H. SHOEMAKER.

TRANSMITTING APPARATUS.

APPLICATION FILED JUNE 17, 1905.

1,005,338.

Patented Oct. 10, 1911.

Fig. 1.

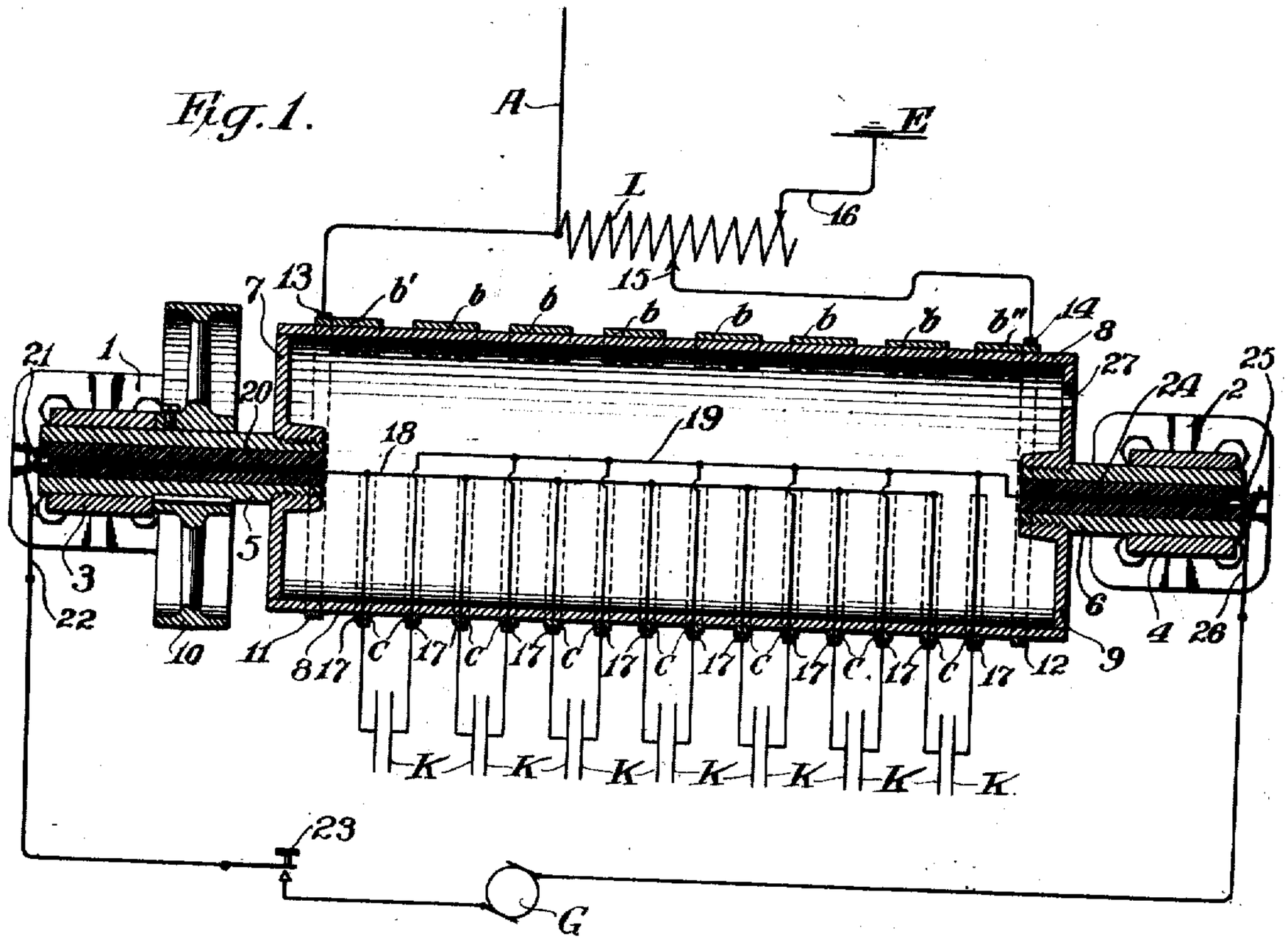
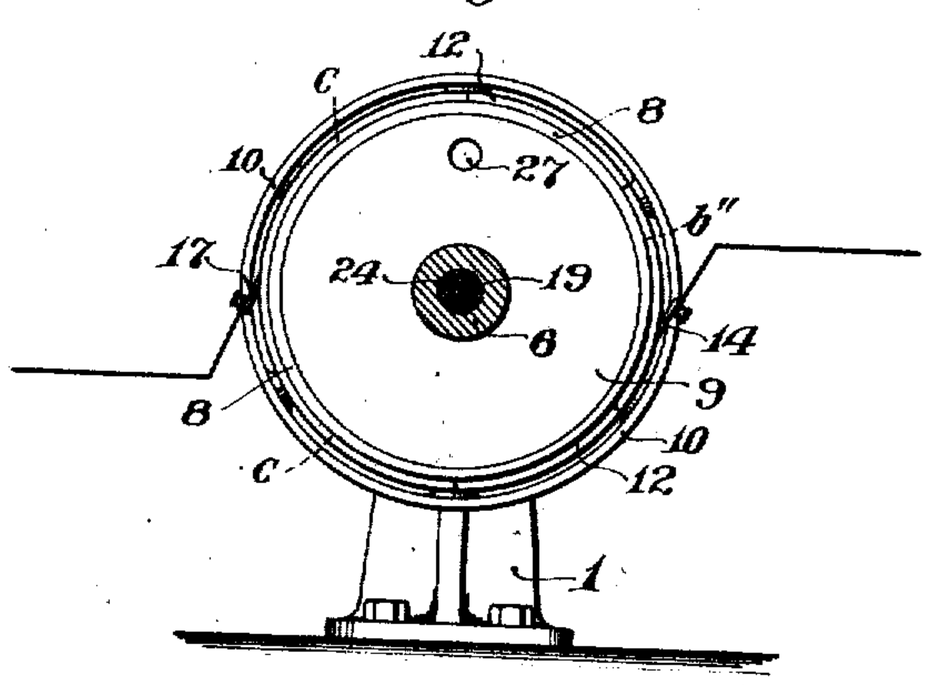


