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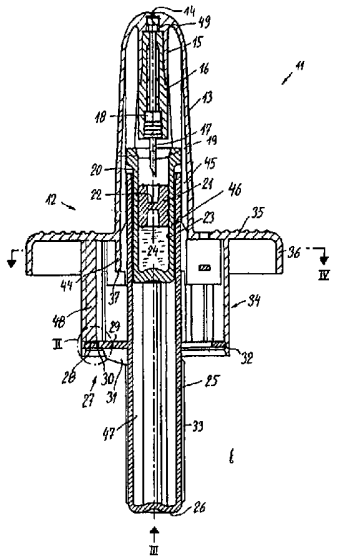
(54) Title: DISCHARGE DEVICE FOR FLOWABLE MEDIA USING A THRUST PISTON PUMP

(54) Bezeichnung: AUSTRAGVORRICHTUNG FÜR FLIESSFÄHIGE MEDIEN MITTELS EINER SCHUBKOLBENPUMPE

(57) Abstract

The invention concerns a disposable two–compartment atomizer for discharging two successive part–charges as a spray, said atomizer comprising on a base body (12) a projecting nose–adapter (13) with a nozzle (14), actuating shoulders (35) where two fingers can rest, and an actuating part which can be pressed into the base body and has an actuating sleeve (25) and a medium store (20) held therein. A hollow needle (17) can penetrate the closure piston–stopper (21) of said medium store (20). A ring (28) is mounted on the actuating sleeve (25) by means of spokes (29) and with predetermined breakage points (30), the ring breaking when the atomizer is used for the first time and a minimum actuation pressure is maintained. The spokes strike a stop and thus delimit the first partial stroke. By rotating the actuating sleeve, the actuating section is moved into the starting position for the second stroke step, wherein intermediate webs in the form of material bridges are broken out. The second partial stroke can then also be carried out with a minimum actuating force being maintained.



(57) Zusammenfassung

Ein Einweg–Zweifachzerstäuber zur Ausgabe von zwei aufeinanderfolgenden Teilchargen als Spray weist an einem Grundkörper (12) einen vorspringenden Nasenadapter (13) mit Düse (14), Betätigungsschultern (35) zur Auflage von zwei Fingern und einen in den Grundkörper hineindrückbaren Betätigungsteil mit einer Betätigungshülse (25) und einem darin gehaltenen Medienspeicher (20) auf, dessen Verschluß–Kolbenstopfen (21) von einer Hohlnadel (17) durchstochen werden kann. An der Betätigungshülse (25) ist ein Ring (28) über Sollbruchstellen (30) mittels Speichen (29) angebracht, der bei einer ersten Betätigung unter Aufrechterhaltung eine Mindest–Betätigungsdruckes abreißt. Die Speichen schlagen an einem Anschlag an und begrenzen dadurch den ersten Teilhub. Durch Drehung der Betätigungshülse wird der Betätigungsabschnitt in Startposition für die zweite Hubstufe gebracht. Dort werden mittels Materialbrücken eingesetzte Zwischenstege ausgebrochen, wodurch auch der zweite Teilhub unter Aufrechterhaltung einer Mindestbetätigungskraft erfolgt.

ABSTRACT

The invention concerns a disposable two-compartment atomizer for discharging two successive part-charges as a spray, said atomizer comprising on a base body (12) a projecting nose-adapter (13) with a nozzle (14), actuating shoulders (35) where two fingers can rest, and an actuating part which can be pressed into the base body and has an actuating sleeve (25) and a medium store (20) held therein. A hollow needle (17) can penetrate the closure piston-stopper (21) of said medium store (20). A ring (28) is mounted on the actuating sleeve (25) by means of spokes (29) and with predetermined breakage points (30), the ring breaking when the atomizer is used for the first time and a minimum actuation pressure is maintained. The spokes strike a stop and thus delimit the first partial stroke. By rotating the actuating sleeve, the actuating section is moved into the starting position for the second stroke step, wherein intermediate webs in the form of material bridges are broken out. The second partial stroke can then also be carried out with a minimum actuating force being maintained.

