H. SHOEMAKER.

TRANSMITTING APPARATUS.

APPLICATION FILED JULY 22, 1908.

927,433. Patented July 6, 1909.

Fig. 1.

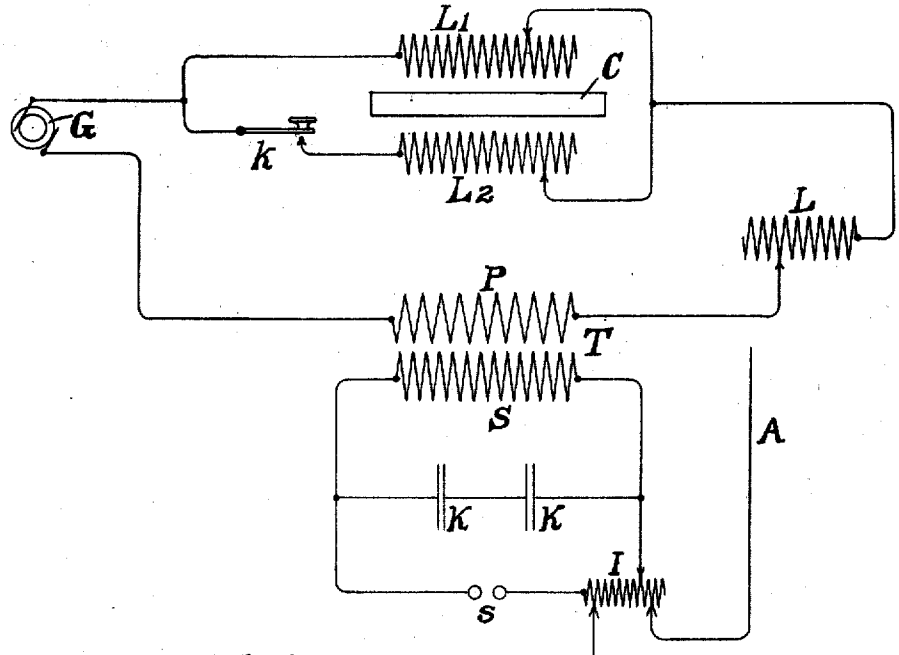
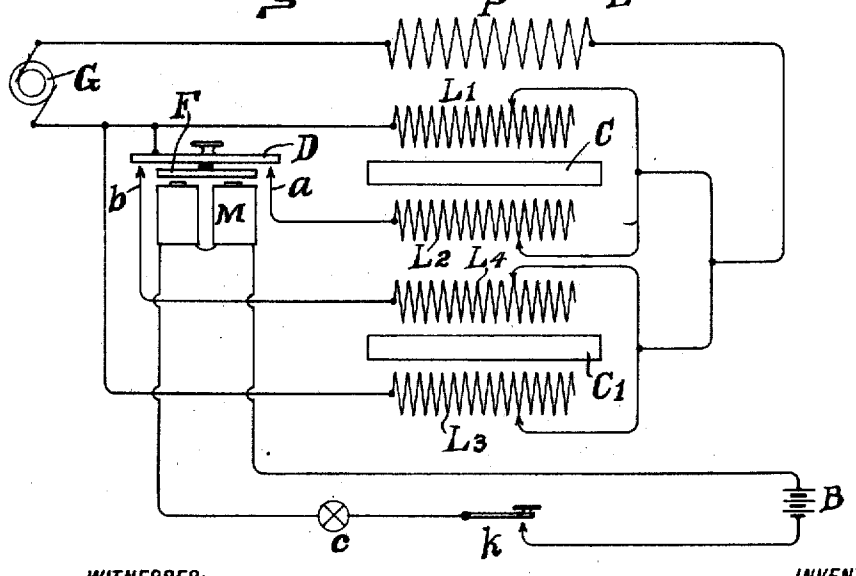


Fig. 2.



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TRANSMITTING APPARATUS.

No. 927,433. Specification of Letters Patent. Patented July 6, 1909.

Application filed July 22, 1908. Serial No. 444,731.

To all whom it may concern:

Be it known that I, HARRY SHOEMAKER, a citizen of the United States, residing in Jersey City, county of Hudson, State of New Jersey, have invented certain new and useful Improvements in Transmitting Apparatus, of which the following is a specification.

