No. 756,720. PATENTED APR. 5, 1904.

# H. SHOEMAKER.

## WIRELESS SIGNALING SYSTEM.

APPLICATION FILED JUNE 26, 1903.

NO MODEL.

Fig 1.

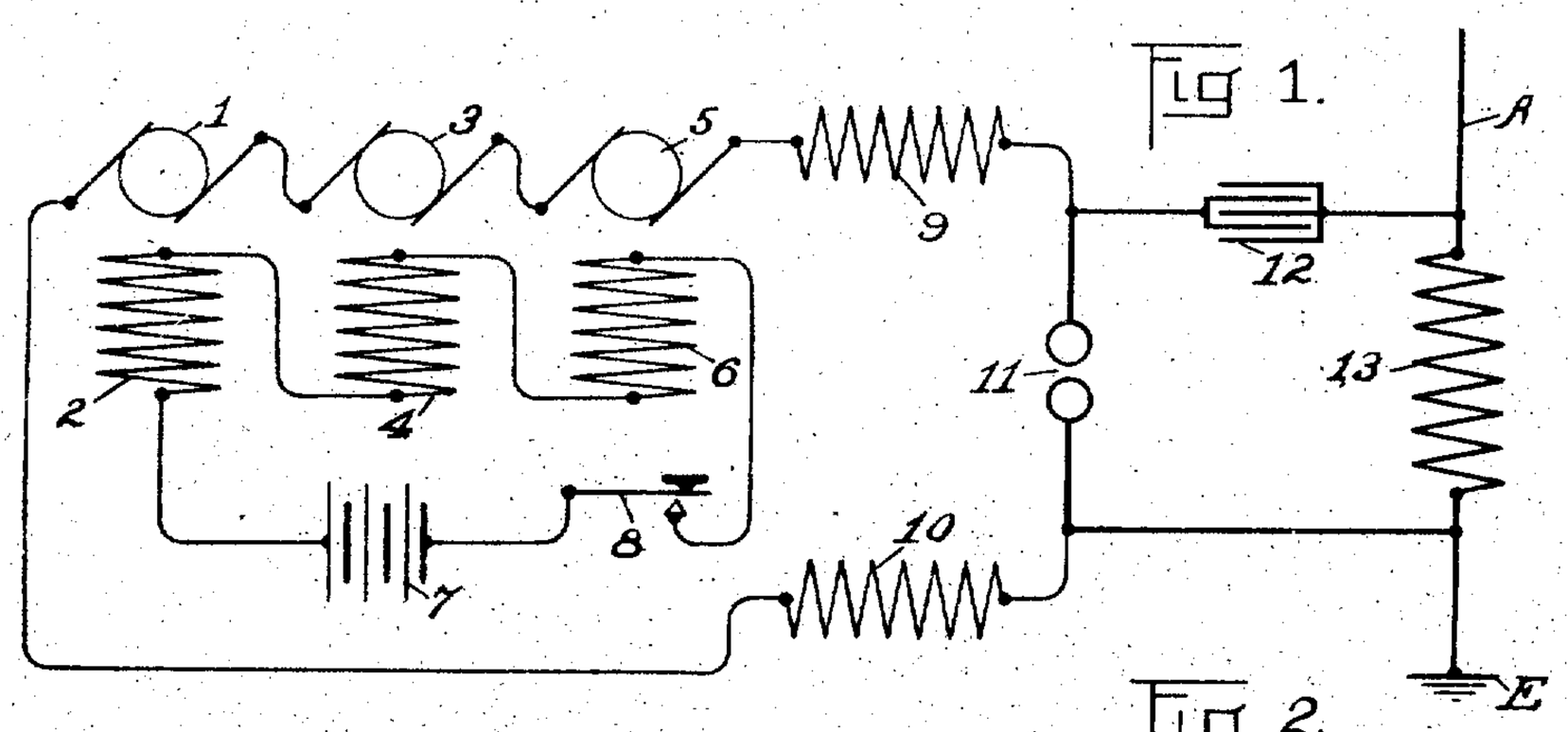
