No. 859,092. PATENTED JULY 2, 1907.

W. W. MASSIE.

SPARK GAP APPARATUS.

APPLICATION FILED JAN. 16, 1906.

Fig. 1.

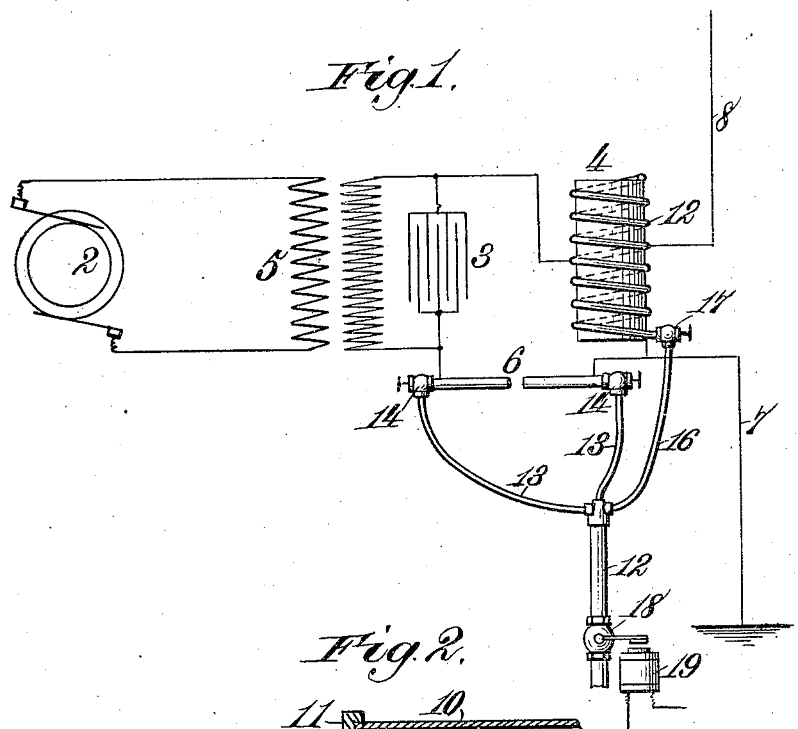


Fig. 2.

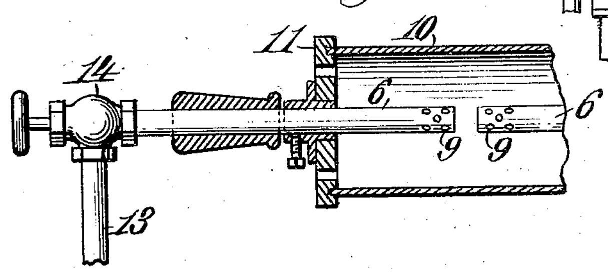
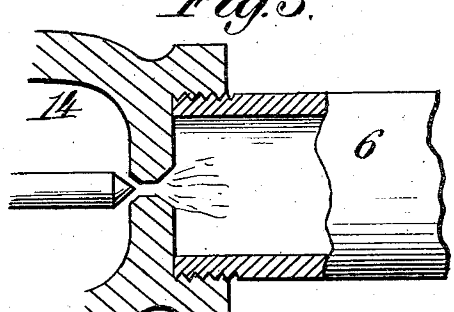


Fig. 3.



Witnesses.
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UNITED STATES PATENT OFFICE.

WALTER W. MASSIE, OF PROVIDENCE, RHODE ISLAND.

SPARK-GAP APPARATUS.

No. 859,092. Specification of Letters Patent. Patented July 2, 1907.

Application filed January 16, 1906. Serial No. 296,332.

To all whom it may concern:

Be it known that I, WALTER W. MASSIE, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented new and useful Improvements in Spark-Gap Apparatus, of which the following is a specification.

This invention relates to spark gap apparatus. The latter is susceptible of advantageous use in many different connections; it is of especial utility, however, when employed in conjunction with or forming part of a wireless telegraphic system, and this particular use is hereinafter particularly described.

In transmitting wireless signals the spark gap rods and inductance get very hot, this being particularly so when a large amount of power is employed. In the case of the spark-gap the resistance thereat, when the rods are heated in the manner set forth, is lowered to such an extent that the discharge thereacross becomes a flame or arc, by reason of which oscillations, which are essential in a successful system, are destroyed.

By virtue of my invention I wholly avoid the formation of an arc or flame at the gap and also keep the inductance in the best possible working condition. There are several ways within the scope of my invention in which the latter may be successfully put into use. In the drawings which accompany this specification I show one of the said ways, and I will set forth the same fully in the following description to enable those skilled in the art to practice the invention.

The novel features of said invention will be incorporated in the claims succeeding said description.

