No. 711,130. Patented Oct. 14, 1902.

H. SHOEMAKER.

WIRELESS TELEGRAPHY.

(Application filed Oct. 16, 1901.)

(No Model.)

Fig 1.

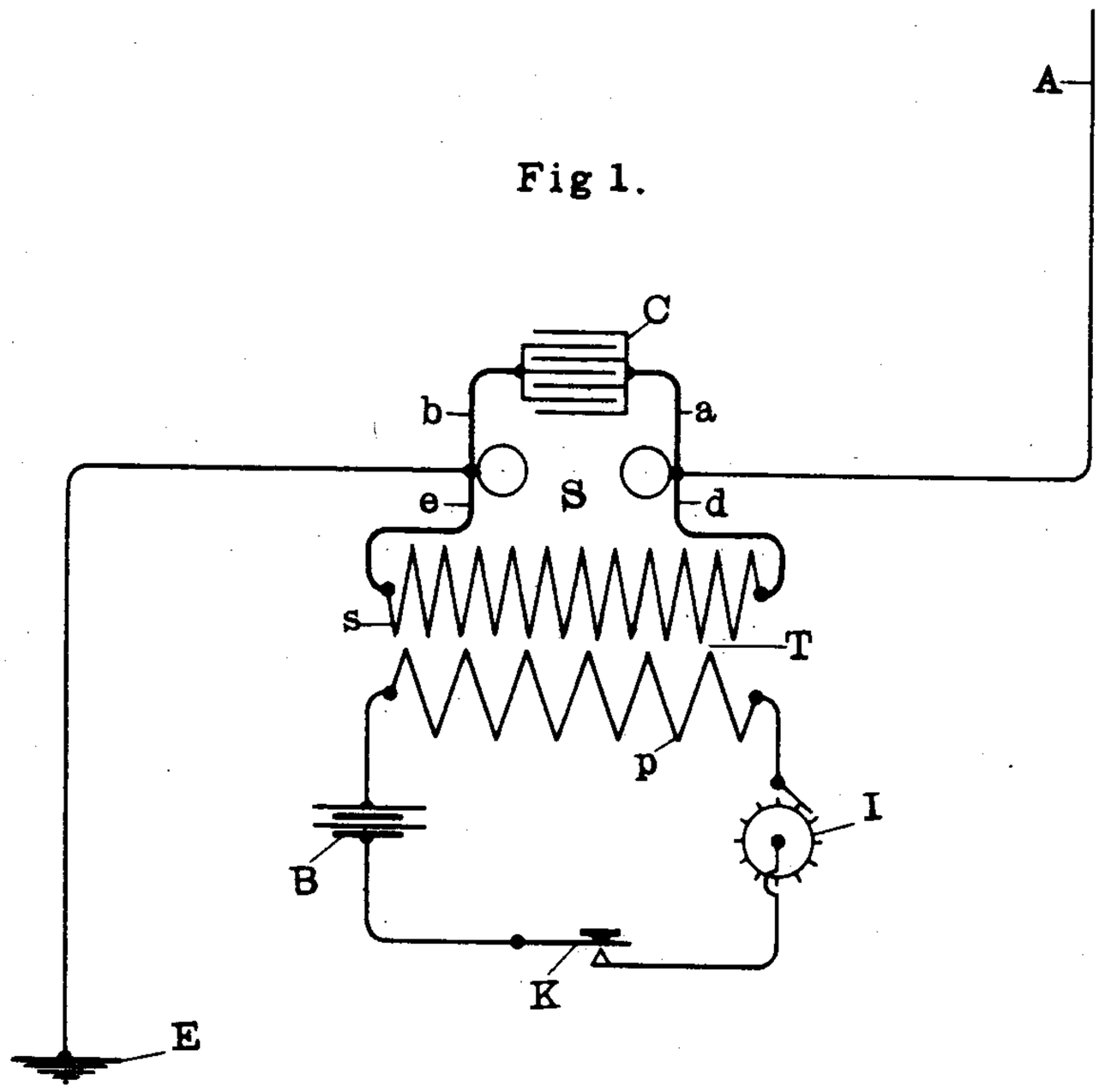
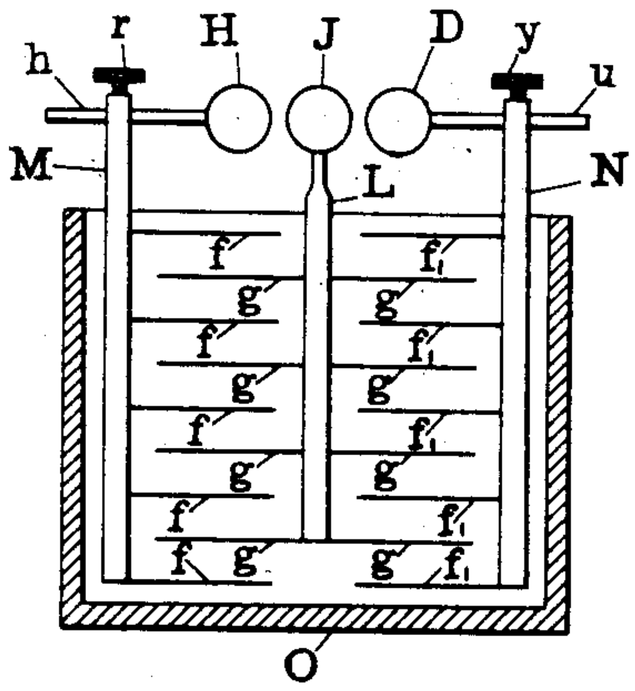