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DISCHARGE DEVICE FOR FLOWABLE MEDIA USING A THRUST PISTON PUMP

FIELD OF USE AND PRIOR ART

The applicant's EP-B-311 863 (= US-A-4 964 069) describes a discharge device, in which a pump cylinder and a resilient stop constructed in the manner of a snap locking means cooperate in such a way that before performing a partial stroke it is necessary for the operator to apply a specific actuating pressure, so that after overcoming this pressure point the liquid is discharged with a specific minimum force and speed. This construction ensures that e.g. on atomizing the medium from the outset adequate atomizing pressure exists and that the pump is actuated up to the end of its stroke and consequently the complete content of the medium reservoir or store, which simultaneously forms the pump cylinder, is discharged in one or two strokes. Such single or multiple dosing devices are important for the delivery of medicaments, which are particularly critical with respect to the dosage, contamination, conservation or other criteria.

The applicant's WO 92/00812 discloses the use of medium reservoirs for a single discharge stroke, which are closed by a stopper simultaneously serving as a piston, the stopper being perforated by a needle for actuation purposes.

SUMMARY OF THE INVENTION

According to the present invention there is provided a discharge device for flowable media using a thrust piston pump, the device having a main body and a reservoir for holding a discharge medium, the reservoir also defining a pump chamber of the thrust piston pump, a pump piston

being movable over at least two discharge strokes from a starting position, and actuating means to move the pump piston relative to the pump chamber, the discharge medium being adapted to flow via a discharge channel provided in the main body to a discharge opening, wherein at the starting position of the piston pump and at the start of each further discharge stroke step there is provided a pressure point protector adapted to be broken by a minimum actuating force by the actuating means, characterized in that a fixed stop separate from the pressure point protector is provided for terminating the first discharge stroke step and an unlocking action frees the piston pump from the stop such that the at least second pressure point protector can be broken by a further minimum actuating force.

According to the present invention there is still further provided a discharge device for flowable media using a thrust piston pump, the device having a main body and a reservoir for holding a discharge medium, the reservoir also defining a pump chamber of the thrust piston pump, a pump piston being movable over at least two discharge strokes from a starting position, and actuating means to move the pump piston relative to the pump chamber, the discharge medium being adapted to flow via a discharge channel provided in the main body to a discharge opening, wherein at the starting position of the piston pump and at the start of each further discharge stroke step there is provided a pressure point protector adapted to be broken by a minimum actuating force by the actuating means.

Thus, it is possible to spray e.g. into both nostrils of the patient a medicament, which has to act rapidly, in two successive strokes. This is particularly important for medicaments for the treatment of highly painful illnesses or attacks thereof, e.g. migraine. The medicaments which have been developed for treating such illnesses are very

expensive and must therefore be used in a very accurately dosed manner. Their absorption by means of the nasal mucosas is very good and acts rapidly, but should be uniformly absorbed by both nostrils in order to further increase the rapid action. Patients suffering from, e.g. a migraine attack, are frustrated by the pain and consequently a reliable, uncomplicated function of the discharge device is vital. This is ensured by the multistroke discharge device according to the invention, independently of any external circumstances.

The following is a summary of preferred embodiments of the invention only and is not intended to restrict the broadest concept of the invention as defined by the claims.

The pressure point protector can preferably contain at least one predetermined breaking point. In particularly preferred manner, it is provided on a snap-on ring, which is e.g. shaped by means of destructible material bridges on a sleeve receiving the medium container and forming an actuation pusher. This snap-on ring makes it possible to provide the material bridges on one of the two parts to be joined together and then following the separation of the material bridges the ring snapped onto the other part remains thereon.

When the first discharge stroke step has been initiated and the first stroke has ended, preferably a stop is provided, whose stop elements are e.g. spokes in the vicinity of the ring. Thus, when the first stroke is ended, the part movable with respect to the main body, preferably the actuating sleeve with the medium store, strikes against a fixed stop, which ensures that simultaneously the second discharge stroke step is not initiated. For this purpose initially an unlocking actuation is carried out, for instance by mutually turning

the two parts movable relative to one another. Thus, e.g. the spokes separated from the ring in the meantime and remaining on the actuating sleeve can be turned into a position where they are in the vicinity of webs, which are in turn connected to the base body by predetermined breaking points. This turning position can be limited by projecting wall portions, in order to prevent excessive turning. If now a second actuation takes place, once again the predetermined breaking points between the web and the base body break, so that a second discharge stroke performed with a minimum actuating force is carried out.

In order to permit an introduction of the delivery tubule into the corresponding curved areas of the nasal cavity, it can have a bend, such as a curve, a kink, etc. or can be angled away from the connecting piece. It can itself be elastically or plastically flexible, i.e. pliable, so that on introduction into a nose channel it adapts thereto.

