

Nov. 22, 1938.

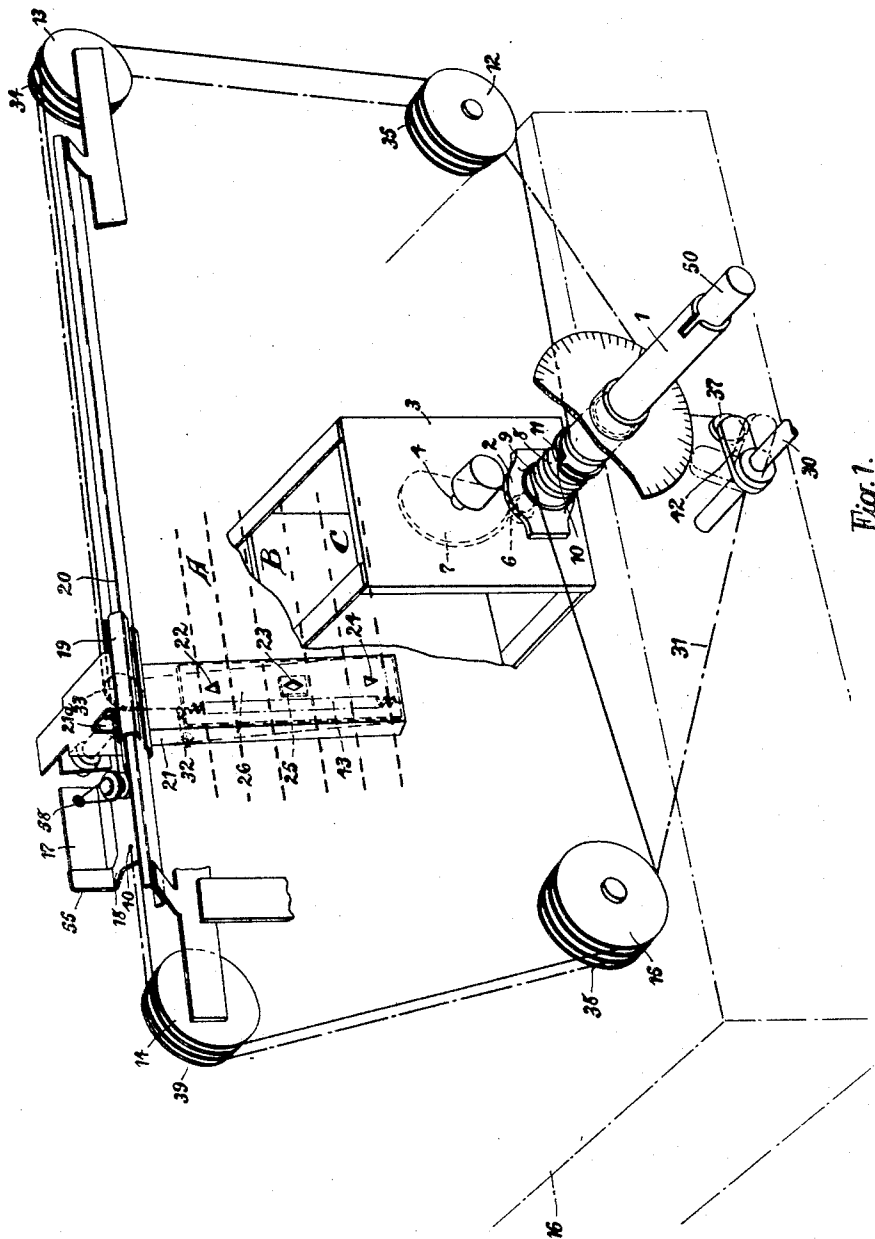
F. G. GILLARD

2,137,684

CONTROL AND POSITION INDICATOR FOR ROTATABLE ELEMENTS

Filed May 11, 1937

2 Sheets-Sheet 1



INVENTOR
FRANK GEORGE GILLARD
BY *H.S. Siver*
ATTORNEY

Nov. 22, 1938.

