

May 24, 1927.

B. NEWTH ET AL

1,630,207

MECHANISM CONTROLLING ALARMS IN CLOCKS

Original Filed Nov. 26, 1923

2 Sheets-Sheet 1

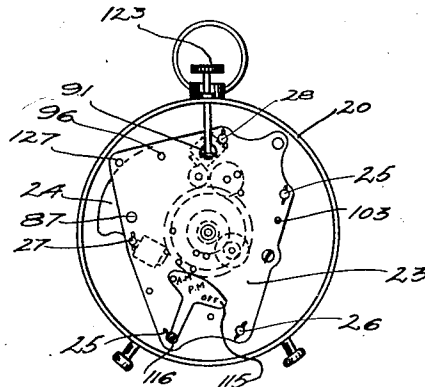
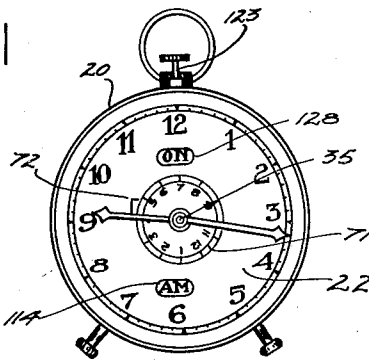
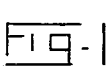


Fig. 2.

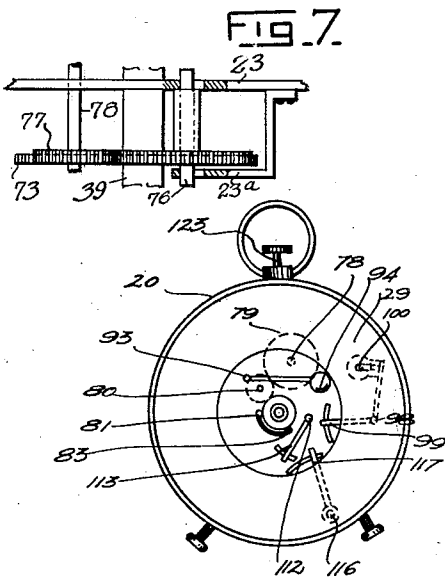


Fig. 3.

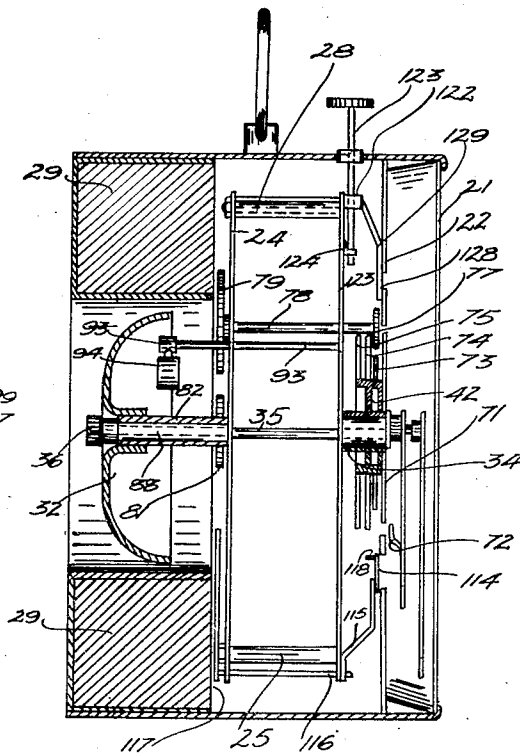
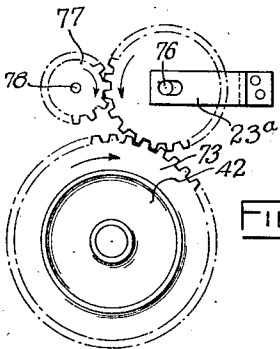


Fig. 4.

