May 3, 1938. A. J. MACDONALD 2,116,247

ALARM CLOCK

Filed Sept. 15, 1936

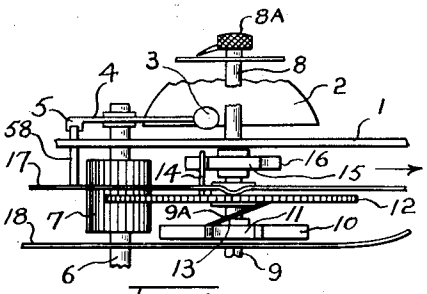


FIG. 1.

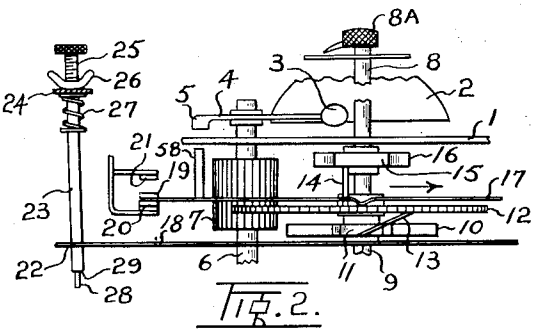


FIG. 2.

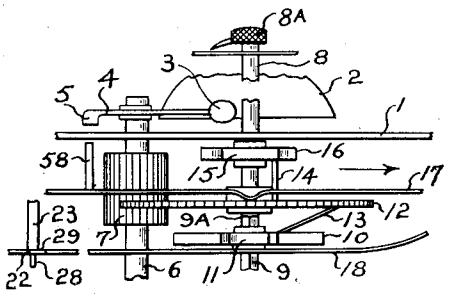


FIG. 3.

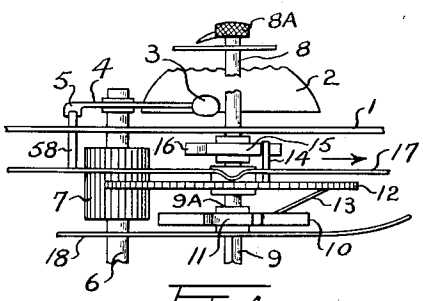


FIG. 4.

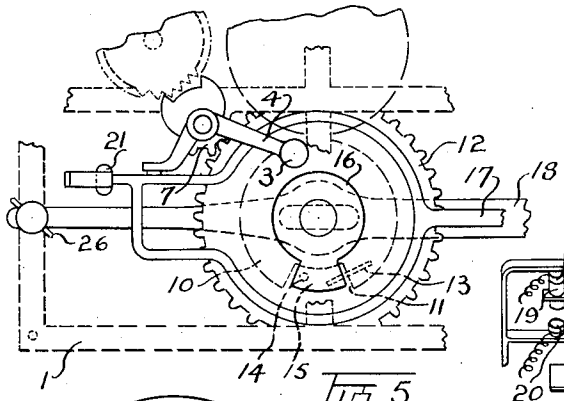


FIG. 5.

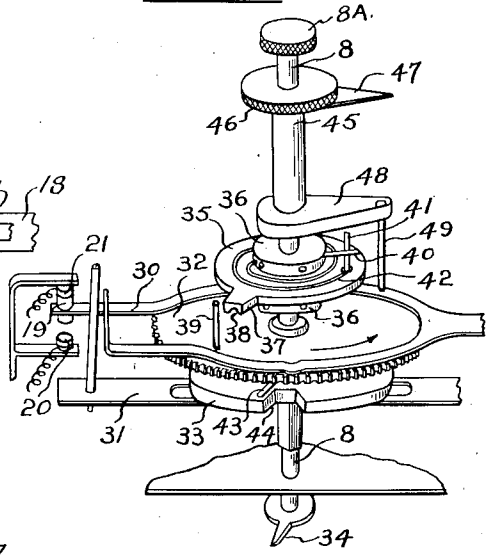


FIG. 6.

