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(54) **Tool for attaching clamps to a supporting surface**

(57) The present invention relates to a tool (14) for attaching clamps (10) for attaching an electric cable to a supporting surface, such as a wall. The tool comprises a sleeve shaped, hollow body (14) with an internal shape configured to retain a clamp (10) at least during an initial phase of clamp attachment process to the supporting surface. A ramming body (15) is slidably arranged in the hollow body (14), the ramming body (15) being intended to hit or ram the clamp (10) into the supporting surface. The ramming body (15) further have a length which is larger than the length of the sleeve shaped hollow body (14) and wherein one end of the ramming unit (15) preferably being configured to form a proper supporting surface for the clamp (10).

One end of the ramming body (15) being provided with an attached clamp driver (24) intended to cooperate with a corresponding ramming surface (13) on the clamp (10). At least one inner side surface of the walls of the sleeve shaped body (14) is provided with a surface or a tongue (25) extending into the opening for attachment of the clamp (10) in the first phase of the clamp attachment process.

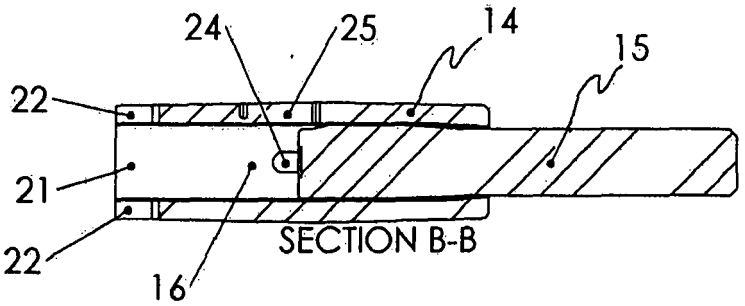

Fig.19

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Description

[0001] The present invention relates to a tool intended to be used for clamping electrical cables to a supporting surface, such as a wall, by means of clamps. The tool comprises a sleeve shaped, hollow body provided with an opening extending through the tool, the opening having a shape allowing retention of a clamp at least during the initial phase of attachment of a clamp to the supporting surface. The invention comprises further a ramming body, intended to drive or force the clamp into the supporting surface. The ramming body has a length, and one end of the ramming body is preferably configured for providing a proper support for the clamp.

[0002] When an electrical cable is to be attached to a supporting surface, such as a wall or the like, it is common practice to use clamps extending around the electrical cable. In such case, it is important that the cable is not damaged by the tool used for attaching the clamp to the supporting surface. Further, it is important that the clamp is hit in a proper manner so that the clamp is driven into the supporting surface at the first try and is not damaged or given an un-aesthetic appearance.

[0003] It has previously been proposed to use a tool or a piston shaped mean for attaching a more or less "Y"-shaped or "U"-shaped clamp, wherein the tool is placed in the "Y"-part or the "U"-part in order to drive the clamp into the supporting surface. Such tool is in practice not suitable for certain types of clamps, such as the so called TP-clamps, and clamps for gypsum walls.

[0004] For clamps of the latter type, i.e. clamps for gypsum wall plates and TP-clamps, it is known to use a tool comprising a sleeve shaped body provided with a slidably arranged ramming piston. The entire tool, which normally is used by professional electricians for attaching electrical cables to a supporting surface, is in general made of metal, generally steel. In order to retain the clamp in position in the sleeve shaped body, the clamp receiving end of the tool is provided with a magnet element. When attaching a cable to the supporting surface, the ramming piston is moved to a retracted position, and a clamp is inserted into the opening where it is retained by means of the magnet. Thereupon, the electrician uses a hammer to hit the ramming piston at its opposite end and the retaining part of the clamp is forced into the supporting surface, while the clamp loop is curved around the cable, attaching the cable to the wall.

