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TUNING MECHANISM FOR WIRELESS SETS

Filed July 12, 1944

2 Sheets-Sheet 1

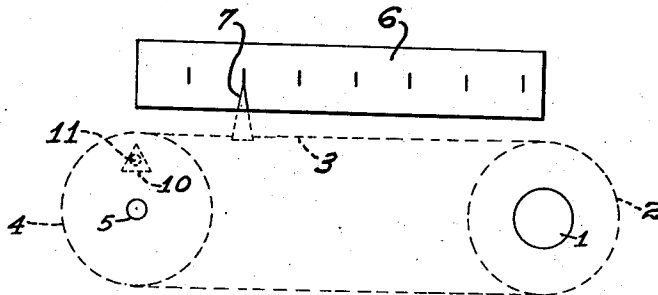


Fig. 1

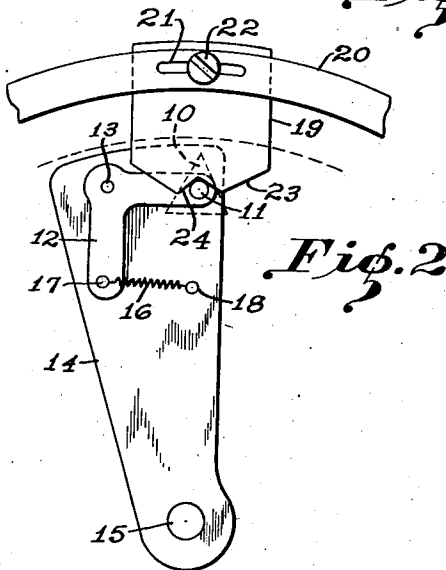


Fig. 2

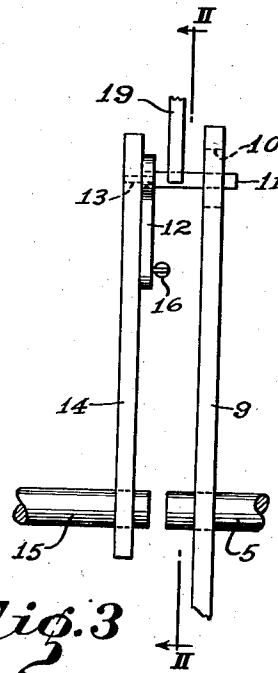


Fig. 3

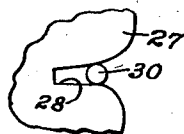


Fig. 5.

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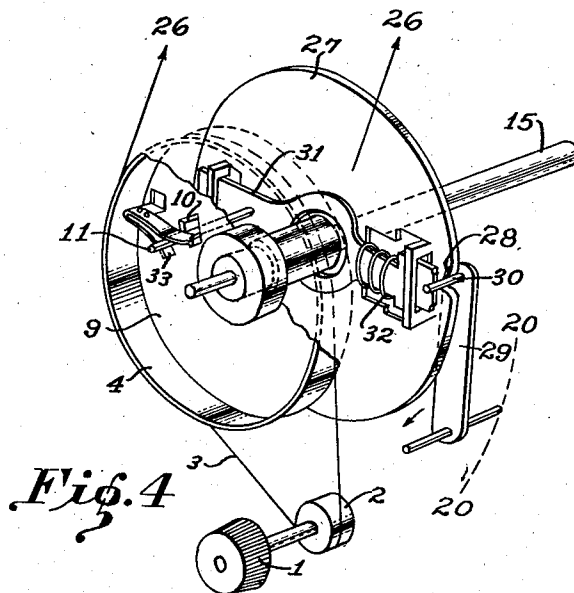
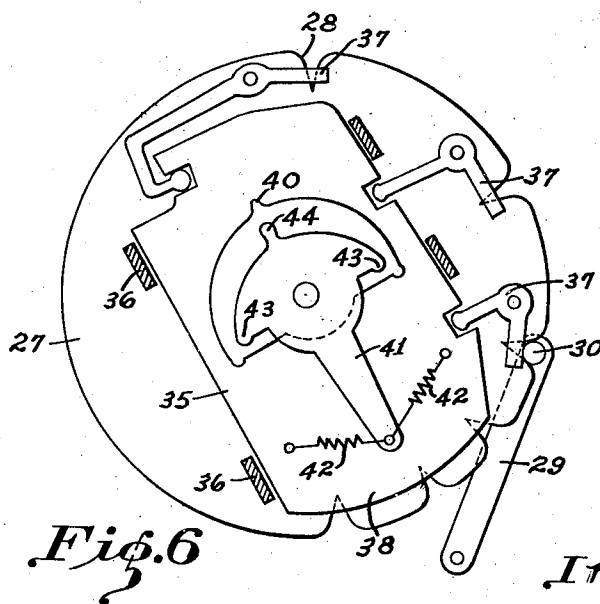
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TUNING MECHANISM FOR WIRELESS SETS

