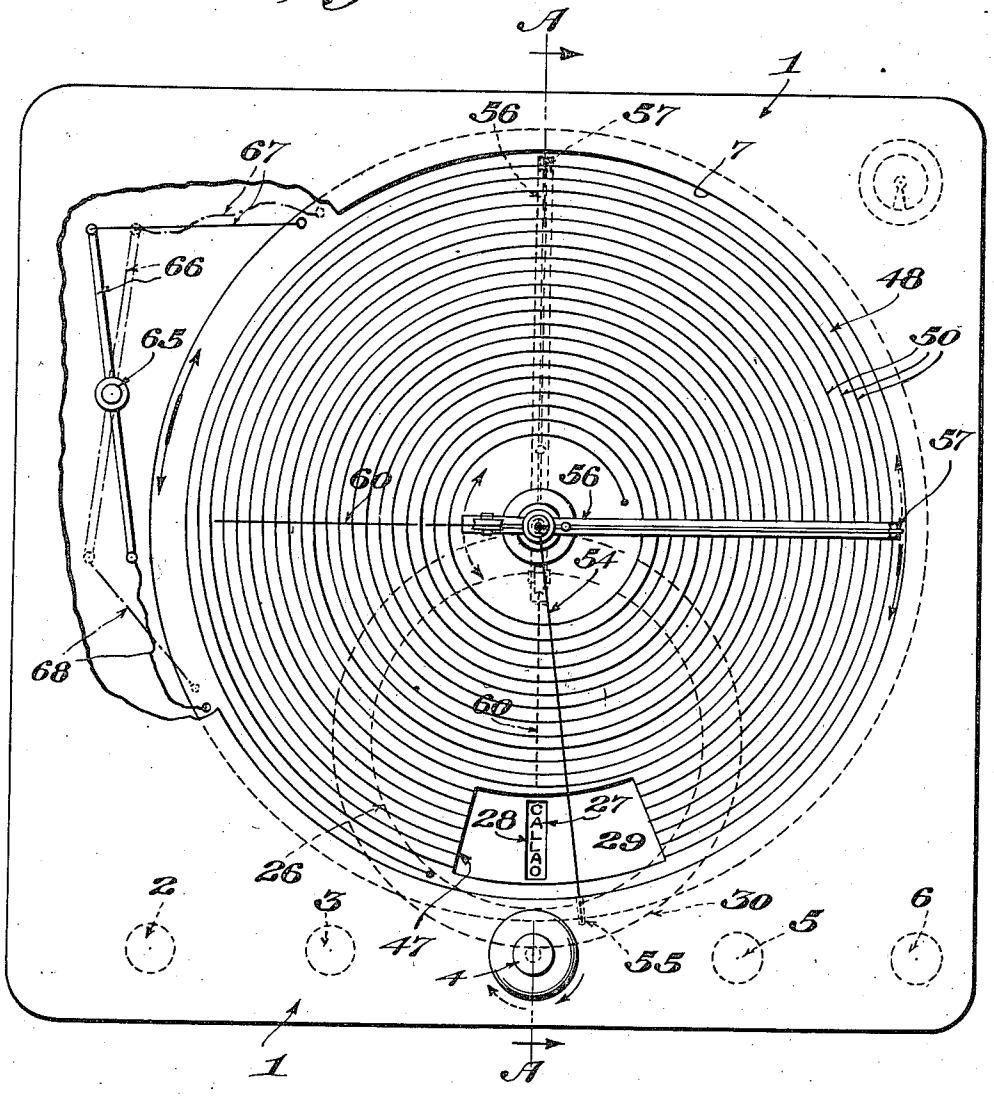
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TUNING DEVICE FOR RADIO RECEIVERS

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Fig. 1.



