

Jan. 19, 1937.

A. A. THOMAS
AUTOMATIC RADIO TUNER

2,067,992

Filed Oct. 30, 1923

3 Sheets-Sheet 1

Fig. 1

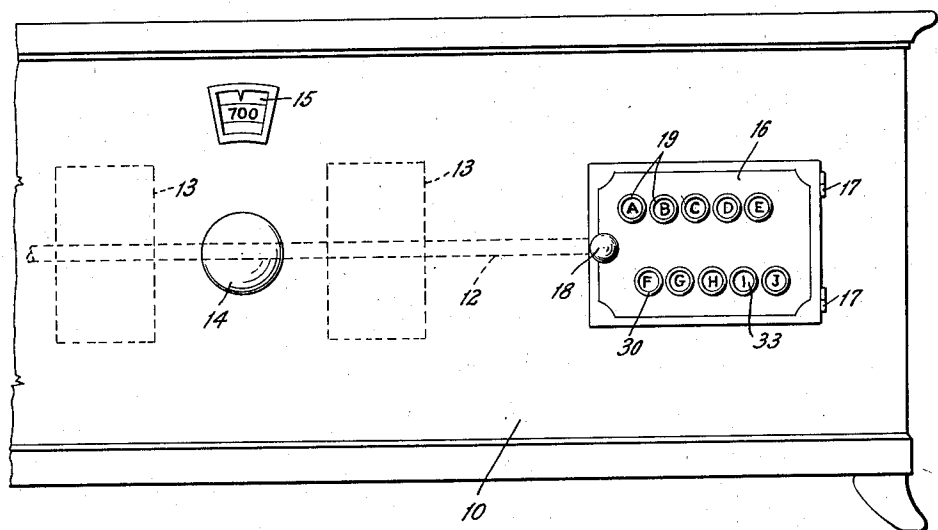


Fig. 2

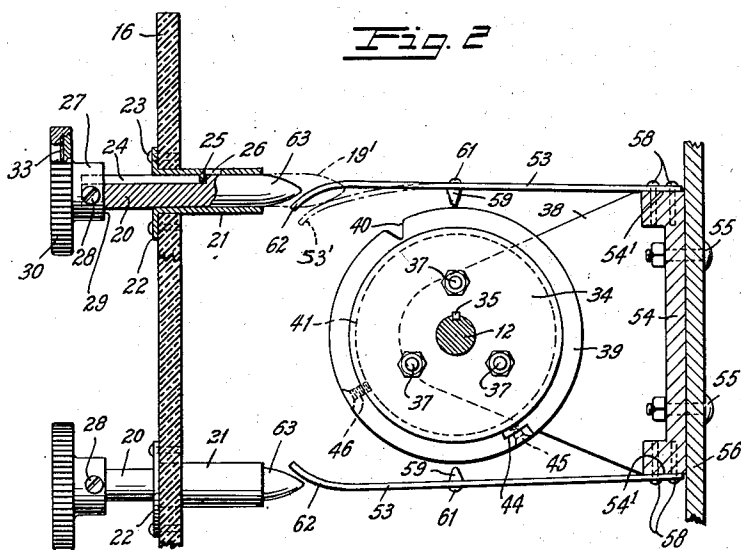


Fig. 4

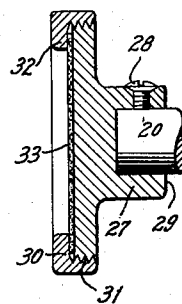
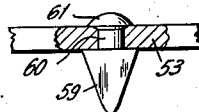


Fig. 4a



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Fig. 5

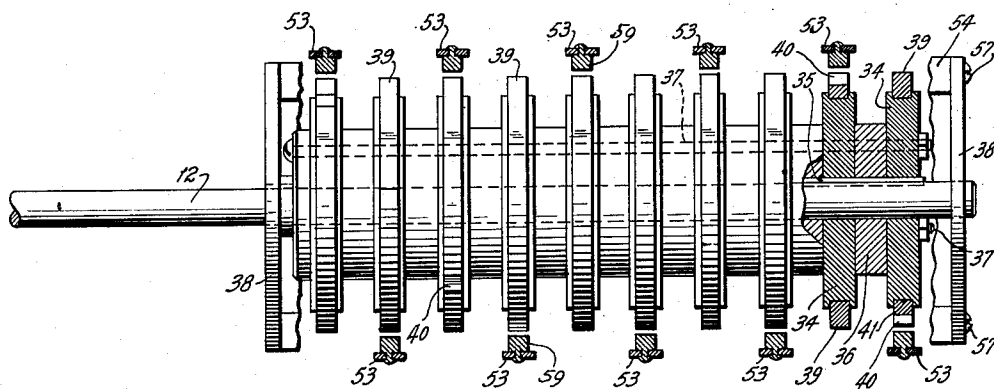
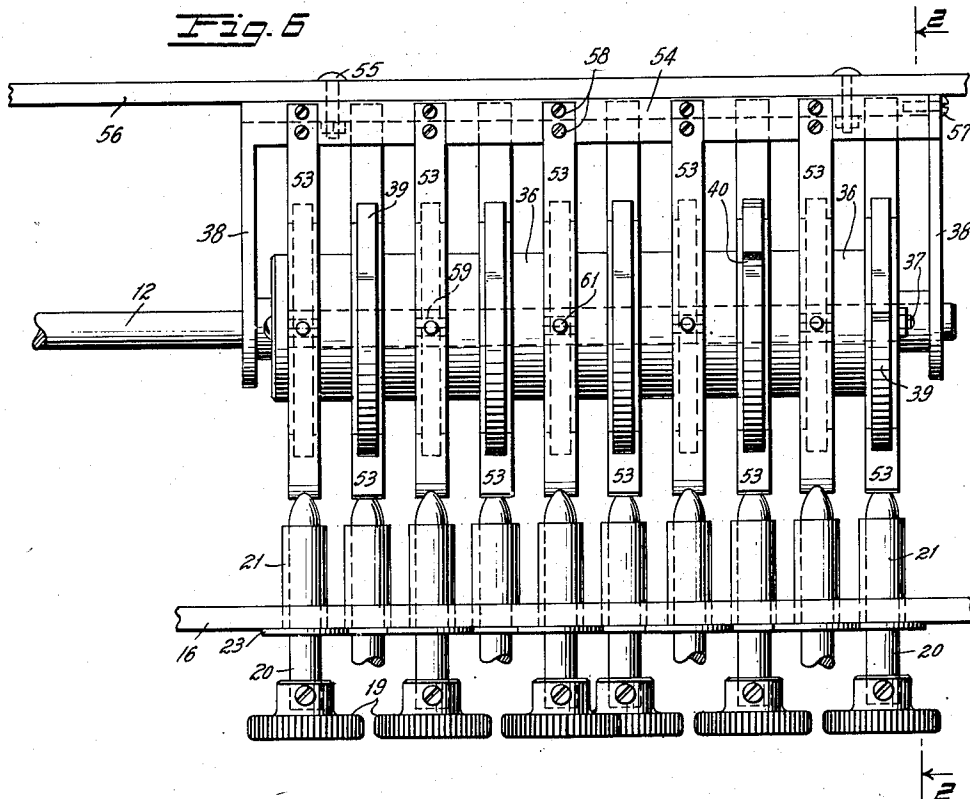