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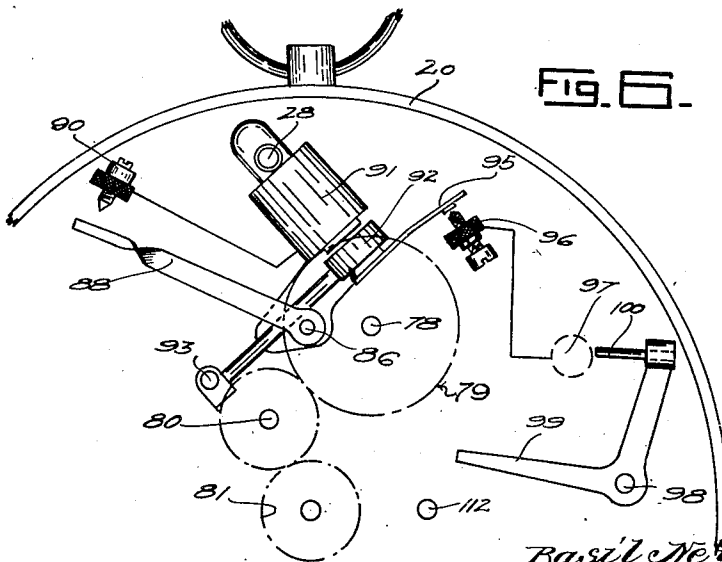
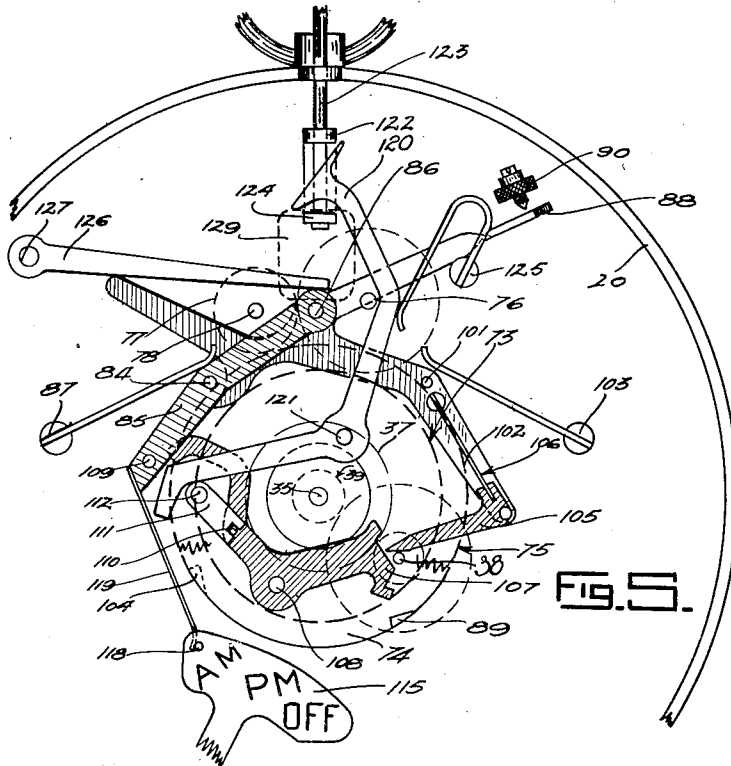
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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MECHANISM-CONTROLLING ALARM IN CLOCKS.

Original application filed November 26, 1923, Serial No. 677,048, and in Canada November 27, 1923.
Divided and this application filed August 16, 1924. Serial No. 732,477.

This invention relates to improvements in alarm mechanism for clocks and has for its object the provision of means whereby the mechanism may be set to cause the alarm to ring for only a limited period at one time and which may be so set that the alarm will be sounded at a predetermined time either antemeridian or postmeridian.

A further object of the invention is the provision of means whereby the alarm may be stopped while ringing and which, if left in the "off" position will be re-set by the alarm mechanism in order that the alarm may be free to sound at the time set.