In the embodiment where the delivery portion is relatively long tubule, which due to the small diameter of generally below 5 mm (preferably 2 to 4 mm) for a length of more than 10 mm (preferably 20 to 30 mm), cannot contain the actual applicator, i.e. usually a thrust piston pump, the problem arises of the dead space, which not only uselessly receives the normally very valuable medicament, but in particular impedes the spontaneity of pressure buildup by widening under pump pressure. The delivery tubule has an inner channel, which is largely filled by a filler, with the exception of a line channel for the medium. Its face adjacent to the discharge port can, together with the latter, form a boundary for spray nozzle vortex channels, which can be contained in said face in the form of spiral grooves.

In a preferred embodiment a disposable two-compartment

atomizer for the delivery of two successive partial charges as a spray is created. It has on a base body a projecting nose adaptor with nozzle, actuating shoulders for the application of two fingers and an actuating part with an actuating sleeve which can be pressed into the base body and a medium store or reservoir held therein, whose closure piston stopper can be perforated by a hollow needle. To the actuating sleeve is fitted by means of predetermined breaking points and using spokes a ring which, during a first actuation tears off, whilst maintaining a minimum actuating pressure. The spokes strike against a stop and consequently limit the first partial stroke. By rotating the actuating sleeve the actuating portion is brought into the starting position for the second stroke step. There, intermediate webs inserted by means of material bridges are broken out, so that also the second partial stroke takes place, whilst maintaining a minimum actuating force.

These and further features can be gathered from the claims, description and drawings and the individual features, either singly or in the form of sub-combinations, can be implemented in an embodiment of the invention and in other fields and can represent advantageous, independently protectable constructions for which protection is hereby claimed. The subdivision of the application into individual sections and the subtitles in no way limit the general validity of the statements made thereunder.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments, incorporating all aspects of the invention, will now be described by way of example only with reference to the accompanying drawings in which:

Fig. 1 A longitudinal section through a discharge device

according to a first embodiment of the present invention;

Fig. 2 A greatly enlarged detail of area II in fig. 1;

Fig. 3 A view of the actuating sleeve and shaped-on ring, shown from below following arrow III in fig. 1;

Fig. 4 A sectional view along line IV in fig. 1;

Fig. 5 A sectional view along line V in fig. 4;

Fig. 6 A partial longitudinal section of a second embodiment of the discharge device; and

Fig. 7 A partial longitudinal section of a third embodiment of the discharge device.

DESCRIPTION OF THE EMBODIMENT (figs. 1 to 5)

The discharge device 11 shown in the drawings has a plastic injection moulded main body 12 having a central, elongated connecting piece 13, or delivery portion, whose shape and length is adapted to the particular application. In the present embodiment the device is a nasal adaptor for introduction into the nostril of a patient. At its upper end it has a discharge opening 14 in the form of a spray nozzle with an upstream angle chamber and following onto the latter in the interior of the hollow connecting piece 13 is provided a sleeve-like piston rod carrier 15, into which is pressed from below a hollow piston rod 16. A plunger 17 is pressed into piston rod 16. Plunger 17 is a hollow steel needle chamfered at its lower, free end in a similar manner to an injection or hypodermic needle, namely it has a needle-surrounding seal 18. The needle-like plunger 17 completely penetrates the piston rod and

is led up to the discharge opening 14 thereby forming a discharge channel 19.

The pharmaceutical medium 24 to be discharged is housed in a medium container 20, or reservoir, which is a cylindrical glass container similar to an ampoule and having a lower closed end and an upper open end, and lateral flanges. It simultaneously forms the medium reservoir, or store, and the pump chamber 23, so that its inner walls simultaneously form the cylindrical piston bore of a thrust piston pump 46. The piston 21 is formed by a piston stopper, which is made from rubber or rubbery material and has in the centre a diaphragm 22 in the form of a centrepiece with limited wall thickness, which can be perforated by the plunger 17.

The medium container 20 is received in an actuating and reception sleeve 25, which is a very long, plastic sleeve with a closed bottom 26 and inner reinforcing ribs for supporting the medium container. Its closed bottom 26 forms an actuating surface for the discharge device 11. Sleeve 25 is guided together with the medium container between ribs 45 in the interior of the connecting piece 13 and is axially movable therein.

