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(54) **ELECTRONIC CONNECTOR AND LIGHTING DEVICE**

(57) The invention is related to an electronic connector (1) comprising a first support (11) with first channels (21), a second support (12) with second channels (22). The first (11) and the second (12) supports are adapted to mechanically couple so that each first channel (21) collaborate with one second channel (22) to provide a lower cable housing for at least a portion of a cable. The second support (12) further comprises first insulating displacement connections (31) comprising at least a cutting edge made of an electrically conductive material and located in contact with a first channel (21). The second support (12) further comprises a first outlet connector (41), being in electric connection with the first insulating displacement connections (31), such that the first outlet connector (41) is in electrical connection with the cable when the cable is in the lower cable housing.

placement connections (31) comprising at least a cutting edge made of an electrically conductive material and located in contact with a first channel (21). The second support (12) further comprises a first outlet connector (41), being in electric connection with the first insulating displacement connections (31), such that the first outlet connector (41) is in electrical connection with the cable when the cable is in the lower cable housing.

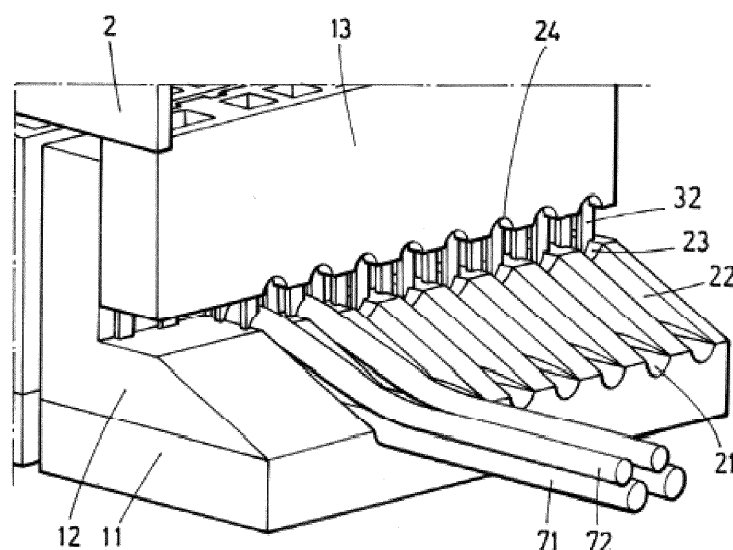


FIG. 4

Description

TECHNICAL FIELD

[0001] The present invention belongs to the field of electronic connectors comprised in automotive lighting devices.

STATE OF THE ART

[0002] Automotive lighting devices require the arrangement of electric circuits to feed light sources. As every arrangement related to the automotive industry, space and cost need to be minimized, and sometimes a linear deposition of conductive tracks is more efficient than a harness distribution.

[0003] However, a linear distribution of conductive tracks may be inadequate to use conventional connectors, which are adapted to handle bundles of cables.

DESCRIPTION OF THE INVENTION

[0004] The invention provides a solution for this problem by means of an electronic connector according to claim 1 and a lighting device according to claim 9. Preferred embodiments of the invention are defined in dependent claims.

[0005] In an inventive aspect, the invention provides an electronic connector comprising

a first support with first channels suitable for cables to be at least partially housed in;
a second support with second channels suitable for cables to be at least partially housed in, in such a way that the first and the second support are adapted to mechanically couple so that each first channel collaborate with one second channel to provide a lower cable housing for at least a portion of a cable;

wherein the second support further comprises

first insulating displacement connections, in turn comprising at least a cutting edge made of an electrically conductive material and located in contact with a first channel; and
a first outlet connector, being in electric connection with the first insulating displacement connections, such that the first outlet connector is in electrical connection with the cable when the cable is in the lower cable housing.

[0006] This electronic connector provides a quick and safe way of connecting two different electronic elements. The outer connector may be provided in several different ways, to fulfil the requirements imposed by particular manufacturers.

[0007] In some particular embodiments, the first outlet connector is a card edge connector.

[0008] This kind of outlet connector is easy to connect with a complementary connector, without the risk of wear by friction, or being incorrectly coupled.

[0009] In some particular embodiments, the first support is a portion of an automotive lighting device housing.

[0010] This embodiment saves space, since the first channels are located in a housing inner wall, so the rest of the electronic connector is directly coupled to this housing inner wall, without the need of using auxiliary elements that would increase the size of the connection.

