No. 765,298. PATENTED JULY 19, 1904.

R. W. SHOEMAKER & L. H. GIDDINGS.

METHOD OF SIGNALING.

APPLICATION FILED JUNE 25, 1902.

NO MODEL.

Fig. I.

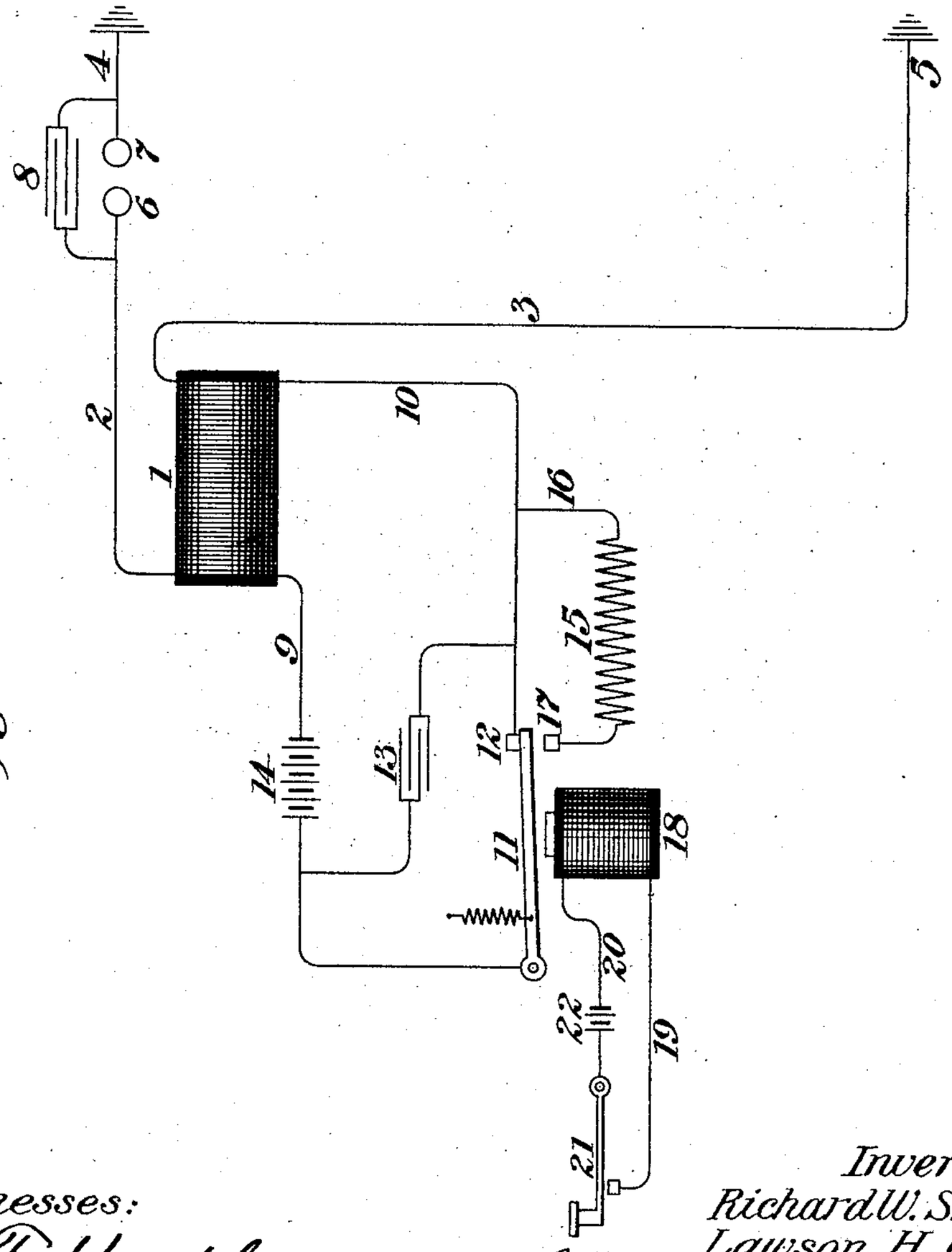
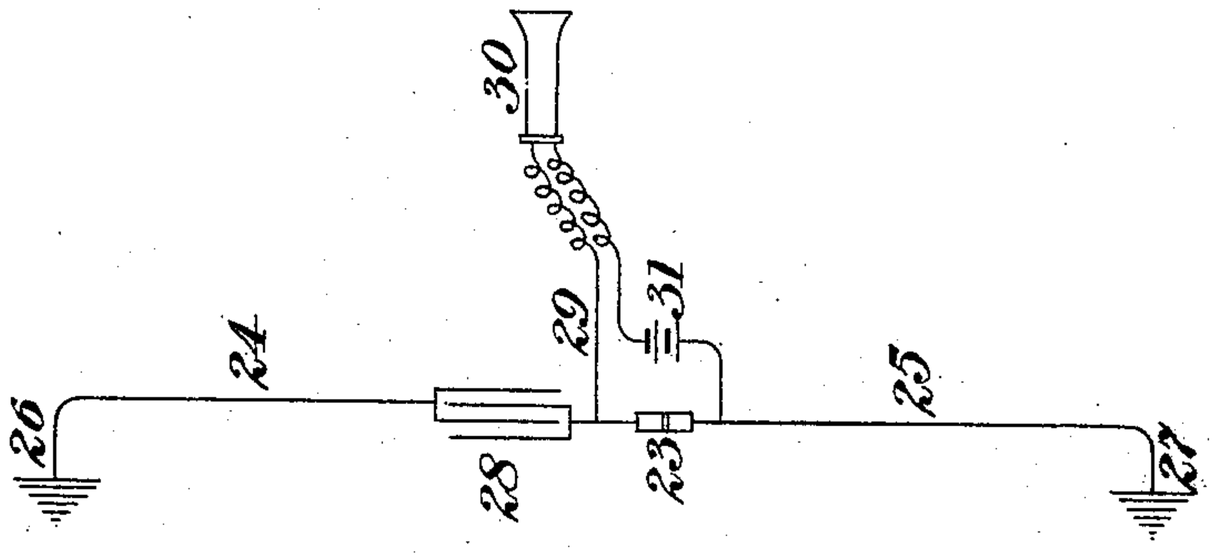


