Sept. 8, 1953 B. D. DORFMAN 2,651,166

ELECTRIC TIMING DEVICE

Filed Jan. 29, 1948 5 Sheets-Sheet 1

Fig. 1.

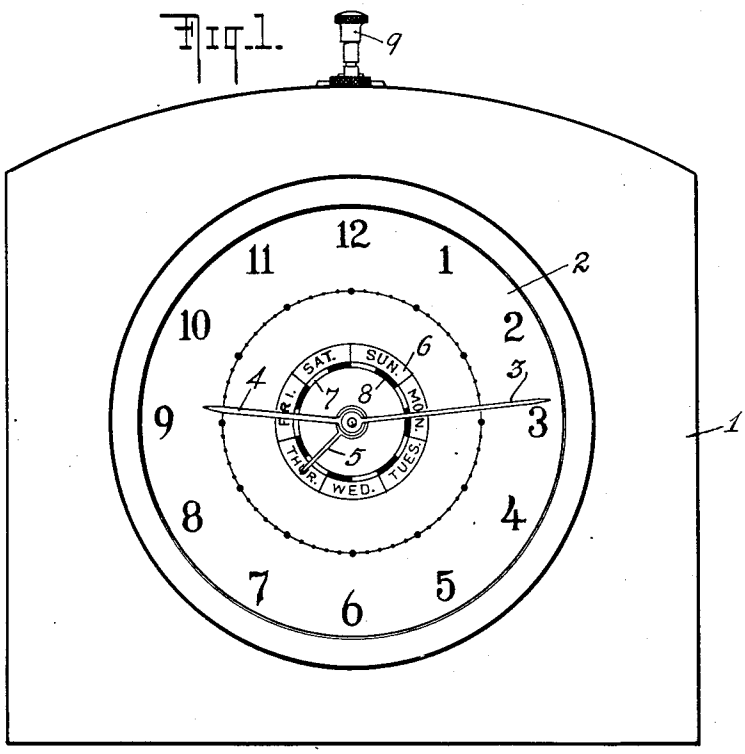


Fig. 6.

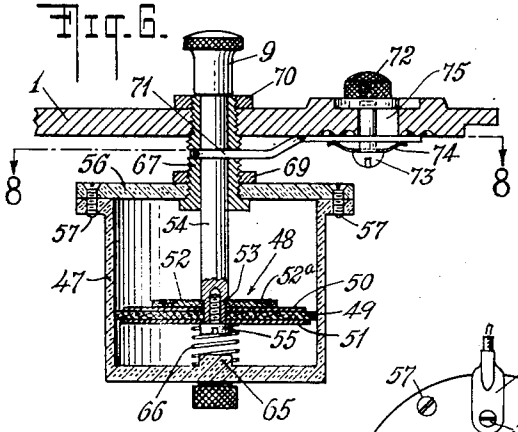


Fig. 7.

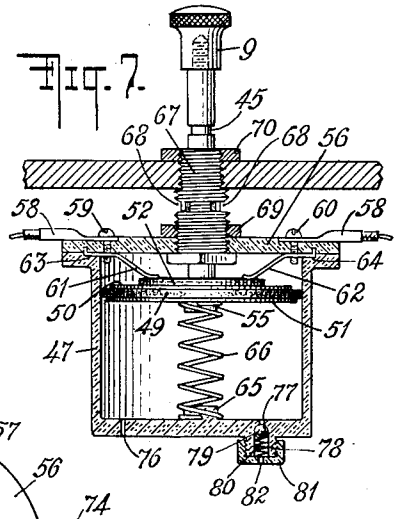
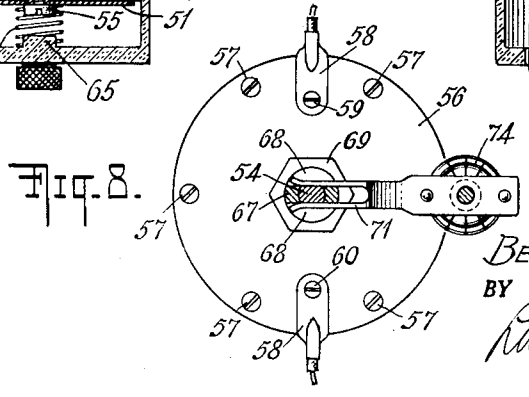


Fig. 8.



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ELECTRIC TIMING DEVICE

Filed Jan. 29, 1948 5 Sheets-Sheet 2

Fig. 2.

