May 4, 1926. 1,583,281

E. K. CURTIS

DEVICE FOR MAKING PRECISION ADJUSTMENTS

Filed May 22, 1924

Fig. 1.

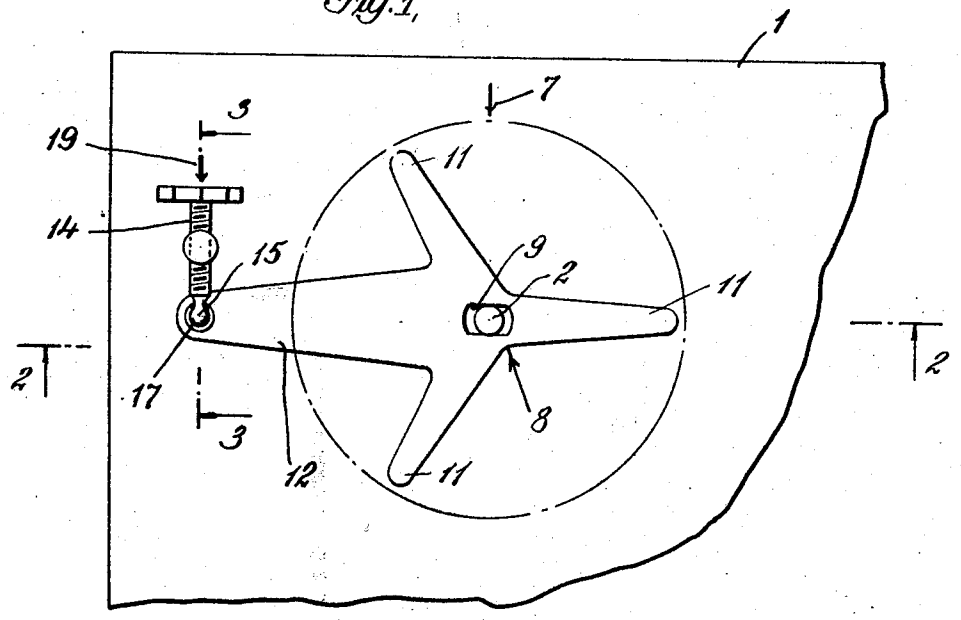



Fig. 2.

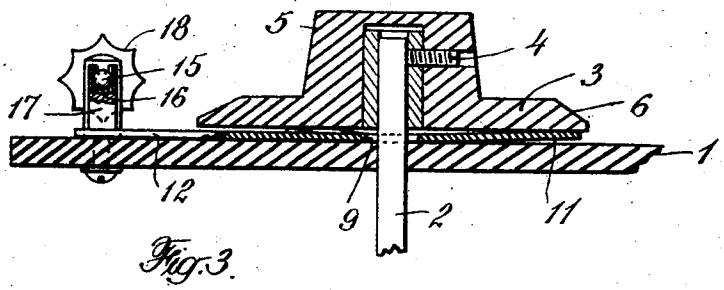
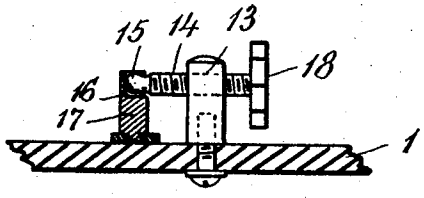



Fig. 3.




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# UNITED STATES PATENT OFFICE.

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## DEVICE FOR MAKING PRECISION ADJUSTMENTS.

Application filed May 22, 1924. Serial No. 715,259.

*To all whom it may concern:*

Be it known that I, EDWARD K. CURTIS, a citizen of the United States, residing at 1735 West 11th Street, Brooklyn, in the county of Kings, State of New York, have invented certain new and useful Improvements in Devices for Making Precision Adjustments; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a device for making precision adjustments, and particularly to one adapted for use in radio tuning.

