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(54) **Dose counting device for a distributor of doses of fluid products, especially for pharmaceutical use.**

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Description

The present invention relates to a dose counting device for a distributor of doses of fluid products, especially for pharmaceutical use.

Such dose counting devices find particular application in the field of nasal distributors.

The latter essentially comprise a bottle open at its upper end and tapered for the introduction of a member for the distribution of the product contained inside it. The member for the distribution of the product has a terminal spout at its upper end from which the distributed product is introduced. In a truncated-cone element, called «nasal», shaped so as to be able to be inserted in the nasal cavities and thus allow the product to be injected into the nostrils.

A ring nut screwed or fastened to the bottle accomplishes the connection between the bottle, the distribution member and the nasal.

In such distributors the distribution of the product is operated by successive strokes on the nasal so as to cause it to slide with respect to the coupling ring nut and to correspondingly activate the distribution member.

Every stroke imparted to the nasal causes the distribution of a given dose of product. Since the product contained in the nasal distributors consists mainly of substances to be administered in a controlled dose, it is particularly important to have available a dose counting device suitable for visualizing the total number of doses distributed.

EP-A-0 269 496 discloses a dose counting device as defined in the preamble of claim 1.

The object of the present invention is to provide a dose counting device that is easy and safe to use as the distributor of doses of liquid products, especially but not exclusively for nasal distributors, with the possibility of indicating with a progressive numerical index the number of doses distributed over time.

According to the present invention such object is attained with a dose counting device for a dose distributor of fluid products, especially for pharmaceutical use, said distributor comprising means for the distribution of doses of fluid from a container of fluid product, a ring nut for fastening said distributor means onto said mouth of the container, a translatable operating member for the operation of said distribution means, retaining means for preventing rotation of said operating member over said ring nut, and elastic means suitable for transforming the translatory motion of said operating member with respect to the ring nut in a rotatory and axially reciprocating motion of a rotating and axially translatable element provided with progressive numerical indices which can be positioned in succession with every dose distributed in a pre-set ob-

servation position, said elastic means comprising a succession of small flexible circumferentially distanced legs which project from said translatable element and which react against a set of one-directional teeth provided on one of said ring nut and operating member, characterized in that said small flexible legs are fastened at an intermediate position to the rotating element and have an angle with reference to the rotational axis of such element, said legs having a first part suitable for reacting with a first set of one-directional teeth on the operating member, and a second part suitable for reacting with a second set of one-directional teeth on the ring nut, so that when said first set of one-directional teeth approaches said second set of one-directional teeth under the action of said operating member, one part of said first and second parts of said small legs disengages from the corresponding tooth of the corresponding set of teeth to engage an immediately adjacent tooth and thus drives in rotation and axial forward movement said element and when said first set of teeth is moved away from said second set of teeth when the action of said operating member ceases the other part of said small legs disengages from the corresponding tooth of the corresponding set of teeth to engage an immediately adjacent tooth and thus drives in rotation and axial backward movement said element.

In particular the ring nut is provided with radial ridges suitable for their engagement in slots of the operating member. In order to guide the latter's translation with respect to it.

The same dose counter, used in the case in question in the pharmaceutical field, can also find application in cosmetics when fluid products are to be distributed.

There is also the possibility of applying it to a distributor of pills with a controlled dosing.

Given the reduced dimensions wherein it is necessary to silk-screen the numerical indices there is lastly the possibility of using suitable colour hues for them giving an auxiliary and immediately understandable piece of information.

The features of the present invention shall be made more evident by an embodiment illustrated as a non-limiting example in the enclosed drawings, wherein:

Fig. 1 shows an axial sectional view of a dose counting device according to the present invention;

Fig. 2 is a transversal cross-sectional view taken along the line II-II of Fig. 1;

Fig. 3 is a transversal cross-sectional view taken along the line III-III of Fig. 1;

Fig. 4 illustrates with a full line a small flexible leg and the two sets of teeth in the starting position and in a dotted line the same small leg

and the corresponding sets of teeth during the course of the operation of the operating member for the distribution of a dose of product;

Fig. 5 illustrates the same small leg of fig. 4 after the return of the operating member to the starting position;

Fig. 6 shows the upper part of the nasal, seen from the right hand side with respect to Fig. 1.