Fig. 6



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Fig. 7

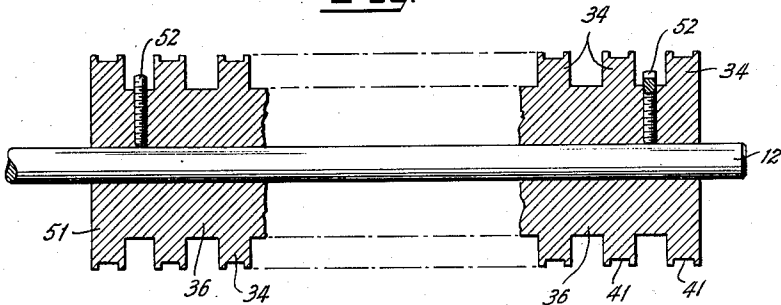


Fig. 8

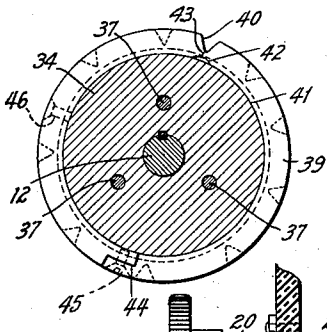


Fig. 9

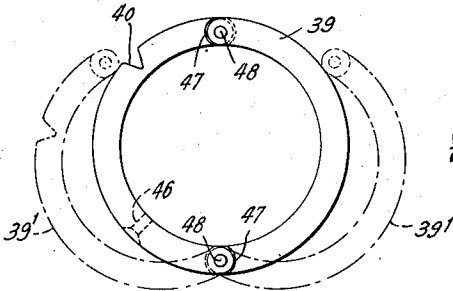
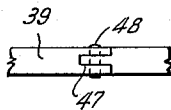
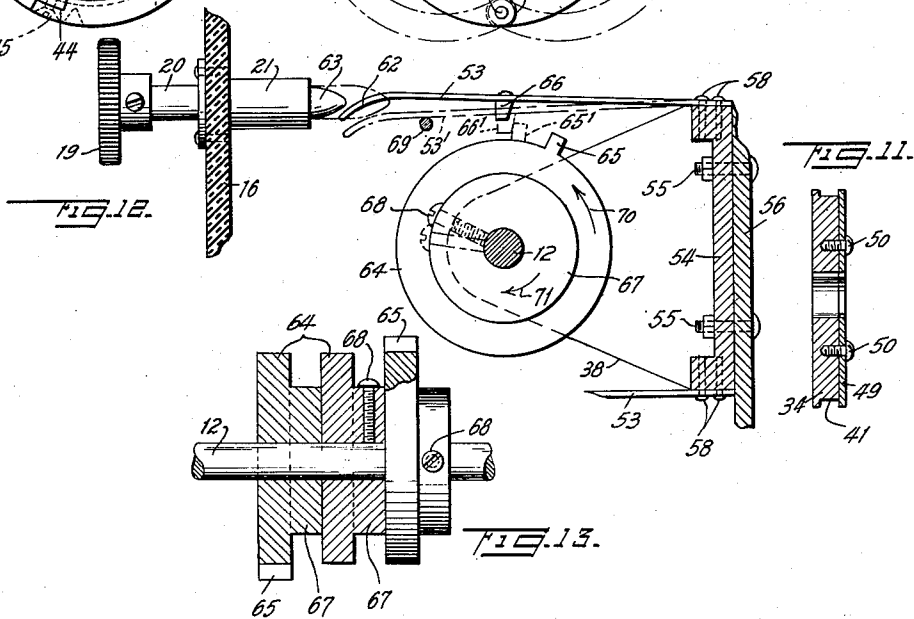


Fig. 10



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UNITED STATES PATENT OFFICE

2,067,992

AUTOMATIC RADIO TUNER

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Application October 30, 1928, Serial No. 316,090

33 Claims. (Cl. 250—40)

My invention relates to radio receivers, and its object is to provide mechanism for automatically stopping the tuning shaft when in position to bring in a selected station. As will appear later, my new tuning device is simple and compact in structure, certain in its operation, and easily adjustable for any station to be tuned in. The entire mechanism is contained in the radio cabinet and occupies comparatively small space, so that it can be installed in receivers of approved design. Another practical advantage of my automatic tuning attachment is that in normal condition it does not interfere with ordinary dial tuning.