[0011] In some particular embodiments, the second support further comprises third channels suitable for cables to be at least partially housed in, and wherein the electronic connector further comprising a third support, the third support comprising

fourth channels suitable for cables to be at least partially housed in, in such a way that the second support and the third support are adapted to mechanically couple so that at least part of each third channel collaborate with one fourth channel to provide an upper cable housing for at least a portion of a cable;

wherein the third support further comprises

second insulating displacement connections, in turn comprising at least a cutting edge made of an electrically conductive material and located in contact with a fourth channel; and
a second outlet connector, being in electric connection with the second insulating displacement connections, such that the second outlet connector is in electrical connection with the cable when the cable is in the upper cable housing.

[0012] This arrangement is suitable when a great amount of cables is to be connected, and there is no possibility of making the connector wider. In this embodiment, a second bundle of connecting cables may be incorporated into the connector, but at a different height level, doubling the capacity of the connector without increasing its width.

[0013] In some particular embodiments, the second outlet connector is a card edge connector and is oriented in the same direction as the first outlet connector.

[0014] The fact that the first and second connectors are oriented in the same direction allows considering them as a single connector.

[0015] In some particular embodiments, the electronic connector further comprises a connector case, which encompasses the second support and the third support.

[0016] This connector case provides structural cohesion for all the elements comprised in the connector, keeping a stable shape and protecting them from external hazards.

[0017] In some particular embodiments, the connector case comprises a first group of holes, corresponding to the first outlet connector, and a second group of holes,

corresponding to the second outlet connector. This connector may be treated as a standard one.

[0018] In some particular embodiments, the supports are made of plastics. This connector is easy and cheap to manufacture, but still reliable.

[0019] In a further inventive aspect, the invention provides a lighting device comprising

an electronic connector according to any of the preceding claims; and
a light module connected to the outlet of the electronic connector;

wherein the first support corresponds to a housing inner wall of a housing of the lighting device.

[0020] Such a lighting device provides a standard for connecting the conductive tracks in an organized and space-saving manner.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] To complete the description and in order to provide for a better understanding of the invention, a set of drawings is provided. Said drawings form an integral part of the description and illustrate an embodiment of the invention, which should not be interpreted as restricting the scope of the invention, but just as an example of how the invention can be carried out. The drawings comprise the following figures:

Figure 1 shows an electronic connector according to an embodiment of the invention.

Figure 2 shows part of an electronic connector according to a different embodiment of the present invention.

Figure 3 shows an exploded view of the complete multi-stepped connector.

Figure 4 shows an assembled view of the complete multi-stepped connector of Figure 3.

Figure 5 shows a lighting device comprising an electronic connector according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0022] Figure 1 shows an electronic connector 1 according to an embodiment of the invention. This electronic connector 1 comprises

a first support 11 with first channels 21 suitable for cables to be partially housed in;
a second support 12 with second channels 22 suitable for cables to be partially housed in, in such a way that the first 11 and the second 12 support are adapted to mechanically couple so that each first

channel 21 collaborate with one second channel 22 to provide a lower cable housing for at least a portion of a cable.

[0023] Further, the second support 12 further comprises

first insulating displacement connections 31, in turn comprising cutting edges made of an electrically conductive material and located in contact with a first channel 21; and
a first outlet connector 41, being in electric connection with the first insulating displacement connections 31.

[0024] As may be seen in this figure, the first outlet connector 41 is a card edge connector.

[0025] As a consequence, a cable installed in such an electronic connector 1 enters the connector 1 guided by one of the first channels 21, and then, when arriving at the second support 12, it is housed by the combination of one first channel 21 and the corresponding second channel 22. At this moment, it is cut by the cutting edge of a first insulating displacement connection 31, so that an electrical connection is established between the cable and the first outlet connector 41.

[0026] Fig 2 shows a connector like the one shown in Figure 1, but having a different second support 12. In this case, the second support has the first outlet connector 41 oriented in a different direction. Further, the second support 12 comprises third channels 23 suitable for cables to be housed in. These third channels 23 will be useful in the event that additional cables are installed in the electrical connector 1.

[0027] Figure 3 shows a connector like the one shown in Figure 2, but with further elements.

[0028] This electronic connector 1 further comprises a third support 13, the third support 13 comprising

fourth channels 24 suitable for cables to be housed in, in such a way that the second support 12 and the third support 13 are adapted to mechanically couple so that at least part of each third channel 23 collaborate with one fourth channel 24 to provide housing for at least a portion of a cable;

wherein the third support 13 further comprises

second insulating displacement connections 32, in turn comprising cutting edges made of an electrically conductive material and located in contact with a fourth channel 24; and
a second outlet connector 42, being in electric connection with the second insulating displacement connections 32.

