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(54) **WATER TIGHT CONNECTING TERMINAL FOR A COATED OVERHEAD CABLE**

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Description

[0001] The present invention relates to a watertight terminal for a coated overhead cable, comprising two face-to-face adaptable jaw elements provided with conductor slots for wires to be joined, and slots transverse to the conductor slots for metallic clamp elements, as well as liners partially surrounding the clamp elements, said clamp element being provided, in line with the conductor slots, with conductor-insulation piercing teeth which, upon clamping the terminal, emerge from within the liner while the liner compresses against the conductor insulation around the piercing point of the teeth.

[0002] Such a terminal is known e.g. from Patent publications DE-A-3,715,529 and DE-A-3,824,741.

[0003] One problem with this type of terminals is the adaptation of a clamping force in such a way that the teeth of clamp elements certainly penetrate to a sufficient depth into a conductor, yet not too deep so as to cause mechanical damage to the conductor, i.e. to cut it partially off. This has been done by means of moment screws used for tightening the jaw elements towards each other. There is a problem, however, that at varying temperatures the force required for piercing a conductor insulation varies considerably. Thus, the correct penetration depth for the teeth cannot be controlled by means of a moment screw alone.

[0004] Another problem is the provision of sufficiently good tightness. Even if the liner should compress tightly against the conductor insulation around the teeth, there still remains a risk that moisture will be able to work its way into the joint through a gap between the clamp element and the liner. Because the clamp element must be provided with a mechanical bearing, the liner cannot surround the clamp element completely in the area of clamp element bearing surfaces.

[0005] An object of the invention is to provide a terminal of the above-mentioned type, wherein the foregoing problems have been eliminated in a structurally simple manner.

[0006] This object is achieved by means of the invention on the basis of the characterizing features defined in the appended claim 1. Preferred embodiments of the invention are set forth in the non-independent claims.

[0007] One exemplary embodiment of the invention will now be described in more detail with reference made to the accompanying drawings, in which

fig. 1 shows a terminal of the invention in a lateral view;

fig. 2 shows a bottom portion of the terminal in a plan view;

fig. 3 shows a section taken along a line III-III in fig. 2;

fig. 4 shows a section taken along a line IV-IV in fig.

2;

fig. 5 shows a top portion of the terminal in a view from below;

fig. 6 shows a section taken along a line VI-VI in fig. 5;

fig. 7 shows a section taken along a line VII-VII in fig. 5;

fig. 8 shows a metallic clamp element used in the terminal in a lateral and a plan view;

fig. 9 shows a clamp element fitted together with a rubber liner in a slot present in a jaw element;

fig. 10 shows separately a clamp element and a rubber liner on top of the same;

fig. 11 shows a section taken along a line XI-XI in fig. 10;

fig. 12 shows a section taken along a line XII-XII in fig. 10;

fig. 13 shows the terminal of fig. 10 along with its rubber liner in a lateral view facing the teeth and

fig. 14 shows a cross-section of an aluminium profile used for making the clamp elements of the invention by punching the profile in two down the middle in the area between teeth 14.

[0008] The terminal shown in fig. 1 comprises a lower jaw element 1 and an upper jaw element 2. The jaw element 1 includes two parallel conductor slots 3, 5 and the jaw element 2 includes, in respective positions, two parallel conductor slots 4, 6. The jaw elements are damped together by means of a screw, not shown, which extends through a central hole present in the jaw elements (holes 9 and 10 in figs. 2 and 3).

[0009] The lower jaw element 1 of the terminal has its structure depicted in more detail in figs. 2-4. The jaw element is provided with slots 7, transverse to the conductor slots 3, 5 and extending to the area of the conductor slots and intended for receiving metallic clamp elements 13 provided with teeth 14 in line with the conductor slots 3, 5. When clamping the terminal, the teeth 14 pierce the conductor insulation and establish a contact.

[0010] Respectively, the upper jaw element 2 has its structure shown in more detail in figs. 5-7. For the clamp elements 13 there are provided receiving slots 8 which run crosswise relative to the conductor slots 4, 6 and extend between the conductor slots 4, 5 in such a manner that the teeth 14 of the clamp elements 13 accommodated in the slots 8 find their way to conductors

present in the slots 4, 6 and establish a joint contact between the conductors. The flanks of the jaw element 2 are provided with downward projecting claws 12, which settle against the side faces of the jaw element 1 and, thus, guide the jaw elements 1 and 2 into the alignment with each other.

