Aug 5, 1941. A. B. WINCHELL 2,251,476

TUNING UNIT FOR RADIO RECEIVERS

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FIG. 1.

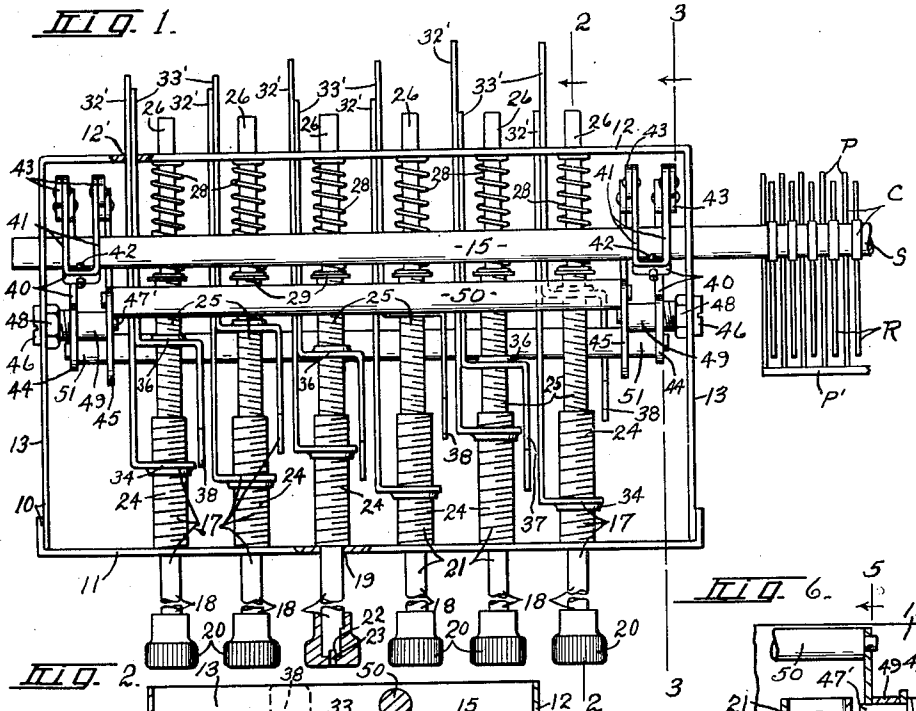


FIG. 2.

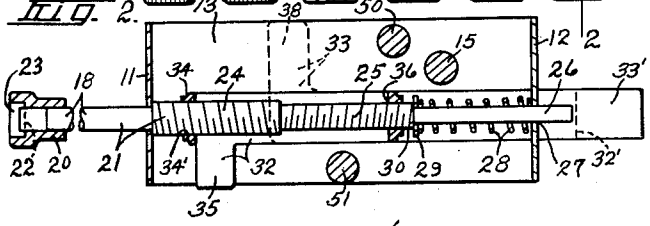


FIG. 6.

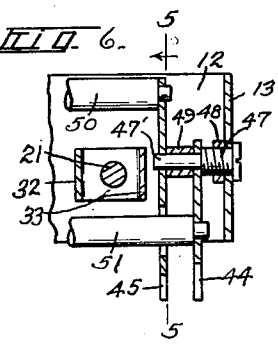


FIG. 3.

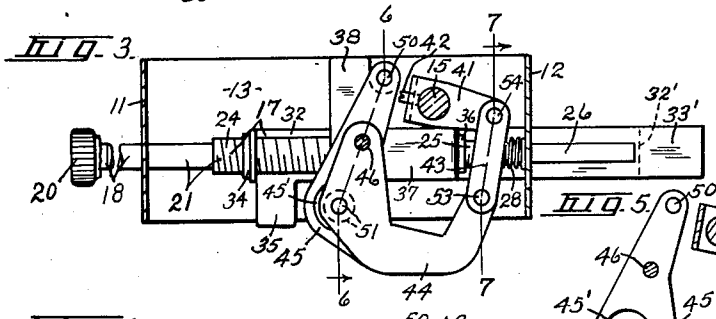


FIG. 7.

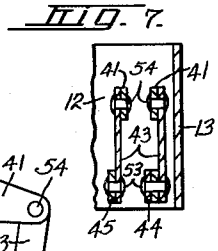


FIG. 5.

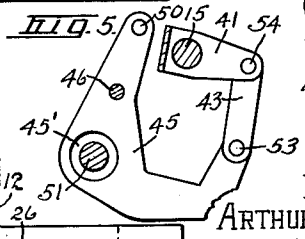
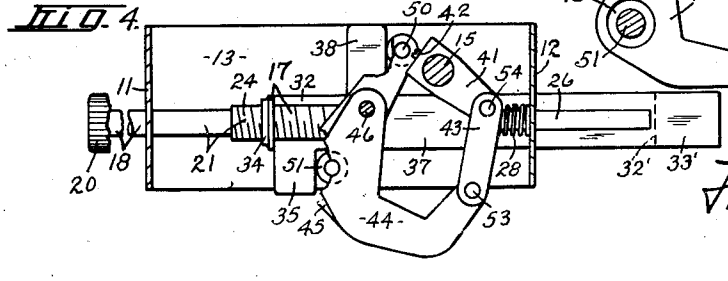


FIG. 4.



