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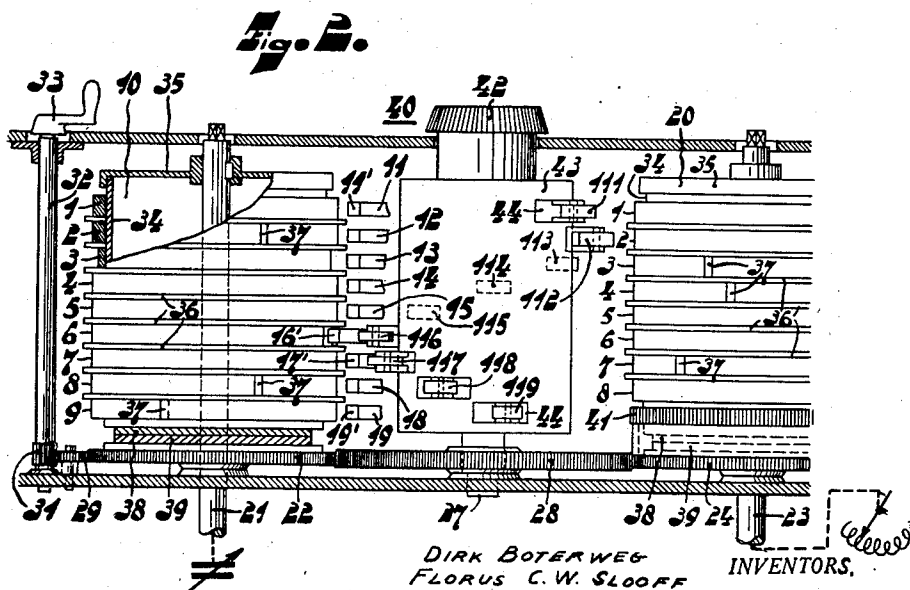
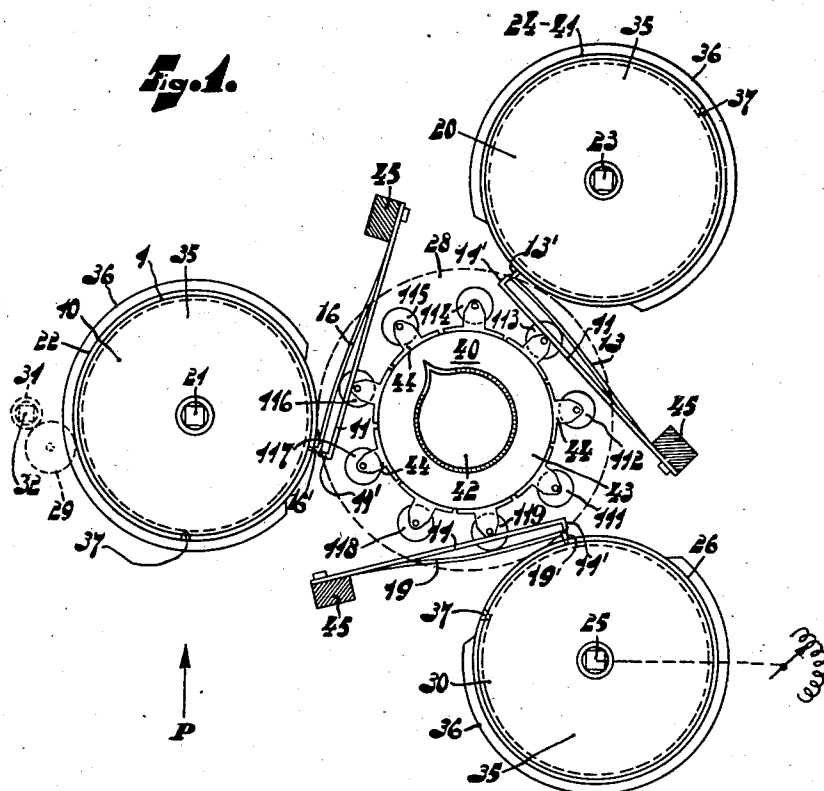
D. BOTERWEG ET AL

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WIRELESS TRANSMITTING OR RECEIVING SET

Filed June 17, 1940

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BY *H. S. Brown*

ATTORNEY.

