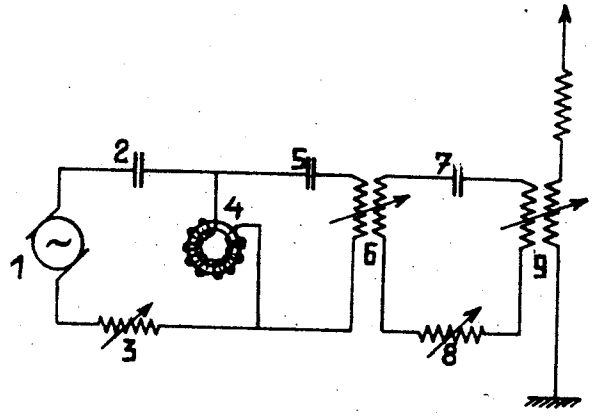
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W. DORNIG

CIRCUIT ARRANGEMENT FOR FREQUENCY MULTIPLYING TRANSFORMERS

Filed May 10, 1923



INVENTOR

Walter Dornig

BY

ATTORNEY

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WALTER DORNIG, OF BERLIN-STEGLITZ, GERMANY.

CIRCUIT ARRANGEMENT FOR FREQUENCY-MULTIPLYING TRANSFORMERS.

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To all whom it may concern:

Be it known that I, WALTER DORNIG, a citizen of the Republic of Germany, residing at 37 Fregestrasse, Berlin-Steglitz, Germany, have invented certain new and useful Improvements in Circuit Arrangements for Frequency-Multiplying Transformers, of which the following is a specification.

This invention relates in general to circuit arrangements for frequency multiplying transformers and particularly to arrangements of this kind used in wave or wireless transmission systems.

No producers of electric high frequency oscillations give waves of an ideal sine form; the current and voltage curves are all distorted more or less according to the type of the wave producer employed so that a number of higher harmonic oscillations can be found besides the principal wave which the machine is really intended to produce. These collateral higher harmonics produce a disturbing effect and contaminate a large part of the wave transmission area, particularly in the case of large transmission stations. The increasing density of radio networks renders it necessary to eliminate such collateral contaminating waves and many attempts have been made to suppress them.

In most cases blocking circuits or frequency traps for dissipating the undesired oscillations are connected in the circuits of the apparatus, these frequency traps including capacity and inductance and offering a considerable resistance to the disturbing waves. Another method consists in connecting such tuned dissipating circuits in parallel to an oscillation circuit and to thus short circuit the contaminating waves so that their effect on the waves sent out from the station is entirely or nearly suppressed. Another similar arrangement consists of the Wagner chain of circuits. These methods are advantageous in that they cause little loss of the energy of the principal waves and are used more particularly in transmitting stations employing generators in conjunction with frequency multiplying transformers.

Another method of suppressing undesirable waves, which is often employed in connection with thermionic valve senders, consists in inserting a loosely coupled oscillation circuit between the valve and the wave radiator or aerial. This reduces the efficiency of the plant to quite as much as one half so that this method is only reluctantly employed, this reluctance being aggravated by the circumstance that a thermionic valve transmitting arrangement including the power source and all the accessory apparatus has on the whole a low efficiency in any case.

In stations employing frequency multiplying transformers such loosely coupled oscillation circuits inserted between the wave producer and the aerial are not advantageous because, in the frequency duplicating arrangements with transformer cores saturated by continuous current coils in accordance with the principle of Joly Vallauri, the inconsiderable disturbing upper harmonics can be suppressed without difficulty by the simple means mentioned in the preceding paragraphs without introducing the disadvantage of considerably impairing the efficiency by an intermediate oscillation circuit between the wave producer and the wave radiator or aerial.

In contradistinction herefrom in the present invention a relatively loosely coupled intermediate oscillation circuit, which is adapted to suppress disturbing collateral or upper harmonic waves, is connected between a frequency multiplying transformer and the antenna. A frequency multiplying transformer arrangement is employed whose efficiency is so great that the insertion of an intermediate circuit for the aforesaid purpose is more advantageous than the simple means hereinbefore mentioned. This is due to the fact that in accordance with the invention a frequency multiplying transformer is employed in which waves of a large range of frequencies can be produced in a single transforming step, instead of a transformer arrangement of the Joly Vallauri type which only gives a few different definite frequencies. A condition for satisfactory operation is that the collateral wave suppressing intermediate circuit has only a small ohmic resistance.

The invention is illustrated by way of example in the drawing in which 1 is the oscillation producer that generates the fundamental frequency, 2 and 3 are the tuning devices of the primary circuit, 4 represents the frequency multiplying transformer or transformers, 5 the tuning condensers employed in conjunction with or without tuning coils for the secondary frequency, 6 the coupling coils between the secondary frequency circuit and the intermediate circuit,

7 and 8 tuning devices for the intermediate circuit by which disturbing frequencies or harmonics are suppressed, and 9 the coupling coils between the intermediate disturbance elimination circuit and the antenna. The only inductance besides the transformer coil in the secondary circuit is the coil required for the coupling between the secondary circuit and the disturbance elimination circuit.

I claim:—

1. An arrangement of the kind described comprising an oscillation producer, a wave radiator, a frequency multiplying transformer in which waves of a large range of frequencies are produced in a single transforming step by wave distortion in the transformer core, a primary circuit including the oscillation producer and the primary of the transformer, a secondary circuit including a coil of the transformer, and a disturbance elimination circuit inserted between the secondary circuit and the wave radiator and adapted to transfer the oscillation energy from the transformer to the wave radiator, the secondary and disturbance elimination circuits being tuned to the same frequencies as the wave radiator.

2. An arrangement of the kind described comprising an oscillation producer, a wave radiator, a frequency multiplying transformer, a primary circuit including the oscillation producer and the primary of the transformer, a secondary circuit including the inductance of a transformer coil and a coupling coil only, and a disturbance elimination circuit coupled between the secondary circuit and the wave radiator and adapted to transfer the oscillation energy from the transformer to the wave radiator, the secondary and disturbance elimination circuits being tuned to the same frequencies as the wave radiator.

3. An arrangement of the kind described comprising an oscillation producer, a wave radiator, a frequency multiplying transformer in which waves of a large range of frequencies are produced in a single transforming step by wave distortion in the transformer core, a primary circuit including the oscillation producer and the primary of the transformer, a secondary cicuit including a coil of the transformer, a disturbance elimination circuit, a coupling of variable coupling effect between the secondary circuit and the disturbance of elimination circuit, and another coupling of variable coupling effect between the disturbance elimination circuit and the wave radiator, the secondary and disturbance elimination circuits being tuned to the same frequencies as the wave radiator.

In testimony whereof I affix my signature in presence of one witness.

WALTER DORNIG.

Witness:

E. H. ALGERMAN.