[0005] Such tools are expensive to produce since they are designed for a very long working life and since they must be robust, efficient and reliable. Such requirements affect both choice of material and degree of accuracy in the production. According to the present invention there is provided a tool for attaching a clamp for attaching an electric cable to a supporting surface, such as a wall, comprising a sleeve shaped, hollow body with an internal shape configured to retain a clamp at least during an initial phase of clamp attachment to the supporting surface, and an ramming body slidably arranged in the hollow body, the ramming body being intended to hit or ram the clamp into the supporting surface, the ramming body further having a length which is larger than the length of the sleeve shaped hollow body and wherein one end of the ramming body preferably being configured to form a proper supporting surface for the clamp, characterized in that said one end of the ramming body is provided with an attached clamp driver intended to cooperate with a corresponding ramming surface on the clamp, and wherein at least an inner wall surface of the opening in the sleeve shaped body being provided with a surface or a tongue extending into the opening for retaining the clamp during the first phase of the clamp attachment process.

[0006] Such a tool may be cheap to manufacture, whilst producing optimal transfer of force from the clamp driver to the clamp, the tool functioning satisfactory for a short period and thereupon to be disposed of.

[0007] Such a tool may form part of a help-yourself-kit for hobby electrician, together with pre-packed boxes of twenty to fifty clamps. The tool may in such case be in an unassembled state, whereby the purchaser assembles the tool himself. The tool is for such purpose made up in a simple manner, making it possible in an easy manner for a purchaser to assemble the kit.

[0008] According to a preferred embodiment of the invention, at least one end of the sleeve formed body is provided with a wall which extends outwards beyond the remaining three walls to form a support surface for the clamp during the last phase of the clamping process.

[0009] According to a further embodiment of the invention, edges are arranged in conjunction with the extended wall end, the edges being arranged along the sides of the extended wall, extending vertically up from the extended wall, forming a channel wherein the clamp and the outer part of the ramming piston will be guided.

[0010] The outwards extending wall end preferably has a length which at least partly corresponds to the thickness of the cable to be attached to the supporting surface, whereby the clamp is guided at least partly during the initial phase of the attachment process.

[0011] The tongue or surface projecting into the opening of the sleeve shaped body may preferably be pivoted about an axis of rotation, the axis of rotation being positioned closer to the clamp holding end than the free end of said area or tongue.

[0012] According to a further embodiment of the invention said area or tongue may be arranged on a side wall being perpendicular with respect to the extended end wall of the sleeve shaped body.

[0013] The ramming body may further have a larger cross sectional area at the end intended to support the clamp than the remaining part of the ramming body. A side surface of the ramming body may be provided with an elongate recess which is intended to cooperate with a knob or lip configured to project down into the recess, the length of the recess restricting the ramming body from being withdrawn into the opening beyond a point where

the clamp supporting surface of the ramming piston is in contact with said surface or tongue.

[0014] Further, the lip extending into the elongate recess may preferably be arranged at the end of an arm which is flexibly arranged on the sleeve formed body, configured so that the ramming body may be snapped on to the sleeve shaped body.

[0015] The sleeve shaped body and the ramming body may preferably be made of a plastic material, while the clamp driver attached to the front end of the ramming body may be made of metal.

[0016] According to another aspect of the present invention, a help-yourself-kit tool is provided, making it easy for usual consumers to attach a couple of meter of electrical cables on to a supporting surface. The tool may be included in pre-packed clamp packages without having any significant effect on the sale price.

[0017] Further a solution where the tool is delivered to the purchaser in an un-assembled state is provided, reducing the price, but still being simple to assemble without being dependent on use of tools for the assembly process.

[0018] The present invention will be described, by way of example, with reference to the accompanying drawings, in which:

