Jan. 19, 1932. L. A. LINDSEY 1,841,746

ELECTRIC ALARM CLOCK

Filed Feb. 17, 1931 2 Sheets-Sheet 1

Fig. 1.

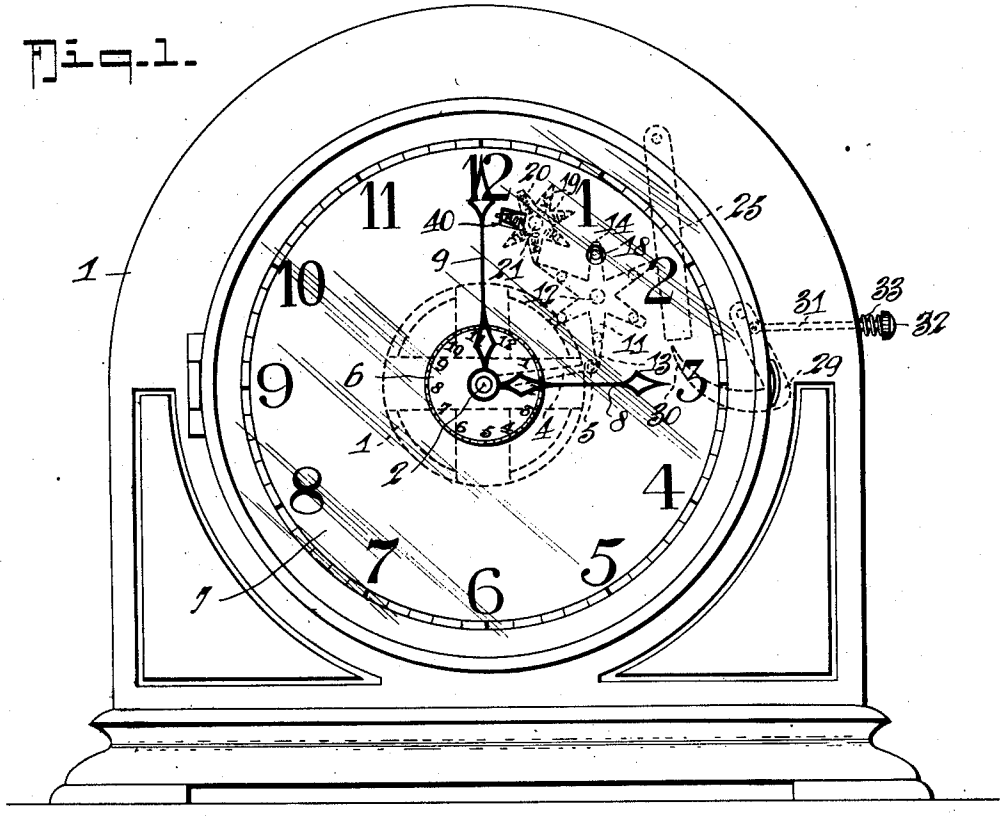



Fig. 7.

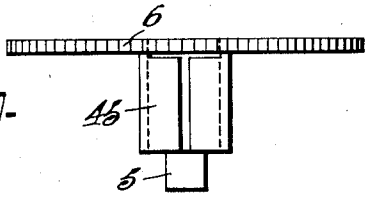



Fig. 8.

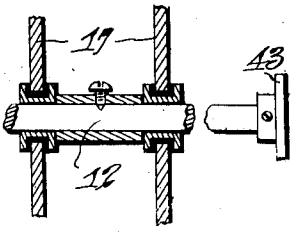
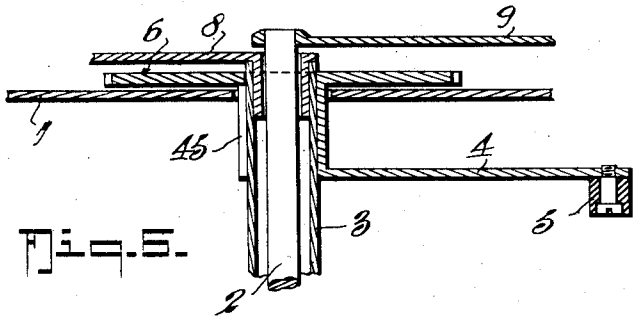



Fig. 5.

