

Dec. 12, 1944.

G. M. LANE ET AL

2,365,088

STATION SELECTOR

Filed Nov. 29, 1937

2 Sheets-Sheet 1

FIG. 5

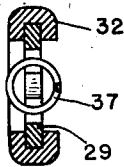
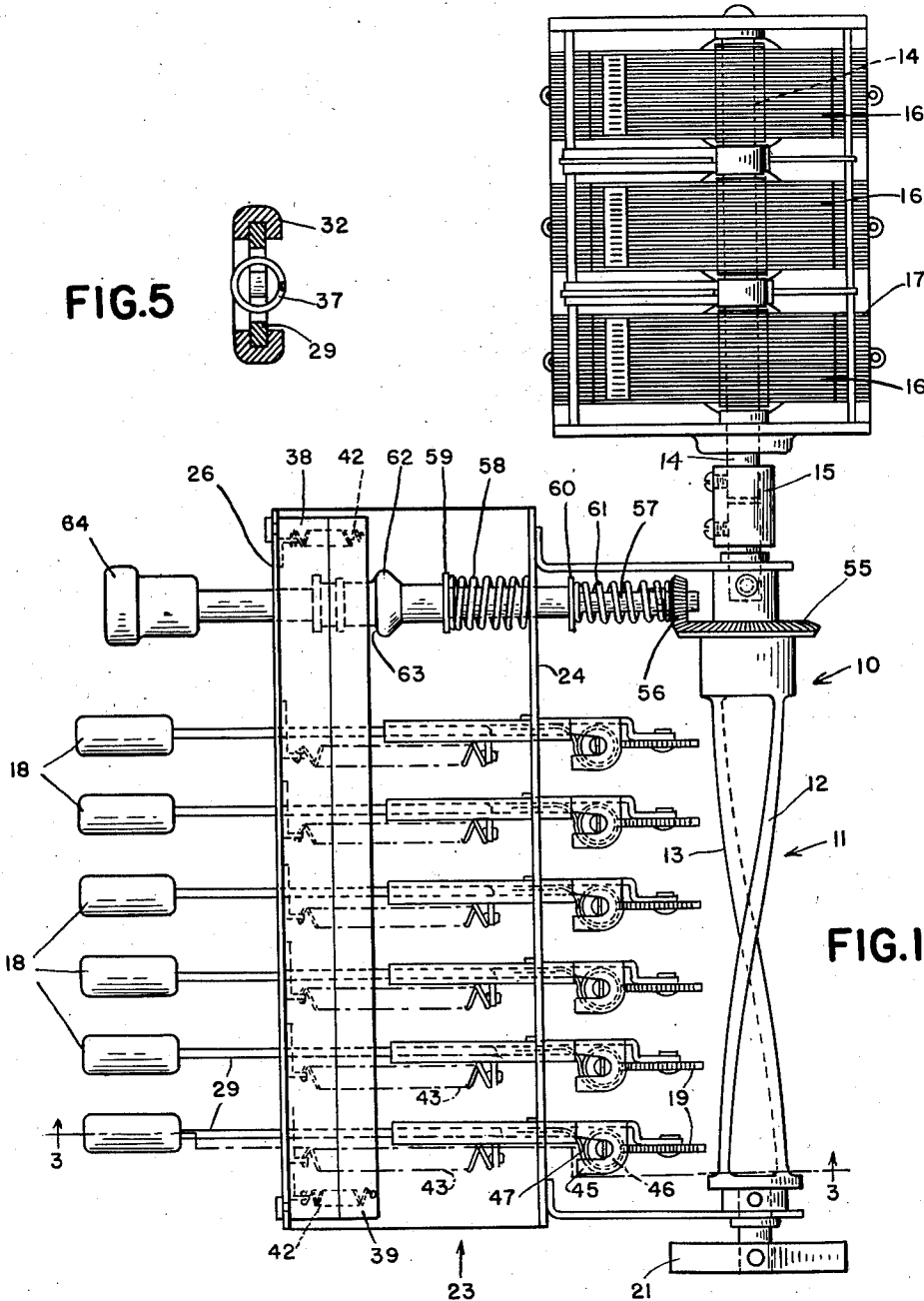


FIG. 1

INVENTORS
GUY M. LANE
HENRY W. MACKEY

BY

W. H. Hutton *Hubert A. Belknap*
ATTORNEYS

Dec. 12, 1944.