Figures 1a-1d show various types of clamps intended to be attached by means of the tool according to the invention;
Figure 2 shows in perspective a view of an assembled tool according to the invention, seen from the intended to be rammed, wherein the ram is partly pulled back to a retracted position in order to attach a clamp at the front end;
Figure 3 shows in perspective a view of the assembled tool, seen from the front, where the ram is completely retracted;
Figure 4 shows in perspective a view of the sleeve shaped body, where the ram is removed;
Figure 5 shows in perspective a side elevation of the sleeve shaped body, seen from the opposite side;
Figure 6 shows a front view of the sleeve shaped body, seen from the front of the body;
Figure 7 shows a front elevation of the sleeve shaped body, seen from the rear side of the body;
Figure 8 shows in perspective a view of the assembled tool, the ram being shown in its extreme outer position, subsequent to insertion of a clamp into the wall;
Figure 9 shows a front view of the front end of the tool;
Figure 10 shows a vertical section through the sleeve shaped body, the body being provided with an inwards protruding surface or tongue;
Figures 11-13 show a side view of three of the sides of the sleeve shaped body according to the invention;
Figures 14 and 15 show a side view of an assembled tool, where the ram is in its extreme, outer position; a view seen from one side and a view seen from above;
Figures 16 and 17 show a corresponding side view of an assembled tool, where the ram is in its second, opposite extreme position; and
Figures 18 and 19 show a corresponding horizontal side view of an assembled tool, showing the ram in its first and second, opposite extreme position.

[0019] Figures 1a-1d show different embodiments of a clamp 10a-10d for which the tool according to the invention is designed for. The clamps 10a and 10b are so called TP-clamps, provided with a single nail 11 and a head 12, the head 12 being configured to enclose an electric cable (not shown), the head 12 being provided with an aperture 13.

[0020] Figure 1c and 1d show to different embodiments of a clamp for gypsum or plaster walls, comprising three legs 11, a head 12 with an aperture 13 corresponding to the one for the TP-clamp. The purpose of the aperture 13 will be described below in relation to the ram and the ramming pin.

[0021] Figure 2 shows a sleeve shaped housing 14 in perspective with an assembled ramming unit 15. The ramming unit 15 is slidably arranged inside an opening 16 extending through the sleeve shaped housing between two extreme positions (see Figures 6 and 7). In Figure 2 the ramming unit 15 is shown in its extreme position subsequent to completion of attachment of a clamp 10 into the supporting structure. Figure 3 shows a corresponding view in perspective, where the ramming unit 15 is in its second extreme position in the sleeve shaped housing 14, ready for insertion of a clamp (not shown) in the central opening 16. The configuration of the sleeve shaped housing 14 and the ramming unit 15, together with the function of the tool, will be described in further details below, referring to the Figures 4-17.

[0022] Figures 4 and 5 show two views of the sleeve shaped housing 14, seen from either side of the housing 14. As illustrated in Figures 4 and 5, the sleeve shaped housing 14 is at its rear end at the upper side, provided with an elastic lip 18, the outer end of which being provided with a downwards into the opening 16 projecting knob 19. The knob 19 is intended to cooperate with a slot in the ramming unit 15 in order to establish the two extreme positions of the ramming unit 15. At its opposite end, i.e. the front end 20, one wall on the sleeve shaped housing 14 extends beyond the remaining three walls, forming a projection 21. On each side the projection 21 is provided with two upwards projecting edges 22. The length of the projection 21 may preferably be less than the thickness of the electrical wire intended to be fixed to a wall, while the height of the edges 22 may preferably be slightly higher than the thickness of the clamp 10. As indicated in Figure 5, one side wall of the sleeve shaped housing 14 may also be provided with a surface or a tongue 25 intended to project into the opening 16. The tongue 25 will be described in further details below, referring inter alia to Figures 10 and 13.

[0023] Figure 8 shows an assembled tool comprising a sleeve shaped housing 14 and the ramming unit 15. As illustrated in the Figures, one end of the ramming unit 15 is intended to rest against a clamp 10, said end being provided with an attached clamp driver 24 made of metal. The purpose of the clamp driver 14 is to rest against the central aperture 13 in the clamp head in order to secure that the ramming force produced by the ramming unit 15 is transferred directly from the ramming unit 15 to the clamp 10 in controlled manner so that the head 12 of the clamp 10 is not unintentionally deformed.

[0024] Figure 9 shows a view of the end of the tool 14 intended to rest against a clamp 10. As indicated the ramming unit 15 is provided with a ramming clamp driver 24. The clamp driver 24 is arranged on the surface of the ramming unit 15 sliding along the extended surface wall 21.