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2 Sheets-Sheet 2



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TUNING MECHANISM FOR WIRELESS SETS

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7 Claims. (Cl. 74—10)

In wireless sets it is sometimes desirable to be able to set the tuning member (condenser or inductance) rapidly to a predetermined position so as to tune to the corresponding wavelength without the exercise of care and attention. When tuning is effected by rotation of a shaft which, for example carries the moving vanes of a variable condenser, this result can be achieved by a so-called click system in which by spring action a lever on one component is urged into engagement with a notch-like recess in another component, one component being stationary while the other is fixed to and rotates with the shaft. For accurate tuning it is necessary for the lever to seat in a predetermined position in engagement with both walls of the recess.

Due to considerations of convenience in tuning, appearance of the cabinet housing the wireless set, and the circuit design determining the location of the components within the set, the tuning knob or member which has to be operated to tune the set is usually not in alignment with the shaft to be rotated to effect the tuning, and the tuning indicator or wavelength scale may also be remote from both tuning knob and the said shaft. A driving connection such as a cord system has therefore to be provided between the tuning knob and the shaft and perhaps between the latter and the indicator. This adds to the weight of the parts to be moved and the frictional resistance to be overcome during the tuning operation. As a result it is difficult to ensure that proper engagement is obtained in a click system, as the spring effecting the click engagement cannot conveniently be made powerful enough.

The object of the present invention is to ensure that proper click engagement is obtained irrespective of the relative positions of the components. According to the present invention and with this object in view the driving connection between the tuning knob and the tuning shaft which normally is arranged to be substantially without play is modified when a click lever encounters a click notch and as a result of this modification a limited amount of play is introduced into the driving connection to enable the click spring to move the click lever into full engagement with the click notch and thereby to bring the shaft into the predetermined tuned position without having at the same time to impart a corresponding movement to the tuning knob through the driving connection. In other

words, during the click action and in order to enable it to be completed provision is made for temporarily releasing the tuning shaft from its normal driving connection.

This result can be achieved in various ways and various mechanisms suitable for the purpose will be hereinafter described with reference to the accompanying drawings, by way of example.

In the drawings:

Fig. 1 is a diagrammatic representation of a typical tuning arrangement to which the present invention is directed;

Fig. 2 is a fragmentary face view (substantially along the line II—II of Fig. 3) of a mechanism according to the invention for incorporation in a tuning arrangement according to Fig. 1;

Fig. 3 is a side view corresponding to Fig. 2;

Fig. 4 is a semi-diagrammatic representation of another tuning mechanism according to the invention;

Fig. 5 is a fragmentary view showing a detail of Fig. 4 on an enlarged scale;

Fig. 6 is a semi-diagrammatic representation of a third tuning mechanism according to the invention.