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2 Sheets-Sheet 2

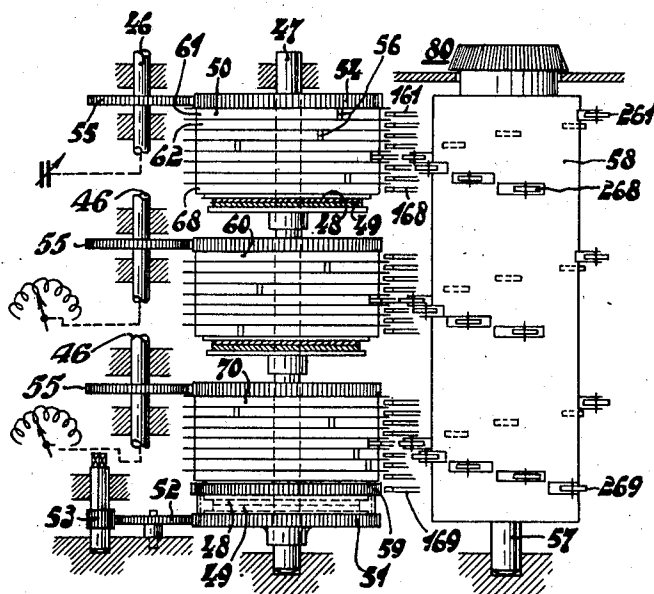


Fig. 3.

DIRK BOTERWEG
FLORUS C.W. SLOOFF INVENTORS.

BY H.G. Brewer

ATTORNEY.

UNITED STATES PATENT OFFICE

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WIRELESS TRANSMITTING OR RECEIVING SET

Dirk Boterweg and Florus Cornelis Willem Slooff,
Eindhoven, Netherlands, assignors to Radio
Corporation of America, New York, N. Y.,

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4 Claims. (Cl. 74—10)

This invention relates to a wireless transmitting or receiving set comprising a device for tuning to a number of predetermined wavelengths. With such sets it is often desired that they should be tuned automatically to a given wavelength. Particularly in the case of a transmitter a number of adjustable members such as several wave-range switches and fine-adjustment elements for the various circuits, must be separately operated for this purpose. In speaking of adjustable members it is intended to include, for example, a control circuit and separator-circuit condenser, the wave range tappings on the control and separator circuit coils and the wave-range tappings on the anode circuit of the final stage and the antenna-circuit coils. The present invention makes provision for means whereby all these controls can be effected simultaneously, after a selecting member is adjusted to the desired station, by rotation of a single shaft which can be driven by a hand-knob or a motor. It is hardly necessary to mention that such a control is substantially simpler than that of transmitting or receiving installations in which a separate knob has to be rotated for each variable element. The device according to the invention can previously be adjusted, with the aid of the means to be described hereinafter, to a number of wavelengths to be received or to be transmitted automatically.

The device according to the invention is characterized in that the set comprises a selecting device, a common drive mechanism for the variable elements and locking devices for these elements. One of the parts of a locking device, which is adjustable and when in use is rigidly coupled to the shafts of the variable elements to be adjusted automatically, is provided for each of the wavelengths to be adjusted automatically and the other parts of the locking devices are moved into the correct position by the adjustment of the selecting device. The drive mechanism is coupled in such slipping manner to the shafts of the variable elements that the movement of the drive mechanism has the effect of moving the variable elements to the desired position until the associated locking parts co-operate and the shaft or shafts of the variable elements corresponding to these locking parts are stopped.

It is simple from a constructional point of view when the transmitting or receiving set according to the invention is so constructed that the shafts of the variable elements which are connected to the common drive mechanism via

a slipping coupling are arranged at the corners of an equilateral polygon. According to the invention, in this case all the shafts of the variable elements engage, via a slipping coupling of their own, a common member such as a gear wheel the shaft of which is located at the centre of gravity of the polygon.

In a further form of construction of the set according to the invention the driving means rigidly coupled to the shafts of the variable elements are arranged co-axially, preferably on one shaft, the driving means being slippingly coupled to this shaft and this shaft being driven by the common drive mechanism, the shaft of the selecting member being arranged parallel to this shaft in such manner that the locking members mounted on it can co-operate with the locking members which, when in use, are rigidly coupled to the driving means of the variable elements.

According to the invention, a number of rings corresponding at least to the number of wavelengths to be tuned automatically may be coupled adjustably but when in use rigidly in relation to the shafts of each of the variable elements, said rings being furnished at their circumference with one of the parts of the locking mechanism. This part of the locking mechanism, which part is arranged on the rings, may be formed by a change in profile, for example an indentation, of the surface of the rings.

