

Feb. 25, 1941.

M. W. KENNEY ET AL

2,232,787

TUNING CONTROL FOR RADIO RECEIVERS OR THE LIKE

Filed June 7, 1937

4 Sheets-Sheet 1

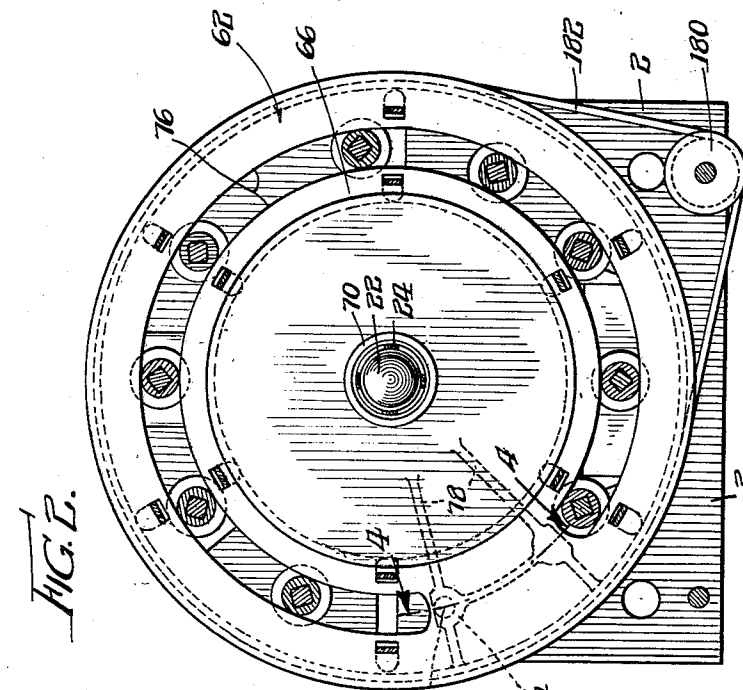


FIG. 1.

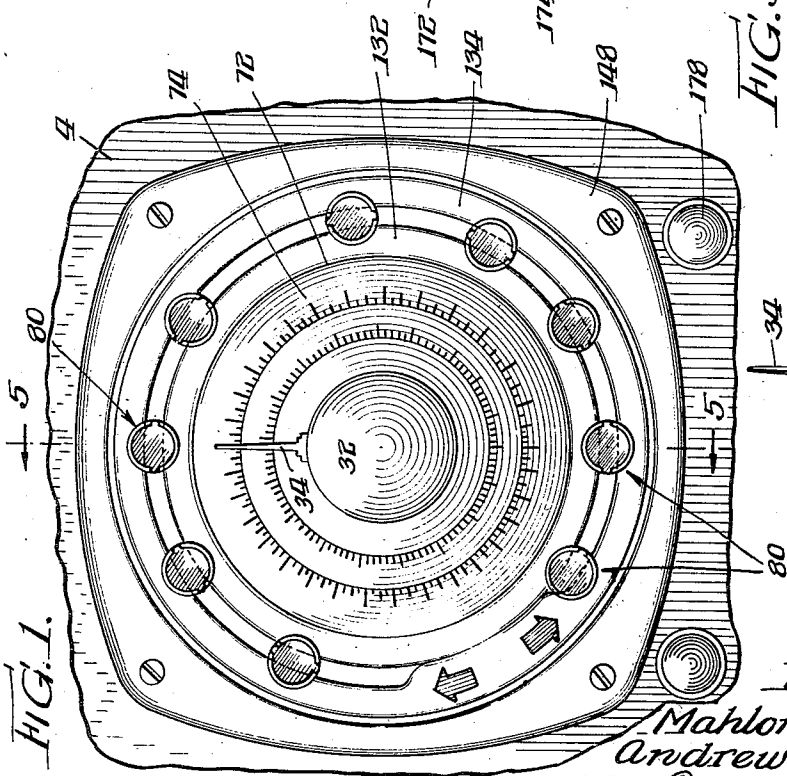


FIG. 2.

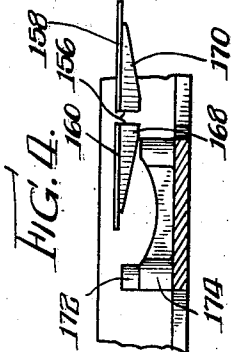


FIG. 3.

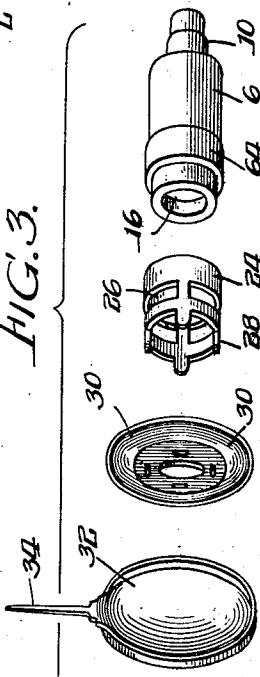


FIG. 4.

