(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 247 257 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
18.01.2012 Bulletin 2012/03

(21) Application number: **09707392.8**

(22) Date of filing: **22.01.2009**

(51) Int Cl.:
A61D 1/02 *(2006.01)*

(86) International application number:
PCT/NL2009/000011

(87) International publication number:
WO 2009/099320 (13.08.2009 Gazette 2009/33)

(54) TEAT NEEDLE WITH PROTECTIVE END WALL

ZITZENNADEL MIT SCHÜTZENDER ENDWAND

AIGUILLE POUR TRAYON A PAROI D'EXTRÉMITÉ PROTECTRICE

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR

(30) Priority: **05.02.2008 NL 2001259**

(43) Date of publication of application:
10.11.2010 Bulletin 2010/45

(73) Proprietor: **Helvoet Rubber & Plastic Technologies B.v.**
3223 EV Hellevoetsluis (NL)

(72) Inventors:
- **VAN DER MOLEN, Peter-Jan**
  NL-2496 PP Den Haag (NL)
- **VAN VESSEM, Louis**
  NL-3223 GG Hellevoetsluis (NL)

(74) Representative: **Riemens, Roelof Harm**
Exter Polak & Charlouis B.V. (EP&C)
P.O. Box 3241
2280 GE Rijswijk (NL)

(56) References cited:
US-A- 1 797 339
US-A- 4 236 520
US-A- 4 906 239

EP 2 247 257 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The invention relates to a teat needle for administering an injection medium into a teat canal in the udder of a milking animal such as a cow or goat.

[0002] A similar teat needle is known from BE-1005479, for example. The teat needle has a thin tapering shaft that slides into the teat canal of the udder. The length of the needle shaft is such that when it is fully inserted into the teat canal, a medicine or salve can be injected directly into the udder. The teat needle is connected to a container that is filled with a specific quantity of the medicine or salve. The teat needle delimits a through flow canal with a forward facing discharge opening.

[0003] The disadvantage of this is that ease of use and the animal-friendliness of the teat needle leaves to be desired. It may occur that when the needle shaft is inserted into the teat canal it meets a certain resistance. It may also be the case that the teat canal can suffer injury when the needle shaft is inserted. This happens especially if during manufacture membranes or burrs are left on the needle shaft on, for example, the discharge opening. There is a risk that these membranes or burrs will cut into the flesh internally. Wounds of this sort are painful for the animal and can lead to serious infection and to contamination of the milk that is withdrawn from the teat after treatment with the teat needle. Wounds of this sort also lead to financial loss for the farmer. In addition the discharge opening may get blocked during insertion into the teat canal. The needle shaft with its forward facing discharge opening scrapes free, as it were, all types of material that it encounters on the wall of the teat canal, and the material attempts to find a way into the interior of the flow canal via the discharge opening.

[0004] In addition a teat needle is known from GB-914,131. This teat needle is designed for applying antibiotics to an infected and damaged teat canal, and if required can remain in the teat canal if this is deemed necessary for healing. In this case the needle shaft has both a forward facing discharge opening and a lateral facing discharge opening. Although the lateral facing discharge opening reduces the problem of blockage, the forward facing discharge opening still has the above-mentioned disadvantages.

[0005] US 4,236,520 discloses a flexible fluid drain or injection tube for insertion into a teat of an animal's udder. The injection tube comprises an elongated tubular body with an inlet opening at a bottom end part and a closed opposite end at an upper end part. The closed end is formed by a solid, rounded, tapered tip. Inside the tubular body an axial bore is present which connects to the inlet opening. Along a cylindrical section of the tubular body two elongated slot-shaped outlet openings are present which connect to the bore. Those outlet openings are provided at axially different height positions along the tubular body and open out in opposite sideways directions.

[0006] The injection tube of US 4,236,520, upon which prior art the two part form of claim 1 is based, still leaves to be desired, in terms of manufacturing, animal friendliness and ease of use.

[0007] The aim of the invention described below is to remove at least partially the above-mentioned disadvantages or to provide a usable alternative. In particular the aim of the invention is to create a user-friendly teat needle that is relatively cheap and simple to manufacture and which does not easily lead to wounding of the teat canal.

[0008] This aim is achieved by a teat needle in accordance with claim 1. In this case the teat needle comprises an elongated needle shaft with a distal end piece that slides into the teat canal. Through the needle shaft in axial direction a flow canal extends, which in the distal end piece connects to one or more laterally placed discharge openings. A protective end wall is provided which at least partially closes off the flow canal in the forward direction. This protective end wall is located here in the extension of the flow canal and thereby at least partially covers the distal end of the flow canal in the axial direction. This has the advantage that a teat needle is obtained that can be manufactured with a protective end wall that connects to the needle shaft via gradual transition. Advantageously a punching or scraping action of the needle shaft can therefore be avoided. This diminishes the risk of blocking of the teat needle. In addition it simplifies the insertion of the needle shaft into the teat canal and prevents injury to the wall thereof.

[0009] The provision of the protective end wall in combination with one or more laterally positioned discharge openings makes it advantageously possible during manufacture of the needle shaft as an injection moulding product to work with connecting mould cores within the outer circumference of the needle shaft. In particular on the, for example, cylindrical or conical extending outer circumference wall of a mould core for the formation of the flow canal, one or more mould cores can be connected for the forming of the one or more outlet openings. As contact between the mould cores then takes place at the point of the transitions between the flow canal to be formed and the laterally placed discharge openings to be formed, any membranes or burrs that remain after manufacture then advantageously come to lie on these transitions over the wall thickness of the needle shaft within the outer circumference of the needle shaft. There the membranes and burrs cannot, or can hardly, lead to injury to the animal on insertion into its teat canal.