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ELECTRIC ALARM CLOCK

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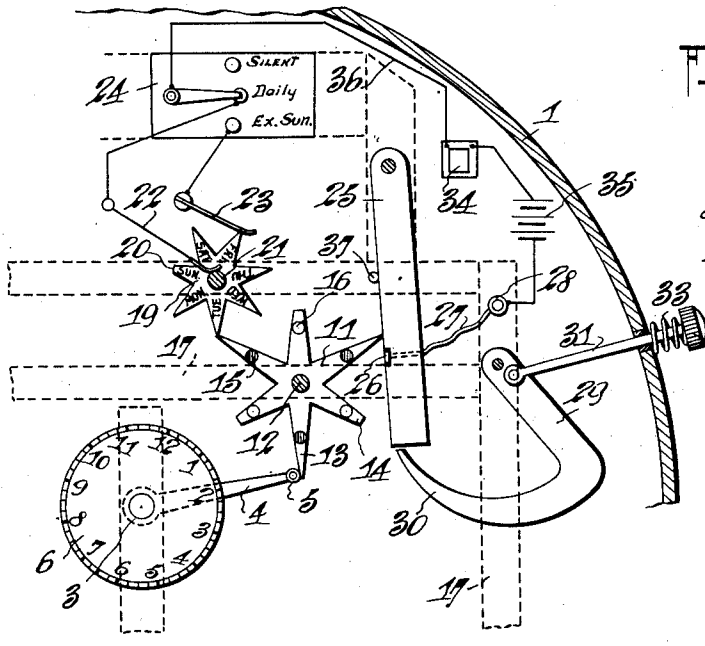



Fig. 4.

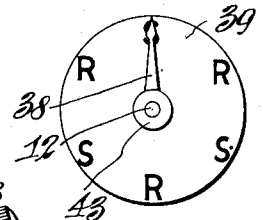
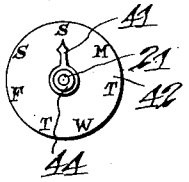



Fig. 2.

Fig. 5.



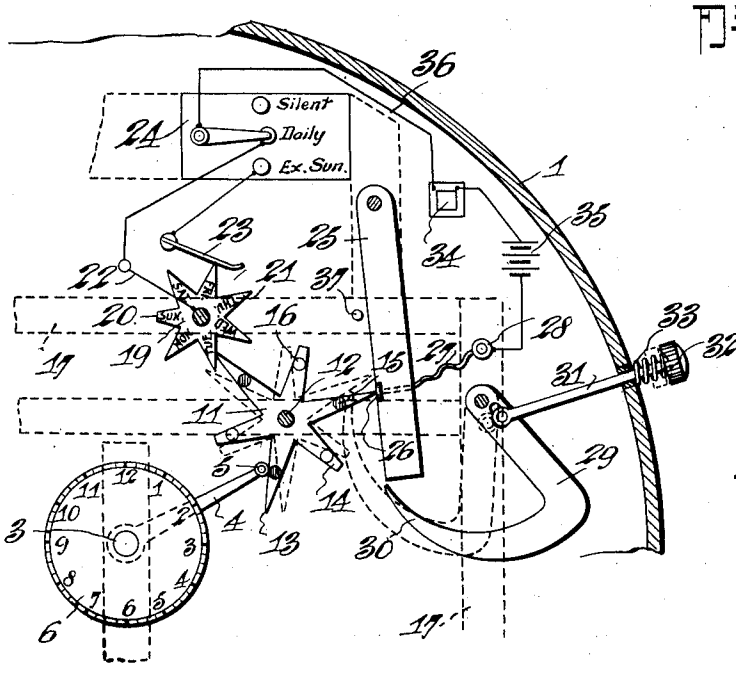




Fig. 3.

