Jan. 1, 1935. G. BROWNING 1,986,499

ALARM MECHANISM

Filed Jan. 25, 1932 3 Sheets-Sheet 1

Fig. 1

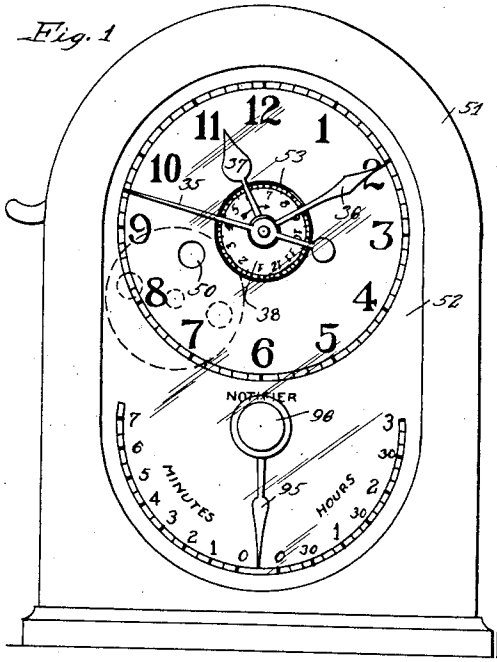


Fig. 2

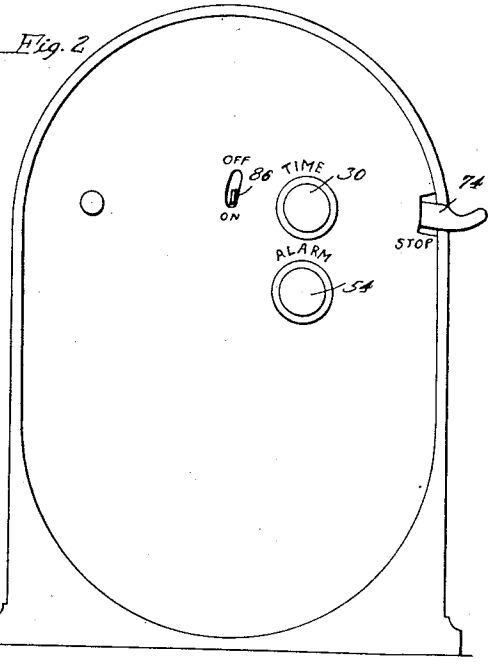
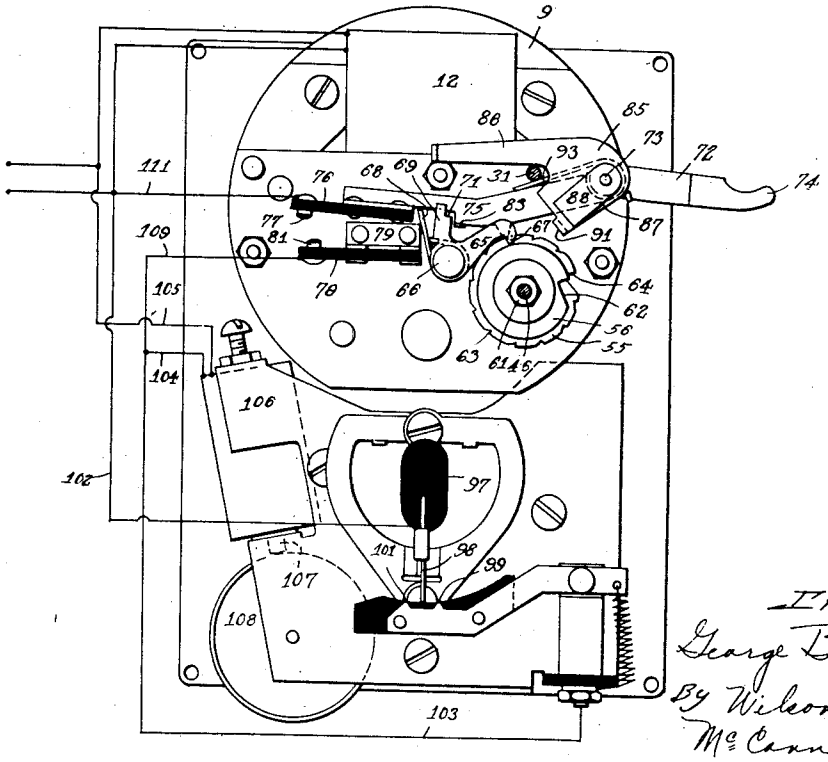


Fig. 3



Inventor
George Browning
By Wilson, Darnell, Mc Cann & Rehm
Attys.