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FIG. 8.

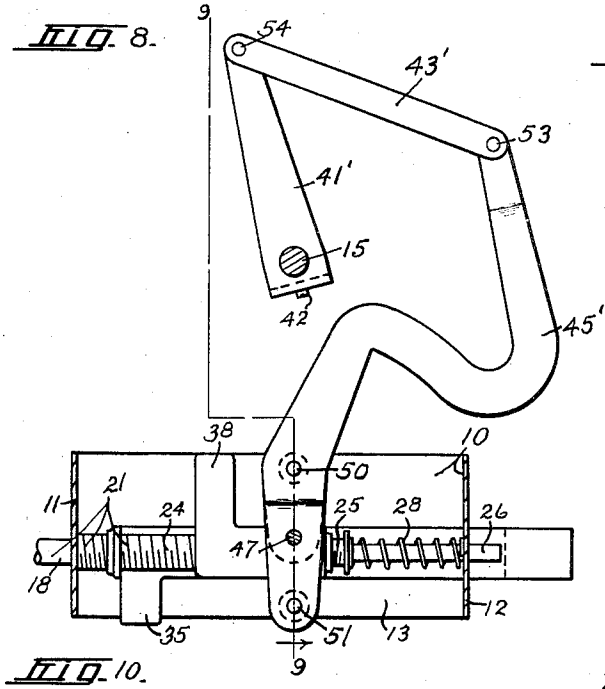


FIG. 9.

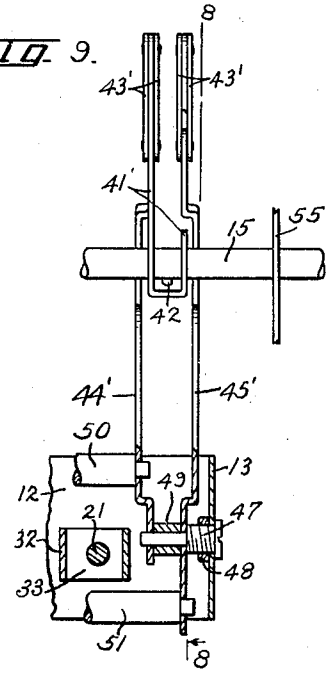


FIG. 10.

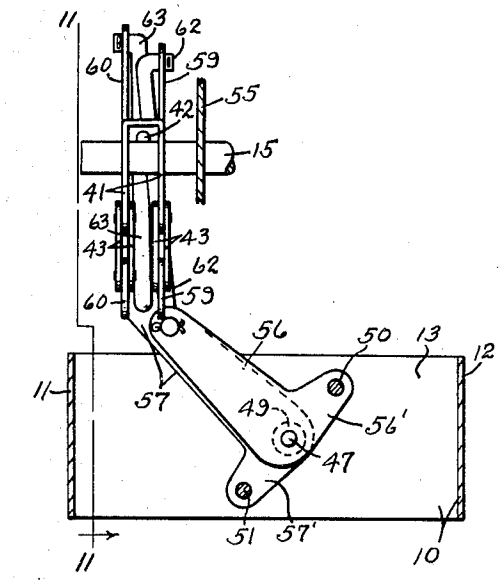
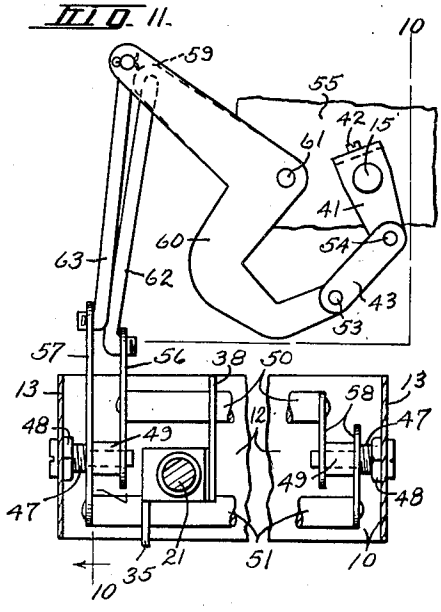


FIG. 11.



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UNITED STATES PATENT OFFICE

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TUNING UNIT FOR RADIO RECEIVERS

Arthur B. Winchell, Jackson, Mich., assignor to The Sparks-Withington Company, Jackson, Mich., a corporation of Ohio

Application June 11, 1938, Serial No. 213,299

18 Claims. (Cl. 74—10)

This invention relates to improvements in a station selector or tuning unit for a radio receiving apparatus. The invention pertains more particularly to a mechanical mechanism having a plurality of manually operated control or selector members, the setting of any one of which will operate a variable condenser unit to tune the radio receiving set to the frequency of a corresponding one of a plurality of pre-selected broadcasting stations without the usual necessity of more or less critically adjusting the main tuning control of the receiving set, which conventionally includes a tuning knob and a dial associated with ganged variable condensers.

The main object of this invention is to provide simply and durably constructed mechanical tuning means which may be readily connected with the operating shaft of a variable condenser, or a plurality of such condensers of a radio receiving set, and which is provided with a plurality of manually operated selector means, each of which is arranged for setting the condenser or condensers for a corresponding one of a selected group of broadcasting stations.