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# UNITED STATES PATENT OFFICE

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## ELECTRIC ALARM CLOCK

Application filed February 17, 1931. Serial No. 516,419.

My invention relates to certain new and useful improvements in time operated signalling circuits employed generally for giving an alarm, though it may be used with other types of signalling circuits, for example the invention may be used to close the circuit of a radio turn-off switch or to turn on or off a system of lighting at a given time, the invention, however, being particularly designed for alarm purposes.

Generically, the invention consists in combining with a suitable clockworks of the kinds now well known, either mechanical or electrical, a mechanism for making and breaking an alarm circuit, which mechanism is designed to be operated by an arm mounted on the hour shaft of the clock and possessing means by which an electric circuit is closed at every other actuation of the mechanism by the arm.

Further, the invention has for its object to provide a mechanism of the character stated above which will also cause an ordinary alarm action by said means to be counteracted or cancelled at stated intervals, thereby preventing the giving of the signal even through the circuit closing means, which acts at every other revolution of the arm, is actuated as usual.

Further, it is an object to provide an electrical alarm clock to give an alarm only at stated times of day and only over a predetermined number of consecutive days.

Further, it is an object to provide an alarm circuit closer whose movable circuit closing means operates step-by-step fashion at a constant rate of speed through cooperation of the hour shaft of a clockworks in order to keep the circuit closed for a definite period each time, but with means provided by which the user may manually speed up the step movement to open the circuit sooner than it is automatically opened, all without disturbing subsequent normal operations of the mechanism.

Other objects will in part be obvious and in part be pointed out hereinafter.

To the attainment of the aforesaid objects and ends, the invention still further resides in the novel details of construction, combination and arrangement of parts, all of which will be first fully described in the following detailed description, then be particularly pointed out in the appended claims, reference being had to the accompanying drawings, in which:—

Figure 1 is a face view of an electric alarm clock embodying my invention.

Figure 2 is a diagrammatic view of the working parts after an alarm signal has been given and the circuit has automatically been opened.

Figure 3 is a similar view of the parts shown in Figure 2 at the instant the alarm circuit is closed, and showing in dotted lines how the finger operated push button device may be employed to accelerate the movement of the circuit closing star wheel, thereby manually cancelling a part of the alarm time.

Figure 4 is a diagrammatic view of a modified indicator for the six-point star wheel.

Figure 5 is a diagrammatic view of a modified indicator for the seven-point star wheel.

Figure 6 is an enlarged detail section showing one way of placing the actuating arm on the hour shaft of the clockworks.

Figure 7 is an elevation of the combined dial and setting knob.

Figure 8 is a detail section showing one way of mounting the arbor shafts in insulated bearings.

In the drawings in which like numerals of reference indicate like parts in all of the figures, 1 represents the clock which may be of the ordinary kind and which is provided with a minute shaft 2 and an hour shaft 3 and with a suitable dial 7 and the usual hour hand 8 and minute hand 9.

4 designates the actuating arm for the alarm mechanism which carries a roller 5 of fiber or other suitable insulation and has a small dial 6 graduated in hours, the purpose for which will presently appear.

The arm 4 has a split friction clamp 45 by means of which it is secured to the hour shaft 3 with retaining friction sufficiently tc permit operation of the star wheels and also to allow for the arm 4 to be manually turned on the hour shaft when it is desired to set the alarm for operation at any particular

hour as will hereinafter be more clearly explained.

11 is a six-point star wheel, the arbor 12 of which is journalled in suitable bearings in the frame portion 17, which latter is held insulated from the frame of the clockworks, or the bearings for the arbor 12 are suitably insulated against electrical conductivity (see Figure 8).