Jan. 1, 1935. G. BROWNING 1,986,499

ALARM MECHANISM

Filed Jan. 25, 1932 3 Sheets-Sheet 2

Fig. 5.

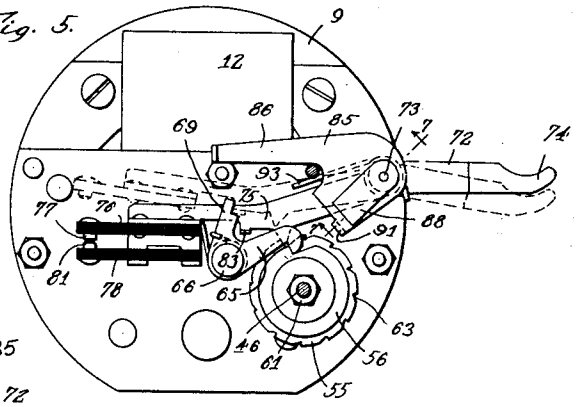


Fig. 7.

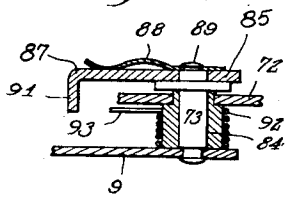


Fig. 6.

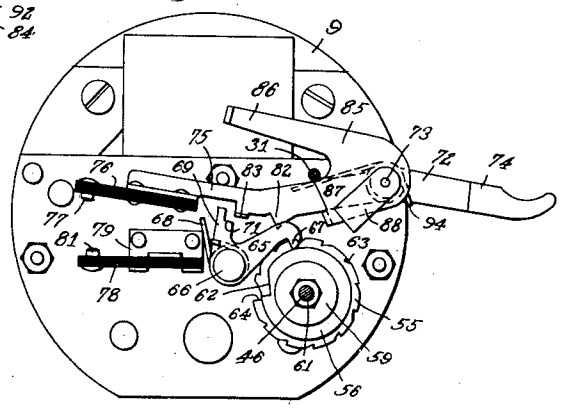


Fig. 8.

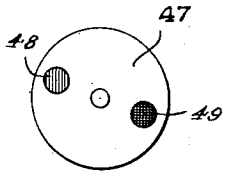
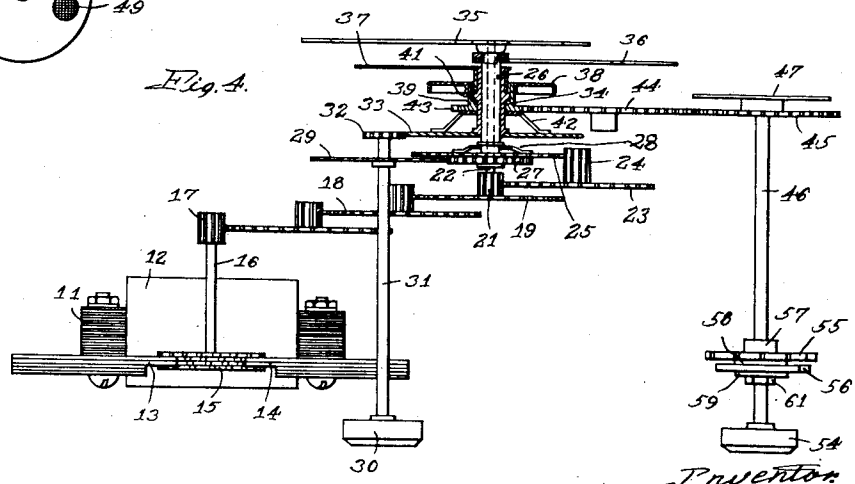


Fig. 4.



