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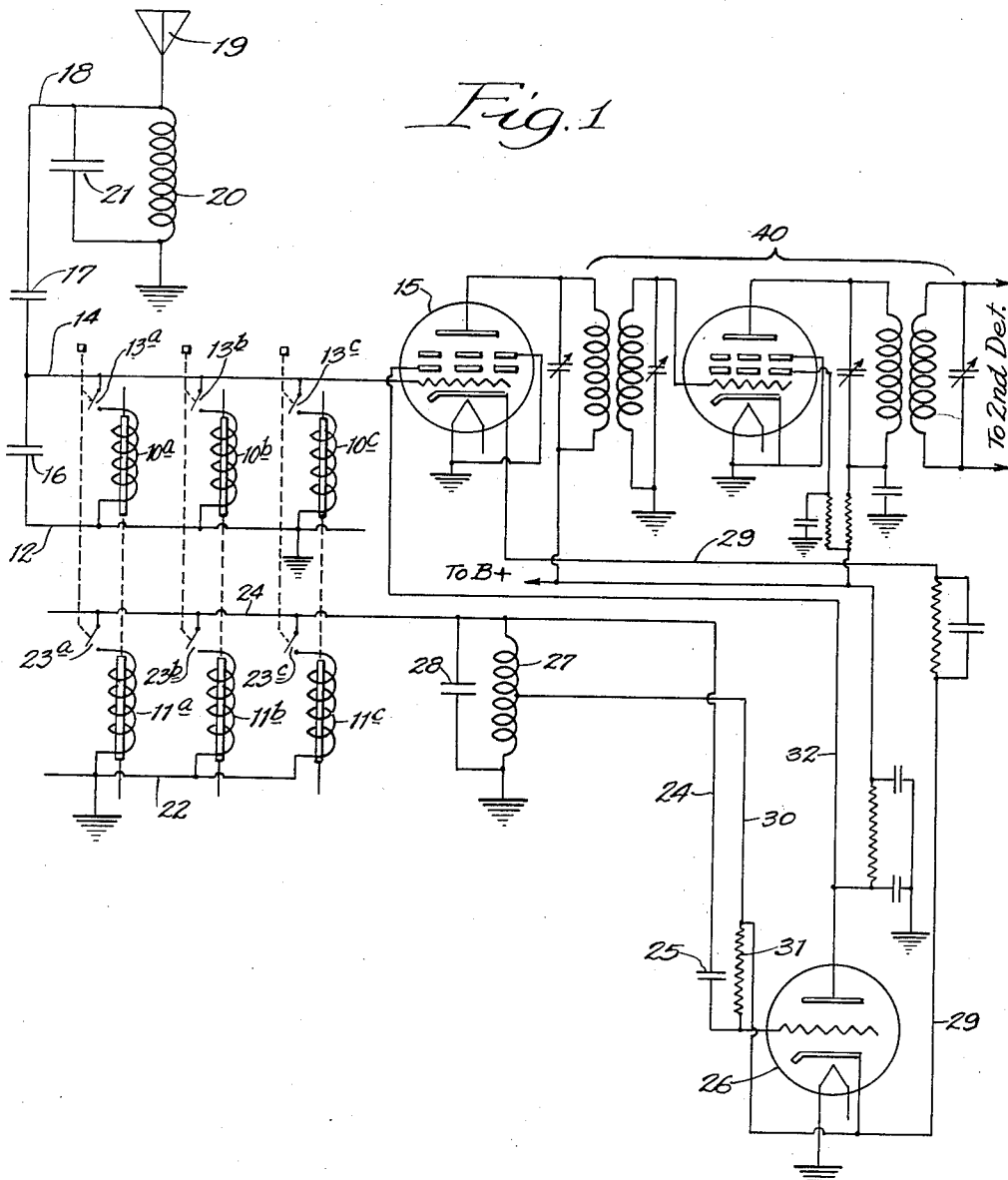
H. B. CANON ET AL

