

Sept. 5, 1939.

R. C. MARHOLZ

2,172,288

INDICATING AND CONTROL APPARATUS FOR RADIO RECEIVERS

Filed Jan. 19, 1938

2 Sheets-Sheet 1

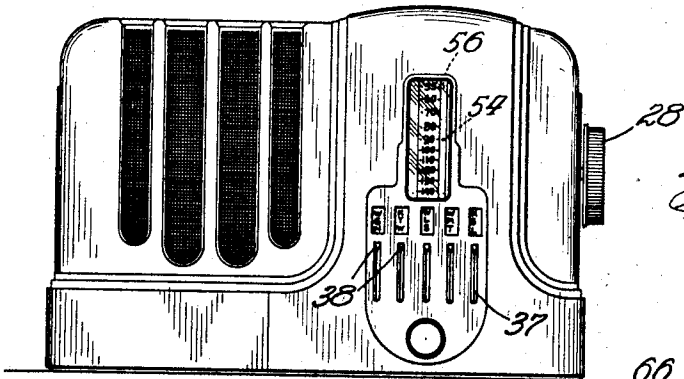


Fig. 1

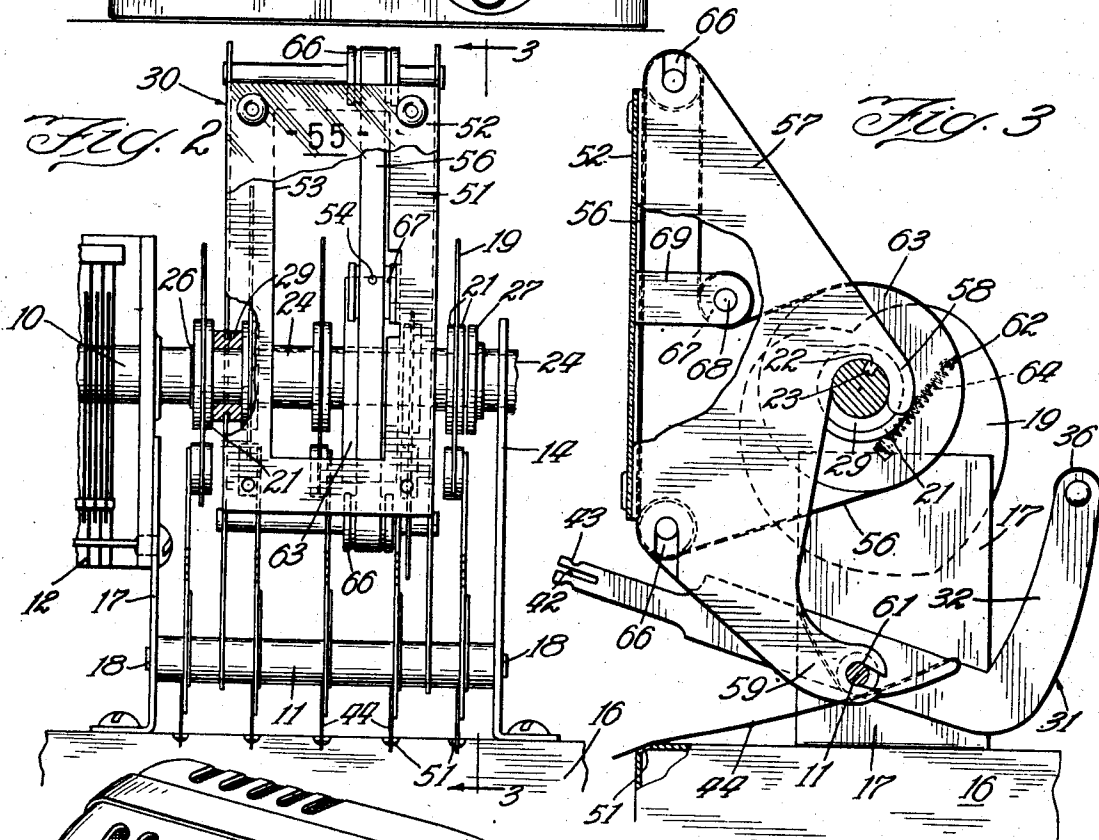


Fig. 2

Fig. 3

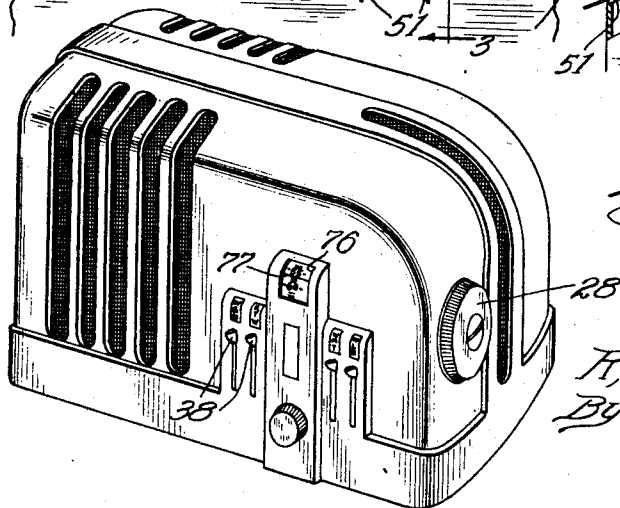


Fig. 4

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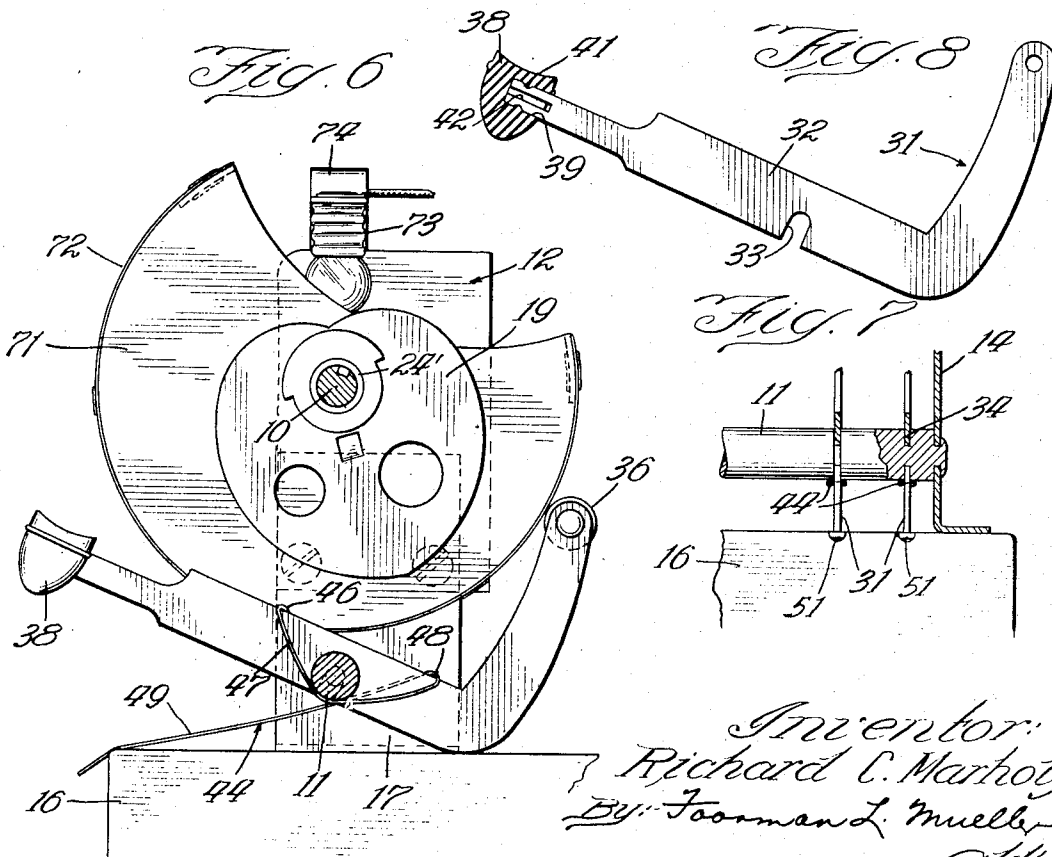
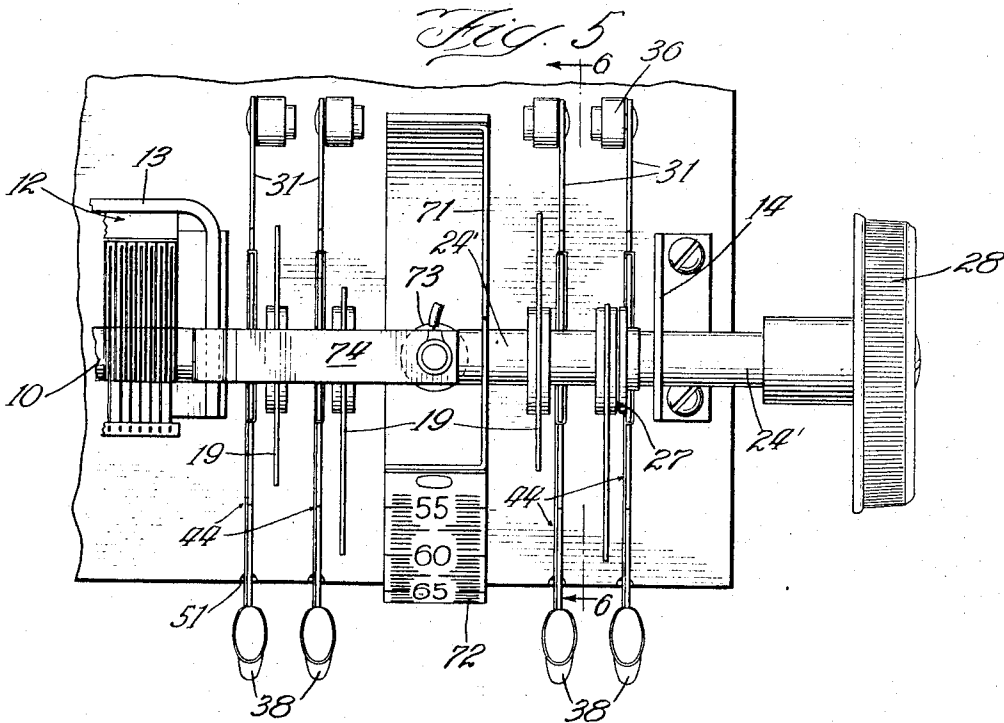
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INDICATING AND CONTROL APPARATUS FOR RADIO RECEIVERS

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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INDICATING AND CONTROL APPARATUS FOR RADIO RECEIVERS

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Application January 19, 1938, Serial No. 185,649

15 Claims. (Cl. 74—10)

My invention relates in general to tuning and indicating apparatus for a radio receiver and more particularly to the cam and lever type of automatic tuning structure in combination with mounting frame and indicating structure therefor, such apparatus being of the general type disclosed in my copending application, Serial No. 177,287 and that of copending Plensler application, Serial No. 170,070.

It is an object of the present invention to provide simplified, improved combination tuning and indicating apparatus for radio receivers.

It is a further object of my invention to provide such apparatus in a low cost and sturdy structure providing automatic tuning, and adapted for use especially with small, low-priced table model radio receivers, with the entire construction of the apparatus being such as to cooperate in providing not only efficiently operating mechanism, but also a pleasing appearance in the complete radio receiver employing such apparatus.

A still further object is to provide such apparatus in compact structure which will occupy only a relatively small space on the radio receiver chassis, and in the receiver cabinet.

One of the features of my invention is the provision of a simplified lever unit including a finger tip for use in the complete tuning and indicating apparatus.

