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(12) # EUROPEAN PATENT SPECIFICATION

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(54) **Electrical terminal.**

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DE-A- 3 343 828
FR-A- 2 601 730

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EP 0 340 951 B1

Description

This invention relates to an electrical terminal for insertion into a cavity in an insulating housing and having opposed latching tongues for engagement with a shoulder in the cavity to retain the terminal therein.

There is described in US-A-3,187,297 an electrical terminal for insertion into a cavity in an insulating housing and having an elongate mating portion and a wire connecting portion, the mating portion having a central longitudinal axis and having secured snugly there about, a one piece metal sleeve comprising, latching tongues which project obliquely towards the wire connecting portion for engagement with shoulders in the cavity. The mating portion of this known terminal is in the form of circular, hollow, barrel to which the sleeve is secured by dimpling the sleeve. The sleeve is stated to be "metallic."

The present invention is directed to the provision of such a sleeve on a terminal, the mating portion of which is in the form of a flat, electrical tab comprising first and second superposed layers of the tab material so that the tab is of double thickness, whereby the tab is of sufficient rigidity for its purpose, albeit that it has been made from the same piece of metal stock as the wire connecting portion, which will usually be in the form of a U-cross section crimping ferrule. Such tab terminals are described, for example, in ES-U-86653. An object of the invention is to ensure that the latching tongues are symmetrically disposed and that at the same time, the sleeve is immovable lengthwise of the tab portion.

According to the present invention, an electrical terminal as defined in the second paragraph of this specification is characterized in that the mating portion is in the form of a flat electrical tab comprising first and second superposed layers of the tab material, the first layer having formed therein a rabbet exposing the second layer so that it provides a reduced cross section length of the tab portion; and in that the sleeve, which is made of a spring tempered metal, is welded about said reduced cross section length which has been pressed into said rabbet so that said length is bisected by said central axis, whereby the latching tongues are located in rotational symmetry with respect to said axis, end walls of the rabbet preventing movement of the sleeve lengthwise of said axis.

When the terminal is inserted into the cavity in the insulating housing, the latching tongues are, in known manner, depressed by a reduced cross section part of the cavity and resile to engage the shoulders in the cavity. Since the tongues are of spring metal they will not take on permanent set when so depressed, and by virtue of their symmetry will engage the shoulders at precisely equal distances from the reduced cross section portion of the cavity. The terminal cannot, therefore, be dislodged from its cavity under the action of vibration at the site of use, for example, in a motor vehicle, or by tension being applied to a lead wire connected to the wire connecting portion.

The sleeve, which is preferably made of spring tempered steel, may be welded at a plurality of points along a longitudinal seam defined by overlapping edges of the sleeve and one of these edges may be chamfered back from its junction with the other edge, to assist the welding operations. The outer surface of the sleeve is preferably flush with that of the tab.

The sleeve may be rolled by wrapping a spring tempered steel blank about the reduced cross section length of the tab, adjacent edges of the blank providing the welding seam. For assembling the blank to the tab, the blank may be folded along its center line, so that substantially half of the blank extends perpendicularly to the remainder thereof, a margin of the other half of the blank being turned up, so that the blank forms a receptacle for the reduced cross section length of the tab. With said length received in the receptacle, the first half of the blank is folded over to engage the turned up margin, thereby to provide the welding seam.

The invention will now be described by way of example with reference to the accompanying drawings, in which:

FIGURE 1 is a fragmentary, longitudinal sectional view through an insulating housing, showing therein an electrical terminal comprising a tab portion and a crimping ferrule portion, the latter being shown schematically and in broken lines, the tab portion having assembled thereto, a spring tempered metal sleeve from which project opposed latching tongues;

FIGURE 2 is a fragmentary plan view of the terminal shown in Figure 1;

FIGURE 3 is a similar view to that of Figure 2, but showing the terminal before the assembly of the sleeve to the tab portion;

FIGURE 4 is a left hand end view of Figure 1 showing the tab portion in cross section on the lines 4-4 in Figure 1;

FIGURE 5 is an end view, shown partly in cross section, illustrating a step in the assembly of the sleeve to the tab portion;

FIGURE 6 is an isometric view of the terminal as shown in Figure 3, with part thereof broken away;

FIGURE 7 is a plan view of the sleeve; and

FIGURE 8 is a right hand end view of Figure 1, but in which the terminal is not shown.

