July 20, 1948. K. E. VAUGHN 2,445,700

HIGH-FREQUENCY TUNING UNIT

Filed March 14, 1946

Fig. 1.

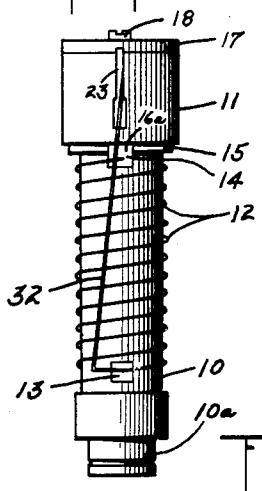


Fig. 2.

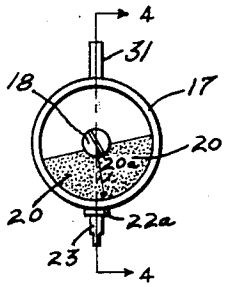


Fig. 3.

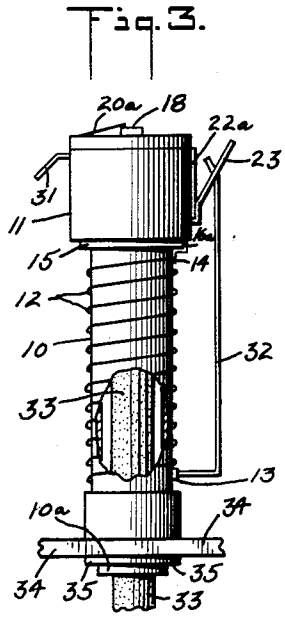


Fig. 6.

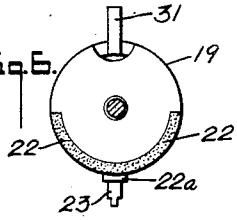


Fig. 4.

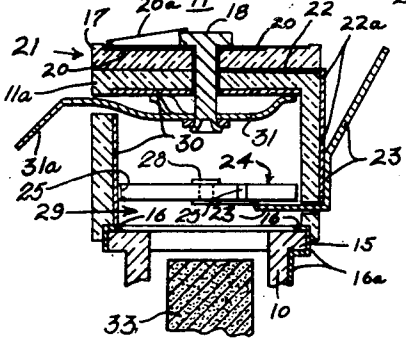


Fig. 5.

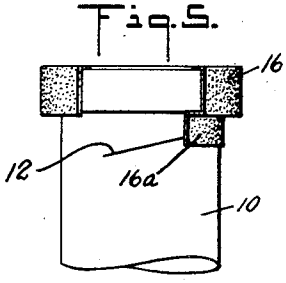


Fig. 9.

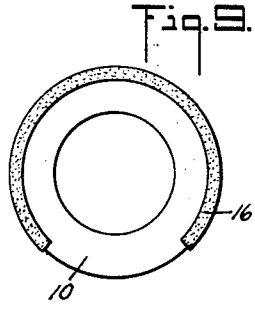


Fig. 7.

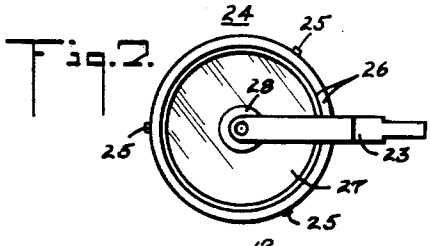


Fig. 8.

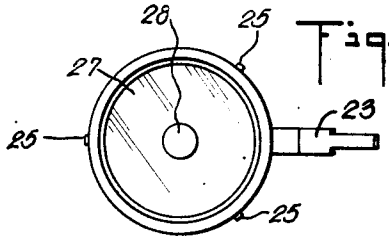
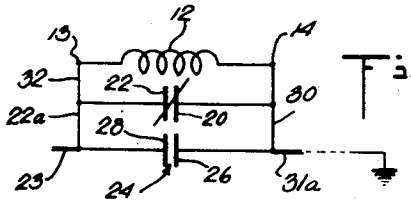


Fig. 10.