A further feature is the provision of elements in the embodiments of my invention which make possible a rapid and easy assembly of the apparatus itself, rapid and low-cost assembly of the apparatus on the receiver chassis, and then facilitates the assembly of this structure in the receiver cabinet.

A still further feature of my invention is the provision of a structure such that certain elements perform a multiple function to reduce the normal number of elements required in such an apparatus and thus simplify the same, and provide a very low-cost device.

Another feature of my invention is the provision of simplified indicating mechanism including the frame structure therefor, for the complete tuning and indicating apparatus.

Other objects and features of my invention will be apparent from the following description taken with the drawings, in which:

Fig. 1 is a front elevation of a radio receiver cabinet in combination with one embodiment of the tuning and indicating apparatus of my invention.

Fig. 2 is a fragmentary view partly in elevation, and partly in section of the tuning and indicating apparatus employed in the radio receiver cabinet of Fig. 1.

Fig. 3 is a sectional view along the line 3—3 of

Fig. 2 looking in the direction of the arrows indicated thereon.

Fig. 4 is a perspective view of a radio receiver cabinet with a modified embodiment of the tuning and indicating apparatus of my invention.

Fig. 5 is a plan view of the tuning and indicating apparatus employed in the radio receiver of Fig. 4.

Fig. 6 is a sectional view along the line 6—6 of Fig. 5.

Fig. 7 is a front view partly in section and partly in elevation of a fragmentary portion of two of the tuning levers of Figs. 2 or 6 showing particularly the manner in which such levers are mounted upon the stationary lever shaft.

Fig. 8 is a detailed view of the finger lever employed in each of the two embodiments of my invention illustrated herein.

In the embodiment of my invention illustrated in Figs. 1 to 3, inclusive, I provide a one-piece rotary shaft 10 acting for the condenser 12, and the cam members of the apparatus. A stationary rod or shaft 11 is provided for the tuning levers as will be explained. The shaft 10 is journaled in the condenser frame 13 in the usual manner at one end, and at the other end is rotatably supported in an elongated frame bracket 14 for mounting on the chassis 16 of a radio receiver. The condenser frame 13 preferably acts as a portion of the complete frame for the tuning and indicating apparatus and is rigidly secured by bolts or the like to bracket frame 17 shorter than the bracket 14, as is clearly shown in Fig. 2. The stationary shaft 11 is supported in each of the plates 14 and 17, and by virtue of upset ends 18, acts with the condenser 12 and its associated shaft 10 to hold the complete apparatus together for mounting on the radio receiver chassis.

The embodiment of my invention illustrated in Figs. 1 to 3 is especially adapted for a small radio receiver having only a relatively small space for mounting of the tuning and indicating apparatus. The tuning cams 19 are supported on the shaft 10 and normally retained against rotation thereon by frictionizing means including a pair of washers 21 longitudinally movable on the shaft, yet keyed against rotation by means of an ear 22 carried in a keyway 23. Slidable sleeves 24 are provided on the shaft 10 intermediate certain cam units and the entire cam, washer, and sleeve assembly is moved longitudinally on the shaft 10 up to, or away from, a stop 26 on said shaft at one end of the assembly. The moving means includes a spring washer 27, and a cap screw and knob unit 28 at the outer end of the shaft. The frictionizing structure is more fully described and claimed in the Plensler application, Serial No. 170,070, referred to above. In addition to the slidable sleeves 24 intermediate

certain cam units on the shaft, I provide an annularly grooved spacer and bracket support member 29. Two of these members are provided in the complete assembly, and one of such members, at the left-hand side of Fig. 2, is shown in section with a portion of the scale bracket 30 broken away to make such member 29 more clearly visible.

A finger lever unit 31 for moving each of the cams 19, comprises a one-piece substantially L-shaped member 32 having a notch 33 intermediate its end for insertion in a corresponding annular groove 34 around the stationary shaft 11. The same finger unit 31 is employed in both embodiments of my invention illustrated and described herein, and each of the plurality of units utilized is identical. A roller 36 mounted on a stud at one end of the member 32 engages the edge surface of the cam 19 for movement thereof as is readily apparent. If desired, this engaging portion may be merely a rounded projection or embossed portion integral with the lever member 32.

