(19) DANMARK

(10) DK/EP 2829296 T3

(12) Oversættelse af europæisk patentskrift

Patent- og Varemærkestyrelsen

(51) Int.Cl.: *A 61 M 5/32 (2006.01)*

(45) Oversættelsen bekendtgjort den: **2018-12-10**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2018-08-15**

(86) Europæisk ansøgning nr.: **14173845.0**

(86) Europæisk indleveringsdag: **2014-06-25**

(87) Den europæiske ansøgnings publiceringsdag: **2015-01-28**

(30) Prioritet: **2013-07-24 DE 102013214429**

(84) Designerede stater: **AL 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 RS SE SI SK SM TR**

(73) Patenthaver: **RAUMEDIC AG, , 95213 Münchberg, Tyskland**

(72) Opfinder: **Jakob, Thomas, Friedrich-Ebert-Strasse 1, 95111 Rehau, Tyskland**
Braun, Thomas, Faunapark 2a, 95032 Hof, Tyskland
Festel, Tobias, Bergstraße 7, 95234 Sparneck, Tyskland
Maag, Sebastian, Grünewaldstrasse 12, 95448 Bayreuth, Tyskland
Skaper, Frank, Ringstraße 10, 95191 Leupoldsgrün, Tyskland

(74) Fuldmægtig i Danmark: **Chas. Hude A/S, H.C. Andersens Boulevard 33, 1780 København V, Danmark**

(54) Benævnelse: **MEDICINSK INJEKTIONSINDRETNING**

(56) Fremdragne publikationer:
EP-A1- 2 578 255
EP-A1- 2 578 256
EP-A2- 0 272 035
WO-A1-2014/048298
US-A- 4 923 447
US-A1- 2009 259 193

The invention relates to a medical injection device with an injection device and a needle guard.

Medical injection devices with needle guards are known from EP 460 914 B1, EP 707 860 B1, US Pat. No. 4,838,871, EP 692 271 B1, US Pat. No. 4,944,397, US Pat. No. 4,982,842, US Pat. No. 5,232,455, US Pat. No. 5,139,489, US Pat. No. 5,154,285, US Pat US 5,277,311, US 5,232,454, US 5,312,367, US 5,342,322, US 5,423,765, US 5,643,219, WO 1991/009639 A2, EP 862 920 B1, EP 885 621 B1, EP 1 525 016 B1, the EP 1 568 321 A1, EP 1 587 419 B1, EP 1 592 346 B1, US Pat. No. 5,584,816, US Pat. No. 5,632,732, CH 685 979 A5 and DE 695 02 357 T2.

US 2009/0259193 A1 describes a single-use syringe.

EP 2 578 256 A1, EP 2 578 255 A1 and US 4,923,447 A describe a needle guard.

EP 0 272 035 A2 describes an injection device.

Document WO 2014/048298 A1 published after the priority date of this application describes a needle guard for a syringe configured as a sliding sleeve.

It is an object of the present invention to further develop an injection device of the type mentioned at the outset in such a way that an intuitively operable and operationally safe needle guard is obtained.

This object is achieved by a medical injection device with a needle guard and a securing device with the features specified in claim 1. The securing device leads to a secure retention of the safe position by the protective component as soon as the safe position of the protective component is reached. The securing device can be designed as a snap-locking securing device, for example as an axially and or radially snap-locking securing device. Alternatively or additionally, the securing device can achieve a secure fixing of the protective component in the safe position by means of an interlocking connection, designed for example in the manner of a bayonet connection. The needle guard can be actively displaceable from the injection position into the safe position and can be designed such as to be displaceable by the user. The entire needle guard and also the securing device can be made with plastic components. The medical injection device has an interlocking adapter for interlocking the needle guard to the injection device. Such an interlocking adapter can be designed such that the needle guard is adaptable to commercial designs of injection devices. An interlocking and/or snap-locking connection of the interlocking adapter can be produced both with the injection device and with the needle guard. A protection against rotation of the interlocking adapter can be ensured both with the injection device and with the needle guard. The interlocking adapter can be configured as an axially attachable adapter sleeve or as radially snap-lockable C-shaped adapter. In a telescopic design of the needle guard, the interlocking adapter can at the same time be a connecting sleeve. This connecting sleeve may be one of the telescoping sleeves. The needle guard has at least two telescoping sleeves, with one of the telescoping sleeves being connected to the injection device while a protective telescoping sleeve is the protective component. An embodiment of this type configured as a telescopic needle guard can

be produced in a compact manner. In the injection position, the telescoping sleeves can be arranged such as to be slid one into the other. In the safe position, the telescoping sleeves can be arranged in a telescopic manner. The injection cannula can be completely enclosed by the protective telescoping sleeve and on all sides. A connection between the telescoping sleeves can be produced by an interlocking and/or snap-locking arrangement. At least one of the telescoping sleeves, which is arranged in another of the telescoping sleeves, may have a conical outer wall. This can ensure a uniform force transfer during a displacement of the interlocking connection and or snap-locking arrangement between the injection position and the safe position. This can improve an intuitive handling of the needle guard when transferring it from the injection position to the safe position. Between a locking position, which defines the injection position between the telescopic components, and a locking position, which defines the safe position of the telescopic components, at least one intermediate locking position can be defined by corresponding intermediate locking steps. The locking intermediate steps can in particular be designed with peripheral grooves in outer walls of the respective inner telescoping sleeves. The snap-locking arrangement can be designed as a radially and/or as an axially acting locking connection. The directions "radial" and "axial" refer to the direction of movement of locking components in the displacement between a locking position and a release position with respect to a central longitudinal axis of the needle guard.

