

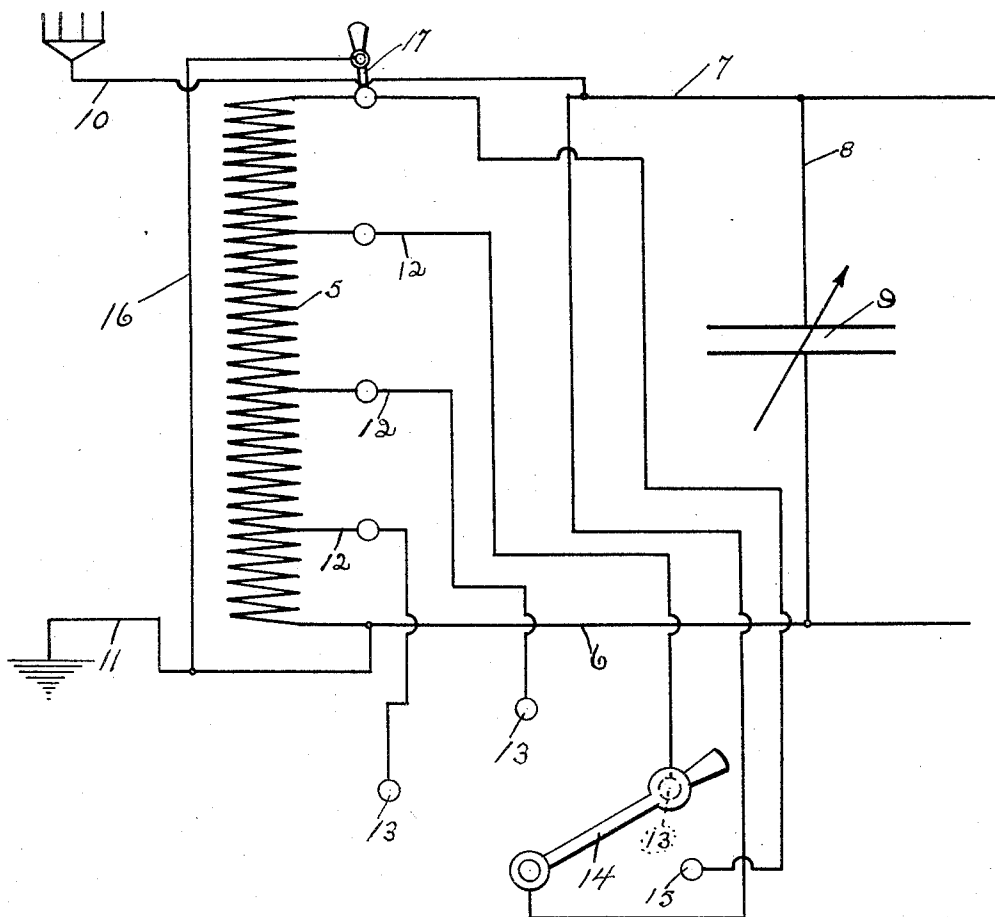
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RADIO SYSTEM

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INVENTOR.

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RADIO SYSTEM

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This invention relates to radio apparatus and has for its particular object the provision of a new and improved radio set which may be readily adjusted to accommodate itself to a wide range of frequencies and more particularly to such a set which when constructed to receive or transmit throughout a certain range, for example the present customary broadcast range of from 250 to 550 meters, and may be readily converted to receive signals of shorter wave lengths down to for example 34 meters or less.

A further object of the invention is the provision of a new and improved fixed inductance which may be varied in its inductive reactance throughout a wide range without introducing complications, and without unduly increasing the between turns capacity by the presence of dead-end coils.

A further object of the invention is the provision of an inductance such that as the inductive reactance is decreased the internal capacity is also decreased whereby the reduction in inductive reactance results in a marked decrease in the natural period of the coil.

A further object of the invention is the provision of a new and improved inductance comprising a plurality of parts in inductive relation which are connected in series to obtain a maximum inductance but which, to obtain a smaller inductance may be placed in multiple in a manner to reduce the internal capacity to a minimum by causing adjacent turns to be of as nearly the same potential as possible and also to cause the inductance of each portion of the coil to exert its influence to reduce the inductance of another portion.