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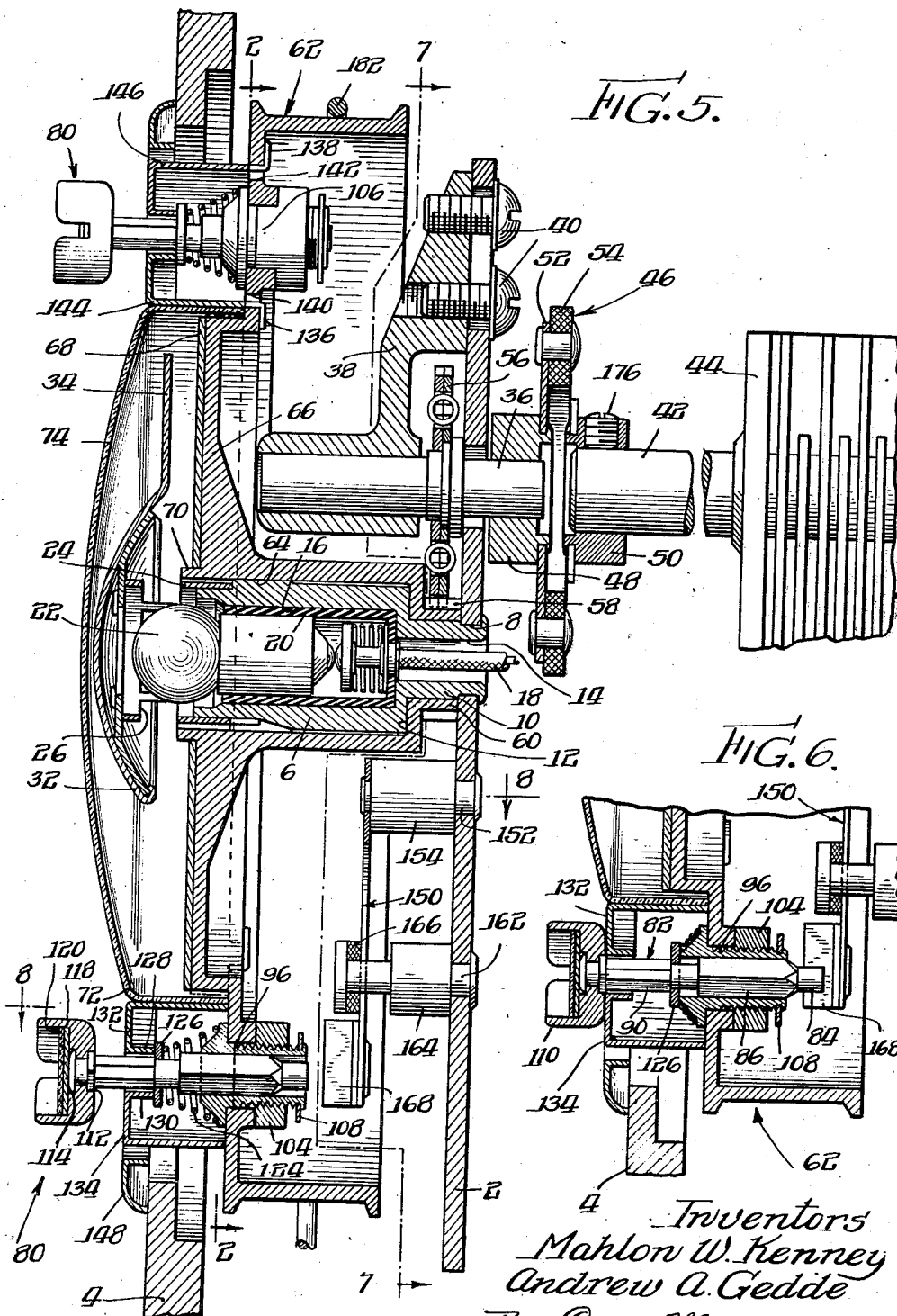
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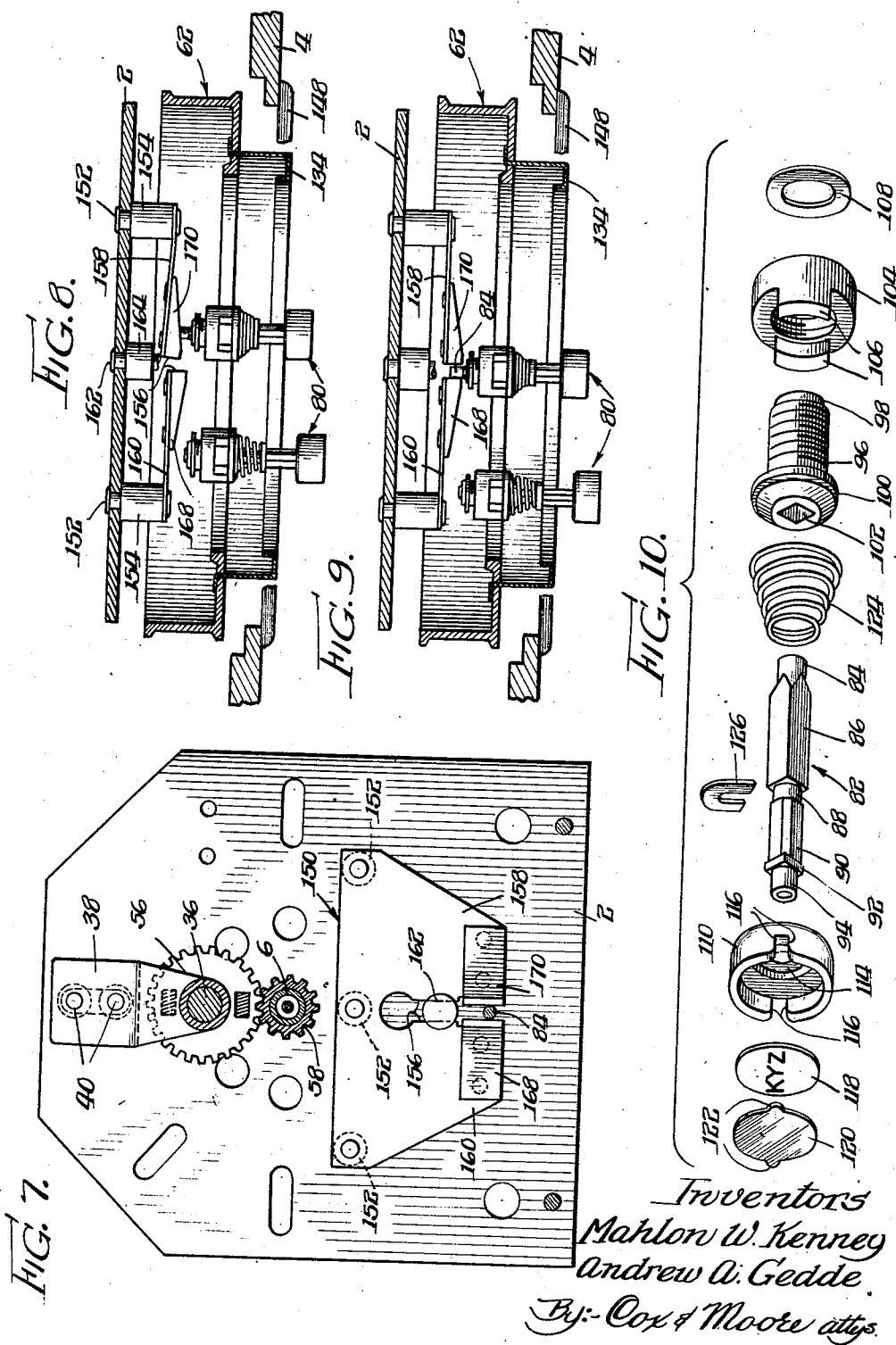
