A. J. COUGHENOUR.

TUNING DEVICE FOR WIRELESS TELEGRAPH SYSTEMS.

APPLICATION FILED JAN. 24, 1914.

1,127,738.

Patented Feb. 9, 1915.

2 SHEETS—SHEET 1.

Fig. 1

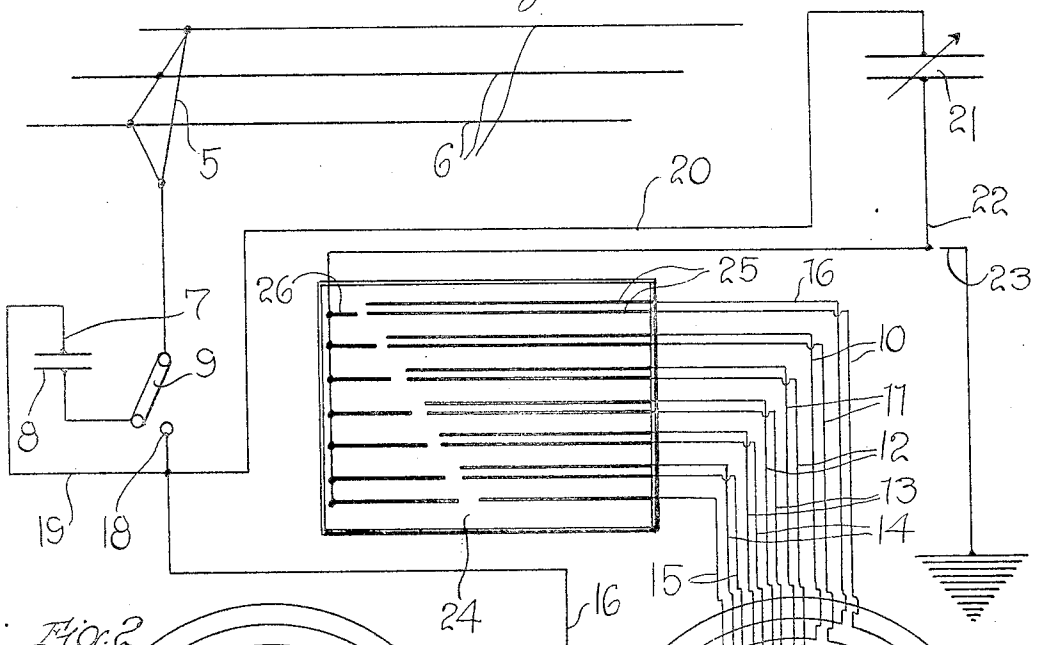
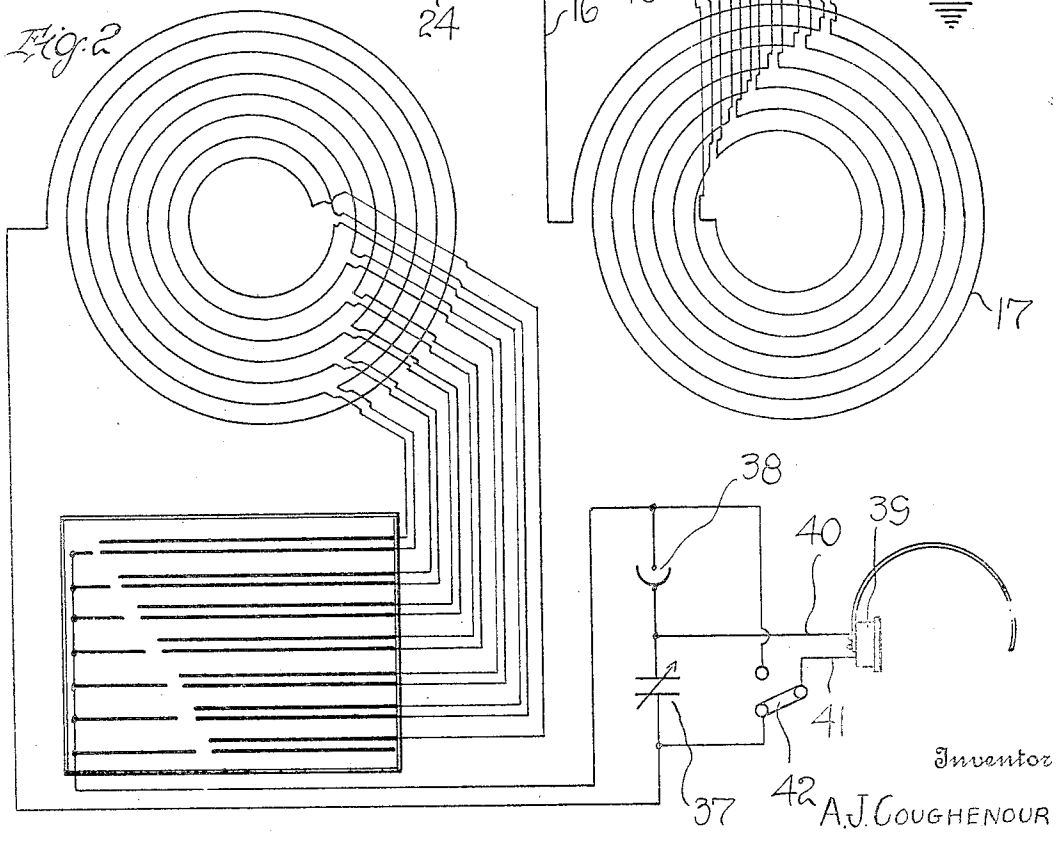