Inventor

Ramon Masllorens,

By Wheelwright & Groff

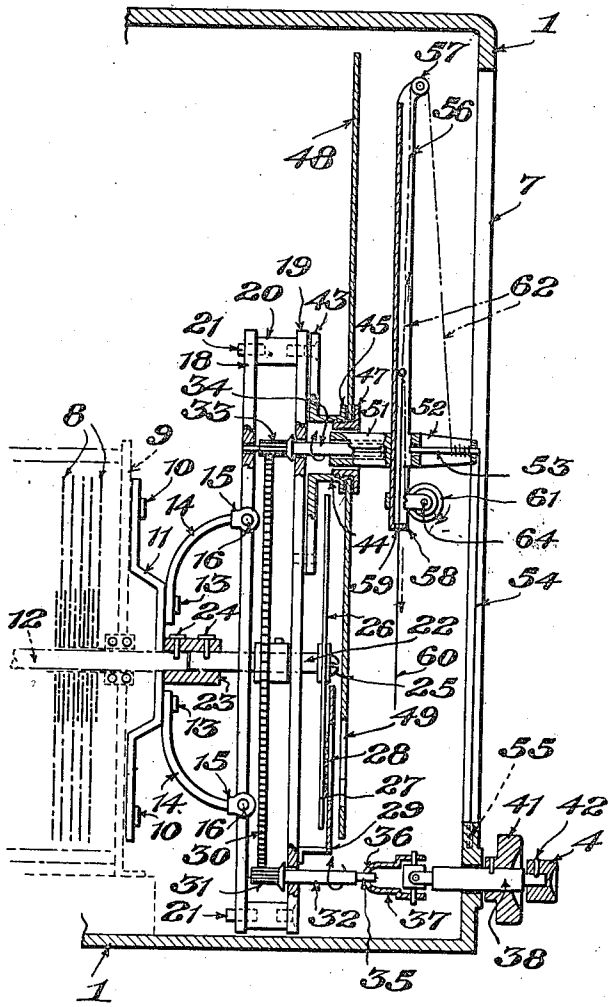
Attorneys

Feb. 9, 1943. R. MASLLORENS 2,310,303

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Fig. 2.



Inventor

Ramon Masllorens,

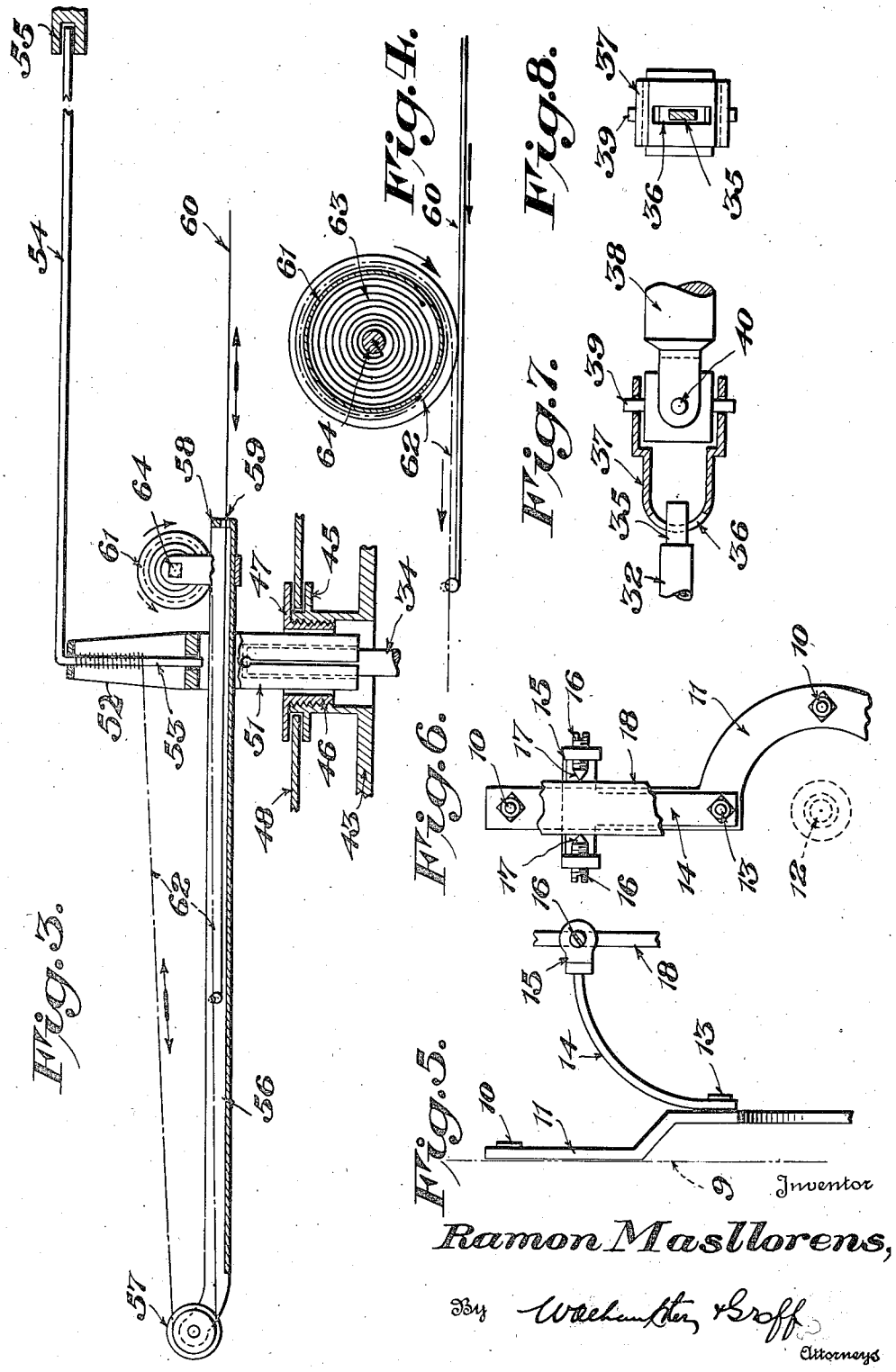
By Williamson & Groff.