A more specific object of the invention is to provide a multiple control tuning unit for operating a variable condenser which is constructed so that the maximum movement of the condenser may be produced by a relatively small amount of movement of any one of a plurality of manually operated selector members.

Another object of the invention is to provide a tuning unit of the above mentioned class having the manually operated selectors provided with relatively movable selector elements which may be adjusted at any time to change the setting of the variable condenser produced thereby, so that any desired change in the station to be tuned in by a given selector may be effected.

A further object resides in producing a tuning unit wherein the selector elements may be adjusted from the front of the receiving set cabinet while simultaneously observing the setting of the usual tuning dial associated therewith, so that the selector elements may be quickly and easily adjusted to produce a desired setting of the condensers associated with the tuning dial.

Other objects and advantages of my invention will be apparent from the following description taken in conjunction with the accompanying drawings, in which:

Figure 1 is a top plan of a tuning unit embodying the various features of this invention, portions of the unit being shown broken away and in section, and the drive member or shaft thereof being illustrated connected with the shaft of a variable condenser.

Figure 2 is a transverse sectional view taken in the plane of the line 2—2, Figure 1, illustrating a manually operated selector member in the normal or outer inoperative position.

Figure 3 is a transverse sectional view taken on line 3—3, Figure 1, and illustrating a manually operated selector member in an intermediate position.

Figure 4 is a transverse sectional view similar to Figure 3, illustrating the manually operated selector member in the inner or operative position.

Figure 5 is a detail transverse sectional view taken substantially on the line 5—5, Figure 6, illustrating an inner portion of the toggle mechanism for operatively connecting the manually operated selector members with the drive shaft in the intermediate position illustrated in Figure 3.

Figure 6 is a detail vertical sectional view through the toggle mechanism positioned at one end of the tuning unit taken substantially on line 6—6, Figure 3.

Figure 7 is a detail vertical sectional view taken on line 7—7, Figure 3.

Figure 8 is a transverse sectional view similar to Figure 3, illustrating a modified form of linkage mechanism and is taken substantially on line 8—8, Figure 9.

Figure 9 is a detail vertical sectional view taken on the line 9—9, Figure 8.

Figure 10 is a detail sectional view similar to Figure 8 taken substantially on line 10—10, Figure 11, and illustrates a further modification of the linkage structure.

Figure 11 is a longitudinal vertical sectional view taken substantially in the plane of the line 11—11, Figure 10, the central portion of the frame and selector mechanism being broken away.

My novel tuning unit, as illustrated in Figures 1 to 7, inclusive, of the drawings, comprises a substantially rectangular frame 10 adapted to be supportably connected in any suitable manner to the chassis of a radio receiving apparatus. This frame comprises a front plate 11, a back plate 12 and two end plates 13. Journaled in the frame 10, in inward spaced substantially parallel relation to the rear plate 12, is a drive shaft 15 which has the ends thereof extending beyond the side plates 13 of the frame and adapted to be connected in any suitable manner with a variable condenser, as indicated at C, Figure 1.

The condenser C comprises the usual stator plates P connected with a suitable base or support P' in spaced relation to each other, and rotor plates R connected in any suitable manner with the condenser shaft S to operate between corresponding stator plates P. The drive shaft 15, in this instance, is illustrated formed integral with the condenser shaft S. However, it will be understood that the drive shaft 15 may be formed separately from the condenser shaft and connected thereto at one end by a suitable flexible coupling or other conventional means, whereby rotation of the drive shaft will produce a corresponding rotation of the condenser shaft S and the rotor plates R connected therewith. The end of the drive shaft 15 opposite the condenser C is shown projecting a short distance beyond the adjacent end of the frame 10 and may be connected in any suitable manner to the usual tuning knob and dial spindle of the receiving set whereby said shaft may be manually operated in the conventional manner for adjusting the condenser C during the tuning operation.

Mounted in the frame 10 is a plurality of, in this instance six, manually operated selector or control members 17 which extend transversely through the frame 10 in a substantially horizontal plane beneath the drive shaft 15, as illustrated more particularly in Figure 2. Each of these selector members 17 comprises a push rod 21 having the forward portion 18 thereof reduced in diameter and slidably and rotatably received in a corresponding aperture 19 formed in the front plate 11 of the frame 10. Each of these portions 18 of the push bars is adapted to extend beyond the front plate 11 and through the front panel of the radio receiver cabinet into a convenient position to be manually operated from the exterior of said cabinet. A push button 20 may, as shown, be secured to the forward end of each push rod 21 to provide a convenient finger piece by which the rod may be rotated as well as pushed axially for a purpose which will hereinafter be explained.

Each of the push rods 21 has the forward end thereof provided with a transversely disposed slot 22 adapted to receive a screw driver or other implement by which the rod may be rotated. These rods may, as shown in Figures 1 and 2, terminate a short distance inside the push button connected therewith and each push button is provided with a slot or recess 23 in the outer end thereof in registration with the rod slot 22 to allow the screw driver to engage in the latter slot. Each rod 21 is provided with a right-hand screw-thread 24 formed on the portion thereof adjacent the portion 18 and a left-hand screw-thread 25 formed on an intermediate portion thereof adjacent the threads 24, the latter screw having the same number of threads per inch as the screw-threads 24. The rear end portion 26 of each rod 21 is shown slightly reduced in diameter and extended through a suitable aperture 27 formed in the rear plate 12 for both rotary and sliding movement with respect to said plate.

