United States Patent [19]

Garby

[11] **3,753,417**

[45] **Aug. 21, 1973**

[54] **SEQUENCE INDICATING MECHANISM**

[76] Inventor: **Louis C. Garby**, 3890 Armer Dr., Boulder, Colo. 80302

[22] Filed: **June 25, 1970**

[21] Appl. No.: **49,824**

[52] **U.S. Cl.** **116/121**, 206/42

[51] **Int. Cl.** **G09f 9/00**

[58] **Field of Search** 215/7, 43; 204/42; 116/121; 222/23

[56] **References Cited**

UNITED STATES PATENTS

3,151,599	10/1964	Livingston	116/121
3,227,127	1/1966	Gayle	116/121
3,678,884	7/1972	Robbins	116/121

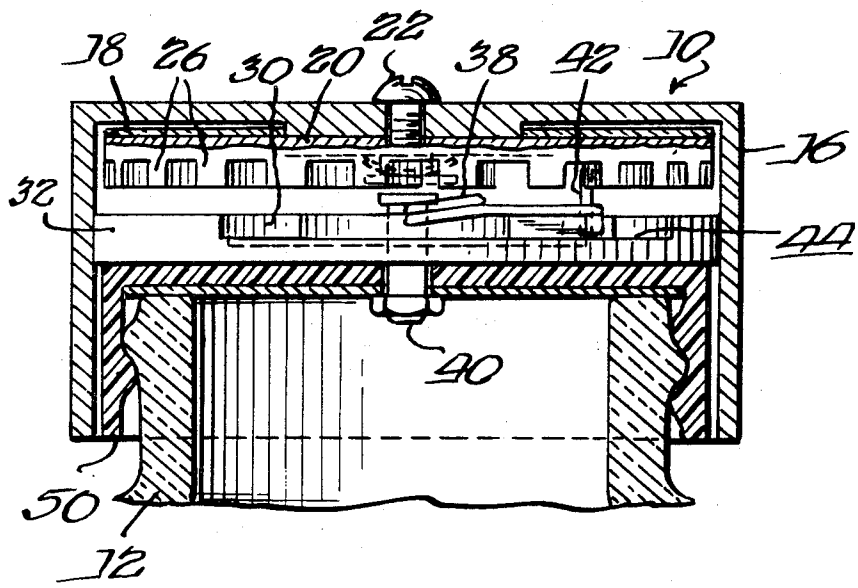
Primary Examiner—George T. Hall

Attorney—Granger Cook, Jr. and John L. Cline

[57] **ABSTRACT**

A sequencing mechanism adapted to incrementally change the relative positions of two members that is activated by reciprocal movement of one of the members.

6 Claims, 10 Drawing Figures



Patented Aug. 21, 1973 3,753,417

Fig. 1

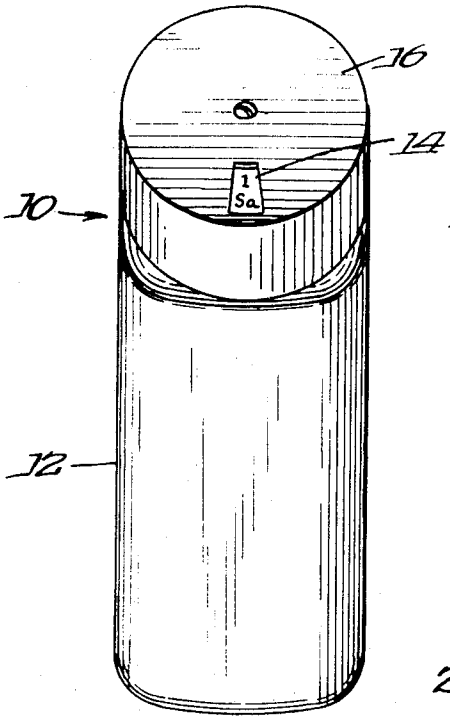


Fig. 3.

