This Invention relates to improvements in time controlled selector devices, and more particularly to an improved time controlled selector for radio programs.

Another object is to effect automatic selection of radio programs at predetermined intervals in accordance with a preselected sequence.

Another object is the production of a device adapted for use with the conventional program selection tuners of radio receivers.

Another object of this invention is to produce a device which will effect the intermittent tuning movement incident to program selection without aid of any source of power other than the tuning device.

Another object is to produce a device which will automatically prevent the production of sensory signals during the tuning period.

Another object is to produce a device which is economical to manufacture and operate and which is both simple and positive in operation.

Another object is to produce a device adapted for alternative manual or automatic operation.

Referring to the drawing:

Fig. I is a side elevation of one form of the device applied to a conventional tuning condenser.

Fig. II is a broken front view of the device.

Fig. III is a front view of the time controlled release mechanism.

Fig. IV is an upward view of a portion of the tuning dial showing the stops and the engaging abutments.

Fig. V is a side view of an alternative arrangement of the time controlled release mechanism.

Corresponding numerals refer to the same parts throughout the several figures.

Referring more particularly to Figs. I to IV of the drawing; a condenser gang 1 having 180° movement has a shaft 2 supporting the rotor on fairly frictionless bearings. The rotor is statically balanced for any position by the counterweight 2. The spiral spring 4, attached at one end to the frame of the condenser gang and at the other end to the shaft 2, biases the rotor of the condenser gang to the full open position (maximum capacity). Upon the forward end of the shaft 2 is fixedly mounted the tuning and indicating dial 5 having gear teeth on one half of its circumference which mesh with idler pinion 6 which in turn meshes with pinion 7. Pinion 7 is fixed to the shaft 3 to which is fixed the tuning knob 8. Shaft 3 passes through a bearing 10 which has sufficient friction therein to maintain the dial 8 in any desired position against the tension of the spring 4, allowing manual operation as hereinafter described. This shaft is slidably mounted in the bearing 10 so that pressure on the knob 9 will force pinion 5 to disengage pinion 6. This same movement causes bellcrank 12, which is pivoted at 13, to move the worm 14 upward into engagement with gear 15. In this latter position, the tuning condensers are disabled for manual operation and are adapted to be time controlled. The driving connection between the motor 35 and the worm 14 is made laterally flexible so that the worm may be moved by the bellcrank 12 independently of the motor. This may be accomplished by making the connecting shaft, which is of small diameter, fairly long, as indicated by the broken section. Among other expedients which will be obvious to those skilled in the art, are a Bowden wire, or a gear train, similar to that used in the stem setting-winding mechanism of watches, comprising a gear fixed to the shaft of worm 14 which meshes with a gear fixed to the motor shaft, the latter being concentric with the pin 15.

In order to predetermine the sequence in which the stations will be automatically selected, a selector disc 25 is provided. The disc 25 is rotatably mounted upon a stud 25 carried by panel 11 and has a toothed periphery for effecting its rotation. Radial rows of threaded holes 23 are provided at equal angular intervals, every hole in each row representing one station capable of automatic selection. In order to determine which of the stations is to be selected, a screw plug 27 is inserted into the hole corresponding thereto.

These plugs coat with abutments 29 corresponding in number and position to the holes in any radial row. These abutments are flexibly mounted upon the panel 11 by means of screws 40 and are adapted to be depressed upon the passage of a plug 27 thereover.

Dial 5 has a series of raised stops 30 which correspond in number and radial position to abutments 29 and holes 25, and circumferentially correspond to the positions of the desired stations upon the tuning dial. In the instant case each of the stops 30 is displaced 180° from the position of the corresponding station upon the tuning dial.