[0010] The one or more laterally positioned discharge openings extend in an axial direction next to cut outs in the protective end wall. During injection the injection medium will not only be injected out of the needle shaft laterally, but also by being slightly directed forwards, flow into the teat. In addition, this design makes it possible for the above mentioned mould cores to approach each other in an axial direction, during positioning in a mould cavity corresponding to the needle shaft, until the intended end position is reached, in which the mould cores partially

come to rest against each other laterally at the transition (s) between the flow canals and the discharge opening (s).

[0011] In a preferred embodiment at least two, in particular three, discharge openings are distributed laterally around the circumference of the needle shaft. By providing these, moreover, symmetrically around the needle shaft, folding of the wall sections of the teat canal into the discharge openings towards the inside during insertion of the needle shaft can be prevented. This prevents that any membranes or burrs at the transitions of the flow canal to the discharge openings may still lead to injury.

[0012] In particular the protective end wall is integrally formed on the distal end section of the needle shaft. The needle shaft can be manufactured from various materials, such as metal or plastic. The needle shaft is preferably manufactured from plastic in an injection moulding process. If required the needle shaft can be assembled from various materials that can be prepared, for example, in a dual-component injection moulding process in one step.

[0013] Further preferred implementations are laid down in the sub-claims. The invention also relates to a method for the manufacture of the teat needle as well as the use of the teat needle.

[0014] The invention will be further explained using the attached drawings in which:

Fig. 1 is a schematic view in perspective of an embodiment of a syringe with teat needle in accordance with the invention before assembly;
Fig. 2 is a partially cut away view corresponding to figure 1 with a teat needle and break element incorporated into the syringe body;
Fig. 3 is a view corresponding to figure 2 with a piston element mounted in the syringe body;
Fig. 4 is a view corresponding to figure 2 with broken nozzle sealing and fully depressed piston element;
Fig. 5 is a partial view at a larger scale of figure 4;
Fig. 6 is an enlarged view of the assembly of teat needle with break element from figure 1; and
Fig. 7 is a partially exploded view of the teat needle in figure 6.

[0015] In figure 1 the entire syringe is given the reference numeral 1. The syringe 1 comprises a syringe body 2 with a cylindrical section 3 with an axial direction on which a distal end 3a and a proximal end 3b can be distinguished. In addition the syringe 1 comprises a piston element 5 with a piston rod 6 and a piston 7. The free end of the piston rod 6 ends in a thumb support 8 and also has a cylindrical wall section. The piston 7 is an integral part of the piston element 5 and is provided with two elastic deformable ring-shaped wall sections 11. The piston 7 is dimensioned in such a way that in an assembled state it presses with its wall sections 11 to form a seal against the internal circumference of the cylindrical part 3. In this respect the radial external dimensions of the piston 7 are basically the same as the radial internal dimensions of the cylindrical part 3.

[0016] As a further component preceding assembling, the syringe 1 comprises an integrally formed assembly of a teat needle 12 that is connected to a break element 14 by means of weakened wall sections 13 (see also figure 6 and 7). This assembly is designed to be broken during assembling, with the break element 14 and the teat needle 12 being connected successively in their respective end positions with the syringe body 2 (see figure 2).

[0017] After assembling the break element 14 is designed to serve as a piston seal together with compressible cams provided on the piston rod 6.

[0018] The teat needle 12 is destined to form a nozzle on the distal end 3a and must be inserted into the syringe body 2 from the proximal end 3b. At the location of the distal end 3a the teat needle 12 can be firmly attached to the syringe body 2. In the embodiment shown this occurs by means of a snap connection with complimentary inter-gripping wall sections, in particular, a tongue groove connection (see figure 2).

[0019] The teat needle 12 comprises an elongated needle shaft 20 that is implemented here as a conical tapering distal end piece. In the needle shaft 20 a conical tapering flow canal 21 extends in an axial direction. The flow canal 21 discharges into three laterally positioned discharge openings 22 cut-out in the shaft wall that are symmetrically positioned around the circumference.

[0020] According to the invention the tip of the teat needle 12 is provided with a protective end wall 24. The protective wall 24 lies in the prolongation of the flow canal 21 and fully covers in the axial direction. The protective wall 24 is integrally shaped with the needle shaft 20. The discharge openings 22 extend in the axial direction into cut-outs 26 positioned sideways of the protective wall 24. In this way there is formed as it were a cylindrical core section 27 that is connected to the rest of the needle shaft 20 by ribs 28.

[0021] Both the core section 27 and the ribs 28 of the protective wall 24 are constructed with a radius, by which a rounded tip is obtained.

[0022] The teat needle 12 is made from plastic, especially PE, PP and/or TPE. If required parts of the teat needle 12, for example the needle shaft 20, the ribs 28 and the protective wall 24 with the respect to the rest of the teat needle 12 can be made from various materials that can be manufactured for example in a dual-component injection moulding process.

[0023] On the distal end 3a of the syringe 2 a seal is provided of the nozzle formed by the teat needle 12. This nozzle seal 30 is here formed by a protective cap 31 that is formed integrally on the syringe body 2 by a weakened peripheral wall section 32. The protective cap 31 is manufactured in two parts with the two parts 31a and 31b being connected together by a weakened peripheral wall section 33. The makes it possible to remove only the foremost part 31a, or also the rearmost part 31b. This

gives the user the possibility to free up a longer or shorter part of the needle shaft 20 of the teat needle 12 for insertion in a body part.

