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Device for screwing together medium-guiding threaded connections, particularly luer lock connections

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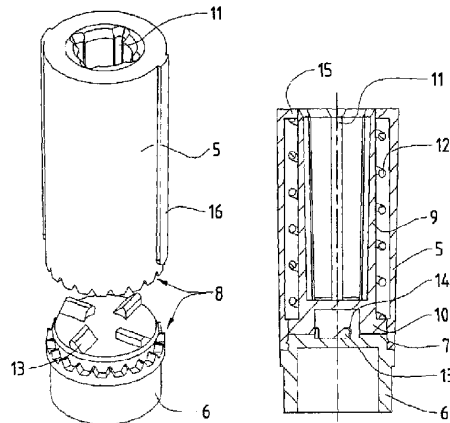
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[Fortsetzung auf der nächsten Seite]

(54) Title: DEVICE FOR SCREWING TOGETHER MEDIUM-GUIDING THREADED CONNECTIONS, PARTICULARLY LUER LOCK CONNECTIONS

(54) Bezeichnung: VORRICHTUNG ZUM VERSCHRAUBEN MEDIUMFÜHRENDER GEWINDEVERBINDUNGEN, INSBESONDERE LUER-LOCK-VERBINDUNGEN



(57) Abstract: Disclosed is a device comprising an outer part (5) and an inner part (9) that is accommodated therein. Longitudinal grooves (11) are provided within the inner part (9) so as to receive longitudinal ribs of an injection needle. Protrusions (13) that are disposed on the outer part (5) and recesses (14) which are arranged within the inner part (9) allow the inner part (9) to be twisted only in one direction relative to the outer part (5) while putting up resistance to said twisting movement. A spring (12) tenses the outer part (5) and the inner part (9) counter to each other in an axial direction.

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**(57) Zusammenfassung:** Die Vorrichtung weist einen Aussenteil (5) und einen darin aufgenommenen Innenteil (9) auf. Längsnuten (11) im Innenteil (9) sind zur Aufnahme von Längstrippen einer Injektionsnadel vorgesehen. Am Aussenteil (5) angeordnete Vorsprünge (13) und im Innenteil (9) vorhandene Vertiefungen (14) lassen eine Drehung des Innenteils (9) gegenüber dem Aussenteil (5) nur in einer Drehrichtung zu und setzen dieser Drehung einen Widerstand entgegen. Eine Feder (12) spannt den Aussenteil (5) und den Innenteil (9) in axialer Richtung gegeneinander.

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(54) Title: DEVICE FOR SCREWING TOGETHER MEDIUM-GUIDING THREADED CONNECTIONS, PARTICULARLY LUER  
LOCK CONNECTIONS.

(57) Abstract: Disclosed is a device comprising an outer part (5) and an inner part (9) that is accommodated therein. Longitudinal grooves (11) are provided within the inner part (9) so as to receive longitudinal ribs of an injection needle. Protrusions (13) that are disposed on the outer part (5) and recesses (14) which are arranged within the inner part (9) allow the inner part (9) to be twisted only in one direction relative to the outer part (5) while putting up resistance to said twisting movement. A spring (12) tenses the outer part (5) and the inner part (9) counter to each other in an axial direction.

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**DEVICE FOR SCREWING TOGETHER MEDIUM-GUIDING THREADED CONNECTIONS, PARTICULARLY LUER LOCK CONNECTIONS.**

The invention relates to a device for screwing together medium-guiding threaded connections, particularly Luer-lock connections, with an outer part and an inner part that is rotatably accommodated therein, which inner part has available means to accommodate the one thread-bearing connection part or an additional part rotationally  
5 secured to the former, impeding means being available that allow a rotation of the inner part in only one direction relative to the outer part and that oppose a resistance to this rotation.

Luer-lock fastenings are used in particular in the area of medical technology, in order to  
10 connect together parts in whose interior a medium flows, especially a fluid. To these parts belong, for example, infusion containers and associated tubes or injection syringes and associated needles. So that such connections are tight and do not loosen, they must be tightened with a certain torque. On the other hand, most of the threaded parts made of plastic must not be tightened too strongly because otherwise they can break.  
15

The task of the invention is to propose a device for tightening fluid-guiding threaded connections, in particular Luer-lock connections, which device can be produced simply and cost effectively, is simple to operate, and reliably limits, above and below, the torque in the tightening of the threaded connection.  
20

Any discussion of documents, acts, materials, devices, articles or the like which has been included in the present specification is solely for the purpose of providing a context for the present invention. It is not to be taken as an admission that any or all of these matters form part of the prior art base or were common general knowledge in the  
25 field relevant to the present invention as it existed before the priority date of each claim of this application.