Other advantageous features of the invention will appear from the following description.

The invention will be described with reference to the accompanying drawings, wherein:

Figure 1 is a front view of a clock embodying the invention;

Figure 2 is a front view of the clock shown in Fig. 1 with the dial and the greater part of the controlling mechanism behind the dial and in advance of the front plate of the framework of the movement removed;

Figure 3 is a rear view of the clock with the alarm bell removed;

Figure 4 is a vertical cross-sectional view of the clock with parts of both the time movement and of the alarm mechanism removed for the sake of clearness;

Figure 5 is a view in elevation showing the levers and other parts of the alarm mechanism which are associated with the front plate of the framework of the movement behind the dial of the clock;

Figure 6 is a view similar to Figure 5 showing further parts of the alarm mechanism disposed between the front and back plates of the framework of the movement as viewed from the rear of the clock;

Figures 7 and 8 are, respectively, a top plan view and a view in elevation showing the mounting of part of the gearing by means of which the time at which the alarm is to sound may be set.

20 designates the clock case, shown in the drawings as of cylindrical form, having an intumed flange at its forward end against which the usual circular glass 21 rests. Behind the glass and spaced from the latter by the usual spacing ring is the dial 22 and behind the dial is the framework of the

movement. This framework comprises a front plate 23 and a rear plate 24 spaced apart by posts 25, 26, 27 and 28 and is secured in the casing in any suitable manner.

The clock is shown as provided with an electrically actuated alarm mechanism, and the casing 20 is continued rearwardly of the back plate 24 of the framework a sufficient distance to receive a dry battery 29 which may be of the form shown and described in our U. S. Patent No. 1,589,211, dated June 15, 1926, and which comprises an annulus, preferably of rectangular cross-section, fitting closely within the casing and having its rear face flush with the rear end of the casing, as shown in Fig. 4.

The battery 29 has its casing, which forms its negative pole, in electrical contact with the interior of the case 20 and has the end of its carbon or positive pole projecting from its inner lateral face.

The hour-hand of the clock is carried by a sleeve 34 which extends from the front plate 23 of the movement framework through the dial 22. The minute hand is carried by a shaft 35 which extends through the sleeve 34 and through the front and rear plates 23 and 24 to the rear end of the case and is provided at its rear end with a knurled knob by means of which it may be turned to set the hands of the clock.

The time-keeping movement, which preferably is of the form disclosed in our application for U. S. patent, Serial No. 677,048, filed November 26, 1923, of which this is a division, may be mounted between the front and rear plates 23 and 24.

Mounted on the hour hand sleeve 34 and in frictional engagement therewith but rotatable thereon is a wheel 42 provided with a peripheral flange. Four thin rings 71, 73, 74 and 75 are secured to the peripheral flange of the wheel 42.

The ring 71 is adapted to rotate in a central opening in the dial 22 with its front face substantially flush with the front face of the latter, and its front face is marked off in hours and parts of hours, as is usual in clocks of this character. A pointer 72 carried by the rear side of the hour hand moves over the front face of the ring 71.

The ring 73, which is immediately behind the ring 71, has peripheral gear teeth which engage with the teeth of an intermediate wheel carried by a short spindle 76 extending

from the front face of the plate 23. The spindle 76 is movable, in a manner to be hereinafter described, to permit the gear wheel carried thereby to move into and out of mesh with a pinion 77 fast on a shaft 78 which extends through the front and rear plates 23 and 24 beyond the rear side of the latter plate and has a driving wheel 79 secured to its rear end. The wheel 79 meshes with a spacing wheel mounted on a post 80 carried by the rear face of the plate 24 and the latter wheel meshes with a driving pinion 81 which is fast on a sleeve 82 mounted to rotate on a sleeve 33 projecting rearwardly from the plate 24 and surrounding the minute hand shaft 35.

