Oct. 31, 1933. A. W. FOWLER 1,932,774

ELECTRIC CLOCK

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Fig. 1.

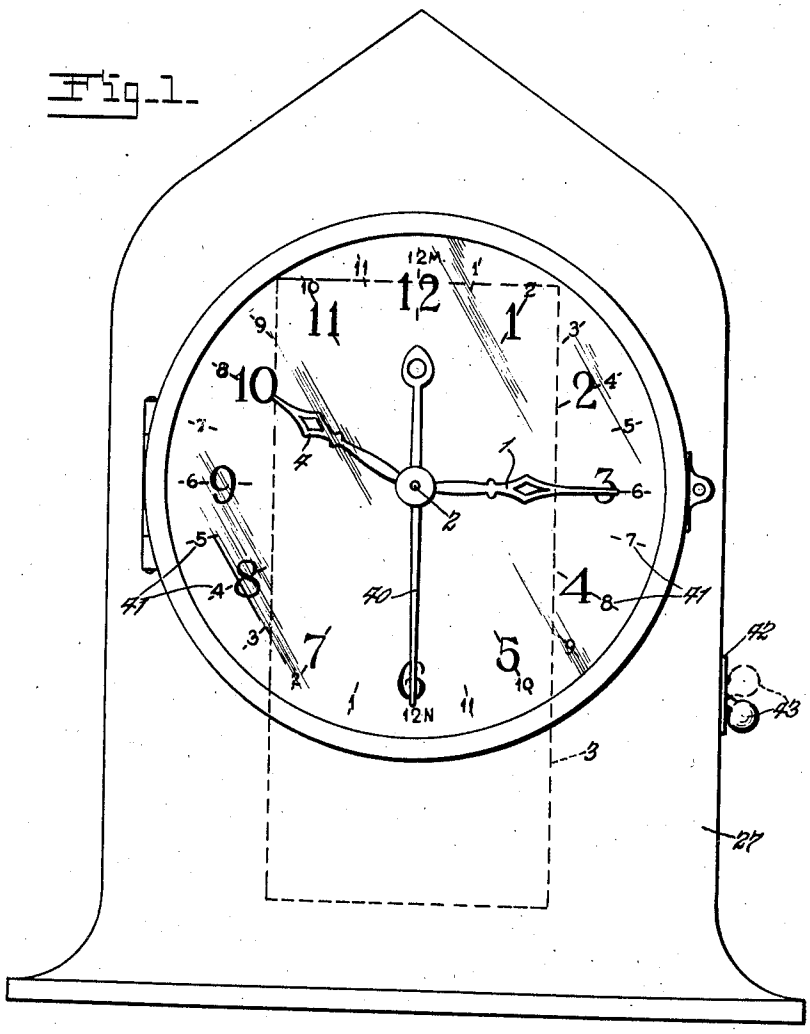
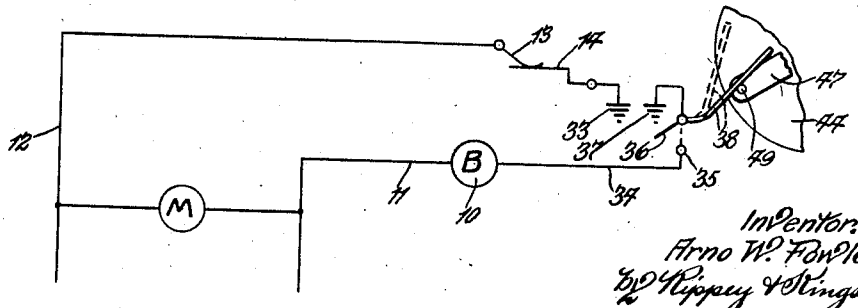


Fig. 2.



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Fig. 3.