Throughout this specification the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element, integer or  
30 step, or group of elements, integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

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The invention achieves this task by the fact that the resistance when rotating increases up to a maximum load and subsequently falls off sharply. The resistance thus preferably runs in the shape of saw teeth, where the sharp falloff of the torque of the device can be discerned tactilely and/or acoustically by the operator, and it is signaled to the operator that the desired torque for screwing on the threaded connection has been achieved.

10 In one aspect, the present invention provides a device for screwing together medium-guiding threaded connections between an injection device and an injection needle, especially Luer-lock connections, with an outer part and an inner part rotatably accommodated therein, which inner part has available means for accommodating a one thread-bearing connection part of the injection needle or an additional part that is rotationally secured to the thread-bearing connection part of the injection needle, 15 impeding means being present, which means permit rotation of the inner part relative to the outer part in one rotational direction only and oppose a resistance to this rotation, characterized in that the resistance during the rotation increases up to a maximum load and subsequently falls off sharply.

20 According to a preferred form of embodiment of the invention, the means for accommodation consist of a bore present in the inner part having longitudinal grooves arranged axially therein. These longitudinal grooves accommodate the longitudinal ribs present on a conventional needle carrier of the Luer-lock type or on a supplementary part and thus ensure a reliable transfer of the tightening torque. The supplementary part 25 is preferably a needle protective cap placed on the connection part.

According to another form of embodiment of the invention, the impeding means exhibit essentially axially-directed protrusions arranged in the outer part which work in conjunction with essentially axially-directed recesses arranged on the inner part, and 30 spring means are present that press the

outer part and the inner part against each other in the axial direction. These protrusions and recesses can advantageously effect a tactile and visible periodic axial displacement of the inner part with respect to the outer part. It is understood that a kinematic reversal of this principle is also possible, where the recesses are arranged in the outer part and the protrusions are arranged on the inner part.

Another embodiment form of the invention provides for the impeding means to exhibit essentially radially-directed protrusions arranged in the outer part that work in conjunction with essentially tangentially directed blades arranged on the inner part, where the blades are formed so as to be resilient in an essentially radial direction. This allows an especially simple realization of the device with only two parts. Naturally, here also the kinematic reversal is possible, the protrusions being arranged on the inner part and the blades in the outer part.

Another aspect of the invention relates to a loading station for the preparation of an injection device that contains a device according to the invention. Here the loading station can contain other functional elements that serve the preparation of an injection device, in particular an autoinjector. The device according to the invention is preferably removably accommodated in the loading station. A special embodiment form of the loading station is designed at the same time as a container for storage of the parts of an injector device. This makes it possible for the user of an injection device to simply carry the necessary individual parts with him and to store them in clear view.

Specific embodiment forms of the invention are further detailed in an exemplary manner with reference to the accompanying drawings, in which:

- Fig. 1 shows a perspective view of an injection needle with Luer-lock connection;
- Fig. 2 shows a partially exploded view obliquely from above of a first embodiment form of the device according to the invention;
- Fig. 3 shows a partially exploded view obliquely from below of the first embodiment form according to Fig. 2;
- Fig. 4 shows a longitudinal section through the first embodiment form according to Figs. 2 and 3;
- Fig. 5 shows an view obliquely from below of a second embodiment form of the device according to the invention;
- Fig. 6 shows a longitudinal section through the second embodiment form according to Fig. 5; and
- Fig. 7 shows a perspective view of a loading station for an injection device, with a device for screwing on a threaded connection.

Fig. 1 shows a known example of an injection needle 1 with a needle carrier 2 made of plastic, into which a cannula 3 made of metal is cast. The needle carrier 2 exhibits two tabs 17 on its upper edge in the figure, the tabs assuming the function of an outer thread that can be screwed into a corresponding inner thread in order to connect the injection needle with a syringe. Formed outside on the needle carrier 2 are ribs 4, which are accommodated by the corresponding longitudinal grooves in a needle protective cap 18 and thus form a rotationally-fixed connection with the cap. The needle protective cap 18, for its part, exhibits external ribs 19, which likewise serve to transfer a torque. The embodiment forms described below of a device according to the invention for screwing on fluid-guiding threaded connections are specifically intended for injection needles of this kind.

