July 18, 1933.

A. ROTH

1,919,043

INDICATING MECHANISM

Filed May 12, 1927

2 Sheets-Sheet 1

Fig. 1.

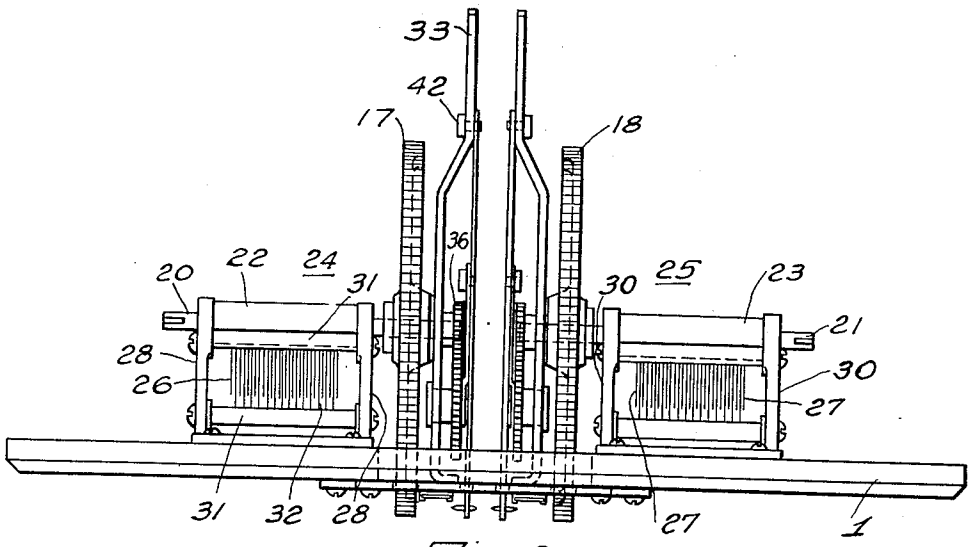
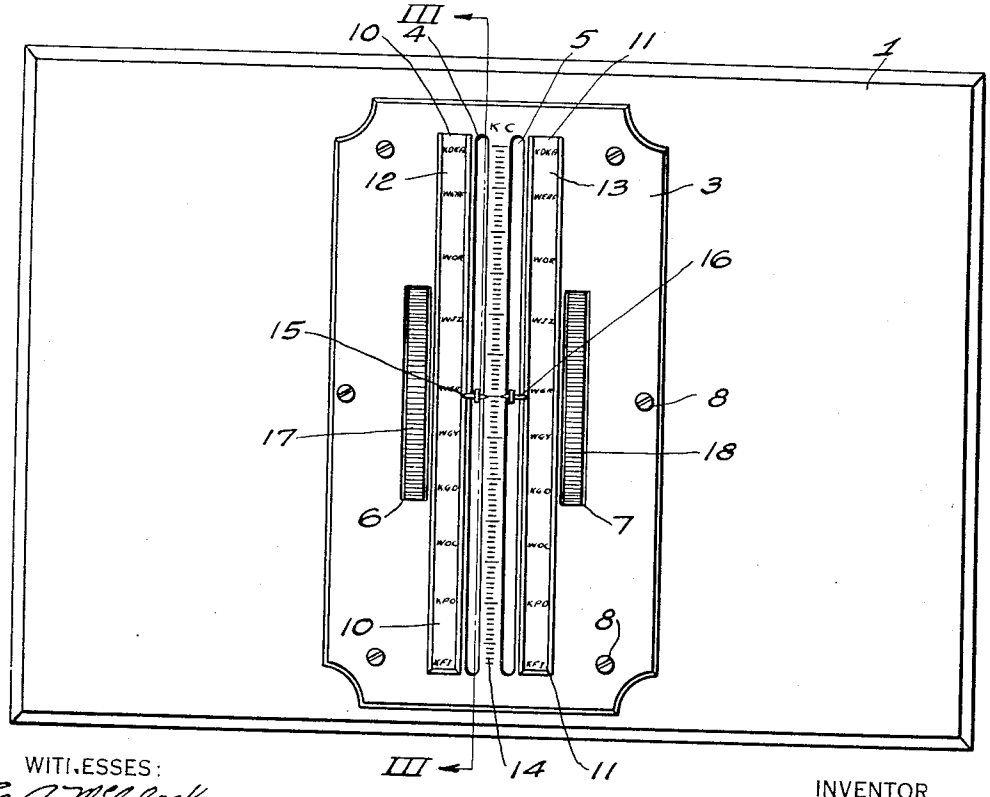


Fig. 2.



