No. 711,181. Patented Oct. 14, 1902.

H. SHOEMAKER.

METHOD OF TRANSMITTING INTELLIGENCE.

(Application filed Jan. 11, 1902.)

(No Model.)

Fig I

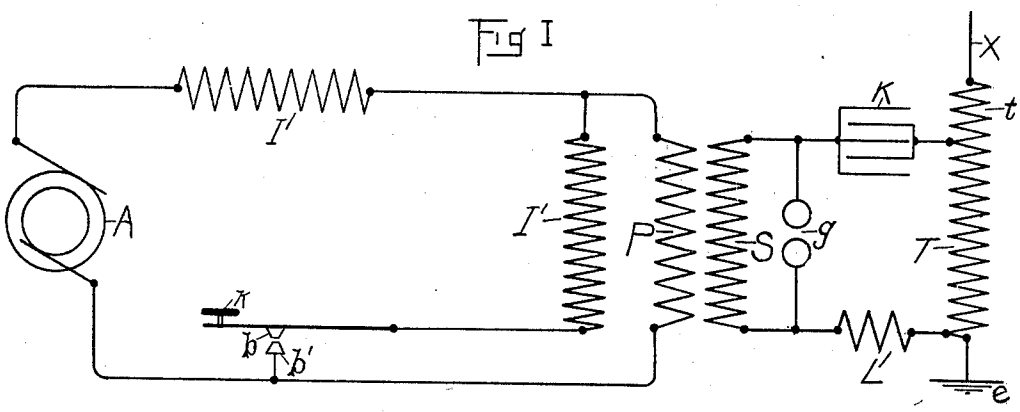


Fig II

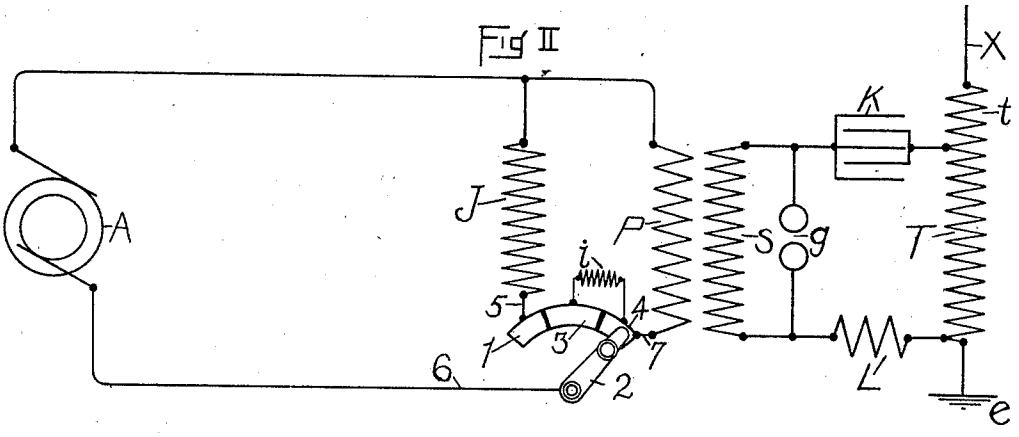
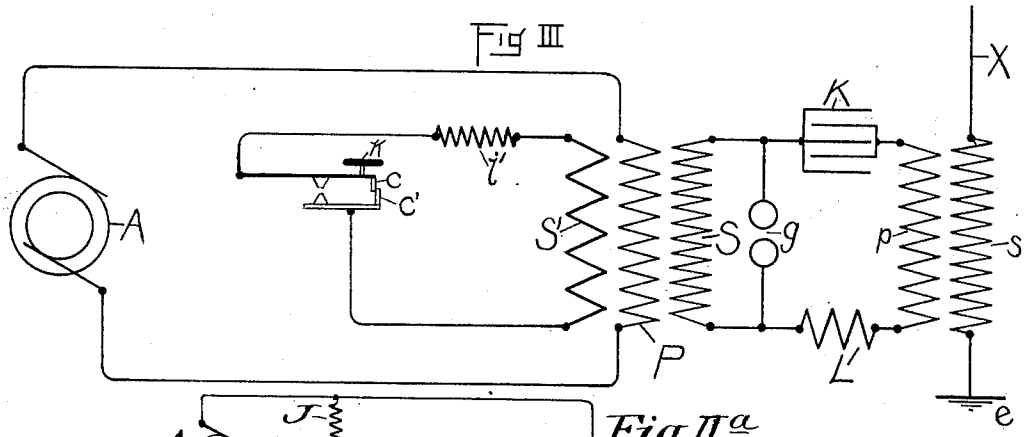


Fig III



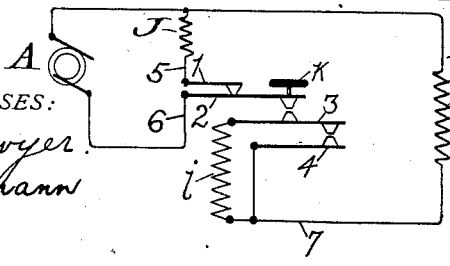


Fig. II a.

