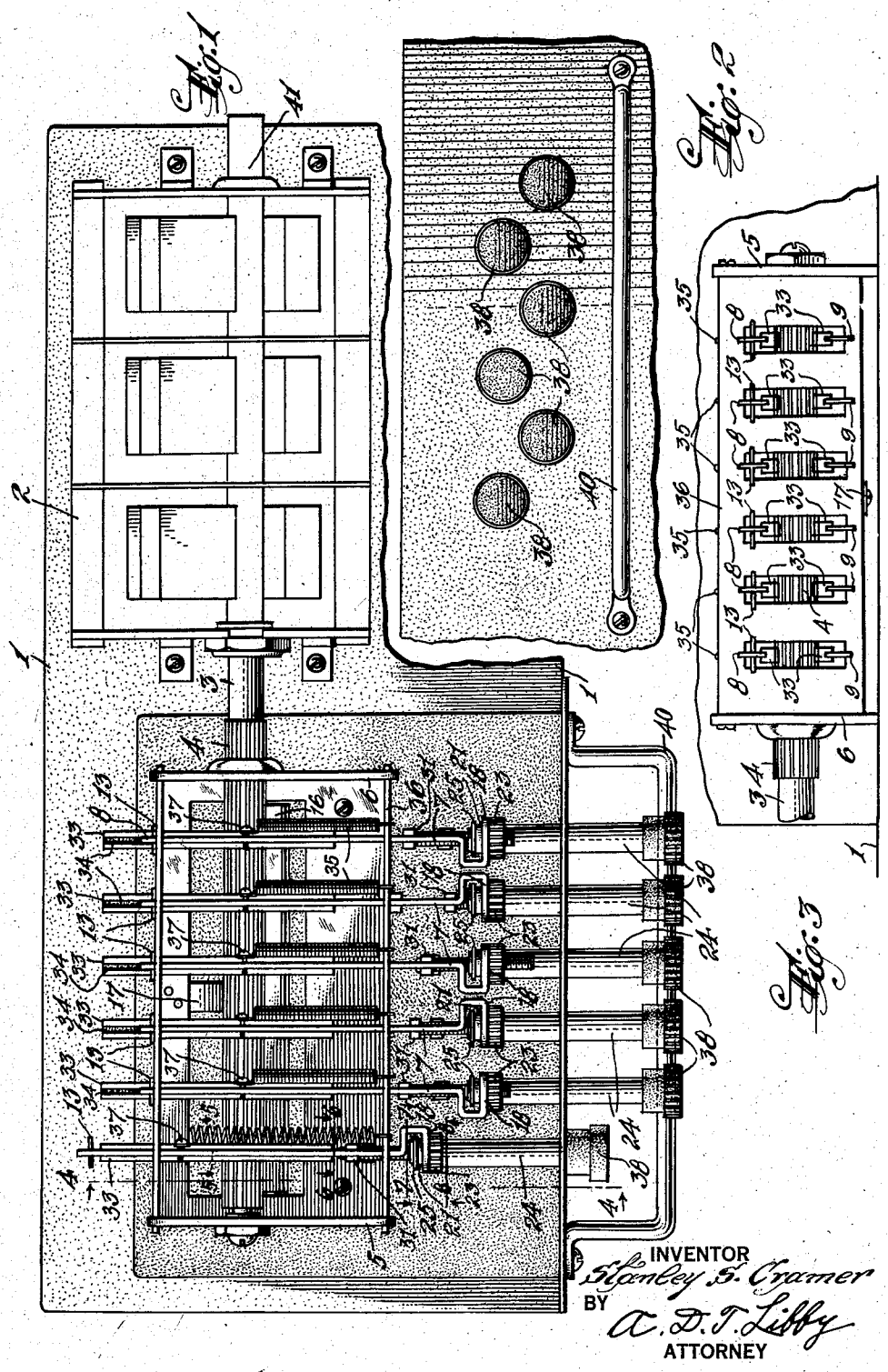
Oct. 9, 1945. S. S. CRAMER 2,386,598

MECHANICAL TUNING MEANS

Filed March 12, 1938 2 Sheets-Sheet 1



INVENTOR
Stanley S. Cramer
BY
A. D. T. Libby
ATTORNEY

Oct. 9, 1945. S. S. CRAMER 2,386,598

MECHANICAL TUNING MEANS

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Fig. 10



Fig. 9

Fig. 11

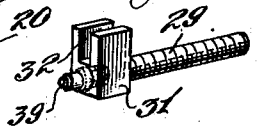


Fig. 8

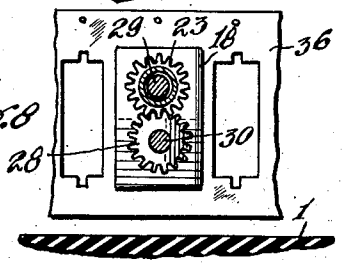


Fig. 7

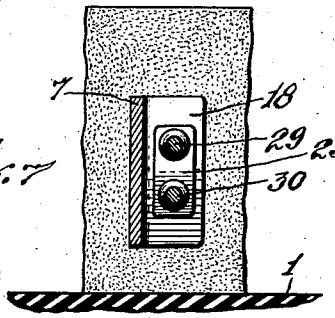


Fig. 6

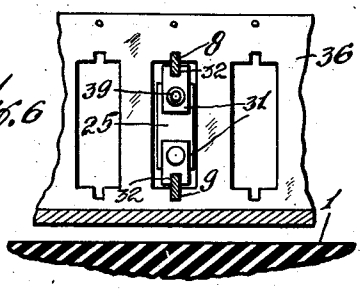


Fig. 5

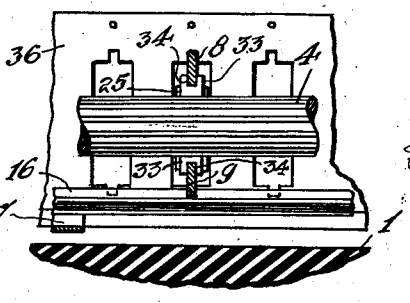
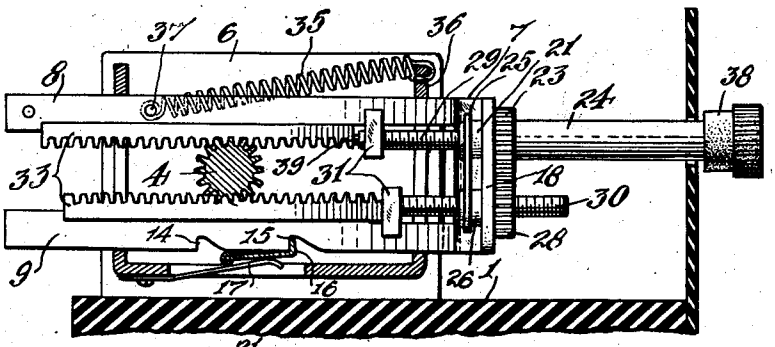


Fig. 4



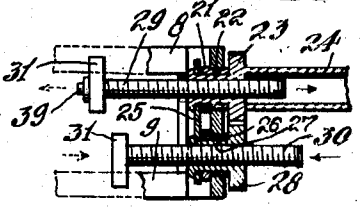


Fig. 12

INVENTOR
Stanley S. Cramer
BY
A. D. T. Libby
ATTORNEY

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MECHANICAL TUNING MEANS

Stanley S. Cramer, Haddon Heights, N. J., assignor, by mesne assignments, to Condenser Development Corporation, Newark, N. J., a corporation of New Jersey

Application March 12, 1938, Serial No. 195,503

16 Claims. (Cl. 74—10)

This invention relates to a mechanical tuning mechanism especially adapted for use in connection with radio receiving sets.

In the usual radio receiving set, the tuning is done by a single dial or knob positioned on the front panel of the set, but there are a large number of persons who, for one reason or another, cannot properly tune in the various stations even by turning the knob back and forth when they think they are close to the proper tuning point. In addition, there are a great many who use only very few stations whose programs appear to them, and they prefer to have a receiving set so constructed that these favorite stations may be quickly selected and accurately tuned.