In a preferred form of my invention, the movements of the condenser shaft are controlled by a set of hand-operable keys or plugs mounted on the front panel of the radio cabinet. Each plug represents a selected station. When all the plugs are pulled out, the tuning mechanism does not function and the condenser shaft is free to be turned by the usual finger piece provided on the cabinet. To bring in any one of the stations represented by the plugs, a person pushes in the corresponding plug and then turns the condenser shaft by hand until it stops. No reading of the dial is necessary, because the shaft automatically stops in tuning position. This control of the shaft is effected by certain stop devices which are set by the plugs. In a simple embodiment of my invention, the plugs actuate a series of spring arms into locking contact with control disks mounted on the condenser shaft. The locking arms are normally out of contact with the control disks to permit rotation of the shaft in the usual way. The control disks and locking arms are provided with co-operating means for locking the condenser shaft in predetermined position, depending on which particular arm is operated. When a plug is pushed in, it forces the adjacent arm into the path of the locking means on the associated disk. The condenser shaft is now turned by hand until the operator feels that it is locked, which occurs when the two locking means on the actuated arm and its disk are in locking engagement. The control disks are individually adjustable on the shaft to bring their locking portions into correct radial position for any selected station. Access to the disks is easily had by mounting the plugs on a removable or hinged door, which can be opened at any time without disturbing the inside mechanism.

The foregoing and other objects and advantages of my new radio tuner will be understood

from a detailed description of the accompanying drawings, in which—

Fig. 1 shows a radio receiver equipped with my invention, a portion of the cabinet being broken away for lack of space;

Fig. 2 is a section on line 2—2 of Fig. 6, the parts being shown in normal position;

Fig. 3 is similar to Fig. 2 (partly broken away), with one of the plugs pushed in to move the adjacent arm into locking contact with the associated control disk;

Fig. 4 represents an enlarged section of a plug or key head carrying a removable cap;

Fig. 4a is an enlarged fragmentary view showing a structural detail of one form of locking arm;

Fig. 5 is a front view of the tuning mechanism, partly in section;

Fig. 6 is a plan view of the mechanism;

Fig. 7 illustrates in section a single casting on which the control portions of the disks are mounted for individual rotary adjustment;

Fig. 8 is a cross-section through one of the disks in Figs. 5 and 6 to show the construction and mounting of the adjustable stop ring;

Fig. 9 shows another form of stop ring consisting of two hinged sections;

Fig. 10 shows a plan of the overlapping joint which connects the ring sections of Fig. 9;

Fig. 11 is a cross-section through a grooved disk in which one side is removable to permit mounting of a stop ring thereon;

Fig. 12 is a view similar to Fig. 2, except that the control disk has a radially projecting stop arranged to be engaged by a stop on the associated arm; and

Fig. 13 is a side view, partly in section, showing how the disks of Fig. 12 are mounted on the condenser shaft for separate radial adjustment thereon.

Referring to Fig. 1, there is a cabinet 10 containing a radio receiver of any approved construction, which need not be shown or described, since there are many well known makes of receiving sets on the market. For the purpose of this description, it is sufficient to indicate the condenser shaft 12 mounted in cabinet 10 as part of the radio mechanism, and this shaft carries one or more condensers 13, or other tuning devices. A rotary knob 14 or other suitable finger piece is operatively connected with shaft 12 to turn the same into the desired tuning position. A dial 15 is operated through suitable connections to identify the broadcasting stations by wave length, frequency, or call letters. It will not be necessary

to show and describe any specific driving connections between the knob 14 and the condenser shaft 12, because that detail can be found in any radio receiver in the market. The member 14 may therefore be referred to as means for manually operating the tuning shaft 12.

The front of radio cabinet 10 carries a door or panel 16, which may conveniently be hinged at 17 and provided with a finger piece 18. The door 16, which may be of any suitable material finished in harmony with the front wall of the cabinet, carries a series of slidable keys or plugs 19, which are individually identified in Fig. 1 by the letters A to J. It is assumed that each letter represents a selected broadcasting station. The construction and mounting of the keys or plugs 19 can best be understood from Figs. 2 and 4. Each plug comprises a cylindrical shank 20 slidably mounted in a sleeve 21 secured to the door 16 and projecting rearwardly. The sleeves 21, which can easily be made from sheet metal, are provided with an annular shoulder 22 adapted to fit against the outer side of door 16 and to receive fastening members 23, such as bolts, screws, rivets and the like. To prevent rotation of the shank 20 in sleeve 21, and at the same time lock the parts together against separation, the shank has an axial groove 24 adapted to receive a lug 25 projecting inwardly from the sleeve. This is clearly shown in Fig. 2. The lug 25 may conveniently be formed integral with the sleeve by cutting a slot 26 and displacing the metal inwardly. The groove 24 is open at its outer end to permit insertion of shank 20 into the sleeve 21 from the rear. After this has been done, a head 27 is put on the outer end of shank 20 and secured by a set-screw 28 or otherwise.

The outer movement of shank 20 is limited by the lug 25 engaging the rear edge of groove or slot 24, and the inner movement of the shank is limited by the inner end 29 of head 27 engaging the outer flange 22 of sleeve 21, as shown in Fig. 3. There is just enough friction between the shank 20 and its supporting sleeve to permit smooth and easy operation of the plugs and cause them to remain firmly in operated position. The head 27 of each plug carries a cap 30 which is removably held in place by a screw-threaded joint 31. The cap 30 has an annular flange 32 arranged to clamp a disk 33 to the head 27. The disk 33 is a wafer of suitable material, such as paper, celluloid, fiber, metal, etc., on which the name, wave length or other identifying data of a selected broadcasting station are imprinted. By simply unscrewing the cap 30, the disk 33 can be removed and another inserted for indicating any other station to be tuned in by that particular plug.

