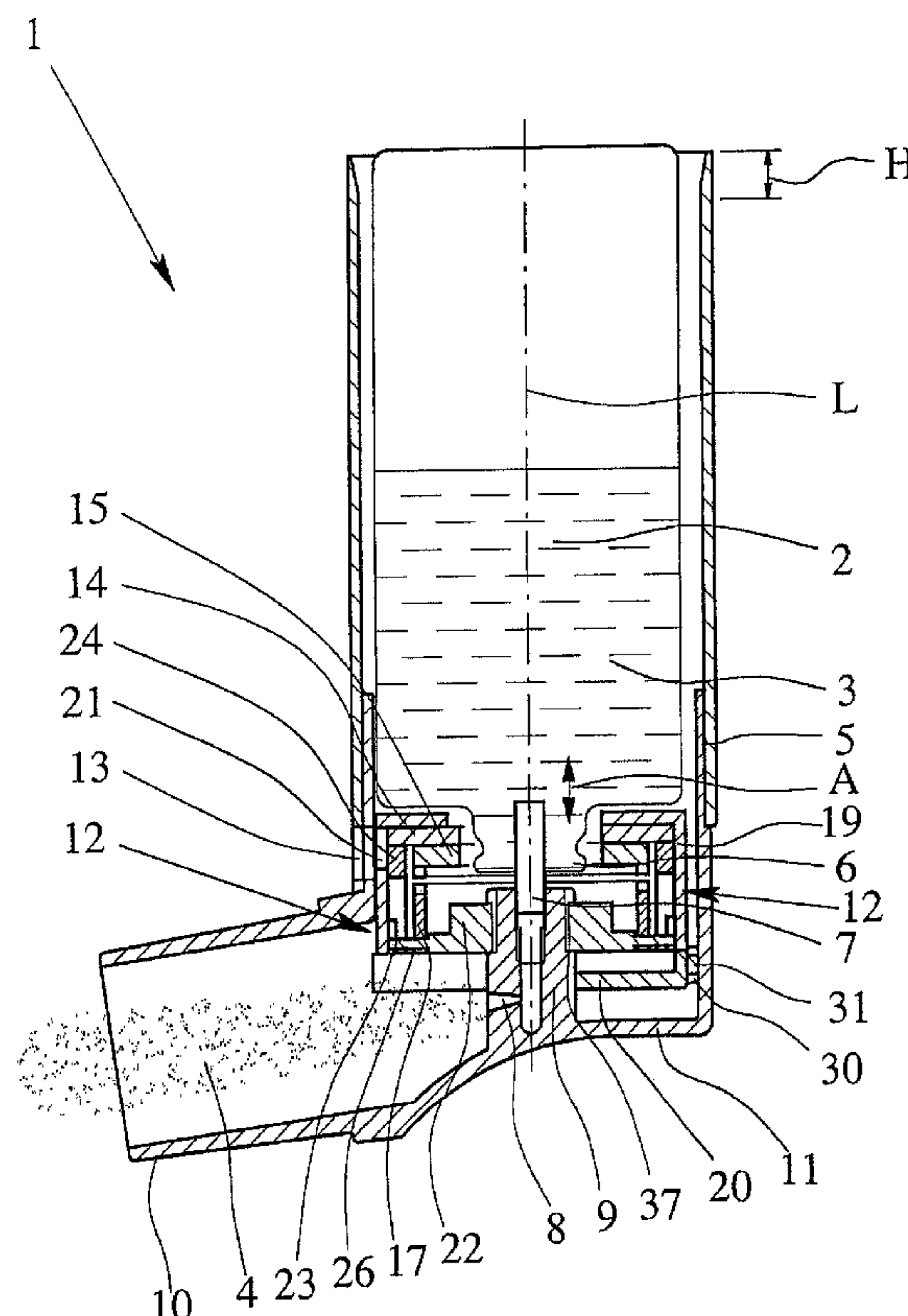




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(54) Titre : UNITE D'ENTRAINEMENT POUR UN COMPTEUR DE DOSE
(54) Title: DRIVE UNIT FOR DOSAGE COUNTER



(57) Abrégé/Abstract:

A nebuliser, particularly an MDI, with a counter is proposed. By means of a guide track or inclined plane and an associated guide element, an axial movement occurring on actuation of the nebuliser is partly converted into a rotary movement for driving a counting ring, using an annular rigid drive element with axial teeth. In this way a simple and operationally reliable construction can be achieved, in which even incomplete actuations are counted.



Abstract:

5 A nebuliser, particularly an MDI, with a counter is proposed. By means of a guide track or inclined plane and an associated guide element, an axial movement occurring on actuation of the nebuliser is partly converted into a rotary movement for driving a counting ring, using an annular rigid drive element with axial teeth. In this way a simple and operationally reliable construction can be achieved, in which even incomplete actuations are counted.

10 (Fig. 1)

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Drive unit for dosage counter

5 The present invention relates to a nebuliser.

10 The present invention preferably relates to nebulisers in the form of inhalers. In particular, the invention relates to so-called Metered Dose Inhalers (MDIs), i.e. inhalers in which a liquid medicament formulation is dispensed as an aerosol, or nebulised, from a pressurised container (aerosol container) by means of a metering valve, in particular. However, the present invention can also be used for other inhalers or nebulisers in which it is important to count the number of doses dispensed.

15 WO 00/09187 A1, which constitutes the starting point, discloses an MDI with a counting device for counting actuations and/or aerosol doses dispensed. On actuation, a container that holds the medicament formulation to be dispensed is pressed into a housing of the MDI. This stroke movement is detected by the counting device and drives a counting ring. For this purpose, the counting device
20 has an elastically deformable drive element resembling a bell-crank lever. When the MDI is actuated, the drive element is moved both axially and in the direction of rotation (circumferential direction) of the counting ring at the same time, so as to rotate the counting ring further.

