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TUNING MECHANISM

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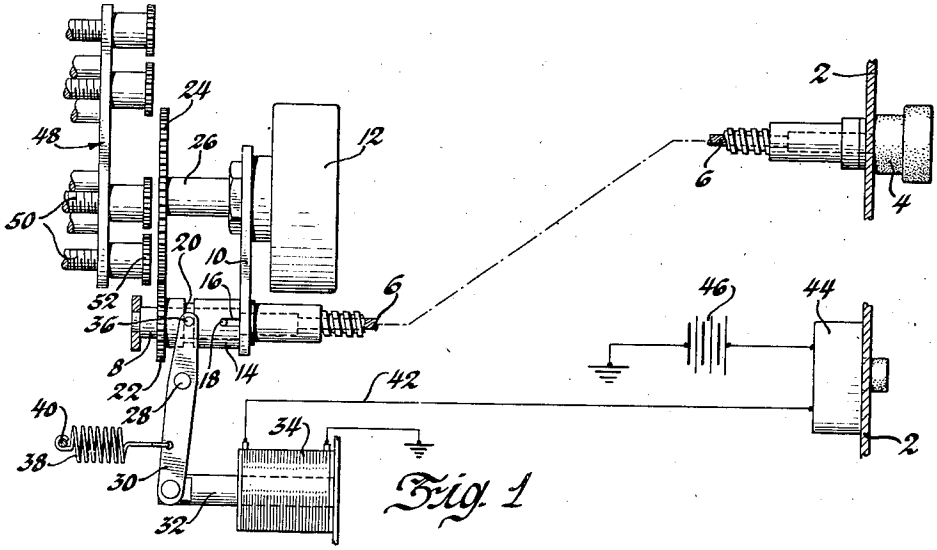


Fig. 1

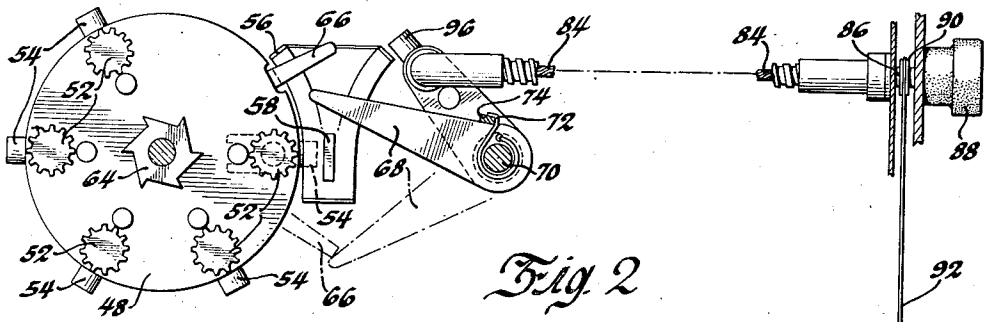


Fig. 2

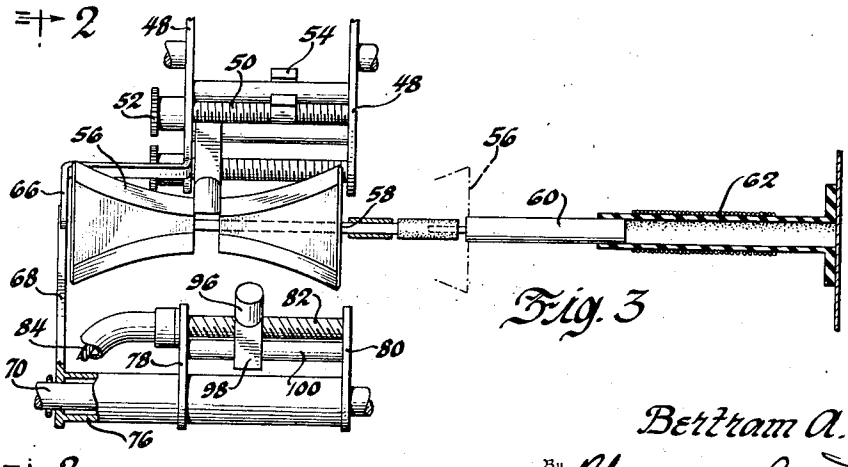


Fig. 3

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TUNING MECHANISM

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7 Claims. (Cl. 250—20)

This invention relates to indexing means and more particularly to means which may be preset and automatically actuated to bring a radio receiver to different resonant frequencies for receiving different broadcast stations.