The condenser shaft 12 carries a series of disks 34, which are held against rotation on the shaft by a spline 35, or in any other practical way. Since the radio cabinet of Fig. 1 has ten plugs 19 to bring in as many stations automatically, there are ten disks 34, one for each selected station. Spacing washers or blocks 36 hold the disks 35 apart, so as to align them with the two rows of plugs or keys 19, as will be clear from Fig. 6. The disks 34 and spacing blocks 36 are held together as a single rigid member on shaft 12 by one or more bolts 37. If desired or found advisable, the condenser shaft 12 may be supported in suitable bearings 38 arranged on opposite sides of the disks 34. Each disk 34 carries a ring 39 provided with a notch or slot 40 arranged in predetermined radial position for each disk. A simple way to

mount the rings 39 on the disks 34 is to provide each disk with a circumferential groove or recess 41 in which the ring is firmly seated against lateral displacement. In order to get the ring 39 in the groove 41 several expedients may be adopted.

In Fig. 8, the ring 39 is cut away at 42 to provide a thin neck 43 which acts like an elastic hinge for the two halves of the ring. It is assumed, of course, that the ring is made of resilient material, such as steel, certain kinds of brass, bronze, and others that a mechanic may select. The ring 39 is cut opposite the notch 40 to form an overlapping joint 44, which is connected by a screw 45. To mount the ring 39 on the grooved disk 34, it is only necessary to hold the ring beside the disk and spread apart the severed ends of the ring until the two halves have separated sufficiently about the elastic hinge 43 to permit insertion of the distorted ring into the groove 41 of the disk. When the ends of the ring are released, they automatically spring into overlapping position as shown in Fig. 8. The screw 45 is then inserted to secure the ring sections together. This screw may be sufficiently long to bite into the disk and secure the ring against rotary displacement. I prefer, however, to use a separate set-screw 46 for this purpose, this screw being arranged about ninety degrees from the locking slot 40 to make it easily accessible through the open door 16.

Another form of ring 39 is shown in Fig. 9, where the ring consists of two semi-circular sections overlapping at 47 and connected by screws or bolts 48. One of the members 48 may constitute a pivot for the two ring halves, so that they may be spread apart as indicated by the dotted lines 39'. The other fastening member 48 may be a removable screw or bolt which is inserted after the ring sections have been placed in the groove 41 of the disk. If it is desired to make the ring 39 in one piece, it will be necessary to provide the disk 34 with a removable side 49, as shown in Fig. 11. The side 49 is secured by screws 50 after the ring has been positioned in the circumferential groove 41 of the disk. It is understood, of course, that the rings 39 are mounted on their respective disks before the latter are positioned on shaft 12. I do not limit myself to any particular construction of ring 39, nor to any special method of mounting it in proper position on its disk. In fact, my invention is not restricted to rings 39 as separate from the disks 34, for it is evident that the locking means 40 can be provided on a solid disk, by which I mean a disk having no separately adjustable section around the periphery. Instead of making the spacing blocks 36 separate from the disks 34, as shown in Figs. 5 and 6, those parts may be cast as a single piece, preferably of light strong metal like aluminum or aluminum alloy. A construction like that is illustrated in Fig. 7, where the casting indicated as a whole by 51 is rigidly mounted on shaft 12 by set-screws 52.

Each disk 34 has associated with it a movable locking member controlled by one of the plugs 19. In the present embodiment, these locking members are shown as spring arms 53, arranged in two rows of five each and mounted at their rear ends on a common support 54. This support may be a casting of aluminum secured by bolts 55 to an upright wall or bracket 56 in the radio cabinet 10. One of the bearing plates 38 for shaft 12 may be cast integral with support 54, while the other bearing plate 38 is secured to

the support by screws or bolts 57. This permits the disks 34 to be mounted on shaft 12 before the outer bearing plate 38 is put in place. The spring arms 53 are attached to the upper and lower ends of support 54 by screws 58 or otherwise. Each arm 53 carries a lug or projection 59 shaped to fit into the slot or notch 40 of the associated disk 34. By making the notches 40 and lugs 59 tapering or wedge-shaped, they can engage in firm locking contact to stop the condenser shaft 12 in exact tuning position. A simple way to secure the locking lugs 59 on the arms 53 is to provide the lugs with integral shanks 60 (see Fig. 4a), which pass through a hole in the arms, so that the projecting end of the shank can be upset to form a head 61. The projections 59 should be made of a hard material capable of resisting wear, such as bronze, aluminum, steel, etc., and they may also be made of antifriction metal or even terminate in a roller, so as to engage the periphery of rings 39 with minimum friction. The reason for this will become clear as the specification proceeds.

The upper and lower spring arms 53 are so mounted that normally the lugs 59 are out of engagement with the disks 34,—or, more strictly speaking, out of contact with the peripheries of the rings 39, which constitute the outer adjustable portions of the disks. If the arms 53 are made in the form of straight spring blades, the upper and lower ends 54' of support 54 may be so shaped that the arms 53 normally slant away from the disks 34, as shown in Fig. 2. This particular mounting of the arms 53 is, of course, not necessary, and I mention it merely as a simple way of normally holding the arms out of locking contact with the disks 34, so that the condenser shaft 12 is free to be rotated in either direction by the knob or wheel 14. Each arm 53 terminates in a curved or cam-shaped end 62 arranged to be engaged by the tapered end 63 of the adjacent plug 19. When the plugs 19 are in normal or pulled-out position, the inner tapered ends 63 are out of contact with (or at least only lightly touch) the free ends 62 of the locking arms 53. Looking at Fig. 2, it will be seen that when the plug 19 is pushed in to the dotted position 19', the tapered end 63 cams the free end of arm 53 downwardly into position 53' and forces the lug 59 into pressure contact with the periphery of ring 39. The arm 53 is of such flexibility that the pressure of lug 59 against ring 39 is not heavy enough to interfere with the easy operation of the tuning shaft 12 by means of the hand knob 14. The shaft 12 is therefore free to rotate in either direction until the notch 40 of the associated disk comes into alignment with the lug 59 of the tensioned spring arm 53, whereupon the lug snaps into the notch (see Fig. 3) and positively locks the shaft against further rotation. This locking of shaft 12 takes place only when it is in correct tuning position for the particular station represented by the actuated key or plunger 19.

