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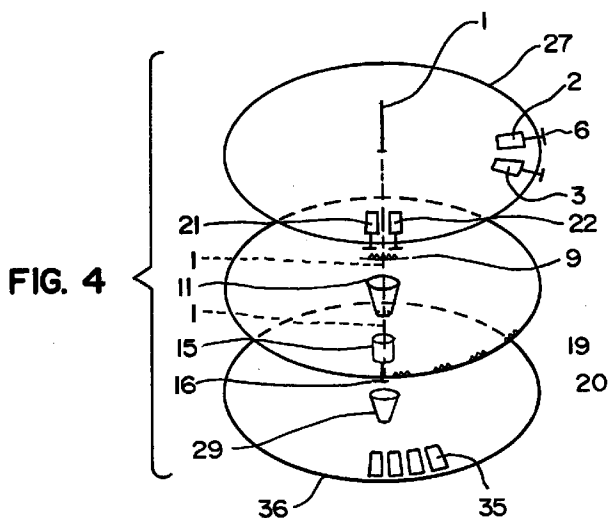
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(54) **Automatic pill dispenser**

(57) An upper circular tray (26,27,28) comprises a series of containers (2,3,21,22) mounted on axles (4,5) and arranged in seven groups of four. Each group of four holds the daily medications (AM, Noon, PM, and Evening) for a particular day of the week. The tray rotates about a vertical axis (1) and at the prescribed time each container's contents are dumped through a funnel (11) into a pill server container (15) where the patient can remove the medications. If the patient does not remove the medications from the pill server container within an allotted time, they are dumped through another funnel (29) into a corresponding container (35, 64) of a lower tray (36) that is correlated with the container of the upper tray that dumped the medications into the pill server container. The lower tray rotates synchronously with the upper tray. A middle part (19, 20) that causes dumping of the pill server container rotates synchronously with both upper and lower trays.



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Description

Background of the Invention

Human life encounters different diseases many of which fortunately are controlled or cured with medications. However, one unfortunate problem with taking medications is that people sometimes forget about the timing of their medications, and then get confused about taking them. This can create problems such as overdosing, underdosing, and confusion, if a patient either took an extra medication, or missed a dose. In my own practice of medicine I have been called by panicked patients many times when they did not know what they had done with their medications, or did not remember whether they had taken them. I have admitted patients to the hospital due to accidental overdose of medications, and this has taught me that there is a problem that needs to be solved. The present invention is a potential solution to help patients to organize their medications and to receive them on a regular basis.

Brief Explanation of the Invention

This invention deals with a machine that will allow the patient to have his medication (typically pills) dispensed on a regular basis. The patient's pills are placed in an upper tray that has twenty-eight smaller containers so that each group of four will hold the medications of one day of the week, for example from the AM dose, noon dose, PM dose, and evening dose. Each dose will be dispensed at the approximate time. The machine has a door that opens to allow the patient to remove the AM dose; then it closes, reopening again at noon to allow the patient to remove the noon dose; then it closes again; reopening for the PM dose, etc. If a dose is not removed before the door closes, then it is dumped into a corresponding one of twenty-eight other special small containers of a lower tray that by their color coding and markings, such as Tuesday PM dose, Wednesday AM dose, etc., will indicate which dose was missed by the patient. In this way, an observer will be able to know exactly which doses were missed. A preferred embodiment allows the person's medications to be organized for one week, and it can be locked when desired.

In addition to this automatic dispenser, this application also introduces a mechanical or mini-computer programmed cassette recorder or similar machine that produces an alarm or voice to notify the patient about the medications that are to be taken. It may also contain a special noise or message aimed to help the patient emotionally, spiritually, or otherwise.

Brief Description of the Drawings

Fig. 1 is a partial top plan view of one portion of the dispenser.

Fig. 2 is a partial, generalized elevational view of the dispenser.

Fig. 3 is a side elevational view of one of the containers used in the dispenser.

Fig. 4 is a perspective, somewhat schematic, view of the dispenser.

Fig. 5 is a top plan view of an accessory used for facilitating loading of the dispenser with medications.

Fig. 6 is a side elevational view of Fig. 5 with portions removed.

Fig. 7 is an elevational view of another of the containers.

Fig. 8 is a top plan view of Fig. 7.

Description of the Preferred Embodiment

Fig. 1 shows the general arrangement of an upper tray which holds a week's worth of doses in its twenty-eight small containers. (This Fig. shows only the lower half and the whole tray will be a full circle.) The small containers of this tray are to be filled at the beginning of the week, with the medications for each day to be filled in each of the small containers, with their special dosage, coloring of the container and its marking in mind. This tray can be modified to use other than twenty-eight containers and different programs of medication plans. Thus, if a person is to take medications only three times a day, twice a day, or once a day, my automatic dispenser machine can still be designed and/or programmed to handle them.

The center of the tray and the axis of rotation are shown at 1; one individual small container at 2; and another consecutive small container at 3. An axle 4.5 mounts container 2 on the tray with portion 4 connected to the outside wall of the container and portion 5 to the inner wall of the container. The axle 4 goes through a hole in the outer circular rim 27 of the tray to connect to a gear piece 6 that is an important part in causing the small containers, such as 2, 3, to rotate and to empty their contents. Each one of these twenty-eight small containers can rotate around the axis of its axle 4.5. A connecting piece 26 is a bridge between outer rim 27 and an inner circular rim 28.

