Feb. 23, 1943. R. J. DE JONG 2,312,239

RADIO CONTROL APPARATUS

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Fig. 1.

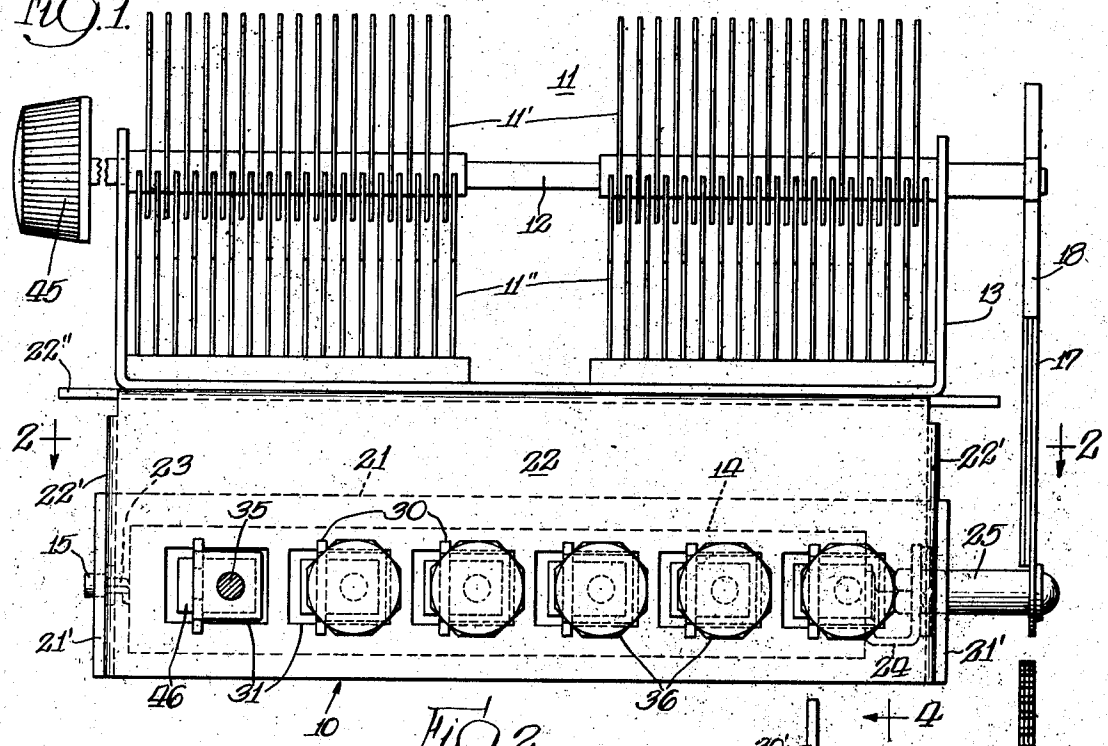
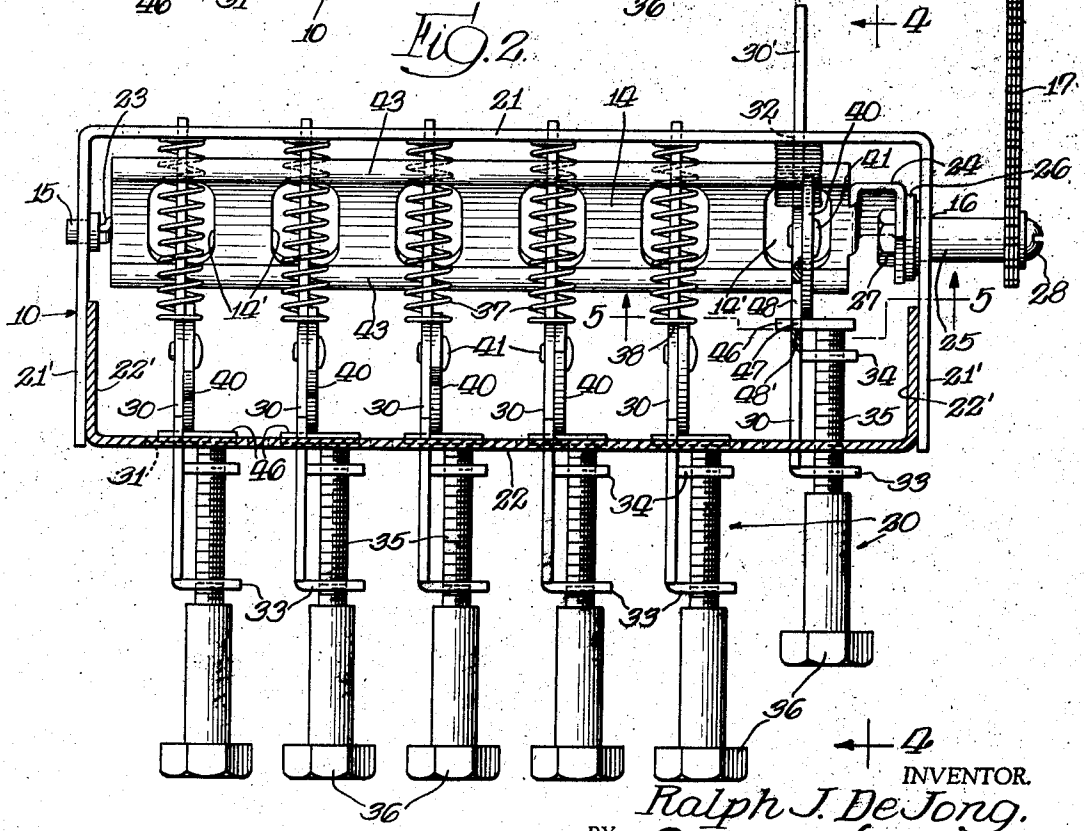


