April 21, 1936. A. A. THOMAS 2,038,323

RADIO TUNING DEVICE

Filed Aug. 9, 1929

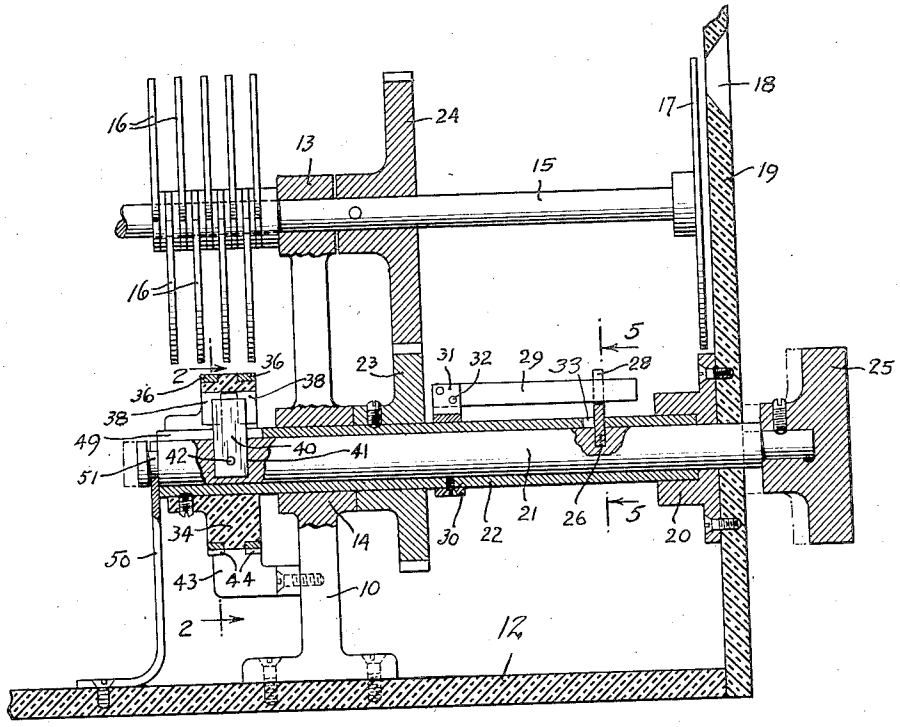


FIG. 1.

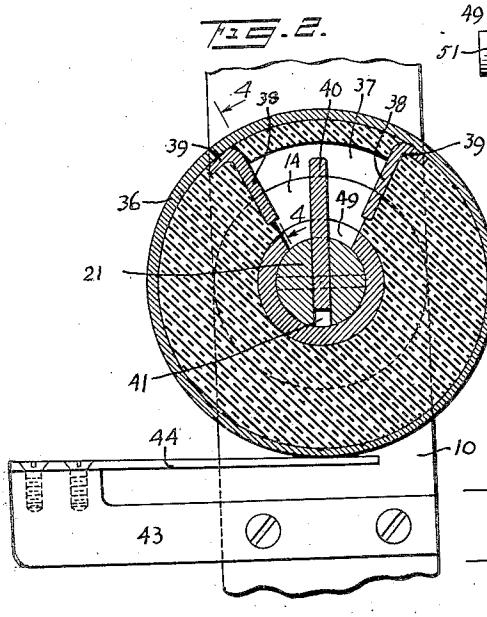


FIG. 2.

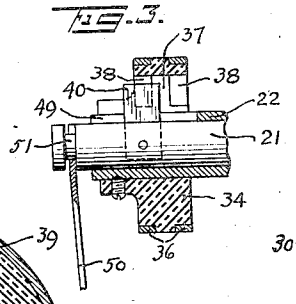


FIG. 3.

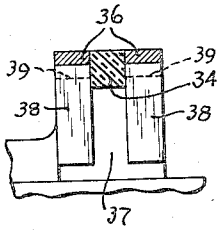


FIG. 4.

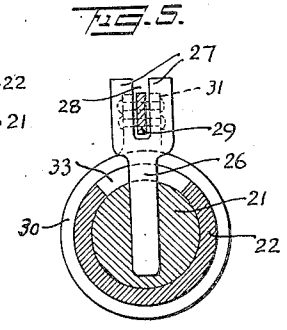


FIG. 5.

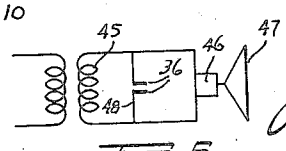


FIG. 6.

