March 12, 1940. R. E. McCLURE 2,193,254

TIMING MECHANISM

Filed Oct. 30, 1937 2 Sheets-Sheet 1

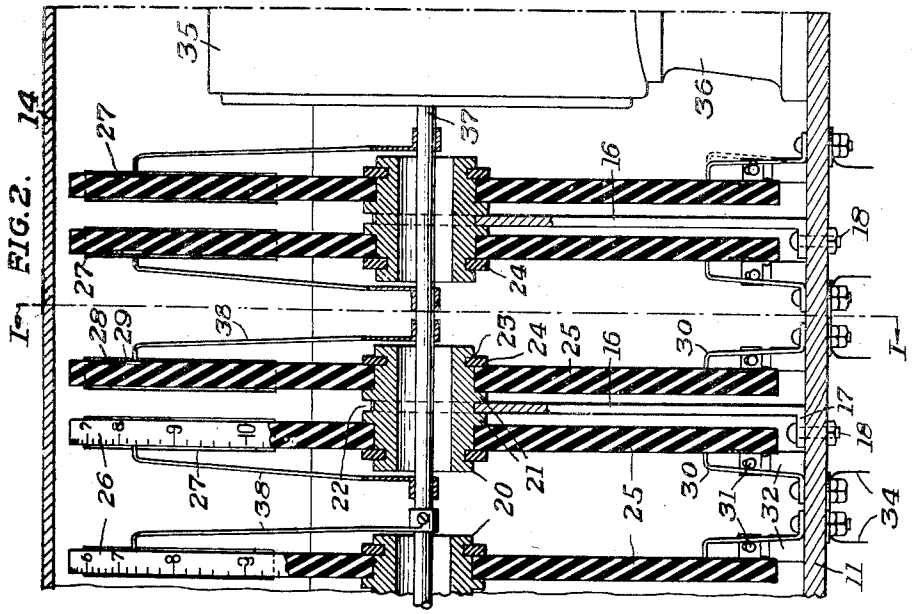

FIG. 2.

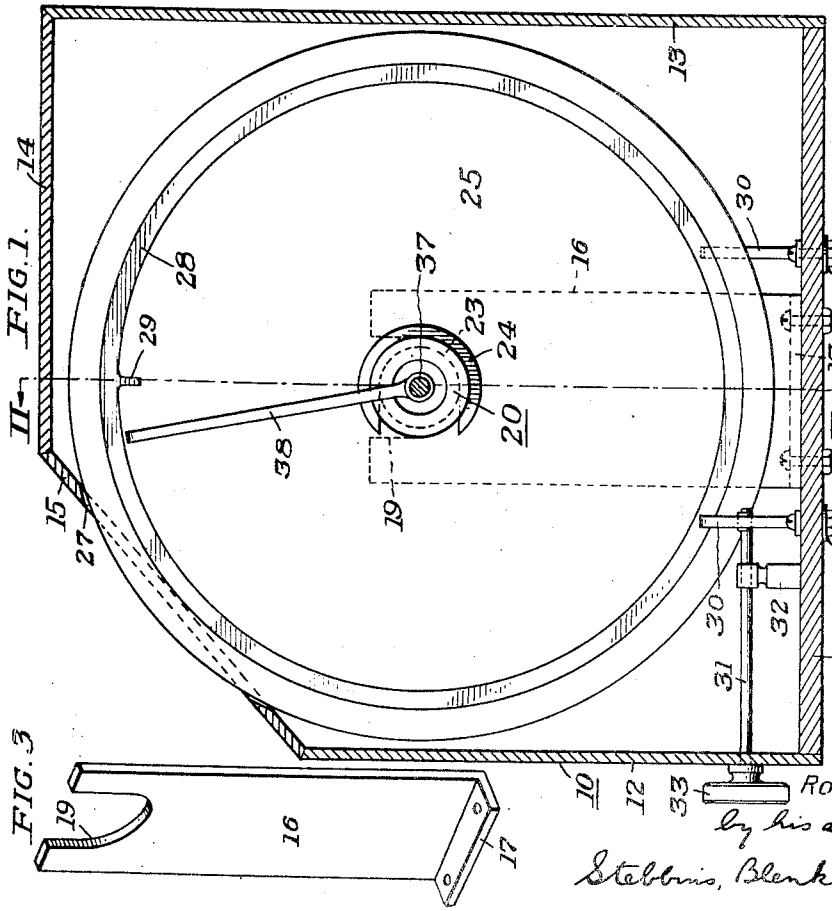

FIG. 1.

