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ELECTRICAL PLUG CONNECTOR

The invention relates to an electrical plug connector for the telecommunication and data technique, according to the preamble of claim 1.

A plug connector of the type referred to hereinbefore is known in the art from EP 0,445,376 A1. Said plug connector includes a housing with a receiving chamber for the plug, a first set of contacts in insulation displacement technology, and a second set of contacts (RJ contacts) connected with said first set and made of elongated contact strips inserted into grooves of the upper housing portion and guided closely to each other and parallelly right into the receiving chamber, whereinto the plug (RJ plug) can be inserted. The shielding of h.f. cables is performed by contacting the cable shield of the h.f. cable to another, additional contact. This additional contact prevents a compact construction of the plug connector.

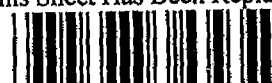
It is therefore the object of the invention to improve an electrical plug connector of the type referred to hereinbefore such that a shielding of h.f. cables integrated in the plug connector is made possible.

The solution of this object is achieved by the characterizing features of claim 1. By application, according to the invention, of a shield contact, the shielding cable of a h.f. cable can safely be connected to the shield contact, by means of a squeeze connection, and can be connected, over the intermediate earth wire contact, to earth potential or can be conducted on.

Further advantageous embodiments of the invention are defined in the subclaims.

In the following, the invention will be described in more detail, with reference to an embodiment represented in the drawings. There are:

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- Fig. 1 a plug connector as known in the art from EP 0,445,376 A1, in an exploded view, and
- Fig. 2 an assembled plug connector according to Fig. 1, comprising a shield contact and an intermediate earth wire contact, in an exploded view, with the h.f. cable to be terminated and a squeezing ring.

The plug connector 25 known in the art from EP 0,445,376, according to Fig. 1, comprises a moulded housing having an upper portion 10 and a lower portion 11. The upper portion 10 has opposed, substantially rectangular side walls 14, 15, each provided with a through-opening 16 for latching wedge-type projections 43 of the lower portion 11 in. On the upper side of the upper portion 10, close to each side wall 14, 15, extend two rows of column-type extensions 18 forming clamping elements, between which slots 20 are formed and receive - as will be described below - electrically conductive connection elements 80 with integrally formed, angled, flat foot sections 85. The front-side end wall 22 of the upper portion 10 is provided with a row of parallel grooves 24, being in connection with similar grooves 26 formed in the lower wall of the upper portion 10. Each of the grooves 26 extends closely up to the lower part of a slot 20 defined by the column-type extensions 18. The front-side end wall 22 comprises, further, opposed, moulded-in and angled, flange-type side portions 28, 29, forming each a channel 30. At the opposed front side, the upper portion 10 is provided with integrated hooks 34 forming clamping elements for electrical conductors.

The lower portion 11 is provided with a substantially flat end section 40 having opposed side walls 42, the outside surfaces of which are provided with wedge-type projections 43. On the inner side of each side wall 42 are provided inwardly directed flanges 44. The front end section 45 of the lower portion 11 includes a moulded-in part defining a hollow space 50 for receiving a plug, such as a plug disposed at the tail of a cord coming from a telephone set or a com-

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puter terminal device. Close to the first end section 40, approximately in the centre of the lower portion 11, are formed opposedly disposed, upright columns 56. The lower portion 11 comprises, on its front, a plane wall 58 uprightly extending in a height of approximately the height of the columns 56. The other end of the wall 58 terminates at projecting portions 60 of each of the side walls 42. The lower portion may receive a closure cover 70 being disposed between the opposed side walls 42 and held in position by the flanges 44. The closure cover 70 may be displaced between a position, wherein it blocks access to the hollow space 50, and a position, wherein the hollow space 50 is open. A spring 72 is attached at the closure cover 70, in order to pre-tension it towards the closed position.

The set of eight electrical connection elements 80 extends into the slots 20 in the upper portion 10 formed by the column-type extensions 18. Each of said connection elements 80 is provided with an insulation displacement contact element 81 having a fork-type shape and defining a relatively narrow contact slot 82 terminating in a wide insertion section 83. The arrangement is adapted such that, when inserting an electrically insulated conductor into the insertion section 83, and when pressing said conductor into the narrow contact slot 82, the insulation of the conductor will automatically be cut-in, so that a contact between the central core of the conductor and the material of the connection element 80 will be established. The insulation displacement contact elements 81 are substantially flat and are disposed at an angle of approximately 45° to a line through the column-type extensions 18, i.e. at 45° to the plane of each slot 20. Each connection element 80 is, further, provided with a foot section 85, being integrally formed with the insulation displacement contact elements 81.

