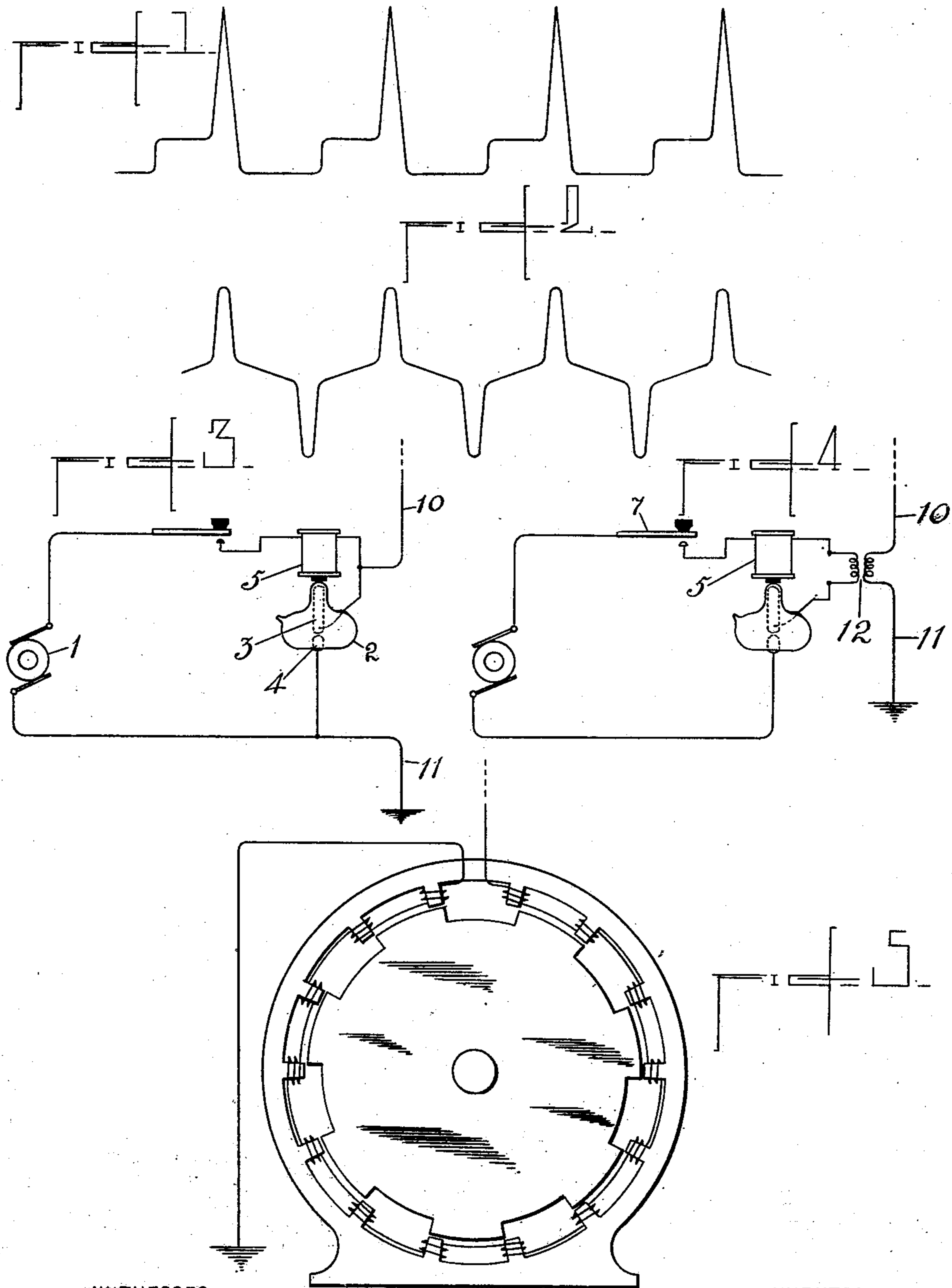


No. 755,305.

PATENTED MAR. 22, 1904.

D. McF. MOORE.
PEAKED WAVE WIRELESS TRANSMISSION.
APPLICATION FILED JUNE 14, 1902.

NO MODEL.



WITNESSES:

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DANIEL MCFARLAN MOORE, OF NEWARK, NEW JERSEY.