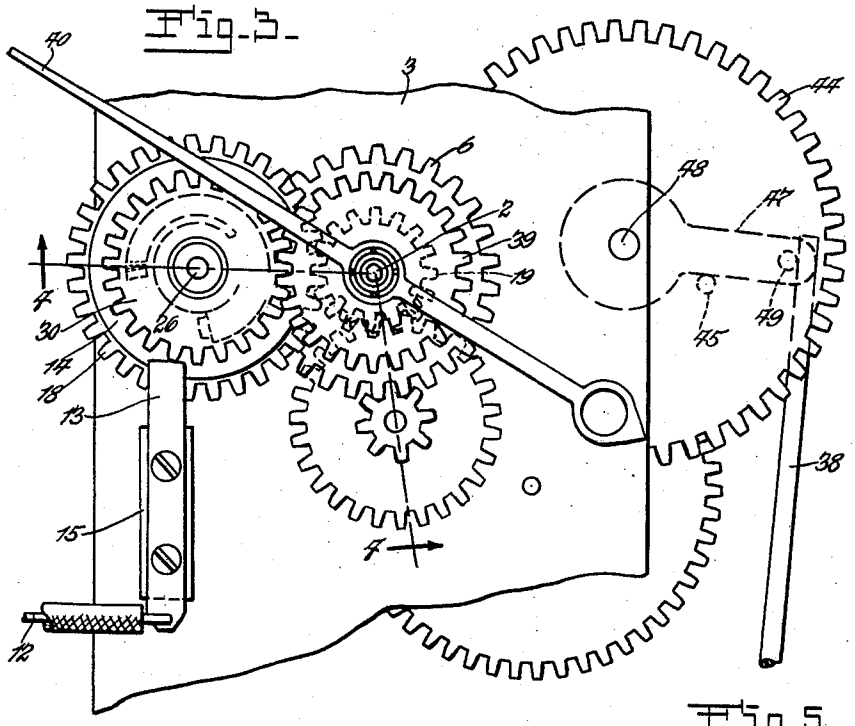


Fig. 4.

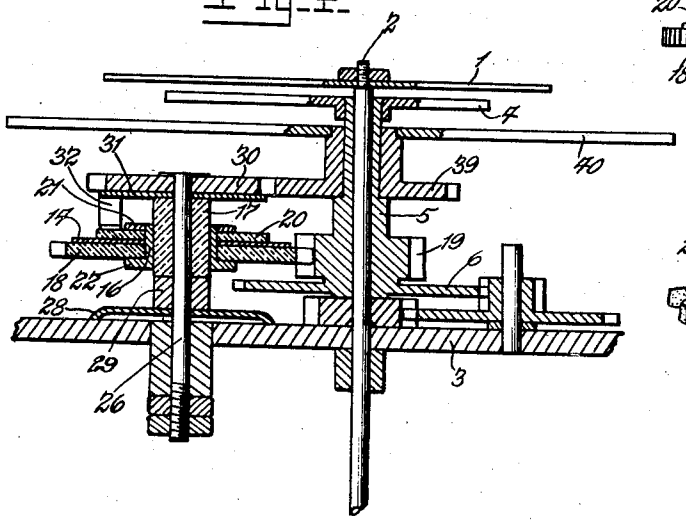


Fig. 5.

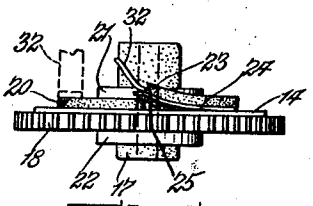
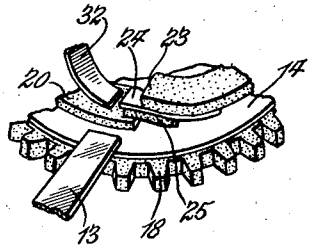


Fig. 6.



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Fig. 7.

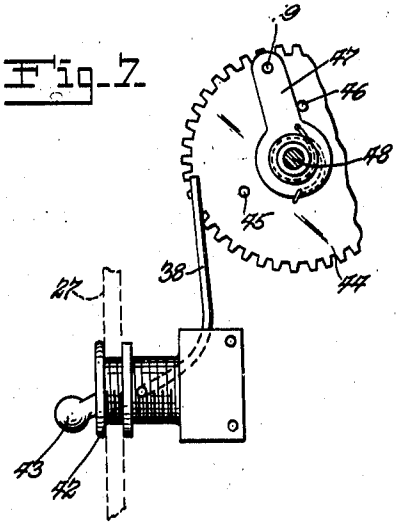


Fig. 9.