It goes without saying that the locking slot or notch 40 on each disk 34 is in such radial position that the station represented by each disk is tuned in when the notch comes into alignment with the lug 59 of the associated locking arm 53. Fig. 8 indicates in dotted lines the relative positions of the locking slots 40 on the ten disks shown in Figs. 5 and 6. The purpose of making the rings 39 circumferentially adjustable on disks 34 is to enable the slot or notch 40 of each disk to be adjusted into the right position.

To make this adjustment it is only necessary to loosen the set-screw 46, move the ring 39 into the required position, and then tighten the set-screw again. The disks 34 are easily accessible through the open door or panel 16 on which the plugs 19 are mounted. Since the plugs have no mechanical connection with the arms 53, the door 16 can be opened and closed without disturbing the inside mechanism. The plugs or keys 19, while most conveniently located on the front door 16, can be mounted on any other accessible part of the cabinet,—as, for example, on top. In a less simple embodiment of my invention, the plugs 19 may operate the locking arms 53 through interposed connections, like pivoted levers, but that is really a needless complication. I mention it, however, as being within the scope of my invention. Manifestly, the keys or buttons 19 and locking members 53 may be so arranged that these members are moved to locking position when the buttons are pulled out instead of being pushed in.

A further practical advantage of the adjustable controlling rings 39 lies in the fact that it is an exceedingly simple matter to change any particular ring from one station to another. Let us suppose that the owner of the radio receiver wants to change station C to some other station not represented by any one of the ten push buttons or plungers 19 when the set was bought. To make this change, it is only necessary to push in plunger C, which we may suppose to be the plunger shown in the upper part of Fig. 2. The shaft 12 is then turned by knob 14 until the notch 40 comes opposite the lug 59, which thereupon snaps into locking position. Or, instead of pushing in plunger C, the operator may open the door 16 and push down the free end of the arm 53 with his right hand, while he manipulates the knob 14 with his left hand. After the notch 40 has come into locking alignment with the associated lug 59, the operator loosens the set-screw 46. Then, while the lug 59 is being held in locking engagement with slot 40 by the pushed-in plunger C, the operator turns the knob 14 by hand until the desired station is tuned in. Then he opens the door 16 and tightens the set-screw 46, so that the ring 39 remains in position to stop the shaft 12 whenever the receiving set is tuned for that particular station. It is therefore only a matter of a few moments to change from one station to another, and no other tool is required than a screw driver. Since the rings 39 are individually adjustable, the adjustment of any one ring does not disturb the others.

In Figs. 12 and 13 the controlling disks 54 are each provided with a radially projecting lug 65 arranged to engage the lug 66 of the associated arm 53. For spacing the disks 64 on the condenser shaft 12, each disk is provided with an integral hub 67 adapted to receive a set-screw 68 for securing each disk in adjusted radial position on the shaft. The operation of the construction in Figs. 12 and 13 is exactly the same as that of Fig. 2, except that in Fig. 12 the movement of the arm 53 toward the controlling disk 64 is limited by a stop 69 to keep the lug 66 out of frictional contact with the periphery of the disk. The actuated position of the arm 53 in Fig. 12 is indicated by the dotted lines 53', and the outline 66' indicates approximately the position of the lug 66 when the arm is forced down by the plug 19. When the shaft 12 is rotated in the direction of the arrow 70 in Fig. 12, its movement is stopped by the lug 65 engaging

the depressed lug 66. The stopping position of lug 65 is indicated by the dotted lines 65'. In this modification, the condenser shaft 12 is supposed to be rotated only in the direction of arrow 70, it being assumed that the tuning position of the condenser shaft is attained when the stop 65 engages the rear edge of stop 66. It is obviously possible to so adjust the disks 64 on the condenser shaft that tuning position is reached when the shaft is rotated in the direction of arrow 71 and the stop 65 engages the front edge of stop 66. At the present time I prefer the construction shown in Fig. 2, where the cooperating wedge-shaped elements 40 and 59 stop the shaft in exact tuning position no matter which way it is turned.

It is evident from the preceding description that I have provided a very simple mechanism for definitely controlling the movement of a tuning shaft by simply pushing in a key or button mounted in a convenient position on the radio cabinet. The keys or buttons are not mechanically connected to the tuning shaft and do not therefore actuate the same when the buttons are pushed in or pulled out. The purpose of these buttons is to control the movements of the tuning shaft which is manually operated by a knob or other suitable finger piece. This arrangement produces a semi-automatic tuning device of unusual simplicity. The compactness of my tuning device makes it adaptable for installation in approved designs of radio receivers, since it requires only sufficient lengthening of the condenser shaft to accommodate the controlling disks. An important practical feature of my invention lies in the simple and easy adjustment of the controlling disks to change from one station to another. This change can be made by the owner of the set without skill, and with no other tool than a screw driver. The various parts comprising the mechanism are easy to make and assemble, and there is nothing to get out of order. It is hardly necessary to say that the drawings have not been made to scale and the actual device can be constructed much more compact than the drawings indicate. I have purposely exaggerated the relative proportions of the parts and spread them out more than necessary in order to promote clearness in the various illustrations.