[0029] The second outlet connector 42 is a card edge connector and is oriented in the same direction as the

first outlet connector 41.

[0030] This electronic connector is able to manage a greater amount of cables. A group of cables may be managed by the first support 11, as in the case of figures 1 and 2. This group of cables are housed by the first 21 and second 22 channels, and are in electrical connection with a first outlet connector 41.

[0031] But a second group of cables may also be managed. This second group of cables may approach the second support 12 and lean on the third channels 23. The third support 13, encompass this second group of cables with its fourth channels 24, so that they are isolated from the first group of cables. The electric connection is established by the second insulating displacement connections 32 located in the fourth channels 24, so that different connections may be established between this second group of cables and the second outlet connector, which is in electrical connections with the cutting edges of the second insulating displacement connections 32.

[0032] Further, the electronic connector 1 comprises a connector case 2, which encompasses the second support 12 and the third support 13.

[0033] The connector case 2 comprises a first group of holes 3, corresponding to the first outlet connector 41, and a second group of holes 4, corresponding to the second outlet connector 42.

[0034] Figure 4 shows an assembled connector like the one shown in Figure 3. A pair of first conductive tracks 71 enters the connector in the housing formed by the first channels and the second channels. These first conductive tracks 71 are cut by the first insulating displacement connections (not seen in this figure) provided in the second support 12.

[0035] Further, a pair of second conductive tracks 72 enters the connector in the housing formed by the third channels and the fourth channels. These second conductive tracks 72 are cut by the second insulating displacement connections 32 provided in the third support 13.

[0036] Figure 5 shows a lighting device which comprises such a connector. This lighting device comprises a housing 5 with a housing inner wall 51, so that a portion of the housing inner wall corresponds to the first support of an electronic connector as shown in previous figures.

[0037] This lighting device 10 further comprises an electronic connector 1 and a light module 6 connected to the outlet connectors 41, 42 of the electronic connector 1.

Claims

1. Electronic connector (1) comprising

a first support (11) with first channels (21) suitable for cables to be at least partially housed in; a second support (12) with second channels (22) suitable for cables to be at least partially housed

in, in such a way that the first (11) and the second (12) support are adapted to mechanically couple so that each first channel (21) collaborate with one second channel (22) to provide a lower cable housing for at least a portion of a cable;

wherein the second support (12) further comprises

first insulating displacement connections (31), in turn comprising at least a cutting edge made of an electrically conductive material and located in contact with a first channel (21); and a first outlet connector (41), being in electric connection with the first insulating displacement connections (31), such that the first outlet connector (41) is in electrical connection with the cable when the cable is in the lower cable housing.

2. Electronic connector (1) according to claim 1, wherein the first outlet connector (41) is a card edge connector.

3. Electronic connector (1) according to any of the preceding claims, wherein the first support (11) is a portion of an automotive lighting device housing.

4. Electronic connector (1) according to any of the preceding claims, wherein the second support (12) further comprises third channels (23) suitable for cables to be at least partially housed in, and wherein the electronic connector further comprising a third support (13), the third support (13) comprising

fourth channels (24) suitable for cables to be at least partially housed in, in such a way that the second support (12) and the third support (13) are adapted to mechanically couple so that at least part of each third channel (23) collaborate with one fourth channel (24) to provide an upper cable housing for at least a portion of a cable;

wherein the third support (13) further comprises

second insulating displacement connections (32), in turn comprising at least a cutting edge made of an electrically conductive material and located in contact with a fourth channel (24); and a second outlet connector (42), being in electric connection with the second insulating displacement connections (32), such that the second outlet connector (42) is in electrical connection with the cable when the cable is in the upper cable housing.

5. Electronic connector (1) according to claim 4, wherein the second outlet connector (42) is a card edge connector and is oriented in the same direction as

the first outlet connector.

