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(54) **Device for the storage of doses of medicine which generates a warning signal at predetermined intervals of time for reminding a patient to take his medication**

(57) Device, particularly for storage of doses of medicine and constructed in such way, and comprising such means, that it generates an acoustical and/or optical warning signal at predetermined times or with predetermined interval time periods, until the device is opened and the user takes for instance part of the con-

tents out. The device according to the invention can for instance be used as reminding aid for regular taking of medication. Preferred embodiments of the invention are characterised by the use of a Reed contact, child-safe lock and transparency of the larger compartment of the device's lower section.

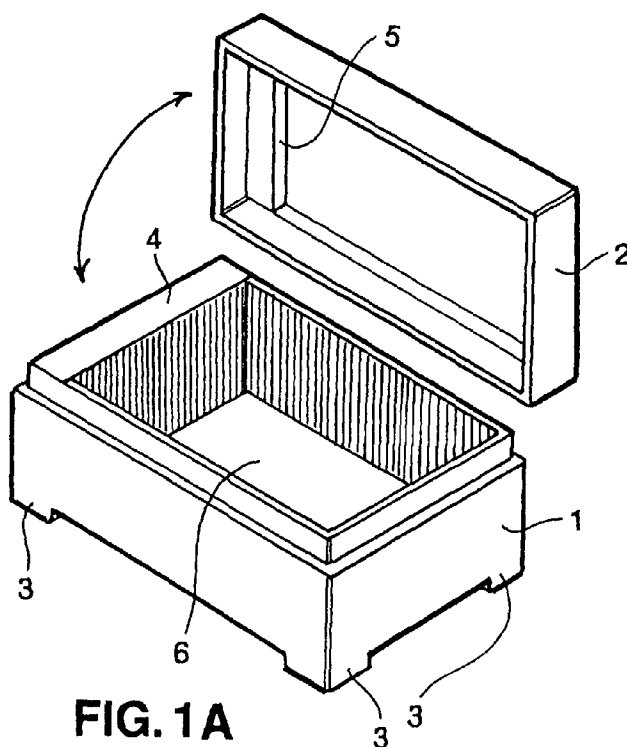


FIG. 1A

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Description

[0001] The invention generally relates to a device for storage of separate doses of medicine in arbitrary form, pills, capsules etc., the device being constructed in such a way, and comprising such means, that the device generates an acoustical and/or optical warning signal at predetermined times or with predetermined interval time periods, until the device is opened by a user.

[0002] More particularly the invention is meant to stimulate the user to open the device at predetermined times or with predetermined interval time periods to take out part of its contents, and as such can be used as a reminder device for taking medication at a regular basis.

[0003] Certain actions that are to be repeated regularly, like the taking of medication, are likely to be forgotten because of their routinely character. In certain cases this can have serious medical consequences for the user, for instance when the use of contraceptive medication is concerned or in cases when taking exactly the right dose of medicine at exactly the right time is of vital interest to a user.

[0004] The device according to the present invention offers among others a solution to the above described problems by generating a warning signal at predetermined times or with predetermined interval time periods, until the device is opened and a dose of medicine, for instance a pill or capsule, is taken out.

[0005] The Dutch patent application NL-A-7808415, "Pillen-wekker", describes a device that serves as an aid for reminding whether certain actions that are to be repeated regularly, in particular the taking of medication, have been performed or are still to be performed. The device described in said document is however merely a supporting means for existing medicine containers, whereby the device detects removal of a medicine container from the supporting means. Because of the present diversity in medicine packaging, bottles, boxes etc., and the lack of standardisation in this area, the device according to said patent application NL-A-7808415 would need to have many different embodiments. Furthermore this known device does not enable detection of the timely taking of combinations of different medicines with differing packaging, as does the device according to the present invention.

[0006] The patent application US-A-5.554.967, "Reminder Device", describes a device that is intended to generate a warning signal at predetermined times or with predetermined interval time periods. The user can simply stop the signal by pressing a button, instead of by performing an action that is directly associated with, for instance, the actual taking of medication, like opening the device to take out a dose of medicine. In addition to this, the known device described in the document US-A-5.554.967 is not intended nor suited for storage of any kind of medicine.

