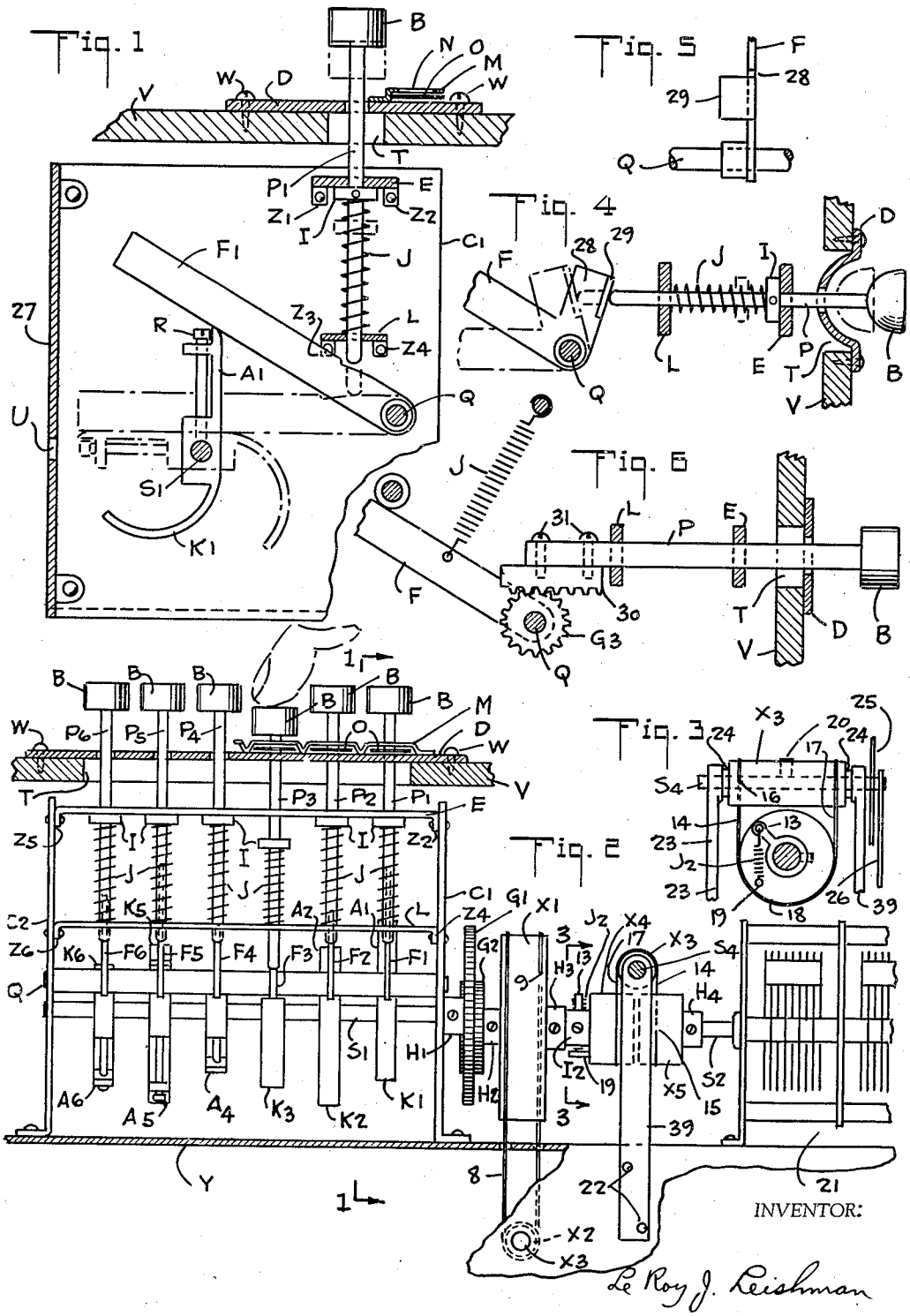
Jan. 11, 1944. LE ROY J. LEISHMAN 2,339,177

AUTOMATIC TUNER

Filed Dec. 13, 1937



Patented Jan. 11, 1944 2,339,177

UNITED STATES PATENT OFFICE

2,339,177

AUTOMATIC TUNER

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Application December 13, 1937, Serial No. 179,439

