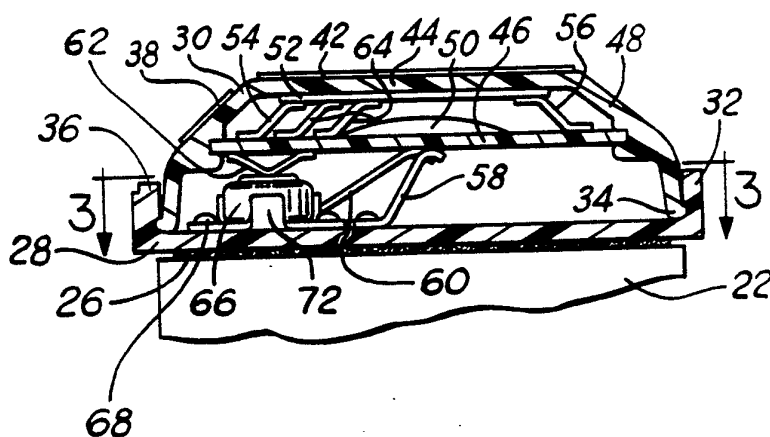




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(54) Title: MEDICATION DOSAGE REMINDER DEVICE AND METHOD EMPLOYING SAME



(57) Abstract

A method of reminding a person to administer medication from a container (22) at prescribed time intervals utilizes an alarm device (20) which the user attaches to the container by means of an adhesive pad (26). The device (20) includes a housing (28, 30) containing an audible alarm (52), a power supply (66) and electronic circuitry (93, 94, 96) for actuating the alarm (52) at preprogrammed, desired time intervals. The housing (28, 30) includes a bottom (28), stationary portion (22) secured to the container (22) by the adhesive pad (26), and a top portion (30) rotatable to any of a plurality of desired positions respectively representing preprogrammed times at which the alarm (52) is to sound.

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MEDICATION DOSAGE REMINDER DEVICE
AND METHOD EMPLOYING SAME

TECHNICAL FIELD

The present invention broadly relates to methods and devices for reminding persons to issue, dispense or administer medicants or drugs, such as pills from a container, and deals more particularly with a miniaturized, electronic alarm suitable for attachment, for example, on the cap of a pill bottle, as well as a method utilizing the same.

BACKGROUND ART

Compliance with prescriptions and instructions for administering drugs and medicants has received increased attention in recent years, both because of the aging population and the proliferation of drugs and the expansion of their use in treating various medical conditions. Others in the past have devised various types of aids for reminding persons to take their medication, including those of a passive type which provide the person with an indication of his or her compliance with a dosage schedule, and those of an active type which provides the person with a visible or audible alarm signal when the time arrives to take medication in accordance with a prescribed schedule, typically dictated by a physician.

Although numerous types of the so-called active reminder devices mentioned above employing an alarm have been devised in recent years, none have enjoyed wide-spread use and success. Some of these prior devices are rather large in size, and thus

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not easily portable. Others, while possessing a host of features and flexibility for permitting the user to program his or her personal dosage alarm schedule, are often complex and thus are not well-suited for either the casual user or elderly, feeble patients who may not possess the requisite skills, dexterity or patience to learn and execute complex steps for programming the alarm device. Also, the more complex, electronic type alarms previously devised are necessarily relatively expensive because of either their size and/or the complexity and extent of electronic parts used in them.

There is therefore a need in the art for a substantially more simple, exceptionally low cost active device for reminding a patient to take his or her medication which obviates each of the shortcomings suffered by prior art devices mentioned above. The device of the present invention, and the method of using same, are directed toward satisfying this need.

SUMMARY OF THE INVENTION

In accordance with the present invention, a medication dosage reminder device is provided which includes a housing, an annunciator or alarm means within the housing for periodically issuing an alarm to remind a patient to take medication, electronic means within the housing for controlling the alarm or annunciator, and means for attaching the housing, preferably with an adhesive, to the container in which the medication is held. Because of its simplicity, the device is exceptionally small in size and is thus preferably configured such that the housing is circular in shape, often no greater in diameter than the size of a typical "pill" bottle cap, and can be attached either to the bottle cap, or the bottom of the bottle or other medication container, particularly where the container is cylindrical in shape. The housing comprises a bottom, circularly shaped portion stationarily attached to the

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medication container, and a top portion which may be rotated by the user to both activate the device and select a medication alarm schedule in accordance with the dosage intervals prescribed by the physician. The bottom portion of the housing is attached to the medication container by means of a layer of adhesive, preferably in the form of a thin, compressible foam or rubber type pad secured to the bottom portion of the housing which includes an outer layer of adhesive normally covered with a removable, protective sheet prior to use. The user attaches the device to the medication container simply by peeling away the protective sheet to reveal the adhesive and then "sticking" the device directly onto a surface of the medication container, for example the container cap, or the bottom wall of the container. Several adaptors are also disclosed to provide a means for attaching the device to medication containers.

The device includes an audible alarm in the form of a piezoelectric element controlled by an electronic circuit powered by a small battery, such as that used in electric watches, contained within the housing. In a preferred embodiment of the invention, the piezoelectric device is mounted on the top wall of the top portion of the housing. This top may be flexed downwardly with the user's finger to activate a switch which resets the alarm device after it is actuated by the electronic circuit. The electronic circuit controlling the alarm includes an oscillator, a frequency divider, and logic circuitry which is responsive to the rotational position of the upper portion of the housing to set the timing of the alarm. This logic circuitry is preprogrammed, and thus, setting the proper rotational position of the upper portion of the housing automatically selects the desired, fixed alarm timing. One or more fixed timing intervals may be provided, with indicia being provided on the upper portion of the housing which can be rotated into registration with a pointer to select a desired timing schedule.

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In accordance with another aspect of the invention, a method is provided for reminding a person to administer medication from a container at prescribed time intervals, comprising the steps of providing an alarm device which issues an alarm at each of the intervals, providing attaching means for allowing the person to attach the alarm device to the container, and then attaching the alarm device on the container using the attaching means. The simplicity of the alarm device of the present invention eliminates the need for learning or remembering complex programming techniques, and thus renders the device particularly suitable for use by the casual user or elderly patients. Because of its small size, it is possible to mount the device directly on the medication container. In effect, the extreme simplicity and low cost of the alarm device render it virtually disposable so that it forms an integral part of the medication container and may be simply discarded along with the medication container after use and/or replaced when the medication container is likewise replaced.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, wherein like reference numerals are employed to designate identical components in the various views:

FIGURE 1 is a perspective view of a pill bottle type medication container having the reminder device of the present invention installed on the cap thereof;

FIGURE 2 is a cross-sectional view taken along the line 2-2 in FIGURE 1;

FIGURE 2A is an enlarged, fragmentary, sectional view of an upper portion of the device of FIGURE 1, showing the top wall of the housing being depressed to reset the alarm;

FIGURE 3 is a sectional view taken along the line 3-3 in FIGURE 2;

FIGURE 4 is an enlarged, cross-sectional view taken through the bottom wall of the bottom portion of the housing of the device of FIGURE 1, illustrating the mounting of the battery;

FIGURE 5 is a block diagram of the electronic circuit used in the device of FIGURE 1;

FIGURE 6 is a detailed schematic diagram of the electronic circuit shown in FIGURE 5;

FIGURE 7 is a perspective, exploded view depicting one alternate means for attaching the device of the present invention to a medication container;

FIGURE 8 is a side view of another arrangement for attaching the device of the present invention to a medication container;

FIGURE 9 is a perspective view of still another arrangement for attaching the device of the present invention to a medication container;

FIGURE 10 is a cross-sectional view of a cap of a medication container having the device of the present invention formed integrally therein, various electrical and mechanical parts of the device not shown for simplicity;

FIGURE 11 is a side view of a medication container depicting the device of the present invention installed on the bottom thereof;

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FIGURE 12 is a cross-sectional view depicting an adhesive pad for attaching the device of the present invention to a medication container;

FIGURE 13 is an enlarged, cross-sectional, fragmentary view better showing the relationship of the device, the adhesive pad and the cap of a medication container;

FIGURE 14 is a combined block and schematic diagram of an alternate form of an electronic circuit for the device of FIGURE 1; and,

FIGURE 15 is a combined block and schematic diagram of still another form of an electronic circuit for the device of FIGURE 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

