A rotary manually operated pill dispenser is disclosed, for holding and dispensing a collection of pills from several separate compartments. A cover has an integral dispensing porthole which overlies each compartment in turn. Six tapered tabs strategically placed on a ledge of the cover to match the same configuration of open-notches on a shelf of the base serve as an indexing apparatus, whereby the user can readily align the cover, and porthole, correctly. The dispenser has an integrated conical plastic spring washer, fitted in a central chamber in the base, which biases the cover and base apart, and keeps the ledge in engagement with the shelf. The bottom of the base is constructed with the same configuration of tabs as the lid, and a pills reservoir, or other accessory component, can be locked onto, and removed from, to the dispenser. The base and cover can be injection-moulded in a suitable transparent plastic material.
FIG. 2
INDEXING PILL DISPENSER

[0001] This invention relates to a technology disclosed in patent publication CA-2,430,936 (December 2004, Allen). The rotary manually operated pill dispenser there disclosed performs holding, transporting and pill-dispensing functions, and possesses numerous benefits and advantages over known rotary manually operated pill dispensers.

[0002] The present invention aims to simplify some features, which diminishes some assembly labour requirements associated with cost, to be more user friendly, especially to users with limited fine motor ability, and amputees, in that one can actually reload and dispense the pills by the use of one hand only. The present invention aims to provide a novel rotary manually operated pill dispenser, which successfully integrates simple components. The new dispenser is aimed at being simple to activate, using only one hand. Preferred features include a reservoir that allows a several-week supply of pills to be stored, and stacked in advance, and safety features which make inadvertent operation unlikely.


[0004] In the prior art, designers have included a reminding device, a safe travelling device, a skipped or double does prevention device, and so on. Unfortunately each dispenser has some deficiency, for example: too large in size, too expensive in price, requiring of too high a level of skills and coordination to access. The task to access these dispensers may also be difficult for amputees, and other users with arthritic conditions, or with limited fine motor ability.

[0005] The designs as depicted herein are aimed at including the beneficial aspects of the prior art designs in a new design that is less expensive, easier and less confusing to access, and does not compromise its safety features.

[0006] The invention will now be described by way of example, with reference to the accompanying drawings, in which:

[0007] FIG. 1 is a pictorial view of a lid or cover of a pill dispenser;

[0008] FIG. 2 is a pictorial view of the underside of a base component of the dispenser;

[0009] FIG. 3 is a view of the topside of the base, showing its multiple compartments;

[0010] FIG. 4 is a pictorial view of pill supply reservoir of the dispenser;

[0011] FIG. 5 is a pictorial view of a conical spring component of the dispenser;

[0012] FIG. 6 is a pictorial partly exploded view of some of the components of the dispenser;

[0013] FIG. 7a is a diagrammatic plan view showing the cover of a dispenser assembled to the base;

[0014] FIG. 7b is the same view as FIG. 7a, but with the cover relatively rotated;

[0015] FIG. 7c is the same view as FIG. 7a, but with the cover rotated further;

[0016] FIG. 8a is a diagrammatic side view showing some of the cylindrical parts of the cover and base as if unrolled;

[0017] FIG. 8b is the same view as FIG. 8a, but with the cover relatively rotated;

[0018] FIG. 8c is the same view as FIG. 8a, but with the cover rotated further;

[0019] FIG. 9 is a sectioned side elevation of the dispenser;

[0020] FIG. 10 is the same view as FIG. 9 of another dispenser;

[0021] FIG. 1 (which appears with FIG. 5) is an exploded view of the dispenser of FIG. 9.

[0022] The patent protection sought herein is defined by the scope of the accompanying claims, and not necessarily by the features of depicted embodiments.

[0023] The dispenser 30 includes a cover 32, which is formed with a pill-dispensing porthole 34, and also with an associated primary indexing tab A. An arrow 36 on the cover 32 identifies the primary tab A. A base 38 of the dispenser 30 is formed with twenty-eight pill-containing compartments 40. To dispense pills, the user aligns the arrow 36 with the particular day and time of the dose. This results in the dispensing porthole 34 being aligned with the compartment for that day and time. To dispense the pills, the user tips the dispenser 30 upside-down, whereupon the pills fall out of the aligned compartment.

