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(54) **Closing part for a gate or fence and method for manufacture thereof**

Schließelement für ein Tor oder einen Zaun und Verfahren zur Herstellung desselben

Élément de fermeture d'une porte ou d'une clôture et procédé de fabrication de celui-ci

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Description

[0001] The present invention relates to a closing part, typically a closing part for a gate or a fence, comprising a first beam, a second beam and a plurality of bars extending between the first beam and the second beam.

[0002] Such closing parts are known and are for instance described in the Netherlands patent applications NL 1007535 and NL 2006096 in the name of applicant. Techniques are in addition known for making tube connections by expanding a part of a tube, see for instance the European patent application EP 0 916 855 in the name of applicant.

[0003] WO 98/11311 describes a closing part with a top railing 12, a base railing 14 and a number of balusters 16. Figures 2 and 3 show how these balusters are mounted in a railing 12. Baluster 16 is provided with two elongate thickened portions 42, 44 which are interrupted at the position of numerals 46, 48, see figure 2. A baluster 16 can in this way be secured in railing 12 by a rotating movement. Railing 12 is provided for this purpose with an opening with recesses 27 which are complementary to the shape of the elongate thickened portions 42, 44. Thickened portions 42, 44 are not arranged by arranging an expanding tool in the second ends of the balusters.

[0004] US 2010/155683 describes a fence with an upper rail 12b, a lower rail 12a and a number of pickets 14. Although the pickets have crushed parts which are intended to secure the pickets in the upper and lower beams, it is not the case that one end of a picket is secured mechanically in the beam by a translating and rotating movement. The outer ends of the pickets are pressed into the beams. Finally, US 2010/155683 does not describe arranging an expanding tool in an outer end of the pickets.

[0005] The present invention has for its object to provide a closing part according to claim 1.

[0006] The first beam and the first ends of the plurality of bars are configured for this purpose to secure the first ends by translation and rotation in the first beam. The second beam is further provided with openings which run through the second beam and through which the second ends of the plurality of bars protrude, wherein parts of the second ends have protrusions which are such that the second ends are secured in the second beam. These protrusions are typically formed by arranging an expanding tool in the second ends of the bars.

[0007] Within the context of the present invention the term "protrusion" refers to a part which is expanded in more or less convex form. It is noted that a protrusion may protrude minimally from the bar and that convex parts which protrude a little can be sufficient to secure the second beam.

[0008] The closing part can in this way be mounted quickly by coupling the bars mechanically to the first beam on one side, this first beam being advantageously closed at the top, and by expanding parts of the second ends of the bars on the other side for the purpose of fixing the second ends in the second beam. Welded connections are in this way not necessary, and an optionally treated outer layer of the beams and bars or a coating on the beams and bars is not affected. If the first beam is used as upper beam it can be closed at the top, thereby avoiding the possibility of dirt entering the upper beam.

[0009] The second beam preferably comprises a tubular element with an upper wall and a lower wall, and the openings for the bars are arranged through the upper and the lower wall. Each bar preferably has at its second end at least one protrusion with a rounded shape. The at least one protrusion is preferably adjacent to the upper and/or lower wall of the second beam. This can for instance be one (relatively large) protrusion adjacent to the upper and lower wall, but can also be two or more protrusions, for instance a first one adjacent to the upper wall and a second one adjacent to the lower wall. According to a variant, the second beam is formed as a reverse U-profile with an upper wall and an open underside. Each bar can in this case be provided with a first protrusion adjacent to an upper side of the upper wall and a second protrusion adjacent to an underside of the upper wall.

[0010] The closing part is preferably configured for placing with the first beam on the upper side, so that the first beam forms an upper beam and the second beam a lower beam. The first beam preferably comprises a tubular element with a closed upper wall and with a lower wall in which openings for the first ends of the bars are arranged. The bars are preferably hollow and are preferably provided at their first ends with at least two hook-shaped recesses. The openings in the lower wall of the first beam are then preferably provided with at least two protruding parts which fit into the at least two hook-shaped recesses, this such that a coupling between the at least two hook-shaped recesses and the at least two protruding parts can be realized by translation and rotation of the first ends.

[0011] The invention also relates to a method for forming a closing part, according to claim 13.

[0012] The second beam is preferably a tubular element with an upper wall and a lower wall. In an advantageous embodiment a first protrusion adjacent to the upper wall and a second protrusion adjacent to the lower wall are formed for each bar. According to another embodiment, the second beam is formed with an upper wall and an open underside. More generally a first protrusion and a second protrusion are preferably provided which are adjacent to an inner or outer wall of the beam at a first and a second location along a bar.

[0013] Expanding of parts of the second ends of the bars preferably takes place by arranging an expanding mandrel in the second ends of the bars.

[0014] Provided according to another aspect is a method for securing a bar in a beam of a closing part, wherein at least a first and a second protrusion are arranged, preferably simultaneously, in the bar such that this first and second protrusion are adjacent to an upper or lower

wall of the beam. If a beam has only an upper wall, the protrusions can be arranged on an upper and underside of the upper wall. If the beam has an upper and lower wall, there are different options: on either side of an upper wall, or on either side of a lower wall, or a first protrusion adjacent to an upper wall and a second protrusion adjacent to a lower wall. It is further also possible to provide more than two protrusions. If the beam has an upper and lower wall, four protrusions can for instance be formed: on either side of an upper wall and on either side of a lower wall.

[0015] Another aspect also relates to a closing part, typically a closing part for a fence or a gate, comprising a beam and a plurality of bars extending through the beam, wherein the beam is provided with a number of through-openings through which the plurality of bars protrude, wherein each bar has at least a first and a second protrusion which are adjacent to an inner or outer wall of a beam, are arranged by arranging an expanding mandrel in the bars, and are such that the bars are secured in the second beam.

[0016] Provided according to yet another aspect is an expanding mandrel for arranging at least two protrusions in a tube, comprising a pull rod guided in a pull tube and having a first end for coupling to a pulling means and having a second end which protrudes from the pull tube and which is provided with a head part, wherein at least a first and a second compressible element are provided on this second end between the head part and the pull tube, wherein a pressing element is received between the first and second compressible elements, this such that the first and the second compressible element are compressed when the pull rod is pulled into the pull tube for the purpose of reducing the distance between the head part and the pull tube.