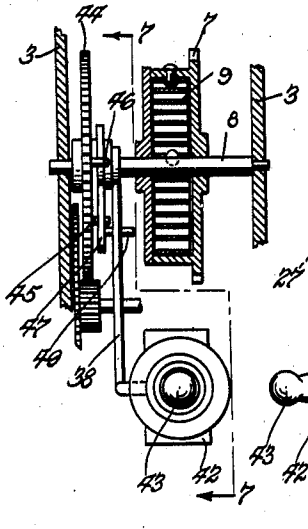
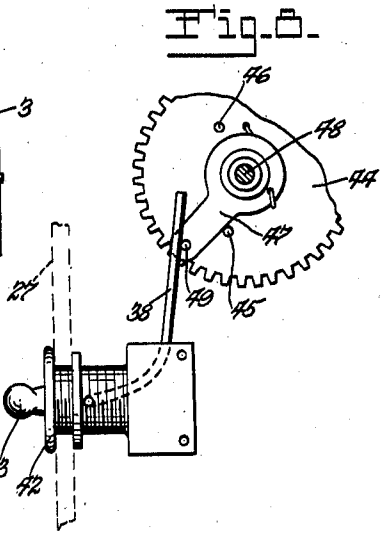


Fig. 8.



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UNITED STATES PATENT OFFICE

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ELECTRIC CLOCK

Arno W. Fowler, Highland, Ill.

Application November 8, 1929. Serial No. 405,834

3 Claims. (Cl. 161—1)

This invention relates to electric clocks and has special reference to alarm mechanisms for embodiment in electric clocks and consists in the novel construction, arrangement and combination of the parts operated by the time indicating mechanism of the clock for operating an electric alarm device in accordance with the predetermined condition and at a predetermined time at the will of the user.

An object of the invention is to provide an improved alarm operating mechanism comprising devices for opening and closing an electric circuit operated by the time indicating mechanism of the clock, and improved optionally settable means for causing the time indicating mechanism of the clock to operate the alarm mechanism at any desired future time within the capacity of the clock.

Another object of the invention is to provide an alarm mechanism of the character and type mentioned, in combination with means under control of the user for stopping the operation of the alarm independently of the time indicating mechanism.

Other objects of the invention are to provide an improved electric clock possessing any or all of the improved features and advantages herein disclosed, reference being made to the accompanying drawings in which—

Fig. 1 is a front elevation of a clock showing particularly the setting device for the alarm and the stop switch.

Fig. 2 is a diagrammatic view of the electric circuit and the switches therein for controlling operation of the alarm.

Fig. 3 is an enlarged view showing the mechanism for setting the alarm controlling switch for operation by the time indicating mechanism after a predetermined interval of time.

Fig. 4 is a sectional view approximately on the line 4—4 of Fig. 3.

Fig. 5 is a side elevation of the manually settable switch that is operated by the time indicating mechanism of the clock to operate the alarm.

Fig. 6 is a fragmentary perspective view of the switch device shown in Fig. 5.

Fig. 7 is a side elevation of the switch that is manually operative to open the circuit and stop the alarm and that is also operative by the winding mechanism to close the circuit for operation at the same time that the switch shown in Figs. 5 and 6 is closed by the time indicating mechanism; and is seen approximately from the line 7—7 in Fig. 9.

Fig. 8 is a view similar to Fig. 7 showing another position of the switch and the device for operating said switch by the winding mechanism of the clock.

Fig. 9 is a side elevation of the switch shown in Fig. 7 and a sectional view of a spring device that operates the time indicating mechanism.