Mounted upon the reduced portion 26 of each rod 21 is a compression spring 28 which has one end thereof arranged in engagement with the inner face of the rear plate 12 and the other end arranged in contact with a washer 29 mounted on the reduced portion 26 of the rod in contact with a shoulder 30 formed at the junction of the reduced portion 26 and the screw-threaded portion 25 of said rod.

Mounted upon each rod 21 is a pair of actuating members 32 and 33, one of which has screw-threaded engagement with the screw-thread 24 and the other actuating member has screw-threaded engagement with the left-hand screw-threads 25. Each of these actuating members is formed from a substantially flat bar provided with a tail piece 32' or 33', respectively. These tail pieces are arranged side by side and extend through a suitable aperture 12' provided in the rear plate 12 at one side of the aperture 27 for the push rod end 26, as illustrated in Figure 1. The forward end of each actuating member 32 is provided with a portion 34 which extends laterally from the portion 32' thereof and which is provided with a screw-threaded aperture 34' receiving the portion 24 of the corresponding rod 21. Each bar 32 is also provided with a pendent portion or head 35 which extends downwardly therefrom adjacent the transverse portion 34 to a position substantially in the plane of the lower side of the frame 10.

Each of the other actuating members or bars 33 is provided with a laterally disposed portion 36, intermediate the ends thereof, which is provided with a screw-threaded aperture and which receives the screw-threaded portion 25 of the corresponding rod therein. Each of the bars or actuating members 33 is provided with an extension 37 which projects forwardly from the lateral portion 36 at the side thereof opposite the portion 33' and in substantially parallel relation therewith. The forward end of the portion 37 is provided with an upwardly extending portion or head 38 which terminates in substantially the horizontal plane of the upper face of the frame 10, as illustrated in Figures 2, 3 and 4.

It will now be observed that the heads 35 and 38 for each reciprocating rod 21 are arranged at opposite sides of said rod and that these heads will be moved in reverse directions with respect to each other and to the rod as said rod is rotated in one direction or the other due to the screw-threaded engagement of the bars 32 and 33 with the respective right-hand and left-hand screw-threads 24 and 25 provided on the rod. Also, it will be seen that, due to this arrangement, the head 38 may be moved by rotation of the rod 21 connected therewith from a position in front of the head 35 to a position at the rear of said head, as desired. In order that the push rod 21 may not be accidentally rotated by objects coming in contact with the forward exposed ends thereof or with the push buttons 20, an appreciable amount of friction is maintained between the screw-threads on the rods and those on the selector bars by bending the transverse portions of at least one of the selector bars as the bars 32 so that said portions will be normally maintained at a slight angle to the normal position thereof with respect to the push rods 21 associated therewith.

It will now be understood that when the rods 21 are moved longitudinally with respect to the frame 10 against the action of the corresponding springs 28 by pressure exerted upon the outer ends of the push rods 21, the actuating members 32 and 33 and the heads 35 and 38 associated therewith will also be moved in unison with said rods. This movement of the bars 32 and 33 is for the purpose of bringing the heads 35 and 38 into cooperative engagement with a suitable linkage mechanism associated with the drive shaft 15 for rotating said shaft.

This linkage mechanism, as 40, comprises a pair of rock arms 41 mounted upon the drive

shaft 15 adjacent the side plates 13 of the frame 10, as shown in Figure 1. Each of these arms 41 is a substantially U-shaped member which is clamped to the shaft 15 by a screw 42 mounted in the transverse portion of the arm. The outer or free ends of each rock arm 41 is connected by a pair of links 43 with corresponding ends of a pair of rock levers 44 and 45 which are rotatably mounted upon a pivotal post or stud 46. As shown in Figure 1, there are two of the pivotal members 46 arranged one at either end of the frame 10. Each of these members 46 is provided with a screw-threaded portion 47 which extends through a suitable aperture formed in the adjacent side plate 13 of the frame and is clamped to said side plate by a nut 48 mounted on said screw-threaded portion.

The inner end of each pivotal member 46 is reduced somewhat in diameter, as at 47', and rotatably supports the adjacent rock levers 44 and 45 thereon. These levers are maintained in spaced relation to each other by a suitable spacing sleeve 49 mounted on the portion 47' of the corresponding stud 46 between the levers 44 and 45, as illustrated in Figure 6. The pivotal studs 46 are connected with the frame 10 in coaxial relation with each other and so as to lie in substantially the horizontal plane of the push rods 21 a short distance in front of the vertical plane passing through the drive shaft 15. The inner positioned rock levers 45, as shown, are constructed alike and extend some distance above the pivotal studs 46 and are tied together at their upper ends by a suitable tie-rod 50 which extends longitudinally within the frame 10 in a horizontal plane above the push rods 21 and in the path of movement of the actuating heads 38. Similarly, the outer positioned rock levers 44 are constructed alike and are connected with each other by a tie-rod 51 which extends in substantially a horizontal plane longitudinally within the frame 10 below the push rods 21 and in the path of movement of actuating heads 35. The tie-rod 51 extends through clearance openings 45' provided in the levers 45.

