

Aug. 25, 1936.

E. F. McDONALD, JR

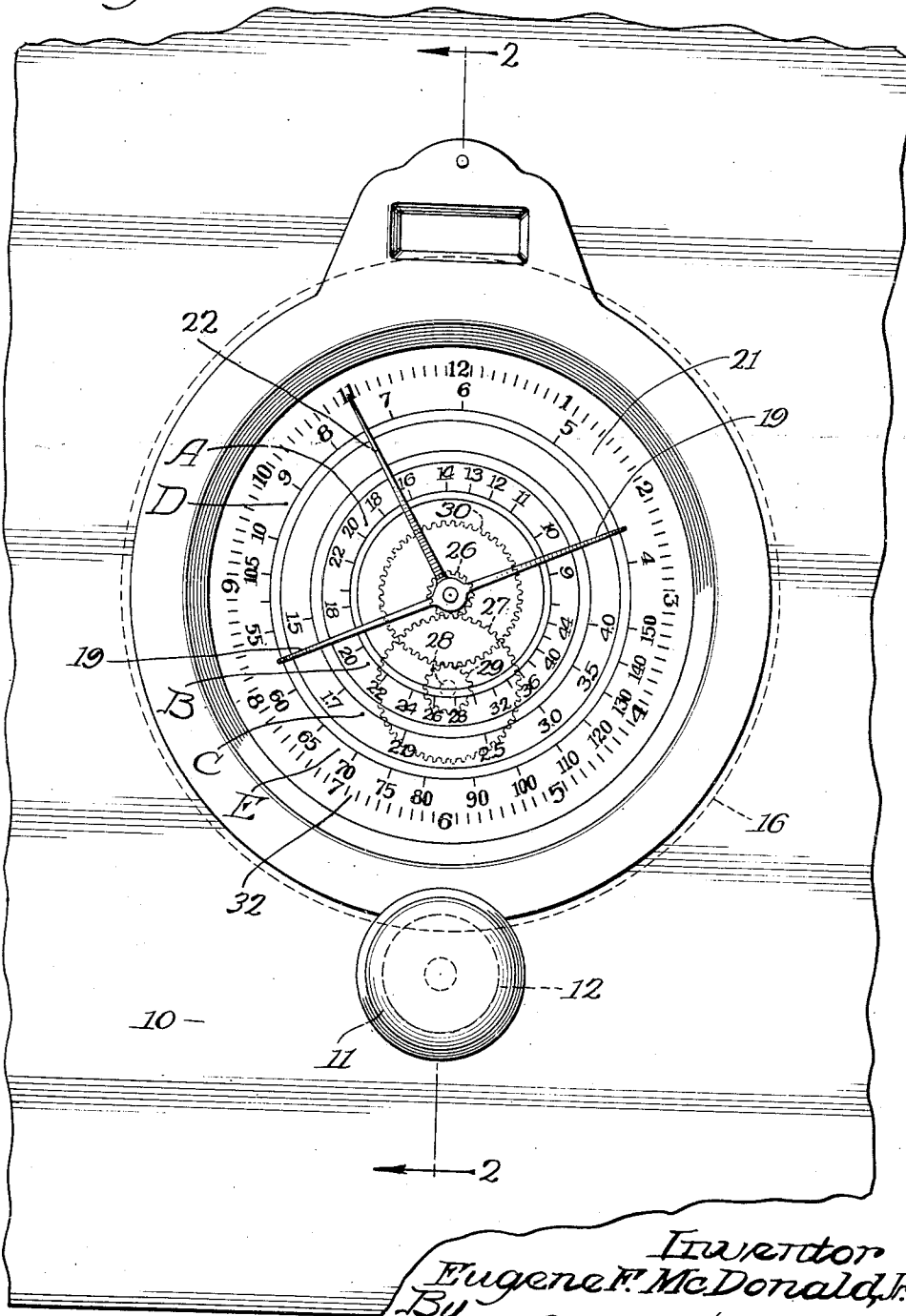
2,052,238

RADIO TUNING AND INDICATING APPARATUS

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2 Sheets-Sheet 1

Fig. 1



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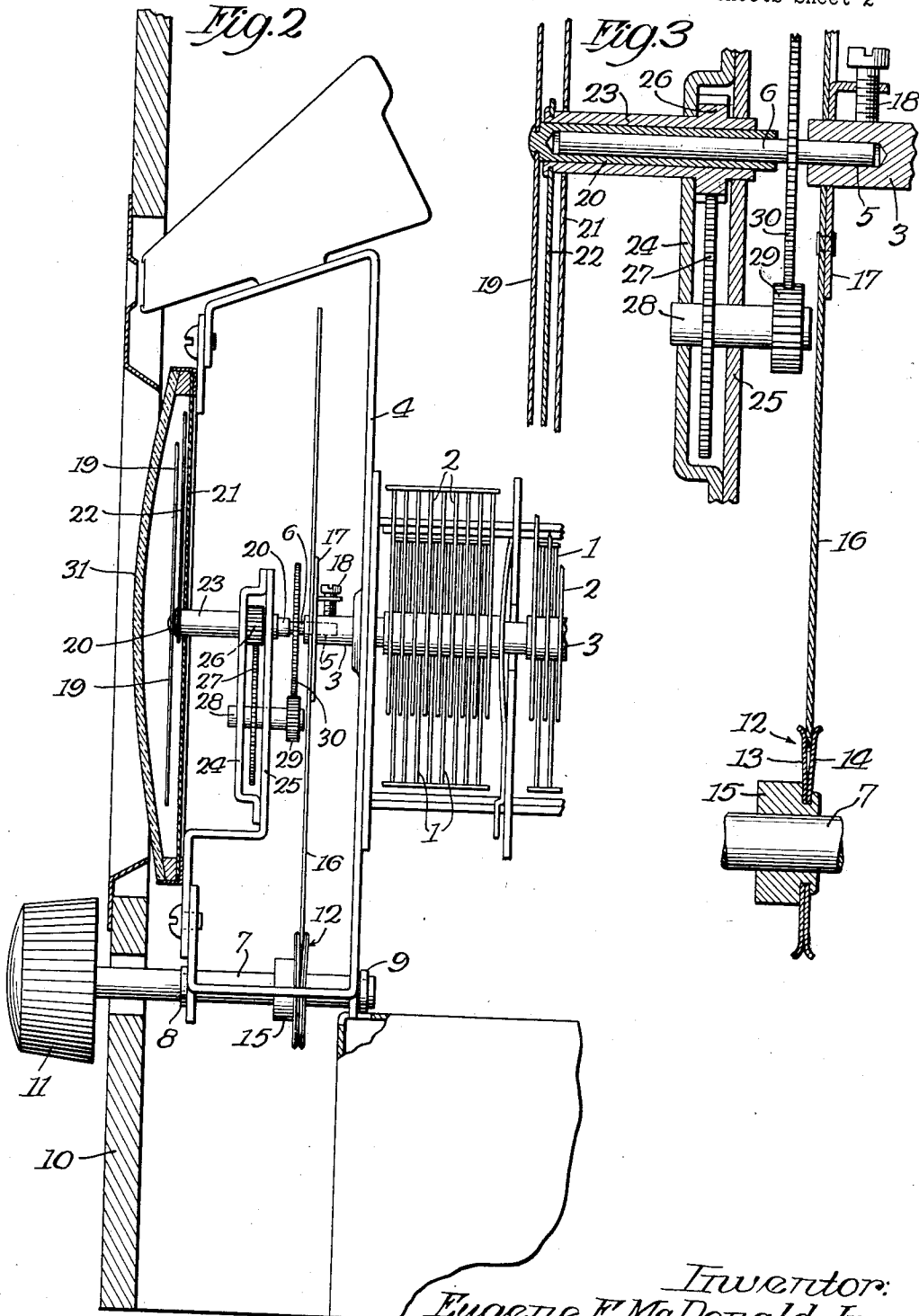
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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RADIO TUNING AND INDICATING APPARATUS

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3 Claims. (Cl. 116—124.1)

My invention relates to radio tuning and indicating apparatus, and more particularly concerns the provision of means through which quick and accurate adjustment of the tuning elements of radio apparatus may be obtained.

Various forms of so-called vernier tuning devices are used to facilitate careful adjustment of radio tuning elements, but these devices have only to do with movement, and while their employment assists in the careful positioning of such elements, it does not lessen, in any sense, the necessity of closely observing the graduation marks upon the tuning scale to determine such positioning. Fine calibrations of tuning scales are difficult to read, and while this has long been recognized as obtaining in the accurate adjustment of the radio tuning elements of the more selective types of broadcast-band receivers, and has always been an objectionable feature in the tuning of short-wave receivers, the advent of the so-called all-wave receiver has accentuated the need of tuning and indicating apparatus through which the careful positioning of the tuning elements may be both quickly and accurately effected and definitely and accurately determined.

