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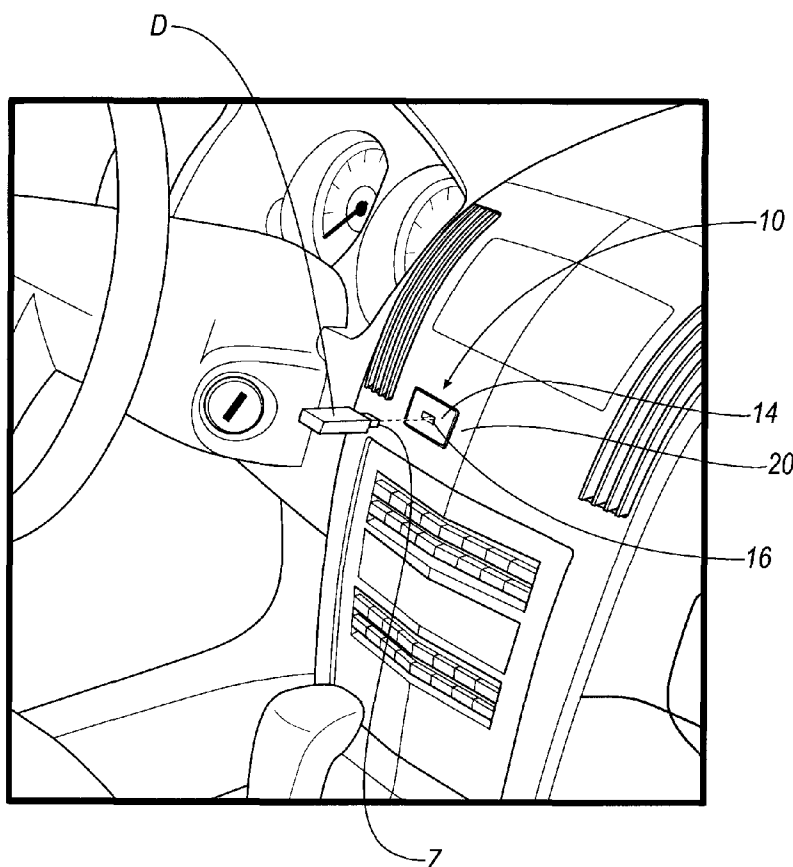
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(54) Title: VEHICULAR DATA PORT HAVING MOVABLE FACEPLATE FOR PROTECTED CONNECTION WITH A DATA DEVICE



(57) Abstract: A vehicular data port for a data device comprising a housing comprising a surface selected from the group consisting of a vehicular console, a vehicular panel, and a vehicular steering column, said housing having sidewalls that define a cavity that terminate at an opening, a communication member provided within said cavity, said communication member including one or more electrically conductive channels to facilitate connection with the data device, wherein said housing includes a faceplate movably disposed within said cavity.



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**VEHICULAR DATA PORT HAVING MOVABLE FACEPLATE FOR
PROTECTED CONNECTION WITH A DATA DEVICE**

Background

Portable input/output memory devices (“portable data storage devices”) are known. An example of a data storage device, among others, includes memory that can be indexed by a controller for accessing the data stored on the memory. Some in the art continually strive to reduce the package size, increase the storage capacity, and increase the speed at which the data is transferred therefrom or thereto. Data storage devices are connected to a system that communicates, upon receiving instructions from a controller, with the memory stored on the storage device. It is appreciated that the controller may reside within the storage device or remotely therefrom, such as on the system.

One example of such a data storage device interfaces with a system via a universal serial bus (“USB”). In the non-wireless format, typically, data connectors (e.g., USB connectors) are used to physically connect the data storage device to a connector port resident on a system (e.g., USB port). USB data storage devices are used for convenience as they are portable, are standardized and can include non-volatile memory. It will also be appreciated that the data storage device can include a system having a processor. It is also recognized that data storage devices can be provided singly or in combination with other electronic means such as a music player, a camera, a voice recorder and the like.

Although adequate for most applications, the connection between the data connector and the connector port may be lost or damaged if, for example, the data connector (and/or the data storage device) experiences undesirable forces.

Accordingly, there is a need in the art to provide an improved data port that reduces the susceptibility of undesirable forces that may be experienced when, for example, the data connector is connected to the data port.

Brief Description of the Drawings

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

Figure 1 depicts a data port positioned within a vehicle in accordance with an embodiment of the invention;

Figure 2A is an exploded view of a data port according to an embodiment of the invention;

Figure 2B is an exploded view of a data port according to an embodiment of the invention;

Figure 3A is a cross-sectional view of the data port of Figure 2 in a first position according to an embodiment;

Figure 3B is a cross-sectional view of the data port of Figure 2 in a second position according to an embodiment.

Figure 4A is a cross-sectional view of a data port in a first position according to an embodiment;

Figure 4B is a cross-sectional view of a data port in a second position according to an embodiment;

Figure 5A is a cross-sectional view of a data port in a first position according to an embodiment;

Figure 5B is a cross-sectional view of a data port in a second position according to an embodiment;

Figure 6A is a cross-sectional view of a data port according to an embodiment;

Figure 6B is a cross-sectional view of a data port according to an embodiment;

Figure 6C is a cross-sectional view of a data port according to an embodiment;

Figure 7A is a cross-sectional view of a data port according to an embodiment;
and

Figure 7B is a cross-sectional view of a data port according to an embodiment.

Description

Representative and exemplary embodiments of a multi-positional vehicular data port (“port”) are shown generally at 10 in Figures 1-7B according to an embodiment. Referring to Figures 2-7B, the exemplary ports 10 include a housing 12, a moveable faceplate 14, and a communication member 16.

