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(54) **SET AND TOOL FOR THE SNAP FIXATION OF A CLIP, CORRESPONDING METHOD**

(57) The tool(3) comprises an end part (5), the end part (5) comprising a wall (51) with an opening (53) for receiving protrusions (23) arranged on flexible arms (21) of the clip (1) and a transverse edge (55) defining an end of the wall (41) in a longitudinal direction (L), the transverse edge (55) closing the opening (53) in said longitudinal direction (L), the transverse edge (55) having a first tapering portion (57) and a second tapering portion (59), the first tapering portion (57) considered perpendicularly to a transverse direction (T) having a cross section tapering longitudinally toward the opening (53), and the second tapering portion (59) considered perpendicularly to the transverse direction (T) having a cross section tapering longitudinally opposite the opening (53).

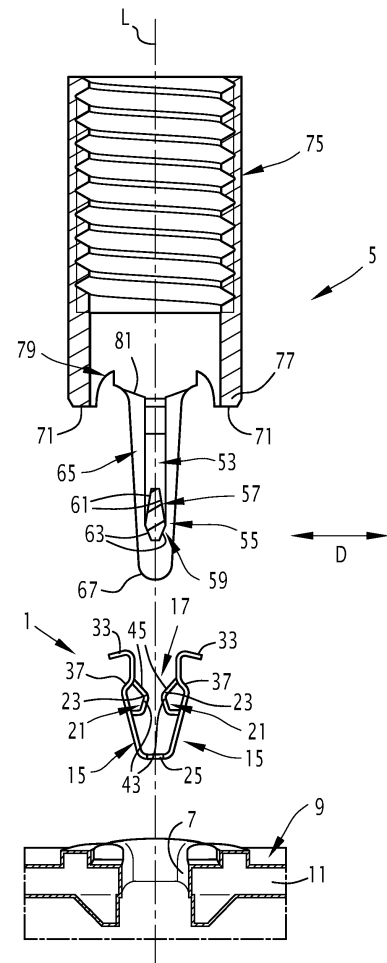


FIG.2

Description

[0001] The present invention relates to the snap fixation of a clip in a hole of a part, for example a trim part of an automobile.

[0002] The fixation of a clip, for example a clip described in WO2020/089389 A1, in the hole of a part is usually done manually, by operators, using insertion tools. For trim parts of automobiles, a large number of clips must be fixed to each part.

[0003] The current tools are not well suited to the fixation of large numbers of clips, at a high pace.

[0004] As a consequence, it happens that clips are distorted during the fixation operation. When the clip is made of a metal covered by a protective coating, the coating is sometimes damaged during the fixation operation. The clip may be positioned improperly inside the hole. There is in that case a risk that the clip is lost during a subsequent operation or that the trim part is not properly secured in the automobile. The repeatability of the fixation operation is not good, and a lot of time is wasted by the operators. Due to bad working positions, the operators may suffer musculoskeletal disorders.

[0005] It is an object of the present invention to provide a tool with a user-friendly design, and that permits a more reliable snap fixation of the clips in the corresponding holes.

[0006] Said object is achieved according to a first aspect of the invention by providing a tool for the snap fixation of a clip in a hole of a part, the tool comprising an end part the end part comprising a wall with an opening for receiving protrusions arranged on flexible arms of the clip and a transverse edge defining an end of the wall in a longitudinal direction the transverse edge closing the opening in said longitudinal direction the transverse edge having a first tapering portion and a second tapering portion the first tapering portion considered perpendicularly to a transverse direction having a cross section tapering longitudinally toward the opening and the second tapering portion considered perpendicularly to the transverse direction having a cross section tapering longitudinally opposite the opening.

[0007] The second tapering portion makes it possible to mount the clip on the end part of the tool before inserting the clip into the hole. The second tapering portion cooperates with deflection surfaces of the protrusions of the flexible arms. It is arranged such that the flexible arms are deflected away from one another when the end part of the tool is introduced into the space between the two side walls of the U-shaped part of the clip.

[0008] The first tapering portion makes it possible to retain the clip on the end part of the tool before inserting the clip into the hole. The first tapering portion of the transverse edge cooperates with retaining surfaces of the protrusion. It is arranged such that, when the end part of the tool is accommodated between the side walls of the U-shaped part of the clip, the clip is retained on the tool.

[0009] The opening makes it possible to introduce the clip into the hole while being mounted on the end part of the tool. When the clip is inserted into the hole, the flexible arms are deflected toward one another. The flexible arms can be sufficiently tilted toward one another to allow the clip to enter the hole because the protrusions arranged on the flexible arms of the clip are received in the orifice. In absence of the orifice, the thickness of the wall plus the size of the flexible arms would prevent clip from entering the hole. It must be pointed out as well that the shape of the first tapering portion is well suited for guiding the protrusions toward the orifice when the clip is inserted into the hole.

[0010] The first tapering portion makes it possible to extract longitudinally the end part of the tool out of the clip once the clip is snap fixed in the hole. The first tapering portion cooperate with the retaining surfaces of the protrusions. It is arranged such that the flexible arms are deflected away from one another when the end part of the tool is extracted out of the clip.