Fig. 2.



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Fig. 3.

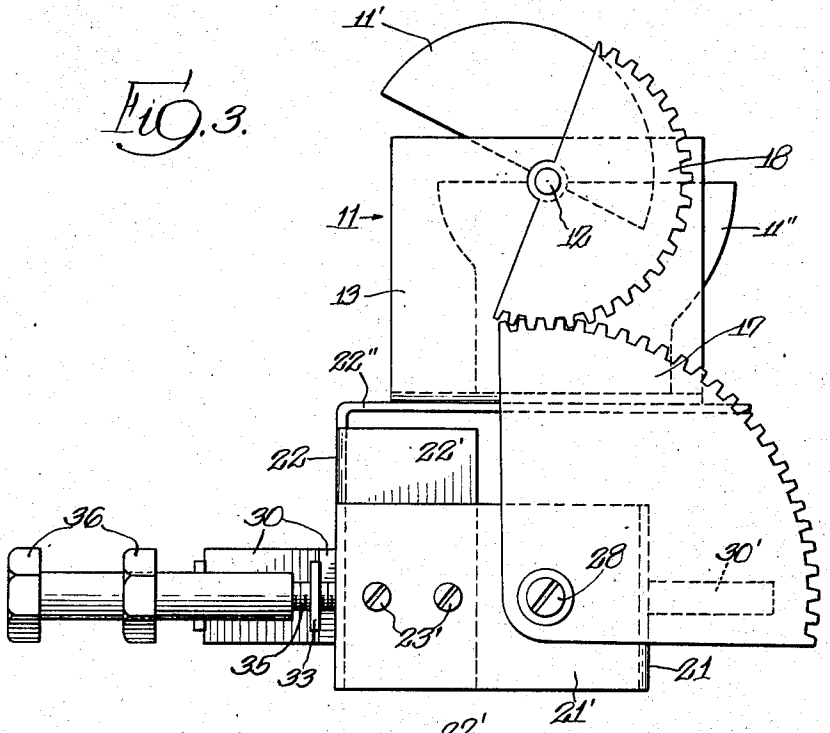


Fig. 4.