The distances from the common axis of rotation of the levers 44 and 45 to the tie-rods 50 and 51 are substantially equal. Furthermore, the distances from the common axis of rotation of the levers 44 and 45 to the pivotal connections 53 between these levers and the links 43 are substantially equal. It therefore follows that for each degree of movement of the tie-rods 50 and 51 about the axes of the pivotal studs 46, a uniform degree of movement of the pivots 53 and, therefore, of the arms 41 will be produced.

In the construction shown in the drawings, the distances from the common axis of swinging movement of the levers 44 and 45 to the pivots 53 are substantially twice the distances from said axis to the axes of the tie-rods 50 and 51, while the distance from the axis of the drive shaft 15 to the pivot connection, as 54, of the arms 41 with the links 43 is slightly less than the distance from said common axis of rotation of the levers 44 and 45 to the tie-rods 50 and 51 so that the degree of rotation of the shaft 15 produced by swinging movement of the levers 44 and 45 will be considerably greater than the degree of rotation of the tie-rods about said axis of rotation of the levers.

It will now be observed that the rocking movement of the levers 44 and 45 is produced by the engagement of the heads 35 and 38 with the tie-rods 51 and 50 as each push rod 21 is moved inwardly against the action of the corresponding spring 28. The tie-rod which is nearest its actuating head 35 or 38 when said heads are in their normal outermost position will, of course, be engaged first by said head and be swung rearwardly thereby. This rearward movement of one of the tie-rods will effect a corresponding forward swinging movement of the other tie-rod due to the connection of said rods with each other, provided by levers 44 and 45, links 43 and arms 41. This forward swinging movement of one of the rods 50 or 51 will continue until said rod is engaged by its actuating head 35 or 38, whereupon the rods and heads will be held against further movement in their respective directions. It therefore follows that the rock levers 44 and 45, arms 41 and the drive shaft 15 will be moved to a predetermined position upon each inward stroke of an actuating member 17 and the direction of rotation of the shaft 15 will depend upon which of the two tie-rods of the linkage mechanism is first engaged by an actuating head.

When it is desired to adjust or set the tuning unit so that the manipulation of a predetermined one of the reciprocating control or selector members 17 will set the variable condenser C to the frequency of a selected broadcasting station, the heads 35 and 38 of that selector member 17 are moved inwardly by pressure exerted upon the outer end of the corresponding push bar 21 until both heads contact with the tie-rods 50 and 51. As the heads 35 and 38 thus engage the tie-rods 50 and 51 the frequency to which the condenser is then tuned may be readily determined by observing the setting of the usual tuning dial associated therewith. If the tuning dial indicates that the condenser is not tuned to the frequency of the station selected, the selector member 17 is adjusted to properly set the condenser in the following manner: The push rod 21 is rotated by means of the push button 20 or a screw driver engaging in the slot 22, while the heads 35 and 38 are being firmly maintained against the tie-rods, in a direction to move said heads toward or from each other, depending upon the direction it is desired to rotate the condenser shaft S for tuning the condenser to the desired station. This movement of the heads 35 and 38 toward or from each other will produce a corresponding rotation of the levers 44 and 45 about the axes of the pivotal studs 46, and this rotation of the levers will produce a corresponding movement of the rock arms 41 and shaft 15.

It will be understood that rotation of shaft 15 will produce a corresponding rotation of condenser C and also of the tuning dial associated with said condenser and shaft. It follows, therefore, that the push rod 21 may be rotated in the proper direction until the tuning dial indicates that the condenser is tuned to the frequency of the broadcasting station selected. The push rod may then be released whereupon the spring 28 will return said rod to its normal forwardmost position.

After the first selector member 17 has been thus adjusted to tune the condenser to a given station, a second one of the selector members may be adjusted in a similar manner for tuning the condenser to a second station. In like manner, the remaining selector members 17 may be adjusted for tuning the condenser to a corresponding one of a group of selected stations. After the selector members have all been prop-

erly adjusted, it will be obvious that the receiving set may be quickly and easily tuned to the frequency of any one of said group of selected stations by merely pressing inwardly on the proper push bar 21.

To explain more explicitly, let it be assumed that the heads 35 and 38 of the selector member 17 to be actuated are positioned as illustrated in Figure 2. It will be observed that as the push rod 21 is moved inwardly against the action of the spring 28, the head 38, being normally nearer to the tie-rod 50 than the head 35 to the tie-rod 51, will engage the tie-rod 50 prior to the engagement of the head 35 with the tie-rod 51. In other words, the selector member 17 will be in the position illustrated in Figure 3 when the head 38 contacts the tie-rod 50. As the selector member is moved inwardly to a greater distance, the head 38 will rock the levers 45 about the axes of the studs 46 in a direction to move the rear ends of said levers connected with the links 43 downwardly and thereby produce a corresponding downward movement of the rock arms 41.