PEAKED-WAVE WIRELESS TRANSMISSION.

SPECIFICATION forming part of Letters Patent No. 755,305, dated March 22, 1904.

Application filed June 14, 1902. Serial No. 111,591. (No model.)

To all whom it may concern:

Be it known that I, DANIEL MCFARLAN MOORE, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Peaked-Wave Wireless Transmission, of which the following is a specification.

My invention relates to a method of setting up waves of radiant electric energy for propagation through space, as in systems of space telegraphy or transmission of power, or for other uses where it is desired to employ similar waves of radiant energy sometimes termed "electromagnetic" or "Hertzian" waves or simply electric waves. It is known that waves of this character can be propagated through space or through the all-pervading ether by changes of electric potential or condition, and it has heretofore been proposed to produce such changes of electric potential or condition by the breaking of electric circuits or the discharge of the same over a space between electrodes, as in the well-known Hertzian oscillator.

Heretofore in developing Hertzian waves or waves of radiant electric energy no attention has been given to the form of the oscillatory waves or pulses of electric condition or potential which primarily excite or produce the ether waves, most experimenters being satisfied with the natural effects resulting from the electric discharge across an air-gap. What I have discovered and what seems to have been completely ignored so far by all other workers in the wireless field is that the shape of the wave is a matter of great importance—that is, the shape of the wave of the circuit, which is the source of ether-radiating waves.

My present invention or discovery is addressed to the manner of primarily exciting or producing the waves of radiant energy; and it consists, substantially, in setting up or originating in any proper way changes of electrical condition or polarization which by reason of their high rate of change will be better suited to produce radiating spheres or lines of wave action that will propagate themselves for greater distances and will act with greater power upon the receiving apparatus.

Otherwise stated, the improved method devised by me depends for its efficacy upon the sudden action of the primary exciting cause upon the surrounding ether or medium in which the said waves propagate themselves.

Briefly stated, my invention consists in the improved method of propagating such waves by producing changes of primary exciting electric potential or polarization which if graphically described as a series of waves would show a series of waves of highly-peaked form. Such changes of electrical polarization or condition may be produced by various forms of apparatus, some of which will be herein described. They may be produced, among other ways and with great effectiveness, by interrupting a charged circuit in a high vacuum through simply bringing the two electrodes or contacts of the circuit into and out of contact with one another while included in the vacuum. In this way said contacts may serve practically the double purpose of the ordinary make-and-break device heretofore employed in Hertzian wave telegraphy and the function also of the electrodes of the oscillator or radiator separated by a space over which the discharges primarily produced by the vibrator take place. By "high vacuum" I mean one in which the exhaustion has been carried to the highest practicable degree. The higher the vacuum the better for the purposes of my invention. The apparatus in this simple form suitable for producing the exciting waves or pulses is the same as that described in my prior application filed December 16, 1898, Serial No. 699,423, of which the present application is as to that feature a continuation.

The essence of my invention consists in producing in any manner changes of electric condition or potential for the purpose of developing the free electromagnetic waves radiated through space, by causing changes of electric potential or condition of predetermined form or rate of change which, graphically represented, may be described as a wave or pulse of extremely peaked form, and while the use of a high-vacuum break is the most effective means known to me for setting up such ether vibrations or electromagnetic

waves I do not limit myself to the use of such a device, since the same accentuated change of electric potential or condition in a wire or conductor might be produced by generating the electric potentials directly in a properly-designed dynamo-electric machine of the general character shown in my prior patent, No. 678,191, dated July 9, 1901.

With an induction-coil using an open-air break, due to the conductivity of the air and due to the necessarily longer time constant of secondary coil, it is impossible to produce a wave whose peakedness is at all comparable with that produced by the vacuum break in which the best dielectric known—namely, an extremely high vacuum—inserts itself automatically in the electric circuit, and therefore produces a complete interruption thereof in the minimum length of time.

As is well known, it is desirable that the oscillations or vibrations which excite the electromagnetic vibrations in the ether shall continue as long as possible before they are dampened out, and Maxwell and others have shown that these oscillations would continue for a maximum length of time and with a rapidity approximating that of light if the apparatus from which they emanate were reduced to molecular proportions. It is physically impossible, of course, to produce such an apparatus; but, as I have discovered, great advantage may be secured by primarily exciting the ether vibrations by an impulse or impulses whose character is such as to act with great violence or suddenness upon the ether, and thereby set up electromagnetic waves or vibrations of greater amplitude, and therefore of greater carrying power.

