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EUROPEAN PATENT SPECIFICATION

- ④⑤ Date of publication of patent specification: **08.10.86** ⑤① Int. Cl.⁴: **H 01 R 31/02**
②① Application number: **83303246.9**
②② Date of filing: **06.06.83**

⑤④ **Electrical tab connector and tab plate therefor.**

③① Priority: **17.06.82 FR 8210575**

④③ Date of publication of application:
04.01.84 Bulletin 84/01

④⑤ Publication of the grant of the patent:
08.10.86 Bulletin 86/41

③④ Designated Contracting States:
BE DE FR GB IT NL

⑤③ References cited:
DE-C- 913 191
FR-A-1 574 163
US-A-2 985 861
US-A-3 064 224
US-A-3 670 295

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Description

There is disclosed in US—A—2,985,861 an electrical connector comprising first and second tab plates each being in the form of a metal sheet from which upstands a plurality of tabs, the second tab plate being arranged in superposition with the first tabs plate, and an insulating housing secured to the tab plate and surrounding the tab thereof.

Such connectors are commonly used for grounding electrical leads, which can be connected to the tabs of the connector by means of electrical tab receptacles.

It is desirable in the interests of economy of space and of the housing material that the housing should accommodate as many tabs as possible.

The present invention is intended to enable this advantage, and to provide a connector which is nevertheless most economical to produce.

According to one aspect of the invention, an electrical connector according thereto is characterised in that the tabs have been struck out from the sheets in such a way as to leave openings therein, the tabs of the second tab plate extending into the housing through openings in the first tab plate, left by the striking out of the tabs thereof.

A tab plate for the connector according to the invention comprises a first row of equally spaced, upstanding tabs struck out from a metal sheet, and is characterised by a second row of upstanding tabs also struck out from the sheet and comprising one less tab than the first row, each tab of the second row being coplanar with a tab of the first row, through a slot dimensioned to allow a tab to be passed therethrough being formed in the metal sheet at an end of the second row and in alignment with an end tab of the first row, the slot being adjacent to an end tab of the second row.

FR—A—1574163 also discloses superpositioned tab plates of an electrical connector.

An embodiment of the invention will now be described by way of example, with reference to the accompanying drawings which is an exploded perspective view of an electrical grounding connector.

The connector consists of an insulating housing 2, and two similar tab plates 4 and 4'.

The housing 2 is in the form of a substantially rectangular frame consisting of opposed end walls 6, opposed side walls 8 which are of greater length than the walls 6 and are formed integrally with the walls 6, and a central partition 10 also formed integrally with the end walls 6 and extending parallel to the side walls 8. Each side wall 8 is formed, internally of the housing 2, with five grooves 12 which run perpendicularly to the length of the wall 8 and each of which opens at one end into one longitudinal edge 14 of the wall 8. Each groove 12 terminates, in a shoulder 16, short of the opposite longitudinal edge of the wall 8, a portion 17 of the wall 8 thus extending between such edge and the shoulder 16. The housing 2 can be very simply moulded in one piece.

Each tab plate 4 and 4' has five upstanding electrical tabs 18 arranged in juxtaposed rows 20

and 22, respectively, the row 20 consisting of three tabs and the row 22 of only two tabs. Each tab of the row 22 is coplanar with a tab of the row 20, the planes of the tabs being mutually parallel.

Mounting lugs 24 provided with holes 25 for bolts or other fasteners (not shown) extend centrally from opposite edges of each tab plate 4 and 4' at right angles to the rows 20 and 22 of tabs 18.

In the manufacture of each tab plate 4 and 4' by means of a progressive die forming operation, the tabs 18 were struck out from a metal sheet 5, thereby leaving an opening 26 therein adjacent to each tab, and there being an opening 26 between each pair of adjacent tabs of each row. Each plate 4 and 4' was also formed with a tab-receiving through slot 28 at one end of the row 22 of tabs, in alignment with an end tab of the row 20 and opposite to an end tab of the row 22.

The tabs 18 of the tab plate 4' were made longer than those of the tab plate 4 by the thickness of the metal sheet 5.

Adjacent to its junction with the sheet 5, each tab 18 has a pair of laterally projecting stops 30 and 30', for limiting the insertion of the tab into a tab receptacle (not shown) to be mated therewith. The stop 30', which is directed outwardly of the tab plate 4 or 4', is formed with a notch 32 providing a retention lug 33.