The majority of the radio receiving sets which are built at the present time incorporate two means of tuning the receivers to different stations. They have a series of so-called push buttons which upon manual pressure thereon bring the tuning means to a definite preset position. There may be a series of these, depending upon how many stations the manufacturer believes the set owner would like to have permanently set up. There is also provided means for manually tuning the set to any intermediate tuned position for receiving other stations which are not so commonly used by the operator. There is also provided of course in these receivers some visual indicating means so that the operator can by glancing at the set ascertain to which station he is listening. In order to provide as simple a combination control of this type as possible, it is necessary to disconnect the manual tuning means from the remainder of the tuning drive when the so-called automatic means is actuated and it is also with a view to simplicity that the indicating means or dial be operated by the manual tuning means.

It is therefore an object of my invention to provide means for automatically tuning a radio receiver.

It is a further object of my invention to provide a novel presetting means for the automatic tuning means.

It is a still further object of my invention to provide means for indicating the position of the tuning means controlled by the manual tuning means.

With these and other objects in view which will become apparent as the specification proceeds, my invention will be best understood by reference to the following specification and claims and the illustrations in the accompanying drawing, in which:

Figure 1 is a schematic view showing the system of resetting the preset tuning means;

Figure 2 is an end view of the apparatus shown in Figure 3 taken on line 2—2 thereof; and

Figure 3 is a plan view showing both the manual and automatic or preset means for tuning a resonant circuit.

Referring now more specifically to Figure 1, there is shown therein a frame member 2 upon which is rotatably mounted a volume control knob 4 which is connected by a flexible drive cable 6 with a short rotatable shaft 8 so that when the knob 4 is rotated the shaft 8 will turn in unison. The shaft 8 is rotatably mounted on a rigid panel 10 which is within the receiver, which panel also carries a variable resistor 12 used to control the volume of the receiver. Carried upon the rotatable shaft 8 is a slidable sleeve 14 having a slot 16 therein through which a pin 18 extends, said pin being rigidly secured to the shaft 8. Thus the sleeve 14 will rotate with the shaft, but can at the same time have axial movement with respect thereto. The sleeve 14 is also provided with a circular groove 20 in its outer surface and a spur gear 22 which is mounted upon the remote end thereof. This spur gear is adapted to mesh with a large gear 24 mounted upon the end of a rotatable shaft 26 to vary the resistance in the volume control 12.

Pivoted on the frame at 28 is a lever 30, one end of which is pivotally connected to a magnetic core 32 which is mounted within a magnetic coil 34. The opposite end of the lever 30 carries a small pin 36 which projects down into the circular groove 20 in the sleeve 14 and tends to move the sleeve axially as the lever is pivoted about its pivot 28 but permits rotation of the sleeve. A tension spring 38 is connected to one arm of the lever and to a stationary point 40 on the frame and tends to rotate the lever clockwise about its pivot and to withdraw the magnetic core member 32 from the coil 34. The coil 34 is connected by line 42 to a manual push button switch 44, the opposite terminal of which is connected to a source of power 46 and thence to ground.

