

May 6, 1947.

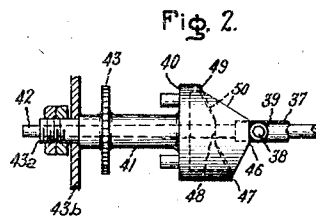
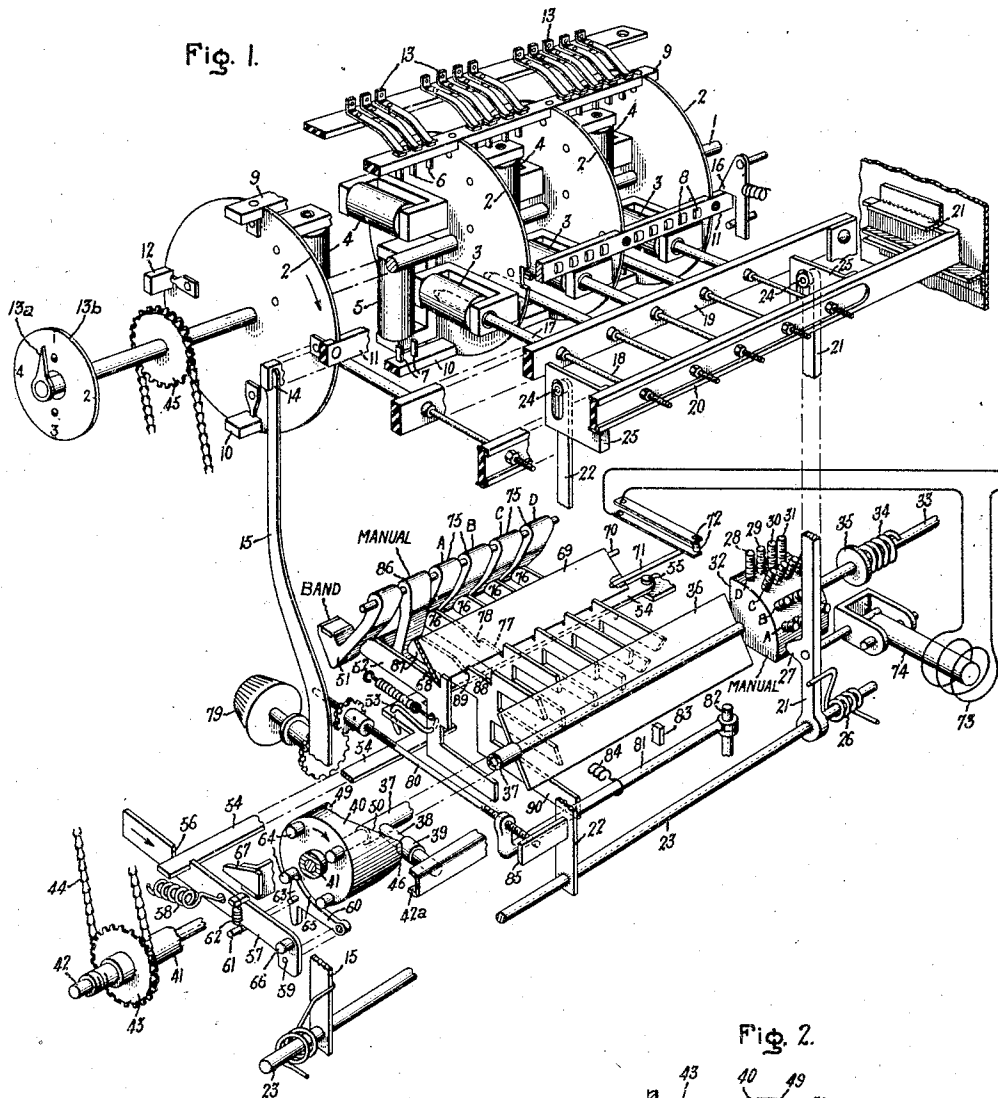
B. ROBERTS

2,419,968

PUSH BUTTON TUNER FOR MULTIBAND RADIO RECEIVERS

Filed July 26, 1944

2 Sheets-Sheet 1



Inventor:
Bruce Roberts,
by *Harry E. Dunham*
His Attorney.

May 6, 1947.

