

Oct. 5, 1948.

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SPARK TRANSMITTER
Filed Feb. 7, 1946

2,450,413

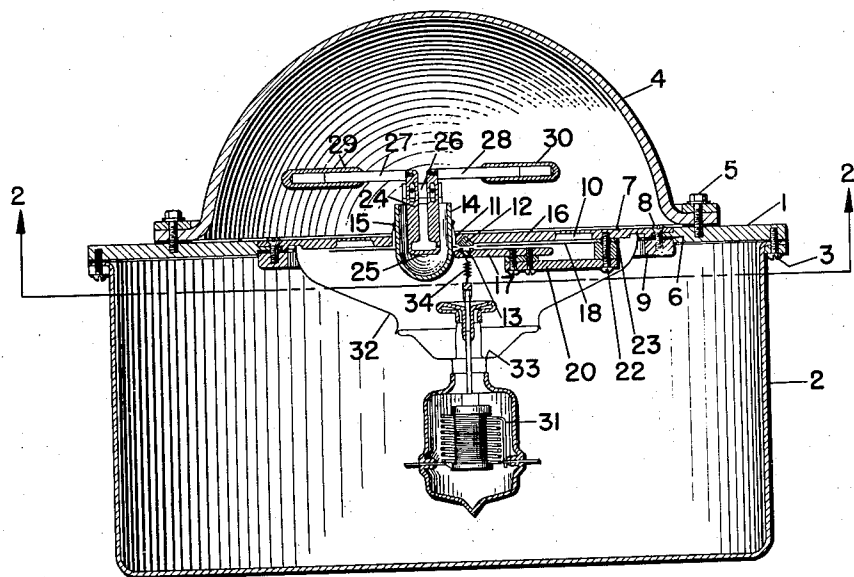


FIG. 1

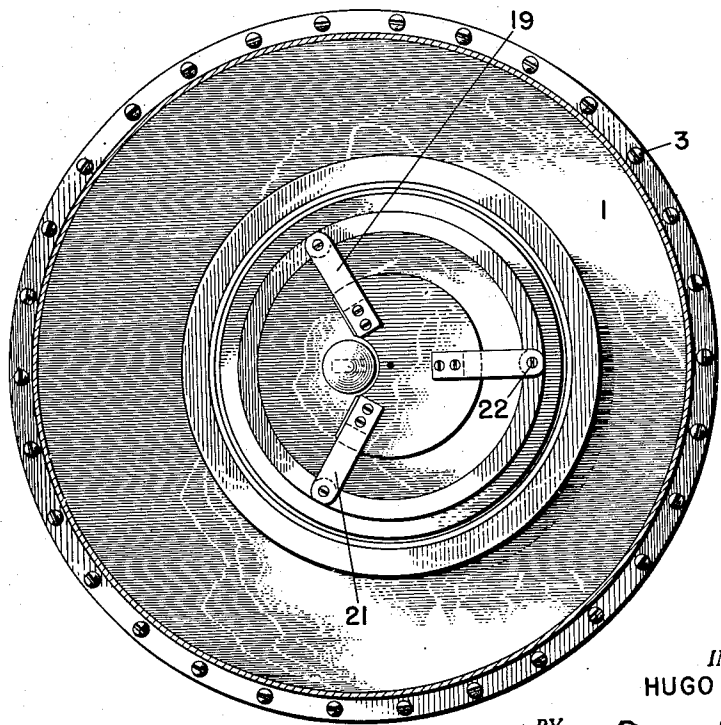


FIG. 2

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2,450,413

SPARK TRANSMITTER

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Application February 7, 1946, Serial No. 646,080

7 Claims. (Cl. 250-17)

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The present invention relates to an ultra high frequency electromagnetic transmitting device of the spark type and has for its purpose means for effectively and efficiently radiating electromagnetic energy by means of a spark circuit. The invention is an improvement on my copending application Serial No. 620,562 filed October 5, 1945.

In the present invention the antenna system is electrically coupled with the oscillating circuit so that more or less the antenna oscillatory circuits and the oscillatory power supply circuit are independent of one another except for the coupling effect. By this means it is possible to tune more sharply the supply circuit and thereby establish a more efficient oscillatory circuit. In the arrangement of the present invention it will be noticed that the oscillatory supply or tank circuit has its spark electrodes arranged or placed in close proximity to the coupling loop of the antenna system.

The coupling loop is aligned in the direction of the sparking electrodes so that one end of the loop is close to the electrodes electrically while the other end is as far away as possible. The plates forming the capacitor for the tank circuit each have a sector cut away in which the loop of the antenna circuit is placed. It will also be noticed that in the present system the entire tank circuit is sealed from the atmosphere and the impulse transformer, which is contained within an evacuated casing, is positioned so that the conductor from one electrode may be extended to one of the sparking electrodes.

The invention will be more fully described in connection with the drawings illustrating an embodiment thereof in which Fig. 1 shows a vertical section through the invention and Fig. 2 shows a horizontal section taken on the line 2-2 of Fig. 1.

