

April 3, 1928.

1,664,541

G. H. COOPER

TUNED TRANSFORMER

Filed Aug. 3, 1927

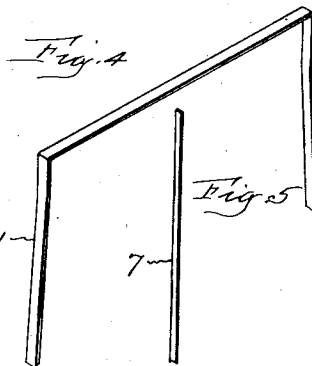
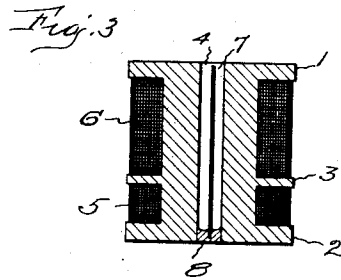
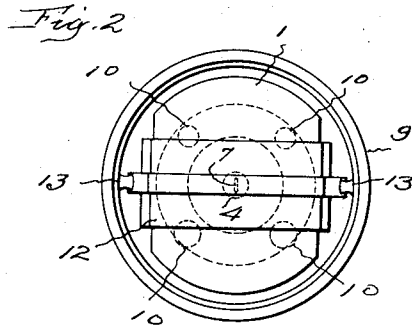
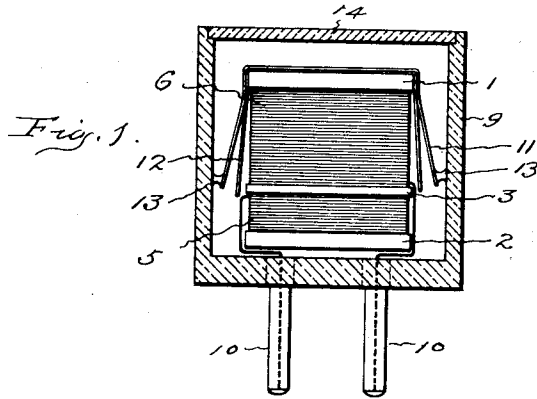


Fig. 5

INVENTOR

Georg H. Cooper by
Harry P. Williams
att.

UNITED STATES PATENT OFFICE.

GEORGE H. COOPER, OF HARTFORD, CONNECTICUT.

TUNED TRANSFORMER.

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This invention relates to those transformers which are provided for amplifying electric signal waves such, for instance, as are used in radio receiving sets. In order to obtain the desired effect it is common practice to wind the coils of the transformers with an approximate number of turns of wire and test to note the result and then add or subtract turns of wire until the required condition is obtained, or to place a fixed capacity or adjustable capacity across, and electrically connected with, one or both windings. This in commercial quantity production requires skill, consumes valuable time and adds expense.

The present conception provides a very simple method of making and tuning such transformers whereby they may be rapidly produced in large numbers and will be accurately and uniformly tuned and remain in the desired condition. A further advantage also is that the method of tuning according to this invention is so simple that it can be practiced by relatively unskilled persons.

This is attained by winding a definite predetermined number of turns of wire upon a spool of insulation that has no metallic core, which turns are always the same and remain the same for transformers of the like frequency, and which will produce a slightly higher frequency than that ultimately desired. The structure is then tuned down by inserting one or more very small strips of iron in an opening in the center of the spool to compensate for variations of inductance in the windings and distributive capacity of the windings and their support. This element thus tuned is placed in an insulating case and after the wire terminals are attached to contact pins, or suitable terminal devices, it is further tuned by folding one or more very small strips of iron over the end and down the sides of the spool. When finally tuned a cover is applied to the case and sealed air tight.

Fig. 1 of the accompanying drawings shows a side elevation of the transformer with the case cut in section. Fig. 2 shows a plan with the cover removed. Fig. 3 shows a section of the spool and coils. Fig. 4 shows on greatly enlarged scale one of the iron tuning strips that may be applied over the end and down the sides of the spool. Fig. 5 shows an iron tuning strip which may be inserted in the center of the spool.

The spool of the transformer illustrated is

made of wood or other non-metallic insulating composition, with a flange 1 at the top, a flange 2 at the bottom, and an intermediate flange 3 nearer the lower end than the upper end. The spool has a central bore 4. The primary wire 5 is wound in the narrow lower space of the spool and the secondary 6 is wound in the wide upper space of the spool.

In the manufacture of these transformers the wire, preferably single silk enamel wire, is wound on the spool with a definite predetermined number of turns, and that number of turns is adhered to for all transformers of the same frequency. In practice the number of turns is such as to produce a slightly higher frequency than is ultimately desired. The element thus produced is then tuned down to a desired frequency by inserting into the central bore of the spool one or more thin narrow strips of iron 7, which will compensate for any variation of frequency resulting from the windings. The strip of strips placed in the bore and which preferably extend the full length of the spool may be retained in place by a drop of wax 8. This element is then fastened in a case 9, preferably cylindrical, of insulating material, and the wire terminals connected with the contact terminals 10 that extend through the case. When the element thus tuned to compensate for variations in the windings and spool capacity is in the case one or more thin narrow strips of iron 11 bent to extend over the end and down the sides may be applied to the spool. A strip of paper 12 is preferably placed under this exterior strip to insure insulation. Drops of wax 13 may be used to hold the ends of this strip in fixed position. This exterior strip bent over the end and down the sides of the spool further tunes the element and may be applied after the element is inserted in the case so as to take care of any irregularity incident to capacity effect of the case or the retaining wax. The exterior strip also tends to shield the windings from outside interference. The strip may, if desired, be omitted from the bore, but if omitted the element cannot be tuned as critically as by its use. After the active element has been placed in the case a cover 14 is sealed upon the top so that the closure will be air tight.

With the construction illustrated there is no substantial iron core to absorb energy and create disturbing influences. The simple

tuning strips, which are very inexpensive, can be quickly applied or removed to obtain the desired frequency without disturbing the windings which once made need not be altered. This in commercial quantity manufacture is of great advantage. By making and tuning the transformers in the manner above described large numbers can be turned out so that they will be uniform and will accurately keep tuned to the frequency for which they are rated, although of course, the method of tuning set forth may be made use of by relatively unskilled persons building transformers in small quantities.

15 The invention claimed is:

1. The method of producing a tuned transformer which consists in winding primary and secondary coils of predetermined definite numbers of turns upon a spool of insulation and tuning the same by folding a thin

narrow strip or strips of iron over the end and down the sides of said spool.

2. The method of producing a tuned transformer which consists in winding primary and secondary coils of predetermined definite numbers of turns upon a spool of insulation and tuning the same by inserting a thin narrow strip or strips of iron within the spool and folding a thin narrow strip or strips of iron over the end and down the sides of said spool.

3. A method of tuning transformers which consists in winding a predetermined number of primary and secondary turns on an insulating spool to produce a higher frequency of resonance than ultimately desired, and applying to said spool thin narrow strips of iron to produce the frequency to the required degree.

GEORGE H. COOPER.

CERTIFICATE OF CORRECTION.

Patent No. 1,664,541.

Granted April 3, 1928, to

GEORGE H. COOPER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 38, claim 3, for the word "produce" read "reduce"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 1st day of May, A. D. 1928.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.