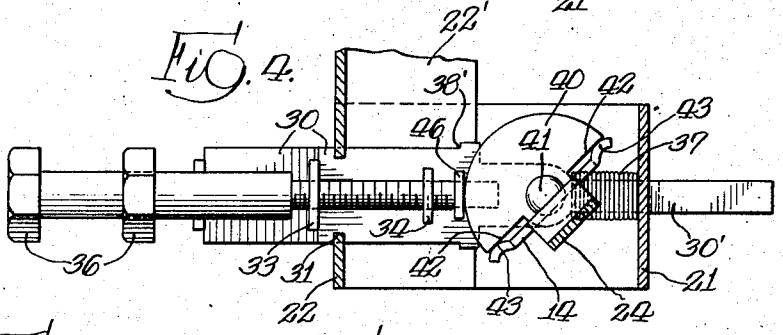


Fig. 6.

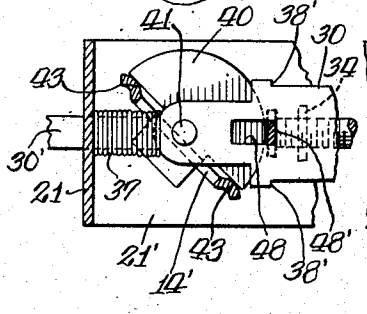
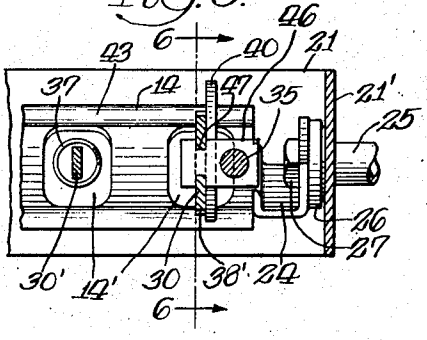


Fig. 5.



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UNITED STATES PATENT OFFICE

2,312,239

RADIO CONTROL APPARATUS

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Application March 23, 1938, Serial No. 197,688

16 Claims. (Cl. 74—10)

More particularly, the invention relates to radio tuning or station selector controls for radio receiving sets.

It is the general object of the invention to provide a new and improved control apparatus for radio receiving sets having a plurality of station selecting devices operable individually to tune in predetermined stations.

Radio receiving sets are generally provided with a station tuning means in the form of a variable condenser operable by a control knob through suitable gearing for changing the wave length to which the apparatus responds. The position of the condenser is generally indicated by means of a pointer and dial or other visible means. In order to facilitate tuning in the more popular stations and to obviate the need for watching the dial while selecting the station, radio sets have been provided with various types of controls. This invention relates to a type wherein a plurality of push button devices are arranged to actuate the tuning condenser through suitable connections, the push button devices having adjustable means thereon which may be pre-set to correspond to the condenser positions of a number of different stations. It is an object of the invention to provide such a push button type of radio station selector embodying a plurality of adjustable selector devices of new and improved construction.

Another object is to provide a new and improved control of this character constructed so that the setting of each selector device may be adjusted without the use of any tools by manipulation of the push button itself and the usual manual tuning control knob.

Another object is to provide a control of this character with improved means for clamping or securing each selector device in the desired position.

Further objects and advantages will become readily apparent from the following detailed description, taken in connection with the accompanying drawings, in which:

Fig. 1 is a front elevation of a preferred form of the invention, showing one selector device depressed.

Fig. 2 is a plan section approximately along the line 2—2 of Fig. 1.

Fig. 3 is an end elevation looking at the right hand end of Fig. 1.

Fig. 4 is a fragmentary vertical section along the line 4—4 of Fig. 2.

Fig. 5 is a fragmentary section along line 5—5 of Fig. 2.

Fig. 6 is a fragmentary section along line 6—6 of Fig. 5.