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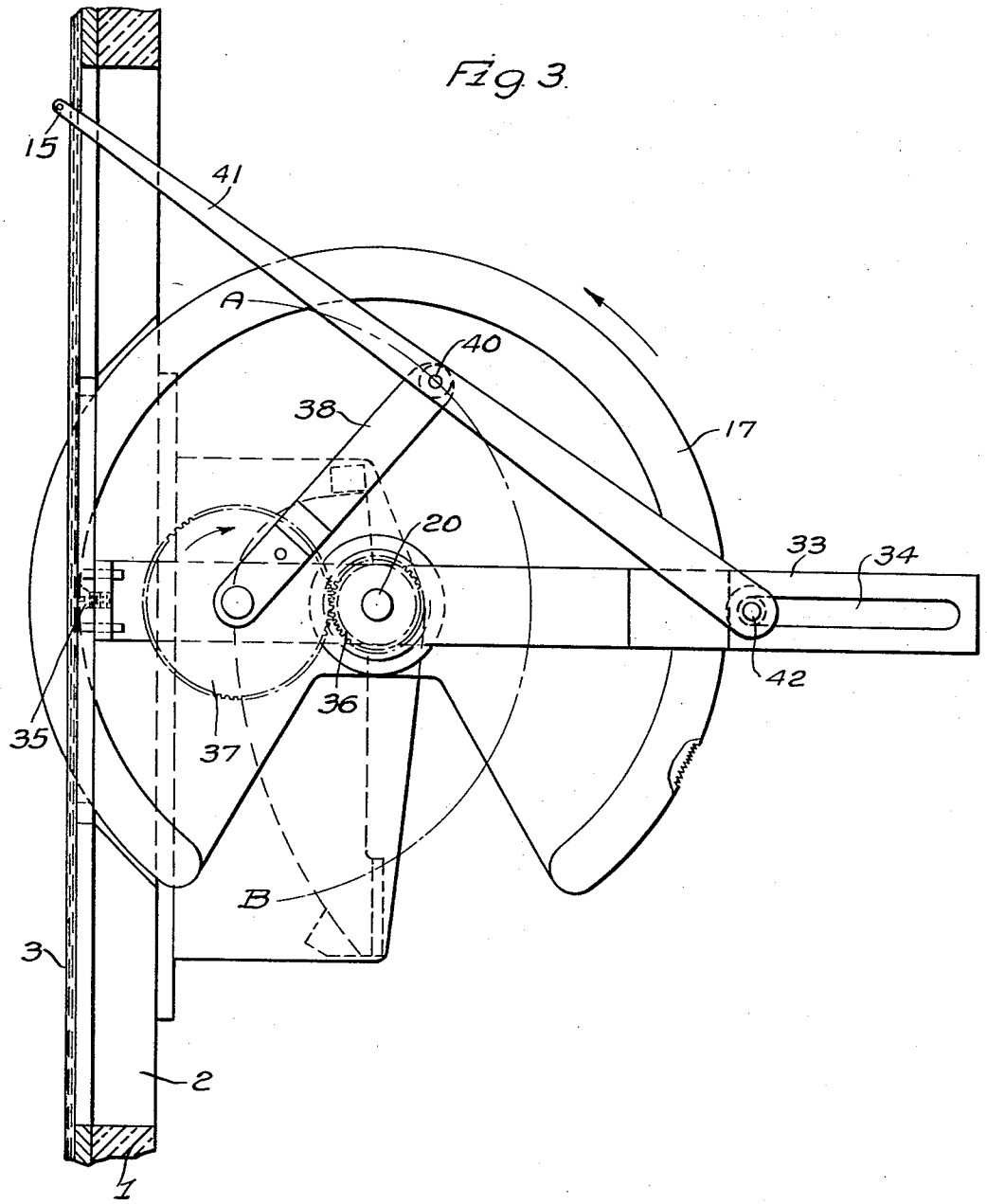
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Fig 3.



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UNITED STATES PATENT OFFICE

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INDICATING MECHANISM

Application filed May 12, 1927. Serial No. 190,716.

My invention relates to controlling mechanism, and it has particular relation to devices for controlling the adjustment of a plurality of variable reactors such as are commonly employed in radio receiving and transmitting apparatus.

One object of my invention is to provide a reactor-controlling device that is capable of being quickly and accurately adjusted.

Another object of my invention is to provide a reactor-controlling device so interconnected with indicating means that the relative position of the said reactor with respect to its entire range of variation is at all times apparent.

Another object of my invention is to provide a reactor-controlling device that is particularly adapted to be incorporated into receiving systems of the type known as "superheterodyne," in which condensers of the so-called "straight-line-frequency" variety are preferably employed in order to maintain a constant frequency difference between certain tuned circuits.