A multi-component injection molding part design expands the possibilities for designing the components of the needle guard. The multi-component injection-molded part can be configured as a two-component injection molded part

or, alternatively, as an injection molded part with more than two components, for example three components, four components, five components or even more components. Softer plastics can be combined with harder plastics. Softer plastics can be used, for example, for a grip section of the needle guard or for molded components acting on counter components to compensate for play and/or for creating or increasing a frictional engagement between the respective molded component and the respective counter component.

A soft component of the multi-component injection-molded part can be made, for example, of one or more thermoplastic elastomers (TPE), of polyurethane or of silicone. A hard component of the multi-component injection molded part may be made of polypropylene, polyethylene, ABS (acrylonitrile-butadiene-styrene), a thermoplastic based on methyl methacrylate, acrylonitrile, butadiene and styrene (MABS), polyoxymethylene (POM), polybutylene terephthalate (PBT) or as a blend system, in other words a mixture based on polyolefins and polyamide.

A guard locking assembly according to claim 2 leads to a particularly secure fixing of the protective component in the safe position. The guard locking assembly can be configured such that the protective component, once it is transferred to the safe position, can no longer be moved out of the safe position by the user without being destroyed.

An injection connecting assembly according to claim 3 prevents the needle guard from being transferred unintentionally from the injection position to the safe position. The injection connecting assembly can be configured in a snap-

locking manner, for example an axially and/or radially snap-locking manner, and/or by an interlocking connection, for example as a bayonet connection, as already explained above in connection with the guard locking assembly.

An injection locking assembly according to claim 4 can be implemented with low production costs. The injection locking assembly can be designed releasably, which can be achieved, for example, by disengaging locking components by applying a defined pressure on the needle guard by the user.

At least one additional telescoping sleeve according to claim 5 allows a larger stroke of the telescopic needle guard between the safe position and the injection position and, therefore, the covering of longer injection cannulas while ensuring a compact axial length. Exactly one more telescoping sleeve can be arranged between the connecting telescoping sleeve and the protective telescoping sleeve. Also, a plurality of additional telescoping sleeves of this type, for example, two or three additional telescoping sleeves, may be provided in such a telescopic needle guard. A guard locking assembly according to claim 6 can have locking teeth with a preferred direction, thus ensuring a one-way conversion of the protective component of the needle guard into the safe position and/or a defined end position of the protective component in the safe position. The guard locking assembly may have a plurality of locking teeth rows arranged peripherally arranged the telescoping sleeves, which can each interact with a counter locking body. The locking teeth can be formed in one piece with the respective telescoping sleeve.

At least one tongue/groove guide device according to claim 7 ensures a defined and secure guidance between the telescoping sleeves during their relative displacement between the injection position and the safe position.

The embodiments according to claim 8 represent advantageous variations when using multi-component injection-molded parts.

A multi-component injection-molded design of the interlocking element and the interlocking element supporting body allows the at least one interlocking element, which can be configured as an axial rib, to be made of a plastic material that is softer than that of the interlocking element supporting body so a frictional engagement of the interlocking elements is improved at the inner opening and connecting section. This improves the protection against rotation of the interlocking adapter relative to the opening and connecting section.

Embodiments of the invention will be explained in more detail with reference to the drawing, in which

Fig. 1 shows a medical injection device with an injection device and a telescopic needle guard in the assembled and ready-for-delivery state;

Fig. 2 shows the injection device according to Fig. 1 in a ready-to-use state, in which an original protective cap has been removed from an injection cannula;

Fig. 3 shows the injection device according to Fig. 2 during a displacement of the telescopic needle guard between an injection position according to Figs. 1 and 2, in which the injection cannula is exposable (Fig. 1) or exposed (Fig. 2) for injecting a medium, and a safe position in which a cannula tip of the injection cannula is recessed in a protective component of the telescopic needle guard;

Fig. 4 shows the injection device with the telescopic needle guard in the safe position;

Fig. 5 shows a partial longitudinal sectional view through the injection device with the original protective cap being attached thereto, wherein the telescopic needle guard is shown in a position between the injection position and the safe position;

Fig. 6 shows an enlarged detail view of detail VI in Fig. 5;

Fig. 7 shows an enlarged view of a section of the injection device in the safe position; 8 to 11;

Fig. 8 shows current positions during assembly of the injection device;

Fig. 12 shows an exploded view of another embodiment of a medical injection device with a telescopic needle guard;

Fig. 13 shows the injection device according to Fig. 12 with the needle guard in the injection position;

Fig. 14 shows the injection device according to Fig. 12 with the needle guard in the safe position;

Fig. 15 shows an interlocking adapter for interlocking the needle guard according to Figs 12 to 14 with the injection device, configured as a radially snap-lockable C-shaped adapter;

Fig. 16 shows a telescoping sleeve of the needle guard according to Figs 12 to 14, which is arranged between the interlocking adapter according to Fig. 15 and a protective telescoping sleeve of the needle guard;

Fig. 17 shows the protective telescoping sleeve of the needle guard according to Figs. 12 to 14;

Fig. 18 shows an exploded view of another embodiment of a telescopic needle guard for a medical injection device;

Fig. 19 shows an injection device with the needle guard according to Fig. 18 in the injection position;

Fig. 20 shows the injection device according to Fig. 18 with the needle guard in the safe position;

Fig. 21 shows an interlocking adapter for interlocking the needle guard according to Figs. 18 to 20 with the injection device;

Fig. 22 shows a connecting telescoping sleeve of the needle guard according to Figs. 18 to 20, which is arranged between the interlocking adapter according to Fig. 21 and a central telescoping sleeve of the needle guard;

Fig. 23 shows a central telescoping sleeve of the needle guard according to Figs. 18 to 20, which is arranged between the connecting telescoping sleeve according to Fig. 22 and a protective telescoping sleeve of the needle guard;

Fig. 24 shows the protective telescoping sleeve of the needle guard according to Figs. 18 to 20;

Fig. 25 shows an annular cover for the protective telescoping sleeve according to Fig. 24;

Fig. 26 shows an axial longitudinal sectional view through the needle guard according to Figs. 18 to 20, shown in the safe position;

Figs. 27 to 35 show illustrations similar to Figs. 18 to 26 of components of another embodiment of a needle guard for an injection device;

Figs 36 to 42 show illustrations similar to Figures 18 to 24 of components of another embodiment of a needle guard for an injection device, and

Fig. 43 shows an axial longitudinal sectional view through the needle guard according to Figs. 36 to 38, shown in the safe position.