Heretofore broadcasting and receiving sets of the standard makes usually received signals on wave lengths from 250 meters to 550 meters, and it is the aim of the present invention to make these same sets capable of receiving wave lengths from 250 meters down to 34 meters or less, without any material cost in manufacturing. It is well known that broadcasting and receiving sets have been especially constructed to receive short wave lengths, but the same sets were not capable

of being converted into sets capable of receiving wave lengths of 250 meters to approximately 550 meters, while applicant's invention is readily convertible without any material change to the set.

With these and other objects in view, the invention consists in certain novel features, combination and arrangement of parts as will be hereinafter more fully described, pointed out in the diagrammatical view of the drawing, and claimed.

In the drawing,

The figure is a diagrammatical illustration of my improved method, including means for receiving signals on short wave lengths.

Referring to the drawing, the numeral 5 indicates an inductance coil of any well known type, and the lower end of this coil is connected in circuit with the filament wire 6 of the tube, while its upper end is normally in circuit with the grid wire 7 of the usual construction.

The grid wire 7 and filament 6 are shunted in the usual way by virtue of a wire 8 carrying a variable condenser 9.

The coil is illustrated as being connected in circuit with an aerial connection 10 and is also in circuit with a ground connection 11. This coil has also been provided with a plurality of taps 12, the free ends of which extend to a panel board of a set and have their terminals provided with contacts 13, the purpose of which will be hereinafter more fully described.

A contact arm 14 is provided and is in circuit at one point with the grid circuit 7, and its free end is normally engaged with a contact point 15, which is in series with the grid wire 7, whereby the set may be set for the normal reception of broadcasting stations sending on wave lengths between approximately 250 and 550 meters.

It is generally known that the use of an inductance coil with aerial and ground connections shunted by a variable condenser in circuit with the grid and filament of a broadcasting and receiving set is old in the art, but it is the purpose of the present invention, when applied to a circuit as above described, or any similar circuit, to break up the in-

ductance coil of the said circuit into a plurality of units, paralleling said units for the purpose of receiving signals from broadcasting stations, broadcasting or transmitting on wave lengths from approximately 250 meters down to 34 meters or less, and at the same time retaining the complete functions of the coil, thereby keeping the full and complete inductance of said coil and also its original amount of voltage as obtained from the whole coil before it is paralleled and divided into units.

To accomplish the above described method, my invention consists in shunting the opposite ends of a coil, which in the present form is indicated at 5, which is shunted by a wire 16, one end of which is engaged with a switch 17, for the purpose of placing the shunt wire 16 in operative position for the purpose of receiving wave lengths, of approximately, as above stated, on wave lengths from 250 meters down to approximately 34 meters or less. The opposite end of this shunt wire 16 is permanently connected to lower end of the coil 5 and for the purpose of illustration, as shown in the drawing, the ends respectively engaged when in operative position with the grid and filament.

Description of normal circuit

In the usual receiving set, receiving wave lengths between 250 meters and 550 meters, when using my improved construction the arm 14 is normally on contact 15, and switch 17 is open, which is the normal circuit of an ordinary broadcasting and transmitting set.

For reception of shorter wave lengths

Arm 14 is moved to any one of the contacts 13 on the terminals of the taps 12, switch 17 is closed, as illustrated in the drawing, and the device is then ready to receive wave lengths from approximately 250 meters down to 34 meters or less. The principle or operation that takes place when arm 14 is moved on contact 13 and switch 17 is closed, is as follows:

The coil 5 is divided into units which are in mutual inductive relation. So long as the coils are in series the cumulative effect is greater than the sum of the effect of each coil because of the mutual inductance.

As soon, however, as the switch 14 connects the output of the coil with one of the intermediate taps and the switch 17 short circuits the coil at its ends a different relation exists. If a tap is selected which is near one end of the coil the smaller section thereby selected has of its own accord a correspondingly smaller reactance according to well known principles. This reactance is in accordance with my invention still further reduced by the opposing effect of the larger coil which is in multiple therewith and in an opposed relation.

In accordance with this invention it will be

clear that I am able to reduce the inductive reactance to a very low figure by making one of the opposed multiple branches of very low value. As an illustrative example in practical operation I have produced a radio set in accordance with my invention whose natural period with a standard shunt variable condenser could be increased to 550 meters but which could be altered by a mere shifting of a switch contact so that the same shunt condenser will bring its minimum range down to 34 meters.