Referring first to Figures 1-4, the present invention relates, in part, to a device generally indicated by the numeral 20 for reminding a person or patient to dispense or take a preselected quantity of a medication either of a prescription type issued by a physician or "over-the-counter" drugs, including vitamins that are to be taken at prescribed time intervals or in accordance with a preset schedule. As best seen in Figure 1, the device 20 is exceptionally small in dimensions (relative to a typical pill bottle, for example) and is therefore well-suited to be directly attached to the container holding the medication, such as the pill bottle 22 having a snap-fit or screw-on type cap 24. In the present invention, the pill bottle container 22 as well as the cap 24 are cylindrical in configuration, and thus the device 20 is configured in a circular shape so that it may be attached to an end of the container 22 by means of an adhesive pad 26 or any of various other fastening means, such as a Velcro type fastener, a suction

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cup, or a barbed mechanical connector, to name only a few by way of example. The device 20 is thus adhesively secured, in the present example, by means of the adhesive pad 26 directly to the top surface or top of the cap 24, however, as will later be discussed, the device 20 may be attached to the bottom wall of the container 22, particularly where the top 25 of the cap 24 possesses a surface configuration which is other than strictly flat which would otherwise render it less suitable for attaching the device 20 thereto. Moreover, the device 20 may be adhesively secured to other surfaces of the container depending upon the configuration of the container, such as the front or rear sidewall of a container having relatively flat, opposing sides, of the type often used to contain liquid medications. In any event, the diameter of the device 20 may be selected such that it is well-suited to fit on the end of cylindrical medication containers having a wide range of diameters. In the present example, as seen in Figure 2, the device 20 has a diameter slightly less than that of the cap 24, however, the diameter of the device 20 could be equal to or greater than that of the cap 24 to which it is attached.

In addition to the adhesive pad 26 previously mentioned, the device 20 broadly includes a housing consisting of a base 28 and a top 30, as well as electronic means, later described, contained within the housing. The base 28 and top 30 may be made of any suitable material, but preferably comprise formed plastic made as by injection molding. The base 28 includes a substantially flat bottom wall and a circumferentially extending cylindrical side wall 32. Extending upwardly from and formed integral with the side wall 32 is a pointer 36 adapted to selectively register with indicia 38 defined on the top portion 30 of the housing. The base further includes a circumferential, integral groove adapted to matingly receive a rounded rib-like edge 34 which extends around the entire circumference of the top 30. The edge 34 is captured within the groove in the base 28 to

form a snap-fit connection to facilitate ease of assembly, yet the tolerances provided and the yieldable nature of the plastic materials used in the bottom 28 and top 30 allow the rib edge 34 to be rotatable relative to the stationary base 28 about a central axis extending through both the device 20 as well as the container 22 and cap 24. Thus, it may be appreciated that the top 30 may be rotated to any of a number of preselected positions relative to the pointer 36 which remains stationary on the base 28.

The top 30 of the device housing further includes a substantially flat, flexible top wall 44, an inclined or beveled side wall 40, and an internal shoulder 48 provided with a circumferentially extended end groove which receives and mounts the edges of a printed circuit board (PCB) 46 therein. The planer nature of the top surface 44 permits an adhesive label 42 to be applied to the top surface thereof, which label 42 may include any desired indicia (not shown), such as advertising information from a pharmacy, drug manufacturer, etc. The previously mentioned indicia 38 may be applied by any suitable means on the inclined side wall 40 and are herein shown as being integrally formed as raised indicia on the surface of side wall 40. In the present example, the indicia 1, 2, 3, 4₁₆ and "OFF" are provided, respectively representing four dosage intervals in each 24-hour period, along with an OFF setting.

Mounted on the bottom surface of the top wall 44 is an electrically energizable audible alarm in the form of either a capacitive type piezoelectric crystal or a so called thin film type piezoelectric crystal energizable with an AC voltage signal to produce a beeping type audible alarm. The piezoelectric annunciator 52 may be secured to a metal backing (not shown) if necessary which is in turn bonded, as by gluing, to the bottom surface of the top wall 44 to prevent cracking of crystal when the top wall 44 is flexed, as shown in Figure 2A, during a later

discussed reset operation. The annunciator 52 is electrically connected with electronic circuitry on a PCB 46 by means of a pair of flexible, metal connectors 54, 56 extending between the PCB 46 and electrical contacts on the bottom surface of the annunciator 52. A second set of flexible electrical connectors 64 respectively extend up from conductive pads 65 on the PCB 46 to contact points closely spaced beneath the bottom side of the annunciator 52. The reset contacts 64 are shorted together via a conductive pad or surface (not shown) on the bottom of the annunciator 52 when the top wall 44 is depressed, as shown in Figure 2A, to complete a later discussed reset circuit.

The PCB 46 includes most of the electronic circuitry, including a suitable integrated circuit 50 mounted thereon, whose details will be discussed later in more detail. On the bottom side of the PCB 46, there is mounted a battery contact 62 which engages one terminal 74 of a battery 66. The battery 66 is mounted on the bottom wall of the base 28 by means of a battery holder 68, formed of conductive material. The battery holder 68 includes a plurality of upstanding, circumferentially spaced holding clips surrounding the battery 66, and a pair of mounting tabs 70 which are apertured to receive hold-down lugs 76 integrally formed from the material of the base 28; a secondary forming process may be employed to mushroom the material of the lugs down over the mounting tabs 70.

The bottom surface of the PCB 46 includes various conductive pads, shown diagrammatically in Figure 3, which are contacted by various electrical wiper terminals which will now be discussed. Connected to the battery holder 68 so as to make contact with a terminal of the battery 66, there is provided a battery contact wiper 60 which extends upwardly to slidably contact an electrical contact pad 88 formed on the bottom side of the PCB 46. The contact pad 88 is generally ring shaped, coaxial with the central axis of the device 20, but is

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interrupted around approximately one-third of its circumference to facilitate an "off" position for the device 20. From Figure 3 it may be seen that the wiper 60 connects the battery 66 to the electrical circuit on the PCB 46 when the outer end of the wiper 60 engages the pad 88; this electrical contact which results in power being delivered to the circuitry is interrupted, of course, when the top 30 is rotated to the OFF position indicated in both Figures 1 and 3.

A shorting terminal comprising a pair of electrical wipers 58 is secured to the bottom wall of the base 28. The wipers 58 are adapted to contact and electrically connect four pairs of electrical contact pads 78-86 formed on the bottom of the PCB 46, and circumferentially spaced in a 180° segment around the central axis of the device 20, as best seen in Figure 3. The contact pads 78-86 respectively correspond to four different, selectable time interval settings for the alarm. As previously mentioned, these alarm settings may be based on intervals corresponding to frequently prescribed time intervals for taking medications, based on either 24-hour days or other time bases. In the present example, four time settings are shown in Figure 3 which respectively correspond to an alarm being provided once, twice, three and four times per each sixteen hour interval (optionally, or additionally, a fourth setting may be included which provides four alarms on a 24-hour day). Thus, it may be readily appreciated that the top 30 may be rotated from an OFF position to any of a plurality of settings, and the arrangement of the contact pads 78-86 provides the function of a multiple position switch.

Referring now to Figures 5 and 6, the electronic means for selectively actuating the annunciator 52 broadly comprises the previously discussed multi-position switch 90, an oscillator and frequency divider 92, a reset switch 94, and a latch and driver 96 whose output actuates the alarm 52. With the switch 90

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switched from its OFF position to one of the selected time intervals, a selection is thereby made for the calibrated RC oscillator and frequency divider 92. The oscillator and frequency divider 92 is shown herein as an analog circuit, however those skilled in the art will recognize that a digital oscillator implementation could easily be devised, and indeed, alternate circuits will be discussed later herein. The oscillator and frequency divider 92 provides a clock signal which, on its rising edge, clocks into the latch and driver 96, thereby latching in the output and causing the alarm 52 to be actuated. The alarm 52 remains energized until the reset switch 94 is actuated by the user, although it should be recognized that the circuit may also include an automatic time out circuit (well-known in the art), instead of or in addition to the reset switch 94, which turns off the alarm 52 after a prescribed time interval, if desired.

