May 22, 1951 H. C. HANSEN 2,554,052

RADIO STATION SELECTOR

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Fig. 1.

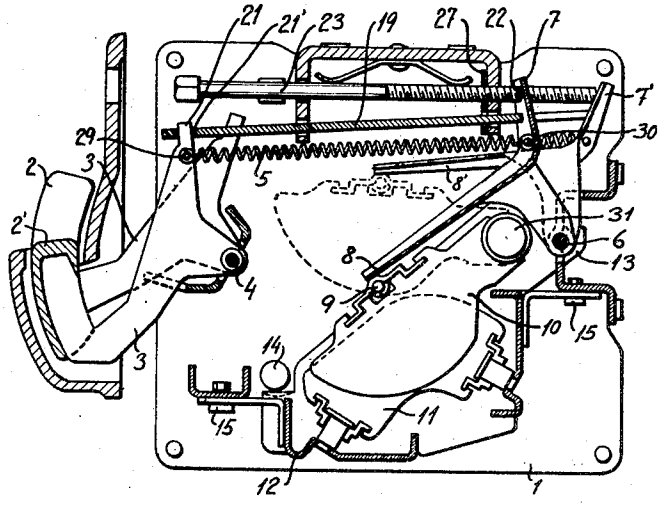
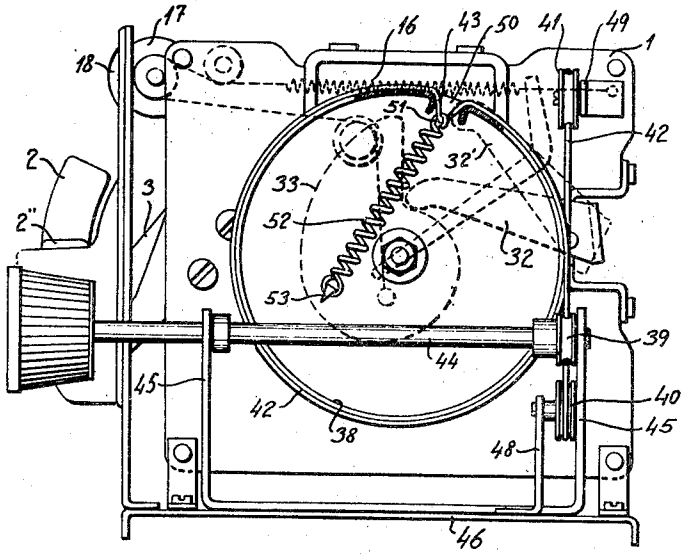


Fig. 2.



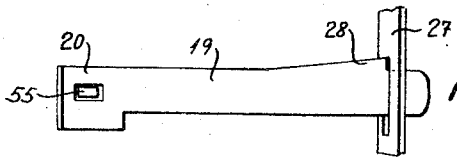


Fig. 3.

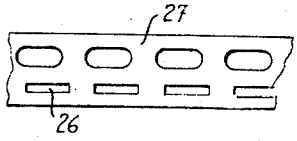


Fig. 4.

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Fig. 5.