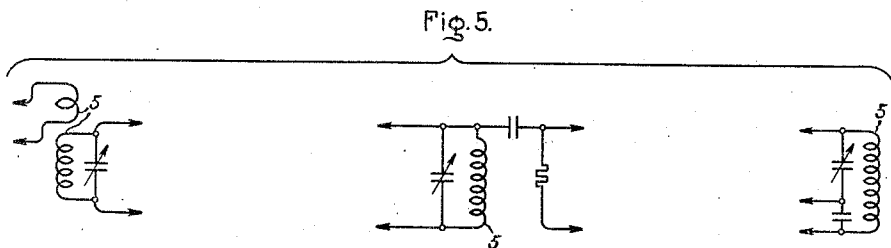
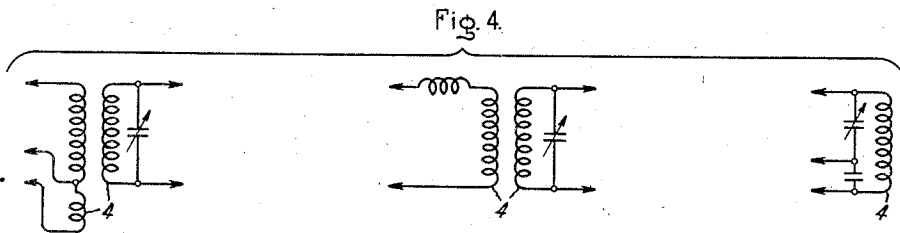
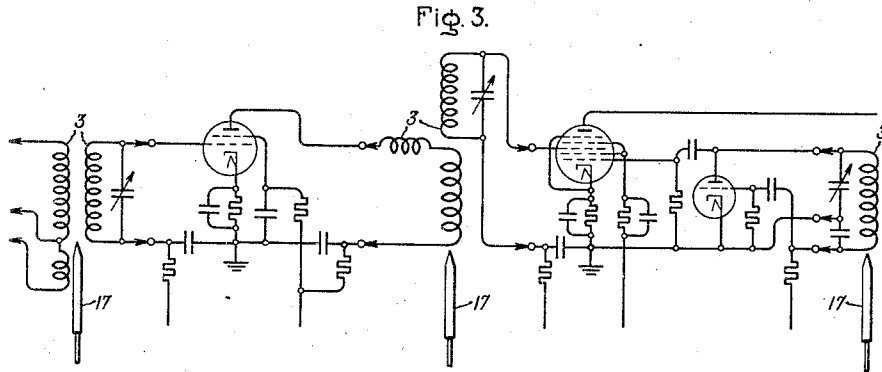
B. ROBERTS

2,419,968

PUSH BUTTON TUNER FOR MULTIBAND RADIO RECEIVERS

Filed July 26, 1944

2 Sheets-Sheet 2



Inventor:
Bruce Roberts,
by *Harry E. Dunham*
His Attorney.

UNITED STATES PATENT OFFICE

2,419,968

PUSH BUTTON TUNER FOR MULTIBAND RADIO RECEIVERS

Bruce Roberts, Philadelphia, Pa., assignor to
General Electric Company, a corporation of
New York

Application July 23, 1944, Serial No. 546,877

9 Claims. (Cl. 250-49)

1

The present invention relates to a multiband radio receiver, and is particularly concerned with presettable push button tuning.

An object of my invention is to provide an arrangement in which a push button is usable to select a station in each of the receiver bands.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings in which Fig. 1 is an exploded perspective of the push button tuner; Fig. 2 is a detail of the band selecting cam; Fig. 3 is a diagram of the tunable receiver circuit; and Figs. 4 and 5 are diagrams of circuit elements connectible in the Fig. 3 circuit to condition the receiver for other signal bands.

Referring to Fig. 1 of the drawings, there is shown a tuner for a multiband radio receiver having a band selecting reel 1 with disks 2 supporting sets 3, 4, 5 of circuit elements respectively connected to rows of contacts 6, 7, 8 on strips 9, 10, 11 of insulating material fitting in notches 11a in the disks. There is space on the disks for an additional set of circuit elements to be connected to similar contacts on strip 12. By means of contact fingers 13 one of the sets of circuit elements is connected into the receiver circuit in each position of the reel to condition the receiver for reception of signals in the corresponding band. The reel is positioned in each band selecting position indicated by a pointer 13a and a dial 13b by a retractable stop 14 at the upper end of an arm 15 which engages the under side of one of the contact carrying strips 9, 10, 11, 12 and a spring pressed latch 16 engaging the upper side of the strip.