To facilitate ease of comprehension of the invention, this description and the accompanying illustrations employ common reference numbers for like elements and variations thereof across a broad range of exemplary embodiments. And, by this system, it should therefore be appreciated that one of ordinary skill in the art will come to understand that the different variations to the similar elements can be interchanged and the invention should not be limited to any of the representative configurations.

In an embodiment, port 10 is provided for communication with a removable data device D (“data device”) exemplarily illustrated as a data storage device D in the Figures. In an embodiment, faceplate 14 can move to a protected position, B, to defend the connection between data device D and communication member 16. Similarly, faceplate 14 is adapted to move to a presented position when data device D is not connected, or is removed from communication member 16, to therefore provide facilitated connection with data device D in accordance with the principles exemplarily illustrated in the following disclosure.

In an embodiment, housing 12 comprises a first member 18 having surface 20 and sidewalls 22 that define a cavity 24 that terminates at an opening 25. With reference to Figure 2A, sidewalls 22 can extend beyond said opening 25 to define cavity 24 to form housing 12. It will be appreciated that housing 12 may be more than one piece, as illustrated in Figure 2B – 4B, such that a second member 26 may be

provided proximate to first member 18, wherein second member includes a surface 27 and sidewalls 28 that define a secondary cavity or opening 30 proximate to and terminating at opening 25 of first member 18 to thereby define a two-piece housing 12. It will be appreciated that variations to the foregoing exemplary description will be recognized by one of ordinary skill in the art and the invention should not be so limited thereby. For example, housing 12 may comprise more than two pieces.

Referring to Figure 2A – 4B, a faceplate retaining member 29 is provided to restrict faceplate 14 from exiting cavity 24. It will be appreciated that other methods to prevent such egress will become known and the present invention should not be limited to the foregoing faceplate retaining member 29. For example, in an embodiment employing the two-piece housing as illustrated in Figure 2B – 4B, among other possibilities which will become obvious upon considering this disclosure, secondary opening 30 could be configured smaller than opening 25 (this feature is not shown) and smaller than the perimeter of faceplate 14, such that faceplate 14 is restricted from moving outside cavity 24. Alternatively, and among other possibilities obviated hereby, a flange or the like (not shown) may extend radially inwards from opening 25 or opening 30 to restrict faceplate 14 from moving outside of cavity 24.

Referring to Figure 1, Figure 2A, and Figures 5A-7B, in an embodiment, at least a portion of first member 18 can be coextensive with vehicular structure such that surface 20 of first member 18 represents the surface of such vehicular structure. Referring to Figures 2B -4B illustrating an exemplary multiple piece housing construction, second member 26 can be coextensive with vehicular structure such that surface 27 represents the surface of such vehicular structure. For example, and among others, Figure 1 illustrates that vehicular structure can be a vehicular console and, for purposes of the present disclosure, surface 20 of Figure 1 represents a portion of the surface of the vehicular console. It is hereby recognized that other vehicular structure is suitable for the invention and the present invention should not be limited to the vehicular console. For example, and among others, vehicular structure can be a vehicular panel, and a vehicular steering column.

With reference now to Figures 2A-7B, and according to an embodiment, faceplate 14 includes a surface 31 and sidewalls 32 that define an aperture 34 through faceplate 14. Faceplate 14 is movably disposed within cavity 24 of housing 12. In an embodiment, faceplate 14 is a plunger and is moveable between a first position A (see, e.g., Figure 3A, Figure 4A, Figure 5A, Figure 6A, Figure 7A) and a second position B (see, e.g., Figure 3B, Figure 4B, Figure 5B, Figure 6B, Figure 7B). While a plunger configuration is shown and described herein, it is recognized that the patentee hereof is entitled to the general concept of a faceplate movable between first position A and second position B, and the invention should not be limited to the exemplary disclosed embodiment. It should be recognized that while the exemplary embodiments described herein are mechanical, electrically operable equivalents are also contemplated hereby and the disclosure hereof should not be used to limit the invention to a mechanical design.

In an embodiment, communication member 16 includes sidewalls 38 that define an opening 40. Communication member 16 includes one or more electrically conductive channels (not shown) disposed therein that are adapted to communicate with corresponding electrically conductive channels (not shown) resident on a connector Z associated with data device D. For brevity, the disclosure hereof describes and illustrates a female communication member 16 that accepts a male connector Z, however, the invention hereof should not be limited to the exemplary embodiment. For example, communication member 16 may be a male communication member or, moreover, communication member 16 may be a hybrid communication member. The choice of communication member is application specific and the invention should not be limited thereby. It will also be appreciated that the nomenclature “electrically conductive” should be broadly interpreted to include any type of electrical conduction and such a constructions can extend to fiber optic technology and the like.

Referring to Figure 3A and Figure 3B, in an embodiment, communication member 16 is mounted to faceplate 14 and extends within aperture 34 and within a portion of cavity 24 and moves congruently with faceplate 14. The foregoing representative Figures illustrate that a top portion of communication member 16 may

be generally flushly aligned with surface 31 of faceplate 14, however, it is appreciated that communication member 16 may not be flushly aligned as provided hereinabove. In an alternative embodiment, referring now to Figures 4A -7B, communication member 16 is statically mounted to housing 12 and recessed therewithin and does not move coextensive with faceplate 14. In an embodiment employing the latter configuration, as faceplate 12 moves toward second position B (e.g., as illustrated in Figure 4B) communication member 16 becomes accessible for communication with data device D; otherwise, as faceplate 12 moves toward first position A, or away from second position B (e.g., as illustrated in Figure 4A) communication member 16 is not accessible to data device D until faceplate 14 moves into or around second position B. Various configurations to accomplish the foregoing will become readily apparent to the ordinary artisan and the exemplary arrangement described should not be used to limit the full entitlement.