WITNESSES:
J. M. Sawyer
Mae Hofmann

INVENTOR.
Harry Shoemaker
BY Cornelius D. Ehret
his ATTORNEY.

UNITED STATES PATENT OFFICE.

HARRY SHOEMAKER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO MARIE V. GEHRING, OF PHILADELPHIA, PENNSYLVANIA, AND AMERICAN WIRELESS TELEPHONE & TELEGRAPH COMPANY, A CORPORATION OF ARIZONA TERRITORY.

METHOD OF TRANSMITTING INTELLIGENCE.

SPECIFICATION forming part of Letters Patent No. 711,181, dated October 14, 1902.

Application filed January 11, 1902. Serial No. 89,248. (No model.)

To all whom it may concern:

Be it known that I, HARRY SHOEMAKER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Method of Transmitting Intelligence, of which the following is a specification.

My invention relates to a method of transmitting intelligence to be applied in those systems in which the modified electrical energies representing the signal or message are impressed upon the natural media.

It comprises a method of generating and transmitting through or impressing upon the natural media a large amount of energy—many horse-power in some cases—for the purpose of long-distance communication.

It comprises, further, a method of generating the energy at low pressure and low frequency and stepping it up or transforming it to energy of high pressure and very high frequency.

It comprises, further, a step, in addition to the transforming of energy to high pressure and high frequency, of further transforming the energy to supply it to the radiating-conductor, this being done by a simple transformer or an autotransformer.

It comprises, further, the step of modifying the energy at will while such energy is in the low-pressure form or by robbing the radiating-conductor of energy by and in accordance with the intelligence to be transmitted, which consists in controlling the low-frequency energy in the secondary of a transformer wound for a pressure still lower than that of the main generator, whereby objectionable sparking is avoided in the case where a complete rupture of circuit is made by the apparatus controlling the energy in accordance with the message sent.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a diagrammatic view of the circuits employed in transmitting messages in which the controlling device is in the circuit of the main generator and controls an impedance-circuit in parallel with the primary of the transformer. Fig. 2 is a diagrammatic view similar to that in Fig. 1 with a different arrangement of the impedance device in its relation to the primary of the transformer. Fig. 2^a is a detail view of the controller shown in Fig. 2 in a form more suitable for manipulation. Fig. 3 is a diagrammatic view showing a further and preferred arrangement of the controlling means.

A represents a generator or source of alternating currents of comparatively low frequency and low potential—such, for example, as a transformer or dynamo furnishing alternating current at one hundred and ten volts and at a periodicity of one hundred cycles per second. The current derived from the source A passes normally through the impedance I and the primary P in series. At the terminals of the secondary S there exists a very high potential, in the neighborhood of one hundred thousand volts or more, and the current derived from the secondary charges the condenser K until there exists across the terminals of the condenser a potential sufficiently high to break across the spark-gap *g*, when there occurs throughout the circuit K T L *g* a very high frequency oscillatory current, whose frequency is independent of the frequency of the source A and depends upon the capacity inductance and resistance of the circuit K T L *g*. The frequency of this high-period current is one hundred thousand per second or more.

X represents the radiating-conductor of the transmitter and which connects through the windings *t* T to earth-plate *e*. The portions *t* and T coöperate as an autotransformer, and there exists, therefore, upon the radiating-circuit oscillatory energy of a frequency one hundred thousand per second or more and of a potential still higher than that across the terminals of T. The electrical constants of X, *t*, and T may be so proportioned as to render them resonant with the frequency of the energy in the circuit K T L *g*. To control the radiated energy, there is placed across the terminals of the primary P an impedance I′ in series with a key *k*, having the terminals *b b′*, shown here and in the remaining figures

as large and massive, for the reason that they must carry currents of considerable volume, and upon the depression of the key *k* the transformer P S is robbed to a greater or less extent of its energy and there ceases during such period to be developed to any considerable extent the high-frequency oscillations in the circuit K T L *g*. The impedance I is simply a restraining means to prevent overloading to a dangerous point the source A.

In Fig. 2 the disposition of the apparatus is the same as in Fig. 1, with the exception that the impedance I is omitted and the impedance J substituted for I′ in combination with a different form of controlling-switch. In the position shown, with the switch-blade 2 upon the segment 4, the total current of source A is passing through the primary P and exciting the secondary and the associated circuits, as described above. To send a message, the switch-arm 2 is moved in a counter-clockwise direction into contact successively with segments 3 and 1, and after having made one such journey and returned to its position, as shown, it has transmitted either a dot or a dash, depending upon the time of contact. In passing from segment 4 to 3 the impedance *i* is thrown into circuit with primary P, which diminishes the energy in the secondary and associated circuits, and a further travel to contact with segment 1 the primary P is entirely out of circuit and the current from the generator passes through impedance J only, with a resulting deënergization of the transmitting-conductor.

