July 13, 1948. F. H. DRAKE 2,445,211

RADIO TUNING MECHANISM

Filed Jan. 4, 1946

Fig. 1.

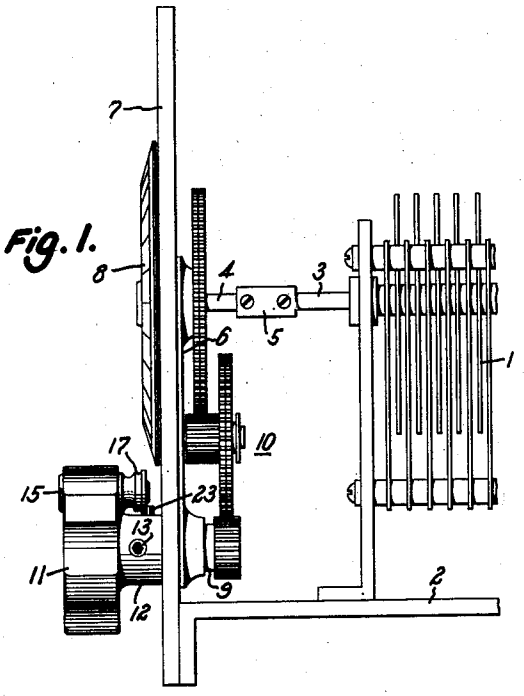


Fig. 2.

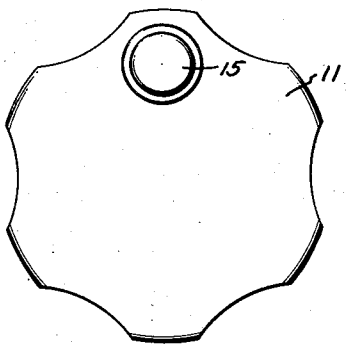


Fig. 3.

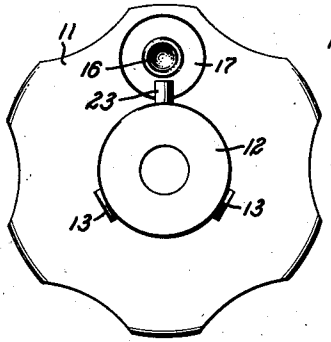


Fig. 4.

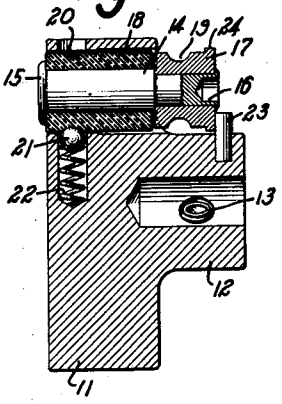
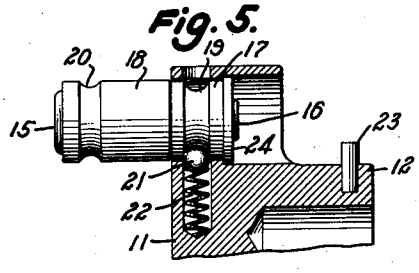


Fig. 5.



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UNITED STATES PATENT OFFICE

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RADIO TUNING MECHANISM

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Application January 4, 1946, Serial No. 639,129

5 Claims. (Cl. 74—553)

1

This invention relates to radio tuning mechanisms and more particularly to knobs which are secured to shafts for manual rotaton to alter the effective impedance of an adjustable tuning element.

Various arrangements have been proposed to obtain a rapid, coarse adjustment of tuning of a radio receiver or transmitter or, alternatively, a slow "vernier" adjustment of the tuning. An exceedingly fine adjustment of the tuning may be, and usually is, effected by introducing a reduction gear train between the manually adjusted shaft and the shaft of the condenser or other tuning element. Such arrangements are quite satisfactory when only small changes are to be made in the tuning of a circuit, but they are open to the objection that considerable time is lost in tuning from one region to another of a wide range receiver or transmitter. A great number of rotations of the tuning knob are required in view of the reduction gear train, and the resultant slow adjustment of the circuit tuning is particularly objectionable in the case of radio receivers on military aircraft. Mechanisms for altering the transmission ratio of the gear train have been proposed but these gear-shift arrangements have been relatively expensive and not entirely satisfactory in operation.

According to the present invention, the manually adjustable tuning knob is provided with a disappearing handle or crank arm which is retained in retracted position for fine tuning and which may be extended to permit high speed operation of the tuning knob in shifting from one region to another of the tuning range of the apparatus.

An object of the invention is to provide a tuning knob assembly which may be manually rotated at low speed or alternatively at high speed. An object is to provide a radio tuning knob having a handle or crank arm which may be telescoped into the knob or, when desired, may be extended into operating position.

These and other objects and the advantages of the invention will be apparent from the following specification when taken with the accompanying drawing in which:

Fig. 1 is a fragmentary side elevation of a tuning system embodying the invention;

Figs. 2 and 3 are front and rear elevations respectively, and on a somewhat larger scale, of the manually operated knob;

Fig. 4 is a view of the novel tuning assembly as seen in axial section; and

Fig. 5 is a similar and fragmentary sectional

2

view showing the knob with the crank arm in extended position.