[0007] The device according to the present invention is characterised by the fact that it comprises:

- a lower section, consisting of two main compartments, the larger of which serves as means to store for instance doses of medicine and may consist of smaller sub compartments for separate storage of, for instance, several different kinds of medicine, and the smaller of which contains an electronic circuit board comprising at least the following electronic means: an internal electronic timer, means to start and stop said electronic timer and to set an interval time period, means to generate an optical and/or acoustical warning signal, means that enable detecting whether the device is open or closed, and means for temporary disabling operation of the device, whereby the bottom of said smaller compartment contains small holes and the entire lower section of the device is equipped with four small legs to ensure that an acoustical signal produced by the electronic means on the circuit board is audible outside the device, and
- an upper section serving as a lid that is attached to the lower section by means of a movable connection mechanism.

[0008] As mentioned above, the device according to the invention is at least equipped with electronic means to start the electronic timer and to detect opening of the device during a predetermined interval time period, whereby the timer is reset and started anew following the opening and subsequent closing of the device, whereas in the case that the device has not been opened when said interval time period expires, an optical and/or acoustical warning signal is generated that can be switched off by opening the device, in which case the electronic timer is reset and started again after the subsequent closing of the device, thus repeating the entire process. Consequently the warning signal is generated AFTER expiration of the predetermined interval time period, whereby the signal is switched off by opening the device, for instance to take out a dose of medicine. No signalling takes place in case the device is opened before the set interval time period has expired, in which case the internal timer is reset and started again after the subsequent closing of the device.

[0009] In a preferred embodiment of the invention the upper section of the device is attached to the lower section by means of a movable connection, for instance a hinge, and detection of the open or closed state of the device is performed by means of a known method involving a so called Reed contact situated in the smaller compartment of the device's lower section, in combination with a permanent magnet connected to the device's upper section, whereby said magnet is positioned directly above the Reed contact when the device is closed during operation. By shifting the permanent magnet away from the Reed contact, so that it can not influence this contact anymore, the operation of the device can be disabled.

[0010] The upper and lower sections of the device ac-

cording to the present invention are preferably made of a plastic, the outer wall of the lower section being preferably transparent to make the contents visible from the outside, and the device is preferably equipped with a "child-safe" locking mechanism (not shown in the drawings) making undesired opening of the device by children and possible ingestion of the medicine stored in it more difficult.

[0011] The kind of mechanism used to connect the upper and lower section of the device is not limited to a hinge construction. A sliding mechanism for instance can be equally well suited for this purpose.

[0012] All parts of the invention can be easily manufactured with the use of presently known techniques.

[0013] The invention will now be explained in conjunction with the appended drawings, which are merely meant to illustrate the invention and not to limit its application in any way, wherein

- figure 1A is a perspective view of a preferred embodiment of the device according to the invention;
- figure 1B is a top plan view of the lower section of a preferred embodiment of the device according to the invention;
- figure 1C is a bottom plan view of the lower section of a preferred embodiment of the device according to the invention;
- figure 2 is a flowchart that schematically illustrates the successive steps in the operation of a preferred embodiment of the device according to the invention, and
- figure 3 is a timing diagram that illustrates the timing aspects of the operation of a preferred embodiment of the device according to the invention.

[0014] Figures 1A-1C show a preferred embodiment of the device according to the invention. In figure 1A the lower section (1) of the device and the upper section (2) are connected by a hinge-construction. The exact location of the hinge or hinges is not shown in this figure. The four corners of the lower section (1) of the device are equipped with four small legs (3). The compartment (4) in the lower section (1) of the device, reachable only through the bottom side of the device, contains electronic means (7) and has a removable cover plate (not shown) with small holes. A compartment (5) in the upper section (2) of the device contains a permanent magnet that is situated directly above a Reed contact in compartment (4) of the lower section (1) when the device is closed and in operation. With the use of simple mechanical means (not shown) the permanent magnet can be moved through the compartment (5) to a position where it can not influence said Reed contact anymore, thus disabling the operation of the device. In the larger compartment (6) of the lower section of the device doses of medicine can be stored. With simple known means (not shown) this compartment can be segmented into smaller sections in which for instance several kinds of medi-

cine can be stored separately and/or according to the day of the week on which the user is supposed to take the medicine.

