

March 10, 1959

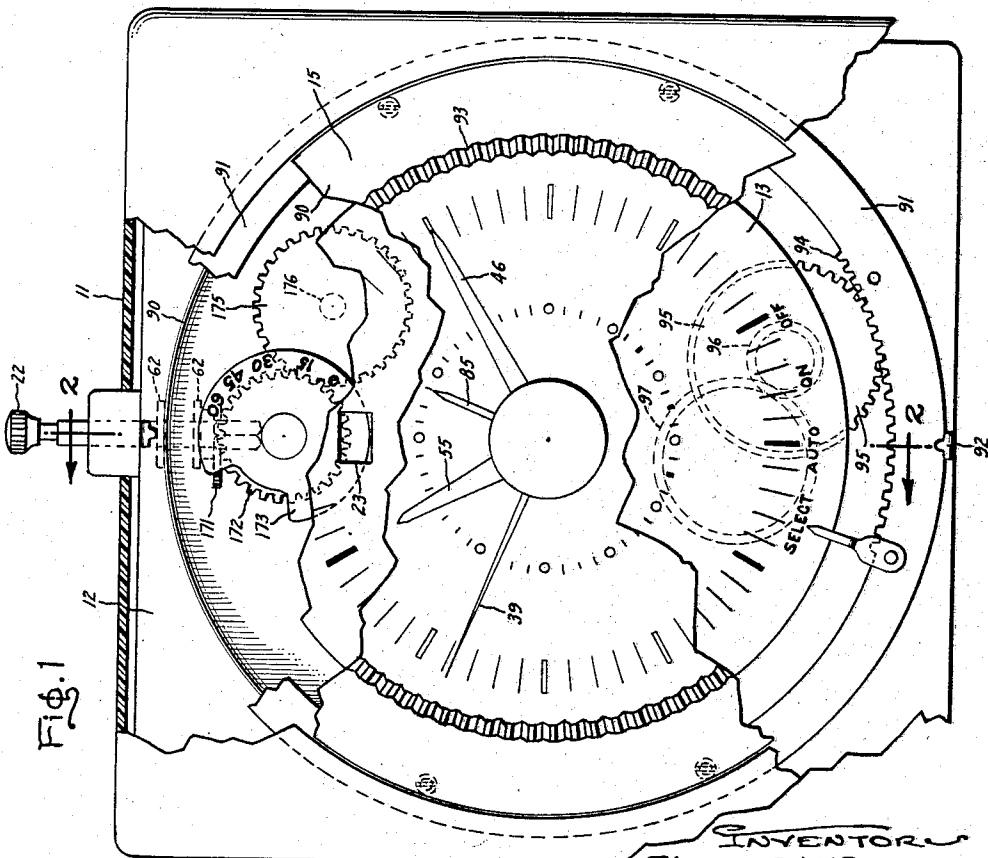
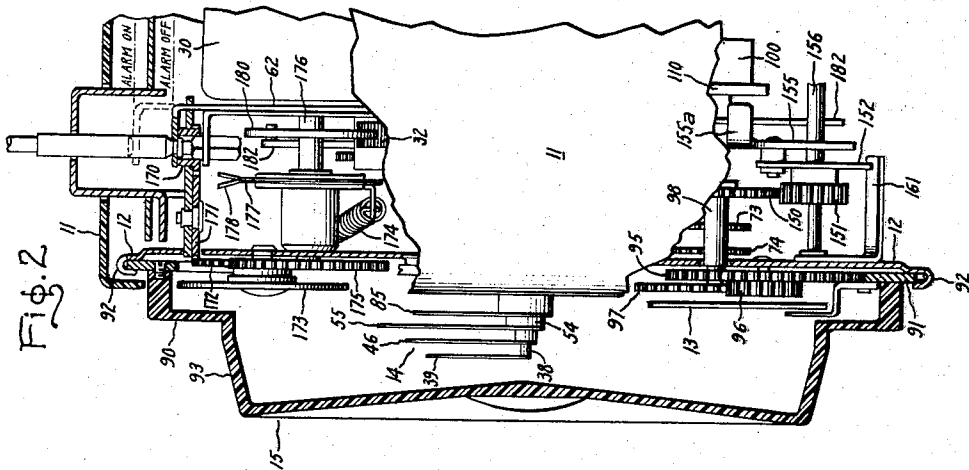
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ELECTRIC CLOCK MECHANISM

