

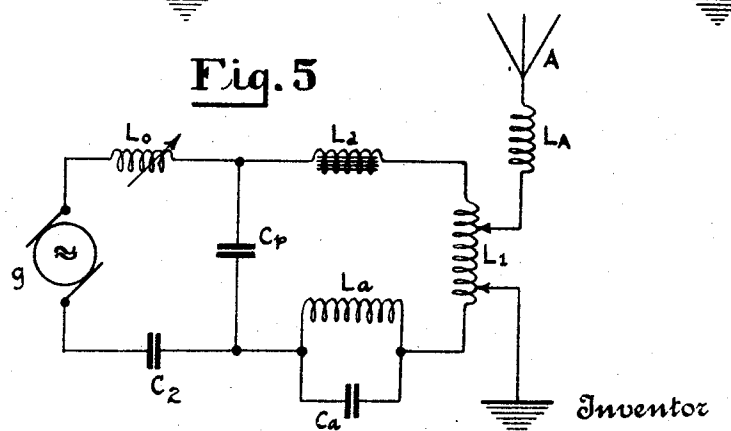
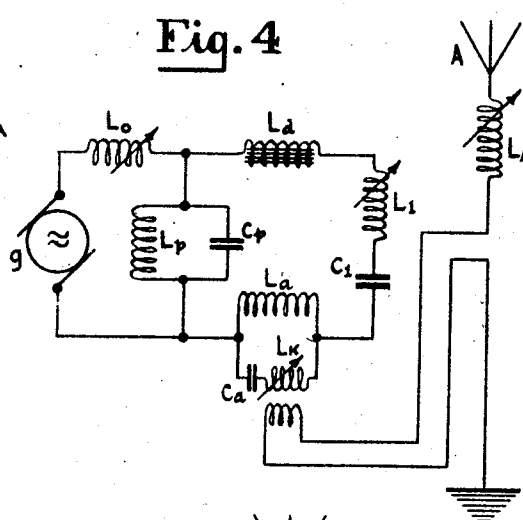
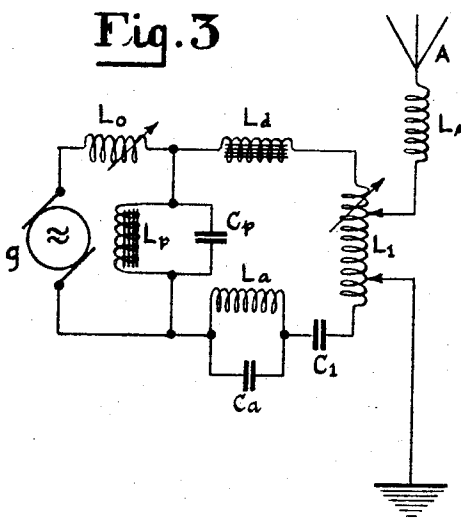
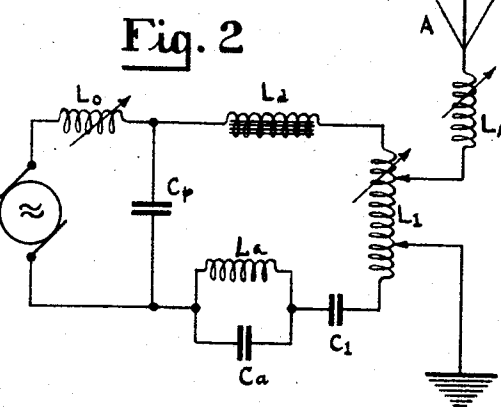
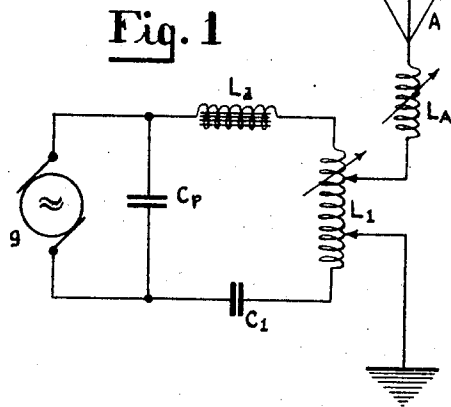
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CIRCUIT ARRANGEMENT FOR HIGH FREQUENCY SENDING STATIONS

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CIRCUIT ARRANGEMENT FOR HIGH-FREQUENCY SENDING STATIONS.

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The present invention is a further improvement on the arrangement described in my application Serial No. 609,215, filed December 27, 1922.

5 In the drawing—

Fig. 1 is a diagrammatic representation of a circuit arrangement embodying the invention described in said application, and

10 Figs. 2 to 5 inclusive are diagrammatic representations of circuit arrangements of various forms embodying the present invention.