Inasmuch as a narrow slot 37 in the front face of the cabinet or in an escutcheon plate on the front of the cabinet is desirable in order to prevent light from the interior of the cabinet from shining through, the finger tip portion of the lever 31 is removable to permit the insertion of the narrow lever portion 32 through the narrow slot. In the present invention I provide a one-piece molded tip 38 having a cavity 39 extending from one side therein, with such finger tip molded in a manner that a slight detent 41 is provided on the top and bottom of such cavity (Fig. 8). To permit the ready insertion of the end of the lever 32 in the cavity 39, I provide a slotted portion 42 on such end including a pair of spaced slightly resilient ears. Corresponding notches 43 in the outer edge of each of the two ears at the slotted portion act to frictionally engage the detent 41, and retain the finger tip 38 thereon firmly enough so that it requires a relatively hard pull on such tip to remove it from the lever.

In the assembly of the lever unit 31 on the shaft or rod 11, the lever 32 itself is merely dropped onto the shaft in a manner such that the notch 33 fits over the restricted portion of the shaft at the annular groove 34. The groove 34 prevents longitudinal movement of the lever on the shaft 11, and vertical removal is prevented by means of a one-piece hairpin-like spring member 44. The spring member comprises a hooked end 46 placed over the top edge of the lever member 32, as shown in Figs. 3 and 6, with a bowed retaining portion 47 passing under the shaft 11 and extending to a looped portion 48 hooked over the top edge of the lever member and to the rear of the shaft 11. From this point the spring extends through an elongated tension portion 49 which rests against the front edge of the chassis 16, being preferably retained in a shallow notch 51 in such front edge so that the tension portion 49 will be retained substantially in the vertical plane of the lever member for which it is provided. The spring 44 is preformed and assembled on the lever by slipping the spring over the lever at the looped portion 48, and bringing the bowed portion under the shaft for hooking over the lever at 46.

As to the indicating portion of the complete apparatus of my invention, with an odd number of tuning lever and cam units of the embodiment illustrated in Figs. 1 to 3, it was necessary to maintain a symmetry between the lever members

and indicating structure, at least as to that mechanism visible on the outside of the cabinet. Furthermore it was necessary to conserve space on the receiver chassis, and in the cabinet as much as possible, so that such symmetry had to be obtained without sacrificing space. This was accomplished by indicating apparatus fitting directly into the cam and lever assembly, and comprising the bracket 30 mentioned above, hooked over the two annularly grooved spacing units or members 29 on the shaft 10, and locked onto the shaft 11 as shown in Fig. 3. The bracket 30 comprises a substantially channeled member with a front face 51 for carrying a stationary dial 52 thereon, and apertured at 53, for illuminating the dial from the rear and making visible a movable indicator 54 in the form of a dot on a movable film or ribbon 56 carried on the bracket, as will be hereinafter explained. Integral identical side walls 57 extend rearwardly on each side of the front face 51. In order to raise the front face 51 substantially above the line of movement of the tuning levers 31, the walls 57 each extend rearwardly and angularly downwardly, terminating in a rear edge portion having an ear 58 forming a notch for fitting in the annular groove in a member 29. At the lower outer end of each side wall 57, an extension 59 is notched at 61 to fit into a channeled or annular groove in the shaft 11 corresponding to a groove 34 for receiving a tuning lever unit 31 as heretofore described. After positioning the notch 61 over the shaft 11 the two outer portions of the extension on each side of the notch are pressed together sufficiently to extend past the top and bottom edge of the shaft groove so that the brackets cannot be removed therefrom.

