Aug. 9, 1932. M. R. DEL SONNO 1,870,769

TUNING DEVICE

Filed Jan. 4, 1932

Fig. 1.

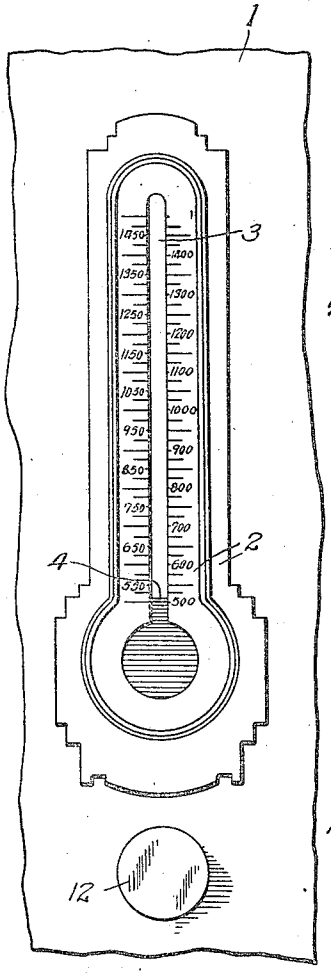


Fig. 2.

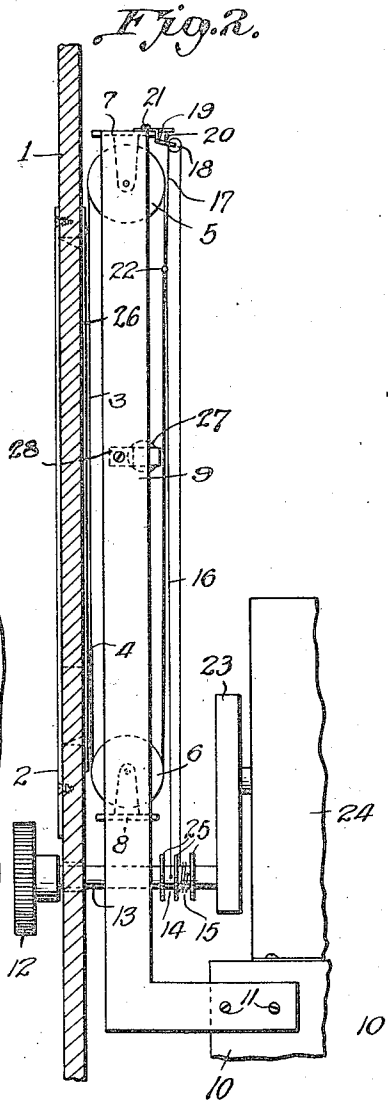
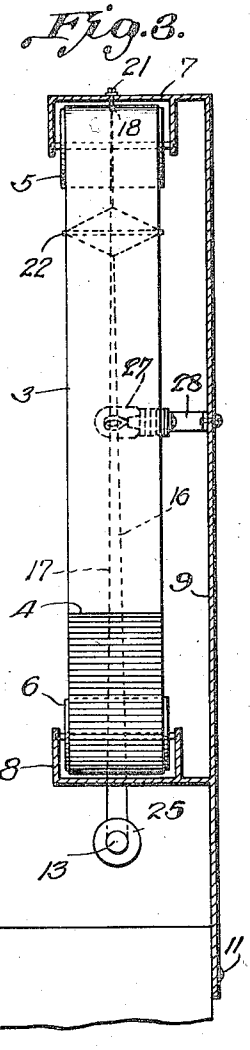


Fig. 3.



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UNITED STATES PATENT OFFICE

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TUNING DEVICE

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This invention relates to tuning devices.

Ever since the advent of commercial radio receivers, manufacturers have been engaged in designing novel and improved tuning devices to facilitate tuning, and to create a pleasing and individualistic dial design. So prominent have been these efforts that radio receivers bearing dials of all shapes and designs have been manufactured, which are more or less meaningless to the average radio listener.

Because the dial is the medium through which the vast radio audience is connected to the various radio broadcasting stations, it is only natural that this piece of apparatus should be given special consideration.

It is, therefore, among the objects of the present invention to provide a novel and improved tuning device for radio receiving apparatus or the like, which includes novel means for indicating the position of the condenser or equivalent tuning unit.

A further object of the present invention is to provide, in a tuning device, means for indicating the setting of the receiving apparatus on a full-vision, stationary, vertically calibrated dial plate located on the tuning panel of the receiver, said means comprising a belt system which moves proportionally in response to tuning of the receiving apparatus.