Referring now particularly to Figure 5, the battery 66, typically a conventional three volt type, provides power to the circuitry and is connected to the remaining circuitry by means of switch 60 comprising the previously discussed battery contact wiper which engages the conductive wiper pad 88 (Figure 3). A plurality of resistors R_1 - R_5 respectively associated with the time intervals at which the alarm is to be activated, are selectively switched into the circuit by means of switch 90 which is effectively formed by the pairs of contact pads 78-86 being selectively connected by the shorting wiper contacts 58. The resistors are R_1 - R_5 cooperate with capacitor 103 to form an RC circuit that controls the timing of timer 100 which may comprise, for example, a CMOS 7555C integrated circuit. The timer 100 outputs a square wave clock signal to the frequency divider 108 which may comprise, for example, an HEF 4521BT integrated circuit. The frequency divider 108 divides the clock signals received from timer 100. Switch S_2 supplies the output of the frequency of divider 108 which has been divided by 2^{24}

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into a latch 102 which may comprise, for example, a 74HC74 chip. Switch S_2 actually is defined by the wiper contact 60 and pads 86 (Figure 3) to produce a signal which activates the alarm 52 four times during a sixteen hour period of each day. A second timing signal is output from a frequency divider 108 (on pin 13) to the input of a logic circuit 106 which may comprise a 74HC00 high speed CMOS logic gate, whose output is also delivered to the latch 102. The output of the latch 102 is (delivered on its pin 6) is used to drive the piezoelectric alarm 52. In the present example, a transistor 104 is employed to increase the current for driving the alarm 52. Following an alarm cycle, the latch 102 is reset by a reset signal on its pin 13 received from the logic circuit 106. Additionally, the latch 102 may be reset by a signal from the logic circuit 106 after a prescribed time-out period following activation of the alarm.

As mentioned earlier, the electronic circuit employed in the device 20 may be implemented in various forms, each of which may possess certain advantages from either a technological or cost standpoint. The previously described circuit employs an R/C (resistor/capacitor) time base; two additional embodiments employing a crystal oscillator time base, respectively shown in Figures 14 and 15, will now be briefly described, although it is to be understood that the present invention contemplates a range of other equivalent designs. Referring to Figure 14, a crystal oscillator 150 having a frequency, for example, of 3.579 MHz delivers its signal to a conventional oscillator circuit 152 which conditions the oscillator signal to provide a well-controlled, tight time base in the form of a clock signal which is delivered to a divider circuit 154. Divider circuit 154 may be a conventional integrated circuit such as an HEF4521BT which is a divide by 34 circuit that divides the clock signal into five output signals identified as Q30-Q34 which differ by a factor of two in terms of their time base. The output of divider circuit 154 is delivered to four conventional

comparator circuits 156-172 which compare their inputs with preset values. In the present example, the reference values for comparators 156-162 respectively comprise the numbers 18, 9, 4 and 3. The outputs of the comparators 156-162 are delivered to the inputs of respectively associated AND gates 164-172, the other inputs to these gates being signals established by the multi-position switch 90 (Figure 5). The outputs of AND gates 164, 166 are delivered to the inputs of an OR gate 176. The output of AND gate 168 is delivered to a conventional logic circuit 172 which is arranged to produce an output signal at three preselected times during a sixteen hour interval each day. A similar logic circuit arrangement 174 receives the output of AND gate 170 and is configured to provide an output signal at four hour intervals during each sixteen hour period, the remaining eight hours during each day being skipped. The outputs of the logic circuits 172, 174 are delivered to two additional inputs of the OR gate 176. The output of OR gate 176 is delivered to a latch 178 which latches in the high signal from the OR gate 176, and includes a tone pulse circuit for driving the alarm 52, which, in this embodiment, comprises a two wire type piezoelectric beeper. The latch 178 is reset by the reset switch 94.

Referring to Figure 15, a crystal oscillator 151 having a frequency of, for example, 32.768 KHz outputs its signal to a divider circuit 180 which may comprise a HEF4521BT type integrated circuit. The divider circuit 180 conditions and divides the clock signal produced by oscillator 151, to provide a plurality of outputs respectively comprising different time bases, that are received by a programmable logic array circuit 182 which may comprise, for example, a PAL16R8 type integrated circuit. The programmable logic array 182 is field programmable to output signals at its pin 12 at the times desired to initiate an alarm. This output signal is delivered to a driver circuit comprising transistor 184 and resistors 186-190 which function

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to drive a three wire type piezoelectric beeper 52. The values of resistors 186-190 are selected to produce a tone in the desired audible range, for example, 5 KHz. A simple switch 95 is provided to electrically couple the battery 66 to the remaining components of the circuit. The switch 95 may be positioned at any location on the housing 28,30 of the device 20, and when switched to a closed position energizing the circuit, results in initialization of the logic array 182 to begin counting the necessary timing cycles corresponding to the preselected, preprogrammed, fixed intervals of time at which an alarm is to be issued and medication is to be administered.

The logic circuit array 182 may be programmed to provide, if desired, fixed program alarms at predetermined, fixed intervals, within a given time period, e.g. 24 hours. In this embodiment then, the end user would not have the choice of selecting a particular alarm schedule since the device would be programmed with a single, fixed alarm schedule which could not then be later altered by the user. The device 20 can be preprogrammed at the time of manufacture and/or assembly to provide alarms on this fixed schedule, thus eliminating the need for the multiposition alarm schedule selection switch 90, previously described. In this embodiment, the previously described multiposition switch 90 is replaced by the simple 2-position switch 95 which, rather than selecting a specific alarm schedule from a plurality of choices thereof as in the previous embodiments, merely effects connection of the battery 66 to the circuit shown in Figure 15, effectively acting as an off-on power switch and well as a means for starting the subsequent timing cycles of the fixed schedule at a preselected time; in other words, the switch 95 establishes a timing reference starting point for the fixed alarm schedule upon which the subsequent timing cycles are based. Thus for example, if the user closes the switch 95 at 9:00 AM and the logic array circuit 182 is preprogrammed to issue alarm signals to the alarm

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52 only once every 24 hours, then the alarm 52 (in this example) would sound every day only once at 9:00 AM. This embodiment would, of course, require that the user be provided with a device 20 which is preprogrammed at the time of manufacture and/or assembly to match the prescription dosage of the particular medication with which the device is to be used. This arrangement, because of its extreme simplicity, is particularly advantageous for many applications, such as usage by the elderly and the occasional user, since the user does not need to learn complex procedures for setting/programming the device to suit his or her particular prescription in terms of frequency of dosage. Moreover, the manufacturing cost of the device 20 is reduced to a level such that it may be considered to be a disposable item, and thus discardable after all of the medication issued in a particular prescription has been consumed.

Figure 7 shows an alternate means of attaching the device to the top surface 25 of the cap 24 of a pill container or bottle 22. In addition to utilizing adhesive means as previously described, the attaching means shown in Figure 7 comprises a pair of attachable Velcro-type pads 110, 112 which are respectively adhesively secured (as by means of the previously discussed adhesive pads or the like) to the bottom surface of the device 20 and the top surface 25 of the cap 24. By this mounting arrangement, the device 20 may be removed from the pill bottle 22 when appropriate, for example, to remount the device 20 on a new or different medication container.

Figure 8 shows another means of attaching the device 20 to a medication container 22. The device 20 is formed integral with or may be attached by means of an adhesive pad 26 to a mounting base 116. The base 116 includes a pair of opposite resilient legs between which the container 22 may be inserted and captively held. In this manner, the device 20 is effectively mounted on the side of the cylindrical container 22, rather than on either of its ends.

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Still another means of mounting the device 20 on a medication container is depicted in Figure 9. The device 20 is secured to a longitudinally extending spine 122 by means of an arm 122. The bottom of the spine 122 has secured thereto a base support 130. A strap 126 provided with velcro 128 extends through an eye 124 on the spine 120 and wraps around the container 22. Although not shown, the spine 120 may be formed so as to telescope in order to accommodate containers of various heights.

The device 20 of the present invention is well adapted to be integrated into the top of a cap 132 of a pill bottle 22 as shown in Figure 10. The top wall 134 of the cap 132 defines the base of the device 20. The circumferential rib 34 of the top of the device is received within grooves formed on an upstanding circumferential extension 136 of the top 132.

As previously mentioned, some forms of pill bottle caps include raised indicia or the like thereon as shown in Figure 11 wherein the container 22 is turned upside down and the raised indicia on the cap is indicated by the numeral 138. In this type of application, as previously mentioned, the device 20 may be merely mounted on the bottom of the container 22 by means of the adhesive pad 26 as depicted in this Figure.