Inventor
George Browning
By
Wilson, Dowell, McCanna & Kehm
Attys.

Jan. 1, 1935. G. BROWNING 1,986,499

ALARM MECHANISM

Filed Jan. 25, 1932 3 Sheets-Sheet 3

Fig. 9.

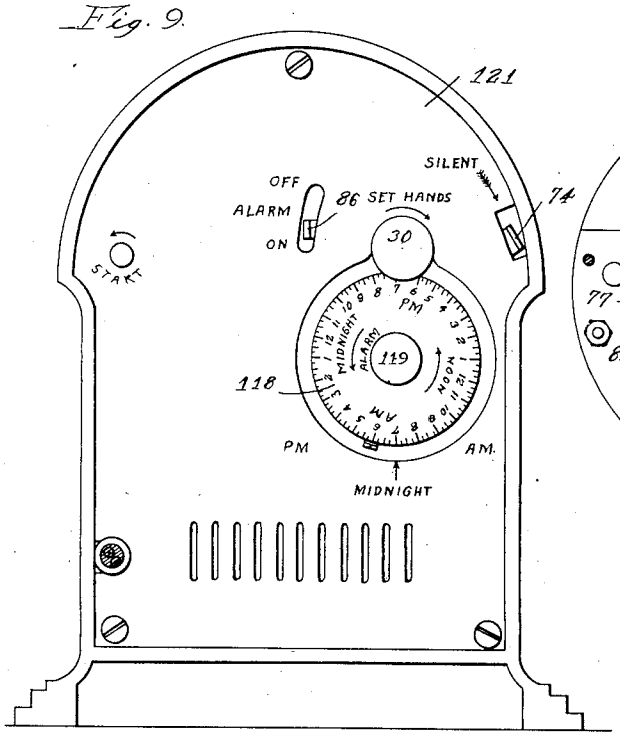


Fig. 10.

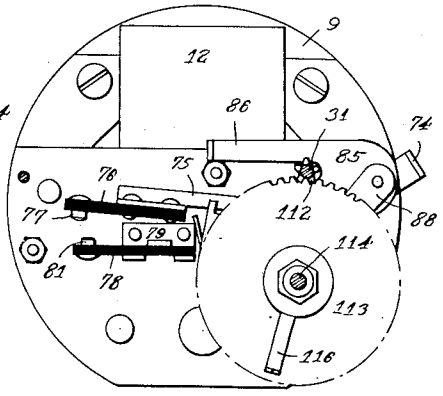
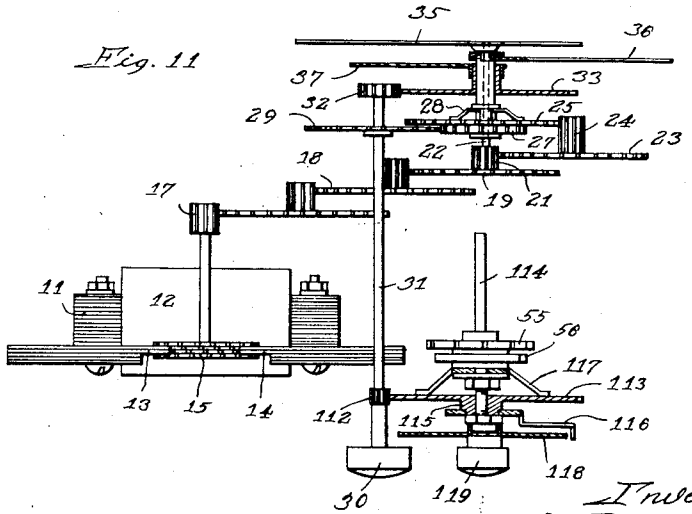


Fig. 11



Inventor.

By George Browning

Wilson, Dowell, McCannat Kehm

Attys.