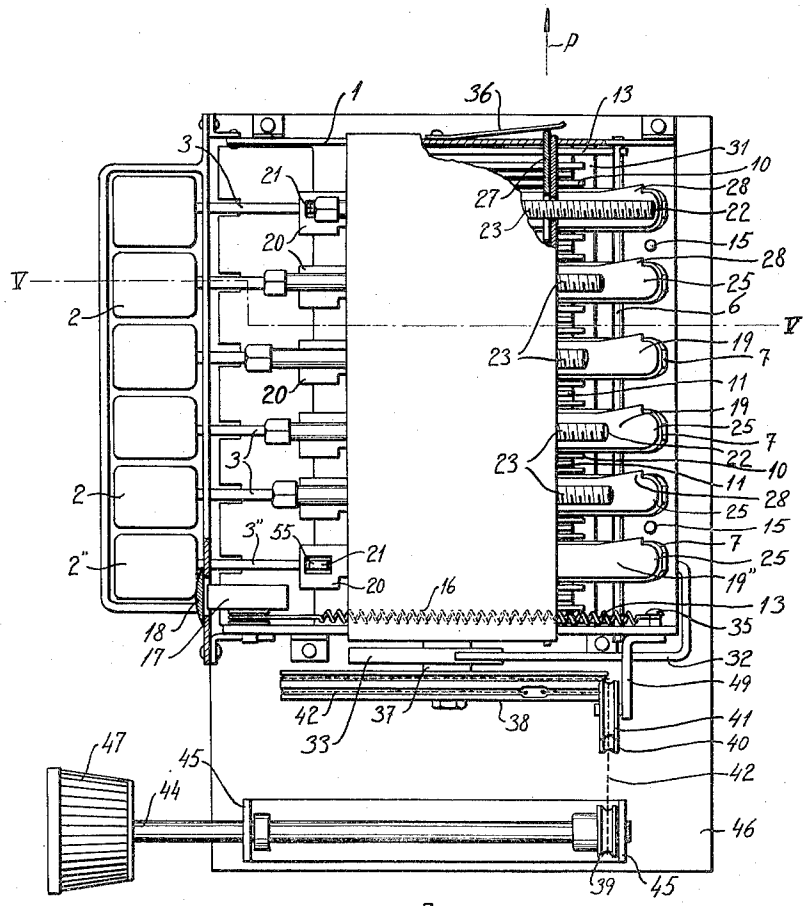
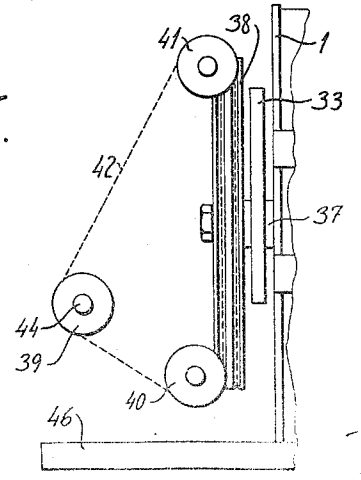


Fig. 6.



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RADIO STATION SELECTOR

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In Denmark December 10, 1945

9 Claims. (Cl. 74—10.27)

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The present invention relates to a radio station selector comprising one or more tuning condensers, the rotatable plate set of which is adapted to be set in a plurality of mutually different positions by means of an operating mechanism comprising a number of juxtaposed push button levers journaled in the frame of the selector.

The main object of the invention is to improve the said mechanism so as to obtain that this adjustment of the rotor set is less dependent on the guiding and the adjustment of the push button levers as in heretofore known radio station selectors of the kind in question.

A further object of the invention is to provide for the automatic return of the operating means to their initial position by the same means, viz. a spring, as that which fixes the setting of the condenser in dependence on the adjustment of the adjusting members in the path of movement of rotor actuating means, in order to ensure that the adjustment of the rotor plate set of the condenser is independent of incidentally occurring play, etc. in the member of the actuating device carrying the press button.

A still further object of the invention is to provide for a proper cooperation of the adjustable rotor plate set of the condenser or condensers and the means for operating same, without using means for direct mechanical interconnection of said plate set and said adjusting means, in order that the condenser may be mounted in and dismounted from the frame of the selector without thereby in any way affecting the adjusted condition of the member adapted to operate the rotor plate set.

According to the invention, the members for operating the rotor plate set comprise two groups of a number of juxtaposed levers journaled in the frame about mutually parallel but not coinciding axes, each individual lever in one of said groups being connected to an individual lever of the other of said groups of levers by way of a helical spring stretched in a strained condition between one end of each of said two levers by means of a spacing member inserted between the said two ends of the levers so as to be clamped between same by the said spring and to form together with the latter an operative connection between the said two levers, one of which is provided with a push button for the manual operation of same, while the other of said levers is arranged to have one free end of same engaging the adjustable rotor plate set, so as to cause,

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when the lever carrying the push button is operated, the rotor plate set to move about its axis of revolution against the action of a spring tending to keep the rotor plate set in engagement with the lever actuating same.

