

Title

Protective device for the needle tube of a syringe

Description**Introduction**

[01] The invention relates to a protective device for the needle tube of a syringe, comprising a housing for the needle tube which is pivotably formed on a support element, which has an open housing side in the pivot plane, so that after being used for injection, the needle tube can be pivoted into the housing and wherein on the housing side, a retaining means is provided for the inwardly pivoted needle tube.

Prior art

[02] It is known that the needle of a hypodermic syringe normally comprises a metal tube provided with a syringe and connected to a hollow support element and which is connected to the cylindrical body of a syringe. The present invention is concerned here with the problem of protecting the metal tube against needlestick, in this case in particular after a patient's body has been injected, in order to avoid injecting people who might come into contact with the needle following the treatment. If a second person is stabbed with the needle after it has been used on a first person, then this could lead to the transmission of diseases. Thus, a considerable risk is attached to the use of these needles, especially for those who normally work with them, i.e. in particular for hospital and clinic personnel. The disposal of used needles as waste also endangers those who handle the waste containers or who get close to these containers. Because of these circumstances, it is particularly

important for the needle tube to be protected after the injection in order thereby to prevent the possibility of the transmission of diseases.

[03] In order to counter this problem, WO 2009/007718 A1 as well as the German Utility Model DE 20 2018 107 052 have already disclosed a protective device for the needle tube of a syringe. In this known protective device from the prior art, the needle tube of the syringe is located on a support element which is accommodated by it. The outlet of the syringe is attached to the support element or the needle tube. In this manner, the protective device is then connected to the body of the syringe. In this regard, for protection, a pivotably mounted housing is disposed on the support element which in particular has an open housing side, in particular at its pivot plane. When the syringe is used in order to carry out an injection, the housing which is pivotably mounted on the support element is pivoted out of the way so that the needle tube is free and an injection can then be made. After the injection, the housing is pivoted back, whereupon the needle tube pivots back into the housing through the open housing side so that after being used for injection, the needle tube is once again located in the housing. So that inadvertent pivoting of the housing portion on the support element is prevented following use, according to the prior art, retaining means in the form of clamps or catches are provided on the housing walls of the pivotable housing which grip the needle tube and thus prevent inadvertent pivoting of the needle tube out of the housing.

[04] A disadvantage which is observed this known protective device of the prior art is that with the known embodiments, what is known as an unintentional pivoting process could occur so that then - without an injection having taken place - this exposes the needle tube. Furthermore, the fact that the retaining means cannot guarantee secure retention after

being used for injection, because the housing has swung back, is also seen as a disadvantage.

[05] Another problem is that even when the syringe has not been used, problems may arise because an unintentional pivoting process has commenced, which then exposes the needle tube and it is unprotected. In this regard, the syringes are stored one beside the other in the packaging. If one or more syringes are then removed from this packaging, the problem arises that the needle can jump out of the housing which is covered with a film because the outer packaging has been opened incorrectly. In addition, the problem arises that the known retaining devices here do not hold the needle tube in the desired protected position in the housing, whereupon the needle tube can jump out of the housing at any time upon improper removal. The result is that there is no indication that the retaining device in particular is securely retaining the needle in the housing.

[06] Furthermore, the fact that the known embodiments of protective devices are very expensive as regards their manufacturing costs is also seen as a disadvantage; in this regard too, the fact that cheap manufacture often means that important requirements regarding details are overlooked because they affect the manufacturing cost structure must also be taken into account.

Objective

[07] Thus, the problem to be solved by the invention is to further develop a protective device for a needle tube of a syringe which in particular overcomes the aforementioned disadvantages, wherein the protective device is substantially modified in a manner such that it is substantially more hygienically designed for what is known as the park station,

with the proviso that in particular, the manufacturing costs can be substantially reduced.

Solution

[08] In accordance with the invention, this problem is solved by the features of claim 1; advantageous embodiments of the invention are defined in the dependent claims.

[09] The advantages obtained by the invention consist in the fact that because of the inexpensive manufacture of a monobloc protective device for the needle tube of a syringe, all of the requirements for safe handling of the item are met. In this regard, it is ensured that unintentional flipping open of the housing region prior to injection is prohibited because this is prevented by a predetermined breaking point which is injection moulded in this case. Furthermore, the retaining devices in accordance with the invention ensure that the needle tube is prevented from coming loose from the housing which has been pivoted back.