[0024] The protective cap 31 of the nozzle seal 30 is constructed in such a way that with its front part 31 it lies sealing against the needle shaft 20 of the teat needle 12. In addition the protective cap 31 and the teat needle 12 are dimensioned in such a way that in the assembled state a small chamber is created between the tip of the teat needle 12 and the protective cap 31. This has the advantage that a small quantity of injection medium can gather around the tip via the discharge openings 22 and/or the cut-outs 26, with the small quantity of injection medium after removal of the protective cap 31 serving directly as a friction reducing lubricant during insertion of the teat needle in, for example, the udder of an animal. The protective cap 31 is designed with a basically cylindrical cavity or with a cavity that has a smaller cone angle than that of the needle shaft 20. This ensures that in the assembled state on the one hand a small chamber is formed around the tip while on the other hand a sealing takes place between the peripheral wall of the needle shaft 20 and the protective cap 31.

[0025] In addition to the embodiments shown many other variants are possible. This means that the various parts of the syringe can be given various forms and dimensions. Instead of the integrally formed nozzle seal at the distal end another type of tamper evident construction can also be applied to seal and/or close off the distal end in a reliable way. In this way it is also possible to form the teat needle integrally onto the syringe body or use a teat needle that can be connected from the outside with the distal end of the syringe. It is also possible to use the teat needle freely in combination with another type of syringe or supply unit. The discharge openings can also be provided at a lower level along the needle shaft and vary in number. The protective wall will then be able to spread over the entire tip.

[0026] Thus according to the invention a teat needle is provided that can be manufactured easily and cheaply and which lends itself very well to the introduction of an injection medium into the teat of an udder of a milking animal such as cow or goat, for example a salve with antibiotic qualities, or a curable medium that can seal the teat temporarily.

Claims

1. Teat needle for insertion of an injection medium in a teat canal of the udder of a milking animal, comprising:

- an elongated needle shaft (20) with a distal end piece that is slidable into the teat canal; and
- a flow canal (21) that extends in an axial direction through the needle shaft (20);

in which the flow canal (21) in the distal end part connects to at least one laterally placed discharge opening (22) that is provided in a side wall of the distal end piece of the needle shaft (20),

in which the distal end piece of the needle shaft (20) comprises a protective end wall (24) that lies in the prolongation of the flow canal (21) and which covers the flow canal (21) at least partially in the axial direction,

characterized in that

the laterally placed discharge opening (22) continues in the axial direction into a cut-out (26) which is adjacent to the protective end wall (24).

2. Teat needle according to claim 1, in which at least two laterally placed discharge openings (22) are distributed around the circumference of the needle shaft (20).

3. Teat needle according to claim 2, in which at least three laterally placed discharge openings (22) are distributed around the circumference of the needle shaft (20).

4. Teat needle according to claim 2 or 3, in which the discharge openings (22) are placed symmetrically around the circumference of the needle shaft (20).

5. Teat needle according to one of the preceding claims, in which the at least one discharge opening (22) is provided at the transition between the protective end wall (24) and the side wall of the needle shaft (20).

6. Teat needle according one of the claims 2-4 and 5, in which the discharge openings (22) are separated from each other by ribs (28) that extend between the protective end wall (24) and the side wall of the needle shaft (20).

7. Teat needle according to one of the preceding claims, in which the protective end wall (24) has a radius.

8. Teat needle according to one of the preceding claims, in which the transition between the protective end wall (24) and the side wall of the needle shaft (20) is rounded off.

9. Teat needle according to one of the preceding claims, in which the needle shaft (20) is manufactured from plastic, in particular in an injection moulding process.

10. Teat needle according to one of the preceding claims, in which the protective end wall (24) forms an integral part of the distal end piece of the needle shaft (20).

11. Teat needle according to one of the preceding claims, in which the protective end wall (24) fully covers the flow canal (21) in the axial direction.

12. Teat needle according to one of the preceding claims, in which the protective end wall (24) comprises a core element (27) that covers at least the center of the flow canal (21).

13. Method for the manufacture of a teat needle (12) according to one of the preceding claims, comprising the following steps:

- the placing in a mould cavity corresponding to the needle shaft (20), of a first mould core extending in an axial direction for keeping the flow canal (21) free;
- the placing in the mould cavity corresponding to the needle shaft (20) of at least a second mould core for keeping at least one laterally placed discharge opening (22) free,

in which the second mould core at the transition between the flow canal (21) and the laterally placed discharge opening (22) lies against a side wall of the first mould core, and
in which the second mould core keeps free both the laterally placed discharge opening (22) as well as a cut-out (26) which is a continuation of the discharge opening (22) in the axial direction situated adjacent to the protective end wall (24).

14. Method according to claim 13, in which the first and second mould core approach each other in the axial direction during placing in the mould cavity, and partially slide past each other until they have reached their respective end positions.

Patentansprüche

1. Zitzennadel zur Einführung eines Injektionsmediums in einen Strichkanal des Euters eines milchgebenden Tiers, umfassend:

- eine längliche Nadelwelle (20) mit einem distalen Endstück, welches in dem Strichkanal gleitbar ist; und
- einen Strömungskanal (21), welcher sich in einer axialen Richtung durch die Nadelwelle (20) erstreckt;

wobei der Strömungskanal (21) in dem distalen Endteil mit zumindest einer seitlich angeordneten Entnahmeöffnung (22) verbunden ist, welche in einer Seitenwand des distalen Endstücks der Nadelwelle (20) vorhanden ist,
wobei das distale Endstück der Nadelwelle (20) eine schützende Endwand (24) umfasst, welche in der Verlängerung des Strömungskanals (21) liegt und den Strömungskanal (21) zumindest teilweise in der axialen Richtung abdeckt,
dadurch gekennzeichnet,
dass sich die seitlich angeordnete Entnahmeöffnung (22) in der axialen Richtung in einen Ausschnitt (26), welcher benachbart zu der schützenden Endwand (24) liegt, fortsetzt.