Fig 2.



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WIRELESS TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 711,130, dated October 14, 1902.

Application filed October 16, 1901. Serial No. 78,874. (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 certain new and useful Improvements in Wireless Signaling Systems, of which the following is a specification.

This invention relates to wireless signaling systems in which the signal or message is represented by electroradiant energy and is transmitted through the natural media.

This invention relates more particularly to the transmitting apparatus, especially the circuit arrangements thereof, whereby efficient transmission is attained.

More particularly, it relates to the disposition of a capacity or condenser with relation to the usual spark-gap of an oscillator, whereby great efficiency in the transmitting apparatus is attained.

My invention consists also of a disposition of a condenser with relation to the radiating-circuit whereby a great amount of energy may be radiated in a certain interval of time, and whereby the transmitting-transformer may be caused to deliver at the spark-gap more energy than has heretofore been possible.

It has heretofore been the custom in wireless signaling systems to insert in the aerial radiating-conductor a spark-gap in shunt to which is the secondary winding of the usual transmitting coil or transformer. By this arrangement it was seldom possible to radiate as electromagnetic waves as much energy as the transformer was able to supply in case it were used in the arts of electric lighting or power transmission. In other words, it was impossible to load the transformer to a point anywhere near its capacity.

By the employment of a properly-proportioned condenser in shunt to the spark-gap I have been enabled to get results with an aerial conductor of a certain size and a transformer of a certain capacity which I have never been able to attain without the use of such condenser. I connect the armatures of the condenser to the spark-gap terminals by a direct connection—that is, by means of conductors which are very short and thick—thereby avoiding any inductance in such connections. If long conductors of small diameter were employed for such connections, considerable inductance would be present and my system would operate differently on a different principle and produce different results.

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

Figure 1 is a diagrammatic view of the circuits of my transmitting apparatus. Fig. 2 is a view of a special type of condenser which I have employed in the system herein described.

A represents the aerial radiating-conductor, between which and the earth-plate E is the spark-gap S. In shunt to this spark-gap S is connected the secondary *s* of the transformer T by means of the conductors *e* and *d*.

At *p* is shown the primary of the transformer T, and in circuit with such primary is the source of energy B, operator's key K, and the interrupter I.

In shunt to the spark-gap S there is connected also the condenser C by means of the short thick conductors *a* and *b*. These conductors in virtue of their dimensions possess negligible self-induction, and the result is, for all practical purposes, that the armatures of the condenser C are in direct communication with the terminals of the spark-gap.

The conductors *d* and *e* are shown on the drawings as of large diameter, but such dimensions are unnecessary. It is immaterial whether or not the conductors *d* and *e* possess self-induction, because they are, in fact, a portion of the secondary winding *s*, which has very great self-induction. The presence of the condenser in shunt to the spark-gap S means also, in the arrangement of circuits shown, that the condenser C is also in the circuit of the secondary winding *s*. The condenser C operates, therefore, as a condenser connected in series in a circuit with an inductance, and therefore operates, as is well understood in the art of fluctuating or alternating currents, to counteract the effect of the inductance and permit a larger current-flow in such circuit under a predetermined electrical pressure. In other words, the con-

denser C operates to permit the flow of a greater amount of energy from the transformer than would be possible were such condenser absent. Furthermore, the presence of the condenser in the disposition shown in the aerial circuit causes also a great amount of energy to be radiated as electromagnetic waves in a definite interval of time. The condenser C is, in fact, a part of the radiating-circuit, and because the connections from the condenser to the terminals of the spark-gap possess an inductance or self-induction which is practically *nil* the condenser is not in a local freely-oscillating circuit, which would then set the period of the oscillations in the aerial conductor and which would determine the period of the electromagnetic waves. By my system, therefore, with a transmitting-transformer of definite capacity and with the radiating-circuit of certain dimensions it is possible to radiate a greater amount of electromagnetic-wave energy in a definite interval of time, due to loading the transformer to a higher point than heretofore, and by the disposition of the condenser in the aerial circuit, which causes it to radiate great amounts of energy in very few oscillations.

The condenser shown in Fig. 2 is contained in a vessel O, containing a liquid dielectric. M is a post which is in electrical communication with the leaves *f*, forming one armature of the condenser. N is a post in electrical communication with the leaves *f*, forming another armature of the condenser. In the top of post M may be adjusted the rod *h*, which carries at its end the spark-ball H. Through the top of post N passes the rod *u*, which carries at its end the spark-ball D. The rods *h* and *u* are clamped in position by the thumb-screws *r* and *y*, respectively. Between the spark-balls H and D is a third spark-ball J, mounted at the upper end of the rod L, which is in electrical communication with the leaves of the condenser *g*.

In practice the aerial conductor is connected directly to the rod N, while the earth connection is made directly to the rod M.

It is to be understood that the condenser shown in Fig. 2 is not necessary in my system, though it produces advantageous results. As shown in Fig. 1, the ordinary type condenser may be used, but is preferably adjustable for the purpose of obtaining the proper relation with respect to the aerial circuit and with respect to the secondary of the transformer. It is to be understood also that in place of the battery B and interrupter I in the primary of the transformer T there may be used, and it is the preferable arrangement, a source of true alternating currents.

What I claim is—

1. In a wireless signaling system, an aerial conductor, a spark-gap in series therewith, a source of energy in shunt with said spark-gap, and a condenser directly connected in shunt to said spark-gap.

2. In a wireless signaling system, a radiating-conductor, a spark-gap in series therewith, a condenser directly connected in shunt to said spark-gap, and a source of energy in connection with said spark-gap.

3. In a wireless signaling system, a radiating-conductor, a capacity in series therewith, a spark-gap having its terminals in direct connection with the terminals of the capacity, and a source of energy connected across the terminals of said spark-gap.

4. In a wireless signaling system, a radiating-conductor, a spark-gap associated therewith, a source of energy in shunt to said spark-gap, and a condenser having its armatures in direct connection with the terminals of said spark-gap.

5. In a wireless signaling system, a radiating-conductor, a large capacity in series therewith, and a spark-gap directly in shunt to said capacity.

6. In a wireless signaling system, a radiating-conductor, a capacity in series therewith, a spark-gap, conductors of negligible inductance joining the terminals of said capacity with the terminals of said spark-gap, and a source of energy in shunt to said spark-gap.

7. In a wireless signaling system, a transmitting-circuit comprising a source of energy, a spark-gap in connection with said source, and a condenser having its armatures in direct connection with the terminals of said spark-gap.

8. In a wireless signaling system, a radiating-circuit comprising a conductor, a spark-gap in series therewith, and a condenser connected to the terminals of said spark-gap by conductors having negligible inductance.

9. In a wireless signaling system, a radiating-conductor, a spark-gap in series therewith, a large capacity in shunt to said spark-gap by conductors whose self-induction is practically *nil*, and a source of energy in shunt to said spark-gap.

10. In a wireless signaling system, a transmitting-transformer, a radiating-conductor, a capacity in series with said radiating-conductor, and a spark-gap connected in shunt to said capacity by conductors of negligible inductance.

11. In a wireless signaling system, a radiating-conductor, a large capacity in series therewith, and a spark-gap in direct connection with the terminals of said capacity.

12. In a wireless signaling system, a radiating-conductor, a plurality of spark-gaps in series therewith, and a condenser connected in shunt to each spark-gap by connections whose self-induction is practically *nil*.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY SHOEMAKER.

Witnesses:

E. B. HUME,

R. LEAMAN.