[0011] The tool is particularly adapted for inserting clips, especially U-shape clips

[0012] The tool may present the following features, alone or according to any technically feasible combination:

- the first tapering portion extends along the opening;
- the second tapering portion, defines a free end of the transverse edge in the longitudinal direction opposite the opening;
- the first tapering portion has a triangular or trapezoidal cross section, and/or the second tapering portion has a triangular or trapezoidal cross section;
- the end part comprises two guiding arms arranged along two longitudinal sides of the wall and extending longitudinally past the transverse edge up to respective tips;
- the two guiding arms have respective outer surfaces delimiting the guiding arms in the transverse direction opposite the wall, said outer surfaces tapering in the longitudinal direction toward the tips;
- the end part comprises two stop surfaces, arranged for stopping a longitudinal movement of the clip along the end part when the clip is inserted in the hole using the tool;
- the stop surfaces protrude with respect to two large faces of the wall along a third direction, the third direction being substantially perpendicular to the longitudinal direction and substantially perpendicular to the transverse direction.

[0013] According to a second aspect, the invention is related to a set comprising a tool having the features above and a clip adapted for being mounted on the end part of the tool and snap fixed in a hole of a part while being mounted on the end part of the tool, the clip comprising :

- a U-shape part with two side walls separated from one another along a spacing direction by a space, each side wall having a window, the U-shape part being arranged for receiving the end part of the tool inside the space;
- two flexible arms integral with the U-shape part, each flexible arm extending in one the window and having a protrusion protruding in the space;

the protrusions having respective retaining surfaces oriented for cooperating with the first tapering portion the transverse edge such that, when the end part of the tool is accommodated inside the space, the clip is retained on the tool.

[0014] The set may present the following features, alone or according to any technically feasible combination:

- the protrusions of the flexible arms have respective deflection surfaces oriented for cooperating with the second tapering portion such that the flexible arms are deflected away from one another when the end part of the tool is introduced into the space between the two side walls;
- the side walls of the U-shaped part are arranged such that respective free ends of the side walls comes in abutment against the stop surfaces when the clip is inserted into the hole while being mounted on the end part of the tool;
- the retaining surfaces of the protrusions are oriented for cooperating with the first tapering portion of the transverse edge such that the flexible arms are deflected away from one another when the end part of the tool is extracted longitudinally out of the space while the clip is snap fixed in the hole.

[0015] According to a third aspect, the invention is related to a method for the snap fixation of a clip in a hole of a part using a set having the features above,

- mounting the clip on the end part of the tool by introducing the end part of the tool into the space between the two side walls of the U-shaped part;
- snap fixing the clip in the hole of the part by introducing the clip in the hole while the clip is mounted on the end part of the tool;
- separating the tool from the clip by extracting the end part of the tool out of the space.

[0016] Other features and advantages will become apparent from the description of the invention given below, only as an example, in reference to the following figures:

- The figure 1 is a perspective view of a tool according to the invention;
- The figure 2 is a section view showing an end part of the tool of the figure 1, a clip adapted to be mounted by the tool, and the part with the hole in which the

clip must be snap fixed;

- The figure 3 is a perspective view of the clip of the figure 2; and
- The figure 4 is a front view of the end part of the tool of the figure 1.

[0017] The set depicted on the figures 1 and 2 comprises a clip 1 and a tool 3.

[0018] The clip 1 is adapted for being mounted on an end part 5 of the tool 3 and snap fixed in a hole 7 of a part 9 while mounted on the end part 5 of the tool 3.

[0019] The part 9 is typically a trim part or a molding of an automobile. Alternatively, it is another part of the interior or the exterior of an automobile, or even a part belonging to an equipment that is not an automobile.

[0020] The part 9 is made of a plastic material. It may present any shape.

[0021] The part 9 comprises a thin wall 11, in which the hole 7 is arranged.

[0022] The part 9 usually comprises several holes 7, all arranged in the thin wall 11 or arranged in different members of the part 9. Each hole receives a clip 1.

[0023] The clip 1 is for securing the part 9 to another structure, for example the dashboard of the automobile, a door of the automobile or any other structure. Alternatively, the clip is for securing another structure to the part 9, for example a decorative insert

[0024] The clip 1 cooperates with a complementary part, integral with the other structure and not depicted on the figures.

[0025] The tool 3 is a manual tool, arranged for being handled by an operator. The operator typically uses the tool 3 for mounting a large numbers of clips 1 on different parts 3, at a high pace. Alternatively, the tool is an automatic tool, for example mounted on a robot arm.

[0026] As shown on the figures 2 and 3, the clip 1 comprises :

- a U-shape part 13 with two side walls 15 separated from one another along a spacing direction S by a space 17, each side wall having a window 19 ;
- two flexible arms 21 integral with the U-shape part 13, each flexible arm 21 extending in one the window 19 and having a protrusion 23 protruding in the space 17.