Filed May 18, 1954

4 Sheets-Sheet 1



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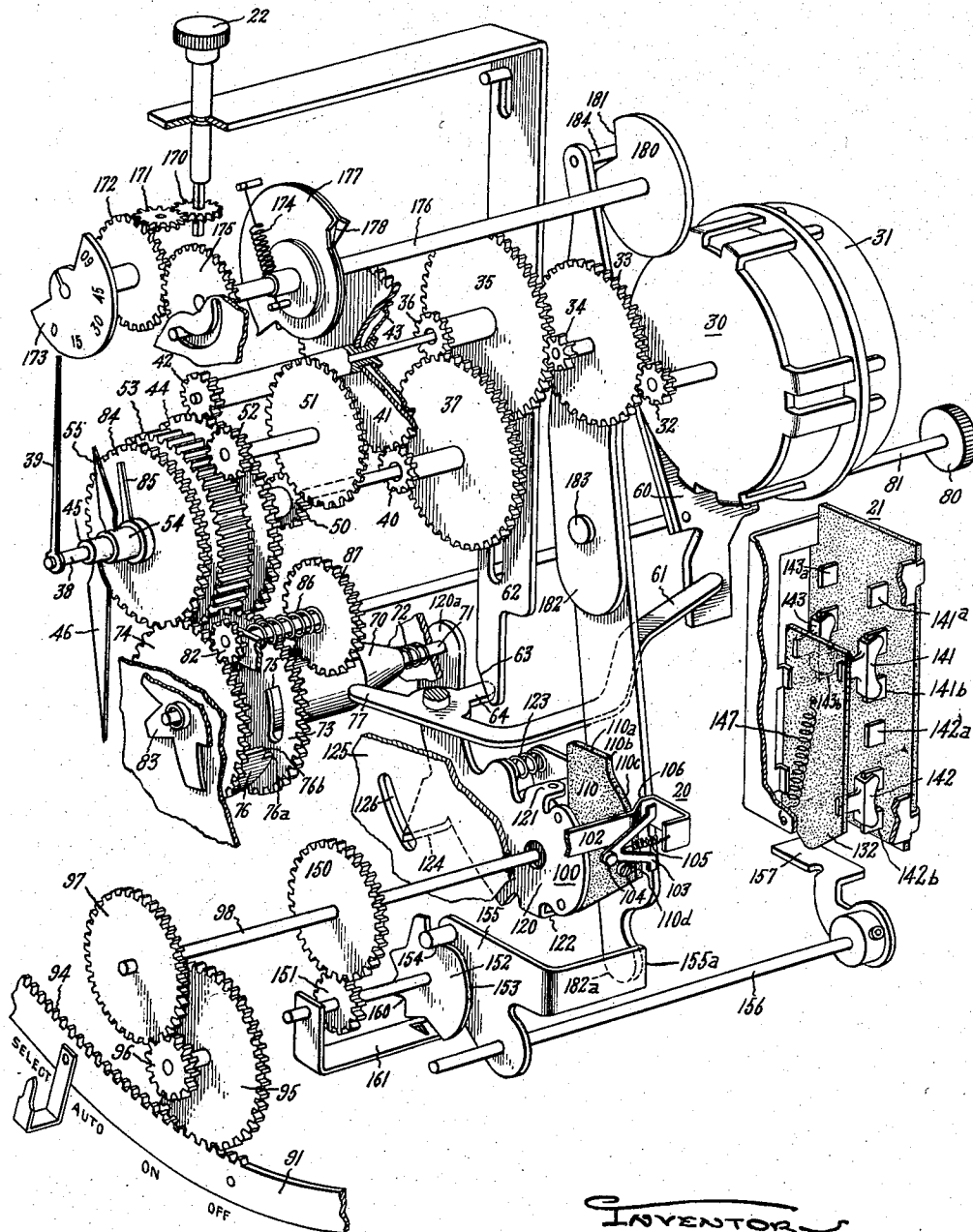
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Fig. 3.



