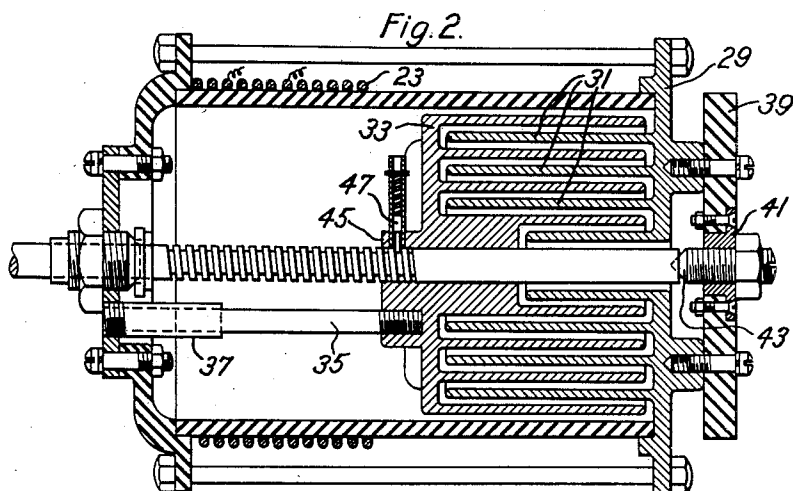
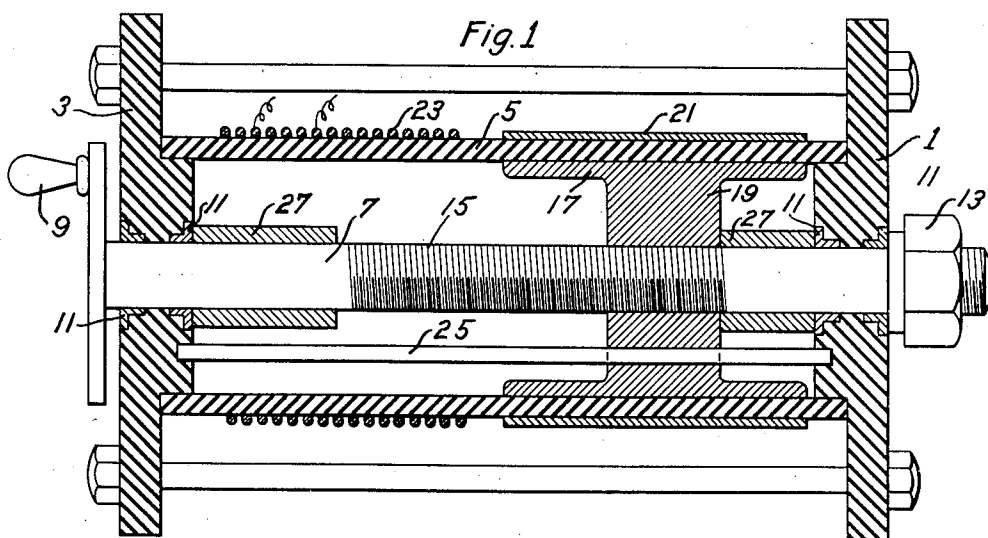


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A. P. BOCK
COMPACT TUNING DEVICE

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COMPACT TUNING DEVICE

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1 Claim. (Cl. 250—40)

My invention relates to apparatus for use in radio circuits, and more particularly to a tuning device adapted for the purpose of determining the frequency of operation of such circuits.

It is an object of my invention to provide means for tuning a circuit throughout a large frequency range in a continuous manner.

It is another object of my invention to provide means for tuning a circuit in a continuous manner throughout a range of frequencies and maintain a substantially constant ratio between the inductance and capacitance in the tuned circuit at any frequency within that range.

Another object of my invention is to provide means for tuning a radio circuit, which means shall be very compact and shall combine both the capacitor and the inductor in a single unit.

Another object of my invention is to provide means for tuning the circuit which shall provide substantially straight-line frequency tuning.

A further object of my invention relates to a tuning unit for radio circuits capable of use in coupling a plurality of stages and which shall provide a constant voltage ratio in the coupling circuit.

Additional objects of my invention will be disclosed in the following description of the same, taken in conjunction with the accompanying drawing, wherein:

Figure 1 is a view in cross-section illustrating one embodiment of my invention; and

Fig. 2 is a similar view representing a second embodiment of the same.

Tuning a radio circuit, according to present-day practice, is usually accomplished by varying either the capacitance or the inductance in a continuous manner. In accordance with the teachings of my invention, I provide a construction which enables one to tune a circuit by simultaneously varying both the capacitance and the inductance of the tuned circuit, and this is accomplished in such a manner that the many advantages, as set forth in the objects of my invention, may be realized.

In accordance with the embodiment of my invention as disclosed in Fig. 1, I provide a pair of end plates 1 and 3, preferably of insulating material, such as "Mica", or the like, clamped each against an end of a cylindrical tube 5, also of insulating material. A shaft 7 provided with a handle 9 at one extremity extends through the end plates along the axis of the tube and is rotatably supported in the end plates by means of suitable bushings 11. Withdrawal of the shaft through the end plates is prevented by a nut 13

fastened to the end of the shaft opposite that end which supports the handle.

