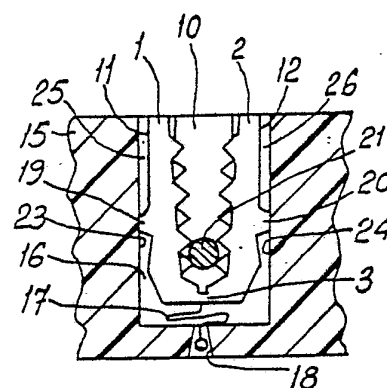
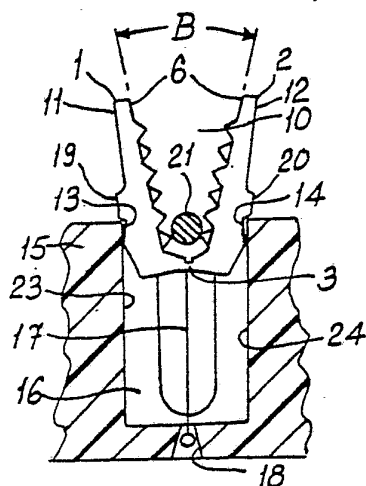




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<p>(21) International Application Number: PCT/GB82/00020 (22) International Filing Date: 26 January 1982 (26.01.82)</p> <p>(71)(72) Applicant and Inventor: HAYES, Derek [GB/GB]; Home Farm Cottage, St. Michael, Bungay, Suffolk NR35 1NF (GB).</p> <p>(74) Agent: NEWBY, Raymond, Laurence; J.Y & G.W. Johnson, Furnival House, 14-18 High Holborn, Lon- don WC1V 6DE (GB).</p> <p>(81) Designated States: DE (European patent), FR (Euro- pean patent), JP, NL (European patent), SE (Euro- pean patent), SU.</p> <p>Published <i>With international search report.</i></p>		

(54) Title: IMPROVEMENTS IN GRIPPING OR LOCATING DEVICES



(57) Abstract

A device for locating or gripping an elongate member (21), for example an insulated electrical conductor or cable, includes a pair of jaws (1, 2) made at least partly of resilient plastics material and a camming means (16) into which the pair of jaws is insertable, with the end (3) of the jaws first, for the purpose of engaging two opposite, outwardly-facing surfaces (11, 12) of the pair of jaws with a pair of opposed, inwardly-facing surfaces (23, 24) of the camming means so that the jaws are urged towards one another in order to locate or grip the elongate member (21) between confronting faces (6) of the two jaws. To enable the device to locate or grip elongate members (21) having a wide range of cross-sectional areas, the jaws (1, 2) and/or the camming means (16) are so shaped that, when the pair of jaws is fully inserted into the camming means with no elongate member (21) between the confronting faces (6), the urging together of the jaws (1, 2) takes place by engagement between limited areas (19, 20) of the outwardly-facing surfaces (11, 12) of the pair of jaws and the adjacent inwardly-facing surfaces (23, 24) of the camming means, there being a gap (25) between the surfaces (11) and (23) and a gap (26) between the surfaces (12) and (24) in regions extending from the end of the pair of jaws remote from the end (3) towards the latter end.

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Improvements in gripping or locating devicesTechnical Field

This invention relates to an improved gripping or locating device comprising a pair of jaws. In particular, 5 but not exclusively, the invention relates to a device of this kind for gripping or locating an electrically insulated cable or conductor in an electrical coupling device.

Background Art

In my published British Patent Application No. 2076461 10 (hereinafter referred to as "the aforesaid Application") there are described various gripping or locating devices each comprising a pair of jaws and a camming means into which the pair of jaws is insertable for the purpose of urging the jaws towards one another in order to locate or 15 grip an elongate member between confronting faces of the two jaws. In each of these devices, the elongate member-engaging face of at least one of said jaws is provided with a plurality of spaced-apart projections which, when said pair of jaws is inserted into said camming means to bring 20 said faces into confrontation with one another, project towards the elongate member-engaging face of the other jaw. The use of such gripping or locating devices in electrical coupling devices for gripping or locating electrically insulated cables or conductors is also described in the afore- 25 said Application.

Various ways are described in the aforesaid Application in which a particular pair of jaws can be employed with a camming means to grip or locate elongate members in a range of different sizes. Examples of the use of such a pair of 30 jaws, mentioned in the aforesaid Application, include use as a cable grip in an electric plug, where the plug is required to be used with any one of a range of cables of different sizes, and as a means for gripping one of a number of conduits of different sizes at an entrance to an electrical 35 junction box.

In my International Patent Publication No. WO 80/01339 (hereinafter referred to as "the aforesaid Publication") there



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is described an electrical coupling device which comprises a cable grip in the form of a pair of jaws which cooperate with camming means which urges the pair of jaws towards one another for the purpose of gripping the cable between confronting surfaces of the jaws. Again, various ways are described in the aforesaid Publication in which a particular pair of jaws can be employed with a camming means to grip cables in a range of different sizes.