Fig. 2 shows some important parts of the automatic dispenser machine in sequence. One of the small containers 2 mentioned earlier is to hold the medications, or pills. This container will rotate and dump the medications into an upper opening 12 of an upper funnel 11 that funnels the medications from a lower opening 13 to an opening 14 of a middle container 15, which is referred to as the "Pill Server" and is a place that will be available to the patient to allow the pills to be removed from it by the patient. If the patient did not remove the pills on a timely basis, then they are dumped into an upper opening 21 of a lower funnel 29, which funnels the pills from a lower opening 62 into an opening 63 of a small container 64 of the lower tray, the lower tray not being shown here.

The tip of axle portion 4 is shown at 8. Gear piece 6 is affixed to portion 4 and has notches and teeth 7 that will engage with matching notches and teeth 10 of a rack part 9 to cause the rotation of the container 2 and the

dumping process to occur. Part 9 is stable and fixed and does not move with time so that naturally notches and teeth 10 do not move either. However the upper tray is moving with scheduled speed to turn 360 degrees during one week (or periodically by computer programming). With rotation of the upper tray a calculated pre-scheduled moment will come that a small upper container 2 will meet a piece 9 and the notches and teeth 7 of gear part 6 will be predictably engaged with the matching notches and teeth 10 of part 9. This will cause the rotation of container 2 about the axle axis so that at one point it will be upside down dumping its pills into funnel 11. The pills fall through into pill server 15. The pill server will hold the pills until they are picked up, or otherwise dumped if not picked up.

Pill server 15 comprises an upper opening 14, an axle 18 that supports pill sever 15 for rotation, and a gear part 16 having notches and teeth 17. Under pill server 15 is an edge of a rotating circular piece 19 which is about the same size as the upper tray and will also rotate about axis 1. In the periphery or the rim of this part there are periodic groups of notches and teeth 20. There are twenty-eight groups of such notches and teeth 20. The speed of motion of piece 19 will be exactly the same as that of the upper tray. The rotation of piece 19 will bring notches and teeth 20 to engage with notches and teeth 17, causing the rotation of the container 15 about the axis of axle 18, which then dumps its contents into funnel 29. The pills then are directed by funnel 29 into one of the smaller containers of the lower tray, here shown by 64 with its upper opening 63.

Fig. 3 shows a small container 2 having a body 25 which has the general shape shared by all the upper small containers as well as pill server 15. The axle portions are supported at 23 and 24. This rotation will be 360 degrees and the contents of the container will be dumped easily during this rotation.

Fig. 4 shows the three circular pieces that rotate around vertical axis 1 and the two funnels between them. To prevent crowding, only four of the small containers of the upper tray are shown in this Fig. with two of the small containers in fronts marked by 21 and 22, and two of them at the right side of the picture marked by 2 and 3. Part 9 is responsible for rotation of the small containers of the upper tray as their gear parts 6 successively come in contact with notches and teeth 10 of part 9. Piece 19 has its periodic groups of notches and teeth 20 that will be moving synchronously with the rotation of the upper and lower trays about axis 1. With rotation of piece 19, its notches and teeth successively come to contact with the notches and teeth of part 16 of pill server 15 to make the pill server rotate 360 degrees and dump unremoved pills into lower funnel 29. Under funnel 29 is the lower tray which has multiple small containers similar to the containers in the upper tray except they are fixed and do not rotate about an axle axis, as do the upper tray's containers; however the lower tray itself will rotate synchronously with the upper tray and the middle piece 19 about axis 1.

Figs. 5 and 6 show a special circular filling tray which allows filling the small containers of the upper tray with medications to be done with ease. This special tray has a center 40 to fit to axis 1, and a total of seven funnels A, B, C, D, E, F, G, distributed uniformly around a flat circular body. Each of these seven funnels has a wider upper opening 43 and a smaller lower opening 48 that fits the upper openings of the containers of the upper tray. The right side of the special tray is shown by 41 and the left by 42. If the special filling tray is placed so that funnel A is in a morning dose container, all the other (B-G) will be in respective morning dose containers. Similarly for noon, PM, and evening doses, Fig. 6 shows the upper surface of the flat circular body by 46 and the lower surface by 45. Only funnel A is shown on Fig. 6 for convenience.

Figs 7 and 8 show a special shape for a pill server 15 to allow easy removal of the pills by a special matching scoop. They show the opening of this pill server by 57, the bottom surface by 58 and 59 and the deepest point by 60. Two axles of 55, 56 allow rotation for dumping.

