Nov. 4, 1969 R. L. BOYLES 3,475,899

RADIO AND ALARM CONTROL MECHANISM

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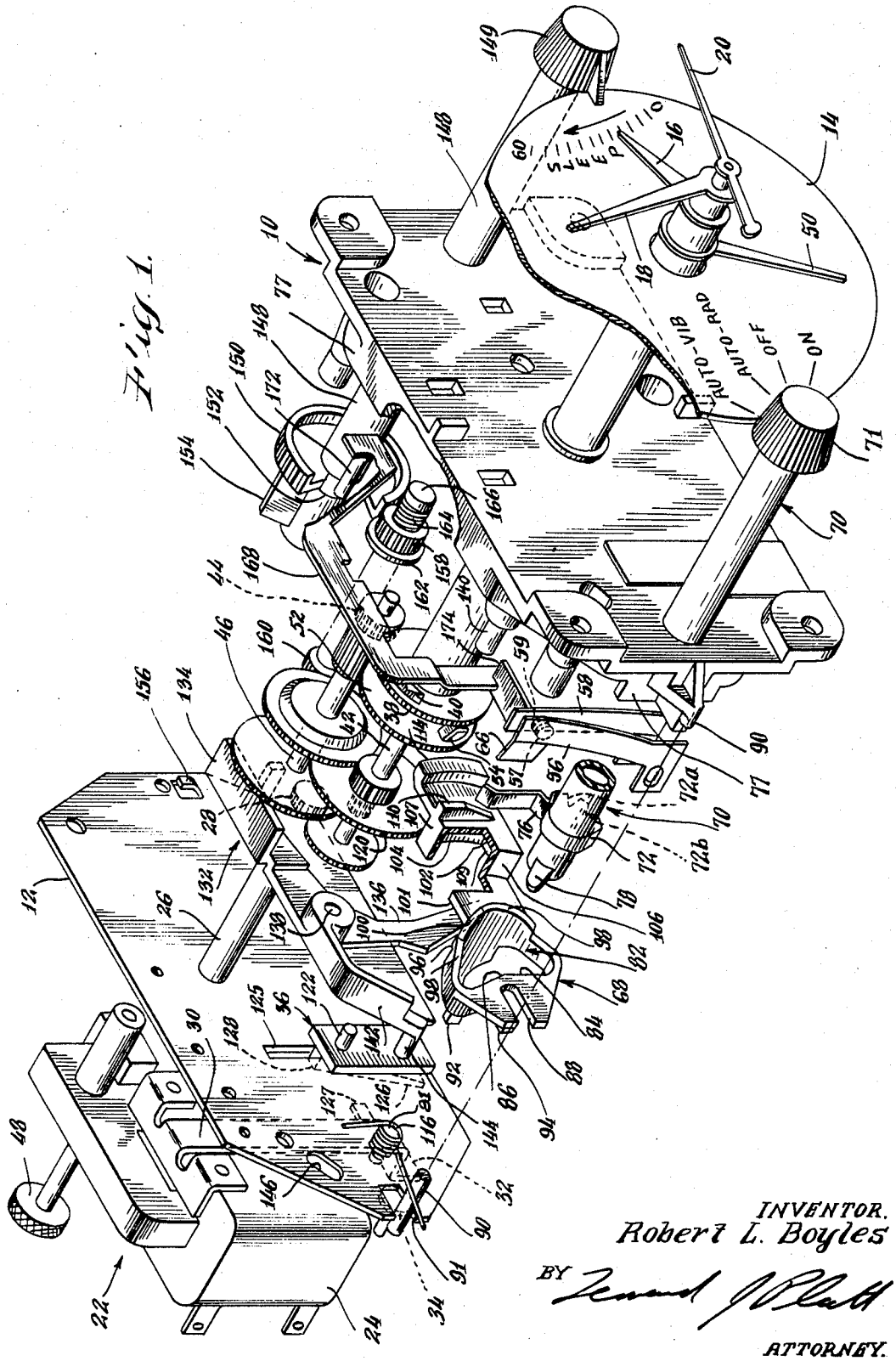


Fig. 1

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RADIO AND ALARM CONTROL MECHANISM

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Fig. 2.

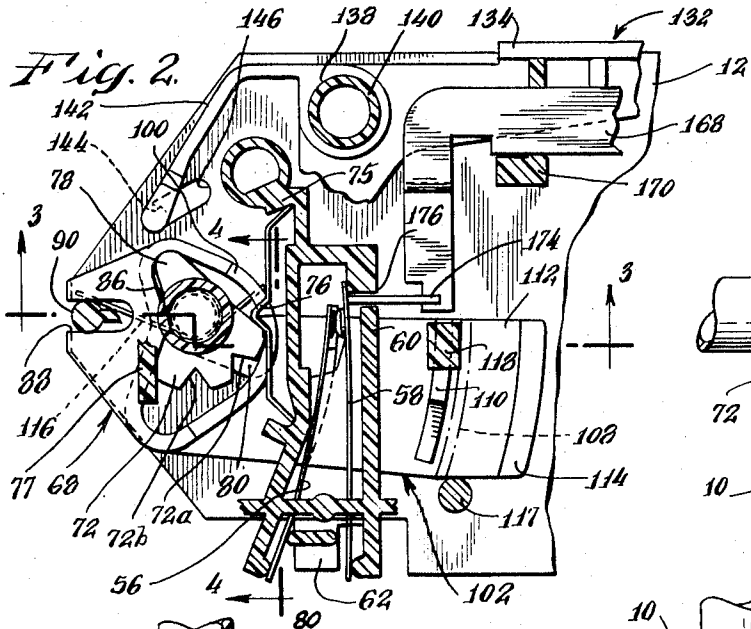
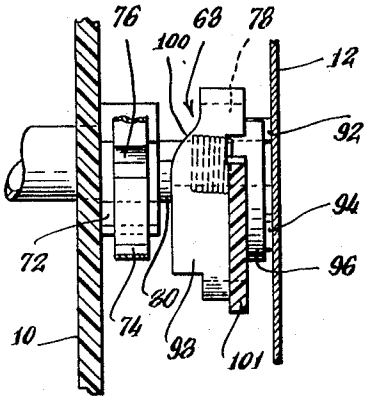


Fig. 4.



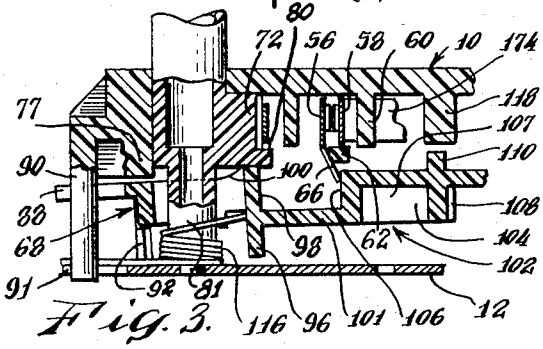


Fig. 3.

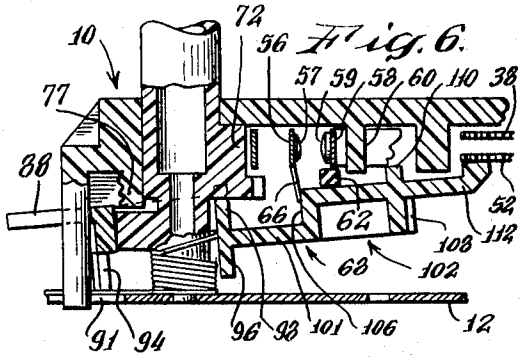


Fig. 6.

