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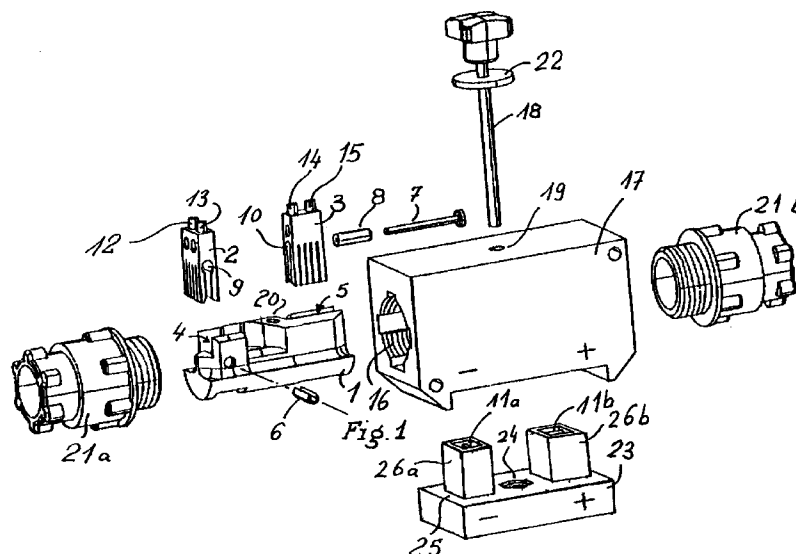
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(54) **Tight protected connector system for parallel and series wiring**

(57) In a connector system a contact set for the first side contact body is anchored in a slidable shuttle (1) element lying in a bore (16) which is sealed on both ends by the cable-holding strain reliefs (21a,b) and by the tight mating between the first side contact body (17) and the second side contact plug part (23) imposed by a locking screw (18).

This configuration allows to combine touch-protection, pole identification and easy access to the terminals which offer a variety of wiring schemes (e.g. series and parallel).



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Description

[0001] A simple connecting system which would not only save the polarity of the cabling but would also have touch-protected plug contacts and accessible easy wiring is missing mainly for stand alone direct current installations with battery storage and e.g. photovoltaic or wind generator; provision should also be made for good tightness, as these connectors have to be used on photovoltaic modules, on ships or vehicles: these are the most wide-spread stand alone systems.

[0002] The present invention refers to a quick connecting system which features following peculiarities, which are usually quite difficult to integrate in one device:

- saving polarity by unconfundible contact arrangement
- tightness by flat sealing around the contacts
- resistant to vibration by tight central screw locking
- assemblable and wirable without special tools
- wiring by screw clamping or soldering
- easy access for pre-assembling or field service
- double strain relief inlets for parallel and series wiring schemes
- touch-protected contacts when unplugged

[0003] According to the invention, this is achieved in that the contact set of the first contact side is anchored in a slidable shuttle (1) which lies in a bore (16) of the first side connector body (17), this bore being closed on both ends by tight strain reliefs (21a,21b) and in that the contact set of the second side contact plug part (23) protrudes through the first side connector body (17) perpendicularly to the axis of the bore (16) and reaches the contact set of the first contact side anchored in said slidable shuttle (1) which is located in said bore (16) of that said first side connector body (17). By removing in the unplugged situation the tight strain reliefs (21a,21b) and the knurled knob screw (18), the slidable shuttle (1) will be free to move out of the first side connector body (17), yielding thus totally unimpeded access for wiring work on the terminals of the first side contact set.

[0004] By way of example, the invention will be further described below with reference to the accompanying drawings, in which

FIG. 1 shows the elements of a possible embodiment of the connecting principle, while in

FIG. 2 a cut through the positive contact of FIG. 1

illustrates the plugging situation, whereas

FIG. 3 adds a possible key-like differentiation of the poles showing a view on the modified plug part of the second side contact set.

[0005] In a similar way to a slide in a drawer, the slidable shuttle bears a first contact set which is shown here as the female part embodied by resilient claws (2,3) which fit the rectangular openings (4,5) in the slidable shuttle (1). These resilient claws (2,3) are maintained either by a pin (6) or a screw (7) surrounded by an isolating sleeve (8) which engage with clearance in their respective claw holes (9,10). The choice of this well-known multiple contact principle based on resilient claws (2,3) as shown in FIG. 1 is guided not only by the premium contact behaviour, but also by the easy multiplication of screw clamp terminals (12,13,14,15) on the back side of the claws which yield a variety of wiring possibilities.