[0017] The first and second compressible elements are preferably a first and second rubber ring which are arranged around the second end of the pull rod. The pressing element is preferably a pressing ring arranged around the second end.

[0018] An additional pressing ring is preferably further arranged between the pull tube and the first compressible element, wherein the pressing ring, the additional pressing ring and a part of the head part adjacent to the second compressible element preferably have substantially the same diameter as the first and second rubber rings.

[0019] Finally, an assembly for a closing part, typically a closing part for a gate or a fence, comprises a first beam, a second beam and a plurality of bars. The first beam and the first ends of the plurality of bars are formed such that each first end can be secured by translation and rotation in the first beam. The second beam is provided with a number of through-openings through which the second ends of the plurality of bars are insertable, wherein parts of the second ends are configured to be expanded by an expanding tool for the purpose of securing the second ends in the second beam.

[0020] The present invention will be further elucidated on the basis of a number of by no means limitative exemplary embodiments of a closing part according to the invention with reference to the accompanying drawing. In the drawing:

Figure 1 is a schematic cut-away perspective view of an embodiment of a closing part according to the invention;

Figure 2 is a schematic perspective detail view of the connection between the upper beam and a bar for the embodiment of figure 1;

Figure 3 shows a cross-section through a bar secured in the upper and lower beams for the embodiment of figure 1;

Figure 4 shows a first variant of the connection between bar and lower beam;

Figure 5 shows a second variant of the connection between bar and lower beam; and

Figures 6A-6C illustrate an embodiment of an expanding tool.

[0021] Figures 1-3 illustrate an embodiment of a closing part 1 for a fence or a gate. Closing part 1 comprises a first beam 10, a second beam 20 and a plurality of hollow bars 30. Each bar 30 has a first end 31 and second end 32. First beam 10 and each first end 31 are configured for securing each first end 31 mechanically in first beam 10 by a translating and rotating movement. First beam 10 is formed as a tubular element with a closed upper wall 15 which can optionally be provided with a comb-like structure and with a lower wall 16 in which openings 11 are arranged for the first ends 31 of bars 30. As shown most clearly in figure 2, each bar 30 is provided at the first end 31 thereof with four hook-shaped recesses 33. Openings 11 in lower wall 16 of upper beam 10 are provided with four protruding parts 13 which fit into the four hook-shaped recesses 33. Depending on the diameter of the bars, it is also possible to provide fewer or more protruding parts 13/recesses 33. Each hook-shaped recess 33 is formed with a first, downward oriented slot 34 which transposes into a second, roughly horizontally oriented slot 35. This second slot 35 could also be oriented slightly upward. Protruding parts 13 can thus be placed in first slots 34 by moving a bar 30 into upper beam 10, and can be secured by then rotating bar 30 such that protruding parts 13 come to lie in second slot 35. In order to simplify rotation of bars 30 a recess 38 for a tool can be provided at the second end of bar 30 such that bar 30 can be rotated in first beam 10 using this tool.

[0022] It is noted that other twist couplings are possible between upper beam 10 and bars 30. Further examples of possible couplings are described in the Netherlands patent application with publication number 2006096 in the name of applicant, see for instance figures 6 and 7.

[0023] Second beam 20 is provided with a number of through-openings 22 through which the second ends 32 of bars 30 protrude. The second beam is formed as a

tubular element with an upper wall 25 and a lower wall 26, and each through-opening 22 is thus formed by an opening in upper wall 25 and an opposite opening in lower wall 26. A part 36 of a second end 32 has a protrusion 37 which is arranged by arranging an expanding tool in second end 32 of bar 30. It is noted that it is not necessary to provide one or more protrusions in each bar. According to possible embodiments, one in two bars could for instance be provided with one or more protrusions.

[0024] In the variant of figures 1-3 one protrusion adjacent to upper and lower walls 25, 26 is arranged in each second end 32 of a bar 30. According to a second variant illustrated in figure 4, two protrusions 37a, 37b, respectively adjacent to upper wall 25 and lower wall 26, are formed in each second end 32 of a bar 30. Figure 5 illustrates yet another variant in which the second beam 120 is formed with an upper wall 125 and an open underside 126. Two protrusions 137a, 137b are adjacent here to either side of upper wall 125.

[0025] Closing part 1 of figures 1-3 is preferably assembled as follows. In a first step the first ends 31 of bars 30 are secured in first beam 10 by a translating and rotating movement of first ends 31 relative to first beam 10. In a second step the second ends 32 of bars 30 are inserted through openings 22 in second beam 20. In a subsequent step one or more protrusions 37;37a,37b;137a,137b are formed in each second end 32. These one or more protrusions are formed such that second ends 32 are secured in second beam 20. Expanding of the parts 36 for the purpose of forming the protrusions is performed by arranging a suitable expanding mandrel in the second ends 32 of bars 30.

[0026] A suitable expanding tool is for instance described in the European patent application with publication number EP 0 916 855 and in EP 0 772 500.

[0027] A particularly advantageous embodiment of an expanding tool will now be described with reference to figures 6A-6C. The expanding tool is particularly suitable for simultaneously arranging two protrusions, for instance protrusions 137a, 137b of figure 5. The expanding tool comprises a mandrel 200 with a pull rod 202, 203 which is guided through a pull tube 201. This is shown most clearly in figure 6A, which shows pull tube 201 from which pull rod 203 protrudes at the left-hand end, and in figure 6B in which pull tube 201 has been omitted. Provided on an end part 202 of pull rod 203 are two rubber rings 204a, 204b with an interposed pressing ring 206. Two further pressing rings 205, 207 are provided between pull tube 201 and rubber ring 204a. The entity of rubber rings 204a, 204b and pressing rings 205, 206, 207 is secured using a head part in the form of two nuts 208, 209. When pull rod 203 is pulled to the left relative to pull tube 201, the distance D between head part 208, 209 and the pull tube will decrease, whereby rubber rings 204a, 204b are compressed and move outward for the purpose of expanding a tube in which the mandrel is operative. Pull rod 203 is provided at an outer end with a coupling piece 210 which can be coupled to a piston rod of a hydraulic cylinder 213. Pull tube 201 is mountable in a receiving part 211. Receiving part 211 is mounted against a wall of a mounting block 212, while coupling piece 210 can be coupled in mounting block 212 to a piston rod. A pushbutton 215 can be provided for the purpose of activating the hydraulic cylinder. It is further advantageous to provide a handle 214 for manipulating the tool. When pull rod 203 is pulled to the left, lower wall 26 of second beam 20 is pressed against stop 220, after which the expanding process begins.