[0025] Figure 10 shows a vertical section through a sleeve shaped housing 14, also showing the opening 16 extending centrally through the housing 16, the extended wall section 21 and the upwards extending side edges 22. As illustrated in the Figure, one of the walls of the sleeve shaped housing 14 is provided with a surface or a tongue 25, which at the end adjacent to the extended surface 21, is pivotably hinged about an axis 26. The tongue 25 is intended to partly pivot about the axis 26, so that the tongue 25 partly will swing into the opening 16 extending through the housing 14. In such position, extending into the opening 16 of the housing 14, the tongue 25 will rest against the ramming unit 15. The purpose of the tongue 25 is to retain the clamp 10 in the opening 16, so that the clamp does not unintentionally drop out of its seating. Such effect is achieved due to the tongue 25, causing a reduction in the free cross sectional area of the opening 14, whereby the clamp is "wedged" in the opening.

[0026] Figures 11-13 show side views of three of the four sides of the sleeve shaped housing 14. The side which is not shown, is the bottom side of the sleeve shaped housing 14. The rotational axis 26 of the tongue 25 may preferably be arranged at the outer surface of a wall of the sleeve shaped housing 14. The axis 26 may for example be in a form of weakening or attenuation; or may be in form of a partly slot 27 in the wall material.

[0027] Figures 14 and 16 show a side view of the tool according to the invention, where Figure 14 shows the tool with the ramming unit 15 in one extreme position, while Figure 16 shows the same view where the ramming unit 15 is retracted to its opposite extreme position. Figures 15 and 17 show a corresponding top view of the tool where the two extreme positions of the ramming piston 15 are illustrated. As shown in Figures 14 and 15 the ramming unit 15 may be moved so far that the tip of the clamp driver 25 just protrude outside the extended wall 21. In opposite direction the ramming unit 15 may be retracted so far into the opening 16, that the end of the ramming piston 15 is positioned in the area of the free end of the tongue 25. Such features are also illustrated in Figure 19, showing a section seen along the line B-B in Figure 16.

[0028] As illustrated in Figure 17, one side surface of the ramming unit 15 is provided with an elongated slot 28. The length and position of the slot 28 in the ramming unit 15 are such that they restrict the total possible distance of movement of the ramming unit 15 inside the opening 16 of the sleeve shaped housing 14. The slot 28 cooperates with the knob 19 arranged on the flexible, movable tip 18. The ramming unit 15 may preferably have a larger cross sectional area at the end where the clamp driver 24 are arranged, that the remaining part of the ramming unit, the transition between the two different cross sectional areas being even. The part of the ramming unit 15 having an increased cross sectional area may extent approximately to the nearest end of the elongated slot 28, preferably a small distance beyond the nearest end. Correspondingly may two parallel side walls of the sleeve shaped housing 14, at the ramming end 17 of the housing be provided with two constrictions, so that the end of the ramming unit having a reduced cross sectional is resting against said constrictions.

[0029] The tool according to the present invention functions as follows:

The ramming unit is retracted to a position, for example as shown in Figure 16. Thereupon, a first clamp 10 is fed into the opening 16 so that the clamp 10 rests against the tongue 25 and is firmly kept. In this position, the aperture 13 in the head 12 of the clamp 10 rests against the clamp driver 24 on the ramming unit 15. It is important that the clamp driver 24 is firmly resting against the aperture 13 in the clamp 10, and that the aperture is aligned with the central pin 11 of the clamp, if only a one pin clamp is used, or against the middle pin 11 in case a three pin clamp 10 is used, in order to obtain an optimal transfer of ramming force from the ramming unit 15 to the clamp 10. The tool is set at the required place on one side of an electric cable intended to be fixed to the supporting surface. A hammer may for example be used to hit the ramming unit 15 in order to force the clamp by means of the clamp driver into the supporting surface. Upon completion of this operation, the ramming unit 15 is pulled back into the housing and the same operation is reiterated at a new position on the supporting surface.