In making precision adjustments of delicate instruments, such as the variable condensers, variometers, variocouplers, etc., used in radio, direct manipulation is at best unsatisfactory and cannot well be employed where the instrument must be set within a fraction of a degree. Where the shaft of the instrument is tightly journaled, it is practically impossible to make nice adjustments by turning the knob or dial directly with the fingers, for the instrument does not turn smoothly but by a series of jerks, any one of which is greater than the precise increment desired. When the shaft is loosely journaled, precise digital adjustment, although easier of attainment than when the instrument does not turn readily, is still difficult enough, and besides the adjustment once made is not permanent and is easily lost through vibration. I am aware that various devices have been designed to overcome these objectionable features, but those which have been successful have been complicated and expensive, and in the case of radio receiving sets not readily adaptable for use on sets already built and in operation.

It is, therefore, the object of the present invention to provide a simple and inexpensive device for making and maintaining precision adjustments, without interfering or slowing up approximate adjustments, particularly designed for radio receiving sets, and adapted to be used in connection with the ordinary tuning dials now in common use, so that a set may be readily equipped with these adjusting devices at small expense and with little labor. I have attained this object by interposing between the dial and the panel an element which makes frictional contact with the dial, but which does not interfere with the large approximate adjusting movements made directly with the fingers, and providing some gear-reducing means such as a screw or worm and wheel for imparting a slow rotative movement to the friction element. By this means the rough adjustment is made directly with the fingers and the precision adjustment made through the friction element which bears against the dial with sufficient pressure to impart its rotative movement thereto.

The nature of the invention will be more clearly understood after a study of the accompanying drawing which illustrates a preferred embodiment of it, as applied to a radio receiving set. In this drawing, Fig. 1 is a plan view of a portion of a panel on which the precision adjusting device of the present invention is mounted, the dial of the instrument to be adjusted being removed, and its position indicated by dot and dash line; Fig. 2 is a section taken along line 2—2 of Fig. 1 showing the precision adjusting device and the dial of the instrument in operative position; and Fig. 3 is a detail of the actuating element of the precision device taken along line 3—3 of Fig. 1.

In these drawings, 1 represents the usual panel of a radio receiving set upon which the various instruments are mounted, and 2 represents the shaft of one of these instruments shown in its usual position projecting outwardly through the panel. Rotation of this shaft and consequent adjustment of the instrument is ordinarily effected by means of a dial 3, which is adjustably mounted upon the end of the shaft 2 by means of a set screw 4. This dial is provided with the usual knurled head or knob 5 and the usual indicia (not shown) upon its beveled peripheral face 6, the setting of the instrument being read against a pointer line 7 on the panel. The construction described above is the usual and ordinary construction found in radio receiving sets, and I shall now proceed to describe the precision adjusting device of the present invention and its use in connection with equipment of this type.

Between the panel and the dial there is interposed an element 8 provided with a longitudinal slot 9 designed to receive the shaft of the instrument. This element is made of any suitable electrically non-conductive ma-

terial, preferably fibre. The element is provided with three radial arms 11 of a length just slightly less than the radius of the dial, and a projection or extension 12 which extends beyond the periphery of the dial. These arms 8 are turned upwardly or outwardly as clearly shown in Fig. 2 and make frictional contact with the under face of the dial. The pressure of these arms against the dial can be regulated by varying the amount which they turn upwardly and also by setting the dial nearer to or farther from the panel.

Adjacent the outer end of extension 12, a pin 13 is mounted upon the panel. This pin is provided with a threaded aperture through which extends a screw 14 designed to impart a slow rotative movement to the friction element 8. One end of this screw is provided with a ball 15 which fits within a socket 16 on the upper end of a pin 17, mounted upon the outer end of the extension 12. The other end of the screw is provided with a head 18, polygonal in shape, the apices of which, when read in conjunction with a line 19 on the panel, indicate the degrees of rotation of the screw.

To mount the precision adjusting device of the present invention upon a panel board of the ordinary radio receiving set is a simple matter. The dial of the instrument to be set is first removed and the friction element 8 slipped over the shaft thereof. A hole is then drilled in the panel and the pin 13 fixed in position. The arms 11 are bent upwardly and outwardly a slight degree and the dial then replaced and fixed upon the shaft in such a position that the instrument can be turned by hand without great difficulty although the frictional engagement of the dial with the friction element 8 should be reasonably stiff. This frictional engagement should, of course, be sufficient so that when the screw 14 is turned for precision adjustment, the dial will be moved, the friction engagement of the arms 11 with the dial thus being sufficient to overcome any stiffness in the instrument mounting itself.