As shown in Figures 1, 2 and 4, the terminal comprises a tab portion 2, a transition portion 4, a crimping ferrule portion 6, which were stamped and formed from a single piece of metal stock, for example of brass or copper, and a one piece spring tempered steel sleeve 8 welded about a reduced cross section length 9 of the tab portion 2 and comprising identical latching tongues 10 both extending obliquely towards the crimping ferrule walls 6 in opposed relationship.

The tab portion 2, comprises first and second superposed layers 12 and 14, respectively, of the tab material, produced by folding over, in known manner, opposite margins of the sheet metal blank (not shown) from which the terminal was formed, to define a central longitudinal seam 15. Part of the layer 12 was cut away during the stamping operation, to form a rabbet 16 in the layer 12, exposing a length 9 of the layer 14, and the length 9 was pressed and deformed into the rabbet 16 so as to be bisected by the longitudinal central axis X of the tab portion 2 (as best seen in Figures 1 and 6), both in respect of the width of the length 9 and its thickness. By virtue of this pressing operation tongues 10 are located in precise rotational symmetry about the axis X, as will best be apparent from Figure 1. The sleeve 8 is prevented from movement along the axis X relative to the tab portion 2, by end faces 18 of the layer 12 and end faces 20 of rudimentary side walls 22 bent up from the layer 14, proximate to the transition portion 4. The root portions 24 of the tongues 10 extend between the side walls 22. Near its junction with the tab portion 2, the portion 4 is formed with opposed lateral stop ears 26.

The sleeve 8 was rolled from a spring steel blank 8′ (Figure 5) formed with the tongues 10 and having been folded in half along its center line C so that one half 28 of the blank 8′ extends perpendicularly with respect to its other half 30. A margin 32 of the half 30 was bent up, as shown in Figure 5, so as to extend parallel to the half 28 and perpendicularly with respect to the remainder of the half 30. The half 28 has a free longitudinal edge portion 34, the margin 32 having a free longitudinal edge portion 36 having an external chamfer 38 running there along. The blank 8′ formed as described above, acts as a receptacle for the length 9.

In order to assemble the blank 8′ to the reduced cross section length 9, the blank is applied thereto, so that the length 9 is received between the half 28 and the margin 32 to lie against said remainder of the half 30. The half 28 is then rolled over in the direction of the arrow A in Figure 5 so that the edge portion 34 engages the edge portion 36 whereby the length 9 is snugly received in the sleeve 8 now provided by the blank 8′, the outer surface of the sleeve 8 being flush with that of the tab portion 2. The edges 34 and 36 which cooperate to provide a longitudinal welding seam 40 (Figures 2 and 7) are now laser welded together at two longitudinally spaced points P (Figure 2) whereby the sleeve 8 is firmly secured about the length 9 in snugly fitting relationship therewith.

For use, the ferrule portion 6 thereof having been crimped to an insulated lead wire L, the terminal is inserted into a cavity 42 in an insulating housing 44 in the direction of the arrow B in Figure 1, with the tab portion 2 leading, so that the tongues 10 are resiliently depressed by convergent walls 46 (Figures 1 and 8) adjacent to a reduced cross section portion 48 of the cavity 42 and resile when they have passed there through, to overlap and engage the shoulders 50 in the cavity 42, bounding the portion 48 thereof at its end remote from the walls 46. As will be apparent from Figure 1, the tongues 10 engage the shoulders 50 at positions equidistant from the cavity portion 48, since the tongues 10, being made of spring metal, resile fully and so do not take on a permanent set but resume their symmetrization about the axis X. At this time, the ears 26 engage lateral wall portions 52 (Figures 4 and 8) on either side of the cavity portion 48, so that the terminal is latched against any axial movement in the cavity 42. Even if the lead wire L is pulled sharply, the tongues 10 will be deformed only elastically and will not be dislodged from the shoulders 50 and will resile when the tension has ceased, to assume the symmetrical position in which they are shown in Figure 1.

