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(56) References cited:
**US-A1- 2004 200 742 US-A1- 2008 041 738
US-A1- 2011 120 900**

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Description

[0001] The present patent application for industrial invention relates to a measuring cap. The measuring cap of the invention falls within the field of devices used to provide the exact and quick mixing between a liquid contained in a container and an additive substance contained in the measuring cap of the container.

[0002] Similar caps are used in the pharmacological field because some drugs are made of two components that need to be mixed a few seconds before consuming the drug.

[0003] Said caps comprise a chamber that contains a substance to be mixed as well as means adapted to let said substance out to mix it with the liquid contained in the container.

[0004] After making the mix, the cap can be removed in order to use the drug that is ready for consumption.

[0005] Similar caps do not allow for obtaining a specific mix according to the patient's clinical conditions. It must be noted that the preparation of a drug for administration to a patient is one of the most important phases of the pharmaceutical treatment process because each drug must be administered in the correct dose. The caps of the known type do not allow for customizing the dose of the substance to be mixed with the liquid contained in the container closed with the cap since the substance contained in the cap is poured completely, without the possibility of measuring it, inside the container with the drug to be added.

[0006] Consequently, the use of said single-dose caps does not allow for changing the dose of the additive mixed with the drug according to the patient's physical and clinical conditions.

[0007] If the patient needs a different dose from time to time, said additive substances are packaged in multi-dose containers that are separated from the container where they must be poured to obtain the desired mix.

[0008] The multi-dose containers are provided with measuring devices, such as spoons or cups, which have a series of notches to indicate the quantity of substance contained in the measuring device. The use of the measuring devices allows the patient to adjust the dose of the substance to be mixed according to his requirements. However, the patient must pay the utmost attention and check the quantity of substance actually poured in the measuring device.

[0009] The patient must carefully check the numbers indicated near to each notch on the measuring device and must measure the quantity of substance poured in the measuring device, paying attention not to make reading mistakes. This operation is often difficult to make, especially when the patient is not at home, and in any case the patient must make a visual evaluation of the quantity of substance to be mixed to the drug.

[0010] US2004/0200742 discloses a cap for mixing different kinds of materials, comprising a containing element with two chambers to contain the materials to be

mixed and a breakable sheet that closes the two chambers. An opening element is fixed to the mouth of a container and comprises a funnel-shaped axial hole and two teeth. The containing element is screwed onto the opening element in order to move axially towards the opening element. In this way the two teeth perforate the sheet that closes the two chambers, thus causing the discharge of the two materials to be mixed. Such a solution requires the presence of a number of teeth equal to the number of chambers of the materials to be mixed. Moreover, the perforation of the sheet that closes the chambers does not guarantee the complete discharge of the materials to be mixed from the chambers.

[0011] The purpose of the present invention is to remedy the drawbacks of the prior art by devising a measuring cap adapted to provide for a different mixing title according to the consumer's needs, between at least one substance contained in the cap and the liquid contained in the container closed with the cap.

[0012] Although the description of the prior art explicitly refers to devices used in the pharmaceutical field, the protection of the present invention is not limited to the measuring caps used in such a field. More precisely, the measuring cap of the invention has the same advantages in any container that contains a liquid to be added with a liquid or granular substance.

[0013] The object of the present invention is a measuring cap according to claim 1.

[0014] It is understood that the higher the number of the peripheral chambers of the containing element, the higher is the possibility to obtain different mixing percentages between the substance contained in the cap and the liquid contained in the container.

[0015] For explanatory reasons, the description of the measuring cap according to the present invention continues with reference to attached drawings, which only have an illustrative, not limiting value, wherein:

- Fig. 1 is an axonometric view of the measuring cap of the invention, in assembled condition and screwed onto the mouth of a container;
- Fig. 2 is an exploded axonometric top view of the measuring cap of the invention;
- Fig. 3 shows three top views of the three elements of the measuring cap of the invention, respectively;
- Fig. 4 shows three axial views of the three elements of the measuring cap of the invention, respectively;
- Fig. 5 is an exploded axonometric bottom view of the measuring cap of the invention, with chambers closed by the bottom walls;
- Fig. 6 is the same view as Fig. 5, except for the chambers that are open after overturning the bottom portions by 180°;
- Fig. 7A is a top view of the measuring cap of the invention in assembled condition, in which a portion of the lid has been removed;
- Fig. 7B is the same as Fig. 7A, except for the cap seen in an axonometric view;

- Fig. 7C is the same as Fig. 7A, except for the cap that is seen in a sectional view;
- Fig. 8A is the same as Fig. 7A, except for the measuring cap that is in a different condition, after overturning the bottom portions by 180°;
- Fig. 8B is the same as Fig. 8A, except for the cap that is seen in an axonometric view;
- Fig. 8C is the same as Fig. 8B, except for the cap that is seen in an axial view.

[0016] Referring to the figures, the measuring cap of the invention is disclosed and generally indicated with reference numeral (100).

