

(19) **DANMARK**

(10) **DK/EP 3286808 T3**



(12) **Oversættelse af
europæisk patentskrift**

Patent- og
Varemærkestyrelsen

-
- (51) Int.Cl.: **H 01 R 13/627 (2006.01)** **H 01 R 13/512 (2006.01)** **H 01 R 13/58 (2006.01)**
H 01 R 13/633 (2006.01) **H 01 R 13/635 (2006.01)** **H 01 R 13/639 (2006.01)**
H 01 R 24/22 (2011.01) **H 01 R 103/00 (2006.01)**
- (45) Oversættelsen bekendtgjort den: **2021-09-13**
- (80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2021-07-07**
- (86) Europæisk ansøgning nr.: **16720473.4**
- (86) Europæisk indleveringsdag: **2016-04-20**
- (87) Den europæiske ansøgnings publiceringsdag: **2018-02-28**
- (86) International ansøgning nr.: **GB2016000086**
- (87) Internationalt publikationsnr.: **WO2016170298**
- (30) Prioritet: **2015-04-20 GB 201506683**
- (84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
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- (54) Benævnelse: **GENANVENDELIG ELEKTRISK KONNEKTOR**
- (56) Fremdragne publikationer:
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US-B2- 8 439 697

DESCRIPTION

[0001] This invention relates to a re-wireable electrical connector and in particular, though not exclusively, to a connector of the IEC type (known also as a "kettle plug") and in the form of a socket for receiving a plurality of pins.

[0002] Re-wireable electrical connectors commonly comprise a main body in the form of a plug or socket which supports an elongate tubular cable guide of a material which is relatively flexible in comparison with that of the main body.

[0003] Examples of known electrical connectors are described in BE 1 003 915 A6, WO 2015/005436 A1, US 2011/079414 A1, GB 2 383 202A and US 8 439 697 B2.

[0004] The main body typically comprises two sections which can be separated for access to terminals to which cable conductors are secured. Accordingly when wiring the connector there are three components which subsequently need to be assembled correctly, namely the two sections of the main body and the tubular cable guide. The two sections of the main body typically co-operate in the assembled condition to define an annular groove for location of an outwardly extending rib provided at the end of the flexible cable guide. Thus in the assembled condition the cable guide is held captive relative to the main body.

[0005] To wire or re-wire the connector the two parts of the main body are separated, a cable is fed through the tubular sleeve, the or each conductor within the cable is secured to a respective terminal of the main body, and the main body sections are then secured together in a manner in which the guide is held captive relative to the main body.

[0006] Although the known connectors perform satisfactorily, they are not wholly convenient for re-wiring, especially if being re-wired by competent but relatively inexperienced persons.

[0007] A further feature of many known connectors is that they are of undue length. That is particularly the case for some types of connectors that incorporate a locking mechanism. These require space for provision of a locking mechanism that is provided to enable the connector to be separated from the pins of a complementary, mating connector. The provision of a more compact and lockable type of connector would be advantageous, especially for a connector to be used employed in a situation in which space is limited or space reduction is important.

[0008] The present invention seeks to provide an improved re-wireable type of electrical connector.

[0009] In accordance with the present invention there is provided a re-wireable electrical connector as recited in claim 1.

[0010] The primary chassis member may be held securely in position in the assembled connector by interengaging with a formation such as a recess or rib which is part of the housing base or top and or it may be held securely by means of screws such as screws or other means provided for securing together the housing top and base.

[0011] The handle formation is an integral part of or secured to the secondary chassis that is slidable relative to the housing top and base.

[0012] The secondary chassis may comprise a control arm which is integral with or secured to the handle and which is configured to effect release of the locking mechanism, for example to tilt a locking blade to a release position, when slid in a direction away from the terminal socket.

[0013] The primary chassis preferably is arranged, in the assembled condition of the connector, to lie disposed between the the control arm of the secondary chassis and the cable whereby the cable is not subject to sliding movement of the control arm of the secondary chassis relative to the housing.

[0014] In the assembled connector the handle and control arm preferably are supported by being sandwiched between confronting surfaces of the housing top and housing base.

[0015] The housing top and housing base may define a recess in which part of the handle formation resides.

[0016] As considered in a plane perpendicular to the length of the connector the handle formation may have a cross-sectional shape no larger than that of the assembled housing top and housing base.

[0017] Embodiments of the present invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings in which:-

Figure 1 shows a perspective view of a connector in accordance with a first embodiment of the present invention.

