March 14, 1944.

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PUSH BUTTON TUNING MECHANISM

Filed June 19, 1941

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This invention relates to tuning mechanism for radios, and more particularly to push button tuning mechanism in which the power necessary to change the tuning from one frequency to another is supplied by the operator.

In apparatus of the class described, as here-tofore employed, the amount of force required to be exerted by the operator depends to some extent on the amount of movement of the mechanism to be made. For example, if the apparatus is tuned to a frequency near the low frequency end of the broadcast spectrum, and it is desired to tune it to a frequency near the high frequency end of the spectrum, a much greater movement of the tuning mechanism will be required than if the apparatus is to be tuned to another frequency not far removed from the first.

This may result in unsatisfactory tuning, because when wide changes in tuning are to be made, the operator (and particularly, unskilled operators) may not apply enough force to the push button to carry the mechanism completely to its new position and maintain tuning may result.

It is an object of this invention to provide manual push button tuning mechanism in which the amount of force required to be exerted by the operator in changing tuning is constant, regardless of whether the amount of change in tuning is large or small.

It is a further object of this invention to provide such mechanism which is free from any tendency of the operator to mistune because of variation in force required to operate the tuning buttons.

It is still a further object of this invention to provide such a tuning mechanism having the characteristic that the same amount of effort is always required to operate the push buttons, regardless of the amount of change of tuning to be made, with mechanism which is relatively little more complex and little more expensive to manufacture, than the apparatus heretofore known.

Still other objects and advantages of my invention will be apparent from the specification.

In this application I have particularly pointed out and distinctly claimed the part, improvement or combination which I claim as my invention or discovery and I have explained the principles thereof and the best mode in which I have contemplated those principles, so as to distinguish my invention from other inventions.

In the drawings:

Fig. 1 is a front elevation of a radio receiver employing tuning mechanism in accordance with my invention;

Fig. 2 is a top plan view in partial section, of one form of tuning mechanism in accordance with my invention;

Figs. 3, 4 and 5 are sections on lines 3—3, 4—4 and 5—5 respectively of Fig. 2, Fig. 3 showing the apparatus before actuation of a plunger and Fig. 4 showing the same at the termination of its stroke, in fully engaged position.

Fig. 5 is a section on line 7—7 of Fig. 2.

Referring more particularly to Fig. 1, I designate the casing of any suitable form of radio apparatus, for instance, a radio receiver having manual control knobs 2 and 3 which may be switch and volume control, and tuning knobs respectively, and having a series of push buttons 4a, 4b, 4c and 4d which may be calibrated or preset so that upon pushing any one of them, the apparatus will be tuned to a particular predetermined frequency which may be indicated on a dial 5 in the usual manner. 6 may represent the opening for a loud speaker or may represent the screen of a cathode ray tube in case the receiver is a television receiver.

The tuning mechanism per se is indicated as contained in a sub-assembly which may be made up of side plates 10a and 10b held in spaced relation by brace plates 11a, 11b, 11c, 11d, front plate 12 and intermediate plate 13, the latter being L-shaped in cross-section and the rear wall extending downwardly a sufficient distance to receive and support the rear end of the plungers hereafter to be described.

Mounted within this sub-assembly, I may provide a variable tuning element which may be in the form of a variable gang condenser as shown or may be any other suitable mechanism, such as variable inductors. Since the construction of the condenser is well known in the art, and since per se no part of my invention, the same is not described in detail.

Pivotedally mounted adjacent the forward end of the sub-assembly, I may provide the tilt or rocker bar 14, this being mounted for limited rotation in the side walls 10a and 10b, as for instance by ball bearing 15 at one end and by set screw and lock nut assembly 16 at the other. Secured to the rocker bar 14 in any suitable manner, I may provide the arm 17 carrying a gear sector 18 meshing with scissor gears 19 upon the shaft of the variable tuning element. It will be understood that rotation of the rocker bar 14
will rotate the gear sector 18 and thereby move the variable tuning element.

A number of plungers 20a, 20b, 20c and 20d may be provided for rotating the rocker bar. These may be in the form of a metal plate having a slot fitting over a depending projection 31a, 31b, 31c and 31d on the front plate 12 and may be spring biased in a counter-clockwise direction, for instance by spring 33d anchored to the detent and to spacing plate 11d in holes formed therein. The outer end of the detent may be formed in two portions side by side, one portion 35d extending upwardly and engaging the inner face of its corresponding plunger 20d to provide a stop for the button and having another portion 36d engaged by the inner face of the button and serving as a trigger to be engaged by the corresponding button at the end of its inward travel, to release the detent.

Interposed between the outer offset portion 21a, 21b, 21c and 21d of the respective plungers and the inner face of the buttons 4a, 4b, 4c and 4d, I may provide suitable spring 31a, 31b, 31c and 31d, so that upon movement of the button inwardly, the spring is compressed and energy stored up in it. When the detent is released, the spring moves the plunger inwardly, engaging the rocker bar and rotating it to the position determined by the tappet and so setting the tuning element.

The operation of the apparatus, it is believed will be clear from the foregoing. When it is desired to calibrate or set any particular button, its corresponding knob is removed from the sleeve. A screw driver may then be inserted in the slot in the sleeve and the clamping member rotated in a direction to unclamp its tappet. The apparatus may then be tuned manually to the desired frequency and the corresponding plunger pushed inwardly to the full extent of its motion. This may be most conveniently done by temporarily slipping the button back in position.

As the button moves inwardly, spring 31d will be compressed but the plunger will not move, being held against inward movement by its corresponding detent. As the button reaches its inner limit of motion, it engages the outer lip 36d of the detent and forces it down, thus releasing the plunger for inward motion and the spring 31d moves the plunger to the rear to the full extent of its motion. Since the rocker bar is now in tuning position and the tappet is free, it will take up the angular position corresponding to that of the rocker bar. To clamp the tappet in adjusted position, the button may be removed again, and the sleeve may now be rotated, rotating its corresponding clamping member and clamping the tappet securely in position.

It will be understood that after each one of the tappets has been calibrated or set and locked in position, the apparatus may be quickly tuned from any one of the calibrated positions by simply pushing the corresponding button inwardly to the limit of its motion. The lug 32d prevents the corresponding plunger 20d from moving inwardly until the button has reached the full extremity of its motion, at which time the detent 34d is moved out of position and the force of the spring 31d snaps the plunger quickly to the calibrated position. It will be seen that by this construction there is no difference in the adjustments required, whether the throw of the tuning element be small or large, the operator in any case working against a uniform and constant force exerted by the spring.

While I have shown and described certain preferred embodiments of my invention, it will be understood that modifications and changes may be made without departing from the spirit and
In combination, a variable tuning element, a rocker bar operatively connected to said element, a plurality of plungers mounted for sliding movement toward and away from said rocker bar, each plunger having an adjustable tappet for engaging said rocker bar, screw threaded clamping means mounted on each plunger for engaging its tappet, a sleeve longitudinally slidable on each clamping means, a push button mounted on each sleeve, resilient means opposing motion of said sleeve on said clamping means, a detent normally preventing motion of each plunger, and means for tripping said detent upon predetermined movement of said sleeve with respect to said plunger.

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