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Electricity / Mechanics

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Description of the Application

[001] The invention relates to electrical connectors for connecting to electrically insulated cables. An insulated cable comprises an electrical conductor (e.g. a copper wire) and a sheath of insulating material provided around the electrical conductor. In particular, the invention relates to an electrical connector of the type having an electrical contact element comprising a pin contact and blades for cutting the sheath of insulating material. The pin contact of the electrical connector can be inserted into the female contact of an electrical socket.

[002] Fig. 1a shows an electrical contact element 20 of a known electrical connector (not shown) and an insulated cable C positioned above the contact element. The contact element 20 comprises a pin contact 22 and blades 24. To electrically connect the insulated cable C to the contact element 20, the insulated cable is pressed between the blades so that the blades cut through the sheath of the cable until they are in electrical contact with the electrical conductor of the cable. Fig. 1b is a view of the contact element 20 with the insulated cable C connected. With such an electrical connector, precisely positioning the cable relative to the blades is difficult.

[003] The object of the present invention is to provide an electrical connector of the above type whereby precise positioning of the cable is facilitated. This object is achieved by the electrical connector defined in the claims.



[004] Brief description of the drawings

Figs. 1a and 1b show a known electrical contact element and an insulated cable.

Fig. 2 is a view of an electrical connector according to the present invention.

Fig. 3 is a cross section of the electrical connector of Fig. 2 with an insulated cable

5 inserted in it.

Fig. 4 is a cross section of the electrical connector of Fig. 2 with an insulated cable connected to it.

An embodiment of the invention will now be described with reference to the drawings.

10 **[005]** As shown in Fig. 2, the electrical connector 1 comprises a body 2. The body 2 is defined by a front wall 4, two side walls 6, a rear wall 8, and a bottom wall 10, the walls defining an interior space. The electrical connector 1 has a cover 12. The cover 12 is attached to the body 2 by a hinge 14. The hinge 14 is arranged along the front wall 4 of the body 2. When the cover 12 is in the closed position, it closes the interior space of the
15 body 2. The body 2 and the cover 12 are made of an insulating material.

[006] The connector 1 comprises an electrical contact element 20 (as shown in Fig. 1a). The contact element 20 is arranged so that the blades 24 are in the interior space of the body 2. The pin contact 22 passes through a passageway in the front wall 4 and
20 protrudes out of the body 2.



[007] The cover 12 comprises a guide 30. The guide 30 comprises a straight tube 32 and a stop 34. As shown in Fig. 3, to insert an insulated cable C into the electrical connector 1, the cover 12 is opened and the insulated cable C is fed through the straight tube 32, which guides the cable C towards the hinge 14 until it abuts against the stop 34.

5 The stop 34 prevents the cable C from reaching the hinge 14. With the cable C in this position, when the cover 12 is moved into the closed position, the blades 24 cut through the sheath of the cable C and make electrical contact with the electrical conductor of the cable C (Fig. 4). The cable C is thus electrically connected to the connector 1. The stop 34 has a blind hole 36 which can receive the cable C. The blind hole 36 helps in
10 precisely guiding the cable C to the required position above the blades 24. However, satisfactory guiding can also be achieved using a stop not having a blind hole. The opening of the straight tube 32 is funnel-shaped for facilitating the insertion of the cable C. The connector 1 includes a locking means (not shown) for locking the cover 12 in the closed position.

15

[008] When the cover 12 is moved from the closed position to the open position, the cable C is pulled away from the blades 24 since it is held in the straight tube 32 of the guide 30. This allows the cable C to be removed easily from the connector 1.



Claims

1. Electrical connector (1) for connecting to an insulated cable (C) having a sheath of insulating material and an electrical conductor, the electrical connector (1) comprising:
 - a) a body (2) comprising a front wall (4), two side walls (6), a rear wall (8), and a bottom wall (10);
 - b) a cover (12) for closing the body (2) when the cover (12) is in a closed position;
 - c) a hinge (14) arranged along the front wall (4) of the body (2) and connecting the cover (12) to the body (2);
 - d) an electrical contact element (20) having a pin contact (22) and blades (24) for cutting the sheath, the pin contact (22) protruding out of the body (2) and the blades (24) being disposed in the body (2),
 - e) wherein the cover (12) comprises a guide (30) for guiding the insulated cable (C), the guide (30) having a straight tube (32) and a stop (34), the straight tube (32) being orientated towards the hinge (14).
2. Electrical connector (1) according to claim 1, the connector (1) being preferably configured so that, when the cover (12) is in the closed position and the insulated cable (C) is located in the straight tube (32) and abuts against the stop (34), the electrical conductor of the insulated cable (C) is in electrical contact with the blades (24).
3. Electrical connector (1) according to claim 1, wherein the pin contact (22) protrudes out of the front wall (4) of the body (2), and wherein when the cover (12) is in an open position, the insulated cable (C) is guided through the straight tube (32) towards the hinge (14), until it abuts against the stop (34), which prevents the insulated cable (C) from reaching the hinge (14).
4. Electrical connector (1) according to claim 3, wherein an opening of the straight tube (32) is funnel-shaped.
5. Insulated cable (C) according to claim 1, which is received in a blind hole (36).