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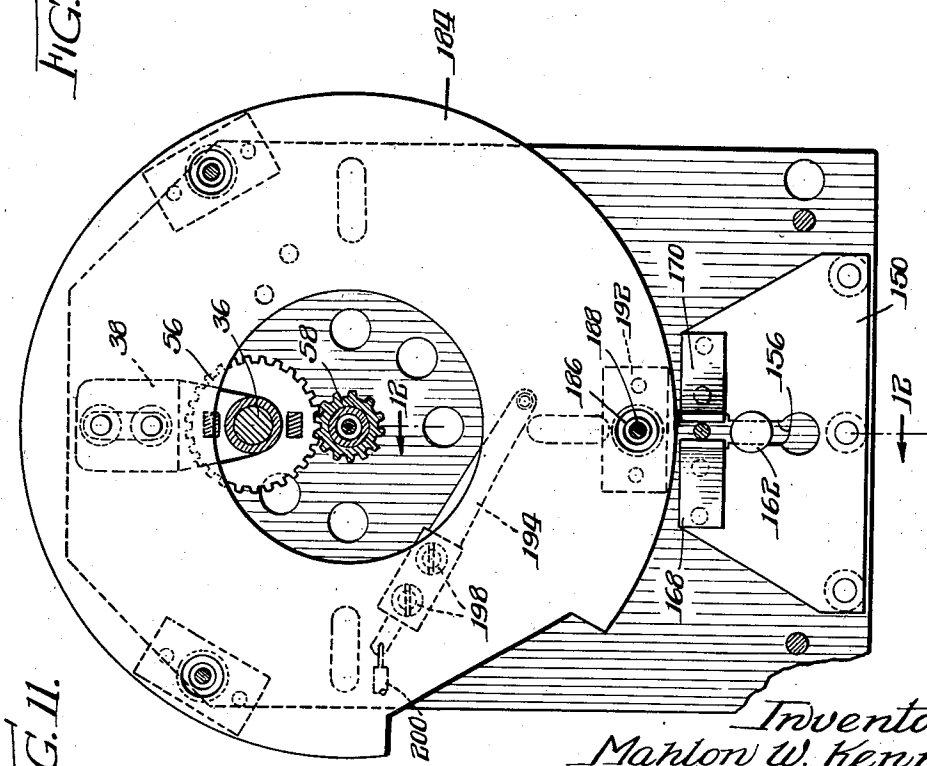
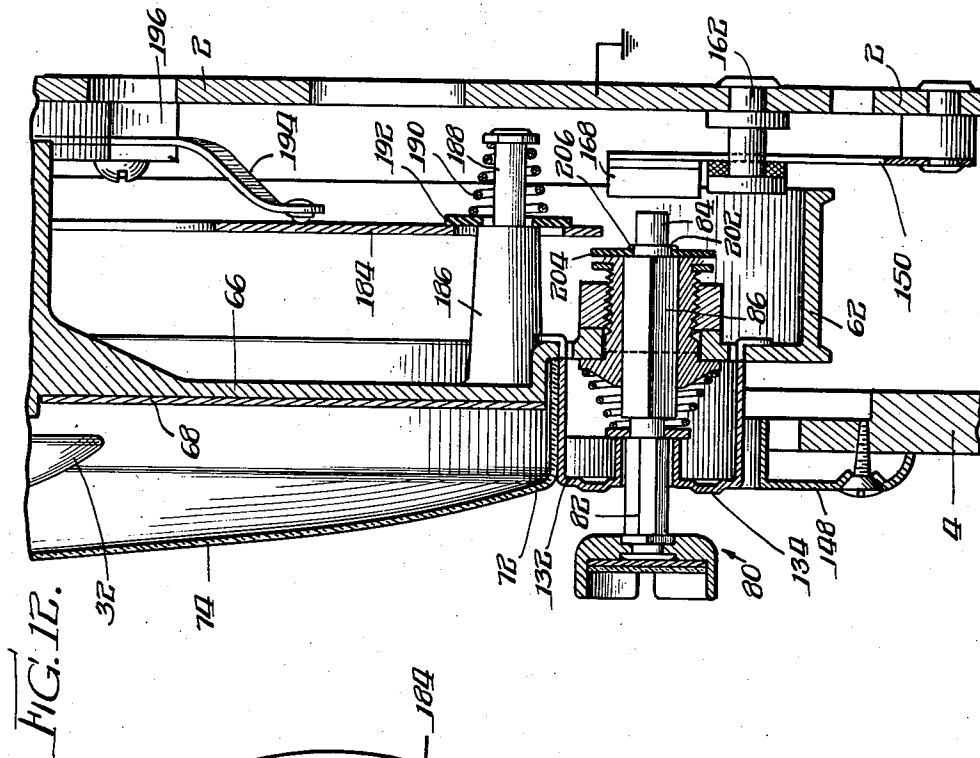
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TUNING CONTROL FOR RADIO RECEIVERS OR THE LIKE