Attorneys

Feb. 9, 1943. R. MASLLORENS 2,310,303

TUNING DEVICE FOR RADIO RECEIVERS

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Inventor

Ramon Masllorens,

By Wolcott, Hoffman & Groff

Attorneys

Feb. 9, 1943. R. MASLLORENS 2,310,303

TUNING DEVICE FOR RADIO RECEIVERS

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Fig. 10.

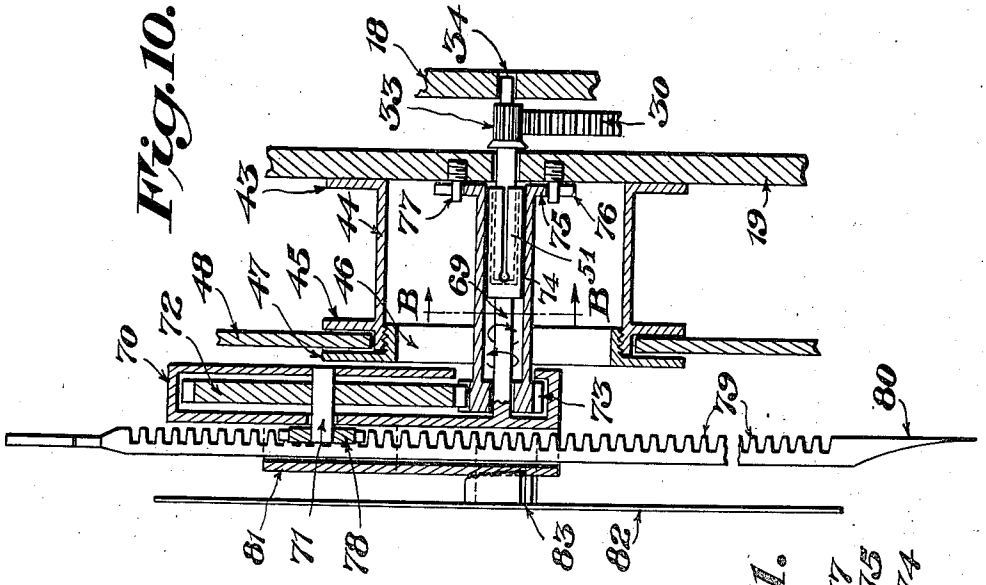


Fig. 11.