The two bracket supports 29 are frictionally retained between adjacent washers 21 for corresponding cams 19, and rotate with the shaft 10 upon rotation thereof. There is sufficient play in the connection between the support 29 and the bracket wall 57 so that little if any friction results from this assembly to interfere with the movement of the shaft 10. The film or ribbon 56 having an indicating dot 54 or similar designation, likewise moves upon movement of the shaft 10, and comprises an elongated ribbon secured at each end in the slot 62 of a drum 63 keyed to such shaft. Tension on the ribbon 56 is provided by means of a spring 64 on the drum. The film or ribbon 56 is carried in each direction away from the drum over pulleys 66 at the top and bottom of the brackets, and an idler pulley 67 supported on the stub shaft 68 secured to a bracket 69 stamped out of the front face of the bracket 30. As is evident in Fig. 2, three cams are carried on the shaft 10 within the bracket 30 and one cam 19 is carried on each side and outside of such bracket. With the tuning and indicating apparatus as described, the odd number of cam and lever units are very satisfactorily assembled in the apparatus frame and are symmetrical in all of the elements as viewed from the outside.

In the embodiment of the invention illustrated in Figs. 4 to 6 particularly, I employ a one-piece stamped out dial frame 71 having a tuning scale dial member 72 secured thereto. The frame 71 is keyed to the shaft 10 so that the drum-type dial will rotate with the rotary shaft.

The cam and lever units are identical with those illustrated and described with respect to the embodiment of Figs. 1 to 3. Each cam unit, including friction washers on each side thereof is

Carried on the shaft 10 and spaced apart from an adjacent unit by the slidable sleeve 24' as described above. Illumination for the dial is provided by a pilot lamp 73 supported in a bracket 5 74 mounted on the frame for the tuning and indicating apparatus. The rotary dial is visible through a relatively small viewing aperture 76 (Fig. 4) in the front of the cabinet, and station indication is accomplished by means of a wire or line 77 extending across the opening. As may be seen in Fig. 4, the even number of lever and cam units are spaced on each side of the drum 71 to provide a symmetrical yet compact and simple assembly for the small radio receiver cabinet.

15 Although I have illustrated and described the two embodiments of my invention as mounted on the radio receiver chassis of a so-called midget receiver utilizing a small molded cabinet, it is understood that the application of the invention is not restricted to this particular structure. The tuning and indicating apparatus as is illustrated and described herein does provide an extremely simple and inexpensive mechanism which may be quickly assembled as a unit and just as readily 20 mounted upon a radio receiver chassis. By virtue of the finger tip construction for the lever units, the chassis may be quickly assembled in the cabinet and the tips then applied.

30 Although I have described my invention in its preferred embodiments, it is understood that it is not limited thereby, but is limited only by the scope of the appended claims.

I claim:

35 1. Control and indicating apparatus for a radio receiver including in combination, a rotary control shaft and a stationary frame member spaced therefrom, and indicating means for indicating the position of said control shaft including a one-piece bracket having an apertured front face for receiving a dial scale thereon, a pair of rearward extensions from said front face having a notched end portion thereon for hooking over said rotary control shaft, and a pair of locking portions on said bracket rearwardly from the front face for 40 positioning over said stationary frame member and locking thereon to retain said bracket fixedly secured in said apparatus.

50 2. Control and indicating apparatus for a radio receiver including in combination, a rotary control shaft, means for moving said shaft to predetermined tuning positions for said radio receiver, said means including a stationary shaft spaced from said rotary shaft and parallel thereto, a one-piece dial bracket with an apertured front face and integral side walls extending rearwardly therefrom, each side wall having an extending ear for hooking over the rotary shaft and a closable notch spaced therefrom for inserting over the stationary shaft and locking thereon, a stationary dial scale on said bracket at said aperture, and indicating means movable upon movement of the rotary shaft for indicating the tuned position of the receiver on said scale.

