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F. C. BRADLEY

TUNING UNIT FOR RADIO RECEIVING SETS

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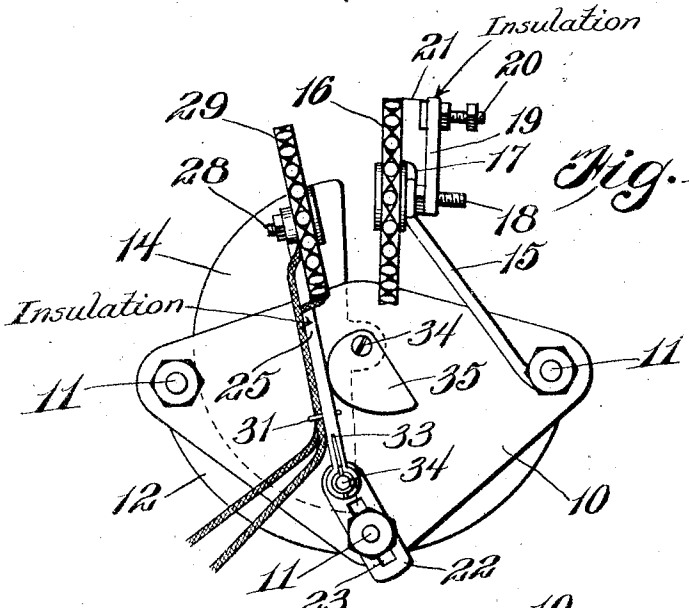


Fig. 1.

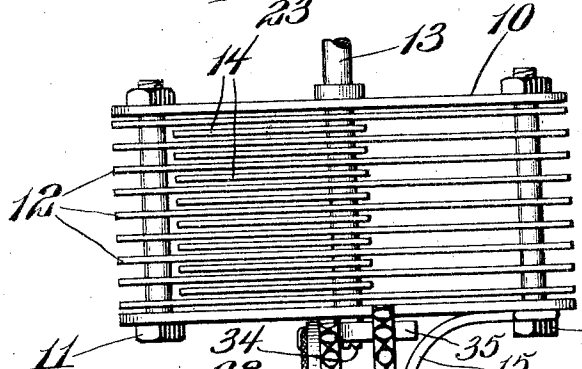


Fig. 2.

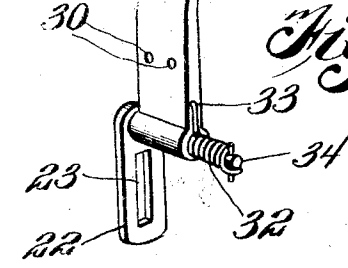


Fig. 3.

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UNITED STATES PATENT OFFICE.

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TUNING UNIT FOR RADIO RECEIVING SETS.

Application filed February 19, 1925. Serial No. 10,386.

To all whom it may concern:

Be it known that I, FRANCOIS C. BRADLEY, a citizen of the United States, residing at Union, in the county of Newton and State of Mississippi, have invented certain new and useful Improvements in Tuning Units for Radio Receiving Sets, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to tuning units for radio receiving sets and more particularly to a device of this character for use in what is generally termed broadcast receivers.

An important object of the invention is to provide a device of this character including a combination of elements usually requiring considerable skill in the handling thereof so arranged and constructed that the element of skill is eliminated and the tuning unit becomes substantially mechanical in its operation.

The invention has particular reference to the combination of a condenser, tuned coil usually connected in the grid circuit of a vacuum tube of the receiving set and a feed back coil usually employed in a plate circuit of the same tube for regeneration. It is well known to those familiar with the art that regeneration is very difficult to control. Where the apparatus employed may require a certain approximation of the coils at low frequencies, an entirely different arrangement of the coils is necessary at higher frequencies due to the fact that these higher frequencies have a tendency to self-regeneration in the grid coil. As a matter of fact, at such higher frequencies practically no regeneration can be employed. Usually, the grid and plate coils of regenerative apparatus are provided with a separate control by means of which the position of the plate coil may be controlled to thereby control the extent of regeneration, thus necessitating the tuning of two instruments to provide proper tuning and regeneration at any wave length. An important object of this invention is accordingly the provision of such an apparatus wherein the position of the plate coil with relation to the grid coil is automatically controlled by the operation of the condenser tuning the grid coil.