Fig. 2



Witnesses
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Fig. 3

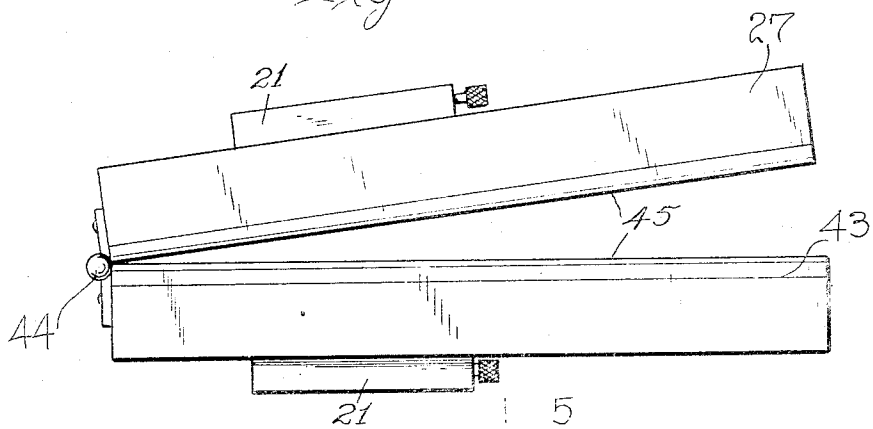


Fig. 4

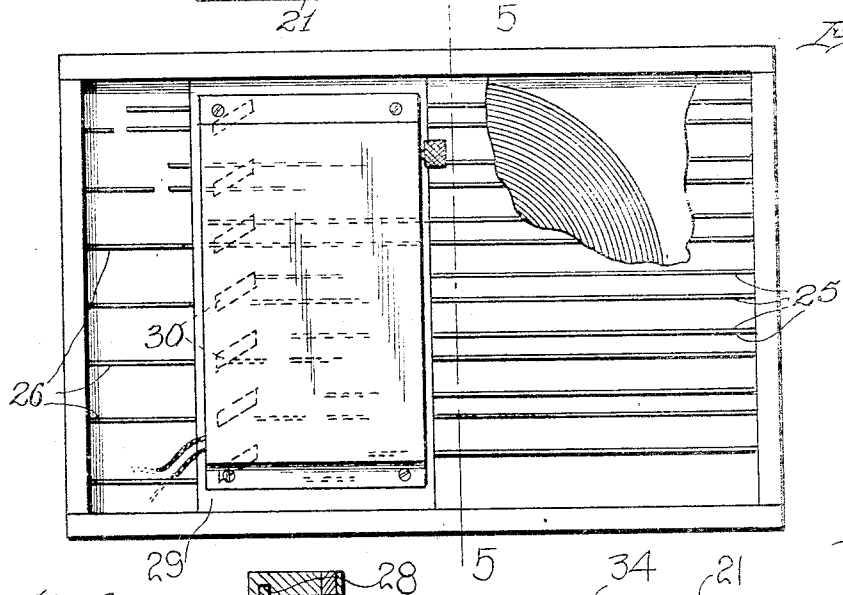


Fig. 17

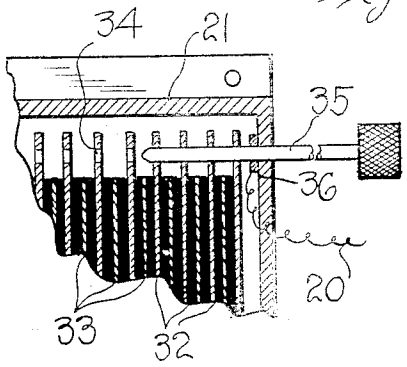


Fig. 6

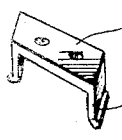
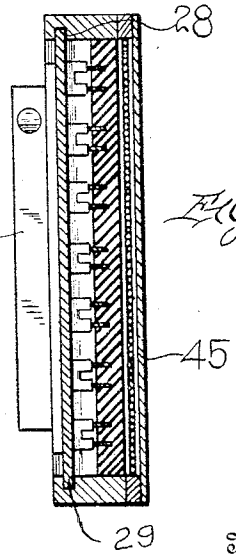


Fig. 5.



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UNITED STATES PATENT OFFICE.

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TUNING DEVICE FOR WIRELESS-TELEGRAPH SYSTEMS.

1,127,738. Specification of Letters Patent. Patented Feb. 9, 1915.

Application filed January 24, 1914. Serial No. 814,212.

To all whom it may concern:

Be it known that I, ALLEN J. COUGHENOUR, a citizen of the United States, residing at Fort Leavenworth, in the county of Leavenworth and State of Kansas, have invented certain new and useful Improvements in Tuning Devices for Wireless-Telegraph Systems, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to high frequency systems of transmission of energy and more particularly to an electrical tuning device for a wireless telegraph system.

The invention has for its primary object to provide a tuning device including a variable inductance coil and switch therefor whereby the connection of the dead ends of the coil in the circuit may be avoided and losses in energy thus prevented.

The invention has for another of its objects to provide a tuning device for use in wireless telegraphy including the aerial and local inductances, said inductances being so constructed and arranged as to provide a very compact and easily transportable device.

The invention has for a further object to provide an improved mounting for the aerial and local inductances of the tuning device whereby the same may be moved and positioned relative to each other to vary the kind or intensity of the conductive connection between the same.

In its more specific aspect, the invention provides a variable inductance coil of the flat or "pancake" type, and a switch having parallel metallic conductors arranged in pairs, contact members arranged in spaced relation to the pairs of conductors, wires connecting said conductors with the convolutions of the inductance coil, and a sliding switch member provided with spaced circuit closing members whereby the circuit may be closed through any one of the pairs of conductors and the opposed contact member, to include a portion of the inductance coil while the remaining portion thereof is cut out of the circuit.