A further object of the present invention is to provide, in a tuning device, a belt system with its associated rollers, said belt consisting of an upper portion of white and a lower portion of some darker color. The line, or level, where the upper white portion meets the lower darker portion is to be considered the reference point in locating the position of the tuning apparatus on the full-vision, stationary, vertically calibrated dial plate.

A further object of the present invention is to provide, in a device of the character described, a belt system located in close proximity to the full-vision, stationary, vertically calibrated dial plate, and arranged in such a manner that the aforesaid color-dividing line, or level, on one side of the belt will move, in tuning, within the confines of the upper and lower extremities of the calibrated dial plate, thus locating the position of the tuning apparatus on said stationary, calibrated dial plate.

A further object of the present invention is to provide, in a tuning device of the character described, a full-vision, stationary, vertically calibrated dial plate whose sight-opening, or window, resembles a thermometer in shape. In looking at the dial from the front of the tuning panel, one sees that portion of the aforesaid belt which is within the thermometer-shaped opening, or window, of the calibrated dial plate, said calibrated dial plate being preferably in the form of an escutcheon plate, and mounted on the front of the tuning panel. Thus, in tuning, the level of the lower, darker portion of the belt moves vertically along the thermometer-shaped sight-opening, or window, of said calibrated dial plate, said level acting as a reference point or line to locate the frequency setting of the receiving apparatus on said full-vision, stationary, vertically calibrated dial plate in much the same manner that the level of the fluid in a thermometer indicates temperature on a calibrated scale.

Further objects and features of the present invention will be apparent from a consideration of the following specification taken in conjunction with the accompanying drawing, in which

Figure 1 is a front elevation of a portion of the tuning panel of a radio receiving cabinet, showing the general shape and appearance of the tuning device;

Fig. 2 is a side view of the tuning device, showing the belt system and its associated driving means, and showing also the relation of the various parts; and

Fig. 3 is a front elevation of the belt system with the tuning panel removed.

By referring more particularly to Fig. 1 of the drawing, it will be seen that the invention is disclosed in combination with the tuning panel, 1, of a conventional radio receiving cabinet. Mounted on this tuning panel is an escutcheon plate, or name plate, 2, having a sight-opening, or window, of thermometer-shaped configuraton through which a thermometer-shaped portion of belt 3 is visible. The kilocycle graduations on the calibrated dial plate 2 are brought in very close proximity to the moving belt 3 by means of a bevel. In the form of the invention shown in Fig. 1, the 'thermometer-dial' is graduated in kilocycles in place of the usual temperature graduations of a thermometer.

By referring to Fig. 2, it will be seen that band, or belt, 3 is made up of two portions, an upper portion, which is preferably white, and a lower portion of some darker color, such as red. The line, or level, which divides the upper, white portion from the lower, darker portion is to be considered the reference point or pointer in locating the position of the tuning apparatus on the full-vision, stationary, vertically calibrated dial plate 2. This color-dividing line, or level, is indicated in Fig. 2 by the numeral 4, but is shown more clearly in Fig. 3.

As seen in Fig. 2, belt 3 has associated with it a roller system comprising an upper roller 5 and a lower roller 6. Rollers 5 and 6 are free to rotate about their shafts, when belt 3 is moved in either direction. Roller supports, or frames, 7 and 8 are suitably attached to a rigid bracket 9, which is in turn rigidly mounted on the tuning chassis 10 of the receiving apparatus by means of screws 11. Bracket 9 is mounted in such a position that belt 3 assumes its correct spaced relation in respect to calibrated dial plate 2.

By referring further to Fig. 2, it will be seen that movement of the tuning unit 24 is controlled by knob 12 through a vernier driving system shown at 23. The object of this invention is not to improve this vernier driving system, but rather to provide a novel means for indicating the position of the tuning unit on a full-vision, statonary, vertically calibrated dial plate. Vernier driving system 23 may, therefore, be any conventional vernier driving unit. In the present case let us assume that this vernier driving unit has a five to one ratio. In other words, starting with the tuning unit at its minimum capacity, when knob 12 makes five complete revolutions, tuning unit 24 will have completed a movement from its minimum to its maximum capacity in the case of a variable condenser tuning unit.