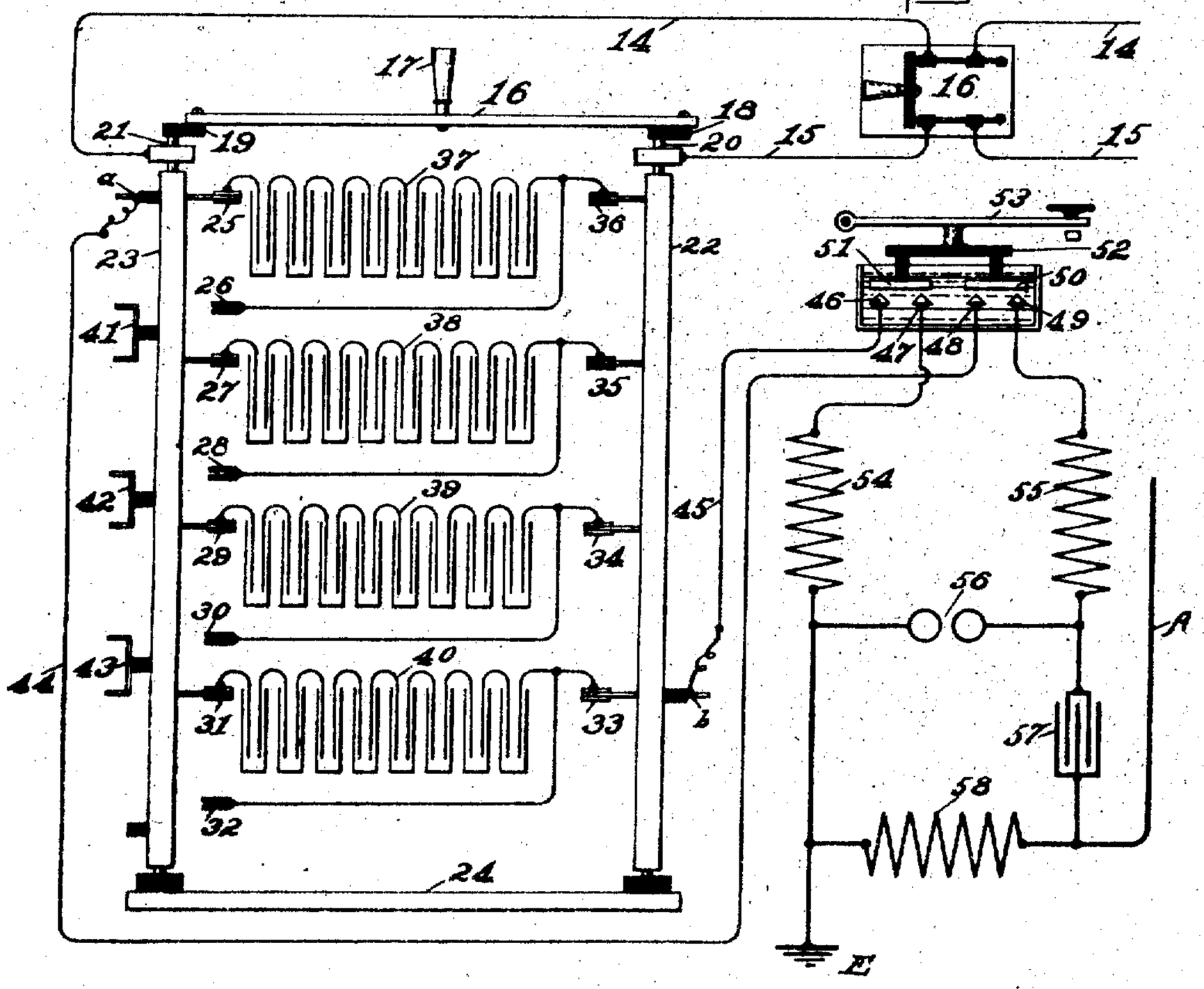



Fig 2.




Witnesses
James M. Sawyer.
Bernard A. Gallert

Inventor
Harry Shoemaker
by Cornelius D. Ehret
his Attorney

No. 756,720. Patented April 5, 1904.