According to the invention, it is advantageous to arrange on a rotary shaft rigidly connected to the selecting device members such as projecting lugs, pawls, rollers or the like the number of which corresponds at least to the number of tuned wavelengths, said members being distributed on the said shaft in a helical line over equal distances and co-operating, in some cases by the intermediary of other members such as springs or the like, with the parts of the locking mechanism which are arranged on the shafts of the variable elements.

If such a set is also to be used for hand-tuning it is preferable that for this purpose a steady-
ing mechanism should be provided for the inter-engaging members such as gear wheels which are coupled to the shafts of the variable elements through a slipping coupling, and in the position of the selecting device which is associated with this manner of tuning, all mutual locking devices remain inoperative.

In order that the invention may be clearly understood and readily carried into effect it will now be described more fully with reference to the accompanying drawings.

One form of construction of the tuning device which comprises the wireless transmitting or receiving set according to the invention is shown in Figs. 1 and 2, Fig. 1 being a plan of the tuning device and Fig. 2 a side elevation in the direction of the arrow P, the driving means 10 and 20 of the variable elements and the selecting device 40 being aligned. The driving means 30 and the locking devices, operated by the selecting device, which are associated therewith and with the driving means 20 are omitted in this figure.

Fig. 3 is an elevation of another embodiment of the invention.

The tuning device shown in the two embodiments illustrated is intended for wireless transmitting sets in which three adjustable members have to be controlled separately for the purpose of tuning the set to a given wavelength. The tuning device shown in Figs. 1 and 2 permits of tuning automatically to eight wavelengths. It will, however, be clear from the following description that the invention can also be applied to sets in which automatic tuning has to be effected to more or less than eight wavelengths, there being in addition no need for limiting the number of adjustable members to three.

The figures do not show the variable elements but they show the shafts 21, 23 and 25 (Figs. 1, 2) which are rigidly coupled, in some cases via a transmission, to the said elements and which in the present case are arranged at the corners of an equilateral triangle. The shaft 21 has the control circuit condenser and separator circuit condenser of the transmitter coupled to it. The shaft 23 controls the wave-range tappings on the control and separator circuit coils, whereas the shaft 25 controls the wave-range tappings on the anode circuit of the final stage and the antenna circuit coils. These shafts are each connected, via a slipping-coupling to be mentioned hereinafter, to a common drive mechanism which comprises inter alia a gear wheel 28 rotating loosely about a shaft 27 arranged at the centre of gravity of the equilateral triangle and engaging three gear wheels 22, 24, 26 which are adapted to rotate about the shafts 21, 23, 25 respectively. The gear wheel 22 may be operated by a hand-knob or by a motor by which the other gear wheels 24, 26 are also set rotating as a result of the mutual coupling by the gear wheel 28. In the construction shown in Figs. 1 and 2 the drive mechanism is caused to move by rotation of a crank 33 mounted on a shaft 32 which carries a pinion 31. This pinion drives the gear wheel 22 via a gear wheel 29 and thus the remaining gear wheels 28, 24, 26.

Each of the shafts 21, 23, 25 of the variable elements is rigidly coupled to a driving means the following parts of which are shown in the drawings: a cylindrical shell 34 arranged so as to be concentric with the associated shaft and closed at the top by a plate 35 which is rigidly connected to the associated shaft, as may be seen in Fig. 2 for the shaft 21. The construction of the driving means will be set out more fully with reference to the driving means 10 for the shaft 21. At the circumference of the shell 34 are arranged nine rings 1 to 9 separated from each other by partitions 36. When in use these rings are rigidly arranged on the shell 34 and consequently also rigidly in relation to the shaft 21 but they can be detached from the shell by a device (not shown) and are thus enabled to be rotated relatively to the shaft. The periphery of each ring except for ring 3, which is constructed

so as to be less high than the other rings, has formed in it an indentation 37 which constitutes one of the parts of the locking device to be described hereinafter. To the bottom of the shell 34 is secured a friction plate 38 which together with a friction plate 39 rigidly secured to the gear wheel 22 constitutes a slipping coupling between the shaft 21 and the drive mechanism 31, 29, 22, 28, 26, 24.

The driving means 30 associated with the shaft 25 is similarly constructed except for the ring without indentation which is not arranged at 3, as in the previous case discussed, but at 6 (not shown).