25 The elastic deformation of the drive element in the known MDI may be problematic. In particular, satisfactory resetting of the drive element is absolutely necessary if problem-free operation of the counting device is to be guaranteed. This requires very narrow manufacturing tolerances.

30 A further problem or disadvantage of the known MDI is the fact that incomplete actuation - i.e. where the container is only partly moved - does not ensure that the counting device or counting ring is reliably moved on, even when a dose is dispensed in spite of only partial actuation.

35 The problem of the present invention is to provide a nebuliser having an improved counting device.

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The above problem is solved with a nebuliser as described herein. Advantageous further features are the subject of the sub-claims.

In one aspect of the present invention, the drive device of the counter comprises a first guide track and/or an inclined plane and an associated guide element for
5 converting an axial movement into a rotary movement for driving the counting ring or an associated gearwheel. This allows positive driving or rotating and counting, with elastic deformation of the drive element neither needed nor provided. This allows a construction which is particularly reliable in operation, while avoiding elastic deformation of the drive element.

10 In a second aspect of the present invention which can also be implemented independently, the drive element is annular with axial teeth and/or of rigid construction. This again provides a simple construction which is reliable in operation.

In a third aspect of the present invention which can also be implemented independently, the nebuliser or counter is configured such that even a partial
15 actuation of the nebuliser is sufficient to move the counter on. This leads to particularly reliable counting and hence very reliable operation of the nebuliser.

In an embodiment, the invention relates to nebuliser for dispensing an aerosol, having a counter for counting actuations of the nebuliser, the counter comprising a counting ring and a drive device having a drive element associated with the counting
20 ring for driving the counting ring or a gearwheel associated with the counting ring, wherein: the drive element is of annular configuration and of rigid construction, the drive element has axial teeth and comprises a first guide track which forms or contains an inclined plane or is formed by a helical track section, and the drive device comprises a guide element associated to the guide track for conversion of an axial
25 movement into a rotary movement for driving the counting ring or gearwheel.

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Further advantages, features, properties and aspects of the present invention will become apparent from the following description of a preferred embodiment, by reference to the drawings, wherein:

Figure 1 is a schematic section through a proposed nebuliser with a counter;

5 Figure 2 is an exploded view of parts of the counter;

Figure 3 is a schematic partial section through the counter without a housing, with the nebuliser actuated; and

Figure 4 is a schematic representation in the manner of a development of a drive device of the counter at the start of actuation of the nebuliser.

In the Figures, the same reference numerals are used for identical or similar parts, while corresponding or comparable properties and advantages are achieved even when the description is not repeated.

5 Figure 1 shows, in a purely schematic section, a preferred embodiment of a nebuliser 1 according to the present invention. The nebuliser 1 is, in particular, an inhaler, preferably an MDI.

10 In particular, the nebuliser 1 is designed to deliver a medicament formulation or a fluid 2 from a container 3 as a spray mist or aerosol 4, as shown schematically in Figure 1. It should be noted that Figure 1 shows the nebuliser 1 in the unactuated state, but the spray mist or aerosol 4 is shown for illustration purposes.

15 In the embodiment shown the nebuliser 1 has a housing 5 into which the container 3 preferably has been inserted or can be inserted. However, other design solutions are also possible.

20 The nebuliser 1 or container 3 preferably comprises a valve 6, particularly a metering valve. Particularly preferably, the valve 6 comprises a valve element that can be moved in particular to open the valve 6, particularly a valve stem 7 that can be pressed in axially. However, other design solutions are possible here, too.

25 The nebuliser 1 preferably comprises a spray device or nozzle 8 which is attached to the container 3 or to the valve 6 or its valve element or valve stem 7 - via a connecting member 9 in the embodiment shown - for dispensing the fluid 2 by spraying or for forming the aerosol 4 on actuation of the nebuliser 1. Preferably, the nozzle 8 is formed by the connecting member 9, particularly in a side surface of the preferably substantially hollow cylindrical connecting member 9. However, other design solutions are possible here too.

30 The nebuliser 1 preferably comprises a mouthpiece 10 or other endpiece for delivering the aerosol 4, which is particularly preferably formed or held by a housing part 11 in the form of an angle member. However, other design solutions are possible here too.

35

5 The nebuliser 1 or its housing 5 and/or container 3 is or are preferably of elongate construction. The aerosol 4 is preferably dispensed diagonally or at right-angles to this longitudinal direction L. The mouthpiece 10 or other endpiece is preferably correspondingly angled or adapted to be folded away, optionally also adjustable, particularly pivotable.

10 On actuation of the nebuliser 1 the valve 6 is opened and in particular only one dose of the fluid 2 is delivered through the valve stem 7, the connecting member 9 and the nozzle 8. In the nozzle 8 the medicament is atomised or nebulised as an aerosol 4 which is dispensed through the mouthpiece 10 or other endpiece. The aerosol 4 can then be inhaled.

15 The actuation of the nebuliser or the opening of the valve is preferably carried out by axially pressing in the valve stem 7 or otherwise actuating the valve 6.

20 In the embodiment shown, during the actuation of the nebuliser 1, or for the purpose of actuating it, the container 3 or the valve 6 is or are moved or compressed on the one hand relative to the connecting member 9 or housing part 11 or on the other hand relative to one another, particularly in the direction of the longitudinal axis L, in an axial movement as indicated by the arrow A. In the embodiment shown, this is done by manually pressing the container 3 by its base (at the top in Figure 1) further into the open housing 5 - in particular counter to the spring force of the valve 6 and/or another spring element. However, the actuation may also be carried out in reverse manner by pressing onto the housing part 11 (angle member) or another actuating part, in which case the housing 5 is then closed off at the top, for example, and the housing part 11 or other part can be slid along, actuated or pressed in relative to the housing 5.