Figs. 1 to 11 show an embodiment of a medical injection device 1. The injection device 1 has an injection unit 2. The injection unit 2 includes a container 3 for the medium to be injected. The container 3 can be configured as a syringe container 3 for receiving a syringe piston, which is not shown in the drawing. The injection unit 2 further includes an injection cannula 4, which is shown in Fig. 2 and which is covered in Fig. 1 by an original protective cap 5. The original protective cap 5 is placed onto the injection cannula 4 in the originally delivered state of the injection device 1 according to Fig. 1 and is axially locked with a cannula-side end of the container 3. For injecting the medium, the injection cannula 4 communicates with the container 3 via a cannula-side opening and connecting section 6 of the container 3, which is shown in the sectional view according to Fig. 5. The opening and connecting section 6 is slid onto a conically tapered opening end of a glass body of the container 3 and may be additionally interlocked therewith in a positively engaging manner, in particular by means of a snap-locking connection. The injection cannula 4, which is a metal cannula, is connected to the opening section 6 via a

plug-in or conical connection 7. In an alternative embodiment of the injection device 1 not shown, the conical connection 7 is configured as a Luer lock connection. In the region of the plug-in or conical connection 7, an inner wall of the opening section 6 can be snap-locked with an outer wall of a cannula attachment or be connected thereto in any other positively engaging manner.

Apart from the injection cannula 4, all components of the injection device 1 are made of plastic material. The injection cannula 4 may generally be made of plastic material as well.

The injection device 1 further has a needle guard 8. Said needle guard 8 is displaceable between an injection position shown in Fig. 2, in which the injection cannula 4 is exposable, for example, for subcutaneous or intravenous injection of the medium, and a safe position shown in Fig. 4, in which a cannula tip 9 of the injection cannula 4 is recessed in a protective component 10 of the needle guard 8.

The needle guard 8 surrounds the opening section 6 in the manner of a sleeve and has at least two telescoping sleeves. In the embodiment according to Figs. 1 to 11, the needle guard 8 has a total of three telescoping sleeves 10, 11 and 12, with one of these three telescoping sleeves, the protective telescoping sleeve 10, representing the protective component of the needle guard 8. The protective telescoping sleeve 10 is at the same time the outermost of the three telescoping sleeves 10 to 12 of the needle guard 8. An innermost of the three telescoping sleeves, the connecting telescoping sleeve 12, is connected to the

injection unit 2 by means of an interlocking adapter 13. Between the innermost telescoping sleeve 12 and the outermost telescoping sleeve 10 of the needle guard 8, the telescoping sleeve 11 is located, which serves as another telescoping sleeve of the needle guard. 8

In the injection position, the telescoping sleeves 10 to 12 are completely slid one into the other. In the injection position, the needle guard 8 covers the conical connection 7 axially in such a way that it is not accessible from outside. In the safe position, the telescoping sleeves 10 to 12 are telescoped relative to each other.

Figs. 5 and 6 show details of the injection device 1 and in particular details of the needle guard 8.

For securing the protective component, i.e. the outermost protective telescoping sleeve 10, in the safe position, a securing device configured as a guard locking assembly 14 is provided. Said guard locking assembly 14 has locking teeth rows 15 with locking teeth 16 arranged one behind the other along the central telescoping sleeve 11 and the inner connecting telescoping sleeve 12. Each of the telescoping sleeves 11, 12 has two outer locking teeth rows 15 arranged opposite one another and peripherally around the longitudinal axis of the injection device. The two locking teeth rows 15 of the central telescoping sleeve 11 are offset relative to the two rows of teeth 15 of the inner connecting telescoping sleeve 12 by 90°about the longitudinal axis of the injection device 1 in the peripheral direction.

The locking teeth 16 are each engaged by a counter locking body 17 of the outer protective telescoping sleeve 10 or a counter locking body 18 (see. Fig. 7) of the central telescoping sleeve 11a. In the axial longitudinal sectional view of the injection device, the locking teeth 16 have a sawtooth profile with a preferred direction to ensure a one-way conversion of the telescoping sleeves 10, 11 from the injection position into the telescoped safe position. Seen in an axial sectional view, a locking tooth 16 '(see. Fig. 6), which corresponds to a maximum telescoped relative position of the associated telescoping sleeves 10, 11, has a preferred direction, which is exactly counter thereto, in order to define the telescopic end position, in other words the safe position of the needle guard 8.

The locking teeth 16 are formed in one piece with the respective telescoping sleeve 11, 12.

To ensure a telescopic guidance and, at the same time, a protection against rotation between two adjacent ones of the three telescoping sleeves 10 to 12, i.e. between the telescoping sleeves 10, 11 on the one hand and the telescoping sleeves 11, 12 on the other, the needle guard 8 is provided with tongue/groove guide devices 19.