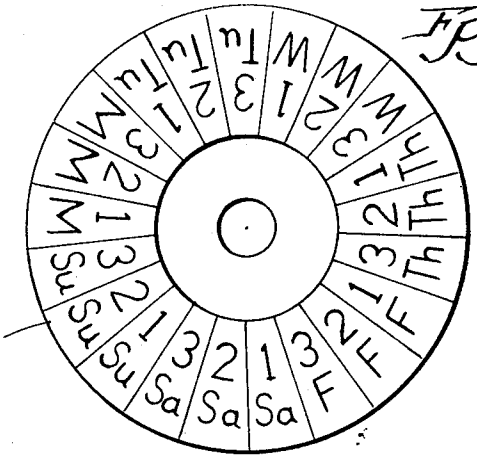


Fig. 4

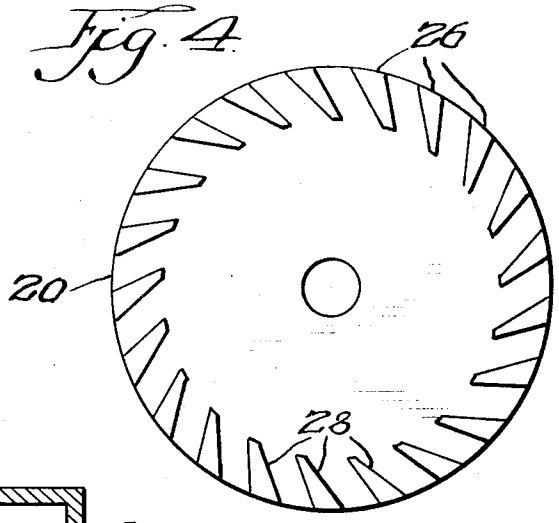


Fig. 2.

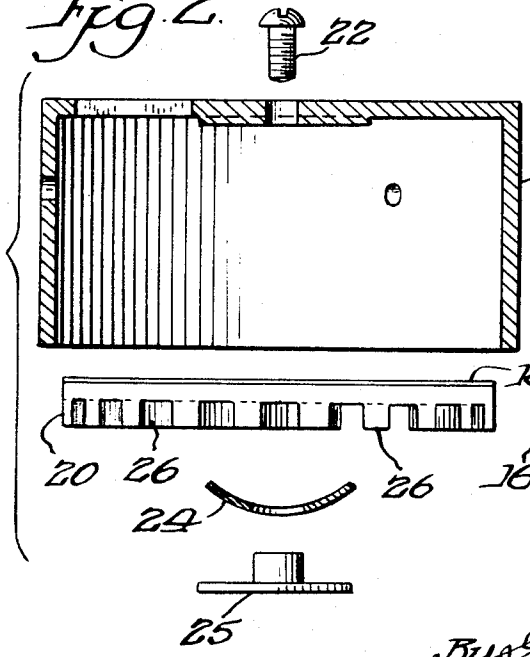
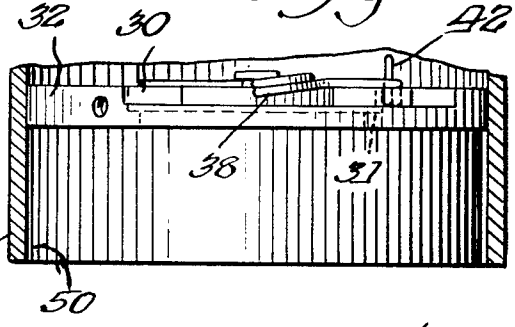


Fig. 5



Inventor:
Louis C. Garby.
By Granger Cook, Jr. & John L. Cline.
Attys.