Patented Jan. 1, 1935

1,986,499

UNITED STATES PATENT OFFICE

1,986,499

ALARM MECHANISM

George Browning, Wilmette, Ill., assignor to Chicago Flexible Shaft Company, Chicago, Ill., a corporation of Illinois

Application January 25, 1932, Serial No. 588,617

5 Claims. (Cl. 200—38)

This invention relates to clocks and has special reference to alarm mechanism to be employed therewith for the purpose of emitting an alarm at predetermined times.

It has been customary in the past to provide alarm devices having a supplementary dial on the face of the clock and a separate hand positioned thereon to cooperate with the dial in indicating the time at which the alarm would be emitted. With this construction it was necessary to provide a relatively expensive cam and pin mechanism for rendering the bell or other signal means operative at the desired time. A portion of this mechanism was assembled on the clock driving mechanism and a portion on the shaft supporting the alarm hand. This mechanism increased the cost of manufacture of the clock and was not well adapted for use in electrically driven clocks.

I have, therefore, aimed to provide improved alarm mechanism for clocks having improved time setting means and simplified means for rendering the signal means operative at the desired time.

Another object of the invention is the provision of alarm mechanism adapted to emit a signal every twenty-four hours and to provide means for manually interrupting the signal without disturbing the periodic operation thereof.

A further object of the invention is the provision of alarm mechanism adapted to periodically emit a signal and manually operative means for suspending the periodic operation thereof when desired.

Another object of the invention is to provide means for preventing the clock hand from being turned in the wrong direction sufficiently to injure the mechanism.

A still further object of the invention is to provide alarm mechanism for clocks wherein the timing hands are caused to indicate the alarming time.

Another object is to provide an electric clock having improved means for actuating the signal means of an alarm mechanism.

Another object of the invention is the provision of a clock having combined means for sounding an alarm at twenty-four hour intervals, and also at very short intervals with accuracy.

Other objects and attendant advantages will become apparent to those skilled in the art from the following description and the accompanying drawings in which—

Figure 1 is a face view of a clock embodying my improved alarm mechanism;

Fig. 2 is a back view of the clock shown in Fig. 1;

Fig. 3 is a view of the rear side of the clock movement with the electrical connections shown diagrammatically;

Fig. 4 is a schematic view of the clock movement and alarm mechanism shown partly in section;

Fig. 5 is an elevation of the back of the clock movement showing in solid lines the switching mechanism in the alarm sounding position and in dotted lines, the position of this mechanism in the alarm interrupting position.

Fig. 6 is an elevation of the back of the clock movement showing the alarm sounding mechanism in its inoperative position;

Fig. 7 is a section on the line 7—7 of Fig. 5 showing the alarm lever latch.

Fig. 8 is a face view of the indicating disk;

Fig. 9 is a back view of a clock embodying a modified form of alarm setting mechanism;

Fig. 10 is a back view of the clock shown in Fig. 9 with the back plate and dial removed; and

Fig. 11 is a diagrammatic showing of a clock movement and the modified form of alarm setting mechanism.

While in its broader aspect the invention is by no means limited to the present embodiment, I have herein shown it in combination with an electric motor driven clock of the synchronous, non-self-starting type. Referring first to Figures 1 to 8 inclusive, the clock includes the customary frame plates 9 upon which are supported the customary non-self-starting motor having a laminated core 11 about which is wound the coil 12 and to which is secured the stator poles 13 and 14. A rotor 15 is supported between the poles 13 and 14 on a shaft 16 to rotate in timed relation with the current frequency in the customary manner, the shaft 16 being provided with a pinion 17 for the purpose of driving the conventional clock train designated generally by the numeral 18. The clock train is so arranged that the gear 19 and pinion 21 affixed to the second shaft 22 will make a complete revolution in one minute. A gear 23 meshes with the pinion 21 and drives a pinion 24 meshing with a gear 25 on the minute shaft 26, causing the minute shaft to make a complete revolution once every hour. A gear 27 is fixed on the minute shaft 26. The gear 25 is rotatable with respect to the minute shaft but is nor-