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HIGH-FREQUENCY TUNING UNIT

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Application March 14, 1946, Serial No. 654,290

2 Claims. (Cl. 250—40)

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This invention relates to tuning units for use with radio apparatus and more particularly to a compactly assembled and mounted unit which is suitable for operation at high radio frequencies.

In so-called slug-tuned radio frequency circuits employing a permeability tuned inductance, a padder condenser and a trimmer condenser associated therewith, rough tuning may be accomplished by adjusting the extent of telescoping of the powdered iron core or slug into the inductance coil winding, and finer adjustment may be made by tuning either or both of the condensers. When such devices are used at high radio frequencies, it is necessary to eliminate long interconnecting leads and sliding contacts or wiping contacts associated with the various components of the tuned circuit.

Accordingly, it is a principal object of this invention to provide a tuning unit suitable for use at high radio frequencies, wherein all of the components of the unit are compactly assembled on a single mount and with short conductors connecting the various components.

It is another object of this invention to provide an improved permeability tuner for use at high radio frequencies, and carrying integrally therewith a padder condenser and an adjustable trimmer condenser, all compactly arranged on a single mounting.

A feature of the invention relates to a novel assembly of parts which cooperate to form a compact plural electrostatic condenser system for use with a permeability tuner.

A further feature relates to the novel organization, arrangement and interconnection of parts which cooperate to produce an improved permeability tuner for use at high radio frequencies.

Other objects, features and advantages of this invention will be apparent to those skilled in the art as will be evident from the following descriptions taken in connection with the accompanying drawing, in which,

Fig. 1 is a front elevation view of an embodiment of the inventive concept.

Fig. 2 is a top view of Fig. 1.

Fig. 3 is a side view of Fig. 1.

Fig. 4 is an enlarged cross-sectional view of a portion of Fig. 1, taken along line 4—4 of Fig. 2.

Fig. 5 is a view of part of Fig. 4.

Fig. 6 is a top view of Fig. 1 with the top cap which forms the rotary plate of the trimmer condenser removed.

Fig. 7 is a bottom view of the button-type condenser shown in edge view in Fig. 4.

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Fig. 8 is a top plan view of the button-type condenser.

Fig. 9 is a top end view of Fig. 5.

Fig. 10 is a schematic diagram of the electric connections of the various components shown in Figs. 1–9.

Referring to the drawing, the mounting of the various components comprises an elongated hollow tube 10, to which is fastened at the upper end a circular inverted box-like member 11. A rotatable disc 17 lies flat against the outer flat wall 11a of member 11. The members 10, 11 and 17 are made of a low loss ceramic such as customarily used for insulation in high frequency radio circuits. Attached, for example by soldering to electroplated areas on member 10, are two metal tabs 13, 14 to which the opposite ends of the inductance coil 12 are respectively soldered. As shown in Figs. 1 and 3, the coil 12 is tightly wound around member 10, and if desired, the surface of member 10 may be helically threaded to receive and space the successive turns of the coil.

Ceramic disc 17 is rotated by turning pin 18 which passes freely through wall 11a and through metal spider 31. A metallic coating 20 is provided on the slightly recessed upper face of disc 17, and a short metal strap 20a is soldered at one end to coating 20 and at the other end to the head of pin 18. Coating 20 serves as the rotor plate of the trimmer condenser 21 and in the particular arrangement shown in Fig. 10 is connected to ground by means of the spider 31 and the lug 31a which extends outwardly through an opening in the member 11.

Plating 20 is semi-circular in area as shown in Fig. 2, and electrostatically cooperates with a stator plate 22 in the form of a strip metal coating or plating on the upper face of wall 11a and extending half-way around the margin of wall 11a as shown in Fig. 6. Plating 22 is connected to the terminal lug 23 by a strip of solder 22a on the exterior surface of member 11 (Fig. 4). Lug 23 also connects to the central plate 28 of a button-type condenser 24 which is shown in detail in Figs. 7 and 8. This condenser comprises a disc 24a of mica or other suitable insulation through the center region of which passes a metal rivet whose ends are flattened against the mica to form the condenser plates 28. Surrounding the mica disc 24a and rigidly fastened thereto is a metal ring 26 which acts as the other condenser plate in cooperation with plates 28. The lug 23 is soldered to the central plate 28 as shown in Fig. 7. The plate 26 of the button-type con-