Fig. 6

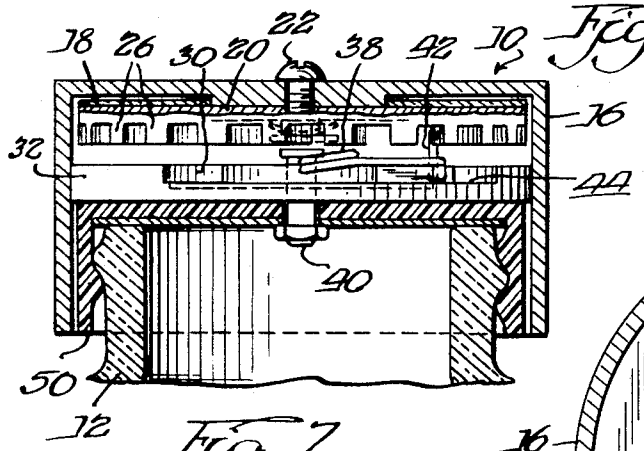


Fig. 7

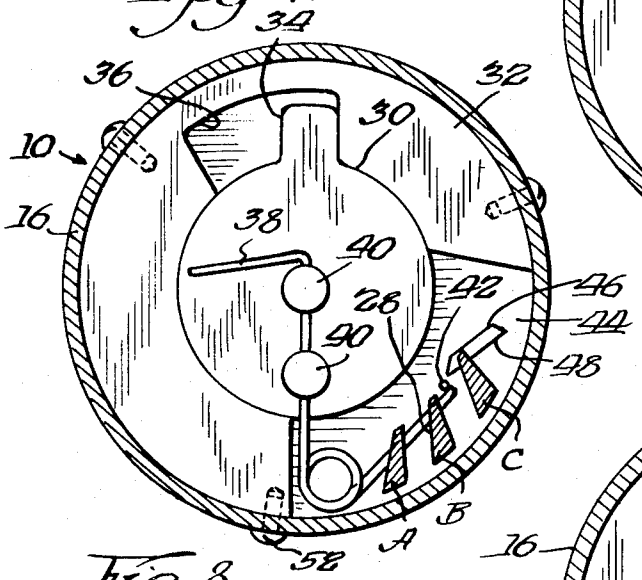


Fig. 8.

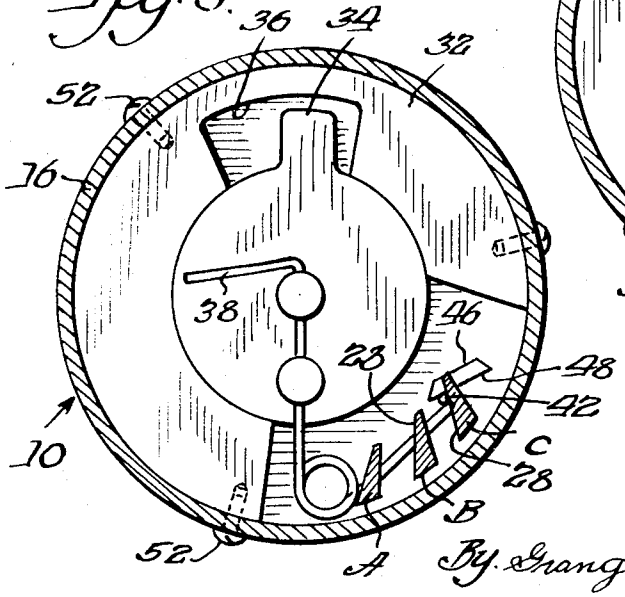


Fig. 9.