Claims

1. An electrical terminal for insertion into a cavity (42) in an insulating housing (44) and having an elongate mating portion (2) and a wire connecting portion (6), the mating portion (2) having a central longitudinal axis (X) and having secured snugly there about, a one-piece metal sleeve (8) comprising latching tongues (10) which project obliquely towards the wire connecting portion (6), for engagement with shoulders (50) in the cavity (42); characterized in that the mating portion is in the form of a flat electrical tab (2) comprising first and second superposed layers (12, 14) of the tab material, the first layer (12) having formed therein a rabbet (16) exposing the second layer (14) so that it provides a reduced cross section length (9) of the tab portion (2); and in that the sleeve (8), which is made of a spring tempered metal, is welded about said reduced cross section length (9) which has been pressed into said rabbet (16) so that said length (9) is bisected

by said central axis (X), whereby the latching tongues (10) are located in rotational symmetry with respect to said axis (X), end walls (18, 20) of the rabbet (16) preventing movement of the sleeve (8) lengthwise of said axis (X).

2. A terminal according to claim 1, characterized in that the sleeve (8) is formed from a metal blank (8′) wrapped about said length (9) and having adjacent edge portions (34, 36) defining a seam (40) extending longitudinally of the tab portion (2), said edge portions (34 and 36) being welded together at a plurality of points (P) spaced there along.

3. A terminal according to claim 1 or 2, characterized in that the end walls of the rabbet (16) comprise end edges (18) of the first layer (12) and end edges (20) of walls (22) bent up from the second layer (14).

4. A terminal according to claim 3, characterized in that root portions (24) of said tongues (10) extend between said bent up walls (22).

5. A terminal according to any one of the preceding claims, characterized in that the outer surface of the sleeve (8) is flush with the outer surface of the tab portion (2).

6. A terminal according to any one of the preceding claims, characterized in that the spring tempered metal is spring tempered steel.

Patentansprüche

1. Elektrischer Anschluß zum Einsetzen in einen Hohlraum (42) in einem isolierenden Gehäuse (44), der einen langgestreckten Fügeabschnitt (2) und einen Drahtverbindungsabschnitt (6) hat, wobei der Fügeabschnitt (2) eine zentrale Längsachse (X) hat und dicht um ihn herum befestigt eine einstückige Metallhülse (8) hat, die Verriegelungszungen (10) aufweist, die schräg zu dem Drahtverbindungsabschnitt (6) zum Eingriff mit Schultern (50) in dem Hohlraum (42) vorragen, **dadurch gekennzeichnet,** daß der Fügeabschnitt die Form einer flachen elektrischen Lasche (2) hat, die erste und zweite übereinanderliegende Schichten (12, 14) des Laschenmaterials aufweiset, wobei in der ersten Schicht (12) ein Falz (16) ausgebildet ist, der die zweite Schicht (14) freilegt, so daß sie eine Länge (9) des Laschenabschnitts (2) mit vermindertem Querschnitt bildet, und daß die Hülse (8), die aus einem vergüteten Federmetall hergestellt ist, um die Länge (9) mit vermindertem Querschnitt herum geschweißt ist, die in den Falz (16) hineingedrückt wurde, so daß die Länge (9) durch die zentrale Achse (X) halbiert ist, wodurch die Verriegelungszungen (10) in Rotationssymmetrie in bezug auf die Achse (X) angeordnet sind und wobei Endwände (18, 20) des Falzes (16) eine Bewegung der Hülse (8) in Längsrichtung der Achse (X) verhindern.

2. Anschluß nach Anspruch 1, **dadurch gekennzeichnet,** daß die Hülse (8) aus einem Metallrohling (8') gebildet ist, der um die Länge (9) herumgelegt ist und benachbarte Kantenteile (34, 36) hat, die einen Saum (40) bilden, der sich in Längsrichtung des Laschenabschnitts (2) erstreckt, wobei die Kantenteile (34 und 36) an einer Vielzahl von Punkten (P) zusammengeschweißt sind, die daran längs beabstandet sind.

3. Anschluß nach Anspruch 1 oder 2, **dadurch gekennzeichnet,** daß die Endwände des Falzes (16) Endränder (18) der ersten Schicht (12) und Endränder (20) von Wänden (22) aufweisen, die von der zweiten Schicht (14) nach oben gebogen sind.