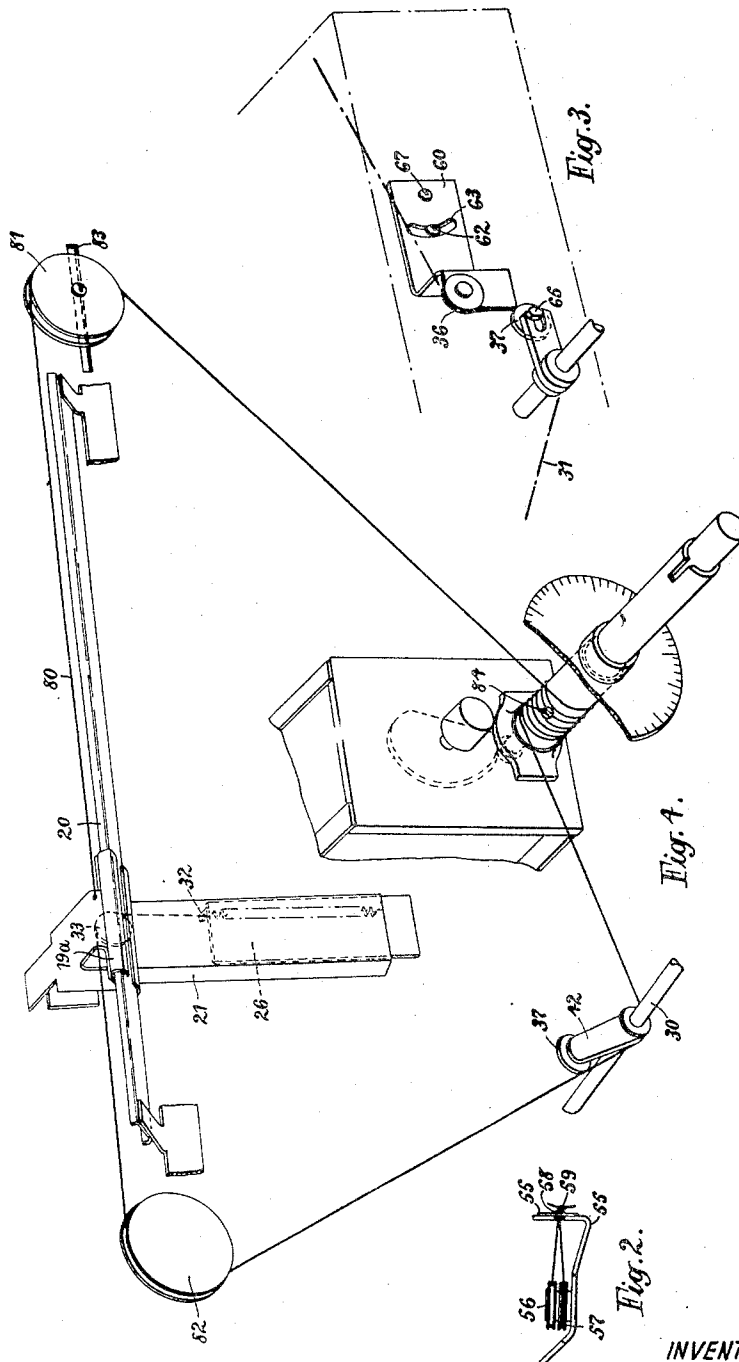
F. G. GILLARD

2,137,684

CONTROL AND POSITION INDICATOR FOR ROTATABLE ELEMENTS

Filed May 11, 1937

2 Sheets-Sheet 2



INVENTOR
FRANK GEORGE GILLARD
BY *H. B. Grover*
ATTORNEY

UNITED STATES PATENT OFFICE

2,137,684

CONTROL AND POSITION INDICATOR FOR
ROTATABLE ELEMENTS

Frank George Gillard, Ilford, England, assignor
to Electric & Musical Industries Limited, Mid-
dlesex, England, a company of Great Britain

Application May 11, 1937, Serial No. 142,063
In Great Britain May 14, 1936

4 Claims. (Cl. 116—124.1)

This invention relates to improved means for controlling and indicating the position of a rotatable element or elements such as, for example, the tuning elements of wireless receiving apparatus and the like of the kind in which movements of the member controlling the tuning element are transmitted by a belt, cord, or like flexible member to a moving member, the position of which affords an indication of the setting of the rotatable element or elements.