Figure 2 is an exploded perspective view of the connector of Figure 1;

Figures 3 to 8 are exploded perspective views showing successive stages in the disassembling of the connector of Figure 1;

Figure 9 is a perspective view of a connector in accordance with a second embodiment of the present invention, and

Figures 10 and 11 are part cut-away views of the connector of Figure 9 when respectively in a locked and an unlocked position.

[0018] A lockable connector 10 in the form of a socket of the IEC type (known commonly as a "kettle plug") and of elongate shape comprises a main body 11 to which is slidably attached a handle 12 operable to release a locking mechanism and facilitate removal of the connector from an inter-connected complimentary component such as the pin assembly of a kettle or other electrical appliance.

[0019] In the exploded perspective view of Figure 2 the main body 11 is shown as comprising a housing top 13 and a housing base 14 securable together by a pair of screws 15 that extend through apertures 16 in the housing top to engage with screw threaded holes 17 in the housing base.

[0020] The handle 12 in the assembled connector is located to reside in part in a recess region 18 at one end region 19 of the housing base. The other end region of the housing base defines a tubular formation 20 in which the ends 21 of electrical terminals 22 are located.

[0021] In the assembled connector the housing top and base have sandwiched therebetween two chassis components, a main, primary chassis 25 which is secured in position within the connector and a secondary chassis 26 which is slidable within the connector.

[0022] The main chassis 25 has an end region 27 which defines a tubular surround 28 for location of three terminals 22. The surround 28 has three apertures 34 each for a retention screw 29 that engages with a respective terminal to hold the terminal in position relative to the chassis and to secure the end of a conductor (not shown) within the terminal.

[0023] A cable (not shown) comprising three conductors for connection to the three terminals 22 is held in position by means of a conventional grip bar 30. The grip bar 30 may be drawn downwards against the cable to hold it against the chassis 25 by means of a pair of screws 31 that extend through apertures 32 in the housing base to engage with screw treaded apertures 33 in the bar 30.

[0024] The surround 28 of the main chassis 25 acts in part to support a locking blade 35 and spring 36 of a locking mechanism of the type described and explained in more detail in our aforementioned GB 2383202. The blade 35 is positioned to be aligned with a central of the three terminal ends 21, which typically is designated as an earth terminal and of a larger size than the other two terminal ends.

[0025] The secondary chassis 26 comprises the handle 12 and a connecting bar 40 that extends to a locking mechanism control region 41. The control region 41 comprises a pair of shoulders 42 that provide sideways support for a compression spring 43 that, in the assembled connector, extends between the blade 35 and an abutment surface (not shown) within the end region 27 of the main chassis. The control region 41 has an end abutment 44 which bears against an end of the blade 35, the blade end thereby being sandwiched between the spring 43 and said abutment 44.

[0026] From the foregoing it will be apparent that the secondary chassis 26 lies positioned between the main chassis 25 and the housing base 14. In consequence a cable secured to and supported on the upper surface 46 of the main chassis is not exposed to and is thereby protected from sliding movement of the secondary chassis 26 whenever the handle is operated to move the locking mechanism.

[0027] Sliding movement of the secondary chassis is effected by pulling of the handle 12 which then acts against the force of the spring 43 to move the locking plate from a tilted, locking orientation towards an upright position for facilitating release of a pin that has been help captive in the plate. Subsequent pulling of the handle enables the connector to be separated from the pin(s) of a complimentary component. Movement of the handle is guided by a pair of ribs 50 that extend inwardly, towards one another and slide within respective grooves of a pair of groove 51 at the recess region 18 of the housing base.

[0028] The construction of the connector and manner in which it may be employed for connection to the end of a cable or for re-wiring will be further apparent from Figure 3 to 8.

[0029] Figure 3 shows removal of the screws 15 to allow removal of the housing top 13.

[0030] Figure 4 shows removal of the screws 31 to effect release of the grip bar 30.

[0031] Figure 5 shows removal of the main and secondary chassis by sliding them away from the end 19 of the housing base 14.

[0032] Figure 6 shows the main and secondary chassis having been lifted out of the housing base.

[0033] Figure 7 shows the main and secondary chassis having been separated.

[0034] Figure 8 shows removal of the terminal screws to allow the terminals to be slid out from the chassis.

[0035] Subsequently, for connecting the conductors of a cable, each conductor is inserted in a respective terminal and the screws 29 are then employed to serve the dual purpose of locating the terminal within the housing surround 28 and securing the conductors within the terminals. Subsequently the components of the connector are re-assembled in a sequence reversed to that shown in the Figures 3 to 8, with the cable having been arranged to pass centrally through the handle 12 and to be secured in position by means of the grip bar 30.