The tool is assembled in the following way:

The tool is delivered in three parts; namely the sleeve shaped housing 14, the ramming unit 15 and the clamp driver 24. Firstly, the clamp driver 24 is attached to the ramming unit 15, which is configured with recesses (not shown) adapted to receive the clamp driver 24. Thereupon, the ramming unit 15 with the attached clamp driver 24 is inserted into the opening 16, passing through the sleeve shaped housing 14 from the

opposite side of the end where the elastic lip 18 with the knob 19 is arranged. When inserting the ramming piston 15 into the opening 16, the ramming end of the ramming unit 15 gets into contact with the knob 19, whereby the knob 19 is lifted up by the ramming unit 15, until the knob 19 snaps down into the elongated slot 28. In such manner, the knob 19 will co-act with the slot 28 for limiting the maximum travelling distance of the ramming piston.

Claims

1. A tool (14) for attaching a clamp (10) for attaching an electric cable to a supporting surface, such as a wall, the tool (14) comprising a sleeve shaped, hollow body (14) with an internal shape configured to retain a clamp (10) at least during an initial phase of clamp attachment to the supporting surface, and a ramming body (15) slidably arranged in the hollow body (14), the ramming body (15) being intended to hit or ram the clamp (10) into the supporting surface, the ramming body (15) having a length longer than the length of the sleeve shaped hollow body (14) **characterized in that** one end of the ramming body (15) is provided with an attached clamp driver (24) intended to cooperate with a corresponding ramming surface (13) on the clamp (10), and wherein at least an inner wall surface of the opening in the sleeve shaped body (14) is provided with a surface or a tongue (25) extending into the opening for retaining the clamp (10) during the first phase of the clamp attachment process.

2. The tool (14) according to claim 1, wherein at least one end of the sleeve shaped body (14) is provided with a side wall (21) extending beyond the end of the remaining three wall in order to form a support surface for the clamp (10) during the attachment operation.

3. The tool (14) according to claim 2, wherein upwards extending side edges (22) are arranged in conjunction with the outwards extending wall (21), forming a channel in which the clamp (10) and the ramming body (15) may slide.

4. The tool (14) according to claim 2 or 3, wherein the outwards extending side wall (2) at least has a length which partly corresponds to the thickness of the electrical cable intended to be attached to the supporting surface, so that the movement of the clamp (10) is guided at least partly during the initial phase of the attachment process.

5. The tool (14) according to any one of the preceding claims, wherein the surface or tongue (25) extending into the opening of the sleeve shaped body (14) is pivotably arranged about an axis (26), positioned closer to the opening for the clamp than the free end of the surface or the tongue (25).

6. The tool (14) according to any one of the preceding claims, wherein the surface or tongue (25) is positioned on a sidewall arranged perpendicular on the extended wall of sleeve shaped body.

7. The tool (14) according to any one of the preceding claims, wherein the ramming body (15) has a larger cross sectional area at the end intended to support the clamp (10) than the part of the ramming unit (15) intended to be arranged inside the opening of the sleeve shaped body (14).

8. The tool (14) according to one of the preceding claims, wherein the ramming unit (15) on one side is provided with an elongated slot (28) intended to cooperate with a knob (19) extending into the slot (28), the slot (28) having a length that limits retraction of the ramming unit (15) into the opening (14) to a point where an edge of the clamp end of the ramming unit (14) rests in contact with said surface or tongue (25).

9. The tool (14) according to claim 8, wherein the knob (19) extending into the elongated slot (28) is arranged at end of a flexible arm (18) arranged on the sleeve shaped body (14), so that the ramming body (15) may be snapped on to the sleeve shaped body for slidably retaining the ramming body (15) in the sleeve shaped body (14).

10. The tool (14) according to any one of the preceding claims, wherein both the sleeve shaped body (14) and the ramming unit (15) are made of plastic materials, and wherein the clamp driver is made of metal.