Fig. 2.



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TRANSMITTING APPARATUS.

1,005,338. Specification of Letters Patent. Patented Oct. 10, 1911.

Application filed June 17, 1905. Serial No. 265,758.

To all whom it may concern:

Be it known that I, HARRY SHOEMAKER, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented a new and useful Transmitting Apparatus, of which the following is a specification.

My invention relates to transmitting apparatus, more especially as employed in a wireless signaling system wherein electro-radiant energy represents the signal or message during its transmission through the natural media.

It is the object of my invention to provide powerful transmitting apparatus to the end that communication may be established over very great distances. For this purpose a condenser or battery of condensers is employed, the condenser or condensers being discharged through a circuit or winding either inductively or conductively associated with a radiating circuit, conductor, or conductors, without the intervention of the usual spark gap heretofore employed in wireless signaling systems.

It is a feature of my invention that the high frequency oscillations are produced in a conductor or circuit having no spark gap.

It is a further object of my invention to provide transmitting apparatus which is substantially noiseless as compared with transmitting apparatus heretofore employed. As is well understood in this art, the transmitters heretofore known for high frequency oscillations have employed spark gaps. The sparking at such spark gaps is always accompanied with more or less noise, and in high power or long distance transmitters such noise amounts to crashes, necessitating the spark gap being isolated in separate buildings in some cases. The sparking is particularly objectionable in confined operating rooms, especially on shipboard. By my invention herein disclosed such noises and crashes are avoided.

For an illustration of one form my invention may take, reference is to be had to the accompanying drawing in which:—

Figure 1 is in part a horizontal sectional view of the commutating mechanism, the remainder of the view being diagrammatic in nature. Fig. 2 is an end view, partly in section, showing the commutating apparatus.

At 1 and 2 are shown standards carrying bearings 3 and 4. A hollow shaft 5 rotates in the bearing 3 and a similar hollow shaft 6 rotates in the bearing 4. The hollow shaft 5 is screwthreaded into the head 7 of a commutating cylinder 8 of insulating material. Similarly the hollow shaft 6 is screwthreaded into the head 9, the insulating cylinder 8 being secured upon the heads 7 and 9. A pulley 10 is keyed to the hollow shaft 5 and drives the commutating cylinder 8 continuously at any desired speed.