[0017] As shown in Fig. 1, the measuring cap (100) is adapted to be applied on the mouth of a container (R).

[0018] Referring to Fig. 2, the measuring cap (100) comprises a containing element (2) to contain the substance to be measured, and an opening element (1) to discharge the substance to be measured from the containing element (2).

[0019] The containing element (2) has a basically cylindrical shape and comprises a plurality of peripheral chambers (4) that define internal compartments (V) to contain the substance to be measured. Advantageously, the peripheral chambers (4) are equally spaced angularly.

[0020] Each peripheral chamber (4) comprises a removable bottom portion (41) (Figs. 5 and 6) that closes the internal compartment (V). Advantageously, the bottom portion (41) is hinged to the peripheral chamber (4) in a hinge point (P) in order to be overturned around the hinge point (P).

[0021] The containing element (2) comprises an axial hole (F1).

[0022] The opening element (1) has a basically cylindrical shape and is revolvingly and coaxially mounted with respect to the containing element (2) so that the two elements (1, 2) can rotate mutually without moving axially.

[0023] The measuring cap (100) comprises unidirectional mutual rotation means (15, 21) that provide for the unidirectional rotation of the containing element (2) with respect to the opening element (1). The unidirectional mutual rotation means (15, 21) comprise a toothed profile (15) with sawtooth obtained on an upper circular edge of the opening element (1), and a toothed profile (21) with sawtooth obtained on a lower circular edge of the containing element (2) (Figs. 5 and 6).

[0024] The opening element (1) comprises an upper side (12) adapted to be faced towards the containing element (2). In order to prevent the accidental opening of the peripheral chambers (4), the bottom portion (41) of each peripheral chamber (4) rests on the upper side (12) of the opening element (1).

[0025] A tooth (3) protrudes from the upper side (12) of the opening element (1).

[0026] The opening element (1) comprises at least one through hole (13, 14) in peripheral position close to the

tooth (3).

[0027] Therefore, when the containing element (2) is rotated with respect to the opening element (1), the tooth (3) of the opening element pushes an edge of the bottom portion (41) of the peripheral chamber (4) in parallel direction to the bottom portion, thus overturning the bottom portion (41) around the hinge point (P) by 180°. In view of the above, the peripheral chamber (4) is opened and the substance to be measured is discharged from the peripheral chamber (4), passes through said at least one hole (13, 14) and falls into the container (R).

[0028] After overturning the bottom portion (41) of the peripheral chamber (4) by 180°, the bottom wall (41) is disposed on the upper side (12) of the opening element (1).

[0029] When it is discharged from the internal compartment (V) of the peripheral chamber (4), the measured substance tends to be distributed on the sides with respect to the tooth (3); therefore, if the opening element (1) is provided with only one hole (13, 14), part of the substance may not be discharged through the hole completely and may remain on the upper side (12) of the opening element. In order to remedy such a drawback, the opening element (1) is advantageously provided with two peripheral holes (13, 14) and the tooth (3) is situated between the two holes (13, 14) in such manner to ensure the complete discharge of the measured substance.

[0030] The opening element (1) comprises a shank (16) that protrudes axially from the upper side (12) and is provided with an indicator (B).

[0031] The measuring cap (100) comprises a lid (5) that is fixed on the containing element (2) to close the peripheral chambers (4) of the containing element (2). The lid (5) is provided with pegs (53) (Figs. 5 and 6) disposed in register with the peripheral chambers (4) to close the peripheral chambers (4).

[0032] The lid (5) comprises an axial hole (F2) to receive the shank (16) of the opening element. The external surface of the lid (5), around the axial hole (F2), is provided with notches (T) of a graduated scale that indicates the quantity of substance discharged after opening the peripheral chambers (4).

[0033] The shank (16) of the opening element (1) is inserted into the axial holes (F1, F2) of the containing element (2) and the lid (5), respectively, and the indicator (B) aims at the notches (T) of the graduated scale to indicate the quantity of substance discharged.

[0034] The containing element (2) and the lid (5) are prismatically coupled. Referring to Figs. 5 and 6, the containing element (2) is provided with a rib (22) that protrudes outwards radially in order to be engaged in a groove provided in the lid (5).

[0035] The figures shows an embodiment in which the opening element (1) is fixed in the mouth of the container (R) and the containing element (2) rotates with respect to the opening element.