[0024] In the example shown, the designer has provided twenty-eight compartments, corresponding to four pill doses per day, for a week. (The designer may alternatively provide other configurations. The minimum number of compartments, for the invention to be applicable, would be seven.) The day and time of each dose is labelled on the outside of the respective compartments, and the same information is provided in braille. To replenish the compartments 40, the cover 32 is removed from the base 38, whereupon the compartments 40 now all lie exposed, and further pills can be added by the user or caregiver. The base may be moulded in a transparent plastic material, for extra visibility. The cover too.

[0025] FIG. 7a is a plan view of (part of) the base 38 and cover 32 of another pill dispenser. The base 38 is formed with a series of sockets, which are defined by projections 43 on a shelf 45 of the base. In this case, there are twenty-nine sockets, pitched in a circle centred on the axis of rotation 50 of the cover 32. The twenty-nine sockets correspond to orientations of the cover 32, in which the porthole 34 in the cover overlies respective ones of the twenty-eight compartments 40 in the base 38, plus one remove-cover orientation, at which the cover can be removed from the base.
[0026] Some of the sockets between the projections 43, termed open sockets, are wider than the other sockets. The six sockets at numbered locations 1, 7, 12, 19, 22, 28 are the open sockets. The sockets in the remaining numbered locations are termed the tight sockets. FIG. 7a shows the cover 32 in its remove-cover orientation, and it can be seen that the designer has arranged for the six tabs A, B, C, D, E, F on the ledge 47 of the cover 32 to be aligned with the six open sockets, at this orientation of the cover. Thus, in the remove-cover orientation of the cover, the ledge 47 of the cover is now not constrained underneath the shelf 45 of the base, and the cover can be lifted off.

[0027] FIG. 7c shows the cover 32 having been rotated anticlockwise one twenty-ninth of a complete revolution. Now, the tab A overlies the tight socket at location 29. It will be noted that, in this orientation, all six of the tabs overlie respective tight sockets, i.e. none of the tabs now overlie one of the open sockets. The tight sockets are circumferentially narrower than the circumferential width of the tabs, whereby the tabs cannot pass through the tight sockets, and the cover 32 cannot be removed from the base 38.

[0028] It will be understood that, with the cover 32 shown in the orientation of FIG. 7b, the cover is very firmly held in place on the base 38. All six of the tabs are constrained by the tight sockets, whereby the ledge 47 of the cover engages the shelf 45 of the base, and the cover is firmly held onto the base.

[0029] FIG. 7c shows the cover 32 having been rotated further. Now, the tab A overlies the open socket at location 22. Also, the tab B on the cover also overlies one of the open sockets, being the one at location 28. These tabs A, B, C, D, E, F, in the FIG. 7c orientation of the cover, therefore cannot contribute anything to the security with which the cover is guided and carried for rotation with respect to the base. In FIG. 7c, all the guiding constraint for the cover must therefore come from the other four tabs C, D, E, F, which do overlie respective tight sockets, as shown.

[0030] A polygon (being a quadrilateral 49 in this case) has been drawn, by joining up the tabs that overlie tight sockets. Attention is drawn to the fact that the axis 50 about which the cover rotates is located inside the perimeter of this polygon. The axis being inside the polygon, the four tabs C, D, E, F that provide constraint for the cover are well spaced around the circumference of the ledge and shelf, providing good guiding stability.

[0031] Note that if there were to be an orientation of the cover in which the axis 50 lay outside the perimeter of the polygon, that would mean that all the tabs contributing to the provision of guiding constraint for the cover would then all be on one side of the ledge and shelf. If such a configuration were allowed, therefore, the cover would be liable to tipping, relative to the base. Even if the cover did not fall off, it might easily happen that the cover would be liable to jamming or other misalignment problems.

[0032] The designer should therefore see to it that, in every one of the possible orientations of the cover (other than the remove-cover orientation, of course), as many as possible, and never fewer than three, of the tabs overlie tight sockets. The designer should also make sure to choose a configuration of tabs and sockets in which, in every one of the possible orientations of the cover that corresponds to the porthole overlying one of the compartments, that the configuration should be such that a triangle joining those three includes the axis 50 within its perimeter.

