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PRESELECTIVE TUNING MECHANISM FOR RADIO RECEIVING SYSTEMS AND THE LIKE

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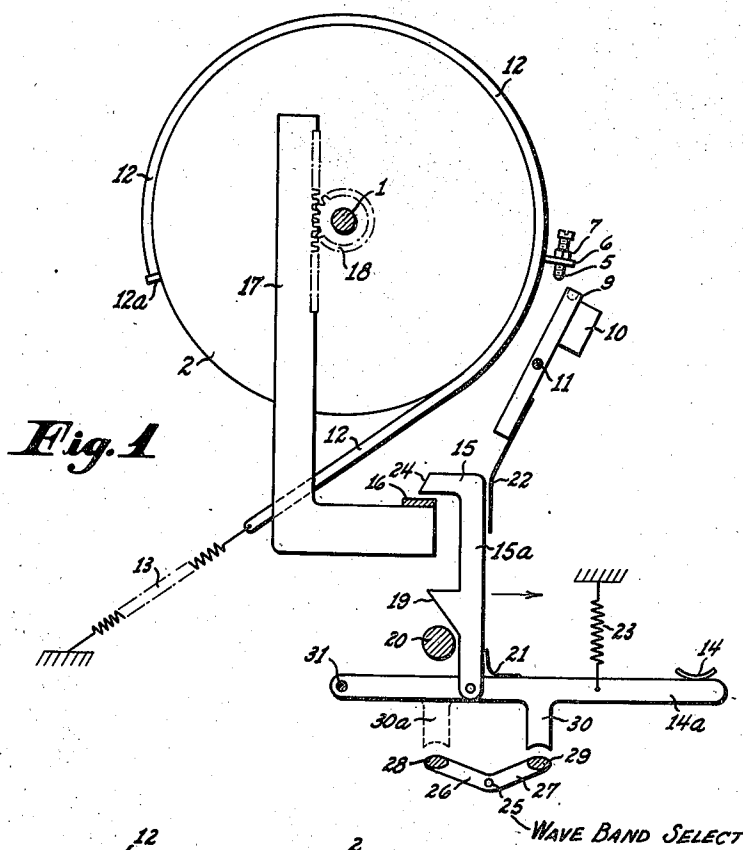


Fig. 1

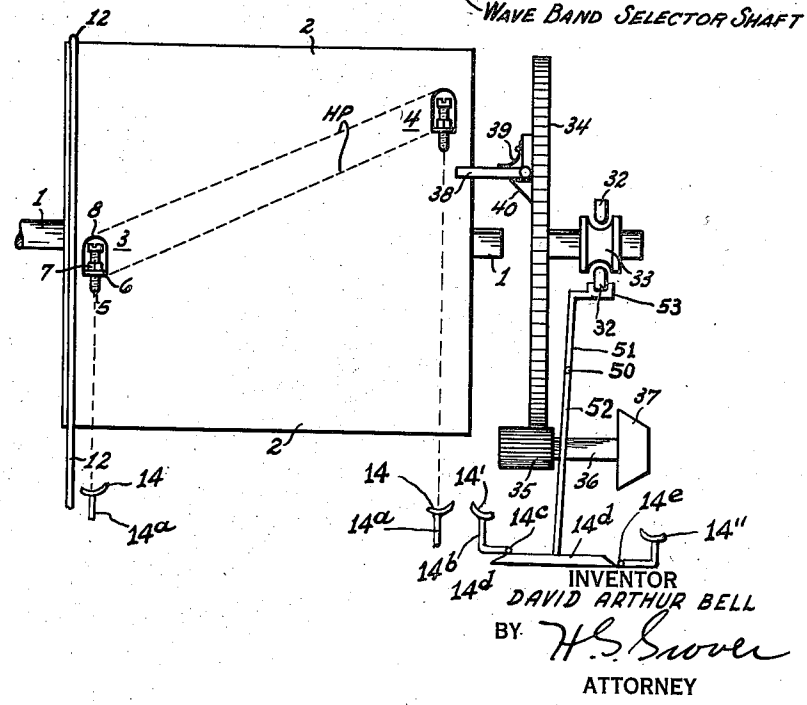


Fig. 2

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PRESELECTIVE TUNING MECHANISM FOR RADIO RECEIVING SYSTEMS AND THE LIKE

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5 Claims. (Cl. 250—40)

This invention relates to preselective tuning mechanism for radio receivers and the like, that is to say, to tuning mechanism whereby any desired one of a predetermined plurality of tuning settings can be obtained by merely pressing an appropriately marked key or pushing an appropriately marked button so that the operation of tuning the receiver calls for no skill on the part of the operator. The invention provides improved preselective tuning mechanisms of the kind wherein any desired one of a predetermined plurality of positions of a tuning member, usually the shaft of a tuning condenser or condenser gang, can be selected merely by operating the appropriate key or button.