Secured upon the periphery of the cylinder 8 are a plurality of pairs of contact segments or rings *c* which extend circumferentially on the cylinder 8 to the extent of half of a circumference, more or less as desired. Circumferentially extending contact rings 11 and 12 are disposed upon opposite ends of the cylinder 8 and upon these bear the brushes 13 and 14 respectively. The brush 13 is in electrical communication with the base of the aerial radiating conductor A and one terminal of the inductance or length of conductor L. The brush 14 is in electrical communication through the rider 15 with any portion of the inductance or conductor L and the rider 16, also adjustable to any point on the conductor or inductance L, communicates electrically with the earth at E. A plurality of bridging segments *b* are also secured upon the periphery of the cylinder 8 and are comparatively short circumferentially and sufficiently long axially to bridge the pairs of brushes 17 forming terminals of neighboring condensers K. The bridging segment *b'* at one end of the cylinder is in electrical communication with the slip ring 11 while the bridging segment *b''* is in electrical communication with the slip ring 12. Alternate segments or contacts *c* are connected to the conductor 18 within the cylinder 8 while the other segments or contacts *c* connect with the conductor 19, also within the cylinder 8. The conductor 18 extends through the insulating bushing 20 within the hollow shaft 5, and terminates in the contact button 21 upon which bears the brush 22 connected through the operator's key 23 with one terminal of the source of either direct or alternating current G. The conductor 19 extends through the insulating bushing 24 and terminates in the contact button 25 upon which bears the brush 26 which is in electrical communication with the other terminal of the source G.

The source G may deliver current at a

potential of one thousand volts, for example, and in place of the number of condensers shown, a great many more may be employed as, for example, twenty-five or thirty.

With the parts in the position shown in Fig. 1, by pressing the key 23, the condensers K will be charged in parallel. As the cylinder 8 continues to rotate, the condensers will first be isolated from the source G and thereafter the bridging segments *b* will bridge neighboring terminals of neighboring condensers and thereby throw all the condensers into series with each other, and they will then discharge through the slip rings 11 and 12 and the associated brushes 13 and 14 through the inductance or length of conductor L. L and the condensers form thereby a closed oscillating circuit in which are developed electrical oscillations of a frequency depending upon the inductance, capacity, and resistance of such closed circuit. The connections from the condenser terminals to the brushes 17, and other parts of such closed circuit comprise the entire inductance of such circuit and, if desired, inductances may be inserted between the condenser armatures and the brushes 17.

Large quantities of energy may be stored in the condensers K during the charging period, which is greater than the discharging period. This energy is then instantly discharged through the circuit aforementioned with resultant production of high frequency oscillations which in turn result in radiation from the conductor A of Herzian waves or other electroradiant energy.

The cylinder 8 may rotate at any desired speed but it is preferred that it shall rotate at the rate of several complete revolutions during the duration of the shortest code character employed in the transmission of messages. That is to say, while the key 23 is held depressed for an interval of time representing a dot, the cylinder 8 should preferably make several complete revolutions with the result that several trains of energy waves are radiated.

To thoroughly insulate the conductors 18 and 19 from each other and to support them mechanically, the inside of the cylinder 8 may be filled with molten wax or rosin or any other suitable material which when cooled will solidify. This material may be poured in in the molten state through the hole 27 in the head 9.

Since each condenser is charged potentially to only one or two thousand volts, sparking will be practically nothing upon the approach of the bridging contacts *b* and the brushes 17 in the act of connecting the condensers in series with each other. The potential of a few thousand volts is capable of causing a spark to leap an extremely short distance only, more especially if the contacts are submerged in oil or other insulating medium as is preferable with the apparatus herein described. The commutating mechanism as a whole may be submerged or surrounded by an insulating medium or simply to the depth of the contact surfaces of the brushes 17 or slightly more.

What I claim as new, and desire to secure by Letters Patent of the United States is:

1. In a signaling system employing electroradiant energy, transmitting apparatus comprising a plurality of condensers, means for charging said condensers in parallel, means for discharging said condensers in series through a circuit having no spark gap, and radiating means associated with said circuit.

2. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a plurality of condensers, a source of energy, an oscillation circuit having no spark gap and having a natural period equal to that of the transmitted energy, and a commutator for bringing said condensers into communication with said source of energy and subsequently with said oscillation circuit.

3. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a plurality of condensers, a source of energy, an oscillation circuit having no spark gap and having a period equal to the period of the transmitted energy, and a commutator for bringing said condensers alternately into communication with said source of energy and said oscillation circuit.

4. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a condenser, a source of energy, an oscillation circuit having no spark gap and having a period equal to the period of the transmitted energy, and a commutator for bringing said condenser into communication with said source of energy and subsequently with said oscillation circuit.

5. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a plurality of condensers, a source of energy, an oscillation circuit having no spark gap, radiating means associated with said oscillation circuit, a commutating mechanism for bringing said condensers alternately into communication with said source of energy and said oscillation circuit charging contacts and bridging contacts therein, said charging contacts being longer than said bridging contacts whereby the duration of communication with said source of energy is relatively longer than the duration of communication with said oscillation circuit.

6. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a plurality of condensers, a source of energy, an oscillation circuit having no spark gap and hav-

ing a period equal to the period of the transmitted energy, a commutating mechanism for bringing said condenser alternately into communication with said source of energy and said oscillation circuit, and an operator's key for controlling said source of energy.

7. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a plurality of condensers, a source of energy, an oscillation circuit having no spark gap, radiating means associated with said oscillation circuit, a commutating mechanism for subjecting said condensers in parallel to said source of energy and for subsequently connecting said condensers in series with each other in said oscillation circuit, and an operator's key for controlling said source of energy.

8. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a condenser, a source of energy, a radiator having no spark gap, a commutator for alternately bringing said condenser into communication with said source of energy and with said radiator, and an operator's key in the circuit of said source of energy, said commutator performing its cycle of operations a plurality of times during the duration of the shortest code character.

9. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a plurality of condensers, a source of energy, a radiator having no spark gap, a commutator for alternately subjecting said condensers in parallel to said source of energy and discharging them in series into said radiator, and an operator's key in the circuit of said source of energy, said commutator performing its cycle of operations a plurality of times during the duration of the shortest code character.

10. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a condenser, a source of energy, a radiator having no spark gap, and a commutator for bringing said condenser alternately into communication with said source of energy and said radiator, the duration of communication with said source of energy being relatively longer than the duration of communication with said radiator.

11. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a plurality of condensers, a source of energy, a radiator having no spark gap, and a commutator for alternately subjecting said condensers in parallel to said source of energy and discharging them in series into said radiator, charging contacts and bridging contacts thereon, said charging contacts being longer than said bridging contacts whereby the duration of communication with said source of energy is relatively longer than the duration of communication with said radiator.

12. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a plurality of condensers, a source of energy, a radiator having no spark gap, a commutator for alternately subjecting said condensers in parallel to said source of energy and discharging them in series to said radiator, and an operator's key controlling said source of energy, said commutator performing its cycle of operations a plurality of times during the duration of the shortest code character, charging and bridging contacts on said commutator, said charging contacts being longer than said bridging contacts whereby the communication of the condensers with said source of energy is relatively longer than their communication with said radiator.

13. In a wireless telegraph transmitter, a cylinder, alined shafts insulated from each other upon which said cylinder rotates, contacts upon said cylinder, contacts carried by said shafts, conductors carried by said cylinder communicating with said cylinder contacts and with said shaft contacts, a source of energy, and leads therefrom communicating with said shaft contacts.

14. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a cylinder, hollow shafts insulated from each other upon which said cylinder rotates, contacts carried by said shafts, charging contacts upon said cylinder, conductors passing through said shafts for establishing electrical communication with said shaft contacts and charging contacts, a source of energy and means for establishing communication between said source of energy and said shaft contacts.

15. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a plurality of condensers, an oscillation producer having no spark gap associated therewith, a rotatable commutator cylinder, a plurality of charging contacts carried thereby for communicating with said condensers, a source of energy, means for maintaining communication between said source of energy and said charging contacts, and bridging contacts carried by said cylinder, said charging contacts having greater circumferential extent than said bridging contacts.

16. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a plurality of condensers, an oscillation producer having no spark gap associated therewith, a source of energy, a rotatable commutator cylinder, charging contacts carried thereby, bridging contacts, means for continuously maintaining electrical communication between said source of

energy and said charging contacts, and brushes communicating with the terminals of said condensers and adapted to be alternately engaged by said charging and bridging contacts.

17. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a condenser, a substantially non-inductive circuit for charging said condenser, and means for discharging said condenser through a conductively continuous inductive conductor of substantially constant resistance, whereby high frequency oscillations are produced.

18. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a condenser, a substantially non-inductive circuit for charging said condenser, an oscillator having no spark gap, and a switch for discharging said condenser into said oscillator.

19. In transmitting apparatus, a radiator, an earth connection therefor, a plurality of condensers, means for charging said condensers in parallel, and means for discharging said condensers in series without the intervention of a spark gap.

20. In transmitting apparatus, a radiator, and an associated oscillating circuit having no spark gap, condensers contained in said oscillating circuit, means for charging said condensers in parallel to relatively low potential, and a switch for discharging the same in series through said oscillating circuit.

21. In transmitting apparatus, a radiator, a closed oscillating circuit having no spark gap associated with said radiator in conductive relation, a plurality of condensers in said oscillating circuit, and means for charging said condensers in parallel to relatively low potential and for discharging the same in series.

22. In a signaling system employing electro-radiant energy, transmitting apparatus having no spark gap and comprising a plurality of condensers, means for charging said condensers in parallel to relatively low potential and for discharging said condensers in series.

23. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a plurality of condensers, means for charging said condensers in parallel, an inductive circuit of substantially constant resistance, and means for connecting said condensers in series with each other in said circuit.

24. In a signaling system employing electro-radiant energy, transmitting apparatus comprising a condenser, a rotating shaft, and means operated by said shaft for placing said condenser in communication with a charging source and for subsequently including said condenser in an inductive circuit without a spark gap, whereby high frequency oscillations are produced.

25. In a signaling system, transmitting apparatus comprising a high frequency oscillation circuit including inductance and capacity, a source of energy of substantially steady electro-motive force for charging said capacity, commutating mechanism comprising a plurality of relatively fixed and movable contacts for opening and closing a series of gaps in said oscillation circuit, said oscillation circuit when closed by said commutating mechanism having no spark gap, and a signaling instrument for controlling the communication between said charging source and said capacity.

26. In a signaling system, transmitting apparatus comprising a high frequency oscillation circuit including inductance and capacity, a commutator serially connected in said oscillation circuit comprising a plurality of sets of relatively movable contacts, said contacts when separated introducing a plurality of gaps in said oscillation circuit and when in engagement closing said oscillation circuit without a spark gap, a source of energy for causing said capacity to absorb a charge when said contacts are separated, and a signaling instrument controlling the charging of said capacity.

27. In a signaling system, transmitting apparatus comprising a high frequency oscillation circuit including inductance and capacity, a power driven commutator serially connected in said oscillation circuit and comprising a plurality of sets of relatively rotating contacts, said contacts when in engagement closing said oscillation circuit without a spark gap and when separated introducing into said circuit a plurality of gaps in series with each other, and means for causing said capacity to absorb a charge when said oscillation circuit is open.

28. In a signaling system, transmitting apparatus comprising a high frequency oscillation circuit having no spark gap including inductance and a plurality of condensers, a source of current having a voltage lower than the voltage required for disruptive sparking for charging said condensers, and commutating mechanism for causing said condensers to be charged in parallel and for including said condensers in series in and for closing said oscillation circuit.

29. In a signaling system, transmitting apparatus comprising a high frequency oscillation circuit having no spark gap including inductance and a plurality of condensers, a source of direct current having a voltage lower than the voltage required for disruptive sparking for charging said condensers, and commutating mechanism for causing said condensers to be charged in parallel and for including said condensers in series in and for closing said oscillation circuit.

30. In transmitting apparatus, inductance and a relatively great capacity, a source of low potential energy, and means for periodically charging said capacity to low potential and closing a circuit having no spark gap including said inductance and capacity.

31. In transmitting apparatus, an inductance and a relatively great capacity, means for periodically opening and closing a circuit having no spark gap including said inductance and capacity, and means operative when said circuit is open for charging said capacity to relatively low potential.

32. In transmitting apparatus, a high frequency oscillation circuit including inductance and capacity, a series of gaps serially connected in said oscillation circuit, a commutator for substantially simultaneously closing all said gaps, whereby said oscillation circuit has no spark gap, and means for subjecting said capacity to a charging source when said gaps are open.

In testimony whereof I have hereunto affixed my signature in the presence of the two subscribing witnesses.

HARRY SHOEMAKER.

Witnesses:
M. F. CARROLL,
M. M. ACHESON.