Referring now to Figure 3A-7B, communication member 16 is configured for further connection to a data transfer member 46. Data transfer member 46 is communicatively coupled to electrically conductive channels (not shown) of communication member 16.

In an embodiment, data transfer member 46 provides a conduit for data transfer from communication member 16 to a vehicular unit 50. It will be appreciated, that many types of data transfer members may be employed with the present invention. For example, data transfer member 46 may be a wire, a cable or the like, communicatively connected to electrically conductive channels 42 and adapted to transfer data to and from electrically conductive channels (not shown) and vehicular unit 50. It should further be understood that data port 10 can be any type of port and the following claims should not be limited to any specific type of port. For example, data port 10 may be a power provision unit such as a 110 volt power source, a cigarette lighter, or the like wherein the data is power such that the foregoing vehicular unit is a generator, a vehicular battery, a transformer, an alternator or the like. Additionally, it is understood that data port can be a port for communicating with a portable storage device. An example of such a storage device may employ

USB technology or the like. It is understood that the foregoing examples are illustrative and the invention should not be limited thereby.

As described hereinabove, faceplate 14 is moveable between a first position A (see, e.g., Figure 3A, Figure 4A, Figure 5A and Figure 7A) and a second position B (see, e.g., Figure 3B, Figure 4B, Figure 5B and Figure 7B). In an embodiment, first position A is a non-use position such that faceplate, whereas second position B is a protected position adapted to protect the connection between connector Z and communication member 16.

Referring generally to the Figures, in an embodiment, port 10 can further include one or both of a bias member 54 and a retaining member 56. Bias member 54 can be disposed in cavity 24 of housing 12 between a rear wall 58 of housing 12 and faceplate 14. In an embodiment and as illustrated in Figures 3A – 4B and Figures 7A – 7b, bias member 54 is a coil spring, however other types of bias members and arrangements are equally plausible and will be recognized by one in the art. According to an exemplary embodiment, bias member 54 is provided to urge faceplate towards first position A (see, e.g., Figure 3A).

Retaining member 56 can be connected to rear wall 58 and adapted to removably retain faceplate 14 in second position B (see, e.g., Figure 3B, Figure 4B, and Figure 7B). It will be appreciated that other types, and positions, of retaining members will become obviated by the present disclosure and the invention should not be limited to the exemplary embodiments. For example, and among others, Figure 5B generally illustrates a heart and pawl retaining mechanism positions upon sidewall 22 of housing.

Referring now to Figures 2A – 5B, and Figure 7A-7B, in an embodiment, faceplate 14 can include a locking finger 60 (Figures 2A- 5B) or a recess detent 73 (Figures 7A-7B) for selective interaction with retaining member 56. For example, upon movement of faceplate 14 to second position B, locking finger 60 of faceplate 14 engages the retaining member 56 to retain faceplate 14 in the second position B. As illustrated in detail in Figures 2A – 4B, locking finger 60 includes a notched end

62 that catches on a notched flange 64 of retaining member 56. As is known in the art and therefore only briefly mentioned, among other well known variations, retaining member 56 can include an internal bias 63 and guide means 65 to provide selective control of engagement and disengagement of notched flange 64 and notched end 62 or selective engagement with locking detent 73.

It will be appreciated that the retaining member 16 as described above may be provided, for example, a well-known “push-push” type mechanism. According to an embodiment, the push-push-type mechanism 16 may mechanically retain faceplate 14 in a squeezing fashion with more than one notched flanges 62 or without any flanges. Three exemplary variants of linear push-push type mechanisms are shown in Figures 2A-5B and Figures 7A-7B. According to another embodiment, the push-push-type mechanism 16 may include a twist-and-lock feature that rotates faceplate 14 as the faceplate 14 is moved to/from the first and second positions as shown in Figure 6A-6C. These and other types of retaining members 16 are but examples and additional equivalents will become readily recognized by one of ordinary skill. For example, a detent may be similarly used to retain faceplate in the second position B, such that a withdraw force applied to the data device overcomes the retentive force exerted by the detent. It will be recognized that the withdraw force should be set less than force needed to remove the data device D from the port 10.

Accordingly, referring now to Figure 3B, Figure 4B, Figure 5B, Figure 6B, and Figure 7B by retaining faceplate 14 in second position B for connection with a data device D, it will be understood that data device D may be substantially releasably retained and generally protectively encapsulated within a portion of cavity 24; as a result, the potential for a loss of connectivity and/or damage is reduced since it is less likely for shear forces or other type of removable force to be applied to the connection between communication member and data device D while protected within cavity 24.

As such, because cavity 24 of housing 12 is positioned behind/within A-surface, it will be appreciated that the data device D may be retained behind/within an instrument panel, dashboard, center console, overhead console, steering column or the

like. For example, among others, data device D can be provided as a key and data port is provided as an ignition switch such that housing 12 may thereby be provided within a steering column or otherwise proximate to a driver for instigating operation of a vehicle. As another example data device D can also be provided as a music storage device, and housing 12 may be provided within an instrument panel arranged to play the music stored on data device D.