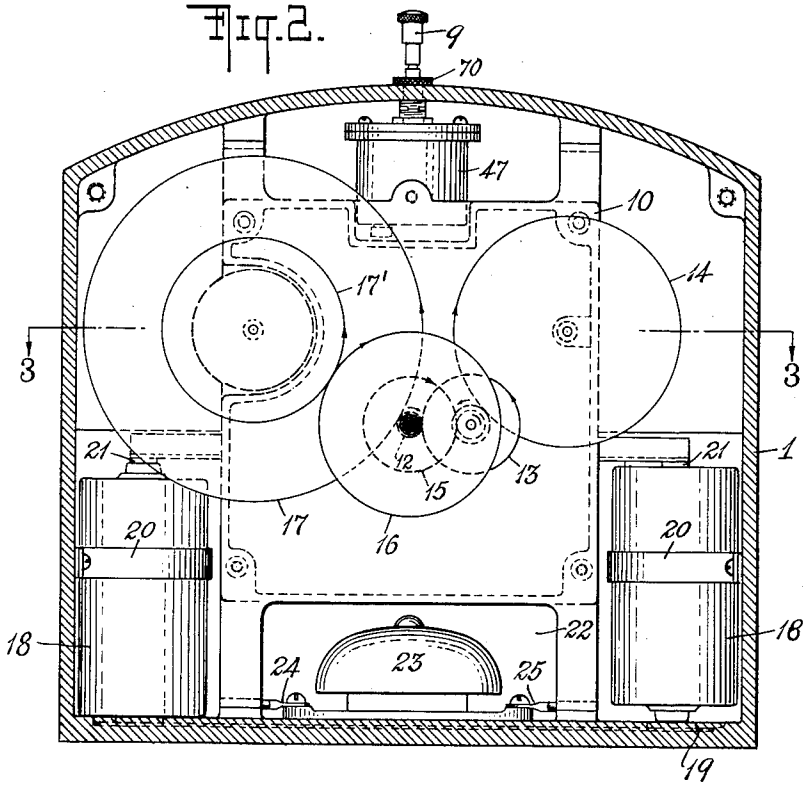
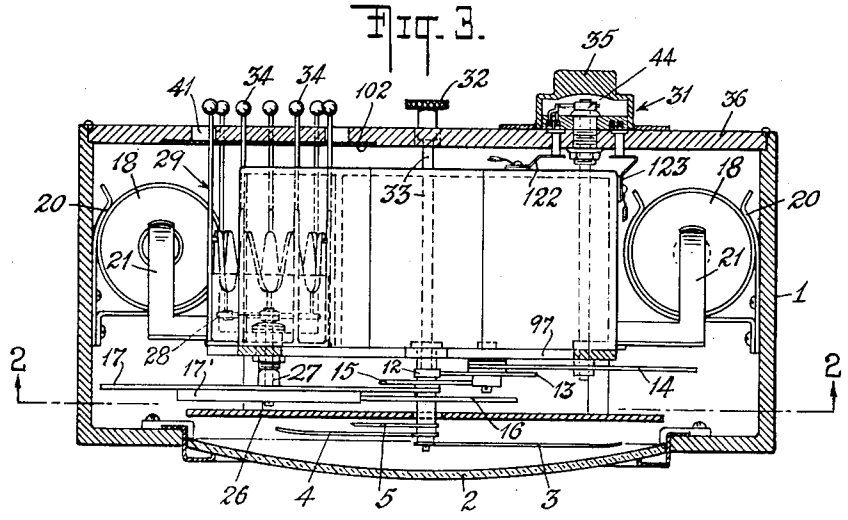


Fig. 3.



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ELECTRIC TIMING DEVICE

Filed Jan. 29, 1948 5 Sheets-Sheet 3

FIG. 5.

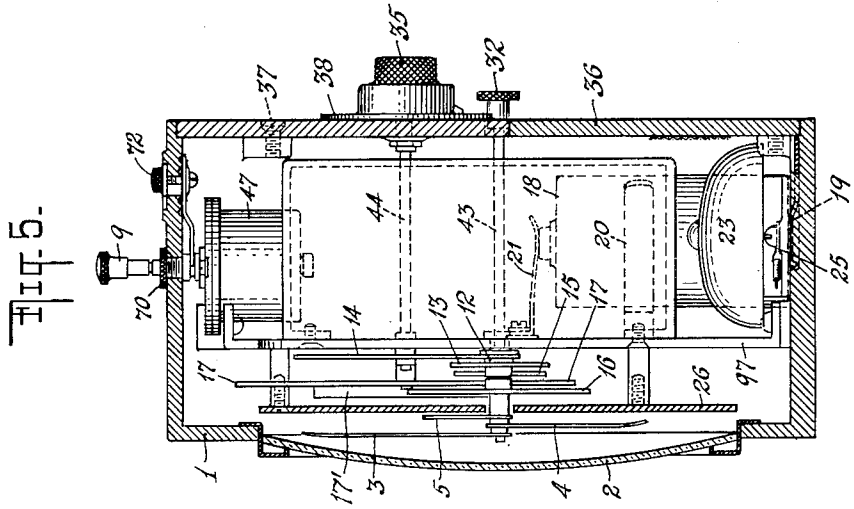


FIG. 4.

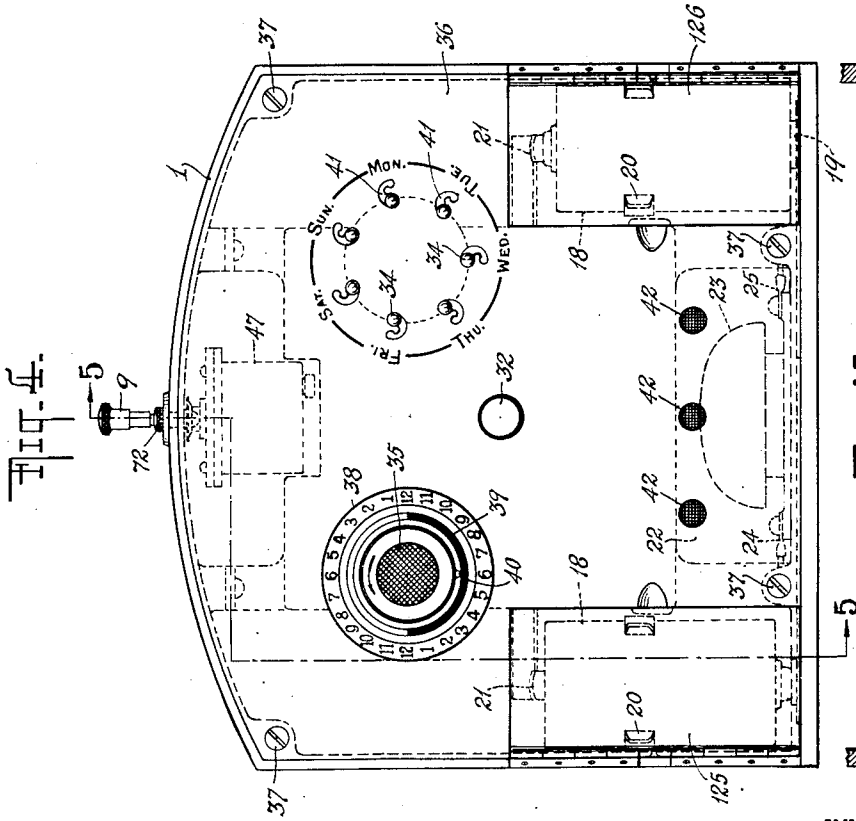
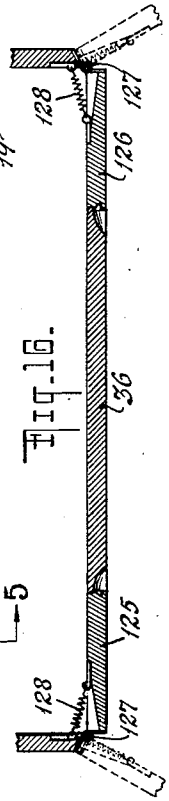


FIG. 16.