The present invention aims to provide a combination of a pair of jaws and a camming means for urging the jaws together, which is capable of gripping or locating elongate members in a wider range of sizes compared with the devices described in the aforesaid Application and in the aforesaid Publication.

15 Disclosure of the Invention

According to one aspect of the invention, the combination of a pair of jaws having first and second opposed ends and made at least partly of resilient plastics material and a camming means into which the pair of jaws is insertable, with said first end first, for the purpose of engaging two opposite, outwardly-facing surfaces of the pair of jaws with a pair of opposed inwardly-facing surfaces of the camming means so that the jaws are urged towards one another in order to locate or grip an elongate member between confronting faces of the two jaws, is characterised in that, when the pair of jaws is fully inserted into the camming means with no elongate member between said confronting faces, the urging together of the jaws takes place by engagement between a limited area of one of said outwardly-facing surfaces of the pair of jaws and the adjacent inwardly-facing surface of the camming means, there being a gap between these two surfaces in a region extending from said second end of the pair of jaws towards said first end thereof. Preferably, the urging together of the jaws, with no elongate member between said confronting faces, takes place by engagement between a respective limited area of each of said outwardly-facing surfaces of the pair of jaws

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and the respective adjacent inwardly-facing surface of the camming means, so that there is a respective gap between each of these pairs of adjacent surfaces in a region extending from said second end of the pair of jaws towards said first end thereof.

The or each of said gaps may be formed by suitable shaping of one or both of said outwardly-facing surfaces of the jaws and/or of one or both of the inwardly-facing surfaces of the camming means.

Preferably, the two jaws of the pair are joined together at said first end thereof, so that the two jaws hinge towards one another, about said first end, when the pair of jaws is inserted into the camming means.

The effect of the aforesaid gap or gaps in the combination in accordance with the invention is to increase the range of cross-sectional areas of elongate members which can be satisfactorily located or gripped by the pair of jaws in comparison with the combinations of pairs of jaws and camming means described in the aforesaid Application or in the aforesaid Publication. The reason for this is that the resilient jaws can flex outwardly, at said second end of the pair of jaws, into said gap or gaps. In this outwardly flexed condition of the jaws, the jaws may or may not contact the opposed inwardly-facing surfaces of the camming means in said regions of the outwardly-facing surfaces of the jaws.

According to another aspect of the invention, an electrical coupling device comprising the combination of a pair of jaws having first and second opposed ends and made at least partly of resilient plastics material and a camming means into which the pair of jaws is insertable, with said first end first, for the purpose of engaging two opposite, outwardly-facing surfaces of the pair of jaws with a pair of opposed inwardly-facing surfaces of the camming means so that the jaws are urged towards one another in order to locate or grip an insulated electrical conductor or cable between confronting faces of the two jaws, is characterised in that, when the pair of jaws is fully



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inserted into the camming means with no conductor or cable between said confronting faces, the urging together of the jaws takes place by engagement between a limited area of one of said outwardly-facing surfaces of the pair of jaws and the adjacent inwardly-facing surface of the camming means, there being a gap between these two surfaces in a region extending from said second end of the pair of jaws towards said first end thereof. Preferably, the urging together of the jaws, with no conductor or cable between said confronting faces, takes place by engagement between a respective limited area of each of said outwardly-facing surfaces of the pair of jaws and the respective adjacent inwardly-facing surface of the camming means, so that there is a respective gap between each of these pairs of adjacent surfaces in a region extending from said second end of the pair of jaws towards said first end thereof.

In each of the above-recited aspects of the invention, the camming means may be a recess in a base member. This recess may take the form of a blind hole in a surface of the base member, this hole having two opposed surfaces which form the aforesaid inwardly-facing surfaces of the camming means. Alternatively, the recess may be formed between two spaced-apart pillars projecting from the base member, said opposed inwardly-facing surfaces of the camming means being provided by confronting surfaces of the two pillars.

Brief Description of the Drawings

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

Figure 1 is an end view of a first pair of jaws forming part of a combination in accordance with the invention,

Figure 2 is a sectional view taken on the line II - II of Figure 1,

Figure 3 is a side view of the pair of jaws of Figures 1 and 2,

Figures 4 and 6 are sectional views of a first embodi-



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ment of a combination in accordance with the invention incorporating the pair of jaws of Figures 1 to 3, the jaws being shown in partially withdrawn position,

5 Figures 5 and 7 are sectional views similar to Figures 4 and 6, respectively, but showing the jaws in fully inserted position,

Figure 8 is an end view of another pair of jaws forming part of a combination in accordance with the invention,

10 Figure 9 is a sectional view taken on the line IX - IX of Figure 8,

Figures 10 and 11 are views similar to Figures 5 and 7 of another embodiment of a combination in accordance with the invention,

15 Figure 12 is an end view of a further pair of jaws forming part of a combination in accordance with the invention, and

Figures 13 to 17 are sectional views of a further embodiment of a combination in accordance with the invention employing the pair of jaws of Figure 12.