Other objects of the invention reside in the improved construction of the operating mechanism as set forth more fully in the following with reference to the accompanying drawing, in which

Fig. 1 shows a push button selector in side elevation and partly in section,

Fig. 2 the push button selector in side elevation,

Fig. 3, in plan view, a connection rod between two levers belonging to an actuating device of the push button selector as well as the neighbouring portion of a locking bar.

Fig. 4 is a plan view of a portion of a locking bar.

Fig. 5 is a plan view of the selector on a slightly larger scale than Fig. 1; and

Fig. 6 is a schematic side view of a drive for moving a cam member to set the condenser of the selector to any desired position.

1 is the frame of a push button selector which at one side is provided with a number of push buttons or keys 2 arranged side by side and accessible from outside, one of these push buttons being shown in its operated position 2' in Fig. 1. Each of these push buttons is arranged at the end of a lever 3 referred to in the appended claims as push button lever, which is rotatably mounted on a shaft or spindle 4 mounted in the frame and common to all levers 3. Each lever 3 is connected by means of a helical spring 5 with one arm 7 of a double-armed lever 7, 8 referred to in the appended claims as rotor actuating lever, which is rotatably mounted on another spindle 6 parallel to the spindle 4, and the other arm 8 of which lever contacts with an abutment 9 on the rotatable disk set 10 of a condenser or a number of condensers arranged side by side. These condensers are accommodated in a separate casing 12 inserted into the frame of the push button switch and guided relatively to same by means of lugs 13 engaging the spindle 6, and a fixed abutment 14 with which the side of the condenser casing 12 opposite to the lugs contacts. The condenser casing is kept against the abutment 14 and the spindle 6 by means of screws 15, and when these are removed the casing can be withdrawn independently of the actuating device constituted by the levers 3 and 7, 8 and the appurtenant helical spring 5. The operation of such actuating device is to be described in further detail in the following.

The movable disk set 10, which in Fig. 1 is shown in dotted lines in the position it will occupy when withdrawn from the spaces between the disks of the fixed disk set 11, is connected with one end of a helical spring 16 by means of a cord drive running over a rotatable scale 17 which indicates the adjustment of the condenser in an opening 18 of the frame. The other end of the spring 16 is connected to the frame at 35. The said adjustment is effected by means of the said actuating devices in the following manner;