2,229,404

PERMEABILITY TUNING

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2 Sheets-Sheet 1



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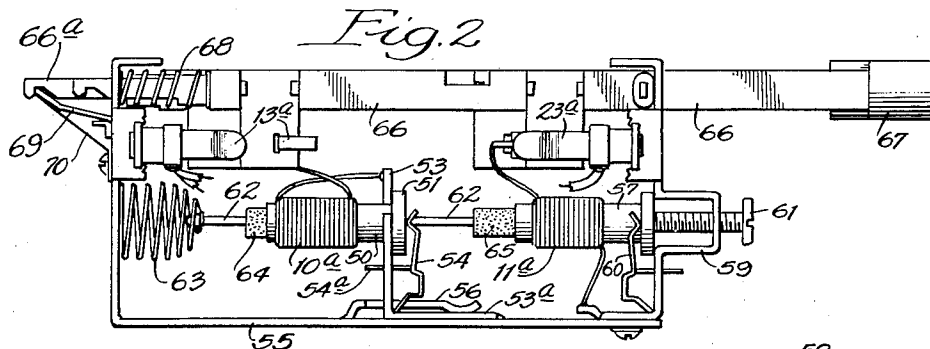
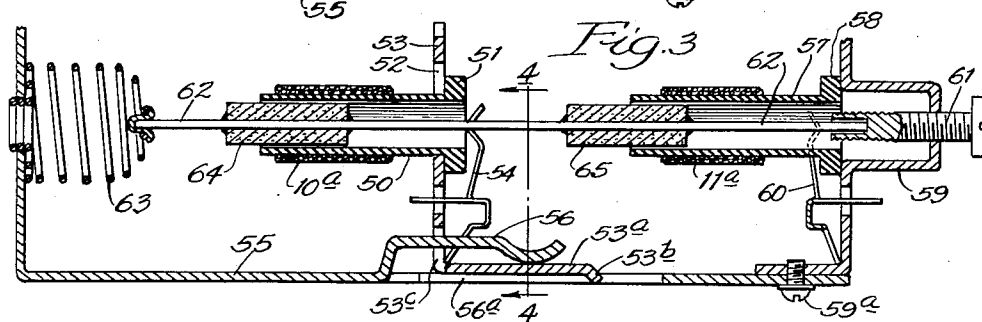
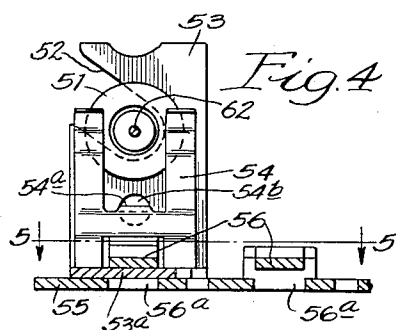
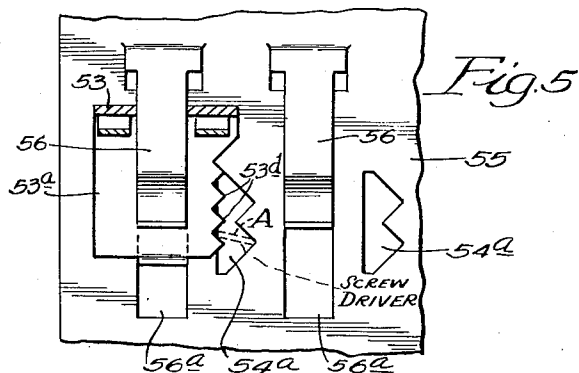
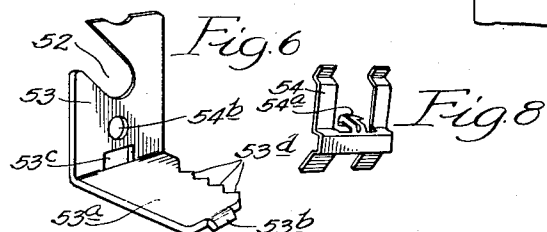
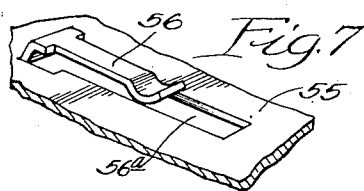
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PERMEABILITY TUNING

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UNITED STATES PATENT OFFICE

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PERMEABILITY TUNING

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5 Claims. (Cl. 250—40)

An object of this invention is to provide an improved, simplified and concise form of permeability tuning device for radio receiving sets with particular reference to the reception of broadcast frequencies.