4. Anschluß nach Anspruch 3, **dadurch gekennzeichnet,** daß Wurzelteile (24) der Zungen (10) sich zwischen den nach oben gebogenen Wänden (22) erstrecken.

5. Anschluß nach einem der vorhergehenden Ansprüche, dadurch **gekennzeichnet,** daß die äußere Oberfläche der Hülse (8) bündig mit der äußeren Oberfläche des Laschenabschnitts (2) ist.

6. Anschluß nach einem der vorhergehenden Ansprüche, dadurch **gekennzeichnet,** daß das vergütete Federmetall ein vergüteter Federstahl ist.

Revendications

1. Borne électrique destinée à être introduite dans une cavité (42) dans un boîtier isolant (44), et comportant une partie d'emboîtement oblongue (2) et une partie (6) de connexion à un conducteur, la partie d'emboîtement (2) ayant un axe longitudinal central (X) et portant, fixé étroitement autour de sa surface, un manchon en métal d'une pièce (8) comprenant des languettes métalliques de verrouillage (10) qui font saillie obliquement vers la partie (6) de connexion au conducteur, destinées à venir en prise avec des épaulements (50) situés dans la cavité (42), caractérisée en ce que la partie

d'emboîtement a la forme d'une broche électrique plate (2) comprenant une première et une deuxième couche superposée (12, 14) de la matière constituant la broche, la première couche (12) présentant une découpe (16) qui découvre la deuxième couche (14), de telle sorte qu'elle donne un segment (9) de section transversale réduite de la partie formant broche (2), et que le manchon (8), qui est fait d'un métal trempé pour ressorts, est soudé autour du segment (9) de section transversale réduite qui a été pressé dans la découpe (16), d'une façon telle que le segment (9) soit divisé en deux par l'axe central (X), les languettes de verrouillage (10) occupant des positions en symétrie de révolution par rapport à l'axe (X), des parois d'extrémité (18, 20) de la découpe (16) empêchant le manchon (8) de se déplacer longitudinalement dans la direction de l'axe (X).

2. Borne suivant la revendication 1, caractérisée en ce que le manchon (8) est formé au départ d'un flan de métal (8') enroulé autour du segment (9) et comportant des bords adjacents (34, 36) qui définissent un joint (40) qui s'étend dans le sens de la longueur de la partie formant broche (2), ces bords (34, 36) étant soudés l'un à l'autre en plusieurs points (P) espacés sur leur longueur.

3. Borne suivant la revendication 1 ou 2, caractérisée en ce que les parois d'extrémité de découpe (16) comprennent des bords d'extrémité (18) de la première couche (12) et des bords d'extrémité (20) de parois (22) pliées vers le haut depuis la deuxième couche (14).

4. Borne suivant la revendication 3, caractérisée en ce que des parties de base (24) des languettes (10) s'étendent entre les parois pliées vers le haut (22).

5. Borne suivant l'une des revendications précédentes, caractérisée en ce que la surface extérieure du manchon (8) est à niveau avec la surface extérieure de la partie formant broche (2).

6. Borne suivant l'une des revendications précédentes, caractérisée en ce que le métal trempé pour ressorts est de l'acier trempé pour ressorts.