INVENTOR

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RADIO TUNING DEVICE

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Application August 9, 1929, Serial No. 384,673

11 Claims. (Cl. 250—20)

My invention is for a novel radio tuning device which is in its preferred form selectively operable for silent and loud tuning of the receiver. A characteristic feature of my tuner comprises a pair of rotary members having a lost-motion connection which also acts as a switch for controlling the loudspeaker circuit. As long as the two members are coupled for simultaneous rotation, the loudspeaker is inoperative and the receiver is tuned silently. The usual knob may be used for rotating one of the members, and when a person removes his fingers from the knob, the coupling switch between the two members is automatically operated to connect the loudspeaker in circuit. This switch-controlling operation is entirely automatic, requiring no special manipulation of the tuning knob, which is turned in the ordinary way.

There are times when a person wants a suitable broadcast program without regard to what particular station it comes from, and so he turns the tuning knob back and forth till he gets what he likes. During this hunting expedition, as I may call it, it is necessary for the loudspeaker to be in operative condition all the time, so that each broadcasting station may be heard as it crosses the tuning point. Thus loud tuning is accomplished in my device by simply pushing or pulling on the knob while turning it. The effect of this operation is to prevent the switch from disabling the loudspeaker during the rotation of the knob. Suitable spring means normally holds the knob in position for silent tuning.

In the accompanying drawing which illustrates a preferred embodiment of my invention,

Fig. 1 shows my new tuning device in vertical section, with the parts in normal position;

Fig. 2 is an enlarged view on line 2—2 of Fig. 1;

Fig. 3 is a fragmentary view, partly in section, showing the rear end of the hand-operated spindle in position for loud tuning;

Fig. 4 is a section on line 4—4 of Fig. 2;

Fig. 5 is an enlarged sectional view on line 5—5 of Fig. 1; and

Fig. 6 is a simplified circuit diagram of the loudspeaker circuit controlled by the switch of the tuning device.

A supporting bracket 10 mounted on the base plate 12 of a radio cabinet is provided with two bearings 13 and 14. The upper bearing 13 supports one end of a tuning shaft 15, which carries condenser plates 16 or other tuning elements. An indicator disk or dial 17 mounted on (or otherwise movable with) the tuning shaft 15 is visible through an opening 18 in the front panel 19 of the cabinet. A bearing 20 fixed on front panel 19 is in alignment with bearing 14, and these two bearings support a spindle 21 and a surrounding sleeve 22. A pinion 23 fixed on sleeve 22 is in mesh with a gear wheel 24 secured on tuning shaft 15 for operating the latter at properly reduced speed. Any suitable driving connection may be used between sleeve 22 and shaft 15.

A knob or other finger piece 25 is connected to the outer end of spindle 21 for actuating the same. A radial pin 26 fixed in spindle 21 terminates in a yoke or fork 27 to provide a slot 28 for receiving the free end of a spring blade 29 carried by sleeve 22. A simple way to mount the spring blade 29 on sleeve 22 is by means of a ring or collar 30 rigidly mounted on the sleeve and having a pair of spaced extensions or ears 31 between which the rear end of spring blade 29 is connected, as by rivets 32 or otherwise. The radial pin 26 extends through an arcuate slot 33 in sleeve 22 to permit a preliminary idle movement of spindle 21 in either direction from its normal position. The normal tension of spring blade 29 holds the pin 26 about midway of slot 33, as shown in Fig. 5.

An insulating disk 34 is fixed on the rear end of sleeve 22 by a set-screw 35 or otherwise, and this disk carries a pair of conductor rings 36, which are normally insulated from each other. A sector of disk 34 is cut away to provide a chamber or recess 37. From the radial walls of chamber 37 project two pairs of metal strips 38, which are electrically connected to the rings 36 and are in effect radial extensions of the rings. The insulating disk 34 may be of bakelite, hard rubber, or other moldable composition in which the conductors 36 and 38 are permanently embedded during the molding operation. The radial contact strips 38 may be separate pieces attached to the conductor rings 36 before the latter are positioned in the mold, or the strips 38 may be formed as integral radial extensions of rings 36. If the strips 38 are separate pieces, they are easily attached to rings 36 by means of lateral offsets 39 adapted to receive screws, rivets, solder, or other fastening means to produce a good electrical contact with the rings. The rear end of spindle 21 carries a radial switch plate 40, which extends into chamber 37 of disk 34. A simple way to attach the switch plate 40 to spindle 21 is by inserting it in a radial slot 41 and securing it by a cross-pin 42. The spring blade 29 on sleeve 22 normally holds the switch plate 40 about midway between the radial contact strips 38. An insu-

lated extension 43 on bracket 10 carries a pair of switch arms or brushes 44 arranged in contact with rings 36. The arms 44 are preferably spring blades adapted to maintain a firm pressure contact with rings 36 at all times.