When assembling the grounding connector, the tab plates 4 and 4' are arranged as shown, in superposed relationship, with the lugs 24 of the two plates 4 and 4' in precise alignment and with each of the openings 26 between the tabs of the row 20 of the upper (as seen in the drawing) plate 4, in alignment with a tab of the row 22 of the lower (as seen in the drawing) plate 4', each opening 26 of the row 22 of the upper plate 4 being aligned with a tab of the row 20 of the lower plate 4' and the slot 28 of the upper plate 4 being aligned with the rearmost (as seen in the drawing) tab of the row 20 of the lower plate.

The upper plate 4 is then nested with the lower plate 4' in the direction of the arrow A so that the two plates are interengaged with their lugs 24 contiguous and in precise alignment. The rearmost tab 18 of the row 20 of the lower plate projects through the slot 28 of the upper plate and each of the remaining tabs 18 of the lower plate projects through an immediately superposed opening 26 of the upper plate.

With the plates 4 and 4' so nested with their tabs 18 interdigitated, the housing 2 is lowered onto the plates 4 and 4' in the direction of the arrow B, so that each retention lug 33 snaps into the adjacent groove 12 and engages against the shoulder 16 at the base thereof, the portion 17 of the wall 8 between the shoulder 16 and the lower edge of such wall, engaging in the notch 32 below the lug 33. The housing 2 is thereby secured to the plates 4 and the plates 4 are secured together in their superposed relationship, the tabs being surrounded by the housing 2 and projecting thereinto to an equal extent, since the tabs 18 of the plate 4' are longer than those of the plate 4, as mentioned above.

In order to facilitate their snap engagement in the grooves 12, the lugs 33 have end faces 35 which are inclined with respect to the vertical so as to cam the walls 8 of the housing 2 slightly outwardly as it is assembled to the plates 4, whereafter these walls return by virtue of the natural resilience of the walls 8.

In the connector, when so assembled, the central partition 10 of the housing 2 extends between the two rows of tabs 18 therein, each of which rows consists of five tabs, that is to say, two tabs of one of the tab plates and three tabs of the other.

The assembled connector can be secured to an electrically conductive support e.g. the chassis of an automobile, or of an electrical appliance, by means of bolts or other fasteners passed through the holes 25. Leads (not shown) can be connected to the tabs 18 by means of tab receptacles (not shown).

Since the number of tabs that can be struck out from a metal sheet is limited by the area thereof, the connector has the advantage that a double density of tabs can be provided in the same housing as compared with the case where a single tab plate is used. Since the plates 4 are similar, they can be made by means of the same forming dies, simple conversion means being employed to allow for the difference in tab length. Thus, both of the tab plates are preferably provided with a slot 28. The housing 2 is uncomplicated and is therefore simple to mould in one piece.

The tab plates may, if desired, be provided with only one row of tabs or with more than two such rows, and more than one slot may be provided in each plate; such slot may open into an adjacent edge of the plate. Instead of, or additionally to, the lugs 24, each tab plate may have a central mounting hole for receiving a bolt. These central holes being in register when the tab plates are assembled to the housing. The lower tab plate is preferably provided with means, which may be in the form of lances struck out therefrom, for making electrical contact with the support through paint thereon.

Claims

1. An electrical connector comprising first and second tab plates (4 and 4', respectively) each being in the form of a metal sheet (5 and 5') from which upstands a plurality of tabs (18), the second tab plate (4') being arranged in superposition with the first tab plate (4), and an insulating housing (2) secured to the tab plates (4 and 4') and surrounding the tabs (18) thereof; characterised in that the tabs (18) have been struck out from the sheets (5 and 5') in such a way as to leave openings (26) therein; tabs (18) of the second tab plate (4') extending into the housing (2) through the openings (26) in the first tab plate (4).

2. A connector according to Claim 1, characterised in that the tabs of the first and second tab plates are identically arranged, each tab plate (4

and 4') having a plurality of juxtaposed rows (20 and 22) of tabs (18), a tab (18) of the second tab plate (4') at an end of one (20) of the rows of tabs thereof, which row (20) comprises one tab (18) more than in adjacent row (22) of tabs of the second tab plate (4'), extending into the housing (2) through a slot (28) formed in the first tab plate (4).