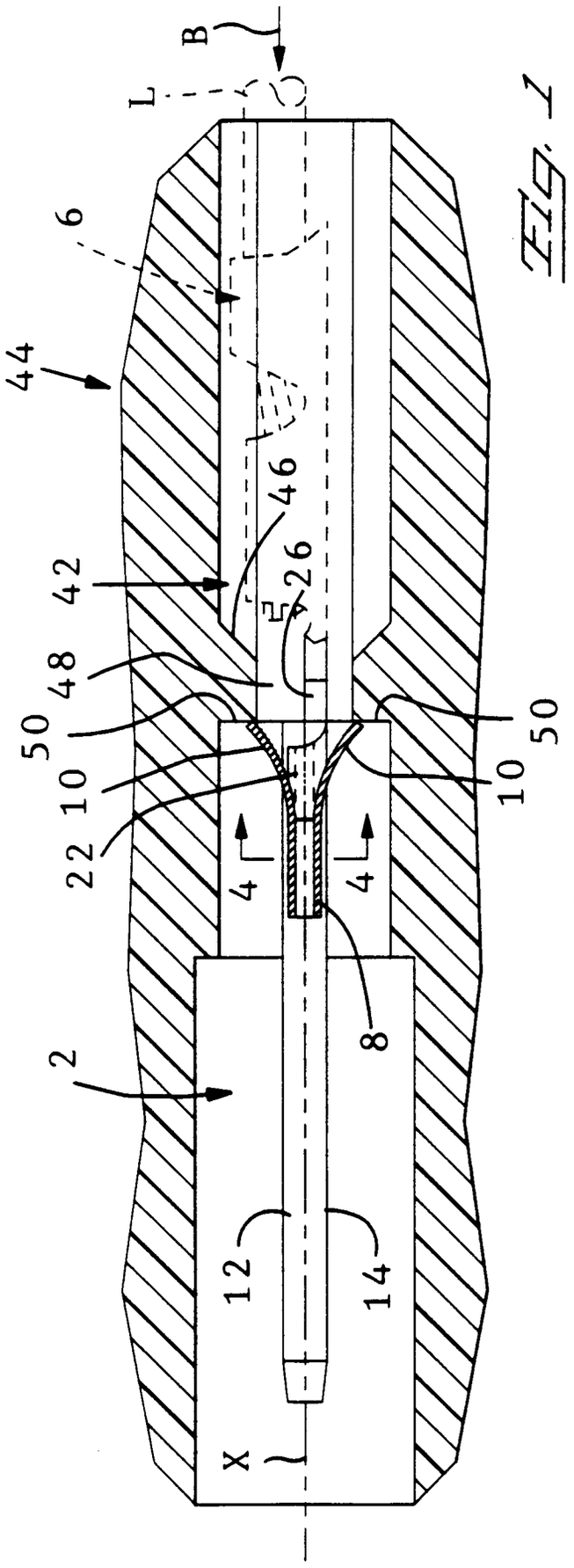


Fig. 1

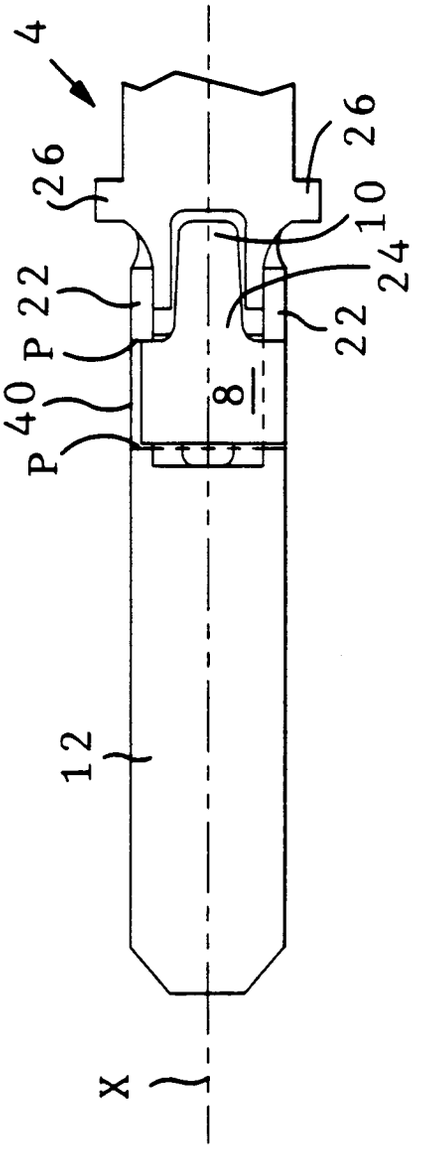