Referring to Figure 3B, Figure 4B, Figure 5B, and Figure 7B to move faceplate 14 (and data device D) into the first position A from the retained, second position B, a force is applied to faceplate 14 (vis-à-vis, for example, data device D) in the direction of the arrow, F. Accordingly, once returned to first position A, the data device D may be removed.

Referring now to Figure 5A e 5B, according to an embodiment, housing 12 may further include one or securing members 59 for releasably locking the connection between the communication member 16 and the data device D when faceplate 14, data device D and communication member 16 are in second position B, or move theretoward. In an embodiment, securing member 59 includes a securing finger 61 connected to a toothed control arc 63. Toothed control arc 63 may be meshed with a toothed arm portion 65 extending from faceplate 14. Thus, as faceplate 14 moves toward second position B, toothed control arc 63 engages toothed portion 65 which rocks locking finger 61 toward faceplate 14 and into locked position such that locking finger 61 engages a retention spring 67 provided on communication member 16. In turn, retention spring 67 is directed towards connector Z to releasably retain connector Z within communication member 16. It will be appreciated that the principles hereof can be applied to the rotatable assembly as illustrated in Figures 6A – 6C and the invention should not be limited to the linear locking member 59. For example, referring to 6C, as a rotation force is applied to faceplate 14, locking fingers 61 similarly engage lock retention spring 67.

Referring now to Figure 2A– 5B, in an exemplary embodiment, port 10 can further include a damping member 70 to controllably affect the movement of faceplate 14 within cavity 24.

Referring to Figures 2A-4B and in an embodiment, damping member 70 is positioned between faceplate 14 and sidewalls 22 of housing 12. In an embodiment, sidewalls 22 of housing 12 can further define a damping channel 72 to controllably interact with damping member 70. It will be appreciated that other damping arrangements will become readily apparent upon considering this disclosure. For example, and among other possibilities, referring now to Figure 5A and 5B, damping member 70 can alternatively be provided extending from sidewall 22 and controllably interact with a toothed damping finger 71 extending from faceplate 14. It is appreciated that, if desired and as illustrated, toothed damping finger 71 can play the dual role of selective interaction with toothed arm portion 65 to control securing member 59.

In an embodiment, damping member 70 and faceplate 14 move along an axis M-M, as illustrated in Figure 2A and Figure 2B. As such, the damping member 70 provides damped movement of the faceplate 14 as the faceplate 14 is moved along the axis, M-M, to/from first position (e.g., Figure 3A) and second position (e.g., Figure 3B).

Among other possibilities of which will become expressly or implicitly known upon considering this disclosure, an exemplary damping member 70 can include a substantially circular member 74 that rotates about an axis, N-N, that substantially traverses the axis, M-M, in a perpendicular fashion. In an embodiment, a circumference of circular member 74 can define teeth 75. In an embodiment, damping channel 72 also includes teeth 77 such that teeth of circular member 74 become meshed therewith. Accordingly, as faceplate 14 moves to/from first position (e.g., Figure 3A) and second position (e.g., Figure 3B), circular member 74 rotates about the axis, N-N, to provide the damped movement of faceplate 14. It is appreciated that other dampening means can be substituted therefore, or used in combination therewith and the invention should not be limited to the exemplary structure. For example and among others, dampening may be accomplished via a friction fit between dampening channel 72 and faceplate 14. Further, it is appreciated that the dampening relationship therebetween may be wholly omitted.

The present invention has been described with reference to certain exemplary embodiments thereof. However, it will be readily apparent to those skilled in the art that it is possible to embody the invention in specific forms other than those of the exemplary embodiments described above. This may be done without departing from the spirit of the invention. The exemplary embodiments are merely illustrative and should not be considered restrictive in any way. The scope of the invention is defined by the appended claims and their equivalents, rather than by the preceding description.

CLAIMS

What is claimed is:

1. A vehicular data port for a data device comprising:
a housing comprising a surface selected from the group consisting of a vehicular console, a vehicular panel, and a vehicular steering column, said housing having sidewalls that define a cavity that terminate at an opening; and
a communication member provided within said cavity, said communication member including one or more electrically conductive channels to facilitate connection with the data device,
wherein said housing includes a faceplate movably disposed within said cavity.
2. A vehicular data port according to claim 1, wherein said faceplate moves between a first position so that said faceplate is generally flush with said opening of said first member and a second, retracted position so that said faceplate is recessed within said cavity away from said opening such that said faceplate and said cavity protect a connection between said communication member and the data device.
3. A vehicular data port according claim 1 or 2, wherein said communication member is mounted to said faceplate and moves congruently therewith.
4. A vehicular data port according to claim 1, wherein said communication member is statically disposed within said cavity, and wherein in said first position said faceplate is forward from said communication member and in said second position said faceplate becomes extended through an aperture defined in the faceplate.
5. A vehicular data port according to claim 1, claim 2, claim 3 or claim 4, said vehicular data port further comprising a biasing member disposed between the faceplate and an end of the cavity to biasably engage the faceplate and urge the faceplate toward the first position.