A still further object of the invention is to provide a novel and improved apparatus of this character capable of application to any condenser which might be desired for use in shunting the grid coil to provide for the tuning thereof.

A still further object of the invention is to provide a device of this character such that provision may be made for its use in connection with aerial of different lengths.

Other objects and advantages will become apparent.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a rear elevation of a tuning unit constructed in accordance with my invention;

Figure 2 is a plan view thereof; and

Figure 3 is a perspective of the arm carrying the movable coil.

Referring now more particularly to the drawings, the numeral 10 indicates the end plate of a rotary variable condenser which may be of any suitable character, 11 binding posts electrically connected with the stator plates 12 of this condenser and 13 the rotor shaft of the condenser which is electrically connected with the rotor plates 14 of the condenser and by rotation of which variation of the capacity of the condenser is had. These parts are all normal parts of the ordinary variable condenser and enter into the invention in no way except in connection with the apparatus hereinafter described.

In accordance with my invention I provide a metallic arm 15 which is secured to one binding post 11 of the condenser and the free end of which extends outwardly from the rear end plate 10 of the condenser a distance sufficient to permit ready mounting upon this end of a grid coil 16 of any suitable character. This coil is preferably, however, of the type generally referred to as spider web. The arm 15 being of conducting material serves as a means of connecting one terminal 17 of this coil to the stator of the variable condenser. The securing element 18 directed through the end of the arm serves both as a means for mechanically attaching the arm to the coil and the terminal of the coil to the arm and a mounting for an insulating bar 19, the free end of which is provided with a contact receiving binding post 20 to which the second terminal 21 of the coil may be connected. The connection of the arm 15 to the binding post 11 is such that the arm is rigid to this binding post.

By means of a second binding post 11, an insulating arm 22 is connected to the end

plate 10 of the condenser. This arm is relatively short and is adjustably mounted upon the binding post having formed therein a slot 28 providing for such adjustment. The free end of this arm has projecting outwardly therefrom in parallelism to the rotor shaft 13 a pivot 24 upon which is mounted an oscillating arm 25, the free end of which is turned outwardly from the rear end plate 10 of the condenser so that this free end 26 is arranged in opposition to the free end of the arm 15. This free end has formed therein a slot 27 in which is adjustably mounted a securing element 28 forming a means for mechanically attaching to the arm a second or plate coil 29 of the same character as the coil 16. The terminals of this coil are usually in the form of flexible leads which may be secured to the arm 25 by forming in this arm a pair of openings 30 through which is passed a tie 31 passing about the leads holding them in position on the arm. Secured at one end to the pin or pivot 24 is a spring 32, the opposite end of which engages the arm 25, as at 33, to constantly urge the free end of this arm and the coil 29 carried thereby toward the coil 16 of the arm 15.

The ends of rotor shafts of variable condensers usually project through the end plates 10 thereof and at least are accessible through such end plates. In accordance with my invention, the end of this rotor shaft is formed with a threaded bore receiving an attaching element 34 serving as a means for attaching to the rotor shaft a cam 35. This cam is computed with the coil 16 as a basis and with a given aerial used in conjunction with this coil. The contour of the cam is such that the coil 29 is kept in such regenerative relation to the coil 16 that oscillation of the vacuum tube employed will not occur at any position of the condenser. Since maximum regeneration is had at high wave lengths and the coil 16 is shunted by the condenser, it follows that maximum regeneration or closest proximity of the coils 16 and 29 should be had when the rotor plates of the condenser are completely interdigitated with the stator plates thereof and minimum regeneration should be had when the rotor plates are removed from proximity to the stator plates. Between these points but slight variation from uniform spiral contour is had and the cams may accordingly be very easily produced. In the sale of the apparatus, cams may be provided for use with aerials of different lengths, each cam varying slightly in their construction and the proper cam being provided when the sale of the apparatus is made.