With reference to Figs 1 to 3 and 6, the device comprises a container 1 of a fluid product, not shown, in the form of a bottle with its upper mouth open 31 to allow the introduction inside it of a distribution valve 2 for the fluid contained in it. Such valve 2, already described in the Italian patent application No. 22133 B/87 filed on 30 July 1987 in the name of the same applicant, is associated with the container 1 through a flange 3 forming part of a ring nut 4 fastened to the container 1 by means of an annular protrusion 35 of the same and terminates at the upper end with an axially slidable distribution spout 6 inserted and blocked in a guide channel 7 for the fluid, which forms part of and passes right through an axially translatable nasal 8, constituting the operating member of the valve 2.

The latter is an internally hollow cylinder 26 terminating at its lower end with an annular edge 10 turned outward, connected to a corresponding annular edge 11 of the ring nut 4 so as to prevent the separation of the nasal 8 from the ring nut 4 and provided with axial slots 32 in which there are slidably inserted radial ridges 33 of the ring nut 4 for the axial translation of the nasal 8 with respect to it. At its upper end and in its middle portion the nasal 8 extends in a protrusion 34 shaped in the form of a nose so that it can be inserted into the nostrils for the introduction of the fluid product to be distributed.

Inside both the nasal 8 and the ring nut 4 there are accomplished internal sets of saw-tooth shaped teeth 12, 13 in engagement with corresponding upper parts 14 and lower parts 15 of a circumferential succession of small elastically flexible legs 16 whose intermediate part 20 is integral with a rotating element 9 with progressive numerical indices 17. With reference to Fig. 6, such indices 17 during the rotation of the rotating element 9 are positioned in succession in an observation position constituted by a window 19 obtained in the annular part 26 of the nasal 8, indicating the number of strokes that have been imparted to the nasal 8 up to that time. The rotating element 9 is also provided with a radial locator 9A suitable for coming to a stop against a corresponding locator 8A protruding radially from the nasal 8 to prevent the rotation of the rotating element 9 after a given number of strokes has been imparted to the nasal 8 and thus a pre-set maximum number of doses distributed

highlighted, as explained above, by the progressive numerical indices 17 in the window 19.

It should also be noted that in the specific case the ring nut 4 is fastened onto the container 1, but it is also possible for the ring nut 4 to be screwed down onto the container 1 itself.

The operation of the dose counting device according to the present invention is as follows.

At each operation of the distributor the nasal 8 is moved in an axial translation with respect to the ring nut 4 by the axial depression of the same and thanks to the engagement of the radial ridges 33 of the ring nut 4 in the slots 32 of the nasal 8. More accurately, with reference to Fig. 4, initially the small generic leg 16 of the succession of the small circumferentially distanced legs is with its upper part 14 engaged with a tooth 21 of the internal set of teeth 12 of the nasal 8. The same small leg 16 is now with one of its lower parts 15 engaged with a tooth 22 of the internal set of teeth 13 of the ring nut 4, while its middle portion 20 is integral with the rotating element 9. Pressing on the nasal 8, while the same nasal operates through the slidable spout 6 the valve 2 for the distribution of a dose of product, the small leg 16 is elastically urged by the approach of the set of teeth 12 towards the set of teeth 13 in the configuration illustrated by a dotted line in the same Figure 4. During this urging its upper part 14 leaves the tooth 21 to position itself in a tooth 24 adjacent to it. With reference to Fig. 5, when the pressure on the nasal 8 is released, the latter translates in a direction opposite to the ring nut 4, the set of teeth 12 moves away from the set of teeth 13 and the lower part 15 of the small leg 16 leaves the tooth 22 to position itself in the tooth adjacent to it. The displacement of the upper part 14 in the notch 24 and of the lower part 15 in the notch 25 is equivalent to the forward movement of the small leg 16 through one position. During this forward movement the intermediate part 20 of the small leg 16 takes with it the rotating element 9 in a unitary rotation. The numerical index 17 attached to the rotating element 9 shall be rotated through one position and behind the window 19 there shall appear the immediately successive numerical index 17, updating the information related to the number of strokes imparted to the nasal 8 and thus to the number of doses distributed. At the end of a given maximum number of strokes imparted to the nasal 8 and thus of a given maximum number of doses of product distributed, the radial locator 9A protruding from the rotating element 9 comes to a stop against the radial locator 8A protruding from the nasal 8. The rotation of the rotating element 9 is blocked and behind the window 19 there appears the progressive numerical index 17 corresponding to the maximum allowed number of doses distributed. Even after the bloc-