6. Electronic connector (1) according to any of claims 4 or 5, further comprising a connector case (2), which encompasses the second support (12) and the third support (13). 5
7. Electronic connector (1) according to claim 6, wherein the connector case (2) comprises a first group of holes (3), corresponding to the first outlet connector (41), and a second group of holes (4), corresponding to the second outlet connector (42). 10
8. Electronic connector (1) according to any of the preceding claims, wherein the supports (11, 12, 13) are made of plastics. 15
9. Lighting device (10) comprising
- an electronic connector (1) according to any of the preceding claims; and 20
- a light module (6) connected to the outlet connectors (41, 42) of the electronic connector (1);
- wherein the first support (11) corresponds to a housing inner wall (51) of a housing (5) of the lighting device (10). 25

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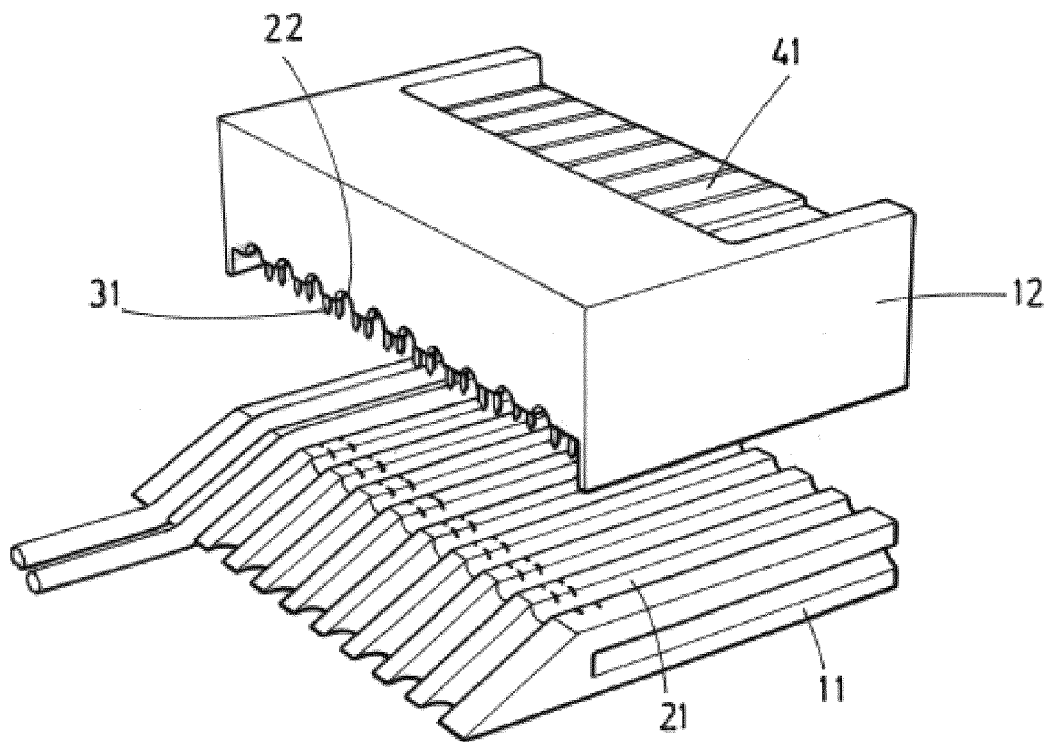


