

June 12, 1951

E. A. HALLSTRAND ET AL

2,556,875

TUNING DEVICE FOR RADIO RECEIVERS

Filed Jan. 16, 1947

2 Sheets-Sheet 1

Fig. 1.

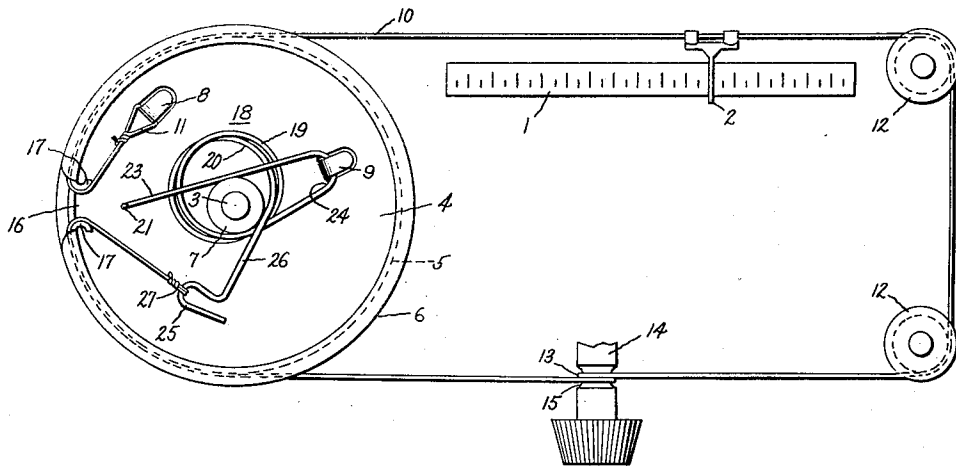


Fig. 2.

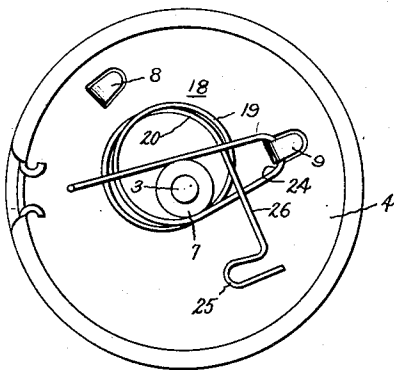


Fig. 3.

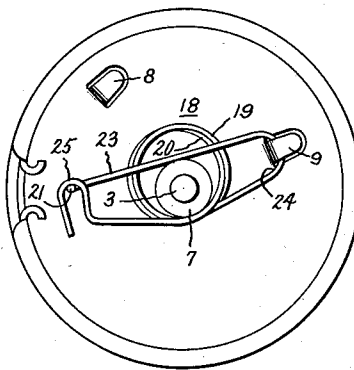
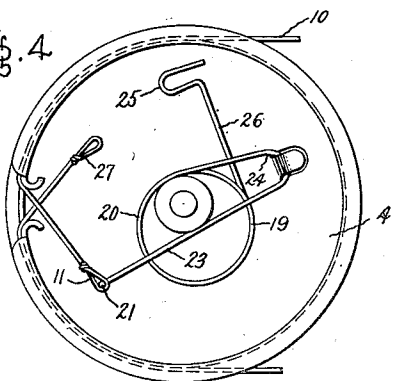


Fig. 4.



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Fig. 5.

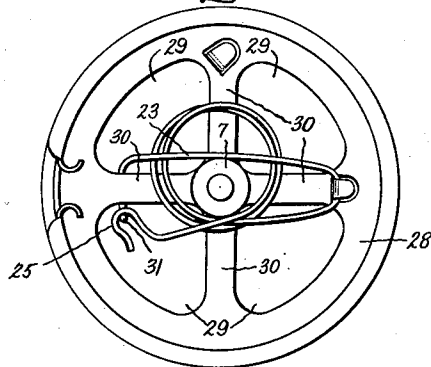


Fig. 6.

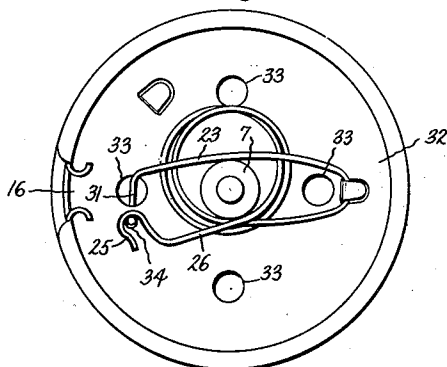
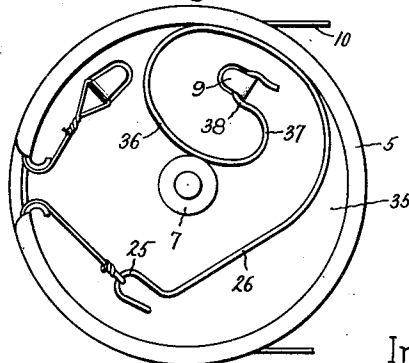


Fig. 7.