# UNITED STATES PATENT OFFICE.

HARRY SHOEMAKER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO MARIE V. GEHRING, OF PHILADELPHIA, PENNSYLVANIA.

## WIRELESS SIGNALING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 756,720, dated April 5, 1904.

Application filed June 25, 1903. Serial No. 162,998. (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 Wireless Signaling System, of which the following is a specification.

My invention relates to the transmission of signals or messages by energy of the electroradiant form transmitted through the natural media.

My invention consists of an apparatus for impressing the electroradiant energy representing a signal or message upon the natural media.

My invention consists in deriving high-frequency oscillations from a source of high-potential direct current and impressing upon the natural media the electroradiant energy derived from the high-frequency oscillations.

My invention consists in supplying to a freely-oscillating circuit direct-current energy and employing the energy of the high-frequency oscillations resulting in the oscillating circuit for any purpose whatsoever.

Heretofore in wireless signaling it has been the practice to impress upon a freely-oscillating circuit a high-potential alternating current, such alternating current being derived from step-up transformers and kindred apparatus. By my system, however, a source of high-potential direct current is employed, the result being greater persistency of the oscillations in the freely-oscillating circuit, because the potential existing across the terminals of said circuit is constant and not fluctuating, as in the case of an alternating-current supply.

Referring to the accompanying drawings, Figure 1 is a diagrammatic view of the circuits of a transmitter involving my invention. Fig. 2 is a diagrammatic view of modified form of transmitter in which a plurality of banks of storage-cells are employed as the source of high-potential direct current.

At 1, 3, and 5 are represented the armatures of dynamo-electric generators of the direct-current type, whose field-windings are represented at 2, 4, and 6, respectively. These generators are wound for high potential—that is, with the usual field strength—and with the usual speed of rotation the armatures produce a very high electromotive force in virtue of a very great number of convolutions or turns upon each armature. The field-windings are here shown in series with each other, a source of energy 7, and an operator's key 8. I prefer to wind the fields with relatively few turns of conductor in order to reduce the self-induction of the field-circuit in order that the field-magnetism may build up quickly and promptly upon each closure of the key 8. When employing a relatively small number of turns upon each field-winding, the field-conductor is made relatively large and a relatively large current passed through them in order that the magnetizing force may be sufficiently great.

In circuit with the several armatures of the generators are the high inductances 9 and 10, communicating with the spark-gap 11. In shunt to the spark-gap 11 are the condenser 12 and inductance 13. In shunt to said inductance 13 is connected the radiating circuit or conductor comprising the aerial conductor A and the earth connection E.

The method of operation is as follows: At each closure of the key 8 the fields of the several generators are excited and there is immediately impressed upon the spark-gap 11 a very high potential. The condenser 12 is charged to a high potential, and when said potential reaches a critical point the spark-gap 11 breaks down and there are set up in the circuit 12, 13, and 11 high-frequency oscillations, the frequency depending upon the capacity inductance and resistance of the circuit 11 12 13, as is well understood in this art. The effect of these high-frequency oscillations is to cause surgings of charge at an equivalently high rate in the aerial conductor A, resulting in the production of electroradiant energy in the usual way. It is thus seen that condenser 12 is continuously charged to a high potential by the direct-current source, and it is impossible, therefore, to obtain practically continuous high-frequency oscillations in the freely-oscillating circuit.

Relatively great inductances 9 and 10 pre-

vent any fluctuation in the direct-current circuit and also prevent any high-frequency oscillations from dissipating themselves in the direct-current circuit.

The usual blow-out magnet or air-blast may be employed at the spark-gap 11 to prevent a direct-current arc across such gap.