6. A vehicular data port according to claim 5, wherein the biasing member is a coil spring.
7. A vehicular data port according to claim 5 or claim 6 further comprising a retaining member extending from said end of the cavity to removably retain said faceplate in said second position.
- 8.. A vehicular data port according to claim 7, wherein said faceplate includes a locking finger that selectively engages said retaining member
9. A vehicular data port according to claim 8, wherein said locking finger includes a notched end and said retaining member includes a notched flange, and wherein said notched end selectively catches the notched flange as said faceplate moves into second position.
10. A vehicular data port according to claim 7, wherein the retaining member is a push-push mechanism.
11. A vehicular data port according to claim 10, wherein said push-push mechanism includes a twist and lock feature that rotates said faceplate as said faceplate moves between said first and second positions.
12. A vehicular data port according to claim 7, wherein said retaining member is a flange and one or both of said communication member or said faceplate define a recess detent that selectively engages the retaining member as said faceplate moves toward said second position.
13. A vehicular data port according to claim 1, further comprising a data transfer member in electrical communication with said communication member

14. A vehicular data port according to claim 1, wherein said faceplate includes a surface and sidewalls that define an aperture through said faceplate.
15. A vehicular data port according to claim 1, wherein said faceplate is a plunger
16. A vehicular data port according to claim 1, wherein one of said faceplate and said housing define a detent recess and the other one of said faceplate and said housing includes a flange for selective retention by said detent recess, and wherein a withdraw force applied to said faceplate can overcome a retentive force between the flange and said detent recess.
17. A vehicular data port according to claim 1, further comprising a securing member for releasably locking a connection between said communication member and the data device.
18. A vehicular data port according to claim 17, wherein said securing member includes a securing finger and a toothed control arc, and wherein said faceplate includes a toothed arm portion for meshed engagement with said tooth controlled arc such that as faceplate moves toward second position, said toothed control arc engages the toothed arm portion to rock locking finger toward faceplate and releasably lock said communication member when said faceplate is at or substantially around said second position.
19. A vehicular data port according to claim 17 or claim 18, wherein said securing member is rotatably mounted to said sidewall of said housing.
20. A vehicular data port according to claim 16, further comprising a damping member positioned between said faceplate and said securing member.
21. A vehicular data port according to claim 17, claim 18, or claim 19, further comprising a damping member positioned between said faceplate and said securing member.

22. A vehicular data port according to claim 21, wherein said damping member includes teeth that selectively mesh with said teeth of said toothed arm portion of said faceplate.

23. A vehicular data port according to claim 22, wherein said damping member is rotatably mounted to said sidewall of said housing.

24. A vehicular data port according to claim 17 or 18, wherein said faceplate moves between a first position so that said faceplate is generally flush with said opening of said first member and a second, retracted position so that said faceplate is recessed within said cavity away from said opening such that said faceplate and said cavity protect a connection between said communication member and the data device.

25. A vehicular data port according claim 24, wherein said communication member is mounted to said faceplate and moves congruently therewith.

26. A vehicular data port according to claim 24, wherein said communication member is statically disposed within said cavity, and wherein in said first position said faceplate is forward from said communication member and in said second position said faceplate becomes extended through an aperture defined in the faceplate.

27. A vehicular data port according to claim 26 further comprising a biasing member disposed between the faceplate and an end of the cavity to biasably engage the faceplate and urge the faceplate toward the first position.

28. A vehicular data port according to claim 17, wherein said faceplate rotates within said cavity so that as faceplate is rotated in a first direction said securing member engages the data device and as faceplate is rotated in a second direction, said securing member disengages the data device.

29. A vehicular data port according to claim 28, wherein said faceplate is statically recessed within said cavity.
30. A vehicular data port according to claim 28, wherein said securing member includes a securing finger and a toothed control arc, and wherein said faceplate includes a toothed receiving arc for meshed engagement with said tooth controlled arc such that as faceplate is rotated in said first direction, said securing finger engages the data device and as faceplate is rotated in said second direction, said securing finger disengages the data device.
31. A vehicular data port according to claim 30, wherein said securing member is mounted to said sidewall of said housing.
32. A vehicular data port according to claim 2, further comprising a toothed damping member rotatably mounted to said faceplate, wherein said sidewalls define a damping channel having teeth for meshed engagement with said damping member to damp the movement of said faceplate between said first position and said second position.