3. A connector according to Claim 2, characterised in that the planes of the tabs (18) of each tab plate (4) are parallel, each tab of the adjacent row (22) being coplanar with a tab (18) of the one row (20), the slot (28) being positioned at an end of the adjacent row (22) of tabs of the first tab plate (4), in line with a tab (18) at the end of the one row (20) of tabs thereof and opposite to a tab (18) at the end of the adjacent row (22) of tabs thereof.

4. A connector according to Claim 1, 2 or 3, characterised in that each tab plate (4 and 4') is provided with a mounting lug (24), the mounting lugs (24) of the two tab plates (4 and 4') being arranged in superposed relationship and in precise alignment with one another.

5. A connector according to any one of the preceding claims, characterised in that the housing (2) is in the form of a frame having side walls (8) formed with grooves (12) receiving retention lugs (33) projecting laterally of the tabs (18) and engaging shoulders (16) at the ends of the grooves (12).

6. A connector according to Claim 5, characterised in that the housing (2) consists of opposed end walls (6) formed integrally with the side walls (8) and a central partition (10) formed integrally with the end walls (6) and extending between two rows of tabs (18) of the tab plates (4 and 4').

7. A connector according to Claim 5 or 6, characterised in that the retention lugs (33) are formed with cam surfaces (35) for camming the side walls (8) resiliently apart, as the housing (2) is assembled to the tab plates (4 and 4'), so that the retention lugs (33) engage in the grooves (12) with a snap action.

8. A connector according to Claim 7, characterised in that portions (17) of the side walls (8), between the shoulders (16) and the adjacent edges of the side walls (8), are received in notches (32) in stops (30') on the tabs (18), from which stops (30') the retention lugs (33) project.

9. A connector according to any one of the preceding claims, characterised in that the tabs (18) of the second tab plate (4') are longer than the tabs (18) of the first tab plate (4) by the thickness of the metal sheet (5).

10. A tab plate for a connector according to Claim 1, comprising a first row (20) of equally spaced, upstanding tabs (18) struck out from a metal sheet (5), characterised by a second row (22) of upstanding tabs (18) also struck out from the sheet (5) and comprising one less tab (18) than the first row (20), each tab (18) of the second row (22) being coplanar with a tab (18) of the first row (20), a through slot (28) dimensioned to allow a tab (18) to be passed therethrough being

formed in the metal sheet (5) at an end of the second row (22) and in alignment with an end tab (18) of the first row (20), the slot (28) being adjacent to an end tab (18) of the second row (22).

Patentansprüche

1. Elektrischer Verbin mit ersten und zweiten Zungenplatten (4 bzw. 4'), von denen jede als Metallblech (5 und 5') ausgebildet ist, von dem eine Vielzahl von Zungen (18) aufrechtsteht wobei die zweite Zungenplatte (4') über der ersten Zungenplatte (4) angeordnet ist und ein isolierendes Gehäuse (2) an den Zungenplatten (4 und 4') befestigt ist und deren Zungen (18) umgibt, dadurch gekennzeichnet, daß die Zungen (18) aus den Blechen (5 und 5') derart ausgestanzt sind, daß sie Öffnungen (26) zurücklassen, und daß die Zungen (18) der zweiten Zungenplatte (4') sich in das Gehäuse (2) hinein durch die Öffnungen (26) in der ersten Zungenplatte (4) erstrecken.

2. Verbinder nach Anspruch 1, dadurch gekennzeichnet, daß die Zungen der ersten und zweiten Zungenplatten identisch angeordnet sind, daß jede Zungenplatte (4 und 4') eine Vielzahl von nebeneinanderliegenden Reihen (20 und 22) von Zungen (18) besitzt, daß eine Zunge (18) der zweiten Zungenplatte (4') an einem Ende der einen (20) der Reihen von Zungen, welche eine Zunge (18) mehr als eine benachbarte Reihe (22) von Zungen in der zweiten Zungenplatte (4') besitzt, sich in das Gehäuse (2) durch einen Schlitz (28) hinein erstreckt, der in der ersten Zungenplatte (4) geformt ist.