The star wheel 11 has three long points 13 and three truncated or short points 14 alternating with the long points, and the star wheel is so arranged that it will be moved one step by engagement of the roller 5 with it once in each twelve hours. The long points are provided with suitably colored indicators as at 15 and the short points with other colored indicators 16 which are visible one at a time through the window 18 in the front of the clock so that one can tell thereby whether or not the next operation will be an alarm or a blank.

19 designates a seven-point star wheel, one point for each day of the week. This star wheel is provided with a short or truncated point 20, the purpose of which is to effect a skip operation once per week.

The points of the star wheel represent the several days of the week and the short or truncated point represents the skip day, i. e., the day on which the alarm is not to be operated, as for example Sunday.

The arbor 21 of the seven-point star wheel 19 is mounted in suitable insulated bearings when the frame 17 is not insulated from the clockworks. 22 is a contact brush which constantly engages the arbor 19 and 23 is a second contact brush which engages the periphery of the star wheel and thereby cooperates with the long points only of the star wheel 19.

24 is a two-point switch, the points of which are respectively connected to the brushes 22 and 23 while the lever of which is connected to the alarm circuit 36 in which is included a suitable source of energy 35 and a suitable actuating device (as a buzzer for example) 34.

25 designates a gravity held contact lever adapted to lie by gravity into the path of movement of the long points 13 of the star wheel 11 but prevents it from being engaged by the short points thereof because of its movement being limited by a suitable stop 37. The lever 25 is provided with an insulated contact segment 26 in that face which is located for engagement by the long points 13 of the star wheel 11, and the insulated contact 26 is electrically connected by a flexible connection 27 with the terminal post 28 that connects to the circuit 36.

29 is an alarm shut-off lever whose finger 30 is adapted at times to engage the points of the star wheel 11 to hasten the movement thereof for the purpose of breaking the alarm circuit. Normally, however, the lever 29 is prevented from functioning because of the position of the lever 25 being such that the end of the finger 30 would engage the end of the lever 25 as a stop. The lever 29 is operated by a push rod 31 having a button head 32 and provided with a return spring 33.

In Figure 4 I have shown a modification of the indicator for the six-point star wheel. In this embodiment of the invention instead of having the window 18 the arbor 12 of the star wheel carries a pointer 38 which travels over a suitable dial 39 having indicating references as S, R, S, R, etc. arranged around the dial to indicate "Silent" and "Ring". The position of the lever 38 with respect to these indicating characters discloses to the observer whether or not the next action of the device will be a signal or whether the device will remain silent.

In Figure 5 is shown a modification of the indicator for the seven-point star wheel. Instead of having a window 40 through which the points of the star wheel are visible as in the first embodiment of the invention, the arbor 21 may be provided with a pointer 41 to travel over a dial 42 having the days of the week indicated by the letters S, M, T, W, etc. The pointer 41 being arranged to correspond with the truncated point of the star wheel will indicate one day of the week the alarm will be silent.

The arbors 12 and 21 respectively may be provided with knobs 43 and 44, by movements of which the respective star wheels may be turned independently for setting purposes. The arm 4 is so disposed with reference to the numbers on the dial 6 that when these figures align with those on the clock face 7 one of the long points on wheel 11 will engage the contact point 26 on lever 25 and close the circuit 36.

So far as described the manner in which my invention operates may be explained as follows:—

Assume that at the hour of 9.00 P. M. on Wednesday it is desired to set the alarm to operate at 5.30 A. M. each day except Sunday. Operator sets switch to point "Ex. Sunday". Operator then turns dial 6 in a clockwise direction until daily indicator at window 40 shows Wednesday and indicator at window 18 shows alarm or ring. Continue turning dial 6 until the point half way between 5 and 6 is directly underneath the hour hand. However, if the time of setting is earlier than 5.30 P. M. or earlier than the time the alarm is desired stop dial 6 when the indicator in window 18 shows silent, in which case the alarm will not operate at the next period set for, which would be at 5.30 P. M. on the day of setting.