Still another, and more specific, object of my invention is to provide means for indicating, by rectilinear movement of a pointer with respect to a fixed index, the angular position of the movable portions of a plurality of variable reactors with respect to the fixed portions thereof.

It has heretofore been the practice, in connection with the variable reactors incorporated in radio receiving sets, to indicate the setting thereof by the relative position of movable indices carried thereby with respect to a fixed point on the panel of the set. In my copending application, Serial No. 36,105, filed June 10, 1925 I have illustrated and described apparatus of the type just mentioned, and the present invention is to be considered as an improvement thereon.

In general, it may be said that my invention consists in providing instrumentalities whereby the rotary motion of a control device for a variable reactor is translated into proportional rectilinear motion of an indicator with reference to a stationary index carried by a panel. I also provide means whereby the stationary index is removably supported on the panel, whereby the said index may be replaced when soiled without disturbing the precalibration of the set.

Among the novel features of my invention are those particularly set forth in the appended claims. The invention in its generic aspect, however, as well as further objects and advantages thereof, will best be understood by reference to the following description of certain specific embodiments, taken in connection with the accompanying drawings, in which:

Figure 1 is a view from above of a radio-set panel supporting a plurality of condensers equipped with a preferred embodiment of my invention,

Fig. 2 is a front elevational view of a radio set panel showing the relation of the rectilinearly-movable indicators with respect to the stationary index, and

Fig. 3 is a sectional view as seen from the left along a line corresponding to the line III—III of Fig. 2.

Referring to the drawings, a panel 1, preferably made of an insulating material such as bakelite, hard rubber, or the like, is provided with a large opening 2 in order to permit the extension therethrough of certain apparatus that will later be specifically described. An escutcheon plate 3 having a plurality of openings 4, 5, 6 and 7 therethrough is affixed to the front face of the panel in such manner as to serve as a cover for the panel-opening, and is held in position thereon by a plurality of screws 8 or equivalent devices.

The plate carries a plurality of devices 10 and 11 in the nature of label-holders, such as are commonly used on the fronts of drawers of filing cabinets, etc., in which are removably carried stationary index-slips 12 and 13 which slips may be pre-calibrated with radio-station call-letters, or which may initially be left blank.

The plate 3 is also provided with a series 14 of permanent indicia indicating the frequencies corresponding to various settings of a plurality of indicating devices 15 and 16 that will later be described more in detail.

Minor lateral portions of two adjusting-discs 17 and 18 project through the plate 3,

the discs being mounted on shafts 20 and 21 which carry the movable portions, or rotors 22 and 23, of a plurality of variable condensers 24 and 25 respectively, which condensers are supported on the rear surface of the panel adjacent the opening 2.

Each of the rotors 22 and 23 carries a plurality of plates 26 and 27, respectively, shafts 20 and 21 thereof being mounted for rotation in bearings provided in insulating end plates 28 and 30, respectively.

Inasmuch as the condensers 24 and 25, and the adjusting and position-indicating devices associated therewith, are identical, further description will be confined to the condenser 24.

A plurality of spacer-elements 31 are mounted between the end plates, and extend parallel to the shaft 20 carrying the rotor 22. These spacer-elements support a plurality of stator plates 32 that are so arranged as to interleave with the rotor plates 26 when the shaft 20 is rotated by the adjusting disc 17.

An elongated member 33 provided at one end with a guiding-slot 34 is affixed to the rear surface to the plate 3 by a screw 35 or other analogous devices, and extends perpendicularly thereto. The member 33 is provided with an opening through which extends the end of the shaft 20 that carries the adjusting disc 17. That portion of the shaft which extends beyond the member 33 has affixed thereto a small pinion 36 that meshes with a larger pinion 37 rotatably mounted on the member 33 intermediate the shaft 20 and the plate 3. An arm 38 is permanently affixed to the pinion 37 radially thereof, and is provided at its free end with an opening through which extends a pin 40 carried by a pointer-device 41.

The pointer-device 41 extends from the rear of the panel through the elongated opening 4 in the escutcheon plate 3, and carries, on the end projecting to the front of the panel, the indicating device 15 previously referred to. The opposite end of the pointer-device 41 is provided with an opening in which is riveted a pin 42 arranged to slide in the guiding-slot 34. The pin has an enlarged head, clearly shown in Fig. 1, that prevents dis-association of the pointer and the elongated member when the device is operated.

The angular position of the small pinion 36 on the shaft 20 is so adjusted with reference to the large pinion 37 that when the condenser is at its mid-capacity setting, the pointer device 41, the arm 38 carried by the large pinion 37 and the elongated member 33 are parallel and extend in a direction perpendicular to the plane of the panel 1. In this position the transverse indicating device 15 is in the position shown in Fig. 2.