In the arrangement described in the figures the device is supported on a plate 1 to which a rear cover 2 is secured by means of a series of screws 3 passing through an outwardly extending flange of the cover into the plate. A dome 4, transparent to electromagnetic waves, is secured to the front of plate 1 by means of the screws 5 passing through a flange of the dome 4 into the plate 1. Mounted within the dome 4 is the entire spark mechanism. For this purpose the plate 1 is provided with a large opening bordered by a thin flange 6 on which is retained the plate 7 by means of the clamping screws 8 passing through the plate from the top and the clamping ring 9 on the bottom side of the plate, both the plate and

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the ring resting in the shoulder forming the flange. The plate 7 is provided with a concentrically positioned annular recessed section 10 and within it an eccentrically positioned hole 11 just to one side of the center of the plate where the sparking electrodes 12 and 13 are positioned. The hole 11 is filled with an upwardly opening cup shaped member 14 of nonconductive material which is supported in the hole by means of a collar 15 extending upwardly from the plate 7 around the edge of the hole 11 forming a hermetical seal between the cup and the plate.

The sparking electrodes 12 and 13 are positioned at the center of the capacitor plates 16 and 17 which, as indicated more clearly in Fig. 2, extend sectorially for about 240° in arc. The plates 16 and 17 are spaced close together with a mica separator 18 in between which has a perforation aligned with the electrodes 12 and 13. These plates 16 and 17 form the capacitor for the oscillatory circuit which includes the plates 16 and 17 and the sparking electrodes 12 and 13. The thin annular section 10 on the top plate at the edge of the top plate 16 terminates the effective capacity of the plate at this point. The lower plate 17 is supported by three insulating projecting arms 19, 20 and 21 attached at the underside to the lower plate and supported to the outer portion of the upper plate 1 by means of the screws 22, with a separator block 23 for obtaining the proper spacing of the arms 19, 20 and 21 between the capacitor plates to provide the proper alignment. The mica plate 18 may be supported at the same time in this construction.

Within the cup 14 there is retained and supported the antenna system comprising the coupling loop member 24 which has a loop at the end the bottom portion 25 of which is directed radially towards the line joining the sparking electrodes 12 and 13. The upwardly extending arms of the loop, which actually forms a U-shaped section, are adjustably supported to the plate 26 at the top of the cup 14, the arms having an adjustable slot so that the position of the loop may be moved up and down with respect to the position of the electrodes and the capacitor plate.

The U-shaped loop 24 has outwardly extending arms 27 and 28, which are preferably capped by closed tubes 29 and 30 sliding over the arms 27 and 28 respectively so that the antenna length may be adjusted if desired.

A vacuum mounted impulse transformer 31 similarly as described in my aforementioned copending application Serial No. 620,562 is supported by the enclosed bowl or shell 32 in a her-

metical seal 33. The top end connection of the vacuum mounted impulse transformer leads directly to the conducting spring 34 and the electrode 13. The shell 32 is also sealed hermetically to the plate 7 so that the entire oscillatory circuit unit supported by the plate is a sealed unit which may be filled with gas if desired. In the operation of the device the capacitor plates 16 and 17 are energized with the desired high frequency impulses through the transformer to obtain a spark discharge across the electrodes 12 and 13 projecting slightly at the center of the capacitor plates. The lower section of the loop 24 nearest the electrodes is coupled to the capacitor oscillatory circuit by the magnetic linkages of the arc and the nearer end of the conducting loop 24. This induced current causes the antenna circuit to be charged from which the electromagnetic energy is radiated. The construction in the present system permits the desired coupling between the oscillating tank circuit and the antenna circuit and provides a means of obtaining, more closely, the desired resonance characteristics. The present device also provides improved methods of construction in that the antenna is physically free from the rest of the system and assembly and adjustment is therefore readily made.

Having now described my invention I claim:

1. An ultra high frequency spark transmitter comprising an oscillatory circuit having a pair of opposed plates with discharge electrodes opposed to one another and an antenna system having an input loop one arm of which has a portion adjacent the discharge electrodes.

2. An ultra high frequency spark transmitter comprising an oscillatory circuit having a pair of opposed plates with discharge electrodes opposed to one another and an antenna system having an input loop aligned with the discharge electrodes with one side of the loop adjacent said electrodes.

3. An ultra high frequency spark transmitter comprising an oscillatory circuit having a pair of opposed plates formed as segments of a disc; an antenna system having a U-shaped loop lying substantially in a plane and directed radially from the center of said segments and a pair of discharge electrodes extending from the opposed discs towards one another at the center of said segments.

4. An ultra high frequency spark transmitter comprising an oscillatory circuit having a pair of opposed plates formed as segments of a disc,

an insulating separator positioned between said discs, an antenna system having a U-shaped loop lying substantially in a plane and directed radially from the center of said segments and a pair of discharge electrodes extending from the opposed discs towards one another at the center of said segments.

5. An ultra high frequency spark transmitter comprising an oscillatory circuit having a pair of opposed plates formed as segments of a disc with discharge electrodes extending towards one another from the center of said segments, means sealing said plates and electrodes from the external atmosphere including a cup shaped insulating member sealed to one of said segments and positioned near the center thereof, a doublet antenna having a U-shaped loop extending into said cup aligned radially with said electrodes for coupling to said oscillatory circuit.

6. An ultra high frequency spark transmitter comprising a plate member having formed therein a bossed segment of a disc, a similar segment supported in opposed relation thereto, a pair of electrodes extending towards one another from the center of said segments, an insulating separator between said segments and a U-shaped antenna coupling member aligned radially with the sparking electrodes.

7. An ultra high frequency spark transmitter comprising a plate member having formed therein a bossed segment of a disc, a similar segment supported in opposed relation thereto, a pair of electrodes extending towards one another from the center of said segments, an insulating separator between said segments and a U-shaped antenna coupling member aligned radially with the sparking electrodes, a cup shaped insulating member positioned in the angular space between the edges of said segments near the sparking electrodes and supporting therein said U-shaped coupling member.

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The following references are of record in the file of this patent:

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