The primary object of the present invention is to provide an improved arrangement of the above described kind whereby a satisfactory ratio between the rates of movement of the rotatable element and of the moving member may be readily achieved and without the use of members such as belt or cord pulleys of inconveniently large size.

In accordance with the invention there is provided a control for a rotatable element such as a tuning element for a wireless receiver, with a position indicator for indicating the setting of the rotatable element, the control comprising a rotatable member geared or otherwise, connected in driving relationship with the rotatable element so as to drive it at a reduced rate, a cord or like flexible member arranged for movements to and fro by co-operation with said rotatable member, or with a member rotatable therewith, and a cursor or like indicator connected with the linearly moving portion of said flexible member. The cord or like flexible member having a linear portion arranged for movements to and fro, may be an endless belt passing around a guide pulley or pulleys in a path comprising a linear portion in which the cursor is introduced; preferably the endless belt comprises a cord secured at both ends to a tensioning device comprising a single spring to which the ends of the cord are secured, which spring acts equally and in the same sense on both ends of the string.

In the preferred arrangement a secondary driving arrangement is provided to form a slow motion drive for the rotatable member, to permit vernier or fine tuning adjustments to be made and a graduated disc or the like may be mounted on the rotatable member or a part connected therewith for co-operation with a fixed cursor or pointer to afford an indication of the extent of vernier adjustments made by an operator.

The improved arrangement as constructed for operation of the tuning element of a wireless receiver may also include means operable in conjunction with a wave changing switching mechanism whereby the linearly moving cursor

is adjusted for co-operation with alternative fixed wave range scales.

The method of carrying the invention into practice will be readily understood from the following description with reference to the accompanying drawings in which:

Fig. 1 is a diagrammatic perspective view showing the arrangement of a control for the tuning elements for a wireless receiver with a position indicator according to the invention,

Figs. 2 and 3 are detail views of the arrangement shown in Fig. 1 and

Fig. 4 is a view corresponding to Fig. 1 of another embodiment of the invention.

Referring to Fig. 1 of the drawings, it will be seen that the arrangement therein shown includes a control member 1 in the form of a hollow spindle mounted for rotation in a fixed bearing 2. This bearing is secured on a frame 3 which includes tuning condensers of a wireless receiver assembled on the spindle 4. The spindle 1 is mounted with its end projecting outside the housing or cabinet of the receiver (not shown), and the projecting end of control member 1 is provided with a suitable control knob (not shown). The end of the spindle 1 within the frame 3 carries a small toothed pinion 6 which engages with a gear or quadrant 7 on the spindle 4 of the tuning condensers. Mounted on the spindle 1 and rigidly secured thereto, for example, by a set screw, is a sleeve 8 around which are arranged several turns of cord 9, of which the central turn is anchored by being passed through a slot 10 in a flange or ring 11 which may be formed on or applied to the sleeve 8.

The cord 9 extends around suitably spaced pulleys 12, 13, 14 and 15, suitably mounted on the chassis 16 of the wireless receiver, and the ends of the cord are joined at a point between the uppermost pulleys 13 and 14 to the spring 17 of a tensioning device 18 mounted on a carrier 19, to be moved to and fro along the rail 20 which is also suitably mounted on the chassis 16. The construction of the tensioning device 18 is more fully described with reference to Fig. 2 of the drawings. Supported on the carrier 19 is a cursor 21. With this arrangement the cursor 21 will thus be drawn linearly to and fro as the spindle 1 is rotated, to an extent dependent on the diameter of sleeve 8 and the amount of movement of the spindle.

The cursor 20 is preferably made in the form of a rectangular tube as shown and in order that its position may at any time be observed,

it is illuminated internally by a lamp 21a mounted on the carrier 19, from which light falls on the rear surface of the cursor which is made slightly sloping and diffusely reflecting so as to illuminate the apertures 22, 23 and 24 which may be viewed through a scale suitably located in front of the cursor, the aperture which is illuminated being selected in accordance with the position of an aperture 25 in a shutter 26 shown in dotted lines in the drawings.

By suitable selection of the gear ratio between the small pinion 6 on the control member 1 and the quadrant 7 on the spindle 4 of the tuning condensers, and of the diameter of the sleeve 8, a desired wide range of movement of the cursor 21 for a given movement of the tuning elements can be obtained without the use of members of inconveniently large diameter.