For purposes of disclosure, I have illustrated in the drawings and shall hereinafter describe in detail the preferred embodiment of the invention with the understanding that I do not intend to limit my invention to the particular construction and arrangement shown, it being contemplated that various changes may be made by those skilled in the art without departing from the spirit and scope of the appended claims.

In the form selected for purposes of disclosure, the invention is illustrated as comprising a support or a frame 10, a tuning condenser 11 with movable plates 11' secured to a shaft 12 rotatably mounted on a U-shaped bracket 13 on the frame, a control member 14 rotatably mounted in bearings 15 and 16 on the frame, gear devices 17 and 18 connecting the control member to the condenser shaft and a plurality of push button operated devices or selector elements 20 slidably mounted on the frame 10 in laterally spaced parallel relation and operable to rotate the control element 14 through any one of a plurality of preselected angular positions effective to adjust the condenser to positions corresponding to preselected broadcasting stations. A manual control knob 45 may be provided on the shaft 12 (or connected thereto through suitable reduction gearing in a manner well known in the art) for initially adjusting the selector elements and for tuning in additional stations.

The frame 10 is formed of two U-shaped members 21 and 22, the adjacent ends 21' and 22' of which overlap and are secured together by means of screw devices 23 (Fig. 3). The front and side portions of the member 22 extend upwardly above the upper edge of the member 21 and, as illustrated most clearly in Figs. 1 and 3, the member 22 has a rearwardly bent portion 22'' which serves as a shelf for supporting the condenser 11. The supporting bracket 13 for the condenser shaft is suitably secured to this supporting shelf and carries the stationary condenser plates 11''.

The control element 14 is herein shown in the form of an elongated flat member or cam follower bar having a projection 23 at one end journaled in the bearing 15 and an angularly bent portion 24 at the other end, to which a hollow operating shaft 25 is secured by means of a flange 26 and a nut 27. The hollow shaft 25 is journaled in the bearing 16 and carries the segmental gear 17, the gear being preferably splined to the shaft and secured thereto by means of a headed screw device 28, to the inner end of which

the nut 27 is secured. In the form illustrated, the control element 14 is arranged to be adjusted through an angle of 90°, and, in order to rotate the movable element of the condenser 11 through 180°, the gear device 18 on the condenser shaft has a radius one-half as long as the radius of the segmental gear 17.

The station selector devices 20 are herein shown as comprising push bars 30 slidably mounted in suitable vertical slots 31 in the frame member 22 and slots 32 in the rear frame member 21 and extend through openings 14' in the control element 14. The forward ends 33 of the push bars 30 are bent transversely as shown in Fig. 2, and parallel projecting lugs 34 are secured to intermediate portions of the bars, the ends 33 and lugs 34 being suitably screw-threaded to receive screw-threaded devices 35, the forward ends of which carry push buttons 36 by which the push bars may be operated. In order to return the push bars to their forward positions, coil springs 37 are provided. These springs as illustrated in the drawings surround reduced portions 30' of the push bars intermediate the frame member 21 and shoulders 38 on the push bars and are effective to return the push button devices to their forward or extended positions as determined by the engagement of shoulders 38' on the bars with the frame member 22, in which position five push buttons are illustrated in Fig. 2. The slots 31 in the member 22 are enlarged at 31' and 31'' to permit the projections 33 and 34 on the push bars to pass therethrough.

The means whereby the push button devices are effective to operate the control element or cam bar 14 will now be described. Each push bar 30 carries a semi-circular cam member 40 (see Figs. 2 and 4 to 6), which cam member is rotatably secured to an intermediate portion of the push bar by means of a pivot device or rivet 41. Radially extending edges 42 on the cam members are arranged to engage corresponding follower portions 43 (Figs. 4 and 6) on the cam bar 14 so as to swing the cam bar into the plane of the edges 42. In the form illustrated herein, the follower portions 43 on the cam bar are in the form of ribs extending along the longitudinal edges thereof. The push bars 30, as mentioned hereinbefore, pass through openings 14' in the control element, and it will be evident from Fig. 4 that the axis of the cam members 40 coincide with the axis of the cam bar when the push bar is in its rear position, as shown in Fig. 4.