This downward movement of the arms 41 will produce a corresponding downward movement of the rear ends of the levers 44 due to the connection of said levers with the arms 41 by links 43. This downward rocking movement of the levers 44 will produce movement of the tie-rod 51 connected therewith toward the front side of the frame 10 so that the head 35 and tie-rod 51 will be moved in directions toward each other until the head 35 engages the rod 51, at which period in the operation of the selector member the heads 35 and 38 and the linkage mechanism will be in the position illustrated in Figure 4. This rocking movement of the levers 44 and 45 will, of course, produce a corresponding rotation of the shaft 15 and the rotor plates R of the condenser C connected with said shaft. As the push bar 21 is released, the spring 28 connected with the corresponding control member will return the push rod 21 associated therewith to its normal outermost or inoperative positions, while the condenser will remain in the set position.

In order to tune the set to another selected station of the group, it is only necessary to push inwardly on the corresponding control member 17 to bring the heads 35 and 38 thereof into engagement with the tie-rods 50 and 51. When both of said heads engage said tie-rods, the condenser will be properly adjusted to the frequency of the station selected. It will be understood that the push rods 21, when in their outermost inoperative positions, will maintain the selector heads 35 and 38 out of the path of movement of tie-rods 50 and 51 so that said rods are free to be actuated by the heads associated with any one of the selector members 17 for adjusting the condenser. Also the condenser may be adjusted by the conventionally constructed tuning control of the receiving set when the selector heads are in their operative positions at one side of the path of movement of the tie-rods 50 and 51.

The modified structure shown in Figures 8 and 9 is very similar in construction and operation to that shown in Figures 1 to 7, inclusive. This structure is adapted to actuate a drive shaft, as 15, which is positioned either above or below the supporting frame 10. The drive shaft 15, in this instance, is shown as being positioned above the frame 10 while the levers, as 44' and 45' and the links 43' and arm 41', are of such a length and form as to permit them to readily rotate the shaft 15 upon engagement of any one of the manually operated selector or control members 17 with the tie-rods 50 and 51. In the structure shown in these figures, there is provided a set of levers 44' and 45' at each end of the frame 10. The levers 45' of each pair are constructed substantially alike except that one is a right-hand lever and the other is a left-hand lever. Likewise, the levers 44' of each pair are constructed substantially alike except that one is made a right-hand lever and the other a left-hand lever. The rock levers 44' and 45' are of substantially goose-neck construction, as illustrated in Figure 8, so as to provide sufficient movement of the levers to produce a maximum rotation of the shaft 15 without their coming into contact with said shaft. In this instance, the drive shaft 15 is supported by any suitable means exteriorly of the frame 10, such as indicated at 55, Figure 9, which may comprise a portion of the housing or frame supporting the variable condenser to which the shaft 15 is connected.

In Figures 10 and 11, the linkage mechanism connecting the tie-rods 50 and 51 with the drive shaft 15 is adapted more particularly for operating the shaft 15 when said shaft is positioned at one side of the frame 10, either above or below said frame, and in substantially parallel relation with the push rods 21 instead of transversely of said push rods as in the structures shown in Figures 1 and 8. In the structure shown in Figures 10 and 11, the drive shaft 15 may be supported at one side of the frame 10 by any suitable means, as by the condenser frame indicated at 55, secured to the chassis of the radio receiving set. As shown more particularly in Figure 10, the rock levers 56 and 57 connected with the tie-rods 50 and 51 positioned at one end of the frame 10 are substantially L-shaped members which are pivotally mounted upon the pivotal post or stud 47 carried by the frame 10. The shorter legs, as 56' and 57' of the levers 56 and 57, extend in opposite directions from the pivotal stud 47 and support adjacent ends of the tie-rods 50 and 51 respectively. The opposite ends of the tie-rods 50 and 51 are similarly supported by a pair of rock levers 58 rotatably mounted upon a pivotal stud 47 positioned in the opposite end of the frame 10 from the levers 56 and 57. These levers 58 are relatively short members which function to rotatably support the adjacent ends of the tie-rods 50 and 51 only and are not connected, in this instance, directly with the drive shaft 15. The tie-rods 50 and 51 are preferably fixedly connected with the levers 56, 57 and 58 to provide a relatively rigid operating structure, that is, one which will function without flexing, for producing the required movement of shaft 15 irrespective of the particular selector member 17 by which said operating structure is actuated.

The drive shaft 15, in this instance, is provided with a single rock arm 41 constructed and secured to the shaft 15 in the manner described above and shown in Figures 1, 3, 4 and 5 of the drawings. The outer ends of the arm 41 are pivotally connected with links 43 which, in turn, are pivotally connected to rock levers 59 and 60, as shown in Figures 10 and 11. These levers 59 and 60, as shown, are pivotally connected intermediate their ends, as at 61, to the supporting member 55 at one side of the shaft 15 to rock about a common axis extending in spaced substantially parallel relation with shaft

15. The ends of the levers 59 and 60, at the opposite side of the pivot 61 to that of the links 43, are operatively connected with the rock levers 56 and 57, respectively, by tie-rods 62 and 63.