The main object of the invention is to provide improved preselective tuning mechanisms of the kind in question wherein there is no need for any "re-set" key, one tuning setting after another being automatically obtainable merely by pressing one key or button after another.

A further object of the invention is to provide improved preselective tuning mechanism of the kind referred to wherein the predetermined tuning positions are easily adjustable either in manufacture or otherwise.

A still further object of the invention is to provide improved preselective tuning mechanism of the kind referred to wherein the operator may, if and when he so desires, tune the set in the ordinary way by operation of a manual tuning knob.

According to this invention a preselective tuning mechanism for a radio receiver or the like comprises a plurality of abutment members fast with the tuning member of the receiver, a plurality of cooperating stop members individually movable into and out of the paths of said abutment members, said stop members and abutment members being in such mutual relationship that the permissible movement of the tuning member away from a datum position can be selected at any of a plurality of predetermined amounts by selecting an appropriate stop member to be moved into the path of its cooperating abutment member, means for biasing said tuning member away from said datum position, selector members for selecting any stop member to be moved into the path of the cooperating stop member, means actuated upon operation of any of the selector members for moving said tuning member to its datum position and then releasing it to move under its bias until it is stopped by the selected stop member, and means for retaining any abutment member and cooperating stop member which have engaged one another in such engagement until a fresh tuning operation is initiated.

Preferably ordinary manual control means for the tuning member is provided so as to permit of the use of ordinary tuning when desired.

Preferably also means are provided for automatically maintaining the receiver inoperative to reproduce while a tuning operation is in progress.

Though not limited to its application thereto the invention is particularly well adapted to application to radio receivers embodying so-called automatic frequency control, that is to say, to radio receivers having means whereby once the receiver is tuned within a predetermined degree of accuracy to an incoming station, it automatically "pulls" into corrct tune and maintains itself so tuned. When the invention is applied to such a receiver it will be appreciated that slight errors in the individual tuning settings selectable by the preselective mechanism become of minor importance because, so long as the preselective mechanism is capable of tuning the receiver fairly closely to the appropriate stations, the automatic frequency control system will take charge and obtain and maintain accurate tuning.

The invention is illustrated in the accompanying drawing which shows schematically one way of carrying out this invention as applied to a receiver wherein the tuning member is a rotary condenser shaft, Fig. 1 being an end view of the mechanism and Fig. 2 a side view of that part of the mechanism which revolves with the said condenser shaft.

Referring to the drawing the condenser shaft 1 is rotatable over a predetermined angle of rotation limited at both ends by fixed stops as in the usual way and on this shaft is keyed a concentric drum 2. Helically arranged along the periphery of the drum is a plurality of abutment members. Only the first and last of these abutment members have been shown. These two abutment members are generally designated 3 and 4 respectively. The other, intermediate abutment members are spaced along the helical path represented by the broken lines HP in Fig. 2. Each abutment member is in the form of a screw 5 which is tangential to or parallel to a tangent to the drum 2 and is carried in a bracket 6 fixed to or formed on the drum 2. For example, the brackets 6 may be constituted as shown by tongues punched from the sheet metal constituting the curved surface of the drum and bent up at right angles thereto leaving

a slot 8 in the drum surface behind each bracket. Each screw 5 may be fitted with a lock nut 7 or alternatively some suitable cement, such as shellac, wax, or Celluloid solution, may be arranged to fix each screw in a desired position of adjustment. A plurality of pivoted stop members 9 is provided, there being one stop member for each abutment member, the ends of all the stop members being in a line parallel to the axis of the drum 2. The arrangement is such that each stop member is individually movable into or out of the path of the abutment member with which it is associated and is biased out of said path by a spring or, as shown, by a weight 10. The stop members may all be pivoted on a common shaft or spindle 11 parallel to the axis of the drum. The radius adopted for the drum (measured from the shaft of the abutment members) depends upon the accuracy of tuning required. For example, in the case of a broadcast receiver having automatic frequency control a tolerance of 3 k. c. on the medium wave band will generally be regarded as permissible. The accuracy of setting would then have to be 3 parts in 1,000 for a range of 500 k. c. to 1500 k. c. (assuming the tuning system to be such that the frequency is rectilinearly proportional to angular rotation of the tuning shaft) and assuming a drum of 3" radius this would mean a tolerance of the order 1/30 of an inch, quite a generous tolerance. Moreover, individual fine adjustment is easily obtainable by screwing the screws 5 in and out of the brackets 6.

The tuning shaft is spring biased in such direction that it tends to rotate to bring the abutment members against the stop members and the extreme position of the tuning shaft in a direction opposite to the direction of spring bias is the position herein termed the datum position. In the construction illustrated the spring bias is provided by a tension spring 13 acting through a flexible cord 12 which is wrapped round the drum and anchored thereto at the end 12a. Of course, other methods of spring bias could be used; for example, a coiled spring could be provided on the shaft with one end anchored to the shaft and the other to a fixed point or a spring could be provided to act on the rack 17 to be referred to later.