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UNITED STATES PATENT OFFICE

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TUNING DEVICE FOR RADIO RECEIVERS

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Application January 16, 1947, Serial No. 722,350

6 Claims. (Cl. 116—124.1)

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Our invention relates to radio receivers of the type in which a scale and marker are provided, the marker being moved by the movable element used to tune the receiver. It is a primary object of our invention to effect certain improvements in the tuning device for such receivers.

It is customary in radio receivers to provide a tuning indicating system which usually consists of a marker movable rectilinearly in unison with the rotary movement of a shaft used for effecting tuning of the receiver circuits. A cord attached to the marker has several turns wrapped around the shaft and one end affixed to a rotatably mounted drum. The other end of the cord is attached to a different point on the drum through a helical spring which provides tension in the cord. Certain difficulties have been encountered in the past due to changes in the length of the cord caused by stretching of the cord or moisture absorption. In addition, difficulty has been encountered in preventing slippage between the shaft of the tunable element and the cord wrapped therearound.

It is an object of our invention to provide a new and improved type of spring for tuning mechanisms of this type in which a substantially uniform tension is provided over a wide change of length of the indicator cord.

It is still another object of our invention to provide a new and improved tension spring for a radio tuning and indicating mechanism which may be easily and cheaply manufactured and which reduces the time required for assembly in the manufacture of a radio receiver.

The features of our invention which we believe to be novel are set forth with particularity in the appended claims. Our invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing in which Figs. 1-3 are elevation views illustrating one form of our invention in assembled and unassembled condition, and Figs. 4-7 illustrate modifications of the spring construction of Fig. 1.

Referring to Fig. 1, there are shown the essential elements of a dial cord arrangement of a radio receiver. In such a receiver, it is customary to employ a scale 1 which indicates either frequency or wavelength of the station to which the receiver circuits are tuned and a cooperating marker or indicator 2 which it is desired to move simultaneously with the tuning of the receiver circuits to indicate the frequency or wavelength

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to which these circuits are tuned. The usual superheterodyne receiver employs a plurality of condensers (not shown) which usually consist of fixed or stator plates and movable or rotor plates, all of which may be mounted on a shaft 3. Likewise mounted on the shaft 3 is a drum or pulley 4 having a recess 5 in its circumferential surface. The recess 5 may be formed, for example, by flange 6 which is attached to the drum 4 near its periphery. The drum 4 is provided with a centrally positioned hub 7 which surrounds the shaft 3 and which, according to our invention, is utilized in a manner to be pointed out later.

The drum is likewise provided with a pair of tabs 8, 9 which may be formed by incomplete punchings of the web of the drum 4. A cord 10, which is attached to the indicator 2 has one end formed into a loop 11 which is slipped over the tab 8. The cord 10, after attachment to the indicator 2, is passed around one or more idler pulleys 12 and then formed usually as one and one-half turns 13 around a shaft 14 which is provided for operating the tuning mechanism of the receiver. The shaft 14 may be provided, if desired, with a recessed portion 15 to accommodate the turns of the cord 10 and prevent them from moving longitudinally of the shaft 14. The cord 10 is then returned to the drum 4 and passes through an opening 16 provided in the flange 6. To prevent cutting of the cord, the sides of opening 16 may be provided with rounded surfaces 17. The other end of the cord is attached to a tension spring 18.

The spring 18 may be formed of a spring wire formed of any suitable material, such as steel, the wire preferably being round in cross-section. The spring 18, as illustrated, comprises a flat coil spring of two turns 19, 20 having a diameter larger than the diameter of the hub 7, the axis of the coil being substantially perpendicular to the web of drum 4. One end of the spring 18 is formed as a small hook 21 which extends in a direction normal to the web of the drum 4. A straight portion 23 proceeds from the hook end 21 to form a small loop 24 which engages the tab 9 and retains the spring 18 pressed against the web of drum 4. The opposite end of the spring is likewise provided with a larger hook 25 which is attached to a long arm portion 26 connected to the loop 20. The cord 10, at the end opposite the end 11, is provided with a loop 27 which is adapted to be engaged by the hook 25.