Although I have shown and described certain specific constructions, I want it understood that my invention is not limited to the details set forth, since it is manifest that the basic features of my invention may be mechanically embodied in other forms and arrangements than herein set forth by way of example. Changes and modifications may be expected to occur to others skilled in the art without departing from the scope of the invention as defined in the appended claims. When I speak of a tuning shaft in the claims, I do not necessarily mean a shaft carrying electric tuning elements, but I mean broadly any shaft operable to adjust the tuning mechanism of the receiver for any desired station.

I claim as my invention:

1. A radio cabinet having a set of manually operable members representing stations to be tuned in, a rotary tuning shaft in said cabinet, each of said members being movable to two extreme positions irrespective of the angular position of said shaft, means whereby each member remains in either position when manually released, mechanical connections controlled by said members for stopping said shaft in selected

tuning position, and a finger piece for turning said shaft in either direction until stopped by said connections.

2. In a radio tuner, a disk rigidly mounted on a rotary tuning shaft, locking means carried by said disk and adjustable thereon circumferentially to represent a selected station, controllable mechanism associated with said disk to engage said locking means and lock said shaft in tuning position, and means independent of said mechanism for manually operating said shaft.

3. A radio tuner comprising a disk mounted on a rotary tuning shaft, a movable locking member normally inoperative in relation to said disk, cooperating means on said disk and said member for locking the disk against rotation when said shaft reaches a predetermined tuning position, a slidable key mounted to move independently of said member for actuating the latter to locking position, and means independent of said key for manually operating said shaft to the desired tuning position.

4. In a radio tuner, a disk rigidly mounted on a rotary tuning shaft, a ring carried by said disk and adjustable thereon circumferentially, locking means on said ring, a normally inoperative member adapted to engage said locking means, and means for moving said member to locking position.

5. In a radio cabinet, the combination of a tuning shaft rotatable in opposite directions, a set of independently slidable plugs representing each a selected station, means for so mounting said plugs that they slide in and out the same distance for any station and remain in either actuated position when manually released, said plugs being always mechanically disconnected from said shaft, whereby the full operation of any plug in either direction produces no movement of said shaft, a driving member for actuating said shaft in either direction, mechanism controlled by each plug when the latter is moved to operative position for stopping the shaft in tuning position for the station represented by the actuated plug, means whereby said stop mechanism is automatically rendered inoperative when the plugs are moved to normal position, and means whereby said stop mechanism is operative irrespective of the direction of rotation of said shaft.

6. A radio tuner comprising a disk mounted on a rotary tuning shaft, said disk having a slot in predetermined radial position to represent a selected station, a movable member having a projection adapted to enter said slot for locking said disk and shaft, said projection being normally out of the path of said radial slot, said member representing the same station as said slot, means movable independently of said member for actuating the latter toward said disk to place said projection in operative relation to said disk without interfering with the rotation of said shaft, and means for rotating said shaft after said member has been moved to operative position, said projection entering said slot and thereby stopping said shaft when the shaft is in tuning position.

7. In a radio tuner, a disk fixed on a rotary tuning shaft, a ring rotatably mounted on said disk and provided with locking means arranged in predetermined radial position, means for securing said ring in adjusted position on said disk, a member adapted to be moved into engagement with said locking means for automatically locking said shaft in tuning position, and con-

trollable means for operating said member, which normally permits rotation of said shaft.

8. A radio tuner comprising a series of disks mounted on a rotary tuning shaft, each disk having locking means arranged in predetermined radial position, a flexible spring arm associated with each disk, each arm being supported at one end and normally held by its own tension in an inoperative position, means on said arm for engaging said locking means when the arm is actuated into locking position, means for so mounting each spring arm relatively to the adjacent disk that the flexing of the free end of said arm presses the engaging means of the arm against the disk in all radial positions of the latter, and a series of selectively operable keys adapted to be mechanically connected with said arms to flex the free ends thereof and hold said engaging means pressed against the adjacent disk while the latter rotates, whereby the engaging means on any flexed arm automatically snaps into locking engagement with the adjacent disk when the locking means on said disk is in radial alignment with said engaging means.

9. A radio cabinet having a set of slidable plugs mounted for independent operation, each plug being movable to two extreme positions, means whereby each plug remains in either position when manually released, a rotary tuning shaft in said cabinet, means independent of said plugs for operating said shaft, which is not actuated by the in-and-out movements of said plugs, a series of controlling elements mounted on said shaft in predetermined relation to represent certain stations, a normally inoperative locking member associated with each element, means for establishing a separable mechanical connection between an actuated plug and one of said members to move the latter into locking engagement with the associated element, whereby the shaft is stopped in tuning position, and means for so mounting said slidable plugs that the operation of each plug is wholly independent of the others and any actuated plug is always free to be withdrawn to normal position without affecting the position of any other plug.

10. In radio receiving apparatus, a rotary tuning shaft provided with a series of controlling elements arranged in predetermined radial positions, each element corresponding to a selected station, a normally inoperative locking member associated with each controlling element, a set of selectively operable keys movable independently of said members for actuating the latter into the path of said elements, whereby the tuning shaft is automatically stopped against further rotation when one of said controlling elements comes into locking engagement with the actuated member, said keys being mechanically disconnected from said shaft, and means independent of said keys for manually operating said shaft until stopped by one of said locking members.

11. A radio tuner comprising a disk mounted on a rotary tuning shaft, said disk having a locking element arranged in predetermined radial position, a flexible spring arm supported at one end and having a projection adapted to engage said element for locking said disk and shaft, said projection being normally held out of the path of said locking element by the inherent tension of said arm, means for so mounting said spring arm relatively to the disk that the flexing of the free end of said arm presses said projection against the disk in all radial positions of the latter, and controllable means arranged to en-

gage the free end of said arm for flexing the same toward said disk and pressing the projection on said arm against the disk while the latter is rotated, whereby said shaft is rotatable until the projection on the flexed spring arm automatically snaps into locking engagement with the element on the adjacent disk, whereby the shaft is locked in preselected tuning position.