20 Best Modes of Carrying Out the Invention

Referring to Figures 1 to 3, the pair of jaws shown consists of jaws 1, 2, made of resilient plastics material, joined together at a first end by a hinge 3 in the form of a strip of plastics material moulded integrally with the two
25 jaws. The hinge 3 is arranged to bias the two jaws apart at their second end, remote from the hinge 3, as indicated by the arrows A.

The jaw surfaces 6 which confront one another when the jaws are close together, as shown in Figure 1, define a
30 tapered gap 10 between the jaws, which gap is of increasing width in the direction away from the hinge 3. Each of the surfaces 6 is provided with ridges 9, disposed substantially parallel to the hinging axis of the hinge 3, and rows of
35 pimples 8, all moulded on the surfaces 6, the ridges and pimples alternating as shown in Figure 2. In each of the outwardly-facing surfaces 11, 12 of the jaws 1, 2 there is a respective notch 13, 14. The surfaces 11, 12 are shaped



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so that they have a respective projection 19, 20 intermediate their upper and lower ends which, in the embodiment shown, extend across the full width of the surfaces 11, 12 (see Figure 3).

5 The pair of jaws 1, 2 is combined with a camming means to provide a combination in accordance with the invention. Figures 4 to 7 illustrate such a combination, in which the jaws 1, 2 of Figures 1 to 3 serve as a cable grip in a block 15 of electrically-insulating material forming part
10 of an electrical coupling device of the kind described in the aforesaid Publication. The jaws 1, 2 are shown held captive in the camming means in the form of a recess 16 in the block 15 by means of a cord or tape 17 secured at one end to the hinge 3 and at the other end in a hole
15 18 in the block 15. The cord or tape 17 may be moulded integrally with the hinge 3.

Figures 4 and 6 show the two jaws partially withdrawn from the recess 16 to the extent allowed by the cord or tape 17, and in this position the notches 13, 14 engage the
20 upper edges of the recess 16 under the influence of the resilience of the hinge 3. Each time the jaws 1, 2 are moved into this partially withdrawn position, the surfaces 6 of the two jaws will be inclined to one another at the same predetermined angle B.

25 With the jaws occupying the partially withdrawn position shown in Figure 4 or 6, an electrically insulated cable, which it is required to grip by means of the jaws 1, 2, is laid in the tapered gap, where it will rest in a position determined by its size. For example, a cable of
30 small size might occupy the position indicated by the numeral 21 (Figure 4), whereas a considerably larger cable might occupy the position indicated by the numeral 22 (Figure 6). The two jaws are then pressed into the recess 16 to the position shown in Figure 5 or 7, and the cable will be
35 firmly gripped irrespective of its original resting position in the gap 10 (provided, of course, that in the original resting position the upper surface of the cable is below the upper ends of the jaws 1, 2). The longitudinally

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disposed ridges 9 on the surfaces 6 serve to resist any tendency for the cable to rise in the gap 10 as the jaws 1, 2 are pressed down into the recess 16.

From Figure 5 it will be seen that the small size cable 21 is gripped by the jaws 1, 2 in a region quite close to the hinge 3. With such a cable, there is no appreciable distortion of the jaws 1, 2 as they are pressed into the recess 16 and urged together by engagement of the projections 19, 20 with the inwardly-facing surfaces 23, 24 of the recess. Consequently, then the jaws 1, 2 are fully inserted into the recess 16 there will be a gap 25 between the surfaces 11 and 23 and a gap 26 between the surfaces 12 and 24, these gaps extending from the upper ends of the jaws down to the projections 19, 20, respectively. When used with such a small size cable, the hinge 3 will be under tension and the pair of jaws acts on the cable in the same way as a nut-cracker.

From Figure 7 it will be seen that the large size cable 22 is gripped by the jaws 1, 2 in a region well away from the hinge 3. With such a cable, the resilient jaws 1, 2 can deflect outwardly at their ends remote from the hinge 3 as the jaws are pressed into the recess 16 and urged together by engagement of the projections 19, 20 with the inwardly-facing surfaces 23, 24 of the recess. Consequently, the gaps 25, 26 described above with reference to Figure 5 are to a large extent, or entirely, eliminated when the large size cable 22 is gripped by the jaws. Due to this ability of the jaws 1, 2 to deflect at their ends remote from the hinge 3, it will be appreciated that the jaws 1, 2 can securely grip cables in a wide range of sizes. When used with a large size cable, as shown in Figure 7, the hinge 3 of the pair of jaws will be under compression.