The time indicating mechanism of the clock comprises a minute hand 1 attached to the end of a rotary shaft or spindle 2 supported in any suitable manner by the clock frames 3. The hour hand 4 is attached to and operated by the hub 5 of a gear wheel 6 mounted on the shaft of spindle 2 for independent rotation. The shaft or spindle 2 and the gear wheel 6 are independently rotated by trains of gearing operated by the gear wheel 7 rotatively supported by a shaft 8 and rotated about said shaft by a clock spring 9. These trains of gearing for rotating the shaft 2 and the gear wheel 6 by the gear wheel 7 are not specifically shown, as such mechanism is well known and the specific form of these trains of gears is immaterial. In fact, the shaft 2 and the gear wheel 6 may be rotated by any suitable or known mechanism, including synchronous motor clocks.

This clock includes an alarm device mounted in any convenient location and this alarm is shown in Fig. 2 and comprises a bell 10. This bell may be of the usual familiar type to be operated by an electromagnet to one side of which the electric circuit wire 11 is connected. The other electric circuit wire 12 leads to connection with a resilient metallic brush 13, one end of which presses against a metallic disc 14 which is brought into and out of circuit with the opposite side of the electromagnet for the bell 10 at predetermined times at the option of the user of the clock. The wires 11 and 12 lead to a motor M that may be used to wind the clock by appropriate connections.

In the embodiment of the invention shown, the brush 13 is mounted on an insulation support 15 and the metallic disc 14 is mounted on a hub 16 supported for rotation on a hub 17 of insulating material. Thus, the disc 14 and the hub 16 are insulated from the remaining parts of the clock other than the brush 13 until the time indicating mechanism cooperates with the disc 14 to close the circuit to the magnet for operating the bell 10.

The disc 14 is rigid with a gear wheel 18 that is composed of fiber, or other appropriate insulating material, and which meshes with and is driven by a pinion 19 integral or in rigid connection with the gear wheel 6 and the hub 5. It

is now clear that the gear wheel 18 is rotated at proper speed with the hour hand 4 of the clock, and is rotated by the same mechanism that rotates said hour hand 4.

A disc or ring 20 is composed of fiber, or other insulating substance, and is mounted in rigid connection with the metallic disc 14 and the insulation gear wheel 18, so that said parts 14, 18 and 20 rotate together. The parts 14, 18 and 20 are clamped and secured together by a ring or washer 21 attached to one end of the hub 16, which cooperates with the flange 22 on the opposite end of the hub 16 for this purpose. As clearly shown in Fig. 4, the parts 14, 18 and 20 are clamped between the parts 21 and 22, which are rigid with the hub 16.

The ring 20 is a split ring having one end 23 (Figs. 5 and 6) twisted or bent laterally away from and out of alinement with the opposite end of the ring 20 which is flat against the metallic disc 14. A metallic piece 24 extends between the disc 14 and the end 23 of the ring 20 and is in permanent contact with the disc 14. This metallic piece 24 projects beyond the end 23 of the ring 20 and overlaps, but is spaced from, the opposite end of the ring 20, as clearly shown in Figs. 5 and 6 of the drawings. This projecting end of the piece 24 is held at a distance from the end of the ring 20 which it overlaps by an interposed piece of insulation 25. The metallic piece 24 projects beyond the insulation piece 25 and constitutes part of the mechanism controlled by the time indicating mechanism of the clock for closing the circuit to the alarm device 10. It is now apparent that the metallic piece 24 is rotated with the metallic disc 14 and that both of said parts are rigid with the insulation gear 18 and are insulated from the remaining mechanism of the clock other than the brush 13.

The insulation hub 17 is mounted loosely on a shaft 26 supported by the clock frame structure 3. A spring device 28 is loosely mounted on the shaft 26 and by engaging the frame structure 3 exerts pressure against the abutment 29 rigid on the shaft 26. The spring device 28 is sufficient to hold the shaft 26 from displacement longitudinally. The abutment 29 does not engage nor retard the rotation of the hub 17. Therefore, the spring device 28 does not interfere with the rotation of the wheel 18 by the entrained part of the time indicating mechanism. The shaft 26 is in electrical communication with the frame structure 3 of the clock.