In Fig. 2ª I have shown a more practical arrangement of the transmitting device, in which similar reference characters designate similar elements and connections. Upon depressing the key *k* in Fig. 2ª the contact on flexible spring *l* follows the key-blade 2 until the key-blade 2 contacts with blade 3 through the contact-points carried thereby. At this moment contact with *l* is entirely interrupted, and during the further pressure of key *k* the spring 3 is depressed to come in contact with 4, thereby throwing impedance *i* entirely out of operation.

In Fig. 3 the secondary S of the transformer supplies a circuit K *p* L *g*, as in the cases above, except that *p* now forms the primary of a transformer and does not form a part of the conductor-circuit, as in the case of T. *s* is a winding in the circuit of the conductor X and which forms a secondary for the primary *p*. Otherwise the operation of the secondary circuit is the same as in Figs. 1 and 2, and it is to be understood that the form in Fig. 3 may be used in either Figs. 1 and 2 or that the form in Figs. 1 and 2 may be used in Fig. 3. S′ represents a very coarse secondary associated with the primary P and which delivers, therefore, through impedance *i*′ and key *k*, a current of very low potential and of large volume. The object of this is to enable the control of the messages by means of a key in a very low potential circuit to obviate sparking. *c c*′ are the carbon shunt-contacts of the main contacts of the key *k* and which are adapted to rupture the circuit after the separation of the main contacts for the purpose well known in electric switches to prevent arcing at the contacts. In the position shown the key *k* is just on the point of rupturing the circuit of the secondary S′, the current at this instant being very small, due to the resistane of the carbons *c c*′. The operation of this system is as follows: Upon depressing the key a low-potential current begins to flow through the secondary S′, impedance *i*′, and the carbon-contacts *c c*′. Upon further travel the main contacts *b b*′ of the key come into contact and a very heavy current flows through the circuit. This robs the secondary circuit S K *p* L *g* of its energy so long as the key is held depressed. Upon release of the key the secondary S again receives its full amount of energy. In this manner the radiated energy may be controlled at the will of the operator.

It is to be understood that in place of the make and break devices herein shown microphonic contacts may be used, whereby every increase or decrease of pressure between the contacts will influence accordingly the energy radiated from the conductor X. It is to be understood, furthermore, that the energy radiated from the conductors may be of any predetermined frequency, so as to secure selectivity between the transmitting and receiving stations; furthermore, that in place of energy of a single frequency being transmitted the combination of several energies of different frequencies may be controlled in the same manner as herein described. It is to be understood also that I do not limit my method to the transmission from a grounded radiating-conductor; but I may use also a plurality of such conductors without earth connections or with a single earth or with double earth connections for each conductor.

What I claim is—

1. The method of transmitting intelligence, which consists in generating fluctuating electric energy, supplying a transformer with said energy, increasing the potential of said energy by said transformer, supplying an oscillating circuit with said high-potential energy, and modifying the energy by and in accordance with the signal to be sent by changing the impedance of a circuit connected across the terminals of a winding of said transformer.

2. The method of transmitting intelligence, which consists in generating electric energy of low frequency and low potential, supplying said energy to a transformer, increasing the potential of said energy by said transformer, supplying a circuit oscillating at high frequency with the high-potential energy, modifying the energy by and in accordance with the signal to be sent by changing the impedance of a circuit connected across the terminals of a winding of said transformer, and

impressing the energy of said oscillating circuit upon the natural media.

3. The method of transmitting intelligence, which consists in generating electric energy of relatively low potential and relatively low frequency, transforming said energy to high potential and high frequency, modifying the energy by and in accordance with the signal to be sent by changing the impedance of a circuit connected across the terminals of a winding of the transformer, and impressing the high-potential high-frequency energy upon the natural media.

4. The method of transmitting intelligence, which consists in generating fluctuating electric energy, supplying a transformer with said energy, increasing the potential of said energy by said transformer, supplying a circuit oscillating at high frequency with the high-potential energy, modifying the energy by and in accordance with the signal to be sent by loading a secondary of said transformer, and impressing the energy of the oscillating circuit upon the natural media.

5. The method of transmitting intelligence, which consists in generating alternating currents of low potential and low frequency, supplying said currents to a transformer, stepping up the potential of said currents, supplying the resulting high-potential current to a circuit proportioned to oscillate at high frequency, modifying the energy in the oscillating circuit by loading a low-potential secondary circuit, and impressing the modified energy upon the natural media in electroradiant form.

6. The method of transmitting intelligence, which consists in generating alternating currents of relatively low potential and relatively low frequency, supplying said currents to a transformer, stepping up the potential of said currents, supplying the resulting high-potential current to a circuit oscillating freely at high frequency, modifying the energy in the oscillating circuit by loading a low-potential secondary of said transformer, and impressing the modified energy of the oscillating circuit upon the natural media by means inductively connected with the oscillating circuit.

HARRY SHOEMAKER.

Witnesses:
MAE HOFMANN,
J. E. ENICH.