Fig. 7 shows a groove 20 of one of the tongue/groove guide devices 19, which is formed as an axial longitudinal groove in an outer jacket wall of the inner connecting telescoping sleeve 12. This groove 20 is engaged by a complementary tongue 21, which is formed in an inner wall of the central telescoping sleeve 11 in such a way as to protrude inwardly. The tongue 21 of the central

telescoping sleeve 11, which interacts with the groove 20 of the inner telescoping sleeve 12 in a guiding manner, is formed by the inner ends of the locking teeth 16 of the central telescoping sleeve 11.

Another groove/tongue guide device 19 is formed by axial longitudinal grooves 22 in the inner jacket wall of the outer protective telescoping sleeve 10 and complementary tongues 23, which are formed in the outer jacket wall of the central telescoping sleeve 11 in such a way as to project radially outwardly. Two identical groove/tongue guide devices 19 at a time are arranged opposite one another relative to the longitudinal axis of the injection device 1. In relation to a respective one of the telescoping sleeves 10 to 12, one locking component of the guard locking assembly 14 alternates with a respective component of the groove/tongue guide device 19 in 90° increments about the longitudinal axis of the injection device 1 in the peripheral direction.

Figs. 8 to 11 show current positions during assembly of the injection device 1. The interlocking adapter 13 is snap-locked with the container 3 of the injection unit 2 by means of locking hooks 24. For this purpose, the locking hooks 24 engage behind a locking collar 25 of the container 3, said locking collar 25 being arranged at the transition to the opening section 6.

The inner connecting telescoping sleeve 12 is axially connected to the interlocking adapter 13 by means of a plurality of locking bodies 26 formed at free ends of locking tongues 27 of the interlocking adapter 13. The locking tongues 27 extend in the axial direction and are formed on a common supporting ring 28 of the interlocking adapter 13. Consequently, the interlocking adapter 13

therefore has the shape of an axially attachable adapter sleeve. A distance between two locking tongues 27 adjacent to one another in the peripheral direction about the longitudinal axis of the injection device 1 and the number of locking tongues 27 is matched to a width and a number of axially extending peripheral ribs 29, which are formed on the outside of the opening section 6 of the container 3. When the interlocking adapter 13 is attached, in each case one of the locking tongues 27 is fitted between two adjacent peripheral ribs 29, so that a protection against rotation of the interlocking adapter 13 relative to the container 3, namely the opening and connecting section 6 of the container 3, is provided. An inner wall of the inner connecting telescoping sleeve 12 is provided with axial structures, which are not shown in detail in the drawing and ensure a protection against rotation of the inner connecting telescoping sleeve 12 relative to the interlocking adapter 13 when the inner connecting telescoping sleeve 12 is snap-locked with the interlocking adapter 13. The inner axial structures of the connecting telescoping sleeve 12 engage between respective adjacent locking tongues 27 of the interlocking adapter 13.

When the inner connecting telescoping sleeve 12 is in the snap-locked condition, the locking bodies 26 engage behind a complementary locking collar of the connecting telescoping sleeve 12, which is not shown in detail in the drawing.

For interlocking the protective telescoping sleeve 10, in other words the protective component of the needle guard 8, to the injection unit 2 in the injection position, an injection connecting assembly is provided, which is designed as

injection locking assembly. Locking components of this injection locking assembly are, on the one hand, the outer edges of the free ends of the locking hooks 24 of the interlocking adapter 13, and on the other hand the counter locking bodies of the protective telescoping sleeve 10 engaging behind the same in the injection position This injection locking assembly 17, 24 can be overcome by disengaging the counter locking bodies 17 from the engagement with the locking tongues 24. This disengagement can be performed by applying a defined pressure on the needle guard 8.

The injection device 1 is assembled as follows: First, the injection unit 2 is in a commercial delivery design, which is shown in Fig. 8. The needle guard 8 with the sleeves 10 to 12 is pre-assembled in the injection position in which the telescoping sleeves are completely slid one into the other. The interlocking adapter 13 is then slid onto the injection unit 2 from the cannula side of the injection unit 2 with the locking hooks 24 ahead until the locking hooks 24 engage behind the locking collar 25 of the container 3 in a snap-locking manner (cf. Fig. 9). Subsequently, the prefabricated needle guard 8 with the three telescoping sleeves 10 to 12, which are arranged one inside the other and are interconnected in a snap-locking manner, are also slid onto the injection unit 2 from the cannula side thereof until the inner connecting telescoping sleeve 12 on the one hand is snap-locked with the interlocking adapter 13, wherein the locking tongues 27 are pressed radially between the peripheral ribs 29 for protection against rotation, and the injection locking assembly 17, 24 on the other comes into engagement. When slid onto the interlocking adapter 13, the inner connecting telescoping sleeve 12 is oriented in the peripheral direction such that the inner axial structures of the connecting telescoping sleeve 12 engage

between the locking tongues 27 of the interlocking adapter 13. When the inner connecting telescoping sleeve 12 is completely slid on, a leading abutment collar of the connecting telescoping sleeve 12 comes to abut against a facing end wall of the supporting ring 28 of the interlocking adapter 13.

Internal structures of the connecting telescoping sleeve 12 at the same time serve as hold-down means for holding the locking tongues 27 between the peripheral ribs 29 of the opening section 6 of the injection unit 2.

After assembly, the injection device 1 is ready for use with the needle guard 8 in the injection position, and the originally mounted protective cap 5 is arranged on the injection needle 4 as shown in Figs. 1 and 11. Due to the various anti-rotation components, the total of four components 10 to 13 of the needle guard 8 are secured against rotation relative to each other and also the entire needle guard 8 is secured against rotation relative to the injection unit 2.