Another object is the provision of means for readily adjusting the tuning elements to overcome small inaccuracies of manufacture without the use of trimmer condensers.

Still another object is to provide means other than variable condensers for simultaneously tuning two tuned stages of radio frequency, one of which is preferably an oscillator stage.

Another object is to provide such a radio receiver which is operated by push buttons, one for each frequency it is desired to receive.

These and other objects, as will hereinafter appear, are accomplished by this invention which is fully described in the following specification and shown in the accompanying drawings, in which—

Figure 1 is a wiring diagram of one embodiment of the invention;

Fig. 2 is an end elevation of a frame with the selector and oscillator coils mounted therein together with the switches for operating these coils;

Fig. 3 is a partial enlarged longitudinal section through the coils;

Fig. 4 is a partial section on the line 4—4 of Fig. 3;

Fig. 5 is a partial section on the line 5—5 of Fig. 4;

Fig. 6 is a reduced perspective view of the adjusted bracket of Figs. 3 and 4;

Fig. 7 is a partial perspective view of the up-struck tongue for holding the bracket in place; and

Fig. 8 is a reduced perspective view of a spring for retaining the insulating sleeve on the bracket.

The embodiment illustrated, particularly in Fig. 1, comprises a series of selector coils 10^a, 10^b, 10^c, etc. and a corresponding series of oscillator coils 11^a, 11^b, 11^c, etc. which are wired so as to be selectively connected in pairs as 10^a and 11^a in a superheterodyne receiver, each pair being controlled as by switches operated by a push button, and the tuning of each pair of coils being controlled by mechanically connected magnetic dust cores, all as will later be described.

The selector coils 10^a, 10^b, 10^c, etc. are connected at one end to a common grounded lead 12, the other ends being connected respectively through switches 13^a, 13^b, 13^c, etc. to a lead 14 which is connected to the control grid of a first

detector tube 15, with a condenser 16 across the leads 12, 14 whereby any one of the selector coils may be operably connected by means of its switch to this condenser to form a resonant circuit for a predetermined broadcast frequency. The lead 14 connects through a condenser 17 and a lead 18 to an aerial 19 with a coil 20 and condenser 21 connected to the aerial and to ground.

The oscillator coils 11^a, 11^b, 11^c, etc. are connected at one side to ground through a wire 22 and at the other through a series of switches 23^a, 23^b, 23^c, etc. to a lead 24 which connects through a condenser 25 with the grid of an oscillator tube 26. Each of the switches 23^a, 23^b, 23^c, etc. is operatively connected to the corresponding switch 13^a, 13^b, 13^c, etc. as indicated by dotted lines so that these switches open and close in pairs as will later be described in detail. The lead 24 also connects to ground through a tuner tracking coil 27 and a condenser 28. The cathode of the first detector tube 15 is connected through a lead 29 to the cathode of the oscillator tube 26 and by a lead 30 to the top on the tuner tracking coil 27. The lead 30 also connects to the grid of the oscillator tube through a biasing resistance 31.

The plate of the oscillator tube 26 is connected by a lead 32 with the screen grid of the first detector tube 15. Amplification is then obtained in any well known manner by means of an intermediate frequency amplifying circuit 40 and is connected to a second detector and audio frequency (not shown) amplifier and thence to a loud speaker.

Much of the novelty in this invention resides in the construction and arrangement of the selector coils 10^a, 10^b, 10^c, etc. and of the oscillator coils 11^a, 11^b, 11^c, etc. These will now be described in detail. It will be understood however that where one of the selector coils as 10^a is tuned with respect to the condenser 16 to a particular broadcast frequency, the corresponding oscillator coil 11^a will be tuned to this same frequency plus the intermediate frequency. The first detector is then tuned to pass this intermediate frequency and the intermediate amplifier 40 is tuned to amplify it in any well known manner.