[10] Thus, in accordance with the invention, it is proposed that, in addition to the connection of a film hinge in order to form a pivot axis, the support element and the pivotable housing are additionally connected together via a predetermined breaking point and wherein after being used for injection, the housing can be pivoted back over the destroyed predetermined breaking point. Because of this construction, by means of the monobloc configuration of the protective device, in this case, prior to use, the support element is firmly connected to the pivotable housing, wherein the pivotability is not compromised because here what is known as the predetermined breaking point means that the predetermined breaking point can be torn open by the application of manual pressure, so that pivoting can then be carried out. In particular, in this case, the predetermined breaking point

prevents what is known as swing-out upon removal from packaging. In addition, after the predetermined breaking point has been destroyed, the protective device is still in a condition wherein it can still accommodate the needle in the pivotable housing after injection because on the one hand, because the housing swings back, the retaining means engages in the housing, wherein on the other hand, over-swinging of the housing then means that the needle tube cooperates with the interior latch so that the retaining means ensures that the needle tube is accommodated in the pivotable housing following injection.

[11] In a variation of the invention, the predetermined breaking point consists of injection moulded flexible web elements. In this regard, the web elements are disposed on and connected to the edge regions of support element and housing edge, wherein they are injection moulded in a distributed manner over the edge region of the support element and housing.

[12] In accordance with an advantageous embodiment, after being used for injection, the housing can be pivoted back over the predetermined breaking point into a latched position, wherein the needle tube can be brought into operational connection with a retaining means provided in the housing. In this embodiment, the housing is pivoted over a pivot point so that in the latched end position, the support element and housing are in a slightly inclined position with respect to each other. This has the particular advantage that the inclined position ensures that the retaining means engages into the housing for the needle tube.

[13] In accordance with the invention, a retaining means is proposed in this regard which consists of two tongues formed in the housing on the housing wall, which are orientated in the manner of a harpoon in the direction in which the needle

tube pivots inwards. In order to forcibly guide the needle as it pivots inwards, so that the needle either jumps behind one or behind the other of the tongues, a peg element with a triangular configuration is provided between the tongues which forces the needle tube which has pivoted inwards under one or the other tongue.

[14] In a further variation of the protective device as an injection moulded monobloc component, the retaining means here consists of a deformable sleeve which is connected to the housing via sawtooth-like predetermined breaking points. The predetermined breaking points are formed on the housing front by means of protruding web struts, wherein the web struts are formed on the outside of the housing wall. Because of this construction, in this case, a retaining means in the form of a deformable sleeve is provided which can be injection moulded directly along with the housing part; here again, this means that the manufacturing costs are substantially reduced.

[15] In this regard, it should be noted that the protective device is produced as a monobloc from an injection moulded part with support elements, needle housing, predetermined breaking point as well as the retaining means.

[16] In accordance with an advantageous variation of the invention, optionally, a protective sleeve may cooperate with the housing which is pivotably mounted on the support element, by means of which, after being used for injection, the open housing side located in the pivot plane can be closed. The protective sleeve means that the protective device in which the needle tube is clamped and interlocked can additionally be hermetically sealed. In this regard, the protective sleeve has an opening disposed in the wall which is congruent with the open side located on the housing. This means that the protective sleeve does not impede the needle when it pivots outwards, because the retained needle can pivot through the

opening of the protective sleeve. The protective sleeve is rotatably mounted on the housing so that after being used for injection, it can be turned from an open position into a position which closes the housing.

[17] In this regard, the protective sleeve is connected and rotatably mounted with its lower housing edge on the edge region of the housing by interlocking. In order to prohibit unintentional twisting of the protective sleeve on the housing after being used for injection, a catch element is formed on the edge region of the housing which, after twisting the protective sleeve through 180° on the housing, cooperates with an aperture disposed in the wall of the protective sleeve which produces the latched position of the protective sleeve on the housing. The upper cover region of the protective sleeve comprises a gripping element on the underside of which a ring element is formed and which cooperates with a shaped 180° control cam which cooperates with a wedge formed on the cover region of the housing, which prevents the protective sleeve from turning backwards after interlocking the control cam with the wedge.

[18] In accordance with a particularly advantageous variation, the upper cover region of the protective sleeve has a gripping element. A ring element is formed on the underside of the gripping element, wherein a control cam which is curved around 180° is shaped into the ring element. The formed control cam cooperates in this regard with a wedge formed on the cover region of the housing which locks into the end region of the curve when it traverses the control cam. In this manner, twisting of the protective sleeve backwards after interlocking the control cam with the wedge is prohibited. In order to fix the gripping element on the protective sleeve, the ring element has a circular aperture located in the axis of rotation through which a locking clamp reaches and engages with the covering region of the housing.