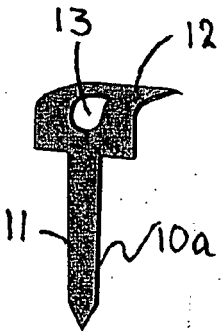

Fig. 1a

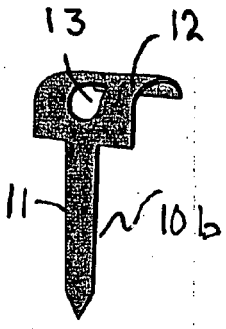

Fig. 1b

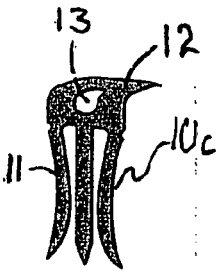

Fig. 1c

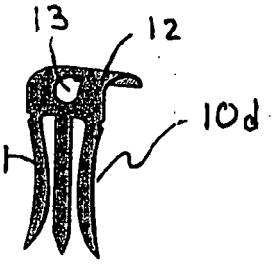

Fig. 1d

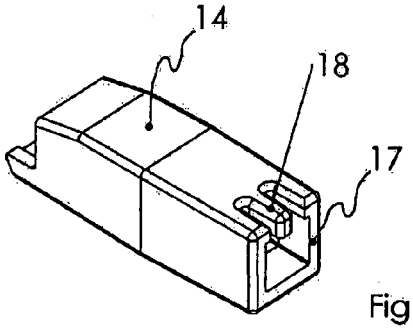

Fig.4

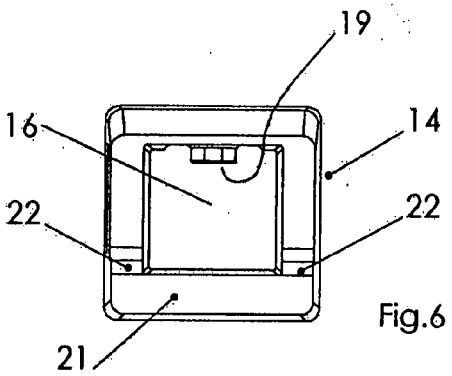

Fig.6

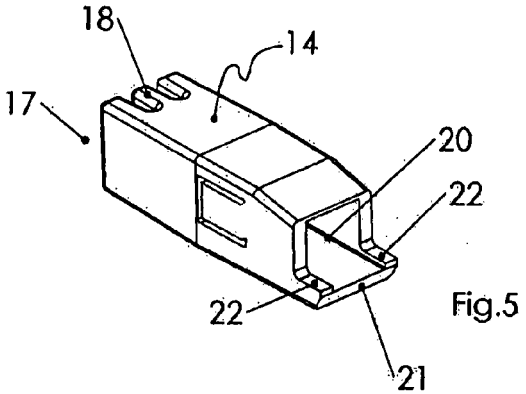

Fig.5