The invention has for a further object to generally improve and simplify the construction of electrical tuning devices of the above character, to render the same highly efficient and serviceable in practical use and reduce their manufacturing cost to a minimum.

With the above and other objects in view as will become apparent as the description proceeds, the invention consists in certain constructions, combinations and arrangements of the parts that I shall hereinafter fully describe and claim.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawing, in which—

Figure 1 is a diagrammatic view illustrating the aerial circuit; Fig. 2 is a similar view showing the local circuit; Fig. 3 is a side elevation of my improved tuning device, illustrating the mounting for the aerial and local inductances and the manner in which the conductive connection between the same may be varied at the will of the operator; Fig. 4 is a top plan view of one section of the device, partly broken away to show the inductance coil; Fig. 5 is a section taken on the line 5—5 of Fig. 4; Fig. 6 is a detail perspective view of one of the contact members carried by the slidable switch plate; Fig. 7 is a detail fragmentary section of the variable condenser which is mounted upon the switch plate.

In the illustrated embodiment of my invention, the high frequency system of transmission of energy includes an aerial 5 comprising the antennæ wires 6. The antennæ wires are connected by a wire 7 to one side of a fixed condenser 8, by means of a movable switch plate 9 whereby the aerial is connectible to the tuning circuit.

The variable inductance coil includes a series of wires 10, 11, 12, 13, 14 and 15, each of which is provided with a single convolution. These convolutions are graded in diameter and the coils arranged in nested or pancake form, said coils of course being suitably insulated from each other. A wire 16 in which the outer convolution 17 of the inductance coil is formed, is connected at one of its ends to the contact member 18 with which the movable switch plate 9 is adapted to be engaged, when it is desired to cut the condenser 8 of the aerial out of the circuit. The wire 16 is connected through the wire 19 to the wire 7. A wire 20 connected to one side of the variable condenser 21 is also joined to the wire 16. The opposite side of this condenser is joined by a wire 22 to the ground wire 23.

