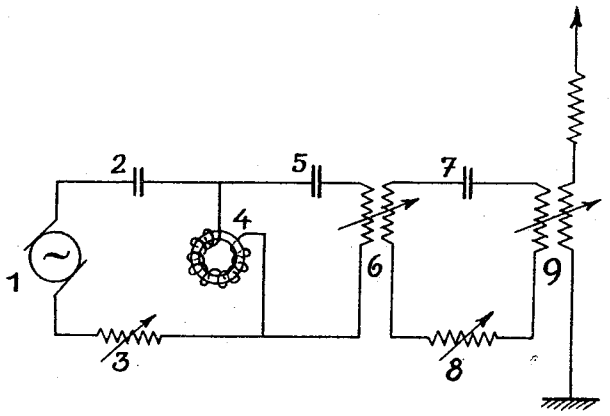
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W. DORNIG

MULTIPLYING TRANSFORMER

Filed May 10, 1923



INVENTOR

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BY

ATTORNEY

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UNITED STATES PATENT OFFICE.

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MULTIPLYING TRANSFORMER.

Application filed May 10, 1923. Serial No. 638,146.

To all whom it may concern:

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

In a known method for improving the efficiency of frequency multiplying transformers in accordance with the Joly Vallauri system employing iron cores arranged in pairs and magnetized in opposite senses to the saturation point by continuous current sent through auxiliary coils the distortion of the fundamental current wave by means of the magnetization curve of the iron core of the transformer is accomplished by connecting an untuned auxiliary circuit so that it opposes the secondary coil, and an improvement of the efficiency of the arrangement is thereby effected. In this known method the improvement of the efficiency is only obtained if, in the case of an uneven harmonic at the secondary side, the auxiliary circuit is connected to windings which happen to produce harmonics and vice versa, i. e., the additional or auxiliary circuit must be connected to windings of the two halves of the transformer arrangement in which the frequency used for operation or signaling practically does not occur.

In distinction herefrom the novel idea underlying the present invention is to dispense with two oppositely magnetized iron transformer cores and to directly connect an auxiliary circuit tuned to a lower frequency than the operating circuit to the secondary or primary winding of a frequency multiplying transformer in which the multiples of the fundamental frequency are filtered out by distortion of the curve, or if, as is found advantageous in practice, only one winding is employed, the auxiliary circuit is connected to this winding, the resonance frequency of this auxiliary circuit being a harmonic of the frequency of resonance of the primary. In this arrangement it is not necessary to tune the auxiliary circuit accurately to a certain periodicity. Its natural frequency may for example lie between the 15th and 17th higher harmonic. It may even carry a number of more or less heavy currents of different frequencies although the best results will be obtained when the auxiliary circuit carries a current of substantially a certain frequency. By this arrangement the secondary output or the output available for operation is considerably increased and this result is obtained both when the frequency multiplying transformer is not saturated with the aid of continuous current and when it is thus saturated.

The invention is illustrated in the drawing. 1 is a high frequency generator or any suitable source of electric current, 2 and 3 represent the primary tuning devices, 4 is a frequency multiplying transformer with an iron core in which the multiples of the fundamental frequency are filtered out by distortion of the fundamental current curve. The frequency multiplying transformer is one which causes a three-fold or higher multiplication of the fundamental frequency in a single transforming step. A preferred transformer of this type is described in my copending application Ser. No. 519,324 filed on December 2nd, 1921. 5 and 6 are secondary tuning devices, 7 a coupling coil for the antenna and 8 and 9 are the tuning devices of the auxiliary circuit provided in accordance with the invention. Instead of employing only a single auxiliary circuit, two or more such circuits may be connected to the transformer. 10 is a source of continuous current which supplies current to the trasnformer for the purpose of magnetizing its iron core.

Transformer coils connected in opposite senses are not used in the arrangement according to this invention because in practice the transformer is preferably provided with only a single winding for the primary, secondary and auxiliary current. It would be possible to place several coils on the core of the transformer, but in the method contemplated by the invention the technical effect obtained by the various coils is the same as that accomplished by a single coil. The technical effect obtained by dividing the transformer into a number of parts or using a number of transformers connected in parallel or in series is also the same as that obtained in the novel method by a single transformer core.

I claim:—

Frequency multiplying arrangement for wave transmission comprising a wave radiator, a primary oscillation circuit, an iron cored frequency multiplying transformer for distorting the fundamental wave form

through the magnetization curve of the transformer and for thus filtering out the multiples of the fundamental frequency in the primary circuit, a secondary oscillation circuit connected between the transformer and the wave radiator, and an auxiliary circuit connected to the transformer, means for tuning said secondary circuit to the frequency of the wave radiator, and means for tuning said auxiliary circuit to upper harmonics of the primary frequency that differ from the frequency of the radiator.

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

WALTER DORNIG.

Witness:
E. HOLLZERMAN.