[0036] In a second embodiment of the present invention a connector 60 is constructed substantially as described in respect of the first embodiment but the handle 61 is of a different design. The handle 61 comprises only one pair of apertures 62 which may be employed as finger grip positions in contrast to the four finger grip positions of the handle of the first embodiment. Additionally the handle is devoid of the end tabs 55 of the aforescribed handle

12 and in consequence the connector is of a shorter overall length. Also the grooves 51 are replaced by ribs 63 that locate with grooves in the handle.

[0037] The connector of Figure 9 is shown in perspective, in longitudinal cross-section in Figures 10 and 11 to reveal the internal construction which corresponds with that of the first embodiment.

[0038] In Figure 10 the connector is in a locked orientation whereby the spring 43 urges the locking plate 35 to reside in a tilted position. In that tilted position the aperture 56 is able to engage with and lock an appropriately sized pin of a complimentary component to which the connector is connected.

[0039] In the event of the handle being pulled away from the body 10, as shown in Figure 11, the spring 43 is compressed as the end face abutment 44 of the secondary chassis 26 moves the locking plate to a vertical position at which the aperture 56 presents an enlarged opening to allow disengagement of the connector from a pin.

[0040] From the foregoing it will be understood that the present invention provides a connector of a type which is both lockable and is particularly suitable for re-wiring.

REFERENCES CITED IN THE DESCRIPTION

Cited references

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- [BE1003915A6 \[0003\]](#)
- [WO2015005436A1 \[0003\]](#)
- [US2011079414A1 \[0003\]](#)
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- [US8439697B2 \[0003\]](#)

Patentkrav

1. Genanvendelig elektrisk konektor (10), der har et terminalstik (21) og omfatter en låsemekanisme til at muliggøre fastholdelse af en komplementær konnektors stift i terminalstikket (21) og frigørelse derfra, hvor konnektoren (10) endvidere omfatter en hustop (13) og en husbasis (14), der kan fastgøres til hinanden for at rumme et primært rammeelement (25) i et arrangement af sandwichtypen, hvori det primære rammeelement (25) holdes på plads mellem husets top (13) og husets basis (14), hvor det primære rammeelement (25) omfatter mindst én terminal (22), hvortil en kabelleder kan fastgøres, hvor det primære rammeelement (25) kan fjernes fra husets top (13) og husets basis (14) for adgang til den mindst ene terminal (22), hvilken mindst ene terminal (22) er udformet til at være i elektrisk ledende kontakt med terminalstikket (21), hvori den komplementære konnektors stift kan isættes,

hvor låsemekanismen omfatter et frigørelsesmiddel (41), der kan betjenes ved hjælp af en grebsformation (12), der er glidende understøttet i forhold til husets top (13) og husets basis (14),

hvor grebsformationen (12) er fastgjort til eller integreret i et sekundært rammeelement (26), der kan glide i forhold til husets top (13) og husets basis (14), kendetegnet ved, at det primære rammeelement (25) omfatter en bæreflade (46) til kabellederen, hvilken bæreflade vender ind mod én af husets top (13) og husets basis (14), og hvor det sekundære rammeelement (26) er placeret mellem det primære rammeelement (25) og den anden af husets top (13) og husets basis (14).

2. Genanvendelig elektrisk konektor ifølge krav 1, hvor det primære rammeelement (25) understøtter en flerhed af terminaler (22).

3. Genanvendelig elektrisk konektor ifølge et hvilket som helst af de foregående krav, hvor det primære rammeelement (25) holdes på plads i den samlede konektor ved indgreb med en formation, der er en del af husets basis (14) eller husets top (13).

4. Genanvendelig elektrisk konektor ifølge et hvilket som helst af de foregående krav, hvor det primære rammeelement (25) holdes på plads i den samlede konektor ved hjælp af skruer (15).

5. Genanvendelig elektrisk konektor ifølge et hvilket som helst af de foregående krav,

hvor det primære rammeelement (25) holdes på plads ved hjælp af midler, der er tilvejebragt til at sammenholde husets top (13) og husets basis (14).

6. Genanvendelig elektrisk konektor ifølge et hvilket som helst af de foregående krav, hvor låsemekanismen omfatter et vipbart låseblad (35) og det sekundære rammeelement (26) omfatter en styrearm (40), der strækker sig fra grebsformationen (12) mod låsebladet (35).