2. Zitzennadel nach Anspruch 1, wobei mindestens zwei seitlich angeordnete Entnahmeöffnungen (22) um den Umfang der Nadelwelle (20) herum verteilt sind.

3. Zitzennadel nach Anspruch 2, wobei mindestens drei seitlich angeordnete Entnahmeöffnungen (22) um den Umfang der Nadelwelle (20) herum verteilt sind.

4. Zitzennadel nach Anspruch 2 oder 3, wobei die Entnahmeöffnungen (22) symmetrisch um den Umfang der Nadelwelle (20) herum angeordnet sind.

5. Zitzennadel nach einem der vorhergehenden Ansprüche, wobei die mindestens eine Entnahmeöffnung (22) an dem Übergang zwischen der schützenden Endwand (24) und der Seitenwand der Nadelwelle (20) vorhanden ist.

6. Zitzennadel nach einem der Ansprüche 2-4 und 5, wobei die Entnahmeöffnungen (22) voneinander durch Rippen (28) getrennt sind, welche sich zwischen der schützenden Endwand (24) und der Seitenwand der Nadelwelle (20) erstrecken.

7. Zitzennadel nach einem der vorhergehenden Ansprüche, wobei die schützende Endwand (24) einen Radius aufweist.

8. Zitzennadel nach einem der vorhergehenden Ansprüche, wobei der Übergang zwischen der schützenden Endwand (24) und der Seitenwand der Nadelwelle (20) abgerundet ist.

9. Zitzennadel nach einem der vorhergehenden Ansprüche, wobei die Nadelwelle (20) aus Kunststoff hergestellt ist, insbesondere in einem Spritzgieß-Verfahren.

10. Zitzennadel nach einem der vorhergehenden Ansprüche, wobei die schützende Endwand (24) ein integrales Teil des distalen Endstücks der Nadelwelle (20) ausbildet.

11. Zitzennadel nach einem der vorhergehenden Ansprüche, wobei die schützende Endwand (24) den Strömungskanal (21) in der axialen Richtung voll-

ständig überdeckt.

12. Zitzennadel nach einem der vorhergehenden Ansprüche, wobei die schützende Endwand (24) ein Kernelement (27) umfasst, welches zumindest die Mitte des Strömungskanals (21) einnimmt.

13. Verfahren zur Herstellung einer Zitzennadel (12) nach einem der vorhergehenden Ansprüche, folgende Schritte umfassend:

- Anordnen eines ersten Formkerns, welcher sich in einer axialen Richtung erstreckt, um den Strömungskanal (21) freizuhalten, in einem Formhohlraum, welcher mit der Nadelwelle (20) korrespondiert;
- Anordnen mindestens eines zweiten Formkerns in dem Formhohlraum, welcher mit der Nadelwelle (20) korrespondiert, um mindestens eine seitlich angeordnete Entnahmeöffnung (22) frei zu halten,

wobei der zweite Formkern an dem Übergang zwischen dem Strömungskanal (21) und der seitlich angeordneten Entnahmeöffnung (22) gegen einer Seitenwand des ersten Formkerns liegt, und
wobei der zweite Formkern sowohl die seitlich angeordnete Entnahmeöffnung (22) als auch einen Ausschnitt (26), welcher eine Fortsetzung der Entnahmeöffnung (22) in der axialen Richtung bildet und benachbart der schützenden Endwand (24) liegt, freihält.

14. Verfahren nach Anspruch 13, wobei sich der erste und der zweite Formkern in der axialen Richtung einander annähern während sie in dem Formhohlraum angeordnet sind und teilweise aneinander vorbei gleiten, bis sie ihre entsprechenden Endpositionen erreicht haben.

Revendications

1. Aiguille pour trayon, pour insertion d'un fluide d'injection dans un canal de trayon de la mamelle d'un animal de traite, comprenant :

- une tige d'aiguille (20) allongée, avec une pièce d'extrémité distale susceptible de coulisser dans le canal de trayon ; et
- un canal d'écoulement (21), s'étendant dans une direction axiale à travers la tige d'aiguille (20) ;

dans laquelle le canal d'écoulement (21), dans la partie d'extrémité distale, relie à au moins une ouverture de décharge (22) disposée latéralement, prévue dans une paroi latérale de la pièce d'extrémité distale de la tige d'aiguille (20),
dans laquelle la pièce d'extrémité distale de la tige d'aiguille (20) comprend une paroi d'extrémité protectrice (24), située dans le prolongement du canal d'écoulement (21) et couvrant au moins le canal d'écoulement (21) dans la direction axiale,
caractérisé en ce que
l'ouverture de décharge (22), disposée latéralement, continue dans la direction axiale, en une découpure (26) adjacente à la paroi d'extrémité protectrice (24).

2. Aiguille pour trayon selon la revendication 1, dans laquelle au moins deux ouvertures de décharge (22), disposées latéralement, sont réparties sur la circonférence de la tige d'aiguille (20).

3. Aiguille pour trayon selon la revendication 2, dans laquelle au moins trois ouvertures de décharge (22), disposées latéralement, sont réparties sur la circonférence de la tige d'aiguille (20).

4. Aiguille pour trayon selon la revendication 2 ou 3, dans laquelle les ouvertures de décharge (22) sont disposées symétriquement sur la circonférence de la tige d'aiguille (20).

5. Aiguille pour trayon selon l'une des revendications précédentes, dans laquelle la au moins une ouverture de décharge (22) est prévue à la transition entre la paroi d'extrémité protectrice (24) et la paroi latérale de la tige d'aiguille (20).