65 3. Control and indicating apparatus for a radio receiver including in combination a rotary control shaft, indicating means for indicating the position of said control shaft including a dial bracket having a front face for mounting a dial thereon, a pair of spaced apart side walls extending rearwardly from said face with each having a hook-like extension for hooking over the rotary shaft, tuning units for said apparatus including an odd number of control members frictionally retained on said rotary shaft with three 70 of said members mounted on said shaft inter-

mediate the side walls of said bracket and the remaining number equally divided as to number on the outside of said bracket on each side thereof and frictionally retained on said rotary shaft, means movable upon movement of said rotary shaft and connected therewith to indicate on the dial the controlled position of the shaft, and selector members corresponding in number to the control members movably mounted for selective engagement with a control member to move the 10 shaft.

4. Control and indicating apparatus for a radio receiver including in combination a rotary control shaft, control means for said shaft including a plurality of cams normally frictionally retained thereon, a plurality of friction washers non-rotatable but longitudinally slidable on the shaft with one of said washers on each side of each cam, slidable spacing means intermediate each cam and washer assembly to space such assemblies apart on the shaft, said spacing means including two combination one-piece annularly grooved spacer and bracket supports with one of said one-piece members spacing apart the cam assemblies in each of two pairs of cam assemblies 15 on said shaft, a bracket for an indicating scale to indicate the position of the control shaft, said bracket having a pair of hooked extensions for hooking into the annular grooves of the one-piece members, and means for locking said bracket into the control and indicating apparatus to prevent the removal of said extensions from said one-piece members.

5. In a tuner unit for mounting in a radio receiver, a rotary control shaft, a stationary shaft, means for causing rotation of said rotary control shaft including a pivotal lever having a notch opening at one edge for insertion over said stationary shaft, and a one-piece combination lever retaining and lever return spring having one end hooked over the top edge of said lever on one side of the pivotal point of the lever on the shaft, extending from said end underneath said shaft and upwardly to loop over the top edge of said lever on the opposite side of said shaft to retain said lever on said shaft, and with said spring extending downwardly and toward the shaft away from said looped portion to lie underneath the shaft and rest at its other end under tension on stationary means to act as a return spring for said lever.

6. In a tuning device for a radio receiver, a rotary shaft, means for moving said rotary shaft, said means including a stationary shaft mounted in said device and having a plurality of annular mounting grooves therein at spaced intervals thereon with each groove forming a restricted portion in the shaft, and a pivotal lever corresponding to each mounting groove comprising a body portion having a notch opening from one edge thereof substantially at right angles to said edge, with the lever positioned in an annular groove on said stationary shaft and having the notch in said lever fitting over the restricted portion in the shaft, and a spring extending over said lever and under said shaft to normally prevent removal of the lever from the shaft.

7. Control and indicating apparatus for a radio receiver including in combination a rotatably supported control shaft, a fixedly supported frame portion spaced from said control shaft, and indicating means for indicating the angular position of said control shaft including a preformed frame having a front face for supporting a dial and a pair of side portions extending rearwardly 75

therefrom, said side portions each including a hook portion supported on the control shaft, and means on said side portions for locking said frame onto the fixedly supported frame portion to fixedly retain said frame in said apparatus.

8. Control and indicating apparatus for a radio receiver including in combination a rotatably supported control shaft, a frame bracket with a top end and a bottom end and having a front face for receiving an indicating dial thereon and sidewalls extending rearwardly from said front face with said frame bracket supported on said control shaft at the sidewalls, means for moving said shaft to predetermined tuning positions for said radio receiver including a plurality of control members on said shaft within the sidewalls of said bracket, a plurality of selector members corresponding in number to the control members movably mounted at one of said ends of the bracket and selectively movable for engagement with a corresponding control member within said bracket to move the rotary shaft, means for fixedly retaining said bracket within said apparatus, a dial on the front face of said bracket, and indicating means at said dial movable upon movement of the rotary shaft for indicating on said dial the tuned position of the receiver.