The first embodiment form of the device, represented in Figs. 2 to 4, exhibits an outer sleeve 5 that is connected to a base 6 by means of a snap connection 7. So that the sleeve 5 cannot turn relative to the base 6, the two parts are provided with a tothing 8. Supported in the sleeve 5 is a rotation part 9 that exhibits an axial opening in which longitudinal grooves 11 are present for accommodating the ribs 19 of the needle protective cap 18. A spring 12 formed as a compression spring is located between the sleeve 5 and the rotation part 9, the spring being supported axially on an upper edge 15 of the sleeve 5 and on a lower flange 10 of the rotation part 9 and pressing the rotation part 9 against the base 6. On this base 6 are arranged a number, in the present example four, of protrusions 13, each of which has a vertical and an inclined side. Incorporated into the lower front side of the rotation part 9 are recesses 14, which correspond in number and form to the protrusions 13. Now, for example, if an injection needle 1 is introduced into the rotation part 9, the ribs 4 at the needle carrier 2 engage the longitudinal grooves 11 of the rotation part 9, so that the needle carrier 2 cannot turn in the rotation part 9. If the syringe is now turned in the clockwise sense, there occurs at first a relative rotation between the syringe and the needle carrier 2, whereby the thread is tightened. If a predetermined minimal torque is reached, the rotation part 9 begins to turn relative to the sleeve 5. In the process, the recesses 14 of the rotation part slide over the protrusions 13 of the base 6, whereby the rotation part is raised so far against the force of the spring 12, in the present example after a turning angle of 90°, that the recesses 14 are again flush with the protrusions 13. At this moment, the rotation part 9 is thrust downward by the spring 12 and strikes the base 6, whereby due to the feel as well as the sound the user is alerted to the fact that the desired torque has been achieved. The longitudinal ribs 16 present on the outer periphery of the sleeve 5 serve, on the one hand, to provide a better hold when the device is held in the hand, and on the other hand serve as a protection against rotation when the device is arranged in a loading station, as is described further below.

Figures 5 and 6 show a second advantageous embodiment form of the device according to the invention, which consists of only two parts, namely of a sleeve 25 and a rotation part 29 arranged

in the sleeve, both of which can be produced of plastic by the injection molding process. The rotation part 29 exhibits in its lower part tangentially formed-on blades 33. These blades 33 act as spiral springs and upon a turning of the rotation part 9 are guided past the longitudinal ribs 28 which are formed inside on the rotation part, the blades 33 yielding radially in an elastic manner. After passing the longitudinal ribs 28 the blades 33 again spring outward, whereby a clicking sound occurs that signals the user that the desired torque has been achieved. This device is very simple to assemble in that the rotation part 29 is pushed into the sleeve 25 from above, the blades 33 in the upper, slightly conical part of the sleeve 25 deforming symmetrically inward and, after passing the step 27 of the sleeve 25, snapping outward. The rotation part is thus held at the top. At the bottom the rotation part 29 is held in the sleeve 25 by means of an upper edge 30 formed on the rotation part 29, which edge rests against a further step 26 of the sleeve 25. In this embodiment example, also provided at the outer periphery of the sleeve 25 are longitudinal ribs 36, which serve for better holding when the device is held in the hand, or serve as rotation protection when the device is arranged in a loading station, as is described below.

From the above description of the two embodiment examples of the invention there results the fact that the inner part 9 or, as the case may be, 29 can only be turned in one direction and that it is blocked in the opposite direction. This device according to the invention can thus also be used for loosening threaded connections.

Figure 7 shows a loading station 40 for the preparation of an autoinjector. Autoinjectors serve especially for administration of medications that the patient in question himself injects. The autoinjectors usually operate through spring force, whereby in an automatic manner an injection needle is first stuck in and then an agent is expelled. If an autoinjector is fitted for use with filled syringes, then the stressing of the spring, the placing of the injection needle onto the syringe, and the introduction of the syringe into the autoinjector all belong to the preparation process. Elements that enable this preparation or make it easier can, for example, include a tension pin 43 which serves the stressing of the spring, and a receptacle (44) (not shown) can be provided for an assembly aid, with the help of which aid the autoinjector can be put together after the introduction of the syringe. Furthermore, the loading station 40 can be fitted with storage depressions 40 and 41, which serve the storing of the autoinjector or its parts and/or the storing of the mentioned assembly aid. This loading station further contains a device 45 such as was described above by way of the two embodiment examples and which serves the tightening of the threaded connection between the injection needle and the syringe. This device 45 is preferably removably accommodated in a cylindrical depression of the loading station, which depression exhibits longitudinal grooves into which the longitudinal ribs 16 or, as the case may be, 36 of the device fit.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