[0015] In figures 1B and 1C elements that are also shown in figure 1A have identical numerical references.

[0016] Figure 1C also shows a circuit board with electronic means (7) enclosed in compartment (4) of the lower section (1) of the device according to the invention.

[0017] Figure 2 shows a flow chart that schematically illustrates the operation of the device according to the invention. In the following the different elements of the flow chart will be described in more detail. First the interval time period T is set (201), with T being the maximum time before the device is supposed to be opened to take out for instance a dose of medicine. Then the internal electronic timer is set to zero (reset) (202) and re-started. Next a check is performed to see if the device has been opened (203) or the interval time period T has expired (204). If the device has indeed been opened the process moves to step (209) and stays there until the device is closed again, after which the timer is reset to zero and the entire process is repeated. In case the device remains closed the process advances to step (204) to check if the set interval time period T has already expired. If this is the case than a warning signal is generated (206) until the device is opened and for instance a dose of medicine is taken out, which causes the signal to stop (208). Now the process keeps looping through step (209) until the device is subsequently closed and the process returns to the initial state.

[0018] Figure 3 is a timing diagram illustrating the operation of the device according to the invention. As an example we now assume that every 24 hours at the same time, a user has to take a pill, but the situation does not get critical until 30 hours after the previous pill was taken. The interval time period T is thus set to 30 hours, so that the device will generate a warning signal in case it has not been opened within 30 hours after taking the previous pill. If the device is opened earlier, no signalling takes place. The time-base of the diagram is shown in units of 24 hours.

Claims

1. Device, particularly for storage of several separate doses of medicine in arbitrary form, the device being constructed in such a way, and comprising such means, that it generates an acoustical and/or optical warning signal at predetermined times or with predetermined interval time periods, until the device is opened, characterised by the fact that said device comprises:

- a lower section, consisting of two main compartments, the larger of which serves as means to store for instance doses of medicine and may consist of smaller sub compartments for sepa-

rate storage of, for instance, several different kinds of medicine, and the smaller of which contains an electronic circuit board comprising at least the following electronic means: an internal electronic timer, means to start and stop said electronic timer and to set an interval time period, means to generate an optical and/or acoustical warning signal, means that enable detecting whether the device is open or closed, and means for temporary disabling operation of the device, whereby the bottom of said smaller compartment contains small holes and the entire lower section of the device is equipped with four small legs to ensure that an acoustical signal produced by the electronic means on the circuit board is audible outside the device, and

- an upper section serving as a lid that is attached to the lower section by means of a movable connection mechanism.

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2. Device according to claim 1, characterised by the fact that, to detect whether the device is open or closed, a so called Reed contact is present in the lower section of the device, and a permanent magnet is present in the upper section of said device, whereby said magnet influences the Reed contact when the device according to the invention is closed, whereas this influence is absent when the device is in its open state.

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3. Device according to claim 2, characterised by the fact that said permanent magnet in the upper section of the device according to the invention can be moved in such a way that said Reed contact can not be influenced by the magnet, even when the device is closed, which disables operation of the device.

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4. Device according to claims 1, 2 or 3, characterised by the fact that at least the larger compartment of the lower section of the device according to the invention is made of a transparent material, making the contents of said compartment visible from the outside of the device.

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5. Device according to claims 1 through 4, characterised by the fact that the device according to the invention is equipped with a known "child-safe" locking mechanism.