Although the combination of Figures 4 to 7 has been described as being part of an electrical coupling device, it will be understood that the combination can be used in other devices, for example for gripping a conduit at the entrance to an electrical junction box, or by itself, for

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example as a stop member removably mountable on an elongate member or as a device, such as a cable cleat, for securing an elongate member to a support. In the last mentioned example, the camming means could be secured to a support
5 by means of a nail, screw or the like.

A similar combination to that described above with reference to Figures 4 to 7 may be provided by using, instead of the pair of jaws 1, 2 shown in Figures 1 to 3, the pair of jaws shown in Figures 8 and 9 in combination
10 with a camming means such as the recess 16 in the block 15 of Figures 4 to 7.

Referring to Figures 8 and 9, the pair of jaws shown again consists of jaws 1, 2 made of resilient plastics material, joined by a hinge 3 in the form of a strip of
15 plastics material moulded integrally with the two jaws.

Each of the jaws 1, 2 has an elongate member-receiving slot 5 formed in its surface 6, which slots are opposite one another when the two jaws are close together as shown in Figure 8. In the embodiment of Figures 8 and 9, the two
20 slots 5 define, when the surfaces 6 of the two jaws are close to one another, a hole of substantially oval cross-section.

Moulded into the surface of each of the slots 5 is a series of ridges 9 disposed substantially parallel to the
25 longitudinal axes of the slots 5. The surfaces 11, 12 are shaped so that they have a respective projection 19, 20 intermediate their upper and lower ends which extend across the full width of the surfaces 11, 12. This shaping of the jaws enables them to deflect outwardly at their ends remote
30 from the hinge 3 when the pair of jaws is used in the way described above with reference to Figures 5 and 7. Consequently, the jaws 1, 2 can securely grip or locate elongate members in a wide range of sizes.

Figures 10 and 11 illustrate a modified embodiment of
35 the combination shown in Figures 4 to 7. In this embodiment, in which the same reference numerals are used to designate the same parts as in Figures 5 and 7, provision is made for

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outward deflection of the upper ends of the jaws 1, 2 not by shaping the outwardly-facing surfaces 11, 12 of the jaws, as in Figure 5, but by suitable shaping of the inwardly-facing surfaces 23, 24 of the recess 16. Thus, in the combination shown in Figures 10 and 11, the recess 16 has steps 30 and 31 in its surfaces 23 and 24, respectively, to provide the gaps 25 and 26.

Figure 12 illustrates a further pair of jaws 1, 2 for employment in a combination in accordance with the invention. The jaws 1, 2, which are made of resilient plastics material, are joined together by a hinge 3 in the form of a strip of plastics material moulded integrally with the two jaws. Figure 12 shows the pair of jaws in its relaxed condition, as moulded.

The jaws 1, 2 have convexly curved, outwardly-facing surfaces 11, 12, respectively, extending for the major part of their height from the free ends of the jaws towards the hinge 3, but near to the hinge 3 the surfaces 11, 12 merge into plane surfaces 11a, 12a, respectively, which, in the relaxed condition of the jaws, are parallel to one another. The inwardly-facing surface 6 of each jaw is provided with two elongate member-receiving slots 5a, 5b of concave shape, the longitudinal axes of these slots being parallel to the hinging axis of the hinge 3. Near to the hinge 3, the surfaces 6 of the two jaws merge into a slot 5c having spaced-apart side walls which, in the relaxed condition of the jaws, are parallel to the plane surfaces 11a, 12a of the jaws.

The pair of jaws 1, 2 of Figure 12 is combined with a camming means to provide a combination in accordance with the invention. Figures 13 to 17 illustrate such a combination, in which the jaws 1, 2 of Figure 12 serve as a cable grip in a block 15 of electrically-insulating material forming part of an electrical coupling device of the kind described in the aforesaid Publication. The block 15 has a recess 16 with concavely-curved, inwardly-facing surfaces 23, 24 which extend through the major part of the height of the block 15 from its upper surface 34 towards its lower

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surface 35. The two surfaces 23, 24 converge towards one another in the direction towards the lower surface 35 of the block 15, and close to the lower surface 35 the two surfaces 23, 24 merge into plane surfaces 23a, 24a, respectively, which are disposed parallel to one another and spaced apart a distance equal to the spacing apart of the plane surfaces 11a, 12a of the jaws of Figure 12.