Drawings of the Application

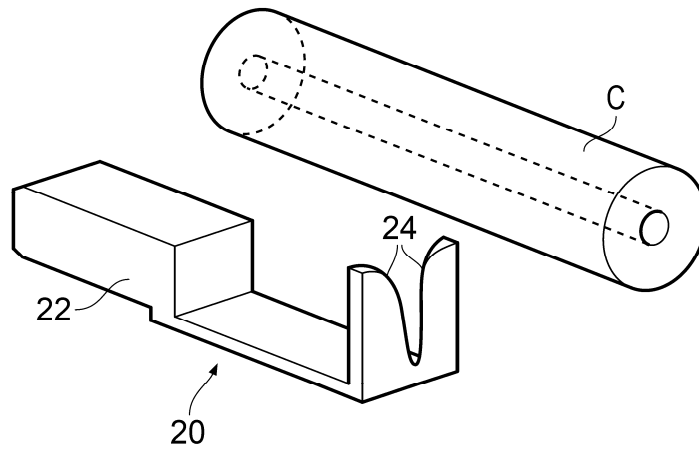


FIG. 1a

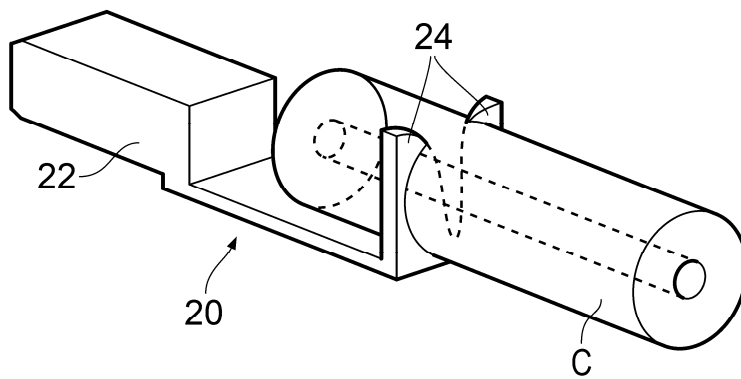


FIG. 1b

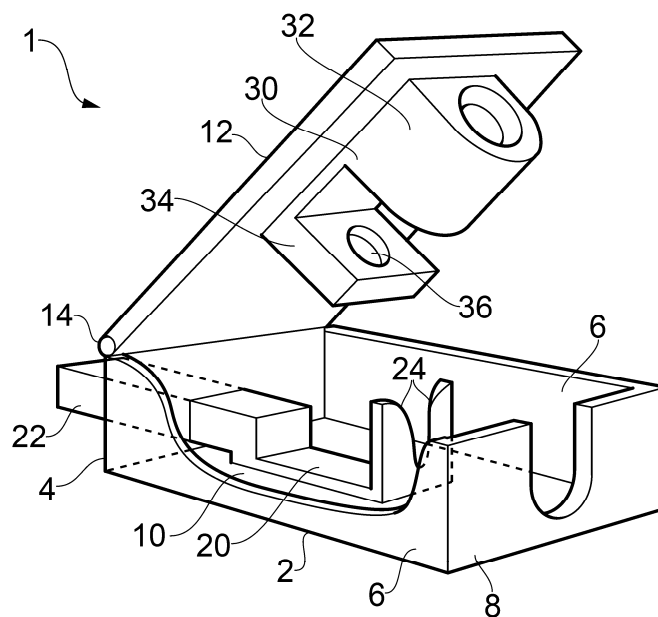


FIG. 2



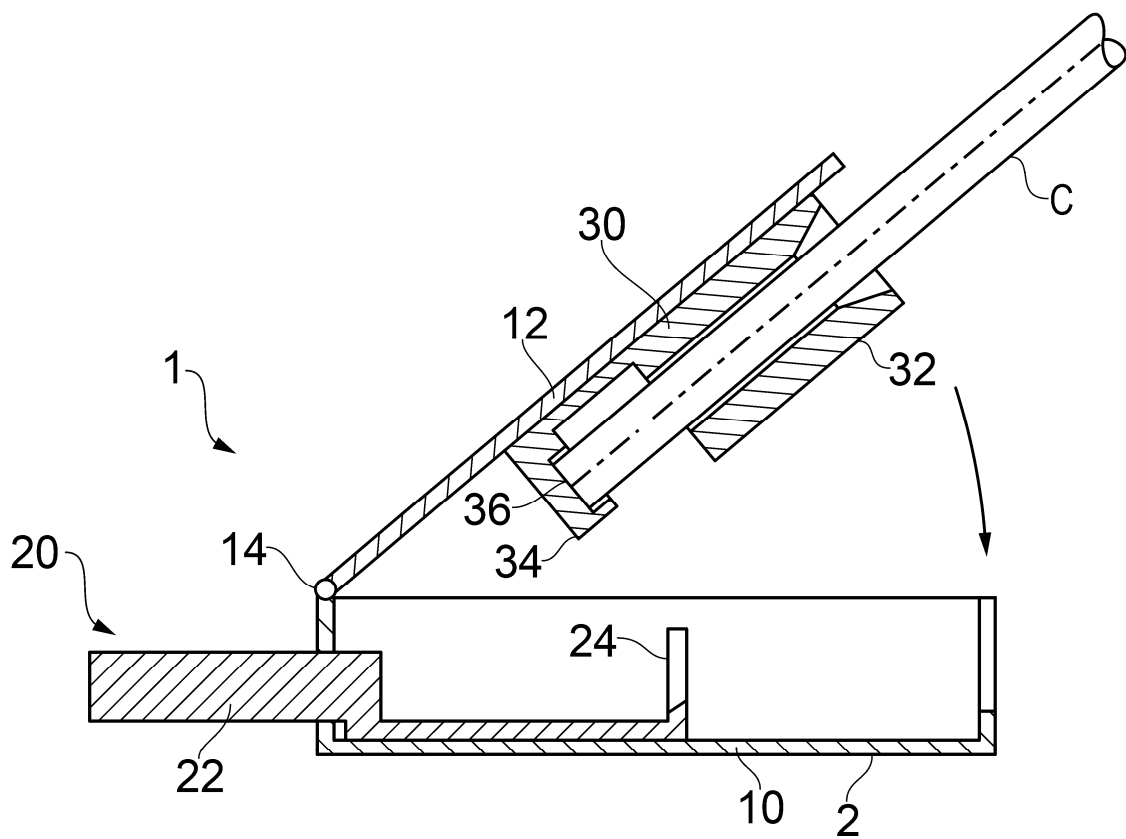


FIG. 3

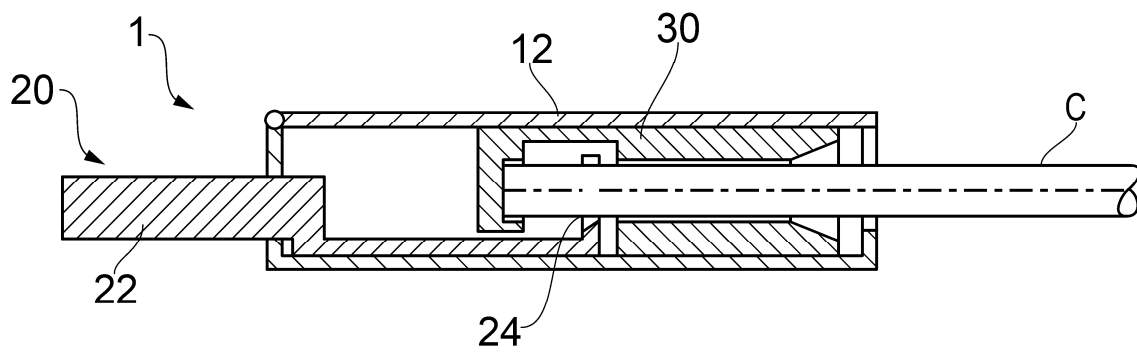


FIG. 4



Communication

1. This communication is based on the application documents as originally filed.
Attached documents D1 and D2 are prior art according to Art. 54(2) EPC.
2. The subject matter of claims 1 and 2 is not new within the meaning of Art. 54(1) and (2) EPC, and therefore the requirements of Art. 52(1) EPC are not met.