3. Verbinder nach Anspruch 2, dadurch gekennzeichnet, daß die Ebenen der Zungen (18) jeder Zungenplatte (4) parallel sind, daß jede Zunge der benachbarten Reihe (22) koplanar mit einer Zunge (18) der einen Reihe (20) ist, daß der Schlitz (28) an einem Ende der benachbarten Reihe (22) von Zungen der ersten Zungenplatte (4) angeordnet ist, und zwar in einer Linie mit einer Zunge (18) am dem Ende der einen Reihe (20) von Zungen und gegenüberliegend zu einer Zunge (18) an dem Ende der benachbarten Reihe (22) von Zungen.

4. Verbinder nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß jede Zungenplatte (4 und 4') mit einer Montagelasche (24) versehen ist, daß die Montagelaschen (24) der beiden Zungenplatten (4 und 4') in übereinanderliegender Beziehung und in präziser Ausrichtung zueinander angeordnet sind.

5. Verbinder nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das Gehäuse (2) in Form eines Rahmens vorliegt, welcher Seitenwände (8) besitzt, in denen Nuten (12) geformt sind, welche Haltetaschen (33) aufnehmen, die seitlich der Zungen (18) wegragen und mit Schultern (16) an den Enden der Nuten (12) im Eingriff stehen.

6. Verbinder nach Anspruch 5, dadurch gekennzeichnet, daß das Gehäuse (2) gegenüberstehende Endwände (6) besitzt, die einstück-

kig mit den Seitenwänden (8) geformt sind, sowie eine zentrale Trennwand (10), die einstückig mit den Endwänden (6) geformt ist und sich zwischen den beiden Reihen von Zungen (18) der Zungenplatten (4 und 4') erstreckt.

7. Verbinder nach Anspruch 5 oder 6, dadurch gekennzeichnet, daß die Haltetaschen (33) mit Nockenflächen (35) geformt sind, welche die Seitenwände (8) elastisch auseinanderdrücken, während das Gehäuse (2) mit den Zungenplatten (4 und 4') zusammengefügt wird, so daß die Haltetaschen (33) in die Nuten (12) mit einer Schnappwirkung eingreifen.

8. Verbinder nach Anspruch 7, dadurch gekennzeichnet, daß Abschnitte (17) der Seitenwände (8) zwischen den Schultern (16) und den benachbarten Rändern der Seitenwände (8) in Kerben (32) in Anschlägen (30') der Zungen (18) aufgenommen sind, wobei von diesen Anschlägen (30') die Haltetaschen (33) wegragen.

9. Verbinder nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Zungen (18) der zweiten Zungenplatte (4') länger sind als die Zungen (18) der ersten Zungenplatte (4), und zwar um die Dicke des Metallblechs (5).

10. Zungenplatte für einen Verbinder nach Anspruch 1 mit einer ersten Reihe (20) von in gleichen Abständen angeordneten aufrechtstehenden Zungen (18), die aus einem Metallblech (5) ausgestanzt sind, dadurch gekennzeichnet, daß eine zweite Reihe (22) von aufrechtstehenden Laschen (18) ebenfalls aus dem Blech (5) ausgestanzt ist und eine Zunge (18) weniger besitzt, als die erste Reihe (20), daß jede Zunge (18) der zweiten Reihe (22) koplanar mit einer Zunge (18) der ersten Reihe (20) angeordnet ist, daß ein Durchgangsschlitz (28), der derart dimensioniert ist, daß ein Zunge (18) hindurchgeführt werden kann, in dem Metallblech (5) an einem Ende der zweiten Reihe (22) geformt ist, und zwar ausgerichtet mit einer Endzunge (18) der ersten Reihe (20), und daß der Schlitz (28) benachbart zu einer Endzunge (18) der zweiten Reihe (28) angeordnet ist.

Revendications

1. Connecteur électrique comprenant des première et seconde plaques (4 et 4' respectivement) à languettes se présentant chacune sous la forme d'une feuille métallique (5 et 5') de laquelle s'élèvent plusieurs languettes (18), la seconde plaque (4') à languettes étant agencée en superposition à la première plaque (4) à languettes, et un boîtier isolant (2) étant fixé aux plaques à languettes (4 et 4') et entourant les languettes (18), caractérisé en ce que les languettes (18) ont été découpées dans les feuilles (5 et 5') de manière à y laisser des ouvertures (26); les languettes (18) de la seconde plaque (4') à languettes pénétrant dans le boîtier (2) en passant dans les ouvertures (26) de la première plaque (4) à languettes.