[0027] The clip 1 is made of metal. It is covered by a coating.

[0028] The coating is a top coat. A top coat is a chemical varnish, reducing the friction coefficient of the clip.

[0029] Alternatively, the clip 1 is made of a plastic material.

[0030] The two side walls 15 face each other. They have substantially the same shape. They are symmetrical of one another about a center plane substantially perpendicular to the spacing direction S.

[0031] The U-shape part 13 comprises a nose 25 connecting distal ends 27 of the side walls 15 to one another.

[0032] The nose 25 closes the space 17 on a distal side. The space 17 is open on a proximal side, opposite the nose 25 along a height direction H. The height direction is substantially perpendicular to the spacing direction S.

[0033] Each side wall 15 is bent toward the outside of the space 17 at its proximal end 29. Each side wall 15 thus comprises a main part 31 in which the window 19 is cut and a flap 33 folded with respect to the main part 31. The flap 33 forms with the main part 31 an angle of substantially 90° in the example depicted on the figures. The flap 33 is connected to the main part 31 by a rounded edge 35.

[0034] A locking surface 37 is formed in each side wall 15.

[0035] The main part 31 comprises a first surface 39 connected to the nose 25 and defining the distal end of the side wall 15. It comprises a second surface 41 connected to the rounded edge 35. The locking surface 37 is a step connecting the first surface 39 to the second surface 41. The locking surface 37 extends, from the first surface 39, toward the center plane and the proximal end 29 of the side wall.

[0036] The first surface 39 and the second surface 41 are substantially parallel to one another. The locking surface 37 forms with the first surface an angle close to 270°. The locking surface 39 forms with the second surface 41 an angle close to 90°.

[0037] The locking surface 37 extends along a width direction W. The width direction W is substantially perpendicular to the height direction H and to the spacing direction S. The locking surface 37 extends over the whole width of the side wall 15. It is interrupted by the window 19 but extends on both sides of the window.

[0038] The side walls 15 are oriented such that they diverge from the nose 25 along the height direction. They form together for example an angle of 30°. The thickness of the space 17, taken along the spacing direction S, increases from the nose up to the proximal end.

[0039] The flexible arms 21 are connected by respective ends to the U-shaped part 13. Their opposite ends are free.

[0040] In the example depicted on the figures, the protrusions 23 are formed by bending and shaping the flexible arms 21.

[0041] Each protrusion 23 defines a retaining surface 43.

[0042] The retaining surface 43 is oriented such that the retaining surface 43 faces the nose 25 and the center plane P.

[0043] In the example depicted on the figures, the retaining surface 43 considered in section perpendicularly to the width direction W, is flat. It forms with the height direction H an angle comprised between 30° and 60°.

[0044] Each protrusion 23 defines a deflection surface 45.

[0045] The deflection surface 45 is oriented such that it faces the open proximal side of the space 17, and the

center plane P.

[0046] In the example depicted on the figures, the deflection surface 45 considered in section perpendicularly to the width direction, is flat. It forms with the height direction H an angle of substantially 30°.

[0047] As shown on the figure 1, the tool 3 comprising a handle 47 arranged for being gripped by an operator, the end part 5 being integral with the handle 47.

[0048] The handle 47 is for example made of wood, plastic or metal. It is shaped such that the operator can firmly hold it in his hand.

[0049] The end part 5 is typically made of metal. It is secured to an end of the handle 47.

[0050] For example, the end part 5 is screwed to an intermediate part 48, which is itself screwed to the end of the handle 47.

[0051] As best seen on the figure 4, the end part 5 comprises a wall 51 with an opening 53 for receiving the protrusions 23 arranged on the flexible arms 21 of the clip 1.

[0052] The end part 5 comprises as well a transverse edge 55 defining an end of the wall 51 in a longitudinal direction L. The transverse edge extends in a transverse direction T, substantially perpendicular to the longitudinal direction.

[0053] The transverse edge 55 closes the opening 53 in said longitudinal direction L. It extends transversely along all the width of the wall 51.

[0054] The opening 53 has for example a rectangular section, typically a square section. It is delimited by two edges extending in the longitudinal direction, and two edges extending in the transverse direction. The transverse edge 55 is one of said edges extending in the transverse direction.

[0055] The transverse edge 55 has a first tapering portion 57 and a second tapering portion 59.

[0056] The first tapering portion 57, considered perpendicularly to the transverse direction T, has a cross section tapering longitudinally toward the opening 53. In other words, the thickness of the cross section decreases when one follows said section longitudinally toward the opening 53.

[0057] The second tapering portion 59, considered perpendicularly to the transverse direction T, has a cross section tapering longitudinally opposite the opening 53. In other words, the thickness of the cross section decreases when one follows said section longitudinally away from the opening 53.

[0058] The first tapering portion 57 and a second tapering portion 59 taper in directions opposite to one another.

[0059] The first tapering portion 57 extends along the opening 53.

[0060] The second tapering portion 59 defines a free end of the transverse edge 55 in the longitudinal direction opposite the opening 53.