Thus in the normal operation of the device the knob 4 when rotated will turn the flexible shaft 6, which in turn rotates the short shaft 8 to turn the sleeve 14 to turn the gear 22 mounted on the end thereof which meshes with gear 24 to turn shaft 26 to control the volume of the receiver. If, however, switch 44 is closed, the solenoid coil 34 will be energized to rotate the lever 30 counterclockwise and disengage gears 22 and 24 so that further rotation of the knob 4 will have no effect upon the volume of the receiver. However, there is provided a drum type presettable tuning unit indicated generally at 48 which rotates about the drum axis and has a plurality of axially extending threaded shafts 50 about its periphery, upon which threaded shafts there are a plurality of displaceable indexing means, the positions of which can be altered by the rotation of said threaded shafts. This general drum tuner construction is described

fully in copending application Serial No. 394,071 filed May 19, 1941 in the names of Edward S. Kaegi and Ludwig Fichter and entitled "Tuning mechanism," and therefore forms no part of the present invention and it is not deemed necessary to at this time go into any more detail with respect to its construction. It will be sufficient to state that as the threaded shafts are rotated, the axial position of the indexing means will be changed.

Each threaded shaft **50** carries outside the drum head a driving gear such as **52**, each of which it is desired to cause to mesh sequentially with the gear **22** when the latter is in its innermost position. Thus as the lever **30** moves the sleeve **14** to the left as shown in Figure 1, it will bring the gears **22** and **52** of that particular threaded shaft which is in engageable position into mesh. Then any rotation of the knob **4** will, instead of causing a volume change, cause a change in the position of the indexing member on that shaft **50** and therefore preset the indexing means to a new position. Thereafter as the indexing drum is rotated each time that particular indexing means comes into position, the new station will be received. Thus, in order to preset to a new position any of the automatic preset indexing means on the drum, it is only necessary to hold the switch **44** in closed position and operate the volume control means to reset instead of the manual tuning means as the automatic tuning buttons are depressed. This leaves that portion of the system free to operate the indexing means as desired.

Figure 2 deals primarily with the indicating means and the manual control means just mentioned in that again there is shown the drum tuner **48** which has spaced arcuately around its periphery a series of gears **52**, each of which is connected to the end of a threaded shaft **50**, which shafts are parallel to each other and carry indexing lugs **54**. These projecting lugs are adapted as they rotate to come between one side of arcuate horns **56** and to move the same sideways or axially, such movement causing a direct and equivalent movement of a shaft **58** upon which the divergent horns are mounted. Also secured to the shaft **58** and at a spaced position is a tuning means, which, in this instance, is illustrated as being a comminuted core **60** which may be placed at different positions within a tuning coil **62**. Of course this motion may equally as well be applied to rotating a condenser for tuning if desired. The drum **48** is rotated to different positions by a ratchet **64** which has teeth thereon equal to the number of tuning positions which are provided on the drum and this ratchet may be operated by any suitable solenoid means not shown, each actuation of the same bringing the drum to a new tuning or indexing position. As before mentioned, each of the gears **52** controls the location of a presettable index **54** for automatically tuning in a given station.

If it is desired to tune the set manually, the ratchet solenoid is actuated until the drum in its rotation causes the lever arm **66** to contact one end of a pivoted lever **68**. This lever is mounted upon a shaft **70** on the opposite side of the slidable horns **56** and is spring biased by a coil spring **72** against a stop **74**. On this rotatable lever assembly and forming an integral part thereof is a hollow tube **76** which carries two spaced ears **78** and **80** rotatably supporting a threaded shaft **82** near their outer ends. To this threaded shaft is directly secured one end of a flexible cable drive **84**, the opposite end of which is connected to a shaft **86** having on the outer end thereof a manual knob **88**. The shaft **86** also carries a small pulley **90** over which one end of a cord **92** is fed, said cord having clamped thereon an indicator needle **94** which is adapted to run across the front of the receiver and cooperate with a scale for indicating the position of the tuning means.