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ELECTRIC TIMING DEVICE

Filed Jan. 29, 1948 5 Sheets-Sheet 4

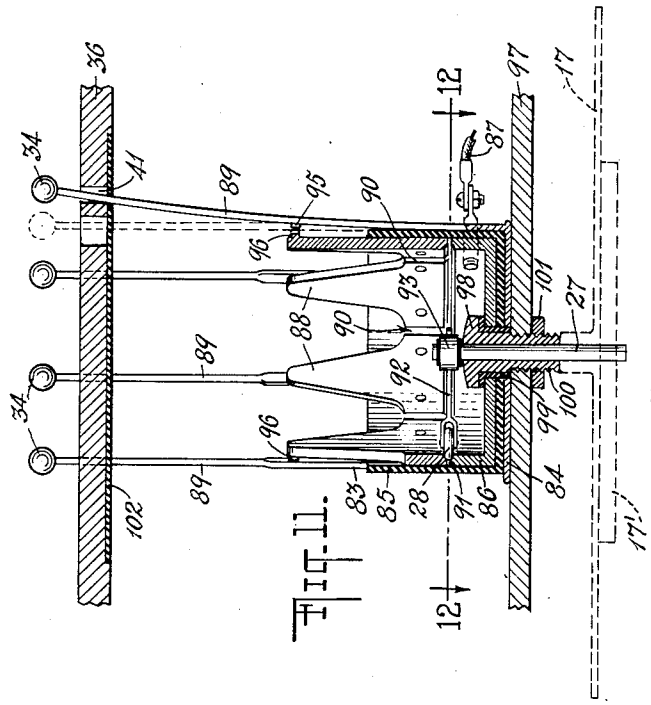


Fig. 11.

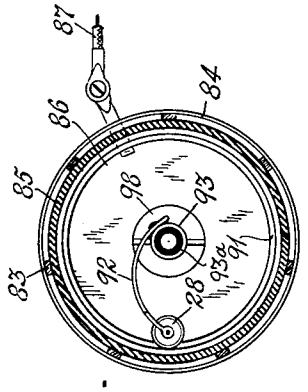


Fig. 12.

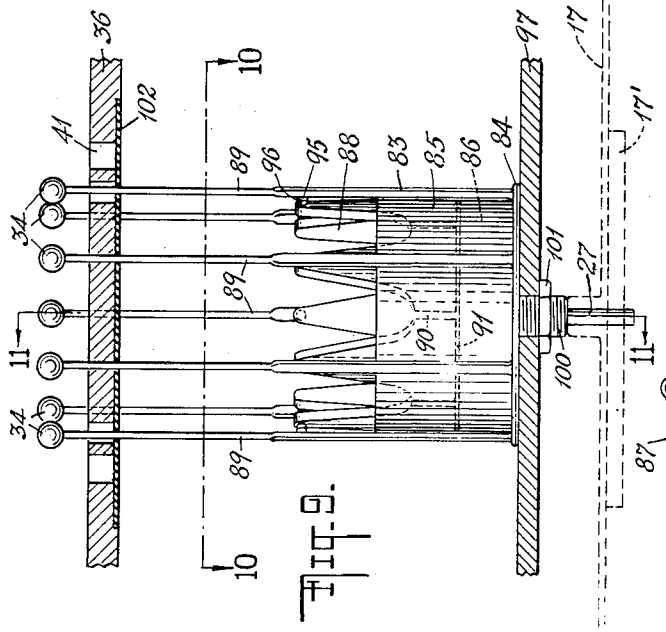


Fig. 9.

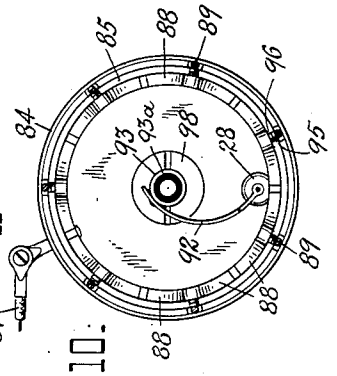


Fig. 10.

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Sept. 8, 1953 B. D. DORFMAN 2,651,166

ELECTRIC TIMING DEVICE

Filed Jan. 29, 1948 5 Sheets-Sheet 5

Fig. 15.

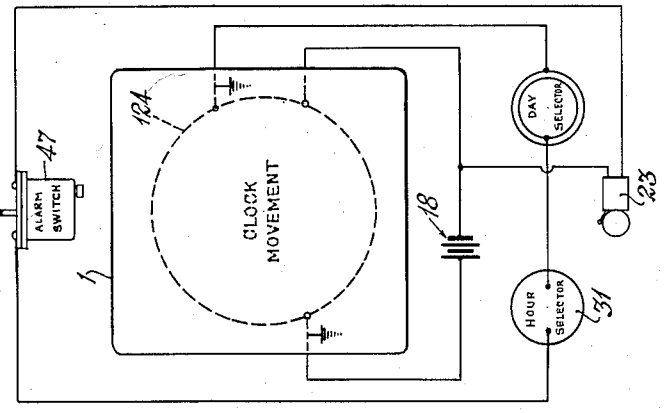


Fig. 13.