king of the rotation of the rotating element 9 it is still possible to press against the nasal 8 in order to use up completely the product contained in the container.

Claims

1. Dose counting device for a distributor of doses of fluid products, especially for pharmaceutical use, said distributor comprising, means (2) for the distribution of doses of fluid from a container (1) of fluid product, a ring nut (4) for fastening said distributor means (2) onto a mouth (31) of the container (1), a translatable operating member (8) for the operation of said distribution means (2), retaining means (32,33) for preventing rotation of said member (8) over said ring nut (4), and elastic means (16) suitable for transforming the translatory motion of said operating member (8) with respect to the ring nut (4) in a rotatory and axially reciprocating motion of a rotating and axially translatable element (9) provided with progressive numerical indices (17) which can be positioned in succession with every dose, distributed in a pre-set observation position (19), said elastic means comprising a succession of small flexible circumferentially distanced legs (16) which project from said translatable element (9) and which react against a set of one-directional teeth provided on one of said ring nut (4) and operating member (8), characterized in that said small flexible legs (16) are fastened at an intermediate position (20) to the rotating element (9) and have an angle with reference to the rotational axis of such element (9), said legs (16) having a first part (14) suitable for reacting with a first set of one-directional teeth (12) on the operating member (8), and a second part (15) suitable for reacting with a second set of one-directional teeth (13) on the ring nut (4), so that when said first set of one-directional teeth (12) approaches said second set of one-directional teeth (13) under the action of said operating member (8), one part (14) of said first and second parts (14,15) of said small legs (16) disengages from the corresponding tooth (21) of the corresponding set of teeth (12) to engage an immediately adjacent tooth (24) and thus drives in rotation and axial forward movement said element (9) and when said first set of teeth (12) is moved away from said second set of teeth (13) when the action of said operating member (8) ceases the other part (15) of said small legs (16) disengages from the corresponding tooth (22) of the corresponding set of teeth (13) to engage an immediately adjacent tooth (25) and thus

drives in rotation and axial backward movement said element (9).

2. Device according to claim 1, characterised in that said ring nut (4) is provided with radial ridges (33) suitable for their engagement in longitudinal slots (32) of the operating member (8) in order to guide the latter's translation with respect to it.
3. Device according to claim 1, characterised in that said operating member (8) has a top portion (12) in the shape of a nose.
4. Device according to claim 1, characterised in that said rotating element (9) is provided with a radial locator (9A) suitable for coming to a stop against a corresponding radial locator (8A) of the operating member (8) to prevent the rotation of the rotating element (9), but allowing its axial translation, after a given number of strokes has been imparted to the operating member (8) and thus after a given maximum number of doses distributed.