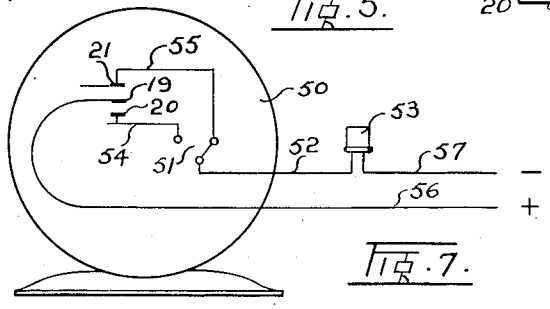


FIG. 7.

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ALARM CLOCK

Alan James Macdonald, Vancouver, British Columbia, Canada

Application September 15, 1936, Serial No. 100,854

8 Claims. (Cl. 200—38)

My invention relates to improvements in alarm clocks, the primary objects of which are to provide means for quickly making and quickly breaking a circuit, so that circuits such as lights, radios, cooking devices and the like which are run at a service line voltage may be directly controlled by the clock mechanism and may receive the approval of the fire underwriters associations. Further objects are to provide means whereby periods between make and break or vice versa, may be varied as desired, for instance the circuit may be made to close at 8 a. m., remain closed until 10.20 a. m. or to open at 8 a. m. and remain open until say 2.30 p. m. A further object is to provide a switch operating mechanism which is not dependent upon the alarm spring, so that the switch or the alarm or both may be operated at will at a desired time. A further object is to provide means whereby the switch may be set for operation once only or at each rotation of the alarm gear, which, for the conventional alarm, would be every twelve hours, which would be one make and one break in the twelve hour period. A further object is to provide for the closing of the switch by the clock mechanism and for said switch to remain closed until it is opened manually.

The invention consists of the combination, with a pinion wheel of a clock, of an arbor slidably and non-rotatably carrying one or more cam discs or one or more coacting gear wheels and a pair of springs of unequal tension for moving the slidable member or members in opposite directions to actuate a switch arm, and if desired, means for holding the switch arm against return movement when so desired, as will be more fully described in the following specification and shown in the accompanying drawing, in which:—

Figs. 1, 2, 3 and 4 are elevational views showing the preferred embodiment of the invention as arranged to give a quick make and quick break to the switch, each showing the position of the gear wheel at different intervals of the time cycle.

Fig. 5 is an end view looking from the front of the alarm mechanism and showing its discs in the position indicated in Figure 2.

Fig. 6 is a modification illustrating means for adjustably setting the interval between make and break of the switch.

Fig. 7 is a wiring diagram.

In the drawing like characters of reference indicate corresponding parts in each figure.

The numeral 1 indicates a frame member of a clock preferably provided with a bell 2 which is rung in the usual manner at predetermined intervals by a hammer 3 mounted on a suitably pivoted lever 4 which is provided at its outer end with a stop lug 5.

Projecting through the frame member 1 is a shaft 6 having fitted thereto at its outer end a time pinion 7 which is rotated a predetermined number of times per day.

Journalled in the frame member 1 is a setting arbor 8 provided with a setting knob 8A. The setting arbor is squared at its lower end as at 9, the squared portion terminating at a shoulder 9A, to slidably but non-rotatably receive a disc 10 having a peripheral gap 11, and to slidable receive a freely rotatable gear 12 which is provided on its under side with a cam 13 inclining downwardly and rearwardly of the direction of rotation, the gear 12 meshes with and is driven by the pinion 7.

The upper side of the gear 12 is fitted with a vertical pin 14, which is adapted to engage, as shown in Figure 2, a lug 15 extending from the periphery of a disc 16 secured upon the setting arbor 8.

