Dec. 10, 1929. B. J. JACOBSON ET AL 1,739,310

VERNIER RADIO DIAL

Filed March 5, 1925

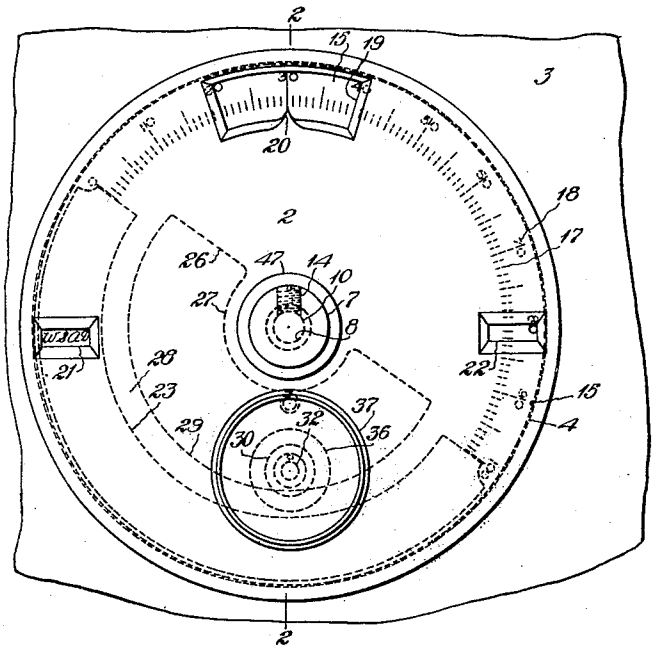

Fig. 1.

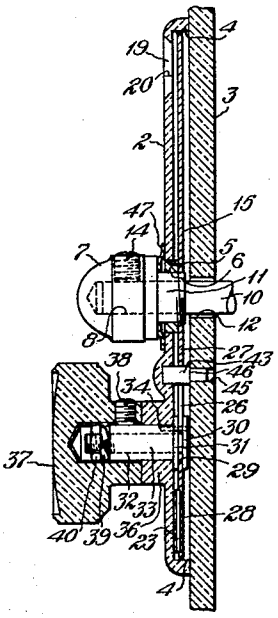

Fig. 2.

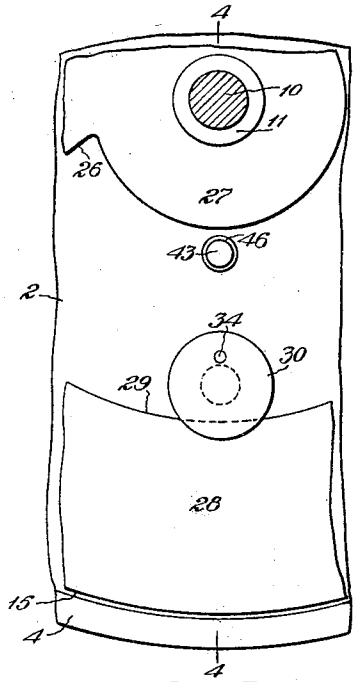

Fig. 3.

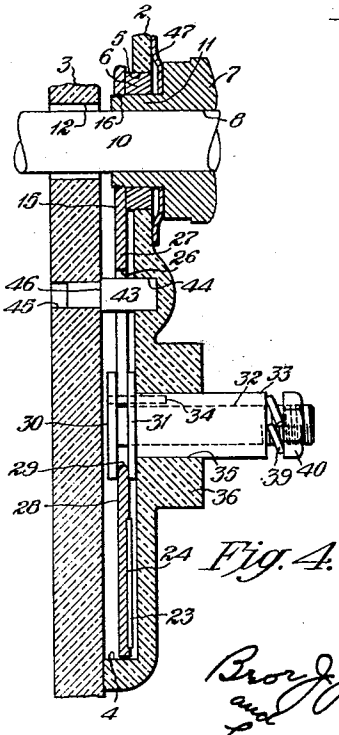

Fig. 4.

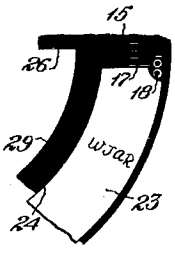

Fig. 5.

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UNITED STATES PATENT OFFICE

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VERNIER RADIO DIAL

Application filed March 5, 1925. Serial No. 13,308.