[0028] The skilled person will appreciate that the invention is not limited to the above described exemplary embodiments, and that many variants can be envisaged which fall within the scope of the invention, which is defined solely by the following claims.

Claims

1. Closing part (1), typically a closing part for a fence or a gate, comprising a first beam (10), a second beam (20) and a plurality of bars (30) with first ends (31) and second ends (32) extending between the first beam and the second beam, wherein the first beam and the first ends of the plurality of bars are configured to secure the first ends mechanically in the first beam by a translating and rotating movement;
   wherein the second beam is provided with a number of through-openings (22) through which the second ends (32) of the plurality of bars protrude, **characterized in that** parts of the second ends (32) have protrusions (37,37a,37b,137a,137b) which are arranged by arranging an expanding tool in the second ends of the bars and which are such that the second ends are secured in the second beam.

2. Closing part as claimed, in claim 1, **characterized in that** the parts having protrusions are adjacent to a wall (25,26) of the second beam.

3. Closing part as claimed in any of the foregoing claims, **characterized in that** the closing part is configured for placing with the first beam (10) on the upper side, so that the first beam forms an upper beam and the second beam (20) a lower beam.

4. Closing part as claimed in any of the foregoing claims, **characterized in that** the first beam (10) comprises a tubular element with a closed upper wall (15) and with a lower wall (16) in which openings for the first ends of the bars are arranged.

5. Closing part as claimed in any of the foregoing claims, **characterized in that** the bars (30) are hollow.

6. Closing part as claimed in claims 4 and 5, **charac-**

terized in that the bars (30) are provided at their first ends with at least two hook-shaped recesse (33), and the openings are provided with at least two protruding parts (13) which fit into the at least two hook-shaped recesses, this such that a coupling between the at least two hook-shaped recesses and the at least two protruding parts can be realized by translation and rotation of the first ends relative to the first beam.

7. Closing part as claimed in claim 6, **characterized in that** each hook-shaped recess (33) is formed with a first slot (34) which is oriented from the first end toward the second end and which transposes into a second slot (35) which is horizontal or oriented toward the first end.

8. Closing part as claimed in any of the foregoing claims, **characterized in that** each bar (30) has at least one protrusion (37) at its second end.

9. Closing part as claimed in any of the foregoing claims, **characterized in that** each bar has at least two protrusions (37a,37b,137a,137b) at its second end.

10. Closing part as claimed in any of the foregoing claims, **characterized in that** each protrusion (37,37a,37b,137a,137b) has a rounded shape.

11. Closing part as claimed in any of the foregoing claims, **characterized in that** the second beam (20) comprises a tubular element with an upper wall (25) and a lower wall (26), and that the through-openings (22) are arranged through the upper and the lower wall.

12. Closing part as claimed in any of the claims 1-10, **characterized in that** the second beam (20) substantially takes the form of a reverse U-profile with an upper wall and an open underside, and that the through-openings (22) are arranged through the upper wall.

13. Method for forming a closing part (1), typically a closing part for a fence or a gate, wherein a first beam (10) is connected by means of a plurality of bars (30) with first ends (31) and second ends (32) to a second beam (20), wherein the first ends of the plurality of bars are secured in the first beam by a translating and rotating movement of the first ends relative to the first beam; wherein the second ends (32) of the plurality of bars are inserted through openings (22) in the second beam; **characterized in that** parts of the second ends (30) are expanded in order to form protrusions (37,37a,37b,137a,137b) which are arranged by arranging an expanding tool and which are shaped such that the second ends are secured in the second beam.

14. Method as claimed in claim 13, **characterized in that** the parts which are expanded are adjacent to a wall of the second beam (20); and/or
that the second beam (20) is a hollow tubular element with an upper wall and a lower wall and that for each bar a first and a second protrusion is formed adjacent to the upper wall or to the lower wall; and/or
that expanding of parts of the second ends (22) of the bars (30) is performed by arranging an expanding mandrel in the second ends of the bars.

Patentansprüche

1. Schließteil (1), typischerweise ein Schließteil für einen Zaun oder ein Tor, aufweisend einen ersten Träger (10), einen zweiten Träger (20) und eine Mehrzahl von Stangen (30) mit ersten Enden (31) und zweiten Enden (32), welche sich zwischen dem ersten Träger und dem zweiten Träger erstrecken, wobei der erste Träger und die ersten Enden der Mehrzahl von Stangen eingerichtet sind, um die ersten Enden mechanisch in dem ersten Träger zu sichern durch eine Translations- und Rotationsbewegung, wobei der zweite Träger bereitgestellt ist mit einer Anzahl von Durchgangsöffnungen (22), durch welche die zweiten Enden (32) der Mehrzahl von Stangen hindurch vorstehen, **dadurch gekennzeichnet, dass** Abschnitte der zweiten Enden (32) Vorsprünge (37, 37a, 37b, 137a, 137b) haben, welche angeordnet sind durch Anordnen eines Expandierwerkzeugs in den zweiten Enden der Stangen und welche derart sind, dass die zweiten Enden in dem zweiten Träger gesichert sind.

2. Schließteil wie in Anspruch 1 beansprucht, **dadurch gekennzeichnet, dass** die Abschnitte Vorsprünge haben, benachbart zu einer Wand (25, 26) des zweiten Trägers sind.