In said drawings, Figure 1 is a diagrammatic view of a wireless telegraphic sending circuit in which is embodied my invention. Fig. 2 is a detail view on an enlarged scale of one of the spark gap rods, a part of the other rod, and a portion of the tube which incloses the rods at and around the gap between them. Fig. 3 is a view on a still larger scale of a portion of one of the rods and a valve coöperative therewith.

Like reference characters refer to like parts throughout the several views

In Fig. 1, the numeral 2 designates an alternating current generator; 5 a step up transformer and 3 a condenser. A variable inductance is represented as 4; and spark gap rods at 6 included in the closed oscillating circuit. When I speak of the spark gap rods, I do so in a broad sense. The several parts to which I have briefly alluded may be connected up in any desirable way. As this particular point in itself forms no part of the invention, I do not deem it necessary to describe the same. From the inductance there extends to ground the ground connection or wire 7, while directly associated with the inductance is the vertical or aerial connection or wire 8. The spark gap rods are hollow, the openings therein extending from the outer ends thereof toward the inner ends or toward the gap between the rods so that the rods can be kept cool by the introduction thereinto of a cooling medium such for example as air, in which case the rods will have in proximity to the gap a multiplicity of perforations, as 9, for the emission of such air. The inner portions of the spark gap rods are shown as inclosed by the customary tube 10 of some suitable insulating material, such as micanite, the opposite ends of the said tubes 10 being fastened to heads or disks as 11 carried upon a suitable base as common in the art. The heads or disks 11 have vent openings for the escape of the expanded air.

I prefer to employ as the cooling medium for the spark gap rods compressed air at a pressure of approximately eighty pounds. I do not show any pump or other means for compressing the air or for supplying compressed air to the spark gap rods. I do show, however, a conduit, as 12, which may lead from an air compressor or from a tank containing compressed air. From this conduit or pipe 12 I show as extended non-conducting and flexible tubes as 13 which are connected at their opposite ends to the casings of valves as 14, by which valves the flow of compressed air into the tubular spark gap rods may be controlled at the will of the operator. The valves 14 may be of any desirable kind, although I find needle valves satisfactory for my purpose. The spark gap rods have adjacent to the spark gap between them, as previously set forth, a multiplicity of perforations 9, which open respectively into the interiors of the two rods, so as to provide for the exhaust to atmosphere of the air which has traversed the said rods from their inner ends. I find that by the construction described I can maintain the rods 6 in a cool condition so as to avoid positively the formation of an arc or flame across the spark gap, and in this way maintain the oscillations set up in the circuit.

The inductance 4 is of tubular or hollow wire or other equivalent tubular construction, so as to provide for the passage therethrough of a cooling agent which may be air from the pipe or conduit 12. I have shown said pipe or conduit 12 as connected by a tube 16 with one end of the tubular inductance and at the junction between the two, I arrange a valve, as 17. The tube 16 and valve 17 may be exactly like the tubes 13 and valves 14 hereinbefore described. When the valve 17 is opened compressed air will be delivered into and through the tubular inductance so as to cool the same. By the expansion of this air from eighty pounds to atmospheric pressure, as is well known, an exceedingly low temperature is produced which tends to keep the spark gap rods, air between the rods, and inductance at a normal temperature. The expansion of this air in the rods and inductance is controlled by needle valves.

To further increase the efficiency of the system a con-

trolling valve 18 is inserted in the supply pipe 12. This valve 18 is operated by an electro magnet 19 which in turn is controlled by the controlling switch on the operating table. In this way the compressed air flows only when sending circuit is in operation.

What I claim is:—

1. A spark gap apparatus embodying spark gap rods having openings therein for the passage of a cooling medium and perforations leading from the openings for the escape of the said cooling medium, in proximity to the gap between the rods.

2. A spark gap apparatus, embodying spark gap rods, at least one of which has an opening therein for the passage of a cooling medium, and said spark gap rod with said opening having further an outlet for the passage of the cooling medium, in proximity the gap or space between the rods.

3. Spark gap rods each having an opening therein for the reception of a cooling medium and each also having an outlet in proximity to the gap between the same for the escape of the cooling medium.

4. Spark gap rods each having a passage extending longitudinally thereof and each also having several perforations in proximity to the gap between the same for the escape of a cooling medium introduced into said passage.

5. Spark gap rods each having a longitudinal passage for a cooling medium and each rod also having an outlet in proximity to the gap between the same for the escape of the cooling medium, and valves at the outer ends of said passages for controlling the amount of cooling medium delivered into said passages.

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

WALTER W. MASSIE.

Witnesses:
FRANK H. CRANSTON,
L. E. HINCKLEY.