[0033] The configuration shown in FIGS. 7a-7c is not the only one of which this condition is true, even for dispensers having twenty-eight compartments. The prudent designer will lay out a proposed configuration of tabs and sockets before committing to a final design of the dispenser, and will check (e.g. by trial and error) that, of all the possible orientations of the cover in which the porthole overlies one of the compartments, there is none in which fewer than three tabs overlie tight sockets. Theoretically, the functional requirements of the tabs and sockets configuration might be met with as few as three tabs (and the number of open sockets must be at least equal to the number of tabs). The larger the number of tabs (and open sockets), the easier it will be for the designer to hit upon a configuration in which the functional requirements are met in respect of all possible orientations. Of course, the functional requirements of the configuration would not be met at all, if only two tabs (or only one tag) were provided—in that, then, no polygon at all could be drawn.

[0034] Each tight socket designed between the projections 43 is so shaped as to block a tag positioned over that socket from passing through the socket. However, as illustrated in FIGS. 8a-8c, the tab and the tight socket are so shaped with respect to each other that the tight socket does provide a measure of rotational restraint against the respective tab. A chamer is provided on one (or both) of the tab and tight socket, whereby, when the tab is biased in the direction axially towards the tight socket, the tag is urged circumferentially rotationally towards a central position within the tight socket. Thus, the design of the tabs and tight sockets serves as an indexing apparatus.

[0035] The cover is biased away from the compartments in the base, by a spring 52. Thus the ledge 47 of which the tabs are a part) and the shelf 45 (of which the sockets are a part) are urged together, by the spring 52. Consequently, the spring 52 provides the biasing force which urges the tabs into contact with the tight sockets. Thus, if the person using the pill dispenser does not touch the cover, the cover remains indexed into the particular orientation dictated by the particular tabs and tight sockets that are in alignment.

[0036] To over-ride that indexed position, the user manually rotates the cover. This causes the tab to ride up on the chamer, whereby the cover moves axially away from the base at the same time as it rotates relative to the base. Thus, the tab on the ledge 47 of the cover 32 lifts itself over the projection 43 and disengages itself from the tight socket on the shelf 45 of the base 38. The tab now rests on top of one of the projections 43 that define the sockets. (Other tabs rest on others of the projections, as shown in FIG. 8c.) As shown in FIG. 8c, (and in FIG. 7c), one (or more) of the tabs would not engage with one of the tight sockets if that tag is positioned over one of the open sockets. Only one tab needs to engage with one tight socket in order to perform the indexing function; however, as mentioned, the designer will see to it that at least three of the tabs do engage with corresponding tight sockets, for the other reasons as described.

[0037] The user can also disengage the tabs from the sockets, enabling the cover to be rotated, by pressing the cover towards the base, against the spring.
The spring 52 is fitted within a hollow chamber 56 lying inside the annular portion of the base 38 in which the compartments 40 are formed. The spring rests against a shoulder 58 of the base, and may be held in position with bumps moulded into the shoulder area. As shown in FIG. 5, the spring 52 is a conical disc spring. The spring is made of a flexible plastic material. The spring includes a central hole 60, and is formed with radial slits that define spokes 63 that provide the desired level of force urging the cover away from the body, and urging the tabs formed on the ledge into contact with the sockets formed on the shell.

FIG. 4 shows an optional component of the dispenser. This comprises a reservoir 65, in which stocks of pills can be stored. The projections 43 are duplicated on the corresponding shelf 45 of the reservoir 65. Thus, provided the tabs A, B, C, D, E, F of the cover 32 have also been duplicated on a duplicate ledge formed underneath the base 38 (as they have been in FIG. 3), the reservoir can, by hand manipulation, be attached to, and removed from, the undersurface of the base 38, just as the cover 32 can, by hand manipulation, be attached to and removed from the upper surface of the base. It will be understood that the cover 32 can be assembled to the reservoir 65, as it can to the base 38.

FIG. 10 shows that the ledge and shelf arrangement of the cover and base have been reversed. The FIG. 9 version is preferred, in that in FIG. 9 a rim of the cover lies outside the base, making the cover easier to grasp and manipulate.

Housed also in the chamber 56 is a timer and annunciator module 70. This is an electronic device, powered by a contained battery. The module 70 includes two manual control/setting knobs 72, which protrude through the hole 60 in the spring 52, and in the cover 32. This arrangement is very convenient as far as operability is concerned; also, the module is tucked securely away in a place where space is available, which would otherwise be wasted.