25 However, other design solutions are also possible for actuating the nebuliser 1.

30 The axial movement A opens the valve 6, and a dose of the fluid 2 is dispensed. When the nebuliser 1 is actuated fully, i.e. when there is a complete axial movement A, the container 3 or other actuating member of the nebuliser - such as the housing part 11, the connecting member 9, the valve element, such as the valve stem 7, or the like - executes a stroke H, particularly relative to the valve 6 or housing 5.

Depending on the construction of the nebuliser 1 or valve 6, the aerosol 4 is often delivered, i.e. a dose of the fluid 2 is dispensed, even when the stroke H is incomplete - i.e. when actuation is incomplete.

5 The nebuliser 1 has a counter 12 for counting actuations of the nebuliser 1 or of doses of aerosol dispensed. The counter 12 is schematically shown in section in Figure 1. It is preferably disposed in or on the housing 5, particularly the head piece, angle member or housing part 11, and/or on the top of the container 3. However, other design solutions are possible here too.

10

The totals counted by the counter 12 can be indicated or read off through a viewing window 13, which is formed in the housing 5 and/or in the housing part 11 here.

15

The counter 12 may for example indicate the number of aerosol doses still available or the number of actuations that have already taken place or the number of aerosol doses dispensed, as the numerical value displayed.

The counter 12 preferably comprises at least one counting ring 14 and/or an associated gearwheel 15.

20

According to an alternative embodiment, the gearwheel 15 may also form a first counting ring and the counting ring 14 may form a second counting ring. In particular the gearwheel 15 is preferably then coupled to the counting ring 14 via a stepping-down gear (not shown) so that after a certain number of counting steps of the gearwheel 15 the counting ring 14 is then advanced or further rotated by one counting step.

25

If only one counting ring 14 or one additional counting ring is also provided, the gearwheel 15 can be selectively coupled to the counting ring 14 directly or via a stepping down gear or if necessary may even be formed directly by the counting ring 14 or integrally formed therewith.

30

The alternative features mentioned above are particularly preferably also covered by the description or phrase "the gearwheel 15 is associated with the counting ring 14".

35

The counter 12 further comprises a drive device 16 for driving the counting ring 14 or gearwheel 15, particularly by stepwise rotation, as shown in exploded view in Figure 2.

- 5 The drive device 16 comprises a drive element 17 which is associated with the counting ring 14 or gearwheel 15 for stepwise further rotation.

10 Preferably, the drive element 17 is at least substantially annular, with axial teeth 18 and/or of rigid construction. The teeth 18 correspond to the teeth 32 on the gearwheel 15, although there is no need for teeth to be provided over the entire underside of the drive element 17 and/or over the entire surface of the gearwheel 15. If desired only individual teeth may be provided.

15 In particular, the drive element 17 can be moved first of all towards the counting ring 14 or gearwheel 15 and particularly preferably can only be rotated jointly with them afterwards.

20 Preferably, the nebuliser 1 or counter 12 or the drive device 16 thereof is or are constructed such that even partial actuation of the nebuliser 1 or a partial stroke H is sufficient to move the counter 12 on or rotate the gearwheel 15 or counting ring 14 by one counting step. A possible design solution will become apparent from the more detailed description of a preferred construction of the counter 12 that follows.

25 As an illustration of a preferred construction of the counter 12 and/or the preferred function of the counter 12, reference is hereinafter made to Figures 2 to 4 in addition to Figure 1. Figure 2 shows components or parts of the counter 12 in an exploded view. Figure 3 shows, in schematic partial section, a part of the counter 12 with the nebuliser 1 actuated. Figure 4 shows in a schematic development parts of the counter 12 or drive device 16 at an initial stage of the actuation of the nebuliser 1.

30

The counter 12 preferably comprises a counter housing which in this case is made up of a lower part 19 and an upper part 20. The terms "lower part" and "upper part" are used only for ease of description but do not provide any information as to their orientation when the nebuliser 1 or counter 12 is in used. In addition, other design solutions are also possible.

35

In the counter housing - in the lower part 19 in the embodiment shown - there is preferably a viewing window 21 for displaying or showing the numerical values of the counter 12 so that they can be read off. The viewing window 21 is associated with the window 13, in particular. For example, the viewing window 21 may be a
5 gap or opening, particularly if the window 13 is transparent but is closed off by a wall. Conversely it is also possible for the viewing window to be closed off by a wall, cover or the like but still be transparent.

The counter 12 also preferably comprises a guide part 22 with at least one guide
10 element 23, in particular two guide elements 23 arranged on opposite sides, and preferably a guide sleeve 24.

The counter device 12 is preferably fitted into the nebuliser 1 or the housing 5 or housing part 11 so as to abut on the container 3 or on a so-called valve plate of the
15 container 3/valve 6 - with the lower part 19 in the embodiment shown - and/or so as to accommodate or embrace the valve element, such as the valve stem 7. The connecting member 9 preferably extends through a central opening 25 in the upper part 20 into the counter housing as far as the valve 6 or valve stem 7. In particular, the connecting member 9 forms a valve stem receptacle and has for this purpose a
20 central bore, recess or the like with a nozzle 8 preferably attached thereto.

On actuation of the nebuliser 1 the axial movement A causes the connecting member 9 to penetrate more deeply into the counter housing, in particular it causes the lower part 19 and upper part 20 to be moved along the longitudinal axis L -
25 upwards, in the representation shown in Figure 1 - relative to the connecting member 9. The counter housing or upper part 20 preferably has a sector-like peripheral depression 26 in the embodiment shown which broadens radially outwards in the circumferential direction, to ensure that even when the nebuliser 1 is actuated when the connecting member 9 is located deeper in the upper part 20, the
30 nozzle 8 can deliver the aerosol 4 in the desired manner, laterally in the direction of the mouthpiece 10 or other endpiece. However, other design solutions are possible here too.