6 Claims. (Cl. 74—10)

This invention relates to automatic tuners, and more particularly to those in which a plurality of independently movable positioning levers turn a rotatable member to different predetermined positions. The objects of this invention are to provide means whereby the positioning levers of such tuners may be operated by push buttons having a plunger action; to afford a simple mechanism for transmtting motion at right angles from the positionable control shaft to a very close dial shaft; to furnish means for operating a lever tuner electrically; to supply a simple system for muting the radio receiver during the operation of the tuner; to provide practical means for de-energizing the motor when the tuning operation is completed; to make it unnecessary to reverse the motor; to reduce the number of electrical contacts to a minimum; and to achieve these various objectives with apparatus that is simple and inexpensive. Still other objects will appear as this specification proceeds.

In the accompanying drawing:

Fig. 1 is a section taken on line 1—1 of Fig. 2, showing one lever of an automatic tuning mechanism and a push-button arrangement for controlling its operation.

Fig. 2 is a front elevation of a push-button controlled mechanical tuner, showing the action of the plungers and the connections to various other moving parts of the set.

Fig. 3 is a section taken on line 3—3 of Fig. 2, and shows a side elevation of the transmission to the dial shaft.

Fig. 4 is a side elevation, partly in section, of a modified mechanism in which the plunger operates horizontally.

Fig. 5 is a detail of Fig. 4.

Fig. 6 is a side elevation, partly in section, of a modification employing a rack and pinion.

Positioning lever F1, Fig. 1, is pivoted on rod Q, which is journalled at one end in end-plate C1 and at the other end in end plate C2, Fig. 2. Lever F1 is shown resting on positionable member A1, Fig. 1, which may be of the type shown, or any other type adapted to lever control, such as the heart-shaped cams of Vasselli, Patent No. 1,846,289, the internal cams of Bird, Patent No. 1,925,651, the reciprocating racks and bars of Schaefer, Patent No. 1,906,106, or the positionable members of my own Patent No. 2,084,851. Positionable member A has a set-screw R and is one of a plurality of such members mounted in predetermined angular positions on shaft S1, and each is adapted to be engaged by one of a plurality of positioning levers, F1 to F6, Fig. 2. Plunger rods P1 to P6, Fig. 2, cooperate with levers F1 to F6 respectively and pass through guide holes in bars E and L, Figs. 1 and 2. Bar E is shown fastened to end-plate C1 by means of rivets or screws in ears Z1 and Z2, which are integral with the bar. Similar fastening means is used at the opposite end of the bar, as indicated in Fig. 2, where ear Z5 shows in the drawing. Bar L is fastened in like manner to end-plate C1 by means of lugs Z3 and Z4, Fig. 1, and to the other end-plate C2, Fig. 2, by ear Z6 and another ear that does not show in this view. Each plunger rod is equipped with an operating button B and a collar I for limiting the upward movement of the rod. A spring J surrounds each plunger rod between the bar L and the collar I, and presses the plunger upward until the collar abuts against bar E. Each plunger rod passes through a slot or hole T in the top V of the radio cabinet, and through an aperture in escutcheon D, fastened to the cabinet by screws W.

Buttons B may possess an index tab, not shown, or else escutcheon D may carry a long tab holder M positioned close to the plungers and carrying an index tab O for each plunger. As indicated in Fig. 1, the tab holder has a window N for each tab, through which the tab may be seen.

Gear G1, Fig. 2, is mounted on shaft S1 by means of a set-screw or pin in hub H1, which abuts against end-plate C1. Gear G1 meshes with gear G2 on shaft S2 of the tuning condenser or other resonance varying means. These gears should have a ratio of 2–1 when using positionable members of the tye shown. Pulley X1 is mounted on shaft S2 next to the hub H2 of gear X2 by means of a pin or set-screw in its hub H3. This pulley cooperates with pulley X2 on shaft S3 adapted to be turned by the regular tuning knob, not shown. Cord 8 is attached to pulley X1 at point 9, and extends around the opposite side of the pulley, through a hole in the chassis top Y, around pulley X2, through another hole in the top of the chassis, and thence around pulley X1, to which it is attached on the opposite side at a position not shown.