The injection device 1 is used as follows: First, the protective cap 5 is removed from the injection cannula 4, which is done by turning (see arrow 30 in Fig. 1). During turning, the cross-sectional configuration of the protective telescoping sleeve 10 projecting over the outer periphery of the container 3 ensures that the user grasps the injection device 1 on the outside of the protective telescoping sleeve 10 in order to turn off the cap 5. For this purpose, the protective telescoping sleeve 10 has axially extending longitudinal ribs which prevent the protective telescoping sleeve 10 from undesirably rotating between the fingers of the user when the protective cap 5 is being turned off. Since all components of the needle guard 8 are secured against rotation relative to each

other and the interlocking adapter 13 is secured against rotation relative to the opening section 6 as well, it is ensured that during a relative rotation of the protective cap 5 relative to the needle guard 8 in the direction of the arrow 30 (or in the direction counter thereto), the cap 5 actually turns off from the opening section 6 in the desired manner. After said turning movement, the cap 5 can be removed from the injection cannula 4.

The injection device 1 is then ready for use as shown in Fig. 2. In order to move the needle guard 8 into the safe position (cf. Figs. 3 to 7), pressure is first applied to the protective telescoping sleeve 10 from both sides in a pressure region 31, which is marked on the outer protective telescoping sleeve 10. This causes the counter locking bodies 17 to disengage from the locking hooks 24, allowing the outer protective telescoping sleeve 10 to be telescoped axially relative to the telescoping sleeve 11 in the direction of the arrow 32 applied thereto (see also arrow 33a in Fig. 3). The counter locking body 17 then rattles over the locking teeth 16 of the guard locking assembly 14 until the end position of the counter locking body 17 in front of the end-side locking tooth 16 'of the central telescoping sleeve 11 is reached. Subsequently, the central telescoping sleeve 11 telescopes relative to the inner connecting telescoping sleeve 12, wherein the counter locking bodies 18 of the central telescoping sleeve 11 rattle over the locking teeth 16 of the inner connecting telescoping sleeve 12 until the end position of the counter locking body 18 abutting against the end-side locking tooth inner of the connecting telescoping sleeve 12 is reached here as well. The needle guard 8 is then in the fully telescoped safe position of Fig. 4. In this position, the cannula tip 9 of the injection can-

nula 4 is arranged such as to be completely recessed in the protective telescoping sleeve 10 such that a secure puncture protection is ensured. A nondestructive transfer of the needle guard 8 from the safe position of Fig. 4 in such a way that the cannula tip 9 is exposed again, is not possible for the user due to the one-way configuration of the associated locking assemblies 14.

A further embodiment of an injection device 33 will be explained below with reference to Figs. 12 to 17. Components and functions corresponding to those already described above with reference to Figs. 1 to 11 bear the same reference numerals and will not be discussed in detail again.

The needle guard 8 of the injection device 33 according to Figs. 12 to 17 again has three telescoping sleeves, namely an outer protective telescoping sleeve 34 the function of which corresponds to the protective telescoping sleeve 10 of the embodiment according to Figs. 1 to 11, a central telescoping sleeve 35 the function of which corresponds to the telescoping sleeve 11 of the embodiment according to Figs. 1 to 11, and an inner connecting telescoping component 36, which represents an interlocking adapter at the same time for interlocking the needle guard 8 with the injection unit 2 in a positively engaging manner. The connecting telescopic component 36 thus combines the functions of the inner telescoping sleeve 12 with those of the interlocking adapter 13 of the embodiment according to Figs. 1 to 11.

The connecting telescopic component 36 is designed as a radially snap-lockable C-shaped adapter. The connecting telescopic component 36 is snap-locked

radially with the opening section 6 of the container 3 such that the locking collar 25 of the opening section 6 is engaged behind by the connecting telescopic component 36 in a peripheral region in order to axially secure the connecting telescopic component 36.

In order to ensure a higher frictional engagement between the connecting telescope component 36 and the opening section 6 of the container 3 of the injection unit 2, and thus in particular a protection against rotation, inner ribs 37 of the connecting telescopic component 36, which – in the assembled state – abut against the opening section 6 between the peripheral ribs 29 thereof, are made of a softer plastic material than the remaining body of the connecting telescopic component 36. The ribs 37 may be formed on the base body of the connecting telescopic component 36, for example by multi-component technology, in particular by 2K technology. Of the inner ribs 37, exactly one rib 37 is indicated in Fig. 15. In fact, there are a plurality of ribs 37, for example five ribs 37, in the peripheral direction, which are arranged at equal distances relative to one another such as to be matched to the peripheral distance of the peripheral ribs 29.

The central telescoping sleeve 35 (see also Fig. 16) is connected to the connecting telescopic component 36 by means of a radially acting snap-locking engagement. For this purpose, the central telescoping sleeve 35 has a spring tongue 38, which engages a corresponding recess of the connecting telescopic component 36.

The outer protective telescoping sleeve 34 also has a spring tongue 39, which engages behind a corresponding locking receptacle in the central telescoping sleeve 35 or the connecting telescopic arrangement 36 to provide a snap-locking engagement. The spring tongue 39 and the locking receptacle associated thereto in the injection position thus form the injection connecting assembly for interlocking the protective telescoping sleeve 34 to the injection unit 2 in the injection position.

In the safe position of the needle guard 8 in the embodiment according to Figs. 12 to 17, the locking tongue 39 engages behind a locking receptacle 40, which is formed in the central telescoping sleeve 35. In this way, and by means of a corresponding snap-locking engagement of the central telescoping sleeve 35 with the connecting telescopic component 36, a guard locking assembly is provided for locking the protective telescoping sleeve 34 in the safe position.

Apart from the differences explained above, the assembly and also the use of the injection device 33 corresponds to what has already been explained above with reference to the injection device 1.

Another embodiment of an injection device 41 will be explained below with reference to Figs. 18 to 26. Components and functions corresponding to those already explained above with reference to the injection devices 1 and 33 bear the same reference numerals and will not be discussed in detail again.