G. M. LANE ET AL

2,365,088

STATION SELECTOR

Filed Nov. 29, 1937

2 Sheets-Sheet 2

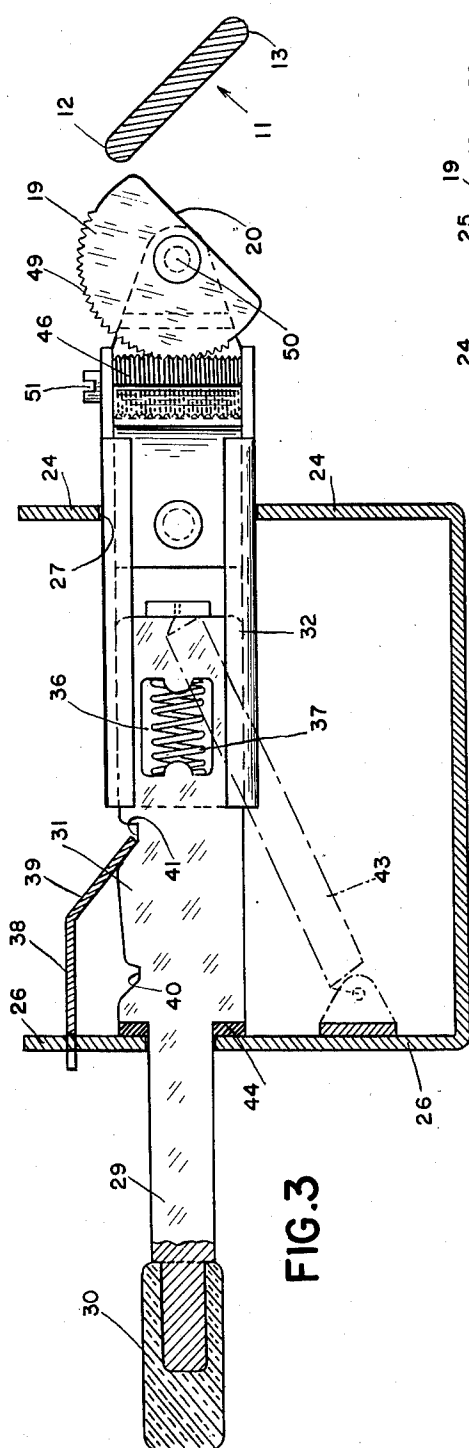


FIG. 3

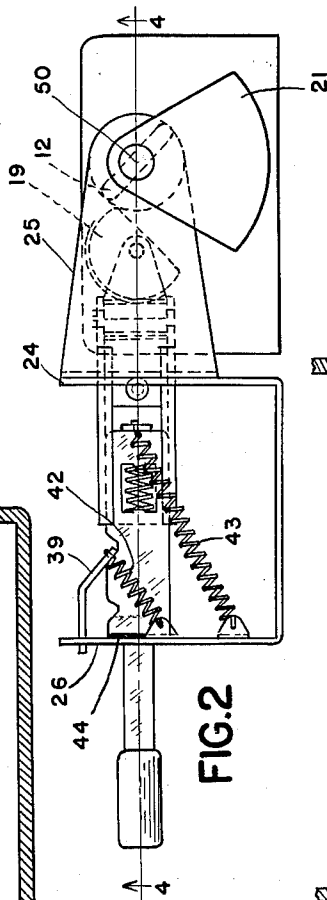


FIG. 2

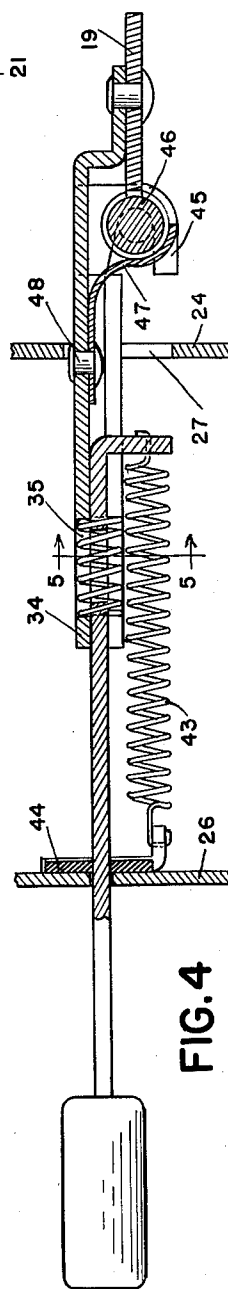


FIG. 4

INVENTORS
GUY M. LANE
HENRY W. MAGKEY

BY
Whittemore Hulbert & Belknap
ATTORNEYS

UNITED STATES PATENT OFFICE

2,365,088

STATION SELECTOR

Guy M. Lane and Henry W. Mackey, Detroit,
Mich., assignors to The Crosley Corporation,
Cincinnati, Ohio, a corporation of Ohio

Application November 29, 1937, Serial No. 177,163

12 Claims. (Cl. 74-10)

This invention relates generally to radio receiving apparatus and refers more particularly to station selectors of the type embodying a plurality of controls for independently adjusting the variable condensers in the tuning circuit of the radio receiving apparatus.

The principal object of this invention resides in the provision of mechanical means operatively connecting each of the controls to the condensers and effective upon selectively manipulating the controls to tune the radio circuit to the predetermined wave length.

Another advantageous feature of this invention resides in the provision of a station selector wherein the controls are in the form of independently operable push buttons respectively mechanically connected to the variable condensers in such a manner that movement of any one of the buttons to its extreme position of adjustment operates the condensers as a unit to tune the radio circuit to a particular wave length. In accordance with this invention, the push buttons correspond to the wave lengths assigned to different stations and the radio circuit may be tuned to selectively receive these stations by merely pressing the push buttons to their extreme operative positions.