It is the principal object of my invention to provide a manually operated mechanism which will automatically tune in a plurality of stations by merely pushing in the button corresponding to the desired station.

Another object of my invention is to provide a mechanical tuning mechanism in which the desired stations may be picked out and set up on the mechanism by merely turning the button, which is also utilized for selecting the desired station once it has been set up on the mechanism.

Another object of my invention is to provide a mechanical tuning structure having a plurality of presetting buttons which, when operated to select a desired station, will maintain this position until another button is pushed to select a different station.

These and other objects will be clear to one skilled in this art from a reading of the following specification, taken in connection with the annexed drawings, wherein:

Figure 1 is a plan view of my mechanical tuning structure connected to a tuning device of a radio receiving set, such as a variable condenser, one of the buttons being pushed into tuning position.

Figure 2 is a front view of the panel of the receiving set showing the arrangement of buttons as used in Figure 1.

Figure 3 is a rear view of the mechanical tuning mechanism.

Figure 4 is a part-sectional, and part-elevational view on the line 4—4 of Figure 1.

Figure 5 is a view on the line 5—5 of Figure 1 with certain of the parts being omitted.

Figure 6 is a view on the line 6—6 of Figure 1, the return spring for the tuning unit being omitted.

Figure 7 is a view on the line 7—7 of Figure 1.

Figure 8 is a view on the line 8—8 of Figure 1.

Figure 9 is a perspective view of the guide and support member for one of the tuning units.

Figure 10 is a fragmentary view of one of the toothed racks guided and supported by the guide and support member shown in Figure 9.

Figure 11 is a perspective view of one of the adjusting devices used in connection with the tuning unit.

Figure 12 is a longitudinal view, part in section and part in elevation, showing the manner in which the adjusting devices are supported in the tuning unit.

Referring now to the details, wherein like numbers refer to corresponding parts in the various views, 1 is a frame member of a radio receiving set carrying a tuning element 2, a three-gang condenser being illustrated. The rotor element of the condenser 2 has a shaft 3 which is adapted to be connected in a suitable manner to a rotatable shaft 4 supported by end plates 5 and 6 of a mechanical tuning mechanism. The shaft 4 has gear teeth longitudinally of its length and, as illustrated, the teeth are continuous between the end frame members 5 and 6.

The mechanical tuning mechanism, as illustrated, is composed of six tuning units, each unit being made up generally in the form shown in Figures 1 and 4. Each unit has a guide-and-support member 7, with arms 8 and 9 extending therefrom. The arms 8 and 9 have stop shoulders 10 and 11 therein for a purpose which will be hereinafter pointed out. The arm 8 is provided with a hole 12 for a stop pin 13 (see Figure 1). The arm 9 is also provided with notches 14 and 15 which are engaged by a locking lever 16 actuated in a direction to engage the said notches by a spring 17.

As shown in Figure 9, the guide-and-support member 7 is formed with a flange 18 having two holes 19 and 20 therein. Positioned in the hole 19 is a bushing 21, and carried by the bushing 21 is a bearing collar 22 forming part of a gear-wheel 23 which, in turn, may be formed integrally or otherwise fastened to a rod 24. The gear 23 may be made separate from the rod 24, in which case the rod 24 passes through the gear and forms the collar 22. Partly supported by the collar 22, is a retaining plate 25 which is held in place on the collar 22 by staking or spinning over the end of the collar. A bushing 26, similar to the bushing 21, is positioned in the hole 20 of the flange 18, and in the bushing 26 is carried a bearing collar 27 carried by or integral with a gear 28. The collar 27 passes through the plate

25 which is fastened thereto in the same manner as to the collar 22.

The collar 22 is internally threaded to receive a screw-threaded member 29 which may extend through the collar into a hollow or threaded portion of the rod 24. Likewise, the collar 27 is internally threaded to receive a screw-threaded member 30. On the screw member 29, there is securely fastened in any satisfactory manner, a guide-and-stop member 31. The member 31 has a slot 32 therein to receive the inner edge of the arm 8 of the guide-and-support member 7. A similar guide-and-stop member 31 is carried on the screw-threaded member 30 and its slot 32 engages the inner edge of the arm 9.