In Fig. 2, 14 and 15 are the supply-conductors of a low-potential direct-current circuit, which continue through the double-pole switch 16 to the conducting-shafts 21 and 20, respectively. These shafts bear at their lower ends in insulated bearings on the member 24. 18 and 19 are cranks of insulating material secured to the shafts 21 and 20. These cranks are connected together at their pins by the bar 16, carrying the handle 17. By means of the handle 17 the shafts 20 and 21 may be rotated. The shafts 20 and 21 carry the metallic cylinder portions 22 and 23, respectively. On the member 22 are carried several switch-blades, which may pass between and through the jaws of the contacts 33, 34, 35, and 36. Similarly member 23 carries several switch-blades coöperating with contacts 25, 27, 29, and 31. In the position shown current is passing through these switch-blades and contacts, so that the banks of storage batteries 37, 38, 39, and 40 are being charged in parallel from the conductors 14 and 15. When it is desired to discharge the storage-cells in series for the purpose of obtaining a high potential, the switch 16 is opened and the members 22 and 23 rotated through a half-revolution by the handle 17. In this case contact is broken at 34, 35, and 36 and established between the contact 33 and the switch-blade *b*. Likewise contact is broken between the switch-blades heretofore referred to and the contacts 25, 27, 29, and 31. Bridge-piece 41, however, engages and bridges contacts 26 and 27, 42 bridges 28 and 29, and 43 bridges 30 and 31, and the switch-blade *a* engages contact 25. The result is that all the storage-cells are thrown into series and the terminals are at *a* and *b*. The switch-blades *a* and *b* are insulated from members 23 and 22, respectively, and bridging members 41, 42, and 43 are insulated from member 23. From the terminals *a* and *b* the conductors 44 and 45 lead to the key-contacts 46 and 48, respectively. The operator's key is shown at 53 and carries an insulating member 52. Secured to 52 are two bridging contacts 50 and 51. Upon a depression of the key, contacts 46 and 47 are bridged by contact 51, and 48 and 49 are bridged by 50, thus according to communication between the high-potential battery and the freely-oscillating circuit 56 57 58 through the great inductances 54 and 55. As shown, the key-contacts are immersed in oil or other medium tending to prevent arcing.

The inductances 54 and 55 and the freely-oscillating circuit 56, 57, and 58 are similar to the arrangement described in connection with Fig. 1, 56 being the spark-gap, 57 the condenser, and 58 the inductance, to which are connected the aerial conductor A and a connection to earth-plate E.

Though I have shown in Fig. 1 but three generators, it is to be understood that a greater or less number may be employed, if desired, and the field-windings may be connected in parallel with each other or in any other manner instead of in series, as shown. It is to be further understood that in place of the precise arrangement of circuits shown there may be used a high-potential source of direct current in connection with the freely-oscillating circuit and the energy of the freely-oscillating circuit may be impressed upon the radiating circuit or conductor through inductive means in place of conductive means, as shown.

What I claim is—

1. In a transmitter, a source of direct current, a freely-oscillating circuit supplied thereby, large inductance-coils between the said source of direct current and said freely-oscillating circuit, and means for impressing the energy of the oscillating circuit upon a radiating circuit or conductor.

2. In a transmitter, a source of high-potential direct current, a freely-oscillating circuit supplied thereby, large inductance-coils between the said source of direct current and said freely-oscillating circuit, means for controlling the direct current by and in accordance with the signal to be sent, and means for impressing the energy derived from the freely-oscillating circuit upon the natural media.

3. In a transmitter, a source of high-potential direct current, a freely-oscillating circuit supplied thereby, large inductance-coils between said source of current and said freely-oscillating circuit, means for impressing the energy of the oscillating circuit upon a radiating circuit and a key for said source of direct current.

4. In a transmitter, a source of high-potential direct current, a freely-oscillating circuit supplied thereby, large indutance-coils between said source of current and said freely-oscillating circuit, means for impressing the energy of the oscillating circuit upon a radiating circuit and a key with contacts in oil for said source of direct current.

5. In a transmitter, a direct-current circuit, a plurality of banks of storage batteries, means for charging said banks of batteries in parallel and for discharging them in series, means for impressing the energy of said batteries upon a freely-oscillating circuit and means for impressing the energy of said freely-oscillating circuit upon a radiating circuit.

6. In a transmitter, a freely-oscillating circuit containing an inductance-coil, a radiating conductor connected to the terminals of said coil, and means for charging a plurality of banks of storage batteries in parallel and

for connecting them in series with said freely-oscillating circuit.