At the outer circumference of sleeve 25 is a first pressure point protector 27. Protector 27 comprises three connecting webs or spokes 29 (fig. 3) provided on the circumference of sleeve 25 that are connected by means of material bridges 30 to a circumferential, outer ring 28. Ring 28 is received in a circumferential position, guided by a guide groove 42 on outer ring 28, and in snap connection 32 with a cylindrical base portion 34 on the body 12. Specifically, ring 28 snaps into a lower edge of base portion 34. The material bridges are designed in such a way that they break on applying a predetermined actuating pressure (fig. 2). An inner rib 48 of the base

portion 34 secures the ring 28 in its axial position.

The base portion 34 extends downwards from the actuating shoulders 35, which are an oval surface (fig. 4) surrounding the central connecting piece 13 and have a downwardly directed reinforcing edge 36.

As can be seen in fig. 3, the spokes 29 have lateral reinforcements and are stiffened in the axial direction by stiffening ribs 31. The outer surface of the actuating sleeve 35 is knurled to form a handle 33 surface.

Fig. 4 shows walls 44, which project downwards in the interior of the base portion 34. They form three arcuate portions 49 and extend in each case on either side to the circumference of the base portion in the outwards direction, so that they form between them slots 43. Between their walls 44 are small plates or webs 40, which form a second pressure point protector 39 for a second stroke and are connected to the walls by material bridges 41. One of the walls 44 is lengthened and forms a turning stop 38, against which the spokes 29 strike on turning.

FUNCTION (figs. 1 to 5)

During the manufacture of the discharge device the parts are assembled in the position shown in fig. 1. The medium container 20 filled with the medium 24 is received in the actuating sleeve 25 and its pump chamber 23 is tightly sealed by the pump stopper 21. It is spaced from the tip of the plunger 17, when the actuating sleeve is in the starting position, which is defined by the fact that the ring 28 of the first pressure point protector 27 has locked in the snap-action device 32 and engages on the underside of the ribs 48.

The resulting ready-to-use discharge device is gripped by

the user when needed, in that he places two fingers on the actuating shoulders 35 and presses with the thumb on the actuating surface 26. When an adequate actuating pressure is applied the material bridges 30 tear. These bridges form a predetermined breaking point, so that now the actuating sleeve moves upwards with a predetermined force and correspondingly high actuating speed (cf. fig. 1). After clearing the idle path predetermined by the distance between needle 17 and diaphragm 22, the needle perforates the diaphragm, the piston rod 16 presses the piston stopper into the medium container 20 and the medium 24 is released via the discharge channel 19 into the needle and the discharge opening 14 in the form of a spray mist. This takes place during the introduction by the patient of the connecting piece 13 into one of his nostrils.

At the end of this first discharge stroke step, in which a precisely dimensioned manner half of the medium has been discharged, the spokes 29 strike against the stop 37 on the underside of the walls 44 and consequently limit the discharge. The discharge pressure suddenly collapses and atomization ends without dripping.

The patient can now introduce the connecting piece 13 into his second nostril, after preparing the discharge device on the second discharge stroke step. This takes place in that the actuating sleeve 25 is rotated by approximately 30° using the handle 33 (knurling on outer surface of actuating sleeve). A comparison of figs. 3 and 4 makes it clear that the spokes 29 are approximately 30° from the slots 43 in walls 44. At the end of the first discharge stroke step the spokes strike against the walls roughly in the centre of the portions 49. They are now turned to such an extent that they are located above the slots 43. The downwardly extended wall portion forms the turning stop 38.

If after rotating the actuating sleeve 25 in fig. 1 it is pressed upwards again, then the spokes 29 will engage webs 40. On reaching the predetermined actuating pressure for the second discharge stroke step, the material webs 41 also break away there. The second discharge stroke step is then able to be performed in the same way as the first, in that the lower terminal edge of the piston rod 16 presses the piston stopper 21 further into the medium container 20 and therefore delivers the medium in the manner of a thrust piston pump through the discharge channel 19.

In the represented embodiment the function is then complete. The device is consequently a double disposable pump, which is discarded after a single use. With the exception of the medium reservoir 20, the steel needle 17, and optionally the piston stopper 21, all parts are injected moulded plastic, preferably from the same material, and therefore recycling is possible.

The discharge device makes it possible to deliver the individual partial charges with high dosing precision and reliability and if desired in different quantities. Due to the idle paths to be traversed during the initial actuation, the partial strokes differ, which is taken into account in the design. It is possible to adapt the discharge device for other applications, e.g. medicaments intended for the eyes or other application points occurring in pairs or in multiple form. The present device is also suitable for several successive applications in spray or other delivery form, e.g. treatment in intervals of a few minutes to the same application point.