Guided and supported by the arms 8 and 9, are two similarly constructed toothed members or racks 33, each having a longitudinal groove 34 therein to receive the inner edges of the arms 8 and 9. As will be seen from Figure 4, the toothed members 33 are disposed on opposite sides of the toothed shaft 4 for turning it in a manner which will be shortly explained.

Each unit has a return spring 35 having one end fastened to the frame member 36, while the other end is attached at 37 to the upper arm 8 of the guide-and-support member 7. The rod 24 has a push-button 38 securely fastened thereto for operating the unit and for tuning in the desired station, so that the operating unit shown in detail in Figure 4 will pick up this station at the time that its button is pushed.

Referring now to the operation of the mechanical tuning mechanism, and referring to Figures 1 and 4, in which the left-hand button of Figure 1 is pushed to tuning position, it is to be understood that when the button 38 and the rod 24 are pushed inwardly, either the screw-threaded device 29 or 30 will engage the end of its cooperative rack 33 with which it is in alignment and will push it to turn the shaft 4. The amount which the shaft 4 is turned will depend on the relative position of the screw-threaded members 29 and 30, and when both rack ends are engaged by the ends of the screw-threaded members 29 and 30, no further rotation of the shaft 4 is produced, this adjustment or setting of the members 29 and 30 being the tuning position for that particular unit. This relative position of the members 29 and 30 can be set by turning the knob 38 and likewise the rod 24 to turn the gears 23 and 28. Turning the knob 38 will cause the screw-threaded members 29 and 30 to move in opposite parallel directions without turning, since they are held from turning by the members 31; but since the collars 22 and 27 are turned by their respective gears 23 and 28, the screw-threaded members 29 and 30 will be caused to travel, as explained, in reverse direction according to the rotation of the button 38. The stops 10 and 11 serve to limit the adjustment of the members 29 and 30.

From this it will be understood that when a person wants to select six different stations, corresponding to the six buttons shown in Figure 2, all the operator needs to do is to push in the button 38 to carry the unit into tuning position as shown in Figure 4, and then turn the knob 38 which will cause the racks 33 to travel in opposite directions, turning the shaft 4 and thereby the tuning shaft 3 of the tuning condenser. After the station has been brought into the proper tuning position, another button 38 may be pushed, releasing the first, and another station selected in a similar manner. Thereafter, all the operator need to do, to pick out the selected station, is to merely push in on the buttons 38 for the stations desired.

By this arrangement it is seen that the operator can very readily tune in his own mechanism, without getting into the set with tools to make internal adjustments, as is common on other devices with which I am familiar; and, likewise, the operator may set up another station on any one of the buttons in a few seconds' time. While the button 38 may be turned to change the relationship of the screw-threaded members 29 and 30 without pushing it into tuning position, as shown in Figure 4, this means that the unit would have to be pushed into tuning position to determine whether or not the station was properly tuned, so that the preferable way of tuning is that as first described.

One of the screw-threaded devices, such as 29, which is in alignment or associated with the push rod 24, is preferably provided with a resilient end, which, as illustrated in Figure 11, is an outwardly, spring-pressed plunger 39 located in its extremity. This is to provide a final pressing movement of the support member 7 after the ends of the members 29 and 30 have contacted with the ends of the racks 33, and will thus allow the support member 7 to be carried a little farther in order to allow the catch 16 to drop into the notch 15 to hold the tuning unit in tuning position. The notch 14 engages the locking member 16 to assist in limiting the return movement of the tuning unit after it has been released from the notch 15 by another tuning unit.

To assist in operating the buttons 38, I prefer to mount on the front of the panel, a finger grip in the form of a rail 40 which is adapted to be engaged by the fingers of the operator, and the thumb used for pushing in the buttons. This arrangement equalizes the forces that are applied to the set and obviates any tendency to move or disturb the cabinet.