Claims**1. A measuring cap (1) comprising:**

- a containing element (2) with basically cylindrical shape comprising at least one peripheral chamber (4) that defines an internal compartment (V) that contains the substance to be measured; said peripheral chamber (4) being provided with a removable bottom portion (41) to discharge the substance to be measured;
- an opening element (1) revolvingly mounted with respect to the containing element (2) so that the two elements (1, 2) can rotate mutually;
- a tooth (3) disposed in peripheral position in said opening element (1) to remove said bottom portion (41) of the peripheral chamber (4) of the containing element;
- at least one hole (13, 14) obtained in said opening element (1) to allow for the passage of said substance to be measured towards a container (R);

wherein

the opening element (1) comprises an upper side (12) facing towards the containing element (2); and wherein the tooth (3) protrudes from the upper side (12) of the opening element (1); and wherein opening element (1) and containing element (2) are revolvingly mounted in order to prevent the mutual axial movement between the two elements (1, 2) and said tooth (3) is disposed in said opening element (1) in such manner to push an edge of the bottom portion (41) of the peripheral chamber (4) along a parallel direction to the bottom portion (41) during the mutual rotation between the containing element (2) and the opening element (1), thus removing the bottom portion (41) of the peripheral chamber,

said at least one hole (13, 14) is situated in peripheral position in said opening element (1) close to the tooth (3) in order to allow for the passage of said substance to be measured towards the container (R).

2. The measuring cap (1) of claim 1, wherein said bottom portion (41) is hinged in a hinge point (P) to the peripheral chamber (4) in such manner that said tooth (3) can cause the overturning of the bottom portion (41) around said hinge point (P).**3. The measuring cap (1) of claim 1 or 2, wherein said tooth (3) is situated between two peripheral through holes (13, 14) of the opening element (1).****4. The measuring cap (1) of any one of the preceding claims, comprising unidirectional mutual rotation means (15, 21) that allow for a unidirectional rotation between the containing element (2) and the opening element (1).**

5. The measuring cap (1) of claim 4, wherein said unidirectional mutual rotation means (15, 21) comprise a toothed profile (15) with sawtooth obtained on a circular edge of the opening element (1), and a toothed profile (21) with sawtooth obtained on a circular edge of the containing element (2).

6. The measuring cap (1) of any one of the preceding claims, wherein said opening means (1) comprises an upper side (12) in contact with said bottom portion (41) of said at least one peripheral chamber (4).

7. The measuring cap (1) of any one of the preceding claims, comprising a lid (5) fixed to said containing element (2) to close said peripheral chamber (4) of the containing element.

8. The measuring cap (1) of claims 6 and 7, wherein said first element (1) comprises a central shank (16) that protrudes from said upper side (12) of the opening element (1) and is inserted into two axial holes (F1, F2) obtained in aligned position respectively in said containing element (2) and in said lid (5); said lid (5) comprising a series of notches (T) obtained on the external surface; said shank (16) being provided with an indicator (B) that cooperates with said notches (T) to indicate the quantity of measured substance that is discharged after opening said at least one peripheral chamber (4).

9. The measuring cap (1) of any one of the preceding claims, wherein said opening element (1) is fixed to the mouth of said container (R).

Patentansprüche**1. Dosierverschluss (1), umfassend:**

- ein im Wesentlichen zylinderförmiges Aufnahmeelement (2), umfassend mindestens einen peripheren Sitz (4), der einen Innenraum (V) definiert, der den zu dosierenden Stoff enthält; wobei der periphere Sitz (4) mit einer abnehmbaren Bodenwand (41) für den Auslass des zu dosierenden Stoffes versehen ist;
- ein Öffnungselement (1), das bezogen auf das Aufnahmeelement (2) derart drehbar montiert ist, dass die beiden Elemente (1, 2) sich gegenüberlich drehen können;
- einen Zahn (3), der in dem Öffnungselement (1) peripher angeordnet ist, um die Bodenwand (41) des peripheren Sitzes (4) des Aufnahmeelements zu entfernen;
- mindestens ein Loch (13, 14), das in dem Öffnungselement (1) vorgesehen ist, um den Durchfluss des zu dosierenden Stoffes in einen Behälter (R) zu ermöglichen;