It will be obvious that this construction may be very readily produced, may be employed with practically any standard rotary variable condenser and will reduce the difficulties of tuning to a minimum. In addition, its use in a set will insure against reradiation from such set for such reradiation only occurs in objectionable amounts when oscillation of the tube employed in the set results. While I have called for the mounting of but a single coil upon the arm 15, it will be obvious that a plurality of coils may be mounted upon this arm as for example a primary coil and the coil 16 and of which the coil 16 would be the secondary. It will furthermore be obvious that while I have consistently referred to the coils as grid and plate coils, these coils might be used in any relation where regeneration and tuning are necessary at the same time and that this regeneration might be furnished from another tube than that to which the grid coil 16 is connected.

I claim:—

1. A tuning unit comprising in combination, a rotary interdigitating plate variable condenser including the usual rotor shaft, rear end plate and binding posts carried thereby, a coil supported from one of said binding posts, a second coil supported from a second binding post and in inductive relation to the first named coil, the support of the second named coil permitting movement of the coil toward and away from the first named coil, a spring urging the second coil toward the first coil, and means carried by the rotor shaft and operatively engaging the movable coil to maintain the same in predetermined positions with relation to the first named coil corresponding to given positions of the rotary element of the condenser.

2. A tuning unit comprising in combination, a rotary interdigitating plate variable condenser including the usual rotor shaft, rear end plate and binding posts carried thereby, a coil supported from one of said binding posts, a second coil supported from a second binding post and in inductive relation to the first named coil, the support of the second named coil permitting movement of the coil toward and away from the first named coil, and means carried by the rotor shaft and operatively engaging the movable coil to maintain the same in predetermined positions with relation to the first named coil corresponding to given positions of the rotary element of the condenser, the support of said second coil including a pivoted arm, said means comprising a cam carried by the rotor shaft and engaging said arm.

3. A tuning unit comprising in combination, a rotary interdigitating plate variable condenser including the usual rotor shaft, rear end plate and binding posts carried thereby, a coil supported from one of said binding posts, a second coil supported from a second binding post and in inductive relation to the first named coil, the support of the second named coil permitting movement of the coil toward and away from the first

named coil; a spring urging the second coil toward the first coil, and means carried by the rotor shaft and operatively engaging the movable coil to maintain the same in predetermined positions with relations to the first named coil corresponding to given positions of the rotary element of the condenser, the support of the first named coil including means for electrically connecting one terminal of the coil to one terminal of the condenser.

4. A tuning unit comprising in combination, a rotary interdigitating plate variable condenser including the usual rotor shaft, rear end plate and binding posts carried thereby, a coil supported from one of said binding posts, a second coil supported from a second binding post and in inductive relation to the first named coil, the support of the second named coil permitting movement of the coil toward and away from the first named coil, a spring urging the second coil toward the first coil, and means carried by the rotor shaft and operatively engaging the movable coil to maintain the same in predetermined positions with relation to the first named coil corresponding to given positions of the rotary element of the condenser, the support of the first named coil including means for electrically connecting one terminal of the coil to one terminal of the condenser and having mounted thereon an insulating supporting arm for the second terminal of the coil.

5. A tuning unit comprising in combination, a rotary interdigitating plate variable condenser including the usual rotor shaft, rear end plate and binding posts carried thereby, a coil supported from one of said binding posts, a second coil supported from a second binding post and in inductive relation to the first named coil, the support of the second named coil permitting movement of the coil toward and away from the first named coil, a spring urging the second coil toward the first coil, and means carried by the rotor shaft and operatively engaging the movable coil to maintain the same in predetermined positions with relation to the first named coil corresponding to given positions of the rotary element of the condenser, the support of the second named coil including a member stationary with relation to the condenser and adjustably engaged with the binding post, a pivot carried by said member, an arm mounted for oscillation upon the pivot and upon the free end of which the coil is adjustably mounted.

In testimony whereof I hereunto affix my signature.

FRANCOIS C. BRADLEY.