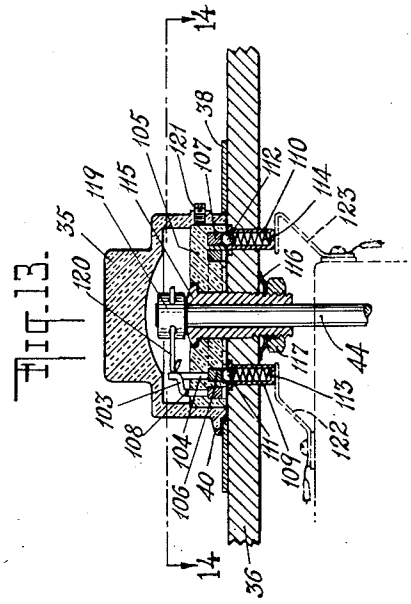
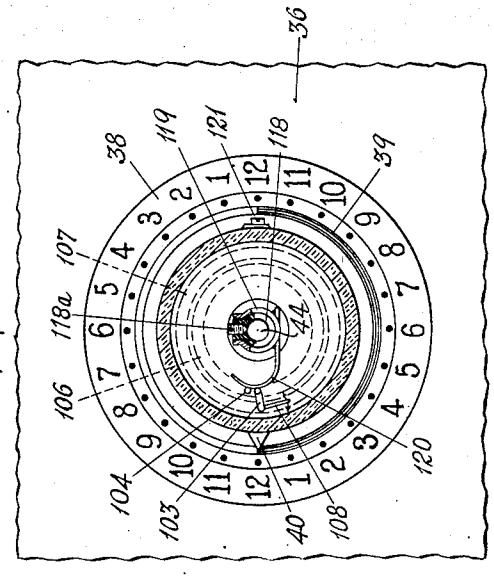


Fig. 14.



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Patented Sept. 8, 1953

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UNITED STATES PATENT OFFICE

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ELECTRIC TIMING DEVICE

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Application January 29, 1948, Serial No. 5,067

15 Claims. (Cl. 58—19)

1

This invention relates to an electrical timing device, such as an alarm clock, and more particularly to a portable alarm clock powered by small dry cells or batteries such as are used in flashlights.

Though the clock is completely self-contained when powered with flashlight cells, it can also be operated by electric current supplied from non-portable cells or from regular power lines, in either of which circumstances only an additional wired connection is necessary.

In the operation of most alarm clocks, an "on and off" switch must be operated manually to set the alarm and shut it off. At night, before retiring, it is usually switched to the "on" position. The disadvantage here is that one may forget to switch the alarm to its "on" position, in which circumstance it will remain inoperative until it is so switched. In addition, the alarm clock must be switched "on" for each time it is desired that the alarm shall go off.

It is therefore the main object of this invention to provide an alarm clock which is portable and can be set to sound its alarm any hour of any day or days of the week.

Another object of this invention is to provide a portable electric alarm clock which may be set to ring at a certain hour, shut itself off and reset itself to ring twenty-four hours later, these operations by the clock being all accomplished automatically.

Still another object of this invention is to provide an electric alarm clock which may be set to ring on certain days of the week and remain silent on other days of the same week.

Another object of this invention is to provide an electric alarm clock which contains a switch capable of stopping the alarm after it has started but which will automatically reset it to ring twenty-four hours later. Another switch is provided to convert the alarm clock into a non-alarm clock by preventing operation of the automatic re-set feature of the first switch mentioned.

Other objects and advantages will appear from the following description considered in connection with the accompanying drawings, in which:

Fig. 1 is a vertical front view of a clock embodying my invention, showing the dial indications.

Fig. 2 is a longitudinal sectional view of the clock of Fig. 1, shown taken along the lines 2—2 of Fig. 3.

Fig. 3 is a plan view of a section of the clock of Fig. 2, taken along the lines 3—3.

2

Fig. 4 is a rear elevational phantom view of the clock of Fig. 1.

Fig. 5 is a longitudinal side sectional view of the clock of Fig. 4 taken along the lines 5—5.

Fig. 6 is a longitudinal sectional view of the automatic re-set switch shown on top of the clock of Fig. 1 in the down or open circuit position.

Fig. 7 is another sectional view of the same switch of Fig. 6, showing the plunger in the up or closed circuit position.

Fig. 8 is a horizontal cross-section of the switch of Fig. 6 taken along the line 8—8.

Fig. 9 is a vertical perspective view of the day selector mechanism shown partially in phantom.

Fig. 10 is a cross-sectional view of the day selector mechanism of Fig. 9, taken along the lines 10—10.

Fig. 11 is a longitudinal sectional view of the day selector mechanism of Fig. 9, taken along the line 11—11.

Fig. 12 is a cross-sectional view of the day selector mechanism of Fig. 11, taken along the lines 12—12.

Fig. 13 is an enlarged view of the section of the hour selector mechanism shown in the sectional view of the clock of Fig. 3.

Fig. 14 is a cross-sectional view of the hour selector mechanism of Fig. 13 taken along the lines 14—14.

Fig. 15 is a wiring diagram of the clock showing the positions of the hour and day selector.

Fig. 16 is a horizontal section through the clock, showing the hinged doors through which the battery cells may be replaced.

Referring now to the drawings, and in particular to the clock shown in Fig. 1, this clock comprises a case 1 in the front of which is the face 2. In addition to the conventional minute and hour hands 3 and 4, respectively, there is a day hand 5 which indicates the days of the week as shown. Each indicated day 6, is divided into a white and dark section, 7 and 8 respectively, to indicate twelve hours a. m. and twelve hours p. m. On top of the case 1 is placed the switch button 9 for stopping the alarm.

Referring now to Figs. 2 and 3, the clock comprises a frame 10, of any suitable material, which supports the clock mechanism. The movement proper is an electrically energized type designed to operate at low voltage and consume very little power. Such movements are well known in the art.

In front of the pillar plate of the clock mechanism is a gear train designed to drive the hands

3, 4, and 5, in their properly timed ratio. Said gear train comprises gears 12, 13, 14, 15, 16, and 17, with gears 15 and 16 arranged concentric with gear 12. Gear 12 operates the minute hand 3 and makes one revolution per hour. Gear 12 drives gear 13 with a ratio of 4:1, while gear 13 in turn drives gear 14, the ratio here being 6:1, so that gear 14 revolves once for 24 revolutions of gear 12 and the minute hand 3, and thus makes one revolution each 24 hours. Gear 13 also drives gear 15 but here the ratio is 3:1, so that gear 15 which operates the hour hand 4, revolves once in twelve hours. In addition, gear 15 operates gear 17 with a ratio of 14:1 so that gear 17 rotates once a week. Gear 17', on the same shaft with gear 17, operates gear 16 with a ratio of 1:1. Day hand 5 is mounted on a hollow shaft attached to gear 16.