A plurality of operating keys 14, corresponding in number to the plurality of abutment members and stop members, is provided. Each key, which may be marked with the name of a transmitting station or other means of identifying the tuning position to which it corresponds is mounted on the end of an operating lever 14a pivoted at 31 and spring biased by a tension spring 23. Each operating lever has pivotally attached thereto a member 15a with an upper arm 15 shaped to engage the upper face of a bar 16 which runs the length of the mechanism and is attached to the lower end of a rack 17 engaging a pinion 18 on the shaft 1. Thus, depression of a key 14 pulls down member 15a and by engagement of 15 and 16, pulls down the rack 17 and rotates the shaft 1 and drum 2 to the datum position. Each member 15a is formed with a cam face 19 and it will be seen that as the member 15a comes down, the cam 19 engages a roller 20 and forces back the member 15a against the bias of a spring 21, as indicated by the arrow in Fig. 1. As a result the part 15 disengages from 16, the rack is released and the drum 2 and shaft 1 rotate (clockwise in Fig. 1) under the bias of the spring 13. Simultaneously, the forcing back of member 15a causes the rear face of this member to engage a strip 22 which rotates stop member 9 on its pivot 11 against the bias of weight 10 so that the end of the said stop member is moved into the path of the appropriate screw 5 and will be engaged thereby when the spring 13 has rotated the drum 2 far enough.

The stop member 9 is suitably recessed at its end to receive the appropriate screw 5, so that once the said screw is engaged in said recess it will remain therein after the operating key 14 is released. When the key 14 is released, since part 15 is now below part 16, the key cannot return to its original position despite the action of spring 23. Thus the key remains partly depressed and this serves as an indicator to show which setting is in use. When another key is depressed it forces down the member 16 again and this, engaging the upper face of the part 15 associated with the already depressed key 14a, forces the member 15a down so that the cam 19 again engages roller 20 thus again forcing back member 15a until 15 is clear from under 16 and the previously depressed key 14 is released, the parts associated therewith returning to their original positions. The part 15 is provided with a bevelled face 24 so that when part 15 is below part 16 and is forced down on depression of another key, it will release, when member 15a is forced back, before member 15a associated with said other key, and whose part 15 is above the part 16, can release. The spring 21 can be omitted if the restoring force applied through strip 22 is sufficient.

Automatic wave-band switching, whereby either of two wave bands is selected appropriately for each individual station key, can also be provided. In Fig. 1 a wave change switch (not shown) is operated by rotation of a shaft 25, to which are keyed two levers 26, 27, carrying bars 28, 29, which run the whole length of the mechanism. Each of the levers 14a carries a downwardly projecting member which may be either in the position shown in full lines at 30 or in the position shown in dotted lines at 30a according to which of the two positions of the wave change switch is required for the operating key in question. Since a member at 30 will obviously have a longer downward travel than one at 30a, owing to the great distance from the pivot 31, the arm 27 is made correspondingly longer than the arm 26.

As will now be seen all that it is necessary to do to select one of the tuning positions (including adjustment of the wave range switch), is to press the appropriate key 14 and hold it down until the appropriate abutment member engages the corresponding stop member.

The above described helical disposition of abutment members on the drum 2 is not a necessity though it will be used when the order of successive selector keys is in sequence of frequencies. The selector keys may, however, be arranged in any other sequence provided the positions of the abutment members on the drum are distributed in the appropriate manner, the remainder of the mechanism being unaltered. Examples of possible sequences of selector keys are alphabetical, geographical or in accordance with a pre-arranged time/frequency schedule for a communication service.

Preferably means may be provided to hold the receiver inoperative to reproduce while a tuning operation is in progress. Similarly, means may, if desired, be provided to operate an indicator to show the operator when a tuning operation has been completed.

Where the number of selectable tuning positions required is large, it may not always be convenient to arrange all the stop carrying levers in a single line. In such a case they may be arranged in several banks, each bank having the ends of its stop levers along a line at a different angular position about the shaft 1, all the operating keys in all the banks, however, acting on common mechanisms for rotating the shaft 1 to datum point and actuating the wave change switch.