In connection with my improved form of the inductance coil, I employ a novel con-

struction of switch whereby the inductance may be varied without an accompanying loss of energy in that part of the coil which is not included in the circuit. This switch comprises a suitable base 24 of insulated material. Upon this base, spaced pairs of metal conducting strips 25 are arranged. These conducting strips terminate at one of their ends upon an oblique line, or in other words, the pairs of strips successively increase in length from one side of the switch base to the other. A single contact plate or strip 26 is arranged in line with one of the metal conductors 25 in each pair, and these contacts are connected together and to the ground wires 23. It is to be observed that the ends of the wires 10, 11, 12, 13, 14 and 15 are connected at their extremities to the contiguous conductors 25 in the adjacent pairs of conductors arranged upon the switch base. The switch is arranged within a suitable box or casing 27 and beneath the base 24 in said box, the inductance coil is adapted to be arranged, as clearly shown in Figs. 4 and 5 of the drawings. In guide grooves 28 provided in the side walls of the box or case 27, the sliding switch plate 29 is mounted. This switch plate upon its inner face is provided with a plurality of obliquely arranged circuit closing contact members 30 shown in detail in Fig. 6. The ends of these members are disposed at right angles to the intermediate portion thereof as shown at 31 and have resilient bearing engagement upon the edges of the metallic conductors 25. The respective ends of one of said circuit closing plates bearing upon the respective conducting strips of each pair.

For convenience and compactness in arrangement, the variable condenser 21 is mounted upon the movable switch plate 28. This condenser includes the usual insulated sets of metal conducting plates 32 and 33 respectively which are suitably insulated from each other. The conducting plates 32 are of greater surface area than the plates 33 and one edge of each of the plates 32 is provided with an opening indicated at 34. These openings are disposed in alinement or coinciding relation to receive a slidable pin or plug 35 which is mounted in the condenser box or casing, said pin being in good electrical contact with a suitable conductor 36 to which the wire 20 is connected. It will be obvious that by simply adjusting the pin or plug 35 to engage the same with a greater or less number of the plates 32, the capacity of the condenser may be varied accordingly.

In so far as the local receiving circuit of the system is concerned, the variable inductance and the switch therefor is of precisely the same construction as that above described and operates in the same manner. In the local circuit, a variable condenser indicated at 37 similar to that above described is included as well as a detector 38. 39 indicates the receiver which is connected to the wires 40 and 41 in the local circuit. In the wire 41, a switch 42 is interposed through the medium of which the receiver may be connected either across the condenser or detector. The local inductance is also mounted in a suitable box or casing 43, and this box or casing is hingedly connected as at 44 to the box 27 which contains the aerial inductance. The pancake inductance coil as above stated is arranged in the box or casing upon the opposite side of the switch base to that upon which the metallic conductors 25 are secured. A plate 45 is arranged over this inductance coil and secured in any suitable manner upon one edge of the boundary walls or the frame of the box. These plates on the respective boxes 27 and 43 are disposed in opposed relation. It will thus be apparent that by separating the boxes 27 and 43 to a greater or less extent, the kind of inductive connection between the aerial and local inductances may be varied at the will of the operator.

In the operation of the device, when it is desired to vary the inductance of either tuning coil, the operator simply shifts the sliding switch plate 29 to position one of the contact members 30 carried thereby in bridging relation between a conductor 25 in one of the pairs arranged upon the switch base and the opposed contact strip 26 which is arranged in line with the other conducting strip in said pair. In the position of the switch plate shown in Fig. 4, the central contact member 30 is in the position above referred to, and the contacts on one side of this central member are engaged upon the pairs of conductor strips 25 while the remaining contacts are disposed beyond the ends of the other conducting strips and upon the contact strips 26. Upon reference to Fig. 1 of the drawings, it will be readily seen that the wires 10, 11 and 12 and the coils formed therein are included in the closed circuit, said wires being connected to the conducting strips 25 with which the contacts on the switch plate are engaged, that contact member 30 which electrically connects the conductor to which the end of the wire 12 is connected with the contact strip 25, closing the circuit through the wire 23 to the ground, one end of the wire 16 which is connected through the medium of the switch 9 with the aerial being connected to one of the longer conducting strips 25 upon the switch base with which one of the contact members 30 is engaged. It will thus be seen that that portion of the inductance coil which is included in the wires 13, 14 and 15 is cut out of the circuit, thus avoiding the dead end losses common in devices of this character as at present constructed.