The injection device 41 also has a telescopic needle guard 8, which comprises a connecting telescoping sleeve 12, an interlocking adapter 13, a central telescoping sleeve 11 and a protective telescoping sleeve 10, and therefore has the same basic design as the needle guard 8 of the injection device 1. Differences can be found in details of the snap-locking connections and the design of the guideways. The snap-locking connections are formed as axial snap-locking connections in the injection device 41.

The protective telescoping sleeve 10 is designed in two parts in the needle guard 8 of the injection device 41 and has an additional annular cover 42 in addition to the actual telescoping sleeve. Via an outer periphery, the cover 42 is snap-locked with an inner peripheral groove 43 in an outer end portion of the protective telescoping sleeve 10. An annular snap-locking connection is formed between the cover 42 and the protective telescoping sleeve 10 by means of an outer periphery of the cover 42 and the inner peripheral groove 43. The cover 42 serves to reduce an externally accessible opening width of the protective telescoping sleeve 10 to a through-opening 44 with a diameter that is smaller than that of the inner diameter of the remaining protective telescoping sleeve 10.

When assembling the needle guard 8 according to Figs. 18 to 26, the central telescoping sleeve 11 is first inserted into the protective telescoping sleeve 10, which is still without cover, from the side of the inner peripheral groove 43. Subsequently, the connecting telescoping sleeve 12 is inserted into the central telescoping sleeve 11 from the same side. Then, the cover 42 is snap-locked

with the inner peripheral groove 43. The interlocking adapter 13 is then inserted into the connecting telescoping sleeve 12 from the opposite side.

The preassembled needle guard can then be slid onto the injection unit 2. This is done until an abutment collar 45 of the interlocking adapter 13 abuts against the locking collar 25 of the injection unit 2 (see for example Fig. 8).

When the needle guard 8 according to Figs. 18 to 26 is slid further on the injection unit 2 in the direction of the container 3, the connecting telescoping sleeve 12 is axially displaced in the direction of the interlocking adapter 13, which is then axially secured to the locking collar 25, until locking hooks 46 formed on the connecting telescoping sleeve engage behind the locking collar 25 of the opening section 6 of the injection unit 2. In the injection device 41, it is not the locking hooks on the interlocking adapter 13 but the locking hooks 46 of the connecting telescoping sleeve 12 that ensure a positive engagement of, among other things, the protective telescoping sleeve 10 serving as a protective component of the needle guard 8, with the injection unit 2 in the injection position.

In the injection device 41, a protection against rotation between the needle guard 8, which is therefore also an anti-rotation device, and the opening section 6 of the injection unit 2 is provided as well. For this purpose, the interlocking adapter 13 of the injection device 41 again has anti-rotation tongues 47 corresponding to the locking tongues 27 of the embodiment of Figs. 1 to 11. The anti-rotation tongues 47 extend axially and are connected to each other via the supporting ring 28 of the interlocking adapter 13 of the injection

device 41. When mounted, the anti-rotation tongues 47 are each received between two adjacent, axially extending peripheral ribs 29 of the opening section 6 of the injection unit 2.

In order to hold the anti-rotation tongues 47 between the peripheral ribs 29, the connecting telescoping sleeve 12 is provided with a hold-down means. Said hold-down means is formed by a total of four inner axial ribs, of which two are visible in the axial sectional view of Fig. 26. The axial ribs 48 are each formed on an inner wall of the connecting telescoping sleeve 12 in such a way as to be offset by 90 ° in the peripheral direction. Each of the axial ribs 48 cooperates with a hold-down counterpart on the interlocking adapter 13 for holding down a respective one of the anti-rotation tongues 47. The hold-down counterparts are formed by outer axial ribs 49 on the interlocking adapter 13 (cf. Fig 21).

The interlocking adapter 13 is secured to the connecting telescoping sleeve 12, and in each case two adjoining telescoping sleeves 12, 11, 10 are secured against one another by respective anti-rotation devices to prevent a relative rotation about the longitudinal axis of the needle guard 8. This protection against rotation is again formed by outer tongues 50 on each of the components 13, 12, 11, which cooperate with complementary inner axial grooves 51 in the respectively adjacent outer telescoping sleeves 12, 11, 10 in such a way as to prevent rotation thereof.

At the same time, the tongues 50 serve as stops, which cooperate with axially extending recesses 51a serving as stops for defining an axial end position of

the connecting telescoping sleeve 12 relative to the interlocking adapter 13 in the snap-locking connection of the needle guard 8 with the locking collar 25 of the opening section 6 via the locking hooks 46 of the connecting telescoping sleeve 12.

Comparable to the locking hooks 46 of the connecting telescoping sleeve 12, the central telescoping sleeve 11 and the protective telescoping sleeve 10 also have comparable, radially acting locking hooks 52. Just like the locking hooks 46, the locking hooks 52 are arranged offset relative to each other by in each case 90° in the peripheral direction as well. In the injection position, for example according to Fig. 19, the locking hooks 46, 52 of adjacent telescoping sleeves 12, 11, 10 lie exactly above one another. The locking hooks 52 of the central telescoping sleeve 11 engage behind complementary recesses 53 formed in the outer side of the locking hooks 46. The locking hooks 52 of the protective telescoping sleeve 10 engage corresponding recesses 53 formed in the outer side of the locking hooks 52 of the central telescoping sleeve 11.

In the safe position of the needle guard 8 (cf. for example Figs. 20 and 26), the locking hooks 52 of the central telescoping sleeve 11 on the one hand and the protective telescoping sleeve 10 on the other interact with outer peripheral grooves 53a in the connecting telescoping sleeve 12 on the one hand and in the central telescoping sleeve 11 on the other.