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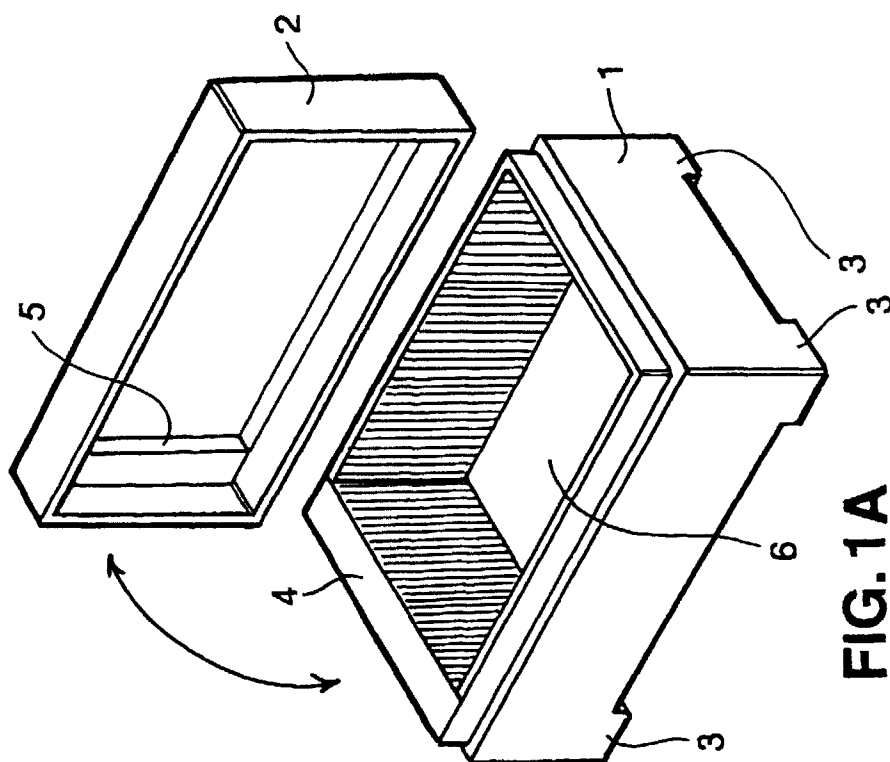