<u>DESCRIPTION OF THE EMBODIMENT</u> (figs. 6 and 7)

With the exception of the differences explained

hereinafter, discharge device 11 of the embodiments illustrated in figures 6 and 7 generally corresponds to that of figs. 1 to 5. In describing the embodiments of figures 6 and 7, reference is made to the description corresponding to figures 1 to 5 and the same parts carry the same reference numerals.

In figure 6, the connecting piece 13 tapers towards its end and passes into a delivery tubule 50, which is constructed in one piece therewith and which is elongated and thin. Its diameter is between 3 and 4 mm or less, but generally no more than 5 mm and has a length over 10 mm, preferably between 20 and 30 mm. The tubule length to diameter ratio is approximately 7 and is advantageously above 5. It is circular and cylindrical and has at its end the delivery port 15 in the form of a spray nozzle. It is a small diameter hole shaped into the delivery tubule 50 and which together with the vortex channels 51 shaped into the front end of a longitudinal filler 52, forms a nozzle with a conical spray jet.

The filler 52 is constructed in one piece with the piston rod 16 and has on its outside very small in cross-section line channels 53 shaped as longitudinal grooves. The longitudinal filler fills an inner channel 54 of the hollow delivery tubule 50, which minimizes the dead space for the medium flowing out. The line channels 53 are connected to the inner bore of the needle 17 by a diameter reduction of the distributing chamber 53 formed by the filler/piston rod unit.

In fig. 7, the delivery tubule is flexible and pliable, namely in the area of a hinge-like kink 56, which is in a central area of the tubule. In the vicinity of the kink, the diameter of the filler 52a is reduced to such an extent that it is readily pliable due to the flexibility of its material. The delivery tubule material is also

flexible to such an extent that it permits a certain hose-like bending, hence kink 56. It would also be possible to provide bellows-like folds at the kink to facilitate bending. It is also possible to make the complete delivery tubule elastically or plastically pliable by a suitable choice of material. It is also feasible to permanently curve or bend the delivery tubule or to have a non-axial spray nozzle orientation.

FUNCTION (figs. 6 and 7)

For applying a medicament to the nasal cavity and the lateral channels thereof, particularly to the conchae nasi, the delivery tubule is introduced into the nasal cavity and correspondingly oriented by the doctor or some other trained person. The discharge device is then actuated in the aforementioned manner in order to perform a first stroke portion. Then the delivery tubule is introduced into the second nostril and the second stroke portion is initiated, optionally following the unlocking thereof.

In the case of a fixed-bent delivery tubule, in the case of a corresponding design of the finger application shoulders 35 a specific hand position can be prescribed, so that the doctor automatically encounters the correct point and this also applies for an eccentric nozzle arrangement. With a plastically deformable delivery tubule the doctor can preorient the tubule in accordance with his experience, whilst with the elastically pliable tubule the latter can be appropriately shaped on introduction into the nose. It is understood that a lubricant can be applied to the delivery tubule to aid insertion.

As a result of this specific form of the discharge device with delivery tubule, a very efficient application can

take place to specific areas of the nasal mucosas or to specific nose areas and cavities, nasal application taking place in two successive strokes.

It will be understood to persons skilled in the art of the invention that many modifications may be made without departing from the spirit and scope of the invention.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Discharge device for flowable media using a thrust piston pump, the device having a main body and a reservoir for holding a discharge medium, the reservoir also defining a pump chamber of the thrust piston pump, a pump piston being movable over at least two discharge strokes from a starting position, and actuating means to move the pump piston relative to the pump chamber, the discharge medium being adapted to flow via a discharge channel provided in the main body to a discharge opening, wherein at the starting position of the piston pump and at the start of each further discharge stroke step there is provided a pressure point protector adapted to be broken by a minimum actuating force from the actuating means, characterized in that a fixed stop separate from the pressure point protector is provided for terminating the first discharge stroke step and an unlocking action frees the piston pump from the stop such that the at least second pressure point protector can be broken by a further minimum actuating force.

2. Discharge device for flowable media using a thrust piston pump, the device having a main body and a reservoir for holding a discharge medium, the reservoir also defining a pump chamber of the thrust piston pump, a pump piston being movable over at least two discharge strokes from a starting position, and actuating means to move the pump piston relative to the pump chamber, the discharge medium being adapted to flow via a discharge channel provided in the main body to a discharge opening, wherein at the starting position of the piston pump and at the start of each further discharge stroke step there is provided a pressure point protector adapted to be broken by a minimum actuating force by the actuating means.

