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(54) **Title**: VEHICLE DIAGNOSTIC PORT ADAPTOR

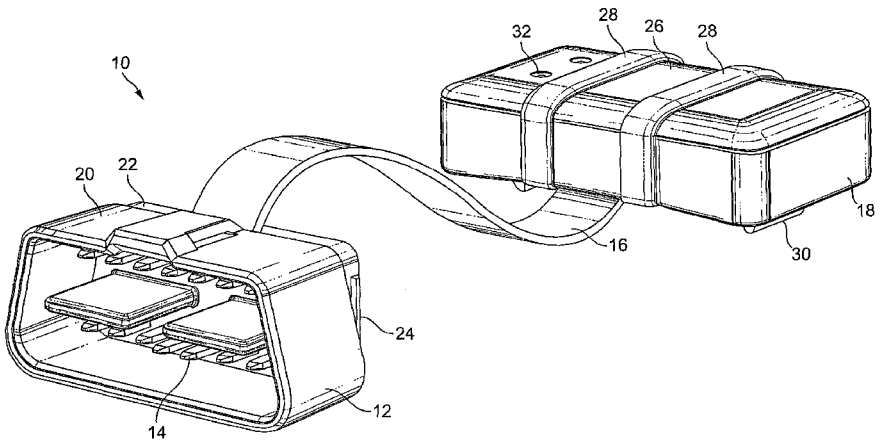

FIG. 1

(57) **Abstract**: A vehicle diagnostics port adaptor 10 has a connector housing 12 that can be connected to a vehicle's On-Board Diagnostics (OBD) port to obtain engine data and a transmitter housing 18 by means of which the engine data can be transferred for processing. The connector and transmitter housings 12, 18 are separable from each other and are joined by a flat data cable 16. If the OBD port is located in a coverable recess in the vehicle, the connector housing 12 fits within the recess so that the recess can be covered. The data cable 16 can be trailed out of the covered recess and the transmitter housing 18 can be conveniently located so as to minimise any interference with driving.

VEHICLE DIAGNOSTICS PORT ADAPTOR

The present invention relates to a vehicle diagnostics port adaptor.

Many modern vehicles such as cars, vans and heavy goods vehicles (HGVs) are fitted with an electronic control unit that monitors engine performance. The unit is generally referred to herein as an Engine Control Unit (ECU), but it is sometimes referred to as a Power-train Control Module (PCM) or an Engine Control Module (ECM). ECU data can be accessed for analysis by means of an On-Board Diagnostics (OBD) port located within the vehicle. There are several specifications of OBD port, one of which is OBD-II.

ECU data can be analysed by a specialist, for example during a service or if the vehicle develops a fault, to get a better understanding of the engine characteristics of the vehicle. Engine emissions can also be modelled using data obtained from the OBD port. More recently, ECU data has been used to monitor engine parameters while the vehicle is being driven, to provide real-time visual feedback to the driver.

It is generally desirable to minimise, or at least carefully control, any distraction to or interference with the driver while they are driving. The present invention is set against this backdrop.

According to a first aspect of the invention, there is provided a vehicle diagnostics port adaptor, comprising a connector housing comprising a connector that is connectable to a vehicle diagnostics port, a transmitter housing comprising a data transmitter, and a data cable arranged to permit data flow between the adaptor housing and the transmitter housing, wherein the connector housing is separable from the transmitter housing. Preferably, the connector housing is connectable to a vehicle On-Board Diagnostics (OBD) port.

Conventional OBD port adaptors are relatively large and easy to handle since they are generally only used for diagnostics and analysis purposes when the vehicle is

stationary and not when it is being driven. Conventional adaptors might, however, distract a driver when driving. For example, a conventional adaptor may obstruct driving to some extent if the vehicle's OBD port is located in the footwell. It can also interfere with driving if the conventional adaptor is plugged into an OBD port which is located adjacent to the gearstick. By providing a customised adaptor which has separable connection and transmitter housings and the data cable, the relative positions of the two housings can be chosen so as to minimise any interference with driving. Indeed, it may not be necessary to reduce the size of any of the standard individual components of conventional adaptors to reduce the overall size of the adaptor, which could in itself be costly.

The connector housing may comprise a recessed OBD connector part arranged to receive data from a vehicle OBD port and a data transfer part for transferring engine data from the OBD port to the transmitter housing, wherein the height of the data transfer part is less than that of the connector part. This provides a physically compact connector housing which can minimise driver interference.

The connector housing may be less than 20mm in height. More preferably, the connector housing is less than 19mm in height. Even more preferably, the connector housing is less than 18mm in height. Yet more preferably still, the connector housing is less than 17mm in height. The smaller connector housings are less likely to interfere with driving. These heights are particularly advantageous when the adaptor is connected to an OBD port located in a coverable recess in a vehicle.

The transmitter housing may comprise a wireless transmitter. Preferably, the wireless transmitter comprises a Bluetooth™ transmitter. The wireless transmitter increases flexibility in terms of the location of the transmitter housing and, again, minimises the risk of any physical interference with driving by not requiring a physical connection. Bluetooth™ is a particularly suitable form of transmitter.

The transmitter housing may comprise a physical connection operable to transmit data.

The data cable may be substantially flat. Flat cables are particularly advantageous when the vehicle OBD port is located in a coverable recess. A flat cable is also beneficial in terms of tidiness and storage space when the adaptor is stored.

The connector housing and transmitter housing may comprise attachment members so that the connector housing and transmitter housing can be releasably secured together. The attachment members allow the adaptor to be neatly stacked either when in use or when being stored.