As long as the switch plate 40 is out of contact with either pair of conductor strips 38, the two insulated rings 36 are electrically disconnected and the loudspeaker circuit is operative. In the simplified circuit diagram of Fig. 6, the rings 36 are connected in shunt across the secondary coil 45 of the loudspeaker circuit, which is therefore operative when rings 36 are disconnected. It is assumed in Fig. 6 that coil 45 controls the driving unit 46 of a loudspeaker diaphragm 47 in accordance with current impulses passing through the talking circuit, as will be understood without further explanation. When the knob 25 is rotated in either direction from its normal position, there is no movement of sleeve 22 and its connected parts until the rigid switch plate 40 strikes one of the radial walls of recess 37 in disk 34. When that occurs, the switch plate 40 spans a pair of contact strips 38, so that a shunt circuit 48 is closed through rings 36 and contact arms 44. This short-circuits the input coil 45 of the loudspeaker circuit and renders the latter inoperative. In other words, when the switch plate 40 on spindle 21 strikes either pair of contact strips 38, the loudspeaker is put out of commission and at the same time the sleeve 22 is coupled to spindle 21. Consequently, continued rotation of knob 25 results in the actuation of sleeve 22 and tuning shaft 15 through the interposed gearing 23—24.

When the operator releases knob 25 after moving the shaft 15 into tuning position, the tensioned leaf spring 29 automatically rocks the spindle 21 to normal position, whereby the short-circuiting switch 38—40 is opened and the loudspeaker is in operative condition. An arcuate slot 49 in sleeve 22 permits the necessary movements of switch plate 40. It is immaterial in what position the spindle 21 is left upon release of knob 25, because the normal position of the spindle relative to sleeve 22 is such that the combined switch plate and coupling member 40 is always held substantially midway of contacts 38 by spring 29. Only a very slight movement of knob 25 is necessary to bring the coupling member 40 against either pair of switch contacts 38. If the switch arms 44 and contact rings 36 are connected in series with coil 45, it is evident that the normal position of contact member 40 must close the switch and open it when the member is moved into coupling position against disk 34. For that purpose it is only necessary to arrange the strips 38 in contact with plate 40 when the latter is in normal position, so that the preliminary idle movements of spindle 21 move plate 40 away from strips 38 to open the loudspeaker circuit. This will be clear without additional illustration.

A spring arm 50 secured at its lower end to the bottom plate 12 terminates at its upper end in a bifurcation which enters an annular groove 51 in the rear end of spindle 21. The normal tendency of spring arm 50 is to hold the spindle 21 in forward position, as shown in Fig. 1. When a slightly inward pressure is applied to knob 25, the spindle 21 is pushed rearward sufficiently to move the switch plate 40 out of line with the two front contact strips 38, as shown in Fig. 3. Consequently, when the spindle 21 is rotated while held in its rearward position, the switch plate 40 does not close the short-circuiting shunt 48 across the conductor rings 36, so that the loudspeaker remains operative during the continued rotation of the spindle. This permits loud tuning to enable the operator to hear each broadcast program as the stations cross the tuning point on dial 17. It is obvious that the spring arm 50 may be so arranged that it normally holds the spindle 21 in rearward position for loud tuning. In that case an outward pull on knob 25 is necessary for silent tuning. If desired, the slidable movement of spindle 21 for loud tuning may be omitted, together with spring arm 50. I prefer, however, to combine loud tuning with silent tuning, for reasons set forth in the first part of this specification.

Although I have shown and described a specific construction, I do not intend to be limited to the details set forth, because changes and modifications are possible within the scope of the appended claims.

I claim as my invention:

1. A radio receiver having a pair of concentrically arranged rotary members normally disconnected so that the preliminary rotary movement of one member is not transmitted to the other, a coupling element carried by one of said members for engaging the other member to connect said members for simultaneous operation, tuning means operated by said members when they are coupled together, and switch contacts carried by said other rotary member controlled by said coupling element.