When the telescoping sleeves 11, 10 are transferred from the retracted injection position into the extended safe position, the locking hooks 52 slide between the respective counter recesses 53 and the peripheral grooves 53a. The

telescoping sleeves 12, 11 widen conically between the respective counter recesses 53 and the respective peripheral grooves 53a so as to ensure a uniform force transfer to the locking hooks 52 during the transfer of the telescoping sleeves 11, 10 to the safe position.

The protective telescoping sleeve 10 is configured as a 2K injection molded part. The protective telescoping sleeve 10 has a grip section 55 provided adjacent to a supporting body 54. The supporting body 54 on the one hand and the grip section 55 on the other are designed as different injection-molded components of the 2K component. Suitable 2K plastic materials include ABS (acrylonitrile-butadiene-styrene) for a hard component, i.e. for example for the supporting body 54, and TPE (thermoplastic elastomer) for a soft component, for example for the grip section 55. Also, a different number of components can be used in such a multi-component injection molded part, for example, three or more components of different plastic materials, and especially of plastic materials having different degrees of hardness.

Due to the design of the protective telescoping sleeve 10 as a 2K injection-molded part, a grippier feel of the protective telescoping sleeve 10 is ensured in the region of the grip section 55.

The axial ribs 48 of the connecting telescoping sleeve 12, which serve as hold-down means as well, may be made of a different plastic material than the remaining connecting telescoping sleeve 12, and the axial ribs 48 can be molded to another supporting body of the connecting telescoping sleeve 12 by means of 2K injection molding technology.

A further embodiment of an injection device 56 will be explained below with reference to Figs. 27 to 35. Components and functions corresponding to those already explained above with reference to the injection devices 1, 33 and 41 and in particular with reference to the injection device 41 bear the same reference numerals and will not be discussed in detail again.

Between the counter recesses 53 and the peripheral grooves 53a, the connecting telescoping sleeve 12 and the central telescoping sleeve 11 each have three intermediate locking steps 57. When displacing the protective telescoping sleeve 10 and the central telescoping sleeve 11 between the injection position and the safe position, the respective locking hooks 52 of the protective telescoping sleeve 10 and the central telescoping sleeve 11 engage the intermediate locking steps 57 on their displacement path between the respective counter-recesses 53 and the respective peripheral grooves 53a. When the two telescoping sleeves 10, 11 travel between the injection position and the safe position, the user receives a haptic feedback concerning the displacement path already covered.

Another embodiment of an injection device 58 will be explained below with reference to Figs. 36 to 43. Components and functions that correspond to those already explained above with reference to the injection devices 1, 33, 41 and 56 bear the same reference numerals and will not be discussed in detail again.

Similar to the injection device 1, the injection device 58 is also configured in four parts with an inner interlocking adapter 13, a connecting telescoping

sleeve 12, a central telescoping sleeve 11 and an outer protective telescoping sleeve 10.

The function of locking hooks 46 and 52 of the telescoping sleeves 12, 11 and 10 in the injection device 58 is similar to the injection device 41. The telescoping sleeves 11 and 10 each have two mutually opposing locking hooks 52, in other words they are offset relative to each other by 180° in the peripheral direction. When the injection device 8 is mounted, the locking hooks 52 of the central telescoping sleeve 11 are offset relative to the locking hooks 52 of the protective telescoping sleeve 10 by 90 ° in the peripheral direction, similar to the concept of the counter locking body and the locking teeth in the injection device 1.

During assembly, the central telescoping sleeve 11 is first inserted into the outer protective telescoping sleeve 10 in the direction of arrow 32 until the locking hooks 52 of the outer protective telescoping sleeve 10 engage behind counter recesses 59 of the central telescoping sleeve 11, which are formed at the end of axial guideways 60 in an outer wall of the central telescoping sleeve 11.

Subsequently, the connecting telescoping sleeve 12 is also inserted in the central telescoping sleeve 11 in the direction of the arrow 32. This is done until the locking hooks 52 of the central telescoping sleeve 11 come to rest in recesses 61 of the connecting telescoping sleeve 12, which are again formed at the end of axial guideways 60 in an outer wall of the connecting telescoping sleeve 12.

Then, the interlocking adapter 13 is inserted into the connecting telescoping sleeve 12 in the direction of arrow 32 again until the locking hooks 46 of the connecting telescoping sleeve 12 engage recesses 62 of the interlocking adapter 13 from outside. The recesses 62 are again formed in axial guideways 60 of the interlocking adapter 13. In this preassembled position, the sleeves 11 and 12 are arranged virtually completely in the outer protective telescoping sleeve 10. The largest part of an axial extension of the interlocking adapter 13 between the recesses 62 and the abutment collar 45 projects beyond the telescoping sleeves 10 to 12 slid one into the other.

When mounting the preassembled needle guard 8 to the injection unit 2, the needle guard 8 is slid onto the opening section 6 of the injection unit 2 with the interlocking adapter 13 going in first until the abutment collar 45 hits the locking collar 25 of the opening section 6. Subsequently, the three telescoping sleeves 10 to 12 slid one into the other are further displaced in the axial direction towards the container 3, causing the locking hooks 46 of the connecting telescoping sleeve 12 to disengage from the recesses 62 of the interlocking adapter 13 such as to slide along the guideways 60 first before engaging behind the locking collar 25 for securing the needle guard 8 to the injection unit 2. At the same time, hold-down means again ensure that the anti-rotation tongues 47 of the interlocking adapter 13 between adjacent peripheral ribs 29 of the opening section 6 are held down against the injection unit 2 in order to prevent rotation of the needle guard 8.

The interaction of the guideways 60 with the associated locking hooks 46, 52 serves as a protection against rotation of the components of the needle guard 8 relative to each other. Another protection against rotation is provided by axial guideways arranged offset relative to the locking hook/guideway designs by in each case 90°.