FIG.1

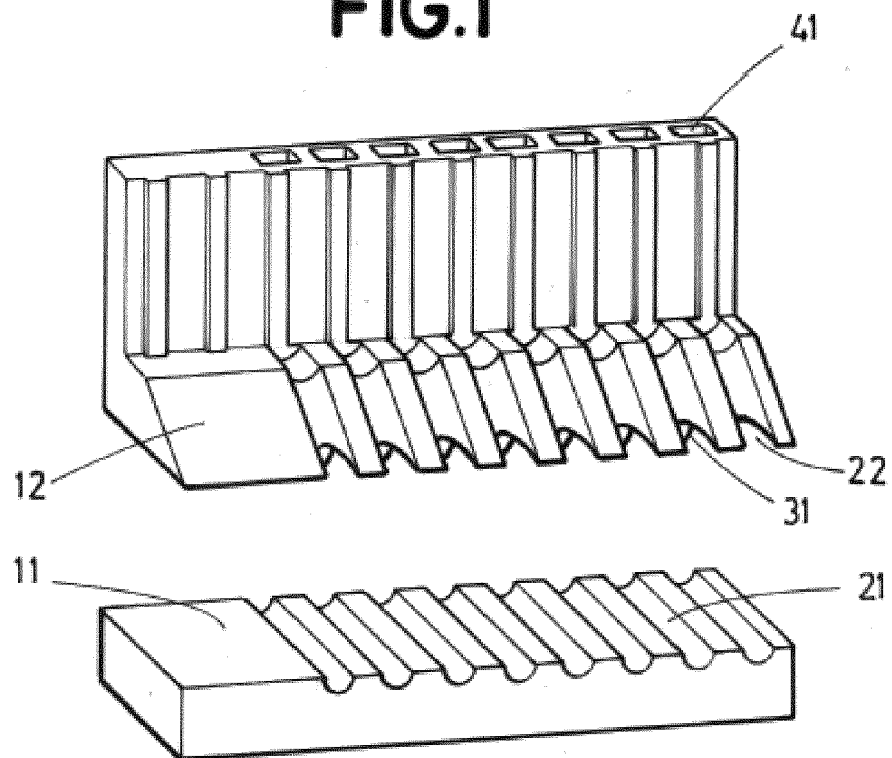
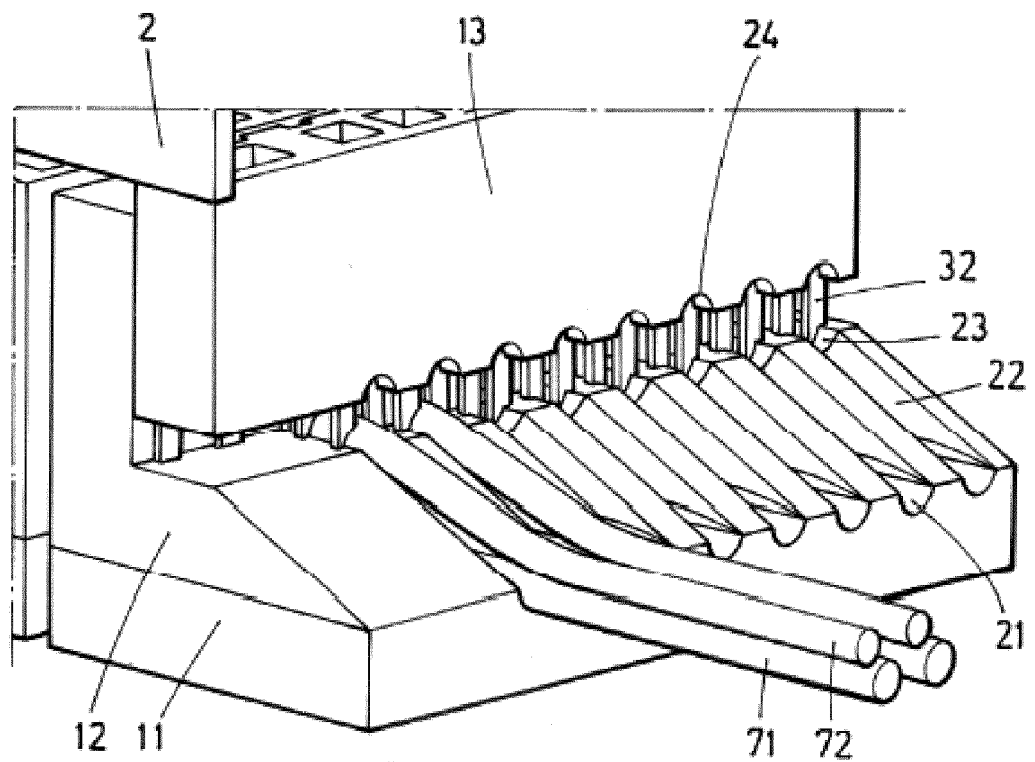
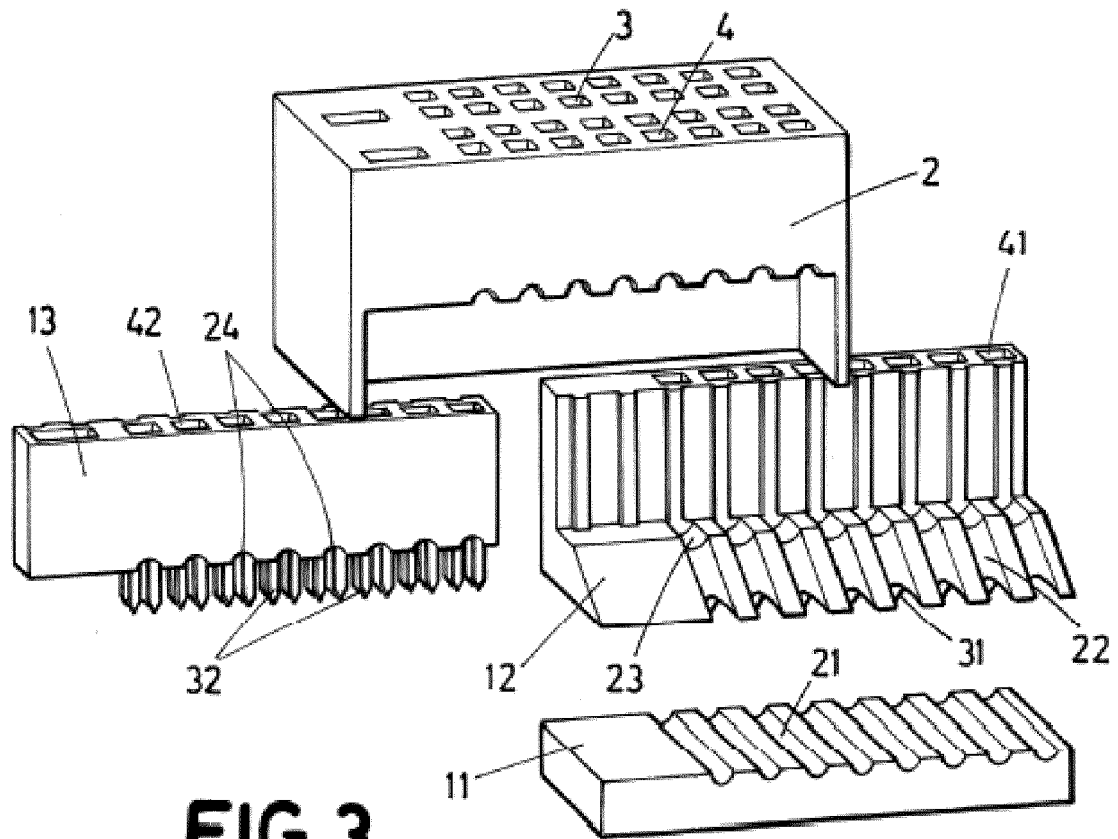