[0006] FIG. 1 shows clearly the good accessibility for wiring work, specially if the solution of fixing the resilient claws (2,3) to the wires before inserting them in the shuttle (1) is chosen: even soldering can then be used, as no plastic part will be subject to overheat in this situation. The resilient claws (2,3) can be inserted together with the wires in the shuttle (1) and then shifted altogether into the bore (16) of the first side connector body (17), where locking occurs by the introduction of the knurled knob screw (18) which engages in the hole (19) in the first side connector body (17) and the hole (20) in the shuttle (1). Once the tight strain reliefs (21a,21b) are screwed in, the first side connector body (17) will provide for waterproof sealing contact against the second side plug part (23), as this flat sealing face is strongly pressed against the mating surface of the first side connector body (17) by the thrust of the knurled knob screw (18) engaged in the threaded insert (24). The washer (22) improves the sealing under the knurled knob, but also indicates the wiring executed (series or parallel) according to which side is visible.

[0007] In FIG. 2 we can appreciate in a cut the plug contact in said tightly sealed position, as the contact blade (11b') engages in the resilient claw (3') and the first side connector body (17) is clamped firmly to the second side plug part (23'); (the sealing effect in this junction can be enhanced by inserting a flat seal); in this cut we see also the screw (7') with its isolating sleeve (8') which maintains the resilient claw (3') in the shuttle (1'). The isolating protection (26b) shown in FIG. 1 appears in FIG. 2 as (26b'), together with the grooves (27',28') for the wire passage and the clamp screw (15').

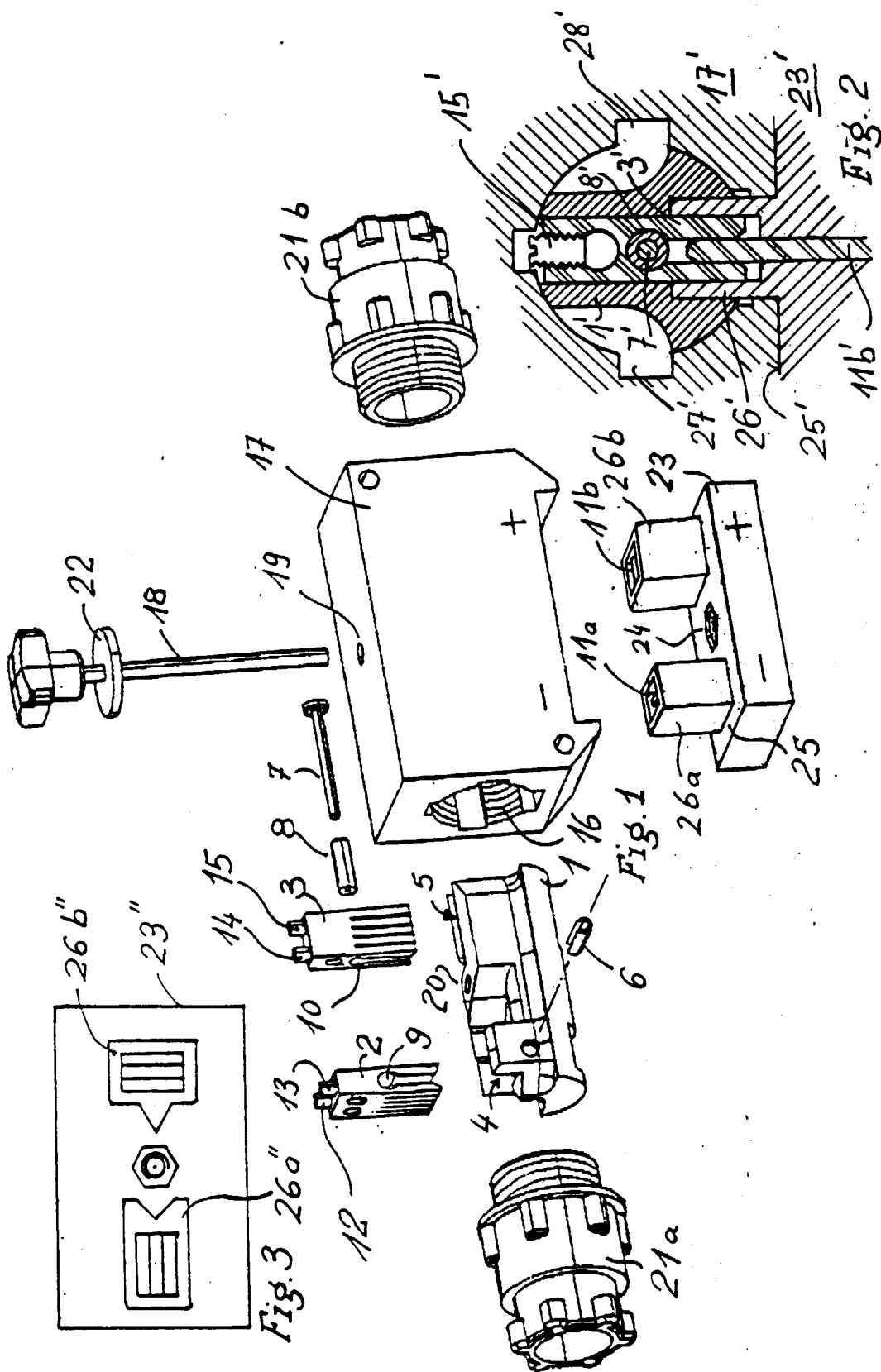
[0008] In FIG. 1, the poles are identified by the relative positioning of the contacts, which are here embodied by the blades (11a,11b) with their respective isolating protections (26a,26b), where e.g. the negative pole blade (11b) is identified by its transversal position on the axis of the positive pole blade (11a). In some cases