It will be noted that the straight portion 23 of the spring engages one surface of the hub 7,

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the opposite surface being engaged by the two loops 19, 20 to prevent movement of the spring 18 longitudinally of shaft 3. The arm 26, on the other hand, is spaced from the hub 7 so that it operates as a long, flat spring attached to a coil spring, the combination producing substantially constant tension for a large movement of the hook end 25.

In Fig. 2, the spring 18 is shown in its unflexed position when the cord 10 is not attached thereto and the coil spring portion is unwound. In this unflexed position, the spring is retained in center position by means of the tab 9 which keeps the loop 24 on one side of the spring close to the web of the pulley 4. In this unflexed position, the tab 9 likewise operates as a stop for the long arm 26.

In Fig. 3, we have shown the spring 18 in fully wound or flexed condition with the large hook 25, at one end of the spring, engaging the small hook 21 at the opposite end. In forming the spring, it is wound and assembled substantially in the condition shown in Fig. 3. Thereafter, the loop formed by the parts 23, 24 is passed under the tab 9 and the turns 19, 20 and part 23 located on opposite sides of hub 7. When it is desired to attach an indicator cord to the tension device, the loop 27 is attached to hook 25 and hook 25 is released from hook 21 to exert full tension on the cord.

It is apparent from a comparison of Figs. 2 and 3 that the hook end 25 moves through a large arc, the total movement of the hook being greater than the radius of the drum 4. It has been found that the tension throughout this arc remains substantially constant. Accordingly, considering again the structure of Fig. 1, it is apparent that the cord 10 may stretch to considerable extent because either of breakdown of the fibers or moisture absorption without any substantial decrease in the tension on the cord. As a result, our improved tension device provides a substantial margin of safety against slipping of the cord on the driving shaft.

In Fig. 4, there is shown a modification of the spring structure of Figs. 1-3. The straight portion 23 of the spring structure lies against the web of the drum and the small hook 21 at the end of the straight portion is directed outwardly from the web of the drum. Thus, the straight portion 23 lies between the web of the drum and the flat coil portion comprising the turns 19, 20. The arm portion 26 thus is the outermost part of the spring assembly and, in the position shown in Fig. 4, there is no initial torsion in the coil portion of the spring. End 11 of the cord 10 is shown as engaging the hook 21 and the other end as being formed in a loop hanging loosely within the drum and which may be engaged by the hook 25 at the end of arm 26. Alternatively, both of the loops at the end of the cord 10 may be slipped on the hook 25 to increase the amount of stretch which is permitted in the cord without reducing the tension furnished by the spring arrangement. One of the advantages of this particular construction is that a straight pull is provided and the cord is not snubbed against the rounded edge of opening 16 so that there is increased tension in the cord. Also both ends of the cord are attached to the tension device so that there is a still greater tension in the cord. This construction greatly facilitates the attaching of the cord to the spring or tension device in those receiver sets where, because of size of the drum 4 or other space factors, the stringing operation is otherwise difficult.

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In Fig. 5, we have shown a modification in which our torsion spring is applied to a drum or pulley having an apertured web. Thus, the pulley 28 is provided with a plurality of apertures 29 formed by four arms 30 which extend outwardly from the hub 7 toward the rim of the pulley. The torsion spring is similar to that shown in Figs. 1-3 with the exception that the straight portion 23 is provided with a hook 31 which is adapted to pass under one of the arms 30 and extend upwardly on the opposite side thereof. At this point, it is engaged by the hook 25.

Still another modification is shown in Fig. 6 which illustrates our torsion spring applied to a different type of pulley 32 having a plurality of holes or apertures 33 in the web thereof. An additional aperture 34 is provided adjacent the aperture 33 closest to the opening 16 in the periphery of the pulley. In this modification, the straight portion 23 has its hooked portion 31 extending into the aperture 33 adjacent the opening 16 and projecting outwardly through the small aperture 34. The end of the hook 31 thus is available for receiving the hook 25 at the end of the long arm 26 to facilitate attachment of a cord to the torsion spring.

In Fig. 7, we have shown still another modification of our torsion spring which is particularly adapted for use on very small pulleys. In Fig. 7, while for illustrative purposes the pulley 35 has been shown as almost the size as shown in the remaining figures, in actual construction the diameter of the pulley 35 is less than one-half that of the pulleys shown in the other figures. In such a small pulley or drum it is not suitable to use a flat coil spring which surrounds the hub 7, for it is difficult to get sufficient length for the long arm 26 which is attached to the coil portion of the spring. Accordingly, the spring in this modification has a flat coil part which is constituted by a single turn 36 which lies between the hub 7 and the flange part 5 of the pulley. One arm 37 extends inwardly from the turn 36 and is provided with a hook 38 which is engaged by the tab 9 formed in the web of the pulley. The long arm 26 extends from the opposite end of the coil 36 and the hook 25 moves through a distance of the order of the radius of the pulley simply through the unwinding action of the coil portion 36.