The spindle 76 is mounted in slots in the front plate 23 and a bracket 23^a carried by the front plate. The wheel carried by said spindle has a boss which is confined between the front plate 23 and the bracket 23^a so that, in the rotation of the ring 73 with the hour hand, said wheel is moved out of engagement with the wheel 77.

The alarm bell 32, which is mounted in the central opening of the annular battery 29, has a central sleeve of a diameter large enough to permit the passage of the knob 36 of the minute hand shaft therethrough and has internal screw threads which engage screw threads on the rear end of the sleeve 82.

By means of the mechanism just described, the bell 32, when rotated in a clockwise direction, will, through the sleeve 82, gear wheel 81, gear wheel on the post 80, gear wheel 79, shaft 78, pinion 77, and gear wheel carried by the spindle 76, rotate the ring 73 to set the alarm dial carried by the ring 73 at the hour and minute at which it is desired that the alarm shall be sounded. This will also rotate the wheel 42 and the rings 74 and 75 carried thereby for the purpose to be hereinafter set forth.

A spring pawl carried by a post 83 projecting rearwardly from the plate 24 is adapted to engage the teeth of the pinion 81 to prevent the turning of said pinion in a direction to cause rotation of the wheel 42 counter to the direction in which the hour hand of the clock is moving if it is sought to rotate the bell 32 in a counter-clockwise direction. Thus the bell 32, when turned in a direction counter to that necessary to turn the ring in the same direction in which the hour hand of the clock is moving, may be unscrewed from the sleeve 82 in order to obtain access to the mechanism behind the bell without causing rotation of the pinion 81.

A spindle 86 extends through the front plate 23 and has its rear end journaled in the rear plate 24. Secured to the forward end of the spindle 86 is a lever 85 (Fig. 5) which carries a pin 84 riding against the

ring 74. The pin 84 is held in contact with the edge of the ring 74 by a spring carried by a post 87 on the front face of the plate 23 and bearing against the lever 85. The ring 74 has a notch 89 in its periphery which is so shaped that, when in the rotation of the ring 74 said notch comes opposite the pin 84 of the lever 85, said pin will abruptly enter it and then be moved gradually outward.

Secured to the spindle 86 of the lever 85 and between the plates 23 and 24 of the movement framework is an arm 88 which, when the spindle 86 is rocked by the entry of the pin 84 into the notch 89 of the ring 74, will be moved into engagement with a fixed contact 90 carried by the rear face of the plate 23, but insulated from the latter. The contact 90 is electrically connected with one terminal of a double pole electro-magnet 91 of which the cores are carried by a metallic plate mounted on the spacing post 28.

A spindle 93, having its forward end journaled in the plate 23 and its rear end journaled in and projecting through the rear plate 24 carries on its forward end an arm upon which is mounted an armature 92 for attraction by the electro-magnet 91 when the latter is energized. The rear end of the spindle 93 carries a hammer 94 (Fig. 3) for the alarm bell 32.

As is usual in electric bell mechanism, means, such as a spring, is provided to move the armature 92 away from the electro-magnet 91 when said magnet is not energized, and mounted on the back of the armature 92 but electrically insulated therefrom is a contact spring 95 which is electrically connected to the other terminal of the magnet 91 and which, as the armature 92 moves toward and away from the magnet 91, makes and breaks contact with a contact 96 carried by but insulated from the front plate 23 and connected to a metallic plug 97 extending through the rear plate 24 opposite to the positive pole of the battery 29. A bell-crank lever 99, mounted on a post 98 carried by the front face of the plate 24 but electrically insulated from the latter, carries a pin 100 which, when said lever is rocked, enters between the rear end of the plug 97 and the positive pole of the battery 29 to close the electrical circuit from the battery to the contact 96.