12. A radio tuner comprising a disk mounted on a rotary tuning shaft, said disk having a slot in predetermined radial position, a spring arm supported at one end and having a projection adapted to enter said slot for locking said disk and said shaft, said projection being normally held out of the path of said radial slot by the inherent tension of said arm, and a slidable plug arranged to engage the free end of said arm for moving the same toward said disk, whereby said shaft is rotatable in either direction until said projection automatically snaps into the slot of said disk when the shaft reaches tuning position.

13. In a radio receiving apparatus, a rotary tuning shaft provided with a series of controlling elements arranged in predetermined radial positions, each element corresponding to a selected station, a normally inoperative locking member associated with each controlling element, a set of selectively operable keys mounted to move independently of said members and having each means for engaging one of said members and moving it into the path of one of said elements, whereby the tuning shaft is automatically stopped against further rotation when one of said controlling elements comes into locking engagement with the actuated member, said keys being mechanically disconnected from said shaft, and means independent of said keys for manually operating said shaft until stopped by one of said locking members.

14. A radio cabinet having a door which carries a set of slidable plugs adapted to be selectively operated, a rotary tuning shaft in said cabinet, means independent of said plugs for operating said shaft, a series of controlling elements adjustably mounted on said shaft in predetermined relation to represent certain stations, said elements being accessible through said door for adjustment, a normally inoperative locking member associated with each element, and means for establishing an operative connection between a plug when pushed in and one of said members to move the latter into locking engagement with the associated element, whereby the shaft is stopped in tuning position, said plugs being mechanically disconnected from said shaft and elements to permit opening of the door without disturbing the other parts.

15. In a radio cabinet having receiving apparatus which includes a rotary tuning shaft and means for manually operating the same in either direction from one extreme position to the other, the combination of a series of controlling elements mounted in predetermined position on said shaft, a corresponding series of slidable plugs mounted on the front panel of said cabinet and operatively disconnected from said shaft, so that the movements of said plugs do not affect the position of said shaft, each plug representing a selected station, said elements and plugs normally permitting manual operation of said shaft to any position, and means movably mounted independently of said plugs for establishing a mechanical connection between each plug and one of said controlling elements when the plug is actuated in one direction, said mechanical connec-

tion including means for locking the shaft in selected tuning position, said locking means being automatically rendered inoperative when the plug is moved in the other direction.

16. A radio cabinet having a set of individually adjustable push buttons projecting from its front panel, each button representing a selected station and being movable to either of two positions, means whereby each button remains in actuated position when released, a rotary hand knob on said panel, a tuning shaft in the cabinet adapted to be operated by said knob, said buttons being operable without actuating said shaft, and stop means controlled by each button for automatically limiting the manual operation of said shaft by said knob to tune in the desired station.

17. A radio receiver having a tuning shaft, a rotary knob for manually operating said shaft in either direction, manually adjustable mechanism for automatically stopping said shaft in any one of a plurality of selected tuning positions when operated by said knob, said mechanism including a set of manually adjustable members representing each a certain station, said members being individually adjustable into and out of station-selecting position and each member remaining in adjusted position when manually released, and means whereby each member is always free to be moved to station-selecting position without preliminary operation of said knob.

18. A radio cabinet having a tuning shaft, a series of individually operable push buttons operatively disconnected from said shaft and representing each a selected station, each push button being movable to either of two positions, means whereby each button remains in station-selecting position when manually released, a movable member for manually operating the tuning shaft in either direction, and means in the cabinet controlled by said buttons for automatically stopping the manual operation of said shaft to bring in the station represented by the actuated button.

19. A radio receiver having a rotary tuning shaft, means for manually operating said shaft in either direction from one extreme position to the other, a normally inoperative device adjustable to stop said shaft in predetermined tuning position, means whereby said device is always free to be adjusted to station-selecting position without preliminary operation of said manual shaft-operating means, said device normally permitting manual operation of said shaft to any position, a manually operable member adapted to be mechanically connected with said device for adjusting said device to stop said shaft, said member being mounted independently of said device and movable relatively thereto, and means whereby said device is operative irrespective of the direction of rotation of said shaft.

20. A radio cabinet having a tuning shaft, a series of individually operable push buttons operatively disconnected from said shaft and representing each a selected station, means whereby each button remains in pushed-in and pulled-out position when released, a movable member for manually operating the tuning shaft in either direction, means in the cabinet controlled by said buttons for automatically stopping the manual operation of said shaft to bring in the station represented by the actuated button, and means whereby said buttons when pulled out permit manual operation of said shaft to any tuning position.

21. A radio cabinet having a rotary tuning

shaft adapted to remain in any actuated position, a member for manually operating said shaft in either direction from one extreme position to the other, manually adjustable mechanism for automatically stopping said shaft in any one of a plurality of predetermined tuning positions, said mechanism including a set of individually adjustable finger pieces mounted on said cabinet and operatively disconnected from said shaft, each finger piece being movable to either of two operative positions, means whereby each finger piece remains in either actuated position when released and is movable back to normal position without affecting the position of any other finger piece, and means whereby said shaft-stopping mechanism is operative irrespective of the direction of rotation of said shaft.