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,232,787

TUNING CONTROL FOR RADIO RECEIVERS
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Application June 7, 1937, Serial No. 146,844

11 Claims. (Cl. 74-10)

This invention relates to a device for tuning a radio receiver or the like.

In so-called "automatic" tuning devices for tuning a radio according to the call letters of a desired broadcast station, the individual controls must be initially preset or adjusted in their relations to the tuning element so that each control will thereafter move the tuning element to the proper position required to tune the receiver to a particular selected station. The presetting or adjusting operation is complex in character because of the complexity of the mechanism and because it requires for its performance partial disassembly of the control mechanism. Accordingly the practice has arisen of having a factory or sales representative make the original adjustment after ascertaining from the prospective user the stations which he customarily selects. If later the tuning position for one or more of these selected stations varies, as it almost universally does, or if it is desired to change from one automatically selectable station to another, the mechanism must be disassembled, adjusted and reassembled. This requires considerable mechanical skill and therefore the flexibility of the automatic selection is lost to a large degree and the accuracy of selection not maintained.

Furthermore, in such automatic control devices the tuning accomplished is only rough in character and reliance is had to a large extent upon the functioning of an automatic frequency control circuit to bring the receiver frequency in step with the carrier frequency. The cost of this automatic frequency control circuit when taken with the cost of the complex automatic control mechanism prevents the use of such automatic tuning devices with the lower and more popularly priced receivers.

In addition to the cost disadvantage, the automatic frequency control circuit makes it virtually impossible automatically to select stations whose carrier frequency is close to that of a local, high powered station.

It is an object of applicant's invention to provide a compact, simplified and inexpensive "automatic" tuning control, more particularly for less expensive receivers.

Another object is to provide an automatic tuning control for radio receivers or the like which shall include simple and readily manipulatable presetting means for adjusting the control properly to select the desired station.

Another object is to make such adjustable means accessible and operable without disassembly of any part or portion of the control mechanism and specifically to provide means permitting the presetting of the automatic control from the front panel of the receiver.

A further object is to provide a more efficient and sensitive means for precisely adjusting or presetting automatic tuning controls for radio receivers or the like.

Other objects and advantages of the present invention will more fully appear from the following detailed description when taken in connection with the accompanying drawings wherein:

Fig. 1 is a front view of a tuning device embodying the invention.

Fig. 2 is a vertical elevation taken on the line 2-2 of Fig. 5.

Fig. 3 is an exploded view in perspective of the elements for mounting the indicator.