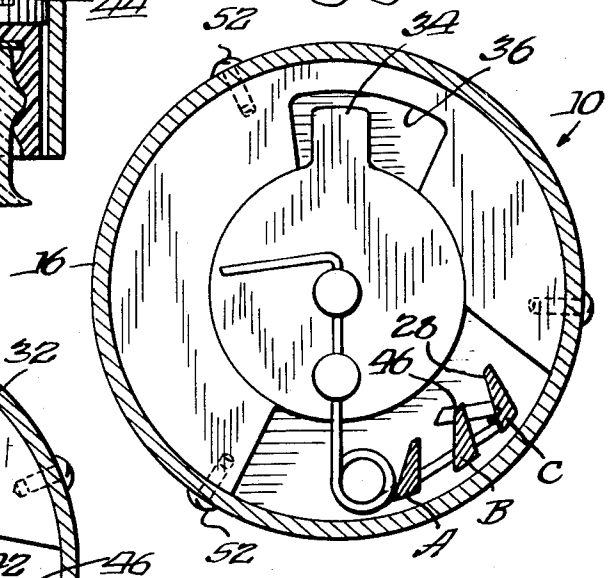
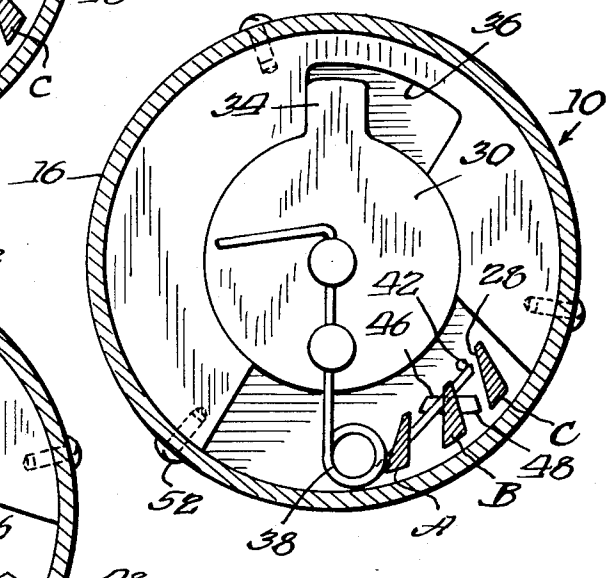


Fig. 10.



Inventor:
Louis C. Garby.

By: Granger Cook, Jr. & John L. Cline,
Attys.

SEQUENCE INDICATING MECHANISM

This invention relates to a sequencing assembly which may be employed in a closure mechanism that indicates the number of openings and/or closings of a container.

The features of this invention will become more apparent in the following description read in conjunction with the figures in which:

FIG. 1 is a front elevational view of a container having an indicating closure mechanism constructed in accordance with the principles of this invention.

FIG. 2 is an exploded front elevational view, partly in cross section, of the upper portion of the closure mechanism.

FIG. 3 is a top view of an indicator for use in a preferred embodiment.

FIG. 4 is a bottom view of a moving element depicted in FIG. 2.

FIG. 5 is a front elevational view, partly in cross section, of the lower portion of a preferred form of indicating closure.

FIG. 6 is a front elevational view, partly in cross section, of a closure mechanism constructed in accordance with the principles of this invention in operating relationship with the container.

FIGS. 7 through 10 illustrate a preferred form of the novel motion transmitting mechanism constructed in accordance with the principles of this invention.

Referring now to the figures wherein like reference numerals indicate like parts, a preferred form of the sequencing assembly and its incorporation into a preferred form of an indicating closure mechanism will be described. Although throughout this description the preferred embodiment will be illustrated as a medication dispensing device, it is obvious that many other dispensing functions such as chemical additions to manufacturing processes and the like, will find a use for an indicating closure as described in the preferred embodiment.

FIG. 1 depicts an indicating closure, denoted generally by the reference numeral 10, on a container 12. A cut out area 14 in the top of the lid 16 exposes the marking 1 SA, representing one Saturday. In this preferred embodiment the indicating closure 10 is utilized as a medication dispensing apparatus and will be described in terms of a medicine that the user must take three times daily; thus, the indication in FIG. 1 would tell the user that he has taken his first dosage on Saturday. After the user takes another dosage and, by so doing, completes one open-close cycle of the indicating closure 10, the indicator will be cycled to 2 SA and thus indicate that the second dosage for the day has been consumed.

The indicating closure 10 is composed of an upper indicating portion and a lower motive portion. The indicating portion is depicted in FIGS. 2, 3 and 4. An indicia-carrying member 18 is secured to the top of a sequenced member 20. The sequenced member 20 is releasably, rotatably secured within the lid 16 by a screw 22, a spring washer 24, and a stud 25 into which the screw 22 is threaded. Thus, the indicia-carrying member 18 will not freely rotate but may be rotated if the frictional forces applied by the washer 24 are overcome.