Figure 12 shows in more detail, the nature and construction of the adhesive pad 26, previously discussed. Adhesive pad 26 includes a central layer 140 of suitable material, preferably a compressible type foam, rubber or other soft resilient material, whose opposite sides are coated with a layer of adhesive 142, 144. Prior to use, in order to protect the adhesive layers 142, 144 a suitable sheet of material 146, 148 is applied over the adhesive layers. When ready for use, the sheets 146, 148 can simply be peeled off to reveal the adhesive layers 142, 144. Adhesive pads 26 of the type shown in

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Figure 12 are well-known in the art and are readily commercially available. In use, the pad 26 is typically first mounted on the device 20 simply by peeling off the protective sheet 146 and then pressing the pad, and particularly the adhesive layer 142 into engagement with the bottom side of the base 28 of the device. When the user is ready to adhesively attach the device 20 to a drug container, he or she merely peels off the second protective sheet 148 to reveal the adhesive layer 144, which is then brought into pressure engagement with some portion of the container, such as the cap or the bottom wall thereon.

Figure 13 shows in more detail how the adhesive pad 26 mounts the device 20 on a surface of the container such as the upper surface of the cap 24. From Figure 13, it can be seen that a sandwich is formed comprising the central layer 140 and adhesive layers 142, 144 which attach the base 28 to the cap 24. It may thus be appreciated that, in use, the end user (health care personnel or patient) may easily mount the device 20 directly on a container from which medication or other drugs are to be dispensed. The user may also remove the device from the container, depending upon the nature of the adhesive means that are employed for mounting, in order to remount the device 20 on a different container, particularly where the user wishes to replace the battery 66 to extend the life of the device 20. However, because of the nature and construction of the device 20 as well as the components used therein, the device 20 is quite inexpensive to manufacture and thus its cost is sufficiently low such that once the device is mounted on a medication container, it may be discarded when all of the medication from the container has been dispensed. The user then simply procures a replacement device 20 to be attached to the next prescription or prescription refill.

The device of the present invention is of course well adapted for use with the majority of common prescriptions which

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normally dictate dosage intervals of 1, 2, 3 or 4 times per day, was well as a dosage of four times per sixteen hour day. The user need only twist the top 30 to line up the pointer 36 with the desired dosage interval corresponding to the dosage prescription of the medication being used. Rotating the top 30 to the desired dosage position activates the electronic means previously described and results in an alarm at the appropriate intervals. In the present embodiment, the alarm remains on until reset by an automatic reset signal issued a prescribed time interval after the alarm is actuated, unless earlier reset as a result of the user pressing the top wall 44 of the top 30 to short the reset connectors 64 (reset switch 94 in Figures 5 and 6) thus turning off the alarm which then remains off until next actuated by the circuit at the end of the next timing interval.

From the foregoing, it is apparent that the present invention provides not only for the reliable accomplishment of the objects of the invention, but does so in a particularly efficient and economic manner. It is recognized, of course, that those skilled in the art may make various modifications or additions to the preferred embodiment chosen to illustrate the invention without departing from the spirit and scope of the present contribution to the art. Accordingly, it is to be understood that the protection sought and to be afforded hereby shall be deemed to extend to the subject matter claimed and all equivalents thereof fairly within the scope of the invention.

CLAIMS

What is claimed is:

1. A device for reminding a person to administer a drug from a container, comprising:

a housing;

means for attaching said housing on one end of said container;

actuatable alarm means for reminding the person to administer the drug from the container at a desired time; and,

electronic means within said housing for actuating said alarm means at said desired time.

2. The device of Claim 1, wherein said housing includes a stationary base and a top rotatable on said base.

3. The device of Claim 2, wherein said top is rotatable to each of a plurality of rotational positions respectively representing a plurality of choices of time intervals between successive desired times when said drug is to be administered.

4. The device of Claim 1, including a cap removably mounted on said container to allow the drug to be removed from said container, and wherein said housing is mounted by said attaching means on said cap.

5. The device of Claim 4, wherein said attaching means includes a layer of adhesive material.

6. The device of Claim 4, wherein said attaching means includes a layer of compressible material and a layer of adhesive on each side of said compressible layer, said adhesive layers respectively adhering to said cap and said body.

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7. The device of Claim 4, wherein said attaching means includes interlocking layers of velcro respectively on said cap and on said housing.

8. The device of Claim 4, wherein said cap includes a flat surface, and
said top is mounted by said attaching means on said flat end surface.

9. The device of Claim 2, wherein said base said top are essentially circular and are concentric about a common axis.

10. The device of Claim 2, wherein said base and said top are interlocking and are formed of thermoplastic material.

11. The device of Claim 9, wherein:
said top includes at least a surface area portion formed of flexible material and capable of flexing upon depression of said surface area portion by a person's finger, and
said electronic means includes means responsive to flexing of said surface area portion for deactuating said alarm means.

12. The device of Claim 2, wherein said base and said top each includes indicia on the periphery thereof, said indicia cooperating upon rotation of said top to indicate a plurality of rotational positions respectively representing a plurality of choices of time intervals between successive desired times when said drug is to be administered.

13. The device of Claim 10, wherein said base includes an upstanding wall around the periphery thereof and the peripheral edge of said top is interlockingly connected with the inside surface of said wall.

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14. The device of Claim 2, wherein said base includes an upstanding wall around the periphery thereof, and the periphery of said top is disposed in and slidably engages said wall upon rotation of said top.

15. The device of Claim 14, wherein:
said top includes a circumferentially extending side wall adjacent said peripheral portions, and
said upstanding wall and said side wall each have indicia thereon which cooperate upon rotation of said top to indicate the dosage of said drug to be administered over a period of time.

16. The device of Claim 1, wherein said electronic means includes at least one actuatable, preprogrammed timing circuit for actuating said alarm means at said desired time.

17. A medication dosage reminder device for use with a cylindrical container holding a quantity of medication to be periodically administered, wherein said container includes a pair of opposite end walls and one of said end walls is defined by a removable cap on one end of said container, said device comprising:

a housing;
annunciator means within said housing for periodically announcing times at which said medication is to be administered;

electronic means within said housing for controlling said annunciator; and,

means for attaching said housing on one of said end walls.

18. The device of Claim 17, wherein said attaching means includes a layer of adhesive.

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19. The device of Claim 17, wherein said attaching means includes:

a sheet of material fixed to said housing, and
a layer of adhesive on one said of said sheet opposite said housing, said adhesive layer being shiftable into adhering engagement with said one end wall when said device is installed onto said one end wall of said container.

20. The device of Claim 19, including a removable sheet protectively covering said adhesive layer until said device is ready for installation on said container.

21. The device of Claim 19, wherein said attaching means includes a layer of adhesive on the opposite side of said sheet for fixing said sheet on said housing.

22. The device of Claim 18, wherein one side of said layer of adhesive is adherent to a portion of the surface of said housing.

23. The device of Claim 22, including a removable sheet protectively covering the other side of said layer of adhesive, said sheet being removable to expose said adhesive layer prior to installation of said device on said container.

24. The device of Claim 17, wherein said housing includes a cylindrical base disposed essentially concentric with said one end wall of said container.

25. The device of Claim 17, wherein said housing includes a base secured by said attaching means to said cap.

26. The device of Claim 25, wherein said attaching means includes a layer of adhesive material and removable means for protectively covering said layer of adhesive material until said device is ready for installation on said container.

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27. The device of Claim 17, wherein said housing includes a base secured by said attaching means to the other end wall of said container opposite said cap.

28. The device of Claim 17, wherein said attaching means includes:

a pad;

a pair of layers of adhesive material respectively on opposite sides of said pad for respectively adhering to said housing and said one end wall.

29. The device of Claim 28, including a pair of protective sheets removably adhered respectively over said pair of layers of adhesive material, said sheets being removable prior to attachment of said housing to said one end wall.

30. In combination:

a pill bottle for containing a quantity of medication pills to be taken by a person at prescribed intervals of times;

electronic alert means for alerting said person at said prescribed intervals of time, so as to remind said person to take a dosage of said pills; and

adhesive means for allowing said person to adhesively attach said electronic alert means to said pill bottle.