The cam members 40 may be adjusted angularly with respect to the push bars 30 when they are unclamped therefrom by manipulating the condenser shaft 12 by means of the usual control knob 45 and then pressing the particular push bar rearwardly by means of its push button until the cam surfaces 42 engage the follower portions 43 of the control element. The cam member may then be secured in this adjusted position by means of a clamp device including the screw-threaded device 35 which is operable by the corresponding push button 36. In order to insure accurate clamping of the control cams, clamp members or levers 46 are fulcrumed on the push bars 30 and extend outwardly therefrom as shown in Fig. 2 across the adjacent peripheral surface of the cam member 40 and in back of the adjacent end of the screw device 35. These clamping members are provided with opposed recesses 47 which form a reduced portion engageable in a slot 48 in the push bar, the forward end 48' of the slot forming a fulcrum for the clamping member.

It will be readily apparent from Fig. 2 that by rotating the push button 36 in a clockwise direction (Fig. 1), the end of the screw device 35 will bear against the clamp member 46 and clamp it against the peripheral surface of the cam member 40. By providing a clamp member such as 46 intermediate the screw device and the cam member, inaccuracies of adjustment are avoided which might occur if the screw device engages the cam member directly. Furthermore, leverage is obtained by fulcruming the clamp member to one side of the push bar and having the end of the screw device engage the clamp member at a point spaced outwardly from the other side of the cam member.

In a radio receiving apparatus equipped with a control of the type herein disclosed, the individual selector devices are generally adjusted for the selection of the more popular broadcasting stations. The control may be adjusted initially by first tuning in one of the desired stations by means of the manual control knob 45. Then, by depressing one of the push rods with the cam 40 thereon free to rotate, the cam, upon engaging the cam bar 14, will rotate into the position corresponding to the angular position of the cam bar. The cam may then be clamped in its adjusted position merely by turning the push button itself and without the aid of any tools. With the clamping means herein provided, the cam member is securely held against rotation on the push bar. The resiliency of the clamp member 46 also tends to prevent the push button from loosening accidently. In a similar manner, the remaining push button operated devices may be adjusted so that they will automatically select other desired stations. Once the selector devices have been adjusted, it is merely necessary to push the button corresponding to the station desired and the tuning condenser will be moved automatically to the proper position upon depressing the proper button.

The invention provides a simple and readily operable and adjustable structure which facilitates selection of any one of a plurality of broadcasting stations.

I claim as my invention:

1. A control device of the character described comprising, in combination, a support, a control member pivotally mounted on said support and adjustable to any of a plurality of different angular positions, a plurality of control devices for adjusting said member slidably mounted for reciprocatory movement toward and from said member and each comprising a bar having a bent-over end and a spaced projecting lug, a screw-threaded device passing through apertures in said end and lug and in screw-threaded engagement with one thereof, a semi-circular cam member rotatably mounted on said bar and against the face thereof from which said lug projects and having an arcuate end adjacent one end of said screw device and a chordal end in the plane of the rotational axis of said cam member, said chordal end arranged to engage said control member on opposite sides of its axis and move it in one direction or the other into the plane of the said chordal end, and a clamp member interposed between the end of the screw device and the arcuate periphery of said cam member and pivotally mounted on said bar.