The circuit elements are illustrated as inductances tuned by magnetic cores 17 carried on rods 18 guided in a bar 19 and moved into and out of cooperation with the inductances by a reciprocatory carriage 20 guided in a slide 21. The magnitudes of the inductances are varied for tuning purposes by varying the distance the cores project within the inductances. The present invention is not limited to the illustrated circuit elements and tuning arrangement.

The carriage 20 is reciprocated by crank arms 21, 22 fixed to a shaft 23 and having pin and slot connections 24 with brackets 25 fixed to the carriage. The shaft 23 is biased in a counterclock-

2

wise direction by a spring 26 engaging the arm 21 urging a projection 27 on the arm 21 against one of a plurality of stops 28, 29, 30, 31 adjustable to determine the position of the carriage and therefore the tuning of the circuit elements. The stops are arranged in rows on a member 32 fixed to a shaft 33. Each row corresponds to a different band of the receiver and each stop corresponds to a different station in the band. The shaft 33 is urged to the left by a compression spring 34 engaging a collar 35 on the shaft. Fixed on the shaft is a vane 36 engaging a tubular sleeve 37 in which the shaft 33 is journaled. The sleeve 37 has a projecting arm 38 carrying a cam follower 39 cooperating with a face cam 40 fixed to a sleeve 41 in which the sleeve 37 is slidably and rotatably journaled by means of a shaft extension 42. The sliding movement of the sleeve 37 is guided by channel 42a cooperating with the end of the arm 38. Also fixed to the sleeve 41 is a sprocket 43 connected by a chain 44 and a sprocket 45 to the reel. The face cam 40, the sleeve 41, and the sprocket 43 are journaled in guide and thrust bearings 43a on a frame 43b (Fig. 2), and the shaft 33, the stop carrying member 32, the vane 36, and the sleeve 37 are slidable as a unit to positions determined by the face cam 40 and the cam follower 39. The face cam 40 has flats 46, 47, 48, 49 which respectively position the member 32 so the projection 27 on the tuning member 21 cooperates with stops 28, 29, 30, 31. The flats are spaced 90 degrees apart and correspond to the band selecting positions of the reel. In the position illustrated, the projection 27 cooperates with the stops 28 for stations in the band determined by the circuit elements 3. As is customary, the flats on the face cam are connected by inclined surfaces 50.

The receiver bands are selected by a push button 51 cooperating with a slide 52 connected by a link 53 to a lever 54 pivoted at 55 in the frame. The free end of the lever 54 normally fits in a notch 56 in a slide 57 retracted by a tension spring 58. Pivoted at 59 on the slide 57 is a pawl 60 having a projecting pin 61 held against the under side of the slide by a tension spring 62. The pawl 60 has a face 63 adapted to engage one of the projections 64 on the face cam 40 and to position the face cam so that one of the flats 46-49 cooperates with the cam follower 39. At the rear of the face 63 the pawl has a cam surface 65 cooperating with the succeeding projection 64. When the button 51 is depressed, the slide 57 is moved forward, causing the pawl 60 to be cammed downward until its working face 63 is moved in

3

front of a succeeding projection 64 on the face cam 40, thereby positioning the pawl to effect a quarter revolution of the face cam upon retraction of the slide 57. Just after the pawl reaches this position a projection 66 on the slide 57 engages the arm 15 pivoted on the shaft 23 and moves the stop 14 clear of the strip 11, thereby permitting clockwise rotation of the reel. At this point the lever 54 is cammed out of the notch 56 by a cam 67, thereby releasing the connection between the push button 51 and the slide 57 which is now retracted by the spring 58. The retraction of the slide 57 causes a 90 degree rotation of the face cam 40 and through the chain drive 44 causes a similar rotation of the reel. At the start of the retracting movement of the slide 57 the projection 66 is withdrawn from contact with the arm 15 so that the stop 14 is positioned to engage the end of the strip 9 and position the reel.

