April 27, 1926. 1,582,555

E. R. STOEKLE

DEVICE FOR CONTROLLING AND INDICATING THE TUNING OF RADIO INSTRUMENTS AND THE LIKE

Filed March 27, 1925

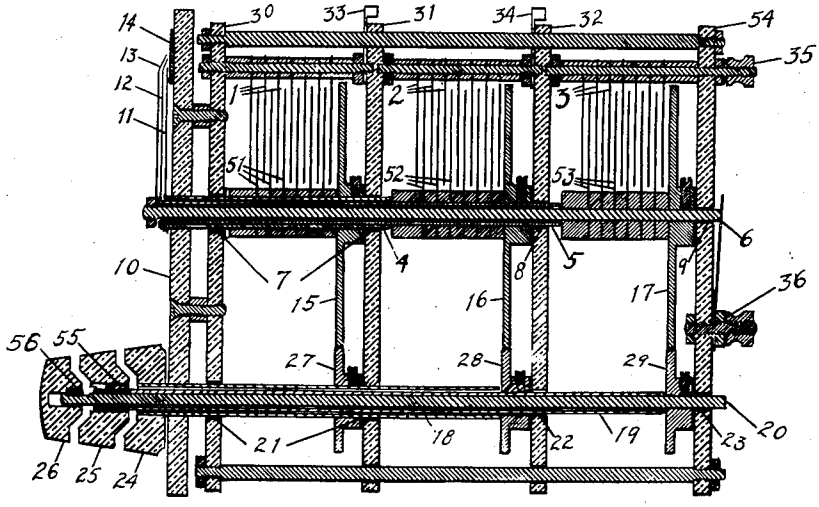


FIG. 1.

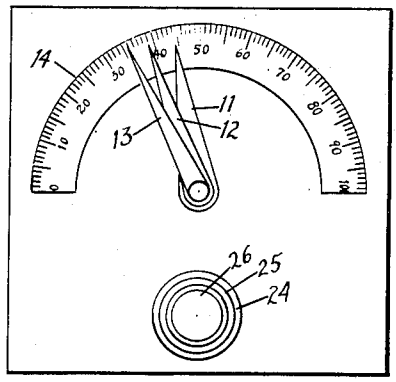


FIG. 2.

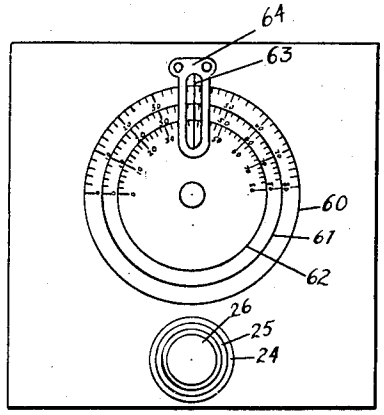


FIG. 3.

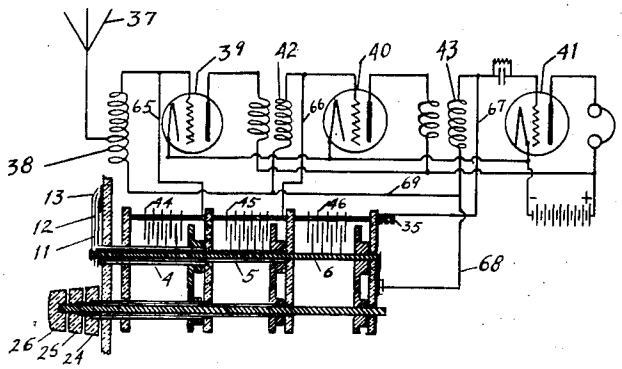


FIG. 4.

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Patented Apr. 27, 1926. 1,582,555

UNITED STATES PATENT OFFICE.

ERWIN R. STOEKLE, OF MILWAUKEE, WISCONSIN.

DEVICE FOR CONTROLLING AND INDICATING THE TUNING OF RADIO INSTRUMENTS AND THE LIKE.

Application filed March 27, 1925. Serial No. 18,712.

To all whom it may concern:

Be it known that I, ERWIN R. STOEKLE, a citizen of the United States, residing in Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Devices for Controlling and Indicating the Tuning of Radio Instruments and the like, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

In radio sets whether they be for sending or receiving it has heretofore been customary to mount the tuning instruments at various locations behind a panel with dials or similar indicating devices located at corresponding positions on the front of the panel. In general two or more instruments must be adjusted in order to effect proper tuning of a radio set and therefore two or more controls must be operated and corresponding positions of the instruments indicated at the front of the panel. In the present usual manner of assembling instruments in radio sets, control knobs or dials and their indicating scales are located at diverse and sometimes widely separated locations on the front of the panel, thus making control and observation of the various instruments very cumbersome since both the hands and the eyes of the operator must be continually shifted from one control and indicator to the other.