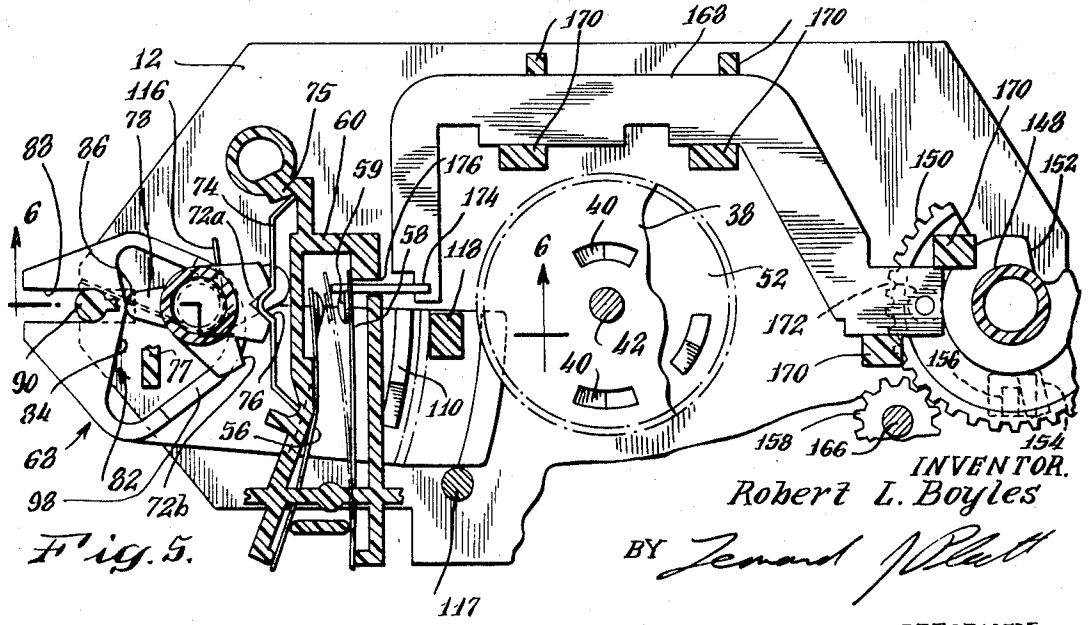


Fig. 5.

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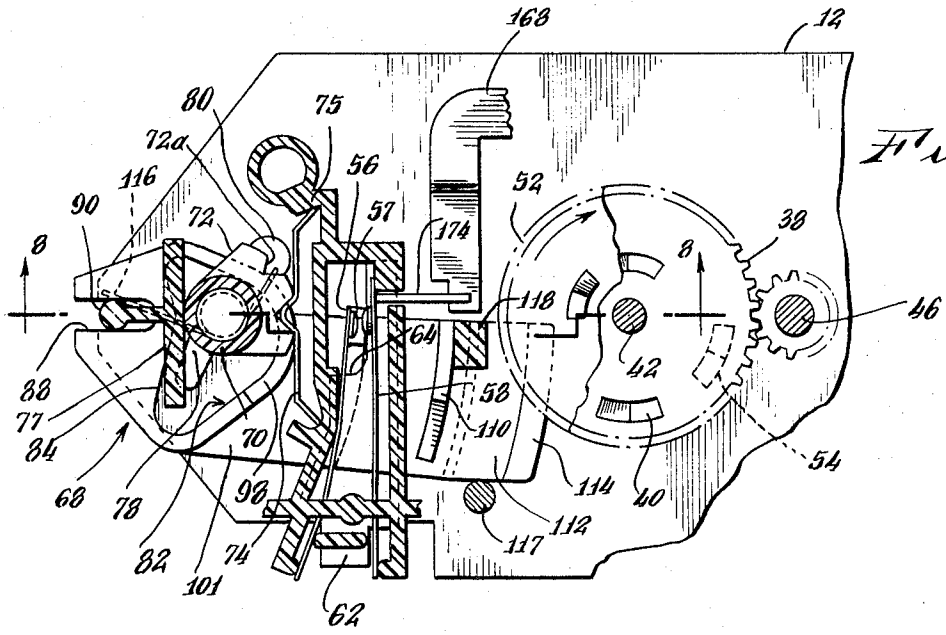


Fig. 7.

Fig. 9.

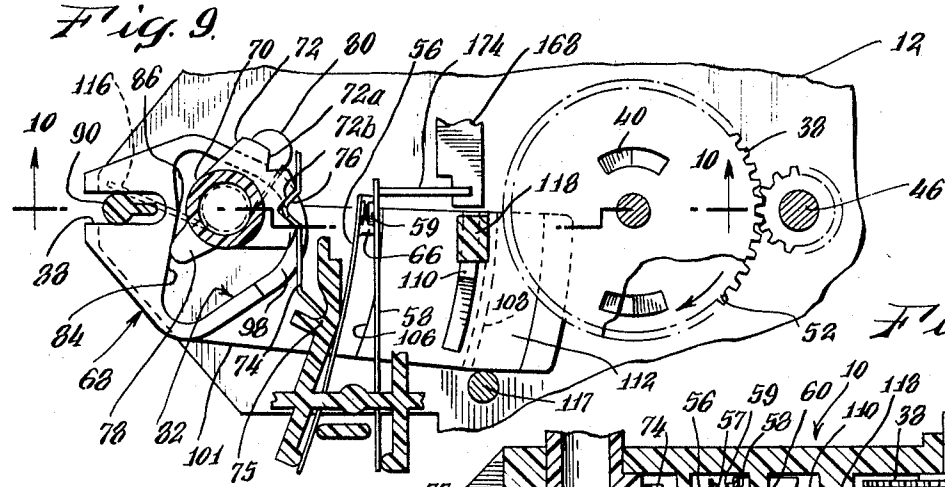


Fig. 8.

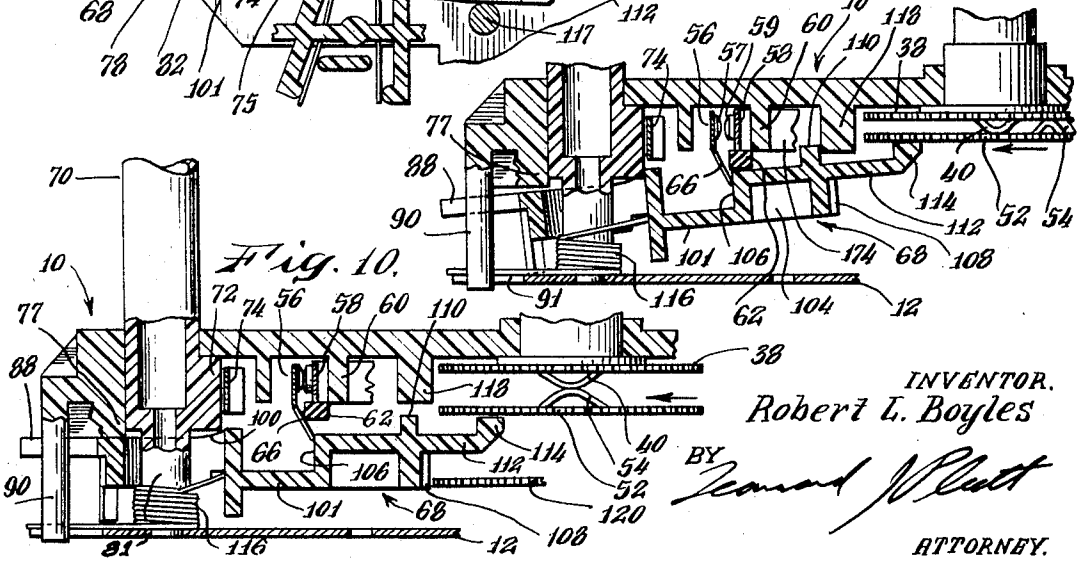


Fig. 10.