This invention relates to an improved vernier dial for use with radio receiving sets or similar instruments.

One object of the invention is to provide a device of the type specified which is simple in structure and convenient of operation for tuning a radio set with a fine adjustment and extreme precision.

Another object of the invention is to provide a device of the type specified which is compact in size, and universally attachable to practically all types of radio apparatus.

Another object of the invention is to provide a device of the type specified in which the mechanism is proof against derangement or getting out of order and more efficient and durable over long periods of use.

Another object of the invention is to provide a tuning dial and adjusting-means therefor embodied in a complete unit which may be readily applied to the panel of the radio set for operating any of the instruments thereof, such as the condenser, variometer or coupler.

Another object of the invention is to provide a device of the type specified having the usual graduated dial and indicating means for the reading thereof, and combined therewith a chart or recording space for logging different stations in accordance with the dial readings.

Further objects of the improvement are set forth in the following specification which describes a preferred embodiment of the invention as illustrated in the accompanying drawings. In the drawings:

Fig. 1 is a front view of the improved vernier dial shown as applied to the panel of a radio receiving set;

Fig. 2 is a sectional view of the same taken on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged rear view of the dial showing its operating-mechanism;

Fig. 4 is a sectional view of the same taken on the line 4—4 of Fig. 3; and

Fig. 5 is a fragmentary view of the dial showing the recording chart or logging space thereon.

The present improved device comprises in general a relatively fixed disk or cover-plate 2 which is adapted to set against the front face of the panel 3 of the radio set and is secured from turning thereon by means as later described. The fixed disk or front plate 2 is preferably constructed of dielectric material such as vulcanized rubber, bakelite or similar composition, and is recessed on its rearward side. As shown in Fig. 2, the disk or plate 2 is formed with a continuous peripheral flange or rim 4 adapted to seat against the face of the panel 3 to hold the rearward side of the plate spaced away therefrom. The disk or plate 2 is provided with an axial bore 5 in which is seated a suitable metal bushing 6, preferably of brass or other wear-resisting material. A knob or cap 7 having an axial bore 8 for receiving the end of a spindle 10, which operates the instrument to which the dial is to be attached, has a reduced portion or sleeve 11 fitted to rotate within the bushing 6. The spindle 10 may be the operating shaft for a rheostat, tickler coil, condenser, variometer, coupler, or any other tuning or control instrument within the radio set, the spindle being arranged to project through an opening 12 in the panel 3 in accordance with the usual practice. The knob or cap 7 may be secured rotatively with the shaft or spindle 10 and held in place thereon by any suitable means, such as a set-screw 14. As shown in Fig. 2, the set-screw 14 is screwed through the side of the knob 7 with its end binding against the shaft 10.

The graduated dial 15 which turns with the spindle 10, to indicate the adjustment of the instrument controlled thereby, is preferably constructed from a thin plate of sheet metal and is arranged within the recess at the rear of the disk or cover-plate 2. The dial 15 has an axial bore 16 which is internally threaded to receive the externally threaded sleeve 11 which screws snugly thereinto to secure the dial rotatively with the knob 7 and spindle 10. The front face of the dial 15 is preferably etched to form raised graduations 17 extending throughout 180° of its outer circumference. The graduations 17 are preferably numbered with raised figures 18, as indicated most clearly in Fig. 5. Usually the graduations and the figures are polished

or left bright and the space surrounding them filled in with black enamel to bring out the indicia in sharp contrast thereto, whereby to make the reading of the dial plain. At the top of the disk or cover-plate 2 is an elongated sight-opening 19 through which the graduations and indicia are visible as the dial is rotated at the back of the plate. The sight-opening 19 is provided at its center with an index mark or pointer 20 with which the graduations 17 register, as shown in Fig. 1.