A metallic gear wheel 30 is attached to the shaft 26 and is rigid with a metallic ring 31 having a resilient metallic tongue 32 extending laterally and being of sufficient length and possessing a sufficient degree of resiliency to contact at all times with the ring 20 and to snap from the laterally bent end 23 of said ring 20 to contact with the metallic piece 24 so as to form electrical communication from the metallic disc 14 to the metallic frame structure 3 of the clock. The wheel 30 is not rotated by the time indicating mechanism of the clock but is manually settable so that this electrical communication from the disc 14 to the metallic frame structure 3 of the clock will be established at any predetermined time and automatically and as an incident to the operation of the time indicating mechanism of the clock. It is now clear that the structure above described establishes a ground 33 (Fig. 2) to the clock frame.

The electromagnet signal device 10 is not grounded to the clock frame except through a switch device provided for that purpose. A wire 34 from the opposite side of the electromagnet from the wire 11 leads to a contact member 35 that is insulated from the clock frame. A switch member 36 is in electrical communication with the clock frame through a ground 37 and is movable by a lever 38 into and out of contact with the contact member 35, so as to close and to open the circuit. When electrical communication to the clock frame is established by operation of the time indicating mechanism which brings the metallic piece 24 into contact with the metallic tongue 32, it is clear that, if the switch 36 be in closed position, a circuit to the electromagnet signal device 10 is established, and said signal device will be operated. Said operation of the signal device will continue until the time indicating mechanism of the clock moves the metallic piece 24 beyond and out of contact with the metallic tongue 32 or until the switch 36 be opened. Provision is made for opening the switch manually and optionally and for closing the switch automatically or manually.

The gear 30 meshes with a gear wheel 39 loosely mounted on the hub 5 for independent rotation about said hub. A pointer 40, which also constitutes a lever or handle, is attached to the gear wheel 39 and operates in front of the dial of the clock to cooperate with the dial indications 41 so as to indicate to the operator the proper adjustment of the mechanism, so that the alarm will be operated at any predetermined time. Thus, by manually engaging and operating the pointer 40, the gear wheel 30 may be turned to any desired extent, so as to locate and position the resilient tongue 32 in a relationship to the metallic piece 24 whereby said metallic piece 24 will, after a predetermined interval, be brought into contact with the tongue 32, so as to close the circuit to the electromagnet signal device 10 and cause said signal device to operate in the well understood manner.

The switch member 36 constitutes a part of the switch device of familiar construction and includes a housing 42 rigidly secured to the clock case structure 27. The switch device comprises a lever 43 movable upwardly to one position to place the switch member 36 into contact with the contact member 35. The switch member 36 is grounded to the frame structure 3 of the clock while the contact member 35 is insulated from the frame structure of the clock. By operating the lever 43 downwardly to the position shown in Fig. 7, the switch 36 is moved to open position out of contact with the contact member 35, so that the magnetic signal device 10 will not operate.

A gear wheel 44, included in the constantly operating mechanism of the clock and which is in constant rotation when the clock is running, supports two laterally projecting pins 45 and 46 between which extends an arm 47 pivoted on the shaft 48 that supports the wheel 44. The lever 38 extends into the path of movement of a pin 49 projecting laterally from the arm 47. It is now clear that the arm 47 will be rotated by the wheel 44. The relationship of the pin 49 to the lever 38 is such that once during each revolution of the wheel 44 the pin 49 will be brought into operating contact with the lever 38 and will operate said lever 38 effectively to close the switch 36—35. Thus, some time after the switch 36—35 has been opened by manual operation of the lever 43, said switch 36—35 will be closed automatically and as an incident to the running of the clock. This is because the pin 49 is operated by the con-

stantly rotating wheel 44 effectively to engage and operate the lever 38, so as to close said switch 36—35. This exemplifies an embodiment of means for automatically conditioning the clock for subsequent automatic operation of the magnetic signal 10 at any time at which the device 40 is set to cause said operation.