7. Genanvendelig elektrisk konektor ifølge et hvilket som helst af de foregående krav, hvor grebsformationen (12) og mindst én af husets top (13) og husets basis (14) omfatter formationer (50, 51), der går i indgreb med hinanden, hvorved grebsformationen (12) føres for glidende bevægelse i en retning parallel med den elektriske konektors (10) længderetning.

8. Genanvendelig elektrisk konektor ifølge et hvilket som helst af de foregående krav, hvor husets top (13) og husets basis (14) definerer en indskæring (18), hvori en del af grebsformationen (12) er anbragt.

9. Genanvendelig elektrisk konektor ifølge et hvilket som helst af de foregående krav, hvor, set i et plan vinkelret på konektorens (10) længde, grebsformationen (12) har en tværsnitsform, der ikke er større end den for den samlede hustop (13) og husbasis (14).

DRAWINGS

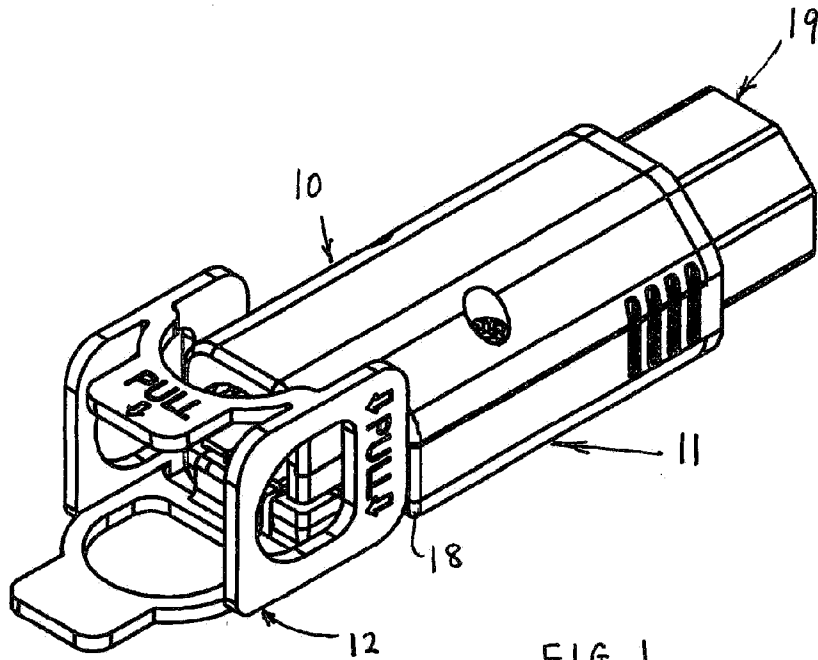
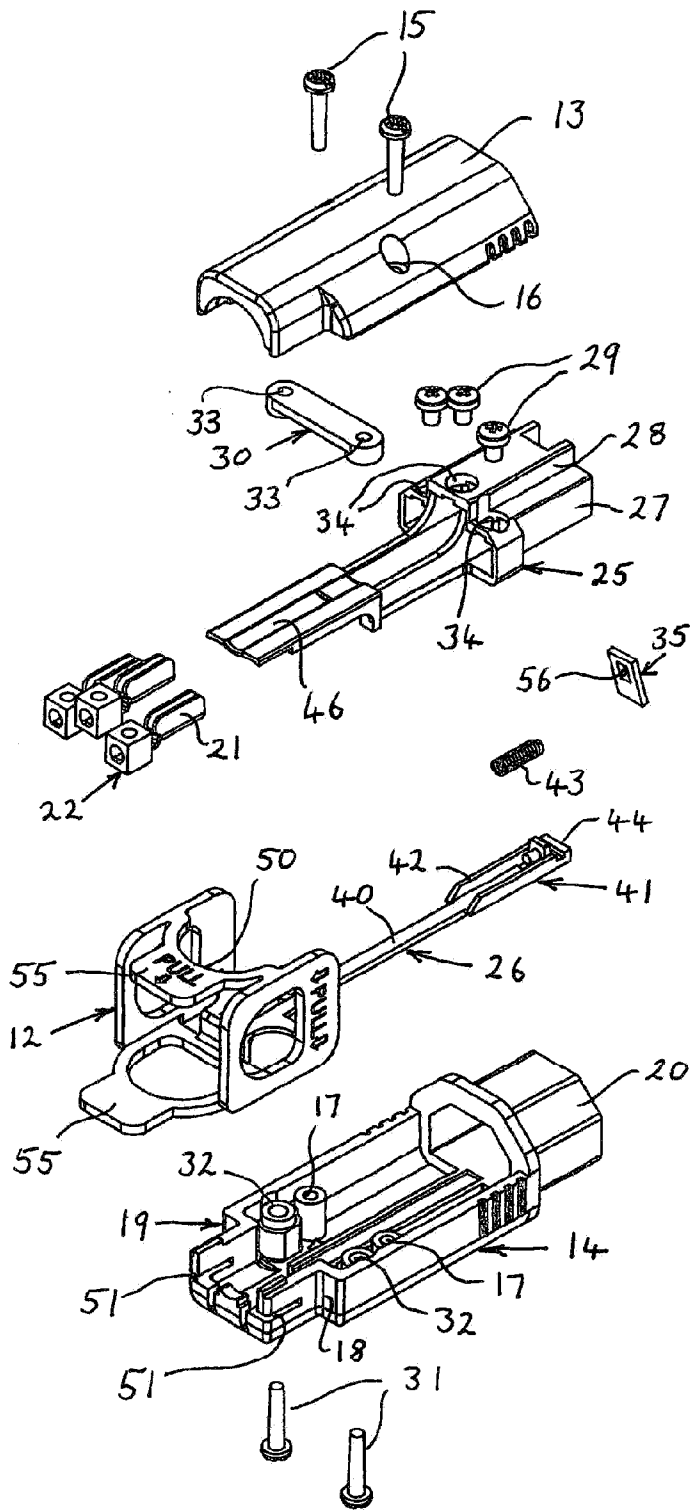


