Sept. 17, 1929. R. H. LANGLEY 1,728,834

ADJUSTING DEVICE

Filed Feb. 4, 1926

Fig. 1.

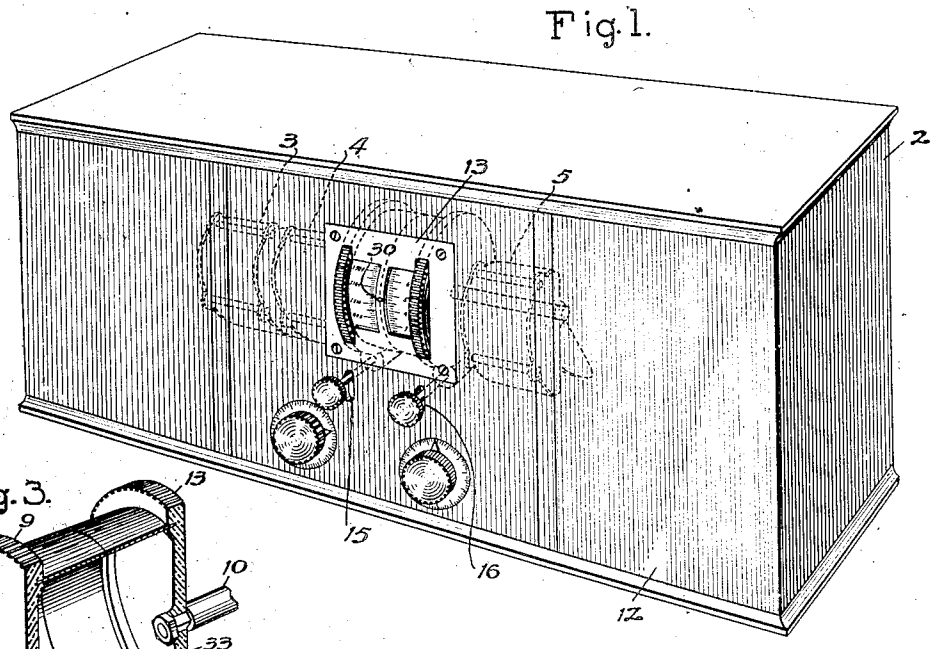


Fig. 3.

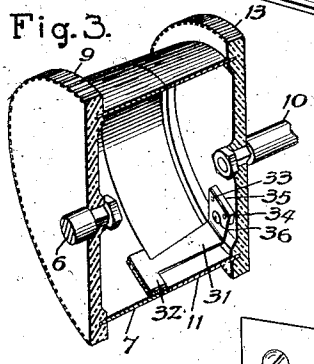
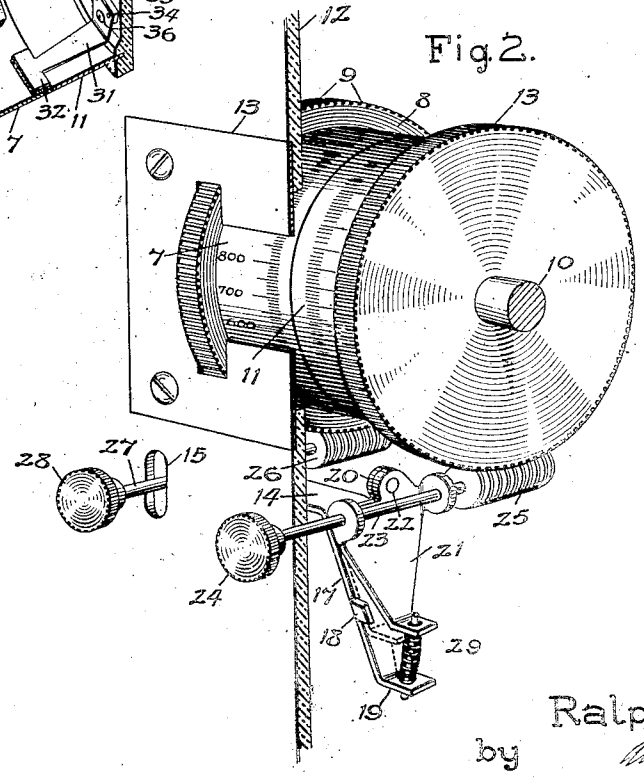


Fig. 2.



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UNITED STATES PATENT OFFICE

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ADJUSTING DEVICE

Application filed February 4, 1926. Serial No. 86,063.

My invention relates to adjusting devices. More particularly it relates to adjusting devices adapted for use in connection with radio apparatus, and in particular in connection with radio apparatus of the receiving type.