A further object of this invention consists in the provision of a station selector having means in association therewith for actuating the condensers to tune the radio circuit independently of the push buttons.

In addition to the foregoing, the present invention contemplates a station selector which is relatively simple in construction and which is capable of accurately tuning the radio circuit to any one of a plurality of wave lengths with the minimum amount of attention and skill on the part of the operator. This feature, as well as the foregoing and other objects, will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings, wherein—

Figure 1 is an elevational view of a station selector constructed in accordance with the present invention and operatively connected to a series of variable condensers;

Figure 2 is a side elevational view of the construction shown in Figure 1;

Figure 3 is an enlarged sectional view taken substantially on the plane indicated by the line 3-3 of Figure 1;

Figure 4 is an enlarged sectional view taken substantially on the plane indicated by the line 4-4 of Figure 2; and

Figure 5 is a cross sectional view taken substantially on the plane indicated by the line 5-5 of Figure 4.

In general, the station selector comprises a revoluble shaft 10 having a 90° spiral 11 extending axially of the shaft and having the opposite edges forming opposed cam surfaces 12 and 13. One end of the shaft 10 is operatively connected to a shaft 14 by means of a coupling 15, and the shaft 14 is shown in Figure 1 as being common to the rotors 16 of a plurality of variable condensers adapted to be electrically connected in the usual way in a tuning circuit of a radio receiver to vary the capacitance of this circuit. In actual practice, the plates of each of the rotors 16 are secured to the shaft 14 in spaced relationship axially of the shaft, and these plates are moved relative to the stator plates 17 to vary the capacities of the condensers by the shaft 10.