2. A radio receiver having a tuning shaft, a rotary sleeve member connected to the tuning shaft, a rotary spindle housed within and normally disconnected from said member so that the latter is not actuated by the preliminary rotary movement of the spindle, a projection on the spindle for automatically coupling the latter to said sleeve member after the spindle is rotated through a predetermined arc, and switch contacts carried by said sleeve member controlled by said spindle projection.

3. A ralio receiver having a rotary spindle adapted to be manually operated in either direction, a rigid metallic projection on said spindle, a rotary member encircling said spindle in the vicinity of its projection, insulated metallic stops carried by said member on opposite sides of said projection, so that rotation of said spindle in either direction moves said projection against said stops to couple the spindle to said rotary member, said projection and stops constituting a switch for controlling the loudspeaker circuit, and spring means for normally holding said projection away from said stops.

4. A radio receiver having a tuning shaft, a hand-operable spindle mounted for rotation in either direction, a rotary sleeve surrounding said spindle and operatively connected with the tuning shaft, a switch member carried by said spindle, normally open switch contacts mounted on said sleeve, and spring means for normally holding said member away from said contacts, whereby rotation of said spindle in either direction from normal position moves said switch member into engagement with said contacts to close a circuit of said receiver, said switch member also acting as a mechanical coupling between said sleeve and spindle to actuate the tuning shaft.

5. A radio receiver having a tuning shaft, a hand-operable spindle mounted for rotation in either direction, a rotary sleeve surrounding said

spindle and operatively connected with the tuning shaft, a switch member carried by said spindle, switch contacts mounted on said sleeve, spring means for normally holding said member and contacts in predetermined relation to maintain the loudspeaker circuit operative, rotation of said spindle in either direction from normal position moving said switch member to disable the loudspeaker and thereby permit silent tuning, said switch member also acting as a mechanical coupling between said sleeve and spindle, and means for adjusting said spindle axially to move said switch member into inoperative position relatively to said switch contacts, whereby the loudspeaker circuit is held operative during the rotation of said spindle for loud tuning.

6. A radio receiver having a tuning shaft, a rotary knob for operating said shaft, a normally open shunt switch in the loudspeaker circuit, means whereby the rotary movement of said knob in either direction automatically closes said switch for silent tuning, and means including a spring member whereby axial movement of said knob in opposition to the pressure exerted by the spring member causes opening of said switch during the rotation of said knob for loud tuning.

7. In radio tuning apparatus, the combination of a rotary tuning knob, a normally open switch connected to the radio loudspeaker circuit, means for automatically closing said switch when the knob is turned, means whereby the release of said knob automatically opens the switch, and selectively operable means for preventing the closing of said switch when the knob is turned.

8. In a radio tuning apparatus, the combination with a movable tuning control means therefor, a shaft connecting said control means and said apparatus, an electrical contact element carried by said means, a cooperating contact element carried by said shaft, resilient means disposed between said control means and said shaft for maintaining a predetermined relationship between said contact elements in the direction of movement of said control means, and means whereby said relationship is disturbed by the tuning movement of said control means.

9. A radio receiver having tuning mechanism, a rotary member permanently coupled to said mechanism for actuating the same, a pair of ring contact members carried by the rotary member, a pair of stationary spring arms in cooperative engagement with said ring contact members, electrical connections between said spring arms and the receiver loudspeaker circuit, a shaft for actuating the rotary member, means mechanically coupling said shaft to said rotary member only after initial idle rotary movement of the shaft in either direction, and a member, carried by said shaft and constituting a part of said coupling means, which bridges the pair of ring contact members at the end of the idle rotary movement of the shaft in either direction to short-circuit the loudspeaker circuit.

10. A radio receiver having tuning mechanism, a tubular member coupled to said mechanism for actuating the same, a pair of ring contact members carried by the tubular member, a pair of stationary spring arms in cooperative engagement with said ring contact members, electrical connections between said spring arms and the receiver loudspeaker circuit, a shaft mounted within the tubular member and having a lost-motion connection therewith, said lost motion connection permitting idle rotary movement of the shaft in either direction before mechanically coupling said shaft to the tubular member for unitary rotation, and a member, carried by said shaft and constituting a part of the lost-motion connection, which bridges the pair of ring contact members at the end of the idle rotary movement of the shaft in either direction to short-circuit the loudspeaker circuit.

11. The invention defined in the preceding claim wherein spring means are provided for normally holding the bridge member and the ring contact members in non-contacting relation.

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