It will be seen from Figure 1, that the guide-and-support members 7 are arranged in reverse position and the push button 38 and rod 24 on the nearest unit to the right of the one shown in operated position in Figure 1, are at the bottom, so that the screw-threaded devices 29 and 30 are in reverse position on alternate buttons. This is merely to carry out a symmetrical arrangement of the buttons on the front of the panel and does not affect the principles of operation of the mechanism. The condenser shaft may have an extension 41 to which a direct drive for operating the rotor may be attached.

It will be obvious that other changes may be made without departing from the spirit of my invention or the scope of the appended claims.

What I claim is:

1. For a radio receiving set having a tuning device with a movable part for tuning circuits in the set, means for operating said movable part of the tuning device including; a frame carrying a rotatable shaft having gear-teeth thereon disposed along its length and adapted to be connected to said movable part of the tuning device, a plurality of actuating units each corresponding to a radio station desired to be selected carried by said frame, each unit comprising a guide and support member having a pair of arms mounted transversely on the frame and positioned on opposite sides of said shaft, toothed rack members guided, one each, by said arms in mesh with the gear-teeth on said shaft, a pair of

screw-threaded members in alignment with said racks, with means carried thereon slidably engaging said support arms for preventing said threaded members from turning, a pair of gears rotatably carried by said guide-and-support member and being internally threaded to support one each of said screw-threaded members, one of said gears having a rod associated therewith, with means on the rod for pushing the unit laterally to cause said screw-threaded members to successively engage said racks to turn said shaft until both of said screw-threaded members are in engagement with their respective racks.

2. A mechanical tuning means as set forth in claim 1, further characterized in that said rod is rotatably mounted to turn said gears to adjust said screw-threaded members to select a desired station as described.

3. Mechanical tuning means as set forth in claim 1, further characterized in that one of said screw-threaded members has a resilient end for engaging the end of its cooperative rack.

4. Mechanical tuning means as set forth in claim 1, further characterized in that one of said screw-threaded members has a plunger resiliently mounted in its end for engaging the end of its associated rack.

5. Mechanical tuning means as set forth in claim 1, further characterized in that said racks have longitudinal grooves therein which receive the inner edges of said support arms and slide thereon.

6. Mechanical tuning means as set forth in claim 1, further characterized in that said racks have longitudinal grooves therein which receive the inner edges of said support arms and slide thereon, means for engaging one of said support arms for locking the unit in operated position, and spring means connected to the other support arms and to the frame for returning any one unit to idle position on operation of another unit.

7. For a radio receiving set having a tuning device with a movable part for tuning circuits in the set, means for operating said movable part of the tuning device including; a frame carrying a rotatable shaft having gear-teeth thereon disposed along its length and adapted to be connected to said movable part of the tuning device, a plurality of actuating units each corresponding to a radio station desired to be selected carried by said frame, each unit including a pair of toothed rack members slidably positioned, one on each side of said shaft, and in engagement with the gear-teeth thereon, a pair of screw-threaded members non-rotatably mounted in alignment one each with said racks but set so they successively engage their respective racks, and manual push means for moving said screws simultaneously longitudinally of their length without turning them to move said racks according to the setting of said screw-threaded members to turn the shaft.

8. For a radio receiving set having a tuning device with a movable part for tuning circuits in the set, means for operating said movable part of the tuning device including; a frame carrying a rotatable shaft having gear-teeth thereon disposed along its length and adapted to be connected to said movable part of the tuning device, a plurality of actuating units each corresponding to a radio station desired to be selected carried by said frame, each unit including a pair of toothed rack members slidably positioned, one on each side of said shaft, and in engagement with the gear-teeth thereon, a pair of screw-threaded members non-rotatably mounted in alignment one each with said racks, and manual push means for moving said screws simultaneously longitudinally of their length without turning them to move said racks to turn the shaft, said manual means also being rotatable for actuating means for causing said screw members to move simultaneously and in equal amounts in opposite direction for setting the unit so it will pick up any desired station.