Two pulleys, X4 and X5, are mounted on shaft S2 between the condenser 21 and collar I2 fixed on said shaft by a set-screw. Pulley X5 is fastened to shaft S2 by a set-screw in its hub H4. A cord 14 is attached to pulley X5 at a point 15,

from which point it extends downward and around the pulley and then up on the opposite side of this pulley and over dial pulley X3 where it is attached at point 16, Fig. 3. Another cord 17 is attached to pulley X3 at a point on the opposite side to that shown in Fig. 3. This cord passes over the pulley as indicated in Fig. 3, and then around pulley X4 to a connecting point 18. Pulley X4 carries a pin or hook 19, and is free to turn on shaft S2 between gear X4 and collar 12, which carries a pin or hook 13. A spring J2, Fig. 3, is fastened to these two pins, turning pulley X4 in a clockwise direction and keeping the cord taut. Pulley X3 is adjustably fastened to dial shaft S4 by set-screw 20. Shaft S4 has a bearing in bracket 39 attached to the front of the chassis by screws 22. The opposite end of shaft S4 is journaled in bracket 23, Fig. 3, which may be attached to the chassis at any convenient location. Washers 24, between pulley X3 and these brackets, prevent undue friction. Shaft S4 passes through the center of a calibrated dial 25, Fig. 3, omitted from Fig. 2 for the sake of clarity, and a pointer 26 is attached to the outer end of this shaft. It will be noted that there is little clearance between pulley X3 and pulleys X4 and X5. This lack of free space makes it impossible to insert a spring in one of the cords, and the small size of the pulleys makes it impossible to run the cord through a hole in the periphery of the pulley and fasten it to the interior by means of a spring, and therefore neither of these methods may be used for keeping the cords taut; but the construction shown here removes all play in the transmission between the two shafts at right angles and may be used wherever there is any clearance at all between the necessary pulleys or reels.

A tuner of this type may be adjusted in the following described manner so that the depressing of any button will bring in a predetermined station. The button on one of the plungers, say P1, is pressed down, causing the button, collar and lower end to assume the positions indicated in dotted lines, Fig. 1. During this movement, the plunger engages lever F1, resting on positionable member A1, moving these two parts to the positions shown in dotted lines. If member A1 should be found at an angle 180 degrees from that shown in the drawing, it will be obvious that lever F1 will rest on the curved end K1 of member A1, and that the downward movement of the plunger and lever will in that case also move the positionable member to the position shown in dotted lines. This will also be true of any intermediate position. While the button is held down, set-screw R is loosened by means of a screw driver inserted through hole U in plate 27, which connects end-plates C1 and C2 and cooperates with bars E and L to hold the frame rigid. The loosening of this set-screw permits shaft S1 to turn freely while member A1 is held stationary. The desired station is then tuned in by means of the regular manual knob, not shown, rotating shaft S3 and transmitting the motion to condenser shaft S2 by means of pulleys X2 and X1 and the interconnected cords. Shaft S2 is operatively connected to shaft S1 by gears G1 and G2, and to the dial assembly by means of the right-angle pulley arrangement previously explained. After the desired station has been carefully tuned in, set-screw R is again tightened. Other positionable members are then adjusted, or "set," in like manner so that the pressing of the associated plungers will thereafter bring in preselected stations. If different positionable means are used, the appropriate adjustments are similarly made. Regardless of the type of lever-controlled positionable means employed, it will be obvious that the pressing of any button will cause the associated positioning means to return the shaft to the angular position that it occupied when the initial tuning operation was performed. This will be true even with sloppy guides for the plunger, because a precision result does not in any way depend upon the accuracy of the plunger's operation when a pivoted lever, rather than the plunger itself, is used to engage and rotate the positionable member.

Fig. 4 illustrates a modification of the mechanism just described, but also embodies the principle of an intermediate positioning lever to transmit motion from the plunger to a rotatable positionable member. In this form, the positioning lever F has a projection 28 at the pivoted end, and this projection has a lug 29 extending transversely from the projection, as will be more clear from Fig. 5. This lug is engaged by the end of plunger P, Fig. 4, and the operation of the plunger turns lever F on pivot Q until the various moving parts occupy the positions shown in dotted lines. Lever F in turn rotates the control shaft as explained in the description of previous figures. The escutcheon D is shaped so that it extends into the opening T in the panel V. This feature makes it unnecessary for button B to extend so far from the panel in its rest position, the full stroke nevertheless being permitted by the fact that the button moves into, or even beyond, the plane of the panel. This construction is very satisfactory on heavy receiving sets, but when used on light table models the pressure required on button B is sufficient to move the set unless it is held in place.