Referring first to Fig. 1, the tuning knob 1 is connected to a pulley or drum 2 within the casing of the set. From the pulley 2, a driving belt or cord 3 extends round a further pulley or drum 4 whereby the drive is imparted to a shaft 5, and thence, for example to the movable vanes of a tuning condenser. The cord 3 carries a tuning indicator 7 which is caused to move over the tuning scale 6. The elements 10, 11 indicated in Fig. 1 form part of the mechanism which will now be described more fully with reference to Figs. 2 and 3; the indication in Fig. 1 serves to show how the mechanism of Figs. 2 and 3 is incorporated in an arrangement according to Fig. 1.

In Figs. 2 and 3, the shaft 5 is assumed to be operated by an arrangement as described above with reference to Fig. 1. This shaft 5 carries an arm or disc 9, which in practice may be constituted by the pulley 4 (Fig. 1). Provided in the disc 9 is an aperture 10 which as shown is of triangular form, the triangle being symmetrical about a radial line through the shaft 5 and the width of the aperture increasing with decreasing radial distance. The shaft 5 is coaxial with a shaft 15 constituting the actual tuning shaft, said shaft 5 thereby serving as a driving shaft for the driven shaft 15. Secured to the shaft 15 is an arm 14. Pivoted on a pin 13 on the arm 14 near its outer extremity is a bell crank lever 12 car-

rying a pin 11 which projects parallel to the shaft 15 and extends into the aperture 10 in the disc 9. A spring 16 anchored to a post 18 on the arm 14 and to a post 17 on the lever 12 tends to rock the lever 12 so as to urge the pin 11 away from the shaft 15, i. e. into the narrow outer portion of the aperture 10. Thus in the absence of further constraint, the pin 11 is caused to engage in this narrow portion where it is in contact with both walls of the aperture, so that the arm 14 is entrained by the disc 9 in either sense of rotation and the shaft 15 rotates with the shaft 5.

The click device for locating the shaft 15 in a predetermined setting consists of a click plate 19 which can be secured in adjusted position on a supporting rail 20 by means of a bolt 22 passing through a slot 21 in the plate 19. The pin 11 in this construction is utilised as the click pin and the spring 16 as the click spring. The inner face of the plate 19 has a click notch 24 adapted to receive the pin 11 and thereby to locate the shaft 15. On either side of the notch 24 the plate 19 exhibits cam surfaces 23, which as the arm 14 approaches the click position depress the pin 11 and rock the lever 12 against the action of the spring 16. The pin 11 is thus moved into the wider part of the aperture 10 and is driven by the engagement of one side of the aperture 10. As soon as the pin 11 passes over the end of the cam surface 23 and begins to enter the notch 24, the spring 16 can cause the pin 11 to seat fully in the notch without any further movement of the shaft 15. The spring 16 has merely to rotate the shaft 15, which can be journalled with very small resistance to movement. In the fully engaged click position there is play between the walls of the aperture 10 and the pin 11. On rotation of the shaft for re-tuning, the play in the driving sense is taken up, the pin 11 is urged out of the recess 24 and after leaving the cam surface 23 the pin re-assumes a position in the apex of the aperture 10 where it is in contact with both walls and the play is eliminated.

Although only one click member 19 is shown in Fig. 2, a plurality of click members will in practice be provided such additional click members being distributed about the axis of the tuning shaft in accordance with the desired predetermined settings of the tuning shaft.

In the arrangement which will now be described with reference to Figs. 4 and 5, those parts which correspond with elements already described with reference to Figs. 1 to 3 are indicated by the same numerals as in those figures. The tuning knob 1 is connected with a drum 2 from which the drive is transmitted to a drum 4 by means of a cord 3. The drive is further transmitted to a separate tuning indicator (not shown) by a connection indicated by arrows 26. Mounted with the drum 4 is a plate 9 with an aperture 10 in which engages a pin 11 whereby the rotation is transmitted to the tuning shaft 15.