FIG. 3

FIG. 4.

FIG. 5.

INVENTOR

Robert E. McClure

by his attorneys

Stebbins, Blenko & Parmelee

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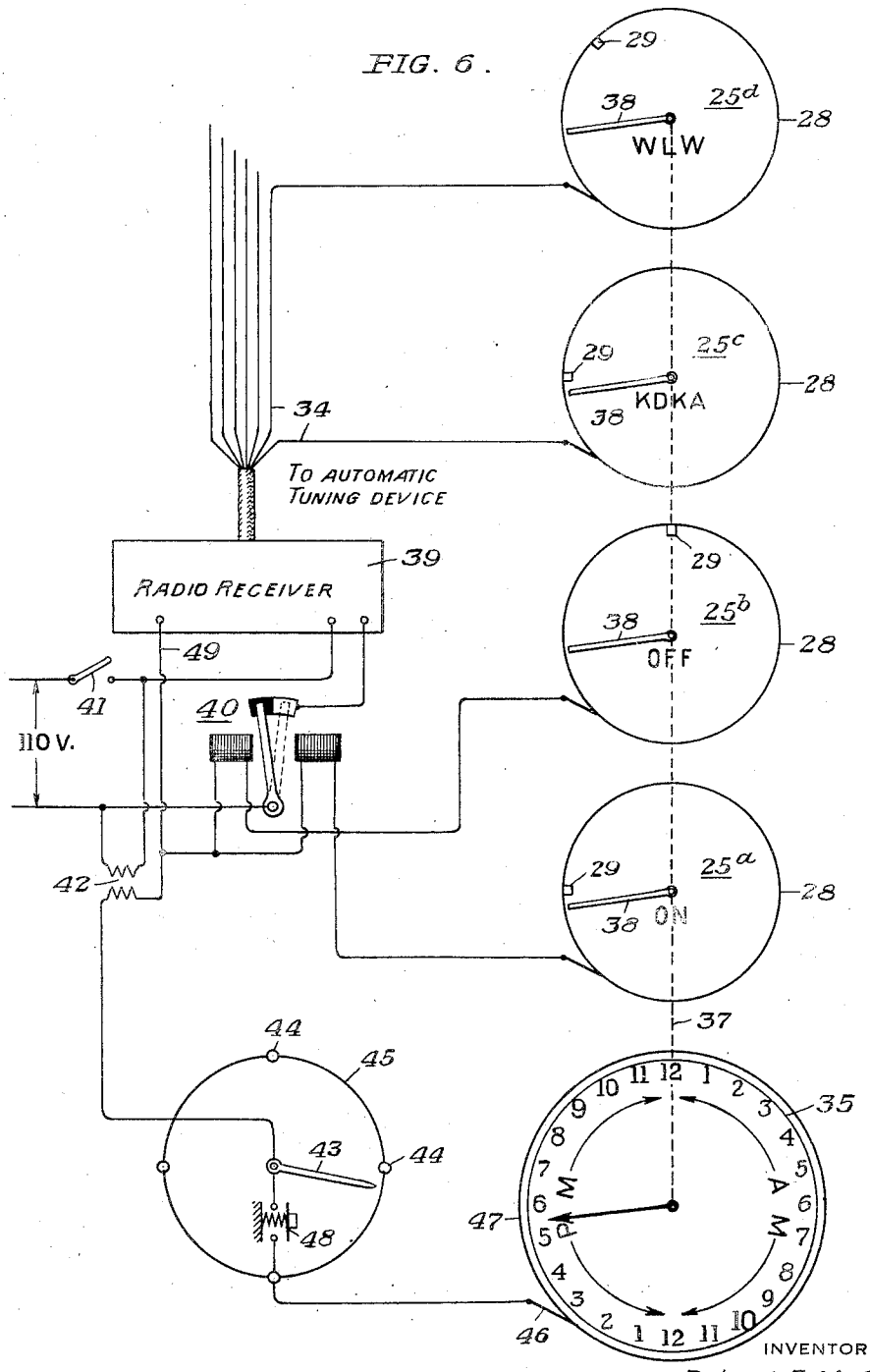
FIG. 6.