[0011] The slots 7, 8 have a width near the bottom of the slots, which slightly exceeds that of the body portion of the clamp element 13. The flanks of the slots 7, 8 are provided with small bosses 17, 18 for eliminating the clearance resulting from the difference in widths. Hence, the clamp element 13 can be readily pushed to bear firmly against the bottom of the slot 7, 8 and the clamp element remains straight and does not tilt aside during the course of clamping or tightening the terminal. The slot 7, 8 has a top portion which diverges in a wedge-shaped manner and receives the skirt portion 15c of a respectively wedge-like diverging liner 15, as depicted in more detail in figs. 9-12.

[0012] The rubber liner 15 has its ends provided with expansions 15a and 15b, inside which are the teeth 14 of the clamp element 13. When clamping the terminal, a wire presses against the trough surfaces of the expansions 15a and 15b while the teeth 14 emerge from inside the rubber liner and pierce the conductor insulation. The trough surfaces of the expansions 15a and 15b constitute a sealing around the piercing point. However, moisture may penetrate into the joint through a gap between the clamp element 13 and the rubber liner 15, resulting in a corrosion hazard and deterioration of the joint contact as well as a risk of conductor damage. Another problem is to control the penetration depth of the teeth 14, regardless of hardness fluctuations of a conductor insulation e.g. at various temperatures. In order to overcome these problems, the flanks of the clamp elements 13 are provided in the invention with elongated bosses 16, which are inside the liner 15. The bosses 16 are located near the base area of the teeth 14 so as to resist excessive penetration of the teeth 14 into the conductor. At the same time, the bosses 16 improve the sealing surrounding the clamp element 13. In particular, the bosses improve the sealing between the clamp element 13 and the liner 15, as the bosses 16 press the liner 15 against the wedge-shaped flanks of the slot 7 or 8. In view of the sealing function, it is essential that the bosses 16 extend over the entire length of the clamp elements 13. In view of the clamping moment take-up function, it is sufficient that the bosses 16 be located at least in line with the base area of the teeth 14.

[0013] The material for the clamp elements 13 comprises some electrically highly conductive metal or metal alloy. The clamp elements 13 can be readily made e.g. from aluminium profile, having e.g. a cross-section which is shown in fig. 14. The teeth 14 of the clamp elements 13 and the areas therebetween are produced by punching out the necessary pieces off the edge of the profile. The use of aluminium is a way of eliminating a corrosion hazard. If the terminal is used for jointing

copper conductors, the teeth 14 must be coated with an appropriate metal. However, this type of terminals are generally used for joining aluminium conductors.

Claims

1. A watertight terminal for a coated overhead cable, comprising two face-to-face adaptable jaw elements (1, 2) provided with conductor slots (3, 4; 5, 6) for wires to be joined, and slots (7, 8) transverse to the conductor slots for metallic clamp elements (13), as well as liners (15) partially surrounding the clamp elements, said clamp element (13) being provided, in line with the conductor slots, with conductor-insulation piercing teeth (14) which, upon clamping the terminal, emerge from within the liner (15) while the liner (15) compresses against the conductor insulation around the piercing point of the teeth (14), **characterized in that** the flanks of the clamp elements (13) are provided with elongated bosses (16) remaining at least partially inside the liner near the base area of the teeth (14), arranged such that the bosses (16) resist excessive penetration of the teeth into the conductor and at the same time improve the sealing surrounding the clamp element (13), and **in that** the clamp element take-up slot (7, 8) has a width which slightly exceeds the bottom width of the clamp element (13) near the bottom of the slot (7, 8), wherein the flanks of the slot (7, 8) are provided with small bosses (17, 18) for eliminating the clearance resulting from said difference in widths, and that the slot (7, 8) has a top portion which diverges in a wedge-like fashion and receives a skirt portion (15c) of the respectively wedge-like diverging liner.
2. A terminal as set forth in claim 1, **characterized in that** the bosses (16) of the clamp elements (13) extend over the entire length of the clamp elements (13).
3. A terminal as set forth in claim 1 or 2, **characterized in that** the clamp elements (13) are made from aluminium profile.