Secured to the shaft 15 is a disc 27 provided in its periphery with a single notch or recess 28. As best seen from Fig. 5, the recess comprises an inner substantially parallel walled section and an outer section which diverges and merges in a smooth curve into the circular periphery. Pivotaly mounted on a circular support 20 are levers carrying stop pins and spring urged towards the disc 27. One such lever 29 and its stop pin 30 are shown in Fig. 4. A spring (not shown) urges it in the direction indicated by the arrow, so that

when the notch 28 is opposite the pin 30 the spring urges the pin into the notch, thereby holding the disc 27 and with it the shaft 15 in a predetermined position.

Slidably mounted on the disc 27 is a plate 31 to which the pin 11 is secured. This plate 31 extends diametrically across the disc 27 and is urged by a spring 32 into a rest position in which one end of the plate 31 is adjacent the open end of the slot 28. In this rest position the pin 11 lies at the inner apex of the diamond-shaped aperture 10, so that the pin follows the rotary movement of the plate 9 in both senses of rotation. When, however, a click pin 30 encounters the end of the plate 31, it displaces the latter against the action of the spring 32 thereby moving the pin 11 into the wide part of the aperture 10, so that the disc 27 can be rotated by the action of the pin 30 on the entrance throat to the slot 28. When the slot 28 is fully in alignment, the pin 30 can enter the substantially parallel sided inner portion of the slot, thereby giving precise location of the disc 27. The pin 11 in this movement is shifted towards the outer apex of the aperture 10. Consequently, when the drum 4 is rotated for re-tuning, one of the inclined walls of the aperture 10 adjacent its outer apex encounters the pin 11 and by a cam-like action displaces it inwardly thereby moving the click pin 30 out into the throat portion of the slot 28. The pin 30 can then ride back on to the periphery of the disc 27 and the latter is free to participate in the rotation. The pin 11 re-enters the inner apex of the aperture 10 and the positive driving connection is restored. To facilitate the re-centering of the pin 11 in the aperture 10, two blade springs 33 anchored to the discs are provided which embrace the pin 11.

In the arrangement as shown in Figs. 4 and 5, the click mechanism can readily be disabled and simple tuning resorted to by the provision of means acting on all the levers 29 to hold them in such a position that the pins 30 are raised clear of the disc 27.

In the modification shown in Fig. 6, a single lever 29 is provided, but the disc 27 is provided with a plurality of slots 28 distributed through the range of rotation at intervals (not necessarily equal), so that by engagement of the pin 30 in any one of the slots 28 the disc 27 can be located in any one of a corresponding number of predetermined positions. Slidably on the disc 27 in guides 36 is a plate 35 which is loaded by springs 42 which tend to maintain it in a position in which all the slots 28 are masked either by the plate itself, as by the masking edge 38, or by levers 37 coupled with the plate 35. The arrangement is such that when the pin 30 engages the edge 38 or a lever 37 at a recess 28, the spring loading on the pin 30 overcomes the springs 42 and displaces the plate 35 into the position shown, so that the pin 30 can enter and seat against both faces of the recess. The drive is transmitted by way of a cam-like member 42 which is mounted on the driven shaft 5 and corresponds to the discs 9 of the embodiments described with reference to Figs. 2 to 5. The substantially semi-circular driving end of the cam member 41 is received by a corresponding aperture in the plate 35. The driving end of the cam 41 has a central projection or pip 44 which in the normal position of the plate 35 registers with an indent 40 and is held in engagement therewith by the springs 42, thereby providing a positive drive to the tuning shaft. In the dis-

placed position of the plate 35 as shown, the positive connection between cam member 41 and plate 35 is released so that the disc 27 can perform a limited rotary movement relative to the driving arrangement. When however the cam member 41 is driven for re-tuning, one of the shoulders 43 thereon encounters the base of the opening in the plate 35 and displaces the latter against the action of the spring-loaded click lever 29 whereby the latter is moved out of the slot 28 in which it was engaged. Thereupon the springs 42 re-centre the plate 35 in relation to the cam member 41 so that the pin 44 re-enters the indent 40 and the positive drive is restored.