Fig. II.



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No. 765,298. Patented July 19, 1904.

UNITED STATES PATENT OFFICE.

RICHARD W. SHOEMAKER AND LAWSON H. GIDDINGS, OF PASADENA, CALIFORNIA.

METHOD OF SIGNALING.

SPECIFICATION forming part of Letters Patent No. 765,298, dated July 19, 1904.

Application filed June 25, 1902. Serial No. 113,163. (No model.)

To all whom it may concern:

Be it known that we, RICHARD W. SHOEMAKER and LAWSON H. GIDDINGS, citizens of the United States, residing at Pasadena, in the county of Los Angeles and State of California, have invented a new and useful Method of Signaling, of which the following is a specification.

Our invention relates to a method for producing a signal of contrasting characteristics which is particularly adapted for use in wireless telegraphy, but which is also adapted to be used in wire-telegraph systems; and it consists in sending an electric current through a circuit and altering the tension of said current.

One object of our invention is to provide a method for producing a definite distinct contrast in the character of an individual signal, so that messages may be sent rapidly and received with accuracy.

By definitely varying the character of a signal, as above described, the transmission of messages is rendered much easier and a greater degree of accuracy is secured than where the significance of the signal depends solely upon the interval of time during which the signal continues. Thus the initial part of the signal as produced by our method may be likened to the downward click of a telegraph-sounder, while the subsequent part of the signal may be likened to the return click of the sounder.

Telegraph operators when sending rapidly are apt to confine the action of the key to a single contact, and by the herein-described method this may be done in wireless telegraphy without affecting the accuracy of the signal. Furthermore, greater accuracy is secured in reading the signals, as the contrasted intervals of the signal are distinct and readily distinguished.

The invention may be understood by reference to the accompanying drawings, in which—

Figure I designates a transmitting-station provided with an apparatus for carrying out our method. Fig. II designates a receiving-station.

1 is an induction-coil or transformer. Leading from the secondary of the induction-coil are wires 2 and 3, having terminals 4 and 5, both of which extend into the earth. The secondary of the induction-coil, wires 2 and 3, and the earth lying between the terminals 4 and 5 may be termed the "signaling-circuit." An oscillator is formed in the signaling-circuit by suitable sparking terminals 6 and 7. A condenser 8 is connected in parallel with the oscillator.

Leading from the primary of the induction-coil 1 are wires 9 and 10. The wire 9 leads to a movable terminal or interrupter, as the armature 11. The wire 10 leads to a fixed terminal 12. The primary of the induction-coil, wires 9 and 10, and armature 11 form what may be termed a "transmitting-circuit."

13 is a condenser which shunts the interrupter.

14 is a battery in the transmitting-circuit.

15 is a resistance which is connected by wire 16 with wire 10 and has a terminal 17, which lies in the path of movement of the interrupter 11. The interrupter lies normally in contact with the terminal 12 and closes the transmitting-circuit.

The means for actuating the interrupter 11 preferably comprises a magnet 18, which is connected in a controlling-circuit formed in part by wires 19 and 20.