FIG. 1



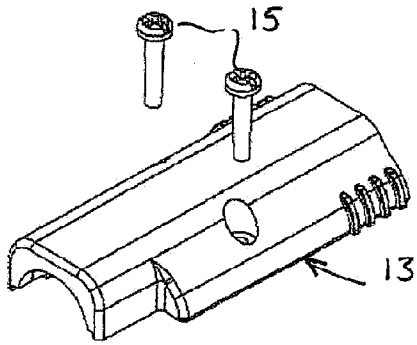


FIG. 3

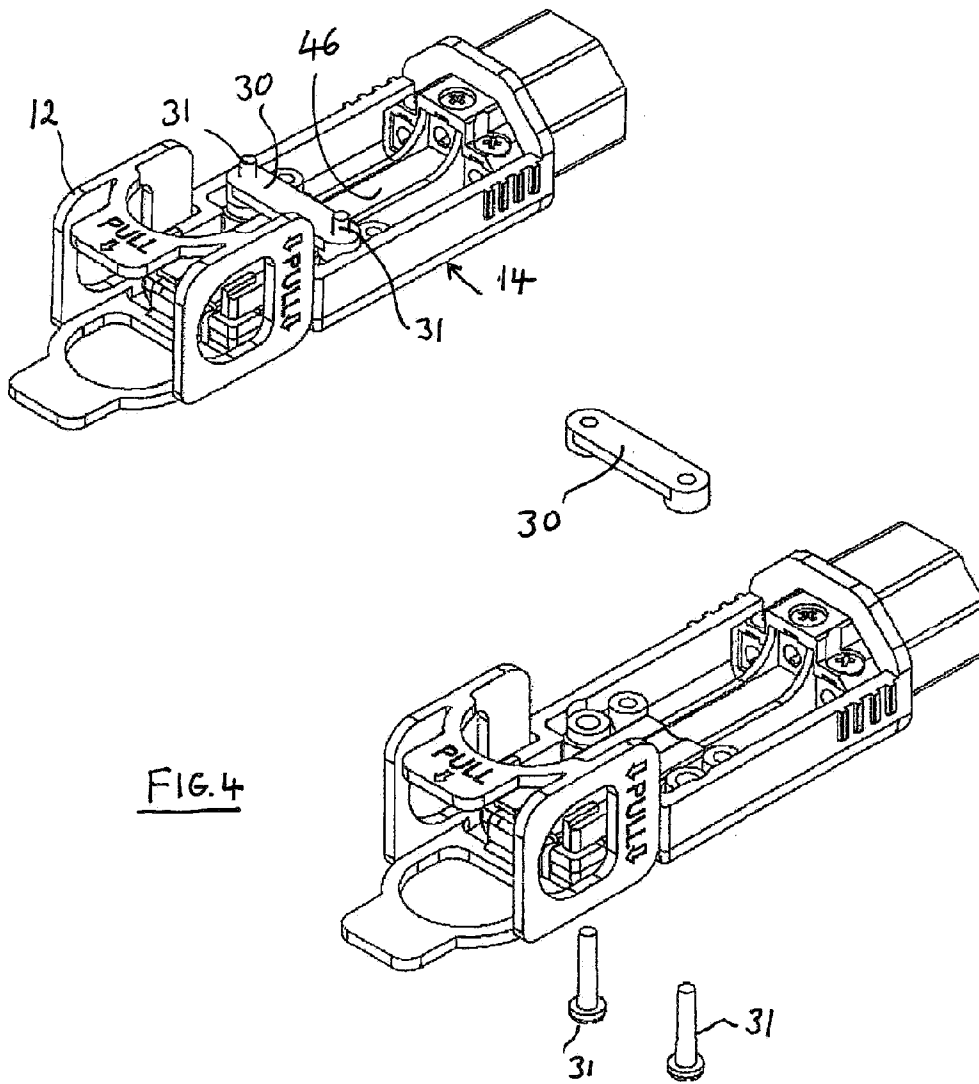