A distance or spacing member 19 is arranged between the tops of each pair of levers 3 and 7, 8 of each actuating device, such distance member being constructed, as shown in Fig. 3, as a flat bar, a slot 55 in one end of said bar receives one end 21 of the lever 3, while the other end of this bar contacts with the arm 7 of the lever 7, 8. If any one of the levers 3 is turned by depressing the push button arranged on same, the appurtenant spring 5 forces the lever 7, 8 to perform a corresponding turning movement so as to move the arm 8 away from the position 8' indicated with dotted lines in Fig. 1 and during the simultaneous movement of the two levers the distance member 19 will keep the two lever arms which are mutually connected by means of the spring 5 at a certain minimum distance from one another, until the end of the lever arm 7 strikes an adjustable stop 22, which in the embodiment shown is constituted by an end of an adjusting screw 23 screwed into the frame and by means of which the possible turning movement of the lever 7, 8 is limited in accordance with the desired angular movement of the movable disk set of the condenser. This rotary motion is imparted to the disk set by the lever 7, 8 as a consequence of the lever arm 8 of the latter being turned downwards from the position indicated by dotted lines in Fig. 1 when the relevant push button 2 is depressed, the said downward movement of the lever arm 8 taking place against the tension of the spring 16 tending to keep the rotatable disk set in contact with the arm 8 and to remove it to the positions indicated in dotted lines in Fig. 1. When in the course of such rotary movement, the lever arm 7 strikes the abutment 22, its movement is stopped, but the lever 3 is capable of further rotary movement and thereby slides the hook-shaped end 25 of the bar 19 into engagement with a slot 26, Figs. 3 and 4, in a locking bar 27, which is slidably mounted in the frame of the push button selector in such a manner as to be slidable crosswise to all actuating devices in direction of the arrow P in Fig. 5 against the action of a leaf spring 36, one end of which engages one adjacent end of the bar 27, the other end of which leaf spring being rigidly attached to the frame 1 of the selector. When a laterally projected nose 28 of the bar 19 is drawn through the said slot, the locking bar 27 is automatically pushed aside by this nose against the tension of a spring (not shown), and immediately after returns to its normal position under the influence of the said spring 16, whereby the locking bar is caused to engage with the hook 25. Thereby the lever 3 is locked. The lever 3 remains in this position until another lever 3 in being operated displaces its distance member 19 so as to cause the locking bar 27 to be displaced longitudinally against the action of the leaf spring 36 in such a manner that the distance member of the previously operated actuating device is released and slides back through the locking bar under the influence of the tension of the appurtenant spring 5. Hereby the lever 7 of the last named actuating device is pushed away from the position shown in full lines in Fig. 1, in which it contacts with the end 22 of the adjusting screw 23 to the position in which the arm 8 of said lever is located as indicated in the dotted lines 8' in Fig. 1. This movement is effected quite automatically by the spring 5, because the point of connection 29 between the latter and the lever 3 lies at a greater distance from the axis of rotation 4 of this lever than the distance from the point of connection 30 between the spring and the lever arm 7 and the axis of rotation 6 of the last named lever, and because the distance member 19 is constructed in such a manner as to prevent the spring 5 from contracting to a neutral condition.

As a consequence of the tendency of the spring 5 to contract to the smallest possible length, the said arrangement of its points of connection with the two levers 3 and 7—8 will result in the latter always being restored to their original position as soon as the distance member 19 is released by the locking bar 27.

The axis 31 of rotation of the rotatable disk set does not coincide with the axis of rotation 6 of the lever 7, 8. This results in some friction coming up between the abutment 9 and the end of the arm 8 during the tuning movement, and for this reason it is convenient to construct the abutment 9 as a roller rotatably mounted on the movable disk set, or alternatively such a roller may be arranged on the end of the arm 6.

There may be any desired number of push button levers 3 for setting the condenser in different desired positions in dependence on the pre-setting of the adjusting screws 23 of the individual rotor setting levers 7—8, Fig. 5. It will be advantageous, though not necessary, to provide the selector with means for gradually adjusting the condenser to any desired position through the agency of a cam rotatably mounted in the frame 1 of the apparatus and co-operating with an arm rotatably mounted on the frame 1, so as to bring about an adjustment of the condenser 10—11 in dependence on the angle of rotation of the said cam as hereinafter described.

It is well known to provide a radio station selector with a tuning device of this kind, but in the embodiment so far proposed, the tuning device is constructed in such a manner as to presuppose an axial displacement of either the cam or the said arm by means of which the tuning device is operated in order to allow for co-operation of these two members, when it is desired to employ the gradual tuning device, and this leads to a rather complicated construction which, according to the present invention, is avoided by providing one of the levers 7—8, namely that one of these levers which cooperates with that one of the levers 3 which is indicated by the character 3'' in Fig. 3 with an arcuated or bent arm 32, Figs. 2 and 5 forming an integral part of said lever 7—8 and arranged to engage the circumference of the cam 33 referred to above when the lever 3'' is operated by depressing the appurtenant push button 2, thus causing the appurtenant distance member 19'' Fig. 5 to allow the appurtenant spring 5 to turn the lever 7—8 which is provided with the said arm 32 to a position in which one end of said arm 32 engages the circumference of the cam disc 33 during the influence of the said spring 5. In the system comprising the lever 3'' and the appurtenant lever 7—8 no screw 23 is provided for limiting the angle through which

the said lever 7—8 may be rotated about the shaft 6. The arm 32 in combination with the cam 33 limit the possible rotative movement of said lever and it would be obvious that if the cam disc 33 is rotated the said disc causes the arm 32 engaging the spirally shaped circumference of said disc and consequently the lever 7—8 to be gradually rotated thus causing the spring 16 to adjust the rotatably mounted plate set 10 of the condenser 10—11 correspondingly, viz. to any desired position depending upon the degree of rotation of the cam disc 33.