[0061] According to an embodiment, the first tapering portion 57 has a triangular cross section, with one apex

of the triangle pointing longitudinally toward the opening 53. On the embodiment depicted on the figures, said apex is cut and the first tapering portion 57 has a trapezoidal cross section.

[0062] According to an embodiment, the second tapering portion 59 has a triangular cross section, with one apex of the triangle pointing longitudinally away from the opening 53.. On the embodiment depicted on the figures, said apex is cut and the second tapering portion 59 has a trapezoidal cross section.

[0063] The first tapering portion 57 defines two inclined surfaces 61, turned longitudinally toward the opening 53. Each surface 61 forms with the longitudinal direction an angle comprised between 5° and 30°.

[0064] The second tapering portion 59 defines two other inclined surfaces 63, turned longitudinally opposite the opening 53. Each other inclined surface 63 forms with the longitudinal direction an angle comprised between 10° and 45°.

[0065] The end part 5 further comprises two guiding arms 65 arranged along two longitudinal sides of the wall 51 and extending longitudinally past the transverse edge 55. The tips 67 of the guiding arms 65 protrude longitudinally with respect to the transverse edge 55.

[0066] The two guiding arms 65 have respective outer surfaces 69 delimiting the guiding arms 65 in the transverse direction opposite the wall 51.

[0067] Said outer surfaces 69 taper in the longitudinal direction toward the tips 67 of the guiding arms.

[0068] The outer surfaces 69 taper toward one another.

[0069] In other words, the transverse spacing between the two outer surfaces 69 decreases when one follows the guiding arms 65 longitudinally toward their tips 67.

[0070] The end part 5 further comprises two stop surfaces 71, arranged for stopping a longitudinal movement of the clip 1 when the clip 1 is inserted in the hole 7 using the tool 3.

[0071] The stop surfaces 71 are shifted with respect to two large faces 73 of the wall 51 along a third direction D, the third direction D being substantially perpendicular to the longitudinal direction L and substantially perpendicular to the transverse direction T (figure 2).

[0072] As shown on the figure 2, the end part 5 comprises a tubular part 75, with a longitudinal central axis.

[0073] The tubular part 75 has an inner thread for securing the end part 5 on the intermediate part 48.

[0074] The wall 51 is integral with a longitudinal end 77 of the tubular part 75. Said longitudinal end defines an edge 79 having a closed contour around the longitudinal central axis.

[0075] The wall 51 is secured to two first portions 81 of the edge 79 opposite to one another with respect to the longitudinal central axis.

[0076] The stop surfaces 71 are defined by two second portions of the edge 79, substantially at 90° with respect to the first portions 81 around the longitudinal central axis..

[0077] As indicated above, the tool 3 is adapted for receiving the clip 1 on the end part 5 and for snap fixing the clip 1 in the hole 7 of the part 9 while the clip 1 is mounted on the end part 5 of the tool 3. Conversely, the clip 1 is adapted for being mounted on the end part 5 of the tool 3 and snap fixed in the hole 7 while mounted on the end part 5 of the tool 3.

[0078] To that end, the U-shape part 13 is arranged for receiving the end part 5 of the tool inside the space 17.

[0079] The end part 5 is introduced through the open longitudinal side of the space 17, between the proximal ends 29 of the side walls 15. The end part 5 is pushed longitudinally toward the nose 25, until the transverse edge 55 arrives beyond the protrusions 23.

[0080] In that situation, the retaining surfaces 43 cooperate with the first tapering portion 57 of the transverse edge 55 such that the clip 1 is retained on the tool 3.

[0081] As shown on the figure 2, when the end part 5 of the tool points toward the floor, the retaining surfaces 43 abut against the inclined surface 61, such that the clip 1 cannot disengage from the end part 5 and fall.

[0082] During the insertion of the end part 5 of the tool into the space 17 between the two side walls 15, the deflection surfaces 45, due to their orientation, cooperate with the second tapering portion 59 such that the flexible arms 21 are deflected away from one another.

[0083] Said deflection allows the transverse edge 55 to clear the protrusions 23.

[0084] The tool 3 is used as well for inserting the clip 1 into the hole 7.

[0085] When the clip 1 is inserted into the hole 7 while being mounted on the end part 5 of the tool 3, the respective free ends of side walls 15, due to their arrangement, come in abutment against the stop surfaces 71.

[0086] Due to the diverging orientation of the side walls 15, the side walls 15 come in abutment against the edge of the hole 7 when the clip 1 is inserted into the hole 7. The clip 1 is pushed longitudinally along the end part 5 until the free ends of the side walls 15 are in abutment against the stop surfaces 71.

[0087] The side walls 15 actually come in abutment against the stop surfaces 71 by their rounded edges 35 or by the flaps 33, as shown on the figure 2.

[0088] The clip 1 can then be further pushed longitudinally through the hole 7, until the locking surface 37 are located below the edge of the hole 7.

[0089] When the clip 1 is pushed through the hole 7, the flexible arms 21 are deflected toward one another.