Supported for movement toward and away from the spiral portion 11 of the shaft 10 in a plane including the axis of rotation of the latter shaft is a plurality of push button units 18. As will be more fully hereinafter set forth, the push button units are mounted for movement independently of each other toward the shaft 10, and each unit has a cam member 19 secured to the end thereof adjacent the shaft 10 for movement therewith. Each cam member 19 is provided with a cam surface 20 which extends transversely or tangentially of the spiral portion 11 of the shaft 10 and is adapted to alternatively frictionally engage the cam surfaces 12 and 13. Upon reference to Figure 3, it will be noted that the cam members 19 are in the form of semi-circular discs and are mounted on their respective push button units for adjustment independently of each other about an axis parallel to the axis of rotation of the shaft 10 to vary the angle of inclination of the cam surfaces 20 relative to the spiral portion 11 of the shaft 10.

The shaft 10 is normally maintained in the position thereof shown in Figure 2 relative to the cam members 19 on the push buttons by means of the weight 21 secured to the shaft and having sufficient mass to automatically return the shaft to a position wherein the condensers are in their zero positions. When the shaft 10 is in its inoperative position defined above, the push buttons 18 are, of course, in their retracted positions and the cam surfaces 20 on the cam members 19 are located with their forwardmost edges adjacent the cam surface 12 on the spiral portion 11 of the shaft. The angle of inclination of each

of the cam surfaces 20 with respect to the spiral portion 11 of the shaft 10 is accurately adjusted so that movement of any one of the push button units 18 toward the shaft 10 effects a rotation of the shaft throughout the number of degrees required to tune the radio receiving circuit to the wave length assigned to the particular push button operated. In other words, selective operation of the push buttons varies the capacity of the condensers through the shaft 10 to tune the radio receiving circuit to different predetermined wave lengths. As will be presently described, provision is made herein for latching each push button unit in its operative position wherein the surface 20 of the cam carried thereby is engaged with the spiral portion 11 of the shaft 10, and the latch for accomplishing this result is automatically released upon manipulation of any one of the other push button units. When, however, all of the push buttons are released, the weight 31 functions to rotate the shaft and associated rotors of the variable condensers to their zero positions.

It follows from the foregoing that each push button unit corresponds to a particular wave length and that the different number of wave lengths capable of being tuned depends upon the number of push buttons employed. Although six push button units are shown in the present illustrative embodiment of the invention, it will, of course, be understood that this number may be varied without departing from the spirit or scope of this invention.

Referring now more in detail to the particular construction of the station selector forming the subject matter of this invention, it will be noted that the push button units 18 are carried by a bracket 23 extending for substantially the full length of the shaft 10 and being channel-shaped in cross section. Upon reference to Figure 2, it will be noted that the inner flange 24 of the bracket is positioned adjacent the shaft 10 and that the latter is rotatably mounted at opposite ends thereof in strips 25 secured to the flange 24. The outer flange 26 of the bracket and the inner flange 24 is formed with a plurality of aligned slots 27 therethrough spaced from each other in the direction of the axis of the shaft 10 and slidably receiving the push button units to support the same for movement in directions toward and away from the shaft 10. It follows from the above that the push button units 18 and the condenser operating shaft 10 form an assembly capable of being installed as a unit in association with the radio receiving apparatus.

Each of the push button units 18 comprises a plunger 29 having a finger engaging button 30 at the outer end thereof and having an enlargement 31 located at the inner side of the flange 26. The inner end portion of the enlargement 31 telescopically engages in an extension 32 and the latter, in turn, extends through the adjacent slot 27 in the flange 24 of the bracket. The extension 32 has the cross sectional contour illustrated in Figure 5 and the side wall 34 is formed with a slot 35 therethrough in registration with an opening 36 formed in the inner end portion of the enlargement 31. A coil spring 37 is secured in the opening 36 under compression and is adapted to extend through the slot 35 to provide a yielding connection between the plunger 29 and extension 32. The arrangement is such that movement of the plunger 29 inwardly toward the shaft 10 effects a corresponding movement of the extension 32 through the medium of

the spring 37. It will be understood as this description proceeds that the spring 37 cooperates with the latch holding the push button unit in its operative position to maintain the cam surface 20 on the cam 19 in frictional contact with the co-operating cam surface on the spiral portion 11 of the shaft 10.