3. Discharge device according to claim 2,

characterized in that a fixed stop separate from the pressure point protector is provided for terminating the first discharge stroke step and an unlocking action frees the piston pump from the stop such that the at least second pressure point protector can be broken by a further minimum actuating force.

4. Discharge device according to any one of the preceding claims, characterized in that the main body has a projecting delivery portion with the discharge opening at an upper end, laterally projecting actuating shoulders and a substantially cylindrical base portion.

5. Discharge device according to claim 4, characterized in that the actuating means is an actuating sleeve that is axially moveable relative to the delivery portion.

6. Discharge device according to claim 5, characterized in that the reservoir is contained in the actuating sleeve.

7. Discharge device according to any one of the preceding claims, characterized in that the pressure point protectors contain at least one predetermined breaking point.

8. Discharge device according to any one of claims 5 to 7, characterized in that one of the pressure point protectors comprises a ring circumferentially attached to radial spokes on the sleeve by way of destructible material bridges.

9. Discharge device according to claim 8, characterized in that one of the stop elements is a spoke.

10. Discharge device according to claims 8 and 9,

characterized in that the undersides of the spokes are reinforced by stiffening ribs.

11. Discharge device according to one of claims 1, 3 to 8, characterized in that the unlocking action is effected by manually rotating the actuating means relative to the main body.

12. Discharge device according to claim 11, characterized in that a turning stop for the unlocking action is provided by a projecting wall of the main body.

13. Discharge device according to one of the preceding claims, characterized in that the pressure point protector for a further discharge stroke is in the form of at least one web connected to the main body by breaking points.

14. Discharge device according to claim 13, characterized in that the web is located in the vicinity of a slot between walls of the delivery portion.

15. Discharge device according to any one of claims 4 to 12, characterized in that a handle for operating the device is provided on the actuating shoulders of the main body and adapted to operate the device in conjunction with a pushing motion on the underside of the actuating sleeve.

16. Discharge device according to one of the preceding claims, characterized in that the reservoir is tightly sealed in its starting position, but at the start of a further discharge stroke step it is in communication with the discharge channel.

17. Discharge device according to any one of the preceding claims, characterized in that the discharge device is a disposable two-component atomizer for the

successive administration of a medicament to the two nostrils of a patient.

18. Discharge device according to any one of the preceding claims, characterized in that on the first stroke of the pump piston, a piston rod presses a hollow plunger into the reservoir and perforates a piston stopper to open the connection of the reservoir to the discharge channel.

19. Discharge device according to claim 18, characterized in that the hollow plunger is a hypodermic needle.

20. Discharge device according to any one of the preceding claims, characterized in that an idle path is provided between the starting position of the actuating means relative to the main body and the position of the actuating means when the reservoir is open.

21. Discharge device according to any one of the preceding claims, characterized in that the discharge opening is a spray nozzle.

22. Discharge device according to any one of claims 4 to 19, characterized in that the delivery portion is a thin, long delivery tubule at the end of which is located the discharge opening.

23. Discharge device according to claim 22, characterized in that the delivery tubule has an inner channel that is largely filled, with the exception of at least one line channel for the medium, by a filler with an end face spaced from the discharge opening to create a spray nozzle vortex channel.

24. Discharge device according to claim 22 or 23,

characterized in that, for a length of more than 10 mm the delivery tubule has a diameter below 5 mm.

25. Discharge device according to claim 24, characterized in that for a length of between 20 and 30 mm of the delivery the tubule has a diameter below 5 mm.

26. Discharge device according to claims 24 or 25, characterized in that the diameter is between 3 and 4 mm.

27. Discharge device according to any one of claims 23 to 26, characterized in that the delivery tubule has a bend, or branches off in an angled manner from the delivery portion.

28. Discharge device according to any one of claims 23 to 27, characterized in that the bend is a flexible pliable portion of the tubule such that it can adapt to a nasal passage when inserted in a nose.

29. Discharge device according to any one of claims 23 to 28, characterized in that the delivery tubule is constructed for introduction into a nasal passage, particularly the inner nostril and/or for the discharge of a medicament, such as a vaccine or immunizing agent.

30. Discharge device according to any one of claims 23 to 29, characterized in that the discharge opening is constructed for producing a spray jet for wetting the conchae nasi.