3. Schließteil wie in irgendeinem der vorhergehenden Ansprüche beansprucht, **dadurch gekennzeichnet, dass** das Schließteil eingerichtet ist zum Platziert werden mit dem ersten Träger (10) auf der oberen Seite, sodass der erste Träger einen oberen Träger und der zweite Träger (20) einen unteren Träger bildet.

4. Schließteil wie in irgendeinem der vorhergehenden Ansprüche beansprucht, **dadurch gekennzeichnet, dass** der erste Träger (10) aufweist ein rohrförmiges Element mit einer geschlossenen oberen Wand (15) und einer unteren Wand (16), in welcher Öffnungen für die ersten Enden der Stangen angeordnet sind.

5. Schließteil gemäß irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Stangen (30) hohl sind.

6. Schließteil wie in Ansprüchen 4 und 5 beansprucht, **dadurch gekennzeichnet, dass** die Stangen (30) an ihren ersten Enden mit wenigstens zwei hakenförmigen Ausnehmungen (33) bereitgestellt sind, und die Öffnungen bereitgestellt sind mit wenigstens zwei vorstehenden Abschnitten (13), welche in die wenigstens zwei hakenförmigen Ausnehmungen passen, dieses derart, dass eine Verbindung zwischen den wenigstens zwei hakenförmigen Ausnehmungen und den wenigstens zwei vorstehenden Abschnitten realisiert werden kann durch Translation und Rotation der ersten Enden relativ zu dem ersten Träger.

7. Schließteil wie in Anspruch 6 beansprucht, **dadurch gekennzeichnet, dass** jede hakenförmige Ausnehmung (33) mit einem ersten Schlitz (34) ausgebildet ist, welcher von dem ersten Ende aus zu dem zweiten Ende hin orientiert ist und welcher in einen zweiten Schlitz (35) übergeht, welcher horizontal ist oder zu dem ersten Ende hin orientiert ist.

8. Schließteil gemäß irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** jede Stange (30) wenigstens einen Vorsprung (37) an ihrem zweiten Ende hat.

9. Schließteil gemäß irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** jede Stange wenigstes zwei Vorsprünge (37a, 37b, 137a, 137b) an ihrem zweiten Ende hat.

10. Schließteil gemäß irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** jeder Vorsprung (37, 37a, 37b, 137a, 137b) eine gerundete Gestalt hat.

11. Schließteil gemäß irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der zweite Träger (20) aufweist ein rohrförmiges Element mit einer oberen Wand (25) und einer unteren Wand (26), und dass die Durchgangsöffnungen (22) durch die obere Wand und die untere Wand hindurch angeordnet sind.

12. Schließteil gemäß irgendeinem der Ansprüche 1 bis 10, **dadurch gekennzeichnet, dass** der zweite Träger (20) im Wesentlichen die Form eines umgedrehten U-Profils hat, mit einer oberen Wand und einer offenen Unterseite, und dass die Durchgangsöffnungen (22) durch die obere Wand hindurch angeordnet sind.

13. Verfahren zum Bilden eines Schließteils (1), typischerweise eines Schließteils für einen Zaun oder ein Tor, wobei ein erster Träger (10) mit einem zweiten Träger (20) verbunden wird mittels einer Mehrzahl von Stangen (30), welche erste Enden (31) und zweite Enden (32) haben, wobei die ersten Enden der Mehrzahl von Stangen in dem ersten Träger gesichert werden durch eine Translations- und Rotationsbewegung der ersten Enden relativ zu dem ersten Träger, wobei die zweiten Enden (32) der Mehrzahl von Stangen eingesetzt werden durch Öffnungen (22) in dem zweiten Träger, **dadurch gekennzeichnet, dass** Abschnitte der zweiten Enden (32) expandiert werden, um Vorsprünge (37, 37a, 37b, 137a, 137b) zu bilden, welche angeordnet sind durch Anordnen eines Expandierwerkzeugs und welche gestaltet sind derart, dass die zweiten Enden in dem zweiten Träger gesichert werden.

14. Verfahren wie in Anspruch 13 beansprucht, **dadurch gekennzeichnet, dass** die Abschnitte, welche expandiert werden, benachbart zu einer Wand des zweiten Trägers (20) sind, und / oder dass der zweite Träger (20) ein hohles Rohrelement mit einer oberen Wand und einer unteren Wand ist und dass für jede Stange ein erster und ein zweiter Vorsprung benachbart zu der oberen Wand oder zu der unteren Wand ausgebildet ist,
und / oder
dass das Expandieren Abschnitte der zweiten Enden (32) der Stangen (30) durchgeführt wird durch Anordnen eines Expandierdorns in den zweiten Enden der Stangen.

Revendications

1. Partie fermeture (1), typiquement partie fermeture d'une barrière ou d'une grille, comprenant un premier profilé (10), un second profilé (20) et une pluralité de barres (30) qui présentent des premières extrémités (31) et des secondes extrémités (32) qui s'étendent entre le premier profilé et le second profilé, dans laquelle le premier profilé et les premières extrémités de la pluralité de barres sont configurés de façon à fixer les premières extrémités de manière mécanique dans le premier profilé par un déplacement en translation et en rotation ; dans laquelle le second profilé est doté d'un certain nombre d'ouvertures traversantes (22) à travers lesquelles font saillie les secondes extrémités (32) de la pluralité de barres, **caractérisée en ce que** des parties des secondes extrémités (32) présentent des saillies (37, 37a, 37b, 137a, 137b) qui sont agencées en agençant un outil d'expansion dans les secondes extrémités des barres, et qui sont telles que les secondes extrémités sont fixées dans le second profilé.

2. Partie fermeture selon la revendication 1, **caracté-**

risée en ce que les parties qui présentent des saillies sont adjacentes à une paroi (25, 26) du second profilé.

3. Partie fermeture selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la partie fermeture est configurée pour un placement avec le premier profilé (10) sur le côté supérieur, de telle sorte que le premier profilé forme un profilé supérieur et que le second profilé (20) forme un profilé inférieur.

4. Partie fermeture selon l'une quelconque des revendications précédentes, **caractérisée en ce que** le premier profilé (10) comprend un élément tubulaire qui présente une paroi supérieure fermée (15) et une paroi inférieure (16) dans laquelle sont agencées les ouvertures des premières extrémités des barres.