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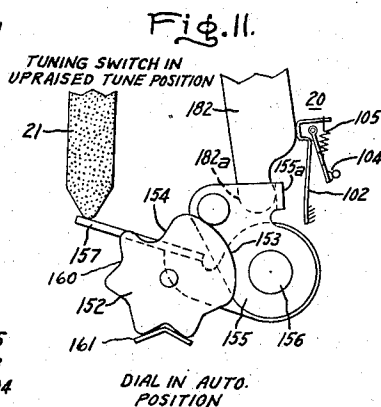
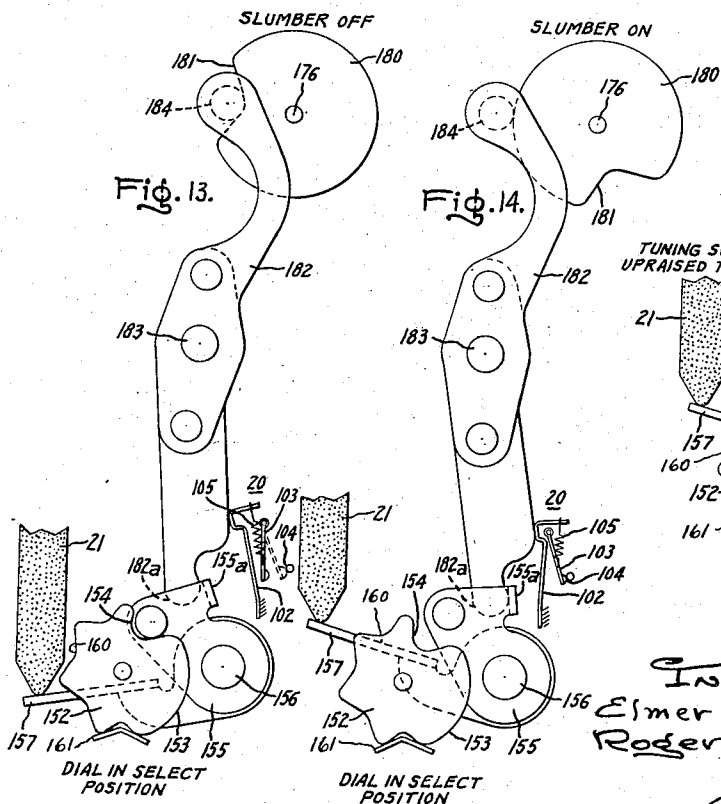
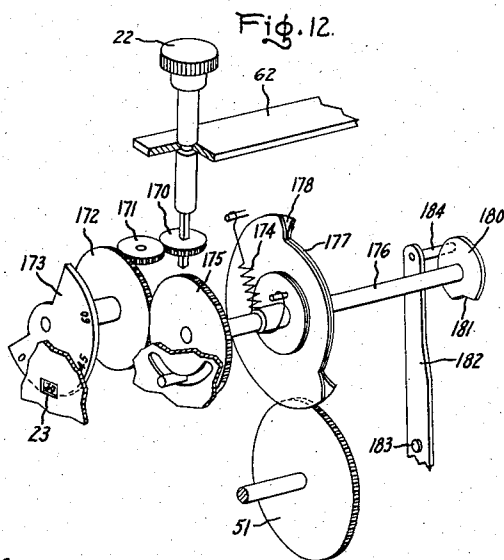
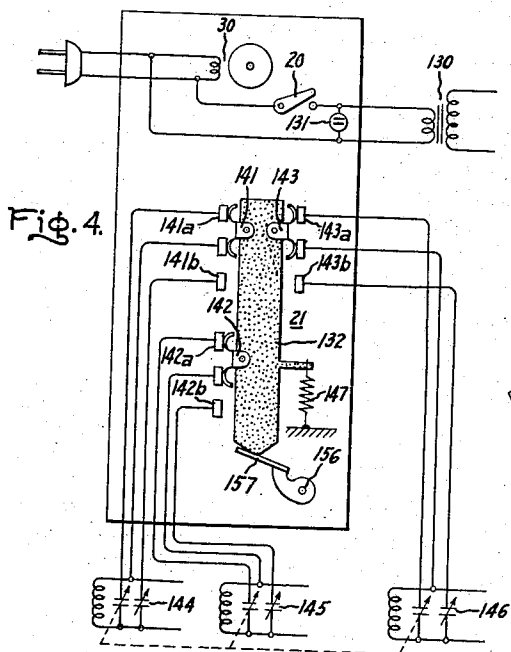
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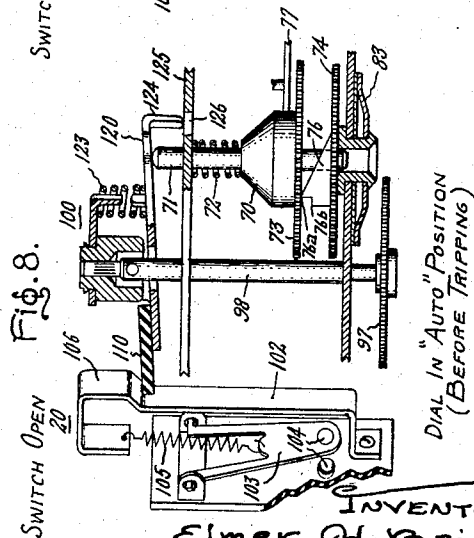
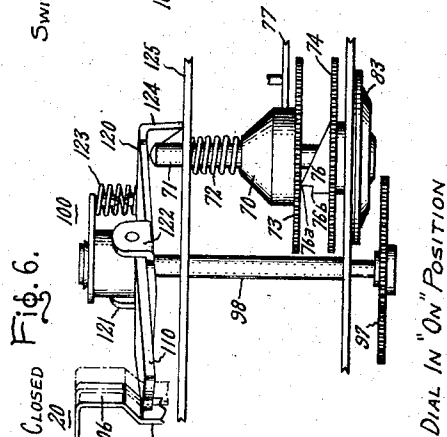
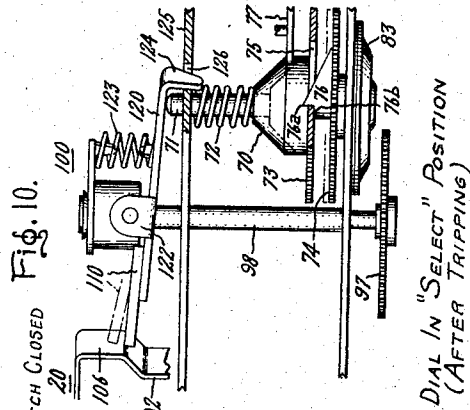
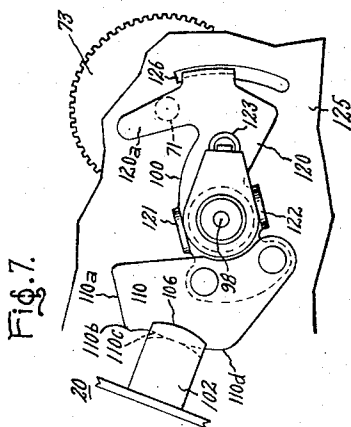
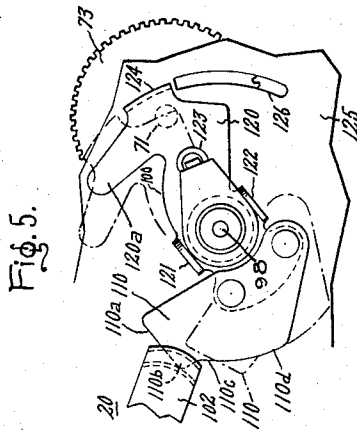
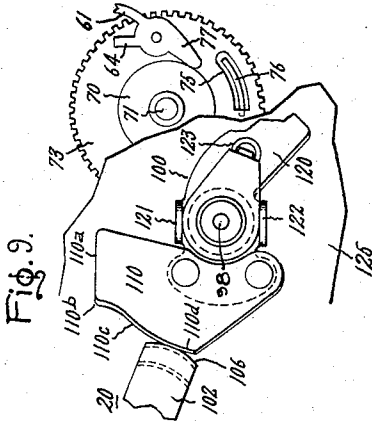
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ELECTRIC CLOCK MECHANISM

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Application May 18, 1954, Serial No. 430,484

8 Claims. (Cl. 250—20)

The present invention relates to electric clocks, and more particularly to a clock for automatically controlling the operation of a radio or the like.