A lever 102 is pivoted on the spindle 86 which carries the contact lever 85 and the arm 88 and lies between the lever 85 and the front plate 23. The lever 102 has an arm which, when said lever is rocked in one direction, engages the pin 84 of the lever 85 so as to rock the latter lever and break the electrical contact between the arm 88 and contact 90. The lever 102 carries a pin 101 which rides against the periphery of the

ring 75. A spring carried by post 103 mounted upon the plate 23 bears against the lever 102 to maintain the pin 101 in contact with the periphery of the ring 75, and the ring 75 has a notch 104 in its periphery which is so shaped that, when in the rotation of the ring 75 it comes opposite to the pin 101, said pin will abruptly enter the same and then be gradually moved outwardly to restore the lever 102 to normal position.

When during the rotation of the wheel 42 with the hour hand of the clock, the notch 89 of the ring 74 comes opposite the pin 84 of the lever 85, said pin will enter said notch and thus rock the lever 85, the shaft 86 and the arm 88 to close the electrical circuit to the electro-magnet 91 and thus energize said magnet. This causes the arm which carries the armature 92 to vibrate and the hammer 94 to ring the bell 32. But the angular relation of the notch 104 in the ring 75 to the notch 89 in the ring 74 and the location of the pin 101 of the lever 102 relatively to the pin 84 of the lever 85 are such that shortly after the pin 84 of the contact lever 85 has entered the notch 89 of the ring 74, the pin 101 of the lever 102 will enter the notch 104 of the ring 75, thus rocking the lever 102 into engagement with the pin 84 of the lever 85 and moving the arm 88 out of contact with the post 90 and breaking the electrical circuit to the magnet.

The spring which bears against the lever 102 exerts sufficient pressure against said lever to overcome the pressure exerted upon the lever 85 by the spring carried to the post 87. By reason of the frictional engagement of the wheel 42 with the sleeve of the hour hand said wheel together with the rings 71, 73, 74 and 75 make a complete revolution once every twelve hours. Consequently the pin 84 of the contact lever 85 will enter the notch 89 of the ring 74 once every twelve hours at the hour and minute at which the dial on the ring 71 is set, so that the alarm will be caused to sound at said hour and minute once every twelve hours unless prevented by means to be hereinafter described.

The means for setting the mechanism to permit the sounding of the alarm either "A. M." or "P. M." is constructed and operates as follows:

A bell crank lever 105 having its arms substantially at a right angle to one another is fulcrumed on one end of the lever 102. One arm of the lever 105 normally extends in the same direction as the arm of the lever 102 to which it is fulcrumed and has a slot in its end into which projects one end of a flat spring 106 of which the other end is secured to a post carried by the lever 102. This spring permits limited rocking movement of the lever 105. A bell crank lever

107, which is fulcrumed on a pin 108 carried by the plate 23, has a pair of notches in one end, which notches are alternately engaged by the pointed end of the lever 105 as the lever 102 is rocked. The other end of the lever 107 is adapted, when the lever 107 is rocked in one direction, to engage with the contact lever 85 to prevent movement of the latter, and, when the lever 107 is rocked in the other direction, to move out of engagement with the contact lever 85. Therefore, each time the lever 102 is rocked in the manner hereinbefore described the pointed end of the lever 105 will engage one of the notches in the end of the lever 107, and thus alternately move the other end of the lever 107 into and out of engagement with the contact lever 85, and, since the latter lever is rocked once every twelve hours, the lever 107 will be caused to engage with and prevent the movement of the contact lever 85 once in every twenty-four hours. A lug 110 on one arm of the lever 107 works in a slot in one end of an arm 111 secured to a spindle 112. The spindle 112 extends through the rear plate 24 and at the rear side of said plate 24 carries an arm 113 by means of which said shaft may be rocked. By rocking the shaft 112 the lever 107 may be rocked to change the position occupied by its slotted end relatively to the pointed end of the lever 105. In this way the lever 107 may set in such position that it will be caused to engage the contact lever 85 only either "P. M." or "A. M."