With the driving means 20 associated with the shaft 23 the difference from the driving means mentioned above is that the lowermost ring 9 is omitted and has given place to a gear rim 41 rigidly connected to the gear wheel 24. The slipping coupling between the gear wheels 24, 41 and the shaft 23 is indicated in dotted lines here.

The shaft 27 mentioned before, which is arranged at the centre of gravity of the equilateral triangle which is formed by the shafts 21, 23 and 25, has secured to it the selecting device 40 which can be rotated by means of an adjusting knob 42. Nine rollers 111 to 119 are uniformly distributed, along a helical line, about the circumference of the cylindrical shell 43, which is concentric with the shaft 27. These rollers are journaled in supports 44 secured to the shell 43. They are arranged in such manner that the roller 111 is always located in the plane that passes through the ring 1 on the driving means of the variable elements and similarly the roller 112 in the plane that passes through the rings 2 and so forth.

Each of three spring carriers 45 has secured to it the ends of nine springs 11 to 19 the free ends of which extend in groups between the selecting device and a driving means for a variable element. These springs form jointly with the indentations 37 on the rings the locking devices for the variable elements, the springs being arranged in such manner that in succession the spring 11 is flush with the roller 111 and with the ring 1, the spring 12 with the roller 112 and the ring 2 and so forth.

At its free end each spring 11 to 19 is provided with a hook-shaped extension 11' to 19' which is arranged at a small distance in radial direction of the ring corresponding therewith on the driving means.

In each of the nine positions which the selecting device 40 is adapted to occupy, in each group of springs the end of one spring is forced by the associated roller against the ring associated with this spring.

The operation of the device is as follows. In order to make the set suitable for transmission at a given wavelength the variable elements have to be moved into a given position. If this wavelength is to be obtained automatically by means of the device according to the invention care must be taken that the rings having an indentation formed in them and which co-operate with the springs that are forced against these rings by the rollers of the selecting device when the latter is moved into the desired position occupy a correct position relatively to their shaft. This adjustment will be set out in greater detail for the ring 6 on the driving means 10. The selecting device 40 is caused to occupy the position shown in Figs. 1 and 2. The end 16' of the spring 16 is thus forced by the roller 116 on to the ring

6. The indentation on the ring will generally not be immediately opposite the extension 16'. The crank 33 is then put on the shaft 21 which is rotated thereby until the extension 16' jumps into the indentation 37 of the ring 6. The clasp 5 of the shell 34 is then disengaged from the ring and after that the shaft 21 is rotated further, the ring being held by the locking device 37, 16'. The rotation of the shaft 21 is stopped when the variable element has reached the position associated with the desired wavelength. The ring is then set tightly again on the shell 34. For the adjustment of the rings 3 and 9 on the other driving means 20 and 30 respectively associated with this wavelength the same course is followed, the crank 33 being put on the shaft 23 or 25 respectively.

For the adjustment of another wavelength the selecting device is moved to another position in which three other rollers force the corresponding springs on to the associated rings. The adjustment to the desired wavelength is again effected for these three rings in the manner indicated above.

For the purpose of tuning automatically to the first-mentioned wavelength the selecting device 40 is first moved into the position shown in Figs. 1 and 2. The driving means 10, 20 and 30 are then set rotating by the common drive mechanism by means of the crank 33 which is put on the shaft 32. Each driving means turns until the depressed spring associated therewith jumps into the indentation of a ring co-operating therewith. This driving means has thus moved the variable element controlled thereby into the desired position. Due to the friction clutch 38, 39 between this driving means and the common drive mechanism the position of this variable element will no longer be altered on further rotation of the crank 33 although the remaining driving means, when they have not yet occupied their final position, can be rotated further until, due to their locking device becoming operative, they also slip relatively to the common drive mechanism.

Fig. 1 shows a moment at which the springs 16 and 19 already lock the driving means 10 and 30 but at which the crank 33 has to be rotated further in order also to lock the driving means 20 by the spring 13.

Wireless sets comprising an automatic tuning device for a number of stations generally comprise in addition a device enabling tuning by hand which permits of also transmitting or receiving at a wavelength which cannot be obtained by the automatic tuning device. In the device according to the invention hand tuning is possible in the following manner. In one of the positions of the selecting device the roller 119 co-operates with the lowermost spring of the group of springs associated with the driving means 20. This spring is not forced on to a ring but is forced on to a gear rim 41 to which the ring has given place and which is rigidly connected to the gear wheel 24. This has the effect of preventing the common drive mechanism 31, 29, 22, 28, 26, 24 from rotating any further. Since the two other compressed springs 13 and 16 associated with the driving means 10 and 30 respectively are located opposite the lowered rings without indentation, 3 and 6 respectively, it is possible to control the three driving means 10, 20 and 30 for the adjustment to a wavelength independently of each other, for example by means of the crank 33 which for this purpose is put on the shaft 21, 23 or 25 respectively without rotation of one driving means resulting in another

driving means rotating therewith. The springs 13 and 16 which are compressed in hand tuning may be omitted similarly to the associated rings 3 and 6 on the driving means 10 and 30 respectively.