It will now be observed that inasmuch as the rock levers 59 and 60 rotate about an axis extending substantially parallel with the shaft 15 and in substantially right angular relation with the axis of rotation of the levers 56 and 57, the shaft 15 will be rotated in one direction or the other by the engagement of the heads 35 and 38 with the tie-rods 50 and 51, depending upon which of the heads is first to engage a tie-rod.

Furthermore, it will be noted that in each of the three different structures illustrated in the drawings, there is a double linkage mechanism connecting the actuating elements or tie-rods 50 and 51 with the adjacent portion of the drive shaft 15, one of these linkage mechanisms being adapted when operated by its respective actuating element, to move the drive shaft 15 in one or a clockwise direction and the other linkage mechanism being adapted, when operated by its respective actuating element, to move the drive shaft 15 in the opposite or counterclockwise direction. This arrangement of the linkage mechanisms provides a structure which will accurately position the drive shaft 15 upon each inward movement of a selector member 17 without the necessity of constructing the linkage mechanism with a high degree of precision. Also, this structure will function efficaciously over an extended period of time, even though lost motion is introduced therein as a result of wear taking place at the joints or pivotal connections between the levers and links.

While I have shown and particularly described the preferred embodiments of my invention, I do not wish to be limited to the exact construction shown as various changes, both in the form and the relation of parts thereof, may readily be made without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. A tuning unit for a radio receiver comprising a drive shaft adapted to be operatively connected to the shaft of a variable condenser, a reciprocating selector rod mounted for movement at one side of the drive shaft, means for actuating said shaft including a linkage mechanism connected therewith and having a pair of operating members arranged at opposite sides of the selector rod, spaced actuating elements mounted on said selector rod movable into and out of operative engagement with said operating members during the reciprocation of said rod, and manually operated means for actuating the selector rod.

2. A tuning unit as in claim 1 wherein the actuating elements are adjustably connected with the selector rod for movement with respect to each other whereby the degree of movement of the linkage mechanism produced by the engagement of said elements with the operating members may be varied.

3. A tuning unit as in claim 1 having spring means connected with the selector rod for yieldingly maintaining the actuating elements out of engagement with said operating members.

4. A mechanical tuning unit for a radio receiver comprising a plurality of manually operated selector members, a drive member mounted in spaced relation to said selector members, an actuating mechanism connected to the drive member, said mechanism having a pair of operating members therefor common to all of said selector members and arranged at opposite sides of said selector members, each of said selector members having spaced actuating elements movable into and out of operative engagement with said operating members during the operation of said selector members, and means for adjusting the actuating elements toward and from each other to cause a variation in the degree of movement of the operating members and therefore of the drive member produced thereby.

5. A tuning unit for a radio receiver comprising a frame, a plurality of selector rods connected with said frame for reciprocating movement with respect to each other, a drive shaft adapted to be connected with the shaft of a variable condenser rotatably connected with said frame at one side of said selector rods, actuating means for operatively connecting the selector rods with said drive shaft including a pair of linkage mechanisms rotatably connected to the frame to rock about a fixed axis and connected to said drive shaft, a pair of tie-rods connecting said linkage mechanisms arranged at opposite sides of said axis of rotation of the linkage mechanisms, a pair of actuating elements on each of said selector rods movable into and out of engagement with a respective one of said tie-rods during the reciprocating movement thereof for actuating the linkage mechanisms, and manually operated means for actuating said selector rods.

6. A tuning unit as in claim 5 wherein the selector rods are rotatably mounted and have right and left screw-threaded engagement with said actuating elements whereby rotation of each selector rod will produce relative movement of the actuating elements connected therewith toward or from each other for varying the degree of movement of the tie-rods produced thereby during the reciprocation of said selector rod.

7. A tuning unit as in claim 5 wherein the selector rods are rotatably mounted and have right and left screw-threaded engagement with said actuating elements whereby rotation of each selector rod will produce relative movement of said actuating elements connected therewith toward or from each other for varying the degree of movement of the tie-rods produced thereby during the reciprocation of said selector rod, and spring means interposed between the selector rods and said frame for yieldingly urging the rods in one direction to maintain the actuating elements out of engagement with the tie-rods.

8. A tuning unit for a radio receiver comprising a frame, a plurality of reciprocative selector members mounted in said frame in spaced substantially parallel relation to each other, a drive shaft adapted to be operatively connected with the shaft of a variable condenser rotatably mounted in said frame at one side of and extending transversely to said selector members, a plurality of pairs of actuating elements, one pair for each selector member, the elements of each pair being arranged in spaced relation to each other, rock members pivotally connected with said frame to swing about an axis extending substantially normal to the axes of reciprocation of the selector members, a pair of operating members connected with said rock members at opposite sides of the axis of rotation thereof and arranged in the path of movement of each pair of actuating elements to be alternately engaged thereby so that the rock members will be

rocked in one direction or the other depending upon which of the operating members is first engaged by an actuating element, and means operatively connecting the rock members to said drive shaft.