It is an object of the present invention to provide a novel clock mechanism which permits controlling of the tuning circuit, as well as the power circuit of a radio or the like to provide a flexible program. In one mode of operation the radio may be turned on at bed time to a desired station and will be turned off automatically after a desired time interval. In the morning the user is awakened at a predetermined time by a second "selected" radio station, followed a few minutes thereafter by the sounding of a self-contained alarm. It is another object of the invention to provide a clock mechanism which may be employed for other modes or cycles of operation conveniently settable on the face of the clock.

It is an object of the invention to provide a radio clock having a "slumber" feature in which the interval may be easily and precisely adjusted and in which the setting may be changed at any point in the delay cycle.

It is another object to provide an electric clock having both power and tuning switch in which the switching does not place any substantial load on the electric driving train. It is a related object to provide a clock capable of switching to a predetermined radio station for alarm purposes, and in which the energy required for such switching is stored incident to manual setting of the controls.

It is a further object to provide a radio clock having the above features which is nevertheless inexpensive to manufacture, using a minimum number of parts, and in which the parts are of the same simple construction as employed in ordinary electric alarm clocks.

It is still another object to provide an electric clock mechanism which is inherently long-lived, simple to operate, and which cannot be damaged as a result of careless handling of the controls.

Other objects and advantages of the invention will be apparent upon studying the attached detailed description and upon reference to the drawings, in which:

Figure 1 is a front view of a clock constructed in accordance with the present invention with portions broken away to show part of the internal construction.

Fig. 2 is a vertical section taken along the line 2—2 in Fig. 1.

Fig. 3 is an exploded perspective of the clock mechanism, partly diagrammatic.

Fig. 4 is an electrical wiring diagram showing the manner in which the clock is connected to an associated radio.

Fig. 5 is a fragmentary view of the power switch-switching mechanism with the dial in the "on" position.

Fig. 6 is a side elevation corresponding to Fig. 5.

Fig. 7 is a fragmentary view showing the power switch-operating mechanism with the dial in the "auto" position.

Fig. 8 is a side elevation corresponding to Fig. 7.

Fig. 9 is a fragmentary view similar to Fig. 7, but showing the switch-operating mechanism with the dial

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in the "select" position and following tripping of the alarm mechanism.

Fig. 10 is a side elevation corresponding to Fig. 9.

Fig. 11 is a fragmentary view of the tuning switch cam and associated linkage.

Fig. 12 is a fragmentary perspective showing the slumber delay mechanism.

Fig. 13 shows a portion of the slumber delay mechanism in the "slumber off" position.

Fig. 14 is similar to Fig. 13, but with the mechanism in the "slumber on" position.

The mechanism illustrated in the drawing and described in the specification constitutes a preferred embodiment of the invention, but it will be understood that we do not intend to limit ourselves to this embodiment but intend, on the contrary, to cover such modifications and alternative constructions as may be included within the spirit and scope of the appended claims.

Turning now to the drawings, our improved clock includes a frame 11 having a front plate 12 to which a clock face 13 is secured by any suitable means. Cooperating with the clock face is a set of hands 14. The clock face and hands are viewable through a transparent dial or bezel 15. As will be more fully covered, the bezel 15 is manually rotatable into a plurality of set positions in order to set up a desired mode of operation of the clock mechanism.

The present clock is intended primarily for use in controlling a bedside radio. Briefly stated, the clock mechanism includes two switches, a power switch 20 which controls application of current to the radio and a tuning switch 21 which is capable of switching tuned circuits between a tuned frequency which is determined by the setting of the ordinary tuning knob and a "select" frequency which is determined by the setting of auxiliary tuning elements, for example, mica capacitors of the compression type.

The three modes of operation which may be selected by rotating the dial 15 are as follows:

(1) Dial in "on" position. Radio functions until dial is manually turned to "off" position.

(2) Dial in "auto" position. Radio turned on automatically when triggered by alarm mechanism on regular tuning circuits.

(3) Dial in "select" position. Radio turned on automatically by alarm mechanism on a preselected frequency determined by the tuning elements, enabling the user to be awakened with a favorite program regardless of the setting of the regular tuning knob on the radio.

In addition to the foregoing modes of operation, additional flexibility is provided by an alarm control knob 22 which enables the clock to be operated as a regular alarm clock when in the upraised position and which further controls a slumber delay mechanism having an index which is viewable through an aperture 23 at the face of the clock. Such slumber delay mechanism enables a clock to be set for a predetermined slumber period up to an hour in length. During the slumber period the radio operates on the normal tuning circuits and at the end of such period the radio is turned off automatically in readiness for operation in response to the alarm mechanism the following morning.

The above brief review is intended to convey a general impression of the types of functions that the present clock is capable of performing. These functions will be further appreciated and understood after the clock mechanism itself is clearly in mind. In Fig. 3 of the drawings, the mechanism is shown in the form of a partly distorted perspective and the locations of the parts and the shape of some of them have been altered to the extent necessary to bring out as clearly as possible the manner in which the parts are related to and cooperate with one another.

Attention will first be directed toward the basic clock mechanism including a driving motor, gear train and conventional clock hands. The driving motor indicated at 30 is of the conventional synchronous type having a rotating armature 31 and pinion 32. The pinion 32 drives a gear train which includes a gear 33, pinion 34, gear 35, pinion 36 and gear 37 which, acting together, serve to step the speed down to one revolution per minute. The gear 37 is connected to a second hand shaft 38 which carries a second hand 39.

For the purpose of driving the minute hand, the second hand gear 37 has a pinion 40 which meshes with a gear 41 having a pinion 42. The pinion 42 is frictionally coupled to the gear 41 by means of a friction washer 43. The pinion 42 meshes with a minute hand gear 44 having a bushing 45 which carries a minute hand 46 at its outer end. As one skilled in the art will readily appreciate, the purpose of the friction washer 43 is to enable the hands to be set without rotating the motor and its driving train.