5. Partie fermeture selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les barres (30) sont creuses.

6. Partie fermeture selon les revendications 4 et 5, **caractérisée en ce que** les barres (30) sont dotées, au niveau de leurs premières extrémités, de deux renfoncements en forme de crochet (33) au moins, et les ouvertures sont dotées de deux parties saillantes (13) au moins qui s'insèrent dans les deux renfoncements en forme de crochet au moins, et ceci de telle sorte qu'un accouplement entre les deux renfoncements en forme de crochet au moins et les deux parties saillantes au moins, puisse être réalisé par une translation et une rotation des premières extrémités par rapport au premier profilé.

7. Partie fermeture selon la revendication 6, **caractérisée en ce que** chaque renfoncement en forme de crochet (33) est formé avec une première fente (34) qui est orientée à partir de la première extrémité vers la seconde extrémité et qui se transpose dans une seconde fente (35) qui est horizontale ou qui est orientée vers la première extrémité.

8. Partie fermeture selon l'une quelconque des revendications précédentes, **caractérisée en ce que** chaque barre (30) présente au moins une saillie (37) au niveau de sa seconde extrémité.

9. Partie fermeture selon l'une quelconque des revendications précédentes, **caractérisée en ce que** chaque barre présente au moins deux saillies (37a, 37b, 137a, 137b) au niveau de sa seconde extrémité.

10. Partie fermeture selon l'une quelconque des revendications précédentes, **caractérisée en ce que** chaque saillie (37, 37a, 37b, 137a, 137b) présente une forme arrondie.

11. Partie fermeture selon l'une quelconque des revendications précédentes, **caractérisée en ce que** le second profilé (20) comprend un élément tubulaire qui présente une paroi supérieure (25) et une paroi inférieure (26), et **en ce que** les ouvertures traversantes (22) sont agencées à travers les parois supérieure et inférieure.

12. Partie fermeture selon l'une quelconque des revendications 1 à 10, **caractérisée en ce que** le second profilé (20) prend sensiblement la forme d'un profilé en U renversé qui présente une paroi supérieure et un dessous ouvert, et **en ce que** les ouvertures traversantes (22) sont agencées à travers la paroi supérieure.

13. Procédé destiné à former une partie fermeture (1), typiquement une partie fermeture d'une barrière ou d'une grille, dans lequel un premier profilé (10) est connecté au moyen d'une pluralité de barres (30) qui présentent des premières extrémités (31) et des secondes extrémités (32), à un second profilé (20), dans lequel les premières extrémités de la pluralité de barres sont fixées dans le premier profilé par un déplacement en translation et en rotation des premières extrémités par rapport au premier profilé ; dans lequel les secondes extrémités (32) de la pluralité de barres sont insérées à travers des ouvertures (22) dans le second profilé ; **caractérisé en ce que** des parties des secondes extrémités (32) sont expansées de façon à former des saillies (37, 37a, 37b, 137a, 137b) qui sont agencées en agençant un outil d'expansion, et dont la forme est telle que les secondes extrémités sont fixées dans le second profilé.

14. Procédé selon la revendication 13, **caractérisé en ce que** les parties qui sont expansées sont adjacentes à une paroi du second profilé (20) ; et / ou
en ce que le second profilé (20) est un élément tubulaire creux qui présente une paroi supérieure et une paroi inférieure, et **en ce que**, pour chaque barre, des première et seconde saillies sont formées adjacentes à la paroi supérieure ou à la paroi inférieure ; et / ou
en ce que l'expansion des parties des secondes extrémités (22) des barres (30) est exécutée en agençant un mandrin à expansion dans les secondes extrémités des barres.