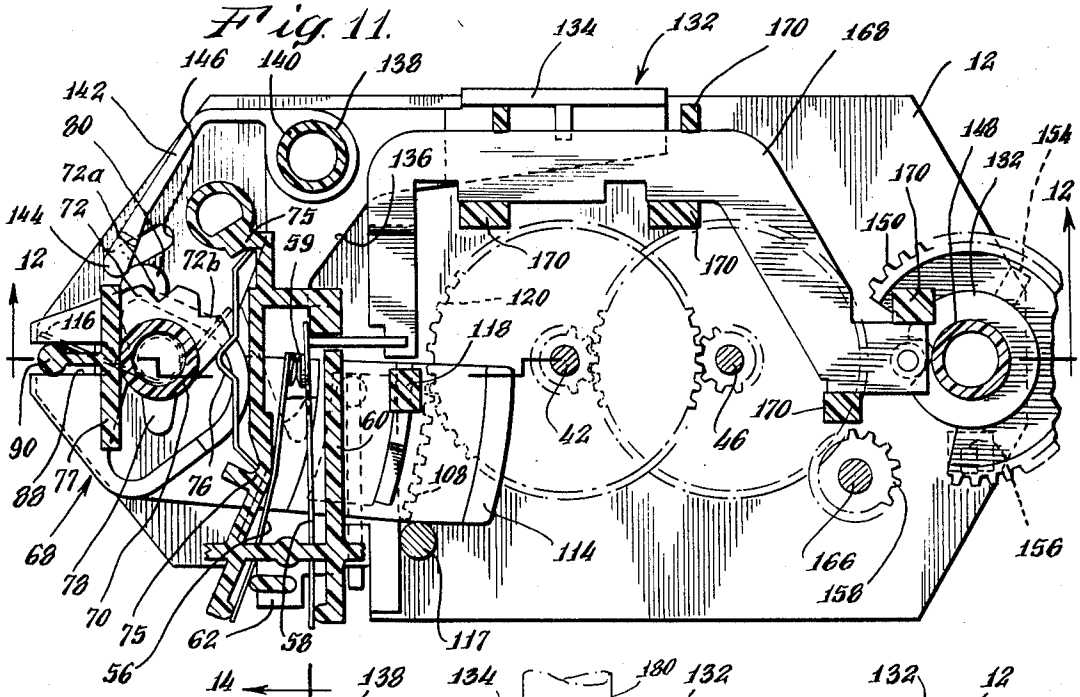
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RADIO AND ALARM CONTROL MECHANISM

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Fig. 11.



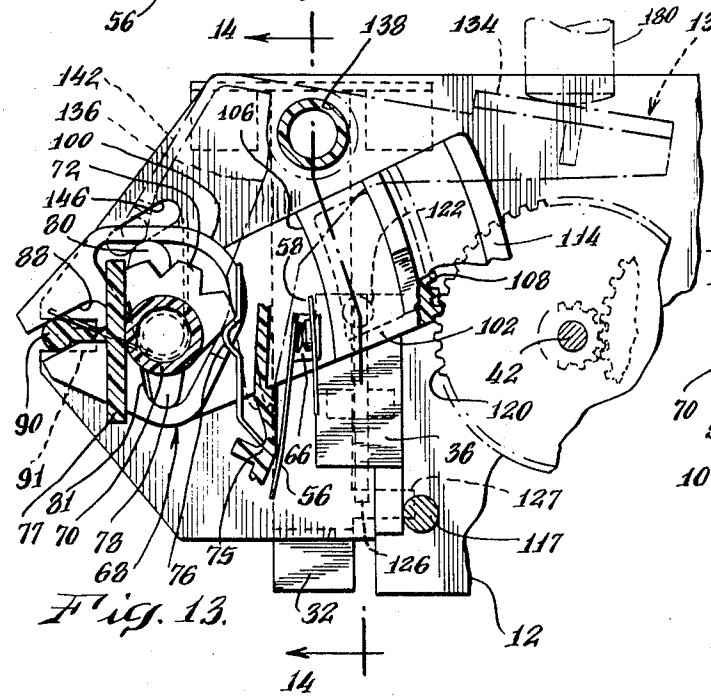


Fig. 13.

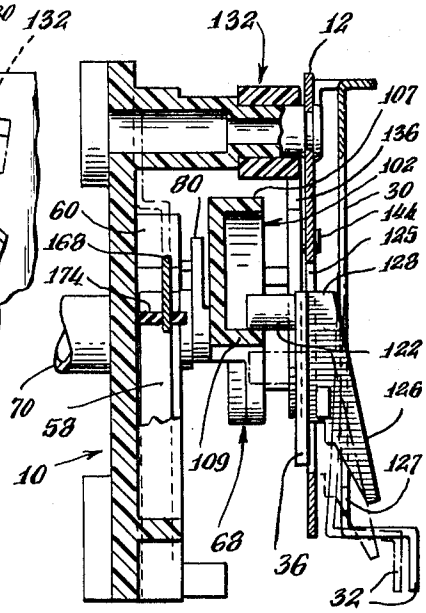


Fig. 14.

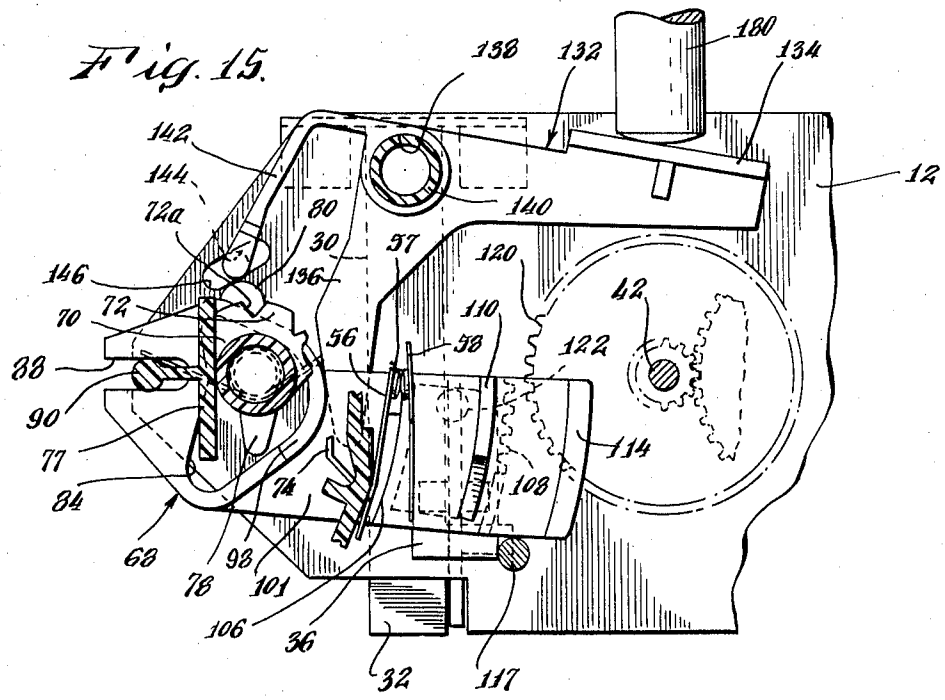
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RADIO AND ALARM CONTROL MECHANISM

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Fig. 15.



