, preferably circular and one or both may be in the form of a cylinder, a rounded edge of which forms the terminal or sparking edge of highest potential.

As illustrated in Fig. 1, one electrode, that indicated by the letter A, is in the form of a cylindrical body having the terminal or sparking edge A′ formed by the smoothly rounded edge of an inwardly extending bead or flange A^2. The other electrode is circular preferably in the form of a disk B, the smoothly rounded periphery B′ of which forms the other sparking or terminal edge of highest potential.

Obviously, the form of the electrodes may be widely varied and as illustrating the double cylindrical form reference is made to Fig. 4, where the two electrodes C and D are cylindrical and the sparking or terminal edges of highest potential are formed by the proximate rounded edges which latter are arranged parallel to each other.

The electrodes are mounted in a substantial manner and with care to prevent possible short circuiting. They are also so mounted as to secure a movement of the air past and between the sparking or terminal surfaces with a view to maintaining uniform air conditions in the gap, inasmuch as the sparks or current flow through the air, changes both its physical condition and chemical composition, either of which will vary the normal resistance at the sparking point.

In Figs. 2 and 3 the form of electrodes illustrated in Fig. 1 are shown mounted in the preferred manner. A suitable casing E usually having double walls and doors is provided and within it the electrodes are mounted on an insulating stand F, the circuit wires being carried in through insulators such as *f f*. The direct mounting for the electrodes, as shown, consists of a base G of slate or other strong insulating material and having four posts or columns H′ of compressed micanite extending upwardly therefrom, with hard rubber tubes surrounding their lower portions. At the upper ends, the columns are connected by cross pieces H′ which may be of iron and from their center or crossing point, a yoke I extends down in position to have its ends connected with the upper portion of the cylindrical electrode. The connection is preferably made through set screws K and brackets or projections K′ on the electrode. To hold the electrode steady and provide for lateral adjustment a screw L having a thumb nut L′ thereon may connect the yoke with a cross piece L^2. The disk like electrode B is carried on the upper end of a post M rising from the base and preferably threaded through the latter for adjustment and convenient attachment of the circuit wire. The outer surfaces of both electrodes

may be covered with insulating substance such as asbestos as at N or mica and asbestos as at N′. At the upper end the cylindrical electrode opens into an air flue or duct leading off to a suitable outtake. As illustrated, a lateral duct O is formed within the yoke, extends out to one side and communicates with a continuation O′ at a higher level and the latter passes out through the walls of the casing and leads off to a flue, preferably passing out of the operators compartment to carry off gases and to assist the upward draft between the sparking electrodes.

The electrodes themselves are preferably of relatively large size, thus with a 5.7 kilowatt apparatus excellent results have been secured with the upper electrode of 6 1/2 inches outside diameter and 5 1/8 inches long, the wall being 1/4 inch thick and the inturned flange 1/2 inch thick. The electrodes themselves are kept cool, because of their large size and radiating surface, and the air at the sparking point wherever that may be, is kept cool and continually changing by the upward draft, due to the heat from the sparks and if desired this may be assisted by well known means.

The electrodes are connected in the sending circuit in shunt with the condensers or Leyden jars and with the aerial in accordance with present practice, one terminal wire being connected with the post for the lower electrode and the other with the arch supporting the upper electrode, but it will be understood that I do not wish to be limited to any particular circuit arrangement at the sending station.

The spark constantly shifts along the parallel sparking or terminal edges of highest potential when the apparatus is in use, and it is found that not only is the uniformity of the impulses maintained, even with continuous sending, but the arcs are instantly extinguished and owing to one or both results, the radius of successful transmission is greatly extended.

What I claim as new and desire to secure by Letters Patent, is:—

1. A spark gap apparatus embodying two electrodes having rounded terminals with proximate edges of highest potential parallel throughout and one of said electrodes forming an air duct through which air passing between the terminal edges of highest potential flows.

2. A spark gap apparatus embodying two electrodes having rounded terminals with proximate edges of highest potential parallel throughout and concentrically arranged with respect to each other.

3. A spark gap apparatus embodying two electrodes having rounded terminals with proximate edges of highest potential, endless and parallel throughout, and one of said electrodes being cylindrical and open at both ends to form a duct for the air passing between the terminals.

4. In a spark gap apparatus, an annular electrode and a circular electrode located concentrically within the same and having a terminal edge of highest potential, parallel with and of uniform distance radially from the annular electrode whereby a radial spark gap of uniform width is formed.

5. In a spark gap apparatus a cylindrical electrode open at the ends and having an inwardly projecting terminal edge and a circular electrode located concentrically within said terminal edge of the cylindrical electrode to form an endless spark gap of uniform width.

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