The transmitter housing may comprise at least one attachment clip and the connector housing may comprise at least one attachment wing which can be secured in the attachment clip. Preferably, the at least one attachment clip is adapted to receive a cable tie by means of which the transmitter housing can be secured to a vehicle. The clip and wing attachments are particularly convenient, secure and consistent attachment members. Two attachment clips and wings can provide a more secure attachment mechanism. The clip can be adapted to receive a standard cable tie, piece of string or the like which can be used to fix the transmitter housing to part of a vehicle.

Preferably, when the connector housing and transmitter housing are secured together, the data cable wraps around at least part of the connector housing and/or or the transmitter housing with substantially no slack. With such a data cable, the adaptor can be neatly stacked, either when in use or when it is being stored.

The data cable may be separable from one or both of the transmitter housing and the connector housing. This increases the convenience and flexibility of the adaptor.

A vehicle may comprise a vehicle diagnostics port and such an adaptor connected to the port. The vehicle diagnostics port may be located in a coverable recess and the connector housing may not protrude out of the recess when the recess is uncovered. The recess may be substantially covered by a recess cover. In cases in which the OBD port is located within a coverable recess, larger conventional adaptors can

protrude out of the recess in such a way that it is not possible to cover the recess. In a more general sense, a larger adaptor within eyeshot when driving might simply be unsightly. By having a separable connector housing and transmitter housing, these concerns can be mitigated or at least reduced.

The present invention will now be described, by way of example only, with reference to the accompanying drawings in which:

FIGs. 1 to 4 are a perspective, left (side), front and plan views of a customised adaptor in the unstacked (or extended) state; and

FIGs. 5 to 8 are perspective, left (side), front and plan views of the customised adaptor of FIGs. 1 to 4 in the stacked (or stowed) state.

FIGs. 1 to 4 show a vehicle diagnostics port adaptor 10 in its operational, extended state. The adaptor has a connector housing 12 having internal male connection pins 14 which are arranged to mate with corresponding female pins in a vehicle's On-Board Diagnostics (OBD) port (not shown). A data cable 16 in the form of a flat and flexible fly lead carries engine data from the connector housing to a separate transmitter housing 18. A wireless transmitter (not visible) in the transmitter housing 18 transfers engine data wirelessly to another unit, such as a smart phone or dedicated display unit (not shown), for further processing.

The connector housing 12 has a lower recessed part 20 that is substantially the same height as, and connects with, the vehicle OBD port. The connector housing includes an upper, data transfer part 22 that is significantly smaller in height than the recessed part 20. As such, the connector housing 12 has substantially the same overall height as the OBD port. The data transfer part 22 accommodates the data cable 16 so that data can be transferred from the connector housing 12 to the transmitter housing 18. The data transfer part 22 has two lateral (or transverse) wings 24 which can be used as part of an attachment mechanism to secure the connector housing 12 to the transmitter housing 18 in a releasable manner, as will be described below.

The transmitter housing 18 is formed of a lozenge-shaped shell and defines an internal hollow cavity. A cable guide 26 defined by two parallel longitudinal ridges 28 is provided on the surface of the transmitter housing 18. Two lateral attachment clips 30 in the form of hooks, clips or loops are provided on the underside of the transmitter housing 18 and are arranged to cooperate with the wings 24 of the connector housing 12 to secure the adaptor 10 together. The loops 30 can also receive a standard cable tie, by means of which the transmitter housing 18 can be secured to the vehicle.

A printed circuit board (PCB) (not visible) provided within the cavity controls overall operation of the adaptor 10. The PCB is in communication with the wireless data transmitter (not visible), which, in this example, is a Bluetooth™ transmitter.

Two LEDs 32, one green and one blue, are provided on the upper surface of the transmitter housing 18. The LEDs 32 denote several different operating modes of the adaptor 10 as exemplified in the following table:

Green LED	**Blue LED**	**Operating mode**
On	-	Power is on
On	On	Bluetooth™ device found and connected to
On	Flashing	Bluetooth™ device found and trying to connect
On	Off	No devices found and not connected
Flashing	Off	Adaptor 10 is in standby mode
Off	Off	Adaptor 10 has no power

It will be appreciated that the above description of the LEDs 32 provides merely one possible configuration.

The flexible fly lead 16 allows engine data to be transferred from the ECU via the connector housing 12 to the transmitter housing 18.

FIGs. 5 to 8 show the adaptor 10 in the stacked or secured state. The adaptor 10 can be stacked for storage and/or during use as desired. In the stacked state, the fly lead 16 is neatly wrapped around the transmitter housing 18 using the cable guide 26, 28. The length of the fly lead 16 is such that the connector housing 12 can complete one or several orbit(s) around the transmitter housing 18 so that it can be stacked and, when stacked, there is negligible slack on the fly lead 16 so that the adaptor 10 is neatly secured. In the stacked configuration, the wings 24 on the connector housing 12 cooperate with their corresponding clips 30 on the transmitter housing 18 to secure the adaptor 10.

The dimension of the adaptor 10 can be chosen to meet individual requirements. For example, the dimensions of the adaptor 10 may need to be smaller for some vehicles than others and may need to be larger if additional components, such as memory, are required or if a larger PCB is used.

In one particularly convenient example, the overall height of the adaptor 10 when stacked is 31.5mm, its maximum width is 45mm and its maximum depth is 26mm. The height of the connector housing 12 is 16mm and the height of the transmitter housing 18 is 15.5mm.

An adaptor 10 of these exemplary dimensions would be ideal for a car having its OBD port located in a coverable recess, the depth of which is not much greater than the height of the OBD port. In this case, the height of the connector housing 12 is only slightly greater than the height of the OBD port and, as such, does not protrude from the recess in such a way as to inhibit or prohibit covering of the recess. The transmitter housing 18 can be conveniently located adjacent to the recess. Since the data cable 16 is substantially flat, although it might obstruct closure of the recess to some extent, it should still be possible to cover the recess securely. Alternatively, a small opening for the cable 16 can be made in the recess cover if desired. Since the

recess can be covered even when the adaptor 10 is connected to the OBD port, the risk of misplacing the recess cover is minimised and the aesthetic appearance of the OBD port area is not significantly affected.