Fig. 2

Fig. 3

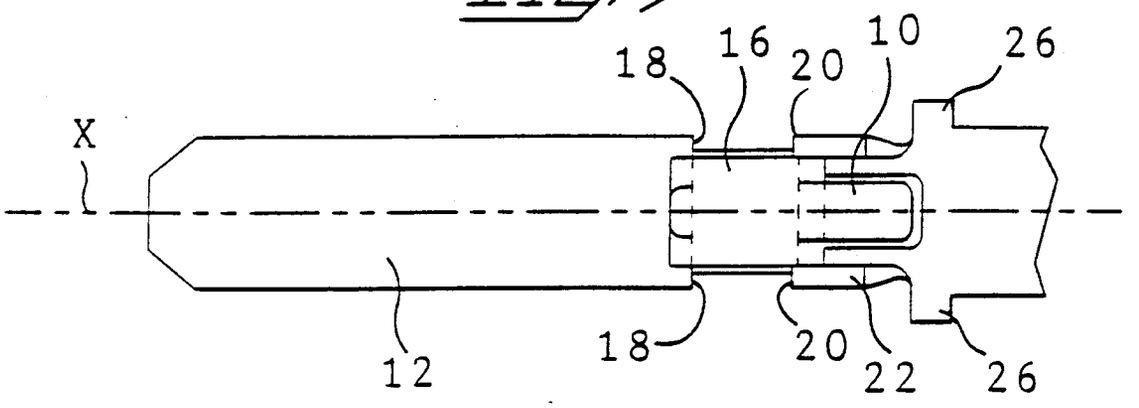
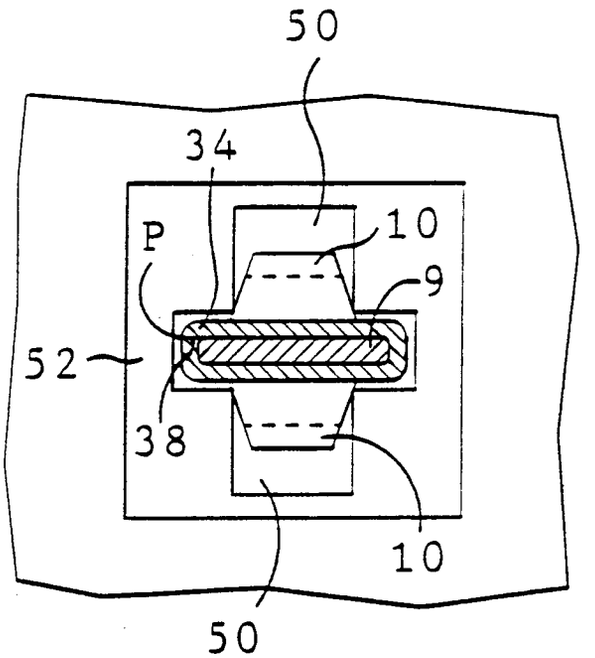