Fig. 4 is an arcuate section taken along the line 4-4 of Fig. 2.

Fig. 5 is a vertical section taken along the line 5-5 of Fig. 1.

Fig. 6 is a fragmentary vertical section showing a portion of the mechanism of Fig. 5 in a different position of operation.

Fig. 7 is a vertical elevation partly in section taken along the line 7-7 of Fig. 5.

Figs. 8 and 9 are horizontal sections taken along the line 8-8 of Fig. 5 showing the parts in different positions of operation.

Fig. 10 is an exploded view in perspective of a certain portion of the mechanism.

Fig. 11 is a vertical elevation similar to Fig. 7 showing a modified form of control mechanism.

Fig. 12 is a fragmentary vertical section taken along the line 12-12 of Fig. 11.

As shown in the drawings, applicant's invention embodies a supporting plate or frame 2 (Fig. 5) secured in any convenient manner (not shown) to the front panel 4 of the radio receiver. A sleeve or bushing 6 passes through an opening 8 in the plate 2 and is fixedly secured thereto in any desired manner as for example by crimping over the edge of the opening 8. The opening 8 and a portion of the sleeve passing therethrough may be polygonal in cross section to secure the sleeve against rotation. The sleeve 6 has a reduced bearing portion 10 forming a shoulder 12 for purposes later to be described and is provided with axial openings 16 for receiving a lamp cord 18 and lamp socket 20, respectively. The lamp socket 20 receives the usual pilot lamp or bulb 22.

At its free end the sleeve 6 is reduced to form a seat for a sleeve 24 which is provided with annular openings 26 to permit the rays of light from the lamp 22 to pass therethrough. The sleeve 24

is provided with a plurality of angularly disposed prongs 28 received in suitable openings in a disk 30 and, in the customary manner, are bent outward to retain the disk on the sleeve. An indicator 32, having a pointer portion or hand 34, is secured to the disk 30 as by crimping the free edges of the dished-out central portion over the free edges of the disk 30. A tuning control stub shaft 36 is journaled in a bracket 38 secured to the plate 2 as by bolts 40. The operating shaft 42 of the tuning element, such as condensers 44, is connected to the stub shaft 36 by a flexible coupling 46 which comprises a pair of collars 48 and 50 secured to the shafts 36 and 42, respectively, and a pair of flexible fibre disks or spiders 52 and 54 are secured to the collars 48 and 50 and riveted together along their outer edges.

An antibacklash gear 56 is secured to the stub shaft 36 between the bracket 38 and the plate 2, and this gear meshes with a gear 58 formed upon or secured to the reduced end portion 60 of a control wheel or drum 62 which is journaled upon the reduced portion 10 and an enlarged annular portion 64 of the sleeve 6, being held against longitudinal movement by the shoulder 12 of the sleeve 6 and the plate 2. The drum 62 is provided with a forwardly offset circular or disk-like central portion 66 upon the outer face of which is secured a disk-shaped dial plate 68 carrying the usual indicia indicative of radio broadcast frequencies. The disk 68 may be secured in any convenient manner to the drum 62, as for example by means of suitable adhesives, and is positively prevented from rotating relative thereto by means of a key engaging in the slots formed in the disk 68 and in the extending hub portion 70 of the drum 62.

A cover member 72 in which the usual transparent window 74 may be mounted, is secured to the drum 62 and encloses the disk 68 and indicator 32. The front wall of the drum 62, inwardly of the central portion 66, is provided with an annular slot 76 extending between a pair of radial ribs 78. A plurality of push button controlling devices 80 are adapted to be releasably clamped in the slot 76. These push button control devices each comprises a push button or rod 82 (Figs. 5 and 10) having a reduced cylindrical end portion 84, an elongated square portion 86, a reduced intermediate cylindrical portion 88, an octagonal elongated portion 90, a short square portion 92 and a reduced cylindrical countersunk end portion 94. Each push rod is received in an externally threaded sleeve 96 having a reduced end portion 98 and an enlarged head 100, the square portion 86 of the pusher rod engaging the square opening 102 in the sleeve to cause these elements to rotate in unison, but to permit the push rod to slide axially of the sleeve. The shank of the threaded sleeve 96 passes through the arcuate slot 76 and the sleeve is clamped in position on the drum by a lock nut 104 which is held against rotation relative to the drum by a pair of oppositely disposed, forwardly directed, annular prongs 106. Each of the prongs 106 is of an arcuate length slightly less than the width of the slot 76 in order that the push button assembly may readily be shifted longitudinally of the slot. A washer 108 is clamped on the reduced end portion 98 of the sleeve 96 by upsetting the outer end of said portion and this washer provides means for limiting the relative axial movement of the sleeve 96 and nut 104.

Each push rod 82 has secured to its reduced end 75 portion 94 a cylindrical cup-like member 110

which is provided with a square recess 112 non-rotatively securing the cup on the squared portion 92 of the push rod. The portion 94 of the push rod passes through the central opening in the cup and is upset into a countersunk recess 114 to prevent axial movement of the cup relative to the push rod. The cup 110 has opposite axially directed slots 116 whereby any suitable tool may be inserted into the cup for the purpose of rotating the push rod 82 and sleeve 96 to clamp the push button control device to, or release it from, the drum 62.