6. Aiguille pour trayon selon l'une des revendications 2 à 4 et 5, dans laquelle les ouvertures de décharge (22) sont séparées les unes des autres par des nervures (28) s'étendant entre la paroi d'extrémité protectrice (24) et la paroi latérale de la tige d'aiguille (20).

7. Aiguille pour trayon selon l'une des revendications précédentes, dans laquelle la paroi d'extrémité protectrice (24) présente un rayon.

8. Aiguille pour trayon selon l'une des revendications précédentes, dans laquelle la transition entre la paroi d'extrémité protectrice (24) et la paroi latérale de la tige d'aiguille (20) est arrondie.

9. Aiguille pour trayon selon l'une des revendications précédentes, dans laquelle la tige d'aiguille (20) est fabriquée en matière synthétique, en particulier dans un procédé de moulage par injection.

10. Aiguille pour trayon selon l'une des revendications précédentes, dans laquelle la paroi d'extrémité protectrice (24) forme une partie intégrante de la pièce d'extrémité distale de la tige d'aiguille (20).

11. Aiguille pour trayon selon l'une des revendications précédentes, dans laquelle la paroi d'extrémité protectrice (24) couvre entièrement le canal d'écoulement dans la direction axiale.

12. Aiguille pour trayon selon l'une des revendications précédentes, dans laquelle la paroi d'extrémité protectrice (24) comprend un élément formant noyau (27), couvrant au moins le centre du canal d'écoulement (21).

13. Procédé de fabrication d'une aiguille pour trayon (12) selon l'une des revendications précédentes, comprenant les étapes suivantes :

- placement dans une cavité de moulage, correspondant à la tige d'aiguille (20), d'un premier noyau de moule s'étendant dans une direction axiale, pour maintenir dégagé le canal d'écoulement (21) ;
- placement dans la cavité de moulage, correspondant à la tige d'aiguille (20), d'au moins un deuxième noyau de moule, pour maintenir dégagée au moins une ouverture de décharge (22) disposée latéralement,

dans lequel le deuxième noyau de moule, à la transition entre le canal d'écoulement (21) et l'ouverture de décharge (22) disposée latéralement, est disposé contre une paroi latérale du premier noyau de moule, et
dans lequel le deuxième noyau de moule maintien dégagées à la fois l'ouverture de décharge (22) disposée latéralement ainsi qu'une découpure (26), qui est une continuation de l'ouverture de décharge (22) dans la direction axiale, située de manière adjacente à la paroi d'extrémité protectrice (24).

14. Procédé selon la revendication 13, dans lequel le premier et le deuxième noyau de moule s'approchent l'un de l'autre dans la direction axiale durant le placement dans la cavité de moule, et coulissent partiellement en passant l'un sur l'autre, jusqu'à ce qu'ils aient atteint leurs positions finales respectives.