The needle guard 8 is then prepared in the injection position.

When transferring the needle guard 8 from the injection position into the safe position, the locking hooks 52 of the central telescoping sleeve 11 on the one hand move out of the recesses 61 of the connecting telescoping sleeve 12 and the locking hooks 52 of the outer protective telescoping sleeve 10 on the other move out of the counter recesses 59 of the central telescoping sleeve 11. The locking hooks of the telescoping sleeves 10, 11 then run axially along the respective guideways 60 of the telescoping sleeves 11 and 12 until the locking hooks 52 of the outer protective telescoping sleeve 10 engage recesses 63 formed at the ends of the guideways 60 opposite the counter recesses 59. In the safe position, the locking hooks 52 of the central telescoping sleeve 11 further move into recesses 63, which are formed at the ends of the guideways 60 of the connecting telescoping sleeve 12 opposite the recesses 61. In this manner, the telescoped safe position of Fig. 38 or 43 is reached.

Patentkrav

1. Medicinsk injektionsindretning (1; 33; 41; 56; 58)

- med en injektionsenhed (2), hvilken injektionsindretning omfatter:

-- en beholder (3) til det medium der skal injiceres,

-- en injektionskanyle (4) som kommunikerer med beholderen (3),

- med en nålebeskyttelsesindretning (8) som kan forskydes mellem

-- en injektionsposition, i hvilken injektionskanylen (4) er indrettet til at blive åbnet for at injicere mediet, og

-- en beskyttelsesposition, i hvilken en kanylespids (9) af injektionskanylen (4) er anbragt forsænket i en beskyttelseskomponent (10; 34) af nålebeskyttelsesindretningen (8),

- med en sikringsindretning (14; 39, 40) til sikker fastgørelse af beskyttelseskomponenten (10; 34) i beskyttelsespositionen,

- med en sammenlåsningsadapter (13; 36) til at forbinde nålebeskyttelsesindretningen (8) med injektionsenheden (2) i en sammenlåsende forbindelse,

- hvor nålebeskyttelsesindretningen (8) omfatter mindst to teleskopmuffer (10 til 12; 34 til 36; 34, 35, 42), hvor en forbindende teleskopmuffe (12; 36; 42) er forbundet til injektionsenheden (2), og hvor en beskyttende teleskopmuffe (10; 34) danner beskyttelseskomponenten,

kendetegnet ved, at

- mindst en del af nålebeskyttelsesindretningen (8) er udformet som en multikomponent, sprøjtestøbt del, og

- mindst en multikomponent, sprøjtestøbt del af nålebeskyttelsesindretningen (8) er udformet som en ydre muffe (10), som har mindst en håndtagsdel (55) og mindst et bærelegeme (54), hvilket bærelegeme (54) på den ene side og den mindst ene håndtagsdel (55) på den anden side er udformet som forskellige sprøjtestøbte komponenter af den multikomponent, sprøjtestøbte del.

2. Injektionsindretningen ifølge krav 1, kendetegnet ved, at sikringsindretningen (14; 39, 40) er udformet som en beskyttelseslåsekonstruktion til fastlåsning af beskyttelseskomponenten (10; 34) i beskyttelsespositionen.

3. Injektionsindretning ifølge krav 1 eller 2, kendetegnet ved en injektionsforbindelseskonstruktion (18, 24; 46) til fastgørelse af beskyttelseskomponenten (10; 34) på injektionsenheden (2) i injektionspositionen på en sammenlåsende måde.

4. Injektionsindretningen ifølge krav 3, kendetegnet ved, at injektionsforbindelseskonstruktionen (18, 24) er udformet som en injektionslåsekonstruktion til låsning af beskyttelseskomponenten (10; 34; 46) i injektionspositionen.

5. Injektionsindretning ifølge et hvilket som helst af kravene 1 til 4, kendetegnet ved, at mindst en yderligere teleskopmuffe (11; 35) af nålebeskyttelsesindretningen (8) er anbragt mellem den forbindende teleskopmuffe (12; 36; 42) og den beskyttende teleskopmuffe (10; 34).

6. Injektionsindretning ifølge et hvilket som helst af kravene 1 til 5, kendetegnet ved, at beskyttelseslåsekonstruktionen (14) omfatter mindst en låsende tandrække (15) af låsende tænder (16; 16) som er anbragt foran den anden langs mindst en af teleskopmufferne (11, 12) med et modlåsende legeme (17, 18) af den yderligere teleskopmuffe (10, 11), som støder op til teleskopmuffen (11, 12) af nålebeskyttelsesindretningen (8), der går i indgreb i låsetandrækken (15).

7. Injektionsindretning ifølge et hvilket som helst af kravene 1 til 6, kendetegnet ved mindst en not/fjer-føringsindretning (19) til sikring af en teleskopføringsbane og rotationsbeskyttelse mellem to tilstødende teleskopmuffer (10 til 12; 34 til 36; 34, 35, 42).

8. Injektionsindretning ifølge et hvilket som helst af kravene 1 til 7, kendetegnet ved, at nålebeskyttelsesindretningen (8) omfatter:

- mindst et sammenlåsningselement (37) der holdes mellem to tilstødende, aksialt forløbende perifere ribber (29) af en åbnings- og forbindelsesdel (6) af injektionsenheden (2),
- hvor sammenlåsningselementet (37) er dannet på et sammenlåsende elementbærende legeme (36),
- hvor det sammenlåsende elementbærende legeme (36) på den ene side og det mindst ene sammenlåsningselement (37) på den anden side er udformet som forskellige sprøjtestøbte komponenter af den multikomponent-sprøjtestøbte del (36).