Among the objects of my invention are the following: To provide an adjustable tuning device which is adapted to vary simultaneously or independently the resonance characteristics of a plurality of circuits, each over a predetermined range of frequency and to provide means whereby the device may be adjusted by hand or mechanically. However, the novel features of my invention are hereinafter more fully set forth and claimed, reference being had to the accompanying drawing, in which Fig. 1 is a perspective view of a radio receiving set with my invention; Fig. 2 is an enlarged view showing the device of Fig. 1 more in detail; Fig. 3 is a sectional view of the device taken along the axis of the drums, Fig. 2.

Referring more in detail to the drawing, it will be seen that the receiving set, Fig. 1, comprises a cabinet 2, which is adapted to contain, for example, the circuits and apparatus of one of the so-called superheterodyne receivers with condensers 3, 4, 5. The stator elements of the condensers 3 and 4 are secured to the front panel 12 of the cabinet, and the rotor elements are mounted on the shaft 6 which terminates in and is secured to the drum 7. The drum, it will be seen, is provided with a head which projects beyond the drum and forms a flange 8, the periphery of which is provided with gear teeth 9. Similarly, the condenser 5 has its stator element secured to the front panel of the cabinet and its rotor mounted on a shaft 10, which shaft terminates in and is secured to the drum 11. This drum is also provided with a head which extends beyond the drum, the periphery of which extension is provided with gear teeth 13. As indicated, the condensers 3, 4, 5, the drums 7, 11, and the shafts 6, 10, have a common axis which runs parallel to the front panel of the cabinet. The drums are so mounted and the flanges of the drums are of such dimension that the flanges both project, as indicated, through the panel and through slots in a plate 13, which plate is secured to the panel in any suitable manner about the opening in the panel. The plate, it will be seen, is provided with two windows through which the scales on the drums may be seen and read with reference to any suitable point, such as a stationary point located in proximity to the central point of the plate 13.

Just below the drums there is secured to the panel a shelf 14 between the openings 15 and 16 in the panel. Each end of the shelf has an ear bent at right angles to the shelf, the right hand one of which, 17, is shown in Fig. 2. Each of these ears is provided with projections 18, 19, 20, the purpose of which will presently appear. On each side of the shelf there is pivotally secured over the ear a plate, the right hand one 21 of which is shown in Fig. 2. The pivot 22 for plate 21 clearly appears in the figure, while the corresponding plate and pivot on the left hand of the shelf 14 is not shown, but the construction and arrangement on both sides are similar. The plate 21 carries a shaft 23 which extends through suitable lugs turned up from the plate, which shaft also extends through the opening 16 in the panel 12 and terminates in a knob 24 in front of the panel. The other end of this shaft terminates in a worm gear 25 which is adapted to engage and mesh with the teeth 13. The arrangement of the device is such that a spring 29, when the plate 21 is in the position shown in full, maintains the worm and gear in operating engagement, and the position of the knob 24 in such case is depressed. However, when the knob 24 is pressed upwardly the plate 21 rotates about the pivot 22 and the spring 29 is drawn over toward the front panel during which operation it is first pressed until it reaches a neutral position with its axis crossing the axis of the pivot 22, after which it again begins to expand and causes the worm 25 to be drawn out of engagement with the gear 13 and the plate 21 to snap against the lug 18, as indicated by the dotted lines. It will be seen that the worm 26 corresponds with the worm 25 and is adapted to work in engagement with the teeth 9. The shaft 27, of course,

corresponds to the shaft 23 and the knob 28 corresponds to the knob 24. It will be understood that the shaft 27 is pivoted in a manner similar to that described with respect to the shaft 23. If it is assumed that the worm 26 is left in engagement with the gear teeth 9 after the worm 25 is withdrawn from engagement with the gear teeth 13, it is possible with the construction shown, by rotating the knob 28, to thereby rotate the drum 7 about its shaft and, at the same time to rotate the drum 11 about the shaft of the latter, inasmuch as the two drums are in frictional engagement with each other, as indicated in Fig. 3. This frictional engagement is obtained by means of an L shaped spring 31 secured to the inside of the head of drum 11. This spring extends beyond the drum 11 and into the drum 7. The forward end of this spring is provided with a shoe 32 which is maintained pressed against the inner surface of the drum 7. It will be seen that spring 31 is secured to the head of the drum 11 by means of a pair of screws 33 and 34. Any other suitable means may, of course, be substituted. The spring 31 is not directly attached to the head of the drum 11, but to a cleat 35. The provision of this cleat makes it possible to adjust the pressure between the shoe 32 and the drum 7. This is done through the medium of an adjusting screw 36 which passes through the spring 31 and is in threaded engagement with the head of the drum 11. Therefore, by turning this screw 36 the pressure of the shoe against the drum 7 may be regulated. Therefore, the arrangement is such that by pressing the finger on the gear teeth 13 the drum 11 may be held stationary while the drum 7 is being rotated through the medium of the knob 28. It will be understood that the operation may be reversed by depressing the knob 24 and pressing the knob 28 up. The result obtained by thus operating the knobs is that the worm 26 will disengage the gear teeth 9 while the worm 25 will engage the gear teeth 13. Now, by turning the knob 24, both cylinders may be rotated through the medium of knob 24. Similarly, by pressing the finger on the gear teeth 9 the drum 11 may be caused to slip with respect to the drum 7.