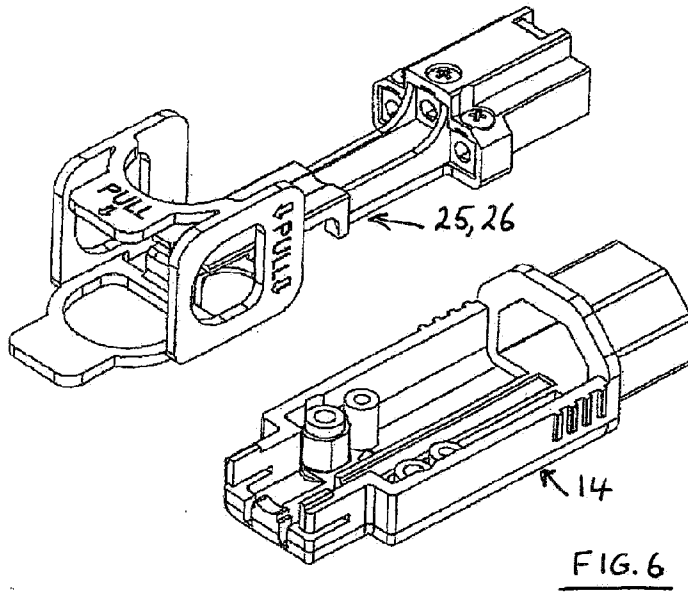
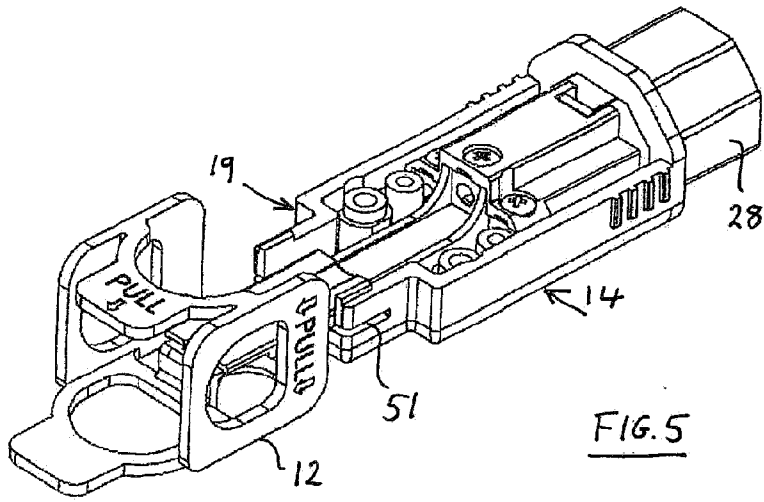
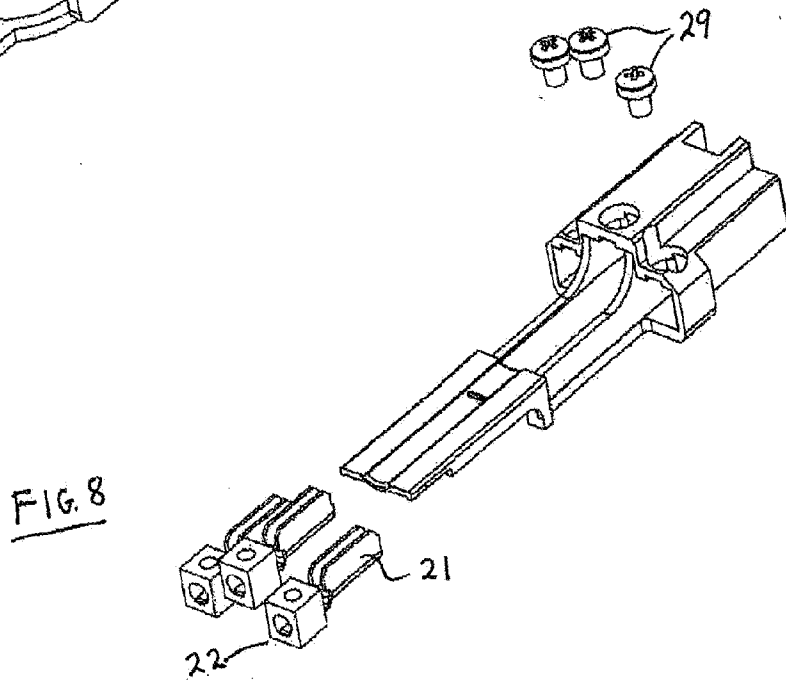