Means are provided to visually indicate whether the lever 107 is set to permit the alarm to be sounded "A. M." or "P. M." These means comprise a plate 115 secured to the forward end of a shaft 116 which extends through the plates 23 and 24 and carrying at its rear end an arm 117 by means of which said shaft may be rocked to bring either one of the legends "A. M." or "P. M." carried by the plate 115 before an opening 114 in the dial 22, according to the position in which the lever 107 has been set.

Means are provided whereby the ringing of the alarm may be prevented. For this purpose a stiff wire 119 is secured to one arm of the lever 85 and projects toward the plate 115. The plate 115 carries on its face the additional legend "Off" and, when the plate is shifted to expose said legend through the opening in the dial, the wire 119 is engaged by a lug 118 carried by said plate to prevent movement of the lever 85.

Means are further provided whereby the alarm may be silenced when it has once commenced to ring and which will be automatically re-set to permit the alarm to sound at the next occurrence of the time it may be set to sound. For this purpose there is provided a further bell-crank lever 120 fulcrumed on a post 121 carried by the plate 23.

One end of this lever is so shaped that, when the lever is rocked, said end will engage a pin 109 carried by the lever 85, so that the lever 85 is prevented from rocking and the contact arm 88 is prevented from engaging the contact 90 the next time that the notch 89 of the ring 74 comes opposite to the pin 84 of the lever 85. A spring extending from a post 125 carried by the plate 23 engages the other arm of the lever 120 and tends to move and maintain said lever out of engagement with the pin 109 of the lever 85. The arm of the lever 120 which is engaged by the spring is so shaped as to be engageable by a lug 122 carried by a vertically movable push rod 123 which is mounted to slide in an opening in the case and in a bracket 124 carried by the plate 23 and which has a push button at its upper end. The push-rod 123 may be held in depressed position by any suitable means such as frictional engagement thereof with the bracket 124.

A lever 126 pivoted on a post 127 carried by the plate 23 has its end projecting into the path of movement of the lower end of the push-rod 123 and this lever 126 is arranged in the path of movement of an arm of the lever 102. Therefore, if the push rod is left depressed the next time the lever 102 is caused to rock by the entry of its pin 101 into the notch 104 of the ring 75 under the action of its spring upon one of its arms, its opposite arm will engage the lever 126 and cause the latter lever to engage the lower end of the push-rod 123 and move said rod upwardly to disengage the lug 122 of said rod from the lever 120 and restore said rod and lug to their normal position.

To visually indicate whether the push rod 123 is in its raised or depressed position, said rod carries a plate 129 bearing on its face the legends "On" and "Off" which are respectively displayed through an opening 128 in the dial 22 of the clock according to the position of said rod.

We claim:—

1. In alarm clocks, alarm actuating means and mechanism permitting the operation of said alarm actuating means only at a set time and for an interval only, said mechanism comprising a wheel mounted on the hour hand shaft of the clock in frictional engagement with said shaft; an alarm setting dial carried by said wheel and arranged centrally in the face of the clock; means for manually moving said wheel relative to the hour hand; a pair of rings carried by said wheel each provided with a notch, and a pair of levers each having a lug bearing against one of said rings and adapted to enter the notch therein, one of said levers, when actuated, permitting the alarm actuating means to operate and the other lever, when actuated, restoring the first lever to

its normal position thereby silencing the alarm.

2. In an alarm clock, alarm actuating means, a lever adapted, when rocked in one direction, to permit the operation of said alarm actuating means and when rocked in the opposite direction to stop the operation of the latter mechanism, said lever being permitted by the time-keeping mechanism of the clock to rock once in twelve hours in the direction to permit the operation of said alarm actuating means; a second lever associated with said first lever and said time keeping mechanism and permitted by the latter to rock, once in every twelve hours, into engagement with said first lever to rock the latter in a direction to stop the operation of said alarm actuating means; and a third lever adapted, when rocked in one direction, to engage said first lever and prevent the latter from rocking into position to permit the operation of said alarm actuating means, said third lever being engaged by said second lever during successive rocking movements of the latter and alternately rocked into and out of engagement with said first lever.