[0090] In that situation, the protrusions 23 slide longitudinally along the first tapering portion 57 until they are received in the opening 53.

[0091] The retaining surfaces 43 slide along and are guided by the inclined surfaces 61.

[0092] Once the protrusions 23 are accommodated inside the opening 53, the flexible arms 21 can be deflected toward one another sufficiently to allow a full insertion of the clip 1 inside the hole 7.

[0093] During the insertion, the side walls 15 are de-

flected toward one another. Once the insertion is completed, the side walls 15 elastically come back to their initial, spaced-apart positions. The locking surfaces 37 come in abutment below the edge of the hole 7, while the flaps 33 are in abutment above the edge of the hole. The clip 1 is snap fixed in the hole 7.

[0094] In that situation, the end part 5 of the tool 3 can be extracted longitudinally out of the space 17.

[0095] When the end part 5 of the tool is extracted longitudinally out of the space 17 while the clip 1 is snap fixed in the hole 7, the retaining surfaces 43 of the protrusions 23, due to the orientation, cooperate with the first tapering portion 57 of the transverse edge such that the flexible arms 21 are deflected away from one another.

[0096] This allows the transverse edge 55 to clear the protrusions 23.

[0097] The invention also relates a method for the snap fixation of the clip 1 in a hole 7 of a part 9 using the tool 3.

[0098] The clip 1 and the tool 3 are those of the set described above.

[0099] The method comprises the following steps:

- mounting the clip 1 on the end part 5 of the tool 3 by introducing the end part 5 of the tool 3 into the space 17 between the two side walls 15 of the U-shaped part 13 ;
- snap fixing the clip 1 in the hole 7 of the part 5 by introducing the clip 1 in the hole 7 while the clip 1 is mounted on the end part 5 of the tool 3;
- separating the tool 3 from the clip 1 by extracting the end part 5 of the tool 3 out of the space 17.

[0100] The steps are carried out successively, in the order above.

[0101] The step of mounting the clip 1 on the end part 5 of the tool is carried out as described above.

[0102] The step of snap fixing the clip 1 in the hole 7 of the part 5 is carried out as described above.

[0103] The tips 67 of the guiding arms 65 are engaged first in the hole 7.

[0104] The hole 7 has a substantially rectangular section. Its length is slightly smaller than the transverse spacing between the outer surfaces 69 of the guiding arms. The width of each arm 65, perpendicularly to the transverse direction, is slightly smaller than the width of the hole 7.

[0105] The guiding arms 65, due to their arrangement and to the tapering shape of the outer surfaces 69, are very effective for guiding the end part 5 when it is introduced into the hole 7.

[0106] The step of separating the tool 3 from the clip 1 is carried out as described above.

[0107] According to an embodiment of the invention, a magnet 83 is mounted in the end part 5 (figure 1). The magnet 83 helps to attract the clip 1 on the end part 5 and helps mounting the clip on the tool 1. By magnetic attraction the clip can be in contact with the stop surfaces 71.

[0108] The magnet force is higher than 1N and inferior to the force retaining the clip 1 on the tool.

[0109] The magnet is mounted inside the tubular part 75 at the longitudinal end 77.

[0110] The end part 5 could be 3D printed or realized by additive manufacturing.

[0111] The handle 47 could be directly threaded to the end part 5. As a variant all the tool from the handle to the end part 5 is made in one part, for example by 3D printing.

[0112] According to an embodiment of the invention, the tool 3 is mounted on a robot arm or on an automatic insertion device. The tool 3 does not comprise the handle 47 but comprises instead a connection for connecting the tool to the robot arm.

Claims

1. A tool for the snap fixation of a clip (1) in a hole (7) of a part (9), the tool (3) comprising an end part (5), the end part (5) comprising a wall (51) with an opening (53) for receiving protrusions (23) arranged on flexible arms (21) of the clip (1) and a transverse edge (55) defining an end of the wall (41) in a longitudinal direction (L), the transverse edge (55) closing the opening (53) in said longitudinal direction (L), the transverse edge (55) having a first tapering portion (57) and a second tapering portion (59), the first tapering portion (57) considered perpendicularly to a transverse direction (T) having a cross section tapering longitudinally toward the opening (53), and the second tapering portion (59) considered perpendicularly to the transverse direction (T) having a cross section tapering longitudinally opposite the opening (53).
2. The tool according to the claim 1, wherein the first tapering portion (57) extends along the opening (53).
3. The tool according to the claim 1 or 2, wherein the second tapering portion (59), defines a free end of the transverse edge (55) in the longitudinal direction (L) opposite the opening (53).
4. The tool according to anyone of the previous claims, wherein the first tapering portion (57) has a triangular or trapezoidal cross section, and/or the second tapering portion (59) has a triangular or trapezoidal cross section.
5. The tool according to anyone of the previous claims, wherein the end part (5) comprises two guiding arms (65) arranged along two longitudinal sides of the wall (51) and extending longitudinally past the transverse edge (55) up to respective tips (67).
6. The tool according to the claim 6, wherein the two guiding arms (65) have respective outer surfaces

(69) delimiting the guiding arms (65) in the transverse direction (T) opposite the wall (41), said outer surfaces (69) tapering in the longitudinal direction (L) toward the tips (67).