It will be obvious that the mechanism of Fig. 1 could be oriented 90 degrees to enable the plunger to move in a horizontal plane, but this would make it necessary to adjust the positionable members from the top of the set rather than from the back. The modification illustrated in Fig. 4 leaves the levers and rotatable members in the positions shown in Fig. 1, thus permitting the adjustments to be made from the back of the set, but the introduction of projection 28 and lug 29 make it possible to use a button that pushes in, rather than down.

The mechanism depicted in Fig. 6 is another modification that permits the buttons to be pushed from the front, rather than the top, of the set, and the adjustments to be made from the back. Pinion G3 is attached to the back of lever F. Rack 30 meshes with the pinion and is rigidly attached to plunger P by screws 31. As this plunger rod has no spring, it is moved to its outward inoperative position by the action of spring J attached to lever F. The pressing of button B moves the rack and rotates the pinion and lever around pivot Q. The movement of lever F is utilized to operate the tuner. Other features of the operation and construction of this modification will be clear from the reference characters, as they all refer to components having the same functions as those bearing the same reference numbers or letters in previously described figures.

Various other modifications, additions, omissions and substitutions may also be made without departing from the spirit of the invention, typical embodiments of which have been described.

My claims are:

1. In a radio tuning instrument, a combination

including: a movable control; a member rotatable about a permanently fixed axis; motion-transmitting means interposed between said control and a first portion of said member for moving said control upon rotation of said member; a rectilinearly movable device for applying a moving force to a second portion of said member, said second portion being not more than two thirds as far from the axis of said member as is said first portion; a plurality of supporting guides for said device; and a restoring spring for holding said device in a normally inactive position.

2. In a radio tuning instrument, a combination including: a movable control; a member rotatable about a permanently fixed axis; means interposed between said control and a first portion of said member and free from rigid connection with said member for moving said control upon rotation of said member; a rectilinearly movable device for applying a moving force to a second portion of said member, said second portion being not more than two thirds as far from the axis of said member as is said first portion; said device comprising a round rod having a push button on the external end thereof; a plurality of supporting guides for said rod; and a restoring spring for holding said device in a normally inactive position.

3. In a mechanism for angularly positioning a control of a radio apparatus, a combination including: a supporting frame; a rotatable shaft mounted in said frame; a plurality of positionable members adjustably mounted on said shaft; a plurality of rectilinearly movable operating devices slidably carried by said frame and each individual to one of said members; and a plurality of pivoted means each interposed between one of said devices and one of said members and acting upon movement of the associated device in one direction to apply a moving force to a portion of said member and rotate said member to a position in which further movement is arrested by the collosion of a second portion of said member with said means.

4. Tuning apparatus for a radio receiver including in combination a rotary control member, said control member having control portions extending in two substantially oppositely disposed directions from a point disposed from the axial center thereof, means pivotally mounted for originally engaging one control portion or the other of the control member to rotate said control member to a predetermined angular position, actuator means linearly movable to engage said pivotally mounted means to bring the latter into contact with and rotate said control member, and supporting means for supporting said actuator means to permit slidable movement thereof.

5. Tuning apparatus for a radio receiver including in combination a rotary control member, said control member having control portions extending away in two substantially oppositely disposed directions from a point displaced from the axial center thereof, means pivotally mounted for originally engaging one control portion or the other of the control member to rotate said control member to a predetermined angular position, actuator means movable toward said control member to engage said pivotally mounted means to move the latter into contact with and rotate said control member, and means for mounting said actuator means.

6. Tuning apparatus for a radio receiver including in combination a rotary control member, said control member having control portions extending in two substantially oppositely disposed directions from a point displaced from the axial center thereof, means pivotally mounted for originally engaging one control portion or the other of the control member to rotate said control member to a predetermined angular position, actuator means substantially rectilinearly movable to engage said pivotally mounted means to bring the latter into contact with and rotate said control member, and supporting means for supporting said actuator means to permit slidable movement thereof.

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