As seen in Fig. 2, the rear side, also, of belt 3 has a color-dividing line, or level. A rigid metallic rod, or bar, 22, about one sixteeenth of an inch in diameter, is attached to the belt on a line with this color-dividing line, or level. This is shown more clearly by the dotted lines in Fig. 3. Attached to bar 22 is a flexible, stranded wire cable 16 of the type ordinarily used in conjunction with the vernier driving of drum dials. The other end of this flexible cable 16 is attached to the vernier tuning shaft 13 in such a manner that, when shaft 13 is rotated in a clockwise direction, flexible cable 16 will wind itself up around shaft 13, within the space 14, and thus draw bar 22 down towards the shaft 13 in proportion to the speed with which shaft 13 is turned. Also attached to bar 22 is another flexible cable 17, which runs up and around pulley 18 and then down to shaft 13, to which it is attached. Cable 17 winds up on shaft 13, when the shaft is turned in a counterclockwise direction, and thus pulls bar 22 upward. Washers, or cable separators, 25 are fitted over the shaft 13 in such a manner that cables 16 and 17 are effectively guided into their corresponding compartments shown at 14 and 15.

By referring again to Fig. 2, it will be seen that, when knob 12 is rotated in a clockwise direction, bar 22 will be pulled downward by cable 16, and at the same time cable 17 will unwind itself from shaft 13 to allow bar 22 to move downward. Likewise, when knob 12 is rotated in a counterclockwise direction, cable 17 will wind itself up around shaft 13 and thus pull bar 22 upwards, and cable 16 will unwind itself from shaft 13 to allow bar 22 to move upward. Because bar 22 is attached to belt 3, it follows that belt 3 will move directly with bar 22.

Flexible cables 16 and 17 are so adjusted that there is no slack in them. This assures a quick direct response of the belt to any slight movement of the tuning knob 12. In order to further assure the cables against slack, cable pulley 18 is hinged at 19 to frame 7, by means of screw 21, and spring 20 is so attached that it tends to pull pulley 18 up. The force exerted by this spring can be so regulated that it will automatically compensate for any slackening or excessive tightening that may be produced in the cables by any external condition. Of course, in place of the spring 20, the same effect could be obtained by attaching pulley 18 directly to frame 7 by means of a resilient strip of metal.

In operation, this tuning device is so arranged that, when knob 12 is in the counterclockwise extremity of its five revolution range of travel, as shown in Fig. 2, cable 16 will be all unwound, cable 17 will be wound up with five turns around the shaft 13, reference line, or level, 4 will be indicating the frequency at the lower end of the calibrated dial plate 2, and bar 22 will be at its upper extremity. As tuning knob 12 is rotated in a clockwise direction, cable 16 will wind itself up around shaft 13, thus pulling bar 22 downward—this amounts to raising the refer-

ence line, or level, 4 upward along the calibrated dial plate 2—and cable 17 will unwind itself in direct proportion. The exact reverse procedure is gone through when knob 12 is rotated in a counter-clockwise direction.

One of the most important features of the present invention is the pleasing effect that it creates in operation. When observed from the front of the tuning panel, this tuning device resembles a thermometer both in appearance and in action.

It is evident from a consideration of Fig. 2 that the distance traveled by reference point, or level, 4 is proportional to the diameter of the cable winding forms, which in this case is the diameter of shaft 13. Because shaft 13 is ¼" in diameter, and has a tuning range of five revolutions, it follows that the length of cable which it is possible to wind up in five revolutions is equal to $3.1416 \times .25 \times 5$, or 3.927 inches. The distance between the upper and lower extremities of the calibrated dial plate scale is, therefore, 3.927 inches, or approximately four inches.

In order to more effectively simulate a thermometer, a transparent or mildly translucent window member 26, shown in Fig. 2 of the drawing, is placed behind the sight-opening, or window, of the calibrated dial plate so that the color-dividing level or reference point 4, on the belt 3, is viewed through this translucent window member. In order to maintain the illusion of a fluid's rising and falling, the colors used on the belt 3 should be absolutely pure, because any foreign color spots on the belt would be seen moving up and down, in tuning, and thus give away the fact that it is not the level of a fluid that is rising and falling, but rather the color level of a material subtsance.

Referring to Figs. 2 and 3 of the drawing, it will be seen that a dial lamp 27 is suitably attached, by means of lamp bracket 28, to bracket 9. Because lamp 27 is mounted behind the front side of belt 3, it is evident that belt 3 will have to be made of a transparent or translucent material, or substance. In one case, the upper portion of belt 3 can be made of some transparent, colorless substance, and the lower portion of either a transparent or translucent colored substance, or an opaque substance. In this case, the calibrated dial plate is provided with a translucent window member. Thus, as the receiver is being tuned, the level of either a colored or black area, as the case may be, is seen to move up and down in response to tuning of the receiving apparatus. This, also, helps to create the novel illusion of seeing a rising and falling level rather than of seeing a rising and falling material substance.