Figure 13 shows the jaws 1, 2 of Figure 12 partly inserted into the recess 16 of the block 15 with the jaws in relaxed condition with their convexly-curved, outwardly-facing surfaces 11, 12 in contact with the concavely-curved, inwardly-facing surfaces 23, 24, respectively, of the recess and the hinged end of the jaws entered a short way into the part of the recess 16 defined by the plane surfaces 23a, 24a. If, with the jaws in the position shown in Figure 13, an insulated electric cable 21 of small cross-section, for example a twin lighting flex, is placed in the tapered gap 10 between the surfaces 6 of the two jaws 1, 2, the cable will drop down into the slot 5c. If the pair of jaws is then pressed down into the recess 16, the plane surfaces 11a, 12a of the jaws 1, 2 will be forced closer together as the curved surfaces 11, 12 of the jaws enter between the plane surfaces 23a, 24a of the recess to narrow the width of the slot 5c and firmly grip the cable 21 as shown in Figure 14.

Figures 15 to 17 show how cables 22a, 22b and 22c of increasingly large cross-section are received between and gripped by the jaws. In Figure 15 the cable 22a is gripped in the slots 5a, and in Figures 16 and 17 the cables 22b and 22c, respectively, are gripped in the slots 5b. In Figures 15 and 16 the cables 22a and 22b are of such a size that the jaws 1, 2 are spaced apart at their upper ends in a position in which there is a gap 25 between the surfaces 11 and 23 and a gap 26 between the surfaces 12 and 24. In these cases, the cables 22a and 22b are gripped solely by the camming action occurring between the surfaces 11, 12 of the jaws and the surfaces 23a, 24a of the recess. In Figure 17 the cable 22c is of such a size that the surfaces

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11, 12 of the jaws 1, 2 bear against the surfaces 23, 24, respectively, of the recess 16 at least along the parts of these latter surfaces lying closest to the surface 34 of the block 15. In this case, the cable 22a is gripped not
5 only by the camming action occurring between the surfaces 11, 12 of the jaws and the surfaces 23a, 24a of the recess, but also by a further camming action between the surfaces 11, 12 of the jaws and the surfaces 23, 24 of the recess.

10 In the embodiment of Figures 13 - 17, the recess 16 extends right through the block 15. It is therefore a simple matter to remove the pair of jaws, either partially or wholly, from the recess 16 by exerting pressure on the hinged end of the pair of jaws.

15 If desired, the combination described above with reference to Figures 12 to 17 may be provided with means preventing complete withdrawal of the jaws 1, 2 from the recess 16. For example, projections may be provided on the surfaces 11a, 12a of the jaws which engage in grooves formed
20 in the surfaces 23a, 24a of the recess, these grooves extending from the lower surface 35 of the block 15 part way up the surfaces 23a, 24a. These grooves may have such a length that the jaws can only be withdrawn from the recess 16 to the position shown in Figure 13.

25 When the embodiments of the invention described above are used to grip cables of large cross-section, such as the cable 22c in Figure 17, considerable force may be needed to press the jaws 1, 2 down into the recess 16. In the aforesaid Publication there is described a 3-pin electric
30 plug having a base with a recess for the reception of a pair of jaws serving as a clamp for an insulated cable, the insulated conductors of which are connected to the pins of the plug. It is mentioned that, when the connections in the plug have been effected, the open top of the base is
35 closed by a simple cover, which is designated by the numeral 6 in Figure 2 of the aforesaid Publication. Such a cover can be employed in the embodiments described above with reference to Figures 4 - 6, 8 and 9 and 13 - 17, and would

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be slidably mounted on the block 15, for example in the manner disclosed in British Patent Specification No. 833,222 (see Figure 11 thereof). It is then a simple matter to provide the underside of such a cover with a groove having 5 converging side walls which, as the cover is slid into its position of securement on the block 15, force the free ends of the jaws 1, 2 towards one another, and the bottom of this groove is inclined to the surface 34 of the block 15 so that, as the cover is moved to its position of secure- 10 ment, it bears against the free ends of the jaws 1, 2 and forces the pair of jaws down into the recess 16.

The invention is not, of course, limited to the various combinations described above with reference to the drawings. For example, in a combination employing the pair 15 of jaws of Figures 8 and 9, the jaws 1, 2 may be provided with notches like the notches 13, 14 of the combination shown in Figures 4 to 7 for the purpose of setting the jaws in an open position for the reception of an elongate member. As an alternative to the notches 13, 14 of the combination 20 shown in Figures 4 to 7, the surfaces 11, 12 of the jaws 1, 2 may be provided with recesses which extend only part way along the surfaces 11, 12. The upper edges of the walls 23, 24 of the recess 16 would then be provided with inwardly-directed projections to engage in these recesses in the 25 partially withdrawn position of the pair of jaws.

Again, the confronting surfaces 6 of each of the pairs of jaws described above need not be parallel to one another (as viewed from above in each of Figures 1, 8, 10 and 12). For example, when viewed from above, the gap between the 30 confronting surfaces 6, when the jaws 1, 2 are close together, may be wider at the end faces of the jaws (i.e. the faces 32, 33 indicated in Figures 2, 3, 9, 10 and 12) than in a region between the end faces, or wider in a region between the end faces of the jaws than at the end faces, or 35 this gap may taper from one end face to the other. In the last mentioned case it is preferred that the narrowest portion of the gap should be at that end face of the jaws which is remote from the point of application of any



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possible tensile force to the elongate member located or gripped by the jaws.