In accordance with said application, the generator is connected in parallel with an element, a so-called "trap" comprising a capacity C_p . In determining the optimum properties of this trap, particularly its capacity, the following conditions must be observed. First, the operation of producing oscillations of the basic frequency must proceed in the most favorable manner, for example, the value of the terminal potential of the generator must not under any conditions vary materially from the idle running value, also as far as possible the dynamo must supply only watt current, and also the operation must be as stable as possible, etc. Second, for the purpose of developing the strongest possible harmonic of the desired frequency it is necessary that the oscillating circuit, as a whole, constitute either a tuned or slightly capacitive short-circuit for the desired harmonic, disregarding ohmic losses, but that it constitute an essentially inductive reactance for the other harmonics, or if it constitutes a capacitive reactance for certain other harmonics, this must be so large that no considerable oscillations of undesired frequency will be generated. Third, as far as possible the machine must be protected from all harmonics, operating waves as well as others.

15 The attainment of the second condition is first of all dependent on the value of that part of the station which comprises the above-mentioned capacity C_p , the self-induction of the generator and possibly a further self-induction connected in parallel with the generator.

20 These three requirements are not always in perfect agreement with each other. For

example, if the said condenser comprised in the "trap"—which, as above stated, forms part of the tuning apparatus which determines the development of the necessary overwaves,—is dimensioned for the purpose of satisfying the second requirement, then it may happen that the fulfillment of the other requirements will be very difficult or impossible. In order to obviate this difficulty in laying out the sending station, in accordance with the present invention, a further margin of safety is introduced by providing a tuning device which serves to determine the development of the desired harmonic and which is separate from the trap which is arranged in parallel with the generator. Preferably, this tuning element is composed of a capacity and an inductance provided in parallel with each other and is arranged in series with an iron core choke coil.

The foregoing will be more fully explained by means of the circuit arrangement shown in Fig. 1. In this figure, g is the high frequency generator, C_p and the inductance of the generator is the trap, L_a the iron core choke coil, C_1 a tuning condenser, L_1 a tuning inductance which or a part of which serves also as a coupling with the antenna circuit, A the antenna and L_a the extension coil.

The following should be observed in determining the values of the separate elements of the station.

As far as the basic frequency is concerned, the current of this frequency, as well as all others, passing through the condenser is leading with respect to its terminal potential. Then the branch L_1 , C_1 , L_a must be so tuned that its primary current of basic frequency is lagging, because only in this case can we satisfy the first requirement for the basic frequency. If, for instance, the leading component of the basic frequency at the condenser C_p is exactly equal to the lagging component of the basic frequency in the loading branch L_1 , C_1 , L_a , then the generator is freed from the wattless current and must supply only the minimum of current which is necessary for covering the losses and the operating wattless current output. If, on the other hand, the leading con-

denser current exceeds the lagging current components of the loading branch so that the generator must supply a leading current, no matter to how slight a degree, then the value of the terminal potential of the generator may be made at all times equal to the idle running potential.

It will be seen therefore, that, for the purpose of satisfying the first requirement the condenser must have such a value that its capacitive reactance is near the inductive reactance of the loading branch L_a , C_1 , L_1 for the basic frequency and preferably is equal thereto or slightly smaller.

If, on the other hand, it is desired to determine the value of the condenser C_p which would satisfy the second requirement then, as more exhaustive study of the problem has shown, this must be accomplished by tuning the closed circuit comprising the capacity C_p and the self-induction L_p of the generator g connected in parallel with the capacity C_p for a frequency which is lower than the desired operating frequency, but higher than the next lowest frequency existing in the station. However, if it is attempted to accomplish this, the capacity of the condenser C_p becomes so small that the third requirement cannot be fully satisfied. With respect to the harmonics which are lower than the operating frequency, the inductive reactance of the generator g will be smaller than the capacitive reactance of the condenser C_p , so that it cannot serve satisfactorily as a trap, i. e. as a protection for the generator. Furthermore, the value obtained will be lower than is desirable for satisfying the first condition.

In order to obviate this difficulty, in accordance with the present invention the condenser C_p is given so high a value that it will be satisfactory for the first and third requirements. However, with respect to the second requirement, the condenser C_p which now operates satisfactorily as a trap is no longer used as a means for developing the desired harmonic. The development of the desired operating harmonic is controlled by a tuning device which is separate from the trap and which may be connected in the loading branch in circuit with the iron core choke coil.

In Fig. 2 the tuning device in question is composed of a capacity C_a and a self-induction L_a , whereas the condenser C_p is of sufficiently large dimensions to serve as a protection for the generator g against all harmonics.