Patentansprüche

1. Dosiszähleinrichtung für einen Verteiler von Dosen von fluiden Produkten, im besonderen für den pharmazeutischen Gebrauch, wobei der Verteiler ein Mittel (2) für die Verteiler von Dosen eines Fluids aus einem Behälter (1) eines fluiden Produkts, eine Ringmutter (4) zum Befestigen des Verteilmittels (2) auf einer Öffnung (31) des Behälters (1), ein verschiebbares Betätigungsteil (8) für die Betätigung des Verteilmittels (2), ein Haltemittel (32,33) zum Verhindern der Drehung des Teils (8) über der Ringmutter (4), und ein elastisches Mittel (16), das zum Umsetzen der Translationsbewegung des Betätigungsteils (8) mit Bezug auf die Ringmutter (4) in eine Dreh- und axiale Hin- und Herbewegung eines sich drehenden und axial verschiebbaren Elements (9) geeignet ist, das mit fortschreitenden numerischen Indices (17) versehen ist, welche in Aufeinanderfolge bei jeder verteilten Dosis in einer vorher festgesetzten Beobachtungsposition (19) positioniert werden können, umfaßt, wobei das elastische Mittel eine Aufeinanderfolge von kleinen flexiblen, umfänglich beabstandeten Schenkeln (16) umfaßt, welche von dem verschiebbaren Element (9) vorstehen und welche gegen einen Satz von einseitig gerichteten Zähnen reagieren, der auf einer bzw. einem von der Ringmutter (4) und dem Betätigungsteil (8) vorgesehen ist, dadurch **gekennzeichnet**, daß die kleinen flexiblen

Schenkel (16) in einer Zwischenposition (20) an dem sich drehenden Element (9) befestigt sind und einen Winkel mit Bezug auf die Drehachse des derartigen Elements (9) haben, wobei die Schenkel (16) einen ersten Teil (14) haben, der zum Reagieren mit einem ersten Satz von einseitig gerichteten Zähnen (12) auf dem Betätigungsteil (8) geeignet ist, und einen zweiten Teil (15), der zum Reagieren mit einem zweiten Satz von einseitig gerichteten Zähnen (13) auf der Ringmutter (4) geeignet ist, so daß, wenn sich der erste Satz von einseitig gerichteten Zähnen (12) dem zweiten Satz von einseitig gerichteten Zähnen (13) unter der Wirkung des Betätigungsteils (8) nähert, ein Teil (14) von dem ersten und zweiten Teil (14,15) der kleinen Schenkel (16) außer Eingriff mit dem entsprechenden Zahn (21) des entsprechenden Satzes von Zähnen (12) tritt, um in Eingriff mit einem unmittelbar benachbarten Zahn (24) zu treten und demgemäß das Element (9) in Drehung und axialer Vorwärtsbewegung antreibt, und wenn der erste Satz von Zähnen (12) von dem zweiten Satz von Zähnen (13) wegbewegt wird, wenn die Wirkung des Betätigungsteils (8) endet, der andere Teil (15) der kleinen Schenkel (16) außer Eingriff mit dem entsprechenden Zahn (22) des entsprechenden Satzes von Zähnen (13) tritt, um in Eingriff mit einem unmittelbar benachbarten Zahn (25) zu treten und demgemäß das Element (9) in Drehung und axialer Rückwärtsbewegung antreibt.

2. Einrichtung gemäß Anspruch 1, dadurch **gekennzeichnet**, daß die Ringmutter (4) mit radialen Leisten (33) versehen ist, die für ihren Eingriff in Längsnuten (32) des Betätigungsteils (8) geeignet sind, um die Verschiebung des letzteren mit Bezug auf dieselbe zu führen.
3. Einrichtung gemäß Anspruch 1, dadurch **gekennzeichnet**, daß das Betätigungsteil (8) einen oberen Teil (12) in der Form einer Nase hat.
4. Einrichtung gemäß Anspruch 1, dadurch **gekennzeichnet**, daß das sich drehende Element (9) mit einem radialen Feststeller (9A) versehen ist, der dazu geeignet ist, in einen Anschlag gegen einen entsprechenden radialen Feststeller (8A) des Betätigungsteils (8) zu kommen, um die Drehung des sich drehenden Elements (9) zu verhindern, aber seine axiale Verschiebung zu ermöglichen, nachdem eine gegebene Anzahl von Hüben auf das Betätigungsteil (8) ausgeübt worden ist, und demge-

mäß nach einer maximalen Anzahl von verteilten Dosen.