Now when the time for the alarm to ring is approached the roller 5 will engage a point of the star wheel 11 to move it one step. This movement, of course, taking place through a

definite time interval as for instance a half hour. At one point in the step of the star wheel 11 the long arm 13 will engage the lever 25, moving it outwardly, and as the contact 26 is reached causes the alarm circuit to operate the buzzer 34. The length of time the buzzer 34 is permitted automatically to operate will depend on the length of the contact strip 26. As soon as the alarm circuit is closed by 13 engaging 26 the user may instantly open the circuit by pushing the button 32. Since the lever 25 has been moved outwardly the end of the finger 30 will pass between the lever and star wheel and engage one of the points thereof to move it to the completion of its step. This movement, however, does not disturb the position of the star wheel 11 for actuation by the roller 5 the next time it comes around.

As will be seen the alarm circuit will be closed but once in twenty-four hours even though the star wheel is given two steps in that time by the roller 5 passing it twice in twenty-four hours. Every other step of the star wheel 11 imparts one step to the star wheel 19. The arm 4 having been once positioned no further attention is necessary in order that the alarm may be actuated at the same hour each day. If the two-point switch 24 has its lever on the point which is connected with the brush 23 then when the short point 20 of the star wheel 19 comes around under the brush no circuit connection will be made and consequently, even though the circuit be closed between 13 and 26 on that day, no actuation of the alarm 34 will occur. It is obvious that by turning the star wheel 19 manually to change its relation to the star wheel 11 the blank day may be made for any day of the week desired. If, instead of operating the alarm at 5.30 o'clock in the morning (the position for which the arm 4 was set) it be desired to operate it at 5.30 o'clock in the afternoon, it will only be necessary for the operator to turn the star wheel one step by means of the knob on the arbor 12.

Numerous changes in the details of construction and arrangements of parts may be made without departing from the spirit of the invention as defined in the accompanying claims, and while the invention has been particularly designed as an alarm for the purposes of automatically repeating the alarm each day over a definite period of days, it is obvious that it may also be used for closing other electrical circuits such for example as are employed to turn radio apparatus off and on, or to actuate the locks on safe doors, etc.

I therefore do not wish to have it understood that my invention is limited to the operation merely of alarms.

If it be desired that the alarm shall ring each day of the week without skipping the day, the lever of the two-point switch 24 is moved to engage that contact which is connected to the brush 12.

From the foregoing description, taken in connection with the accompanying drawings, it is thought the complete construction, operation and advantages of my invention will be clear to those skilled in the art to which it relates.

What I claim is:

1. In combination with a clock having an hour shaft, an electric alarm circuit including an alarm and a source of energy; a star wheel in said circuit having alternately disposed long and short points, the long points only being adapted to act as contact makers, a contact carrying member in the alarm circuit and arranged to be engaged by said long points as the star wheel is turned step-by-step, an arm on said hour shaft to turn said star wheel step-by-step, a second star wheel in said circuit having a definite number of points corresponding to a fixed number of days and operated by said first mentioned star wheel one step in twenty-four hours, and a second contact member in said alarm circuit cooperating with said second star wheel.

2. In combination with a clock having an hour shaft, an electric alarm circuit including an alarm and a source of energy; a star wheel in said circuit having alternately disposed long and short points, the long points only being adapted to act as contact makers, a contact carrying member in the alarm circuit and arranged to be engaged by said long points as the star wheel is turned step-by-step, an arm on said hour shaft to turn said star wheel step-by-step, a second star wheel in said circuit having a definite number of points corresponding to a fixed number of days and operated by said first mentioned star wheel one step in twenty-four hours, one of the points of said second star wheel being short, and a second contact member in the alarm circuit arranged to be engaged by the long points only of said second star wheel.