On each side of the clock frame 10 are located small flashlight cells 18 resting on a metal strip 19 and held in place by clamps 20 while metal leaf springs 21 pressure-contact the other end of the cells 18, so that the cells 18 make good electrical contacts at the metal strip 19 and leaf springs 21, one of which is grounded to the frame 10 and the other insulated from the frame. The cells 18 are so positioned as to be in series connection. In a compartment 22 at the base of the case 1, is placed the bell 23 or a buzzer or any other suitable alarm device. Attached to the base of the bell 23 are insulated electrical terminal lugs 24 and 25, to which is attached the electric wiring.

In Fig. 3, the dial plate 26 is shown in front of the gear train.

Attached to gear 17 is a shaft 27 which drives a roller 28 around the day selector mechanism 29 which will be described in detail hereinafter, while gear 14 drives an arbor 44 within the hour selector mechanism 31 which also will be described below. Knob 32 is attached through a shaft 33 to the gear train so that the hands of the clock may be adjusted to the correct time. Pin heads 34 control the day selector, while knob 35 controls the hour selector.

Referring now to Fig. 4, projecting from the back plate 36, which is removable by means of screws 37, are the hour selector knob 35 and the day selector pin heads 34. A dial plate 38, having two sets of twelve numbers, is affixed to or engraved upon the back plate 36, the upper twelve numbers indicating a. m. and the lower twelve numbers indicating p. m. as shown by the black band 39. A pointer 40 is attached to knob 35 for indication purposes. The day selector indicator comprises the days of the week marked in a circle with a series of crescent shaped slots 41 arranged along the periphery of a circle within the marked days of the week. Protruding from each of the slots 41 are pin heads 34. The box 22 which encloses the alarm bell or buzzer 23 has screened sound holes 42 for emission of the alarm signal.

To facilitate removal of the back plate 36, knobs 32 and 35, which are connected to shafts 33 and 44, respectively, are removable, knob 32 being fitted only friction tight and 35 being held in place by a set screw. With reference to the day indicator, the pin heads 34 need not be removed when opening the back plate 36, inasmuch as one opening in each crescent slot 41 is made large enough to permit said pin heads 34 to pass therethrough when said back plate 36 is removed.

Referring now to Figs. 6, 7, and 8, showing the electric switch for controlling the alarm, this switch comprises a cylinder casing 47 into which fits a piston 48 composed of a disc 49 made of leather or some other suitable material. This disc fits tightly against the inside walls of the casing 47 and is mounted between two metal or composition washers, 51 which is of slightly smaller diameter than disc 49, and 50 which is of slightly smaller diameter than washer 51. A small washer, made of insulating material 52, in which is pressed a flat concentric metal ring 52*a*, is placed on the top washer 50. These parts are fastened to the narrow end 53 of the plunger rod 54 by means of a screw 55 which threads through the center of the plunger rod 54. A cover 56, made of suitable insulating material, is fastened to the top of the casing 47 by means of screws 57. Electric terminal lugs 58 are attached to the top of the insulated cover 56 by means of screws 59 and 60, respectively, while to the underside of cover 56 are attached two metal springs 61 and 62 by means of the same screws 59 and 60 so that electrical contact is made between the lugs 58 and the metal springs 61 and 62 through the insulated cover 56. The outer ends of springs 61 and 62 are bent to fit into recesses 63 and 64 of the cover 56. The underside of the inner ends of springs 61 and 62 contain metal tips made of material suited to make good electrical contact with metal ring 52*a*. In these illustrations, casing 47 is assumed to be made of insulating material. If made of an electrical conductor, springs 61 and 62 are to be insulated from casing 47.

In the center of the bottom of casing 47 is a raised portion 65. A coiled spring 66 is held between the head of screw 55 and this raised portion 65. A hollow bolt 67, externally threaded and having a pair of notches 68 cut in opposing sides, is placed through centrally located holes in the casing cover 56 and the top of the clock case 1. Nut 69 tightens said bolt 67 to the cover 56 while nut 70 tightens said bolt to the top of the clock case 1. The plunger rod 54 passes through the hollow in the bolt 67 and the button 9 is threaded onto the threaded end of rod 54. A slidable fork 71 is attached to the underside of the top portion of the clock case 1 alongside the alarm switch. A knurled knob 72 is attached to the fork 71 by means of a screw 73 which tightens against the tension of spring washer 74. A groove 75 is cut in the case 1 to permit horizontal movement of the knob 72, screw 73 and the fork 71. The fork 71 is adapted to lock into the notches 68 of the bolt 67 and the notch 45 cut in the plunger rod 54.

Two holes 76 and 77 are cut through the bottom of the cylinder casing 47. Hole 77 passes through the center of a tube 78 which projects through the bottom of the cylinder casing 47. A small ball 79 is held in place within the opening 77 which has a widened area to accommodate said ball 79. A coiled spring 80 compresses said ball 79 upward in said hole 77. Threaded cap 81, having a hole 82, at the bottom, threads upon the externally threaded projecting tube 78 whereby said coiled spring 80 is maintained under compression against said ball 79.

Referring now to the day selector mechanism shown in Figs. 9, 10, 11, and 12, said day selector consists of a seven pointed metal "crown" 83 attached to the rim of a circular metal base 84 having a hole in the center thereof. A cup 85, made of insulating material, is fitted within said "crown" 83. A shallow metal cup 86 is fitted within said insulating cup 85 with a wire lead 87 electrically connected to the metal cup 86 and passing through a hole in the wall of the insu-