2.1 The subject matter of claim 1 is known from D1 and also from D2.

D1 discloses:

An electrical connector (101) for connecting to an insulated cable (C) having a sheath of insulating material and an electrical conductor, the electrical connector (101) comprising:

- a) a body (102) comprising a front wall (108), two side walls (106), a rear wall (104), and a bottom wall (110);
- b) a cover (112) for closing the body (102) when the cover (112) is in a closed position;
- c) a hinge (114) arranged along the front wall (108) of the body (102) and connecting the cover (112) to the body (102);
- d) an electrical contact element (120) having a pin contact (122) and blades (124) for cutting the sheath, the pin contact (122) protruding out of the body (102) and the blades (124) being disposed in the body (102); and
- e) wherein the cover (112) comprises a guide (130) for guiding the insulated cable (C), the guide (130) having a straight tube (132) and a stop (134), the straight tube (132) being orientated towards the hinge (114).

Note regarding feature c): Although D1 refers to the hinge 114 as being disposed along a "rear wall 108" of the body 102, the choice of the terms "rear wall" and "front wall" for designating the walls 108 and 104 respectively, is arbitrary.



D2 discloses:

An electrical connector (201) for connecting to an insulated cable (C) having a sheath of insulating material and an electrical conductor, the electrical connector (201) comprising:

- a) a body (202) comprising a front wall (204), two side walls (206), a rear wall (208), and a bottom wall (210);
- b) a cover (212) for closing the body (202) when the cover (212) is in a closed position;
- c) a hinge (214) arranged along the front wall (204) of the body (202) and connecting the cover (212) to the body (202);
- d) an electrical contact element (220) having a pin contact (222) and blades (224) for cutting the sheath, the pin contact (222) protruding out of the body (202) and the blades (224) being disposed in the body (202); and
- e) wherein the cover (212) comprises a guide (230) for (i.e. "*suitable for*") guiding the insulated cable (C), the guide (230) having a straight tube (232) and a stop (234), the straight tube (232) being orientated towards the hinge (214).

2.2 The subject matter of claim 2 is known from D1:

The electrical connector known from D1 is configured so that, when the cover (112) is in the closed position and the insulated cable (C) is located in the straight tube (132) and abuts against the stop (134), the electrical conductor of the cable is in electrical contact with the blades (124).

- 3. Claim 3 is not clear (Art. 84 EPC) because it is directed to a device, whereas the feature "an insulated cable (C) is guided..." is a method step.
- 4. Claim 4 is not clear since claim 4 depends on claim 3. Furthermore the additional feature "funnel-shaped" of claim 4 is known from D1, see par. [005], last sentence.



5. The application lacks unity within the meaning of Article 82 EPC.

The different inventions are:

I. Claims 1 - 4 ("Electrical connector for connecting to an insulated cable")

II. Claim 5 ("Insulated cable").

The above inventions are not so linked as to form a single general inventive concept because the only common concept (an insulated cable), is known.

6. The applicant is invited to file an amended set of claims that meets the requirements of the EPC.



Document D1

[001] A new electrical connector of the type having blades for cutting the sheath of insulating material of an insulated cable is described below.

5

[002] The electrical connector 101 shown in Figs. 1-3 comprises a body 102. The body 102 comprises a front wall 104, two side walls 106, a rear wall 108, and a bottom wall 110. The electrical connector 101 further comprises a cover 112. The cover 112 closes the body 102 when the cover is in the closed position. The connector 101 further
10 comprises a hinge 114 that connects the cover 112 to the body 102, the hinge being arranged along the rear wall 108.

[003] The electrical connector 101 comprises an electrical contact element 120 having a pin contact 122 and blades 124. The pin contact 122 passes through a passageway in
15 the front wall 104 and protrudes out of the body 102. The blades 124 are arranged in the interior space of the body 102.

[004] The cover 112 comprises a guide 130 for guiding an insulated cable C. The guide 130 comprises a straight tube 132 through which the insulated cable C can be fed
20 and a stop 134. The stop 134 has a blind hole 136 for receiving the insulated cable C. The straight tube 132 is disposed between the stop 134 and the hinge 114. As shown in Fig. 2, to insert the insulated cable C into the electrical connector 101 the end of the insulated cable is first bent upwards, then the cover 112 is opened and the bent end of the insulated cable is fed past the hinge 114 and through the straight tube 132 until it
25 abuts against the stop 134. To electrically connect the insulated cable C to the contact element 120, the cover 112 is then closed, the blades 124 thereby cutting the sheath of the cable and making electrical contact with the electrical conductor of the cable as shown in Fig. 3.