The guide part 22 preferably fits onto the connecting member 9. Preferably, the
35 connecting member 9 passes through the guide part 22. Particularly preferably, this guide part 22 is axially supported on the connecting member 9, so that during the

axial movement A or during actuation of the nebuliser 1, the guide part 22 cannot be pushed further onto the connection member 9 in the axial direction. This can be ensured for example by a corresponding axial abutment, such as a shoulder 37 which is shown purely schematically in Figure 1.

5

Instead of being supported on the connecting member 9 the guide part 22 may also be supported on a different part of the nebuliser 1, particularly the housing part 11.

10

The guide elements 23 preferably extend radially outwards from the guide part 22, particularly on opposite sides.

The guide elements 23 are preferably constructed in the manner of pegs.

15

Where reference is made hereinafter to only one guide element 23, this is because a single guide element 23 is theoretically sufficient to perform the function, even though preferably two guide elements 23 will be provided on opposite sides for reasons of design, stability and/or safety.

20

The counter 12 or drive device 16 preferably has a first guide track 27 and/or an inclined plane 28 for the guide element 23, or even, in the embodiment shown, two first guide tracks 27 or inclined planes 28 for the two guide elements 23.

25

The first guide track 27 or inclined plane 28 is preferably formed in or by the drive element 17. However, other design solutions are also possible.

30

The guide elements 23 each preferably pass radially through their associated first guide tracks 27 and are preferably each guided by their free ends in second guide tracks 29, which are preferably formed in or by the guide sleeve 24.

Preferably, the second guide tracks 29 run only in the axial direction. Accordingly, the guide elements 23 are each guided to be movable only in the axial direction relative to the rotation axis of the counting ring 14 or gearwheel 15. However, other design solutions are possible here as well.

35

Depending on the construction, the guide tracks 27 and/or 29 may selectively be formed as a slot, groove or the like.

The guide sleeve 24 is preferably installed in the counter housing so as to rotate therewith. The counter housing is in turn preferably installed in the nebuliser 1 so as to rotate therewith. For this purpose, the upper part 20 comprises, for example,
5 an exterior axial groove 30 into which a radial and/or web-like projection 31 or a spring of the nebuliser 1 or housing 5 or housing part 11 engages, as shown in Figure 1, to create a non-rotational but displaceable connection with the counter housing. However, other design solutions are possible here as well.

10 The gearwheel 15 is provided with preferably axial teeth 32 which take the form of saw teeth, in particular, and/or correspond to the teeth 18 of the drive element 17 such that in the axially contracted state the drive element 17 is able to drive or further rotate or co-rotate the gearwheel 15 at least or only in a direction of rotation D (the counting direction), as shown in Figure 3.

15 Numbers or numerical values, not shown in the Figures, are preferably arranged on the peripheral circumferential surface or other suitable area of the counting ring 14 and/or gearwheel 15 and can be seen from outside through the windows 13, 21, so as to indicate the current total on the counter 12.

20 The guide track 27 or 29 or the inclined plane 28 preferably forms a slot or a groove in which the associated guide element 23 engages. However, other design solutions are also possible.

25 Fig. 4 illustrates the operating principle of the proposed drive device 16 of the counter 12.

The guide elements 23 are each guided so as to be movable only in the axial direction in the second guide track 29 relative to the rotation axis of the counting
30 ring 14 / gearwheel 15, i.e. the guide part 22 is secured against rotation. Alternatively or additionally, the guide part 22 may also be held directly on the housing part 11 or connecting member 9 and/or secured against rotation in some other way.

35 When the nebuliser 1 is not actuated, the drive element 17 is preferably axially spaced from the associated counting wheel 14 or gearwheel 15. When the

nebuliser 1 is actuated the axial movement A of the guide elements towards the counting ring 14 or gearwheel 15 takes place. At the start of this axial movement, which is shown in Figure 4, the drive element 17 is initially pushed axially towards the counting ring 14 or the gear wheel 15 so that the teeth 18 and 32 are brought
5 into engagement with one another. This is achieved by the fact that the guide elements act on the drive element 17 via the first guide tracks 27, and in particular form a slide-like guide or positive guide. Preferably, the guide elements 23 cooperate with the sloping planes 28 such that at the start of the axial movement A initially the drive element 17 is axially moved only or substantially towards the
10 gearwheel 15 until the teeth engage.

In the course of the further axial movement A of the guide elements 23 the drive element A is rotated in the direction of rotation D together with the gearwheel 15 that rotates with it as a result of the meshing of the teeth 18 and 32.

15 Expressed in more general terms, the axial movement A is thus converted into the rotary movement D for driving the counting ring 14 or gearwheel 15 by means of the first guide track 27 and/or the inclined plane 28 and an associated guide element 23 and/or a slide-like guide.

20 Preferably, the inclined plane 28 forms part of the first guide track 27. Particularly preferably, the inclined plane 28 is formed here by a helical track section. The helical track section in turn preferably forms part of the first guide track.

25 Particularly preferably, the nebuliser 1 or the counting device 12 or the drive device 16 thereof is configured such that even a partial actuation of the nebuliser 1, i.e. even a partial axial movement A, and in particular only the initial axial movement A, is sufficient for advancing the counting device 12, i.e. further rotating the counting ring 14 or gearwheel 15 by a numerical value. In the embodiment shown this is
30 achieved by having the first guide track 27 or the inclined plane 28 designed such that adjoining the sloping section or the inclined plane 28 there is optionally an axially extending section 33 of the guide track 27. In this way it can be ensured that after the initial axial movement A, in the course of the continued axial movement A the drive element 17 and hence also the counting wheel 14 or gearwheel 15 are not
35 rotated further. This ensures that only the initial axial movement A brings about the further rotation and hence advance of the counter. Accordingly, even if there is

incomplete actuation of the nebuliser 1, particularly if the maximum stroke H is not achieved, counting can be continued correctly, as in this case, also, a dose of aerosol is usually delivered by the nebuliser 1.