Finally, although the embodiments of the invention described above are concerned mainly with the gripping of an insulated cable, they may also be employed for locating insulated conductors in an electrical coupling device of the kind described in my British Patent Specification No. 1,559,789. It is then necessary to provide at least one hole in the hinge 3 of the pair of jaws 1, 2 for the passage of the conductor-piercing means which makes electrical contact with the located conductor. Such holes, designated by the numeral 4, are shown in Figure 9.

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CLAIMS

1. A device for gripping or locating an elongate member (21, 22), comprising the combination of a pair of jaws (1, 2) having first and second opposed ends and made at least partly of resilient plastics material and a camming means (16) into which the pair of jaws is insertable, with said first end first, for the purpose of engaging two opposite, outwardly-facing surfaces (11, 12) of the pair of jaws with a pair of opposed, inwardly-facing surfaces (23, 24) of said camming means (16) so that the jaws (1, 2) are urged towards one another in order to grip or locate an elongate member (21, 22) between confronting faces (6) of the two jaws, characterised in that said jaws (1, 2) and/or said camming means (16) are shaped so that, when the pair of jaws (1, 2) is fully inserted into said camming means (16) with no elongate member (21, 22) between said confronting faces (6), the urging together of the jaws (1, 2) takes place by engagement between a limited area of one of said outwardly-facing surfaces (11, 12) of the pair of jaws (1, 2) and the adjacent inwardly-facing surface (23, 24) of the camming means (16), there being a gap (25, 26) between these two surfaces in a region extending from said second end of the pair of jaws (1, 2) towards said first end thereof.

2. An electrical coupling device comprising the combination of a pair of jaws (1, 2) having first and second opposed ends and made at least partly of resilient plastics material and a camming means (16) into which said pair of jaws (1, 2) is insertable, with said first end first, for the purpose of engaging two opposite, outwardly-facing surfaces (11, 12) of said pair of jaws (1, 2) with a pair of opposed, inwardly-facing surfaces (23, 24) of said camming means (16) so that the jaws (1, 2) are urged towards one another in order to grip or locate an elongate member in the form of an insulated electrical conductor or cable (21, 22) between confronting faces (6) of the two jaws, characterised in that said jaws (1, 2) and/or said camming means



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(16) are shaped so that, when the pair of jaws (1, 2) is fully inserted into said camming means (16) with no conductor or cable (21, 22) between said confronting faces (6) the urging together of the jaws (1, 2) takes place by engagement between a limited area of one of said outwardly-facing surfaces (11, 12) of the pair of jaws (1, 2) and the adjacent inwardly-facing surface (23, 24) of the camming means (16), there being a gap (25, 26) between these two surfaces in a region extending from said second end of the pair of jaws (1, 2) towards said first end thereof.

3. A device according to claim 1 or 2, characterised in that the urging together of said jaws (1, 2) with no elongate member (21, 22) between said confronting surfaces (6), takes place by engagement between a respective limited area of each of said outwardly-facing surfaces (11, 12) of the pair of jaws (1, 2) and the respective adjacent inwardly-facing surface (23, 24) of the camming means (16), so that there is a respective gap (25, 26) between each of these pairs of adjacent surfaces in a region extending from said second end of the pair of jaws towards said first end thereof.

4. A device according to any of the preceding claims, characterised in that the two jaws (1, 2) of said pair of jaws are connected together at said first end thereof, whereby the two jaws hinge towards one another, about said first end, when the pair of jaws is inserted into said camming means (16).

5. A device according to claim 4, characterised in that said jaws (1, 2) are moulded as a single unit and are connected at said first end of the jaws by a thin strip (3) of the material from which the jaws are made.

6. A device according to claim 4 or 5, characterised in that said confronting faces (6) of said jaws (1, 2) are

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shaped so that when these two faces confront one another in use of the jaws, there is a tapered gap (10) between said two faces (6) which increases in width in the direction away from said first end of the jaws.

5 7. A device according to claim 6, characterised in that the hinged connection of the jaws (1, 2) is resilient so that said jaws are biased in a direction tending to increase the angle between said confronting faces (6) of said jaws.

10 8. A device according to any of the preceding claims, characterised in that said pair of jaws (1, 2) is mounted captively in said camming means (16) so that said jaws (1,2) can only be partially removed from said camming means (16) to a predetermined position for reception of an elongate
15 member (21, 22) which is to be located or gripped by said jaws.