7. The tool according to anyone of the previous claims, wherein the end part (5) comprises two stop surfaces (71), arranged for stopping a longitudinal movement of the clip (1) along the end part (5) when the clip (1) is inserted in the hole (7) using the tool (3).

8. The tool according to the claim 7, wherein the stop surfaces (71) protrude with respect to two large faces (73) of the wall (51) along a third direction (D), the third direction (D) being substantially perpendicular to the longitudinal direction and substantially perpendicular to the transverse direction (T).

9. Set comprising a tool (3) according to anyone of the claims 1 to 8 and a clip (1) adapted for being mounted on the end part (5) of the tool (3) and snap fixed in a hole (7) of a part (9) while mounted on the end part (5) of the tool (3), the clip (1) comprising :

- a U-shape part (13) with two side walls (15) separated from one another along a spacing direction (S) by a space (17), each side wall (15) having a window (19), the U-shape part (13) being arranged for receiving the end part (5) of the tool (3) inside the space (17) ;
- two flexible arms (21) integral with the U-shape part (13), each flexible arm (21) extending in one the window (19) and having a protrusion (23) protruding in the space (17) ;

the protrusions (23) having respective retaining surfaces (43) oriented for cooperating with the first tapering portion (57) of the transverse edge (55) such that, when the end part (5) of the tool (3) is accommodated inside the space (17), the clip (1) is retained on the tool (3).

10. The set according to the claim 9, wherein the protrusions (23) of the flexible arms (21) have respective deflection surfaces (45) oriented for cooperating with the second tapering portion (59) such that the flexible arms (21) are deflected away from one another when the end part (5) of the tool (3) is introduced into the space (17) between the two side walls (15).

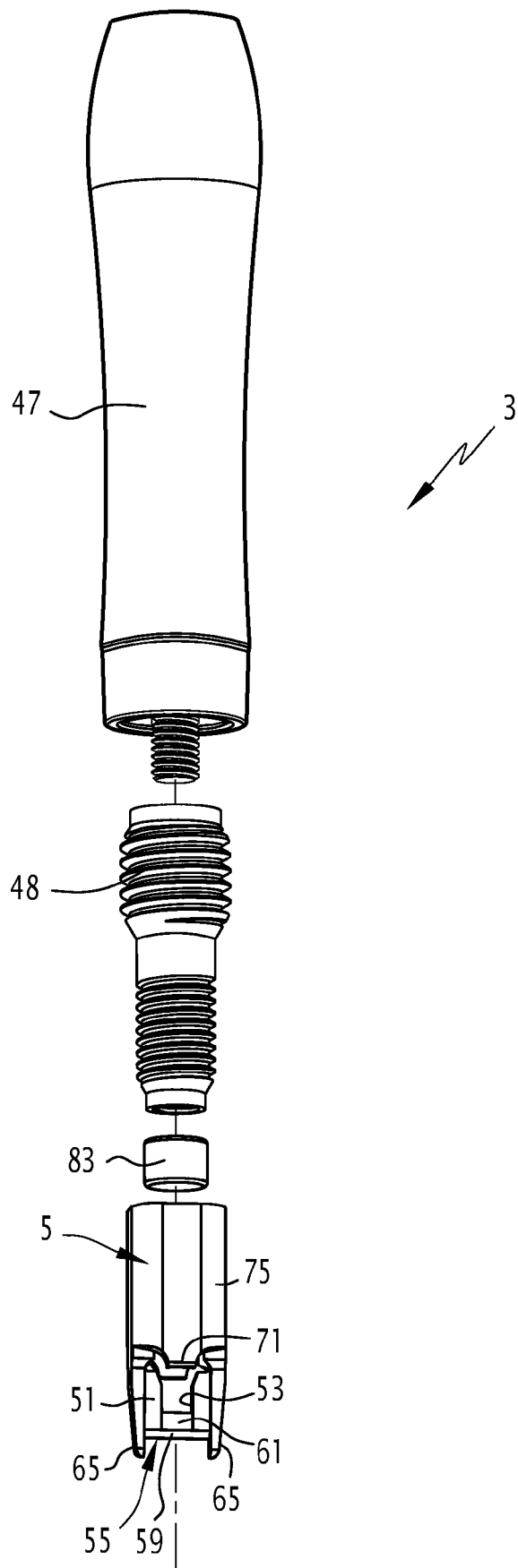
11. The set according to the claim 9 or 10, wherein the tool (3) is according the claim 7 or 8, wherein the side walls (15) of the U-shaped part (13) are arranged such that respective free ends of the side walls (15) comes in abutment against the stop surfaces (71) when the clip (1) is inserted into the hole (7) while being mounted on the end part (5) of the tool (3).