[005] The cover 112 is provided with protrusions 150 that press down on the sheath of the cable C when the cover is in the closed position. The protrusions 150 securely hold the cable C between the cover 112 and the body 102, thereby preventing the cable from being pulled out of the connector 101. The protrusions 150 are positioned close to the
5 hinge 114. This position enables the protrusions to exert a maximum force due to the lever effect on the cable when the cover 112 is closed. Consequently it is easy to close the cover 112 even if the sheath of the insulated cable C is made of a hard material. The opening of the straight tube 132 is preferably funnel-shaped for facilitating the insertion of the cable.

10

[006] With a cable connected to the electrical connector 101, when the cover 112 is moved into the open position, the cable is pulled away from the blades 124 since it is held in the straight tube 132. Thus the cable can be easily removed from the electrical connector.



Drawings Document D1

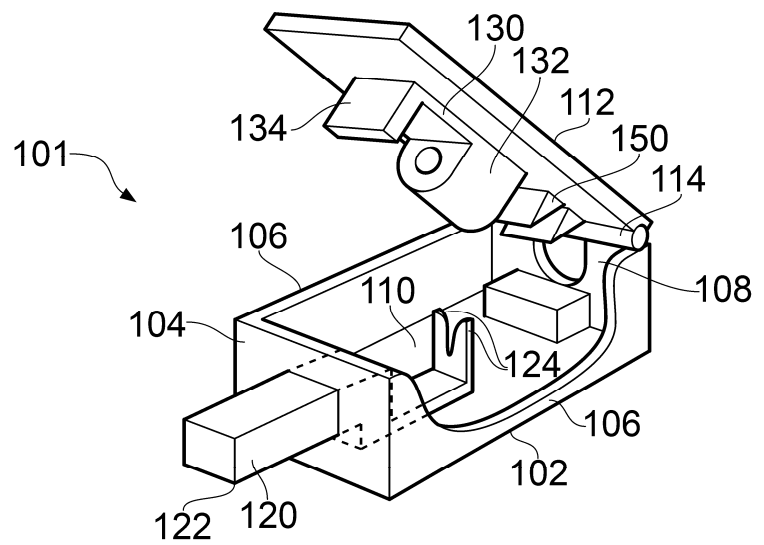


FIG. 1

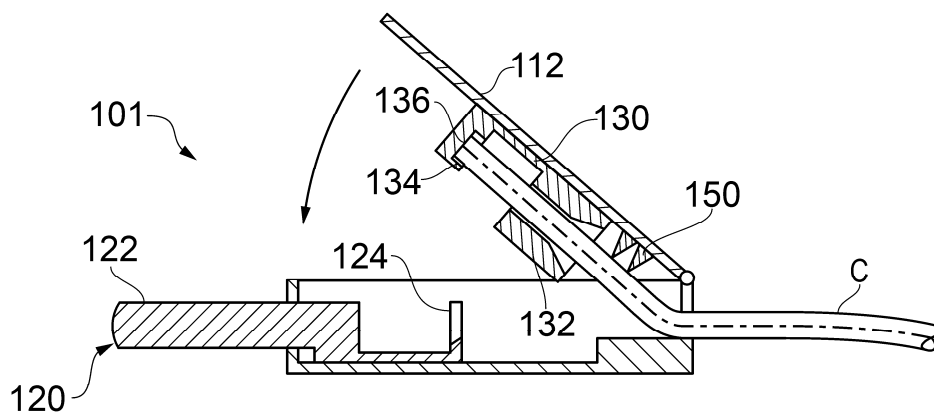


FIG. 2

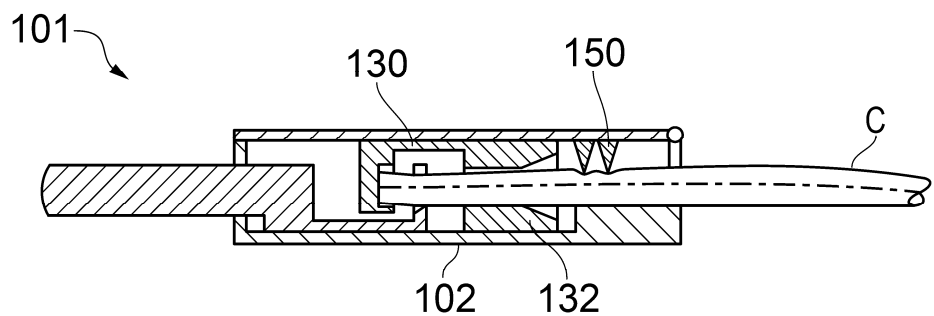


FIG. 3



Document D2

[001] A new electrical connector of the type having blades for cutting the sheath of insulating material of an insulated cable is described below.