5 In the embodiment shown, the slot or groove of the first guide track 27 initially runs at an inclination and then axially, starting from a position of engagement of the guide element 23 shown in Figure 4, with the nebuliser 1 not actuated.

10 It should be noted that in the proposed nebuliser 1 or the proposed counter 12, the drive element 17 is preferably initially movable only axially towards the counting ring 14 or gearwheel 15 and only afterwards is it rotatable together with the latter. As already stated, this is achieved by means of the first guide track 27 and/or inclined plane 28 and the associated guide element 23. However, here again, different design solutions and/or procedures are also possible.

15 After the actuation of the nebuliser 1 has ended the axial movement A takes place in the opposite direction. In particular, the guide elements 23 are moved axially away again from the counting ring 14 or gear wheel 15. This can be assisted by a spring (not shown). This also causes the drive element 17 to be moved axially
20 away from the gearwheel 15, so that they are moved out of engagement. Moreover, the drive element 17 is then rotated back into its starting position in the course of the continued axial movement back of the guide elements 23. This is in turn carried out as a result of the corresponding travel of the first guide tracks 27 or inclined planes 28. The nebuliser 1 is then ready to be actuated again.

25 In the embodiment shown the drive device 16 preferably has two guide elements 23 and/or first guide tracks 27, particularly on opposite sides, i.e. on two slide-like or positive guides. However, only one such guide may be provided.

30 Particularly preferably, the counter 12 has a barrier or latching device 34 for preventing the counting ring 14 and/or gearwheel 15 from turning backwards and/or for stepwise latching of the counting ring 14 and/or gearwheel 15. The barrier or latching device 34 in the embodiment shown preferably has a latching arm 35 that is
35 elastically biased against the teeth 32 and/or in the axial direction, which is in particular formed or held by the guide sleeve 32 and/or formed thereon and/or disposed in a peripheral recess 36 in the drive element 17 as shown in Figure 3.

However, other design solutions are also possible here. In particular, radial engagement and/or locking in one direction of rotation may also be provided.

5 Particularly preferably, the latching arm 35 together with the saw teeth 32 forms a rotation limiter that allows the gearwheel 15 to rotate in only one direction of rotation, namely the direction D for counting onwards.

10 Particularly preferably, the counter 12 forms a construction unit that can be inserted as a single unit in the housing 5 during assembly of the nebuliser 1. This makes assembly considerably easier.

The proposed counter 12 may also be used in other inhalers or nebulisers 1.

List of reference numerals

	1	nebuliser
	2	fluid
5	3	container
	4	aerosol
	5	housing
	6	valve
	7	valve stem
10	8	nozzle
	9	connecting member
	10	mouthpiece
	11	housing part
	12	counter
15	13	window
	14	counting ring
	15	gearwheel
	16	drive device
	17	drive element
20	18	teeth (drive element)
	19	lower part
	20	upper part
	21	viewing window
	22	guide part
25	23	guide element
	24	guide sleeve
	25	opening
	26	depression
	27	first guide track
30	28	inclined plane
	29	second guide track
	30	axial groove
	31	projection
	32	teeth (gearwheel)
35	33	axial section
	34	latching device

35 latching arm
36 recess
37 shoulder

5 A axial movement
 D direction of rotation
 H stroke
 L longitudinal axis

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CLAIMS:

1. Nebuliser for dispensing an aerosol, having a counter for counting actuations of the nebuliser, the counter comprising a counting ring and a drive device having a drive element associated with the counting ring for driving the counting ring
5 or a gearwheel associated with the counting ring,

wherein:

the drive element is of annular configuration and of rigid construction,

the drive element has axial teeth and comprises a first guide track which forms or contains an inclined plane or is formed by a helical track section, and
10 the drive device comprises a guide element associated to the guide track for conversion of an axial movement into a rotary movement for driving the counting ring or gearwheel.
2. Nebuliser according to claim 1 wherein upon driving, the drive element rotates the counting ring or the gearwheel associated with the counting ring stepwise.
- 15 3. Nebuliser according to claim 1 or 2 wherein for driving the counting ring or gearwheel, the guide element only partially converts the axial movement into a rotary movement.
4. Nebuliser according to any one of claims 1 to 3 wherein the drive element can be moved axially towards the counting ring or gearwheel by means of
20 the guide track and the guide element and only afterwards can it be rotated jointly therewith.
5. Nebuliser according to claim 4, wherein the drive element is moved axially towards the counting ring or gearwheel on actuation of the nebuliser.

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6. Nebuliser according to any one of claims 1 to 5, wherein the guide track forms a slot or a groove in which the guide element engages.
7. Nebuliser according to any one of claims 1 to 6, wherein the guide element is of peg-like construction.
- 5 8. Nebuliser according to any one of claims 1 to 7, wherein the drive device comprises two guide elements and two first guide tracks.
9. Nebuliser according to any one of claims 6 to 8, wherein the slot or the groove extends initially on a gradient and then axially, starting from a position of engagement of the guide element, when the nebuliser is not actuated.
- 10 10. Nebuliser according to any one of claims 1 to 9, wherein the guide element is guided to be movable only axially relative to the direction of rotation of the counting ring, but not rotatably.
11. Nebuliser according to claim 10, wherein the guide element is axially guided by means of a second guide track.
- 15 12. Nebuliser according to any one of claims 1 to 11, wherein the teeth are in the form of saw teeth.
13. Nebuliser according to any one of claims 1 to 12, wherein the counting ring or the gearwheel is provided with axial teeth.
14. Nebuliser according to one any of claims 1 to 13, wherein the counter
20 comprises a barrier or latching device to prevent the counting ring and/or gearwheel from turning backwards and/or for the stepwise latching of the counting ring and/or gearwheel.
15. Nebuliser according to any one of claims 1 to 14, wherein the counter comprises a rotation limiter for limiting the rotation of the drive element.