A second set of connection elements 90 comprises a row of eight contact tongues 92 being welded each to a foot section 85. An elongated contact strip 93 extends from each contact tongue 92. The contact strips 93 are adapted such that they extend in parallel to each other. The contact strips 93 terminate as RJ con-



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tacts in the hollow space 50 for the RJ plugs of terminal devices.

In Fig. 2 is shown the assembled plug connector described in detail in Fig. 1 and having a shield contact 1 and an intermediate earth wire contact 5. In addition, the h.f. cable 94 is shown with a squeezing ring 23.

The shield contact 1 is formed as one piece of a shaped metal sheet 34. At two opposite sides, the shaped metal sheet 34 is bent downwardly in two rectangular angled portions 35. These extend first over the full width of the shaped metal sheet 35, become narrow then and form brackets 3 with spring lugs 37 that are adapted rectangularly and are bent off outwardly at their ends at an obtuse angle. In the centre of the shaped metal sheet 34, there is a U-shaped cut-free portion 36 forming an upwardly bendable lip 2 of the shield contact 1. Therein, the bent-off lip 2 projects over the angled portion 35 forming the bracket 3. In the central area, the lip 2 is provided with rectangular cut-free portions 37, so that a web 39 being slightly wider only than the lip 2 projects, in the centre of the shaped metal sheet 34, over the lateral angled portion 35. At the rear end of the shaped metal portion 34 is provided another angled portion 27 forming the rear wall 4 of the shield contact 1.

The intermediate earth wire contact 5 is, same as the shield contact 1, formed as one piece of a shaped metal sheet which has narrow webs 9 at the longitudinal sides. At the front side, the shaped metal portion is bent off upwardly by 90°, and forms the front side 13. At the outer sides of the webs 9, close to the front side 13, are provided barbs 6 being bent off upwardly at right angles. Adjacent to the barbs 6, at the inner sides of the webs 9, flanges 8 are bent off upwardly at right angles. Further, indentations 12 are formed at the outer sides of the webs 9. At the ends directed away from the front side 13, the webs 9 are bent off downwardly at right angles and extend then in a plane being parallel to the original plane of the webs 9. At the outer side of the front-side web 9 of Fig. 2 upwardly projects a wall 17, the rear-side web

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9 being in part cut free in the area of the wall 17. Here, the left-hand side of the rear-side web 9 is slightly widened towards outside. From the outer side of the widened web 9 is a metal sheet 31 upwardly bent off at a right angle, said metal sheet comprising inwardly directed angled portions 32 at both sides. In the lower part of the metal sheet 31, a tongue 21 is cut free from the centre, said tongue being two times inwardly bent off. Thereabove, the metal sheet 31 is cut free from the inwardly directed lateral angled portions 32. The thus cut-free part of the metal sheet 31 acts as a resilient metal sheet 7. In the upper area of the resilient metal sheet 7, the inwardly directed lateral angled portions 32 are cut away, thereby inwardly rounded hooks 19 being formed.

In the following, the assembly of the shield contact 1 and of the intermediate earth wire contact 5 with the h.f. cable 94 and with the plug connector 25 will be described. The lip 2 cut-free from the shaped metal sheet 34 is upwardly bent away. The h.f. cable 94 to be shielded is stripped, and the made-free cable shield 95 is bent off rearwardly onto the remaining insulation. By means of a squeeze connection, the cable shield 95 is connected to the lip 2 of the shield contact 1. The squeeze connection is preferably made by means of a squeezing ring 23, as is shown in Fig. 2. The squeeze connection can however also be made by means of a cable binder having a metal bracket. The eight cables 97 of the h.f. cable 94 are contacted by means of the insulation displacement contact elements 81. The rear wall 4 of the shield contact 1 is inserted into the remaining slot between the grooves 24 of the upper portion 10 and the lower portion 11. The brackets 3 of the shield contact 1 thus rest against the wall 59 of the lower portion 11. The brackets 3 of the shield contact 1 are bent away from the wall 59 of the lower portion 11 at an obtuse angle. This serves for simple introduction of the barbs 6 of the intermediate earth wire contact 5 through the through-passing portion 91 of the lower portion 11. The barb 6 is then conductively positioned with the bracket 3 of the shield contact 1 against the wall 59 of the lower portion 11. After the barb 6 having been