Detailed Explanation of the Invention

One aspect of the progress of medicine is that there are medications for different diseases; however they are potent and should not be missed or be taken in extra doses. Unfortunately, and commonly, there is often a problem with the memory of the very people who take the medications most, namely the elderlies who at times forget about the timing of their medications and then get confused about them. This brings problems such as overdosing, underdosing, and confusion whether a patient took an extra medication or missed a dose. My machine dispenses proper doses on a proper regular basis. Although the specific machine that is shown dispenses medications close to the same timing is commonly used in hospitals, this timing can be modified by different methods, such as by use of computer programming. This machine will have a program to allow the patient to have his pills dispensed on a regular basis. For this purpose the patient will have his pills placed in an upper tray that has different containers, and the machine shown here has twenty-eight smaller containers that are divided to seven groups of four containers in each group. Each one of these seven groups contains the medications of one day, Sunday, Monday, Tuesday, etc., starting each day from the AM dose to noon dose, to PM dose, and to evening dose. After one day's pills have been dispensed, then the next day's will be started, etc. These medications are dispensed on each single dose basis. That is, there is a door that allows a patient to remove his AM dose, then later the noon dose, then later the PM dose, and then later the evening dose. If a dose of pills was not taken, then it is dumped into a special small container in the lower tray which is designed to show which dose was missed by the patient. This will be done by having markings on each small container of the lower tray, such as Tuesday PM dose, Wednesday AM dose, etc.,

so that an alert patient or an observer will be able to find out exactly which dose was missed.

This dispenser allows the person's medications to be organized for one week, with placement in color-coded containers for each dosing of each day. The container for the morning doses is uniquely colored, as are those for each other doses. For example, the containers for the morning doses may be colored yellow, the noon doses, green, the PM doses, pink, and the evening doses, blue. Furthermore they will be marked for the days, such as Sunday, Monday, Tuesday, etc. For example, the Sunday AM container will be yellow and will say in its side Sunday AM dose; the Tuesday PM container will be pink and in its side it will say Tuesday PM dose, etc., so that at the time of filling, it will be very easy to recognize the containers. The upper and lower trays and the piece 19 will then rotate about axis 1 at a pre-designed rate, and the rotation can be controlled in many possible ways including the following:

1. Mechanical Way: In this method the upper and lower trays and piece 19 are regularly and continuously rotated by an electronically powered engine designed to move one full circle during one week, moving 360/7 degrees each day. Such rotation will make it possible for the medications to be dumped in pre-scheduled bases, and a back up battery will prevent disruption of motion by power failure.

2. The Electronic Way: In this case the rotation is controlled by a mini-computer which is programmed to allow certain degrees of rotation to occur during each desired time. The computer controls the function of a small electric engine that is responsible for the rotation.

3. Combinations of both of above mentioned methods: In this case the computer power for the programming and scheduling will be combined with the mechanical method so that a suitable and useful combination will be made. For example, the timing and rate of rotation of the whole unit will be guided and controlled by the computer. Also some other parts such as activation of an alarm may also be done by the computer or mechanical method as well.

Available computer chips and mini-computers will allow a programming of many functions to be done by a small computer. In these versions, such advancement will be utilized so that every aspect of a program can be programmed and changed easily. With some modification of these basic ideas then, every step of such machine could be changed and altered as desired to make it the most useful for each patient's particular needs. Therefore it will be possible to program many steps of these transactions easily and precisely, and a small computer will be incorporated in the construction of such a machine unit for such purposes. With use of such computers, the rotation can be done with an exchangeable rate and timing; also the number of the functional trays (from 28 to 21 to 18 or even 8 based on

the time distance placed between the use of the small containers) can be changed as well, so the timing between the doses can be then adjusted. The number of the containers can be adjusted as well; for example the patient can be chosen to have a three times a day plan, or twice a day plan, instead of four times a day, so that the program can be customized to match the needs and medications to be dispensed on a desired and needed basis.

In one such unit a computer informs patients about timing and use of their medications. In this case one such computer that will be able to accept and function as a mulatto programmer will be connected to activate an alarm or a voice-making system. In other words the computer program will start an alarm or a device that generates human speech, such as cassette recorder or computer voices, so the computer will be able to start an alarm or an informing voice that will tell patients about the need for their medications to be taken. With the power of chips such planning can be done a week or a month ahead, or even longer. In this method the computer can, for example, announce a friendly voice to say: "Hello mother, good morning. It is time for you to take your morning medications. Do not forget them, and remember I love you more than the world." This message can be continued for a period of time until the patient takes his/her medications and presses a button marked "Thank You", at which time the voice will stop, but the function of the computer will continue till next dose, such as noon dose, when the voice will come again to say: "Hello mother, how are you? It is time for you to take your noon medications. You know that I love you." Once again, this message is continued for a period of time until the patient takes his/her medications and then presses the "Thank You" button. Such voices can be actual recordings of the patient's relatives which can have a very important psychological impact and help and support. In certain cases, such as lonely persons, a nice encouraging voice by itself can be curative and will have its own important therapeutic effect. It is important to notice that such messages can be changed and different nice and important things may be said.

In order to have this kind of computer with voice, the following methods can be used:

a. The computer will have a compartment for production of the voice and to allow the voice to be preserved and supplied by digital or other computerized method and use.

b. The mini-computer will control the activation of the function of an electrical recorder, and also to turn the machine off as well. This will allow a pre-recorded message to be heard when the unit turns on, and then to be turned off after the message is finished with control of the timing and the tape to be re-wound or to circulate and repeat the recorded voices everyday automatically. Naturally with recording different messages, different goals and results can be achieved.

The purpose of such units is to remind and encourage the patient to pick up the medications, and then it is expected that the patient will pick up his/her medications.

It is to be mentioned that similar type of units that activate a voice periodically can be made by mechanical methods. One such unit can be made by having a unit that will turn the cassette recorder on and off for a period of time on a pre-scheduled regular basis.