7. In a transmitter, a plurality of banks of storage batteries, contacts for each bank of batteries, two conducting-bars carrying switch-blades, means for rotating said bars so as to connect said banks of batteries in parallel for charging or in series for discharging, means for impressing the energy of said batteries when in series upon a freely-oscillating circuit and means for impressing the energy of said freely-oscillating circuit upon a radiating conductor.

8. In a transmitter, a radiating conductor, a freely-oscillating circuit connected therewith, a key with contacts in oil, large inductance-coils between said key and said oscillating circuit, and a source of direct current adapted to be impressed upon said oscillating circuit by said key.

9. In a transmitter, a radiating conductor, a freely-oscillating circuit connected therewith, a plurality of banks of storage batteries and a key with contacts in oil for connecting said batteries with the freely-oscillating circuit.

10. In a transmitter, a radiating conductor, a freely-oscillating circuit connected therewith, a plurality of banks of storage batteries, a key with contacts in oil for connecting said banks of batteries with the freely-oscillating circuit and large inductance-coils between said key and said oscillating circuit.

11. In a transmitter, a radiating conductor, a freely-oscillating circuit connected therewith, a plurality of banks of storage batteries, means for charging said banks of batteries in parallel and for discharging them in series and a key with contacts in oil for connecting said banks of batteries with the freely-oscillating circuit.

12. In a transmitter, a radiating conductor, a freely-oscillating circuit connected therewith, a plurality of banks of storage batteries, means for charging said banks of batteries in parallel and for discharging them in series, a key with contacts in oil for connecting said banks of batteries with the freely-oscillating circuit and large inductance-coils between said key and said freely-oscillating circuit.

13. In a transmitter, a radiating circuit, a freely-oscillating circuit connected therewith, a plurality of banks of storage batteries, a rotary frame carrying one set of switch-blades for connecting said batteries in parallel with a direct-current circuit and also carrying a second set of switch-blades for connecting said batteries in series and means for impressing the energy of said batteries when connected in series upon said freely-oscillating circuits.

14. In a transmitter, a radiating circuit, a freely-oscillating circuit connected therewith, a plurality of banks of storage batteries, means for connecting said batteries in parallel for charging, means for connecting said batteries in series for discharging and means for connecting said batteries when in series with said oscillating circuit.

15. In a transmitter, a radiating circuit, a freely-oscillating circuit connected therewith, a plurality of banks of storage batteries, means for connecting said batteries in parallel for charging, means for connecting said batteries in series for discharging, large inductance-coils between said batteries and said freely-oscillating circuit and a key for connecting said batteries when in series with said oscillating circuit.

16. In a transmitter, a circuit containing a spark-gap, a condenser and a coil, a radiating conductor connected to said coil, a source of direct current, and large inductance-coils connected between said source of direct current and said spark-gap.

17. In a transmitter, a circuit containing a spark-gap, a condenser and a coil, a radiating conductor connected to said coil, a source of high-potential direct current and large inductance-coils connected between said source of high-potential direct current and said spark-gap.

18. In a transmitter, a circuit containing a spark-gap, a condenser and a coil, a radiating conductor connected to said coil, a source of direct current, large inductance-coils connected between said source and said spark-gap and a key connected between said inductance-coils and said source.

19. In a transmitter, a circuit containing a spark-gap, a condenser and a coil, a radiating conductor connected to said coil, a source of high-potential direct current, large inductance-coils connected between said source and said spark-gap and a key connected between said inductance-coil and said source.

20. In a transmitter, a circuit containing a spark-gap, a condenser and a coil, a radiating conductor connected to said coil, a source of direct current, large inductance-coils connected between said source and said spark-gap and a key with contacts in oil connected between said inductance-coils and said source.

21. In a transmitter, a circuit containing a spark-gap, a condenser and a coil, a radiating conductor connected to said coil, a source of high-potential direct current, large inductance-coils connected between said source and said spark-gap and a key with contacts in oil connected between said inductance-coils and said source.

HARRY SHOEMAKER.

Witnesses:
ALICE T. BURROUGH,
JNO. P. CROASDALE.