2. Connecteur selon la revendication 1, caractérisé en ce que les languettes des première et

seconde plaques à languettes sont agencées de façon identique, chaque plaque à languettes (4 et 4') comportant plusieurs rangées juxtaposées (20 et 22) de languettes (18), une languette (18) de la seconde plaque (4') à languettes, située à une extrémité de l'une (20) de ces rangées de languettes, laquelle rangée (20) comprend une languette (18) de plus qu'une rangée adjacente (22) de languettes de la seconde plaque (4') à languettes, pénétrant dans le boîtier (2) en passant par une fente (28) formée dans la première plaque (4) à languettes.

3. Connecteur selon la revendication 2, caractérisé en ce que les plans des languettes (18) de chaque plaque (4) à languettes sont parallèles, chaque languette de la rangée adjacente (22) étant coplanaire à une languette (18) de la première rangée (20), la fente (28) étant positionnée à une extrémité de la rangée adjacente (22) de languettes de la première plaque (4) à languettes, en alignement avec une languette (18) située à l'extrémité de la première rangée (20) de languettes de celle-ci et en opposition à une languette (18) située à l'extrémité de la rangée adjacente (22) de languettes de celle-ci.

4. Connecteur selon la revendication 1, 2 ou 3, caractérisé en ce que chaque plaque à languettes (4 et 4') comporte une patte (24) de montage, les pattes (24) de montage des deux plaques à languettes (4 et 4') étant agencées en superposition et en alignement précis entre elles.

5. Connecteur selon l'une quelconque des revendications précédentes, caractérisé en ce que le boîtier (2) se présente sous la forme d'un cadre ayant des parois latérales (8) qui présentent des gorges (12) recevant des pattes (33) de retenue faisant saillie latéralement des languettes (18) et portant contre des épaulements (16) situés aux extrémités des gorges (12).

6. Connecteur selon la revendication 5, caractérisé en ce que le boîtier (2) comprend des parois extrêmes opposées (6) réalisées d'une seule pièce avec les parois latérales (8), et une cloison cen-

trale (10) réalisée d'une seule pièce avec les parois extrêmes (6) et s'étendant entre deux rangées de languettes (18) des plaques à languettes (4 et 4').

7. Connecteur selon la revendication 5 ou 6, caractérisé en ce que les pattes (33) de retenue présentent des surfaces de came (35) destinées à écarter élastiquement par action de came les parois latérales (8), lorsque le boîtier (2) est assemblé sur les plaques (4 et 4') à languettes, afin que les pattes (33) de retenue s'emboîtent dans les gorges (12) avec une action élastique.

8. Connecteur selon la revendication 7, caractérisé en ce que des parties (17) des parois latérales (8), situées entre les épaulements (16) et les bords adjacents des parois latérales (8), sont reçues dans des encoches (32) de butées (30') situées sur les languettes (18), butées (30') desquelles dépassent les pattes (33) de retenue.

9. Connecteur selon l'une quelconque des revendications précédentes, caractérisé en ce que les languettes (18) de la seconde plaque (4') à languettes sont plus longues, de l'épaisseur de la feuille métallique (5), que les languettes (18) de la première plaque (4) à languettes.

10. Plaque à languettes, pour un connecteur selon la revendication 1, comprenant une première rangée (20) de languettes équidistantes (18), orientées vers le haut, découpées dans une feuille métallique (5) caractérisée par une seconde rangée (22) de languettes (18) orientées vers le haut, également découpées dans la feuille (5) et comprenant une languette (18) de moins que la première rangée (20), chaque languette (18) de la seconde rangée (22) étant coplanaire à une languette (18) de la première rangée (20), une fente (28) dimensionnée pour permettre le passage d'une languette (18), étant formée à travers la feuille métallique (5), à une extrémité de la seconde rangée (22) et en alignement avec une languette extrême (18) de la première rangée (20), la fente (28) étant adjacente à une languette extrême (18) de la seconde rangée (22).

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