Patentansprüche

1. Ein wasserdichter Anschluß für ein ummanteltes Freileitungskabel, der zwei gegenüberliegende anpaßbare Backenelemente (1, 2), die mit Leitterschlitz (3, 4; 5, 6) für zu verbindende Drähte und Schlitz (7, 8), die quer zu den Leitterschlitz für metallische Klemmelemente (13) verlaufen, versehen sind, sowie Auskleidungen (15) aufweist, die die Klemmelemente teilweise umgeben, wobei das Klemmelement (13) in Übereinstimmung mit den

Leiterschlitzen mit Leiterisolations-Schneidzähnen (14) versehen ist, die bei einem Klemmen des Anschlusses aus dem Inneren der Auskleidung (15) hervortreten, während die Auskleidung (15) gegen die Leiterisolierung um den Schneidpunkt der Zähne (14) drückt, **dadurch gekennzeichnet, daß** die Flanken der Klemmelemente (13) mit länglichen Vorsprüngen (16) versehen sind, die zumindest teilweise in der Auskleidung in der Nähe des Basisbereichs der Zähne (14) verbleiben und derart angeordnet sind, daß die Vorsprünge (16) einem übermäßigen Eindringen der Zähne in den Leiter widerstehen und gleichzeitig die Abdichtung um das Klemmelement (13) verbessern, und dadurch, daß der Klemmelement-Aufnahmeschlitz (7, 8) eine Breite aufweist, die die Unterseitenbreite des Klemmelements (13) in der Nähe der Unterseite des Schlitzes (7, 8) leicht übersteigt, wobei die Flanken des Schlitzes (7, 8) mit kleinen Vorsprüngen (17, 18) zum Eliminieren des Zwischenraums, der sich aus dem Unterschied der Breiten ergibt, versehen sind, und dadurch, daß der Schlitz (7, 8) einen oberen Abschnitt aufweist, der keilartig auseinanderläuft und einen Schaftabschnitt (15c) der jeweils keilartig auseinanderlaufenden Auskleidung aufnimmt.

2. Ein Anschluß gemäß Anspruch 1, **dadurch gekennzeichnet**, daß sich die Vorsprünge (16) der Klemmelemente (13) über die gesamte Länge der Klemmelemente (13) erstrecken.
3. Ein Anschluß gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, daß** die Klemmelemente (13) aus einem Aluminiumprofil hergestellt sind.

Revendications

1. Borne étanche pour câble aérien revêtu, qui comprend deux éléments de mâchoire adaptables disposés face à face (1, 2) qui sont dotés de rainures conductrices (3, 4 ; 5, 6) destinées aux fils à réunir, et des rainures (7, 8) transversales aux rainures conductrices et destinées à des éléments de serrage métalliques (13), ainsi que des revêtements (15) entourant partiellement les éléments de serrage, ledit élément de serrage (13) étant doté, dans l'alignement avec la rainure conductrice, de dents (14) de percement de l'isolant du conducteur qui, lors du serrage de la borne, sortent de l'intérieur du revêtement (15) pendant que le revêtement (15) se comprime contre l'isolant du conducteur autour du point de percement des dents (14), **caractérisé en ce que** les flancs des éléments de serrage (13) sont dotés de bosses allongées (16) restant au moins partiellement à l'intérieur du revêtement au voisinage de l'aire de base des dents (14), de sorte que les

bosses (16) résistent à une pénétration excessive des dents dans le conducteur et, dans le même temps, améliorent le joint étanche entourant l'élément de serrage (13), **en ce que** la rainure (7, 8) de rattrapage d'élément de serrage possède une largeur qui dépasse légèrement la largeur de la partie inférieure de l'élément de serrage (13) au voisinage de la partie inférieure de la rainure (7, 8), où les flancs de la rainure (7, 8) sont dotés de petites bosses (17, 18) servant à éliminer le jeu qui résulte de ladite différence entre les largeurs, et **en ce que** la rainure (7, 8) possède une partie supérieure qui diverge à la manière d'un coin et reçoit une partie jupe (15c) du revêtement divergent en coin respectivement.

2. Borne selon la revendication 1, **caractérisé en ce que** les bosses (16) des éléments de serrage (13) s'étendent sur toute la longueur des éléments de serrage (13).
3. Borne selon la revendication 1 ou 2, **caractérisé en ce que** les éléments de serrage (13) sont faits à partir d'un profilé d'aluminium.