2. A control device of the character described comprising, in combination, a support, a control

member pivotally mounted on said support and adjustable to any of a plurality of different angular positions, a plurality of control devices for adjusting said member slidably mounted for reciprocatory movement toward and from said member and comprising a bar having a projecting lug thereon, a screw-threaded device passing through an aperture in said lug and in screw-threaded engagement therewith, a semi-circular cam member rotatably mounted intermediate the ends of said bar and against the face thereof from which said lug projects and having an arcuate end adjacent one end of said screw device and a chordal end in line with the center of rotation of said cam member, said chordal end arranged to engage said control member on opposite sides of its axis and move it in one direction or the other into the plane of the chordal end, and non-rotatable clamp means interposed between the end of the screw device and the arcuate end of said cam member and operable by the screw-threaded device to clamp the cam member in its adjusted position.

3. A control device of the character described comprising, in combination, a supporting frame, a plurality of laterally spaced and parallel push bars slidably mounted on said frame, cam devices adjustably mounted on said push bars, a common follower member for said cam devices adapted to be connected to a tuning condenser, means for securing said cam devices in their adjusted positions comprising push buttons having screw-threaded shanks engaging in correspondingly screw-threaded portions of said push bars, and clamp members having one end thereof fulcrumed on said push bars, intermediate portions engaging the cam devices and free ends engaged by said threaded shanks, and spring means for returning the push bars to inoperative position.

4. A control device of the character described comprising, in combination, a support, a tuning condenser thereon, a control member pivotally mounted on said support and adjustable to any of a plurality of different angular positions, means connecting said member to actuate said condenser, a plurality of control devices for adjusting said member movably mounted for movement toward and from said member and each comprising a bar and a cam member adjustably mounted on said bar and operable, when the bar is moved in one direction, to engage said control member and move it in one direction or the other into a preselected position determined by the position of the cam member, and means including a screw device carried on the bar for clamping the cam member in its adjusted position, and means secured to said screw device for operating both the screw device and the bar.

5. A control device of the character described comprising, in combination, a supporting frame, a plurality of selector devices movably mounted on said frame, cam members adjustably mounted on said selector devices, a common follower member for said cam members, and means for securing said cam members in their adjusted positions comprising push buttons having threaded shanks engaging in correspondingly threaded portions of said selector devices, and non-rotatable clamp members intermediate the ends of the shanks of the push buttons and the cam members.

6. In a mechanism for positioning a control of a radio apparatus, a combination including: a supporting frame; a plurality of selector devices slidably mounted on said frame for reciprocatory movement, each of said devices comprising an adjustably mounted positioning element; a common positionable follower member for said positioning elements; and means including a rotatable male screw carried by each of said selector devices and extending substantialy longitudinally thereof for retaining said elements in their adjusted positions; each of said screws having means on the external end thereof for operating both the screw and the device carrying said screw; said latter means attached to said screw so that both rotate substantially as a unit.

7. A control device of the character described comprising, in combination, a supporting frame; positionable means mounted to rotate about an axis; and a plurality of rectilinearly movable selector devices slidably mounted on said frame and each comprising a bar, a positioning member adjustably mounted on said bar and adapted upon movement of the bar in one direction to engage said positionable means on one side of its axis and rotate it to a position at which said positionable means engages said positioning member on the other side of said axis, and means including a screw device extending longitudinally of said bar for clamping the positioning member in its adjusted position, and means secured to said screw device for operating both the screw device and the bar.

8. In a radio tuning mechanism, a combination including: a supportnig structure; a positionable control element for said mechanism movably mounted on said structure; a plurality of selector devices for positioning said control element each sildably mounted for rectilinear movement in a plurality of guides provided by said structure; each of said devices comprising adjustable means for predetermining by the adjustment thereof the position that said element will occupy upon completion of the operating stroke of said device in one direction, said means comprising an externally screw-threaded rotatable member for maintaining said adjustment; and a plurality of means disposed entirely outside the space between said guides and each attached to the external end of one of said screw-threaded members and rotatable therewith for operating both the member and the device comprising said member.