3. In combination with a clock having an hour shaft making one revolution in twelve hours, an alarm circuit, and means in said circuit actuated by an arm on said hour shaft for closing the alarm circuit once only in twenty-four hours, said means comprising a star wheel in said alarm circuit step-by-step rotated by the arm on said hour shaft and a contact member also in said alarm circuit and actuated at alternate steps of said star wheel to close the alarm circuit for a definite time interval, and manually controlled means to accelerate the action of said star wheel to reduce said definite interval of time without disturbing the actuation of the alarm at subsequent intervals.

4. In combination with a clock having an hour shaft making one revolution in twelve hours, an alarm circuit, and means in said circuit actuated by an arm on said hour shaft

for closing the alarm circuit once only in twenty-four hours, said means comprising a star wheel in said alarm circuit step-by-step rotated by the arm on said hour shaft and a contact member also in said alarm circuit and actuated at alternate steps of said star wheel to close the alarm circuit for a definite time interval, and manually controlled means to accelerate the action of said star wheel to reduce said definite interval of time without disturbing the actuation of the alarm at subsequent intervals, said means comprising an actuator operated by manual control to engage and expedite the movement of said star wheel through its step interval.

5. In combination with a clock having an hour shaft making one revolution in twelve hours, an alarm circuit, and means in said circuit actuated by an arm on said hour shaft for closing the alarm circuit once only in twenty-four hours, said means comprising a star wheel in said alarm circuit step-by-step rotated by an arm on said hour shaft and a contact member also in said alarm circuit and actuated at alternate steps of said star wheel to close the alarm circuit, and means to blank the alarm action one day each week, the same comprising a second star wheel having seven points, one being shorter than the others, and a contact member in the circuit arranged to engage only the long points of the second star wheel.

6. In combination with a clock having an hour shaft, an electric alarm circuit including an alarm and a source of energy; a star wheel circuit closer in said circuit having alternately disposed long and short points, the long points only being adapted to act as contact makers, a contact carrying member in the alarm circuit and arranged to be engaged by said long points as the star wheel is turned step-by-step, an arm on said hour shaft to turn said star wheel step-by-step one step each twelve hours, a second star wheel in said circuit having a definite number of points corresponding to a fixed number of days and operated by said first mentioned star wheel one step in twenty-four hours and a second contact member in said alarm circuit and cooperating with said second star wheel for the purposes specified.

7. In combination with a clock having an hour shaft, an electric alarm circuit including an alarm and a source of energy; a star wheel circuit closer in said circuit having alternately disposed long and short points, the long points only being adapted to act as contact makers, a contact carrying member in the alarm circuit and arranged to be engaged by said long points as the star wheel is turned step-by-step, means on said hour shaft to turn said star wheel step-by-step, one step in each twelve hours, and manually operated means for accelerating the step of said star wheel to thereby open the circuit again.

8. In combination with a clock having an hour shaft, an electric alarm circuit including an alarm and a source of energy; a star wheel circuit closer in said circuit having alternately disposed long and short points, the long points only being adapted to act as contact makers, a contact carrying member in the alarm circuit and arranged to be engaged by said long points as the star wheel is turned step-by-step, means on said hour shaft to turn said star wheel step-by-step, one step in each twelve hours, and manually operated means for accelerating the step of said star wheel to thereby open the circuit again, said actuator at those times when the star wheel is at rest having its activity stopped by said contact carrying member.

9. In combination with a clock having an hour hand shaft which makes one revolution each twelve hours; an arm secured to said shaft to move with it, an alarm circuit including a step-by-step wheel actuated by said arm one step in every twelve hours, means in said circuit controlled by said wheel for closing the circuit at every other step of the wheel, a second step-by-step wheel in said circuit operated by the first step-by-step wheel one step at every other step of the wheel, said second step-by-step wheel having means to cause a skipping of the circuit closing act once in each revolution of said second wheel.

LUCIUS A. LINDSEY.