 9. A device according to claim 8, characterised by notches (13, 14) in the outwardly-facing surfaces (11, 12) of said jaws (1, 2), said predetermined position being
20 defined by the engagement of said notches (13, 14) with said camming means (16).

 10. A device according to any of the preceding claims, characterised in that said camming means is formed by a recess (16) in a base member (15).

25 11. A device according to claim 10, characterised in that said recess is in the form of a hole (16) in the base member (15), said hole (16) having two opposed surfaces (23, 24) which form said inwardly-facing surfaces of said camming means.

30 12. A device according to claim 10, characterised in that said recess is formed between two spaced-apart



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pillars projecting from said base member (15), said opposed, inwardly-facing surfaces (23, 24) of said camming means (16) being provided by confronting surfaces of the two pillars.



1/2

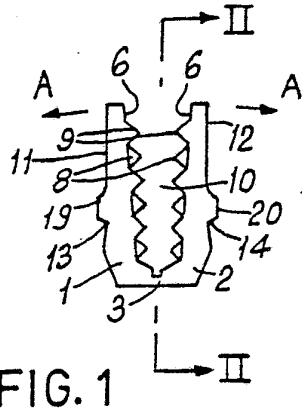


FIG. 1

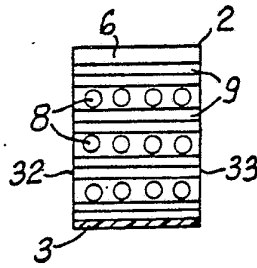


FIG. 2

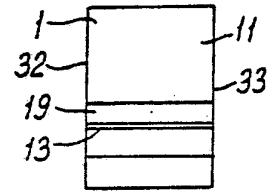


FIG. 3

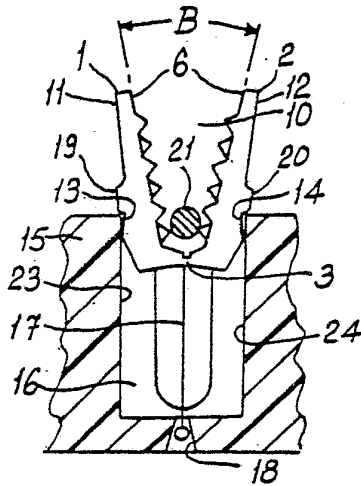


FIG. 4

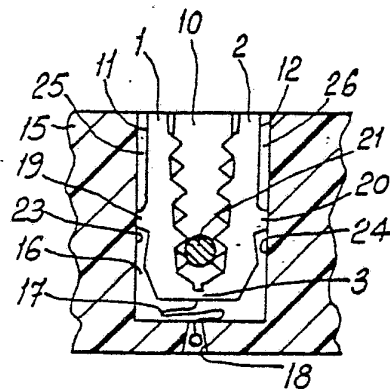


FIG. 5

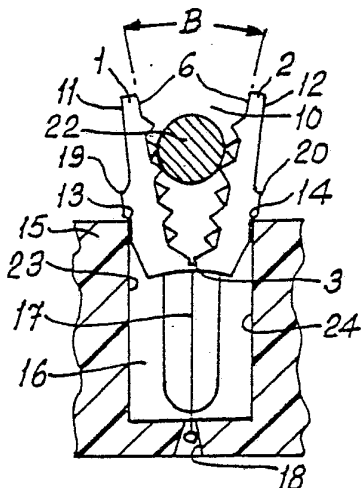


FIG. 6

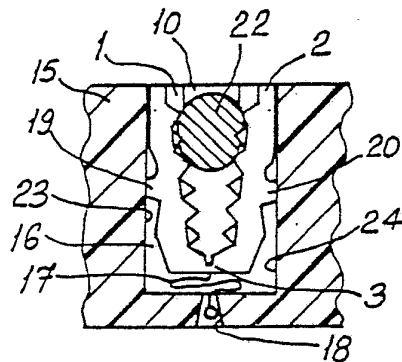


FIG. 7

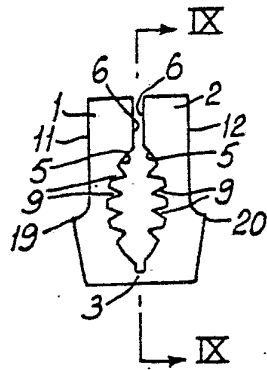


FIG. 8

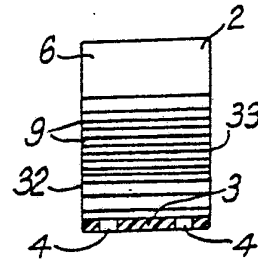


FIG. 9

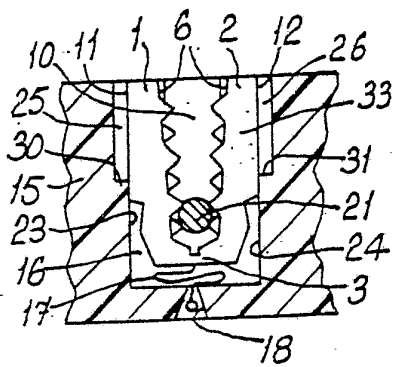


FIG. 10

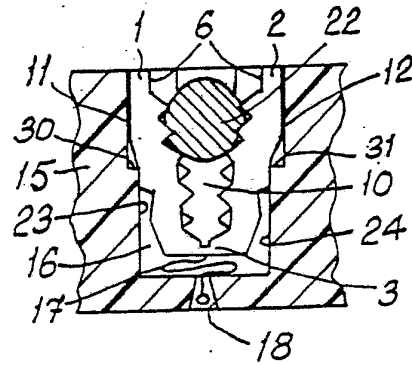


FIG. 11

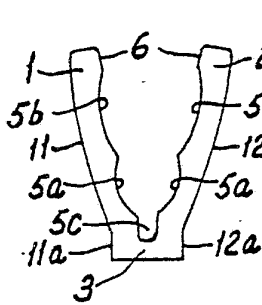


FIG. 12

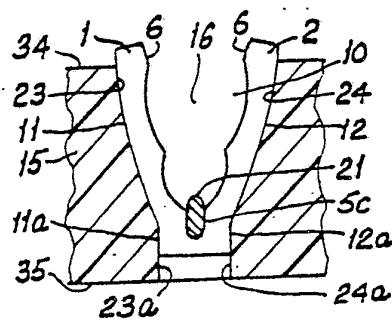


FIG. 13

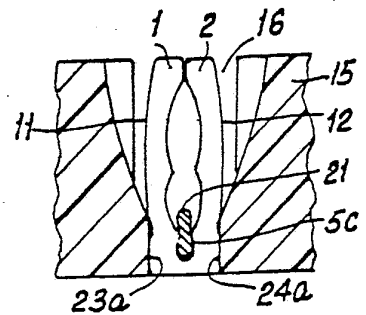