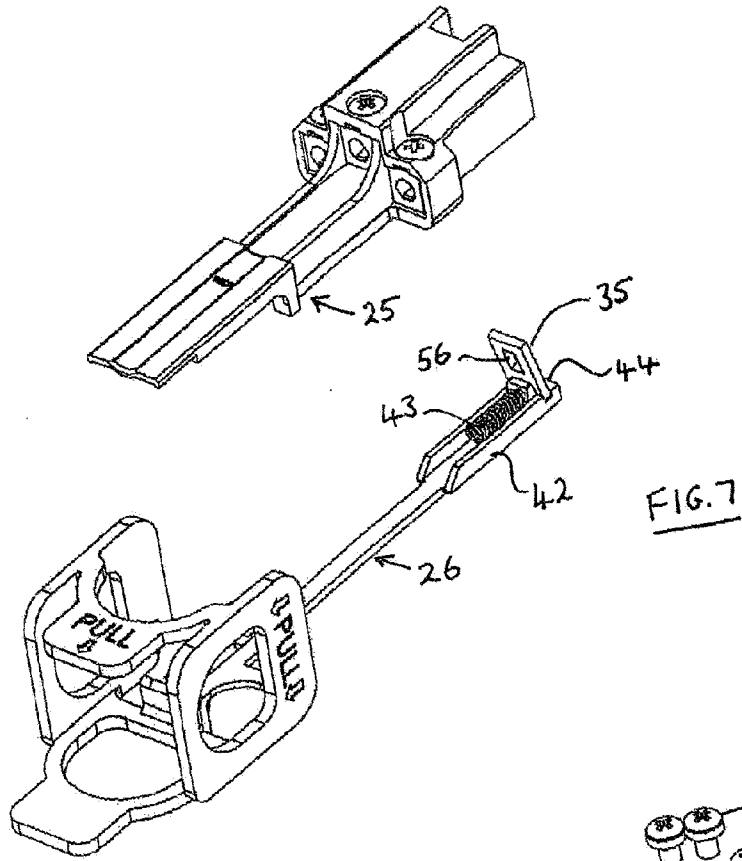
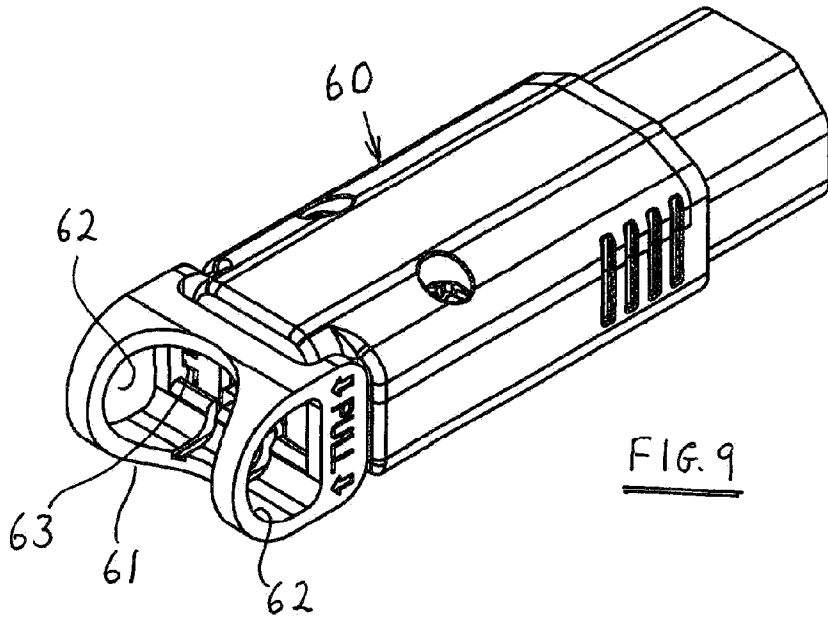
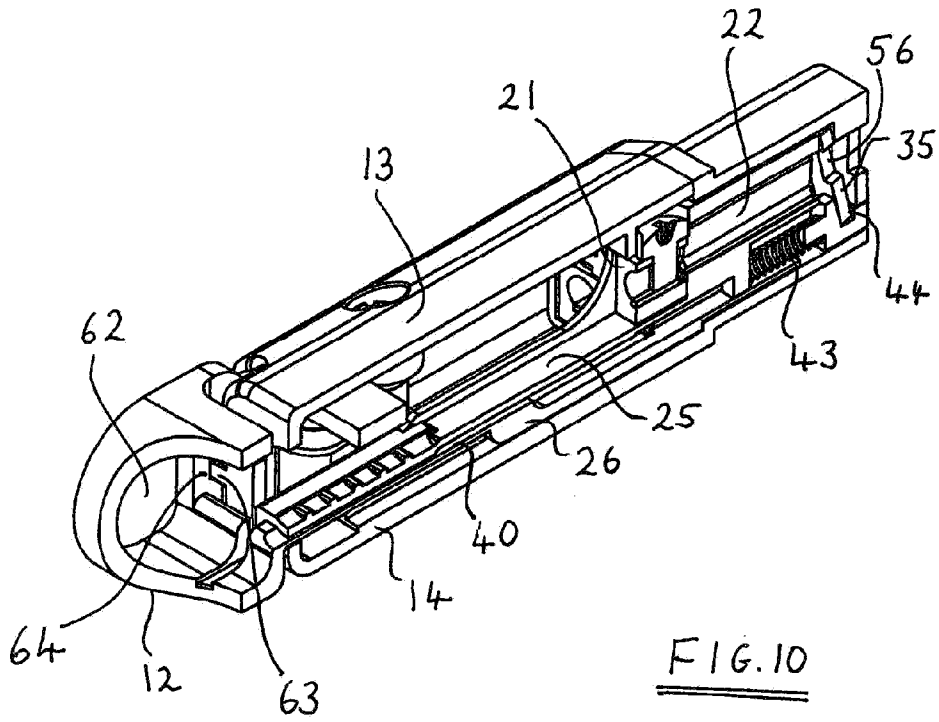