- wobei das Öffnungselement (1) eine zum Aufnahmeelement (2) gerichtete Oberseite (12) umfasst und wobei der Zahn (3) aus der Oberseite (12) des Öffnungselements (1) auskragt; und
 5 wobei das Öffnungselement (1) und das Aufnahmeelement (2) drehbar montiert sind, um eine gegenüberliegende axiale Bewegung zwischen den beiden Elementen (1, 2) zu verhindern und der Zahn (3) in dem Öffnungselement (1) derart angebracht ist, dass eine Kante der Bodenwand (41) des peripheren Sitzes (4) während der gegenüberliegenden Drehung zwischen dem Aufnahmeelement (2) und dem Öffnungselement (1) in eine parallel zur Bodenwand (41) liegende Richtung geschoben werden kann, wodurch die Entfernung der Bodenwand (41) des peripheren Sitzes bewirkt wird,
 10 das mindestens eine Loch (13, 14) ist peripher in dem Öffnungselement (1) in der Nähe des Zahns (3) angeordnet, um den Durchfluss des zu dosierenden Stoffes in einen Behälter (R) zu ermöglichen;
- 15
2. Dosierschluss (1) nach Anspruch 1, wobei die Bodenwand (41) in einem Scharnierpunkt (P) derart am peripheren Sitz (4) angeschlagen ist, dass der Zahn (3) ein Umlappen der Bodenwand (41) um den Scharnierpunkt (P) bewirken kann.
 25
3. Dosierschluss (1) nach Anspruch 1 oder 2, wobei der Zahn (3) zwischen den beiden peripheren durchgehenden Löchern (13, 14) des Öffnungselements (1) angeordnet ist.
 30
4. Dosierschluss (1) nach einem beliebigen der vorstehenden Ansprüche, umfassend Mittel (15, 21) zur gegenüberliegenden Einrichtungsrotation, die eine Einrichtungsrotation zwischen dem Aufnahmeelement (2) und dem Öffnungselement (1) ermöglichen.
 35
5. Dosierschluss (1) nach Anspruch 4, wobei die Mittel (15, 21) zur Einrichtungsrotation ein gezahntes Sägezahnprofil (15) umfassen, das auf einer kreisförmigen Kante des Öffnungselements (1) herausgearbeitet ist, und ein gezahntes Sägezahnprofil (21), das auf einer kreisförmigen Kante des Aufnahmeelements (2) herausgearbeitet ist.
 40
6. Dosierschluss (1) nach einem beliebigen der vorstehenden Ansprüche, wobei das Öffnungselement (1) eine Oberseite (12) umfasst, die sich mit der Bodenwand (41) des mindestens einen peripheren Sitzes (4) in Kontakt befindet.
 45
7. Dosierschluss (1) nach einem beliebigen der vorstehenden Ansprüche, umfassend einen Deckel (5), der an dem Aufnahmeelement (2) befestigt ist, um den peripheren Sitz (4) des Aufnahmeelements zu verschließen.
 50
8. Dosierschluss (1) nach den Ansprüchen 6 und 7, wobei das erste Element (1) einen zentralen Schaft (16) umfasst, der aus der Oberseite (12) des Öffnungselements (1) auskragt und in die beiden axialen Löcher (F1, F2) eingesteckt ist, die in gefluchteter Position jeweils in dem Aufnahmeelement (2) und dem Deckel (5) herausgearbeitet sind; wobei der Deckel (5) eine Reihe von Kerben (T) umfasst, die auf seiner Außenseite herausgearbeitet sind; wobei der Schaft (16) mit einem Zeiger (B) versehen ist, der mit den Kerben (T) zusammenwirkt, um die Menge des zu dosierenden Stoffes anzuzeigen, die nach der Öffnung des mindestens einen peripheren Sitzes (4) abgegeben wird.
 15
9. Dosierschluss (1) nach einem beliebigen der vorstehenden Ansprüche, wobei das Öffnungselement (1) an der Ausmündung des Behälters (R) befestigt ist.
 20

Revendications

1. Bouchon doseur (1) comprenant :

- un élément conteneur (2) de forme essentiellement cylindrique comprenant au moins un siège périphérique (4) qui définit un compartiment interne (V) contenant la substance à doser ; ledit siège périphérique (4) étant doté d'une paroi de fond (41) amovible pour le déversement de la substance à doser ;
- un élément d'ouverture (1) monté pivotant par rapport à l'élément conteneur (2), de sorte que les deux éléments (1, 2) peuvent tourner réciproquement entre eux ;
- une dent (3) disposée sur toute la périphérie du dit élément d'ouverture (1) pour extraire ladite paroi de fond (41) du siège périphérique (4) de l'élément conteneur ;
- au moins un perçage (13, 14) prévu dans ledit élément d'ouverture (1) pour permettre le passage de ladite substance à doser vers un récipient (R) ;

où l'élément d'ouverture (1) comprend une face supérieure (12) tournée vers l'élément conteneur (2) ; et où la dent (3) déborde de la face supérieure (12) de l'élément d'ouverture (1) ; et
 où l'élément d'ouverture (1) et l'élément conteneur (2) sont montés pivotants, de sorte à empêcher le déplacement axial réciproque entre les deux éléments (1, 2) et ladite dent (3) est disposée dans ledit élément d'ouverture (1), afin de pouvoir pousser un bord de la paroi de fond (41) du siège périphérique (4) dans une direction parallèle à la paroi de fond (41), pendant la rotation réciproque entre l'élément conteneur (2) et l'élément d'ouverture (1), en provo-

quant l'enlèvement de la paroi de fond (41) du siège périphérique,
ledit au moins un perçage (13, 14) est disposé sur
la périphérie du dit élément d'ouverture (1), près de
la dent (3), pour permettre le passage de ladite subs- 5
tance à doser vers le récipient (R).