To render inoperative the positive stop or click mechanism of Fig. 6, it is merely necessary to rock the single click lever 29 out of engagement with the disc 27. In this embodiment, as in that of Figs. 4 and 5, the operation of the stop mechanism can be controlled either by a separate knob or by an in-and-out movement of the tuning knob.

I claim:

1. An apparatus for adjusting a tuning shaft to a predetermined position, comprising a driving element, a driven element coupled to said shaft, an eccentric coupled to one of said elements and engaging an aperture in the other of said elements to thereby couple said driving element to said shaft, said aperture having an apex portion and diverging wall portions, means to normally position said eccentric in engagement with the apex portion of said aperture, and means operative at positions of said shaft approximating the said predetermined position to position said eccentric between said diverging wall portions of said aperture to thereby permit limited rotational movement of said eccentric within said aperture and to independently rotate said driven element within the limits of said limited rotational movement to thereby rotate said shaft to the predetermined position without simultaneously rotating said driving element.

2. An apparatus for adjusting a tuning shaft to a predetermined position, comprising a plate-shaped driving element rotatable about an axis coextensive with the axis of said shaft and having an aperture therein, said aperture being positioned about a radial line extending from the center of rotation of said driving element and having its width increasing with decreasing radial distance from the axis of rotation of the driving element, a driven element rigidly secured to said shaft, an eccentric pin member coupled to said driven element and extending into said aperture to thereby couple said driving element to said shaft, spring means to normally urge said pin outwardly into engagement with the narrow portion of said aperture, and a plate member arranged radially about the axis of said shaft in a predetermined position with respect to said axis, said plate member having two-spaced cam surfaces for engaging said pin at positions of said shaft approximating the said predetermined position and for inwardly deflecting said pin to thereby locate said pin in a wider portion of said aperture and permit limited rotational movement of said pin about the axis of said shaft within said aperture, and having a cam surface intermediate said spaced cam surfaces for engaging said pin and rotating said driven element within the limits of said limited rotational movement to thereby rotate said shaft without simultaneously rotating said driving element.

3. An apparatus for adjusting a tuning shaft

to a predetermined position, comprising a plate-shaped driving element rotatable about an axis coextensive with the axis of said shaft and having a triangular aperture therein, said aperture being positioned about a radial line extending from the center of rotation of said driving element and having its width increasing with decreasing radial distance from the axis of rotation of the driving element, a driven element rigidly secured to said shaft, an eccentric pin member coupled to said driven element and extending into said aperture to thereby couple said driving element to said shaft, spring means to normally urge said pin outwardly into engagement with the narrow portion of said aperture, and a plate member arranged radially about the axis of said shaft in a predetermined position with respect to said axis, said plate member having a W-shaped cam surface the arms of which engage said pin at positions of the shaft approximating the said predetermined position and inwardly deflect said pin against the action of said spring means to thereby locate said pin in a wider portion of said aperture and permit limited rotational movement of said pin about the axis of said shaft within said aperture, and the A-shaped portion of which engages said pin at positions of the shaft intermediate said approximate positions to rotate said driven element within the limits of said limited rotational movement and thereby rotate said shaft to the predetermined position without simultaneously rotating said driving element.

4. An apparatus for adjusting a tuning shaft to a predetermined position, comprising a plate-shaped driving element rotatable about an axis coextensive with the axis of said shaft and having an aperture therein, said aperture being arranged about a radial line extending from the axis of said driving element and having an apex portion, wall portions diverging from said apex portion with increasing radial distance from the axis of said driving element and wall portions converging from said diverging wall portion with increasing radial distance from the axis of said driving element, a disc-shaped member rigidly secured to said shaft and having a peripheral notch, a second member mounted on said disc member and displaceable along a diameter of the said disc member and having an end portion positionable over said notch in the displaced position of the said second member, an eccentric pin member mounted on said second member and extending into said aperture to thereby couple said driving element to said shaft, spring means for displacing said second member to thereby position the end of the said second member over the notch and to position said pin at the apex portion of said aperture, a pin element engaging said second member at positions of the shaft approximating the said predetermined position for displacing said second member against the action of said spring means to thereby locate the eccentric pin member between said converging wall portions of said aperture and permit limited rotational movement of the eccentric pin member within said aperture, said second pin member engaging said notch and rotating said disc-member independently of said driving element within the limits of said limited rotational movement to rotate said shaft to the predetermined position without simultaneously rotating said driving element.