Suitably supported from the frame 1 of the clock are two leaf springs which are numbered 17 and 18. The upper one of these, numbered 17, is relatively weak and is adapted to bear downwardly on the upper side of the gear 12 to depress it along the arbor 8, and the second of the springs, numbered 18, is adapted to bear upwardly against the disc 10. The spring 17 is weak enough to be moved by the spring 18 through the gear wheel 12 and the disc 10. The spring 17 is bifurcated and is fitted at one of its free ends with an insulated contact 19 which is adapted to alternately engage other insulated contacts 20 and 21 which are suitably supported from the clock frame.

The lower spring 18 is provided with an orifice 22 through which a pin 23 projects. This pin is somewhat loosely supported in the back cover 24 of the clock and is threaded as at 25 and provided with a fly nut 26 to enable it to be adjusted in an endwise direction. A spring 27 surrounds the pin 23 serving to hold it in adjusted position. The inner end of the pin is reduced in diameter as at 28, the intersection of the pin and reduced portion defining a shoulder 29. The pin is normally at a slight angle to the vertical, so that if it is desired to prevent the closing of the contacts 19 and 21 for any twelve hour cycle on a twelve hour cycle clock, the spring in moving down to the position as shown in Figure 3 will allow the reduced portion 28 to swing to one side

and its shoulder 29 to prevent the spring 18 from rising to the position shown in Figures 1, 2 and 4. If no interruption in the switch closing cycle, as between contacts 19 and 21, is required, the endwise position of the pin 23 is adjusted by the nut 26 until the reduced portion 28 is so far forward to allow free movement to the spring 18.

In the modification shown in Figure 6 the upper spring here indicated by the numeral 30 again carries the contact 19 and is weaker than the spring indicated by the numeral 31. One gear, here numbered 32, is used, which gear is suitably driven and is slidably and rotatably mounted upon the setting arbor 8. The setting arbor is squared adjacent its inner end to slidably but non-rotatably support a disc 33, its free end projecting through the clock frame and the dial, not shown, and is fitted with a pointer 34 to indicate on the dial the time at which the contacts 19 and 20 will close. Rotatably mounted upon the arbor 8 is a further disc 35 which is held against sliding movement by a pair of collars 36. The disc 35 is provided with a lug 37 having an indent 38 on its underside, which is adapted to receive the tip of a pin 39 extending upwards from the gear 32. From the upper collar 36 a pin 40 extends radially, which is adapted to engage a vertical pin 41 fitted in the upper disc 35. The pin 41 serves as an anchorage for one end of a volute spring 42 which lies upon the disc 35 and is anchored to the upper collar at its opposite end to impart a partial rotation to the disc in a direction counter to the direction of the gear 32. The gear 32 is provided on its under side with a cam 43 which is adapted to drop into a gap 44 in the lower disc 33 and to ride out of said gap on the continued rotation of the gear.

A rotatable sleeve 45 is mounted upon the arbor 8, which extends through the back of the clock and is fitted at its outer end with a knurled knob 46 and a pointer 47 which is adapted to be set at a selected switch opening time on a suitable dial on the back of the clock. At the inner end of the sleeve 45 is a radial arm 48 carrying a downwardly projecting pin 49, which pin is adapted to form a stop against which the lug 37 of the disc 35 is brought to rest after being moved by the pin 39 of the gear 32 when said pin is seated in the indent 38 of the said lug.

In the diagram shown in Figure 7, 50 indicates the clock, which is provided with a manually operable two way switch 51 preferably mounted on the back of the clock case, which is connected from its swing arm by a wire 52 to one side of a service outlet 53. The opposite sides of the switch are connected by wires 54 and 55 respectively to the contact points 20 and 21, the service input connected by wires 56 and 57 respectively to the movable contact point 19 and the service outlet.

When it is desired to coordinate the ringing of the alarm bell with the closing of the contacts 19 and 20 an extension 58 projects from the spring 17, see Figures 1, 2, 3, 4 and 5 to engage stop lug 5 to prevent the alarm bell from ringing, or when lowered to disengage said lug to allow said alarm bell to ring.