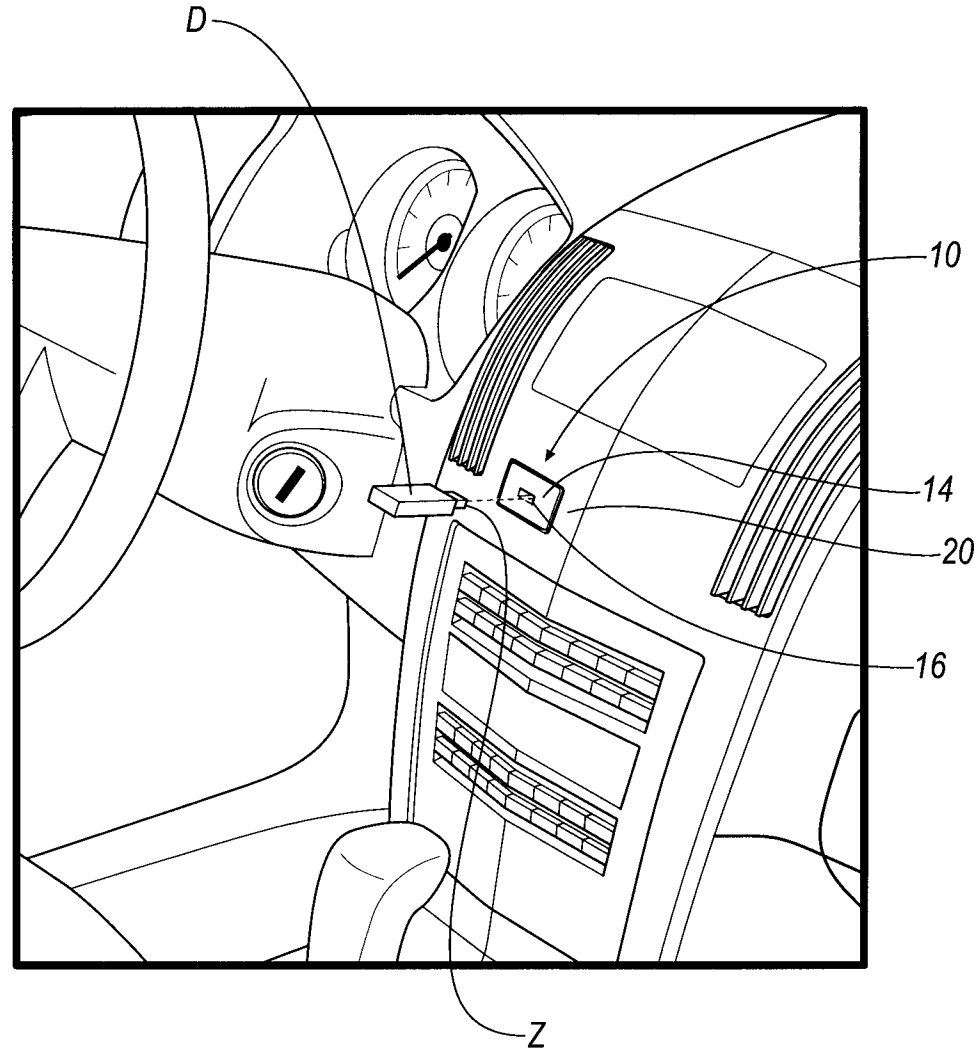


FIG. 1

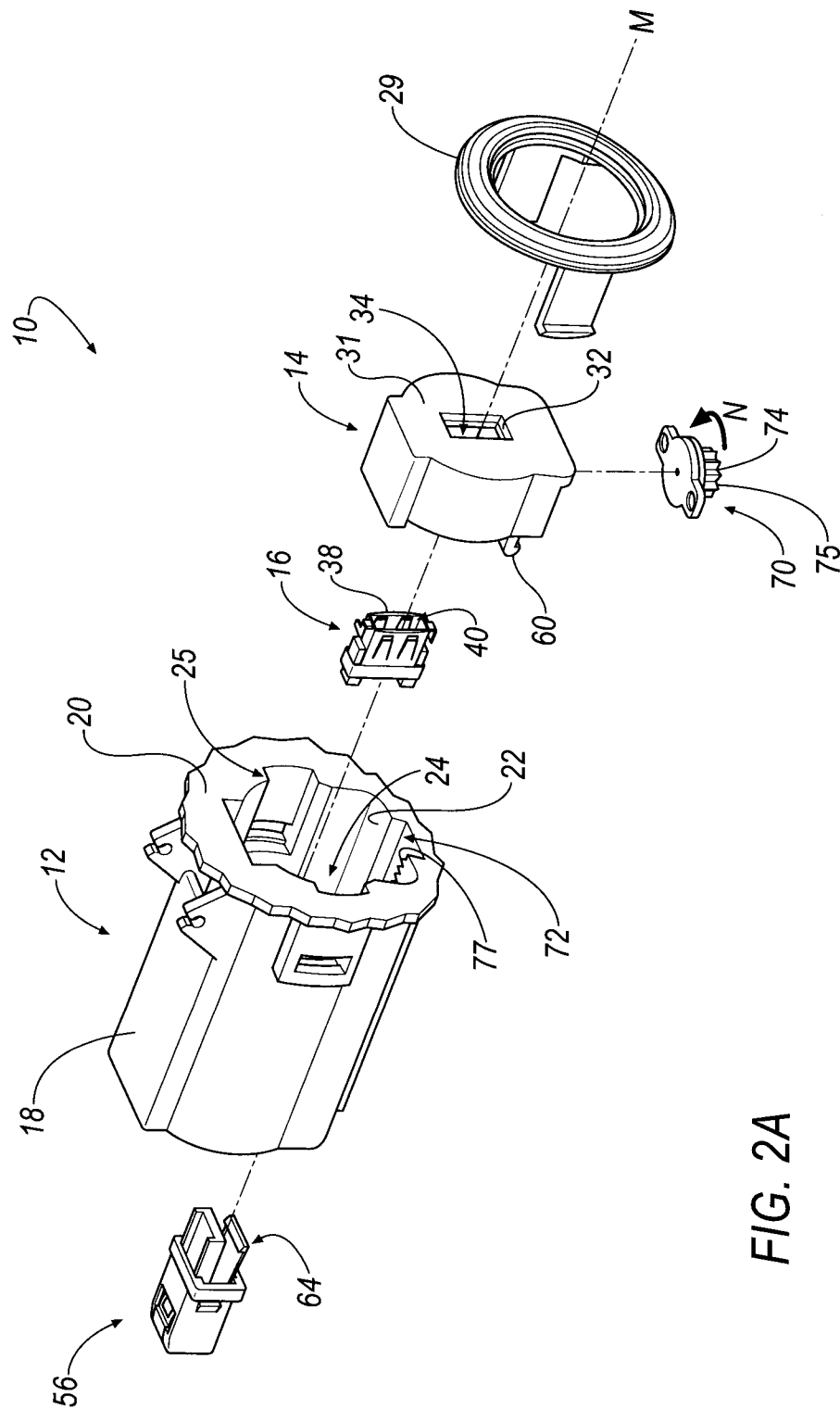


FIG. 2A

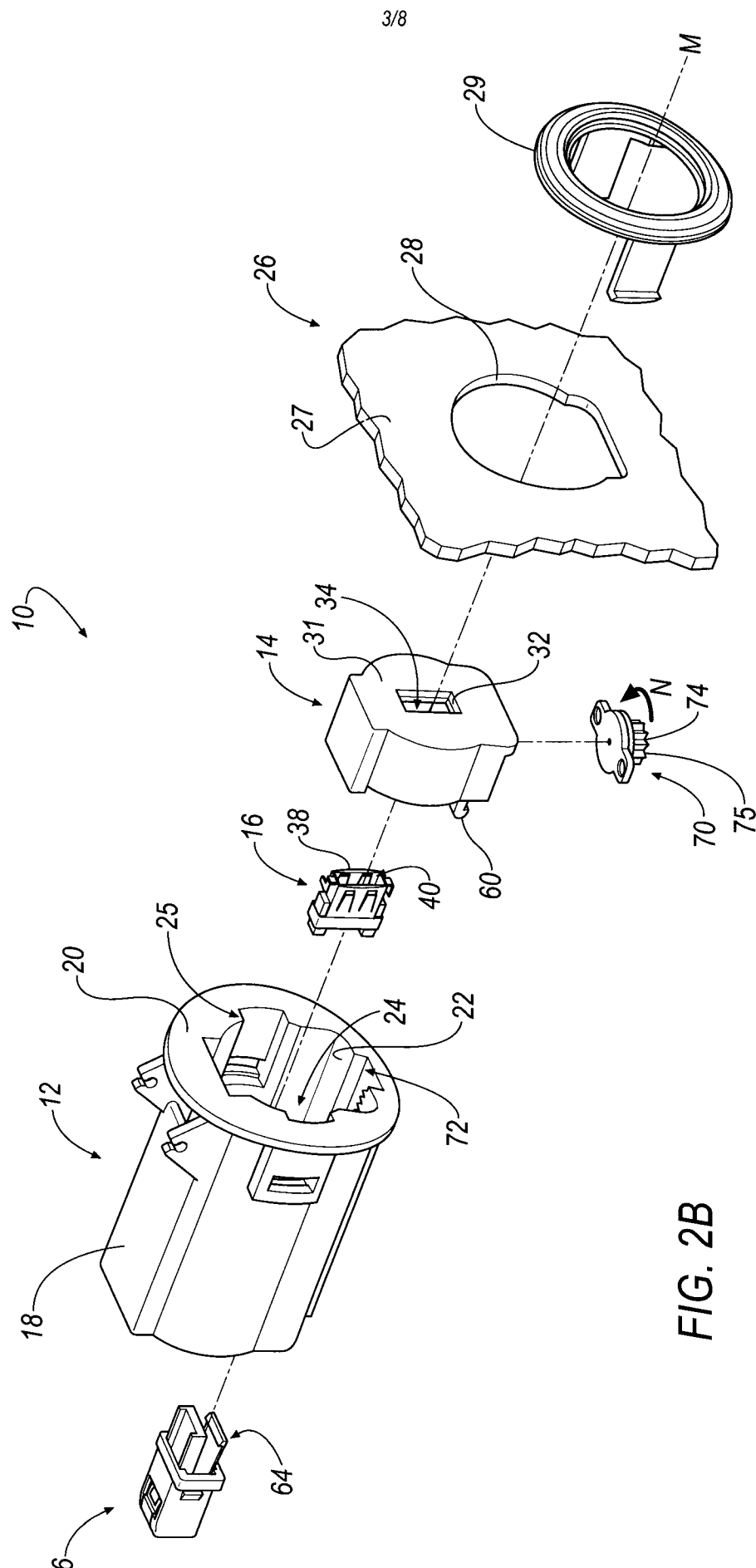