To rotate the hour hand, the minute hand gear 44 has a pinion 50 which meshes with a gear 51 having a pinion 52. The pinion 52 in turn meshes with an hour hand gear 53 having a bushing 54 at the outer end of which is attached the hour hand 55. It will be apparent that the gear train described above will cause the clock hands to keep proper time during synchronous rotation of the driving motor.

In practicing the invention, means are provided for sounding a buzzer alarm at a pre-set time. The alarm is sounded by buzzer armature 60 forming a well-known integral part of the motor 39. The armature 60 is normally held in a retracted and inoperative position by an alarm release lever 61. The lever 61 is locked in its retracted position by means of a manual lockout plunger 62 which is slidable centrally within the clock frame. This plunger includes at its lower end a lockout cam portion 63 which wedgingly engages an arm 64 on the release lever 61. At its upper end the plunger 62 is engaged by the alarms control knob 22. When the alarm control knob 22 and the associated plunger 62 are in their lowered position as shown in Fig. 3, the effect is to rotate the alarm release lever 61 counterclockwise thereby disabling the alarm. When it is desired to use the alarm feature, the knob 22 is pulled upwardly thereby disengaging the elements 63, 64 and freeing the lever 61 for operation by the alarm tripping mechanism.

Turning to the tripping mechanism, it includes an alarm release cam 70 having a plunger 71 and a spring 72 for normally urging the cam 70 to the left, as illustrated in Fig. 3. Integrally fastened to the cam 70 is a drop-off gear 73 which cooperates with a detent gear 74. The drop-off gear is constantly rotated on a twelve-hour cycle by meshing with the hour hand gear 53 and includes a drop-off opening 75. Registering with the opening 75 is a detent 76 mounted on the detent gear 74. The detent 76 has a switch drop-off point 76a to which more detailed reference will be made, and an alarm drop-off point 76b. It will be apparent that when, due to passage of time, the drop-off opening 75 "clears" the drop-off point 76b, the drop-off gear will be free to move the cam 70 to the left, as viewed in Fig. 3, under the urging of the spring 72. Co-operating with the cam 70 is a cam follower arm 77 which forms an integral part of the alarm release lever 61. When the alarm mechanism is tripped, resulting in movement of the alarm release cam 70, the arm 77 is freed and, assuming the lockout plunger 62 is upraised, the buzzer armature 60 is free to sound the alarm.

For the purpose of setting the time at which the alarm mechanism is tripped, an alarm setting knob 80 is provided having a shaft 81 and a pinion 82 which meshes with the detent gear 74. Rotation of the setting knob thus causes the phasing or setting of the detent gear 74 to be varied, the setting being maintained frictionally by a friction washer 83. In order to indicate the set time, the detent gear 74 meshes with an alarm hand gear 84 having

an alarm hand 85 which cooperates with an appropriate twelve-hour scale. A spring 86 is provided on the shaft 81 for normally maintaining the pinion 82 in mesh with the detent gear 74. However, an auxiliary gear 87 is provided on the shaft 81 which is meshed with the minute hand gear 44 when the shaft 81 is moved inwardly, accompanied by disengagement of the pinion 82, so that the knob 80 may also be employed for setting the main clock hands. As previously touched upon, the friction washer 43 enables slippage to take place in the driving train during the time-setting operation.

In the following discussion, portions of the clock mechanism are discussed separately for convenience and ease of understanding, but it will be understood that the invention resides partly in the manner in which the portions are related to and cooperate with one another.

Selector dial and power switch

In accordance with one of the aspects of the invention the transparent bezel 15 in front of the clock face is rotatable and serves as a selector dial to select the mode of operation of the clock. As shown in Figs. 1 and 2, the bezel 15 is of molded construction having a rearwardly extending rim portion generally indicated at 90. Screwed or otherwise fastened to the rim 90 is a metal ring 91 which lies flatly against the front plate 12. The ring 91 is guided for rotation by inwardly bent tabs 92 which are formed integrally in the front plate. Preferably, the bezel 15 has a manual gripping surface 93 which is serrated or roughened to facilitate manual turning.

In order to transmit rotary movement of the bezel, the ring 91 includes a circular rack 94 which engages a gear train consisting of a gear 95, a pinion 96, and a gear 97, the latter being connected to a control shaft 98. The shaft extends inwardly into engagement with a power switch-operating mechanism 100 which engages the power switch 20. The switch-operating mechanism 100 is shown in detail in Figs. 5-10 inclusive. With regard to the switch 20, it is of the overcenter type having an operating member 102 in the form of a leaf spring and a switch blade 103 controlling contacts 104. The blade 103 and the operating member 102 are connected together by a tension spring 105. The member 102 includes a raised face portion 106. The member 102, upon being pushed inwardly, causes the blade 103 to be carried overcenter by the spring 105, closing the contacts. Removal of the operating pressure permits the member 102 to resume its normal position, opening the contacts (see Fig. 8).

For the purpose of applying operating pressure to the switch member 102, a power switch-operating cam 110 is provided which is rotatably coupled to the control shaft 98 and which assumes a position which is dependent upon the setting of the dial 15. The cam 110 has four rotary operating "positions." The first, 110a, is the "switch off" position, the second, 110b, is the "switch on" position, the third, 110c, is referred to as the "auto" position, and the fourth, 110d, is the "select" position. The meaning of the terms will become apparent as the discussion proceeds. For the present, attention may be given to Figs. 5 and 6 which show the operating cam 110 in position 110b, the "switch on" position. Under such conditions the switch contacts are closed for supplying current to the radio power circuit.