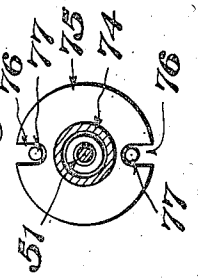


Fig. 9.

Inventor

Ramon Masllorens,

By Wolcott, Hoffman & Groff

Attorneys

Patented Feb. 9, 1943 2,310,303

UNITED STATES PATENT OFFICE

2,310,303

TUNING DEVICE FOR RADIO RECEIVERS

Ramon Masllorens, Buenos Aires, Argentina

Application September 22, 1941, Serial No. 411,899
In Argentina September 6, 1941

4 Claims. (Cl. 116—124.1)

This invention relates to a novel and improved tuning device for short and long wave radio receivers and substantially has for object a novel device of the said kind which owing to its several convenient features of construction and operation offers distinct advantages of the devices of similar kind, heretofore known and used.

The improvement which forms the object of this invention, essentially consists in providing the said tuning device with a novel indicating means, substantially formed by an assembled unit of considerable mechanical amplification, which allows of suitably and speedily locating the short wave stations and obtaining their correct tuning by direct reading of the same on a continuous spiral line of great length, along which moves the end of a pointer of variable length, the said assembled unit being further provided with a connecting device for adjusting the indications of said pointer.

A principal advantage of the improved tuning device in accordance with this invention, consists in that the same permits of directly and distinctly reading each short wave station.

A further advantage of the said tuning device in accordance with this invention consists in that the same allows of location of each of the short wave stations by its respective order, according to the length of wave thereof and its band width in meters for the entire range of the receiver.

Another feature of the novel tuning device which forms the object of this invention, consists in the arrangement of a perfectly smooth control and in the efficient method of mounting the several elements of the device, so as to avoid all harmful stresses.

On the other hand, and owing to its particular improved construction, the novel device in accordance with this invention allows of distributing any desired number of short wave stations in a convenient and spaced manner, one with regard to another, without the necessity of any considerable increase in the dimensions of the corresponding dial, whereby the location and subsequent exact tuning of the same may suitably be performed, with the degree of selectivity required.

The novel tuning device which forms the object of this invention, may be readily and conveniently adapted to any desired type of radio receivers, of whatever construction or size.

This invention also has in view other objects and purposes which will be more fully understood from the following specification and appended drawings.

In order that the invention may be clearly understood and readily carried into practice, a preferred form of construction of the same has been shown by way of example in the accompanying illustrative drawings, wherein:

Figure 1 shows a front view of the improved station tuning device, constructed in accordance with the invention.

Figure 2 illustrates a transverse section on the line A—A of Figure 1.

Figure 3 shows a fragmentary view of a detail, drawn to a considerably enlarged scale, of the means for rotating and synchronously displacing the pointer.

Figure 4 illustrates a detail of the spring tension device which controls the movements of the said pointer.

Figure 5 is a fragmentary side elevation of the doors for supporting the frame of the locating means and the fastening bolts of said frame.

Figure 6 illustrates a fragmentary front view of said supporting means.

Figure 7 shows a detail of the jointed connection between the operating button of the tuning device and the movable elements of the same.

Figure 8 is a detail in front elevation of said joint.

Figure 9 shows an alternate construction of the device for the rotation and synchronous motion of the pointer.

Figure 10 illustrates a cross section, partially in elevation, of the modification of Figure 9, and

Figure 11 is a partial cross section of the modification of Figure 9 on the line B—B of the Figure 10.

In all the said views, similar numbers of reference have been used for indicating like or corresponding parts.

In the embodiment shown, in Figures 1–8 the reference number 1 indicates a short and long wave radio receiver, provided with a knob 2 or the like, for volume control, and with other knobs 3, 4, 5 and 6, for selectivity control, for controlling the tuning pointer, for the change from short waves to long waves, and for the control of tone, respectively, and with another knob, not shown, connected to the spindle 65, hereinafter to be described, for correcting the setting of the indications, all these elements being arranged in the usual way on the front side of the receiver 1.