Fig. 4



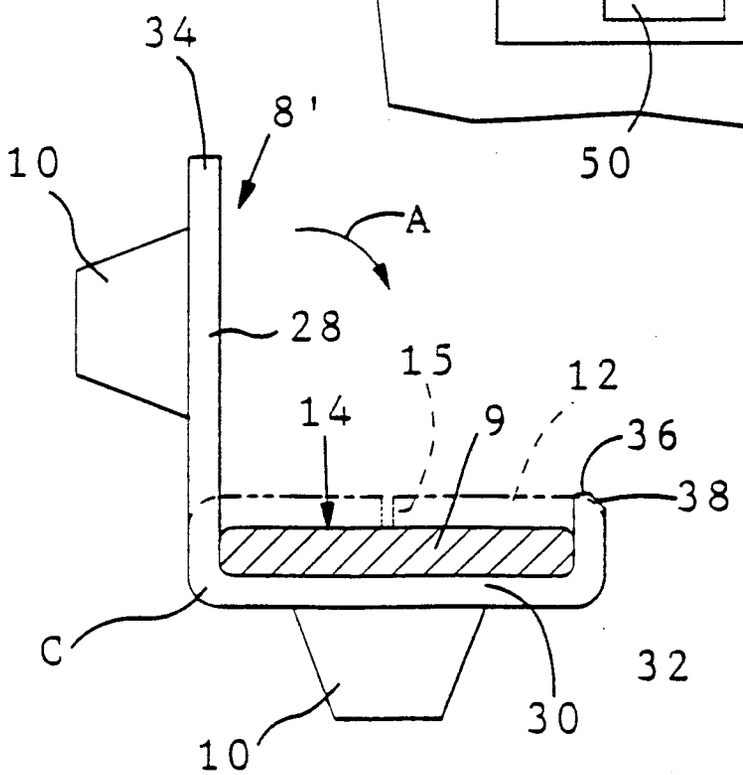


Fig. 5

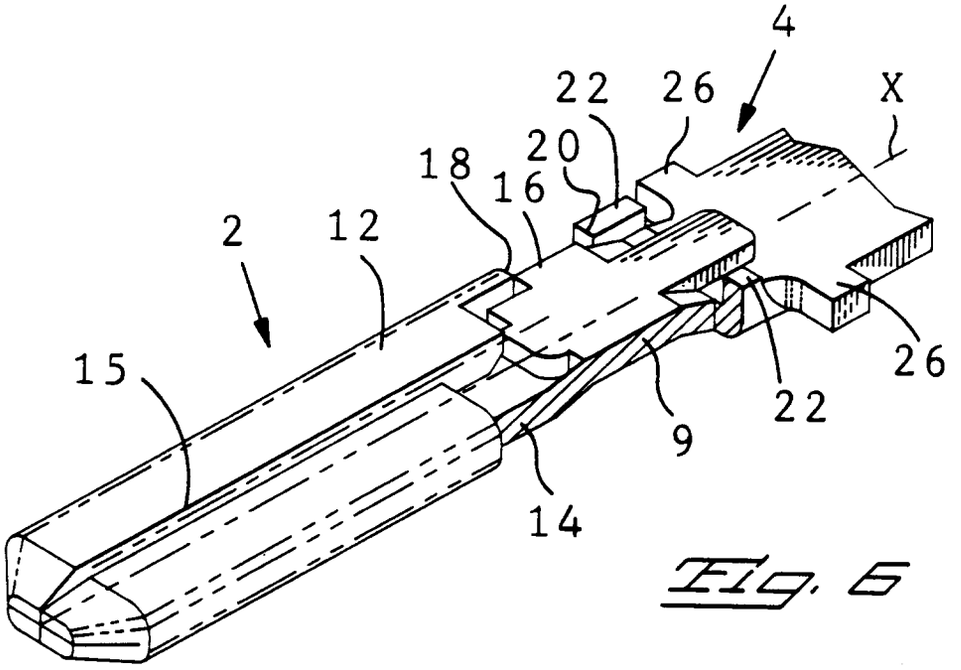


Fig. 6

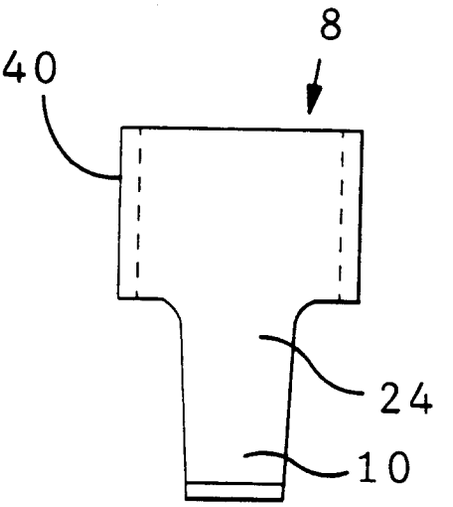


Fig. 7

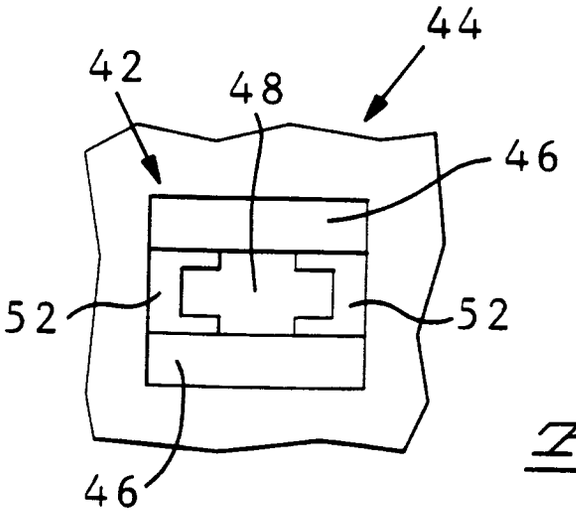


Fig. 8