(mostly for measurement and control purposes) unipolar contacts are used and then, the unequivocal relationship is lost: a way to avoid confusion in these circumstances would be to introduce a difference in the outer shape of the isolating protection (26a",26b"), as shown in FIG. 3 in the view on the modified plug part of the second side contact set (23"): the new outer shapes of the isolating protections (26a",26b") act as key profile if unipolar connectors are used with the correspondent negative shaped receptacles.

[0009] To those familiar in the art it is obvious, that in the above description of this connecting principle provision is made for the achievement of various further developments, mainly in the field of stand alone batteries and module arrays, where simultaneous parallel and series wiring are required.

Claims

1. A tight and touch protected connector with resilient contacts, a first contact side connector body and a second contact side plug part, characterized in that the contact set of the first contact side is anchored in a slidable shuttle (1) which lies in a bore (16) of the first side connector body (17), this bore being closed on both ends by tight strain reliefs (21a,21b) holding the cables and in that the contact set of the second contact side plug part (23) protrudes through the first contact side connector body (17) perpendicularly to the axis of the bore (16) and reaches the contact set of the first contact side anchored in said slidable shuttle (1) which is located in said bore (16) of said first contact side connector body (17).
2. A connector according to claim 1, characterized in that the first contact connector body (17) and the second contact side plug pan (23) are tightly held together resting on flat sealing areas by a knurled knob screw (18) which crosses the first contact side connector body (17) and the slidable shuttle (1), thus locking them in the correct position.
3. A connector according to claim 1, characterized in that the contact set of the first contact side consists of resilient claws (2,3) anchored in the sliding shuttle (1).
4. A connector according to claim 1 and 3, characterized in that the resilient claws (2,3) are provided with multiple screw clamps (12,13,14,15) on their back.
5. A connector according to claim 1, characterized in that the contact blades (11a,11b) of the second contact side plug part (23) are protected by isolating sleeves (26a",26b") which extend beyond the conductive parts.
6. A connector according to claim 1 and 5, characterized in that the outer shape of the isolating sleeves (26a", 26b") have a key profile to identify unipolar cables.





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 98 11 7876

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	US 5 511 995 A (CHENG YU F) 30 April 1996 * abstract; figures 2,3 * * column 1, line 17 - line 20 * * column 1, line 56 - column 2, line 46 * ---	1,3	H01R31/02 H01R11/28
A	US 5 405 172 A (MULLEN JR THOMAS M) 11 April 1995 * abstract; figures 1,2 * * column 1, line 6 - line 13 * * column 4, line 53 - column 5, line 15 * ---	1	
A	US 4 012 104 A (WENING RICHARD R) 15 March 1977 * abstract; figures * * column 2, line 26 - line 61 * ---	1	
A	US 5 363 075 A (FANUCCHI RICHARD) 8 November 1994 * abstract; figure 4 * * column 4, line 42 - line 59 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			H01R
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 7 January 1999	Examiner Serrano Funcia, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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