Upon referring to Figures 1 and 2, it will also be noted that at the front side of the receiver 1, an opening 7, preferably of circular shape, is provided, which allows of freely observing the dial of the device for locating the stations, to

be described later on; while inside of the said receiver 1, a plate condenser 8, of known type is arranged, being preferably mounted in a stationary manner on the base plate of the receiver.

In accordance with this invention and the embodiment shown in Figures 1 to 8, a yoke or bracket piece 11 is secured by means of screws 10, or the like, to the outer side of the front plate 9 of said condenser 8, the central part of the bracket piece 11 being of a convenient arcuate shape as shown in detail in Figure 6, so as to allow of the free passage of the shaft 12 of said condenser; the longitudinal slots of the bracket piece 11 being fastened by means of screws, rivets or similar means 13 to the ends of two arms 14, of suitably curved shape and arranged symmetrically one with regard to the other. Each of said arms 14 is formed at its free end with a forked head piece 15 and through the opposite branches of the same extend the screws 16, or similar means, adjustable as to their spacing, and the free ends 17 of which are suitably pointed. Although not shown in the drawing, said screws 16 may be provided, if desired, with locknuts or like devices, for preventing the same from shifting.

With reference to Figures 1, 5 and 6, it will further be seen that the free ends of the adjusting screws 16 act after the manner of a pivot against the opposite edges of a small plate 18, at the front of which and parallel to the same, a second small plate 19 is mounted, held fixedly spaced from the former by means of bushings 20 or the like, connected to said plate by screws 21 or similar fastening means.

The assembled plate unit formed by the pair of plates 18 and 19 and the connecting means 20, forms a rigid frame, at the center of which is suitably journalled a shaft 22, of which one end, conveniently extended beyond and outside of the plate 18, is connected to the shaft 12 of the condenser 8; and also carries a sleeve 23 or the like, provided with screws 24; and to the opposite ends of shaft 22 is secured by means of a screw 25 or the like, a disc 26, provided on its front face, by engraving or printing, in an interchangeable manner, if desired, with the inscriptions or characteristic identifications of the several long wave stations, which, as may be seen in detail in Figures 1 and 2, may be observed through a narrow opening 28 formed at the front part of a plate 29, supported in a fixed position by the front plate 19.

To the shaft 22, at the part situated between the small plates 18 and 19, is keyed a toothed wheel 30 which engages at its bottom with a small pinion 31, integral with a shaft 32, and which engages at its upper part with a pinion 33, integral with another shaft 34, both shafts 32 and 34 being suitably journalled in the plates 18 and 19 and arranged to project in an outward direction with regard to the plate 19.

By referring to Figures 2, 7 and 8, it will be seen that said shaft 32 is provided at its free end with a rectangular extension 35, adapted to snugly fit within a rectangular slot 36, formed at the end of a small plate 37, curved to the shape of a U, rotatably connected to the shaft 38 of the tuning control knob 4 by means of two pins 39 and 40, arranged in a perpendicular position one with regard to the other, so that said plate 37 will form, with the shafts 39 and 40, a Cardan joint for the transmission of movement between said knob 4 and the pinion 31. In order to be able to vary the rotational turning rate of said pinion 31, a second knob 41 or a similar operating means, of larger diameter, may be secured by means of a stud, key or the like, indicated at 42, to said shaft 38, adjacent to the control knob 4, above referred to.

As clearly shown in Figures 2 and 3, a flat member 43 is secured to the outer face of the front plate 19 of the frame, and from the center of said flat member 43 extends a cylindrical bushing 44, mounted concentrically on the shaft 34 and formed at its end with a circular flange 45. Into said bushing 44 is threaded another tubular bushing 46, also provided with a circular flange 47. On the bushing 46 is rotatably mounted a disc 48, in a concentric position behind the front opening 7 of the receiver, the disc being retained in position by the pressure exerted thereon by the flanges 45 and 47, already referred to.