In accordance with the present invention, the cam 110 of the switch mechanism 100 is not only subject to rotary movement but is arranged to be tiltable when triggered by the clock mechanism for operating the switch 20. The cam 110 may therefore be aptly referred to as a "butterfly" cam. This tilting feature is well shown in Fig. 10. Here it will be noted that the cam 110 is mounted on a tiltable operating plate 120 which is in turn coupled to the shaft 98 by a pair of trunnions 121, 122. The operating cam is biased toward its upward or "tilted" position (as viewed in Fig. 10) by means of a small coil spring

123. The operating plate is, however, prevented from tilting when the cam is in its "off" position 110a and "on" position 110b by means of a tilt-lock cam 124 which, in these two positions, rides against the frame plate 125. However, when the dial is turned to the remaining positions, the tilt-lock cam 124 falls into a slot 126 thereby causing the operating plate to be freely tiltable and under the control of the clock alarm mechanism.

To summarize, manually rotating the bezel 15 to the "off" position serves to rotate the switch-operating cam 110 so that the "low" region 110d is opposite the switch member 102, thereby turning the switch off, and rotation of the bezel to the "on" position brings the high point 110b of the cam into contact with the switch member (Figs. 5 and 6) to turn the switch on to supply current for normal operation of the radio. Prior to a discussion of the "auto" and "select" positions of the bezel reference may be made to Fig. 4 which shows the manner in which the present clock is connected to the circuits of the radio in which the clock is incorporated.

Radio control circuits

As shown in Fig. 4, the motor 30 receives its power from the normal supply line. The switch 20 controls flow of current to the power transformer 130 of the radio and to an auxiliary power outlet 131. For the purpose of switching the radio tuning circuits from a normally tuned condition, which is under the control of the regular tuning knob and a "select" condition corresponding to a selected radio station, a three-pole double-throw switch 21 is provided (see also Fig. 3). This switch includes a plunger 132 carrying three movable contacts designated 141, 142 and 143. Under normal conditions, the switch 21 is in the position shown in Fig. 4 in which the movable contacts engage the "tune" contacts designated by the subscript *a* which are connected, as shown, to the regular tuning condensers of the radio set. When the plunger is in its lowered position, as in Fig. 3, the movable contacts engage the "select" contacts designated by the subscript *b*. In this condition the regular tuning condensers are switched out of the circuit and are replaced by auxiliary tuning condensers 144, 145, 146, which may be of the mica compression type and which are permanently tuned to the desired "wake-up" station. The plunger 132 is biased downwardly by means of a small tension spring 147. However, under the "auto" operating condition to be described in the subsequent section, it will be understood that the plunger is held in its upraised position so that the normal tuning dial is operative.

Selector dial set to "auto" position

The "auto" position is provided to enable the user of the clock radio to be awakened by the radio at a station determined by the regular tuning circuits. In carrying out the invention, the operating plate 120 of the power switch mechanism has an extension 120a (Figs. 7 and 8) which is arranged in the path of movement of the alarm plunger 71. Thus when the alarm mechanism is triggered at the desired time, movement of the plunger 71 causes movement of the operating plate 120 to its tilted position (Fig. 10). This causes engagement between the cam 110 and the raised portion 106 on the switch-operating member, forcing the operating member rearwardly and closing the switch contacts, turning the radio on.

The above operation can be readily understood upon reference to Fig. 3. It will be assumed that the detent 76 occupies a position corresponding to a desired wake-up time. The drop-off gear 73 is rotated by the hour hand gear until the first point of drop-off 76a on the detent 76 is reached. This causes inward movement of the plunger 71 which permits the operating plate to move into its tilted position under the influence of the spring 123 thereon which causes closure of the switch contacts. After approximately seven minutes the second drop-off

point 76b on the detent is reached at which time additional movement of the plunger 71 occurs. Such additional movement moves the alarm release cam 70 out of the way of the release lever 77. The freeing of the release lever permits the buzzer 60 to sound, provided, of course, that the alarm control knob 22 is in its upraised position. The buzzer continues until it is manually shut off by depressing the alarm control knob.

Selector dial set to "select" position

The "select" position is provided to enable the user of the clock radio to wake up with the radio adjusted to a selected "wake-up" station regardless of the setting of the regular tuning dial. In carrying out the present invention, linkage is provided between the selector dial and the tuning switch 21 so that when the dial is moved to the "select" position the plunger of the tuning switch is lowered, putting into operation the auxiliary tuning elements 144-146. Such linkage includes gears 150, 151 which are coupled to a tuning switch cam 152. Such cam has a lobe portion 153 and a notch 154. The notch is engaged by a cam follower arm 155 when the selector dial is in the "select" position. Extending rearwardly from the cam follower arm 155 is a shaft 156 which carries a switch arm 157 at its outer end. In all positions of the selector dial except "select," the cam follower arm 155 rides on the lobe of the cam 152, as shown in Fig. 11, maintaining the switch arm 157 and the switch plunger 132 in the upraised "tune" position. However, when the selector dial is rotated into the "select" position, rocking of the cam follower arm permits the plunger to be drawn to its lowermost or "select" position by the spring 147 which is included in the switch.

With the above major exception, operation of the device takes place much the same as described in the preceding section. That is to say, initial triggering of the alarm mechanism at a predetermined time by drop-off at point 76a causes inward movement of the alarm plunger 71 which tilts the operating plate 120, as shown in Figs. 9 and 10, closing the power switch contacts. This turns the radio on but since the tuning switch is in its "select" position the user will be awakened with the selected program.

In order to insure that the tuning switch is moved positively between its alternate positions, and in order to facilitate manual setting of the selector dial, a detent mechanism is provided which includes notched portions 160 on the cam 152, the notches cooperating with a detent spring 161.