Although example embodiments have been described above, various modifications will be apparent.

For example, although the transmitter housing 18 can comprise a wireless transmitter to transfer engine data to a separate device, the transmitter housing may, instead, have a physical connector such as a Universal Serial Bus (USB) port.

Furthermore, although the data cable 16 can be permanently connected to both the connector housing 12 and the transmitter housing 18, it could be releasable from either or both. For example, the data cable 16 can be detachable from the transmitter housing 18 so that the transmitter housing 18 can be removed from the vehicle while the connector housing 12 remains installed to the OBD port. This can be convenient if the OBD port is located in a relatively inaccessible part of the vehicle.

It is also envisaged that the adaptor 10 could perform as a data logger, by which engine data is recorded during a journey and is then transferred to a separate device after the journey.

CLAIMS:

1. A vehicle diagnostics port adaptor, comprising:

a connector housing comprising a connector that is connectable to a vehicle diagnostics port;

a transmitter housing comprising a data transmitter; and

a data cable arranged to permit data flow between the adaptor housing and the transmitter housing; and

wherein the connector housing and the transmitter housing are arranged to allow physical separation whilst maintaining communication.

2. An adaptor according to claim 1, wherein the connector housing is connectable to a vehicle On-Board Diagnostics (OBD) port.

3. An adaptor according to claim 1 or 2, wherein the connector housing comprises a recessed OBD connector part arranged to receive data from a vehicle OBD port and a data transfer part for transferring engine data from the OBD port to the transmitter housing, wherein the height of the data transfer part is less than that of the connector part.

4. An adaptor according to any preceding claim, wherein the connector housing is less than 20mm in height.

5. An adaptor according to claim 4, wherein the connector housing is less than 19mm in height.

6. An adaptor according to claim 5, wherein the connector housing is less than 18mm in height

7. An adaptor according to claim 6, wherein the connector housing is less than 17mm in height.

8. An adaptor according to any preceding claim, wherein the transmitter housing comprises a wireless transmitter.

9. An adaptor according to claim 8, wherein the wireless transmitter uses frequencies in the range between 2400 and 2480 MHz.

10. An adaptor according to any preceding claim, wherein the transmitter housing comprises a physical connection operable to transmit data.

11. An adaptor according to any preceding claim, wherein the data cable is substantially flat.

12. An adaptor according to any preceding claim, wherein the connector housing and transmitter housing comprise attachment members so that the connector housing and transmitter housing can be releasably secured together.

13. An adaptor according to claim 12, wherein the transmitter housing comprises at least one attachment clip and the connector housing comprises at least one attachment wing which can be secured in the attachment clip.

14. An adaptor according to claim 13, wherein the at least one attachment clip is adapted to receive a cable tie by means of which the transmitter housing can be secured to a vehicle.

15. An adaptor according to any of claims 12 to 14, wherein, when the connector housing and transmitter housing are secured together, the data cable wraps around at least part of the connector housing and/or or the transmitter housing with substantially no slack.

16. An adaptor according to any preceding claim wherein the data cable is detachable from one or both of the transmitter housing and the connector housing.

17. A vehicle comprising a vehicle diagnostics port and an adaptor according to any preceding claim connected to the port.

18. A vehicle according to claim 17, wherein the vehicle diagnostics port is located in a coverable recess and wherein the connector housing does not protrude out of the recess when the recess is uncovered.