Upon examining Figure 1, it will further be seen that the said disc 48 is provided at its bottom and in register with the opening 28 of the fixed plate 29, with another opening 49 through which may be read the names, identifications or characteristics 27 of the long wave stations, marked on the rotating disc 26. On the front face of the disc 48 is marked, by printing, engraving or other suitable means, a spiral line 50 of suitable pitch, on which are marked, in turn, other lines, inscriptions or references, not shown, which characterize the several short wave stations.

Referring to Figs. 1 to 4, on the free end of the shaft 34 is telescoped a resilient bushing 51, formed at its end with a yoke 52 wherein is axially journalled the bent end 53 of a rod or wire 54, of which the opposite end 55 is suitably lodged in the edge or rim of the front opening 7 of the receiver.

Through said yoke 52 extends perpendicularly a bar or fixed guide 56, of the shape of a U in cross section, in one of the ends of which is rotatably mounted a small pulley 57. The opposite end of said guide piece 56 is closed by a small plate 58, formed with a hole 59, within which may freely slide a thin pointer 60; on the said bar or fixed guide piece 56, a rotatable drum 61 is mounted, on the periphery of which is wound a cord or light cable 62, suitably connected, at a point between its ends, to the sliding pointer 60, while the opposite end of the said cable is wound in several turns, after the manner of a reel, in one single layer, around the section of straight bend 53 of the wire 54, above described.

As will be noted by observing Figure 4, in the interior of the rotatable drum 61 is arranged a spiral spring 63, having one of its ends connected to the body part of said drum, while the opposite end is affixed to the shaft 64 and tends to cause the rotation of the same, the device, as just described, thus forming a spring mechanism which, as will later be seen, acts to constantly urge the pointer 60 in an outward or off direction with regard to the guide piece 56. In order to effect the correct operation of the device, the cable 62 is connected to the pointer 60, so that when said pointer is at its position of maximum advance, the spring 63, by a rotation of the drum 61 in the direction of the arrow in Figure 4, will be submitted to a slight degree of tension.

Finally, with reference to Figure 1 it will be seen that in the interior of the receiver 1, a small lever 65 is mounted on spindle 65 to

swing when spindle 65 is turned by its knob as above referred to, the opposite arms of said lever being connected by means of cables 67 and 68, or the like, to two suitable points of the disc 48, selected in such a position that they will allow of said cables being alternately put under tension when the shaft 65 is rotated in any convenient manner, and will thus cause a slight angular displacement of said disc.

Upon turning the tuning control knob 4, or the knob 41, adjacent thereto, in the direction indicated, for instance, by the arrows in Figures 1 and 2, the shaft 38 of said button will operate, through the Cardan joint 37, the shaft 32 of the pinion 31 which, in turn, will cause the rotation of the toothed wheel 30, whose shaft 22 will act through the sleeve 23, on the shaft 12 of the variable condenser 8 and cause the rotation of the disc, on which will then be located the several characteristic indicia 27 of the long wave stations which will become clearly visible, at a given instant, through the openings 28 and 49 of the flat member 29 and of the stationary disc 48, respectively.

The rotation of the toothed wheel 30, in turn, will bring about the rotation of the pinion 33 and of the elements integral therewith, viz: the axle 34, the spring urged bushing 51 with its integral yoke 52 and the guide bar 56 with its corresponding pointer 60; during said rotating motion, the cord or cable 62 will be caused to wind on the bent end part 53 of the wire 54, and, in consequence, the opposite end of said cable will unwind from the drum 61, thereby causing the displacement of the pointer 60 in an inward direction, as shown by the arrow in Figure 4, while winding, at the same time, the spring 63. The diameter of the end 53 of the wire 54 has been so selected that at each complete revolution of the axle 34, the pointer 60 will shift to an extent equal to the pitch of the spiral formed by the line 50, so that at any moment the free end of said pointer will run exactly along the said line and will thus successively mark the several short wave stations distributed along the same and thereby allow of conveniently localizing the same.