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16. Nebuliser according to any one of claims 1 to 15, wherein the counter comprises a guide sleeve for the drive element.
17. Nebuliser according to claim 16, wherein the guide sleeve forms the barrier and/or latching device and/or the rotation limiter.
- 5 18. Nebuliser according to claim 17, wherein the guide sleeve forms the barrier and/or latching device and/or the rotation limiter by radial engagement in a circumferential opening in the drive element and/or by axial engagement in teeth of the counting ring or gearwheel.
- 10 19. Nebuliser according to any one of claims 16 to 18, wherein the guide sleeve guides the guide element in axially movable manner, but secures it against rotation.
20. Nebuliser according to any one of claims 1 to 19, wherein on actuation of the nebuliser a part of the nebuliser, performs a stroke, wherein the stroke forms the axial movement and/or drives the drive device.
- 15 21. Nebuliser according to claim 20, wherein the part of the nebuliser performing the stroke is a container and/or a valve element.
22. Nebuliser according to claim 20 or 21, wherein the guide track is designed such that adjoining the inclined plane there is an axially extending section of the guide track, so that even a partial axial movement caused by a partial actuation
20 of the nebuliser or a merely partial stroke is sufficient to advance the counter or the counting ring.
23. Nebuliser according to any one of claims 1 to 22, wherein the nebuliser is constructed as an inhaler.