The operation of the device, although probably clear from the foregoing description may be briefly reviewed as follows:—

The approximate setting is made with the fingers in the usual way and the fine adjustment by turning the screw 14 with the thumb or fingers through the head 18. If the pin 17 is fixed upon the panel so that the movement of the screw is in a straight line, it is necessary to provide freedom for the element 8 to slide slightly relative to the shaft 2, as well as rotating about it. The slot 9 is, therefore, provided. This same result could, of course, be attained by permitting the pin 13 to have a slight rotative movement. The delicacy of the adjustment depends upon the length of the extension 12 and the pitch of the screw 14, and these can, of course, be varied to suit the requirements. So far as the former is concerned, I have found that for radio work, the general proportions illustrated in the drawings are satisfactory and I have used a screw having such a pitch that the head 18 would make about six hundred (600) complete revolutions for one complete revolution of the dial 3. This device not only gives a very delicate precision adjustment which enables the operator to make microscopic variations in the dial settings, but maintains those settings constant when once they are made. When used in radio reception, it is advantageous to have the friction element 8 of electrically, non-conductive material so that the disturbing effects of body capacity are minimized.

I claim:

1. The combination with a precision instrument having a dial for approximate adjustments and a fixed panel between the instrument and the dial, of a device for making precision adjustments, comprising a single element interposed between the panel and the dial, making frictional engagement with the dial and extending beyond the periphery of the dial, and a screw mounted upon the panel and operatively connected with the extension of the friction member to impart a slow rotative movement thereto.

2. A device for making precision adjustments of an instrument provided with a dial for approximate adjustments and having a fixed panel between the instrument and the dial, comprising the combination of an element interposed between the dial and the panel and making frictional engagement with the dial, a projection on the friction element extending beyond the periphery of the dial, a pin on the panel adjacent the projection on the friction element, a screw threadedly mounted on said pin, and an operative connection between the screw and the projection on the friction element whereby as the screw is turned a slow rotative movement is imparted to the friction element and the dial.

3. A device for making precision adjustments of an instrument provided with a dial for approximate adjustments and having a fixed panel between the instrument and the dial, comprising the combination of an element interposed between the dial and the panel and making frictional engagement with the dial, a projection on the friction element extending beyond the periphery of the dial, a pin on the panel adjacent the projection on the friction element, a screw threadedly mounted on said pin, a head on the end of the screw provided with means for indicating its degree of rotation, and an operative connection between the screw and the projection on the friction element whereby as the screw is turned a slow rota-

tive movement is imparted to the friction element and the dial.

4. A device for making precision adjustments of an instrument provided with a dial for approximate adjustments and having a fixed panel between the instrument and the dial, comprising the combination of an element interposed between the dial and the panel and making frictional engagement with the dial, a projection on the friction element extending beyond the periphery of the dial, a pin on the panel adjacent the projection on the friction element, a screw threadedly mounted on said pin, a ball and socket connection between the screw and the projection on the friction element whereby as the screw is turned a slow rotative movement is imparted to the friction element and the dial.

5. A device for making precision adjustments of an instrument provided with a dial for approximate adjustments and having a fixed panel between the instrument and the dial through which the shaft of the instrument passes, comprising the combination of an element interposed between the dial and the panel, having a longitudinal slot designed to receive the shaft of the instrument and having outwardly bent arms making frictional contact with the dial, a projection on the friction element extending beyond the periphery of the dial, a pin on the panel adjacent the projection on the friction element, a screw threadedly mounted on said pin, and an operative connection between the screw and the projection on the friction element whereby as the screw is turned a slow rotative movement is imparted to the friction element and the dial.

In testimony whereof I affix my signature.

EDWARD K. CURTIS.