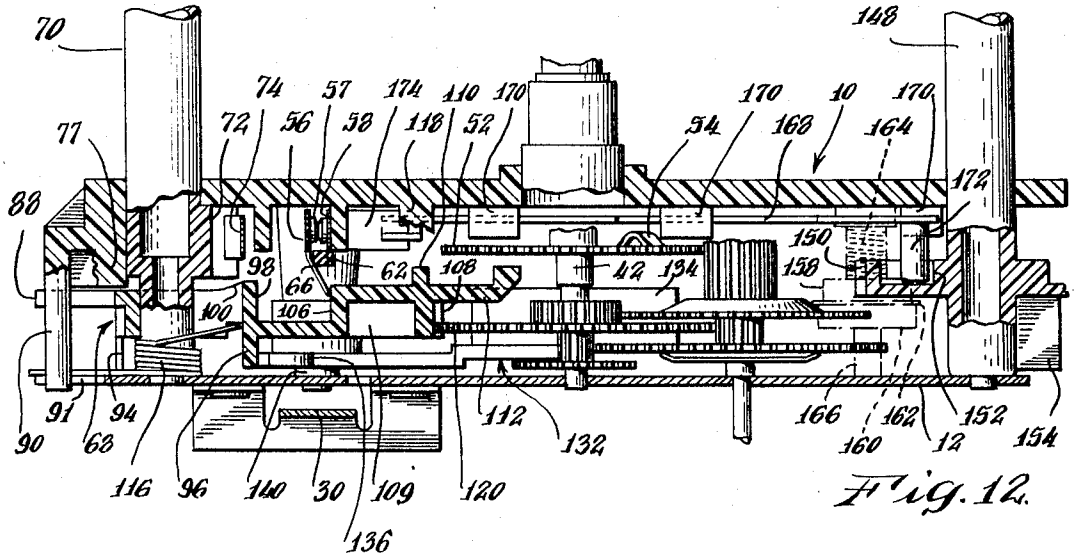


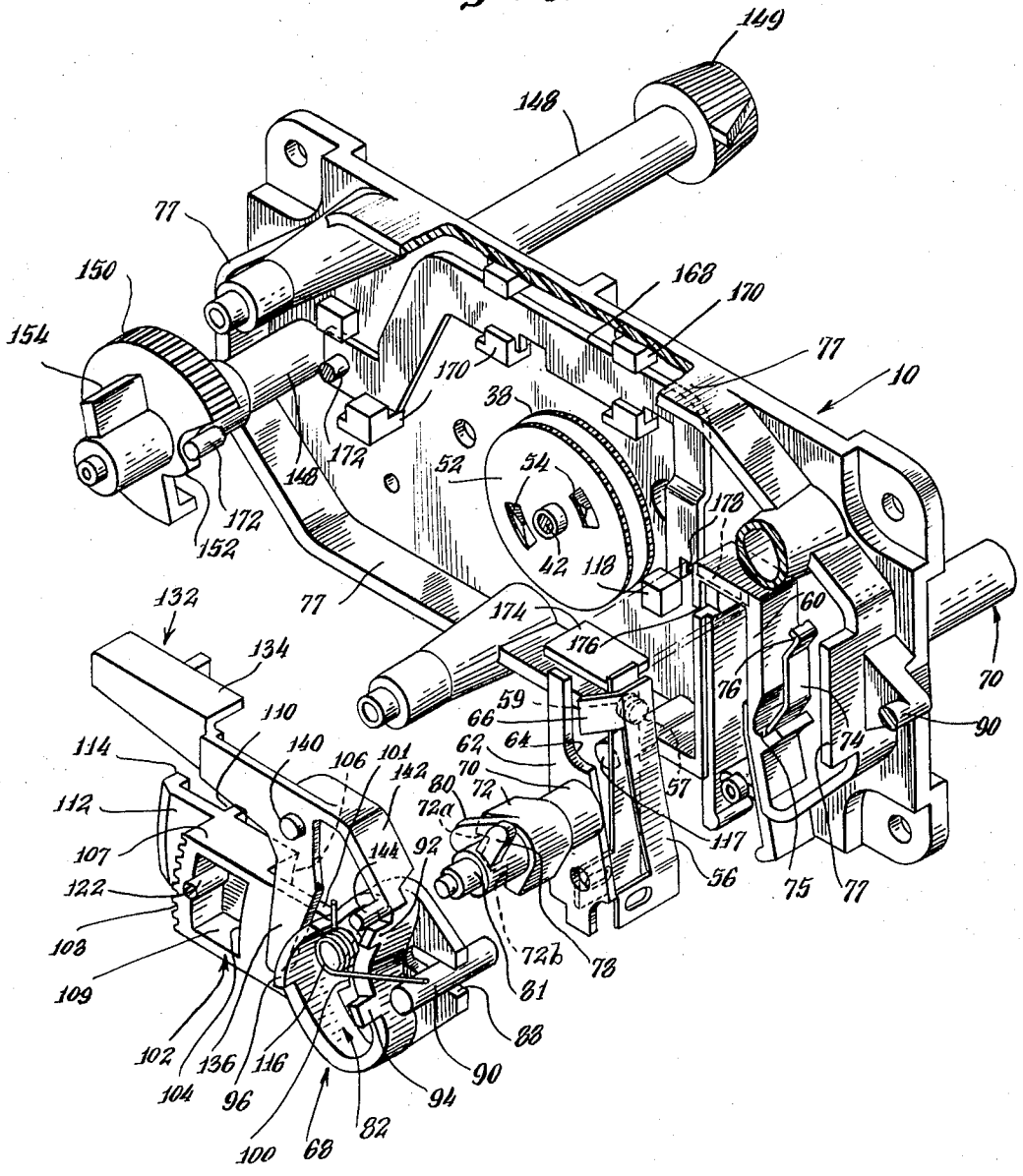
Fig. 12.

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RADIO AND ALARM CONTROL MECHANISM

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Fig. 16.



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United States Patent Office 3,475,899 Patented Nov. 4, 1969

3,475,899

RADIO AND ALARM CONTROL MECHANISM

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Int. Cl. G04b 13/02; G04c 21/16
U.S. Cl. 58—21.155 12 Claims

ABSTRACT OF THE DISCLOSURE

A radio and alarm control mechanism having a plural position lever for controlling the condition of a switch and an audible vibrator alarm, the lever being loosely pivoted upon a selector shaft which controls the position of the lever in cooperation with a torsion spring and a timing device which automatically allows the lever to be moved at a preset time. A temporary alarm shutoff lever is also included to silence the alarm and a sleep control mechanism is included for closing the switch for a predetermined time interval independently of the lever position.

BACKGROUND OF THE INVENTION

My invention relates to time controlled devices and more particularly to an improved control mechanism for the radio receiver and audible vibrator alarm of a clock radio.

It is highly desirable to control apparatus, such as a radio receiver and an audible vibrator alarm, so that operation of the radio receiver will be automatically commenced at a particular preset time, and if desired, the audible vibrator alarm will be commenced thereafter upon the lapse of a predetermined time interval. In conjunction with the audible vibrator alarm it is also desirable to incorporate a temporary shut-off mechanism commonly referred to as a "snooze" control which may be actuated at the option of the user, which allows the user to silence the alarm for a predetermined interval of time. After the short interval of silence, the vibrator alarm is again allowed to sound and the user may again silence the alarm or may choose to arise. Another feature which is often incorporated in modern electric clock radios is a "sleep" control which can be set to energize the radio receiver for a selectively determined interval of time and which will automatically deenergize the radio receiver after the lapse of the predetermined time interval.