2. Bouchon doseur (1) selon la revendication 1, où la-
dite paroi de fond (41) est pivotée sur un point de
charnière (P) au siège périphérique (4), de sorte que 10
ladite dent (3) provoque un basculement de la paroi
de fond (41) autour du dit point de charnière (P).
3. Bouchon doseur (1) selon la revendication 1 ou 2,
où ladite dent (3) est disposée entre deux perçages 15
(13, 14) passants périphériques de l'élément
d'ouverture (1).
4. Bouchon doseur (1) selon l'une quelconque des re-
vendications précédentes, comprenant des moyens 20
de rotation réciproque unidirectionnelle (15, 21) qui
permettent une rotation unidirectionnelle entre l'élé-
ment conteneur (2) et l'élément d'ouverture (1).
5. Bouchon doseur (1) selon la revendication 4, où les- 25
dits moyens de rotation réciproque unidirectionnelle
(15, 21) comprennent un profil denté (15) en dents
de scie, réalisé sur un bord circulaire de l'élément
d'ouverture (1), et un profil denté (21) en dents de
scie, réalisé sur un bord circulaire de l'élément con- 30
teneur (2).
6. Bouchon doseur (1) selon l'une quelconque des re-
vendications précédentes, où ledit élément d'ouver- 35
ture (1) comprend une face supérieure (12) qui est
en contact avec ladite paroi de fond (41) du dit au
moins un siège périphérique (4).
7. Bouchon doseur (1) selon l'une quelconque des re-
vendications précédentes, comprenant un couver- 40
cle (5) fixé au ledit élément conteneur (2) pour fermer
ledit siège périphérique (4) de l'élément conteneur.
8. Bouchon doseur (1) selon les revendications 6 et 7,
où ledit premier élément (1) comprend une tige (16) 45
centrale qui déborde de ladite face supérieure (12)
de l'élément d'ouverture (1) et qui est enfilée à l'in-
érieur de deux perçages axiaux (F1, F2) réalisés en
position respectivement alignée dans ledit élément
conteneur (2) et dans ledit couvercle (5) ; ledit cou- 50
vercle (5) comprenant une série d'encoches (T) réa-
lisées sur sa surface externe ; ladite tige (16) étant
dotée d'un indicateur (B) qui coopère avec lesdites
encoches (T) aux fins d'indiquer la quantité de subs-
stances à doser débitée à la suite de l'ouverture d'au 55
moins un siège périphérique (4).
9. Bouchon doseur (1) selon l'une quelconque des re-

vendications précédentes, où ledit élément d'ouver-
ture (1) est fixé sur l'embouchure du dit récipient (R).