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Patented Mar. 12, 1940

2,193,254

UNITED STATES PATENT OFFICE

2,193,254

TIMING MECHANISM

Robert E. McClure, Warren, Ohio, assignor to The Wean Engineering Company, Incorporated, Warren, Ohio, a corporation of Ohio

Application October 30, 1937, Serial No. 171,872

3 Claims. (Cl. 200—37)

This invention relates to an apparatus for successively closing a plurality of electric control circuits at preselected times. Devices of this character have numerous applications in industry. The one for which the invention has been specially designed and in connection with which it will be described herebelow is that of controlling a radio receiver provided with automatic tuning equipment. The invention is, however, not limited to this application, but may be employed for any other service where it is desired successively to close a plurality of control circuits.

Automatic tuning has now become accepted in the radio receiver field, and although a number of different types of mechanisms have been developed, a requirement common to many is that a circuit identified with a particular broadcasting station be energized when it is desired to receive broadcasts from that station. The mechanism for actually turning the tuning shaft of a receiver provided with rotary tuning condensers forms no part of my present invention, although a mechanism of this type is disclosed in my Patent No. 2,050,719, granted August 11, 1936.

The present invention as applied to radio receivers having tuning shafts concerns only a mechanism for closing contacts at preselected times for energizing the circuits necessary to cause the conventional automatic tuning mechanism to operate to tune the receiver to the desired station.

A clear understanding of the invention may be obtained from a consideration of the following detailed description, which refers to the accompanying drawings illustrating a present preferred embodiment. In the drawings:

Figure 1 is a transverse sectional view through a device for controlling a conventional automatic tuning mechanism for a receiver having a rotary tuning shaft;

Figure 2 is a sectional view taken along the line II—II of Figure 1; the line I—I of Figure 2 indicates the plane on which the section of Figure 1 is taken;

Figures 3, 4, and 5 are perspective views of structural details; and

Figure 6 is a circuit diagram with reference to which the operation of the mechanism shown in Figures 1 through 5 will be described.

Referring now in detail to the drawings and for the present to Figures 1 through 5, the apparatus there shown is contained within a case 10, comprising a base 11, front and rear walls 12 and 13, a top 14, and a sloping wall 15, together with suitable end walls, not shown. A plurality of bearing standards 16 are disposed in alignment and in spaced relation along the length of the base 11. The standards have feet 17, whereby they may be secured to the base 11, as by bolts 18. Each standard has a bifurcated upper end 19.

Cooperating with each of the standards 16 is a bushing 20. Each bushing 20 has a pair of peripheral ribs 21 extending therearound and defining a groove 22 therebetween. Grooves 23 are formed adjacent opposite ends of the bushing and are adapted to receive crescent-shaped lock washers 24. As shown in Figure 2, the bifurcated end of each standard 16 is adapted to receive a bushing 20 and to enter the peripheral groove 22 thereof.

Manually adjustable timing disks 25 are journaled on the bushings 20 on opposite sides of their supporting standards 16 and are held in place by lock washers 24. Each disk 25 has a time scale 26 around its periphery and the edge of each disk extends through a slot 27 in the sloping wall 15, as shown in Figure 1. Each disk may be individually adjusted manually by means of the peripheral portion thereof extending through the slot 27. Each disk 25 has a contact ring 28 on one face thereof. Each ring 28 has a projection 29 extending therefrom. Relatively fixed contact fingers 30 are mounted on the base 11 and have sliding contact with the rings 28 of the disks 25. The fingers 30 are yieldable and may be disengaged from their rings 28, as shown in dotted lines in Figure 2, by cam shafts 31, journaled in the front wall 12 and suitable bearings 32 and operable by knobs 33, secured to the ends of the shafts extending through the front wall 12. The purpose of this feature will be explained later. Connections 34 extend from the fingers 30 to the automatic tuning mechanism of a conventional radio receiver, i. e., one with a rotary tuning shaft. As already stated, one example of such automatic tuning mechanism is shown in my prior Patent No. 2,050,719.