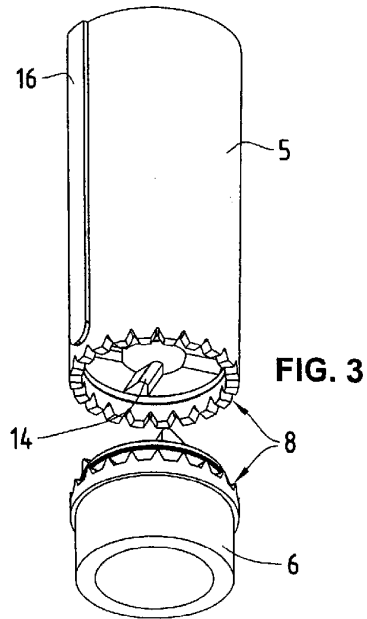
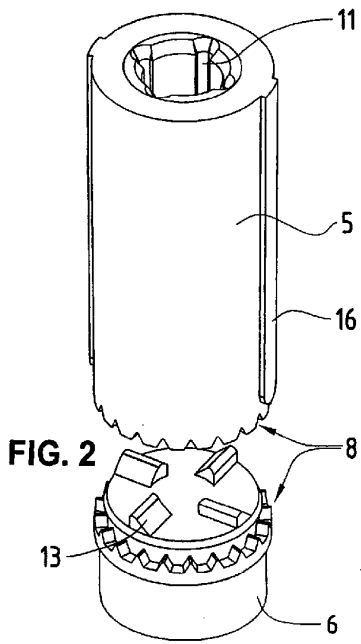
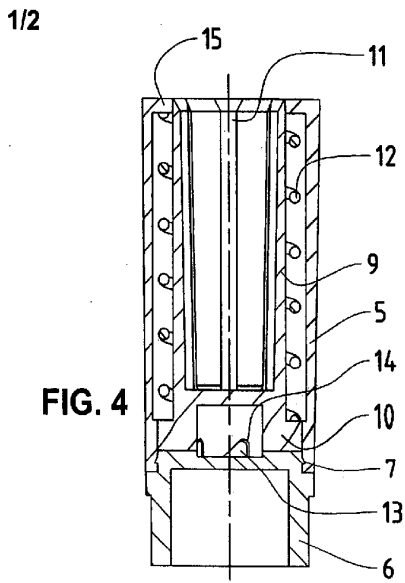
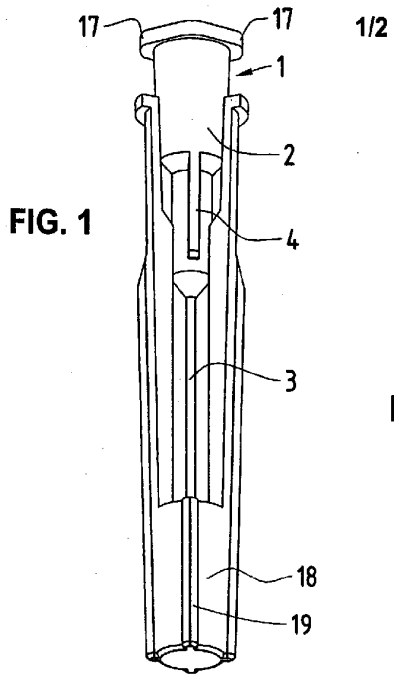
- 5 1. Device for screwing together medium-guiding threaded connections between an injection device and an injection needle, especially Luer-lock connections, with an outer part and an inner part rotatably accommodated therein, which inner part has available means for accommodating a one thread-bearing connection part of the injection needle or an additional part that is rotationally secured to the thread-bearing
- 10 connection part of the injection needle, impeding means being present, which means permit rotation of the inner part relative to the outer part in one rotational direction only and oppose a resistance to this rotation, characterized in that the resistance during the rotation increases up to a maximum load and subsequently falls off sharply.
- 15 2. Device according to claim 1, characterized in that the means for accommodating consist of a bore present in the inner part, said bore having longitudinal grooves arranged axially therein.
- 3. Device according to claim 1 or 2, characterized in that the impeding means exhibit essentially axially-directed protrusions arranged in the outer part, said protrusions working in conjunction with essentially axially-directed recesses arranged
- 20 in the inner part, spring means being present that press the outer part and the inner part against each other in the axial direction.
- 4. Device according to claim 1 or 2, characterized in that the impeding means exhibit essentially axially-directed recesses arranged in the outer part, the recesses working in conjunction with essentially axially-directed protrusions arranged in the
- 25 inner part, spring means being present that press the outer part and the inner part against each other in the axial direction.
- 5. Device according to claim 1 or 2, characterized in that the impeding means exhibit essentially axially-directed protrusions arranged in the outer part, said protrusions working in conjunction with essentially tangentially-directed blades
- 30 arranged on the inner part, the blades being designed to be elastic in an essentially radial direction.
- 6. Device according to claim 1 or 2, characterized in that the impeding means exhibit essentially axially directed protrusions arranged on the inner part, the protrusions working in conjunction with essentially tangentially directed blades
- 35 arranged in the inner part, the blades being designed to be elastic in an essentially radial direction.