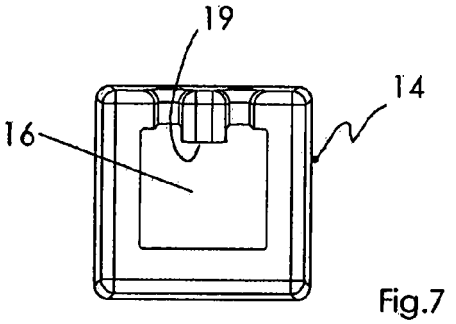

Fig.7

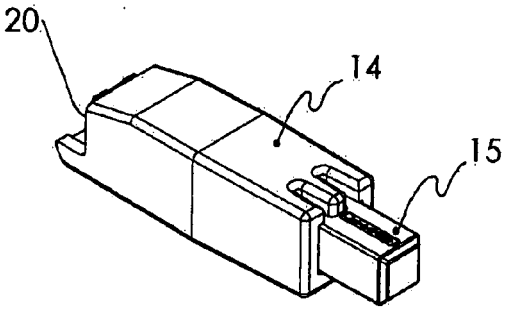

Fig.2

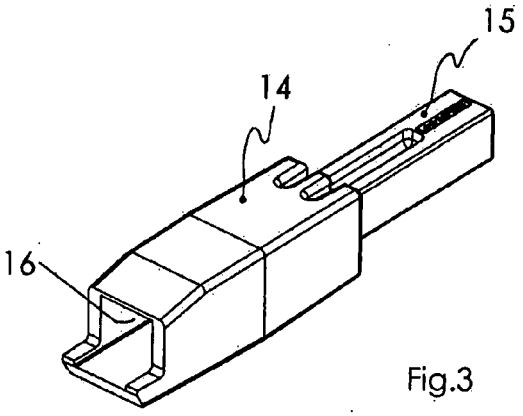

Fig.3

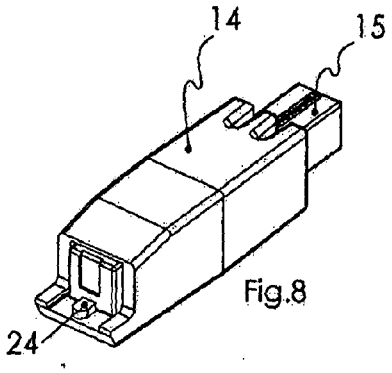

Fig.8

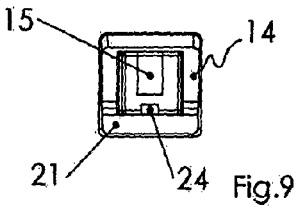

Fig.9

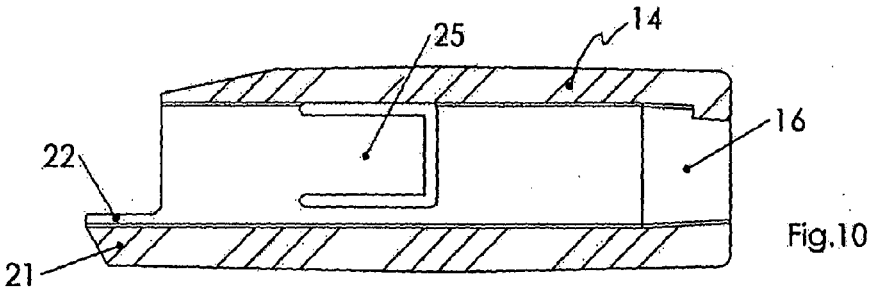

Fig.10

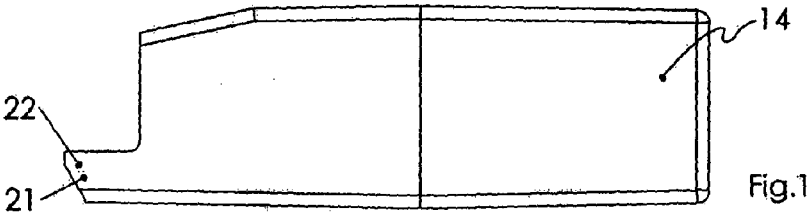

Fig.11

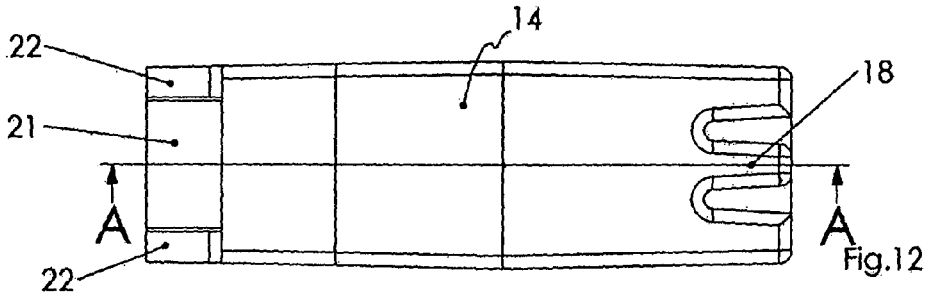