9. In a tuning unit for a radio receiving apparatus, in combination, a frame, a selector rod supported by said frame to extend forwardly therefrom and for both longitudinal and rotary movements with respect thereto, a condenser drive shaft rotatably supported by the frame, a pair of selector elements slidably supported by the frame and having screw-threaded connection with the selector rod to be reciprocated by the rod in unison therewith during said longitudinal movement of said rod and to be moved relative to the rod toward or from each other during said rotary movement of said rod, a pair of operating elements arranged at one and the same side of the selector elements in the path of movement thereof, means pivotally connecting the operating elements to the frame so that said operating elements may swing about a fixed axis extending substantially midway between said operating elements and transversely to the axis of movement of the selector rod, means associated with said pivotal means for operatively connecting the operating elements to the drive shaft, said selector rod having a fingerpiece connected with the forward end thereof by which said rod may be both moved longitudinally to bring the selector elements into engagement with the operating elements and rotated during said engagement of said elements with each other to alter the relative position of the selector elements and of the position of the operating elements produced thereby.

10. In a tuning unit for a radio receiving apparatus, in combination, a frame, a selector rod supported by said frame to extend forwardly therefrom and for both longitudinal and rotary movements with respect thereto, a drive shaft rotatably supported by the frame adapted to be connected with a variable condenser, means operably connecting the selector rod with the shaft comprising a pair of selector elements slidably supported by the frame and having screw-threaded engagement with said selector rod to be reciprocated by said rod in unison therewith during said longitudinal movement of the rod and to be moved relative to the rod toward or from each other during said rotary movement of said rod, an operating mechanism connected to the shaft and including a pair of operating elements, each of said operating elements being arranged at the rear side of a corresponding one of the selector elements in the path of movement thereof, and means including a pivotal member arranged intermediate the operating elements for rotatably connecting said operating elements to the frame, the forward end of said selector rod being provided with a tool engaging means by which said rod may be both moved rearwardly to bring the selector elements into engagement with the operating elements and rotated during said engagement of said elements with each other to alter the position of the selector elements and of the position of the operating elements produced thereby.

11. A mechanical tuning unit for a radio receiver comprising a frame, a manually operated selector rod supported by said frame for longitudinal reciprocative movement with respect to said frame, a rotatable drive shaft adapted to be connected to the shaft of a variable condenser, said shaft being mounted at one side of the frame in spaced relation thereto, means operably connecting the selector rod to the drive shaft whereby reciprocative movement of said rod will produce rotary movement of said shaft including a pair of operating elements mounted at opposite sides of the selector rod to swing about a common axis, means actuated by the selector rod for swinging the operating elements to predetermined positions in their path of movement, and a linkage mechanism operatively connecting the operating elements with said shaft.

12. A tuning unit as in claim 11 wherein the drive shaft is arranged to extend in substantially parallel relation with the selector rod, and the linkage mechanism includes a rock lever having an axis of swinging movement extending substantially parallel with the axis of rotation of the drive shaft in fixed relation therewith.

13. In a tuning unit for radio receiving apparatus, in combination, a frame, a selector rod supported by said frame for longitudinal movement with respect thereto, a drive shaft supported by the frame in spaced relation to said selector rod and drive members, actuating means for operatively connecting the selector rod with said drive shaft including a pair of drive members connected with said selector rod to move therewith and spaced from each other longitudinally of said rod, a pair of driven elements one for each drive member, said driven elements being pivotally connected to the frame to rock about a common axis, and a pair of linkage mechanisms connecting the drive shaft with the driven elements respectively, one of said driven elements and the linkage mechanism therefor being arranged to rotate the drive shaft in one direction and the other driven elements and the linkage mechanism associated therewith being adapted to rotate the drive shaft in the opposite direction when said driven elements are operated by their respective drive members.

14. In an automatic tuning device, a member movable on an axis for tuning purposes and means to move said member to a predetermined position, said last mentioned means comprising a manually translatable element and a pair of positioning means on said element for moving said first mentioned means and for fixing it in position by contacting it on each side of its axis, said manually translatable element bearing means for changing the position of said positioning means and accessible at an end of said manually translatable element.

15. In a device of the character described, means pivoted on its axis, a plunger longitudinally movable in a direction transverse to and through said axis, longitudinally movable means on said plunger for contacting said pivoted member respectively on each side of its said axis, and means on said plunger for moving said longitudinally movable means substantially equally and in opposite directions.

16. In a device of the character described, means pivoted on its axis, a plunger longitudinally movable in a direction transverse to and through said axis, longitudinally movable means on said plunger for contacting said pivoted member respectively on each side of its said axis, and means on said plunger for moving said longitudinally movable means substantially equally and in opposite directions, said last mentioned

means comprising a shaft having threaded engagement with said longitudinally movable means.

17. In a device of the character described, means pivoted on its axis, a plunger longitudinally movable in a direction transverse to and through said axis, longitudinally movable means on said plunger for contacting said pivoted member respectively on each side of its said axis, and means on said plunger for moving said longitudinally movable means substantially equally and in opposite directions, said last mentioned means comprising a shaft having threaded engagement with said longitudinally movable means, an end of said shaft constituting a means whereby said plunger may be moved.

18. In a device of the character described, means pivoted on an axis and means for moving said pivoted means, said last mentioned means comprising a plunger, adjustable positioning means on said plunger for two-way location of said pivoted means and comprising a pair of abutments each adapted to act upon said pivoted means on a different side of its axis, and a common means for moving said plunger and for varying the position of said adjustable positioning means.

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