Such a unit can be made by having a circular plastic non-conductor plate rotate 360 degrees during twenty-four hours and then have pieces of conductors, such as metal, to go through two electrical pieces and to function as a conductor as long as it is moving between them. This connection will cause a circuit to be complete and the recorder to be turned on and function during this period (for example 5-10 minutes or so). Then when this piece has gone through, the conduction will be disrupted and the cassette will stop, until the next conductive piece comes. The different placement of these conducting pieces will allow planning the time of such function to be changed. At the end the unit will make the recorder to rewind or the tape to circulate to continue the recorded message again in another twenty-four hours and the cycle to repeat the next day.

The automatic pill dispenser may also have a picture placed next to the place which the pills are dispensed that will allow placement of the picture of the daughter or son or other loved one to be placed, the same person that is presumably relaying the message.

Although the dispensed medications will be primarily pills and capsules, it may also dispense small capsules to act as the representative of the other medications to remind a patient to use that medication also. Such a small plastic capsule may have the name of medications inside it to refer to medications not in pill form that should be taken or used, such as skin patch, eye drop, insulin, Metamucil, etc. Such a capsule can be opened with a small tab of paper to be stuck on it and then the plastic cover to be closed.

My automatic pill dispenser can be used in the following way. First, an alert person fills the small containers of the upper tray with medications of one week and sets the appropriate timing, and if needed locks the unit. The unit will start to function and on a timely basis, the first small container of the upper tray will rotate and dump its pills or medication reminders through funnel 11 into pill server 15, and at this time an alarm or voice will be activated to inform a patient about the presence of the medications for consumption. Then the patient will have a reasonable time of about 60 minutes or so (this time may be modified) to remove the pills or medication reminder from the pill server. Then the motion of the middle circular piece 19 will cause, via a corresponding set of notches and teeth 20, rotation of the pill server. Any medications still inside pill server 15 are dumped through funnel 29 into a corresponding smaller container that is part of the lower tray and has the correct marking to show which medication was missed. It should be considered that if the patient failed to pick up the pills and medication

reminder during this period of time then they will be dumped into the lower funnel, otherwise the pill server will rotate but there will be nothing left to dump. The dumping function will be done due to precise timing and planning and placement of the lower small tray containers in concert with the upper tray's containers so that the medication not picked up by the patient will be dumped into a small container of the lower tray that has the same coloring and markings as that of the upper tray into which it was originally filled. This method will allow the recognition of the medications that are missed to be done easily. A clear window may allow the person to find about the medication or a special sign will let the person to recognize this important event.

Technical Details of this Invention

The small containers of the upper tray are preferably about 3 cm = width by 4 cm = length by 2.5 cm = depth and have curved edges. An electrical engine is used to rotate the outer rim of one of the three parts that rotate slowly about axis 1, which can be a vertical axle that will also rotate the two other parts as well, when they are fixed to the vertical axle. Patients will be educated to remove the dropped pills or medications from pill server 15 by a scoop.

The lower tray is very similar to the upper tray except it is to keep the dumped medications separate for an important purpose of letting the patient or a supervisor or a relative of the patient notice which dose of medications, if any, were not picked up and consumed by the patient and for this purpose the following differences between the upper tray and the lower tray will be true:

1. The individual containers of the lower tray will not rotate along their own axis, simply since there is no need for it.
2. The individual containers of this tray will have the same coloring and markings to match the small container that originally has released the medications. This will give a method to enable the supervisor or the patient to know which dose of medications were skipped and not taken, which is medically important and helps in decision-making.

The bottom portion of the cover of the unit may be clear to allow inspection of the dumped medications to occur, although this will be optional, and a cover may be chosen to prevent it, considering the level of intelligence of the patient since in some cases it may be wise to have the unused medications hidden to avoid irritation of the patient and his attempt to break the unit.

In order to prevent the schedule from being interrupted if the electricity went off, the unit may have a battery for back up function and the battery may have an indicator to show its level of energy. The computer will be powered by a separate battery to prevent the programming or its function to be disturbed if the electricity went off.

The pill server will be made to have a special curve in its bottom wall to be deeper in the end close to the middle axle so that the pills accumulate there to be picked up easily by a special scoop.

This unit is covered by a nice cover made from metal or hard plastic to cover the whole unit, and to make it to look nice, and it will have an opening for removing the medications. There may be one or more locks used to prevent opening the unit without a key. In some models the opening of the removal place for removal of the medications may have a door that may be closed except for the time that the medications need to be removed. This door may be controlled mechanically or electronically. The door may be made from rubber to prevent hurting the patient's hand if it happened to touch it.

By placing the filling tray on the top of the upper tray, the user or the supervisor will be able to pour the supply of the medications in each group easily.

Importantly in certain models this unit may also be connected to a phone line and an arrangement made that if certain doses of pills were not picked up, that phone would be activated and a previously designed alarm or announcement transmitted through to make another person, a supervisor, a relative, or concerned person aware of this event. This will be very useful in cases that possibility of sudden death or sudden serious damage is high in a given patient and such alarming appears to be justified. Many mechanical or electronic techniques can be designed for such function to occur. For example the drop and presence of the pills inside the small containers of the lower tray can raise a lever or activate a weight-sensitive lever to initiate a mark or to turn one notch of a wheel of a system so that finally when certain number of notches are turned an electric system to be activated to send the message, or a photocell or series of photocells can be activated/de-activated so that again when certain numbers of activations are reached an electric system is activated and the message goes by phone.