When it is desired to vary the speed of advance of said pointer 60 in relation to the angular speed, in order to adjust its movement to the lines 50 of a spiral of different pitch, it will be sufficient to change in a suitable manner the diameter of the bent end 53 of said wire 54.

It will be evident that during the inward movement of the pointer 60 and the consequent rotation of the drum 61 in the direction marked by the arrow of Figure 4, the spring 63 will tend to wind on its fixed axle 64, thereby increasing, as before stated, its degree of tension, whereby, during its rotation in the reverse direction, the pointer 60 will be moved in an outward direction, against its tendency to remain stationary.

Under certain conditions it may happen that a true registration in the marking of the different short wave stations indicated on the disc 48 is not secured; for the purpose of overcoming this difficulty, the swingable bar 66 is swung towards one side or the other by rotating its spindle 65, whereby traction will be applied to one of the end cables, for instance, to the cable 67, thereby relieving the opposite cable 68, as shown in Figure 1, whereby the said disc 48 may be turned to desired extent through a certain angle about its central shaft, between the space formed by the plain flanges 45 and 47, and the true registration between the position of the end of the pointer 60 and the wavelength of the short wave station tuned in will be re-established and, in consequence, the position with regard to all the other stations. In order to then obtain a change of station, it will be sufficient to cause the rotation of said pointer 60 until obtaining its registration with the desired station. During the rotating movements above described, the identifications or characteristics 27, corresponding to the long wave stations, will always remain visible, owing to the ample dimensions of the opening 49 of said disc. In general, this adjusting rotation of the disc 48 will not exceed 40° for extreme cases.

The magnitude of this deviation above referred to is uniform depending on the local conditions and equipment of reception and, in consequence, the adjustment will also be uniform.

Besides the advantages obtained by the arrangement as above described, the novel device in accordance with this invention includes the further feature that the support 14, secured to the front plate 9 of the condenser 8, as well as the action of the screws 16 which support the back plate 18 of the frame, allow of a small amount of axial play of said frame, parallel to the shaft thereof, so as to compensate for any small lack of adjustment, while preventing, notwithstanding, any rotating displacement of the same, so as to avoid any tensions or stresses which might arise by a rigid connection between said points 17 without providing for the said play.

On the other hand, the telescopic coupling between the end tongue 35 of the shaft 32 and the member 37 of the Cardan joint allows of a small amount of clearance due to tolerances in the elements of the controlling device, while preventing, notwithstanding, any variation of angular orientation and avoiding thereby any torque or compression stresses.

A similar effect is also secured by the telescopic adjustment between the resilient bushing 51 and the shaft 34 of the pinion 33, and the axial displacement allowed to said shaft 33 and the shaft 32 with regard to the plates 18 and 19 of the frame.

Besides, in view of the said frame being maintained by the brackets 14 at about the same height as the operating pinion, this latter will compensate for the tendency to rotating motion of the unit owing to the weak resistance of the grid, and, in consequence, the said grid will rotate without causing any displacements of the unit.

The considerable extended length of the spiral 50 of the disc 48 permits of the distribution on the same of a large number of short wave stations, conveniently spaced from each other, so that a perfect locating of any one of the same may be performed without need of excessively increasing the dimensions of the disc.

According to the modified construction shown in Figures 9 to 11, the resilient bushing 51, within which telescopes the shaft 34 of the pinion 33, is rigidly connected, in this case, to a spindle 69, of which the opposite end is secured to the inside of a casing 70, preferably of cylindrical shape, in which is suitably journalled a small spindle 71, provided with a gear wheel 72, adapted to pass through a suitable slot formed in the casing and to freely rotate in the interior of the same.

By observing the said Figures 9–11, it will be noted that said gear wheel 72 is permanently in

engagement with a fixed pinion 73, forming part of a tubular bushing 74, mounted concentrically on said shaft 69 and bushing 51, being provided at its opposite end with a flat flange 75, formed with notches or slots 76, adapted to slide on studs 77, secured to the front side of the plate 19 of the frame. The shaft 71, above described, extends with one of its ends outwardly beyond the casing 70 and is provided with a small pinion 78, permanently in engagement with a rack 79 or the like, formed on one of the sides of the pointer 80, the operation of which is similar to that of the pointer 60 of the embodiment first described.