In order to prevent rotation of the crank 33 mounted on the shaft 32 from resulting in harmful effects for the locking device, which with hand tuning acts on the common drive mechanism, care must be taken that the coupling between the pinion 31 and the other gear wheels is interrupted. This may be effected, for example, by the gear wheel 29 being thrown out of gear with the gear wheel 22 by the selecting device placed in hand tuning.

It is hardly necessary to mention that the device according to the invention also permits of tuning to more or less than 8 wavelengths (that is the number that is obtained by means of the device according to Figs. 1 and 2). In addition the device is not limited to the tuning of three variable elements. Thus, for example, it is possible to arrange four driving means in a square, the selecting device arranged at the centre of gravity thereof carrying eight rollers which co-operate in succession with the eight rings of a driving means. This construction enables the obtainment of seven wavelengths, the eighth position of the selecting device serving again for hand tuning.

The device shown in Fig. 3 is identical in operation with that of Figs. 1 and 2 but the arrangement is different, the driving means 50, 60, 70 rigidly coupled to the shafts 46 of the variable elements being axially arranged on the shaft 47 of the common drive mechanism and each driving means being coupled to this shaft with the interposition of a slipping coupling of its own. This coupling comprises a friction plate 48 secured to the driving means and a friction plate 49 secured to the shaft 47. The shaft 47 has fast on it a gear wheel 51 which is driven by a pinion 53 through a gear wheel 52.

The driving means 50, 60 and 70 carry each a gear wheel 54 which engages a gear wheel 55 fast on a shaft 46 coupled to a variable element. In addition, each driving means carries eight rings 61 to 68 comprising an indentation 56, said number corresponding to the desired number of automatically tuned wavelengths. Each ring of a driving means co-operates with a spring from the group of springs 161 to 168 arranged near the driving means. The shaft 57 of the selecting member 60 which carries the rollers is arranged parallel to the shaft 47. For each driving means the selecting device comprises eight rollers 261 to 268 which are distributed uniformly along the circumference of the shell 58 in the form of a helical line. Only the lowermost group of rollers on the selecting device has added to it a ninth roller 269 which, in the position of the selecting device suited therefor, enables hand tuning. This roller is then located opposite the gear ring 59 secured to the gear wheel 51, said ring being locked by the spring 169 compressed by this roller. The variable elements can thus be adjusted separately and independently of each other.

The adjustment of the rings on the driving means, the automatic tuning and the hand tuning need not be set out in detail since the operation of this device is identical with that of Figs. 1 and 2.

What we claim is:

1. In radio signalling apparatus, a plurality of control shafts, a set of position-determining

means adjustably mounted on each of said shafts, a set of adjustable stops positioned in cooperative relation with each set of position-determining means, there being a stop for each position-determining means, a selector device carrying a plurality of means for simultaneously adjusting a predetermined stop in each set to cooperate with a predetermined position-determining means in each set in accordance with the desired position of said shafts, and single means for driving said shafts in unison to bring each thereof to a position determined by the adjustment of the position-determining means on their respective shafts.

2. In radio signalling apparatus, a plurality of control shafts, a set of position-determining means for each of said shafts, the position-determining means for each of said shafts being adjustably mounted thereon, a set of stops cooperating with each set of position-determining

means, there being a stop for each position-determining means, a selector device carrying a plurality of means for setting in unison a selected stop of each set to cooperate with their associated position-determining means in accordance with the desired position of said shafts, and a common drive mechanism for said shafts, said drive mechanism being coupled thereto through a slip-clutch device.

3. The arrangement described in claim 2 characterized by that said control shafts are positioned around said stop-setting means.

4. The arrangement described in claim 2 characterized by that said means for setting the stops comprises a cylindrical rotary member provided with a plurality of stop operating means arranged spirally along the cylindrical surface thereof.

DIRK BOTERWEG.

FLORUS CORNELIS WILLEM SLOOFF.