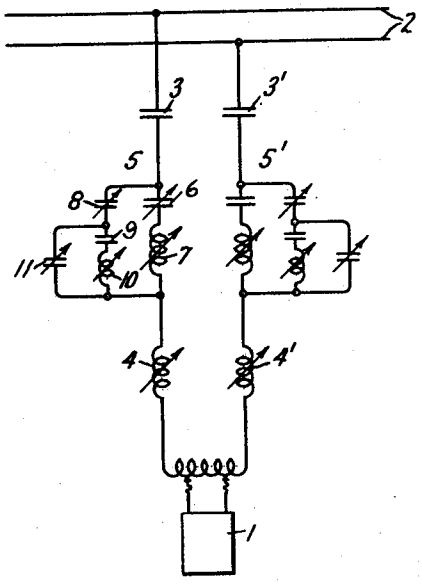
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COUPLING SYSTEM

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COUPLING SYSTEM

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3 Claims. (Cl. 178—44)

My invention relates to coupling systems and more particularly to systems for coupling a source of oscillations having a plurality of frequencies to load through a common coupling reactance.

In connection with the transmission of high frequency carrier currents over the lines of a power distribution system it frequently becomes desirable to couple a carrier current system which is operable at two or more frequencies to a power line through a single pair of coupling condensers. It is therefore necessary to provide a tuning system including the coupling condensers whereby the connection between the source and the line is resonant at each of the different frequencies employed.

My invention relates to certain improvements in systems of the type indicated and has for one of its objects to provide a coupling system for this purpose which is readily adjustable at each of the different frequencies employed.

A further object of my invention is to provide a system of the type indicated which when adjusted for resonance at one frequency may readily be adjusted for resonance at another frequency without disturbing the condition of resonance at the frequency for which the system was previously adjusted.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention, itself, however, may best be understood by reference to the following description taken in connection with the accompanying drawing in which the single figure represents an embodiment of my invention.

Referring to the drawing, I have represented at 1 a source of high frequency oscillations having a plurality of frequencies. This source may, for example, comprise a carrier wave transmitter which is adapted for operation at any one, or all of a plurality of frequencies. This transmitter is coupled to the lines of a power distribution system which I have indicated at 2 through a pair of coupling condensers 3 and 3'.

In order that the connection to the power line may be resonant at each of the frequencies employed an impedance network is provided whereby the various adjustments for resonance at the different frequencies are effected. In accordance with my invention this impedance network comprises a pair of inductances 4 and 4' which resonate with the capacitance of the condensers 3 and 3', and in addition, tuning networks 5 and 5' are provided whereby the adjustments at the additional frequencies are provided.

Since these systems 5 and 5' are identical only one system will be described.

The network 5 includes a condenser 6 and an inductance 7 connected in series with the condenser 3 and the inductance 4. The condenser 6 and inductance 7 are resonant at the frequency at which condenser 3 and inductance 4 resonate, and accordingly are of zero reactance at this frequency. Connected in shunt with this frequency is a path comprising reactance 8, condenser 9, and inductance 10. The path comprising elements 6, 7, 8, 9, and 10 is likewise adjusted to resonate with the capacitance of condenser 3 and the inductance of condenser 4 at a second frequency which is to be transmitted, and the condenser 9 and inductance 10 are adjusted in themselves for resonance at this second frequency. Connected in shunt with the portion 9, 10 of the branch circuit 8, 9, 10 is a reactance 11. This reactance may be so adjusted that the circuit comprising condenser 3, elements 6 to 11 inclusive, and inductance 4, are resonant at a third frequency.

In this way three paths are provided between the source 1 and the line 2 all of which are resonant at a corresponding frequency. These paths, however, are so arranged with respect to each other that the adjustment of the various paths may be readily effected. Thus in assembling the system the inductance 4 may first be made to resonate with the condenser 3. This may be done by either omitting the unit 5 or short-circuiting this portion of the system. When this adjustment has been effected the condenser 6 and inductance 7 are placed in the circuit and by variation of these two elements the circuit 3, 6, 7, 4 is again made to resonate at the frequency at which the inductance 4 resonates with the condenser 3. The reactance 8 is then connected across the condenser 6 and inductance 7, the elements 9, 10, and 11 being omitted, or short-circuited. The reactance 8 is so adjusted that the condenser 3 and resulting reactance of the combination of elements 8, 6 and 7, in series, resonate with the inductance 4 at a different frequency. The reactance 8 may, of course, be either inductive, or capacitive, dependent upon the relation between the two frequencies. This adjustment may be made without affecting the adjustment of the circuit at the first frequency for the reason that the reactance 8 is connected across the elements 6 and 7 which have zero impedance at the first frequency, and accordingly the reactance 8 is effectively short-circuited at the first frequency.

Where only two frequencies are to be employed the system may be left in this condition. Where a third frequency is to be used, however, the elements 9 and 10 may then be included in the system and so adjusted in themselves that the circuit 3, 8, 9, 10, 6, 7, 4 is resonant at the second frequency. This of course means that the condenser 9 and inductance 10 are resonant with each other at the second frequency. The reactance 11 which likewise may be capacitive, or inductive, may then be connected across the condenser 9 and inductance 10 and so adjusted that the circuit 3, 6, 7, 8, 9, 10, 11, 4 is resonant at the third frequency. This adjustment may readily be made without disturbing the adjustment at the second frequency for the reason that the reactance 11 is effectively short-circuited by the condenser 9 and inductance 10 at that frequency. In the same way this last adjustment does not affect the adjustment for resonance at the first frequency for the reason that the branch 8, 9, 10 is effectively short-circuited at the first frequency by the condenser 6 and inductance 7.

It will be apparent that the system may be extended to include as many branches as desired, each branch corresponding to a particular frequency and being adjusted to provide a resonance path at the respective frequency, and each branch having a portion which is in itself resonant at the respective frequency and across which another branch is connected.

While I have shown the two units 3, 5, 4 and 3', 5', 4' one upon each side of the circuit, it will of course be understood that the entire reactance of the system may be included in a single one of these units.

While I have shown a particular embodiment of my invention it will of course be understood that I do not wish to be limited thereto since other modifications may be made, and I contemplate by the appended claims to cover all such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. In a system for coupling a source of oscillations having a plurality of frequencies to a load, a connection between said source and load comprising a plurality of paths each path corresponding to one of said frequencies, and tuned to resonance at the respective frequency, all of said paths including a common portion, and each path having an individual portion resonant with said common portion at the respective frequency, said individual portion of one of said paths including a portion connected in shunt to a portion of another path which said latter portion is in itself resonant at the frequency corresponding to said other path.

2. In a system for coupling a source of oscillations having a plurality of frequencies to a load through a common coupling condenser connected between said source and load, the combination of an inductance connected in series with said condenser and resonant therewith at one of said frequencies, a tuning unit connected in series with said inductance and condenser and resonant at said one frequency, and a reactance connected in shunt to said tuning unit adjusted to resonance with said inductance, condenser and said tuning unit at another of said frequencies.

3. In a system for coupling a source of oscillations having a plurality of frequencies to a load through a common coupling condenser connected between said source and load, the combination of an inductance connected in series with said condenser and resonant therewith at one of said frequencies, a tuning unit connected in series with said inductance and condenser and resonant at said one frequency, a reactance connected in shunt to said tuning unit adjusted to resonance with said inductance and condenser and tuning unit at another of said frequencies, said reactance having a portion resonant in itself at said other frequency, and an additional reactance connected in shunt to said portion and adjusted for resonance at a third frequency with said inductance, condenser, said tuning unit and reactance.

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