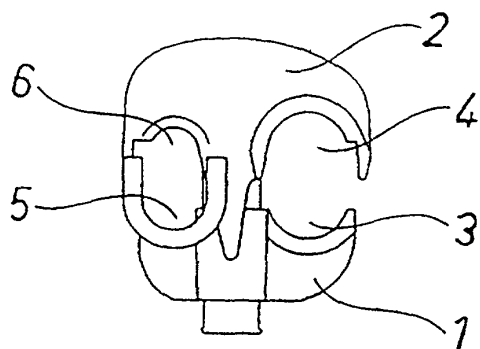


Fig. 1

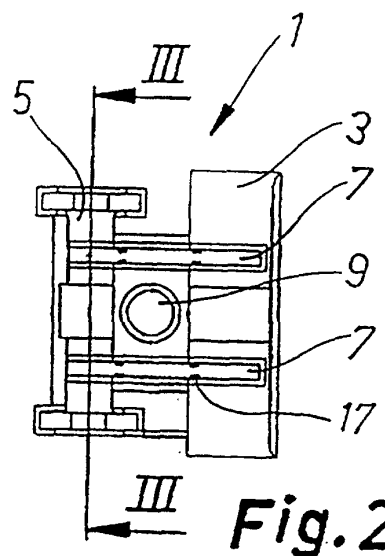


Fig. 2

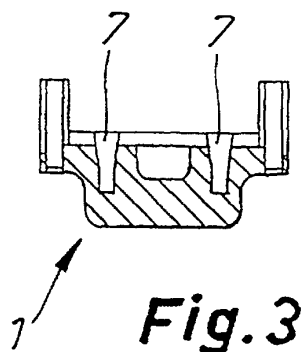


Fig. 3

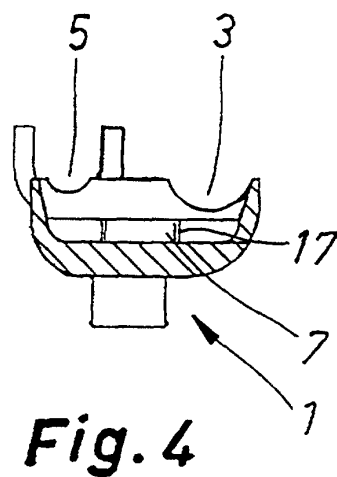


Fig. 4

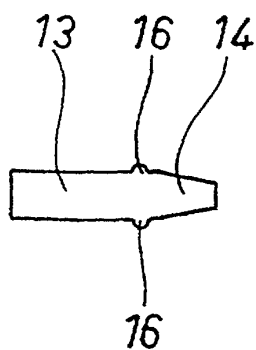


Fig. 14

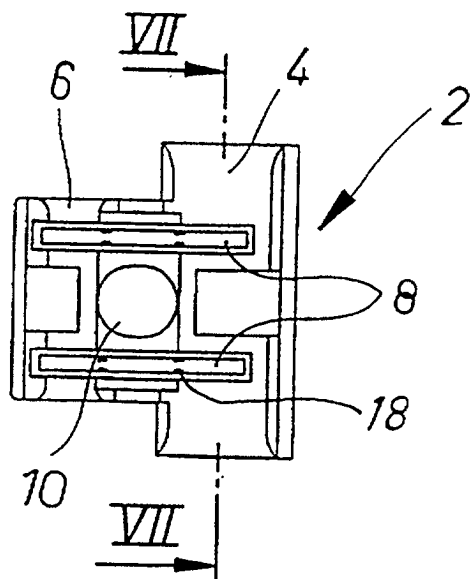


Fig. 5

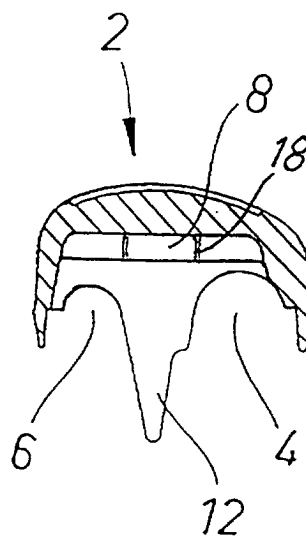


Fig. 6