31. The combination of Claim 30, wherein:

said pill bottle includes a first end having a first removable closure, and a second end opposite said first end and having a second closure, and

said electronic alert means is attached to said pill bottle by said adhesive means on one of said first and second closures.

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32. The combination of Claim 31, wherein said electronic alert means is attached to said first removable closure.

33. The combination of Claim 31, wherein said first and second closures, and said electronic alert means are substantially circular in shape and concentrically disposed with respect to each other along a common axis.

34. The combination of Claim 31, wherein said adhesive means includes:

a pad;

a first layer of adhesive on one side of said pad for adhesively attaching said pad to said electronic alert means, and

a second layer of adhesive for adhesively attaching said electronic alert means to said one closure.

35. A device for alerting a person to administer a medicant from a container at periodic time intervals, comprising:

a housing;

actuatable alarm means within said housing for alerting said person to administer said medicant from said container at the end of each of said time intervals;

electronic means within said housing for actuating said alarm means, including at least one fixed programmed timing circuit means for issuing a control signal to actuate said alarm means at fixed time cycles corresponding to said time intervals;

means connected with said electronic means and actuatable by said person for enabling said electronic means to commence counting said fixed time cycles; and,

means for mounting together said housing and said container.

-25-

36. The device of Claim 35, wherein said electronic means includes clock means for generating time base signals, and said timing circuit means includes means for operating on said time base signals in accordance with fixed programmed instructions to produce said control signal.

37. A method of reminding a person to administer medication from a container at prescribed time intervals, comprising the steps of:

(A) providing an alarm device which issues an alarm at each of said intervals to alert said person to administer said medication;

(B) providing attaching means for allowing said person to attach said alarm device to said container; and

(C) attaching said alarm device on said container using said attaching means.

38. The method of Claim 37, including the step of removing a protective sheet from a layer of adhesive forming a portion of said attaching means, and step (C) is performed by bringing said layer of adhesive into contact with a portion of said container.

39. The device of Claim 37, including the step of adhesively attaching said attaching means to said alarm device.

40. The device of Claim 37, wherein step (C) is performed by adhesively securing said alarm device on a cap of said container.

41. The device of Claim 37, wherein step (C) is performed by adhesively securing said alarm device on the bottom of said container.

42. A device for reminding a person to periodically administer a quantity of medication at preselected times, comprising:

a housing;

electrically responsive annunciated means within said housing for issuing a signal perceivable by said person at said preselected times;

electronic means within said housing for controlling said annunciator, said electronic means including preprogrammed means for issuing signals at preselected times to actuate said annunciator means; and,

adhesive means carried on said housing for attaching said device to a surface of an object selected by said person.

43. A device for reminding a person to periodically administer a quantity of medication at preselected times, comprising:

a housing;

electrically actuatable alarm means within said housing for issuing an alarm signal to said person at said preselected times;

electronic timing means within said housing for actuating said alarm means, said electronic means including a programmable circuit preprogrammed to issue control signals for actuating said alarm means only at fixed timing intervals corresponding to said preselected times;

electrical power supply means within said housing for supplying electrical power to said alarm and said electronic timing means; and,

switch means operable by said person for coupling said power supply means into circuit with said electronic timing means and said alarm means, said electronic timing means being responsive to said switch means for commencing to count said fixed timing intervals.

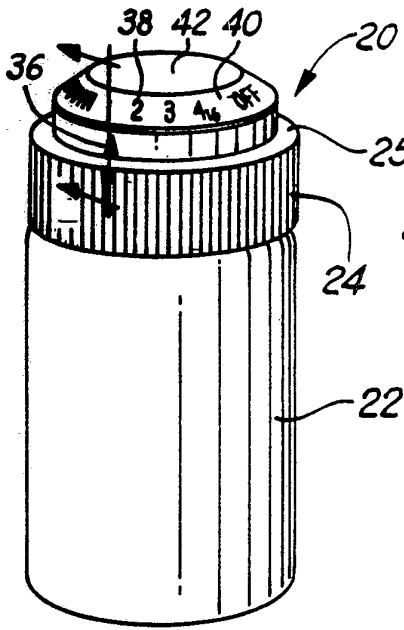


FIG. 1

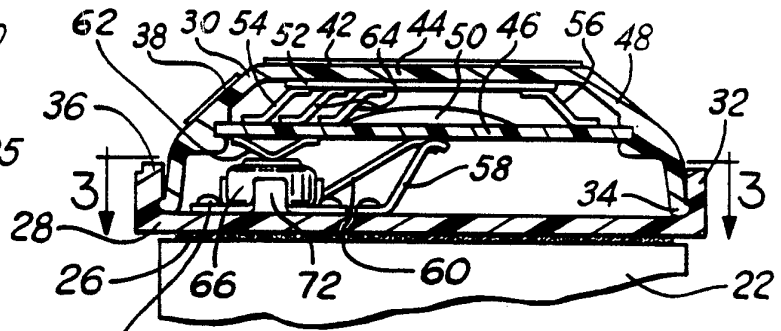


FIG. 2

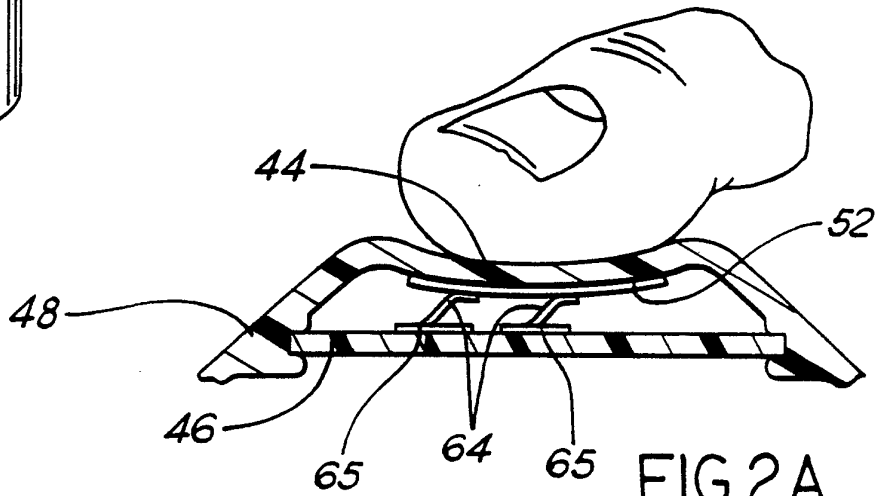
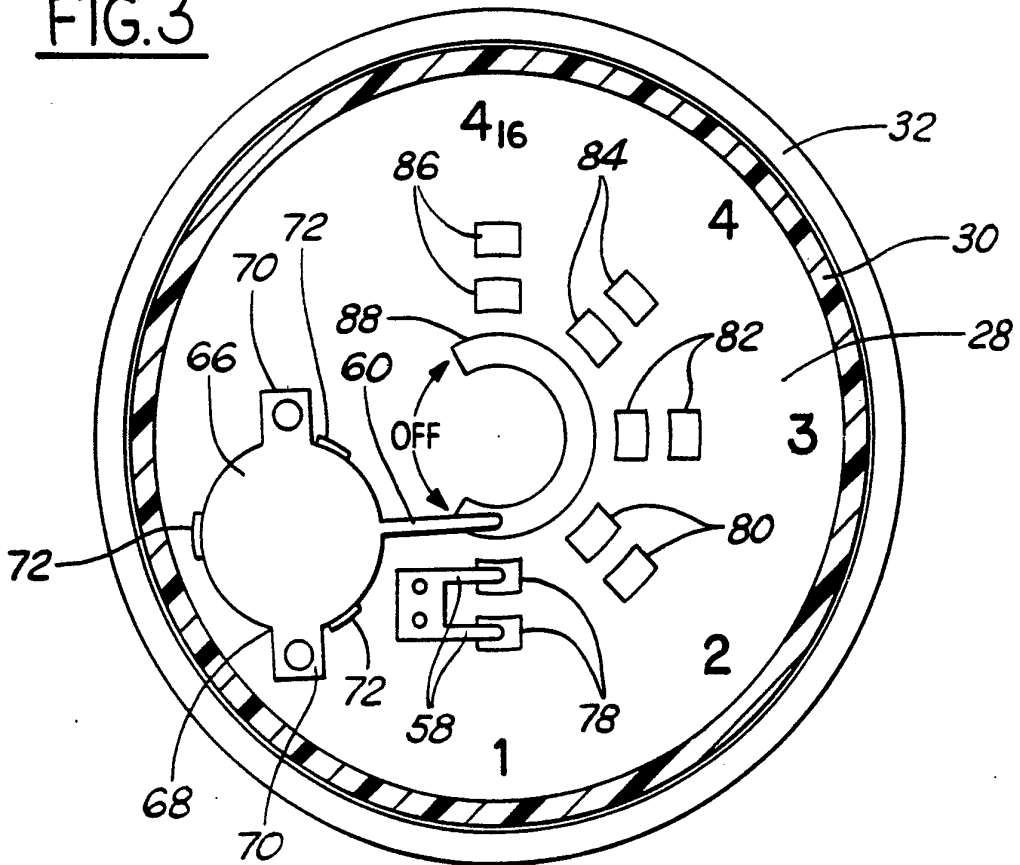