A plurality of marking disks 118 of any suitable material is insertable into the cup-like members 110 and these disks may be inscribed with any suitable indicia representative of radio broadcasting stations, preferably the call letters of such stations. Transparent cover disks 120 have radial projections 122 which frictionally engage the sides of the slots 116 in the cup-like members 110 and removably retain the marking disks in said members. A spring 124 normally urges each push button to its forward position and this spring bears at one end against the head 100 of the sleeve 96, the outer face of which is tapered to provide a seat therefor, and the other end of the spring bears against a locking key 126 fitted upon the reduced portion 88 of the push rod 82. Forward movement of the push rods is limited by the engagement of the key 126 with the intumed, annular flanges 128 and 130 of a pair of escutcheon rings 132 and 134. The escutcheon rings 132 and 134 are secured to the drum 62 by bent over lugs or prongs 136 and 138 which extend inwardly through a concentrically arranged series of openings 140 and 142, respectively, in the drum 62. The prongs 136 and 138 are carried by the annular flanges 144 and 146 of the escutcheon rings 132 and 134, respectively.

The cover member 72 may be attached to the annular flange 144 of the escutcheon ring 132 as by welding or in any other suitable manner, or may be attached to the drum 62 by bent-over prongs similar to the prongs 136 and 138. A fixed escutcheon 148, of any decorative shape such as shown in Fig. 1, overlies the opening in the front panel 4 of the radio cabinet and is provided with a circular opening to receive the tuning control mechanism.

Rotation of the tuning control mechanism in either direction is limited by a mechanism now to be described. A resilient plate 150 is secured along its upper edge by means of bolts 152 and spacers 154 to the supporting frame or plate 2. The plate 150 is centrally slotted as at 156 to provide two independently movable flexible sections 158 and 160 and a pin or rivet 162 passes through this slot 156 and guides the movement of the sections 158 and 160. The pin is provided with a bushing 164 and a washer 166 preferably of a sound deadening material for limiting the movement of the plate sections 158 and 160. These sections carry at their lower edges cam blocks 168 and 170 adapted to cooperate with, and be deflected rearwardly by, the reduced end portions 84 of the push rods 82, as shown in Fig. 8.

A stop pin 172 (Figs. 2 and 4), mounted in, or formed integrally with, one of the bosses 174 formed in the ribs 78, provides means which cooperate with the stop plate 150 to determine the extreme limits of movement of the drum 62. In presetting the drum 62 relative to the tuning condenser the latter is moved to an extreme position in one direction, the coupling member 50 75

being released from the shaft 42 of the tuning condenser, and the drum 62 is then independently rotated to its corresponding extreme position. This position is determined by the engagement of the stop pin 172 in the slot 156 between the cam blocks 168 and 170. In moving to this position, the pin 172 deflects one of the cam blocks rearwardly and engages the side face of the other undeflected cam block. The coupling member 50 is then fastened to the shaft 42 as by adjusting a suitable set screw, such as shown at 176 (Fig. 5).

The operation of the above described mechanism is as follows: The operator inserts a finger into the cup member 110 of one of the push button control devices 80 and moves the push rod 82 rearwardly its full distance, so that the cup member engages the faces of the escutcheon rings 132 and 134, and simultaneously rotates the operated push button and drum 62 in either a clockwise or counterclockwise direction, as he may desire. When the operated push button has been moved to its lowermost position, the reduced end portion 84 of its associated push rod 82 will engage the surface of one of the cam blocks 168 and 170 and deflect the same rearwardly, movement of the push button being limited by engagement of said reduced end portion with the side face of the other and undeflected cam block. When the push button engages the side face of the undeflected cam block it clears the deflected block, which, by reason of the resiliency of the stop plate 150, springs forwardly to its original position and prevents rebound of the operated push button and the drum 62.

In order to preset a push button controlled device to a particular station, or to change an adjustment previously made, the usual manual control knob 178 (Fig. 1), which is connected to the drum 62 by a pulley 180 and cable 182, is operated to rotate the drum 62 and tuning condensers 44 to the correct position for the desired station. The push button control device 80 which is nearest the lowermost position is then released from the drum 62 and adjusted relative thereto in the following manner by means of a suitable tool inserted in the slots 116 of the selected push button control, a large coin being satisfactory for the purpose. The cup member 0 and attached push rod are then rotated, the rotation of the push rod causing the sleeve 96 to rotate and the lock nut 104 to move axially of the sleeve. The nut is held against rotation by the engagement of the prongs 106 with the sides of the circular slot 76. Axial movement of the nut 104 releases the push button control device from the drum 62 and such device is then moved longitudinally of the slot 76 toward the lowermost point of the slot, the push rod 82 being held in its rearward position during this longitudinal movement. The prongs 106, in addition to preventing rotation of the nut 104, also serve to guide the push button control device during this adjusting movement. The adjusting movement of the control device is completed when the reduced end portion 84 of the push rod 82 engages the side face of the undeflected cam block 168 or 170. The cup member 110 is then rotated in the proper direction to cause the nut 104 to move inwardly of the sleeve 96 and clamp the control device in adjusted position.