31. Discharge device according to any one of claims 23 to 30, characterized in that the delivery portion contains a piston stopper and a guide channel for the reservoir acting as a pump chamber.

32. Discharge device substantially as herein

described with reference to and as illustrated by the accompanying drawings.

Dated this 9th day of March 2001
ING. ERICH PFEIFFER GMBH
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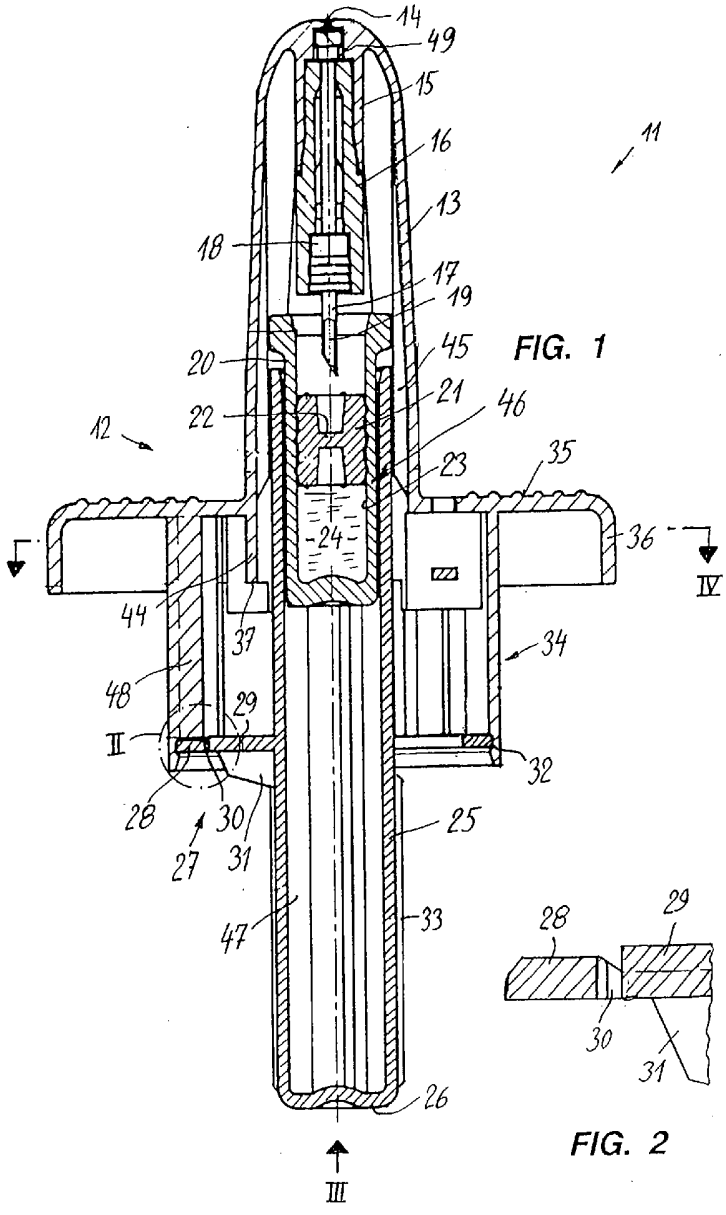
Fellows Institute of Patent and
Trade Mark Attorneys of Australia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IV
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III