Slumber delay mechanism

The slumber delay mechanism is provided to enable the user to fall asleep with the radio tuned to a desired station, the radio being turned off automatically at the end of the delay interval. In accordance with one of the aspects of the present invention, index means are provided so that the unexpired portion of the interval is continuously indicated at the face of the clock. A delay from a few minutes up to an hour may be set by rotating a manual knob. In the present instance, the alarm control knob 22 at the top of the clock is employed for this purpose.

Turning to Figs. 3 and 12, it will be seen that the control knob 22 has a sliding spline connection with a pinion 170 which meshes with a gear 171 which in turn meshes with a gear 172 which is coupled to the index disc 173, viewed through the aperture 23. Rotation of the gear 172 causes setting movement of a gear 175 which is connected to a shaft 176. Mounted on the shaft 176 is a spring sector 177, which sector is aligned with a slowly rotated driving disc, namely, gear 51 in the clock train. The spring sector 177 consists of two layers which bear resiliently against one another and which grip the periphery of the gear 51 between them. Normally the sector 177 is biased out of engagement with the gear 51 by a coil spring 174. However, when it is desired to use the

slumber delay feature, rotation of the knob 22 rotates the sector against the biasing force and into engagement with the gear, the sector being then set at a phasing which corresponds to the desired time delay and as indicated by the disc 173. Entry of the gear 51 is facilitated by flaring the two layers of the sector as indicated at 178.

Upon passage of time, rotation of the gear 51 causes corresponding rotation of the sector 177 accompanied by a gradual decrease in the reading at the index disc. Finally a point is reached where the gear 51 rotates out of engagement with the sector 177. At this point the sector is drawn back into its disengaged position by the spring 174.

For the purpose of coupling the shaft 176 to the clock mechanism, a notched delay disc 180 is provided having a sector-shaped notch 181. Arranged between the notched delay disc 180 and the power switch 20 is a switch-operating lever 182. Such lever is pivoted centrally at a pivot 183 and carries a cam follower 184 at its upper end which is normally received in the notch 181. With the parts in the positions shown in Fig. 3, the lever 182 is out of contact with the switch-operating member 102 and the delay mechanism is thus inactive.

If it be desired, however, to set a slumber period of thirty minutes, the control knob 22 is rotated until "30" appears through the aperture 23, such rotation being accompanied by engagement between the sector 177 and the gear 51 of the clock train as shown in Fig. 12. Such rotation is also accompanied by rotation of the delay disc causing the cam follower 184 to ride out of the notch 181 thereby causing counterclockwise rocking of the lever 182 and turning on the radio power switch 20. Upon passage of the thirty-minute period, rotation of the gear 51 rotates the sector 177 gradually around to a position in which it springs free of the gear 51 under the influence of the spring 174 and the radio is turned off.

It is one of the features of the present device that the user may go to sleep with one station on the radio and wake up with another. This is accomplished by effectively interposing a blocking member between the switch tuning cam 152 and the tuning switch 21 during the slumber interval to produce deferred operation of the tuning switch. In the present instance, the blocking member, indicated at 182a constitutes an extension of the switch operating lever 182 and is arranged in the path of a blocking arm 155a which is integrally formed on the cam follower arm 155.

The operation will be apparent upon reference to Figs. 13 and 14. In Fig. 13, which illustrates the "slumber off" condition, the switch-operating lever 182 is in its released position with the upper end received in the notch 181 of the delay disc. The power switch, indicated schematically at 20, is open and the blocking member 182a is retracted. Thus movement of the selector dial to the "select" position permits the cam follower arm 155 to move downwardly into the lower spot on the tuning switch cam 152. This permits the tuning switch to assume its lowered or "select" position and the radio would normally awaken the user with the selected station at the time for which the alarm has been set.

However, when the slumber feature is used, the sequence is somewhat different. Rotation of the notched delay disc 180 causes counterclockwise rocking of the lever 182 and movement of the blocking member 182a into engagement with the cam follower arm 155. This maintains the plunger of the tuning switch in its normal upraised position, as shown in Fig. 14. The same movement operates the switch 20, turning on the radio at the station for which the tuning dial is set. At the end of the slumber interval the delay disc 180 rotates around to the position shown in Fig. 13, turning off the radio and simultaneously operating the tuning switch, lowering it to its "select" position in readiness for operation of the alarm mechanism the following morning.

It is to be particularly noted that the energy for operating the tuning switch is derived manually and stored incident to turning of the knob 22. Similarly, the energy required to operate the power switch is manually supplied except for the tilting movement of the switch cam 110 which is derived gradually over a period of about two hours from the clock motor. Thus the motor, in spite of the flexible switching functions which are accomplished, is not called upon to do any more work than in a conventional alarm clock.

In the event that a radio which is turned on by the present clock mechanism is not manually turned off, turn-off occurs automatically at the end of approximately two hours. This results in the fact that continued rotation of the drop-off gear 73 causes the same to ride up the inclined surface of the detent, moving the plunger 71 outwardly, thereby shutting off the switch. This shut-off is especially valuable where coffee makers or other appliances may be plugged into the electrical outlet 131.

Clock mechanisms constructed as described may be produced inexpensively, and yet are inherently durable, and completely dependable even when operated by an unpracticed hand.

What is claimed is:

1. In an electric clock for controlling a radio, the combination comprising a frame having a face plate, a clock mechanism in said frame, a plurality of switches coupled to said clock mechanism and having means for connection to the radio, a clock face mounted on said face plate, a transparent bezel arranged in front of said clock face and having a rim portion, the outer peripheral surface of said rim portion projecting rearwardly into contact with said face plate and providing a lateral gripping surface for manual rotation thereof, means on said face plate forming a circular track for guiding the rim of the bezel during manual rotation, detent means on said frame and coupled to said bezel for establishing a plurality of defined bezel positions, index means at the periphery of the clock face for indicating the position of the bezel, and means rotatively coupled to said bezel and responsive to the bezel position for conditioning said switches for different modes of clock-actuated operation.