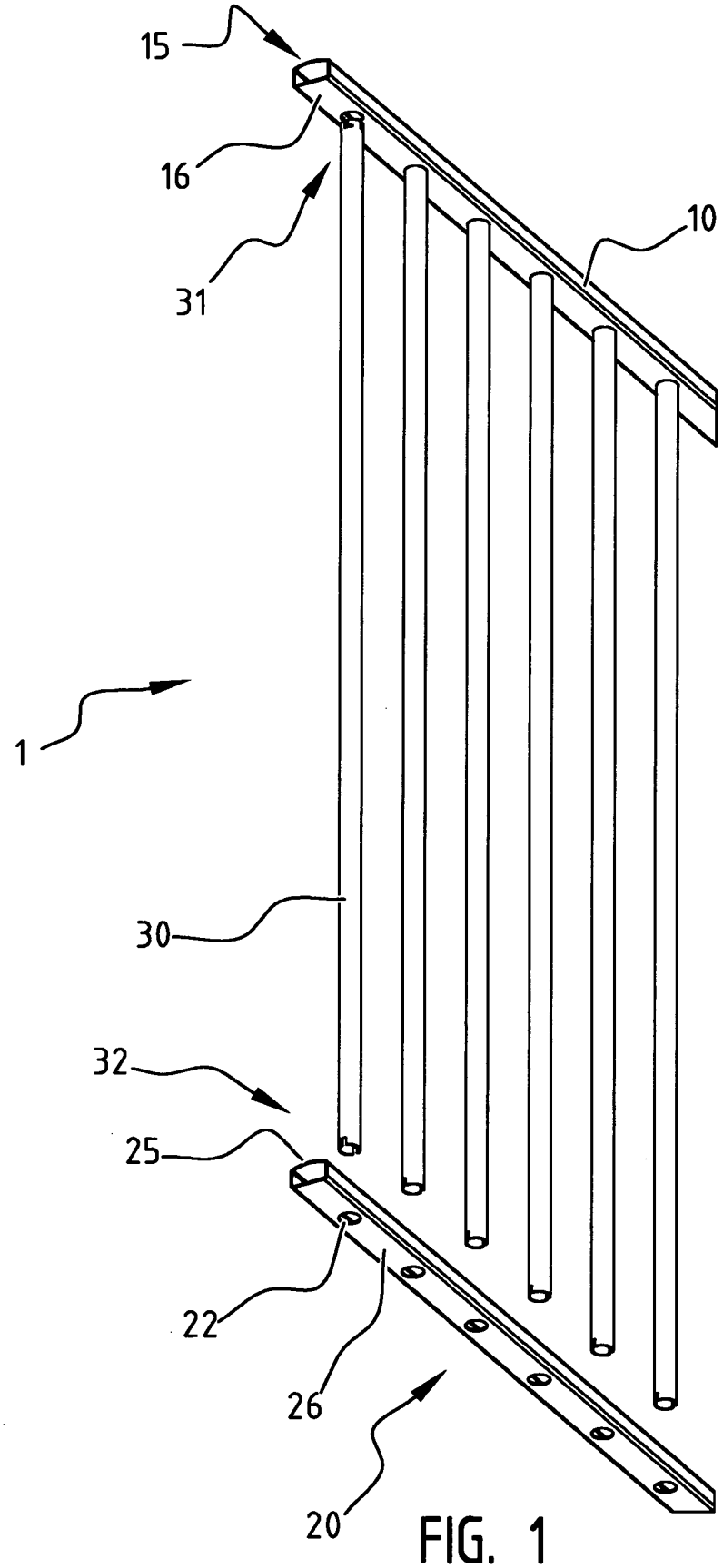

FIG. 1

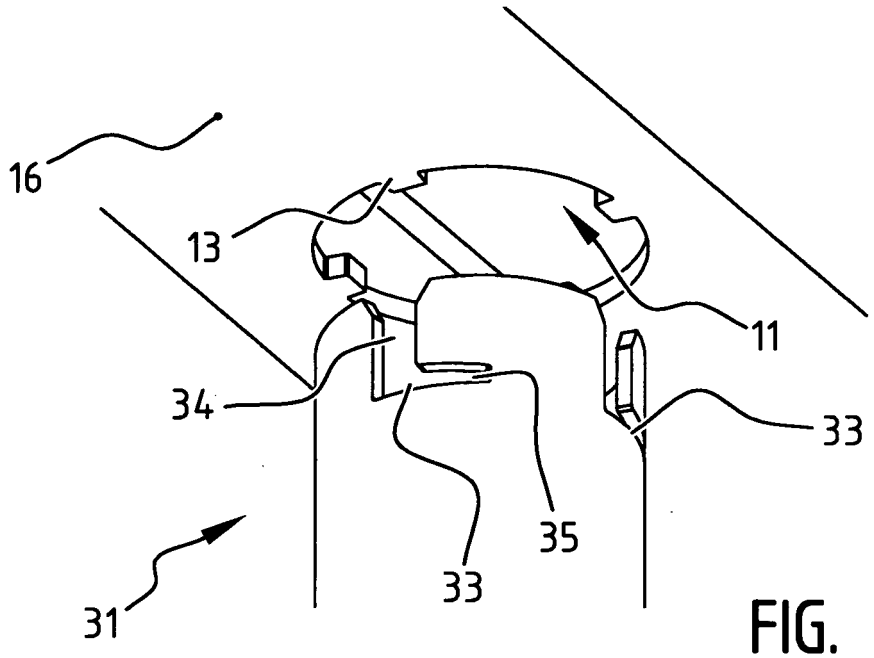

FIG. 2

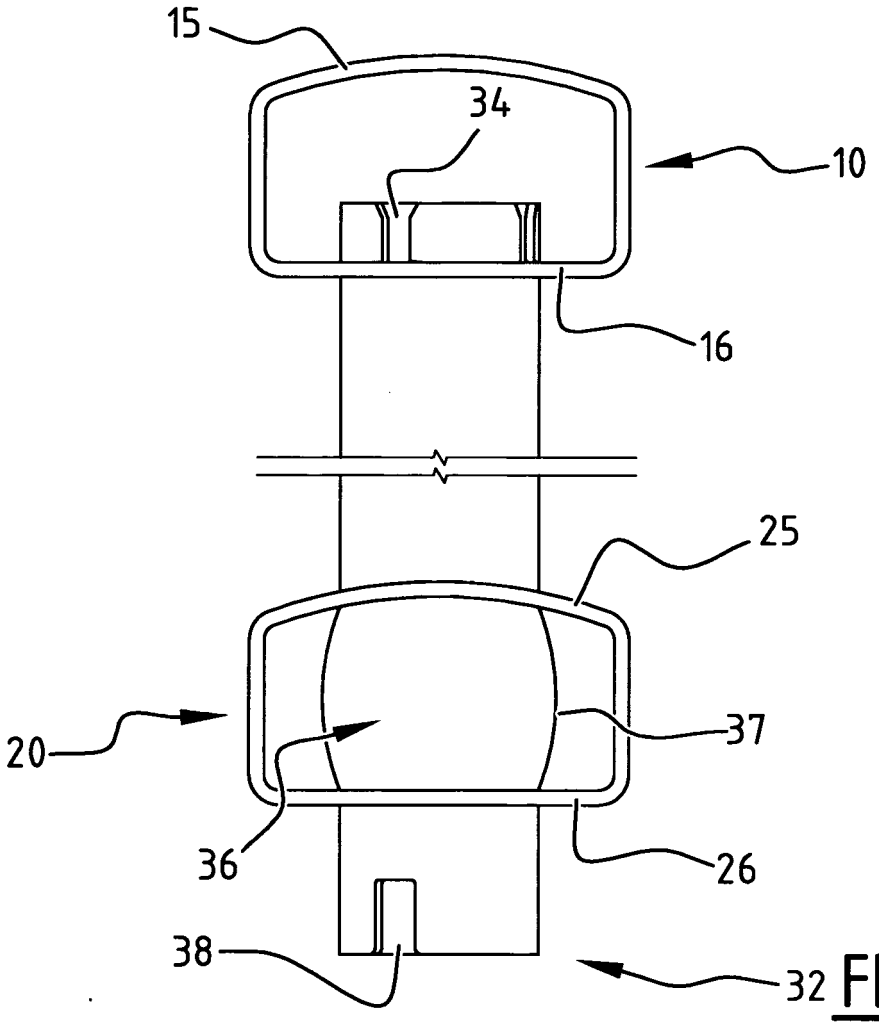

FIG. 3

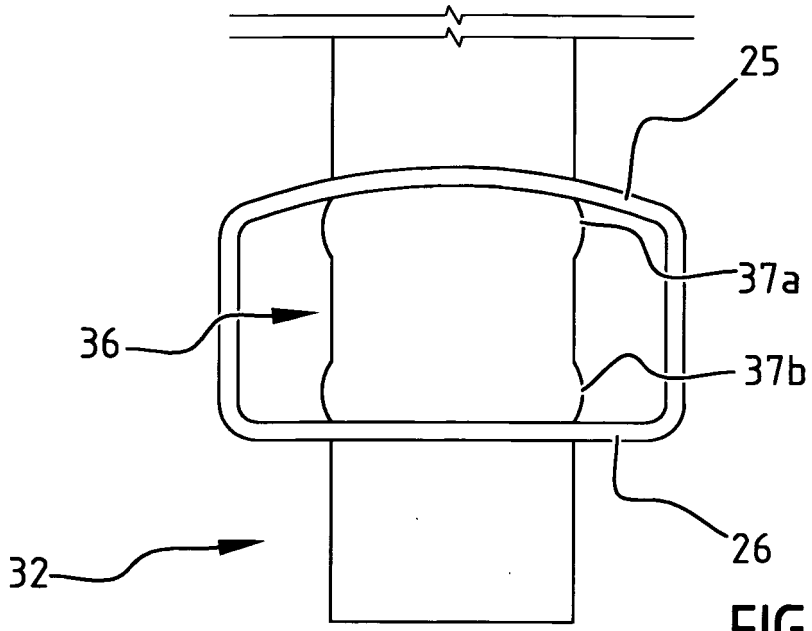