FIG. 1A

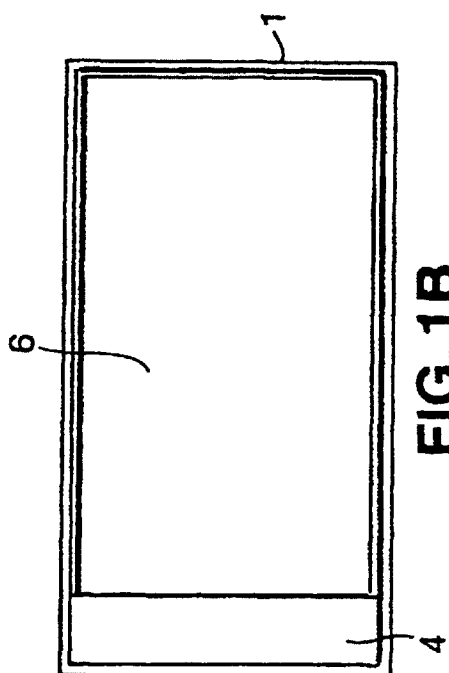


FIG. 1B

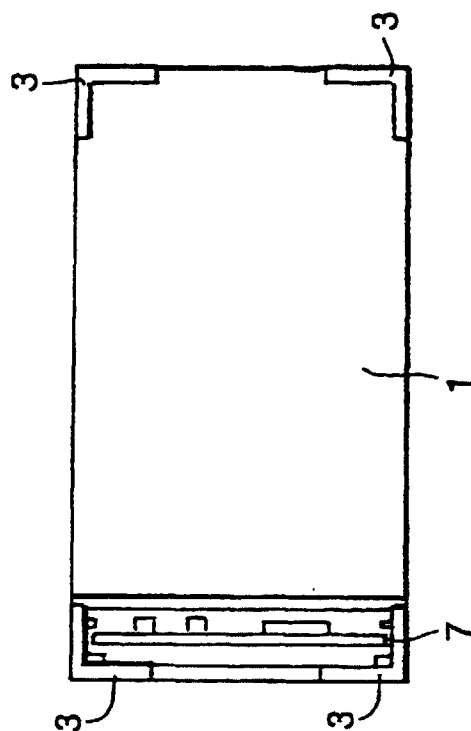


FIG. 1C

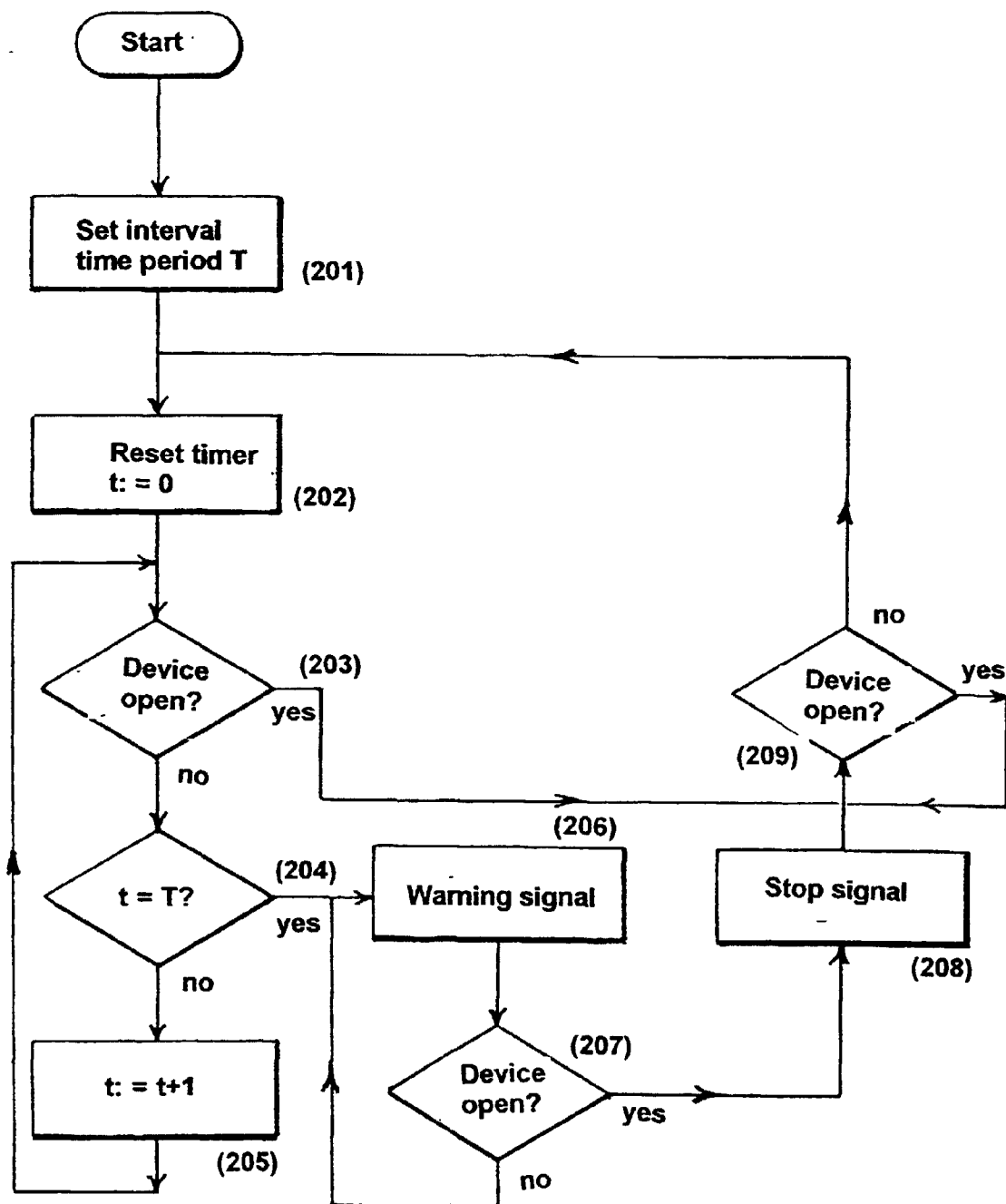


FIG. 2