mally caused to rotate therewith through frictional contact with the gear 27 mainained by the spring spider 28. A gear 29 on the hand setting shaft 31 meshes with the gear 27 and serves to normally drive the hand setting shaft 31. A gear 32, also supported on the hand setting shaft engages a gear 33 on the hour shaft 34, the gear train comprising the gears 27, 29, 32, and 33, serving to rotate the hour shaft 34 one complete revolution every twelve hours. Hands 35, 36, and 37 are supported on the outer ends of the shafts 22, 26, and 34, respectively. The slip connection between the gears 25 and 27 permits the hour and minute hands 37 and 36 to be set with respect to the dial of the clock through rotation of the hand setting shaft 31 without transmitting motion to the remainder of the gear train. The above described mechanism constitutes the normal clock movement with which I have combined novel means for sounding an alarm at a predetermined time.

This consists of an alarm dial indicated generally by the numeral 38, having on its face numerals from 1 to 12 and graduations as best shown in Figure 1, the dial being axially mounted upon and in fixed relation to a sleeve 39 surrounding the hour shaft 34 of the clock. This sleeve is frictionally held against a shoulder 41 on the hour shaft by means of a spring spider 42 acting between the gear 33 and the sleeve. In the present construction the sleeve 39 has a gear 43 formed integrally therewith arranged to drive an idler gear 44 positioned to engage the former. The parts are also positioned so that the idler gear 44 will mesh with a gear 45 on an alarm setting shaft 46, the ratio between the gears 43 and 45 being two to one, so that the gear 43 and the alarm dial 38 secured thereto will make two complete revolutions to each revolution of the gear 45 and the alarm setting shaft 46. A circular disk 47 presently to be more fully described, is fixedly secured to the forward end of the alarm setting shaft 46 and rotates therewith.

Referring now more particularly to Figures 1 and 4, the clock may advantageously be positioned in a suitable cabinet designated generally by the numeral 51 and be provided with a time indicating dial 52. This dial is provided with an axial opening 53 through which the face of the alarm setting dial 38 projects or is visible. The dial is provided with a small opening 50 through which the face of the disk 47 may be viewed.

The face of the disk 47 is shown in Fig. 8 and is provided with two spots 48 and 49 of different colors against a background of white, preferably black and red, for the purpose of designating the portion of the day at which the alarm will sound. Sounding of the alarm is brought about responsive to rotation of the shaft 46, a single alarm period resulting from the rotation of this shaft through one complete revolution. The shaft is also employed to rotate the disk 47 and the alarm dial 38 to indicate to the user the time at which the alarm will be sounded. Thus, upon manual rotation of the shaft 46 through one revolution by means of a knob 54 the alarm dial 38 will move through two complete revolutions. At the beginning of one of these revolutions the black spot will pass beneath the opening 50 and at the beginning of the other revolution the red spot will pass therebeneath. Thus, to set the alarm to ring at a time twelve hours or less from the time at which it is set, the knob 54 is rotated until the red spot appears through the opening 50 in the dial after which the rotation of the knob is continued until the figure on the alarm dial, indicating the hour at which the clock is to ring, is exactly under the hour hand of the clock. The alarm will then sound at the designated hour every 24 hours. On the other hand, if the time at which the alarm is to sound is more than twelve hours distant from the time of setting, the knob 54 is turned until the black spot appears and then rotated until the correct numeral of the alarm dial rests beneath the hour hand whereupon the alarm will sound at 24 hour intervals which are 12 hours distant from the previous setting.