The aggregate reactance of the tuning element C_a , L_a has a slightly inductive character for the basic frequency so that the loading branch may easily be made inductive for this frequency. On the other hand, the whole circuit which has a general multi-wave character may now be tuned as a short-

circuit or as a low capacitive reactance for the desired harmonic.

The present improvement may be applied to all of the circuits described in my earlier application.

Thus, for instance, from the circuit shown in Fig. 4 of said application we may obtain the circuit shown in Fig. 3 of the accompanying drawings. In this figure also the said tuning element L_a , C_a is provided in the loading branch in series with the iron core choke coil L_a . The loading branch may in this case be so dimensioned as to have a capacitive character for the basic frequency when the coil L_p , which, as shown, may be an iron core choke coil, is so dimensioned that, as far as the basic frequency is concerned, its lagging current covers entirely or partially the leading current of the condenser C_p and the loading branch or even exceeds it.

In a similar manner as disclosed in said application, under certain circumstances instead of using the tuning inductance L_1 for coupling with the antenna, another inductance comprised in the oscillating circuit and in which the desired operating wave is strongly developed may be used, e. g. a coupling inductance L_k as shown in Fig. 4.

In all of the circuits hereinbefore described, a potential is applied to the parallel capacity C_p which is approximately equal to the generator potential. However, it may happen that the condensers are constructed for a much higher potential so that they cannot be fully utilized in the above-mentioned circuits. In order to avoid this, the condenser C_p may be connected with the generator g either indirectly through the agency of transformers adapted to increase the potential or, preferably, a capacity C_2 may be provided in the circuit through which the generator current passes. The condenser C_2 and an inductance L_o in the generator circuit may be so dimensioned that the potential of C_p will be sufficiently high for efficient operation. An embodiment of this arrangement is shown in Fig. 5. The high potential at C_p arises from the fact that, with respect to the basic wave of the generator, the circuit composed of L_1 , L_a , C_p and L_a , C_a forms an inductive reactance, and the branch L_o , C_2 , including the inductance of the generator forms a capacitive reactance. The same principle may be applied also to the other circuit arrangements.

Having described my invention, what I claim is:

1. A circuit arrangement for high frequency sending stations comprising a generator, an iron core choke coil and an inductance coil connected in series, a condenser connected in parallel with the gen-

erator and in series with the iron core choke coil and the inductance coil so as to provide a loading branch circuit, an antenna coupled with said loading branch circuit and a tuning element separate from the condenser for promoting the development of harmonics of the desired frequency in the loading branch circuit, said condenser serving also as a protection for the generator against the harmonics.

2. A circuit arrangement for high frequency sending stations comprising a generator, an iron core choke coil and an inductance coil connected in series, a condenser connected in parallel with the generator and in series with the iron core choke coil and the inductance coil so as to provide a loading branch circuit, an antenna coupled with said loading branch circuit, and tuning means in the loading branch circuit for promoting the development of a harmonic of the desired frequency in such circuit, said means being composed of an inductance coil and a condenser connected in parallel with each other, the loading branch circuit being tuned as a whole substantially to the desired harmonic.

3. A circuit arrangement for high frequency sending stations comprising a generator, an iron core choke coil and an inductance coil connected in series, a condenser connected in parallel with the generator and in series with the iron core choke coil and the inductance coil so as to provide a loading branch circuit, a tuning element separate from the condenser for promoting the development of a harmonic of the desired frequency in the loading branch circuit, said element comprising an inductance

coil and a condenser, and an antenna coupled with said last-mentioned coil.

4. A circuit arrangement for high frequency sending stations comprising a generator, an iron core choke coil and an inductance coil connected in series, a trap connected in parallel with the generator and in series with the iron core choke coil and the inductance coil so as to provide a loading branch circuit, said trap having a capacitive reactance of sufficient value to serve as a protection for the generator against all harmonics, and an antenna coupled with said loading branch circuit.

5. In combination, a source of alternating current, a circuit containing a frequency converter and coupled to said source, means connected in parallel to said circuit for protecting said source from the output frequency of said converter, said circuit having means for substantially resonating the output frequency of said converter, and means for utilizing said output frequency.

6. In combination, a source of alternating current, a first circuit containing a frequency converter and coupled to said source, a condenser connected in parallel to said circuit for protecting said source against the output frequency of the converter, means for causing said source to operate at substantially unity power factor, said means including a tuning circuit comprising a condenser and inductance in parallel in said first circuit, said tuning circuit also causing the output frequency of said converter to be substantially resonated, and means for utilizing said output frequency.

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