SUMMARY OF THE INVENTION

Accordingly, it is the primary object of my invention to provide a unique and simplified control mechanism for energizing a radio receiver and an audible vibrator alarm.

It is another object of my invention to provide an improved time controlled device having a single control knob for selecting the desired actuation of the radio receiver and the vibrator alarm, including means for manually closing the radio switch and for manually setting the switch for automatic closure at a preset time.

A further object is to provide a temporary alarm shut-off mechanism of simplified construction which may be uniquely and easily combined with the vibrator alarm control mechanism.

A still further object is to provide an improved time controlled device having a radio and vibrator alarm control mechanism, a manually operable temporary alarm shut-off control and a sleep switch control.

To accomplish these objects in one form I have provided an alarm clock including a timing device incorporating a gear train, a face plate and a spaced rear plate arranged generally parallel to one another, a switch,

an audible alarm, a selector shaft extending between the plates, a trip lever, loosely pivoted upon the selector shaft, having freedom of motion in all directions, an integral gear and switch operating means formed on the trip lever, resilient biasing means positioned to urge the lever radially towards the gear train, the face plate and in a clockwise direction about the selector shaft, latch means projecting from the face plate for cooperating with a portion of the trip lever to prevent movement of the trip lever towards the gear train to maintain the switch operating means in engagement with the switch to maintain the switch in an open condition, tripping means driven by the timing device for an automatically unlatching the trip lever at a preset time to displace the switch operating means from the switch and causing the integral gear to mate with a driving gear of the gear train for driving the trip lever in a counterclockwise direction, and an alarm control lever positioned to be moved out of engagement with the alarm for sounding an audible signal when the trip lever is rotated counterclockwise and to be moved into silencing engagement when the alarm trip lever is rotated clockwise.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and further details of that which I believe to be novel and my invention will be clear from the following description and claims taken with the accompanying drawings wherein:

FIG. 1 is an expanded perspective view of the unique control mechanism of my invention showing the switch in the manual "ON" position;

FIG. 2 is a partial front elevational view taken behind the face plate, of the selector control mechanism showing the switch in the manual "ON" position;

FIG. 3 is a sectional view taken substantially along line 3—3 of FIG. 2;

FIG. 4 is a sectional view taken substantially along line 4—4 of FIG. 2;

FIG. 5 is a front elevational view taken behind the face place of the selector control mechanism showing the switch in the manual "OFF" position and showing the sleep control mechanism in the switch closing position, with the switch shown closed in dot-dash lines;

FIG. 6 is a sectional view taken substantially along line 6—6 of FIG. 5;

FIG. 7 is a partial front elevational view taken behind the face plate showing the control mechanism in a latched "AUTO-RADIO" position for closing the switch automatically at a preset time;

FIG. 8 is a sectional view taken substantially along line 8—8 of FIG. 7;

FIG. 9 is a view similar to that of FIG. 7 showing the control mechanism in the tripped "AUTO-RADIO" position with the switch having been closed automatically at the preset time;

FIG. 10 is a cross-sectional view taken substantially along the line 10—10 of FIG. 9;

FIG. 11 is a front elevational view taken behind the face plate showing the tripped "AUTO-VIBRATOR" position with the switch having been automatically closed at a preset time, but before actuation of the audible vibrator alarm;

FIG. 12 is a cross-sectional view taken substantially along line 12—12 of FIG. 11;

FIG. 13 is a partial front elevational view similar to that of FIG. 11 showing the trip lever in the vibrator releasing position and showing the snooze lever being actuated in dot-dash lines;

FIG. 14 is a cross-sectional view taken substantially along line 14—14 of FIG. 13;

FIG. 15 is a view similar to that of FIG. 13 showing

the snooze lever actuation for allowing the vibrator to be silenced; and

FIG. 16 is an expanded perspective view looking at the rear of the face plate and showing the unique control elements of my invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, and particularly to FIG. 1, the control device of my invention is shown in combination with an electric alarm clock having a supporting structure including a face plate **10** molded of plastic or other suitable material and including integral formations to be more fully described hereinafter, a rear plate **12** and a dial plate **14** mounted upon the face plate and having the usual clock indicia painted or otherwise generally centrally placed thereon. The clock is provided with hour, minute and second hands, **16**, **18** and **20**, respectively, mounted for movement over the dial and driven by a conventional timing device gear train.

The timing device may include any suitable form of timer motor here shown as a self-starting synchronous motor **22**, a field coil **24** of which is connected to a source of regulated frequency alternating currents. A terminal shaft **26**, including a gear **28** affixed thereto, extends through the rear plate **12** for driving the gear train, the hands of the clock and my improved radio and alarm control mechanism. A resilient magnetic vibrator **30** operated by leakage flux from the motor is arranged to have its free end portion **32** vibrate against a stator nut **34** for producing an audible alarm at all times when the motor is energized unless the vibrator is prevented from vibrating by a slidable lever **36** mounted upon the rear plate **12** in a manner to be more fully described hereinafter.

A time set cam gear **38** having a projecting cam surface **40** located thereon is rotatably mounted on a central shaft **42**. The angular position of the cam gear **38** may be manually adjusted by means of a gear **44** mounted on shaft **46** which is offset from the central shaft **42** and which may be manually rotated by means of a knob **48** secured to the end of the shaft **46** and extending through the rear of the clock housing in a conventional manner. A hand **50** is connected to cam gear **38** for rotation therewith for indicating the time setting of the cam gear **38**. A second rotatable cam gear **52** having a cam surface **54** is also rotatably mounted upon the central shaft **42** as shown and is axially movable upon said shaft to actuate the control mechanism in a manner to be more fully described hereinafter. Cam gear **52**, which is driven by the motor **22** at one revolution every twelve hours through a suitable gearing arrangement in a manner known to the art, is connected to hour hand **16**. At the cam gear time setting, cam surfaces **40** and **54** cooperate with each other to move the gear **52** axially away from cam gear **38** in a conventional manner.

A switch contained in the clock is of the single pole, single throw type and is connected in a control circuit across the clock motor supply in which there may be a radio receiver to be controlled. The switch comprises a resilient movable blade **56** with a contact **57** at its end and a resilient "fixed" blade **58** with a contact **59** at its end. The switch is enclosed in a suitable switch housing **60** (FIG. 16) formed as an integral part of the face plate and disposed on the rear surface thereof. The switch housing **60** is formed so that its walls bias the movable blade **56** toward the fixed blade **58** for maintaining the contacts **57** and **59** in engagement and the switch normally closed and bias the "fixed" blade toward the central shaft **42**. A cover **62** made of insulating material may be disposed over the switch housing for enclosing and protecting the switch blades **56** and **58**, and includes a cut-out portion **64** for allowing a normal finger **66**, secured to the end of the movable switch blade **56**, to pass into the area of

switch control for allowing the movable blade **56** to be selectively displaced from the "fixed" contact blade **58** for opening the switch in response to the control mechanism. The switch may be normally controlled in its "ON" or "OFF" settings and has two automatic controls, namely, "AUTO-RADIO" and "AUTO-VIBRATOR," the latter control including both the radio control and a time delay audible vibrator alarm.