The shutter 26 with its aperture 25 is intended to limit the indication given by the light passing through the aperture 22, 23 or 24 to a particular region of the scale in front of the cursor in accordance with the position of a wave-change switch of which the spindle is indicated at 30. For this purpose one end of a chain or cord 31, shown chain-dotted, is secured to a lug 32 on the mask 26, the chain or cord 31 passing over pulley 33 mounted on the upper part of the cursor 21, and then over pulleys 34, 35, 36, 37, 38 and 39, the other end of the cord or chain 31 being secured at 40 to the carrier 19. Pulleys 34, 35, 38 and 39 are similar to and mounted on the same spindles as the pulleys 13, 12, 15 and 14 respectively. Pulley 36 is mounted adjacent to the spindle 30 of the wave change switch and pulley 37 is mounted on a crank 42 rigidly secured on the spindle 30. As the wave-change switch is turned, the pulley 37 moves to one of the positions indicated in dotted lines on either side of the pulley, so that the chain or cord 31 is pulled or slackened, thus causing the mask 26 with aperture 25 to move up or down within the cursor 21 to register with the appropriate aperture 22 or 24 instead of the aperture 23 as shown in the drawings. These apertures may, for example, register with long wave, medium wave and short wave scales.

In order that the mask 26 may move uniformly without sticking, a spring 43 under tension is connected between lug 32 and the bottom of the cursor 21 as shown in dotted lines. It will be seen that when the control member 1 is rotated to move the cursor 21 transversely cord or chain 31 will be pulled by virtue of its attachment to carrier 19, and will move therewith. However, as the length of the cord is not altered during such movement, the shutter 26 will remain in the same position relative to cursor 21 and the aperture 25 in the shutter will remain in register with the same aperture 22, 23 or 24 throughout.

In order that a fine adjustment of the position of the tuning condensers can be carried out, a secondary driving arrangement is provided for acting on the spindle 1. This secondary driving arrangement may be mounted internally of the spindle 1 and may comprise a simple ball clutch device of known type operated from the spindle 50 (Fig. 1). A scale may be provided on spindle 1, adapted to co-operate with a suitable reference mark to indicate the amount of movement given to the spindle 1.

In carrying the invention into practice, it has been found necessary to give special attention to the tensioning of the cord 9, and for this reason, the tension device 18 is given the form shown in

Fig. 1. Another view of this device is given in Fig. 2. It will be seen from this figure that the tensioning device used comprises an L-shaped extension 55 of the carrier 19, the leaf spring 17 being secured to the toe of the L so as to lie behind two pulleys 56 and 57 mounted on the carrier, around each of which one of the ends of the cords pass, both ends being received in an aperture 58 in spring 17. The strings may be anchored in the aperture 58 by being knotted as shown at 59 in Fig. 2. With this arrangement it is found that the tension of the string can be readily adjusted, and that on rotation of the spindle 1 in either direction, the carrier 19 is moved with no appreciable back-lash.

Preferably also, means are provided to allow of the adjustment of the tension of the cord or chain 31. A suitable arrangement for this purpose is shown in Fig. 3. Here it will be seen that the pulley 36 mounted adjacent the spindle 30 of the wave change switch is mounted on a bracket 60 which is held by two fixing screws 61 and 62 on the chassis, the screw 62 being located in an arcuate slot 63 so that before the bracket is finally secured in position, the bracket can be rotated about screw 61 till the pulley 36 occupies the correct position to cause cord 31 to have the proper tension. Preferably also the position of the pulley 37 on the crank 42 is made adjustable, for example by mounting the pulley in a slot 64 in the crank, the position of the pulley being fixed by tightening a clamping nut 65 provided on the threaded end of the pulley spindle. With the pulley 35 adjustable in this way it is possible to take up readily any slack in the chain 31 which may occur during use.

In Fig. 4 an embodiment of the invention is shown which is a simpler arrangement than that shown in Fig. 1. Corresponding parts in both figures are indicated by like reference numerals. Referring to Fig. 4 it will be seen that the cursor 21 is mounted on a carrier 19a which may be moved to and fro on a rail 20 as in the case of the carrier 19 of Fig. 1. However, instead of providing separate cords 9 and 31 for moving the cursor and for actuating the shutter 26 respectively a single cord 80 is provided connected at one end to the carrier 19a and passing over a pulley 81 and around sleeve 8 of the main control spindle 1 and around a pulley 37 on the crank 42 on the wave change switch, and the other end being secured to the lug 32 on the shutter 26.