From the foregoing, it will readily be seen that the present invention provides a novel and improved tuning device, which includes with novel means for indicating on a calibrated dial plate the position of the tuning apparatus, means for creating a thermometer effect so that, in tuning, the tuning device actually simulates a thermometer both in appearance and in action, the only difference being that in the thermometer the level indicates the temperature, whereas in the tuning device the level indicates the frequency setting of the receiving apparatus. It will be understood that the present invention is not specifically confined to the definite structure of details herein presented, but that numerous changes, modifications, and the full use of equivalents may be resorted to in the formation of the invention without departure from the spirit or scope of the appended claims.

I claim:

1. In a radio apparatus, a tuning panel having mounted thereon a full-vision, stationary, vertically calibrated dial plate, said calibrated dial plate having a suitable sight-opening, or window, a belt with its associated rollers, one side of said belt being in very close proximity to said sight-opening, or window, in said calibrated dial plate, said side of said belt consisting of a color-dividing line, or level, which indicates on said calibrated dial plate the setting of the receiving apparatus, driving means adapted to move said belt proportionally in response to tuning of said receiving apparatus, said driving means comprising two flexible cables so attached to the other, or rear, side of said belt, and to the vernier tuning shaft, which is used as a winding form, that movement of said tuning shaft will proportionally move said belt, and the general interrelation and arrangement of the various parts being such that movement of the tuning knob of said receiving apparatus will proportionally move said color-dividing line, or level, within the confines of the upper and lower extremities of the scale of said full-vision, stationary, vertically calibrated dial plate.

2. In a radio apparatus, a tuning panel having mounted thereon a full-vision, stationary, vertically calibrated dial plate, said calibrated dial plate having a suitable sight-opening, or window, a belt with its associated rollers, one side of said belt being in very close proximity to said sight-opening, or window, in said calibrated dial plate, said side of said belt consisting of a color-dividing line, or level, which indicates on said calibrated dial plate the setting of the receiving apparatus, driving means adapted to move said belt proportionally in response to tuning of said receiving apparatus, said driving means comprising two flexible cables so attached to the other, or rear, side of said belt, and to the vernier tuning shaft, which is used as a winding form, that movement of said tuning shaft will proportionally move said belt, associate means for automatically compensating for any slackening or con-

tracting of the lengths of said flexible cables which may be caused by any natural external condition, and the general interrelation and arrangement of the various parts being such that movement of the tuning knob of said receiving apparatus will proportionally move said color-dividing line, or level, within the confines of the upper and lower extremities of the scale of said full-vision, stationary, vertically calibrated dial plate.

3. In a radio apparatus, a tuning panel having mounted thereon a full-vision, stationary, vertically calibrated dial plate, said calibrated dial plate having a sight-opening, or window, of thermometer-shaped configuration, said sight-opening, or window, being covered by a translucent member, a two-colored transparent or translucent belt with its associated rollers and driving means, the color-dividing line, or level, on one side of said belt, being in very close proximity to said calibrated dial plate, and a suitable source of illumination behind said side of said belt, so situated that light coming from this source of illumination will be filtered in passing through said two-colored transparent or translucent belt, and thus cast, or project, two colored lights upon said translucent window member, which covers the thermometer-shaped sight-opening, or window, of said calibrated dial plate, the line, or level, on said translucent window member, where the upper projected color meets the lower contrasting, projected color to be considered the reference point or pointer in locating the position of the receiving apparatus on said calibrated dial plate, said driving means adapted for proportionally moving said color-dividing line, or level, within the confines of the upper and lower extremities of the scale of said calibrated dial plate in response to tuning of said receiving apparatus.

4. In a radio apparatus, a tuning panel having mounted thereon a full-vision, stationary, vertically calibrated dial plate, said calibrated dial plate having a sight-opening, or window, of thermometer-shaped configuration, said sight-opening, or window, being covered by a translucent member, a belt with its associated rollers and driving means, said belt consisting of two portions, an upper portion which is transparent or translucent and a lower portion which is opaque, the level of said lower opaque portion, on one side of said belt, being in very close proximity to said calibrated dial plate, and a suitable source of illumination behind said side of said belt, so situated that light coming from this source of illumination will pass only through the upper transparent or translucent portion of said belt, and thus cast, or project, light upon the upper portion of said translucent window member of said calibrated dial plate, the line, or level, on said translucent window member, where the upper projected light is cut off by said lower, opaque portion of said belt to be considered the reference point or pointer in locating the position of the receiving apparatus on said calibrated dial plate, said driving means adapted for proportionally moving said cast shadow level on said translucent window member within the confines of the upper and lower extremities of the scale of said calibrated dial plate in response to tuning of said receiving apparatus.

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