Referring to Figs. 2 to 8, the selector coil 10^a is wound on an insulating tube 50 which has an enlarged end 51 and which preferably passes through a slotted opening 52 in a bracket 53 and is adjustably held in place by a spring 54 which has a divided anchoring means 54^a which snaps

through a hole 54^b in the bracket to lock the spring to the bracket. The bracket 53 is adjustably mounted on a frame 55 and has a base 53^a which slides on the frame and which has a finger 53^b extending into a slot 55^a which is formed by striking up a tongue 55. This tongue passes through an opening 53^c in the bracket, the tongue having a curved end which presses the base 53^a against the frame. The finger 53^b and the tongue serve to guide the bracket so as to give it a parallel motion.

The oscillator coil 11^a is similarly wound or otherwise mounted on an insulating tube 57 which has an enlarged end 58 which is pressed against the metal end 59 of the frame by means of a spring 60 which is preferably a duplicate of the spring 54. The end 59 is secured to the frame 54 by means of screws 59^a and is threaded to receive a screw 61, the end of which is preferably made hollow to receive a wire rod 62 which extends axially through both of the insulating tubes 53 and 57 and is pressed toward the screw 61 by means of a spring 63. The rod 62 carries two magnetic cores 64, 65 which are preferably made of very finely divided magnetic dust which is molded with a suitably insulating bond. This arrangement provides a very simple and efficient means for mounting the coils and for adjusting the frequency of each coil separately as will hereinafter be described.

An edge of the base of the bracket is provided with a series of small serrations 53^d which overlie an opening 54^a in the frame which preferably has larger serrations so that a flat instrument A such as the point of a small screw driver can be inserted and by rotating this instrument, as shown in Fig. 5, the bracket can be moved back and forth thereby moving the coil 10^a with respect to its core 64 thereby adjusting the frequency of the selector coil 10^a. By moving the screw 61 the frequencies of both the selector coil 10^a and the oscillator coil 11^a are simultaneously adjusted. In practice, the frequency of the oscillator coil 11^a will first be adjusted by means of the screw 61 to a desired frequency as that of a station in the broadcast field, after which the selector coil 10^a will be adjusted by means of the instrument A to the same frequency. After this, any movement of the screw 61 will simultaneously adjust both the selector and oscillator coils and in substantially the same amounts so that an operator can readily adjust the frequency of a pair of selector and oscillator coils as 10^a, 11^a from one station to another station having a nearby frequency. Where, however, a number of such pairs of coils, say six such pairs, were to be made applicable to a fairly wide range of frequencies, such as occurs in the broadcast field, two of such pairs would be wound for the low portion of the desired range, two for the intermediate portion, and two for the high frequency portion.

Over each pair of such coils is preferably mounted a plunger 66 which has an operating button 67 which preferably carries in its face a disk with the call letters of the broadcast station to whose frequency its coils are tuned. This plunger is normally held outwardly by means of a spring 68 and when pressed inwardly to the position 66^a is caught and held by a pawl 69 which is pressed toward the plunger by means of a leaf spring 70. This pawl is so arranged that as each plunger advances, it releases the pawl so as to release any plunger which is held.

The plunger 66 when pushed in closes the switches 13^a and 23^a of Fig. 1. These switches form no part of the present invention and hence will not be described in detail.

Another selector coil like coil 10^a may be added and operated by a core like 64 on the rod 62 to give an added preselector stage of radio frequency amplification if desired.

From the foregoing it will be clear that this provides a very simple and compact form of radio receiver and one wherein a single fixed capacitor serves to form with each of a series of inductances a resonant circuit of a predetermined frequency. It will be noted that the adjustment for frequencies of the several circuits is accomplished without the use of either a variable condenser for this purpose or even of a trimmer condenser.