5

[002] The electrical connector 201 shown in Figs. 1-3 comprises a body 202. The body 202 comprises a front wall 204, two side walls 206, a rear wall 208, and a bottom wall 210, the walls defining an interior space. A passageway 215 is provided in the rear wall 208 for the insertion of an insulated cable C. A ramp 216 is arranged on the bottom wall 210.

10

[003] The electrical connector 201 has a cover 212 and a hinge 214 that connects the cover 212 to the body 202, the hinge being arranged along the front wall 204 of the body. The cover 212 is movable between an open position and a closed position. The cover 212 closes the interior space of the body 202 when the cover is in the closed position. The body 202 and the cover 212 are made of an insulating material. The cover 212 comprises a guide 230 consisting of a straight tube 232 and a stop 234 having a blind hole 236.

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[004] The connector 201 includes an electrical contact element 220 that has a pin contact 222 and blades 224. The pin contact 222 passes through a passageway in the front wall 204 and protrudes out of the body 202. The blades 224 are disposed within the interior space of the body 202.

20



[005] To electrically connect an insulated cable C to the connector 201, the cover 212 is first opened (Fig. 2). Then the end of the insulated cable C is fed through the passageway 215 in the rear wall 208. As the cable C is fed further into the connector 201, the ramp 216 bends the cable upwards so that the cable is positioned above the blades 224. Then the tip of a screwdriver S is inserted into the straight tube 232 in the direction of the arrow A, and passes through the straight tube 232 until it abuts against the blind hole 236 of the stop 234. The cover 212 is then closed by applying a leverage force on the cover in the direction of the arrow B with the screwdriver S. When the cover 212 is moved towards the closed position, the stop 234 applies a downward force on the cable C, thereby forcing the cable between the blades 224, which cut through the sheath and make electrical contact with the electrical conductor of the cable (Fig. 3). The screwdriver S is then withdrawn from the guide 230.

[006] The additional leverage force obtainable by using a screwdriver inserted in the guide 230 facilitates the connection of an insulated cable having a sheath made of a hard material. The electrical connector includes locking means (not shown) for locking the cover 212 in the closed position.