FIG. 1

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FIG. 2

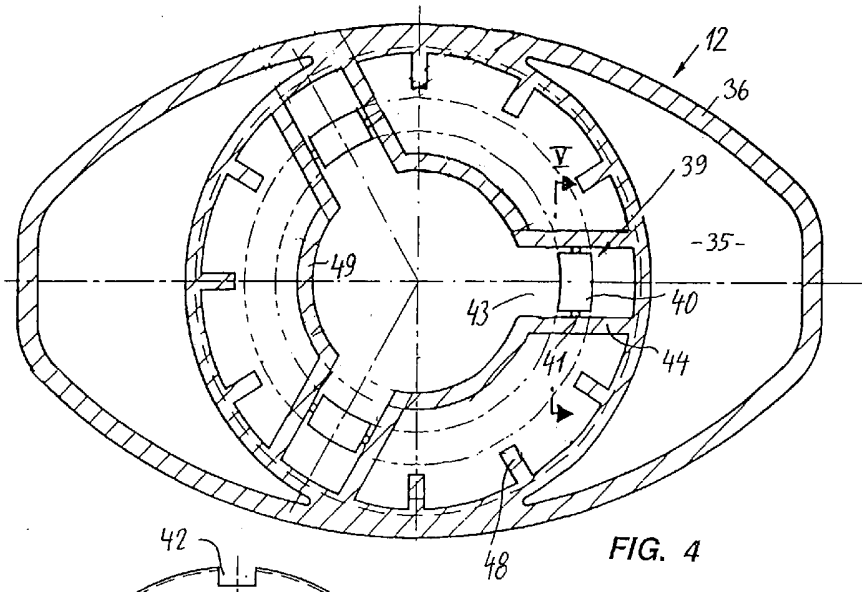


FIG. 4

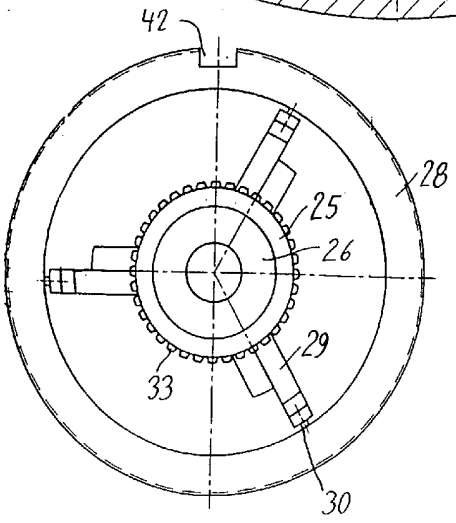
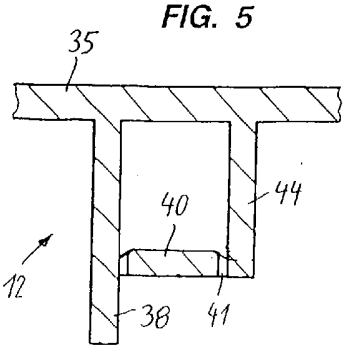


FIG. 3

FIG. 5



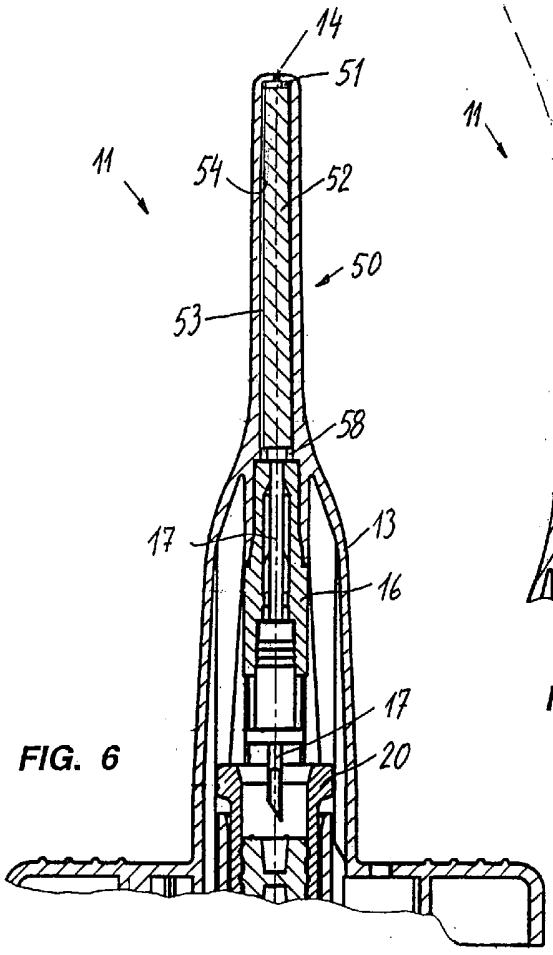


FIG. 6

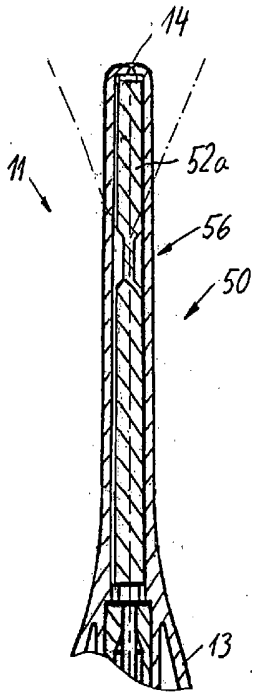


FIG. 7