We claim:

1. In a radio receiving set, a variable high-frequency inductance device comprising a frame, an insulating sleeve, spring means yieldingly clamping the sleeve to the frame, a movable bracket slidably mounted on the frame and movable axially of the sleeve and coil, a second insulating sleeve mounted on the bracket in axial alignment with the first-mentioned sleeve and movable with the bracket, an oscillator coil mounted on one of said sleeves, a selector coil mounted on the other sleeve and electrically connected to the oscillator coil, a core formed of magnetic material mounted for sliding movement in each sleeve, means mechanically connecting said cores for shifting the axial positions of the latter within their respective sleeves in unison, means preventing lateral shifting of the bracket on the frame, a series of serrations formed on the bracket and a series of opposed serrations formed on the frame and spaced from the former serrations, said serrations being designed to cooperate with a tool for shifting of the bracket axially of the sleeves and cores.

2. In a radio receiving set, a variable high-frequency inductance device comprising a frame, an insulating sleeve, spring means yieldingly and detachably clamping the sleeve to the frame, a movable bracket slidably mounted on the frame and movable axially of the sleeve and coil, a second insulating sleeve, spring means yieldably and detachably clamping said latter sleeve to the bracket in axial alignment with the first-mentioned sleeve whereby the latter sleeve is movable with the bracket, an oscillator coil mounted on one of said sleeves, a selector coil mounted on the other sleeve and electrically connected to the oscillator coil, a rod extending axially through both sleeves, a magnetic core secured to said rod within each sleeve, spring means normally urging the rod to a limiting position in one direction, and means on said frame determining the limiting position of the rod and for shifting the rod axially in the other direction.

3. In a radio receiving set, a variable high-frequency inductance device comprising a frame, an insulating sleeve, spring means yieldingly and detachably clamping the sleeve to the frame, a movable bracket slidably mounted on the frame and movable axially of the sleeve and coil, a second insulating sleeve, spring means yieldably and detachably clamping said latter sleeve to the bracket in axial alignment with the first-mentioned sleeve whereby the latter sleeve is movable with the bracket, an oscillator coil mounted on one of said sleeves, a selector coil mounted on

the other sleeve and electrically connected to the oscillator coil, a rod extending axially through both sleeves, a magnetic core secured to said rod within each sleeve, and means on said frame for shifting the position of the rod axially of the sleeves.

4. In a radio receiving set, a variable high-frequency inductance device comprising a frame, an insulating sleeve, spring means yieldingly and detachably clamping the sleeve to the frame, a movable bracket slidably mounted on the frame and movable axially of the sleeve and coil, a second insulating sleeve, spring means yieldably and detachably clamping said latter sleeve to the bracket in axial alignment with the first-mentioned sleeve whereby the latter sleeve is movable with the bracket, an oscillator coil mounted on one of said sleeves, a selector coil mounted on the other sleeve and electrically connected to the oscillator coil, a rod extending axially through both sleeves, a magnetic core secured to said rod within each sleeve, means on said frame for shifting the position of the rod axially of the sleeves, and cooperating means on the frame and movable bracket designed for engagement with a tool in shifting the position of the bracket relative to the frame.

5. In a radio receiving set, a variable high-frequency inductance device comprising a frame, an insulating sleeve, spring means yieldingly and detachably clamping the sleeve to the frame, a movable bracket slidably mounted on the frame and movable axially of the sleeve and coil, a second insulating sleeve, spring means yieldably and detachably clamping said latter sleeve to the bracket in axial alignment with the first-mentioned sleeve whereby the latter sleeve is movable with the bracket, an oscillator coil mounted on one of said sleeves, a selector coil mounted on the other sleeve and electrically connected to the oscillator coil, a rod extending axially through both sleeves, a magnetic core secured to said rod within each sleeve, spring means normally urging the rod to a limiting position in one direction, means on said frame determining the limiting position of the rod and for shifting the rod axially in the other direction, and cooperating means on the frame and movable bracket designed for engagement with a tool in shifting the position of the bracket relative to the frame.

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