Revendications

1. Dispositif de comptage de doses pour un distributeur de doses d'un produit liquide, plus particulièrement pour usage pharmaceutique, ledit distributeur comprenant des moyens (2) de distribution de doses d'un fluide à partir d'un récipient (1) contenant ledit fluide, un écrou annulaire (4) pour fixer lesdits moyens de distribution (2) sur une ouverture (31) du récipient (1), un organe mobile (8) pour actionner lesdits moyens de distribution (2) et des moyens de retenue (32, 33) agissant en translation pour empêcher la rotation dudit organe (8) sur l'écrou annulaire (4), ainsi que des moyens élastiques (16) aptes à transformer le mouvement translatif de l'organe d'actionnement (8) par rapport à l'écrou annulaire (4) en un mouvement rotatif et axialement alternatif d'un élément (9) rotatif et mobile axialement, muni d'indices numériques progressifs (17) qui peuvent être placés, après chaque dose distribuée, dans une position d'observation prédéterminée (19), lesdits moyens élastiques comprenant une succession de petites jambes (16) flexibles, réparties sur la périphérie et faisant saillie de l'élément mobile (9) et qui coopèrent avec un ensemble de dents unidirectionnelles prévues soit sur l'écrou annulaire (4), soit sur l'organe d'actionnement (8), caractérisé en ce que lesdites petites jambes flexibles (16) sont fixées dans une position intermédiaire (20) à l'élément rotatif (9) et forment un angle avec l'axe de rotation dudit élément (9), lesdites jambes comportant une première portion (14) qui peut coopérer avec un premier ensemble de dents unidirectionnelles (12) prévues sur l'organe d'actionnement (8) et une deuxième portion (15) pouvant coopérer avec un deuxième ensemble de dents unidirectionnelles (13) prévues sur l'écrou annulaire (4), de manière à ce que, lorsque ledit premier ensemble de dents unidirectionnelles (12) s'approche du deuxième ensemble de dents unidirectionnelles (13), sous l'action de l'organe d'actionnement (8), une portion (14) desdites première et deuxième portions (14, 15) des petites jambes (16) est libérée de la dent correspondante (21) de l'ensemble de dents correspondant (12) pour s'engager dans une dent (24) immédiatement adjacente et provoquer ainsi une rotation et une avance axiale de l'élément (9), et, lorsque le premier ensemble de dents (12) s'éloigne du deuxième ensemble de dents (13), quand cesse l'action de

l'organe d'actionnement (8), l'autre portion (15) des petites jambes (16) est libérée de la dent correspondante (22) de l'ensemble de dents correspondant (13) pour s'engager dans une dent immédiatement adjacente (25) et provoquer ainsi une rotation et un recul axial de l'élément (9).

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2. Dispositif selon la revendication 1, caractérisé en ce que ledit écrou annulaire (4) comporte des nervures radiales (33) pouvant s'engager dans des fentes longitudinales (32) de l'organe d'actionnement (8) pour guider le mouvement de celui-ci par rapport à l'écrou.

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3. Dispositif selon la revendication 1, caractérisé en ce que l'organe d'actionnement (8) comporte une partie supérieure (12) en forme de bec.

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4. Dispositif selon la revendication 1, caractérisé en ce que ledit élément rotatif (9) comporte un moyen de positionnement radial (9A) susceptible de venir en butée contre un moyen de positionnement radial (8A) de l'organe d'actionnement (8) pour empêcher la rotation de l'élément rotatif (9), tout en permettant son déplacement axial, lorsqu'un certain nombre de poussées a été transmis à l'organe d'actionnement (8) et ainsi après la distribution d'un nombre maximum déterminé de doses.