The means for latching each of the push button units in a position wherein the cam surface 20 is in operative relation with the spiral portion 11 of the shaft 10 comprises a longitudinally extending plate 38 having the opposite end portions pivoted to the ends of the flange 26 laterally beyond the push button units and having the inner end 39 bent inwardly to successively engage in the notches 40 and 41. Suitable springs 42 are provided for the purpose of maintaining the inner edge portion 39 of the plate 38 into frictional engagement with each of the plungers 29 of the push button units. Upon reference to Figure 3, it will be noted that the inner edge 39 of the plate engages within the innermost notch 41 when the push button units are in their inoperative positions so that movement of the plungers 29 of these units to their innermost positions cams the plate 38 out of engagement with the notch 41 and causes the edge 39 of the plate to snap into engagement with the outermost notch 40 to hold the plungers against return movement under the action of the springs 42. In this connection, it will be noted that the inner ends of the springs 42 are respectively connected to the corresponding ends of the plungers 29 and the outer ends of the springs are anchored to the flange 26 of the bracket. The arrangement is such that the push button units are held in their operative positions by the plate 38 until the latter is moved out of engagement with the notches 40 against the action of the springs 42, whereupon the springs 42 operate to return the push button units to their inoperative position shown in Figure 3. If desired, suitable fabric or rubber washers 44 may be inserted between the inner end of the enlargement and the inner side of the flange 26 so as to avoid any noise that may result from engagement of the enlargement with the flange 26.

It will, of course, be understood from the above that the notches 41 in the enlargements 31 of the plungers are so arranged that they do not interfere with the return movement of the push button units to the position thereof shown in Figure 3. The purpose of the notches 41 is merely to cam the latch plate 38 out of engagement with one of the push button units upon manipulation of another of said units. In other words, only one of the push button units is operated at a time to tune the radio receiving circuit to the desired wave length, and this unit is automatically released upon manipulation of another unit to secure a different wave length.

Reference has been made above to the fact that the spring 37 associated with each push button unit serves the purpose of maintaining the associated cam surface 20 in frictional engagement with the spiral portion 11 of the shaft 10. In this connection, it will be noted that manipulation of any one of the push button units to effect an adjustment of the condensers by rotating the shaft 10 applies a counteracting force against the associated cam surface 20 in a direction away from the shaft 10. This force is absorbed by the spring 37 and, as a consequence, the latter functions to yieldably maintain the cam surface 20 in contact with the adjacent portion of the spiral.

The cam discs 19 are respectively adjustably

mounted upon their respective push button units to vary the angle of inclination of the cam surfaces 20 with respect to the spiral portion 11 of the shaft and thereby control the extent of rotational movement of the shaft by the respective cam members when they are moved by the push button units in directions toward the shaft. In detail, the inner end of each of the extensions 32 is return bent, as at 45, to receive a worm 46 maintained in the return bent portion 45 by means of a retainer plate 47 secured to the extension, as at 48. The worm 46 on each push button unit meshes with teeth 49 formed on the peripheral edge of the semi-circular cam member 19 carried by the same unit at the inner side of the worm. As stated above, the cam member 19 is pivotally supported on the extension 32 for rocking movement about an axis 50 located in a common plane with the axis of the shaft 10 and extending parallel to the latter axis. One end of each of the worms 46 is slotted, as at 51, to receive a suitable tool and by means of this tool, the worms may be rotated to effect an angular adjustment of the cam surfaces 20 with respect to the spiral portion 11 of the shaft 10.

Assuming that the condenser is in its zero position wherein the plates of the rotors are completely housed between the cooperating plates of the stators and that it is desired to vary the capacity of the condensers, it will be noted that the operator merely presses the push button unit corresponding to the particular wave length of the station he desires to receive. Movement of this selected push button unit in a direction toward the shaft 10 engages the cam surface 20 of this unit with the cam surface 12 of the spiral portion 11 of the shaft 10 and effects a rotation of this shaft throughout a number of degrees depending upon the angular adjustment of the cam surface 20 with respect to the cam surface 12 on the spiral. Inasmuch as the shaft 10 is directly coupled to the condenser shaft 14, it follows that the rotors of the condensers are moved throughout a corresponding degree of angular travel from the zero position thereof to decrease the capacity of the condensers. Assuming that the operator now desires to secure a station which requires an increase in capacity of the condensers, it will be noted that movement of the selected push button unit toward the shaft 10 engages the cam surface 20 of this unit with the cam surface 13 of the spiral to rotate the shaft 10 and condenser shaft 14 in the opposite direction. As stated above, initial manipulation of the second push button unit releases the latch plate 38 from the first mentioned push button unit and permits the latter to return to its inoperative position under the action of the spring 43. In this connection, attention is called to the fact that the cam surface 20 acts upon the cam surface 12 of the spiral portion 11 whenever the adjustment of the variable condensers requires a decrease in capacity and acts upon the opposite cam surface 13 when it is desired to increase the capacity of the condensers.