The cam disc 33 is rotated by means of a cord drive comprising a circular disc 38, arranged to be rotated about the axis of the cam disc 33 and being rigidly attached to said cam disc, and three pulleys 39, 40 and 41 and an endless cord 42, Figs. 2, 5 and 6, which cord for the sake of clearness is indicated with dotted lines only in Figs. 5 and 6. The pulley 39 is secured to a spindle 44, mounted in bearings 45 on the base plate 46 of the selector and provided with a finger knob 47. The pulley 40 is rotatably mounted in a bearing 48 on the base plate 46, Fig. 2, and the pulley 41 is rotatably mounted in a bearing 49 on one end wall of the frame 1 so as to be located vertically above the pulley 40. As it appears from Figs. 2, 5 and 6, and especially from Fig. 6, the cord 42 extends from the pulley 39 on to the pulley 40, and then is laid twice around the circular circumference of the disc 38 in close engagement with same; from the disc 38 the cords extend to the pulley 41 from which the cord leads back to the circumference of the pulley 39. On the disc 38 a loop 43 of the cord is arranged to extend through a hole 50 in the rim of the disc 38 to engage a hook 51 on one end of a helical spring 52, the other end of which is secured to a projection 53 on one side face of the disc 38. The spring 52 forms a tensioning member of the endless cord 42.

It would be obvious that when the shaft 44 is rotated the cord drive described above will cause the disc 38 and consequently the cam disc 33 to be rotated about the common axis of said two discs, and if the push button lever 3'' has been operated as described above to cause the arcuated arm 32 to engage the circumference of the cam disc 33, then the said arm and consequently the rotor setting lever 7, 8 belonging to the push button lever 3'' will be caused to adjust the movable set of condenser plates 10 to a position depending upon the angle of rotation of the cam disc 33.

Having now particularly described and ascertained the nature of my invention and in what manner the same is to be performed, I declare that what I claim is:

1. In a radio station selector, a frame; a number of variable condensers having a stator plate set mounted in said frame and a rotor plate set journaled in said frame; a mechanism for adjusting said rotor plate set to a plurality of desired positions relatively to the stator plate set; the said mechanism comprising two groups of levers journaled in the frame about two spaced, parallel axes, a push button on one free end of each lever of one of said groups, each lever of the other group being arranged to have one end actuating the rotor plate set, means for separately and resiliently interconnecting the other end of each individual lever of the first group and the other end of a separate lever of the second group to form an operative connection between said levers adapted to transfer a rotary movement of any of the manually operated push button levers to a separate rotor set actuating lever; means for locking any one of the last mentioned levers, when operated, in a predetermined position; and means for releasing such lever from such locked position.

2. In a radio station selector, a frame, a number of variable condensers having a stator plate set mounted in said frame and having a rotor plate set journaled in said frame; a number of push button levers journaled in said frame and each representing a station; a corresponding number of rotor actuating levers journaled in the said frame about an axis parallel to but spaced laterally from the axis of adjustment of the rotor set, each actuating lever having one end thereof arranged to engage the rotor set when the lever is operated; a number of helical springs each connecting the other end of one of said rotor actuating levers with one end of a separate one of said push button levers; a separate spacing member between the said interconnected ends of each push button lever and the appurtenant rotor actuating lever, arranged to be clamped between the said two ends by means of the said spring interconnecting same and so as to form jointly with the said spring an operative connection between the push button lever and the rotor actuating lever; a separate adjustable restraining member in the path of movement of each rotor actuating lever, such restraining members being mounted in the said frame and being arranged to adjust to any desired limit the rotary movement imparted to the rotor actuating lever by manual operation of the appurtenant push button lever, means for locking each individual rotor actuating lever in the position in which it is set by way of the appurtenant push button lever, and means for releasing the said locking means.