FIG. 2B

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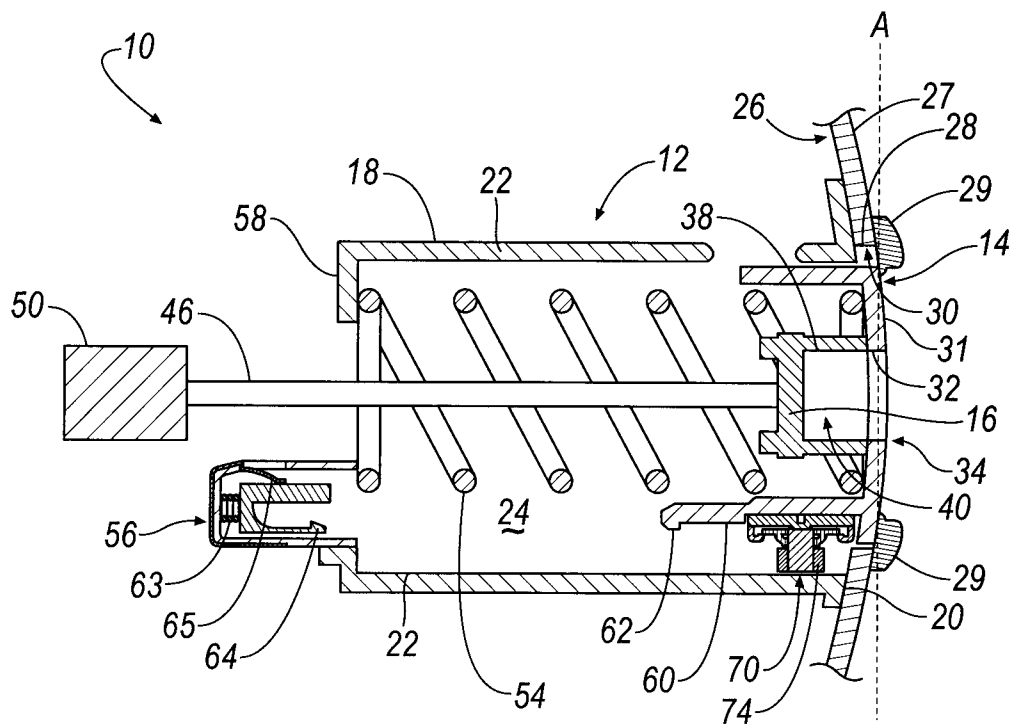