lating cup 85 and through an insulated hole in the "crown" 83 to the outside and thus to the hour selector, as will be described hereinafter. To the inside upper portion of the insulating cup 85 are attached seven metal pieces 88 (resembling the shape of paint brush handles) so that each piece 88 is set adjacent to each prong 89 of the crown 83. Each metal piece 88 is separated from each adjacent piece 88 by a small gap 90 (either of air or insulating material) and all the pieces 88 are separated by a small gap 91 from the top of the shallow metal cup 86. The pieces 88 are held in place by riveting, as shown in Fig. 11, or by other suitable means. The lower edges of the seven metal pieces and the upper edges of the shallow metal cup 86 are beveled to make a track for the revolving contact roller 28. Roller 28 revolves on an axis which is fitted to spring wire 92 which is attached to a metal collar 93 which fits friction tight around insulating collar 93a which in turn fits tightly around the end of arbor 27. A nipple 95, situated on the inside of each crown prong 89, and a similar nipple 96, located on the outside of each metal piece 88, are provided at the same height, so that nipples 95 and 96 can make good electrical contact when the crown prongs 89 are in their closed circuit position. Thus, there are pairs of oppositely disposed nipples for each of the prongs and metal pieces. The circular metal base 84 of the "crown" 83 is firmly attached to the metal pillar plate 97 of the clock works where it makes good electrical contact. A hollow bolt 98 passes through a collar 99 made of insulating material which in turn passes through the aligned central holes in the shallow metal cup 86, the insulating cup 85 and the metal base 84 of the "crown" 83. The bolt 98 projects its threaded end 100 through a hole in the metal pillar plate 97. A nut 101 threads into the bolt 98 and secures the hole day selector mechanism assembly to the pillar plate 97. The arbor 27 passes through the hollow center of the bolt 98 and is attached to gear 17. At the top of each crown prong 89 is affixed a small ball 34. A dust proof insulator 102, perforated to accommodate the seven pin head prongs 89, is attached on the inside of the back plate 36 to prevent dust from getting into the works through the crescent openings 41 which permit the crown prongs 89 to protrude outside of the back plate 36.

Referring now to the hour selector mechanism shown in Figs. 13 and 14, said hour selector consists of the control knob 35 having a pointer 49 thereon. A 24-hour dial plate 38 is either fastened to or engraved on the back plate 36 of the clock case 1. An eccentric pin 103 and a straight pin 104 are set near each other in a thick washer 105 made of any suitable insulating material. The washer 105 has a centrally located hole therethrough. The underside of said washer 105 has two concentric recessed tracks in which thin flat metal rings 106 and 107 are placed and to which pins 103 and 104, respectively, are fastened and make good electrical contact therewith. Straight pin 104 is welded to its metal ring 107 while eccentric pin 103 is fitted to its metal ring 107 only with friction tight engagement, so that said eccentric pin 103 may be rotated by moving regulator pin 108, which pierces eccentric pin 103 at right angles at a point slightly above that where the pin enters washer 105. Tubular shells 109 and 110 contain metal balls 111 and 112 which are compressed by coil springs 113 and 114 held within said tubular shells 109 and 110 by a suitable closure. The top of the metal ball 111 makes electrical contact with the inside recessed metal ring 106, while the other metal ball 112 contacts the outside recessed metal ring 107. Washer 105 is fastened to the back plate 36 by means of a hollow bolt 115, spring washer 116 and nut 117. Shaft 44 is connected to gear 14 as hereinbefore described (see Fig. 5). To the other end of the shaft is attached an assembly consisting of a collar 118 made of insulating material, and a metal collar 119 which is concentric with insulating collar 118 and fitted frictionally thereto. This assembly is fastened to the shaft 44 after said shaft is thrust through the hollow center of the bolt 115. The assembly is held in place by means of a set screw 118a which is threaded into the portion of insulating collar 118 which projects through metal collar 119 in such a manner that set screw 118a is insulated from metal collar 119. To the collar 119 is fastened a wire whip 120 bent so that it will come in contact with pins 104 and 103 with a slight sweeping motion when the shaft 44 rotates the whip 120 past said pins 104 and 103. Control knob 35 is attached to the insulating washer 105 by means of a set screw 121, so that rotation of said knob 35 will cause the insulating washer 105, in which pins 103 and 104 are inserted, to rotate in the same direction. Leaf springs 122 and 123 are attached to the frame of the clock but are electrically insulated from it. The ends of said springs 122 and 123 are so positioned that they are in electrical contact with the lower ends of the tubular shells 109 and 110 respectively. Said springs 122 and 123 are part of the electrical circuit, as will be hereinafter described in connection with the wiring diagram shown in Fig. 15. In the foregoing description, it is assumed that the clock's back 36 is made of insulating material. If non-insulating material is used, tubular shells 109 and 110 are to be electrically insulated from said back.

In the diagram of Fig. 15, a battery of cells 18 is connected in the circuit of the clock mechanism 124, with the clock frame acting as ground for one terminal. The terminals of the battery are in contact with spring terminals 21 (Fig. 3), both of which are fastened to frame 10. One of the spring terminals 21 is grounded to the frame but the other is insulated from the frame. The insulated terminal is electrically connected both to the ungrounded terminal of the clock movement and to one terminal of the alarm element as hereinafter explained. In the alarm circuit, one terminal of the alarm bell 23 is connected to the ungrounded terminal of the battery 18 while the other terminal of bell 23 is connected to the alarm switch 47. From there, the circuit continues through the hour selector, to the inside metal cup 86 of the day selector. The base 84 of the "crown" 83, indicated by the outer ring of the day selector, is grounded and thus completes the circuit back to the grounded terminal of the battery 18.

The manner of removal and replacement of the battery cells is illustrated in Fig. 16, showing, in sectional detail, operation of the two hinged doors for the two cell compartments shown in Fig. 4. Two doors 125 and 126 are supported by hinges 127, so that they may be swung outwardly against the tension of springs 128, to permit the replacement of battery cells 18.

The operation of the device is as follows:

The rotating gear train when activated by the clock mechanism, in addition to rotating the minute, hour, and day hands 3, 4, and 5, also

causes arbor 44 of the hour selector and its attached metal whip 120 to rotate at the rate of one revolution in twenty-four hours, and roller 28 within the day selector, at the rate of one revolution per week.