In this arrangement, as in the case of the cord or chain 31 of Fig. 1, the cord 80 will be pulled or slackened to raise or lower the shutter 26 when the spindle 30 of the wave change switch is rocked. However, as the carrier 19a with associated cursor 21 is held against movement by virtue of its connection to the end of cord 80 not connected to shutter 26, the position of the cursor will not be affected by movement of the wave change switch.

Further, when the main control spindle 1 is operated one end of the cord 80 will be wound on to the sleeve 1 and the other end wound off, as in the case of the cord 9, Fig. 1, and the cursor 21 will be moved to or fro according to the direction in which the spindle is turned. However, as the path of the cord 80 between the pulley 33 on the carrier 19a, over pulley 81 and sleeve 8, pulley 37, pulley 32 and back to pulley 33 does not change in total length unless the wave change switch is actuated, the shutter 26 will not be moved relative to the cursor 21 upon actuation of the main spindle 1 alone.

It will also be observed that the arrangement of Fig. 4 has been further simplified by the omission of pulleys such as 12, 36 and 15, shown in Fig. 1, as well as the pulleys over which the chain or cord 31 is passed. Also in order to allow for the tensioning of the cord 80 the pulley 81 is shown as adjustably mounted in a groove 83.

There is also a further variation of Fig. 4 over that shown in Fig. 1 in that the cord 80 is secured to the sleeve 8 by means of a set screw 84 instead of being passed through groove 10 in a ring or flange such as 11 shown in Fig. 1.

It will be seen that due to the actuation of the cursor 21 and shutter 26 by a single flexible member 80, a tensioning device such as that comprising bracket 18 and spring 17 of Fig. 1 cannot be used in the arrangement of Fig. 4.

I claim:—

1. A control mechanism for indicating the setting of the rotatable tuning element of a radio receiver, comprising a tuning shaft, means interconnecting said shaft with the tuning element in driving relationship so as to drive it at a reduced rate, a flexible cable having a linearly moving portion and a portion wound about said tuning shaft, a guide member in spaced relation to said linear cable portion, a carrier slidably mounted on said guide member, said carrier having a spring portion to which are secured the two ends of the flexible cable to maintain the cable suitably tensioned, and an indicator supported from the carrier whereby upon rotation of said tuning shaft, said indicator may be moved to and fro to give an indication of the setting of said rotatable tuning element.

2. A control mechanism for indicating the setting of the rotatable tuning element of a radio receiver, comprising a tuning shaft, means interconnecting said shaft with the tuning element in driving relationship, a flexible cable having a

linearly moving portion and a portion wound about said tuning shaft, an indicator connected with the linear moving portion of said flexible cable, said indicator being provided with a plurality of light apertures positioned at spaced intervals, a light source carried by the indicator at one side thereof, a reference scale positioned on the opposite side of the indicator and having a plurality of screen sections corresponding with and in alignment with the light apertures, a shutter member for selectively rendering but one of the apertures operative at any given time, and means for actuating said shutter member, the arrangement being such that upon rotation of said tuning shaft and the actuation of said shutter member, said indicator may be moved to and fro to selectively give a visible indication on any one of the screen sections of the setting of said rotatable tuning element.

3. A control mechanism according to claim 2 wherein the shutter actuating means comprises a second flexible cable independently operable from the first cable.

4. A control mechanism for indicating the rotative position of the tuning element of a radio receiver, comprising a scale having a plurality of parallel screen sections, an indicator member positioned behind the scale and operatively connected to the radio tuning element and provided with a plurality of light apertures therethrough positioned at spaced intervals and in alignment with the scale screen sections, a source of light carried behind the indicator member, and a shutter member also carried by the indicator for selectively rendering but one of the apertures operative at any given time, whereby an image of the selected aperture is projected on the corresponding screen section to indicate the rotative position of the tuning mechanism.

FRANK GEORGE GILLARD. 40