21 is a key for closing the controlling-circuit.

22 is a battery connected in the controlling-circuit.

Referring to the receiving apparatus, Fig. II, 23 is a self-restoring wave-receiver or coherer. The wave-receiver is similar to an ordinary coherer in construction and differs therefrom in the character of the powder, which instead of being a metallic powder is a mixture composed of non-conducting particles and conducting particles. The non-conducting particles may be of powdered glass. The conducting particles may be a powdered alloy composed of silver and tin. The proportion of non-conducting particles and conducting particles may preferably be equal. 24 and 25 are wires having terminals 26 and 27 which extend into the earth. The wires 24 and 25 and the portion of earth between the termi-

nals may be termed the "receiving-station." 28 is a condenser connected in the receiving-station in series with the wave-receiver. 29 designates a local circuit in parallel with the receiving-station. A signal-receiving device, as a telephone-receiver 30, may be connected in the local circuit in parallel with the wave-receiver. 31 is a battery in the local circuit 29. The capacities of the condensers 8 and 28 should be equal.

The operation of the method is as follows: Upon closing the controlling-circuit by key 21 the magnet 18 attracts the armature 11, causing it to break the transmitting-circuit, and thereby causing a spark at terminals 6 and 7, which produces oscillating electric currents between the terminals 4 and 5, which currents being of high frequency are confined to the surface of the earth. These currents spread from the terminals 4 and 5 in large arcs for an indefinite distance according to the present accepted theory. When the armature 11 contacts with the terminal 17, the resistance 15 is connected in the transmitting-circuit. When the key 21 retracts, the armature 11 being released by magnet 18 is drawn by its spring away from the terminal 17 and another spark is produced at the terminals 6 and 7, which spark, however, produces a weaker oscillating electric current over the surface of the earth by reason of the reduction of the tension of the current in the transmitting-circuit due to the resistance 15. Thus when the armature 11 breaks from terminal 12 a relatively strong spark is produced at terminals 6 and 7, and when the armature 11 breaks from terminal 17 a relatively weak spark is produced at terminals 6 and 7. Thus for a complete movement of the key 21 down and up two contrasted sounds are heard at the receiving-station, the first sound on the downstroke being loud and the second sound on the upstroke being light. No spark is produced when armature 11 makes contact with terminal 17, nor is a spark produced when armature 11 makes contact with terminal 12, the relatively strong and weak sparks being respectively produced only at the time of the armature 11 breaking from contact 12 and at its time of breaking from contact 17. The contrast in the loud and low sounds heard in the telephone 30 at the receiving-station corresponds to the contrast between the strong and weak sparks at terminals 6 and 7. Every signal thus comprises a loud sound first and a low sound next, the two sounds being separated by an interval which is determined by the action of the sending-key 21. The operator may produce a "dot" by a quick down-and-up movement of the key, and may produce a "dash" by holding the key down to prolong the interval, the termination of each interval being marked by the second sound, which occurs when the key is raised.

Other devices than the telephone shown may be employed, and the receiver 23 may be of any desired suitable type.

We have shown the method as being carried out with both terminals 4 and 5 grounded; but the method is equally applicable where one or both of the terminals 4 and 5 are aerial.

It is obvious that a Rhumkorff coil could be employed in place of the transformer 1, which substitution would lie, obviously, within the scope of our invention, and in the event that a Rhumkorff coil was used sparking would be continuous at the terminals 6 and 7 during the passage of the armature 11 from contact 12 to contact 17, and these sparks would be relatively strong, while sparking would also be continuous at terminals 6 and 7 during the return passage of armature 11 from contact 17 to contact 12, and these latter sparks would be relatively weak, thus producing oscillating electric currents of relative time duration and strength. It is obvious that signals made in the latter way may be as readily determined and utilized as signals made in the former way; but we prefer to employ the ordinary transformer, for the reason that the signals produced are more nearly analogous to signals employed in other methods of telegraphy.

What we claim is—

1. The method of signaling which consists of propagating waves utilized in wireless telegraphy and defining each wave by energizing the primary of the induction-coil with electrical impulses of dissimilar tensions.

2. The method of signaling which consists of propagating waves utilized in wireless telegraphy and defining each wave by energizing the primary of the induction-coil with an initial electrical impulse of relatively high tension and then with an electrical impulse of a lower tension.

In testimony whereof we have signed our names to this specification, in the presence of two witnesses, at Los Angeles, California, this 20th day of June, 1902.

RICHARD W. SHOEMAKER.
LAWSON H. GIDDINGS.

Witnesses:
GEORGE T. HACKLEY,
JAMES R. TOWNSEND.