Provision is made herein for actuating the variable condensers independently of the push button units to vary the capacities of these condensers. As shown in Figure 1, a beveled gear 55 is secured to the shaft 10 and meshes with a beveled pinion 56 secured to the inner end of a shaft 57 slidably mounted in the flanges 24 and 26 of the bracket 23. In the outermost position of the shaft 57, the pinion is free from the gear 55 and is held in this position during tuning of the variable con-

densers by the push button units so that the latter need not overcome the resistance offered by the auxiliary tuning unit when adjusting the shaft 10. The shaft 57 is normally maintained in its inoperative position by means of a spring 58 surrounding the shaft with one end engaging the outer side of the flange 24 and the other end engaging a washer 59 secured to the shaft 57. Movement of the shaft to its inoperative position by the spring 58 is limited by means of a second washer 60 held against a shoulder on the shaft by a spring 61 and engageable with the inner surface of the flange 24. The shaft 57 is held in its innermost position wherein the pinion 56 meshes with the gear 55 by means of an enlargement 62 on the shaft having a shoulder 63 adapted to be engaged by the latch plate 38 previously described as also functioning to hold the push button units in their operative positions. A suitable control knob 64 is secured to the extreme outer end of the shaft in a position where it may be conveniently manipulated by the operator.

With the above construction, it will be noted that manipulation of any one of the switch button units will have the effect of automatically releasing the auxiliary control for the condensers since the pinion 56 is held into mesh with the gear 55 by the latch plate 38 which is, of course, released from the enlargement 62 when any one of the push button units is actuated.

What we claim as our invention is:

1. In a station selector for radio receiving apparatus, the combination with a variable condenser having a rotor shaft, of a positionable member coupled to the rotor shaft and having a cam surface extending in the direction of the axis thereof, a plurality of control members supported for movement independently of each other toward the positionable member, a cam member carried by the end of each control member adjacent the positionable member and each of said cam members having a cam surface engageable with the cam surface on the positionable member upon selectively moving the control members toward the positionable member to rotate the latter and rotor shaft throughout different predetermined degrees of angular travel, means for yieldably resisting movement of the control members toward the positionable member, and latch means for maintaining the cam of each control in engagement with the cam surface on the positionable member against the action of the yieldable means and releasable upon movement of any one of the other control members in a direction toward the positionable member.

2. In a station selector for radio receiving apparatus, the combination with a variable condenser having stator blades and rotor blades movable relative to the stator blades, of a rotor shaft operatively connected to the rotor blades and having a spiral portion extending in the general direction of the axis of the shaft providing opposed cam surfaces, a plurality of controls supported for movement independently of each other toward said surfaces, and a cam member mounted on the end of each control adjacent said spiral portion and each cam member having a cam surface alternatively engageable with the cam surfaces of the spiral upon selectively moving the control members in a direction toward said spiral portion to rotate the latter in opposite directions throughout different predetermined degrees of angular travel.

3. In a station selector for radio receiving ap-

paratus, the combination with a variable condenser having stator and rotor blades movable relative to the stator blades, of a rotor shaft operatively connected to the rotor blades and having a connecting member having opposed cam surfaces extending in the general direction of the axis of the rotor shaft, a plurality of control members supported for movement independently of each other in a direction radially of the axis of the connecting member, a cam member mounted on the end of each control member adjacent said connecting member and each cam member having a cam surface extending toward the cam surfaces on said connecting member and alternatively engageable with the cam surfaces thereof upon selectively moving the control members in a direction toward said connecting member to rotate the latter in opposite directions throughout different predetermined degrees of angular travel, and means effective upon movement of any one of the control members toward said connecting member to yieldably maintain the cam surface of the associated cam member in frictional engagement with the adjacent cam surface on said connecting member.