3. A radio station selector as in claim 2 and in which the ends of the rotor actuating levers engaging the rotor set are in loose engagement with same.

4. In a radio station selector, a frame, a number of variable condensers having a stator plate set mounted in said frame and having a rotor plate set journaled in said frame; a resilient member tending to keep the rotor set in an inoperative position relative to the stator set; a number of push button levers journaled in said frame and each representing a station; a corresponding number of motor actuating levers journaled in the said frame about an axis parallel to and spaced laterally from the axis of the rotor set, each actuating lever having one end thereof arranged to engage the rotor set when the lever is operated; a number of helical springs each connecting the other end of an individual rotor actuating lever to one end of a separate one of the push button levers; a separate spacing member between the said interconnected ends of each push button lever and the appurtenant rotor actuating lever arranged to be clamped between the said two ends by way of the spring interconnecting same and to form together with the said spring an operative connection between the push button lever and the rotor actuating lever; a separate adjustable restraining member in the path of movement of each rotor actuating lever, such restraining members being adjustably mounted in the said frame and being arranged to adjust to any desired limit the rotary movement imparted to

the rotor actuating lever by manual operation of the appurtenant push button lever, means for locking each individual rotor actuating lever in the position to which it is set by means of the appurtenant push button lever, and means for releasing the said locking means.

5. In a radio station selector, a frame, a number of variable condensers having a stator plate set mounted in said frame and having a rotor plate set journaled in said frame; a resilient member tending to keep the rotor set in an inoperative position relatively to the stator set; a number of push button levers journaled in said frame and each representing a station; a corresponding number of rotor actuating levers journaled in the said frame about a common axis parallel to and laterally spaced from the axis of adjustment of the rotor set, each actuating lever having one end thereof arranged to engage the rotor set, when the lever is operated; a number of helical springs each connecting the other end of an individual rotor actuating lever with one end of a separate one of the push button levers; a separate member for spacing each pair of lever-ends interconnected by way of said helical springs so as to form jointly with the helical springs an operative connection between the push button lever and the rotor actuating lever concerned; an adjustable restraining member in the path of movement of each rotor actuating lever, such restraining members being adjustably mounted in the said frame and being arranged to adjust to any desired limit the rotary movement imparted to the rotor actuating lever by manual operation of the appurtenant push button lever, a bar mounted in the frame transversely of the said spacing members and arranged to cooperate with all of the spacing members to automatically lock any of the spacing members and consequently any of the rotor actuating levers in a position corresponding to the position in which the rotor set is adjusted by means of said levers, and means for releasing said locking bar from engagement with any of said spacing members.

6. In a radio station selector a frame, a number of variable condensers having a stator plate set mounted in said frame and having a rotor plate set journaled in said frame, a number of push button levers journaled in said frame and each representing a station; a corresponding number of rotor actuating levers journaled in the said frame about a common axis parallel to and laterally spaced from the axis of adjustment of the rotor set, each actuating lever having one end thereof arranged to engage the rotor set, when the lever is operated; a number of helical springs each connecting the other end of one of said rotor actuating levers with one end of a separate one of said push button levers; a rotatable scale indicating member journaled in the said frame, a helical spring attached at one end to the said frame, a cord stretched between the other end of this helical spring and the rotor set in driving engagement with said indicating member; a separate member for spacing each pair of lever-ends interconnected by a helical spring, so as to form jointly with such helical spring an operative connection between the push button lever and the rotor actuating lever in question; a separate adjustable restraining member in the path of movement of each rotor actuating lever, such restraining members being mounted in the said frame and being arranged to adjust to any desired limit the rotary adjustment imparted to the rotor actuating lever by manual operation of the appurtenant push button lever, a bar mounted in the frame transversely of the said spacing members and arranged to cooperate with any of said spacing members so as to automatically lock any one of these members and consequently any one of the rotor actuating levers in a position corresponding to a desired adjustment of the rotor set, and means for releasing said locking bar from engagement with any rotor actuating member.