Drawings Document D2

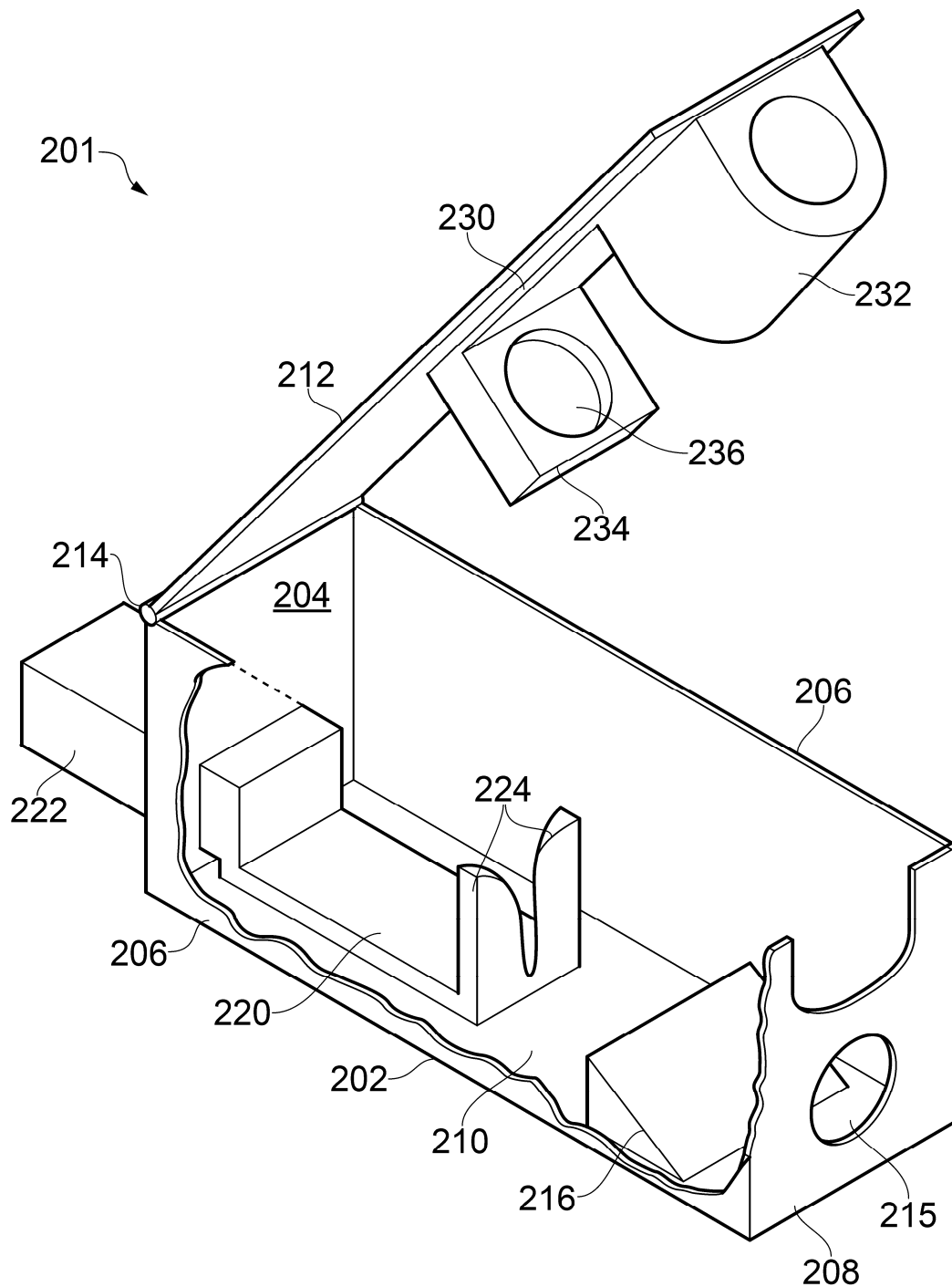


FIG. 1



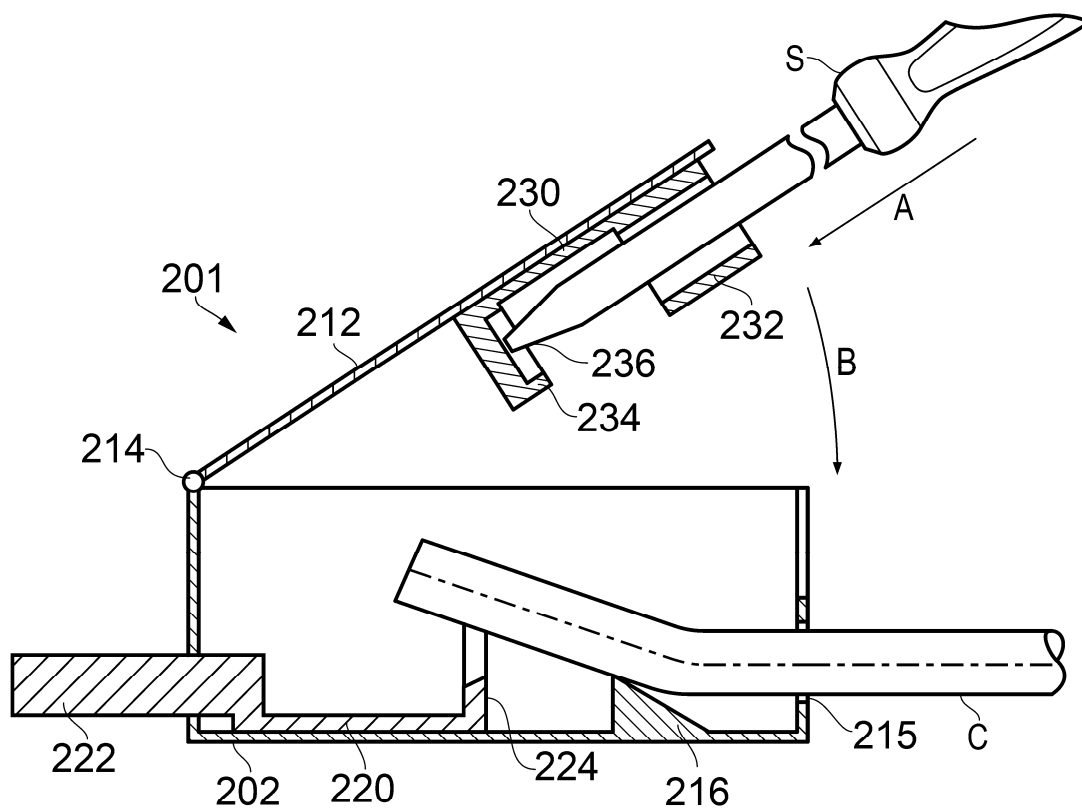


FIG. 2

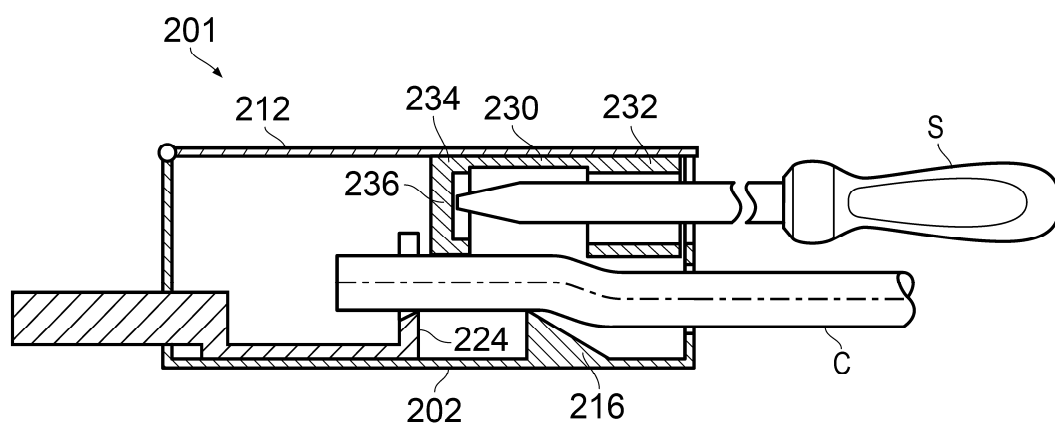


FIG. 3



Client's letter

Dear Mr Glark Cable,

Annexed to this letter is a draft set of amended claims which we think overcome the objections raised in the official communication.

We are selling two types of connectors for which we would particularly like protection: a first type (A) having a pin contact protruding out of the front wall of the body, and a second type (B) having a pin contact protruding out of the bottom wall of the body (see the annexed sketch). These connectors are now covered by feature f) of claim 1. We are only interested in protection for electrical connectors.

We consider the amendment in feature g) as both overcoming the clarity objection raised against original claim 3 and distinguishing our electrical connector from the connector disclosed in D1. D1 does not disclose a stop that is disposed between a straight tube of a guide and a hinge. In our invention, the cable can be inserted more easily.

The examiner cites D2 against claim 1 as filed but we do not understand the objection because the guide 230 of D2 is intended to receive a screwdriver, not an insulated cable.

We propose an amended claim 4 (based on original claim 5) to overcome the objection under Article 82 EPC raised in the communication and to give us protection for a particular embodiment of the electrical connector.



Thus we suggest that you file the annexed claims with any necessary amendments thereto with your reply under Rule 137(2) EPC.

Yours sincerely,
Ms Scart O'Hara

Annexes

Draft set of claims; Sketch



Draft set of claims

(The claims are marked up by underlining additional words and striking through deleted words with respect to the claims as originally filed.)