One object of this invention is to provide means for independently controlling a plurality of radio instruments at a single location on the control panel.

Another object of this invention is to provide means for indicating the positions of a plurality of radio instruments at a common location on the panel.

Another object is to provide means whereby the operator of a radio set may independently or collectively control a plurality of radio instruments by the use of only one hand and may observe the positions of these instruments with a substantially unvarying direction of his gaze.

Other objects and novel features of this invention will be apparent from the drawings Figs. 1 to 4 and the accompanying specifications.

While the drawings show three variable condensers as the independently controlled tuning units it is apparent that other instruments may be equally well incorporated in this device without in any way departing from the spirit or scope of the invention.

Referring to the drawings:

Fig. 1 shows a cross sectional view of the invention as applied to three variable condensers.

Fig. 2 shows a front panel view of the unified control and indication.

Fig. 3 shows a front panel view of a form of the device in which three scales and a single pointer are used instead of three pointers and a single scale as in Figs. 1 and 2.

Fig. 4 shows a diagrammatic representation of the invention incorporated in a so-called tuned radio frequency receiving set.

Referring to the Fig. 1 the fixed plates of three variable condensers are shown respectively at 1, 2 and 3. The movable plates 51, 52 and 53 of these condensers are fastened respectively to the telescoped shafts 4, 5 and 6. These shafts are free to rotate independently one within the other and are provided with suitable bearings 7, 8 and 9 in the frames of the condensers. The shafts 4, 5 and 6 have fastened to their respective ends, which extend through the panel 10, indicators 11, 12 and 13. A scale 14 fastened to the front of the panel or engraved thereon serves to indicate the positions of the pointers. Gears 15, 16 and 17 are fastened to the shafts 4, 5 and 6.

The fixed condenser plates 1, 2 and 3 are insulated by means of insulating plates 30, 31, 32 and 54 and are provided with terminals 33, 34 and 35. For most radio circuits the movable plates of these condensers can all be connected together and provided with a single terminal. In the device shown this inter-connection of the movable plates is accomplished by the metallic shafts 4, 5 and 6 and a common terminal provided at 36. If it is desired to insulate one of these movable units, an insulating shaft can be substituted for supporting this unit and a separate terminal provided for making connection thereto.

A second group of telescoped shafts are shown at 18, 19 and 20. Suitable bearings for these shafts are provided in the frames of the condensers at 21, 22 and 23. Operating knobs 24, 25 and 26 are suitably keyed to the ends of these shafts where they ex-

tend through the panel. Gears 27, 28 and 29 are fastened to these shafts behind the panel and engage with gears 15, 16 and 17.

The knobs 24 and 25 are keyed to their respective shafts by means of keys 55 and 56, but are free to slide axially on their shafts. Adjacent surfaces of the three knobs are adapted to engage when knobs 25 and 26 are moved toward knob 24. Firm engagement may be accomplished by giving these adjacent surfaces a conical form as shown, whereby an axial thrust on knob 26 will cause these knobs to clutch together and move as a single unit. By changing the engagement the three knobs may be moved independently in adjacent pairs or as a unit.

The Fig. 2 shows a front view of the panel with the pointers 11, 12 and 13 registering various positions on the scale 14. The operating knobs are shown at 24, 25 and 26.

The operation of this device is as follows:

First consider the knobs 25 and 26 not engaged but independently movable.

A rotation of the knob 26 is transmitted through the shaft 20 and the gears 29 and 17 to the shaft 6. Rotation of this shaft imparts an angular movement to the movable plates 53 and to the indicator 13. In this manner the exact angular change imparted by the knob 26 to the movable plates 53 is registered by the pointer 13 on the scale 14. In a similar manner each of the operating knobs 24 and 25 may be used to impart an independent angular movement to the movable plates 51 and 52 whose positions will be accurately registered by the pointers 11 and 12 respectively. A thrust on the knob 26 will cause all of the knobs to be clutched together and to be rotatable as a unit whereby all three of the movable condenser elements may be simultaneously adjusted. This provision for engaging adjacent knobs although an added convenience in operation is not essential as is apparent from the special arrangement and form of these knobs. The knobs when arranged as shown permit the operator to grasp any adjacent pair and thus produce a simultaneous adjustment of the corresponding movable plates. It is further possible for the operator to grasp all three knobs and thus to effect a simultaneous adjustment of all three movable elements of the condensers. In every case only one hand needs to be employed for operating the knobs and the adjustments thus accomplished will be accurately registered by the indicators 11, 12 and 13.

In the above described figures the indicating device consists of pointers fastened to the ends of the telescoped shafts and this is a preferred form of indicator. The Fig. 2, however, shows an alternative construction in which three movable graduated dials 60, 61 and 62 are fastened to the ends of the telescoped shafts. A common fixed indicator which may be in the form of a wire 63 mounted in a frame 64 serves to register the readings on each of the dials.