FIG. 2A

FIG. 3



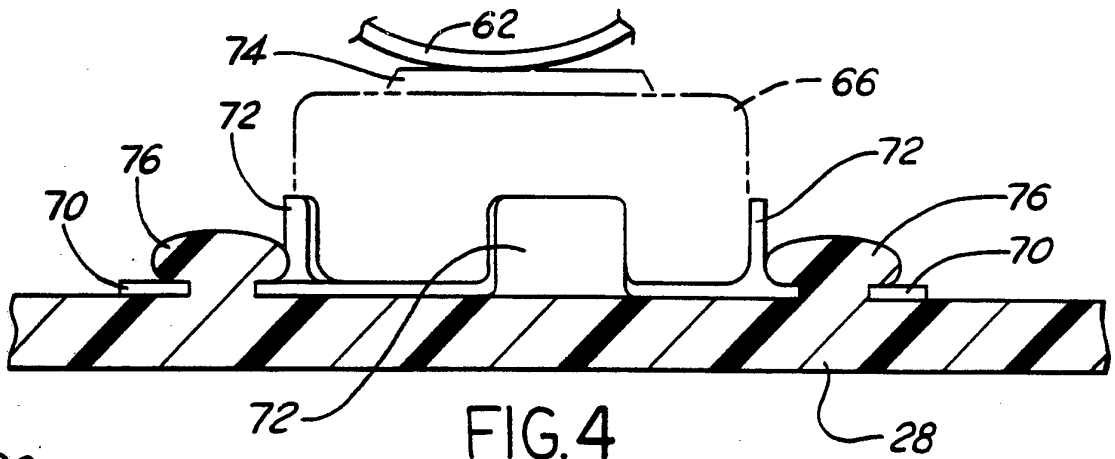


FIG. 4

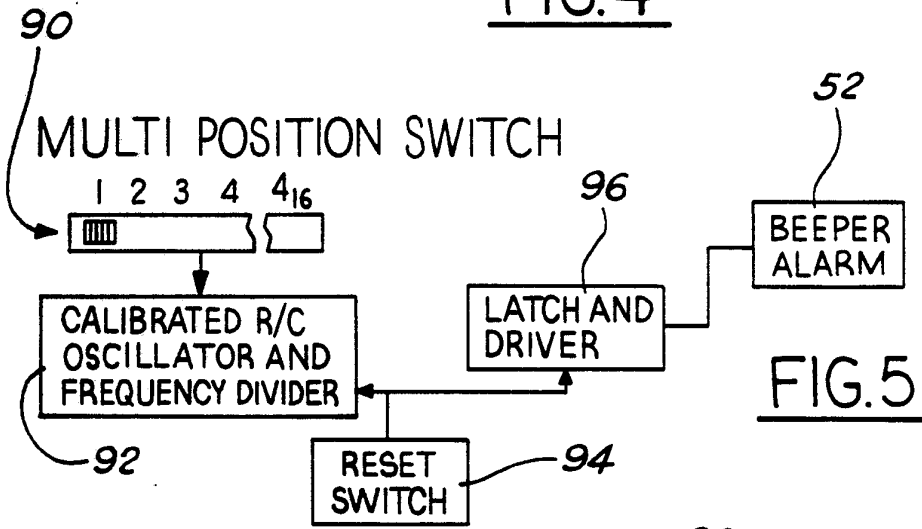


FIG. 5

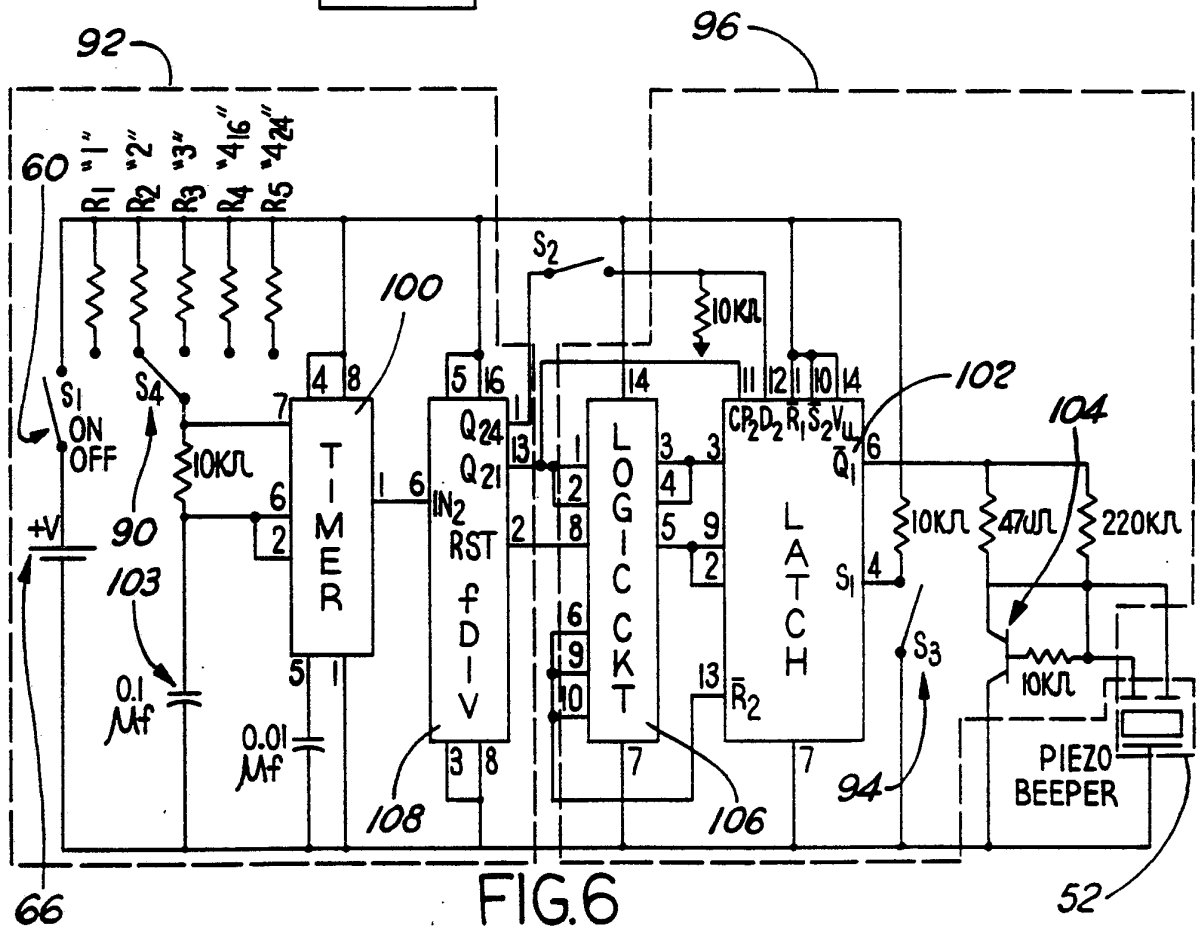


FIG. 6

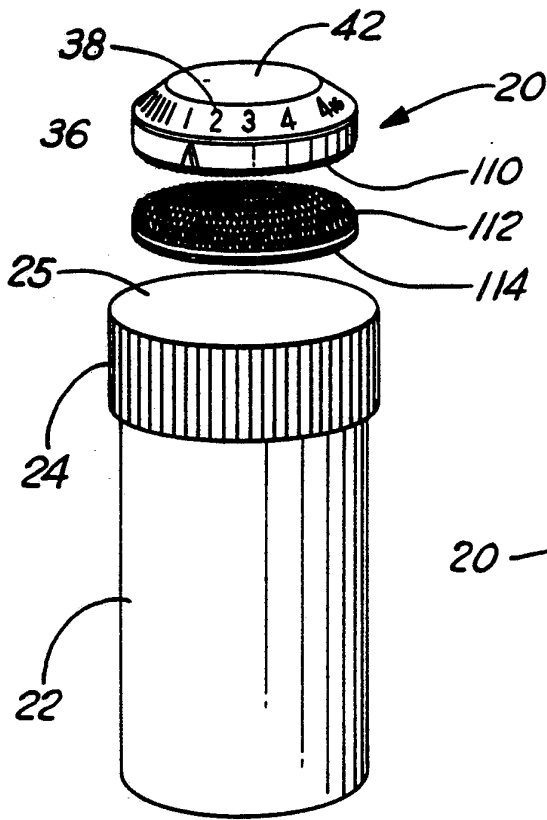


FIG. 7

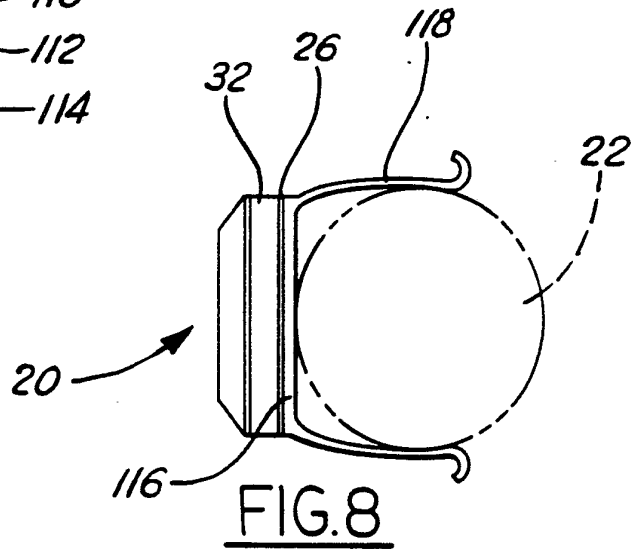


FIG. 8

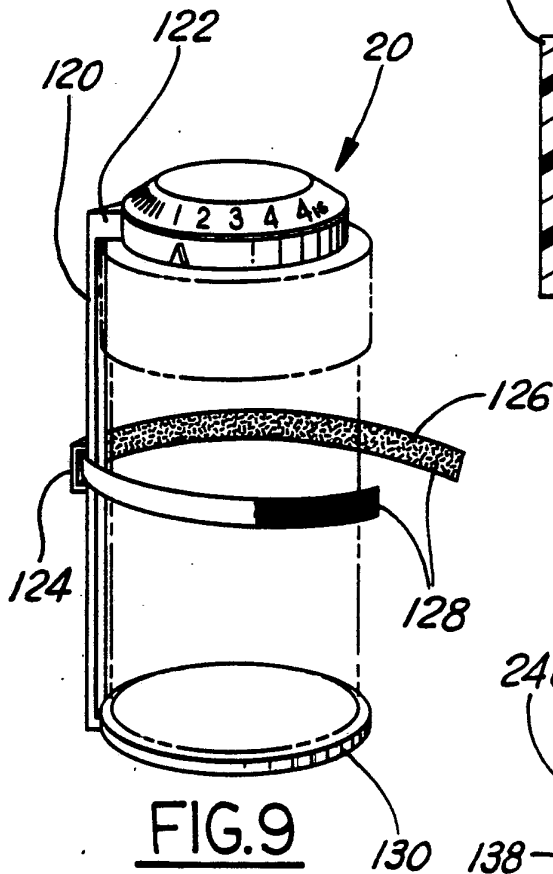


FIG. 9

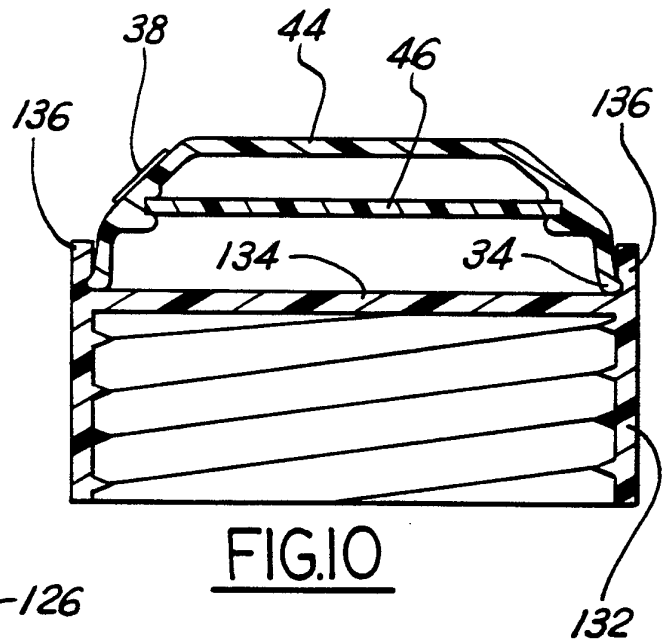


FIG. 10

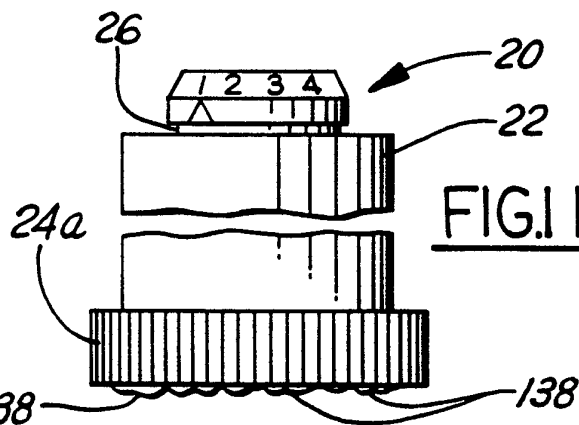
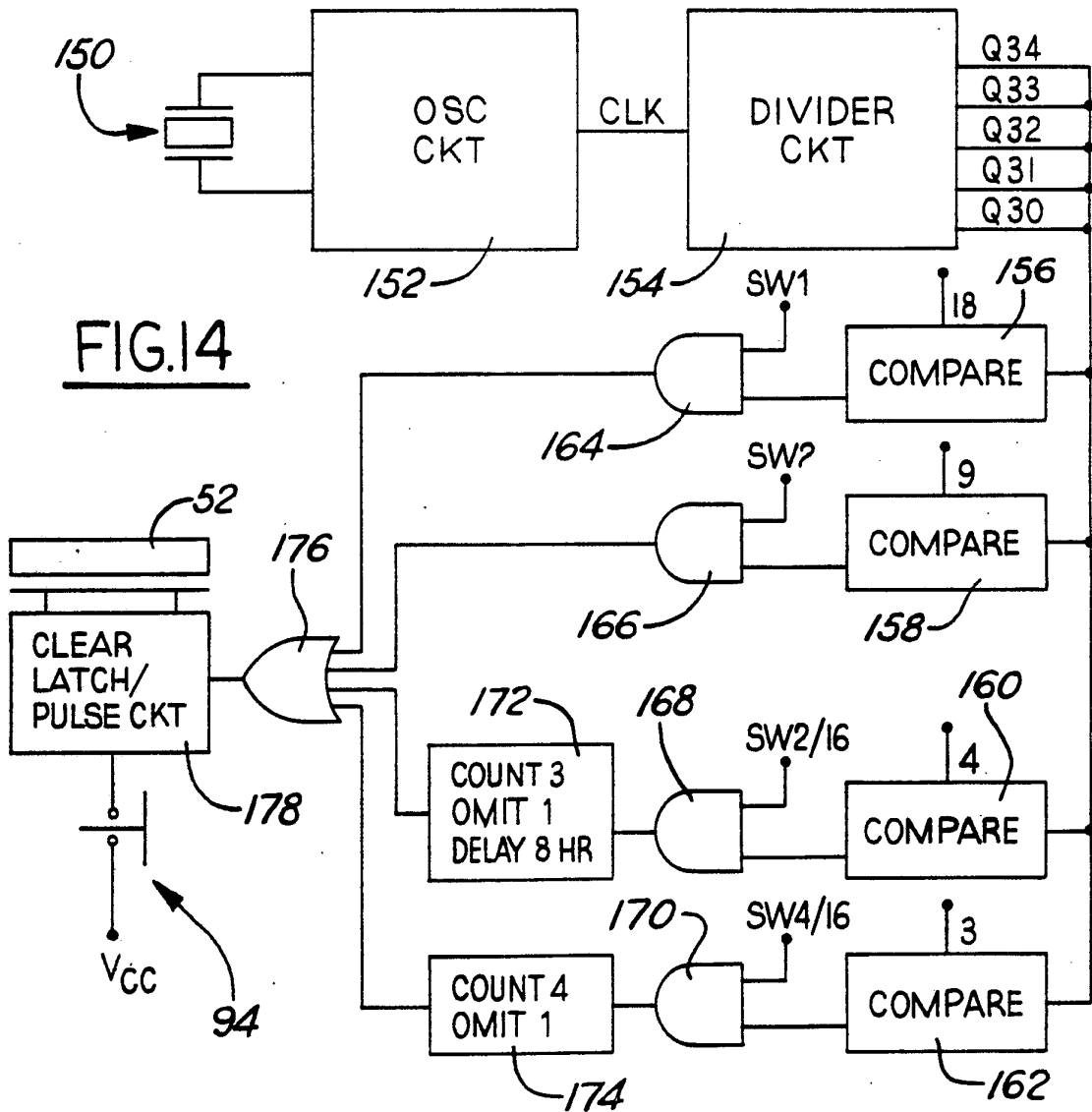
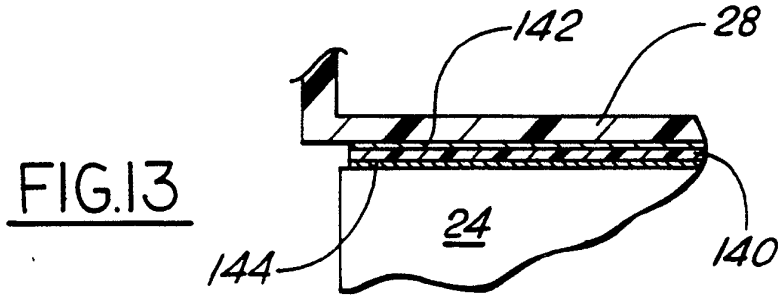
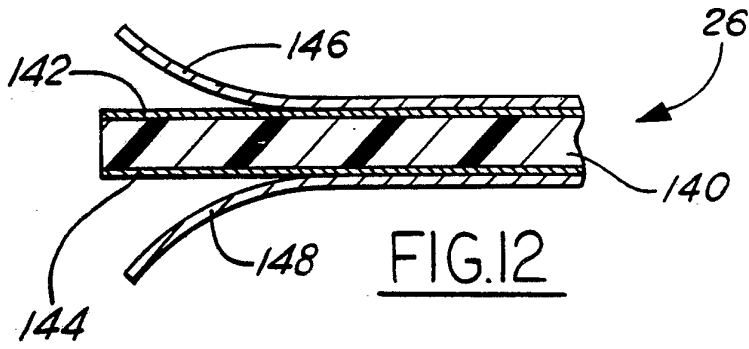


FIG. 11



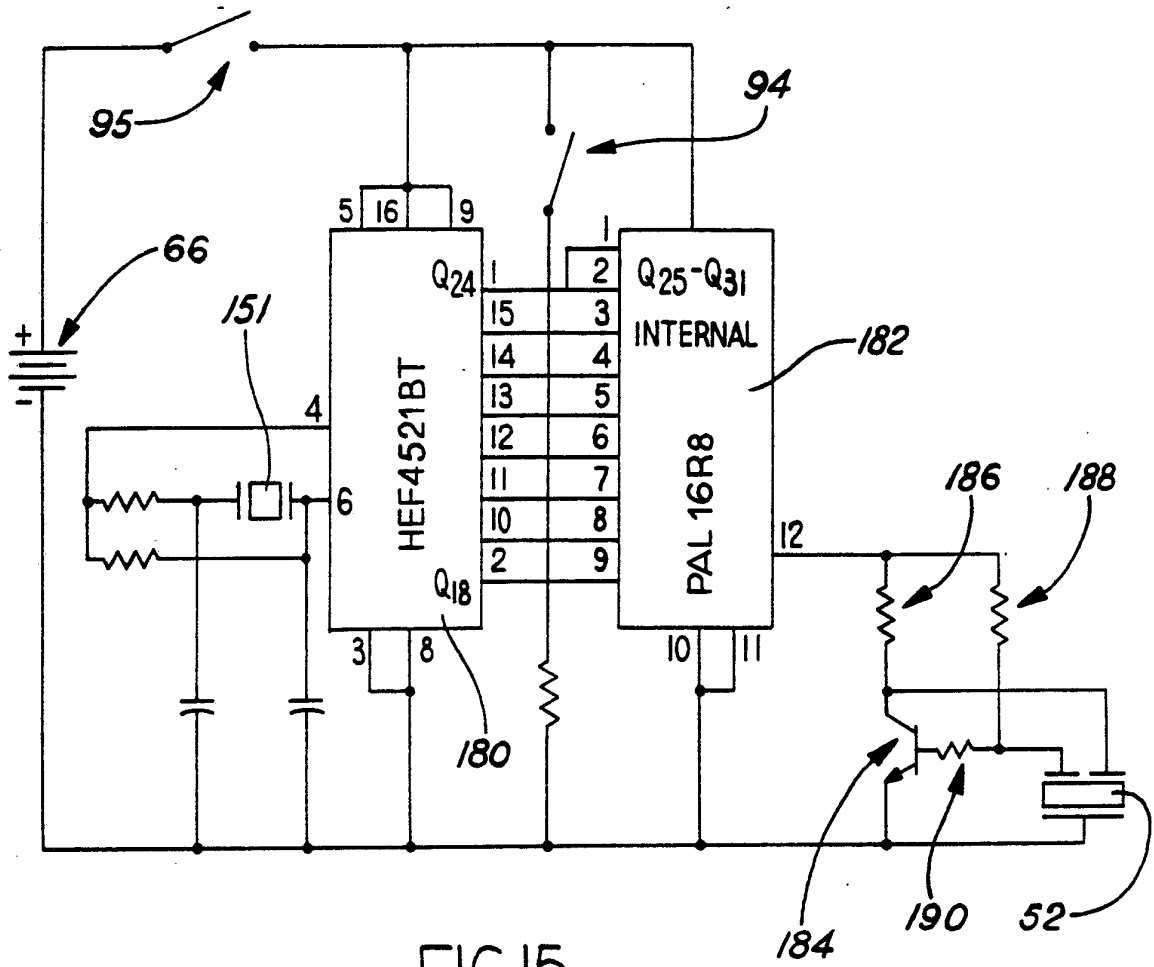


FIG. 15

INTERNATIONAL SEARCH REPORT

PCT/US92/09775

A. CLASSIFICATION OF SUBJECT MATTER		