In such all-wave receivers, in which the tuning range extends over and between the short-wave and the broadcast bands, and in which a single set of adjustable tuning elements is used to cover this greatly extended range, the exact positioning of the tuning elements is absolutely necessary throughout the shorter wave-bands, and the tuning and indicating apparatus should be such as will permit the operator to both obtain and observe extremely accurate and delicate adjustments and also enable him to obtain such adjustments as quickly as he has been accustomed to do when tuning for broadcast band reception. It is impracticable to employ a continuous graduated tuning scale which will embrace the full tuning range of an all-wave receiver, and it is the common practice to break up the scale into sections, such as I have illustrated upon the dial shown in Figure 1, leaving that portion covering the broadcast band substantially as it has been—that is to say, with ten-kilocycle calibrations, but, in using the arrangements so far provided in all-wave receivers the result has been to add to the confusion of the operator in definitely determining the proper positions of the tuning elements for short-wave reception, and I have added a graduated circular scale, spread circumferentially upon the dial so that the graduations thereof may be easily and conveniently observed, and a corresponding pointer to indicate in connection

therewith fractional adjustments of the tuning elements between the graduation marks of each and all of the several tuning scales.

The principal object of my invention is to provide a simple and inexpensive tuning and indicating apparatus whereby the operator may both obtain and observe the most accurate and delicate adjustment of the tuning elements of radio apparatus.

Another object of my invention is to provide an arrangement through which such accurate and delicate adjustment may be obtained simply and quickly, so that, while the apparatus is particularly useful in providing for accurate short-wave tuning, it is equally useful in providing the quick adjustment of the tuning elements often desired in station-finding throughout the broadcast band.

Still another object of my invention is to provide, in combination with the foregoing provisions, a dial having tuning scales and pointers so displayed and arranged that the aforesaid accurate and delicate adjustment of the radio tuning elements will be clearly and conveniently indicated throughout the entire tuning range of the receiver; so that possible confusion of the operator will be minimized; and so that he will not find it necessary to depend upon hearing the desired signal to determine if he has properly adjusted the tuning elements to receive it.

These and other objects and advantages of my invention will appear in the following description.

In the drawings—

Figure 1 is a front elevational view, showing the operating knob and the indicating devices forming a part of my invention;

Fig. 2 is a vertical sectional view, taken upon the line 2—2 of Fig. 1, showing the complete operating mechanism embodying my invention; and

Fig. 3 is an enlarged fragmentary sectional view, illustrating in detail the construction and arrangement of some of the parts shown in Fig. 2.

Referring to Fig. 2, I have shown a conventional form of variable condenser having stator-plates 1 and rotor-plates 2, the latter being fixed upon the rotatable condenser-shaft 3, and the entire condenser structure being secured in any desirable manner upon the fixed support 4. Condenser-shaft 3 is centrally bored at its forward end-part, and into this boring 5 is tightly pressed the rearward end-part of the arbor-shaft 6, the arbor-shaft thus forming a forward extension of said condenser-shaft, and this method of attach-

ment being one which affords accurate alinement and secure attachment of my device with shafts of various types of variable condensers.

Shaft 7 is rotatably supported in bearings 8 and 9 and projects forwardly through the instrument panel 10, adjusting knob 11 being removably fixed upon the outwardly presented end-part. A friction-drive-wheel 12 is fixed upon shaft 7 and is formed by two rim-flared disks 13 and 14 tightly pressed together (Fig. 3) upon a hub 15. These disks 13 and 14 bear upon the opposite circumferential edges of a relatively larger drive-disc 16 of celluloid, pyralin, or other suitable material, the central mounting-plate 17 of which drive-disc is removably fixed upon condenser-shaft 3 by means of set-screw 18. The above described mechanism constitutes a friction-drive vernier adjusting means, by which the operator may quickly and accurately adjust the rotor-plates 2 of the variable condenser. This particular construction of the vernier adjusting means does not form a part of this invention, however, and any other construction of this part of my device may be used, if desired, and the turning ratio of the shaft 7 with respect to the condenser-shaft 3 may be changed without departing from the spirit and scope of my invention.