In operation of the device as in Figures 1 to 5 the gear 12 is rotating in the direction of the arrow and the setting arbor 8 is set to close the contacts 19 and 20 at a given time. In Figure 1 the gear is at the point where the downward pressure of the weak spring 17 is about to depress the gear 12 as its cam 13 drops into the gap 11 of the disc 10 after which the relative position of parts will be as in Figure 2. At this point no downward strain has been imposed on the stronger spring 18, but the pin 14 on the upper side of gear 12 has been instantaneously lowered so that it is free to ride in contact with the under surface of the lug 15 of the disc 16 and the downward movement of the spring 17 will have closed the contacts 19 and 20, thus closing the circuit. With the pin in the above position, the continued rotation of the gear will cause the cam 13 to engage the marginal edge of the gap 11 and ride out of said gap by lowering the disc 10 against the thrust of the lower or stronger spring 18 until the parts are in the position as shown in Figure 3, with both springs in lowered position, viz.: with the spring 18 under strain and the spring 17 in normal position, or not under strain. When the predetermined operating time has elapsed or when the pin 14 has traversed the arc of the lug 15 the built up force of the lower spring being applied to the gear through the disc 10 will, as the pin 14 slips off the lug, cause the upper spring to rise to its upper position, thus breaking the contact between contact points 19 and 20 and making contact between the contacts 19 and 21, and also raising the gear wheel 12, while still leaving the disc 10 in lowered position with respect to the gear 12 where it will remain as shown in Figure 4, until the cam 13 has passed in contact with the upper side of the disc 10 and has again come into register with the gap 11 when the cycle will be repeated.

In Figure 6 the principle is as before described, except that the duration of the closed circuit between contacts 19 and 20 can be set to any desired length of time. The time for the circuit to be closed is set by turning the arbor 8 until its pointer 34 is at the proper place on the front dial, not shown. The time at which the circuit through contacts 19 and 21 is to be opened is set by turning the knurled knob 46 until its pointer 47 is at its proper place on the dial on the back of the clock. In the position shown the contact between 19 and 20 is open, the lower spring 31 is in normal or raised position. As the gear 32 turns in the direction indicated the cam 43 will drop into the gap 44 of the lower disc 33, thus allowing the gear to drop under the influence of the upper spring 30, which obviously brings the contacts 19 and 20 into closed position. The dropping of the gear, while the cam 43 is in the gap 44 will allow the end of the pin 39 to pass under the lug 37 of the upper disc and as soon as the cam 43 starts to ride out of its gap the pin will enter the indent 38 and carry the disc 35 around with it, while preventing the gear 32 from rising along the arbor, so that the disc 33 must slide downwardly and tension the spring 31. When the lug 37 has been carried around and into contact with the pin 49 of the arm 48 which is obviously frictionally held against movement, the pin 39 will ride out of its indent 38 and ultimately slip off the edge of the lug 37. As soon as this happens the built up force of the spring 31 will, since the cam 43 will still be riding upon the upper face of the disc 33, force said disc, the gear 32 and the light spring 30 upwardly to break the circuit through contacts 19 and 20 and close it to contacts 19 and 21, also, as soon as the lug 37 is released by the pin 39, the disc 35 will be returned to its normal position as shown through the force of the volute spring 42. Obviously by swinging the switch arm 51 on the back of the clock, see Figure 7, to the opposite contact the cycle of circuit make

and break will be entirely reversed, that is to say, that a circuit heretofore described as being closed between contacts 19 and 20 will be opened and the circuit described as being opened between these contacts will instead be closed between contacts 19 and 21.

It will be obvious that the same functions may be performed by reversing the general structure to the use of a single disc and two driven gears instead of using a single gear and two discs.