It is of course understandable to consider that this unit can be modified to make other kinds of such units using the methods and teachings and plans mentioned in this application. The use of a computer will be very exciting and helpful as mentioned and many uses can be made with the above mentioned teachings.

In some models of these units the machine will be made to have the lowest pill spaces to have a hinge placed in one end so that the weight of the pills will cause the space to drop and to touch an electrical electrode or a pole in order to initiate a signal that then can be transformed to a telephone call or a recorder or any desirable and suitable signal in order to allow the interested person to be notified that the pill was not taken. The mini computer will be one best way of relaying this information and starting a new action. The presence of the pills inside the lower space may be seen by use of clear pill spaces and use of electric eye or photo cell that by having objects in front of it or removing an obstacle from its way due to motion of the pill space will cause the electrical circuit to

be complete to start a proper course of functions which may be reflected by the use of micro computer as well.

Claims

1. An automatic pill dispenser comprising: a succession of pill supply bins for containing supplies of pills; a patient-accessible pill serving bin at which a patient can remove dispensed pills from the dispenser; a succession of pill collection bins for collecting pills that have not been removed from said pill serving bin; means for causing said pill supply bins to successively dispense their pills to said pill serving bin at timed dispensing intervals; and means for causing said pill serving bin to dispense in time delayed relation to its having been filled from a particular pill supply bin, and in time advanced relation to its being filled from the immediately succeeding pill supply bin, pills that have not been removed from it, to a particular pill collection bin that is correlated with such particular pill supply bin.
2. An automatic pill dispenser as set forth in claim 1 in which:
 - said succession of pill supply bins are arranged in a circular succession on an upper horizontal turntable that turns about a vertical axis;
 - said succession of pill collection bins are arranged in a circular succession on a lower horizontal turntable that turns about said vertical axis; and
 - said pill serving bin is disposed vertically between said upper and lower turntables at a particular circumferential location about said vertical axis so that said pill supply bins and said pill collection bins move in succession past said pill serving bin as said upper and lower turntables turn about said vertical axis and pills are dispensed by gravity from said pill supply bins to said pill serving bin and from said pill serving bin to said pill collection bins.
3. An automatic pill dispenser as set forth in claim 2 in which:
 - each of said pill supply bins is mounted on said upper turntable by its own horizontal axle means such that each individual pill supply bin is caused to dispense pills that have not been removed from it by turning about its own axle means.
4. An automatic pill dispenser as set forth in claim 3 in which:
 - each horizontal axle means lies on a corresponding radial to said vertical axis.
5. An automatic pill dispenser as set forth in claim 3 in which:

said pill serving bin is disposed at such particular circumferential location for turning about its own horizontal axle means such that said pill serving bin is caused to dispense pills that have not been removed from it, to said pill collection bins by turning about its horizontal axle means.

6. An automatic pill dispenser as set forth in claim 5 in which:

each horizontal axle means of said pill supply bins and said horizontal axle means of said pill serving bin lie on corresponding radials to said vertical axis;

said means for causing said pill supply bins to successively dispense their pills to said pill serving bin at timed dispensing intervals comprises:

a toothed drive means disposed at a fixed circumferential location about said vertical axis proximate said upper turntable, and

a toothed driven means on the axle means of each pill supply bin disposed for meshing with said toothed drive means as each pill supply bin is brought by said upper turntable to a position at which its pills are dispensed to said pill serving bin so as to cause said pill supply bin to turn about its axle means and dispense its pills to said pill supply bin; and

said means for causing said pill serving bin to dispense in time delayed relation to its having been filled from a particular pill supply bin, and in time advanced relation to its being filled from the immediately succeeding pill supply bin, pills that have not been removed from it, to a particular pill collection bin that is correlated with such particular pill supply bin comprises:

a further toothed driven means disposed on said axle means of said pill serving bin, and

a succession of further toothed driven means arranged in a circular succession on a further horizontal turntable that turns about said vertical axis for meshing in succession with said further toothed driven means so as to cause said pill serving bin to turn about its axle means and dispense pills that have not been removed from it in time delayed relation to its having been filled from a particular pill supply bin, and in time advanced relation to its being filled from the immediately succeeding pill supply bin, such that pills that have not been removed from said pill serving bin are dispensed to the particular pill collection bin corresponding to the particular pill supply bin that just filled said pill serving bin.

7. An automatic pill dispenser as set forth in claim 5 including a first funnel for funneling pills from said pill supply bins to said pill serving bin and a second funnel for funneling pills from said pill serving bin to said pill collection bins.

8. An automatic pill dispenser as set forth in claim 1 including annunciator means for conveying information to a patient about pills dispensed by the dispenser, said annunciator means comprises means for announcing a delivery of pills from a pill supply bin to said pill serving bin by giving a pre-existing audible message to the patient.

9. An automatic pill dispenser as set forth in claim 1 in which a computer means controls at least some of the operational aspects of the dispenser.