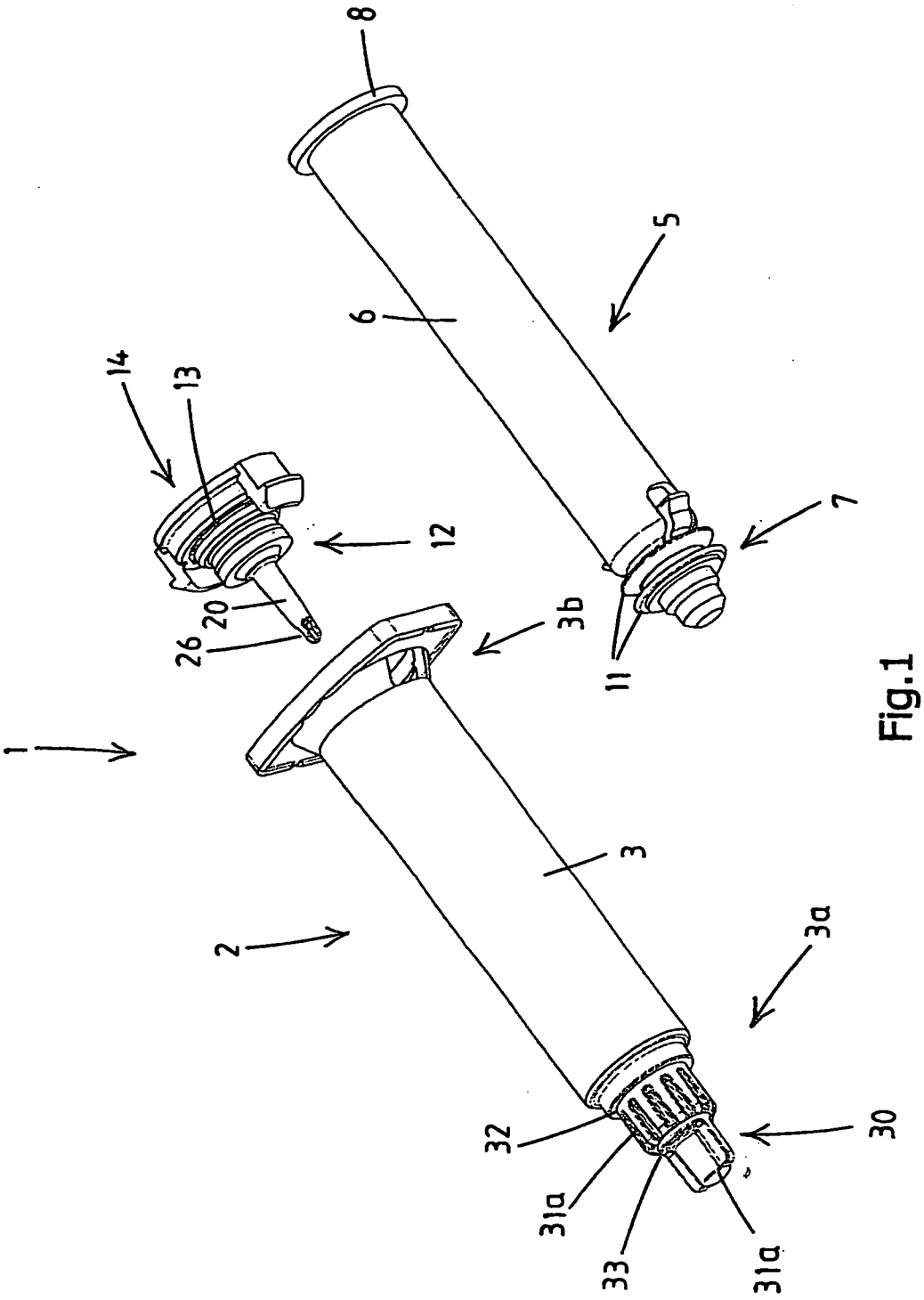

Fig.1

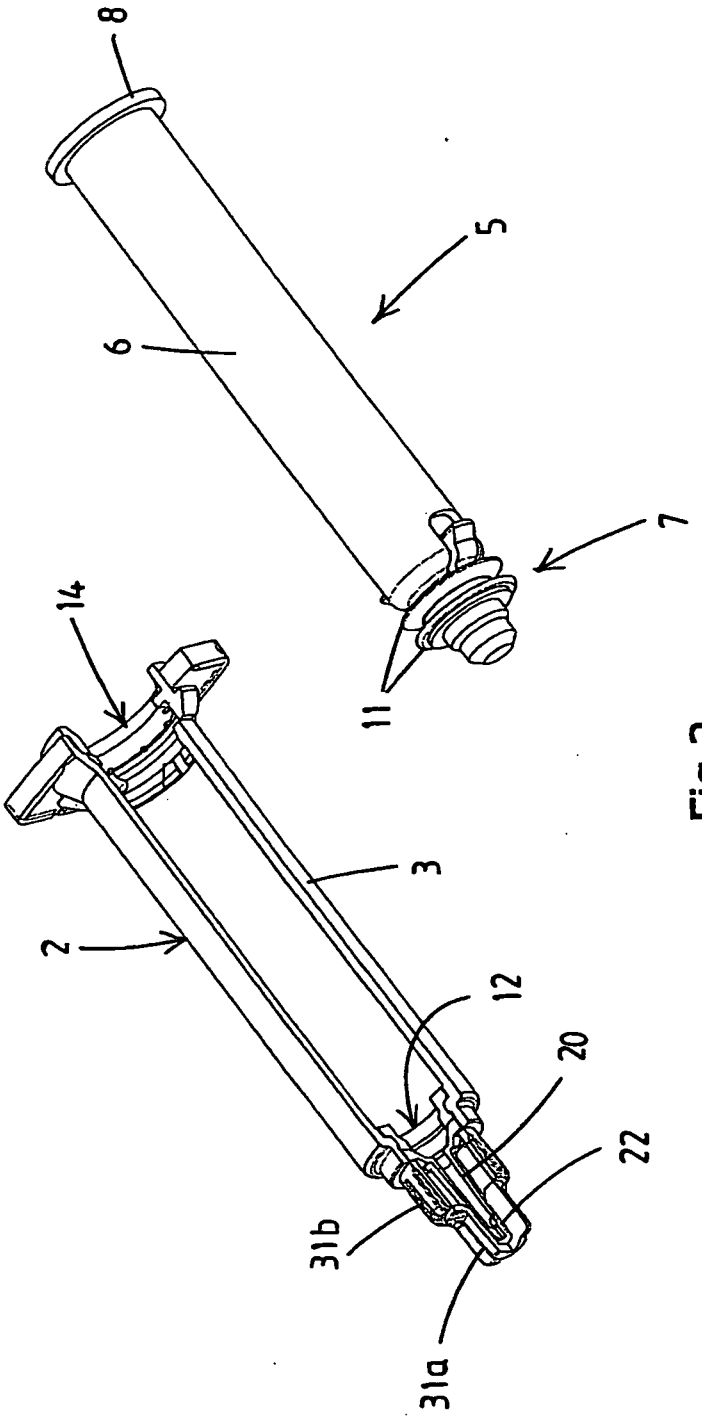

Fig.2

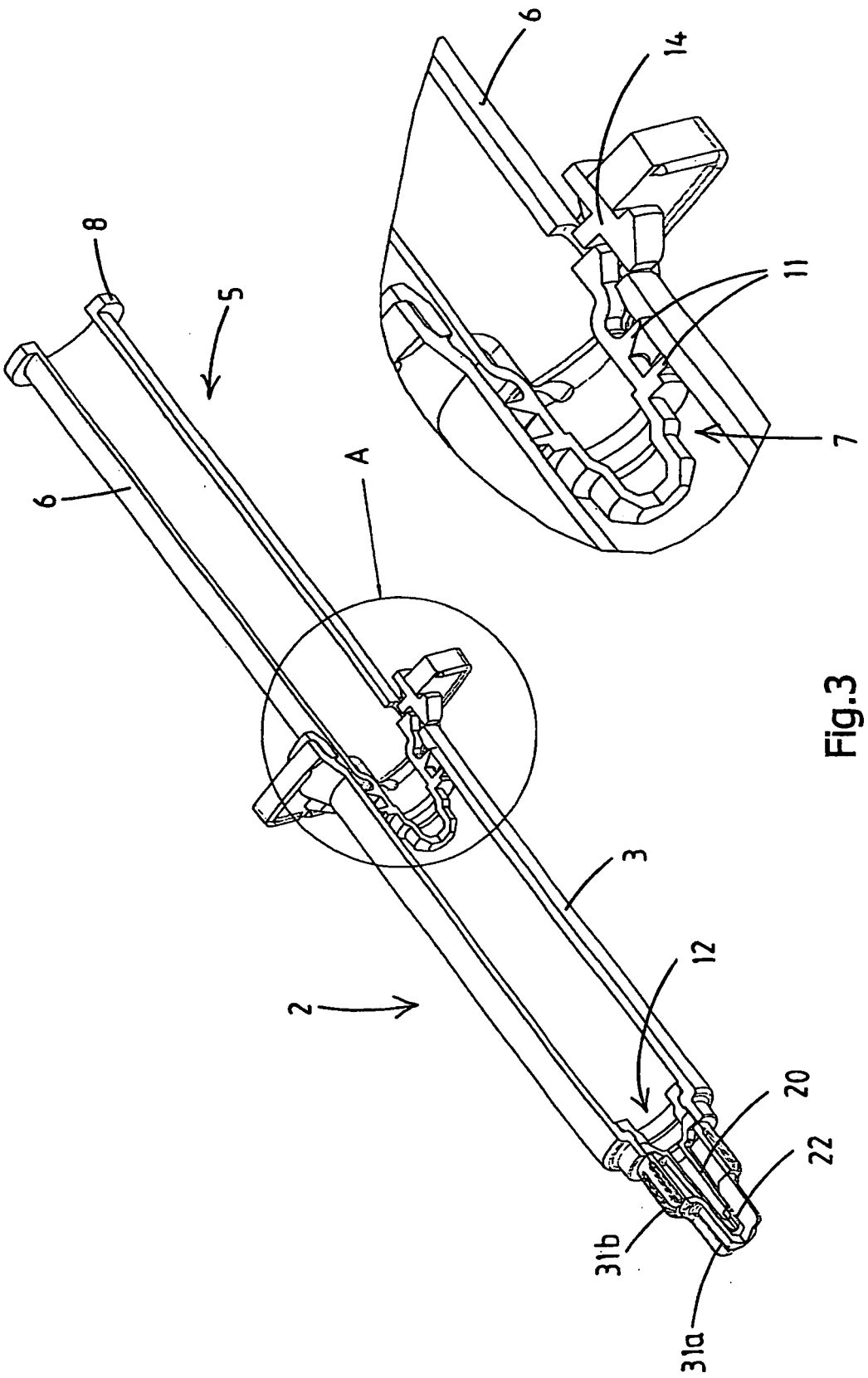

Fig.3