FIG. 4

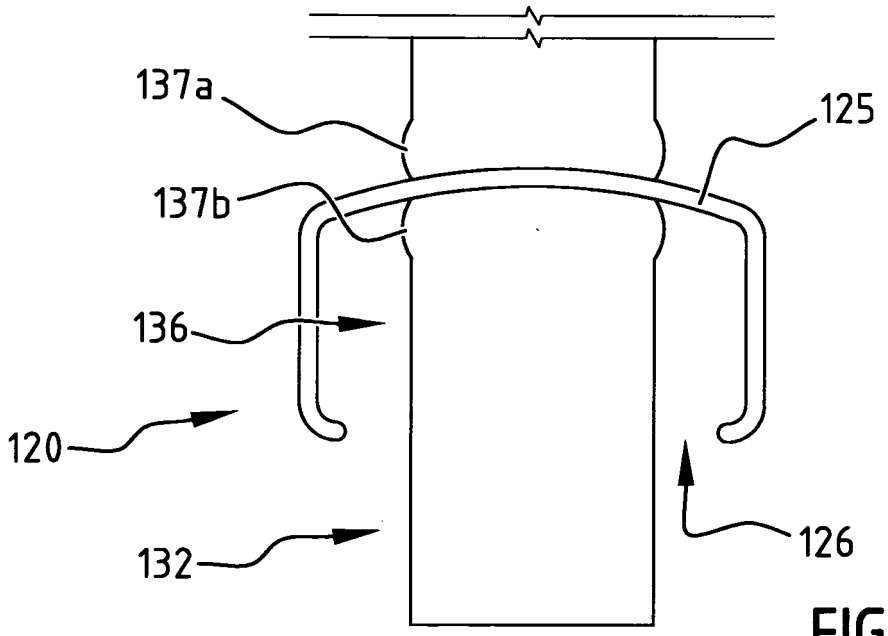

FIG. 5

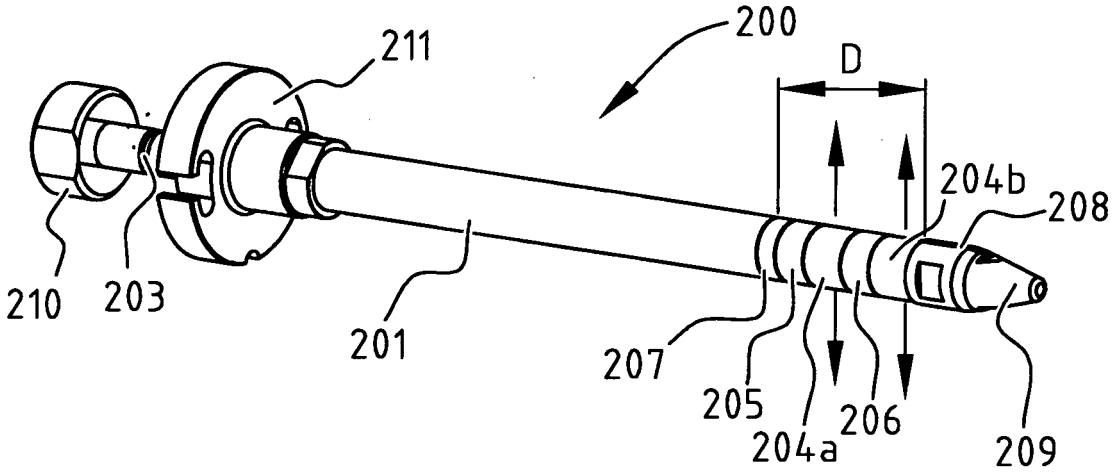
200
211
D
204b
208
210
203
201
207
205
204a
206
209