The Fig. 4 shows diagrammatically a so-called tuned radio frequency receiving circuit employing condensers having the unified control and indication above described. Referring to this figure the antenna and its tuning coil are shown at 37 and 38 respectively. The amplifying vacuum tubes are shown at 39 and 40 and the detector at 41. In circuits of this character it is customary to tune the grid circuits of tubes 39, 40 and 41 by means of variable condensers which are shown respectively at 44, 45 and 46. These condensers and their control knobs and indicators are arranged in the manner shown in Figs. 1 and 2 and corresponding parts in Fig. 4 are therefore given the same numbers as in Fig. 1.

In Fig. 4 the conductors 65, 66 and 67 connect the grids of tubes 39, 40 and 41 respectively with the fixed plates of the condensers 44, 45 and 46.

The movable plates are connected through the shafts 4, 5 and 6 which are connected through conductor 68 to a conductor 69. The coils 38, 42 and 43 are connected to conductor 69 as shown. Thus the variable condensers with the corresponding coils provide a tunable oscillating circuit for each of the grids of the vacuum tubes 39, 40 and 41.

If the condensers are similar in capacity and if the coils 38, 42 and 43 are properly wound resonance of the three grid circuits will be accomplished by approximately equal settings of the movable plates of the three condensers. The condition of resonance between these circuits must be adjusted to a high degree of accuracy when distant stations are being tuned in. The convenient control provided by this invention makes such adjustment for resonance both easily attained and accurate. Furthermore, exact registering of the condenser readings for the three tuned circuits is conveniently under the observation of the operator because his field of vision needs to embrace only the single dial with its three indicators. It is also apparent that in seeking stations not previously heard, the operator may first bring the three indicators into approximately coincident registration and then slowly rotate all three of them simultaneously in the manner described and provided for in Fig. 1. After finding the station by this method the operator may tune it in exactly by independent rotation of each of the three knobs. Exact registration of the condenser readings for that particular station may then be read from the positions of the pointers on the dial and logged for future reference.

While this invention is herein described as applied to variable condensers, other in-

struments such as variable self or mutual inductances may be substituted for the condensers without departing from the spirit or scope of the invention. Complete electrical independence of the tuning units incorporated in this invention may be readily achieved by providing suitable insulating members for supporting the various elements to be controlled. Such complete electrical independence is not provided in the device described because it is not necessary nor desirable that the movable condenser plates be electrically independent as is apparent from the Fig. 4.

What I claim is new and desire to secure by Letters Patent is:

1. A radio tuning device comprising a plurality of tuning instruments, a plurality of independently rotatable telescoped shafts fastened to the movable elements of said instruments; suitable indicating means fastened to said shafts and adapted to show the positions of said movable elements; a second plurality of telescoped shafts; suitable operating members fastened to said second mentioned shafts, and means for transmitting a rotation of each of said second mentioned shafts to corresponding members of said first mentioned shafts; whereby independent control and indication of the settings of the movable elements of said instruments may be accomplished.

2. In a device for controlling and indicating the settings of a plurality of radio instruments, a group of telescoped shafts each of said shafts being fastened to a movable element of one of said instruments; a plurality of indicators one being fastened to each of said shafts; a dial for registering the position of said indicators; a second group of telescoped shafts; a plurality of operating members fastened to said second group of shafts; said members being independently or collectively rotatable; gears fastened one to each shaft of said last mentioned group of shafts; gears fastened to corresponding shafts of said first mentioned group of shafts, and meshing with said last mentioned gears, whereby independent and collective control and indication of the settings of said instruments may be accomplished.

3. A radio tuning device comprising a plurality of tuning instruments, a plurality of independently rotatable shafts to which the movable elements of said instruments are fastened; suitable indicating means fastened to each of said shafts and adapted to independently register the positions of said movable elements upon a common dial; control means for independently and collectively adjusting the settings of the movable elements of said instruments, said control means including a plurality of operating members adapted to be operated independently, in adjacent pairs and as a unit, whereby independent and collective control of the movable elements of said tuning instruments may be accomplished and whereby the settings of said instruments may be independently indicated.

4. In a radio receiving set including a plurality of tuned circuits; tuning instruments having movable elements and included in each of said tuned circuits; means for independently indicating the positions of the movable elements of said instruments upon a common dial, and control means for independently and collectively adjusting the movable elements of said instruments whereby each of said circuits may be independently tuned to effect mutual resonance with the other circuits and may be collectively adjusted to effect resonance with the received signal; the tuned settings of each of said instruments being independently indicated upon a common dial.

In witness whereof, I have hereunto subscribed my name.

ERWIN R. STOEKLE.