1/4

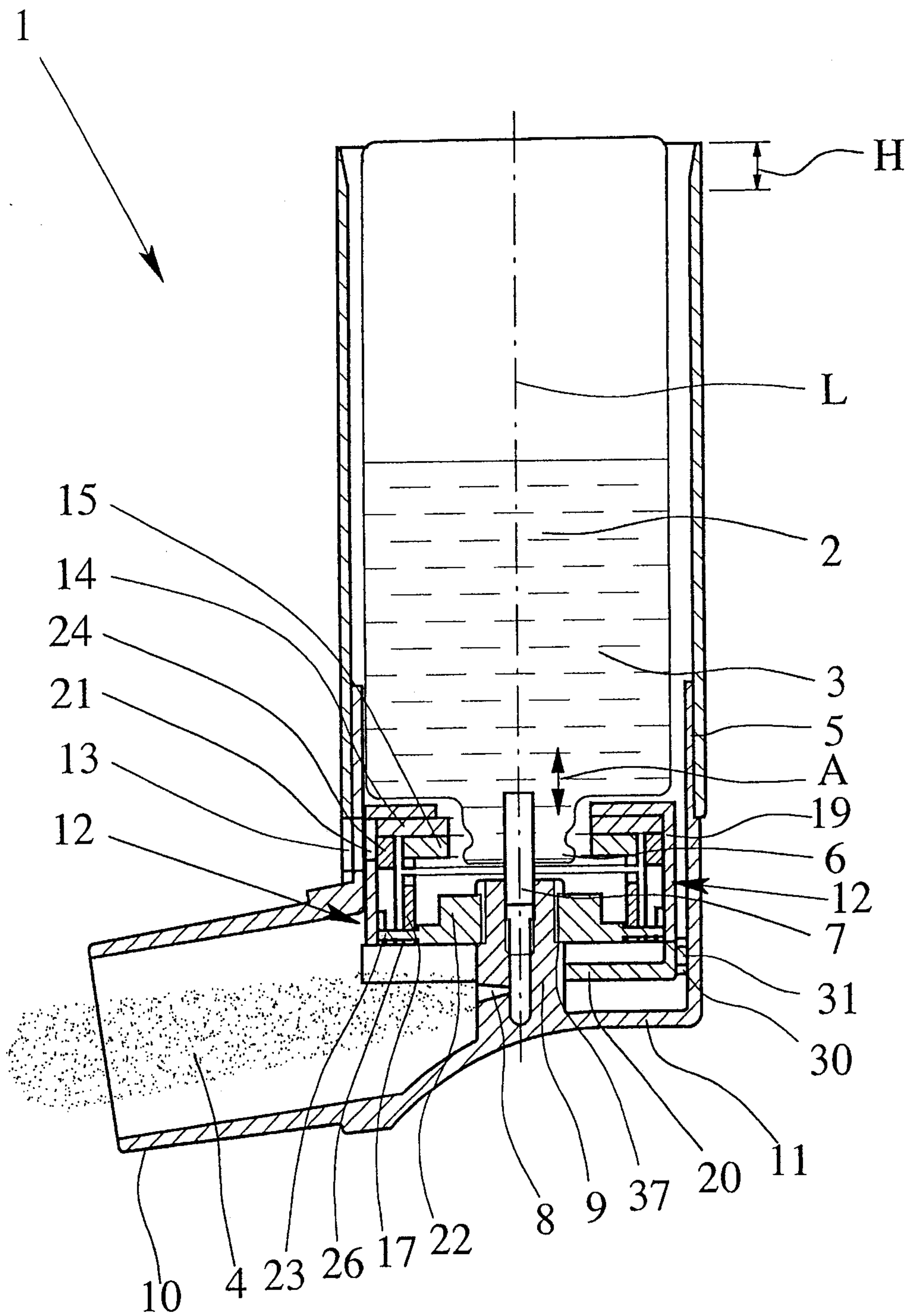


Fig. 1

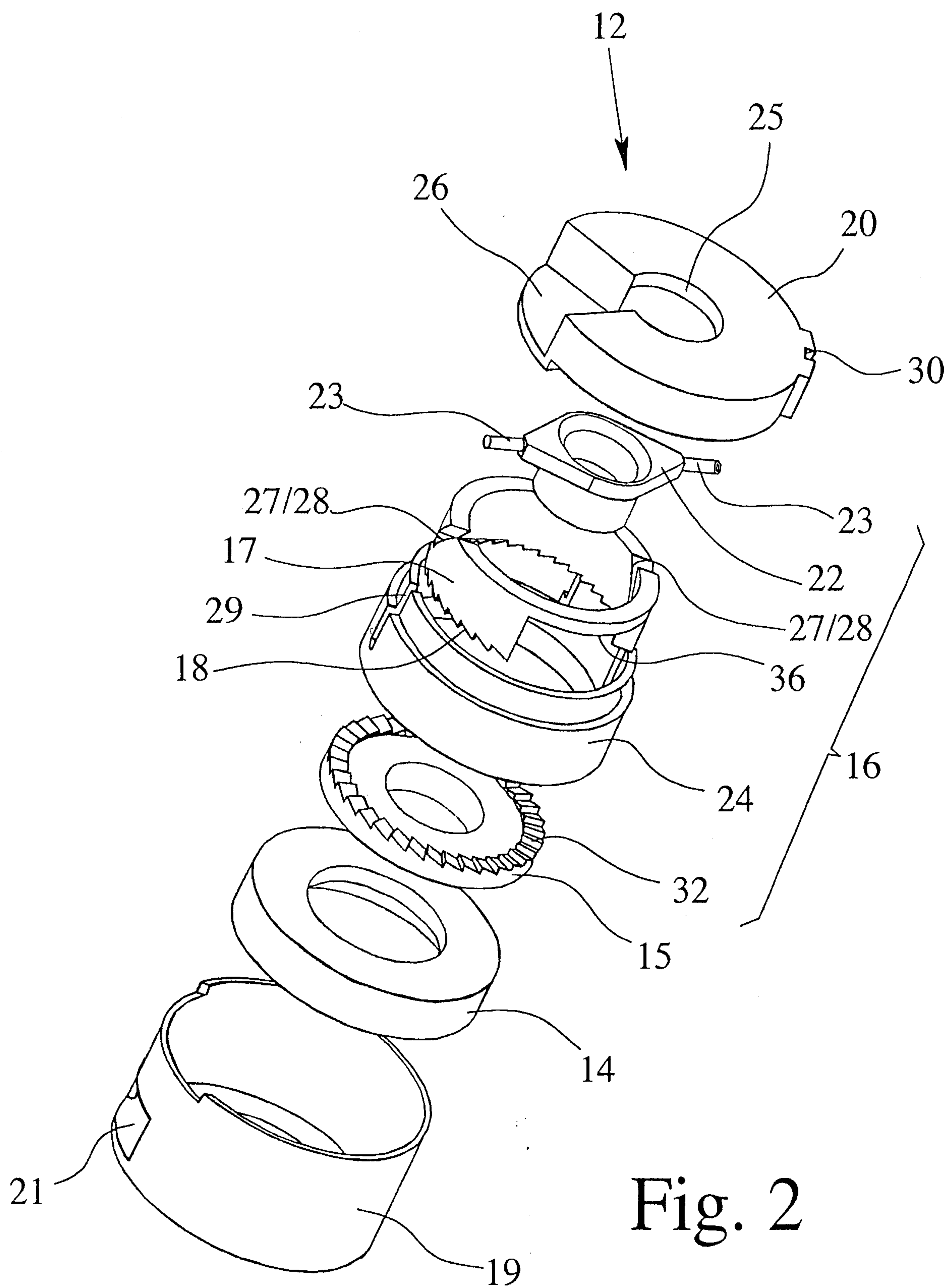


Fig. 2