Referring now to FIG. 4, the movable member 20 has a plurality of circumferentially spaced teeth 26 disposed on its underside. The teeth 26 include cam surfaces 28, which are utilized to produce the sequential indicating movement of the member 20. That motion and the specific utilization of the cam surfaces 28 will be described more fully hereinafter.

The motive portion of the closure 10 is depicted in FIGS. 5 and 7, however, teeth A, B and C in FIG. 7 should be disregarded for present purposes. An internal plate-like member 30 is adapted to be rigidly affixed to a cap which may be removed from a container by a rotating movement. The internal member 30 is fitted within a recess 31 in an outer member 32 which is free to rotate with respect to both the internal member 30 and a container cap when the closure member 10 is affixed thereto. A projecting tab 34 fitted within a recessed portion 36 of the outer movable member 32 provides a stop means for limiting the rotation of the outer member 32 with respect to the inner member 30.

A spring 38 is rigidly affixed to internal member 30 by a suitable fastening means 40. The spring 38 comprises an upstanding pin 42 disposed within a second recessed portion 44 of the movable outer member 32. An upstanding projection 46 having a cam surface 48 thereon is also disposed within the recessed portion 44.

FIG. 6 illustrates the motive and indicating portions of the preferred closure 10 in assembled relationship and secured to rotatable cap 50 on a container 12. The lid 16 is rigidly secured to the outer movable element 32 by suitable screws 52. In this preferred embodiment the cap 50 is removable by counter-clockwise rotation and is secured into position by clockwise rotation with respect to the container 12. Accordingly, to seal the container 12 the lid 16 is rotated clockwise, which rotates the outer member 32 clockwise until the stop 34 on inner member 30 abuts the left edge of recess 36 as shown in FIG. 10. At that point continued clockwise rotation of the lid 16 will cause the cap member 5o to screw on to the container 12. Removal of the closure member 10 may be effected by rotating it in a counter-clockwise direction. That rotation will rotate the outer closure member 32 until the stop 34 has reached the position shown in FIG. 7 at which point the lid 16, outer member 30, inner member 32, inner member 30 and consequently the cap all rotate counter-clockwise thus removing the cap 50 from container 12.

Although the cap 50 has been illustrated as a separate piece from the inner member 30, it is obvious that they could be of unitary construction. Furthermore, it should be apparent that other means than the screws 40,40 could be used to attach the inner member 30 to the cap 50 such as adhesive for one example.

In this preferred embodiment the cycling of indicia takes place during the closing of member 10. FIGS. 7 through 10 sequentially illustrate the closing of closure member 10 and also the details of the sequencing mechanism of this invention. In FIG. 7, the closure member 10 has been removed from the container 12 by rotation in a counter-clockwise direction. Thus, stop member 34 abuts the right-hand side of recess 36. Three teeth A, B and C which correspond to three of the plurality of teeth 26 present on the underside of sequenced member 20 have been superimposed over the motive portion of the closure member 10.

From the starting position in FIG. 7, all elements may be freely rotated clockwise until some degree of friction is generated between the cap member 50 and the container 12. At that point the outer member 32 begins

to rotate with respect to the inner member **30**. The outer member **32** and the sequenced member **20** carrying teeth A, B and C move in unison during the clockwise rotation until the intersection of cam surfaces **28** and **48** is contacted by the upstanding pin **42**, as shown in FIG. **8**.

As the clockwise rotation is continued the pin **42** follows cam surface **48** and maintains the teeth A, B and C stationary with respect to the inner member **30**. In FIG. **9**, the furthest extent of clockwise rotation has nearly been reached as the stop **34** is very near the leftward edge of recess **36**. The pin **42** is about to reach the rightward edge of upstanding member **46** whereupon the spring will retract the pin **42** to the back side of upstanding member **46**.