Exemplary embodiments

[19] The invention will now be described in more detail with reference to an exemplary embodiment which is shown in the figures, in which:

- Figure 1: shows a perspective view of a protective device in accordance with a first embodiment,
- Figure 2: shows a further perspective view in accordance with a further embodiment,
- Figure 3: shows a detailed view, in particular of the predetermined breaking point of the invention between the support element and pivotable housing,
- Figure 4: shows a further perspective view in accordance with Figure 3, in another view,
- Figure 5: shows a further view in accordance with Figures 3 and 4 in the latched condition in the inclined position of the housing with respect to the support element,
- Figure 6: shows a detailed view of the retaining means of a first embodiment,
- Figure 7: shows a further view of the retaining means in a detailed view in accordance with Figure 6 in what is known as the latched position,
- Figure 8: shows a further side view of the retaining means in accordance with the second embodiment, and in fact in accordance with Figure 2,
- Figure 9: shows a perspective view of the protective device with the protective sleeve in the open position,
- Figure 10: shows a partial sectional front view in accordance with Figure 9,
- Figure 11: shows a further perspective view of the protective device with the protective sleeve in the closed position,

Figure 12: shows a perspective view of a gripping element for the protective sleeve in operational connection with the housing, shown in dashed lines, and

Figure 13: shows a further perspective view of the gripping element, in a bottom view.

[20] Figures 1 and 2 respectively show, in perspective views, a protective device 1 for a needle tube 2 of a syringe, not shown in any further detail, in two different exemplary embodiments. In this regard, the protective device 1 comprises a housing 4 for the needle tube 2 which is constructed to as to be pivotable on a support element 3 and which has an open housing side 5 in the pivot plane of the housing 4. Because of the open housing side 5, it is possible for the needle tube 2 to be pivoted into the housing 4 after being used for injection, so that it is then protected.

[21] In particular, in order to protect the needle tube 2 from improper use after the injection, on the housing side, a retaining means 6 is provided for the needle tube 2 which has been pivoted inwards, wherein Figure 1 shows a retaining means 6 inside the housing 4, which here is configured as a clamping means, whereas Figure 2 shows the retaining means 6 which covers the needle tube 2 with a sleeve 7 in order to protect it.

[22] In the protective device 1 in accordance with the invention, as can be seen in more detail in Figures 3 and 4, in addition to being connected by a film hinge 8, the support element 3 and the pivotable housing 4 are also connected via a predetermined breaking point 9 via which the support element 3 and the housing 4 are connected in order to form a pivot axis. If the predetermined breaking point 9 is destroyed, in the embodiment in accordance with the invention, it is possible for the housing 4 to be pivoted back over the

destroyed predetermined breaking point 9 after being used for injection, as can be seen in Figure 5, whereupon then, a catch means 10, shown in Figure 5, is operated. In this position of Figure 5, the housing 4 is in a slightly inclined position with respect to the support element 3, so that in particular the retaining means 6 as can be seen in Figure 7, is also operated. In this position, the housing 4 is in the latched position, such that it assumes a slightly inclined position over the film hinge 8, whereupon latching of the catch means 10 occurs.

[23] As can be seen in more detail in Figures 3 and 4 in particular, the predetermined breaking point 9 consists of injection moulded flexible web elements 11 which are disposed on the edge regions 12 and 13 of the support element 3 and housing 4. In this regard, the web elements 11 are distributed over the edge regions 12 and 13, as can be seen when Figures 3 and 4 are viewed together, and as also can be seen in Figure 2. As already indicated, after being used for injection, the housing 4 can be pivoted back over the predetermined breaking point 9 into a latched position, shown in Figures 4 and 5, wherein the needle tube 2 can be brought into operative connection with a retaining means 6 provided in the housing 4.