19. A vehicle according to claim 18, wherein the recess is substantially covered by a recess cover.

20. An adaptor substantially as hereinbefore described, with reference to the accompanying drawings.

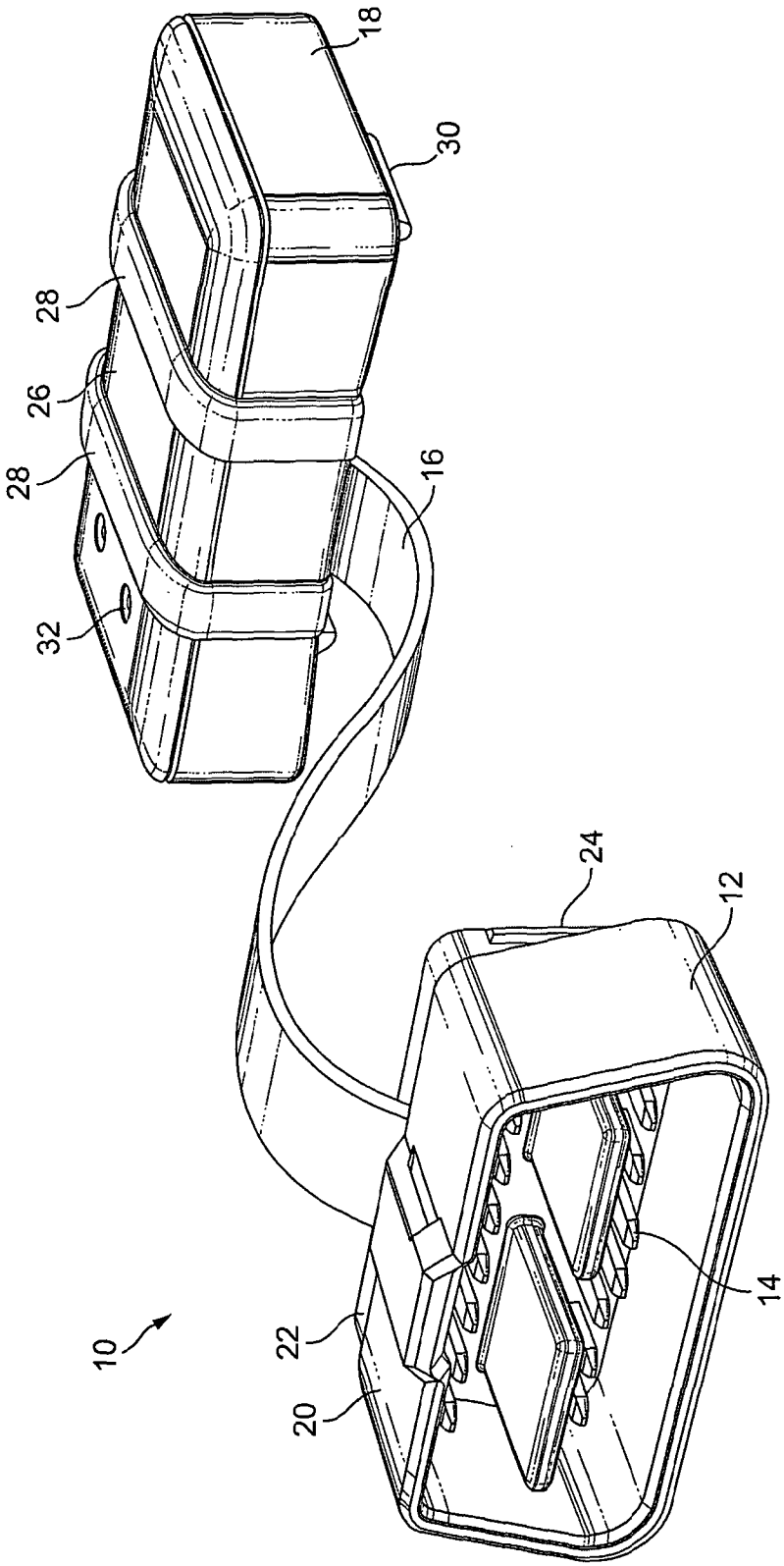

FIG. 1

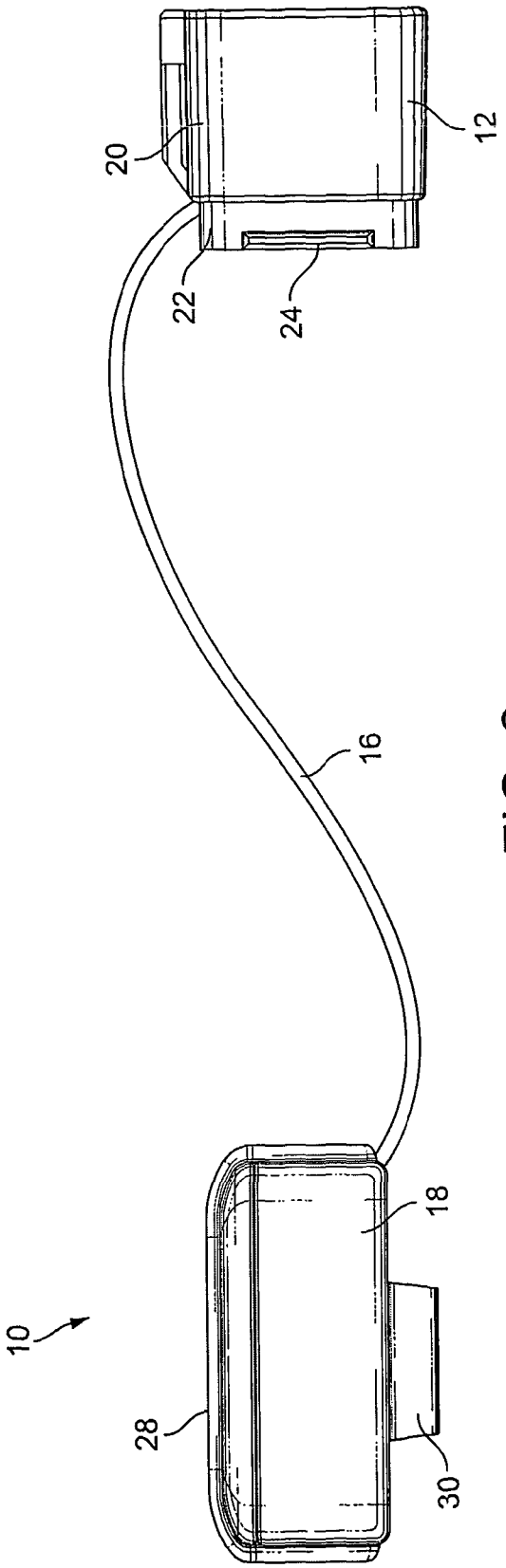

FIG. 2

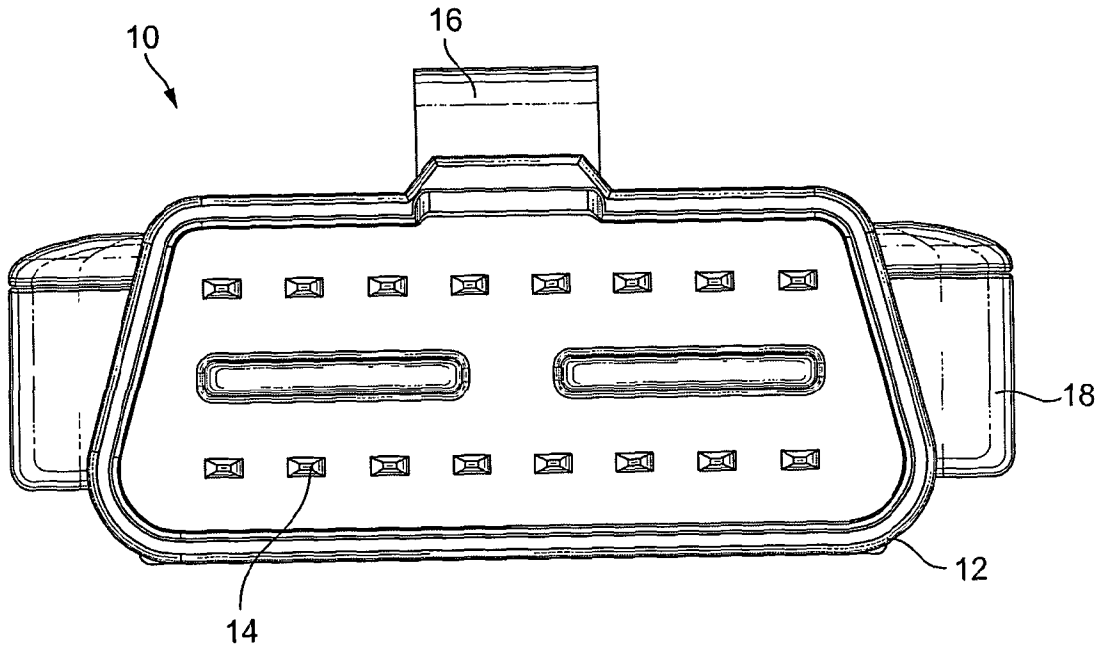

FIG. 3

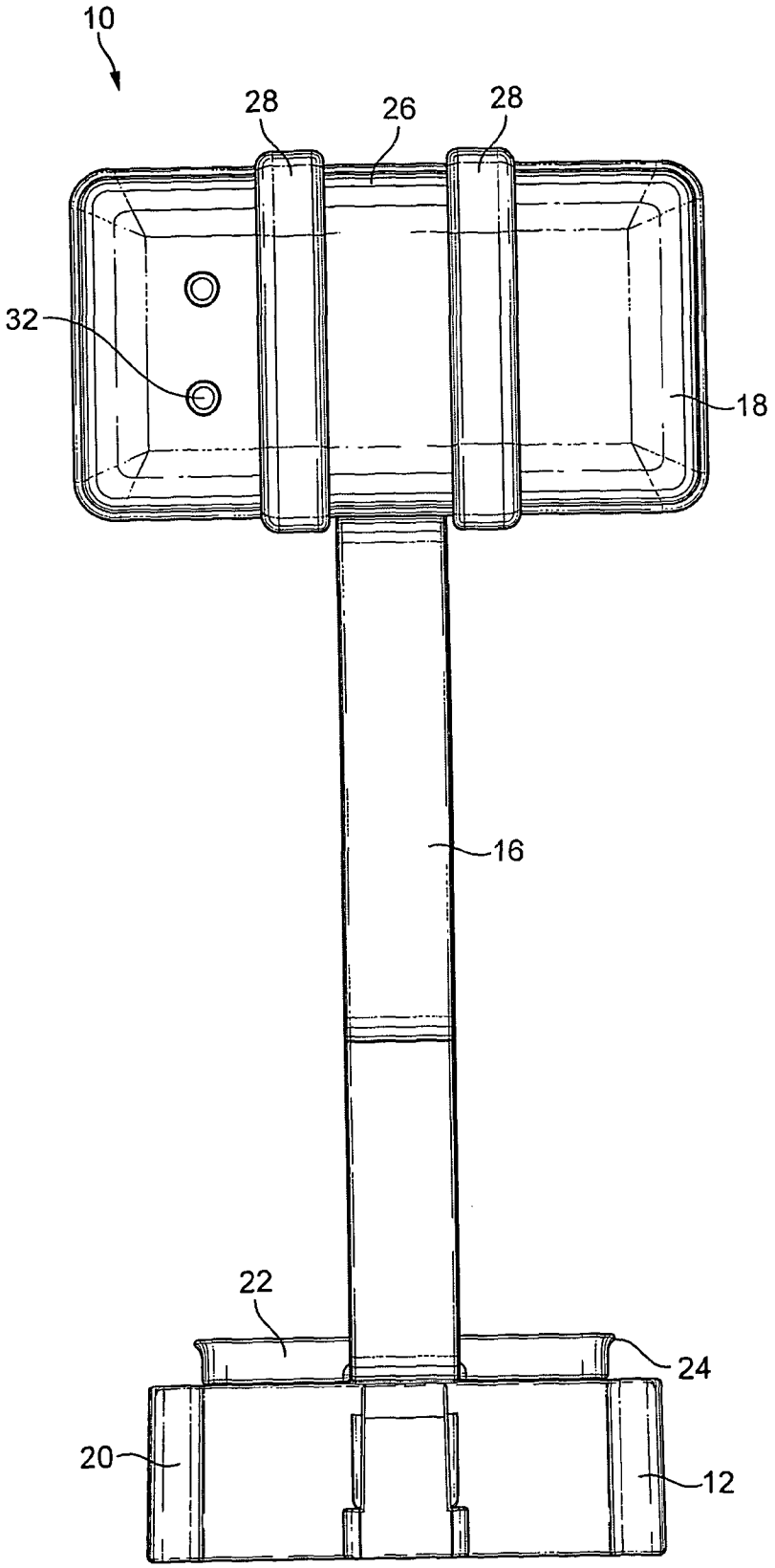

FIG. 4

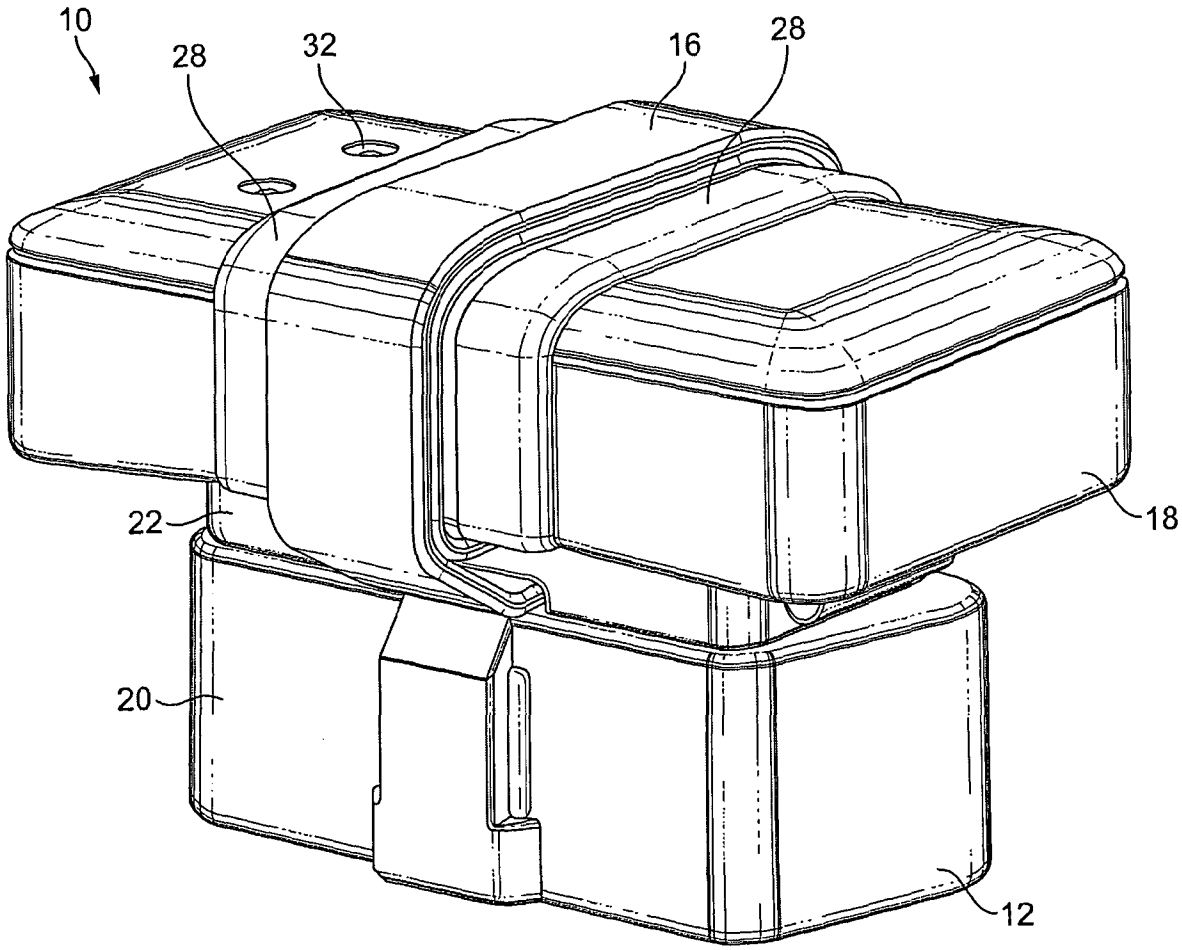

FIG. 5

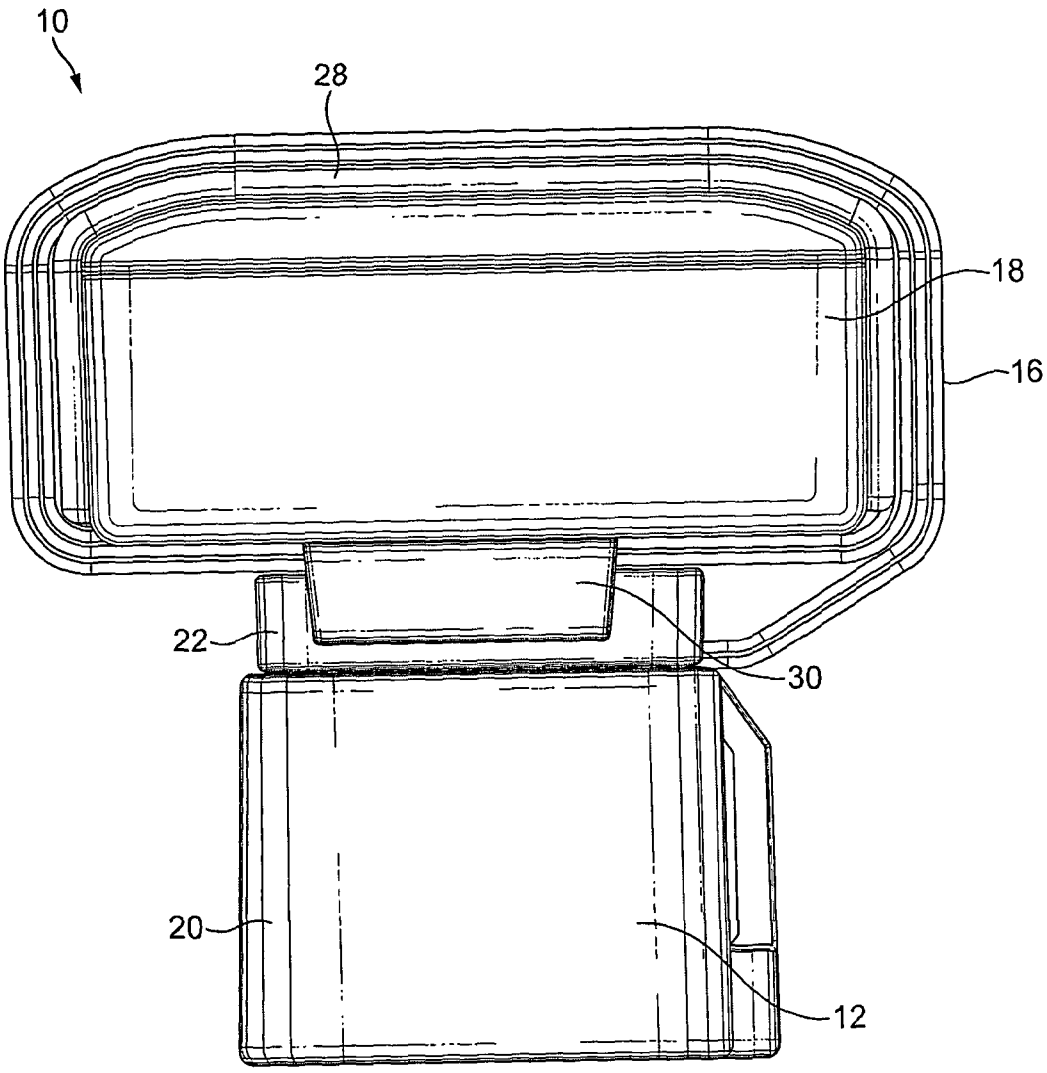

FIG. 6

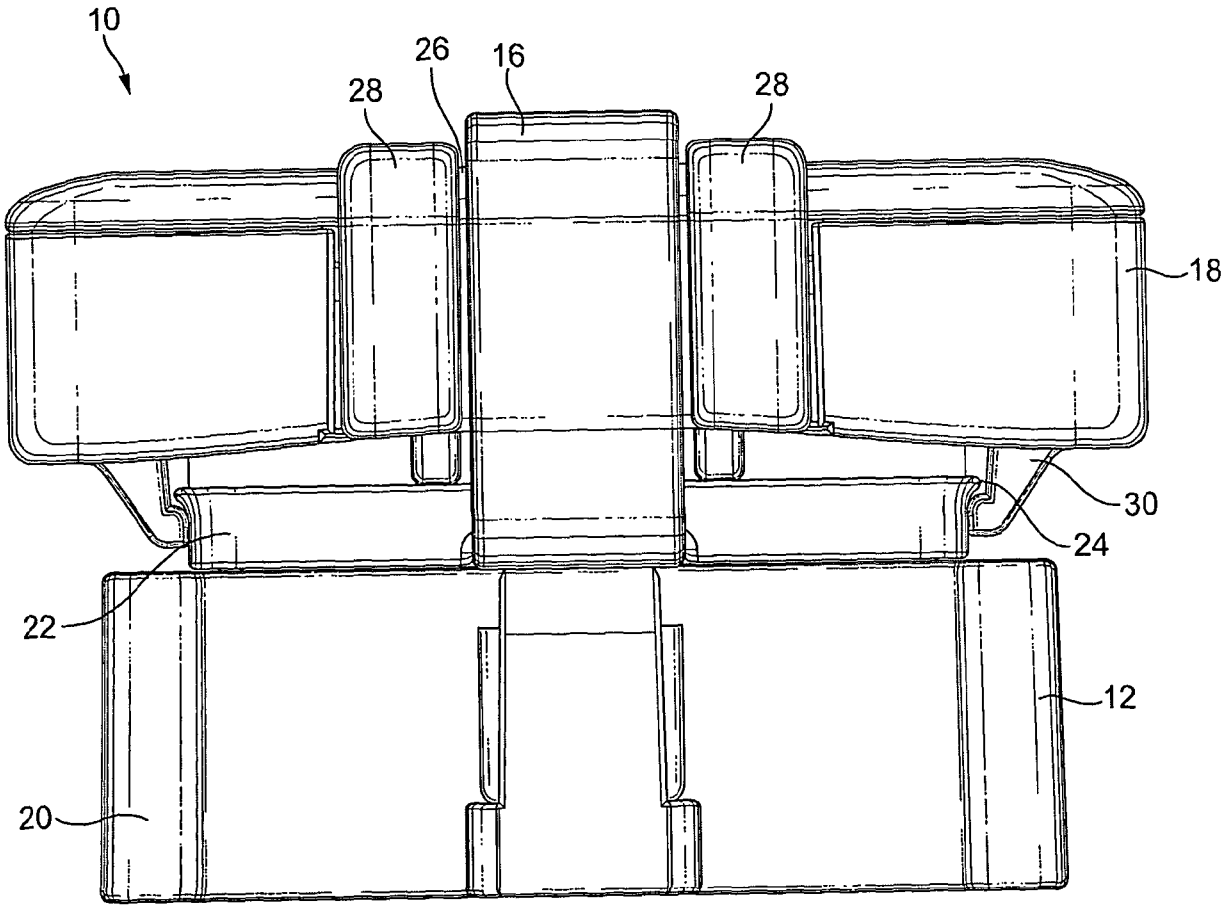

FIG. 7

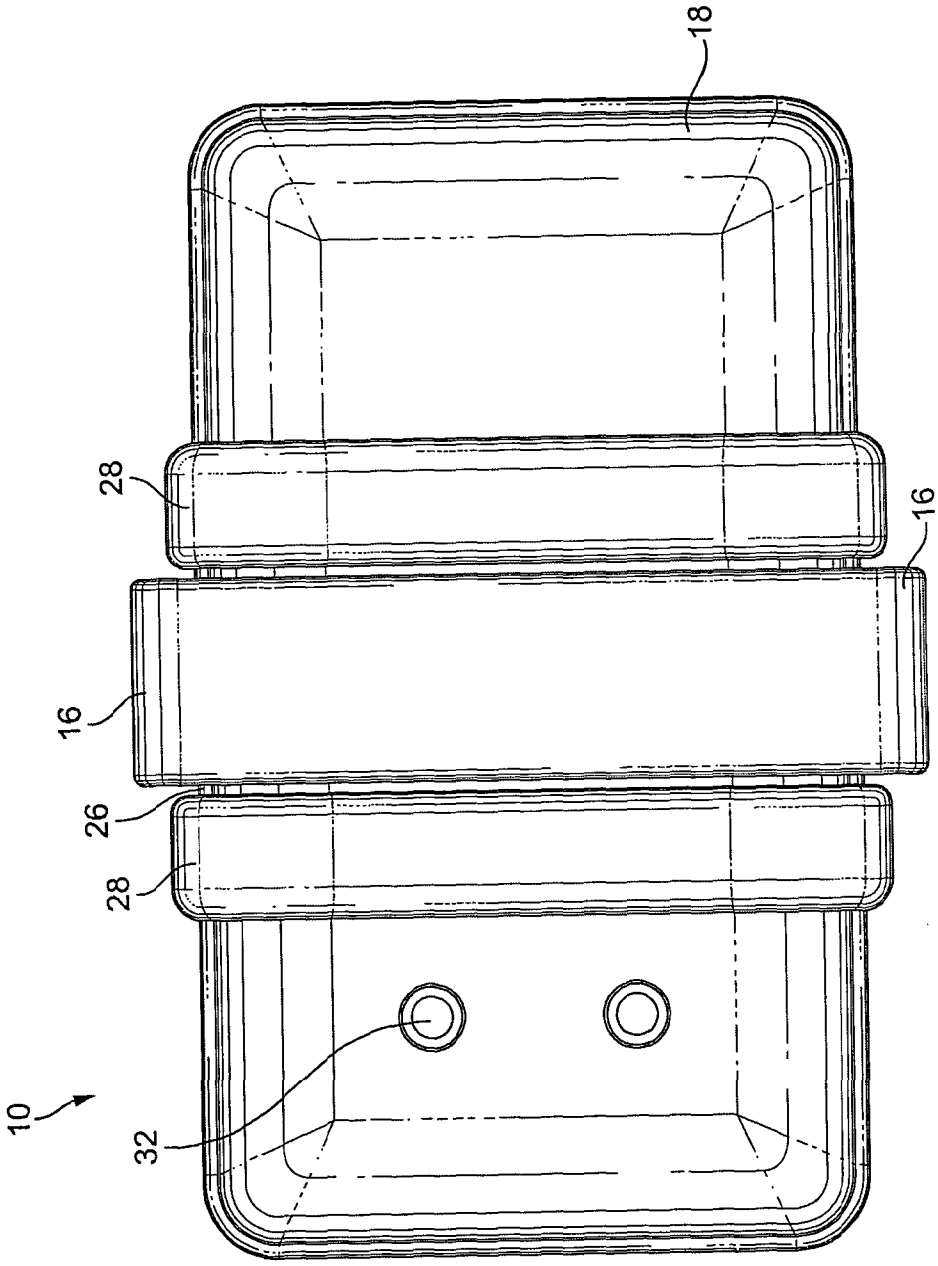