It will of course be evident that the circumferential surface of each cup member 110 may be knurled or otherwise roughened to permit direct rotative manipulation of said cup member.

During the adjustment of the push buttons relative to the drum 62 the manually operable knob 178 is held against movement to prevent rotation of the drum 62. It is evident, however, that positive means such as a manually operable friction brake, detent, pawl, pin or other suitable locking means may be provided to prevent such rotation of the drum when the push buttons are adjusted relative thereto.

In the modifications disclosed in Figs. 1 to 10 and in Figs. 11 and 12 the same parts are given the same reference numerals. In the modification of Figs. 11 and 12, a contact disk 184 is mounted internally of the drum 62 upon axially extending bosses 186 by means of pins 188, 15 springs 190 and insulated washers 192. The pins 188 may be formed integrally with, or threaded into, the bosses 186, and the springs 190 engage and bear at their outer ends against retaining collars secured on the pins 188 and at their other ends bear against the insulated washers 192. Inward movement of the washers 192 is limited by the engagement of the washer with the bosses 186. A spring contact strip or blade 194 is secured to but insulated from the frame 2 by an insulating strip 196 and insulated bolts 198. The contact strip 194 is connected by a wire 200, passing through a suitable aperture in the plate 2, to the conventional silencing circuit by which the speaker or some other portion of the radio receiver is rendered inoperative to transmit signals whenever said wire is grounded during the operation of the automatic tuning control.

The push rod 82 of each push button control device 80 is provided with a reduced portion 202 intermediate the portion 86 and the end portion 84, the portion 202 being slightly larger in diameter than the portion 84. A contact washer 204 is secured on the portion 202, as by a pin 206, and this washer is of such size as to contact the disk 184 when the push rod 82 is moved inwardly to operate a tuning control mechanism. The supporting plate 2 or other suitable fixed portion of the control mechanism is grounded and accordingly when the washer 204 engages the disk 184 the silencing circuit of the receiver will be grounded through the wire 200, the contact strip 194, the disk 184, a washer 204, a push rod 82, the drum 62 and the plate 2. It should be noted that by means of this silencing mechanism the receiver is rendered silent during the tuning operation and during the adjusting of the push button control rods relative to the drum 62, it being further noted that the receiver is tuned to the exact position prior to such adjustment and is thereafter held in such position during adjustment of those devices.

It will be seen from the above description that applicant has provided simple, compact, efficient and readily operable means for presetting and adjusting an automatic tuning control mechanism without disassembly of any part or portion of the automatic control, and specifically has provided selectively operable push buttons releasably and adjustably clamped to the position control element of the tuning mechanism for accomplishing that purpose.

Changes may be made in the form, construction and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its attendant advantages, and the right is hereby reserved to make all such changes as fairly fall within the scope of the following claims.

The invention is hereby claimed as follows:

1. In a tuning mechanism for radio receivers or the like comprising a tuning element, the combination of shiftable means for operating said tuning element, a plurality of selectively depressible stop means shiftable supported, in spaced relation on said shiftable means for moving said shiftable means, means for mounting said depressible stop means on said shiftable means for adjustment parallel to the direction of movement of said shiftable means, a relatively fixed stop member for cooperating with a depressed stop means to limit the movement of said shiftable means to different positions, and clamping means operatively connected to each of said stop means and said shiftable means for preventing relative movement parallel to the direction of movement of said shiftable means and releasable each upon rotation of its associated stop means for permitting relative adjustment between a selected stop means and said shiftable means parallel to the direction of movement of said shiftable means, thereby to predetermine the positions to which said shiftable means is movable by said stop means.

2. In adjusting mechanism, driven control means, a plurality of selectively operable driving and position determining means for moving said driven means to a plurality of different positions, said driven means being formed with guide means on which said driving means are movable in a direction parallel to the direction of movement of said driven means, a plurality of releasable clamp means, one for each of said driving means and connecting each of said driving means to said driven means in individually adjusted position on said guide means relative to the driven means, and means for operating each of said releasable means by its associated driving means to permit such adjustment, thereby to predetermine said different positions to which said driven means is movable by said driving means.

3. In a tuning mechanism for radio receivers or the like comprising a tuning element, the combination of shiftable means for operating said tuning element, means for shifting said shiftable means to different predetermined positions to tune the receiver to different predetermined broadcast stations, said means for shifting the shiftable means including a plurality of individually operable spaced selectors and means for mounting said selectors on said shiftable means for adjustment in a direction parallel to the direction of movement of said shiftable means, releasable locking means, one for each of said selectors, for retaining the selectors in adjusted position on said shiftable means whereby to cause operation of said shiftable means by said selectors and means for operating the releasable locking means by its associated selector to permit such adjustment of said selector, thereby individually to vary the position to which said shiftable means and said tuning element are movable by each selector.