The movable switch blade **56** is moved away from the fixed blade **58** by means of a controlling trip lever **68**, formed of a molded plastic material, which is loosely pivoted upon and controlled by the selector shaft **70** which passes through the face plate and into the rear plate. A control knob **71** secured to the end of the selector shaft **70** may be selectively rotated to the desired control position. An eccentric positioning detent formation **72** having V-grooves **72***a* and **72***b* is formed as an integral part of the shaft **70** for cooperating with the resilient spring strip **74** having a central V-shaped deformation **76** for positively positioning the selector shaft **70** in each of the control positions. The detent strip **74** is disposed on a housing **75** integrally formed in the rear surface of the face plate **10**. A reinforcing flange **77** is also formed on the rear surface of and about the periphery of the face plate and limits clockwise and counter-clockwise rotation of the shaft **70** as the positioning detent formation **72** abuts the flange. The selector shaft **70** further includes a control cam **78**, an "on" position cam **80** and a smaller diameter stem **81** which is supported for rotation in the rear plate **12**.

The trip lever **68** is substantially rectangular and extends from the left end of the control structure toward the central shaft **42** as viewed in FIG. 1, and is provided with a large, generally D-shaped opening **82** for loosely receiving the control cam **78** and a portion of the smaller diameter stem **81**. The D-shaped opening **82** defines a cam follower wall **84** having a central portion **86** extending inwardly into the opening. A slot **88** at the left end of the trip lever **68** is provided for receiving a pivot pin formation **90** which extends from the face plate **10** into a slot **91** formed in the rear plate **12**. The trip lever **68** further includes formations **92**, **94** and **96** extending toward the rear plate which act as feet for spacing the trip lever from the rear plate. Formation **96** comprises an extension of the opening wall and forms part of the snooze control, as will be described hereinafter. Another wall formation **98** opposes formation **96** and extends toward the face plate **10**, including a ramp portion **100** for cooperating with the "ON" position cam **80**. A flat wall portion **101** extends from the opening **82** toward the central shaft **42** terminating in a box portion **102** defining a cavity **104** which faces the rear plate **12** and is bounded on its sides by a curved blade control wall **106**, an upper wall **107**, a gear sector wall **108** and a lower wall **109**. A projection **110** formed substantially as an extension of the gear sector wall **108** extends toward the face plate and forms part of the latch mechanism. Another flat wall portion **112** extends beyond the gear sector **108** and terminates in a flange **114** which faces the face plate.

A torsion spring **116** is mounted upon the smaller diameter stem **81** with its opposite ends biased against the pivot pin **90** and the formation **96**, respectively, for biasing the trip lever **68** in three directions for performing the control functions, viz, toward the face plate **10**, toward the central shaft **42**, and in a generally clockwise direction about the selector shaft **70** (as viewed in FIG. 1), against the stop pin formation **117** of the face plate.

As the control knob **71** rotates the selector shaft **70** to one of the above defined positions, the control cam **78** moves within the opening **82** and cooperates with the cam follower wall **84** for acting against the spring **116** for urging the trip lever away from the central shaft **42**. As the trip lever is moved away from the central shaft **42**, the blade control wall **106** urges the normal finger **66** and the movable blade **56** away from the "fixed" blade **58** for

opening the contacts 57, 59. A latching lug 118 is formed on the rear surface of the face plate and cooperates with the projection 110 for maintaining the contacts 57 and 59 open when the trip lever is in its latched position.

In the "AUTO-VIBRATOR" position, when the latch has been tripped, the gear sector wall 108 is biased against the minute gear 120 and the trip lever is driven in a counter-clockwise direction, as shown in FIG. 13, for releasing the vibrator 30 at the end of a predetermined time interval. The lower wall 109 of the box portion 102 engages a pin 122 disposed on the vibrator control lever 36 which is mounted for reciprocating in a slot 125 formed through the rear plate 12. The vibrator control lever 36 is made of a low friction plastic material so as to enable it to slide freely within the slot 125. Counterclockwise rotation of the trip lever 68 moves the vibrator control lever 36 upwardly from a lower vibrator restraining position wherein the cam finger 126 normally overrides a control lug 127 at the free end 32 of the vibrator to an upper vibrator releasing position wherein the cam finger 126 is moved away from the vibrator, thus actuating the audible vibrator alarm. The cam finger 126 is formed at the lower end of a normal rib 128 which passes through the slot 125 for guiding the entire lever 36 for movement in a vertical plane.

A "snooze" control has also been provided in the timing mechanism for temporarily silencing the vibrator 30. This control comprises a unique lever 132 in the form of a molded plastic bell crank having an operator arm 134, a control arm 136, and a pivot aperture 138 through which a pivot pin 140, formed integrally with the face plate 10, may be passed. The lever 132 further includes an integral spring return arm 142 with a normal pin 144 formed at its end for passing through a slot 146 defined through the rear plate 12. The spring return arm 142 which is formed of a thin wall of the plastic material, chosen for its spring-like characteristics, is deflected as the lever rotates about the pivot pin 140, the pin 144 being constrained within the slot 146. Upon release of the force applied to the operator arm 134, the entire lever 132 is urged in a counter-clockwise direction by the spring return arm 142 resuming its normal shape. The lever is so formed that the control arm 136 bears against the foot formation 96 of the trip lever for urging the trip lever 68 away from the minute gear 120 against the bias of the torsion spring 116 and allowing the torsion spring to urge the trip lever in a clockwise direction back to its starting point against the stop pin formation 117.

The time control mechanism is further provided with a sleep switch which operates to close the contacts 57 and 59 for maintaining the switch in the closed position for a preselected adjustable time interval. The mechanism does not interfere with any of the previously described mechanism for manually operating the switch or automatically closing the switch, except to the extent that operation of such additional means temporarily takes over control of the switch.

The sleep switch is controlled by a shaft 148 which extends between the face plate 10 and rear plate 12 and terminates in a control knob 149. A sector gear 150 is formed on the shaft 148 intermediate the face and rear plate and includes a cam surface 152 formed thereon. A radial flag 154 extends outwardly from the shaft 148 and axially between the sector gear 150 and the rear plate 12 for cooperating with a stop lug 156 lanced from the rear plate 12 for limiting the rotation of the shaft 148 to a time setting of sixty minutes, as indicated by the indicia on the dial plate 14. The sector gear 150 is adapted to be driven by the minute gear 120 through a pinion 158 and a pinion 160 coaxial with the pinion 158 which is connected thereto through a slip friction clutch which may include a washer 162 disposed between the two pinions 158 and 160. The pinion 160 is meshed with the timing mechanism gear train and rotates continuously therewith. The necessary friction for clutch purposes between the pinions 158 and 160 may be supplied by compression spring 164 on the shaft 166 on which the pinion 158 and washer 162 may rotate and on which pinion 160 is fixed. A U-shaped push rod 168 adapted to pass around the gear train lies against the rear surface of the face plate 10 and is guided in formations 170 formed on the rear surface of the face plate. A cam follower pin 172 is secured to the end of the push rod 168 normal thereto and adjacent the sector gate 150 for being moved horizontally by the cam 152. At the end of the push rod 168 adjacent the "fixed" blade 58 the rod contacts a short insulator pusher member 174 which is slidable within a slot 176 formed through the switch housing 60 and in groove 178 formed in the rear face of the front plate. The pusher member 174 abuts the "fixed" blade 58 for moving it towards the movable blade 56 for closing the switch contacts 57, 59 in response to horizontal leftward movement of the push rod 168. The resilient "fixed" blade 58 biases the push rod rightwardly and at the end of the preselected amount of time, the pin 172 moves rightwardly on the cam 152 for opening the switch contacts.