In operation of this alarm mechanism, it is now clear that the mechanism for operating the hour hand 4, and comprising the hub 5 with which the pinion 19 is rigid, is in constant operation. The pinion 19 constantly rotates the gear wheel 18, so that, after any predetermined period of time, the metallic contact member 24 will be carried around and into contact with the resilient brush 32. The electric circuit wire 12 is thereby placed in electrical communication with the frame structure 3 of the clock, as indicated at 33 in Fig. 2. The switch member, being in electrical communication with the frame structure 3 of the clock, as indicated at 37 in Fig. 2, and also being in contact with the contact member 35, will energize and operate the magnetic alarm device 10. This magnetic alarm device 10 will be operated because the wire 11 leads to one side thereof and the wire 34 from the contact member 35 leads to the other side of said magnetic alarm device. The alarm will continue to operate until the gear wheel 18 is rotated a distance sufficient to carry the metallic contact member 24 beyond and out of contact with the stationary tongue 32. However, the alarm may be stopped by opening the switch 36—35, for which purpose the manually operated lever 43 is provided. The switch 36—35 will be closed automatically and as an incident to the running of the clock because the wheel 44 is in constant rotation and will rotate the arm 47, causing the pin 49 on said arm 47 to engage and operate the switch lever 38, which also controls the switch member 36. The switch lever 38 will be operated by the pin 49 a sufficient distance to cause the switch 36 to move into contact with the contact member 35. Thus, the clock is conditioned for another operation of the alarm, which will occur at the predetermined time or hour indicated by the pointer 40 on the dials 41. The hour of operation of the alarm may be varied optionally by turning the pointer 40 to any hour on which it is desired to operate the alarm. The alarm may be caused to operate at any time of the day or night.

The construction, arrangement and relationship of the elements of this invention may be widely varied without departure from the nature and principle of the invention. I contemplate such variations as will make the best adaptation of the invention for the embodiment in which it is to be used, and many such variations will be readily suggested to those skilled in this art. I do not restrict myself in any unessential respects, but what I claim and desire to secure by Letters Patent is:

1. Mechanism of the character described comprising an electrically operative device, a dial, an electric circuit wire in connection with one side of said device, a second electric circuit wire in connection with the opposite side of said device, a constantly rotating contact member, a stationary contact member, a spindle, devices rotative about said spindles as an axis and co-operating with said dial to indicate the time and for changing the position of said rotating contact member with respect to said stationary contact member to vary the period of time required for said members to make contact, an additional device rotative about said spindle as an axis in co-operative relation to said dial for changing the position of said stationary contact member with respect to said rotating contact member to vary the period of time required for said members to make contact and for indicating on said dial the time at which said members will make said contact, means for establishing electrical communication between said two contact members once during each revolution of said rotating contact member after the period of time determined by the relative positions of said contact members, and means establishing electrical communication from said stationary contact member to said second electric circuit wire.

2. Mechanism of the character described comprising an electrically operative device, a time indicating dial, an electric circuit wire in connection with one side of said device, an additional electric circuit wire in connection with the opposite side of said device, a stationary contact member, means for establishing electrical communication from said stationary contact member to said additional electric circuit wire, a constantly rotating contact member, a spindle, elements rotative about said spindle as an axis and cooperating with said dial to indicate the time and being operable to rotate said rotating contact member to vary the period of time required for said members to make contact, and means rotative about said spindle as an axis for setting said stationary contact member in different selected positions for electrical communication with said rotating contact member after different intervals of time and cooperating with said dial to indicate the time at which said contact members will make contact as aforesaid.

3. Mechanism of the character described comprising an electrically operative device, a time indicating dial, an electric circuit wire in connection with one side of said device, an additional electric circuit wire in connection with the opposite side of said device, a stationary contact member, means for establishing electrical communication from said stationary contact member to said additional electric circuit wire, a constantly rotating contact member, a constantly rotating spindle, an element mounted on and rotative about and relative to said spindle, devices supported and operated by said spindle and said element respectively and cooperating with said dial to indicate the time, means for rotating said constantly rotating contact member by said element and causing said rotating contact member to make contact with said stationary contact member once during each revolution of said rotating contact member, and means supported by and rotative about said element for moving said stationary contact member to different selected positions for electrical communication with said rotative contact member after different intervals of time and cooperating with said dial to indicate the time at which said contact members will make contact as aforesaid.

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