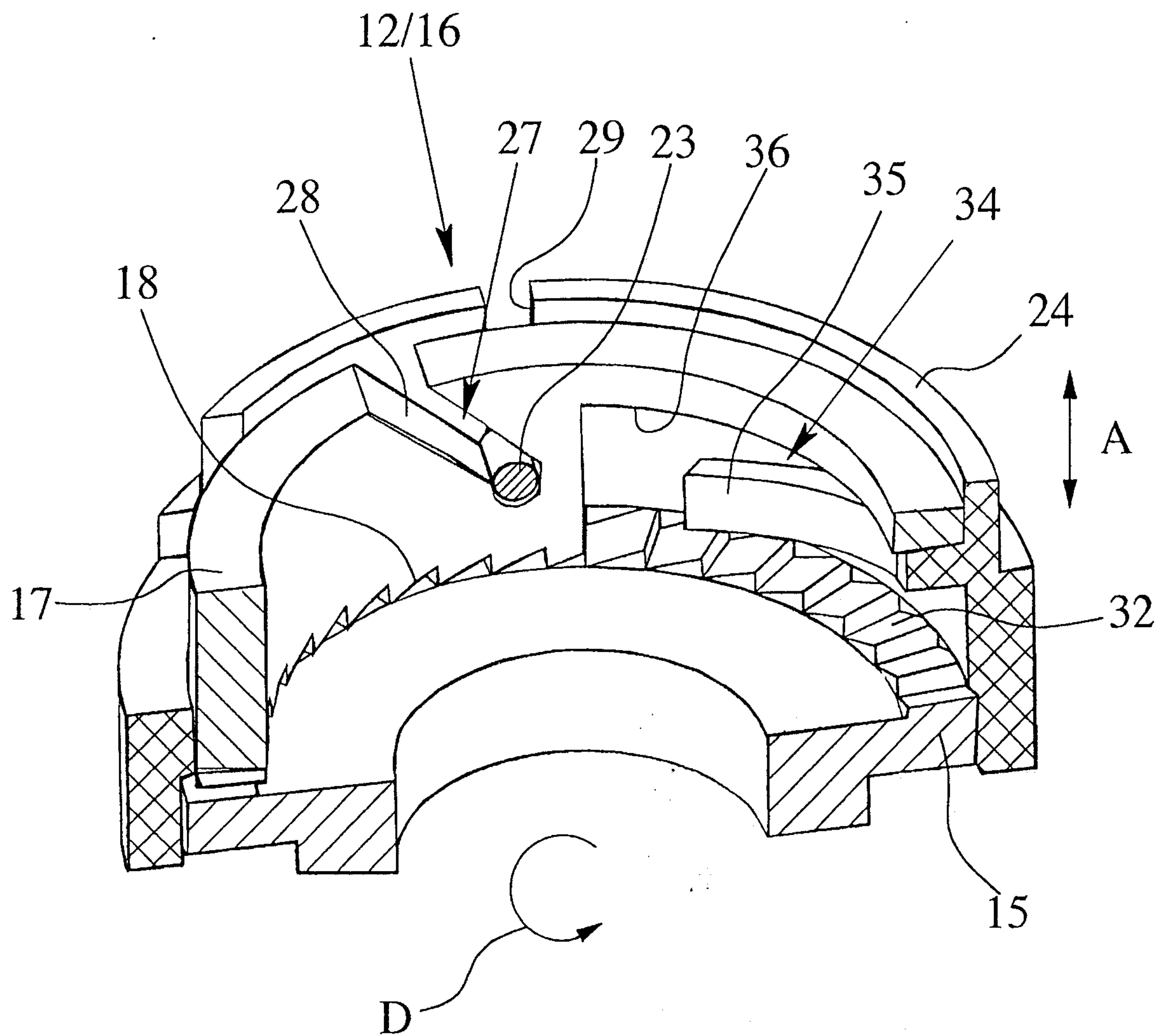


Fig. 3

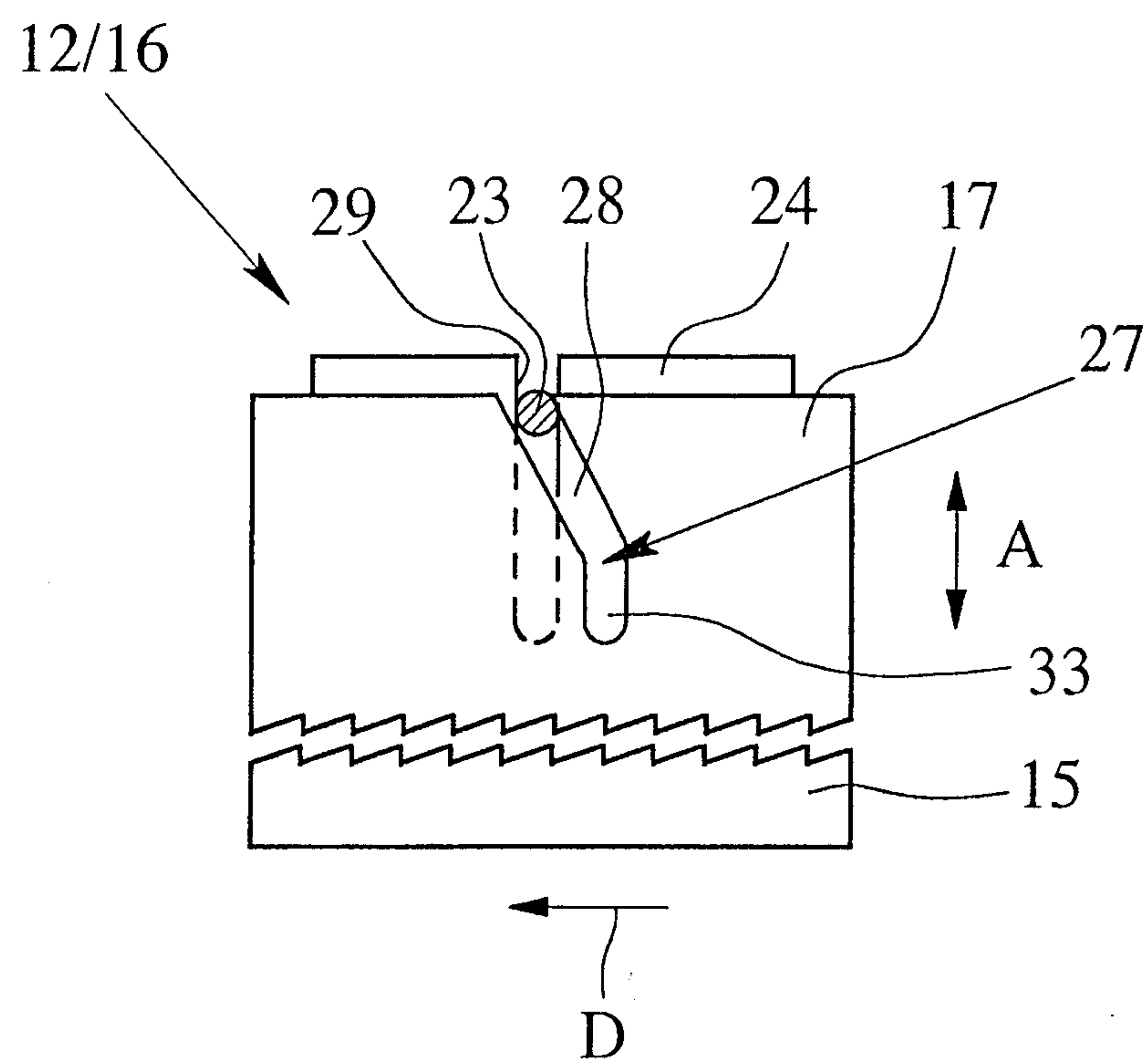


Fig. 4