10. An automatic pill dispenser as set forth in claim 1 including means to convey a message by telephone line to a person at a location that is remote from the dispenser to inform him or her that pills were not removed from said serving bin.

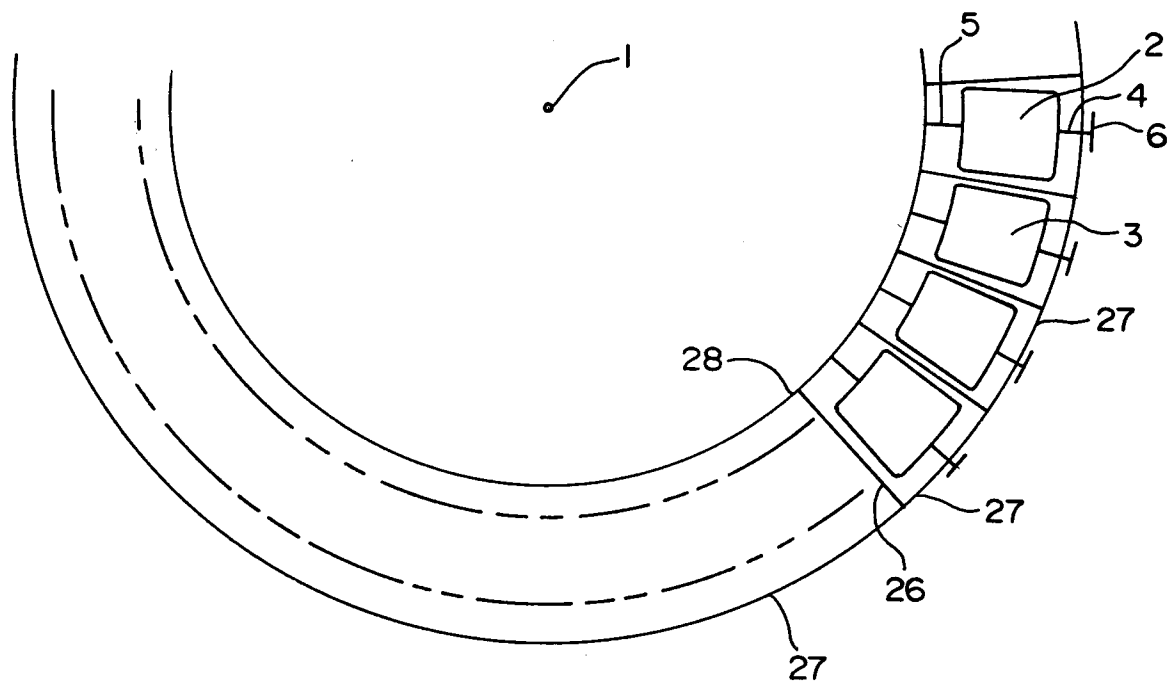
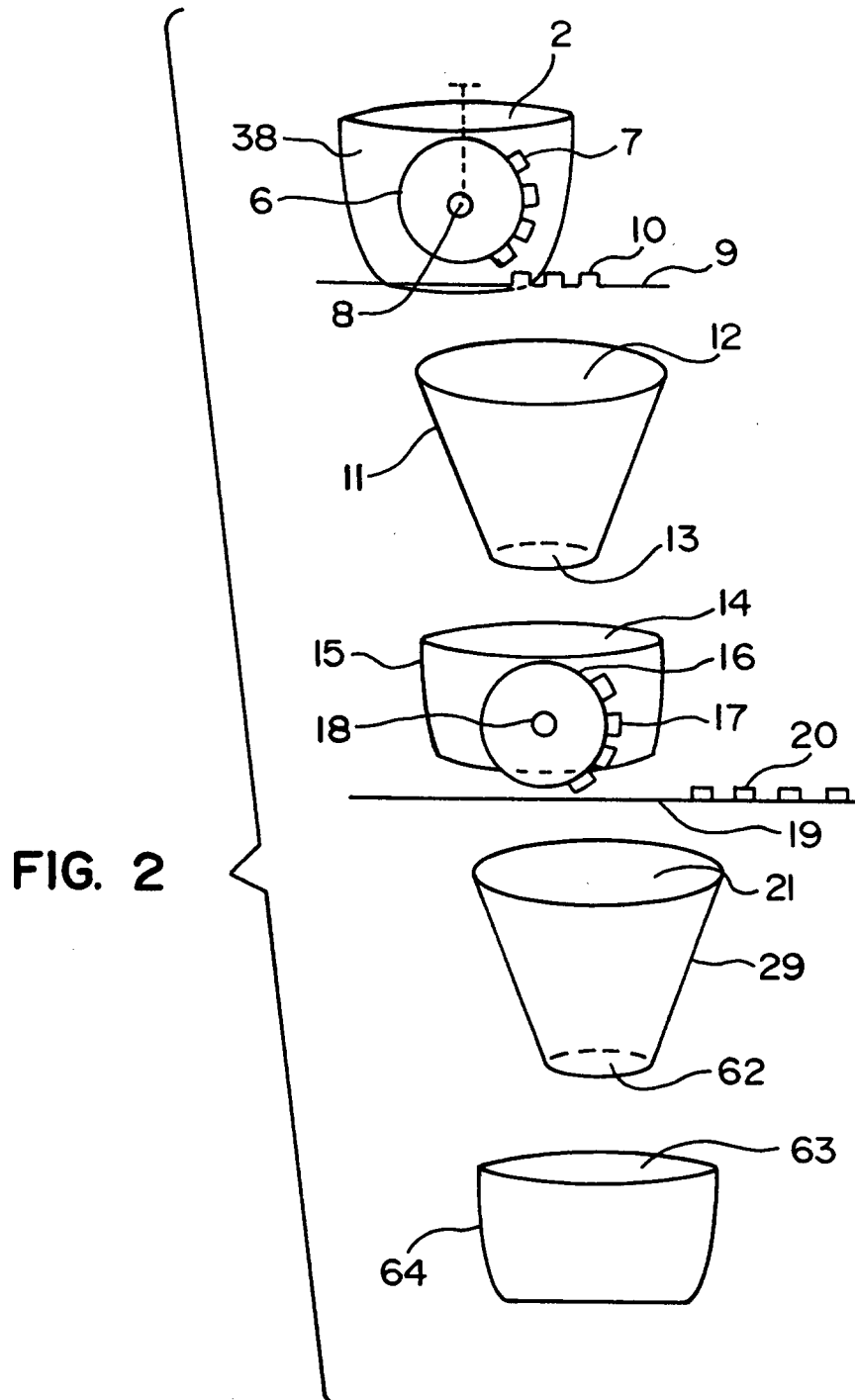