OPERATION

MANUAL "ON".—With particular reference to FIGS. 2, 3 and 4, there is disclosed the position of the trip lever 68 and selector shaft 70 in the manual "ON" position in which the contacts 57 and 59 are in engagement. It can be seen that the selector shaft 70 has been rotated to its extreme clockwise position wherein the eccentric position indicating formation 72 abuts the reinforcing flange 77. The selector shaft 70 is maintained in this position and is prevented from being inadvertently turned in a counter-clockwise direction by means of the V-shaped detent 76. As fully described above, the torsion spring 116 urges the trip lever 68 toward the central shaft 42, toward the face plate 10, and in a clockwise direction, thereby biasing the cam follower wall 84 against the control cam 78 which limits movement of the trip lever toward the central shaft. In this position of the cam 78 the trip lever 68 moves rightwardly a sufficient amount for allowing the blade control wall 106 to move away from the normal finger 66, thus allowing the movable blade 56 to move toward the "fixed" blade 58 for closing the contacts 57, 59. Furthermore, in order to prevent the projection 110 from being "hung up" on the latch 118, rotation of the selector shaft 70 causes the "ON" position cam 80 to move up the ramp 100 onto the wall 98 for biasing the trip lever away from the front wall, as clearly shown in FIG. 3.

MANUAL "OFF".—The manual "OFF' position is shown clearly in FIGS. 5 and 6 wherein the selector shaft 70 has been rotated to a position wherein the V-shaped detent 76 is disposed within the V-groove 72*a*. In this position the control cam 78 contacts the inwardly extending wall portion 86 of the cam follower wall 84 and urges the trip lever 68 leftwardly, away from the central shaft 42, thereby causing the curved wall portion 106 to contact the normal finger 66 for moving the movable switch blade 56 away from the "fixed" switch blade 58 for maintaining the switch in a normal open position.

AUTO-RADIO.—The "Auto-Radio" position is shown in FIGS. 7–10 and actually comprises two positions, namely, an open switch condition and a closed switch condition, the former being maintained until a desired time in the future at which the switch may be closed. When the control knob 71 is set at AUTO-RAD the selector shaft 70 is located so that the V-shaped detent 76 is disposed within the V-groove 72*b*. In this position of the selector shaft the cam 80 does not act upon the trip lever and the torsion spring biases the lever toward the face plate so that the projection 110 is prevented from rightward movement by the latch 118, as clearly seen in FIG. 8. The control cam 78 is located for allowing further rightward movement of the unlatched lever 68. In the latched position the switch

blades **56** and **58** are maintained apart by the blade control wall **106** acting on the normal finger **66**. The torsion spring **116** also urges the flange **114** frictional engagement with the hour cam gear **52**. Thus if it is desired to have the switch for operating apparatus, such as a radio receiver, closed at some time in the future, the time set cam gear **38** may be positioned by rotation of knob **48** so that its projecting cam surface **40** may be disposed to control the automatic operation at the time indicated by the alarm set hand **50**. The timing device rotates the hour cam gear **52** clockwise through the gear train and as the present time is approached the cam surface **54** rises on cam surface **40**, moving gear **52** away from gear **38**, thereby urging the flange **114** away from the face plate **10** for disengaging the projection **110** from the latch **118** and for allowing the torsion spring **116** to further urge the trip lever **68** rightwardlly toward the central shaft **42** until the cam follower wall **84** contacts the control cam **78**, thereby allowing the movable blade **56** to move toward the "fixed" blade **58** for closing the contacts **57, 59**.

AUTO-VIBRATOR.—It is often desired to have the switch for operating the apparatus such as the radio receiver closed at some time in the future and after the lapse of a short time interval sound the audible vibration alarm. This may be accomplished by the unique control mechanism of my invention by rotating the selector **70** to its extreme counter-clockwise position where it is maintained against inadvertent removal by the V-shaped detent **76**. In this position the control com **78** is located to allow maximum rightward movement of the trip lever **68**. However, when the selector shaft **70** is rotated through the "ON," "OFF," and "AUTO-RADIO" positions, the trip lever is also latched in the "AUTO-VIB" position, as shown in FIGS 7 and 8, with respect to the "AUTO-RADIO" position. When the latch is tripped by the interaction of cam surfaces **40** and **54** in the conventional manner, the trip lever **68** is urged by the torsion **116** rightwardly toward the central shaft **42** to a position in which the gear sector **108** is allowed to mesh with the minute gear **120** and the movable blade **56** engages the "fixed" blade **58** for closing the contacts **57, 59** and for actuating the radio receiver. Since the trip lever is loosely pivoted about the control shaft **70** it may rotate counter-clockwise under the driving force of minute gear **120** and will reach its upper limit (as shown in FIG. 13) for sounding the audible vibrator alarm in approximately 8 to 10 minutes. The time relation between the automatic closing of the switch contacts **57** and **59** and the automatic release of the audible vibrator alarm may be determined by the relative dimensioning of the gear sector **108** and is easily subject to vibration. As the lever **68** moves upwardly, and counter-clockwise, the lower wall **109** of the box portion **102** engages the pin **122** or the vibrator control lever **36** and moves the lever **36** from a vibrator restraining position, in which the cam finger **126** overlies the control lug **127**, to a vibrator releasing position, thus sounding the audible vibrator alarm. In order to silence the alarm it is ordinarily necessary for the user to rotate the selector shaft **70** to either the "OFF," "ON" or "AUTO-RAD" position so that the control cam **78** may bias the trip lever **68** leftwardly from the central shaft **42** for deisengaging the sector gear **108** from the minute **120** so that the torsion spring **116** may urge the trip lever **68** in a clockwise direction until the lever contacts the stop pin formation **117** of the front plate. As the lever moves clockwise the upper wall **107** of the box portion **102** engages the pin **122** of the vibrator control lever **36** and moves it downwardly to a point where the cam finger **126** may pass over the control lug **127** for silencing the magnetic vibrator.

SNOOZE LEVER.—There is illustrated in FIGS. 11, 13 and 15 a temporary alarm shut-off mechanism which is particularly useful for silencing the audible vibrator alarm without fear of dozing off and oversleeping while the radio continues to operate, as this mechanism will cause the audible vibrator alarm to sound again after a short time interval. As has been described above with reference to the "AUTO-VIB" position, the trip lever is shown in the vibrator alarm sounding position in FIG. 13 and the user may silence the vibrator by manually turning the selector shaft **70** to the "ON," "OFF", or "AUTO-RAD" positions, as described above for permanently silencing the vibrator. Alternatively he may depress the snooze lever **132** as shown in dot-dash lines in FIG. 13 by means of a suitable button **180**. The snooze lever has been illustrated in its depressed condition in dot-dash lines as it indicates a future position of the lever for disengaging the gear sector **108** from the minute gear **120**, this disengagement being a dynamic condition which can only exist momentarily. Depression of the operator arm **134** causes the control arm **136** to rotate about the pivot pin **140** and to bear against the curved formation **95** of the trip lever for urging the trip lever away from the central shaft **42**, thus causing the gear sector **108** to be moved out of engagement with the minute gear **120**. Once the gears **108** and **120** have been disengaged, the torsion spring **116** biases the trip lever in a clockwise direction until it contacts the stop pin formation **117** of the front plate and moves the vibrator control lever **36** downwardly to a position in which it will silence the audible vibrator alarm in a manner fully described above. As the operator arm **134** is moved downwardly the spring return arm **142** is deformed slightly so that when the operator arm is released the spring return arm **142** will urge the snooze lever **132** to its normal upper position, as indicated in FIG. 11, thus allowing the torsion spring **116** to again bias the trip lever rightwardly toward the central shaft **42** for allowing the gears **108** and **120** to again mesh. Therefore, the minute gear **120** will again rotate the trip lever **68** in a counter-clockwise direction for releasing the magnetic vibrator **30** after a time lapse of approximately 8 to 10 minutes. This may be repeated as often as desired by the user.