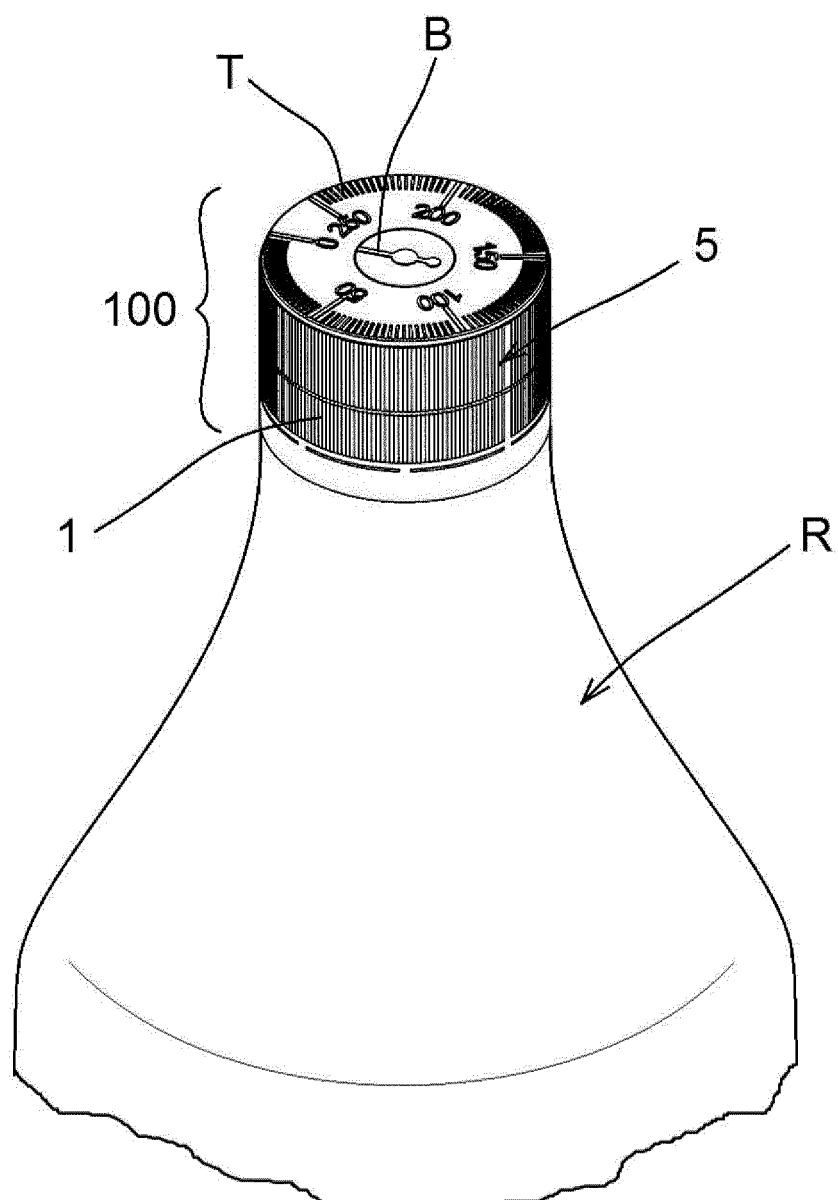


FIG. 1

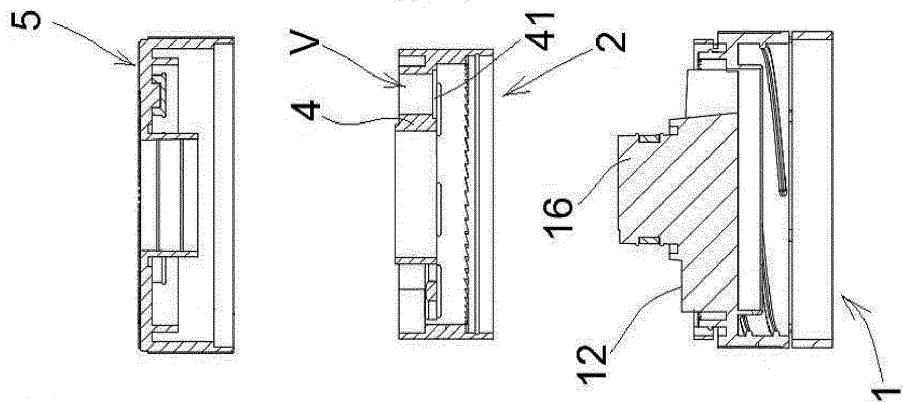


FIG. 4

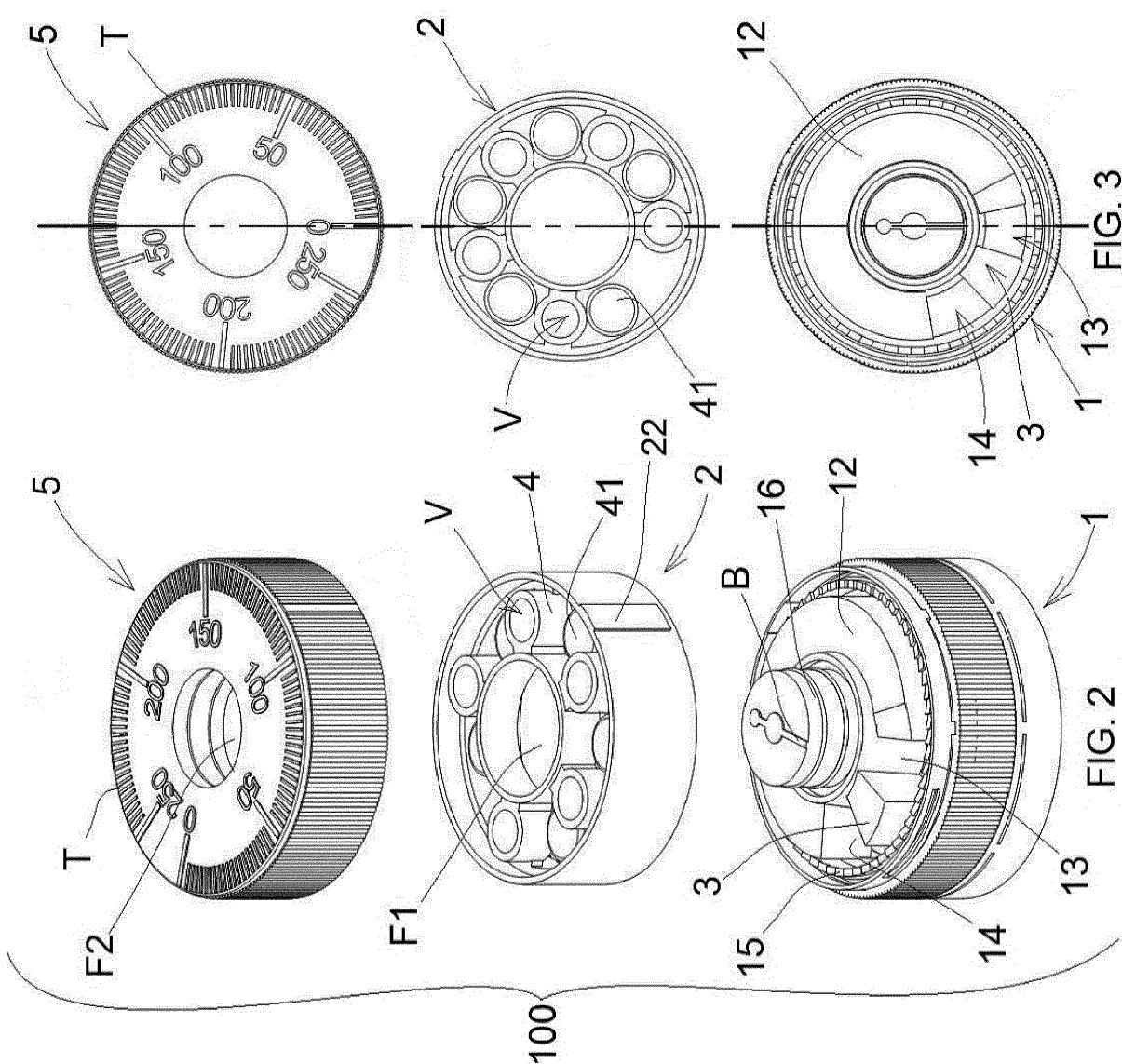


FIG. 2

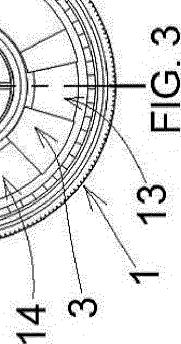


FIG. 3

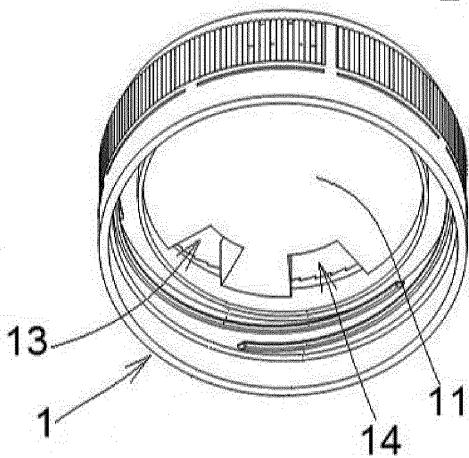