A double-ended pointer 19 is fixed upon the forward end-part of a sleeve 20 which extends rearwardly through a central aperture in the indicator-dial 21 and is snugly fitted in frictional engagement over the major part of arbor-shaft 6, the frictional engagement being such as to insure the turning of the pointer 19 by the condenser-shaft 3 and yet permit it to be adjustably positioned in the testing of the assembled apparatus to accurately indicate upon the dial 21 the various tuning positions of the rotor-plates 2. The double-ended pointer 19 co-operates with a plurality of tuning scales, A, B, C, D and E (Fig. 1), some of which are calibrated to indicate megacycles for short-wave tuning, and one of which E, is calibrated to indicate kilocycles for broadcast-band tuning. I have not shown the usual tuning coils and the circuit connections therefor, since neither their construction nor arrangement is involved herein, and I do not wish my invention to be considered as limited in any respect to the use of the scale arrangement I have shown for illustrative purposes upon the indicator-dial 21. Different scales and different arrangements of scales may be employed as occasion may require or as may be preferred.

A second pointer 22 is fixed upon the forward end-part of a sleeve 23 which is fitted to turn freely upon sleeve 20 and extends rearwardly therewith through the central aperture in the indicator-dial 21 and through bearing-plates 24 and 25. Sleeve 23 carries a pinion-gear 26 fixed tightly thereupon between bearing-plates 24 and 25 and in mesh with a gear-wheel 27. Gear-wheel 27 is fixed upon a counter-shaft 28 which is supported in bearing-plates 24 and 25 and carries a pinion-gear 29 tightly fixed thereupon at or near its rearward end-part. Pinion-gear 29 meshes with a gear-wheel 30 tightly fixed upon arbor-shaft 6. A cover 31 of glass or other transparent material is positioned over the indicator-dial 21 and pointers 19 and 22 to permit observance thereof and to prevent tampering with their proper adjustment.

The ratio of movement of the various parts is such that a single turn of the adjusting knob 11

will effect a partial rotation or vernier adjustment of the condenser-shaft 3 and pointer 19, and at the same time effect more than one revolution of pointer 22. It will be observed that pointer 22 traverses a graduated scale 32, the calibration of which is easy to read, and that the relative positions of the two pointers 19 and 22 are as convenient for observation as the hour and minute hands of a timepiece.

The operation of the device is simple. It consists in the turning of the adjusting knob 11 until the double-ended pointer 19 indicates upon the proper scale the approximate tuning position desired, this adjustment being obtainable quickly, the more accurate and delicate adjustment of the tuning devices being had by observing the position of the pointer 22 with relation to the scale 32.

I claim—

1. In apparatus of the character described, the combination of a dial having a plurality of concentrically arranged sets of arcuate scales and a circular scale displayed thereupon, a plurality of pointers arranged to turn upon a common axis, one of said pointers being double-ended with its diametrically opposite end-parts registering with different scales of said sets of arcuate scales and a second of said pointers registering with said circular scale, driving means, speed-reducing transmission means connecting said driving means with said one of said pointers, and speed-increasing transmission means connecting said one of said pointers with said second of said pointers.

2. In apparatus of the character described, the combination of a dial having a plurality of differently graduated semi-circular scales and an evenly graduated circular scale displayed thereupon, said plurality of scales being concentrically arranged and representing different tuning wavebands and said circular scale surrounding said plurality of scales and representing fractional adjustments only, a plurality of pointers of different length arranged to turn upon a common axis, one of said pointers registering with said plurality of scales and a second and longer one of said pointers registering with said circular scale, and driving means connected with said pointers to effect their simultaneous operation at relatively different speeds.

3. The combination, with the rotatable shaft of an adjustable radio tuning element, a driving shaft, and transmission means connecting said shafts whereby one revolution of said driving shaft will effect a partial revolution of said rotatable shaft, of a dial having a plurality of differently graduated semi-circular scales and an evenly graduated circular scale displayed thereupon, said plurality of scales being concentrically arranged and representing different tuning wavebands and said circular scale surrounding said plurality of scales and representing fractional adjustments only, a plurality of pointers of different length arranged to turn upon a common axis, one of said pointers registering with said plurality of scales and a second and longer one of said pointers registering with said circular scale, and transmission means connecting said pointers with each other and with said rotatable shaft whereby the operation of said driving shaft will effect the simultaneous movement of said pointers at relatively different speeds.

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