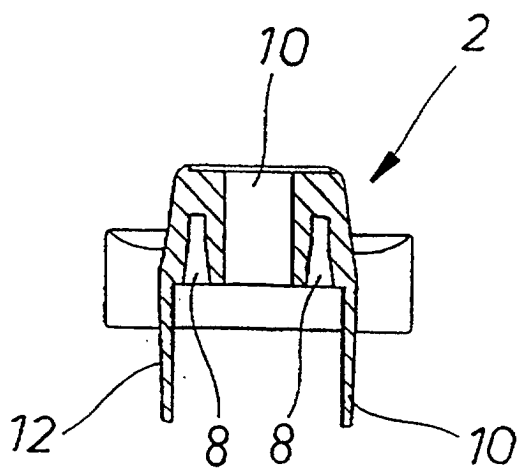


Fig. 7

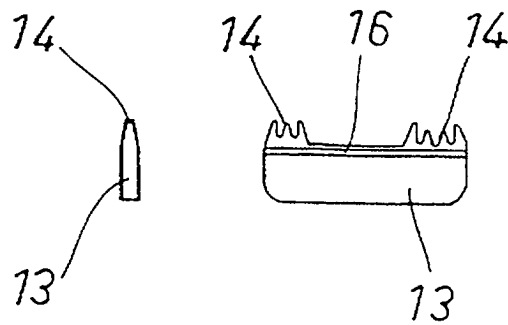


Fig. 8

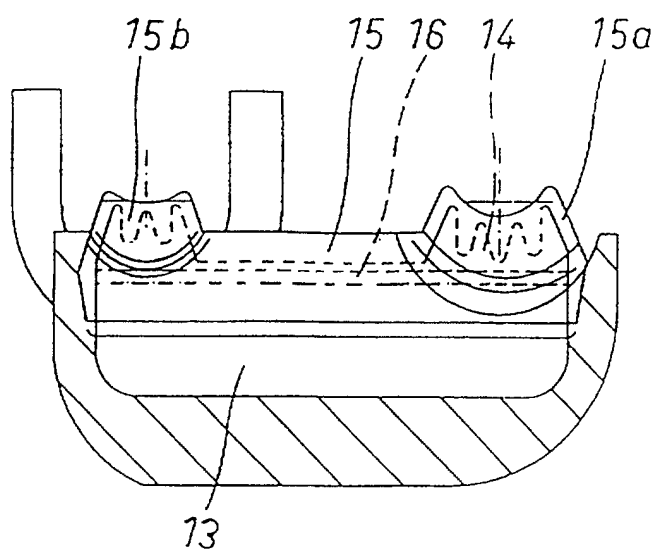


Fig. 9

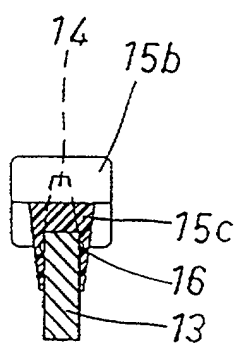


Fig.11

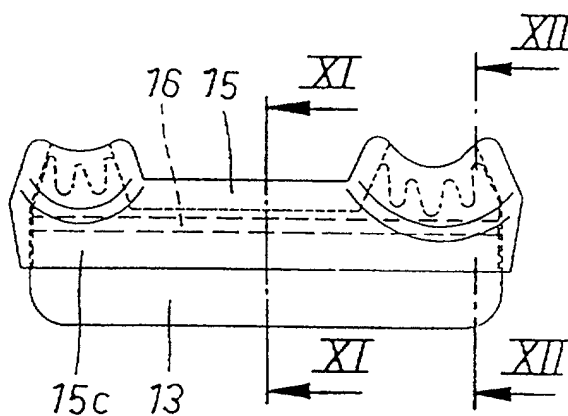


Fig.10

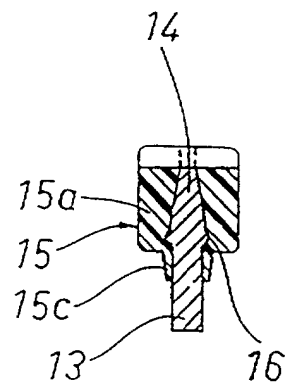


Fig.12

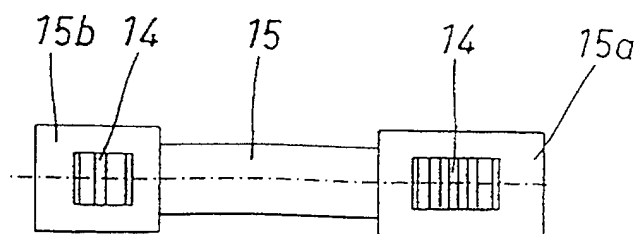


Fig. 13