5. An apparatus for adjusting a tuning shaft to a predetermined position, comprising a disc-

shaped driving element rotatable about its center coincident with the axis of the shaft and having an aperture therein, said aperture being arranged about a radial line and having an apex portion, wall portions diverging from the apex portion with increasing radial distances from the center of the disc and wall portions converging from the said diverging wall portions with increasing radial distances from the center of the disc, a disc-shaped member having a peripheral notch rigidly secured to said shaft and positioned adjacent to said first disc member, a plate member mounted on said second disc member between said disc members and movable along the diameter of said second disc member, an eccentric pin member mounted on said plate member and extending into said aperture, spring means to urge said plate member towards one end position thereof to thereby position the end of said plate member over the notch and said pin member in the apex of said aperture, a pin element engaging said plate member at positions of the shaft approximating the said predetermined position for displacing said plate member against the action of said spring means to thereby locate said first pin member between said converging wall portions of said aperture and permit limited rotational movement of said disc members relative to each other, said second pin member engaging said notch at positions of the shaft approximating the predetermined position and rotating said second disc member within the limits of said limited rotational movement to rotate said shaft to the predetermined position without simultaneously rotating said driving element.

6. An apparatus for adjusting a tuning shaft to a predetermined position, comprising a driving member having its axis of rotation coincident with the axis of the shaft, a disc-shaped driven member rigidly secured to said shaft and having a notch at a predetermined location in its periphery, means to mask said notch comprising a plate member mounted on said disc member, said plate member being displaceable along the diameter of the said disc member and being provided with an aperture having an apex portion and wall portions diverging from said apex with decreasing radial distance from the axis of the disc, a cam member secured to said driving member and engaging said aperture, said cam member having an apex portion and diverging wall portions, a spring member for urging said plate member toward one end position thereof along the diameter of said disc to position the apex of the cam member in the apex of the aperture and to mask

said notch, a pin member engaging the periphery of said disc, said pin member engaging said masking means at angular positions of the disc approximating the said predetermined position of said shaft and displacing said plate member against the action of said spring member to thereby disengage the apex of said cam member from the apex of said aperture and permit limited rotational movement of said disc member relative to said driving member, said pin member further engaging said notch to rotate said disc within the limits of said limited rotational movement to thereby rotate said shaft to the predetermined position independently of the driving means.

7. An apparatus for selectively adjusting a tuning shaft to predetermined positions, comprising a driving member having its axis of rotation coincident with the axis of the shaft, a disc-shaped driven member secured to said shaft and having a plurality of notches at predetermined portions of its periphery corresponding to the said predetermined positions of the shaft, a plate member mounted on said disc, said plate member being displaceable along the diameter of said disc and being provided with an aperture having an apex portion and wall portions diverging from said apex with decreasing radial distance from the axis of the disc, lever members mounted and pivoted on said disc and engaging said plate member, said plate member and said lever members having portions thereof positionable over said notches to thereby mask said notches at one end position of the plate member, a cam member secured to said driving member and engaging said aperture and having an apex portion and diverging wall portions, a spring member for urging said plate member to the said one end position thereof to position the apex of the cam member in the apex of the aperture and the plate member and the lever members over said notches, a pin member engaging the periphery of the disc, said pin member selectively engaging said masking means at angular positions of the disc approximating a selected predetermined position of the shaft and displacing said plate member to thereby disengage the apex of the cam member from the apex of said aperture and permit limited rotational movement of said disc member relative to the driving member, said pin member further engaging the unmasked notch to rotate said disc within the limits of said limited rotational movement to thereby rotate said shaft to the selected predetermined position independently of the driving means.

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