At either side of the center of the disk or cover-plate 2 are two smaller sight-openings 21 and 22 arranged in a horizontal plane coincident with the axis of the dial 15. The several sight-openings are preferably formed with beveled edges and the openings 21 and 22 are somewhat smaller than the main opening 19. The two openings 21 and 22 expose the front face of the dial 15 for recording or logging stations thereon in accordance with the readings of the graduations on the dial shown through the opening 19 and registering with the pointer 20. For this purpose the dial 15 is preferably provided with a suitable writing surface or chart strip 23 secured to its front face. As shown in Figs. 4 and 5 the face of the dial 15 is preferably recessed at 24 to adapt it to receive a circular or segmental strip of celluloid or tough paper constituting the chart 23. The strip or chart 23 extends throughout 180° of the circumference of the dial beyond the graduated portion which extends throughout the other half of the circumference. The paper or celluloid strip 23 may be cemented into its recess 24 and preferably it has a slightly roughened surface on which call letters or other indicia may be marked with a pen or pencil, as indicated at the left in Fig. 1. It will be observed that when the dial is turned from "0" to "50", or throughout one-quarter of its circumference, the chart strip 23 will show through the left-hand sight-opening 21; while when the dial is turned beyond this point the strip will show through the opposite sight-opening 22.

The dial is rotated with respect to the disk or cover-plate 2 to turn the spindle 10 by a vernier adjusting-mechanism arranged as next described. It is to be noted from the dotted lines in Fig. 1, and also from Fig. 3, that the dial 15 is cut away with a segmental opening 26 extending throughout substantially half of its circumference. A circular hub-like portion 27 is left surrounding its axial hole into which is screwed the sleeve 11 on the knob 7, and beyond the hub or rim 27 the metal is cut away to form a semicircular portion 28 extending to the periphery of the disk. The purpose of this construction is to provide an internal edge or rim 29 which is adapted to be frictionally engaged by two overlapping washers or disks 30 and 31 rotated from a stud-shaft or operating-spindle 32, see Figs. 3 and 4. Preferably the operating-shaft or spindle 32 is constructed with the disk 30 formed as an annular flange at its end. Slidable on the spindle 32 is a sleeve 33 which carries the opposite disk 31 formed integral therewith at its end. A dowel-pin 34 driven into the end of the sleeve 33 projects through a hole in the disk 30 to connect the two disks rotatively.

The shaft or spindle 32 and its surrounding sleeve 33 are mounted to rotate in a bore 35 formed in a hub 36 which is molded integral with the disk or cover-plate 2. Fast on the outer end of the sleeve 33 is a knob 37, preferably constructed of vulcanized rubber or the like, and held fast therewith by means of a set-screw 38 extending through its hub and binding against the sleeve, see Fig. 2.

The two disks 30 and 31 are pressed together to adapt them to bind against the opposite sides of the rim 29 of the semicircular portion 28 by resilient means tending to draw the spindle 32 through the sleeve 33. As shown in Fig. 4, this means may consist of a spring-washer or helical wire ring 39 arranged between the end of the sleeve 33 and a nut 40 screwed on to the threaded end of the spindle 32. As shown in Fig. 2 the spring-washer or ring 39 and its nut 40 are enclosed within the bore of the knob 37.

Any suitable means may be employed to hold the disk or cover-plate 2 stationary with respect to the panel 3, such as a dowel-pin 43 shown most clearly in Fig. 4. The pin 43 may be held in a suitable bore or pocket 44 formed in a swelling on the disk 2, the inner end of the pin being reduced in diameter to fit within a hole 45 drilled through the panel 3. The shoulder 46 on the pin 43 abuts the front face of the panel and thus prevents the pin from becoming displaced or sliding through the panel.

It will be understood that the disk or plate 2 is held against the front face of the panel 3 by means of the cap or knob 7 secured to the spindle 10. In order to provide a slight frictional resistance to the turning movement of the spindle 10 and its dial 15, whereby the parts will be held in their adjusted relation against accidental displacement, any suitable friction means may be employed. For this purpose it has been found convenient to insert a cupped spring-washer 47 under the knob 7 with its outer rim bearing against the disk or cover-plate 2. The spring-washer 47 thus serves to clamp the disk or cover-plate 2 snugly against the panel 3 and also provides a slight resistance to the turning movement of the knob 7, whereby when the dial 15 is once adjusted to position it will be held against accidental movement from jar or shock. The method of operation of the complete device is as follows:

As before stated, the present improved device is adapted for use as a universal fitment

or attachment for practically all types of radio sets. The spindles for operating the instruments in the set, such as the condenser, variometer, coupler, or other devices, are usually of standard diameter and are arranged to project through openings in the front panel of the set. To apply the present improved vernier dial to any one of the instruments in the set it is only necessary to place the cover-plate or disk 2 against the front of the panel 3 and clamp it in position by attaching the knob 7 to the spindle of the instrument. It will be understood that the various parts of the dial including its cover-plate and the dial-adjusting mechanism are assembled as a unit and by slipping the cap or knob 7 onto the end of the spindle 10 and securing it thereto by means of the set-screw 14 the whole fitment is at once attached in place, it being only necessary to provide a suitable hole 45 drilled through the panel 3 to receive the dowel-pin 43 which holds the plate 2 from rotating with respect to the panel. It will be understood, of course, that the knob or cap 7 is secured to the spindle 10 with the graduations on the dial 15 properly related to the rotor-element of the instrument which is to be adjusted from the dial.