Since rotation of the reel would not be possible with the cores 17 projecting within the inductances 3, 4, 5 the slide 52 actuated by the band selecting push button 51 is provided with a cam surface 53 which, upon initial depression of the push button, pivots a latch member 69 on a pivot 70 and thereby raises an arm 71 closing normally open contacts 72 in circuit with a solenoid 73. The solenoid has an armature 74 connected to the arm 21 which, upon energization of the solenoid, retracts the carriage 20 and the cores 17 carried thereby to a position in which the cores are clear of the inductances. The solenoid contacts 72 are closed so long as push button 51 is depressed and are opened when the push button is returned from the depressed position. By this time the 90 degree rotation of the reel has been completed and a succeeding set of tuning inductances moved into alignment with the tuning cores. The 90 degree rotation of the face cam 40 positions the flat 49 on the face cam opposite the cam follower 39 and permits longitudinal movement of the shaft 33 and member 32 and the vane 36 to a position in which the projection 27 is opposite the adjustable stops 31. Upon succeeding depressions of the push button 51 the stops 39, 29, and 28 are successively moved into alignment with the projection 27. The band selecting push button 51 and the associated mechanism accordingly provide an arrangement by which the circuit elements carried by the reel are successively connected to the receiver through the contact fingers 13 and the adjustable stops carried by the member 32 and corresponding to desired stations in the respective bands are brought into cooperation with the projection 27 on the tuning arm 21.

The circuit elements carried by the reel and the manner of tuning the circuit elements are matters of design dependent upon the receiver construction. In Fig. 3 is shown a diagram of the radio frequency stage of a receiver with the circuit elements 3 connected. In Figs. 4 and 5 are shown circuit elements 4 and 5 which are successively connected in the receiver circuit in succeeding positions of the reel. The circuit elements which have been omitted from the reel for purposes of illustration are also omitted from the circuit diagram. Each of the sets of circuit elements conditions the receiver for signals within a different band.

Desired stations within the band for which the receiver is adjusted are selected by push buttons 75 engaging slides 76 which cooperate with the vane 36 and turn the member 32 to a position in which a different one of the hori-

4

zontal rows of stops is opposite the projection 27 on the tuning member 21. For convenience, the push buttons 75 are labelled A, B, C, and D to designate the stations corresponding to the push buttons and the horizontal rows of stops are provided with corresponding designations. The ends of the slides 76 which engage the vane 36 are shaped so that upon the depression of any of the push buttons 75, the member 32 is turned through the proper angle to bring the projection 27 into alignment with the corresponding horizontal row of stops. Since each of the push buttons 75 is usable for a station in each of the receiver bands, the number of push buttons required is decreased.

Each of the slides 76 is provided with a cam surface 77 similar to the cam surface 68 which cooperates with the latch member 69 and elevates the same to close the solenoid contacts 72 upon initial depression of any of the push buttons 75. Energizing the solenoid retracts the tuning member 21 clear of the stops and prevents interference with the free rotation of the member 32 carrying the stops. The slides 76 are also provided with a notch 78 into which the latch 69 falls to latch the push button in its operated position. Upon falling into the notch 78, the solenoid contacts 72 are opened and the tuning member is moved forward by the spring 26 into engagement with the stop corresponding to the operated push button. When another push button is depressed, the initial depression lifts the latch 69 out of the notch 78 and releases the previously operated push button. In other respects the operation is identical.

Since the push button selection of stations is confined to a small part of the total number of stations within the receiver bands, manual tuning is desirable. This is effected by means of a knob 79 geared to a shaft 80 threaded in the free end of an arm 81 pivoted at 82 on the frame. The arm 81 is normally held against a stop 83 by a spring 84 in a position in which the shaft 80 is clear of a projection 85 on the arm 22. In this position tuning of the receiver by the knob 79 is impossible. When manual tuning is desired, a push button 86 is depressed, moving a slide 87 forward and positioning the vane 36 and stop carrying member 32 in the position illustrated in which the projection 27 in the tuning member 21 is not opposite any of the tuning stops. The slide 87 is provided with a cam surface 88 similar to the cam surfaces 68 and 77 which pivot the latch member 69 to a position closing the solenoid contacts 72 upon initial depression of the push button 86. The slide 87 is also provided with a notch 89 similar to the notches 78 into which the latch member falls at the end of the downward movement of the push button, latching the push button in the depressed position. When the latch member 69 is in the notch 89, the solenoid contacts 72 are open and the projection 27 on the tuning member 21 is held against the tuning stop carrying member 32. The slide 87 is also provided with a projection 90 which engages the arm 81 and moves it forward to a position in which the shaft 80 engages the projection 85 and positions carriage 20 and the tuning cores 17 carried thereby in accordance with the adjustment of the dial 79.