In this case, the said pointer 80 is conveniently guided in a guide or longitudinal direction by a casing 81, which rotates with spindle 69 and within which guide the pointer may slide freely. In order to prevent this latter device from being seen from the front of the receiver, a small disc or plate 82 is mounted in front of the same, being supported by a bushing or similar means 83 which extends from said casing 81. It will be understood that when the gear 30 and pinion 33 are caused to rotate, with their associated elements 34 and 51, the latter will cause the rotation of the spindle 69 and therewith its casing 70, in either of the directions indicated by the arrows in Figures 9 and 10. During such rotation, the internal gear wheel 72, carried along by the casing 70, will remain in engagement with the fixed pinion 73 and will thus also be compelled to rotate, while its center will simultaneously be displaced along the circumference of a circle, towards one side or the other, as shown by the arrows, and owing to the engagement of the pinion 78 with the rack 79 of the pointer 80, the latter will be caused to advance or recede along its guide 81, thereby submitting said pointer to a synchronous rotating motion on account of the same being integral with the casing 70. In consequence, the free end of the said pointer will move along the spiral line 50 of the disc 48, with an effect similar to that obtained by the operation of the pointer 60, of the construction first above described.

Owing to the telescopic mounting of the flange 75 of the bushing 74, all the other members associated therewith are also allowed a certain amount of axial, but not angular play, so as to assure a perfect tuning of the station located.

From the foregoing description, the manner of operating the radio receiver in accordance with this invention will have clearly been understood and no further explanations will be required by those skilled in the art.

It will be evident that various modifications of of construction and detail may be introduced without departing from the spirit of this invention, and I consider to be part of my invention such modifications which are comprehended within the scope of the appended claims.

Having now clearly described and ascertained the nature of my said invention and the manner in which the same is to be performed, I declare that what I claim and desire to secure by Letters Patent, is:

1. In a tuning unit for radio receivers, a tuning element comprising a rotatable control shaft, manually actuatable means for rotating said control shaft, an indicating shaft, means for rotatably driving said indicating shaft by said control shaft, a register plate positioned on said indicating shaft and carrying a spiral centered about said indicating shaft and with equally spaced turns along which wave length indicia are positioned, a guide sleeve member fixedly carried by said indicating shaft substantially perpendicular thereto and positioned to pass over said register plate, a pointer member carried in said guide sleeve member longitudinally slidable therein, and for movement over said register plate, and means actuatable by rotation of said guide sleeve member about the axis of said indicating shaft for progressively varying the longitudinal position of said pointer member in said guide sleeve member radially with reference to said indicating shaft, said means being adapted to displace said pointer member radially of said spiral on said register plate a distance equal to the space between two successive turns of said spiral for every complete rotation of said pointer member.

2. A tuning unit according to claim 1, said means comprising a fixed spindle mounted coaxially with said indicating shaft, a spring drum carried on said pointer member and containing a coiled cord member, a pulley at the end of said guide member, said cord being mounted to pass from said drum along said guide member and over said pulley and being wound around said spindle, and being attached to a point on said pointer member, and the circumference of said spindle being equal to the radial spacing between two successive turns of said spiral.

3. A tuning unit according to claim 1, said means comprising a rack carried on an edge of said pointer member, an arm member extending radially from said indicating shaft and rotatable therewith, a gear wheel rotatably mounted on said arm member eccentrically with reference to said indicating shaft, a toothed wheel fixedly carried on said indicating shaft and engaging said gear wheel, and a pinion fixedly carried by said gear wheel and mounted to engage said rack.

4. A tuning unit according to claim 1, and adjustable setting means positioned adjacent said register plate and adapted to adjust the angular position of said register plate about said indicating shaft to compensate for variations in the wave length response characteristics of the radio receiver.

RAMON MASLLORENS.