It will be noted moreover that when one of the sections is placed in opposition to the other in parallel therewith that the adjacent portions of the two sections are maintained at the same potential whereby there is no tendency to build up a high capacitative effect between the turns such as would be the case if the high potential side of one section is brought into juxtaposition with the low tension side of an adjacent section.

The general application of this invention consists in the paralleling of portions of an inductance with other portions of the same inductance, thereby securing a system of parallel inductances, the resultant inductance of which is lower than the original inductance.

The above invention is carried as follows:

The turns between the three taps, indicated by the numeral 12, and ground, or lower end of coil connected to the connection 11, supply energy to the leads 6 and 7. For convenience, I have termed 7 as the grid connection in a receiving circuit and 6 as the filament.

The switches 14 and 17 govern the paralleling of the inductance coil 5, and when these switches are properly closed, as illustrated, the upper portion of the coil 5 or the turns thereof, are placed in parallel relation with other portions of the same coil by virtue of said switches and taps. This, therefore, will produce parallel portions of an inductance with other portions of the same inductance by virtue of the switch 17 being closed.

The antenna or aerial 10 is connected to grid 7, which also connects to the switch 14. This is merely one illustration or method of placing the portions of the inductance in parallel with other portions of the same inductance.

It is to be understood that various means and methods of paralleling this coil unit may be resorted to without departing from the spirit and scope of the invention as claimed.

Having thus described my invention, what I claim as new is:

1. A radio inductance comprising a plurality of stationary sections in axial alignment end to end and connected at adjacent ends in series in mutually inductive relation and means for connecting certain of said sections in parallel in opposition to other of said sections.

2. A radio inductance comprising a plurality of coil sections of different inductive reactance in axial alignment end to end and connected at adjacent ends in mutually inductive relation and means for connecting said sections in parallel in opposition to each other.

3. A radio inductance comprising an inductive coil having its ends adapted to be short circuited, taps connected to said coil at certain intermediate points and terminals connected to said ends and to said taps whereby when any pair of said terminals are selected as outlet terminals, one section of said coil is in multiple with and in opposition to the remainder thereof and whereby the adjacent ends of opposed sections are at the same potential.

4. A radio circuit comprising in combination an inductance having end terminals and terminals connected to intermediate taps, means for short circuiting said end terminals and a tuning condenser and means for connecting the terminals of said condenser to different pairs of taps upon said inductance whereby said inductance may be varied and thereby the tuning of the circuit is varied throughout a wide range.

5. A radio circuit comprising in combination an inductance having its ends remote from each other and having a plurality of sections in mutually inductive relation, a condenser and connecting means whereby said condenser may be connected at will either across the terminals of said coil with all of the said sections in series or across two portions of said coil which are in multiple with each other, said coil and said condenser comprising tuning elements, and means for varying one of said tuning elements.

6. A radio circuit comprising in combination an inductance having its ends remote from each other and having a plurality of sections in mutual inductive relation, a condenser and connecting means whereby said condenser may be connected at will either across the terminals of said coil with all of said sections in series across two portions of said coil which are in multiple with and in opposition to each other, said coil and said condenser comprising tuning elements, and means for varying one of said tuning elements.

7. A radio inductance comprising a coil having a plurality of sections, one of said sections having an inductive reactance materially less than the remainder of the coil, means for connecting said section at will either in series or in multiple with the remainder of the coil; a condenser, and means adapted to connect the terminals of said condenser to the terminals of said inductance, said condenser and said inductance constituting the tuning elements and means for varying one of said elements to vary said tuning

whereby when said sections are in multiple, the effective inductance of said coil is a small fraction of the inductance of the complete coil and the effective internal capacity is correspondingly reduced.

8. A radio inductance including a continuous coil having end terminals remote from each other to produce a minimum internal capacity and intermediate terminals dividing the coil into sections and connections for direct connecting certain of said terminals to short-circuit the circuit between them and for connecting the input and output circuits to certain of said terminals including a terminal other than one of said directly connected terminals to embrace other sections.

9. A radio inductance including a continuous coil having its ends remote from each other and intermediate taps and connections for short circuiting said ends and means for connecting input and output circuits to intermediate taps, while said ends are short circuited.

10. A radio inductance including a continuous coil having end terminals and intermediate taps, means for direct connecting said end terminals and means for direct connecting an input and an output circuit to the same intermediate taps.

In testimony whereof he hereunto affixes his signature.

GEORGE A. MAHONE.