FIG. 6A

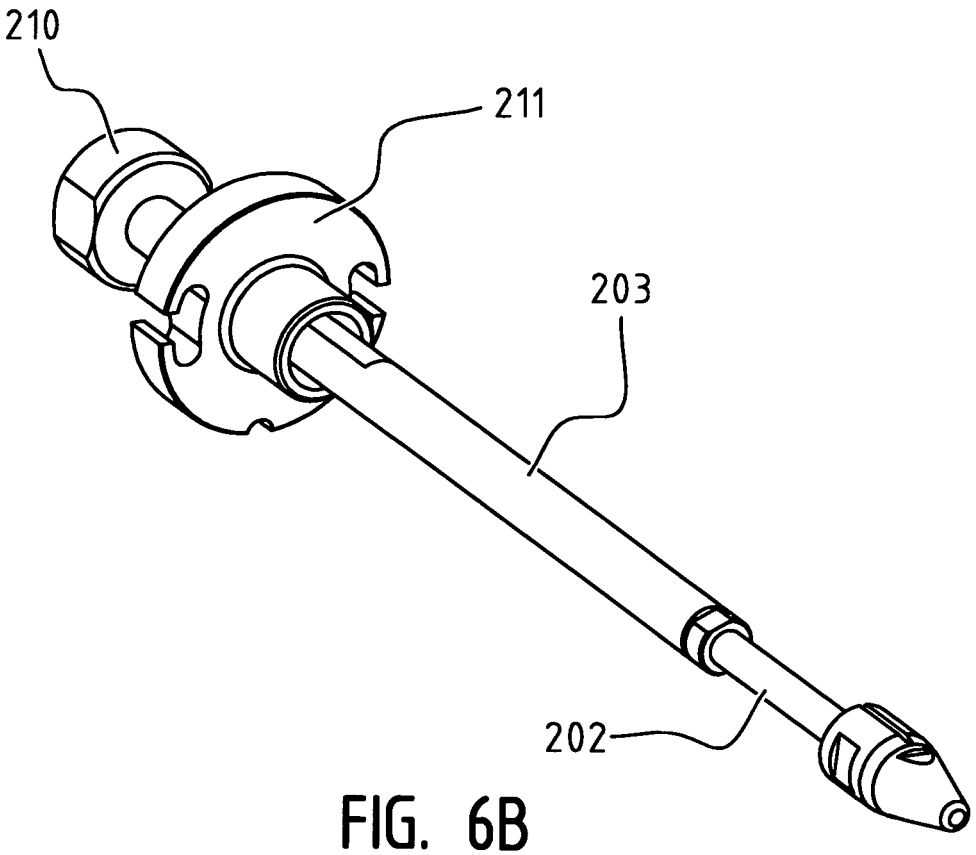
210
211
203
202

FIG. 6B

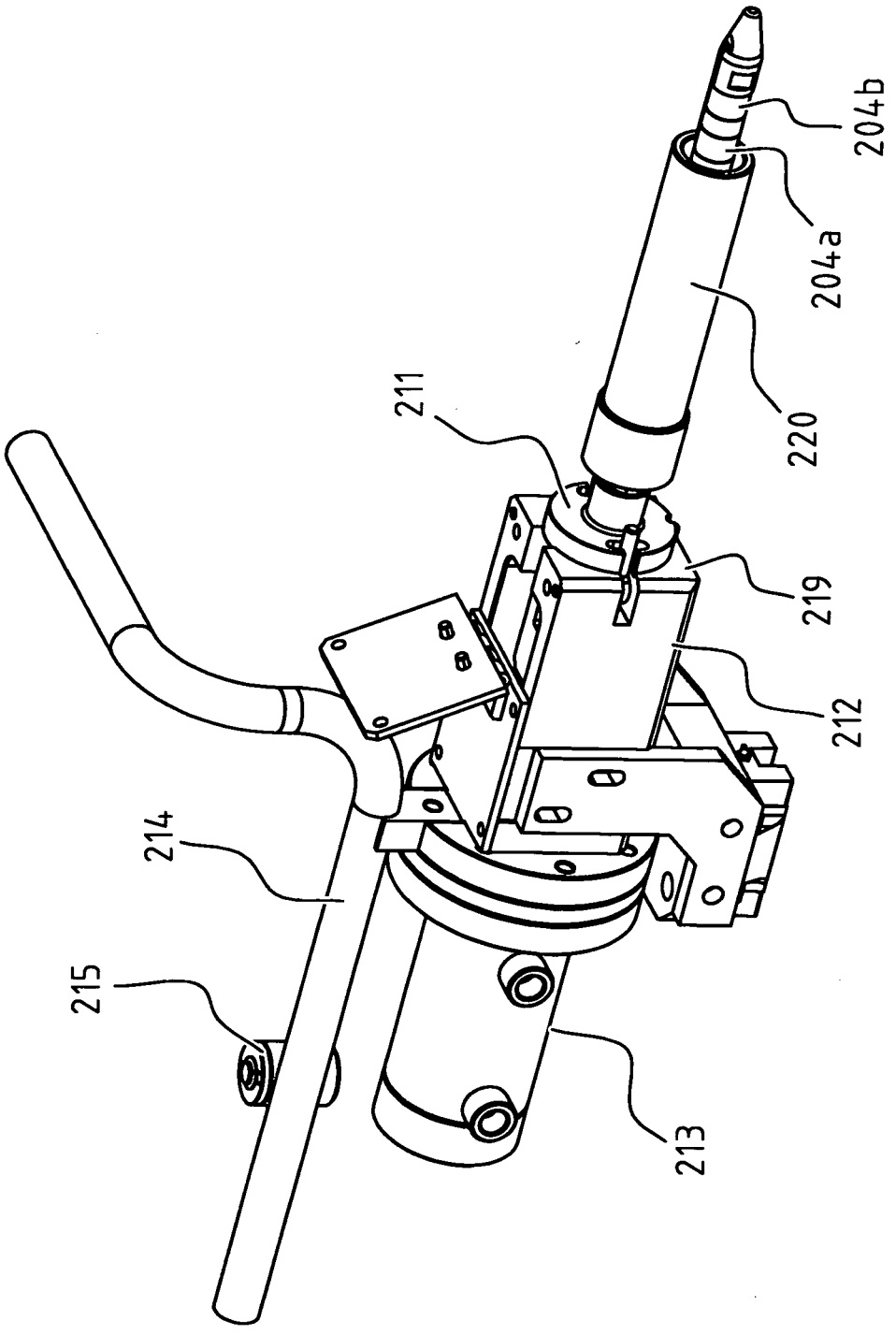

FIG. 6C

REFERENCES CITED IN THE DESCRIPTION

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