IPC(5) :G08B 1/00; G04B 47/00 US CL :340/309.15; 368/10,12; 206/534 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) U.S. : 340/572		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US, A, 4,367,955 (BALLEW) 11 January 1983, See entire document.	1-4,8,9,12, <u>16,35-37,43</u> 5-7,10,13- 15,18-24,26- 29,11,30-34, 38-42
X Y	US, A, 4,419,016 (ZOLTAN) 06 December 1983, See entire document.	17,25,35-37, <u>43</u> 5- 7,10,13-15,18- 24,26- 29,30-34,38- 42
Y	US, A, 4,361,408 (WIRTSCHAFTER) 30 November 1982, See entire document.	11
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents:		"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be part of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means	
"P"	document published prior to the international filing date but later than the priority date claimed	
Date of the actual completion of the international search 11 JANUARY 1993		Date of mailing of the international search report 24 FEB 1993
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. NOT APPLICABLE		Authorized officer <i>Donnie L. Crosland</i> DONNIE L. CROSLAND INTERNATIONAL DIVISION Telephone No. (703) 305-4388

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US92/09775

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4,905,213 (MASSE ET AL.) 27 February 1990, See entire document.	1-43
A	US, A, 3,818,473 (MURRAY ET AL.) 18 June 1974, See entire document.	1-43