9. For a radio receiving set having a tuning device with a movable part for tuning circuits in the set, means for operating said movable part of the tuning device including, a shaft having gear-teeth disposed thereon along its length, a plurality of push-button units spaced longitudinally of the shaft, one for each station to be selected, mounted for motion in the direction of the push and transversely to the axis of the shaft, said units having parts with teeth therein to engage the teeth on said shaft to turn it, said unit having means adjustable by rotation of its push-button for setting parts of its unit so the shaft on rotation will select a desired station.

10. For a radio receiving set having a tuning device with a movable part for tuning circuits in the set, means for operating said movable part of the tuning device including, a shaft having gear-teeth thereon, a plurality of units, one for each station desired to be selected, slidably mounted for motion at right angles to the axis of said shaft, each of said units having parts with teeth therein to engage the teeth on the shaft to turn it, a rod and push-button connected to the unit for pushing it to cause rotation of the shaft, and means connected to the rod for setting parts of the unit on rotation of the push-button so the unit will turn the shaft to select a desired station.

11. Mechanical tuning means as set forth in claim 10, characterized in that the unit includes a support member having two arms extending, one on each side of the shaft, a toothed rack for each arm guided and supported thereby, a screw member for each rack non-rotatably carried by the support to move the racks, a pair of intermeshing gears for simultaneously moving said screw members in opposite direction, and a rod and push-button for transversely moving the whole unit and being rotatable to select a station to be picked up by a transverse push of the unit.

12. Mechanical tuning means as set forth in claim 10, characterized in that the unit includes a support member having two arms extending, one on each side of the shaft, a toothed rack for each arm and having a longitudinal groove therein to receive the inner edge of its associated arm, a screw-threaded member for engaging each rack non-rotatably mounted, a gear for each screw-threaded member and having an internally threaded part to receive one of the screw-threaded members which are set to successively engage their respective racks, a rod and push-button connected to one of said gears, the push-button serving to push the unit laterally to cause said screw-threaded members to successively engage and move said racks to turn the shaft and also serving, when rotated, to tune in a station desired to be selected by said unit.

13. For a radio receiving set having a tuning device with a movable part for tuning circuits in the set, means for operating said movable part of the tuning device including, a shaft having gear-teeth thereon, a plurality of units, one for each station desired to be selected, slidably

mounted for motion at right angles to the axis of said shaft, each of said units having a pair of reciprocating racks engaging the shaft on opposite sides thereof, a pair of screw-threaded members in alignment with said racks to engage one end thereof, means for simultaneously moving said screw-threaded members in opposite directions without turning them to vary the time when they will engage their respective racks, said last-mentioned means comprising a rod and push-button which also serve to push the unit transversely of the shaft to cause rotation thereof.

14. In a radio receiving set, the combination of a movable tuning element, a plurality of manually operated units, each associated with a chosen radio frequency and each, when operated, adapted to move said tuning element, each unit having a support member carrying means for engaging said tuning element, said support membery carrying devices for actuating said means, a rod and push-button rotatably fastened to said support member, and means associated with said rod for setting said devices on rotation of said push-button and rod so they engage said means at different intervals whereby a desired station is brought under control of said unit, said unit being operated to bring in a selected station by pushing in on the push-button.

15. The combination as set forth in claim 14, further characterized in that said means include two reciprocating members engaging said tuning element so as to positively turn it and said devices comprising two screw-threaded members non-rotatably mounted but movable longitudinally of their axes on rotation of the push-button to thereby change the time when they will engage said reciprocating members for the purpose described.

16. The combination as set forth in claim 14, further characterized in that said means include two reciprocating members engaging said tuning element so as to positively turn it and said devices comprising two screw-threaded members non-rotatably mounted but movable longitudinally of their axes on rotation of the push-button to thereby change the time when they will engage said reciprocating members for the purpose described, one of said screw-threaded members being in alignment with the push-button and having a resilient end for engaging its cooperative reciprocating member to allow the support member to be given a final push to lock it in tuning position, and means for engaging said support member to lock it in tuning position.

STANLEY S. CRAMER.