[24] The different retaining means 6 are shown in more detail here in Figures 6 and 7 as well as in Figures 1 and 8. In this regard, Figures 6 and 7 in combination with Figure 1 show a retaining means 6 which consists of two tongues 14 and 15 formed on the housing wall in the housing 4, as can be seen in particular in more detail in Figures 6 and 7. In this regard, the tongues 14 and 15 are configured in the manner of a harpoon such that they engage behind the needle tube 2 in the inward-pivoting direction of the needle tube 2 after it has passed through. In order to promote the engagement process, between the tongues 14 and 15, a peg element 16 formed in the

shape of a triangle is provided which pushes the needle tube 2 which has been pivoted inwards below one tongue 14 or the other tongue 15. It is clear that when the needle tube 2 pivots inwards and what is known as the latched position in accordance with Figure 5 is produced, the position of the needle tube 2 as shown in Figure 7 is assumed, wherein when the needle tube 2 pivots inwards, it is pushed either to the left or to the right and thus goes into the stable position of being retained.

[25] In accordance with a further embodiment concerning the retaining means 6, in particular as shown in Figure 8 in combination with Figure 2, the retaining means 6 consists of a sleeve 17 which can be deformed, which is connected to the housing 4 via sawtooth-like predetermined breaking points 18. As can be seen, the predetermined breaking points 18 are formed onto the housing side with protruding web struts 19. The web struts 19 in this regard are formed on the outside on the housing wall, as can be seen particularly well in Figure 2, but can also be seen in the sectional view of Figure 8. In both embodiments of the retaining means 6, the following applies, wherein in particular, these retaining means, as described and also shown in Figures 6, 7 but also 8, are all injection moulded together in a single injection moulding process so that in addition to the housing 4 and the support element 3, the retaining means 6 is also co-injection moulded and shaped.

[26] This is also the case for the entire protective device 1, which here can be injection moulded as a monobloc part in a manner such that, in addition to the predetermined breaking points 9, 18, the film hinge 8, the catch means 10 as well as the two different retaining means 6 can be injection moulded in a single operation or in a single tool.

[27] In accordance with an advantageous variation of the invention, shown in Figures 9, 10 and 11, a protective sleeve 19 can optionally cooperate with the housing 4 pivotably mounted on the support element 3, by means of which protective sheath, after being used for injection, the open housing side 5 located in the pivot plane can be closed. The protective sleeve 19 enables the protective device 1 in which the needle tube 2 is clamped and interlocked to be hermetically sealed in addition. To this end, the protective sleeve 20 has an opening 21 disposed in the wall which is congruent with the open side 5 of the housing. In this manner, the protective sleeve 20 does not prevent the needle tube 2 from pivoting outwards, because the retained needle tube 2 can pivot through the opening 21 of the protective sleeve 20. The protective sleeve 20 is rotatably mounted on the housing 4 so that it can be turned from an open position after being used for injection, shown in Figure 9, into a position which closes the housing 4, as shown in Figure 11.

[28] In this regard, the lower housing edge 22 of the protective sheath 20 is rotatably mounted on and interlocked with the housing 4. The interlocking here may, for example, be obtained by means of a snap fit connection. In order to prevent unintentional twisting of the protective sleeve 20 on the housing 4 after being used for injection, a catch element 23 is formed at the edge region 12 of the housing 4 which, after twisting the protective sleeve 20 through 180°, shown in Figure 11, cooperates on the housing 4 with an aperture 24 disposed in the wall of the protective sleeve 20, which generates the latched position of the protective sleeve 20 on the housing 4.

[29] In accordance with a particularly advantageous variation, shown in Figures 12 and 13, the protective sleeve 20 has a gripping element 25 at its upper cover region. A ring element

27 is formed on the underside 26 of the gripping element 25, wherein a 180° curved control cam 28 is formed in the ring element 27. The formed control cam 28 in this regard cooperates with a wedge 30 formed on the cover region 29 of the housing 4 which locks in the end region of the curve at the step 31 when it traverses the control curve 28. In this manner, twisting the protective sleeve 20 backwards after locking the control cam 28 with the wedge 30 is prohibited.

[30] In order to fix the gripping element 25 on the protective sleeve 20, the ring element 27 has a circular aperture 32 located in the axis of rotation through which the locking tongues 33 which are formed on the cover region of the housing 4 reach. In the inserted condition of the gripping element 25, the locking tongues 33 then interlock on the edge of the circular aperture 32, whereupon correspondingly, as described, the control cam 28 comes into operative connection with the wedge 30.