SLEEP SWITCH.—It is often desired by the user of such clock radios to listen to the radio for a short time interval before going to sleep. Thus, if the selector shaft is in either the "OFF," "AUTO-RAD" or "AUTO-VIB" position wherein the radio is turned off because the switch contacts **57** and **59** are open, I have provided a unique mechanism for closing the switch contacts **57** and **59** for a predetermined time interval while the user goes to sleep. Such a mechanism is illustrated in FIGS. 1, 5, 12 and 16, the FIG. 5 illustration showing the mechanism in position for closing the contacts **57** and **59**, with the contacts shown closed in dot-dash lines. In order to operate this switch it is merely necessary to rotate the sleep shaft **148** in a clockwise direction an angular amount corresponding to the length of time the user wishes the radio to be operative, as indicated by the indicia on the dial plate **14**. Rotation of the sleep shaft **148** causes the cam follower pin **172** to follow the cam **152** and to urge the U-shaped push rod **168** leftwardly, causing the insulator pusher member **174** to move the "fixed" blade **58** toward the left and into contact with the movable blade **56** for closing the contacts **57** and **59** and the circuit through the radio. Rotation of the shaft **148** also causes engagement of the sector gear **150** with the pinion **158** and causes the pinion **158** to rotate in a counter-clockwise direction. The friction clutch washer **162** between the drive pinion **158** and pinion **160** allows the drive pinion **158** to be rotated by the clockwise movement of the sector gear **150** during the manual setting of the predetermined time interval. The friction clutch washer **162** serves to retain the drive pinion **158** in the position set by the sleep shaft **148** and it allows the pinion **158** to drive the sector gear **150** back to its original position as the pinion **160** is driven by the gear train and turns the drive pinion **158** therewith. At the end of the predetermined time interval the cam follower pin **172** allows the U-shaped push rod **168** to be biased rightwardly under the influence of the "fixed" blade **58** for opening the circuit.

Having described my invention of a radio and alarm time control mechanism, it will be readily appreciated by those skilled in this art that a time control mechanism embodying my invention is simple in design, low in cost because of a reduction in the number of parts and ease of assembly, and ingenious in operation.

It should be understood that the present disclosure has been made only by way of example and that numerous changes in details of construction and the combination and arrangement of parts may be resorted to without departing from the true spirit and the scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An alarm clock including: a timing device including a gear train; a face plate; a rear plate spaced from said face plate and arranged generally parallel thereto, said gear train being disposed between said plates; an electric circuit controlling switch; and audible alarm; a manually operable selector shaft extending between said plates; a trip lever loosely pivoted upon said selector shaft and having freedom of motion in all directions, said lever including a gear integrally formed thereon and switch operating means engageable with said switch; resilient biasing means positioned to urge said lever radially towards said gear train, towards said face plate, and rotationally in a first direction about said shaft; latch means projecting from said face plate and positioned to engage said lever to prevent movement of said lever radially towards said gear train and maintaining said switch operating means in engagement with said switch to maintain said switch in its open condition; means driven by said timing device for automatically unlatching said trip lever at a preset time to displace said switch operating means from said switch and causing said integral gear to mate with a driving gear of said gear train for driving said trip lever rotationally in a second direction; and an alarm control lever disposed to be moved out of engagement with said alarm for sounding an audible signal when said trip lever is rotated in the second direction and to be moved into silencing engagement with said alarm when said trip lever is rotated in the first direction.

2. The alarm clock defined in claim **1** wherein said selector shaft includes a control cam portion positioned to move said trip lever against the bias of said resilient means to locate said trip lever in various switch controlling positions in response to the angular orientation of said selector shaft.

3. The alarm clock defined in claim **1** wherein said selector shaft includes a cam lug positioned to bias said trip lever away from said face plate to move said lever away from said latch means to allow said switch to be closed in one position of said selector shaft.

4. The alarm clock defined in claim **1** wherein: said alarm control lever includes a pin extending therefrom; and said trip lever having a first wall positioned to engage said pin for moving said alarm control lever out of engagement with said alarm and a second wall positioned to engage said pin to return said alarm control lever into silencing engagement with said alarm.

5. The alarm clock defined in claim **4** wherein: said audible alarm comprises a resilient vibrator secured to said rear plate at one end and having a control lug formed at its free end; and said alarm control lever is mounted upon said rear plate to recipocate therein from an alarm silencing position to an alarm sounding position and includes a finger positioned to overlie said control lug in its silencing position.

6. The alarm clock defined in claim **1** further including a manually operable snooze lever positioned to temporarily silence said alarm by momentarily disengaging said integral gear from said driving gear when said trip lever has been driven in the second direction, for allowing said resilient means to rotate said trip lever in the first direction wherein said integral gear may again engage said driving gear.

7. The alarm clock defined in claim **6** wherein said snooze lever is pivotally mounted adjacent said rear plate and includes an operator arm positioned to be manually depressed, a control arm for urging said trip lever away from said driving gear, and a spring return arm positioned to return said lever to its normal position.

8. The alarm clock defined in claim **1** further including means for temporarily closing said switch for a predetermined amount of time said means including: a manually operable sleep shaft extending between said plates; a gear sector disposed on said sleep shaft; a cam surface disposed on said sleep shaft; a pushrod extending between said sleep shaft and said switch for reciprocation therebetween carrying a cam follower at its end against said cam surface to reciprocate said pushrod for closing said switch in response to the rotation of said sleep shaft, said timing device driving said gear sector for returning said sleep shaft to a position for opening said switch after a predetermined time interval.

9. The alarm clock defined in claim **8** wherein said switch comprises a first flexible blade normally biased aganst a fixed stop and a second flexible blade normally biased against said first blade and positioned to be moved against said switch operating means away from said first blade, and said pushrod is positioned to move said first blade in opposition to its normal bias and into contact with said second blade when said sleep shaft is rotated.

10. The alarm clock defined in claim **8** wherein said face plate includes formations thereon positioned to support said pushrod for reciprocation and wherein said gear train is disposed between said switch and said sleep shaft, and said pushrod is generally U-shaped for non-interference with said gear train.

11. The alarm clock defined in claim **1** wherein said switching comprises a first flexible blade normally biased against a fixed stop and a second flexible blade normally biased against said first blade and positioned to be moved by said switch operating means away from said first blade.

12. The alarm clock defined in claim **1** wherein: said selector shaft includes a control cam portion positioned to move said trip lever against the bias of said resilient means to locate said trip lever in various switch controlling positions in response to the angular orientation of said selector shaft; said alarm control lever includes a pin extending therefrom; and said trip lever having a first wall positioned to engage said pin for moving said alarm control lever out of engagement with said alarm and a second wall positioned to engage said pin to return said alarm control lever into silencing engagement with said alarm; further including a manually operable snooze lever positioned to temporarily silence said alarm by momentarily disengaging said integral gear from said driving gear when said trip lever has been driven in the second direction, for allowing said resilient means to rotate said trip lever in the first direction wherein said integral gear may again engage said driving gear; and further including means for temporarily closing said switch for a predetermined amount of time said means including, a manually operable sleep shaft extending between said plates, a gear sector disposed on said sleep shaft, a cam surface disposed on said sleep shaft, a pushrod extending between said sleep shaft and said switch for reciprocation therebetween carrying a cam follower on its end against said cam surface to reciprocate pushrod for closing said switch in response to the rotation of said sleep shaft, said timing device driving said gear sector for returning said sleep shaft to a position for opening said switch after a predetermined time interval.

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