If the operator wished to set the alarm to ring at, say, 12 o'clock noon, as it is shown in Fig. 14, then he would rotate control knob 35 which causes the insulating washer 105 to move with the knob 35 until the pointer 40 is opposite the number 12. The pointer 40 and the two pins 103 and 104 are shown opposite the "12" in Fig. 14, but there need be no correlation between the positions to which pointer 40 and the two pins are initially adjusted. Pointer 40 is fastened to washer 105 in such a position that the time to which it points will coincide with the time indicated on the dial of the clock whenever whip 120 comes in simultaneous contact with pins 103 and 104. When said whip 120 contacts both pins 103 and 104, the alarm circuit will be closed at this point and the alarm will ring, provided the circuit is not open at the day selector, or alarm switch, or elsewhere. The duration of the alarm will depend on the curvature of whip 120 and upon the spacing of the pins 103 and 104. Since the eccentric pin 103 can be moved away from or brought closer to the other pin 104 by means of the regulator pin 108, the ringing interval can be varied to suit the needs of the individual. When the whip 120 sweeps past the point where it makes simultaneous contact with the pins 103 and 104, the circuit is broken and the alarm will stop automatically. If it is desired that the alarm shall ring at the same hour every twenty-four hours and turn itself off automatically each time, no further adjustment is made. But if the user wishes the alarm to sound at the same hour every day except, say, Saturday and Sunday, then in addition to setting the hour selector for the desired hour, he will also set the day selector as follows:

He moves the pin heads 34 located at Saturday and Sunday on the dial, so that said pin heads 34 move from one end of the crescent shaped slot 41 to the other end, where the pin head 34 and its attached prong 89 will be held. This movement will pull the nipple 95 on the inside of the prong 89 away from the nipple 96 located on the outside of the metal pieces 88, so that the circuits on Saturday and Sunday are open, thus preventing the alarm from going off even though the whip of the hour selector continues to contact the pins 103 and 104 on those days. The remainder of the pin heads 34 are left in position so that the alarm circuit will be closed the other five days of the week, since the nipples 95 and 96 are in contact when the prongs 89 are in the contact end of the crescent shaped slot 41.

As the roller 28 revolves in the track 91 made by the beveled edges of the seven metal pieces 88 and the shallow metal cup 86, it closes the circuit between each of the seven pieces 88, in turn, with said metal cup 86. The spaces 90 between metal pieces 88 prevent them from coming in electrical contact with one another except during the very short intervals when the roller 28 simultaneously contacts adjacent pieces 88. The movement of the roller 28 is so geared that each metal piece 88 is contacted for twenty-four hours by said roller 28. In this manner, the alarm can be set to ring at any hour and on any day or combinations of days of the week.

Should the user wish to stop the alarm after it has begun to sound, he presses down the button 9 on the top of the clock case 1. Should he do nothing else, then the alarm circuit will be broken for a short period of time; but it will automatically close itself so that the alarm will again ring twenty-four hours later. The manner in which this alarm switch operates can be understood by referring to Figs. 6, 7, and 8.

When the stop button 9 is pushed down, it forces the plunger rod 54 and its piston 49 downward, breaking the circuit between the terminal strips 61 and 62 and the metal ring 52a which is set on top of the piston 49. At the same time, coil spring 66 is compressed and the air in the cylinder 47 is forced out through hole 76 and hole 77 where the ball 79 is forced down against the spring 80 and the air flows out through hole 82 in the bottom of the threaded cap 81.

Now the compressed spring 66 pushes the piston 49 back to its original position, but this movement is slow since the spring 80 and the ball 79 now close the opening 77 so that air from the outside can enter the cylinder 47 only through the single small opening 76. The upward movement of the piston 49 is thus retarded. This delayed action will hold the circuit open for a period greater than that during which the whip 120 will be in simultaneous contact with the pins 103 and 104. When the piston 49 reaches the top again, the metal washer 52a makes contact again with terminal springs 61 and 62 and the alarm circuit is again closed and the alarm set to ring twenty-four hours later. The tension of spring 66 and the size of opening 76 are so designed that the interval required for the return of piston 49 from a fully depressed position to its normal rest position will exceed the longest interval that whip 120 will be in simultaneous contact with pins 103 and 104 when they are most widely separated.

Should the user wish to render the alarm inoperative when he presses down the button 9, then he simply slides button 72 within recess 75 toward the electric switch so that the fork 71 engages the groove 45 in the plunger rod 54. The plunger rod 54 may be pushed down first and then the fork 71 slid into the groove 45, or the order may be reversed. In either case, the fork 71 will snap into the groove 45 provided for it. To release the electric switch, the fork 71 is moved away from the electric switch and the circuit will be closed by the rising piston 48 in the manner described above.

As will be seen from the above description, the invention discloses a portable alarm clock operated by batteries, preferably small dry cells such as are commonly used in flashlights.

The clock may be operated in any position, is light weight and has an alarm mechanism which can be set to sound for a period of time, stop, reset itself and repeat this performance at 24 hour intervals for whatever days of the week the alarm may be set.

In addition, the clock contains two switches for controlling the alarm. Operation of one switch stops the alarm as it is sounding but automatically resets it to sound again 24 hours later. The other switch can convert the alarm into a non-alarm clock or nullify the automatic reset feature of the first switch mentioned.

If desired, the dial of the clock may be illuminated by any suitable means, such as, for example, a flashlight bulb and a sliding switch. The intensity of illumination of the bulb would also serve as a means of indicating the condition of the battery. However, sufficient advance no-

tice of the need to replace the battery is also given by a weakening of the alarm signal.

While, in disclosing the principles of my invention and its preferred embodiment, I have described various detailed structure and relationship, it will be understood that such embodiment and details are given by way of example only and not as limiting the scope of my invention.

For example, the same device with an electric relay substituted for the alarm element could be used to close or to open electric circuits at any time on all or selected days of the week. Two such devices (or a clock mechanism which operates two sets of hour and day selectors like the one employed in the alarm clock described above but each set controlling a separate circuit) could be employed to close and to open, or to open and to close, circuits on a pattern which would permit selection of the interval of the day on each or all days of the week during which an electrically controlled device would operate or would be out of operation.

Furthermore, while I have described, in detail, the application of my inventive structure to an alarm clock, it will be understood that the principles of my device may be applied in fields other than alarm clocks. The substitution of a relay for the alarm element, for example, or the use of a pair of relays as above set forth, would make possible the utilization of my structure as a circuit breaker serving all manner of electrical devices, such as radios, private power plants, and washing machines, and electrically controlled gas ranges, water heaters, and thermostats.