FIG. 4









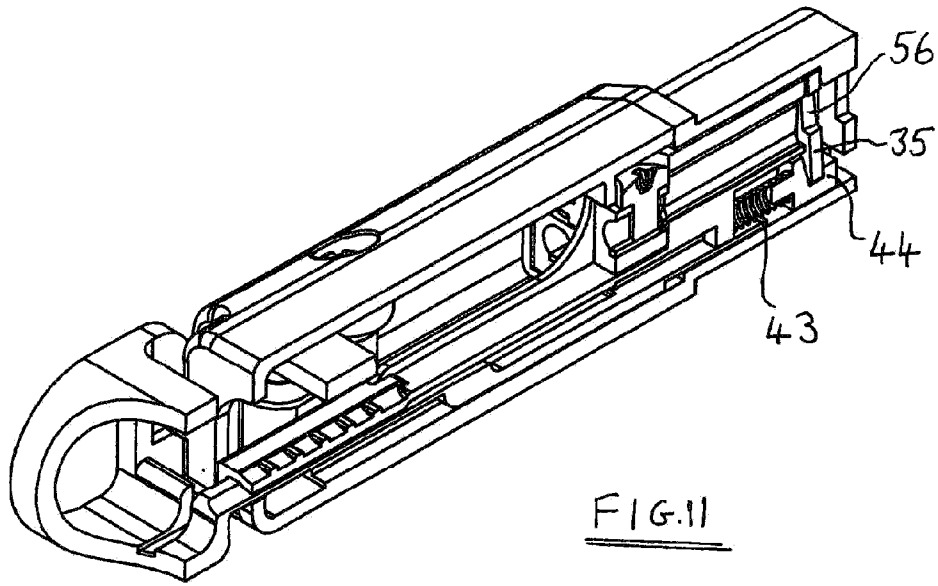


FIG. 11