1. Electrical connector (1) for connecting to an insulated cable (C) having a sheath of insulating material and an electrical conductor, the electrical connector (1) comprising:
 - a) a body (2) comprising a front wall (4), two side walls (6), a rear wall (8), and a bottom wall (10);
 - b) a cover (12) for closing the body (2) when the cover (12) is in a closed position;
 - c) a hinge (14) arranged along the front wall (4) of the body (2) and connecting the cover (12) to the body (2);
 - d) an electrical contact element (20) having a pin contact (22) and blades (24) for cutting the sheath, the pin contact (22) protruding out of the body (2) and the blades (24) being disposed in the body (2),
 - e) wherein the cover (12) comprises a guide (30) for guiding the insulated cable (C), the guide (30) having a straight tube (32) and a stop (34), the straight tube (32) being orientated towards the hinge (14);
 - f) characterised in that the pin contact (22) protrudes out of the front wall (4) or out of the bottom wall (10) of the body (2), [based partly on claim 3] and in that
 - g) the stop (34) is disposed between the straight tube (32) and the hinge (14).
[based on claim 3, together with the description and drawings]
2. Electrical connector (1) according to claim 1, the connector (1) being preferably configured so that, when the cover (12) is in the closed position and the insulated cable (C) is located in the straight tube (32) and abuts against the stop (34), the electrical conductor of the insulated cable (C) is in electrical contact with the blades (24).



34. Electrical connector (1) according to claim 2,3 wherein an opening of the straight tube (32) is funnel-shaped.

45. ~~Insulated cable (C)~~ Electrical connector (1) according to claim 1, ~~which~~ wherein an insulated cable (C) is received in a blind hole (36).

Sketch