The operation and function of the timer/annunciator module are set out in the following tables.

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**USER**

**CONTROL**

**INPUTS**

Block diagram showing generally the nature of the input and output control signals to and from the Timer and Annunciator Control System with the embodiment.

Allen’s Indexing Dispenser

**[0043] Description of Actions**
the tabs-component includes a ledge on which are formed N tabs, which lie pitched at respective locations around a tabs pitch-circle;

the sockets-component includes a shelf on which are formed N open-sockets, which lie pitched at respective locations around a sockets pitch-circle;

both pitch-circles lie centred on the rotary axis of the cover;

the locations of the tabs on the ledge, and the locations of the open-sockets on the shelf, are so arranged that there exists a remove-cover orientation of the cover with respect to the base, in which all N tabs axially overlie respectively the N open-sockets;

the tabs on the ledge and the open-sockets on the shelf are so arranged that:

when the cover is in the remove-cover orientation, the tabs lie aligned with the open-sockets, and can pass in an axial direction through the open-sockets, thereby enabling the cover to be removed from the base; and that

when the cover is in an orientation other than the remove-cover orientation, the tabs lie out of alignment with the open-sockets, and lie blocked from passing through the open-sockets, thereby preventing the cover from being removed from the base; and

the number N is at least three.

2. As in claim 1, wherein:

the tabs and open-sockets are so arranged that:

when the cover is in any rotational orientation, other than the remove-cover orientation, no more than N−3 of the tabs lie aligned with any of the open-sockets, in that at least three of the N tabs, termed the non-aligned tabs, lie out of alignment with each and every one of the open-sockets; and that

chords joining the said non-aligned tabs form a polygon of which the non-aligned tabs comprise the vertices thereof; and that

the polygon includes the rotary axis inside its perimeter.

3. As in claim 2, wherein the porthole is sized to uncover only the one of the C compartments that the porthole overlies, the cover being so arranged as to prevent any pill from being removed from any of the remaining compartments.

4. As in claim 1, including an indexing-apparatus of such structure that, upon the cover undergoing a rotational movement relative to the base, and upon the cover being oriented to respective positions in which the porthole overlies each one of the individual compartments in turn, in respect of each one of those respective locked positions, the indexing-apparatus holds the cover locked against rotation away from that locked position.

5. As in claim 4, wherein the locked position of the indexing-apparatus can be over-ridden and released by manually rotating the cover.

6. As in claim 4, wherein the indexing-apparatus includes a number T of tight-sockets, the number T being such that, when the cover is orientated to the respective positions in which the porthole overlies each one of the individual compartments in turn, in respect of each one of those positions, one of the tabs engages one of the tight-sockets.

7. As in claim 6, wherein the number T is such that, in respect of each individual compartment, three of the tabs engage three of the tight-sockets.

8. As in claim 1, wherein the open-sockets and the tight-sockets lie circumferentially intercalated, on the sockets pitch-circle.

9. As in claim 1, wherein:

the cover is mounted and guided for movement also in an axial sense relative to the base;

the dispenser includes a biasing spring, and the arrangement of the dispenser is such that:

the biasing spring urges the shelf and the ledge together, in an axial direction; and

the biasing spring urges the shelf and ledge together in such manner that, when the cover is in the remove-cover orientation, the biasing spring urges the cover in the axial sense to separate the cover from the base.

10. As in claim 9, wherein:

inside the annulus, the base is formed with a hollow cylindrical chamber; and

the biasing spring is housed inside the chamber;

the spring pushes against a wall of the chamber, and pushes against the cover.

11. As in claim 10, wherein the biasing spring is a conical disc spring.

12. As in claim 11, wherein the conical disc spring is formed with a star-shaped central aperture.

13. As in claim 10, including:

a timer;

an operable annunciator, which is effective, when operated, to announce a warning signal, and to do so at a time that is predetermined by the timer;

the timer and the annunciator are contained in a module; and

the module lies placed inside the said hollow chamber in the base of the dispenser.

14. As in claim 13, wherein:

the timer includes a manual control, in the form of a mechanical knob; and

the knob protrudes through a central hole in the cover.

15. As in claim 1, wherein the number N of tabs is four or more.

16. As in claim 15, wherein the number C of compartments is seven or more.

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