4. In a station selector for a radio receiving apparatus, the combination with a variable condenser having stator blades and cooperating rotor blades movable relative to the stator blades, of a rotor shaft operatively connected to the rotor blades to move the latter relative to the stator blades and having a cam surface extending in the general direction of the axis of said shaft, a plurality of control members supported for movement independently of each other transversely of the shaft, means carried by the control members and effective upon selectively moving the members toward said shaft to engage the cam surface on said shaft and rotate the latter throughout different predetermined degrees of angular travel, said means comprising a cam segment pivotally mounted on the end of each control for swinging movement on an axis parallel to the axis of the shaft and having a straight edge portion disconnectedly engageable with the cam surface on the shaft, and an adjustable screw mounted on each control and engageable with teeth formed on the arcuate surface of the cam segment to vary the angular relationship between the straight edge portion of the cam and the cam surface on the shaft.

5. In an automatic tuning device, in combination with mechanism to be tuned, a positionable member connected to said mechanism for rotating the same, and mounted for rotation about an axis, a plunger member movable longitudinally in a direction transverse to said axis, a positioning member pivoted on said plunger for contacting and moving said positionable member, and means for locking said positioning member in a selected angular relationship on said plunger.

6. In a radio station selector, in combination with a tuning device, a frame, a manual for moving the tuning device to a predetermined position, said manual being slidably mounted in said frame, an actuating member at the inner end of said manual, the said actuating member being rotatably mounted on said manual for adjustment, the

said member having two actuating parts spaced on opposite sides of the rotational axis thereof, and an adjusting screw carried by said manual for adjusting the said actuating member about its said axis.

7. In automatic tuning apparatus a mechanism to be tuned, a member movable on an axis to tune said mechanism, a plunger movable longitudinally transversely to and in a direction through said axis, and means on said plunger for positioning said member by first moving said member in one direction about its axis and then stopping said member in a predetermined position by contact therewith on the other side of the axis of said member, said means on said plunger being adjustable with relation thereto for varying the position to which said plunger moves said member.

8. In an automatic tuning device, a casing, a member pivoted to turn about an axis in said casing, a series of plungers slidably mounted in said casing for longitudinal movement in a direction transverse to and thru said axis, and adjustable means on said plungers for swinging said member to predetermined angular positions.

9. In a radio station selector, in combination with a tuning device, a frame, a manual for moving the tuning device to a predetermined position, said manual being slidably mounted in said frame, an actuating member at the inner end of said manual, said actuating member being rotatably mounted on said manual for adjustment, the said member having two actuating parts spaced on opposite sides of the rotational axis thereof and means carried by said manual for adjusting the said actuating member about its axis.

10. In an automatic tuning device, in combination with a mechanism to be tuned, a member pivoted to turn about an axis, a connection between said member and said mechanism, a plunger longitudinally movable transversely to said axis, and means on said plunger for swinging said member to a determined angular position when said means is brought against said member, said means being adjustable with respect to said plunger.

11. In an automatic tuning device, in combination with a mechanism to be tuned, an elongated member pivoted to turn about its longitudinal axis, a connection between said member and said mechanism, a plurality of plungers each longitudinally movable toward said axis and means on each of said plungers for swinging said member to a determined angular position when said means is brought against said member.

12. In an automatic tuning device, in combination with a mechanism to be tuned, an elongated member pivoted to turn about its longitudinal axis, a connection between said member and said mechanism, a plurality of plungers each longitudinally movable toward said axis and means on each of said plungers for swinging said member to a determined angular position when said means is brought against said member, each of said plungers having resilient means for urging it out of contact with said elongated member.

GUY M. LANE,

HENRY W. MACKEY.