Preferably means are provided to allow of manual tuning when desired, Fig. 2 showing a preferred arrangement. For this purpose two operating keys 14' and 14'' which may be marked "manual" and "automatic" respectively are provided. Each of these keys has pivotally attached to it a member 15a with an upper arm 15 shaped as shown in Fig. 1 to engage the upper face 16 of bar 17, similar in every way to the station selecting key. Thus, upon depression of either key 14' or 14'' the shaft 1 and hence drum 2 are rotated to the datum position. It is to be understood, however, that the manual and automatic keys 14' and 14'' are not provided with stop members 9. A rocker arm 51, 52 pivoted at 50 and provided with two extensions 14d, 14d is suitably arranged with the keys 14' and 14'' so that depression of key 14' will cause the rocker arm to move a forked lever 32 to the left whereas depression of key 14'' will cause the rocker arm to move the fork 32 back to its right-hand position, as shown. For this purpose, the lever 14b associated with 14' is provided with an extension 14c which acts upon a cam surface on the left-hand end of lever 14d in such a way that depression of key 14' moves the lever 14d over to the right from the position shown. The key 14'' is provided with a somewhat similar extension 14e which acts upon the cam surface formed on the end of the right-hand portion of lever 14d. The upper portion 51 of the rocker is provided with a suitable clamping means 53 which engages the forked lever 32 so that the forked lever is moved in accordance with movements of the rocker 51, 52. The forked lever 32 engages a grooves collar 33 which is attached to a gear-wheel 34. Thus, the forked lever 32 when displaced causes the gear-wheel 34 to be shifted along its axis which is in line with the shaft 1. The gear wheel 34 is driven by and slidable with respect to a pinion 35 on a shaft 36 which can be rotated by a manual tuning knob 37. When the key marked "manual" is depressed, the shaft 1 and drum 2 are rotated to the datum position by a mechanism as shown in Fig. 1 and the gear wheel 34 is moved towards the drum 2 by the mechanism 32, 33 so as to bring a stop 38, attached to the gear wheel 34, into a position in which it will engage with the last abutment member 4 on the drum. The spring bias on the drum will, of course, cause the member 4 to press against the stop 38 so that the drum will rotate with the gear wheel 34 in whichever direction the latter is rotated by means of the knob 37. Since the relative positions of the drum 2 and gear wheel 34 prior to the engagement of manual control may sometimes be such that the abutment member 4 is initially on the wrong side of the stop 38, this stop is hinged against a light spring 39 so that the abutment member 4 may travel past it when moving towards the datum position, but not in the reverse sense since the stop 38 is prevented from hinging in the opposite direction by a block 40.

I claim:

1. In a preselective tuning mechanism for a radio receiver or the like, a plurality of abutment members fast with the tuning member of the receiver, a plurality of cooperating stop members individually movable into and out of the paths of said abutment members, said stop members and abutment members being in such mutual relationship that the permissible movement of the tuning member away from a datum position can be selected at any of a plurality of predetermined amounts by selecting an appropriate stop member to be moved into the path of its cooperating abutment member, means for biasing said tuning member away from said datum position, selector members for selecting any stop member to be moved into the path of the cooperating stop member, means actuated upon operation of any of the selector members for moving said tuning member to its datum position and then releasing it to move under its bias until it is stopped by the selected stop member, and means for retaining any abutment member and cooperating stop member which have engaged one another in such engagement until a fresh tuning operation is initiated.

2. In a preselective tuning mechanism for a radio receiver or the like, a variable tuning member, a drum-like element operable with the tuning member, a plurality of adjustable abutment members disposed on said drum-like member, a corresponding number of cooperating stop members individually movable into and out of the paths of said abutment members, said stop members and abutment members being in such mutual relationship that the permissible movement of the tuning member away from a predetermined datum position can be selected to any of a plurality of predetermined amounts by selecting an appropriate stop member to be moved into the path of its cooperating abutment member, means for biasing said tuning member away from said datum position, selectively operable selector members for selecting any stop member to be moved into the path of its cooperating abutment member, means actuated upon operation of any of the selector members, for moving the tuning member first to its datum position and then for releasing it to move under its bias until it is stopped by the engagement of the selected stop member with its cooperating abutment member, means for retaining any abutment member and cooperating stop member which have engaged one another in such engagement until a new tuning operation is initiated, and means for retaining the last operated selector member in a position which serves as an indicator to show which setting of the tuning member is in use.

3. In a preselective tuning mechanism as described in the next preceding claim and wherein the radio receiver is provided with an operable wave change switch, means cooperating with at least one of the selector members for automatically operating said operable wave change switch upon actuation of said selector member to thereby adjust the wave change switch to the position corresponding to the wave range within which the station arranged to be selected by said selector member lies.

4. In an arrangement as described in claim 2, means for rendering the last named means inoperative to retain the last operated selector member in said indicating position upon operation of another of said selector members.

5. In an arrangement as described in claim 2,

a normally inoperative driving mechanism for the tuning member of the radio receiver, an additional operable selector member acting upon selective operation thereof for moving the tuning member first to its datum position and then for releasing it to move under its bias to a position which locks it with said driving mechanism and thereby render said driving mechanism operative, and means acting upon operation of said additional selector member for releasing any previously operated selective member.

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