In the drawing, the reference numeral 1 identifies a variable condenser mounted on a chassis 2 and having a shaft 3 in axial alinement with a tuning shaft 4 and secured thereto by a coupling 5. The tuning shaft 4 is mounted in a plate 6 and extends through the same and through the front panel 7 of the apparatus. An indicating dial 8 on shaft 4 cooperates with a fiducial mark or pointer, not shown, which is engraved in or carried by the panel. The shaft 4 is driven by a shaft 9 and gear train 10 which are also mounted on the plate 6, the shaft 9 extending through the panel to receive a knob 11.

The elements so far described are typical of the known constructions for obtaining a fine or so-called vernier adjustment of a tuning element of radio, television or other electronic apparatus. The sensitivity of the adjustment increases with an increase in the step-down transmission ratio of the gear train 10 but, unfortunately, any increase in the sensitivity of adjustment adds to the delay incident to a manual operation of the knob 11 through many complete revolutions when the apparatus is to be tuned from one region to another of the tuning range. One suggested compromise between the contradictory design requirements for fine adjustments of the tuning element and for a rapid change from one region to another of the tuning range has been to employ a knob of relatively large size on the shaft 9 and a gear train 10 having a relatively low step-down ratio.

According to this invention, the gear train 10 may have a relatively high step-down ratio and the manually operated knob may be of any desired diameter but, preferably, of relatively small diameter, for example of the order of 1¼ inches. The knob 11 has a rear sleeve 12 in which set screws 13 are threaded for securing the knob to the gear train shaft 9, and the periphery of the knob may have any desired milled or scalloped form for precluding slipping when the knob is grasped in the usual manner to effect a fine or slow-motion adjustment of the variable impedance 1.

A handle or crank is telescoped within the knob 11, the handle being slidably mounted in a socket or cylindrical passage which is parallel to and radially spaced from the axis of the knob. The crank comprises a pin 14 having an enlarged head 15 at its forward end, a reduced diameter inner section 16 upon which a bushing 17 is secured by upsetting the end of the pin over the

rear face of the bushing, and a sleeve 18 which is rotatable upon the pin 14. The bushing 17 has a circumferential groove 19 and the sleeve 18 has a similar circumferential groove 20 for cooperation with a ball 21 and spring 22 which are located in a radial bore in the knob 11 to provide an impositive lock for yieldably retaining the handle or crank in extended position as shown in Fig. 5 or in retracted position as shown in Fig. 4. A stop pin 23 is driven into or otherwise secured in the sleeve section 12 of the knob to limit the inner movement of the handle, thereby to space the inner end of the bushing 17 from the front face of the panel 7 (see Fig. 1) to enable the operator to extend the handle by inserting the tip of a finger between the panel 7 and the bushing 17. The forward end of the handle is substantially flush with the front face of the knob 11 when the handle is retracted, thereby eliminating the possibility of a mistuning by accidentally striking the handle.

The handle is assembled on the knob 11 by first inserting the handle assembly from the inner face of the knob, placing the spring 22 and ball 21 in the radial bore, moving the handle assembly forward to retain the ball and spring in their bore, and then inserting the stop pin 23. The inadvertent separation of the handle assembly from the knob is prevented by the stop pin 23 and by a flange 24 at the inner end of the bushing 17 which seats against an inner shoulder of the socket when the handle assembly is displaced forwardly into operative position.

The method of operation of the new knob will be apparent from the above description of the construction. The handle is pressed inwardly into retracted position when the effective value of the variable impedance 1 is to be varied by small increments, and the handle is moved outwardly to serve as a crank arm for the rapid rotation of the knob 11 when the effective value of the impedance 1 is to be adjusted to another region of its range of values.

While the illustrated construction is the presently preferred embodiment of the invention, it will be apparent that various changes may be made in the design and construction of the telescoping crank assembly of the knob without departure from the spirit and scope of the invention as set forth in the following claims.

I claim:

1. A manually adjustable knob assembly for attachment to a rotatable shaft, said knob assembly comprising a knob and an attached sleeve carrying means for securing the knob to a shaft, said knob having a cylindrical passage therethrough parallel to and radially spaced from the axis of the knob, a handle assembly slidably mounted in said passage, and impositive locking means for yieldingly retaining said handle assembly in retracted position with its forward end substantially flush with the front face of said knob or alternatively in extended position projecting forwardly from the front face of said knob.

2. A manually adjustable knob assembly as recited in claim 1, in combination with means preventing removal of said handle assembly from said knob, said means including a radially extending shoulder within said passage, and a radial flange at the rear of said handle assembly for seating against said shoulder.

3. A manually adjustable knob assembly as recited in claim 1, wherein said handle assembly comprises a pin having a sleeve rotatably mounted thereon.

4. A manually adjustable knob assembly as recited in claim 1, wherein said knob is provided with a radial bore extending inwardly from the outer edge of the knob to cross and extend beyond said passage, and said impositive locking means comprises a spring-pressed ball within the inner end of said bore and cooperating grooves in said handle assembly.

5. A manually adjustable knob as recited in claim 1, in combination with stop means on and spaced forwardly of the rear end of the attached sleeve to limit rearward movement of said telescoped handle assembly.

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