In case rapid and rough adjustment is desired both knobs 28 and 24 may be elevated thereby causing both worms 26 and 25 to disengage both drums. In this condition both drums may be rotated by rotating either drum through the medium of the finger in engagement with the gear teeth 9 and 13. Also one drum may be caused to slip with respect to the other by holding the finger on one gear and rotating the other gear.

With reference to the utility of such a device, it may be stated that it is very difficult to manufacture, for example, all condensers alike or to assemble all receiving sets exactly alike. Therefore, it is found, as a matter of practice, that after a receiving device such as shown in the drawing is assembled if both the right and left hand condensers are set to a wave length of 700, for example, as indicated by the index upon the drums, it does not necessarily follow that the different branches of the circuits stand tuned exactly for that particular wave length. On the contrary, it is usually found necessary to recalibrate, so to speak. For example, if a particular station X broadcasts at a frequency of 700 it may be found necessary to mark the left hand dial with the letter X not at the 700 mark, but possibly at the 710 mark. On the other hand, the right hand drum may have to be marked with the letter X, not at the 700 mark, but at the 690 mark, and in order to obtain the best results the left hand drum 710 mark should be brought into line with the right hand drum 690 mark and then the two drums together should be brought to the index position such as represented by the index point 30 in Fig. 1. The two drums having been once adjusted with respect to each other, thereafter the slipping of the drums may be found unnecessary and a rapid tuning may be obtained by hand and delicate tuning may be obtained thereafter through the medium of either of the knobs 24 and 28. It will be understood, of course, that the best relative positions of the drums with respect to each other is finally obtained by locking both worms 25 and 26 with their respective gears and adjusting through the medium of the knobs 24 and 28 rather than by hand.

It will be seen, therefore, that the drums, their heads and shafts, may be considered as a mechanism for making a rough preliminary adjustment and that either drum may be considered as means for individually adjusting each condenser, or adjusting both condensers in common, that is, at the same time. Furthermore, the knobs 24 and 28, together with the supporting apparatus and worms 25 and 26, may be considered altogether as a vernier mechanism, or each separately as a separate vernier mechanism and that each separate vernier mechanism may be considered as means for individually adjusting one of the condensers, or as a common means for adjusting both condensers. From what has been said it will be seen that the worms 25 and 26 serve as locks for the drums 7 and 11 inasmuch as the pitch of the worms is such that tangentially pressing on the drums will not operate to rotate the drums. Therefore, when the drums are once adjusted they can and will be held in the adjusted position by throwing the worms 25 and 26, which serve as a vernier drive, into engagement with the teeth 9 and 13. The method of operating the device may be shortly explained as follows. In order to tune in, the drums are rotated simultaneously while the worms 25 and 26 are

out of engagement until a station desired is recognized. After this is done the right hand vernier, which comprises the worm 25, is thrown into engagement and adjusted for the best signal. The right hand vernier will hold the condensers 3, 4, 5, which may be considered as serving the first, second and third circuits respectively, in readiness for further adjustment. While the right hand vernier is in engagement the left hand vernier is thrown into gear. The adjustment is then further carried on until the best results are obtained. This last adjustment, which may be considered as affecting the loop, or first circuit, takes place while the adjustment of the oscillator circuit by the right hand vernier is maintained due to the locking action of the right hand vernier.

While I have illustrated in connection with the drawing one embodiment of my invention, it will be understood that, in view of the disclosure, the invention may be varied in form without departing from the spirit thereof or from the scope of the claims contained herein.