The threaded shaft **82** carries an extending adjustable lug **96** similar to those on the presettable automatic threaded shafts. This lug may be given axial movement by rotation of the threaded shaft portion **82** and it is prevented from turning entirely around the same by a projection **98** which engages a stationary rod **100**. Thus as the solenoid rotates the drum **48** to different angular positions, the lugs **54** will be forced down between the divergent horns and cause the tuning means to move to different preselected positions. When, however, we reach the point at which the lever **66** engages **68**, further movement will cause it to move **68** to the dotted line positions as shown in Figure 2, which will bring the lug **96** between the divergent horns to move and adjust the tuning means and at this point any rotation of the knob **88** will cause the radio set to be tuned manually. As soon as the ratchet moves another tooth, however, the lever **66** will slip off the end of the lever **68** and it will return to its full line position due to the tension of the spring **72**, and from that point on the automatic stations will be brought into engagement with the horns.

By this means the manual control will be substantially independent of the automatic or push button control and will have associated therewith an indicator for showing to which station the manual means is tuned. The indication is not necessary on the automatic stations as they are usually labeled as to which station they have been preset. Furthermore, any change in the presetting can be accomplished through the volume control shaft and it is not necessary to disturb the manual drive in any way.

I claim:

1. In a control system for radio apparatus having tuning means, a plurality of presettable indexing means to sequentially move the tuning means to different predetermined positions, means to adjust the indexing means to different positions, volume control means for the receiver, shiftable driving means to selectively engage either the means to adjust the indexing means or the volume control means, and a separate manually rotatable means to tune the receiver over the range thereof.

2. In a control system for radio apparatus having tuning means, a plurality of presettable indexing means to sequentially move the tuning means to different predetermined positions, means to adjust the indexing means to different positions, volume control means for the receiver, shiftable driving means to selectively engage either the means to adjust the indexing means or the volume control means, a separate manually rotatable means to tune the receiver over the range thereof and visual indicating means driven by the manually rotatable means to indicate the position of the tuning means.

3. In a control system for radio apparatus having tuning means, a rotatable drum controller, a plurality of circumferentially spaced threaded parallel rods carried by said drum, adjustable nut assemblies on each whose axial position may be changed by rotation of the rod, means connected to the tuning means to be sequentially engaged by the nut assemblies as the drum ro-

tates to tune the set to different stations, manually driven means located adjacent the means connected to the tuning means spring biased away from the same and means extending from the drum adapted to engage the manually driven means and move it against its spring bias into engagement with the means connected to the tuning means to provide manual tuning at one point.

4. In a control system for radio apparatus having tuning means, a rotatable drum controller, a plurality of circumferentially spaced threaded parallel rods carried by said drum, adjustable nut assemblies on each whose axial position may be changed by rotation of the rod, means connected to the tuning means to be sequentially engaged by the nut assemblies as the drum rotates to tune the set to different stations, manually driven means located adjacent the means connected to the tuning means spring biased away from the same, means extending from the drum adapted to engage the manually driven means and move it against its spring bias into engagement with the means connected to the tuning means to provide manual tuning at one point, and indicating means connected to and driven by the manually driven means.

5. In a control system for radio apparatus having tuning means, reciprocating means connected to and capable of moving the tuning means, rotatable drum means having adjustable projections at spaced peripheral points to sequentially engage and move the reciprocating means, a second pivoted adjustable projection means also mounted adjacent the reciprocating means and adapted to engage the same for tuning and means on the drum to engage the pivoted means to cause it to move into engagement with the reciprocating means.

6. In a control system for radio apparatus having tuning means, reciprocating means connected to and capable of moving the tuning means, rotatable drum means having adjustable projections at spaced peripheral points to sequentially engage and move the reciprocating means, a second pivoted adjustable projection means also mounted adjacent the reciprocating means and adapted to engage the same for tuning and means on the drum to engage the pivoted means to cause it to move into engagement with the reciprocating means and manual means for adjusting the position of the pivoted projection.

7. In a control system for a radio set having tuning means, a plurality of presettable indexing members therefor, means for moving the same along a prescribed path, a volume control for the receiver, a manually operable means for operating the volume control, means for disconnecting said manually operable means from the volume control and connecting it to one of the indexing means to alter the position thereof as the same is rotated, and a second separate manually operated indexing means.

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