Referring now more particularly to Figure 3, 5, and 6, a pair of cam disks 55 and 56 are axially supported upon the alarm setting shaft 46 beyond and adjacent to the rear plate of the clock by means of a collar 57, spacing washers 58 and 59, and nut 61. The cam 56 is provided with a depressed cam face 62 on its periphery while the cam disk 55 is provided with a plurality of small depressions or notches 63 substantially uniformly distributed along its edge. A notch 64 in the cam disk 55 substantially coincides with the notch 62 in the disk 56 and is of greater width and depth than the remainder of the notches in the disk 55. A pawl 65 is pivotally supported upon a pin 66 and is provided with an offset end 67 positioned to ride on the periphery of the cam disk 56 as the latter rotates and arranged to drop into the notch 62 under the action of a coil spring 68 on the pin 66. The pawl is also provided with an upwardly projecting arm 69 having a notch on one edge thereof designated by the numeral 71 for the purpose of supporting an alarm lever 72 in a manner presently to be described.

The alarm lever 72 is pivotally supported in a horizontally disposed position upon a pin 73 in the back plate of the clock and is provided with a free end 74 projecting out of the clock cabinet 51 and an end 75 extending along the rear face of the clock in substantially the same vertical plane as the cam disk 55. A layer of insulating material 76 is secured to the extreme end of the lever 72 and is provided with a contact point 77 to which a wire is connected for the purpose of conducting electric current thereto. A plate of electrical insulation 78 is secured to the rear plate of the clock by means of a bracket 79 in a position such that upon rotation of the lever 72 the contact point 77 will come into contact with the contact point 81 on the insulation 78 to close an electrical circuit through signal means presently to be described. The lower edge of the lever 75 is provided with a downwardly extending projection 82 normally adapted to ride along the cam surface of the disk 55. This projection periodically drops into one of the notches 63 in this disk and prevents the manual turning of the shaft 46 in a clockwise direction facing the figures. While these notches are spaced along the disk and do in some instances permit of a certain amount of clockwise movement before the projection 82 drops into a notch, this motion is not sufficient to result in any material damage to the clock mechanism. A laterally extending finger 83 is formed on the lower edge of the lever 72 and is positioned to move in the space between the legs 65 and 69 of the pawl and to rest within the notch 71 thereof under proper circumstances as will presently be described.

As previously described, the dever 72 is pivot-

ally mounted upon the pin 73, a sleeve 84 being interposed therebetween as shown in Fig. 7. An alarm lever control arm 85 having an upper leg 86 and a lower leg 87 is also pivotally supported upon the pin 73, toward the outer end of the pin and is held thereon by means of a flat spring 88 riveted at the end of the pin as shown at 89. The lower leg 87 is provided with an inwardly extending finger 91 which extends beneath the alarm lever 75 such that when the alarm control lever arm 85 is manually rotated in a clockwise direction facing the figures, the finger 91 will be caused to lift the lever 75 free from the cam disk 55 as shown in Fig. 6. In this position the contact points 77 and 81 will not come together to close the circuit through the signal mechanism during the normal operation of the clock. Under these circumstances, an alarm will not be sounded at any time. However, if the arm 85 is rotated to the position shown in Fig. 5, which corresponds to the on position shown in Fig. 2, the alarm lever 72 will be released and be movable between the positions shown in the former figure. A coiled spring 92 rests about the sleeve 84 and has an end 93 thereof positioned to bear against the shaft 31, while the opposite end 94 is secured to the lever 72 to urge the latter into a position in which the projection 82 bears against the cam disk 55.

I have shown my improved alarm mechanism in combination with notifier mechanism shown and described in my copending application Serial No. 553,925, filed July 30, 1931, wherein a hand 95 and shaft are operatively connected to the movable part 97 of the switch unit, the knob 96 serving to rotate the movable portion 97 either clockwise or counterclockwise in the position shown in Fig. 3, the clock movement serving to return the portion 97 to the position shown in the last mentioned figure through a timed interval. Graduated scales are provided on the dial 52 indicating the time required for the switch portion 97 to be returned to its central position. As the switch portion 97 is returned the blade 98 thereof comes into contact with projections 99 or 101 depending upon the direction of rotation, thereby closing a circuit formed by the conductors 102, 103, 104, and 105, through the solenoid 106 which drives a clapper 107 against a bell 108 to emit a signal, all as more fully described in the aforesaid application. The signal means comprising the solenoid 106, the clapper 107 and the bell 108 also forms a part of the alarm mechanism, the solenoid 106 being connected to the contact point 81, through the conductors 109 and 104 and to a source of power through conductor 105, the contact point 77 being connected to a source of electrical energy through the conductor 111.