Since it is practically impossible to construct a set in which all of the stations will appear precisely at the proper dial reading, the abutments 29 are made adjustable so that the dial 5 can be made to stop exactly at the desired position.
The worm 13 is driven by means of a clockwork motor, synchronous motor or equivalent motor of isochronous characteristics 35 and drives the gear 15 counterclockwise at the rate of two revolutions per hour. The gear 15 is integral with hub 18 which is freely rotatable upon shaft 2. The hub 18 has a peripheral slot near its outer end which rides the forked member 18. The forked member has a rearwardly extending horizontal portion having a pin 19 which rides in the spiral slot 22 of the gear 15. The pin 19 after passing through the slot 22 is bent to a position parallel to the gear 15 as shown in Fig. III. A perforation in the end of the pin 19 carries a small friction shoe of leather or similar substance. The forked member 18 also has a vertical forwardly extending portion which is adapted to engage alternatively the fixed stops 21 or the stops 22 which are attached to dial 8. A spiral spring 17 is attached at one end to the rearwardly extending portion of the member 18 and at the other end to hub 16, and tends to bias the member 18 to the position shown in Fig. III; i.e., with the pin 19 at the outer end of the spiral slot 22. The spring 17 is so chosen and adjusted that its tension in this position is greater than the maximum tension of spring 6 by an amount sufficient to give a positive rotation to shaft 2. Both springs 4 and 17 are preferably chosen with several turns so that the increase in tension for one half revolution will not be material.

As the gear 15 is driven in a counter-clockwise direction, the member 18 is held in a vertical position by the stop 21. The spiral slot 20 acting upon the pin 19 of member 18 causes the latter to be forced downward, until such a time that the rearwardly extending portion of member 18 is released from stop 21 and engages the stop 22. At this time gear 15 will have made one half revolution. The spring 17 acting upon the dial 5 through member 18 and stop 22 is sufficiently strong to overcome spring 6 and rotates the condenser rotor to its completely closed position (maximum capacity). At this point the pin 19 of member 18 will have retraced its travel in slot 20, causing member 18 to disengage stop 22 and to engage the lower stop 21. Spring 4 then tends to return the condenser rotor to its former open position.

Spiral slot 20 does not have a uniform pitch but is much steeper adjacent the ends thereof. This allows considerably more accuracy in assuring the point on gear 18 at which the member 18 engages and releases the stops 21 and 22, and hence the time at which a new tuning operation is initiated.

As the condenser was brought to the closed position by the spring 17, pawl 23 on dial 5 engages the pinion 26 mounted on the panel 14 and rotates it. Pinion 24 in turn engages the teeth of selector disc 25 and by its movement rotates the disc 25 in a clockwise direction through an angle equal to that between successive station selecting positions; i.e., the angle subtended between successive radial rows of holes 28. Disc 25 is held against casual movement by means of stationary panel 31 attached to panel 14. As disc 25 is brought into position, a screw-plug 27 is previously inserted in the desired one of holes 28, rides over the corresponding abutment 29, and pushes the abutment into proximity with the side of dial 5. Now, as dial 5 is returned toward the open position by spring 4, a released portion or stop 30 there-of will engage the depressed abutment 29, stopping the dial 5 at a corresponding position.

Since the gear 15 revolves at the rate of two revolutions per hour, and the member 18 is released from stationary stops 21 at each half revolution, it is obvious that the selector disc 25 will be moved to succeeding positions and the dial 5 reset at 15 minute intervals.

In order to control the speed of rotation of dial 5 and prevent slamming of the dial against the abutments, a centrifugal governor 32 is driven by pinion 6. The tips of the spring leaves of governor 32 when displaced outwardly by the flyweights and bear inside of a metallic friction cup 33, acting as friction shoes to control the speed of rotation of the governor. This cup is insulated from ground and is electrically connected to the grid of a stage of amplification in the receiver. Rotation of the governor 32 connects the cup 33 and its associated grid circuit to ground, thus disabling the receiver while dial 5 is in motion. It is preferable that cup 33 be connected to an amplifier stage in which the grid return is grounded, so that only the signal voltage will be applied to cup 33, although this is not absolutely necessary. It is advantageous in sets employing automatic volume control to connect cup 33 to the grid of an audio frequency stage in order to prevent a blast of signals when the disabling circuit is broken.

When the device changes the condenser setting from one station to another, at the time that member 18 is released from stop 21, the stops 22 will not be at a position directly opposite the stops 21 but will be displaced therefore from the fact that dial 5 is at this time held in a position corresponding to the first station. Spring 17 will therefore be required to rotate member 18 until the latter encounters the stop 22. This rotation is unrestrained there will be a considerable impact. To prevent this, the leather friction shoe in pin 19 is provided so that it will bear against the rear face of gear 15. By virtue of the fact that the stops 21 and 22 are forward of the position at which the tension of spring 17 is applied to member 18, the pressure of the friction shoe is released when member 18 is restrained by the stops 21, or when it is rotating the dial 5.