7. In a radio station selector, a frame, a number of variable condensers having a stator plate set mounted in said frame and having a rotor plate set journaled in said frame, a resilient member tending to keep the rotor set in an inoperative position relatively to the stator set, a number of juxtaposed push button levers journaled in said frame and each representing a station, a corresponding number of juxtaposed rotor actuating levers journaled in the said frame about a common axis parallel to and spaced from the axis of adjustment of the rotor set, each rotor actuating lever being arranged to engage the rotor set when the lever concerned is operated, a number of helical springs each arranged to connect a point of one end of an individual push button lever to a point of one end of an individual rotor actuating lever, which latter point is located on the actuating lever at a distance from the axis of same which is smaller than the distance from the first mentioned point to the axis of the push button lever; a separate member for spacing each pair of the interconnected ends of push button levers and appurtenant rotor actuating levers, so as to form jointly with the helical spring interconnecting said ends, an operative connection between each push button lever and the appurtenant rotor actuating lever; a separate adjustable restraining member in the path of movement of each rotor actuating lever, such restraining members being mounted in the said frame and arranged to adjust to any desired limit the rotary movement imparted to the rotor actuating lever by manual operation of the appurtenant push button lever, a bar mounted in the frame transversely of the said spacing members, and arranged to cooperate with all of these members so as to automatically lock any one of the spacing members and consequently any one of the rotor actuating levers in a position corresponding to a desired adjustment of the rotor set, and means for releasing said locking bar from engagement with any rotor actuating member locked by same.

8. In a radio station selector, a frame, a number of variable condensers having a stator plate set mounted in said frame and having a rotor plate set journaled in said frame, a resilient member tending to keep the rotor set in an inoperative position relatively to the stator set, a number of juxtaposed push button levers journaled in said frame and each representing a station, a corresponding number of juxtaposed rotor actuating levers journaled in the said frame about a common axis parallel to and spaced from the axis of adjustment of the rotor set, each rotor actuating lever being arranged to engage the rotor set when the lever concerned is operated, a number of helical springs each arranged to connect a point of one end of an individual push button lever to a point of one end of an individual rotor actuating lever, which lat-

ter point is located in the actuating lever at a distance from the axis of same which is smaller than the distance from the first mentioned point to the axis of the push button lever; a separate member for spacing each pair of interconnected ends of push button levers and appurtenant rotor actuating levers, so as to form jointly with the helical spring interconnecting said ends an operative connection between the push button lever and the rotor actuating lever; a separate adjustable restraining member in the path of movement of each rotor actuating lever, such restraining members being provided in the said frame and being arranged to adjust to any desired limit the rotary movement imparted to the rotor actuating lever by manual operation of the appurtenant push button lever, a bar mounted in the frame transversely of the said spacing members and arranged to cooperate with all of these members so as to automatically lock any one of the spacing members and consequently any one of the rotor actuating levers in a position corresponding to a desired adjustment of the rotor set, and means for releasing said locking bar from engagement with any rotor actuating member, and separate means to adjust the rotor plate set to any desired position relatively to the stator plate set independently of the said push button operated levers.

9. A radio station selector as in claim 8 and in which the same means for adjusting the rotor plate set independently of the push button operated levers comprises a separate push button lever and a separate rotor actuating lever journaled in the frame of the selector about the said axes as the remaining push button levers and rotor actuating levers respectively, a spacing member inserted between said two separate levers, a cam disc journaled in the frame of the selector, means to rotate said cam disc, an arm attached to the said separate rotor actuating lever and arranged to be stopped by engaging the circumference of the said cam disc when moved about the axis of the said separate rotor actuating lever together with the latter when the cam disc is rotated.

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