2. In a clock for use with a radio having a power circuit and alternate tuned circuits tuned to different frequencies, the combination comprising a timing motor, a driving member coupled to said motor for slow timed rotation thereby, a sector-shaped driven member arranged adjacent said driving member and adapted to be moved into frictional peripheral engagement with said driving member, means for rotatively biasing the driven member out of contact with said driving member toward a reference position, means for manually rotating the driven member against the form of bias into a position of desired phasing to establish a time interval during which the driven member is rotated toward its reference position, a power switch having means for connection to said power circuit, a double-throw tuning switch having means for connecting the switch to said alternate tuned circuits, and means for operating both of said switches when said driven member reaches its reference position.

3. In a clock for use with a radio having a power circuit and an alternate tuned circuits tuned to different frequencies, the combination comprising a timing motor having a clock train, a radio power switch for supplying current to the radio power circuit, a radio tuning switch having means for connecting the same to the radio for switching the tuned circuits from a first frequency to a second frequency, means including a switch operator movable between first and second positions for operating said switches, manual means for moving said operator to its first position in which the power circuit is energized with the radio tuned to said first frequency, means coupled

to said timing motor and operative after a predetermined time interval for moving said switch operator to its second position in which the power circuit is deenergized with the radio tuned to said second frequency, and alarm means for independently operating said power switch at a predetermined time to turn on said radio with the radio tuned to said second frequency.

4. In an electric clock, the combination comprising a timing motor and gear train, a switch having a set of contacts and an operating member coupled thereto, a butterfly cam for engaging said operating member, said cam being mounted for rotational movement about a first axis and for limited tilting movement about a second axis at right angles thereto, manual programming means for rotating the cam about said first axis into one of the plurality of positions at least a portion of which are effective to operate said switch contacts, and alarm means having a trigger mechanism coupled to said timing motor for tilting the cam about said second axis for operating said switch.

5. In a clock for use with a radio, having a power circuit and alternate tuned circuits tuned to different frequencies, the combination comprising a timing motor having a clock train, a radio power switch for supplying current to the radio power circuit, a radio tuning switch having means for connecting the same to the radio for switching the tuned circuits from a first frequency to a second frequency, means including a switch operator movable between first and second positions for operating said switches, manual means for moving said operator to its first position in which the power circuit is energized with the radio tuned to said first frequency, means coupled to said timing motor and operative after a predetermined time interval for moving said switch operator to its second position in which the power circuit is deenergized with the radio tuned to said second frequency, and alarm means coupled to said timing motor for energizing the power circuit of the radio at a predetermined later time.

6. In a clock for controlling the power circuit and tuning circuit of a radio having first and second switchable tuned elements tuned to first and second frequencies, the combination comprising a timing motor and clock train, a radio power switch for supplying current to the radio, a radio tuning switch adapted for connection to the tuning circuit of the radio for switching between said first and second tuned elements, means including a first manually settable timing device coupled to said clock train for supplying current to the radio power circuit so that the radio is operated on said first frequency for a predetermined time interval and for turning off the radio at the end of the time interval, means including a second manually settable timing device coupled to said clock train for turning on the radio at a predetermined later time, and means coupled to one of said timing devices for oper-

ating the radio tuning switch so that the radio is tuned to said second frequency when it is turned on by the second timing device.

7. In a clock for controlling the power circuit and tuning circuit of a radio having first and second switchable tuned elements tuned to first and second frequencies the combination comprising a timing motor and clock train, radio power switch means for supplying current to the radio, radio tuning switch means adapted for connection to the tuning circuit of the radio for switching between said first and second tuned elements, manually settable means for simultaneously turning off the power switch means and for causing said tuning switch means to switch from the first tuned element to the second tuned element, and alarm means coupled to said clock train for turning on said power switch means at a predetermined later time and with the radio tuned to the second frequency.

8. In a clock for controlling a radio having a power circuit and a pair of tuning circuits individually tunable to first and second frequencies respectively, the combination comprising, a power switch in said power circuit for supplying current to said radio, an operator for said power switch biased so as to hold the switch normally open, a tuning switch coupled to said tuning circuits for switching the radio between said first and second frequencies, an operator for said tuning switch biased so as to normally tune the radio at said first frequency, a timing motor, means including a manually adjustable time delay device coupled to said motor for establishing a selectable timed interval, means operated by said time delay device when manually adjusted for moving and holding said switch operators against their bias during said time interval and for releasing them after this interval so that the power switch is closed and the radio is tuned to said second frequency for the timed interval, and alarm means for moving said power switch operator at a later time so as to close said power switch with the radio tuned to said first frequency.

References Cited in the file of this patent

UNITED STATES PATENTS

1,440,803	Uphoff	Jan. 2, 1923
1,761,652	Chandler	June 3, 1930
2,068,227	Cutler et al.	Jan. 19, 1937
2,212,386	Cameron	Aug. 20, 1940
2,389,990	Magnusson	Nov. 27, 1945
2,421,986	Bohman	June 10, 1947
2,439,732	Haydon	Apr. 13, 1948
2,450,287	Macintyre	Sept. 28, 1948
2,545,553	Lolli et al.	Mar. 20, 1951
2,578,843	Scalise	Dec. 18, 1951
2,596,790	Punzmann	May 13, 1952
2,677,732	Miller	May 4, 1954
2,721,441	Boyles	Oct. 25, 1955