FIG. 1



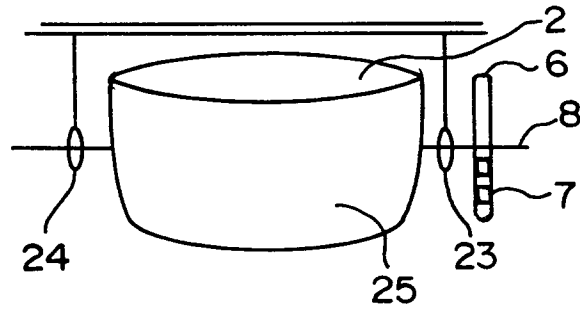


FIG. 3

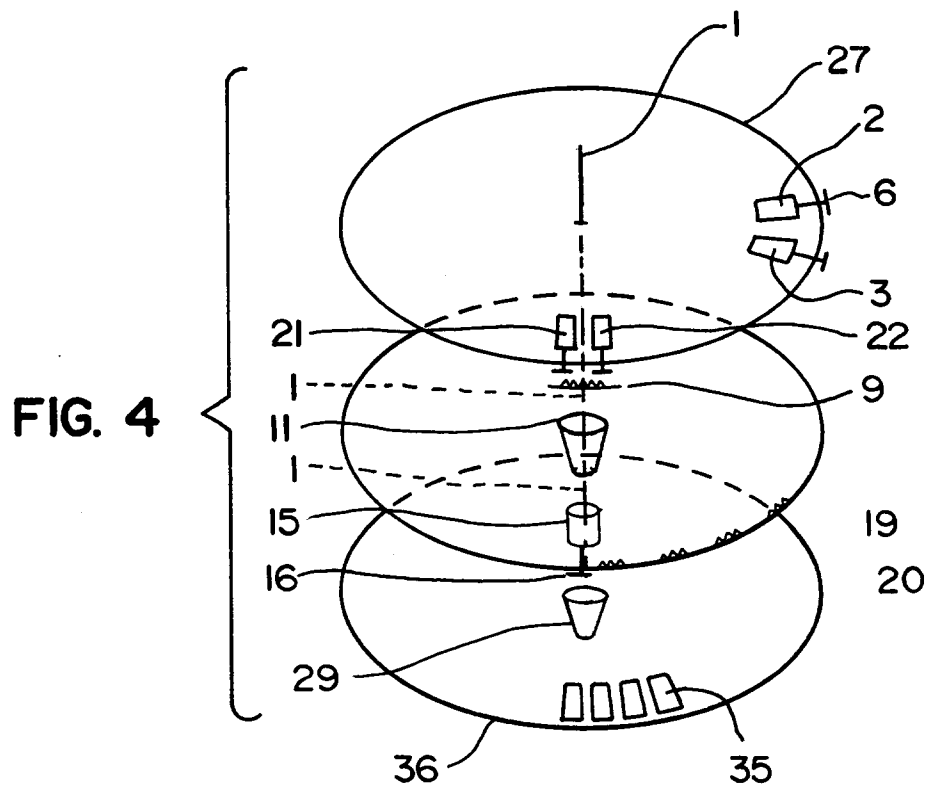


FIG. 4

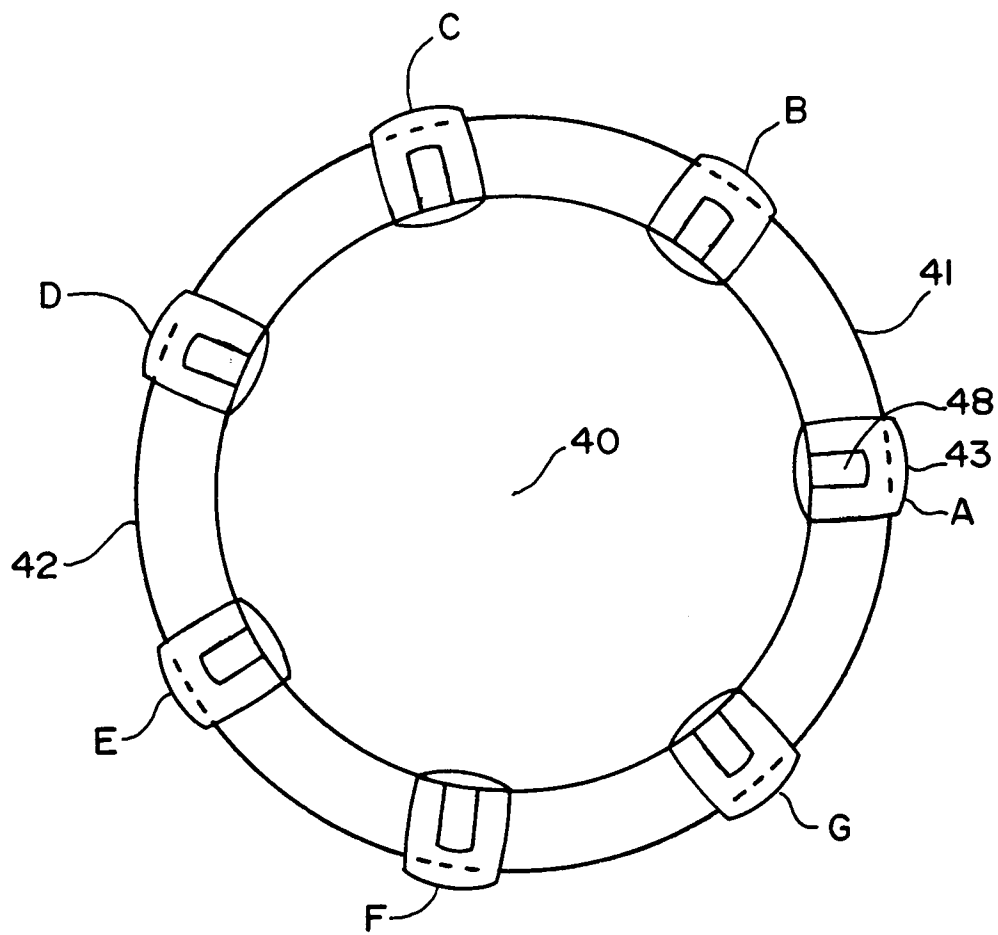


FIG. 5

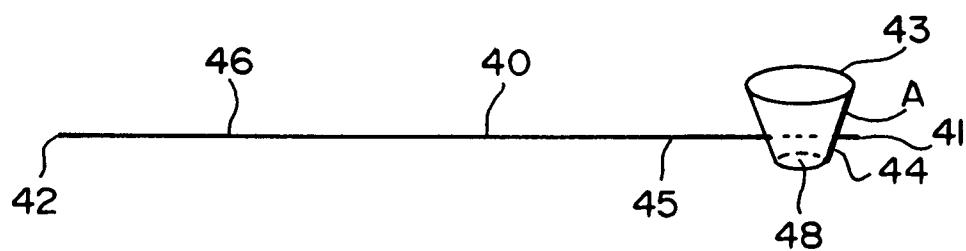


FIG. 6

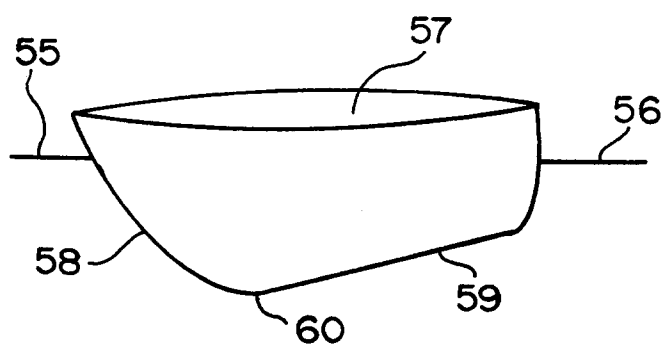


FIG. 7

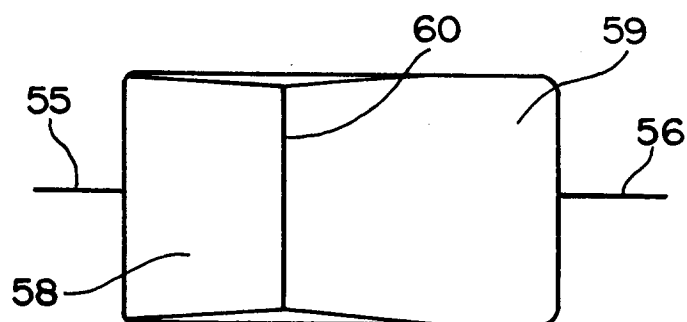


FIG. 8



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 11 7137

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	GB-A-2 099 803 (KARABI GOSCHE) * the whole document *	1,8,9	A61J1/00 A61J7/04
A	FR-A-2 638 142 (YOUINOU) * page 4, line 35 - page 5, line 20; figure 1 *	1,8,10	
A	US-A-4 911 327 (SHEPHERD) * column 2, line 10 - line 16 * * column 3, line 3 - line 43; figures 1,2 *	1,8-10	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A61J
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		2 March 1995	Baert, F
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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