12. The set according to the claim 9 to 11, wherein the retaining surfaces (43) of the protrusions (23) are oriented for cooperating with the first tapering portion (57) of the transverse edge (55) such that the flexible arms (21) are deflected away from one another when the end part (5) of the tool (3) is extracted longitudinally out of the space (17) while the clip (1) is snap fixed in the hole (7).

13. A method for the snap fixation of a clip (1) in a hole (7) of a part (9) using the set according to anyone of the claims 10 to 13, the method comprising the following steps :

- mounting the clip (1) on the end part (5) of the tool (3) by introducing the end part (5) of the tool into the space (17) between the two side walls (15) of the U-shaped part (13);
- snap fixing the clip (1) in the hole (7) of the part (9) by introducing the clip (1) in the hole (7) while the clip (1) is mounted on the end part (5) of the tool (3) ;
- separating the tool (3) from the clip (1) by extracting the end part (5) of the tool (3) out of the space (17).

FIG.1



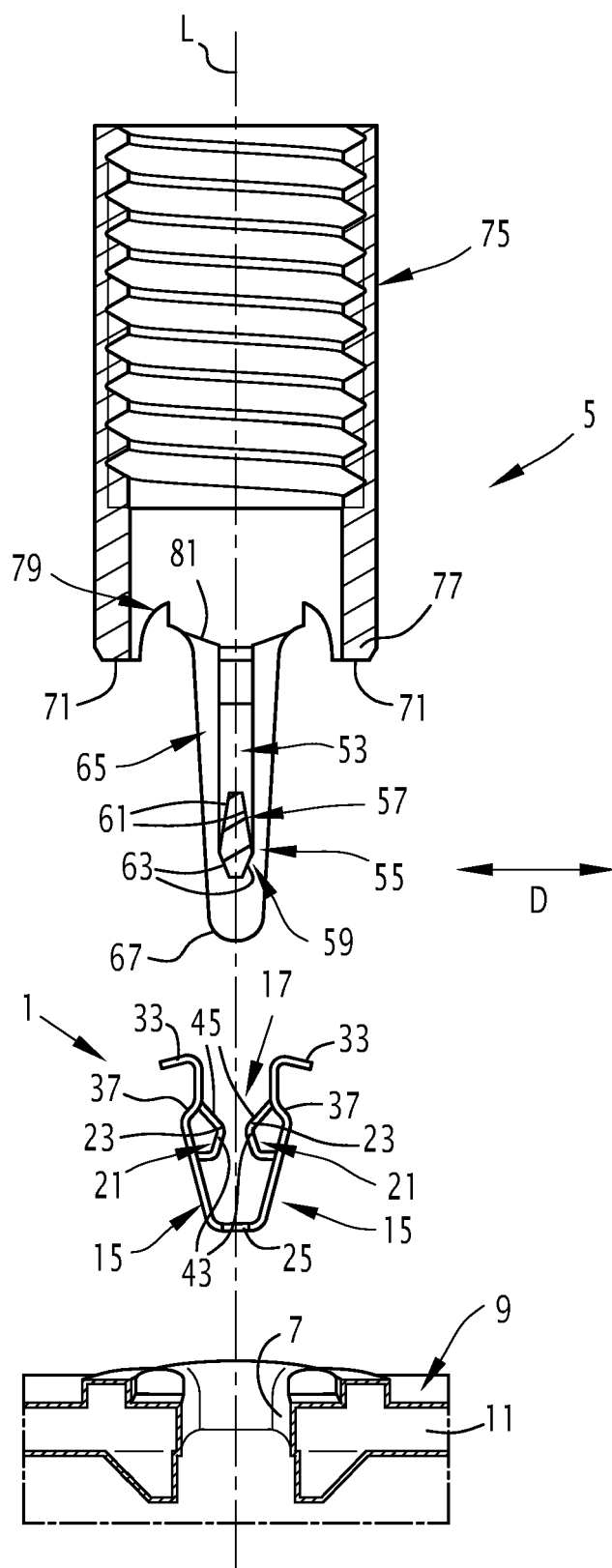


FIG.2

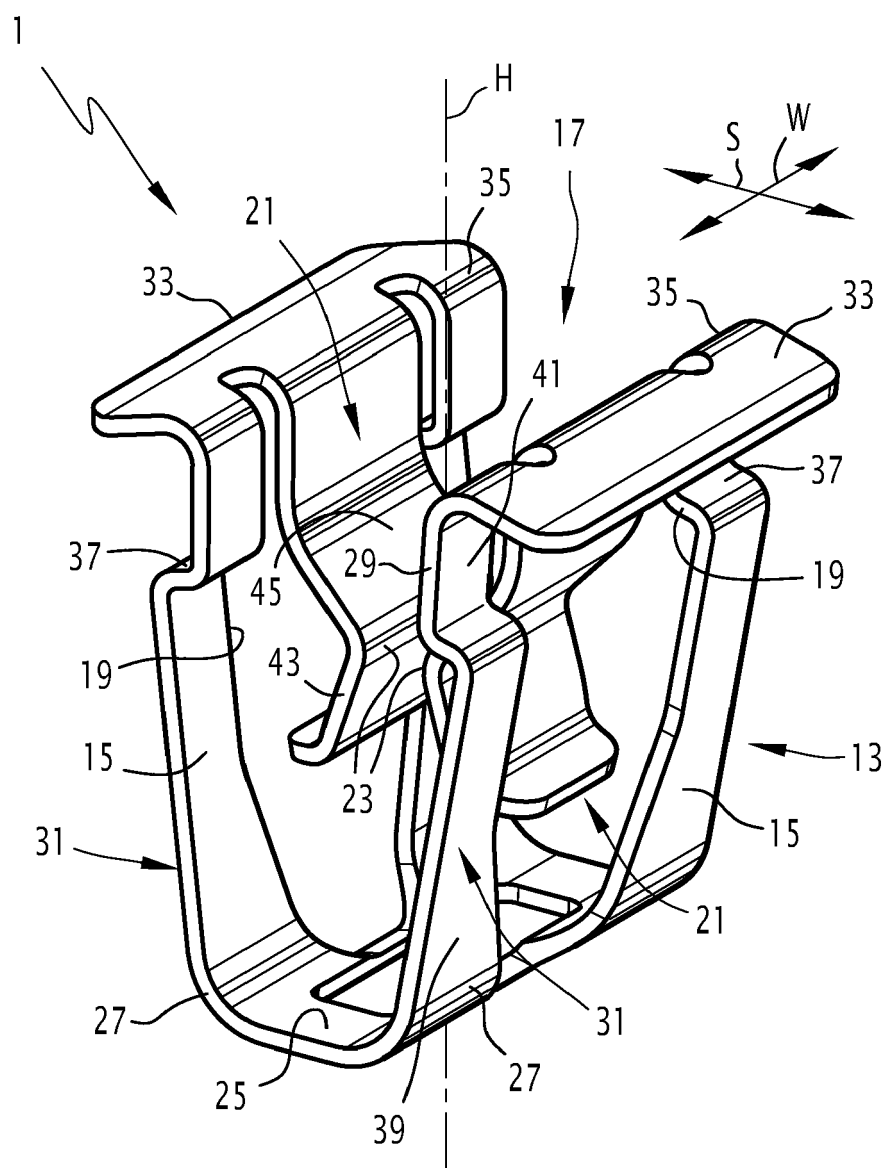


FIG.3

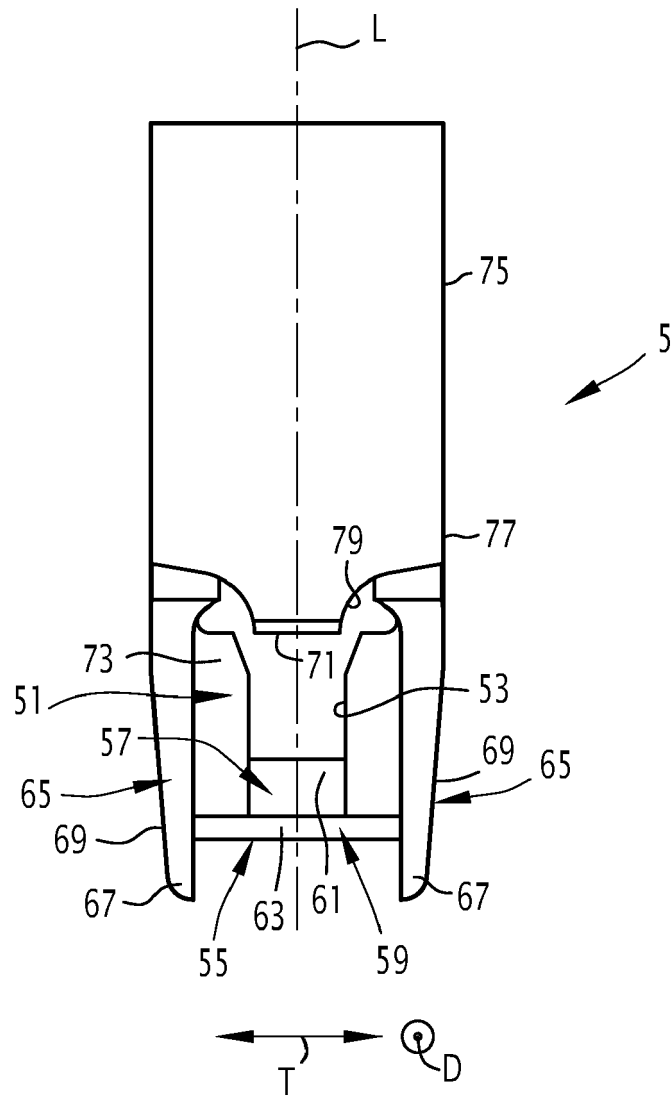


FIG.4



EUROPEAN SEARCH REPORT

 Application Number
 EP 21 30 5207

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Place of search The Hague		Date of completion of the search 26 July 2021	Examiner Pothmann, Johannes
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