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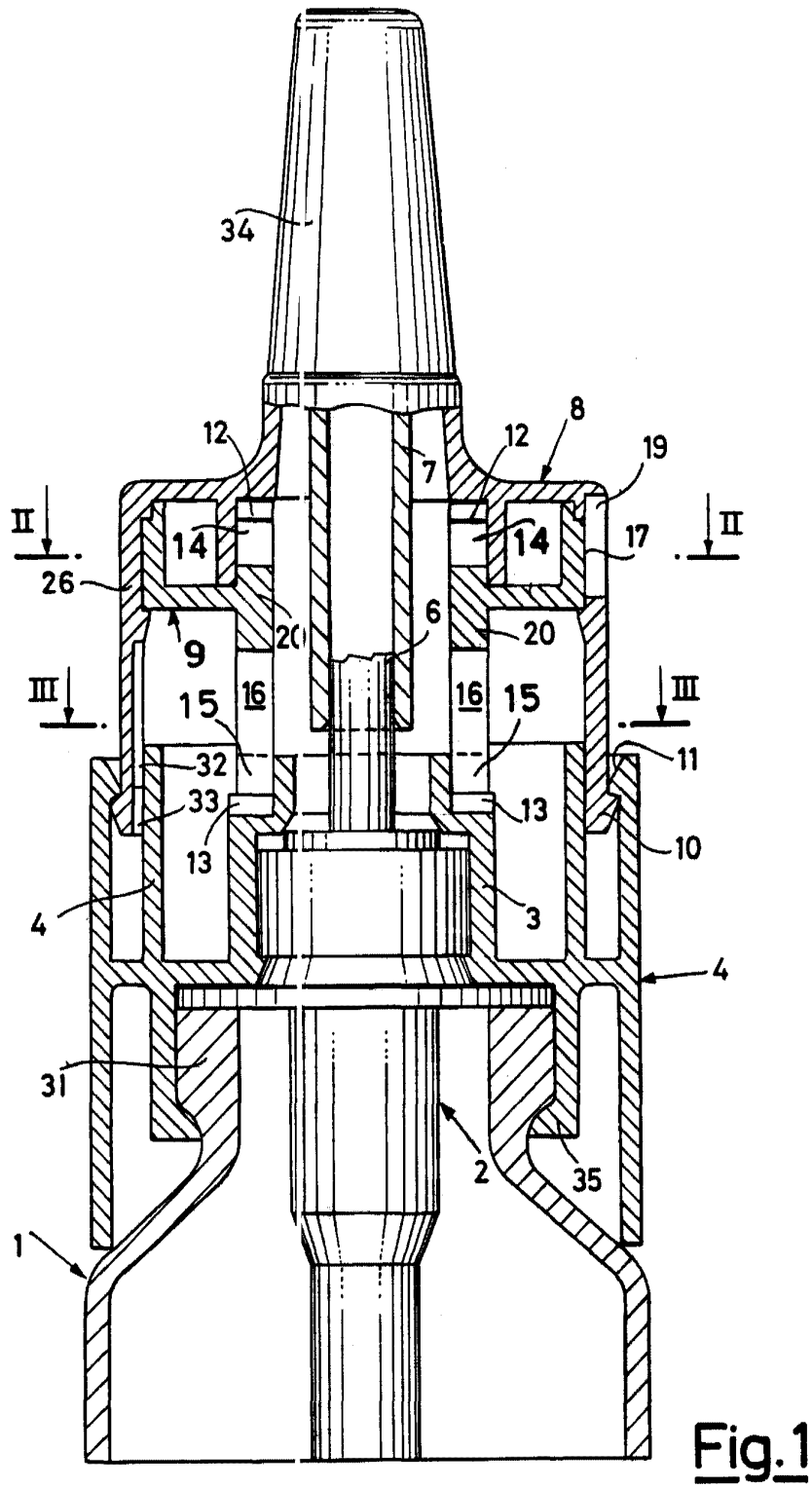