FIG.2



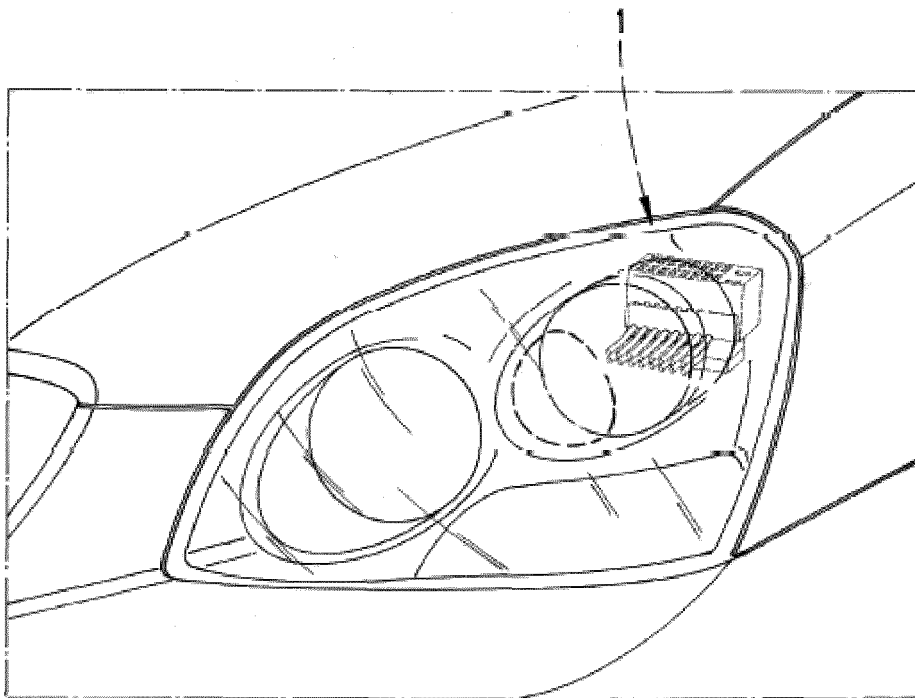


FIG.5



EUROPEAN SEARCH REPORT

Application Number
EP 17 38 2506

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 932 892 A (HATCH DAVID [US]) 12 June 1990 (1990-06-12) * the whole document * -----	1-9	INV. H01R4/24 F21V23/06 H01R12/61 H01R12/67 H01R13/506 F21S8/10
			TECHNICAL FIELDS SEARCHED (IPC)
			F21V H01R F21S
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 October 2017	Examiner Henrich, Jean-Pascal
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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 38 2506

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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18-10-2017

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	US 4932892	A	12-06-1990	NONE
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