I claim:

1. An electric timing device comprising an electric circuit, a battery in said circuit for powering said circuit, an electrically responsive device further in said circuit, a plurality of time indicating means, a time selector mechanism including a pair of separated contact points both arranged on an arc of the same circle and in series with said circuit and arranged when conductively bridged to complete said circuit, a rotating electrically conductive resilient whip for bridging said contacts at a predetermined point in its rotation, means for adjustably positioning said contacts in the path of said conductive whip, a plurality of gears for rotating said indicating means and said whip in synchronism, and an auxiliary manual switch mechanism for breaking said circuit at will, and selectively permanently and for a predetermined period.

2. The combination in accordance with claim 1 wherein is provided means for predetermining the spacing of said separated contact points.

3. A portable electric alarm clock comprising a support, a plurality of time indicating elements, an alarm element responsive to current flow, a source of electric current, a circuit including said alarm element and said source of electric current, a day selector switch connected in said circuit for making and breaking said circuit, an hour selector switch connected in said circuit for making and breaking said circuit, means for visually indicating the hour and days selected by said switches, said day selector switch having a plurality of contact pairs, one for each day of a week, means for opening any selected one or more of said contact pairs, said day selector switch further comprising a selector arm for connecting said contact pairs in said circuit in sequence, one contact pair for each day of a week, and a gear train for rotating one of said time indicating elements and said selector arm in synchronism.

4. The combination in accordance with claim 3 wherein said hour selector switch comprises a rotatably positionable insulating element, two concentric rings secured to said insulating element and rotatable therewith, a first contact pin contacting one of said rings, a second contact pin contacting the other of said rings, a pair of terminal springs, means for making continuous contact between each of said rings and a different one of said terminal springs during rotation of said concentric rings and in any position thereof, a flexible rotatable metallic whip positioned to bridge said first and second contact pins at a predetermined point in its rotation, and means for rotating said rotatable metallic whip in synchronism with another of said indicating elements.

5. The combination in accordance with claim 4 wherein one of said contact pins is straight and the other of said contact pins is eccentric and rotatable.

6. An electrical timing system, comprising: an electric circuit, a source of current connected in series with said electric circuit for powering said circuit, a device operative in response to flow of current in said electric circuit, a rotatable time indicating device, a time selector comprising a plurality of spaced contacts positionable about the arc of a common circle and connected in series with said circuit for closing said circuit when said spaced contacts are conductively bridged, said time selector further comprising a rotatable resilient electrically conductive arcuate whip for bridging said contacts, and means for rotating said rotatable whip, in synchronism with said rotatable time indicating device, about said arc of a common circle, wherein is further provided a manually operative switch device for opening said circuit at will, said switch device comprising means for automatically re-closing said circuit in a predetermined time following said opening.

7. The combination in accordance with claim 6 wherein is further provided means for visually indicating the position of said spaced contacts relative to the position of said time indicating device.

8. The combination in accordance with claim 6 wherein is further provided means for varying the spacing of said spaced contacts.

9. An electric alarm clock comprising: an alarm device responsive to flow of electric current, a circuit for said current, a time period selector mechanism for selecting a predetermined time during the 24 hours of any day of the week, and further selecting any predetermined one or more days of the week at will, said time period selector mechanism comprising a time selector for selecting a time during the 24 hours of a day and a day selector for selecting one or more days of the week, said time selector comprising a pair of normally open contacts in series with said circuit, means for conductively bridging said contacts comprising a wiper arm, means for selectively positioning said pair of contacts at any predetermined position along a predetermined path, in accordance with a selected time during the 24 hours of the day, time controlled means for actuating said wiper arm along said path for conductively bridging said pair of contacts at said selected time of day, said day selector comprising seven normally closed switches, means for at will opening any one or more of said normally closed

switches, means for inserting said switches in said circuit in succession, and each for the entire duration of a different day of the week, and means for connecting said alarm device, said time selector and said day selector in series in said electric circuit.

10. In combination, an alarm device responsive to flow of electric current to provide an alarm, a first normally open time controlled switch settable to close at any predetermined time during 24 hours of a day, a second normally closed time controlled switch settable at will to remain open during any preselected one or more days of the week, a source of electric power, and a circuit for connecting said alarm device, said source of power, said first time controlled switch and said second time controlled switch in series, said first normally open time controlled switch comprising a pair of separated and mutually insulated contacts, and means for bridging said pair of contacts conductively at any predetermined time during 24 hours of a day for a time period determined by the separation of said separated contacts.

11. The combination in accordance with claim 10 wherein is further provided means for adjustably presetting said separation of said contacts to predetermine said time period.

12. The combination in accordance with claim 10 wherein is further provided a normally closed switch in series with said circuit, means for manually actuating said normally closed switch to open position, and means for thereafter automatically reclosing said normally closed switch after a predetermined time interval.

13. The combination in accordance with claim 10 wherein said second normally closed time controlled switch comprises a pointed crown having a plurality of flexible points, a plate having a plurality of slots, each of said flexible points extending through a different one of said slots, each of said slots comprising means for retaining one of said points in flexed position, and operative when any of said points is in said flexed position for setting said second time controlled switch to remain open during a corresponding day of the week.

14. An electrical time control device, comprising, an electric circuit, a device responsive to current flow in said electric circuit, means for controlling the times of current flow in said electric circuit, said means comprising a time control switch connected in series with said electric circuit for closing said electric circuit at predetermined times and for an adjustably predeterminable interval of time at said predetermined times, a manual switch in said electric circuit for opening said electric circuit at will, said manual switch normally closed and comprising automatic means for re-closing in a further predetermined time interval after opening thereof, said further predetermined time interval longer than said predeterminable interval of time.

15. An electrical time control device comprising, an electric circuit, a source of electric power for powering said circuit, an electric alarm operative in response to current flow in said electric circuit, a first switch connected in series with said circuit, a second switch connected in series with said first switch in said circuit, said first switch normally open and comprising means for closing at any predetermined time during 24 hours of a day, and for a predetermined time interval at said predetermined time, said second switch normally closed for all times during a seven day period, and means for maintaining said second switch open at will for any entire one or more days of said seven day period.

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