A clock 35 is mounted in the case 10 on a pedestal 36, or other suitable support, carried on the base 11. The clock is preferably a twenty-four hour clock, that is, one in which the main shaft makes a complete revolution in twenty-four hours. The main shaft of the clock has a rearward extension 37, extending axially through the bores of the bushings 20. The outer end of the extension 37 may be journaled in a suitable type of bearing, not shown. Contact arms 38 are secured to the shaft 37 and turn therewith. Each of the arms 38 has sliding engagement with

the face of one of the disks 25 which is provided with the contact ring 28. The arms 38 are of such length that they will engage the projections 29 of the rings 28 when aligned therewith, but will not engage the rings 28. The arms 38 are all disposed in the same radial plane relative to the shaft 37. The shaft 37 is connected to a suitable source of electric current by any convenient means, not shown. By this arrangement, rotation of the shaft 37 will cause the connections 34 to be energized at preselected times, depending upon the adjustment of the disk 25. This will be made clear in the following description of operation, referring more particularly to Figure 6.

In Figure 6, a radio receiver having an automatic tuning device adapted to turn the tuning shaft of the receiver to appropriate positions when properly energized is indicated at 39. The connections 34 are brought out from the receiver in the form of a cable. An electromagnetic switch 40 is provided for automatically connecting the receiver 39 to its current source at a preselected time. A manual switch 41 is also connected in the circuit. The switch 40 has on and off coils connected to two of the disks 25 indicated in Figure 6 at 25^a and 25^b, respectively. A transformer 42, which is connected across the supply by closure of the switch 41, furnishes low voltage current for operating the automatic tuning device. As already stated, current is supplied to the various connections 34 by the contact arms 38 from the shaft 37. To this end, one terminal of the secondary of the transformer 42 is connected to a contact finger 43 driven by the clock 35 at a speed of one revolution per hour. The finger 43 engages one of four contacts 44 every quarter hour. The contacts 44 are all connected together, as indicated by the conductor 45, and the group of contacts is connected to a brush 46 engaging a slip ring 47 carried on the shaft 37 and in electrical contact therewith. The purpose of the finger 43 and the contacts 44 is to close the control circuit precisely at quarter hour intervals as it would be difficult to obtain accurately timed operations by relying solely on the engagement of the arms 38 of the projections 29. A manual switch 48 is provided for connecting the finger 43 with the conductor 45, when desired, for a purpose which will be described later.

As will be apparent from the description so far, the disks 25 (except the on and off disks 25^a and 25^b) are associated with the various broadcasting stations which are tuned in automatically by the automatic tuning device on energization of the connections 34. Legends may be placed on the sloping wall 15 of the case 10 to indicate the station with which each disk is identified. As already indicated, furthermore, two of the disks, such as 25^a and 25^b are employed to control the "on and off" switch 40.

As shown in Figure 6, the "on" disk 25^a is adjusted so that its projection 29 will be engaged by its arm 38 at six P. M. as indicated by the clock 35. The "off" disk 25^b has its projection set at the twelve P. M. position. The first station disk 25^c has its projection set also for 6 P. M. while the second station disk 25^d has its position set for nine P. M. It will be understood that additional disks are provided up to the capacity of the automatic tuning device incorporated in the receiver 39, but since the construction and operation of all are similar, it is unnecessary to describe more than those illustrated in Figure 6.