Fig.12

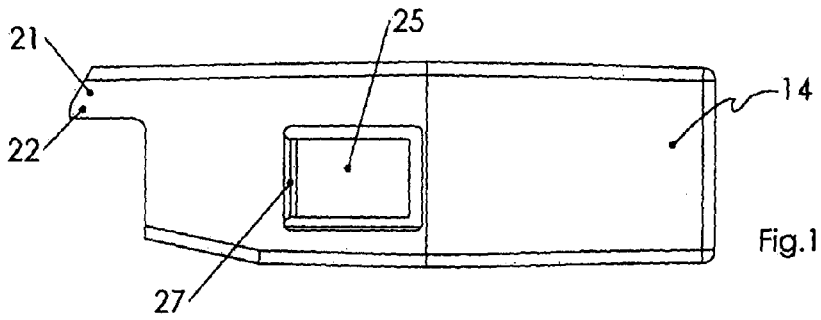

Fig.13

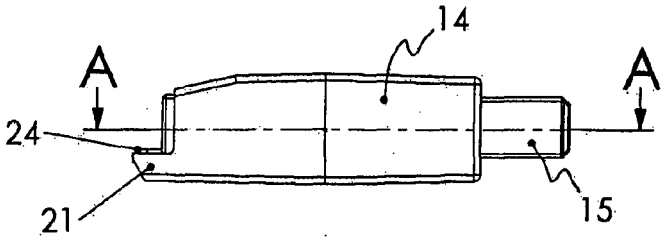

Fig.14

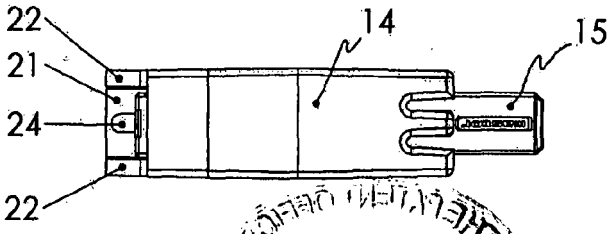

Fig.15

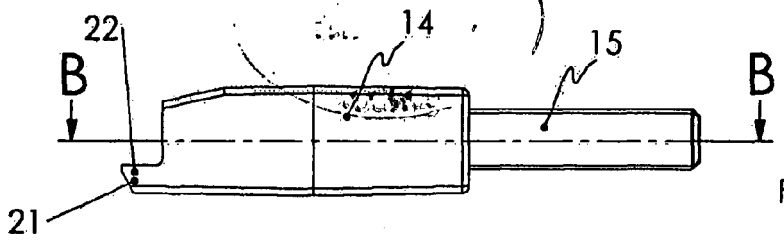

Fig.16

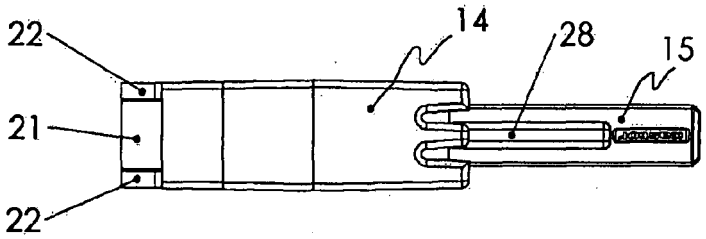

Fig.17

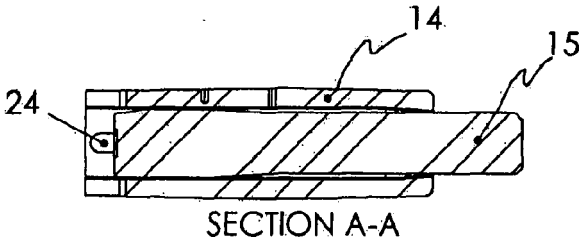

Fig.18

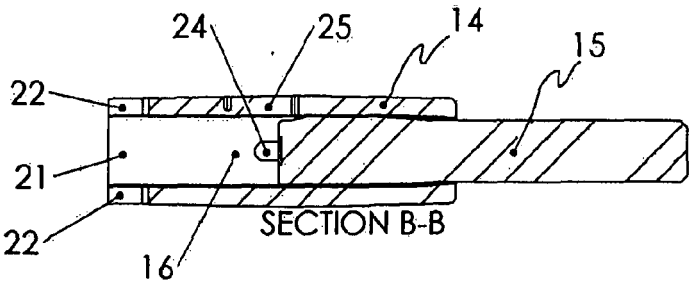

Fig.19