List of reference numerals

1	protective sleeve
2	needle tube
3	support element
4	housing
5	open housing side
6	retaining means
7	sleeve
8	film hinge
9	predetermined breaking point
10	catch means
11	web elements
12	edge region
13	edge region
14	tongue
15	tongue
16	peg element
17	sleeve
18	sawtooth predetermined breaking point
19	web struts
20	protective sleeve
21	opening in wall of protective sleeve
22	housing edge under protective sleeve
23	catch element
24	aperture
25	gripping element
26	gripping element, underside
27	ring element
28	control cam
29	cover region of housing
30	wedge
31	step
32	ring element aperture
33	locking tongues

Claims

1. A protective device (1) for the needle tube (2) of a syringe, comprising a housing (4) which can be pivoted on a support element (3) and which has an open housing side (5) in the pivot plane, so that the needle tube (2) can be pivoted into the housing (4) after being used for injection and wherein on the housing side, a retaining means (6) is provided for the needle tube (2) which has been pivoted inwards,
characterized in that
in addition to the connection of a film hinge (8) in order to form a pivot axis, the support element (3) and the pivotable housing (4) are additionally connected together via a predetermined breaking point (9), and wherein after being used for injection, the housing (4) can be pivoted back over the destroyed predetermined breaking point (9).
2. The protective device as claimed in claim 1,
characterized in that
the predetermined breaking point (9) consists of injection moulded flexible web elements (11).
3. The protective device as claimed in claim 1 and claim 2,
characterized in that
the web elements (11) are disposed on the edge regions (12 and 13) of the support element (3) and housing edge (4).
4. The protective device as claimed in claims 1 to 3,
characterized in that
the web elements (11) are distributed over the edge regions (12 and 13) of the support element (3) and housing (4).

5. The protective device as claimed in claims 1 to 4,
characterized in that
after being used for injection, the housing (4) can be pivoted back over the predetermined breaking point (9) into a latched position, wherein the needle tube (2) can be brought into operational connection with a retaining means (6) provided in the housing (4).
6. The protective device as claimed in claims 1 to 5,
characterized in that
the retaining means (6) consists of two tongues (14 and 15) formed in the housing (4) on the housing wall, which are orientated in the manner of a harpoon in the direction in which the needle tube (2) pivots inwards.
7. The protective device as claimed in claims 1 to 6,
characterized in that
a peg element (16) with a triangular configuration is provided between the tongues (14 and 15) which forces the needle tube (2) which has been pivoted inwards under one or the other tongue (14), (15).
8. The protective device as claimed in claims 1 to 4,
characterized in that
the retaining means (6) consists of a deformable sleeve (17) which is connected to the housing (4) via sawtooth-like predetermined breaking points (18).
9. The protective device as claimed in claim 8,
characterized in that
the predetermined breaking points (18) are formed at the protruding web struts (19) on the housing front.
10. The protective device as claimed in claim 9,
characterized in that
the web struts (19) are formed on the housing wall.

11. The protective device as claimed in one or more of claims 1 to 10,
characterized in that
the protective device (1) is produced as a monobloc from an injection moulded part with the support element (3), needle housing (4), predetermined breaking point (9) as well as the retaining means (6).
12. The protective device as claimed in claims 1 to 7,
characterized in that
a protective sleeve (20) optionally cooperates with the housing (4) which is pivotably mounted on the support element (3) by means of which, after being used for injection, the open housing side (5) located in the pivot plane can be closed.
13. The protective device as claimed in claim 12,
characterized in that
the protective sleeve (20) has an opening (21) disposed in the wall which is congruent with the open side (5) located on the housing.
14. The protective device as claimed in claims 12 and 13,
characterized in that
the protective sleeve (20) is rotatably mounted on the housing (4) so that after being used for injection, the protective sheath (20) can be turned from an open position into a position which closes the housing (4).
15. The protective device as claimed in claims 12 to 14,
characterized in that
the protective sleeve (20) is rotatably mounted with its lower housing edge (22) on the edge region (12) of the housing (4), and wherein a catch element (23) is formed on the edge region (12) of the housing (4) which, after twisting the protective sleeve (20)

through 180° on the housing (4), comes into the latched position with an aperture (24) disposed in the wall of the protective sheath (20).

16. The protective device as claimed in claims 12 to 15, **characterized in that**

the upper cover region of the protective sleeve (20) comprises a gripping element (25) on the underside (26) of which a ring element (27) is formed with a shaped 180° control cam (28) which cooperates with a wedge (30) formed on the cover region (29) of the housing (4) which prevents the protective sleeve (20) from turning backwards after the control cam (28) has interlocked with the wedge (30).

17. The protective device as claimed in claims 12 to 15, **characterized in that**

the gripping element (25) can be fixed to the cover region (29) of the housing (4) by means of locking tongues (33) which reach through the ring element (27).