My invention relates to the control of electrical energy, particularly by a telegraph key or other transmitter, and more especially when used in connection with alternating currents, as in a wireless or other signaling system.

It is the object of my invention to control electrical energy, particularly when in the alternating current form, as used in the transmitting apparatus of a wireless telegraph or other system, where the amount of energy to be controlled is relatively great and yet to be controlled by a key or other transmitter operated to represent dots and dashes or other characters. To this end, I provide differential inductances, which are arranged preferably as shown in the accompanying drawing, one or more of the inductive windings being always in circuit while the key, when closed, throws into circuit one or more inductive windings in differential relation to that or those permanently in circuit.

My invention resides also in other features hereinafter pointed out and claimed.

For an illustration of two of the forms my invention may take, reference is to be had to the accompanying drawing, in which:

Figure 1 is a diagrammatic view of a wireless telegraph transmitter, involving my invention. Fig. 2 is a diagrammatic view illustrating a modified arrangement.

Referring to Fig. 1, G is a source or generator of electrical energy, preferably alternating current energy. Connected in circuit with such source is a primary P of a step-up transformer and an adjustable inductance L, and also an adjustable inductive winding L^1 disposed upon a laminated or other suitable magnetizable core C. Connected in shunt to the adjustable inductance L^1 is the adjustable inductive winding L^2 and the switch or telegraphic key or other transmitter *k*. The windings L^1, L^2 are preferably similar in resistance and inductance, and preferably of conductors of the same size and of the same number of turns, both windings being disposed about the core C, but differentially wound or connected. The secondary S, of the transformer T, is bridged by the condensers K, and these by a spark gap *s* and the adjustable inductance I. A is the aerial conductor, of any suitable form, of a wireless telegraph transmitting station, between which and the earth connection E is connected a variable portion of the inductance I. The inductive winding L^1 is always in circuit with the generator G and the primary P and the value of the current flowing in the circuit will depend upon the inductance of such winding L^1 together with other factors of the circuit, and this current value may be made anything desired. When the key *k* is depressed, current will also flow through the inductive winding L^2, but since these coils are in differential relation with respect to each other, and if they are substantially similar in magnetizing effects, the magnetizing effect upon the core C becomes practically zero, and the value of the combined self-induction of the two coils, L^1 and L^2, is reduced to practically zero and, in consequence, a very much greater current will flow through the primary P. And, as well known, the secondary S charges the condensers K, K and they discharge through the spark gap *s* and the inductance I at high frequency, as well understood in the art of electromagnetic waves, causing electro-radiant energy to be radiated from the aerial conductor A in trains, groups or amounts to represent characters. In practice, it is preferable to have the two coils L^1 and L^2 adjustable so as to secure any desired effect. It is to be understood, however, that the coils L^1, L^2 may be dissimilar in inductive effect, turns, resistance, etc. However, by the arrangement shown the current value through the primary P of the transformer may be varied within any range from practically no current to full current value. The adjustable inductance L may be employed to determine the value of the current flowing in the primary P when the key *k* is open. A resistance may be used in its stead, or it may be omitted altogether.

In Fig. 2 the primary P of the transformer is again shown in circuit with the source G, but the secondary and the oscillating circuit, aerial conductor, etc., are omitted. Here, there are continuously in circuit with the primary P and in parallel with each other the inductive windings L^1 and L^2 associated respectively with the adjustable cores 3 and C^3. And associated with the winding L^1 and

the core C, and differential with respect to the coil L^1, is the inductive coil or winding L^2. And, similarly, there is associated with the core C^1 and the inductive winding L^3 the inductive winding L^4 in differential relation with respect to the coil L^3. All these windings are adjustable as shown, and as described in connection with Fig. 1. The coils L^3 and L^4 are thrown into parallel with the coils L^1 and L^3 respectively when the member D, connected with one terminal of the source G, is pulled downwardly into engagement with the contacts *a* and *b*, forming the terminals respectively of the windings L^2 and L^4. The member D is operated by the relay or other magnets M whose armature F is connected to the member D, the magnets M being energized by current from the battery or other source B, under the control of the key *k*, a switch or other device *c* being included in the key circuit. When the key *k* is depressed the electromagnets M are energized and attract the armature F causing the member D to engage the contacts *a* and *b*, thus throwing the coils L^2 and L^4 into parallel with the coils L^1 and L^3 respectively. Thus, some current is flowing through the primary P at all times, but upon the depression of the key, far greater current flows through the primary P.

In the cases of both Figs. 1 and 2 the current normally flowing through the primary P is insufficient to cause sparking at the gap *s*, but when the key is depressed the current through the primary is greatly increased and is not only sufficient to cause sparking at the gap *s*, but sufficient to send a very powerful signal.

By the arrangements above described, great amounts of energy may be easily handled by a simple key without danger to the key points or contacts and without serious sparking or arcing. And while in Fig. 2 two pairs of differential coils are shown in parallel with each other and in series with the primary P, it is to be understood that more pairs may be so used either in parallel, or in series, or in other relation.

While in Fig. 2 two contacts *a* and *b* are engaged to exercise the control, such contacts may be engaged by the member D either simultaneously or non-simultaneously.

By the arrangements herein shown and described, the primary current is kept below the value required for sparking at the spark gap, and when the key is pressed there is no loss of energy in the primary circuit since the resistances of the coils are low and when thrown into parallel, the combined resistance is practically zero.

What I claim is:

1. In a transmitter of electro-radiant energy, the combination with a source of energy, of oscillation producing means deriving energy therefrom, differentially related inductances associated with said source, and a key for cutting in and out an inductance of said differentially related inductances.

2. In a transmitter of electro-radiant energy, the combination with a source of energy, of oscillation producing means deriving energy from said source, a plurality of pairs of differentially related inductances associated with said source, and a key for cutting in and out an inductance of each pair.

3. In a transmitter of electro-radiant energy, the combination with a source of energy, of means for producing oscillations deriving energy from said source, differentially related inductances associated with said source, and a key for cutting an inductance in and out of parallel relation with a differentially related inductance.

4. In a transmitter of electro-radiant energy, the combination with a source of energy, of means for producing oscillations deriving energy from said source, a plurality of pairs of differentially related inductances connected in parallel with each other, and means for cutting an inductance of each differential pair into and out of parallel relation with its associated inductance.

5. In a transmitter of electro-radiant energy, the combination with a source of current, of means for producing high frequency oscillations deriving energy from said source, a plurality of inductances associated with said source, and signaling means for rendering the effect of said inductances practically *nil*, whereby increased energy is supplied to said oscillation producing means.

6. In telegraphic transmitting apparatus, the combination with a source of fluctuating energy, of differentially related inductances associated with said source, and a key for cutting in and out an inductance of said differentially related inductances, said inductances coöperating to increase the transmitted energy.

7. In apparatus for telegraphically transmitting relatively great amounts of energy, the combination with a source of fluctuating energy, of differentially related inductances associated with said source, and a key for cutting in and out an inductance of said differentially related inductances, said inductances cooperating to increase the transmitted energy.

8. In transmitting apparatus, the combination with a source of energy, of a plurality of pairs of differentially related inductances associated with said source, and a key for cutting in and out an inductance of each pair.

9. In telegraphic transmitting apparatus, the combination with a source of fluctuating energy, of differentially related inductances associated with said source, and a key for cutting in and out an inductance in parallel with a differentially related inductance, said inductances when in parallel increasing the transmitted energy.

10. In apparatus for transmitting electro-radiant energy, the combination with a source of energy, of oscillation producing means deriving energy therefrom, differentially related inductances associated with said source, and a transmitter for controlling an inductance of said differentially related inductances.

11. In apparatus for transmitting electro-radiant energy, the combination with a source of energy, of oscillation producing means deriving energy therefrom, differentially related inductances associated with said source, and a transmitter for controlling said differentially related inductances, the energy delivered to said oscillation producing means being greater than the energy traversing said transmitter.

In testimony whereof I have hereunto affixed my signature in the presence of the two subscribing witnesses.

HARRY SHOEMAKER.

Witnesses:
E. F. DUFFY,
JAMES M. SAWYER.