9. In a radio tuning mechanism, a combination including; a supporting structure; a positionable control element for said mechanism movably carried by said structure; a plurality of selector members each slidably mounted for rectilinear movement in a plurality of guides provided by said structure; a plurality of adjustable means each carried by one of said members for engaging said control element upon movement of said member in one direction and for positioning said element according to the adjustment of said means; said means comprising a rotatable male screw extending substantially longitudinally of the associated member and in screw-threaded engagement therewith for maintaining said adjustment; and means free from engagement with said guides attached to the external end of said screw and rotatable therewith for operating both the screw and the member carrying said screw.

10. The combination with the positionable control of a radio tuning mechanism, of a plurality of guiding supports and a rectilinearly movable device for positioning said control, said device comprising: a member slidably mounted on said supports, adjustable means for predetermining the position that said control will occupy upon completion of an operating stroke of

said device, said means comprising a rotatable male screw extending substantially longitudinally of said member and in screw-threaded engagement therewith for maintaining said means in its adjusted position, and means attached to the external end of said screw and rotatable therewith for operating both the screw and the device.

11. In a radio tuning mechanism, a combination including: a rotatable control element and positioning means for rotating said element, said means comprising: a rectilinearly movable device; an angularly adjustable member carried by said device for determining the position to which said element will be rotated upon operation of said positioning means; and means for securing said adjustable member in its adjusted position comprising a push button having a screw-threaded shank extending substantially longitudinally of said positioning means and engaging in corresponding screw-threaded portions of said device, and clamping means intermediate the end of the shank and the member.

12. The combination with the rotatable control element of a radio tuning mechanism, of a rectilinearly movable device for rotating said control element to a pre-selected angular position, said device comprising: an angularly adjustable member for determining the angular position to which said element will be rotated upon movement of said device in one direction, and means including a screw extending substantially longitudinally thereof for clamping the adjustable member in its adjusted position, and means secured to said screw for operating both the screw and the device.

13. In a radio apparatus, a combination including: a resonance-varying instrument; a movable control element for said instrument; a rotatable positionable means operatively connected to said control element; a movable device for positioning said positionable means, said device comprising an adjustably mounted cam member for engaging said positionable means on either side of its rotational axis upon movement of said device in one direction and for determining by its adjustment the angular position at which said positionable means will stop upon the engagement of said cam by said positionable means on the opposite side of said axis; said positionable means and said cam so constructed that a line connecting their points of engagement on opposite sides of said axis will pass through said axis.

14. In a radio apparatus, a combination including: a resonance-varying instrument; means for operating said instrument comprising a positionable rocker member pivoted on said support and having an opening therein; a pair of guides on said support disposed on opposite sides of said rocker member; a rectilinearly movable operating device for positioning said rocker, said device passing through said opening and slidably mounted on said guides; and a compression spring surrounding said device and expanding between one of said guides and an enlarged portion of said device, said spring extending through said opening to urge said device to a rest position.

15. In a radio tuning mechanism, a combination including: a supporting structure; a positionable control element for said mechanism movably mounted on said structure; a rectilinearly movable selector device for positioning said control element slidably mounted in a plurality of guides provided by said structure and comprising adjustable means for predetermining by the adjustment thereof the position that said element will occupy upon completion of the operating stroke of said device in one direction, and a rod having externally screw-threaded portions engaging in corresponding screw-threaded portions of said device for maintaining said adjustment; and means free from engagement with said guides attached to the external end of said rod and rotatable therewith for operating both the device and the screw-threaded portions of the rod.

16. In a radio tuning mechanism, a combination including: a supporting structure; a positionable control element for said mechanism movably mounted on said structure; and a plurality of individually operable selector devices for positioning said control element, each of said devices slidably mounted in a plurality of guides provided by said structure and each comprising adjustable means for predetermining by the adjustment thereof the position that said element will occupy upon completion of the operating stroke of said device in one direction, and a rod having externally screw-threaded portions engaging in corresponding screw-threaded portions of said device for maintaining said adjustment; and a plurality of knobs free from engagement with said guides and each keyed to the external end of one of said rods whereby said rod may be rotated by the fingers of the operator.

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