3. In an alarm clock embodying a time-keeping mechanism, an alarm actuating means, and means actuated by the time-keeping mechanism once every twelve hours at a selected hour for starting the operation of the alarm actuating means, means for selectively setting the alarm actuating means for operation either during the forenoon hours or during the afternoon hours, said setting means comprising means shifted by the time-keeping mechanism once every twenty-four hours into engagement with said alarm starting means to prevent the operation of the latter and means operative at will for setting said shiftable means for actuation by the time-keeping mechanism either during the forenoon hours or during the afternoon hours.

4. In a alarm clock embodying a time-keeping mechanism, an alarm actuating means and means actuated by the time-keeping mechanism once every twelve hours at a selected hour for starting said alarm actuating means, means for preventing the next expected operation of said alarm actuating means at the hour at which the starting means is set to operate, said preventing means comprising means operable from the exterior of the clock and movable into engagement with said alarm starting means and means actuated by the time-keeping mechanism during the next actuation of the alarm starting means for releasing said preventing means from said starting means.

5. In an alarm clock, the combination with alarm-actuating means of mechanism controlling the operation of said alarm actuat-

ing means comprising a lever of which the rocking movement in one direction permits the operation of said alarm actuating means; a second lever of which the movement in one direction rocks the first lever to its normal position, and means for inhibiting the next expected operation of the alarm-actuating means or for arresting the operation of the alarm-actuating means without inhibiting the next or further operation of the latter, said inhibiting means consisting of a third lever engaging with the first lever to inhibit the movement of the latter, a push rod projecting through the case of the clock and movable into engagement with the third lever, and a fourth lever movable into engagement with said push rod, said fourth lever being moved by said second lever during the movement of the latter into engagement with said push rod for restoring said push rod to its normal position.

6. In an alarm clock, alarm actuating means, a readjustable twenty-four hour self-resetting means for controlling the operation of said alarm actuating means comprising a wheel mounted on the hour hand sleeve of the clock and angularly adjustable on said sleeve relative to the hour hand; an alarm setting dial and a pair of notched rings carried by said wheel; a pair of levers controlled, respectively, by said notched rings, one of said levers, when rocked, permitting the operation of said alarm actuating means and the other of said levers, when rocked, serving to restore the first lever to its normal position; a third lever associated with said first-named lever and actuated by said second lever and preventing said first lever from rocking every other twelve hours; a fourth lever adapted, when actuated, to engage and hold said first lever in position to prevent the next expected operation of the alarm actuating means; means operable from the exterior of the clock for actuating said fourth lever; and means actuated by the movement of said second lever to restore said fourth lever to normal position.

7. In an alarm clock, an electrically actuated alarm comprising a bell, an electro-magnet, an armature for said magnet, a bell-hammer associated with said armature, an electric battery having its negative pole in electrical connection with the metal work of the clock mechanism, a contact insulated from the metal work of the clock mechanism, a hand-operated switch for connecting the positive terminal of said battery with said contact, a make and break having its contact point electrically connected to said contact and having its contact spring carried by and insulated from said armature, said contact spring being electrically connected to one terminal of said electro-magnet, a second contact also insulated from the metal work of the clock movement and electrically connected to the other terminal of said electro-magnet, and a time actuated lever comprised in the mechanism of the clock which, when actuated, closes the electric circuit between said last-named contact and the metal work of the clock.

8. In an alarm clock embodying a time-keeping mechanism, alarm actuating means and means comprising a lever actuated by the time-keeping mechanism once every twelve hours at a selected hour for starting said alarm actuating means, means for preventing the actuation of said lever comprising an extension on said lever and a rock-shaft having an arm movable into and out of engagement with said extension.

In testimony whereof we have hereunto set our hands.

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