In the accompanying drawings, Figure 1 represents, roughly, one of the forms of the primary exciting waves or impulses which might be generated by a proper device, although such graphic representation cannot of necessity be relied upon as a correct representation of what would take place and is only designed to roughly indicate the direction in which I aim to proceed according to my present invention in the production of the primary exciting cause of the ether vibrations termed "electromagnetic" waves or "electric" waves by Hertz and others. Fig. 2 is a graphic representation of another form of wave or pulse which theoretically might be developed by a dynamo-machine, but which could be given a much more peaked or pointed form by proper attention to the design of the machine. As will be obvious, the form shown in Fig. 2 is a very imperfect realization of the form of primary exciting wave or impulse which should be produced or generated in order to best carry out my invention. Fig. 3 represents diagrammatically an apparatus and circuits adapted for use in practicing my invention. Fig. 4 shows another arrangement of circuits. Fig. 5 illustrates in side elevation the parts

of the dynamo constructed to produce the form of pulse or changing potential wave illustrated in Fig. 2.

Referring to Fig. 3, 1 indicates a generator of continuous current preferably, and included in the circuit therewith is the vibratory interrupter 2, composed of a glass receptacle or receiver exhausted to as high a degree as possible and containing the two contacts of an interrupter, (marked 3 and 4.) The lower one, 4, is sealed in the glass body of the receiver, while the upper one, 3, is attached to the vertically-oscillating armature of an electromagnet 5 above the glass extension in which the armature is guided and moved and is included in the circuit passing through the contacts 3 and 4. This device is in its substantial mechanical form the same as the one heretofore employed by me in vacuum-tube lighting and is capable of operation after the manner of an automatic make and break. Its action may be controlled by the key 7 in any obvious way. To improve the effects, antennae or aerial and ground wires 10 11, such as used in ordinary forms of wireless-transmission plant, may be added. The closure of the key 7 permits the vibrator to act and produce sudden and rapid changes of electric condition which result in the transmission or radiation of the electric waves or electromagnetic vibrations propagated through space to any distant receiver of them, as well understood in the art.

In Fig. 5 I show in skeleton the parts of a dynamo adapted to produce the sudden changes of electric condition which it is desirable to produce in order to best generate the electromagnetic waves. This form is in general shown in my prior patent, No. 678,191, and is merely illustrated herein to indicate the possible variations of my invention, although it is recognized that this particular form of machine and form of generated pulse of electric potential is not the best for the purpose. The terminals of said machine would preferably be connected with the usual aerial and ground wires used in wireless transmission.

In Fig. 4 a wireless-telegraph apparatus is shown wherein an induction-coil 12 is employed. The electric condition developed in the primary according to my present invention has its potential raised by employing in the secondary a larger number of turns, as usual in the art.

The arrangement of apparatus shown in Fig. 3 is especially suited to the practicing of the invention, since through the interruption of the circuit in the vacuum the impulses are very abrupt, while owing to the absence of a secondary the time constant of the circuit in which the oscillations take place is reduced to a minimum.

Other forms of apparatus might be employed in carrying out my invention. The forms shown indicate only some of the de-

vices that may be employed for generating the exciting electric potential which, considered as a wave or pulse of exciting energy, would be of highly-peaked form.

5 What I claim as my invention is—

1. The herein-described method of producing waves of radiant energy in space telegraphy or power transmission consisting in impressing upon the ether repeated changes of electrical potential or polarization which, graphically described, would be a series of waves of highly-peaked form.

2. The herein-described method of producing waves of radiant energy for space telegraphy or power transmission, consisting in setting up a series of changes of electric potential in an electric circuit by making and

breaking a circuit in a high vacuum as described, thereby subjecting the ether to a series of waves or pulsations of impressed energy 20 or polarization which, graphically represented, would be of highly-peaked form.

3. In the art of wireless transmission of energy, the improvement consisting in generating free electromagnetic waves or vibrations 25 by abruptly breaking a closed circuit in a high vacuum.

Signed at New York, in the county of New York and State of New York, this 13th day of June, A. D. 1902.

DANIEL McFARLAN MOORE.

Witnesses:

J. GALLWITZ,
E. L. LAWLER.