9. A lever for a control device for controllable apparatus having a frame with a stationary shaft mounted thereon and a stationary portion spaced from said shaft, said lever including a body portion having a notch opening from one edge thereof intermediate the ends of said body portion for inserting over such a shaft, and a one-piece spring on said lever for retaining said lever on the shaft when mounted thereon having an end portion hooked over the top edge of said lever at one side of said notch and extending downwardly therefrom to a loop portion substantially below said notch adapted to lay below the stationary shaft, said spring extending upwardly from the loop portion to hook over the top edge of said lever at the other side of said notch and extending downwardly therefrom in a tail portion for engagement with the stationary portion of a frame to act as a tensioning and return spring for said lever when the lever is mounted in said control device.

10. A lever for a manually operated automatic tuning device for a radio receiver, said lever including a body portion having a notched opening from one edge thereof intermediate the ends of said body portion for inserting over a pivotal mounting for said lever in a tuning device, an engaging projection at one end of the body portion, and said lever being split at the other end to provide a pair of slightly yieldable fingers, a molded button for finger engagement having an internal cavity therein for fitting on said lever at the split end for frictional retention thereon, and a spring carried on the said lever at the notch portion for retaining said lever on the pivotal mounting in the tuning device.

11. A lever for a tuning device for a radio receiver, including a body portion having a notch opening from one edge intermediate the ends thereof and a one-piece spring supported on said lever for retaining said lever on a shaft when mounted in a tuning device, said spring having a pair of spaced apart bent portions each hooked over the same edge of the lever, with said edge being oppositely disposed to the notch opening edge, and having a loop portion intermediate the two bent portions positioned below said notch at the apex of the loop, and a tail portion on said

spring extending from one of the bent portions.

12. A tuner unit for a radio receiver including in combination a preassembled variable condenser having a supporting frame including end portions and a rotary shaft journaled therein having an integral elongated extension at one end thereof, frame means for said unit including an apertured long bracket and a short bracket, with the latter adapted to be rigidly secured to an end portion of the condenser frame to act as an extension therefor, with said integral elongated extension of said shaft journaled in said condenser frame end portion on said short bracket at one end, and journaled in the aperture of the long bracket at the other end, and means for selectively rotating said shaft.

13. Control apparatus for a radio receiver including in combination rotary control means, frame means for said apparatus including a stationary pivot member spaced from said rotary control means in said frame means, and selector means for moving said rotary control means comprising a lever having a pivot portion intermediate the ends thereof with a notch opening from the bottom edge of said pivot portion for insertion on said stationary pivot member for pivotal movement of said lever thereon, said lever being removable from said stationary pivot by a lateral movement of the lever away therefrom, and means for retaining said lever on the stationary pivot member against such removal, including a spring having spaced apart portions hooked over the top edge of the lever and in retaining engagement with the stationary pivot member adjacent the notch opening at the bottom edge of the lever to retain the lever thereon.

14. In a tuning device for a radio receiver, a rotary shaft, means for moving said rotary shaft, said means including in combination a stationary shaft mounted in said device having a plurality of spaced apart annular mounting portions thereon, a pivotal lever corresponding to each annular mounting portion comprising a body portion having a notch opening from one edge thereof and extending laterally with reference to said edge, with the lever at the notch therein being slipped over said stationary shaft at an annular mounting portion, a spring extending over said lever and under said shaft to normally prevent removal of the lever from the shaft, and a push-button operatively connected with said lever for finger engagement to cause movement of the lever, said button having a split finger mounting portion therefor, and having an internal cavity fitting over said split finger mounting portion and being frictionally retained thereon.

15. A lever for a radio tuning device having a stationary frame portion and a stationary pivotal mounting portion with an annular restricted portion thereon, said lever having a notch opening from one edge thereof and extending laterally for slipping over the annular restricted portion to pivotally mount the lever on the stationary pivotal mounting portion of the tuning device, and a one-piece spring bent at one end for operative engagement with said lever at an edge thereof opposite said one edge with said spring extending intermediate its ends over the stationary pivotal portion adjacent the opening of the lever notch and resting at its other end on stationary frame portion, whereby to normally prevent removal of the lever from the stationary pivotal portion of the tuning device and also act as a tensioning spring therefor.