A portion of the shaft lying within the tube is provided with a screw thread 15, and this threaded portion of the shaft supports one plate 17 of a condenser, this plate being cylindrical in form and mounted on the shaft by means of a web 19 of substantial thickness extending across the opening defined by the plate and integral therewith, the web being threaded centrally to engage the shaft. Rotational movement of the shaft will thus produce a longitudinal movement of the plate along the axis of the tube.

This plate forms one element of a condenser, the other element constituting a cylindrical tube 21 of metal supported on the outside of the insulating tube adjacent one end thereof. The insulating tube constitutes the dielectric of this condenser.

The other end of the tube supports a coil 23, which in this construction, comprises a plurality of turns of wire around the tube. The coil being tapped if desired to extend its range of operation.

The tuning unit is so arranged that the longitudinal movement of the adjustable plate 17 of the condenser will cause this plate to enter the magnetic field of the coil. The plate is comprised of non-magnetic material, and as it enters the field of the coil, it produces a decrease in the inductance of the winding. Thus, it will be apparent that rotation of the shaft to cause the condenser plate to shift from the position indicated in the drawing to within the field of the coil will not only reduce the capacity of the condenser, but will simultaneously decrease the inductance of the winding, and all this is accomplished in a smooth and continuous manner.

Since the capacity will be varied linearly, in the construction shown, and since the inductance will vary substantially linearly or can be made to vary linearly by proper distribution of the winding on the tube, a substantially constant ratio of capacity to inductance will be maintained throughout the tuning range of the unit, and practically straight-line frequency will be the characteristic of the device.

The unit disclosed by me may be very conveniently modified so as to constitute a split condenser having a pair of stators and a common "rotor" or adjustable element. This is easily accomplished by splitting the fixed cylindrical plate 21 of the condenser into a pair of separate individual plates, so that each one will constitute a separate capacity with the movable plate, supported internally of the insulating tube. The

resulting device will be the equivalent of two condensers connected in series through a common adjustable element and may be used as such.

5 In order to prevent rotation of the movable plate, and constrain its movement to a longitudinal direction only, a guide rod 25 is provided, which is passed through an opening in the web portion of the movable plate and is supported at its ends in the end plates.

10 Abutment of the movable plate against the end plates in its movement to its extreme positions, is avoided by providing suitable stops which will halt further movement of the plate when it reaches a desired extreme position. This stop
15 may take any desirable form, but that which I have disclosed comprises a collar 27 mounted on the shaft and located one at each end of the tube against the end plates.

In the modification disclosed in Fig. 2, the construction differs primarily from that of Fig. 1 in the design and arrangement of the condenser elements. In this modification, one of the end walls 29 in abutment against the end of the insulating tube comprises the fixed plate of the
25 condenser. This end wall is of metal and supports, integrally therewith, a number of concentric metallic rings 31, and these mesh with an adjustable plate of similar construction to comprise the condenser.

30 This second plate 33 is maintained in threaded engagement with the shaft in such manner that rotation of the shaft will cause movement of this plate away from that of the fixed plate of the condenser, and in such a direction as to cause this movable plate to enter the field of the coil 23
35 which is supported at the other end of the insulating tube. Rotational movement of the adjustable plate is prohibited by means of a guide rod 35 attached thereto and extending into a tube or guideway 37 supported by one of the end plates of the unit.
40

In the second embodiment, just described, the adjusting shaft is insulatingly supported out of conductive contact with the metallic end plate by

means of a piece of insulation 39 mounted on the end plate and supporting a metallic insert 41. This metallic insert has a threaded opening there-through for receiving a tapered bearing 43, against which the end of the shaft is pivotally supported. 5

The adjustable plate, in lieu of being directly threaded to the shaft as in the modification of Fig. 1, is provided with an integral collar 45 which in turn receives a pin 47 under spring pressure and is adapted to engage the thread on the shaft. 10 The pin is preferably so tapered that it does not reach the bottom of the trough of the thread but bears against the edges thereof. This continual pressure of the spring actuated pin against the edges of the thread insures against play in the device due to wear on the thread, and makes for greater accuracy in tuning and adjustment of the device. A similar feature might also be embodied in the device of Fig. 1 if desired. 15

Many modifications of my invention may occur 20 to those skilled in the art without involving invention in the making of such changes, and I, therefore, do not desire that my protection be limited to the specific details disclosed except as may be necessitated by the prior art and the 25 appended claim.

I claim as my invention:

A tuning unit comprising an insulating support of cylindrical structure, a pair of supporting end plates for said structure each housing a bearing, 30 a shaft rotatable therein, one of said end plates being provided with inward concentric projections forming the stator plate of a condenser, a movable element slidably mounted upon said shaft having concentrically arranged projections 35 adapted to mesh with said first-mentioned projections upon rotation of said shaft, an inductive winding peripherally arranged on said support and physically so positioned and so dimensioned as to progressively receive said movable element 40 whereby the ratio of capacitive change of said condenser and the ratio of variation of said inductance remain substantially constant.

ASHLEY P. BOCK.