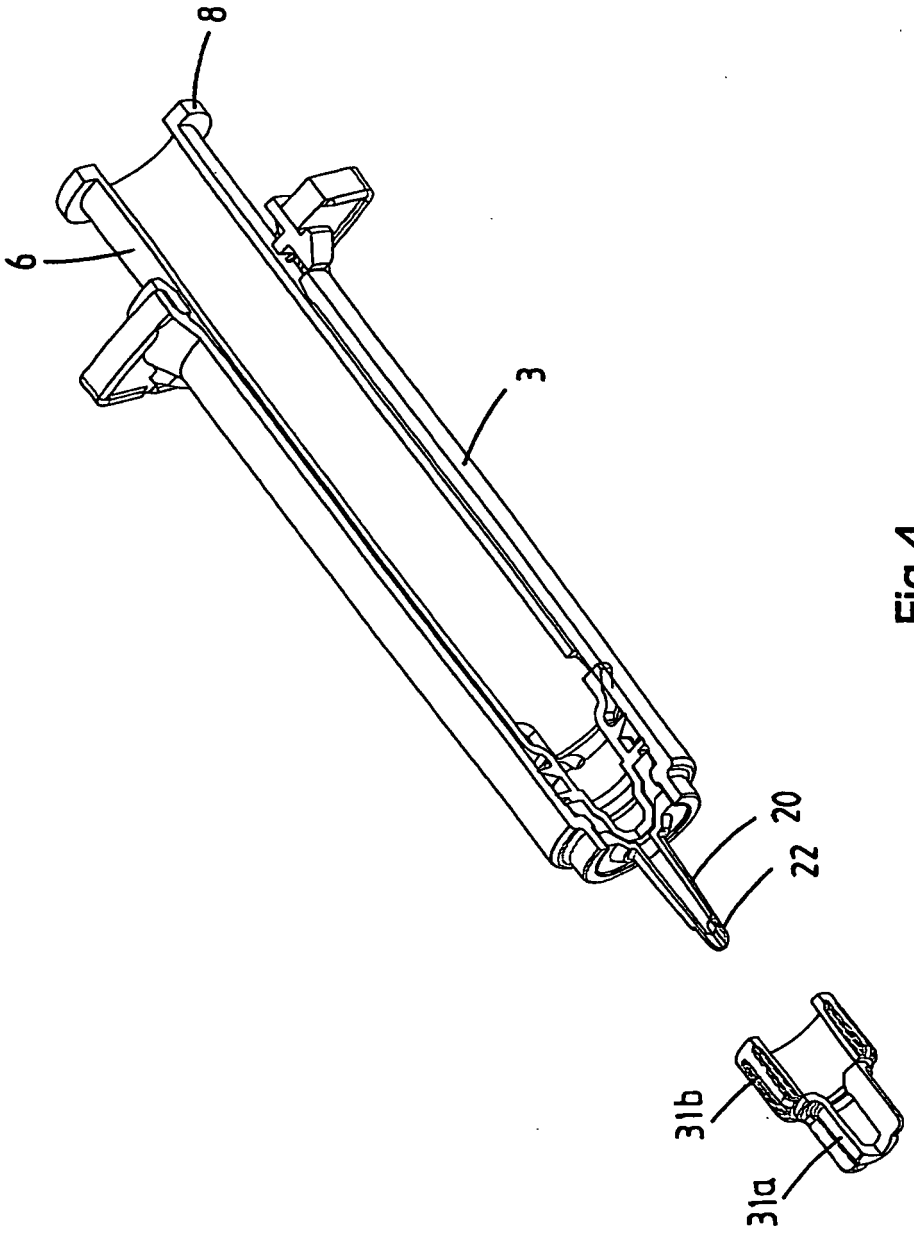

Fig.4

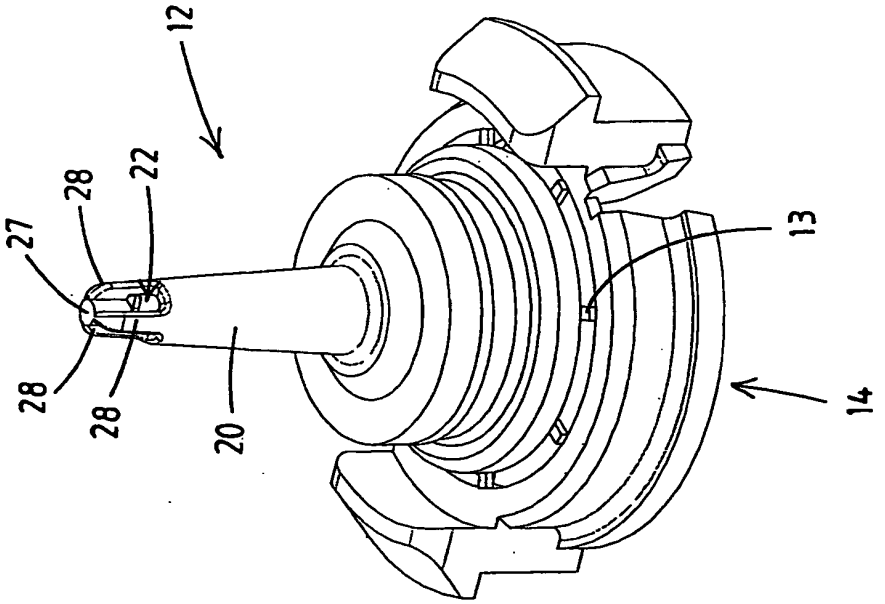

Fig.6

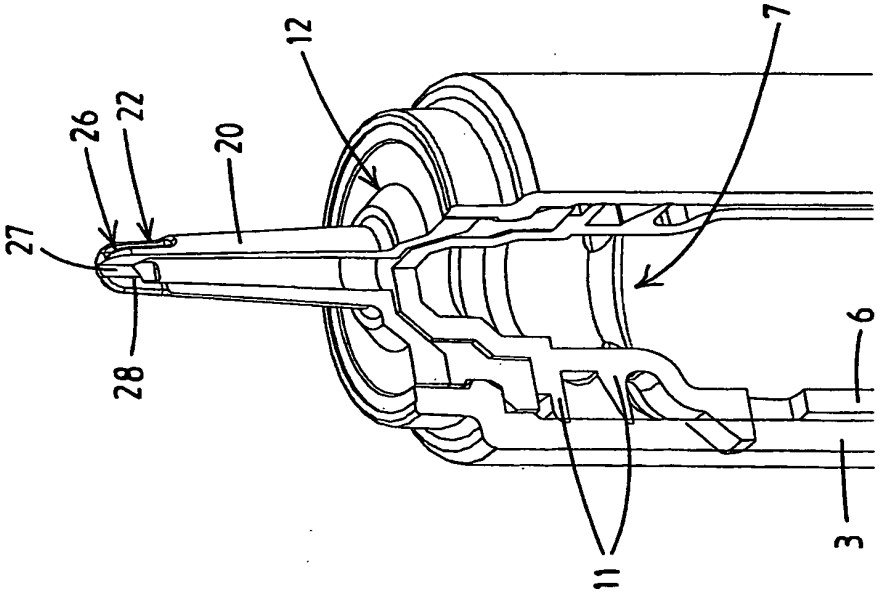

Fig.5

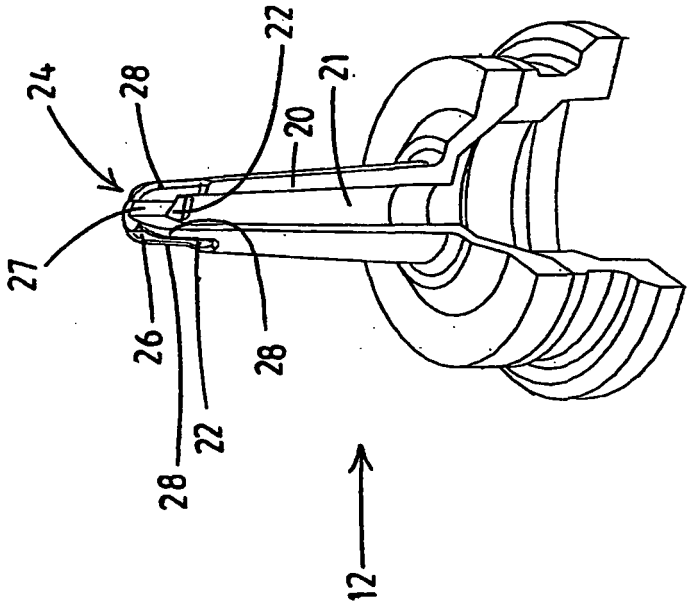

Fig.7

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- BE 1005479 **[0002]**
- GB 914131 A **[0004]**
- US 4236520 A **[0005] [0006]**