While I have shown a particular embodiment of my invention it will, of course, be understood that I do not wish to be limited thereto since many modifications both in the circuit arrangement and in the instrumentalities employed may

be made and I contemplate by the appended claims to cover any such modifications as fall within the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a push button tuner for a multiband radio receiver, band selecting means, control means having sets of adjustable stops corresponding to desired stations in the respective bands, said control means being responsive to said selecting means to position said stops in accord with the band to be selected, tuning means for cooperation with the stops for the selected band, and a push button for effecting cooperation of the tuning means with the stop in the set corresponding to the desired station in the selected band whereby the push button is usable for a plurality of bands.

2. In a push button tuner for a multiband radio receiver, a plurality of rows of adjustable stops, each row corresponding to an individual one of the bands, a tuning member, band selecting means for positioning the tuning member in cooperation with the row corresponding to the selected band, and station selecting means for positioning the tuning member in cooperation with the stop in the row corresponding to the selected station whereby the station selecting means is usable for a station in each of the bands.

3. In a multiband radio receiver, a magnetic core, a reel carrying a plurality of inductances successively positionable by rotation of the reel in cooperation with said core, means for connecting the inductance when in cooperation with said core to the receiver to condition the receiver for signals within a predetermined band, and a push button controlled tuning member for positioning the core with respect to said inductance to tune the receiver for a desired station in the band.

4. In a multiband radio receiver, a magnetic core, a reel carrying a plurality of inductances successively positionable by rotation of the reel into alignment with said core, a carriage for moving the core into and out of the inductance for tuning, means for connecting the inductance in cooperation with said core to the receiver to condition the receiver for signals within a predetermined band, band selecting means for rotating the reel, and means effective upon operation of the band selecting means to rotate the reel from one band selecting position to another for retracting the carriage during said rotation.

5. In a push button tuner for a radio receiver, a plurality of buttons corresponding respectively to manual tuning and to desired stations, means for latching any one of the buttons in its operated position, means effective upon operation of another button for releasing said latching means, a tuning member, means controlled by the station push buttons for positioning the tuning member in accordance with the corresponding stations, manually operable means for positioning the tuning member, means for normally retracting said manually operable means out of cooperation with said tuning member, and means controlled by the manual tuning push button for moving said manually operable means into cooperation with said tuning member.

6. In a multiband radio receiver, tuning means movable in a plane to tune the receiver, push button controlled means having parts in said plane and having means for positioning said tuning means in accordance with stations corresponding

to the respective parts and said push button controlled means having other parts in a plane to one side of said first plane, band selecting means for conditioning the receiver for reception of signals in different bands, and means responsive to the band selecting means for effecting relative movement of said tuning means and said push button controlled means whereby the first parts are moved out of and said second parts are moved into said first plane.

7. In a multiband radio receiver, tuning core, a reel carrying a plurality of coils successively positionable by rotation of the reel in cooperation with said tuning core, means for connecting to the receiver the coil in cooperation with the tuning core to condition the receiver for signals within a predetermined band, and a station selecting control for the tuning core.

8. The combination, in a receiver adapted for reception in each of a plurality of frequency bands, said receiver having a plurality of reactance elements movable to station selecting positions, each reactance element corresponding to a respective band, a group of selectors, one of said selectors corresponding to the frequency bands and each of the other of said selectors corresponding to respective stations in each of the different bands, each of said other selectors corresponding to one station in each band, means respective to operation of said one of said selectors to move any one of said reactance elements to said station selecting positions in accord with the band in which said receiver is to operate, and means responsive to operation of any of said other selectors to vary the reactance of the reactance element in said station selecting position to select the station corresponding to the respective station selector in the band selected by said band selector, whereby the same station selectors select stations in all of the bands.

9. The combination, in a radio receiver, tuning means therefor, a plurality of push buttons, individual actuating means between each push button and said tuning means to actuate said tuning means to tune said receiver to the station corresponding to the push button operated, means to change the band of frequencies in which said receiver is tunable to operate by said tuning means, and means corresponding to each band to individually control said actuating means to adjust the frequency to which the receiver is tuned by said tuning means when actuated by any actuating means, whereby said receiver may be tuned to stations in different bands by operation of the same push button and actuating means.

BRUCE ROBERTS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,191,562	Filippa	Feb. 27, 1940
2,103,035	Lear	Dec. 21, 1937
Re. 22,087	Albright	May 5, 1942
1,955,639	Kline	Apr. 17, 1934
2,214,506	Manning et al.	Sept. 10, 1940
2,276,724	Horowitz et al.	Mar. 17, 1942
2,310,720	Wandrey	Feb. 9, 1943
2,356,935	Koch	Aug. 29, 1944