denser has three equally spaced lugs 25 which are adapted to press against the inner surface of member 11, thus centering the button condenser. It should be noted that this condenser is supported by means of the right angled bend in lug member 23 which is soldered to coating 22a. The horizontal portion of this bend passes through a small opening in member 11 as shown more clearly in Fig. 4. The inside surface of member 11 is provided with a localized coating 30 of solder so that when member 24 is inserted in place, one of the lugs 25 presses against and makes positive electrical contact with coating 30. This coating 30 also extends down so as to extend across the shouldered lower lip of member 11.

As shown more clearly in Fig. 5, the upper shouldered end of member 10 likewise carries a coating 16 of solder so that when parts 10 and 11 are fitted together, as shown in Fig. 4, electrical contact is made between coatings 16 and 30. The coating 16 is provided with a downwardly extending strip 16a to which the connecting lug 14 is soldered. In accordance with one feature of the invention, and as shown in Figs. 5 and 9, the coating 16 does not extend around the entire periphery of member 10, thus avoiding high frequency losses which would otherwise occur by reason of a closed loop of solder. The parts 10 and 11 can be rigidly fastened together by flowing molten solder externally around part of the overlapping shoulders of members 10 and 11. Terminal 13 is connected to lug 23 by strap 32.

The lower end of member 10 has a portion 10a of reduced diameter which is adapted to pass through a circular opening in a panel or bracket 34. Portion 10a has a peripheral recess to receive a suitable split ring washer 35 whereby the entire unit is locked rigidly to member 34. A suitable magnetic slug or core 33 of compressed powdered magnetic material is suitably mounted for adjustable telescoping movement with relation to member 10 as is well-known in so-called permeability tuners.

The equivalent electrical connections of the two condensers and the coil 12 are shown in Fig. 10 wherein corresponding parts to those of Figs. 1–9 are similarly designated.

While one particular embodiment has been disclosed, various changes and modifications can be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. A high frequency tuner unit comprising a tubular insulator member, an inductance coil wound around said member, a permeability core mounted for telescoping movement into said tubular member, an inverted cup-shaped member of insulation having a shouldered lip which seats against a corresponding shoulder on the end of said tubular member, a conductive coating on the outer flat wall of said cup-shaped member

around the margin thereof, a conductive coating extending only partially around to said shoulder and serving as a soldering surface for uniting said tubular member and said cup-shaped member, a button-type condenser, means supporting said button-type condenser within said cup-shaped member and including a connector tab fastened to one electrode of said condenser and extending outwardly through the peripheral wall of said cup-shaped member, an adjusting member having a shank passing through the flat wall of said cup-shaped member and electrically connected to said conductive coating, a connector tab making electrical contact with the said shank of said adjusting member and extending outwardly through the peripheral wall of said cup-shaped member, and means including said conductive coating to complete an electrical circuit from the other electrode of said button-type condenser to said second-mentioned connector tab.

2. A tuning and trimmer condenser unit for high frequency tuner assemblies comprising a cup-shaped insulating member, a rotatable insulator disc seated against the external face of the flat wall of said cup-shaped member, a first coating of conductive material attached to the margin of said flat wall, a second coating of conductive material on the inner surface of said cup-shaped member, a third coating of conductive material on the flat surface of said disc which is out of contact with said first coating and forming therewith a rotary adjustable condenser, a pin having its shank passing centrally through said disc and said flat wall, the outer end of said pin being electrically connected to said third conductive coating and the inner end of the pin being connected to said second conductive coating, a metal spider carried by the inner end of said pin and in wiping engagement with the last-mentioned conductive coating, a connector tab connected to said spider and extending outwardly through the peripheral wall of said cup-shaped member, a button-type condenser supported within said cup-shaped member by means of another connector tab fastened to one electrode of the button-type condenser, said other connector tab extending outwardly through the peripheral wall of said cup-shaped member and anchored thereto, and means connecting the other electrode of said button-type condenser to said second conductive coating.

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