22. A radio cabinet having a tuning shaft, a finger piece for manually rotating said shaft in either direction from one extreme position to the other, controllable mechanism associated with said shaft to stop the same in any one of a plurality of predetermined tuning positions, a set of individually adjustable hand members representing each a selected station for controlling said mechanism to stop said shaft in tuning position for the station represented by the adjusted member, means for so mounting each member that it is movable to operative and inoperative positions without affecting the position of any other member, each member remaining in either position when manually released, means whereby said members are always disconnected from said tuning shaft and are thus incapable of actuating the same, and means whereby said stop mechanism permits operation of the shaft by said finger piece in either direction and is operative to stop the shaft irrespective of the direction of rotation of said shaft.

23. A radio cabinet having a rotary tuning shaft, a member for manually operating said shaft in either direction from one extreme position to the other, a set of individually adjustable elements carried by said cabinet and representing each a selected station, means whereby the operation of any element to any position is incapable of actuating said shaft, a set of stop devices mechanically controlled by said elements for automatically stopping said shaft in tuning position for the station represented by the adjusted element, each element controlling a corresponding stop device, said elements and stop devices normally permitting manual operation of said shaft to any position, and means whereby said elements are mounted independently of said stop devices and movable relatively thereto.

24. A radio receiver having a tuning shaft, a rotary hand knob for operating said shaft, a set of individually operable buttons representing each a certain station, said buttons being operative when pushed in and being adapted to remain in either actuated position, and means in the receiver cabinet controlled by said buttons for automatically locking said shaft in tuning position for the station represented by a pushed-in button, said shaft remaining locked against rotation until the actuated button is pulled out.

25. A radio receiver having a tuning shaft, a rotary hand knob for operating said shaft, a set of individually operable buttons representing each a certain station, said buttons being operative when pushed in and being adapted to remain in either actuated position, means in the receiver cabinet controlled by said buttons for automatically locking said shaft in tuning position

for the station represented by a pushed-in button, said shaft remaining locked against rotation until the actuated button is pulled out, and means whereby said shaft is freely operable by said knob to any tuning position when all the buttons are pulled out.

26. The combination of a radio tuning shaft, means for rotating said shaft in either direction, a plurality of members movable with said shaft, each member representing a selected station, a spring finger associated with each member and normally out of operative relation thereto, whereby said shaft is normally free to be rotated in either direction through its whole tuning range, said fingers being individually operable, a manually slidable pin mechanically associated with each finger for moving the latter to operative position, each pin representing the same station as the associated member, cooperating means on each member and its finger for stopping said shaft in predetermined tuning position for the station represented by the actuated finger, and means whereby said cooperating means operate to stop said shaft irrespective of the direction of rotation thereof.

27. A radio receiver cabinet having a series of manually operable members which represent certain stations, a rotary tuning shaft in said cabinet, means whereby the operation of any member to any position is incapable of actuating said shaft, means for operating said shaft, and mechanism in said cabinet controlled by any actuated member for automatically stopping the shaft in tuning position for the station represented by that member, said mechanism including shaft-stopping means mounted independently of said members and movable relatively thereto.

28. A radio receiver cabinet having a series of push buttons which represent certain stations, a rotary tuning shaft in said cabinet, means whereby the operation of any button to any position is incapable of actuating said shaft, means for operating said shaft, and mechanism in said cabinet controlled by any pushed-in button for automatically stopping the shaft in tuning position for the station represented by that particular button, said mechanism including shaft-stopping means mounted independently of said push buttons and movable relatively thereto.

29. A radio cabinet containing a tuning shaft, a series of individually operable push buttons mounted on an outer panel of said cabinet, said push buttons representing each a selected station, means whereby the operation of any button to any position is incapable of actuating said shaft, a movable member in said cabinet for operating said shaft in either direction, and means in the cabinet controlled by said buttons for automatically stopping the operation of said shaft to bring in the station represented by the actuated button, said shaft-stopping means being mounted independently of said push buttons and movable relatively thereto.

30. A radio tuner comprising a plurality of

disks mounted on a tuning shaft rotatable in opposite directions, each disk having means arranged in a certain angular position to represent a selected station, a plurality of movable members normally inoperative in relation to said disks, there being a member for each disk, means mounted independently of said members and movable relatively thereto for setting any member in preliminary operative relation to its disk without interfering with the rotation of said shaft in either direction, means operative to rotate said shaft after any member has been set to operative position, and cooperating means on each disk and its associated member for automatically locking said disk when the shaft is in tuning position for the station represented by said disk.

31. A radio tuner comprising a series of disks mounted on a rotary tuning shaft, each disk representing a certain station, a movable locking member associated with each disk and normally inoperative in relation to said disk, whereby said shaft is normally free to be rotated in either direction through the entire broadcasting range, selectively controllable means mounted independently of said members and movable into separable mechanical engagement therewith for moving any member to locking position, and cooperating means on each disk and its associated member for automatically locking the disk against rotation in either direction when said shaft reaches tuning position for the station represented by the locked disk.

32. A radio tuner comprising a disk mounted on a rotary tuning shaft, said disk having a peripheral notch arranged to represent a certain station, a movable spring arm having a projection adapted to enter said notch when the shaft is in tuning position for said station, said projection being normally out of operative engagement with said disk, and means for actuating the spring arm to press said projection against the periphery of the disk without interfering with the rotation of said shaft, said pressure contact between the actuated spring arm and the disk causing said projection to snap into said notch and stop the shaft in tuning position.

33. In a radio broadcast receiving set having a unitary tuning system and a manually operable shaft for adjusting said tuning system, means including manually adjustable stop members adapted to be set at predetermined positions corresponding to exact broadcast station frequencies and adapted to lock said shaft when said tuning system is adjusted to said station frequencies, means whereby said adjusted members remain in station-selecting position when manually released, means independent of said members for rotating said shaft in either direction until arrested by an adjusted stop member, said stop members being incapable of operating said shaft, and means whereby said members are operative to stop the shaft in preselected position irrespective of the direction of rotation of said shaft.

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