From the foregoing description taken in connection with the accompanying drawings, it is believed that the construction, manner of operation and several advantages of my invention will be clearly and fully understood. My improved tuning device owing to the simple and compact arrangement of its several parts may be conveniently packed in a comparatively restricted space for transportation or shipment. By eliminating loss in the transmission of energy in high frequency wireless transmission systems, it will be appreciated that the operating cost is reduced to a minimum.

It will be obvious to those skilled in the art that while I have above described and shown in the accompanying drawings, a particular number of coils, in the inductance, the same may be multiplied in order to obtain any desired capacity in accordance with the character and intended use of the apparatus. It is to be further understood that I do not desire to be limited in putting the invention into practical use to any particular mounting of the variable condenser, the switch plate or the conductors and contact members with which the same coöperates, as the construction and arrangement of these parts may be greatly varied without in any way departing from the principle of my invention. I also reserve the privilege of resorting to all other legitimate changes in the form, proportion and arrangement of the several parts which may be fairly considered as within the scope of the invention as claimed.

Having thus described the invention what is claimed is:

1. In a tuning device for wireless telegraphy systems, a variable inductance coil including a plurality of wire conductors, each provided with a coil, said coils being arranged in nested relation, and a switch including a base, a plurality of conductors mounted upon said base and arranged in parallel pairs, the ends of each wire being connected to the contiguous conductors in adjacent pairs, contact members arranged upon the base in opposed relation to each pair of conductors and spaced therefrom, a wire connecting the contact members together and adapted to be grounded, and a switch member mounted for rectilinear movement over the switch base and provided with a plurality of circuit closing members, said members being arranged in coöperative relation with the conductors and contacts upon the switch base whereby the movable switch member may be positioned to engage any one of said circuit closing members with one of the conductors and the opposed contact to close the circuit, certain of the other circuit closing members being engaged with the respective pairs of conductors to include in the circuit a predetermined number of the inductance coils.

2. In a tuning device, for wireless telegraphy systems, a plurality of inductance coils each formed from an independent conducting wire, said coils being arranged in nested relation and insulated from each other, and a switch including a plurality of conductors insulated from each other to which the respective wires of the inductance coil are electrically connected, contact members arranged in opposed relation to the conductors a wire connecting the contact members together and adapted to be grounded, and a movable circuit closing member mounted for rectilinear movement over the conductors and contact members and provided with circuit closing elements for engagement therewith whereby one or more of the inductance coils may be included in the circuit at will.

3. In a tuning device for wireless telegraphy systems, a variable inductance including a plurality of independent conducting wires each provided with a single coil, said coils being arranged in nested compact formation and insulated from each other, and a switch including a plurality of conducting strips arranged in parallel pairs, the ends of the respective wires of the inductance being electrically connected to the contiguous strips of adjacent pairs of conductors, contact members arranged in line with one of the conductors to which each wire is connected, and in spaced relation thereto, a wire connecting said contact members together and adapted to be grounded, and a switch member mounted for rectilinear movement with respect to the conductors and contacts and provided with circuit closing means whereby the circuit may be closed through any desired number of conductors and one of the contact members to include a predetermined number of inductance coils in the circuit at will.

4. In a tuning device for wireless telegraphy systems, a variable inductance comprising a plurality of independent conducting wires each provided with a single coil, said coils being arranged in compact nested formation and insulated from each other, a regulating switch including a plurality of parallel pairs of conducting strips, the strips in each pair being of different length from the strips of the other pairs, a plurality of contact members arranged in alinement with one conductor of each pair and spaced therefrom, said contact members varying in length inversely to the variation in length of the respective pairs of conductors and adapted to be grounded, and a movable switch member provided with a plurality of circuit closing devices, said member being adapted to be positioned to

engage any one of said devices with one of the contact members and the related conductor which is out of alinement with said contact member, others of the circuit closing members being engaged upon the longer pairs of conductors to close the circuit through a predetermined number of the inductance coils.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

ALLEN J. COUGHENOUR.

Witnesses:
M. CARLISLE LYDDANE,
D. W. GALL.