In order that the operation of my device shall be thoroughly understood, reference should now be made to Fig. 3.

Assume first that the relative position of the various elements is that shown in the drawing, and that the adjusting disc 17 is given an increment of rotation in the direction indicated by the arrow. By reason of the meshing of pinion 36, carried by the shaft to which the disc 17 is affixed, with the large pinion 37, the latter pinion is accordingly caused to rotate in the direction indicated by the arrow thereon, and the end of the arm 38 consequently moves in an arc indicated by the dotted line A—B. On account of the rotatable connection, by means of the pin 40, of the arm 38 and the pointer-device 41, that portion of the pointer 41 which is immediately associated with the said pin is also caused to travel in the dotted arc.

An increment of motion downward of the pin 40 accordingly tends to cause the pointer device to describe an arc having the pin 42 as its center. If the said pin 42 were fixed in position on the member 33, and the arm 38 provided with a slot in which the pin 40 could slide, the indicating device 15 would therefore not move in a rectilinear path with reference to the panel, but would describe an arc having the panel as a chord thereof. Inasmuch, however, as there is no relative sliding motion between the arm 38 and the pointer 41, and the end of the pointer 41 carrying the pin 42 is free to move in a direction perpendicular to the panel, the center of curvature of the arc in which the indicating-device 15 tends to travel is constantly moving further away from the panel. The motion of the pin 42 is approximately proportional to the cosine of the angle through which the arm 38 turns, and the relative dimensions of the various parts are so chosen that such motion is sufficient to compensate the curvature of the arc in which the indicating device tends to travel, with the consequence that the path of the said indicating-device 15 is substantially rectilinear and parallel to the index-strip.

Fig. 3 is drawn to scale from an actual embodiment of my invention, and the relative dimensions thereof, if followed, will give rise to an operative structure.

It is also, of course feasible to adapt my invention to the control of condensers of either the straight-line wave-length or straight-line capacity types, no changes being necessary in the mechanism.

I have particularly pointed out the use of my invention in connection with condensers of the straight-line frequency type, inasmuch as such condensers are of extreme importance in receiving systems of the super-heterodyne type. In such systems, it is necessary that a constant frequency-difference be maintained between the frequency of a local oscillator and the frequency to which the input

circuit of the system is tuned, this constant frequency-difference being that frequency to which the intermediate amplifier is tuned.

If, therefore, one of the adjusting discs controls the radio frequency input tuning of a super-heterodyne system, the other disc may be arranged to control the tuning of the local oscillator, and the several inductors associated with the condensers may be so adjusted that when the indicating members 15 and 16 are opposite at any point in their travel, the same frequency difference exists between the tuning of the several circuits as previously described.

Inasmuch as the travel of the indicating devices along the stationary indices may be arranged to have a straight line relation to the frequency of the circuit or circuits associated therewith, it is accordingly apparent that I have provided a very simple and easily operated device for indicating the tuning of either a superheterodyne receiving system or a receiving system in which are incorporated a plurality of tuned stages.

The index holding devices 10 and 11, into which may be inserted either blank strips of roughened celluloid or cardboard on which the various station call letters may be written as desired, prove to be a decided convenience, inasmuch as the strips may be removed when soiled and may be replaced by similarly marked strips in the full assurance that the pre-calibration of the set will not be changed.

Another very decided advantage of my invention lies in the fact that the settings for all of the stations within range of the set equipped therewith are visible at a glance. In tuning systems of most of the usual types, the major portions of the drums carrying the station-call letters are hidden behind a panel and, consequently, the tuning of the set cannot be quickly and easily changed from one extreme position to the other. When all of the call letters are in plain view, it is obvious that the process of tuning is greatly simplified.

In addition to the label holders and removable strips, the index indicating in kilo-cycles the frequencies which correspond to any adjustment of the tuning device is an additional advantage, inasmuch as a station broadcasting on a known frequency, or wave length, may be expeditiously tuned by adjusting the indicating device to correspond to such frequency.

Although I have shown and described only a single specific embodiment of my invention, it is not to be restricted thereto, since modifications thereof are possible. My invention, therefore, is only to be limited by the prior art and by the spirit of the appended claim.

I claim as my invention:

In combination, a panel having a plurality of openings extending therethrough, a shaft lying parallel to one face of said panel and in spaced relationship thereto, an adjusting disc-like control element affixed to said shaft at right angles to said panel and partially extending through one of said openings, an index-device mounted on the other face of said panel adjacent the projecting portion of said control element, an indicating device, and means interconnecting said disc-like control element and said indicating device whereby the latter is constrained to move in a rectilinear path substantially parallel and adjacent to said index-device upon movement of said control element.

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