FIG. 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2011/051742

A. CLASSIFICATION OF SUBJECT MATTER
INV. G07C5/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G07C H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 7 225 065 B1 (HUNT ROBERT [US] ET AL) 29 May 2007 (2007-05-29) column 6, line 12 - column 9, line 20 column 10, line 30 - line 46 column 11, line 47 - line 53 figures 1-3,6 -----	1-11,14, 16-19 12,13,15
X	US 2009/276115 A1 (CHEN IEON C [US]) 5 November 2009 (2009-11-05) page 3, paragraph 33 - paragraph 34 page 3, paragraph 38 - paragraph 39 page 6, paragraph 75 - page 7, paragraph 76 figures 1,3,7 -----	1,2, 8-10,16, 17

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 November 2011	22/11/2011

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Van der Haegen, D

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2011/051742

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 7 620 484 B1 (CHEN IEON C [US]) 17 November 2009 (2009-11-17) column 2, line 33 - column 3, line 6 column 3, line 36 - column 4, line 5 figures 2a-b,3	1,2,8, 10,16,17 15
Y	US 2005/255743 A1 (LIN HSUEH-LAN [TW]) 17 November 2005 (2005-11-17) figures 3a-8c	12,13
A	US 2010/105241 A1 (BERKOBIN ERIC [US] ET AL) 29 April 2010 (2010-04-29) page 2, paragraph 28	4-7
A	US 2006/041348 A1 (LIEBL TROY [US] ET AL) 23 February 2006 (2006-02-23) page 2, paragraph 19 - page 4, paragraph 31 figures 1,3	1,2, 8-10,15, 17
A	WO 2004/040405 A2 (DAVIS INSTR CORP [US]) 13 May 2004 (2004-05-13) figures 3a-b	18,19

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2011/051742

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 7225065 B1	29-05-2007	US 7225065 B1	29-05-2007
		US 7447574 B1	04-11-2008
		US 7596437 B1	29-09-2009
		US 7672763 B1	02-03-2010
		US 7778752 B1	17-08-2010
		US 2011166742 A1	07-07-2011
US 2009276115 A1	05-11-2009	NONE	
US 7620484 B1	17-11-2009	NONE	
US 2005255743 A1	17-11-2005	FR 2870399 A1	18-11-2005
		GB 2414118 A	16-11-2005
		TW I236183 B	11-07-2005
		US 2005255743 A1	17-11-2005
		US 2007134977 A1	14-06-2007
US 2010105241 A1	29-04-2010	NONE	
US 2006041348 A1	23-02-2006	CA 2516361 A1	19-02-2006
		US 2006041348 A1	23-02-2006
		US 2006041349 A1	23-02-2006
		US 2011015822 A1	20-01-2011
WO 2004040405 A2	13-05-2004	AU 2003282831 A1	25-05-2004
		CA 2494350 A1	13-05-2004
		US 2004083041 A1	29-04-2004
		US 2005096809 A1	05-05-2005
		WO 2004040405 A2	13-05-2004