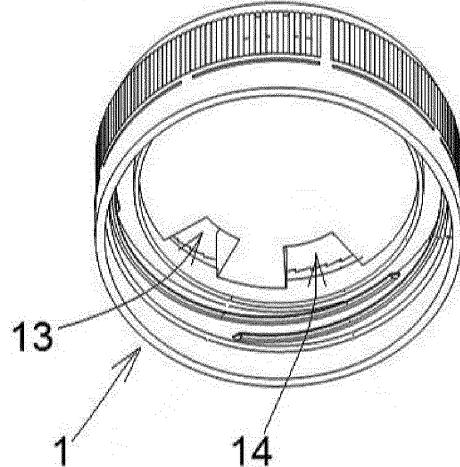
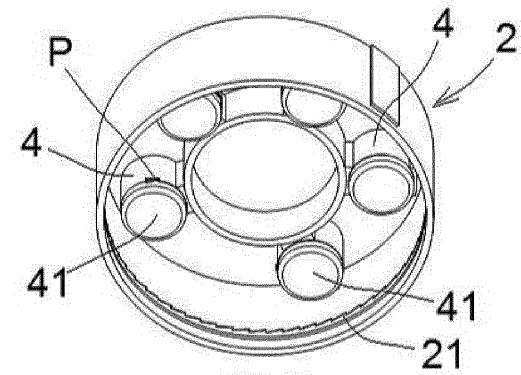
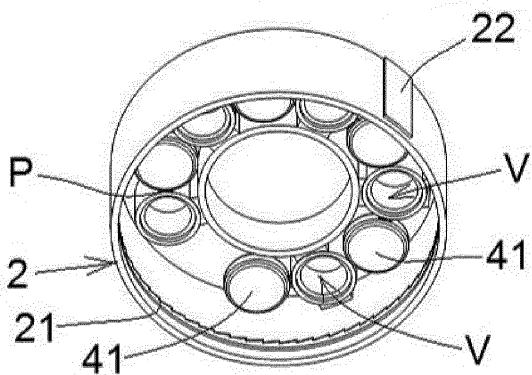
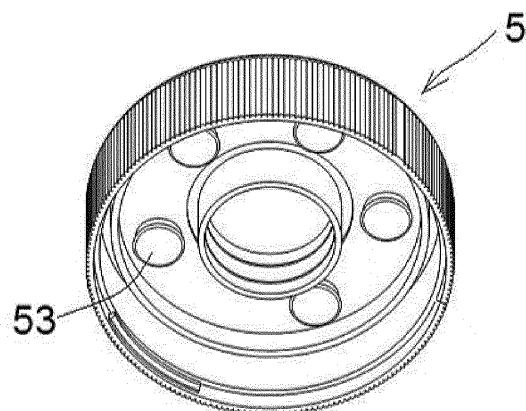
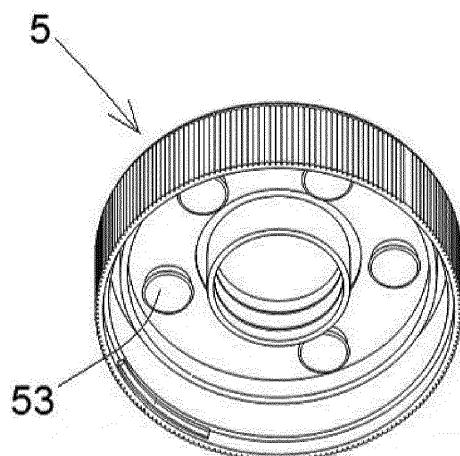