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inserted through the through-passing portion 91, its bent-off portion will be placed on the upper side of the portion 60, and fixes thus the intermediate earth wire contact 5 at the lower portion 11 of the plug connector 25. The flanges 8 of the intermediate earth wire contact 5 rest against the inner walls of the hollow portion 50 of the plug connector 25 and serve for further fixing. The webs 9 of the intermediate earth wire contact 5 lie flatly on the underside of the lower portion 11 of the plug connector 25. The indentations 12 of the intermediate earth wire contact 5 are guided past the flanges 44 of the lower portion 11. The front side 13 is guided between the two portions 60 of the lower portion 11 and rests, in the lower portion, against the wall 58 of the lower portion 11. The wall 17 of the intermediate earth wire contact 5 serving for fixing rests against the rear wall of the upper portion 10, said wall not being visible in the illustrated perspective view.

The actual intermediate earth wire contact 5 is formed by the resilient metal sheet 7 and the hooks 19. When an intermediate earth wire 96 is present, it will be connected to the intermediate earth wire contact 5. For this purpose, the resilient metal sheet 7 is pressed between the hooks 19 in the direction of the barbs 6. The intermediate earth wire 96 is then resiliently clamped down between the resilient metal sheet 7 and the hooks 19. The construction of the actual intermediate earth wire contact 5, formed of the hooks 19 and the resilient metal sheet 7, rests against the rear wall of the last column-type extension 18 of the upper portion 10 of the plug connector 25. The closure cover 70 described in Fig. 1 can even be slid onto the plug connector 25 when applying an intermediate earth wire contact 5.

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LIST OF REFERENCES

1	shield contact
2	lip
3	bracket
4	rear wall
5	intermediate earth wire contact
6	barb
7	resilient metal sheet
8	flange
9	web
10	upper portion
11	lower portion
12	indentation
13, 14	front side
15	side wall
16	through-opening
17	wall
18	column-type extension
19	hook
20	slot
21	tongue
22	end wall
23	squeezing ring
24, 26	groove
25	plug connector
27	angled portion
28, 29	side portion
30	channel
31	metal sheet
32	angled portion
33	hook
34	shaped metal sheet
35	angled portion
36, 37	cut-free portion
38	spring lug
39	web
40	end section
42	side wall
43	projection

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44	flange
45	end section
50	hollow space
56	column
58, 59	wall
60	portion
70	closure cover
72	spring
80	connection element
81	insulation displacement contact
82	contact slot
83	insertion section
85	foot section
90	connection element
91	through-passing portion
92	contact tongue
93	contact strip
94	h.f. cable
95	cable shield
96	intermediate earth wire
97	cable

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Patent Claims

1. An electrical plug connector for the telecommunication and data technique, comprising RJ contacts disposed in a housing and insulation displacement contacts and contact strips connecting the latter, characterised by that for shielding a h.f. cable (94), a shield contact (1) can be terminated at the plug connector (25), by means of which the cable shield (95) of the h.f. cable (94) can be connected to earth potential (5), or can be conducted on, and that the contact between the shield contact (1) and the cable shield (95) is established by means of a clamp connection.
2. An electrical plug connector according to claim 1, characterised by that the shield contact (1) has at least two lateral brackets (3) and a rear wall (4) serving for attachment of the shield contact (1) at the plug connector (25) and at the same time conductively connecting the intermediate earth wire contact (5) to the shield contact (1).
3. An electrical plug connector according to claim 2, characterised by that the intermediate earth wire contact (5) is intended for contacting intermediate earth wires (96) and generally comprises a resilient metal sheet (7) and hooks (19) resiliently clamping down the intermediate earth wire (96).
4. An electrical plug connector according to claim 3, characterised by that the intermediate earth wire contact (5) is provided with fixing elements, in particular barbs (6), webs (9), flanges (8) and rear walls (17) serving for attachment at the plug connector (25).
5. An electrical plug connector according to claim 1, characterised by that the shield contact (1) is formed so that the plug connector (25) has electrical conductive enclosure, whereby the impedance between h.f. cable and flanges is as low as possible.

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