For manual operation, the tuning knob 9 is pulled outward so that pinion 7 meshes with pinion 6. This operation also causes the worm 14 to disengage the gear 15, prevents the latter from being clock driven. The plug 27, which is then actuating one of abutments 28, is removed from the selector disc 25, or the selector disc 25 is manually rotated to such a position that a row of holes 28 having no screw-plugs 27 therein is opposite the abutments 29. Alternatively, the disc 25 may be removed from stud 26. This prevents the abutments 29 from interfering in any manner with the manual operation of the dial 5. Whenever the worm 14 disengages the gear 15 as noted above, the latter will be rotated by the spring 17 in a clockwise direction until the outer end of the spiral slot 20 engages the pin 19 of member 18. This forces the forwardly extending portion of member 18 outwardly into the notch in the end of stop 21. This holds member 18 and gear 15 in a fixed position until such time that worm 14 is again engaged with gear 15 for automatic operation. This same outward engagement of member 18 causes the forwardly extending portion thereof to be free of stops 22 regardless of the position of dial 5. It is obvious that member 18 will be released from fixed abutments 21 at precisely 15 minutes after the worm 14 engages the gear 15, and in order to assure resetting of
the condenser in the interval between broadcast periods, worn 14 should be forced into engage-
ment with gear 15 only during such an interval. The modification shown in Fig. V is designed to
obviate the inconvenience incident to initiating automatic operation only during the intervals
between broadcasting periods. A spur pinion 44
is driven by a synchronous motor 35 and meshes
with the spur gear 45 which is analogous to the
gear 15 of Fig. I. In the position shown, as the
gear 45 is driven in a counter-clockwise direction
by the pinion 44, the operation will be identical
with that described in connection with the first
arrangement. When the tuning knob 9 is pulled
outward for manual operation as before, the bell-
crank 42, under the action of spring 46, will force
the gear 45 to the left, so that member 18 will not
engage either the fixed stops 21 or the movable
stops 22. Gear 45 remains meshed with pinion
44 however and assures that, upon resumption of
automatic operation, the member 18 will be
released from fixed stops 21 at the required time.
If desired, the fixed stops 21 may be made wide
enough, so that upon shifting of gear 45 to the
left, the member 18 will still engage them and be
released thereafter at regular intervals. The stops
22 will in this case have the dimensions shown,
so that shifting of the gear 45 will prevent
interaction of member 18 and the stops 22.

Other modifications of the various parts of
the device may obviously be made by those skilled in
invention. For example, the lower ends of bell-
cranks 12 and 42 instead of terminating in the
manner shown may terminate in a finger or a
forked portion such as that of member 15 and
which is adapted to ride in a peripheral groove
in a portion of shaft 9 which extends to the rear
of pinion 7. Such a construction would dispense
with the need for a spring 46 shown in Fig. V.

The selector disc 25 may also be constructed
with a smooth periphery and having the driving
teeth thereof punched in a small circle close to
its hub. The pinion 24 would then be mounted
above the abutments 20 and the pawl 23 mounted
on dial 9 in such a position as to engage the
pinion 24. Stationary pawl 31 would also be
shifted so as to engage the driving teeth. If de-
sired, the selector disc 25 may be covered with
a cap which is detachably fastened to the panel
11 or to the disc 25.

Usually the sequence of programs which it is
desired to select will repeat each week. In such
a case, if desired, seven of the selector discs 25
may be provided, one for each day of the week,
and the screw-plugs 27 left in their positions;
the discs being changed each day.

By the use of the term "radio" throughout the
specification and claims, I do not intend to limit
myself to radio which has for its purpose the
production of audible sounds, since the device is
obviously applicable to all types of transducers in
which a discrimination is made by selecting a
particular electrical frequency whether the out-
put therefrom be audible, visible, or otherwise.