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7. Device according to any one of the preceding claims, characterized in that the additional part is a needle protective cap placed onto the connection part.
- 5 8. Loading station for the preparation of an injection device, characterized in that the loading station contains a device according to any one of the claims 1 through 7.
9. Loading station according to claim 8, characterized in that the device is accommodated in the loading station so as to be removable.
10. Loading station according to claim 8 or 9, characterized in that the loading station is designed as a container for storage of parts of the injection device.
11. Device substantially as hereinbefore described and the reference to the accompanying drawings.
12. Loading station substantially as hereinbefore described and with reference to the accompanying drawings.

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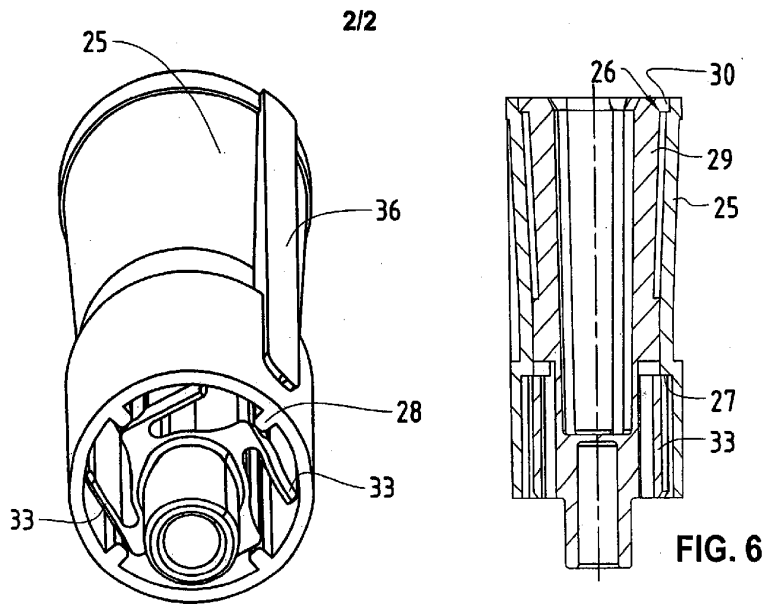


FIG. 5

FIG. 6

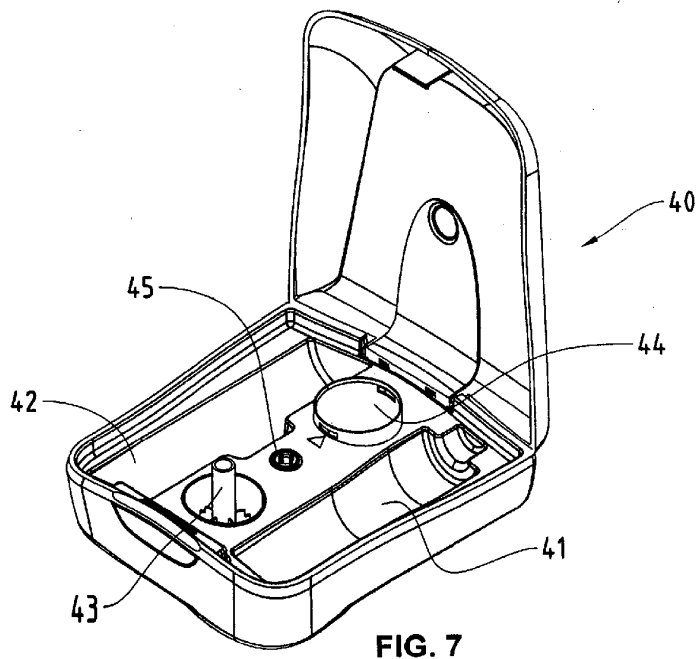


FIG. 7