Assuming that the disks have been adjusted as shown and the manual switch 41 closed, conditions remain unchanged until the arm 38, associated with the disk 25^a, engages the projection 29 thereon. This occurs substantially at six P. M. as indicated by the clock 35. Precisely at the hour, the finger 43 engages one of its contacts 44. A circuit is thus completed for the right-hand coil of the switch 40. Its moving contact is thereby actuated to the dotted line position to connect the receiver to the supply source. At the same time, the arm 38, associated with the disk 25^c, engages the projection 29 on the latter. In a similar manner, this energizes the connection 34, associated with the disk 25^c, and extending to the automatic tuning device of the receiver 39. The latter is immediately actuated to cause the tuning shaft of the receiver to turn to a position such that the station identified with the disk 25^c is tuned in. Conventional automatic tuning devices usually include a motor and suitable control members. Since these details form no part of the present invention, they are not illustrated herein. I have, however, illustrated a return connection 49 for completing the circuit from the automatic tuning device for the secondary winding of the transformer 42. The automatic tuning device includes means whereby the driving motor is deenergized at the proper time so it is immaterial that the circuit established by the engagement of the arm 38 with the projections 29 of the disk 25^c is maintained for a period of some moments after the automatic tuning has been accomplished.

The next operation occurs when the contact arm 38, associated with disk 25^d, engages the projection 29 on the latter. This causes a second operation of the automatic tuning device to change the tuning of the receiver 39. When the arm 38, associated with the disk 25^b, engages its contact 29, a circuit is completed for the left-hand or off coil of the switch 40. The moving contact of the latter is thereby restored to the position illustrated in solid lines and the entire apparatus is deenergized, except for the transformer 42.

As explained above, the invention makes it possible to preselect a program for an extensive period and to cause any desired station to be tuned in at the proper time. If it is desired to tune in a particular station at a time intermediate the quarter hours, it is only necessary to shift the disk identified with that station to a position as shown by the scale 26, corresponding to the time indicated by the clock 35. Incidentally, the face of the clock is preferably exposed in the end wall of the case 10. Closure of the switch 48 will complete a circuit to the automatic tuning device in the manner already described, making it unnecessary to wait for the next quarter hour before effecting the desired tuning. This is desirable where the case 10 is located at a distance from the receiver, as it may conveniently be, by a suitable cable. Otherwise, the receiver may be manually tuned to any station at any time. In case it is desired to tune in only a few of the stations within the range of the receiver, it is desirable to turn the knobs 33, associated with the disks identified with the stations which it is not desired to receive. This will prevent an accidental setting of two of the disks 25 for the same time. With the construction described, it is possible to cause the receiver to tune in any desired station at any hour dur-

ing the day and a program may be selected as much as twenty-four hours in advance.

It will be apparent from the foregoing that the invention provides a simple and relatively inexpensive apparatus, whereby the automatic tuning device of a conventional receiver having a rotary tuning shaft may be caused to tune in a plurality of stations successively at preselected times.

The operation of the invention, furthermore, is so simple that it can be mastered by an entirely unskilled person with the aid of brief instructions.

Although I have illustrated and described herein but a preferred embodiment of the invention, it will be understood that changes in the construction and arrangement disclosed may be made without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. Apparatus for closing control circuits at preselected times, comprising a plurality of bushings, means supporting said bushings in axially spaced alinement, a disk journaled on each bushing for rotary adjustment, each of said disks having a time scale on its periphery and a contact ring on one face with a projection extending therefrom, a shaft extending through said bushings having a contact arm for engagement with the projection on each disk, and means for driving said shaft.

2. Apparatus for closing control circuits at preselected times comprising a plurality of disks, one for each of said circuits, a bushing, a support for said bushing, said disks being journaled in pairs for rotation near opposite ends of said bushing, and having contact members on one face, a shaft extending through the bushing, and contact arms on said shaft for cooperation with said members.

3. In a preselecting apparatus, a bushing having a peripheral groove, a forked standard adapted to receive said bushing and enter said groove, a selecting disk journaled on the bushing, having a contact member thereon, a shaft extending through said bushing, and a finger on said shaft adapted to engage said contact.

ROBERT E. McCLURE.