FIG. 6

FIG. 5

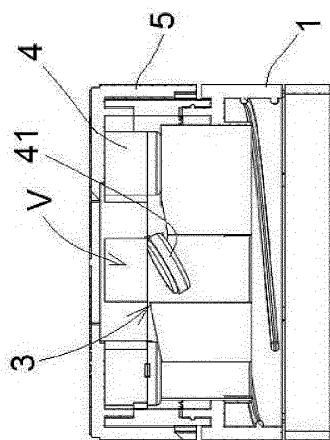


FIG. 7C

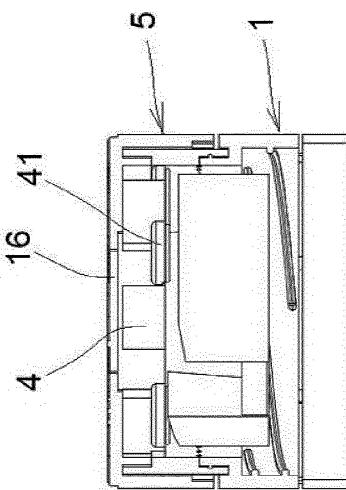


FIG. 8C

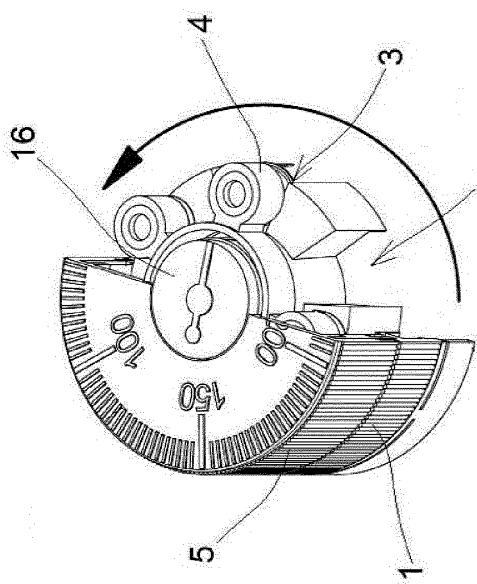


FIG. 7B

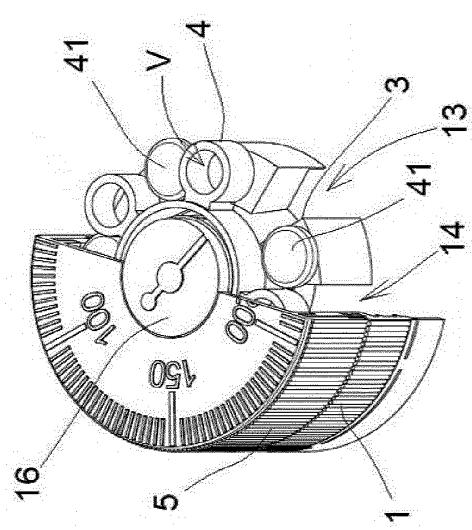


FIG. 8B

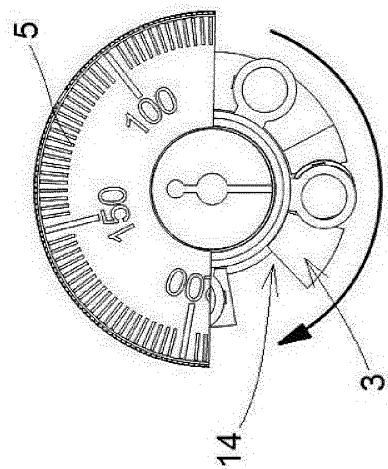


FIG. 7A

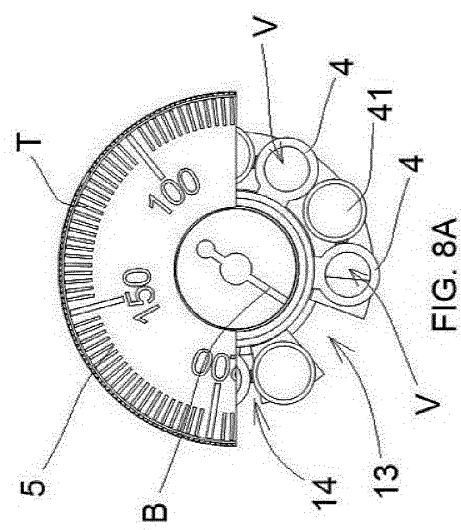


FIG. 8A

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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