In operation the knob 37 is turned to rotate the spindle or shaft 32 and its connected disks 30 and 31. The disks 30 and 31 bear frictionally against the opposite sides of the rim 29 of the segment 28 of the dial 15 so that the turning of the disks will rotate the dial therefrom at a relatively slow rate of movement. That is to say, the disks act on the dial to turn the latter with a very gradual adjustment owing to the disparity between the diameter of the disks and the diameter of the rim of the segment with which they engage. Through this arrangement the dial 15 and its connected spindle 10 which controls the instrument may be adjusted with great precision to effect a highly critical tuning of the radio set.

As the dial 15 is rotated at the rear of the cover-plate 2 its graduations 17 are exhibited through the sight-opening 19 and caused to register with the index or pointer 20. As the dial is adjusted from "0" to "50" a portion of the chart strip 23 is turned past the sight-opening 21, and after the station has been brought in by the proper setting of the dial it may be recorded or logged on the chart strip by marking appropriate identification indicia, such as the call letters, thereon which will thereafter register with the sight-opening 21 when the dial is turned to the proper setting. As the dial is turned beyond the "50" mark the chart strip will appear in back of the sight-opening 22 and call letters, wave lengths or other suitable indicia may be recorded thereon at this point in accordance with the higher readings on the dial.

It will be observed that the present invention provides an extremely simple, compact vernier dial which may be manufactured as a unit for universal attachment to practically all types of radio sets. The vernier adjustment or dial control provides for accurate adjustment of the instrument to which the device is connected with a precise setting for critical tuning. The friction means for rotating the dial from the vernier adjusting-shaft or spindle being resiliently operated is practically proof against wear or deterioration so that it provides for the maximum efficiency throughout long periods of use. In fact, the whole device is proof against derangement, getting out of order, or wear and is thus more reliable in operation. It is to be particularly noted that the friction means for rotating the dial from the vernier knob eliminates all backlash and lost motion common with geared dials, so that the most accurate adjustment may be accomplished more expeditiously and with less chance of variation in repeated settings for the same stations. That is to say, a most critical adjustment is obtained with uniform results for corresponding readings of the dial.

The means for logging stations on the dial provides for greater convenience and facility in locating the stations and for recording or logging the range of the receiving set.

While we have herein described and illustrated a preferred structure and arrangement of our improved vernier dial and its operating mechanism, it is to be understood that modifications may be made therein without departing from the spirit or scope of the invention.

Therefore, without limiting ourselves to the precise details of construction and arrangement of the device as herein shown, we claim:

1. In a vernier dial, the combination of a relatively fixed plate, a thin dial rotatable at the rear of said plate and cut away at one side of its center to form a sector-like rim disposed concentric with its axis of rotation, means whereby said dial is adapted to be secured to the spindle of a radio instrument, a bearing on the plate, an operating-shaft rotatable in said bearing, spaced disks rotatable from the shaft and arranged to engage on opposite sides of the said rim of the dial, and resilient means for holding said disks in frictional contact with the rim whereby rotation of the shaft will turn the dial.

2. In a vernier dial, the combination of a front plate, a thin dial rotatable at the rear of said plate and adapted to be secured to the shaft of an instrument, said dial being cut away at one side of its center to provide a sector-like inwardly facing rim disposed concentric with its axis of rotation, a bearing on the front plate, a shaft rotatable in said bearing, a disk fast on the end of the shaft and adapted to engage one side of the said rim,

a second disk arranged to engage the opposite side of the said rim, said disks being axially movable, and resilient means to draw the disks together to maintain them in frictional contact with the said rim whereby rotation of the shaft will turn the dial.

In testimony whereof we affix our signatures.

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LAURENCE C. MARTIN.