4. In a tuning mechanism for radio receivers or the like comprising a tuning element, the combination of a rotatable shaft controlling the tuning of said tuning element, means for rotating said shaft, a predeterminedly positioned stop member, stop means cooperating with said stop member to stop said rotating means in different positions, said stop means comprising a plurality of spaced selectively operable push buttons, said shaft rotating means being formed with guide means on which said push buttons

are movable in a direction parallel to the direction of movement of said shaft rotating means, and means for releasably clamping said push button to said shaft rotating means in adjusted position on the guide means, said releasable means being operatively connected to said push button for release upon rotation of said push button whereby to predetermine the positions to which said shaft is movable by said rotating means.

5. Selective adjustable mechanism for radio receivers or the like comprising a manually shiftable element and selector means operable during, and as a part of, the shifting of said element to stop the same when the desired adjusted position is reached, said selector means comprising a plurality of spaced, individually and selectively depressible selectors mounted on said manually shiftable element for adjustment parallel to the direction of movement of said element, means for holding each selector in a normal, undepressed position on the shiftable element, stop means adapted to engage a selector when the same is depressed on the shiftable element whereby to stop the shiftable element in a position determined by the depressed selector, and releasable clamping means operatively connected to each depressible selector for operation by its associated selector to permit such adjustment of said selector thereby to vary the determined stop position of the manually shiftable element.

6. In the combination of claim 5 wherein the shiftable element has a slot receiving said depressible selectors and extending in the direction of movement of said shiftable element, and wherein the releasable clamping means operable by each depressible selector for permitting adjustment of the selector relative to said shiftable element comprises cooperating clamping members slidably receiving said depressible selectors and engaging opposite sides of the slot in said shiftable element.

7. Selective adjusting mechanism for radio receivers or the like, comprising an axle, a rotatable wheel journaled on said axle, selector means comprising a plurality of operating members, means for mounting said members on said wheel for axial movement relative to the wheel from an inactive to an active position, said wheel forming a circular guideway along which said members are adjustably movable in the circular direction of the rotational movement of the wheel, a stationary stop, each of said operating members having a portion adapted, when the operating member is in an active position, to engage said stationary stop for the purpose of stopping rotation of the wheel in a predetermined position, and means for connecting each of said operating members to said wheel to retain each member in its adjusted setting on the wheel, said last-named means being operatively connected to an associated operating member for operation, thereby to release said operating member from said wheel for arcuate adjustment to change said predetermined stop position.

8. In a tuning control mechanism for radio receivers or the like having a tuning element, selector means and a stop member adapted to cooperate to determine the positioning of said tuning element, said selector means comprising a shiftable supporting plate associated with said tuning element, a plurality of selectively depressible push buttons, said push buttons being adjustably movable on said supporting plate in elongated slot means extending in the direction

of turning movement of the plate, and means for clamping each push button in adjusted position on said supporting plate by manipulation of the selected push button, whereby to vary the stop position of the tuning element determined by said push button and said stop member.

9. In a tuning mechanism for radio receivers or the like having a tuning element, a rotary member drivingly connected to said tuning element, said rotary member having an arcuate slot therein, a plurality of pins slidably received in said slot and each having an enlarged head engaging one surface of the rotary member, cooperating clamping means for each pin engaging the other face of the rotary member and being non-rotatively secured relative to the rotary member, a plurality of push buttons, one for each of said pins, each push button being slidably received within its associated pin but secured against relative rotation to effect simultaneous rotation of said pin upon rotation of said push button whereby to release said pin from its cooperating clamping member and permit adjustment of said push button within the arcuate slot of the rotary member and a cooperating, relatively fixed stop member for engaging a depressed push button to stop said rotary member and said tuning element in a predetermined position determined by said depressed push button.

10. In an adjusting mechanism for radio receivers or the like having a tuning element, a rotary member, a plurality of selectively depressible push buttons carried by said rotary member, stop means for cooperating with a depressed push button to stop said rotary member

and the tuning element in the position predetermined by the depressed push button, said stop means comprising a stationary plate having a central slot forming spaced, resilient fingers, inclined oppositely facing cams carried by said resilient fingers, said cams being spaced apart a distance sufficient to receive the shank of a depressed push button therebetween, whereby a depressed push button will engage one or the other of said cams dependent upon the direction in which the rotary member is rotated to deflect the engaged cam and to be stopped in a predetermined position by the other cam.

11. In a tuning mechanism for radio receivers or the like having a tuning element, a rotary member drivingly connected to said tuning element, said rotary member having an arcuate slot therein, a plurality of externally threaded sleeves slidably received in said slot and each having an enlarged head engaging one surface of the rotary member, said sleeves each having a polygonally shaped, axially extending aperture, a nut for each sleeve engaging the other face of the rotary member and being non-rotatively secured relative to the rotary member, and a plurality of push buttons, one for each of said sleeves, each push button having a polygonally shaped shank slidably received in the correspondingly shaped aperture in the sleeve to permit axial movement of said push button independently of the sleeve but to secure the push button against rotational movement relative to the sleeve.

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