The operation of the clock is substantially as follows—suppose that it is ten minutes after eleven P. M. and the user desires to set the clock to the correct time and to set the alarm to sound at six o'clock A. M. He rotates the shaft 31 by means of the knob 30 until the hands of the clock designate eleven ten. He then rotates the shaft 46 by means of the knob 54 until the red spot passes beneath the opening 50 and the numeral 6 on the alarm dial 38 rests directly beneath the hour hand. The arm 85 is then moved to its lowermost position as designated by the word "On" in Figure 2. At this point the position of the mechanism is shown in Figure 3. As the clock runs the shaft 46 is rotated in a counterclockwise direction through the gears 43, 44, and 45, rotating the disks 55 and 56. At six o'clock A. M. the parts will have reached the positions shown in Figure 5 and the pawl 65 and projections 82 will have dropped into the notches 62 and 64 in the cam disks 56 and 55 respectively, bringing the contact points 77 and 81 together. This closes the circuit through the signal means which thereupon emits a signal. In order to interrupt or stop the signal the operator merely depresses the portion 74 of the lever 72, moving the parts to the dotted line position shown in Fig. 5. The lever 72 is held in this position by contact of the finger 83 in the notch 71. As the cam disks 55 and 56 continue to rotate the end 67 of the pawl 65 will gradually ride out of the notch 62, whereupon the finger 83 will slide out of the notch 71 permitting the projection 82 to again drop into contact with the cam disk 55. Since the disks 55 and 56 only make one complete revolution every twenty-four hours, the alarm will not be again sounded until twenty-four hours have elapsed or until the end 67 of the pawl 65 and the projection 82 again drop into the notches 62 and 64. If the operator desires at any time to prevent the sounding of the alarm at the customary time the arm 85 may be moved to its upper position designated by off in Figure 2.

In Figures 9, 10, and 11, I have shown a modification wherein the equivalent of the alarm setting dial 38, gears 43, 44 and 45 and disk 47 are positioned on the rear of the clock instead of forming a part of the face of the clock as previously described. In this modification a pinion 112 is positioned on the shaft 31 and engages a gear 113 rotatably positioned upon a shaft 114 corresponding substantially to the shaft 46. A boss 115 carrying the finger 116 is fixedly secured to the gear 113. The cam disks 55 and 56 are supported on the shaft 114 in substantially the same manner as supported on the shaft 46 in the modification previously described and a spring spider 117 fixed to the shaft 114 acts between the cam disks and the gear 113 whereby the gear is normally able to drive the shaft 114 from the shaft 31. A dial 118 which is best shown in Fig. 9, is fixedly secured to the outer end of the shaft 114 and corresponds in a general way to the dial 38 of the modification shown in Fig. 1. A knob 119 is fixed to the shaft 114 and permits the manual rotation thereof. The remainder of the mechanism is substantially the same as that shown and described in the first eight figures of the drawings.

In this modification it is advisable to apply to the back 121 of the clock cabinet certain designations adjacent to the dial 118, such as P. M. and A. M. and the word midnight as shown in Fig. 9. The operation of this modification is substantially the same as for that previously described with the exception that the mechanics of setting the alarm differ slightly. In setting this mechanism it is necessary to rotate the shaft 31 by means of the knob 30 until the finger 116 appears opposite the correct portion of the day as indicated on the rear plate 121 and then set the clock hands to the desired time setting on the face dial. In order to properly set the alarm dial it is then necessary to rotate the shaft 114 by means of the knob 119 until the proper figure on the dial is opposite the finger 116. Thus the dial shown in Figure 9 is set to cause the alarm to sound at six o'clock A. M. If the dial 118 be rotated one-half turn to the six on the P. M. side of the dial the alarm would

sound twelve hours later or earlier as the case might be.