FIG. 14

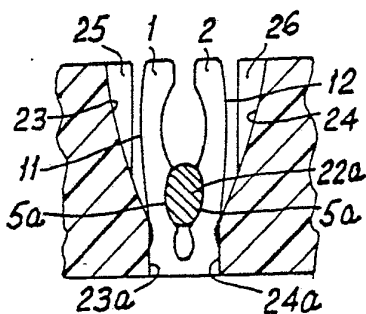


FIG. 15

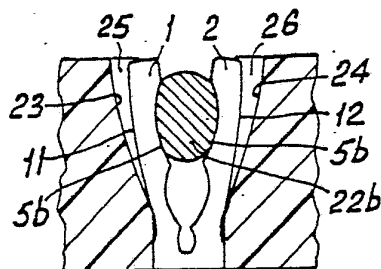


FIG. 16

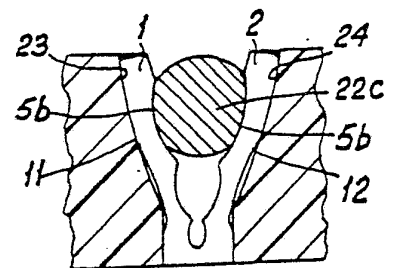


FIG. 17

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 82/00020

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ³		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC ³ : H 02 G 3/24; F 16 L 3/02; F 16 L 3/22		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁴		
Classification System	Classification Symbols	
IPC ³	H 02 G 3/; F 16 L 3/ ; H 01 R 13/ ; F 16 B 2/ F 16 G 11/	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁵		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴		
Category *	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
Y	GB, A, 2076461 (HAYES) 2 December 1981 see figures, abstract (cited in the application) --	1-10
Y	GB, A, 18867 (A.D. 1910) (THOMSON-HOUSTON) 11 May 1911 see page 2, lines 8-16; figures --	1
A	GB, A, 613338 (NIELD) 6 January 1949 see page 2, lines 45-65; figures --	1
A	FR, A, 2402794 (RAYMOND) 6 April 1979 see page 5, line 12 - page 6; figures 9-11 & GB, A, 2007753 --	1
A	US, A, 3056852 (SACHS) 2 October 1962 see figures --	1
A	DE, A, 2027785 (DUNKEL) 16 December 1971 see figure 1 --	1
A	DE, B, 1272412 (SKOPEK) 11 July 1968 --	./.
<p>* Special categories of cited documents: ¹⁵</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search ²	Date of Mailing of this International Search Report	
1st October 1982	14th October 1982	
International Searching Authority ¹	Signature of Authorized Officer ¹⁰	
EUROPEAN PATENT OFFICE	G.L.M. Kruidenberg	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No ¹⁸
	see column 5, lines 9-52; figures 3,5,5a -----	1