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

1. The combination with a pair of condensers of the variable type, each comprising a stator and a rotor, each rotor being mounted on a separate shaft, of a mechanism individual to one of said rotors for making an adjustment of the rotor with respect to its corresponding stator and means for rendering said mechanism common to both rotors whereby an adjustment may be simultaneously obtained between each rotor and its respective stator, said last means comprising a friction clutch for uniting the shafts of the two rotors in operative engagement.

2. In combination, a pair of condensers of the variable type comprising each a stator and a rotor, each rotor being mounted on a separate shaft, a mechanism individual to each of said rotors for making a rough adjustment of the rotor with respect to its corresponding stator independently of the other rotor, a mechanism individual to each of said rotors for making a fine adjustment of the rotor with respect to its stator independently of the other rotor, and means for making both the rough adjustment mechanism and the fine adjustment mechanism of either rotor common to both rotors whereby a rough or fine adjustment may be simultaneously made between the rotors and their respective stators.

3. In combination, a pair of condensers of the variable type comprising each a stator and a rotor, each rotor being mounted on a separate shaft, a mechanism individual to each of said rotors for making a rough adjustment of the rotor with respect to its corresponding stator independently of the other rotor, a mechanism individual to each of said rotors for making a fine adjustment of the rotor with respect to its stator independently of the other rotor, and means for making both the rough adjustment mechanism and the fine adjustment mechanism of each rotor common to both rotors whereby a rough or fine adjustment may be simultaneously made between the rotors and their respective stators, said last means comprising a friction clutch for operatively interlinking the shafts of the two rotors.

4. In combination, a pair of condensers of the variable type comprising each a stator and a rotor, each rotor being mounted on a separate shaft, a mechanism individual to each shaft for rotating the shaft to adjust the corresponding rotor with respect to its stator, each mechanism including a driving element for rotating its shaft, means frictionally connecting said elements, and a driving means for each of said elements which means may be moved into or out of driving engagement therewith.

5. In combination, a pair of condensers of the variable type comprising each a stator and a rotor, each rotor being mounted on a separate shaft, a mechanism individual to each shaft for rotating the shaft to adjust the corresponding rotor with respect to its stator, said mechanism comprising a driving element for rotating the shaft, means whereby the driving element may be individually moved out of or into driving engagement with its shaft whereby when in driving engagement the shaft may be rotated by rotating the driving element and the shaft locked against rotation by either of the adjusting means individual to the other shaft, and means for interconnecting said shafts whereby they may be driven simultaneously by either of the driving elements when the other driving element is out of engagement with its shaft.

6. In combination, a pair of condensers of the variable type comprising each a stator and a rotor, each rotor being mounted on a separate shaft, a mechanism individual to each shaft for rotating the shaft to adjust the corresponding rotor with respect to its stator, said mechanism comprising a driving element for rotating the shaft, means whereby the driving element may be individually moved out of or into driving engagement with its shaft whereby when in driving engagement the shaft may be rotated by rotating the driving element and the shaft locked against rotation by either of the adjusting means individual to the other shaft, and means for interconnecting said shafts whereby they may be driven simultaneously by either of the driving elements when the other driving element is out of engagement with its shaft, said interconnecting means comprising a friction clutch whereby the driving elements may be placed in driving engagement each with its shaft simultaneously or at different times

and the shafts driven simultaneously by either or independently by both.

7. In combination, a pair of condensers of the variable type comprising each a stator and a rotor, each rotor being mounted on a separate shaft, a mechanism individual to each of said rotors for making a rough adjustment of the rotor with respect to its corresponding stator independently of the other rotor, a mechanism individual to each of said rotors for making a fine adjustment of the rotor with respect to its stator independently of the other rotor, and means for rendering both the rough adjustment mechanism and the fine adjustment mechanism of each rotor common to both rotors whereby a rough or fine adjustment may be simultaneously made between both the rotors and their respective stators, said last means comprising a friction clutch for operatively interlinking the shafts of the two rotors, said driving elements being each in the form of a gear and each shaft being provided with a corresponding gear, the driving engagement between the driving element and the shaft being maintained through such gears.

8. In combination, a pair of condensers, each having a rotor element and a stator element, means individual to each condenser for making a rough adjustment and means individual to each condenser and cooperating each with one of said first named means for making a fine adjustment, friction clutch means between said first named means for making the individual fine and rough adjustment means of either condenser common to the two condensers, and means for throwing either of the fine adjustment means into or out of engagement with the condensers.

In witness whereof I have hereunto set my hand this 2nd day of February, 1926.

RALPH H. LANGLEY.