Also, the electrical frequency selected may be
transmitted over radio or wire channels, since it is
obvious that the medium over which the energy
is transmitted will not affect the operation of the
device. Also, since similar tuning devices are
used at the transmitter and receiver, it is obvious
that this device is adapted to vary a transmitted
frequency in any desired sequence.

1 claim:

1. In a frequency selecting electrical network,
adapted to actuate the abutments, and means for moving the selector member to successive positions and causing it to actuate the abutments.

5. The combination as in claim 7 in which the motor is an asynchronous motor and including means for causing the motor to determine the intervals.

8. The combination as in claim 7 including means for controlling the speed of rotation of the shaft.

9. The combination as in claim 7 including means for manually rotating the condenser, and means for making the springs and the manual rotating means selectively effective to rotate the shaft.

10. In a radio receiving set, the combination of a variable condenser having a shaft rotatable to two extreme positions, a spring adapted to bias the shaft to one of the extreme positions, a dial fixed to the shaft, a gear rotatably mounted on the shaft, a hub for the gear, a peripheral groove in the hub, a spiral slot in the gear, a member having a forked vertical portion adapted to ride in the peripheral groove and a horizontal portion adapted to ride in the spiral slot, a spring attached to the hub and the member and adapted to bias the member to one end of the spiral slot, an asynchronous motor for driving the gear against the tension of the second spring, a plurality of fixed stops for restraining the movement of the member until released therefrom by the action of the spiral slot, a series of stops upon the dial, one of which is adapted to be engaged by the member upon release from a fixed stop and thereupon cause the second spring to rotate the dial and shaft to the other of the extreme positions when the spiral slot will cause the member to release the dial, a second series of stops upon the dial, a series of abutments adapted when actuated to engage the second series of stops, a selector disc, plugs in the selector disc for actuating the abutments, and a pawl upon the dial for causing the dial to rotate the disc to a new selecting position.

12. The combination as in claim 13 including means for manually rotating the dial and shaft, and means for making the springs and the manual rotating means selectively effective to rotate the dial and shaft.

13. In a radio set, means for effecting intermittent adjustment of a rotary member comprising the combination of a driving member, means for storing over a predetermined time period energy received from said member, a rotary driven member adapted to be rotated to two extreme positions, means comprising a second energy storing means for moving the driven member to one of the extreme positions, means responsive to the motion of the driving member for causing the first energy storing means at the end of the time period to move the driven member to the second of the extreme positions and to store energy concurrently in the second energy storing means, means for rendering the action of the first energy storing means upon the driven member ineffective at the second position and thereby allow the second energy storing means to return the driven member toward the first position, and means for restraining the driven member intermediate the two extreme positions.

14. The combination in a frequency selecting electrical circuit, of a rotary variable condenser and means for controlling the speed of rotation thereof, said means comprising a rotatable shaft mechanically coupled to the condenser, electrically conducting friction shoes carried by the shaft, flyweights attached to the friction shoes and adapted to displace the latter with respect to the shaft upon rotation thereof, an electrically conducting circular track normally insulated from the friction shoes and adapted to be contacted by the latter upon displacement, and means for disabling the circuit upon contact of the friction shoes with the track.

15. Means for effecting intermittent rotary oscillation comprising a rotatable driving member; a rotatable intermediate member; and a continuously rotatable driving member; a spring connected between the driving member and the intermediate member; means for restraining the intermediate member and causing the spring to be tensioned by the rotation of the driving member; means responsive to the rotation of the driving member for moving the intermediate member in a radial direction, releasing it from the restraining means and causing it to engage the driven member, whereby both may be rotated by the spring; means responsive to the rotation of the intermediate member for causing it to release the driven member; and means for rotating the driven member in the reverse direction upon its release therefrom.

16. In a radio receiving set, the combination of a variable condenser having a rotatable shaft, a series of stops affixed to the shaft, a plurality of abutments normally out of the paths of rotation of the stops, means supporting the abutments rigidly in the direction of rotation of the stops and flexibly in a direction perpendicular thereto, a selector member for moving a selected one of the abutments into the path of rotation of a stop, manually adjustable means carried by the selector member for conditioning the latter to move desired ones of the abutments, and means for actuating the selector member at equal time intervals to move an abutment into the path of the stop.

STEPHEN E. REYMER.