What I claim as my invention is:

1. In a clock controlled electric switch, a slidably mounted gear rotated by the clock mechanism, means for imparting sliding movement to the gear, a pair of springs of unequal strength adapted to be put alternately under strain by the sliding movement of the gear, a switch having a movable contact carried by one of said springs and a cooperating fixed contact, manually operable means for setting the time of operation of the switch, and means operated by the gear for relieving the strain on each spring and for imparting movement to the movable contact to quickly close and quickly open said switch.

2. In a clock controlled electric switch, a slidably mounted gear rotated by the clock mechanism, a pair of springs adapted to be put alternately under strain by the sliding movement of the gear, means coacting with the gear for imparting sliding movement to said gear at predetermined times, a switch having a fixed contact and a moving contact, said moving contact being carried by one of said springs, and means operable in response to the sliding movement of the gear for imparting instantaneous movements to the contact carrying spring to close and to open the switch.

3. In a clock controlled electric switch, a slidably mounted gear rotated by the clock mechanism, a pair of springs adapted to be tensioned and relieved of tension in response to the rotation of said gear, a switch having a fixed contact and a movable contact, said movable contact being carried by one of said springs, and means coacting with said gear alternately releasing the tension of said springs and for imparting a quick make and a quick break to the contacts through the movable contact carrying spring.

4. In a clock controlled electric switch, a manually operable arbor adapted to be set to a switch operating time, a slidably mounted gear rotatable by the clock mechanism, a pair of springs adapted to be tensioned and relieved of tension in response to the rotation of said gear, a switch having a fixed contact and a movable contact, said movable contact being carried by one of said springs, and means carried by the arbor and rotatable therewith coacting with the gear to alternately relieve the tension on the springs and for imparting a quick make and a quick break to the contacts through the movable contact carrying spring.

5. In a clock controlled electric switch, a manually operable arbor adapted to be set to a switch operating time, a slidably mounted gear rotatable by the clock mechanism, a pair of springs adapted to be tensioned and relieved of tension in response to the rotation of said gear, a switch having a fixed contact and a movable contact, said movable contact being carried by one of said springs, and means carried by the arbor and rotatable therewith coacting with the gear to alternately relieve the tension on the springs and for imparting a quick make and a quick break to the contacts through the movable contact carrying spring, the tension relieving means carried by the arbor being adjustable to vary the time interval between the make and break of the switch.

6. In a clock controlled electric switch, a manually operable arbor for setting the time for operating the switch to close it, a sleeve upon said arbor for setting the time for operating the switch to open it, a gear slidably mounted upon the arbor and rotated by the clock mechanism, a pair of springs adapted to be alternately tensioned by the sliding movement of said gear, means rotatably adjustable by the arbor for instantaneously relieving the tension on one of the springs at a predetermined time, and means rotatably adjustable by the sleeve for instantaneously relieving the tension of the other spring at a predetermined time, said switch including a fixed contact and a movable contact, said movable contact being carried by one of said springs.

7. In a clock controlled electric switch, a manually operable arbor adapted to be set to a switch operating time, a slidably mounted gear rotatable by the clock mechanism, a pair of springs adapted to be tensioned and relieved of tension in response to the rotation of said gear, a switch having a fixed contact and a movable contact, said movable contact being carried by one of said springs, and means carried by the arbor and rotatable therewith coacting with the gear to alternately relieve the tension on the springs and for imparting a quick make and a quick break to the contacts through the movable contact carrying spring, and manually operable means for preventing the contact carrying spring from returning to normal position.

8. In a clock controlled electric switch having a time setting device for the operation of the switch including an arbor, a gear slidably mounted upon and rotatable about said arbor, a pair of discs concentric with the gear, one of said discs having a peripheral lug and the second of said discs having a corresponding peripheral gap, manual means for setting the position of the discs, said gear having a cam on one side adapted to be urged into the gap of one of the discs and a pin on the opposite side adapted to support the other disc in a position remote from the gear by engagement with the lug of the disc, a pair of springs adapted to urge one of the discs towards the gear and the second disc, one of said springs being adapted to afford a quick make and the second of said springs a quick break to the switch.

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