Fig.1

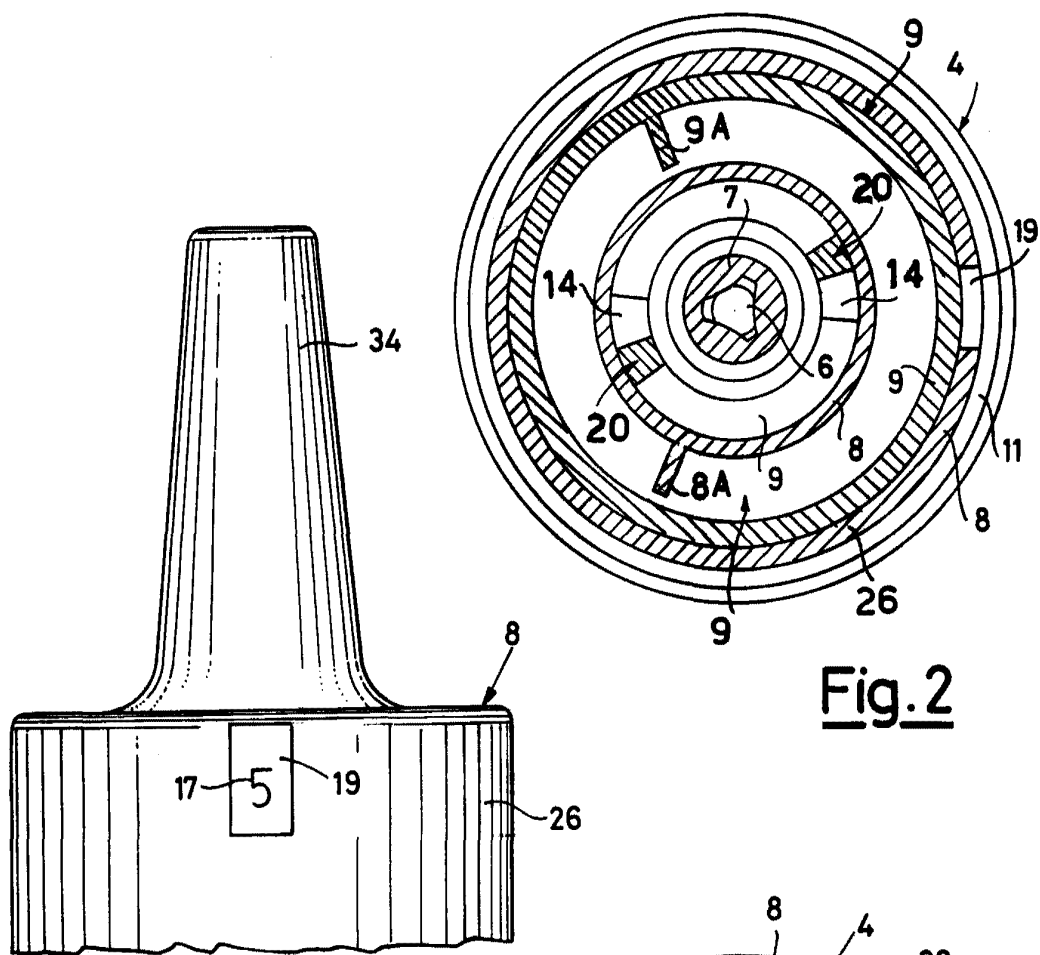


Fig. 2

Fig. 6

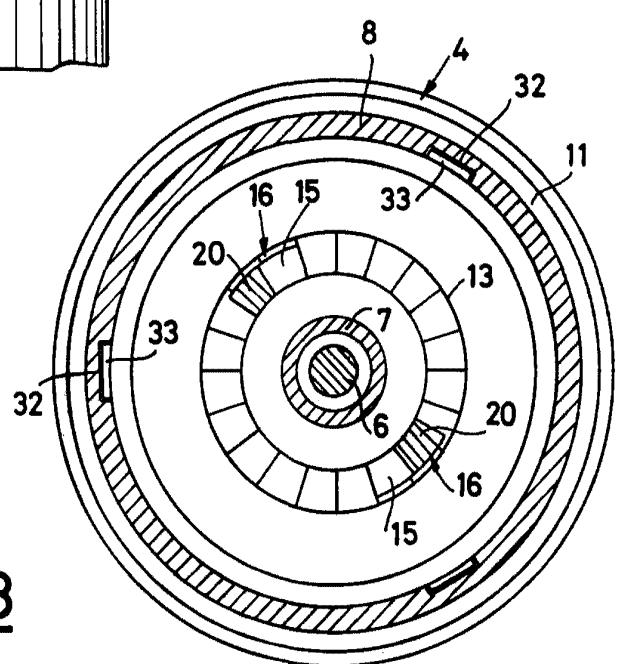


Fig. 3