An important advantage of our improved tension device for radio receiver tuners is that the coil portion of the tension device operates through a long lever arm so that a substantially uniform tension is provided over a wide range of movement of the hook at the end of this lever arm. As a result, a considerable change in the length of the cord for the receiver tuning device is permitted without any substantial reduction in the tension applied to that cord.

Another advantage of our improved tension device is that it greatly facilitates the attaching of the cord to the spring or tension device. The device is so constructed that the cord may be attached to the hook at the end of the long lever arm while this hook is engaged by a retaining means such as the end 21 or 31 at the opposite end of the spring. Thereafter, simply by slipping the hook 25 off of the end 21 or 31, full tension is immediately applied to the cord.

While the invention has been described by reference to a particular embodiment thereof, it will be understood that numerous modifications may be made by those skilled in the art without departing from the invention. We therefore aim in the appended claims to cover all

such equivalent variations as come within the true spirit and scope of our invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. In combination, a pulley having an aperture in the periphery thereof, a cord wound on said pulley and having an end extending through said aperture, means for applying tension to said cord comprising a spring mounted within said pulley and comprising a resilient coil having an axis substantially parallel with the axis of said pulley, and a pair of arms extending from the periphery of said coil, one of said arms being fixed relative to said pulley, said end being connected to the other of said arms, and said other arm being movable for a distance of the order of the radius of said pulley to maintain a substantially constant tension in said cord throughout said distance.

2. In an indicator of the type having a movable marker and a cord attached to said marker for effecting movement thereof, a drive mechanism comprising a shaft having a drum mounted thereon, said drum having a projecting hub extending along said shaft, said cord being wound on said drum and extending through an aperture provided in the periphery thereof, a flat coiled spring mounted within said drum and having one end thereof attached to the web of said drum, said spring surrounding said hub and having an integral arm portion at the other end extending substantially tangentially from the coiled portion thereof, said arm portion being movable over a distance substantially equal to the radius of said drum by winding of said coiled portion around said hub, and said cord being attached to said arm, whereby said cord is placed under tension.

3. In an indicator of the type having a rectilinearly movable marker and a cord attached to said marker for effecting movement thereof, a drive mechanism comprising a shaft, a drum mounted on said shaft having an aperture in the periphery thereof, said drum having a projecting hub extending along said shaft, said cord having one of its ends secured at a substantially fixed position relative to said drum and being wound on said drum, a flat coil spring arranged within said drum, means for maintaining one end of said spring in fixed position relative to said drum, said spring surrounding said hub and having an integral arm portion at the other end extending substantially tangentially to the coil portion thereof, the other end of said cord extending through said aperture and engaging said arm, whereby said cord is placed under tension and movement of said marker may be effected by rotation of said drum.

4. In a cord drive for an indicator, the combination comprising a shaft, a drum mounted on said shaft, said drum having an aperture in the periphery thereof, a cord of said drive being wound on said drum and extending through said aperture, a coil spring surrounding said shaft and having an axis substantially parallel with the axis of said shaft, one end of said spring comprising an arm formed integral with the coil portion thereof and extending outwardly from said portion, said cord being attached to the end of said arm whereby tension is established in said cord by said coil spring.

5. In a cord drive for the tuning indicator of a radio receiver, the combination comprising a shaft, a drum mounted on said shaft, said drum having an aperture in the periphery thereof, a cord wound on said drum and extending through said aperture, and means for establishing tension in said cord comprising a resilient member coiled about said shaft, said member having an arm formed integral therewith, and said cord being attached to said arm, said arm being movable through a distance substantially equal to the radius of said drum through the unwinding action of said resilient member.

6. In a cord drive for the tuning indicator of a radio receiver, the combination comprising a shaft, a drum mounted on said shaft, a spring comprising a coiled portion encircling said shaft within said drum and arranged to have the axis thereof substantially parallel with the axis of said shaft, said spring having a pair of arms projecting outwardly from the coiled portion thereof and lying on opposite sides of said shaft, said spring being wound through movement of said arms, said arms having engaging means at the ends thereof for selectively retaining said spring in wound condition, and said cord being attached to said engaging means.

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