It will thus be observed that I have provided a clock having an improved alarm mechanism whereby alarms may be sounded for substantially any period of time differing from thirty seconds to twenty-four hours. For times varying up to three hours the notifier dial and the setting mechanism are employed, while for times greater than three hours and less than twenty-four hours the alarm mechanism herein specifically described is employed.

I have provided improved and simplified mechanism whereby the alarm is automatically sounded once in twenty-hour hours corresponding to the same time. This will be seen as a great convenience since it permits a person arising at a uniform time to neglect the usual duties of setting the alarm each evening before retiring.

I have also provided improved means for designating the hour at which the alarm will sound and the time of the day, whereby the provision of an independent hand on the face of the clock is eliminated.

I have also provided means for completely shutting off the operation of the alarm mechanism so that no alarm signal will be emitted at any time in the normal operation of the clock.

While I have thus described and illustrated a specific embodiment of my invention I am aware that numerous alterations and changes may be made therein without materially departing from the scope of the invention and the appended claims, in which—

I claim:

1. In an alarm clock having a timing gear train and time indicating hands driven thereby, a switch, a lever carrying one contact point of the switch arranged to open and close the latter when reciprocated, a cam driven from said gear train through a complete revolution in twenty-four hours and having shaped characteristics for reciprocating the lever at each revolution to close said switch during a predetermined interval, manually operable means for moving the lever to open the switch before the end of said interval, latch mechanism arranged to hold the lever in the last-mentioned position until the lapse of said interval and to release said lever thereafter, and additional latch mechanism manually operable for maintaining said lever out of contact with said cam to hold said switch open during said interval.

2. In an alarm clock having a timing gear train and time indicating hands driven thereby, a switch therefor, a lever carrying one contact point of the switch, a cam connected to the timing train against which said lever rides having a notch for reciprocating said lever once in twenty-four hours to close said switch during a predetermined interval, a second cam arranged to rotate with said first-mentioned cam and having a notch coinciding with the notch of the first-mentioned cam, spring actuated latch means arranged to ride said second cam and rendered operative by engagement in said cam notch, and manually operable means for rotating said lever to open said switch during said predetermined interval, said latch means holding said lever in the last-mentioned position until the lapse of said interval and releasing said lever at the termination of said interval responsive to said notch.

3. In an alarm clock having a timing gear train and time indicating hands driven thereby, a switch therefor, a lever carrying one contact point of the switch, a cam disc driven from said gear train through a complete revolution in twenty-four hours, having a plurality of notches of relatively small depth to limit backward manual movement of the cam and a single notch of greater depth, contact of said first-mentioned notches with said lever causing reciprocation of said lever through a small amplitude and contact of said last-mentioned notch therewith causing the closing of said switch during a predetermined interval, manually operable means for opening said switch during said interval, and cam operated latch mechanism automatically rendered operable upon the opening of said switch for holding said switch open during said interval and for releasing said switch at the termination of said interval.

4. In an alarm clock having a timing train and time indicating hands driven thereby, a control switch, a switch actuating lever pivoted intermediate its ends and carrying a switch contact adjacent one end and a cam follower between the contact and the pivotal support, a cam arranged to be rotated by the timing train and positioned for contact with the cam follower to normally hold said contact in an open position, said cam having a notch for the periodic reception of the follower to move the lever and close said contact, and a lever acting between the cam and the switch lever arranged to latch the switch lever in the open position when manually returned thereto.

5. In an alarm clock having a timing train and time indicating hands driven thereby, a control switch, a switch actuating lever pivoted intermediate its ends and carrying a switch contact adjacent one end and a cam follower between the contact and the pivotal support, a cam arranged to be rotated by the timing train and positioned for contact with the cam follower to normally hold said contact in an open position, said cam having a notch for the periodic reception of the follower to move the lever and close said contact, and a spring actuated bell crank lever having an end adapted to ride on said cam and an end adapted to move into engaging position when said first-mentioned end moves into said notch, whereby to engage the switch lever when the latter is manually moved to open the switch and to release the same when the first-mentioned end moves out of said cam notch.

GEORGE BROWNING.