In FIG. **10** the clockwise rotation has been completed, the stop **34** abuts the leftward edge of recess **36**. The pin **42** is now on the opposite side of upstanding member **46** from cam surface **48** and the teeth A, B and C are free to rotate counterclockwise with respect to the pin **42**. Since the relative positions of teeth A, B and C and inner member **30** have been unchanged through FIGS. **8, 9** and **10** but their position with respect to the lid **16** has been altered, a new marking now appears in the window **14**. If from the positions depicted in FIG. **10** the lid is now rotated counter-clockwise to open the container **12**, sequenced member **20** and thus the indicia carrying member **18** will rotate with the lid because of the frictional holding spring **24** and thus maintain the same indicia in the window **14** during the opening cycle. If the container **12** were opened, the positions of the elements would be that shown in FIG. **7** except now tooth A would be in the position tooth B is depicted, tooth B would be in the position tooth C is depicted, and tooth C would have assumed a new position counter-clockwise from that shown in FIG. **7**.

I claim:

1. A sequencing assembly comprising:
- a first stationary member;
- a second member rotatably mounted with respect to said first member;
- a third sequenced member releasably mounted on said second member for forced relative rotation therebetween;
- rotatable pin means fixedly mounted on said first member and overlying said second member;
- a first cam surface upstanding from said second member for rotating said pin means upon rotation of said second member;
- and a plurality of second cam surfaces extending downwardly from said third member and overlying said pin means such that after one of said second cam surfaces contacts said pin during rotation of said second member further rotation thereof will not change the relative positions of said first and third members and thereby cause relative rotation between said second and third members.

2. The sequencing mechanism set forth in claim **1** further including means for limiting the arc through which said second member may be rotated with respect to said first member.

3. The sequencing mechanism set forth in claim **2** wherein said second cam surfaces are perimetrically disposed on said third member and angularly equispaced from each other such that cyclical rotation of said second member causes said pin means to serially coact with said plurality of said second cam surfaces.

4. An indicating assembly comprising:
- first means for rigid attachment to a rotationally operable closure device;
- second means for reciprocating rotation with respect to said first means;
- third means for sequential, unidirectional, relative rotation with respect to said second means; and
- coacting means mounted on said first, second and third means for changing the relative positions of said second and third means during said reciprocating rotation in one direction for leaving said positions unchanged during said reciprocating rotation in the other direction.

5. The assembly set forth in claim **4** wherein said coacting means comprises:
- pin means secured to said first means and mounted on a spring for rotation, said pin means being rotatable from a retracted position to first and second extended positions;
- first cam means disposed on said second means for rotating said pin to said first extended position during said reciprocating rotation in said one direction and rotating said pin to said second extended position during said reciprocating rotation in said other direction for disengagement of said pin from said first cam means;
- and a plurality of third cam means for engaging said pin after said pin has begun to move from said retracted position to said first extended position whereby said third means is sequenced during said engagement.

6. Apparatus for indicating successive openings and/or closings of a container comprising:
- a first plate-like member for fixed attachment to a rotatable closing member;
- a second plate-like member rotatably disposed in relation to said first member;
- said second member including a recessed portion having an upstanding first cam surface;
- means for limiting the relative rotation between said first and second members;
- spring means rigidly affixed at one end to said first member and including a rotatable upstanding pin at the other end;
- gripping means rigidly affixed to said second member;
- and a third member rotatably affixed to said gripping means, said third member being in overlying relationship with second member;
- said third member including a plurality of substantially identical, circumferentially spaced, second cam surfaces located on an arc that overlies said first cam surface;
- said first cam surface, said second cam surfaces, and said upstanding pin being disposed in relation to one another such that said pin follows the intersection of said first and second cam surfaces to stepwise alter the relative position of said gripping means and said third member during an open-close cycle of said container.

* * * * *

PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,753,417 Dated August 21, 1973

Inventor(s) Louis C. Garby

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 37, after "member" change "5o" to read --50--

Signed and sealed this 2nd day of April 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents