

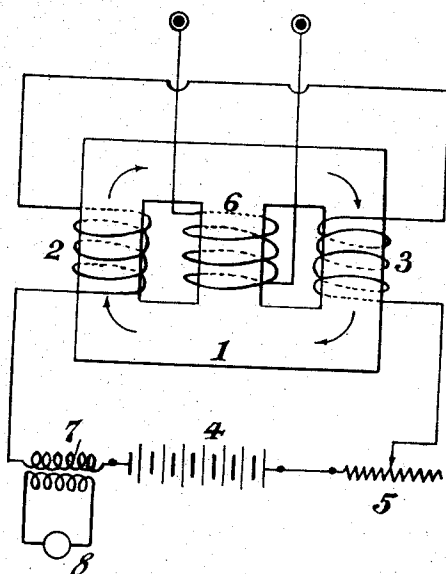
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HIGH FREQUENCY INDUCTANCE

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HIGH-FREQUENCY INDUCTANCE.

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(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

The present invention relates to wireless systems of communication in which the amplitude of the high frequency current traversing the antenna is modulated in accordance with an audible frequency. The object of the invention is to provide a special coil which is inserted in one of the high frequency current circuits and the self induction of which is varied in accordance with the fluctuations of the modulating frequency.

In accordance with a well known method of controlling at will an alternating current without interrupting the circuit of this current, a coil is used which is provided with two windings of a single magnetic circuit. One of the two windings is traversed by the alternating current to be regulated, and the other by the continuous current. By suitably varying the intensity of the continuous current, the self inductance of the coil in said arrangement may be varied as far as the alternating current is concerned and in this manner the amplitude of the alternating current may be regulated.

It is well known that this effect of saturating the core may be obtained by using instead of the continuous current, an alternating current of lower frequency than that of the current to be regulated.

Irrespective of the methods used in the general alternating current art, the present invention provides in a wireless continuous wave transmitter, an arrangement for modulating the amplitude of the high frequency currents of the antenna in accordance with an audible frequency by varying the value of an inductance inserted in the antenna.

In wireless telegraphy, this inductance cannot be readily controlled by means of a simple alternating current in the manner suggested in an allied branch of the electrical art (U. S. Patent 1,337,875) because the modulation obtained is not sufficient.

In accordance with the present invention, I employ a coil, one of the windings of which is traversed by the high frequency antenna current, the saturating effect being obtained by the combined electro-magnetic action of a direct current and an alternating current, the fluxes of which are superimposed in the iron of the magnetic circuit.

Computations and experiments show that under these conditions considerable modulating effect may be obtained and the output of modulated high frequency waves is excellent.

As a matter of fact, if we assume that the high frequency current is modulated simply by means of a low frequency current, the following equation will be obtained for the modulated antenna current:—

$$I_m = I \sin wt (\sin at) \quad (1)$$

in which I_m is the maximum amplitude of the modulated current and I is the maximum amplitude of the antenna current without any modulation.

$$w = 2\pi f$$

f being the sending frequency.

$$a = 2\pi f'$$

f' being the modulating frequency.

On the other hand if a direct current superimposed on the alternating current of the same amplitude is used for the modulation, then we will have

$$I_m = I \sin wt (1 - \sin at) \quad (2)$$

It will be seen that the function (1) varies between zero and 1; whereas, the function (2) varies between zero and 2, which proves that the second method of modulating gives better results than the first method.

The object of the present invention is illustrated in the enclosed drawing in which:

1 is a magnetic core having three branches provided with two windings. The middle branch carries the winding 6 traversed by the antenna current. The side branches carry the coils 2 and 3 interconnected in a manner to form a single winding traversed by the direct current flowing from the source 4 and also by the alternating current generated by the generator 8, e. g., through the agency of a transformer 7. In the drawings the lateral branches are shown as having large cross sections because due to a construction of this type the high frequency energy losses are reduced by reducing the high frequency induction in these branches. Preferably, the coil 6 is arranged in such a manner that it presents the least possible

individual capacity and capacity with respect to the core.

The alternating current source 8 may be of any type. The magnetic circuit 1 may in certain cases consist partially or wholly of nickel instead of iron.

Claims.

1. In a regulating device for controlling a signal wave in a controlled circuit, in combination, a magnetic core having three branches, a winding in co-operative relationship with the middle branch of said core and coupled to the controlled circuit and another winding arranged to be energized by direct currents and alternating currents of audible frequency, said last mentioned winding being mounted in co-operative relationship with the lateral branches of said core.
2. In a regulating device for controlling a signal wave in a controlled circuit, in combination, a magnetic core having three branches, a winding in co-operative relationship with the middle branch of said core arranged to be coupled to the controlled circuit, another winding arranged to be energized by direct currents and alternating currents of audible frequency, said last mentioned winding being mounted in co-operative relationship to the lateral branches of said core, and means for varying the amplitude of the currents traversing said last mentioned winding.
3. In a regulating device for controlling a signal wave and a controlled circuit, in combination, a metallic core having three branches, a winding arranged in co-operative relationship with the middle branch of said core and arranged to be coupled to the controlled circuit, another winding ar-

ranged to be energized by direct currents and alternating currents of audible frequency, said last mentioned winding being mounted in co-operative relationship with the lateral branches of said core, and means for varying the amplitudes of the currents traversing said last mentioned winding.

4. In a device for modulating a signal wave, in combination, a magnetic core member comprising three branches having their corresponding ends connected together, a first winding arranged to be traversed by the signal wave mounted in co-operative relationship with the middle branch and a controlling winding mounted in co-operative relationship with each of the lateral branches of said core and arranged to be traversed by modulating currents, all of said windings being so wound and arranged as to result in substantially zero voltage being induced in the first winding due to the magnetic flux set up by the controlling windings and as to result in the voltages induced in the controlling windings due to the magnetic flux of the first winding being substantially 180% out of phase with each other whereby they substantially neutralize.

5. In a magnetic modulator, a core having lower permeability than iron, and means to apply simultaneously a high frequency field and a signal-varied low frequency field to said core.

6. In a magnetic modulator, a core comprising nickel, and means to apply simultaneously a high frequency field and a signal-varied low frequency field to said core.

In witness whereof, I have hereunto signed my name.

MARIUS LATOUR