FIG. 3A

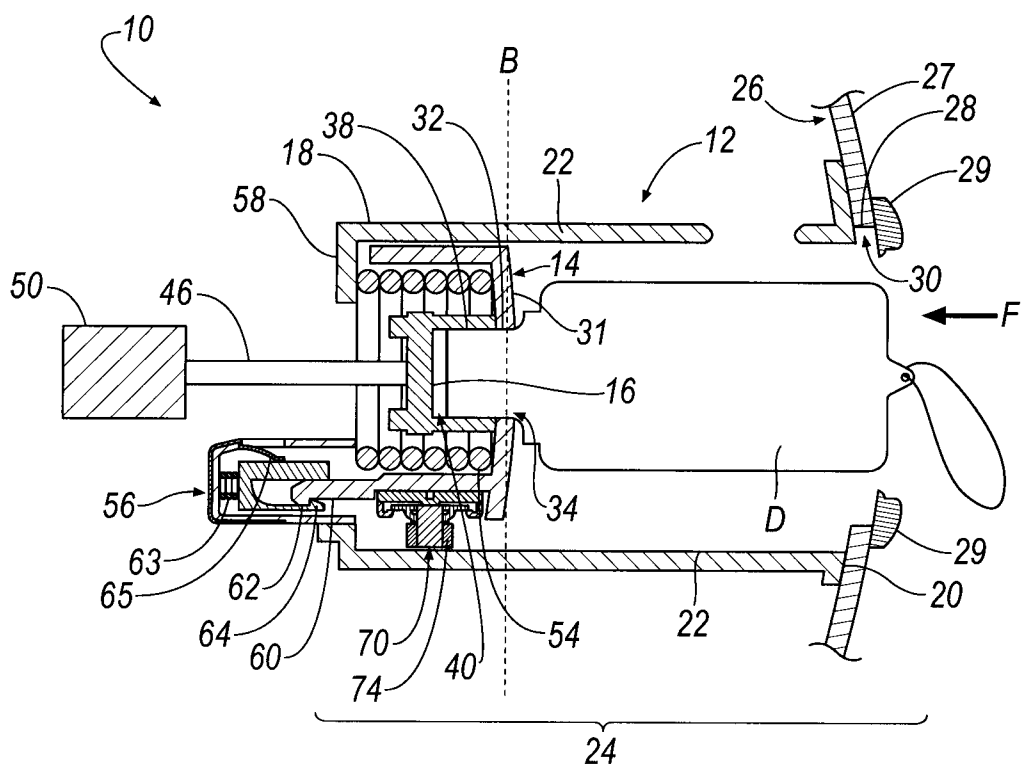


FIG. 3B

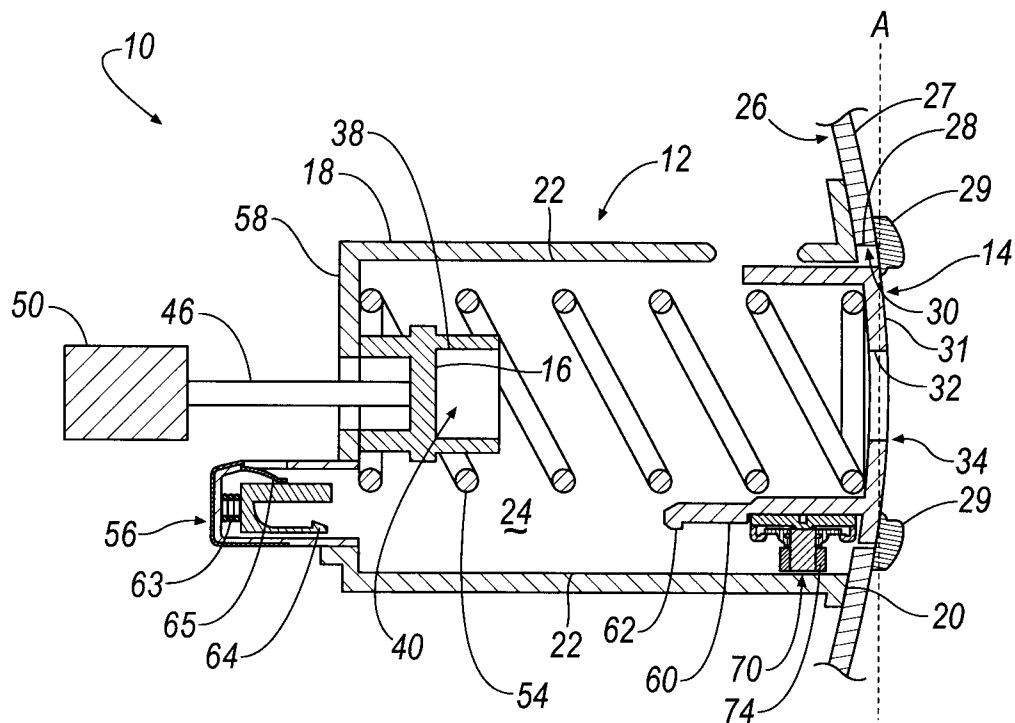


FIG. 4A

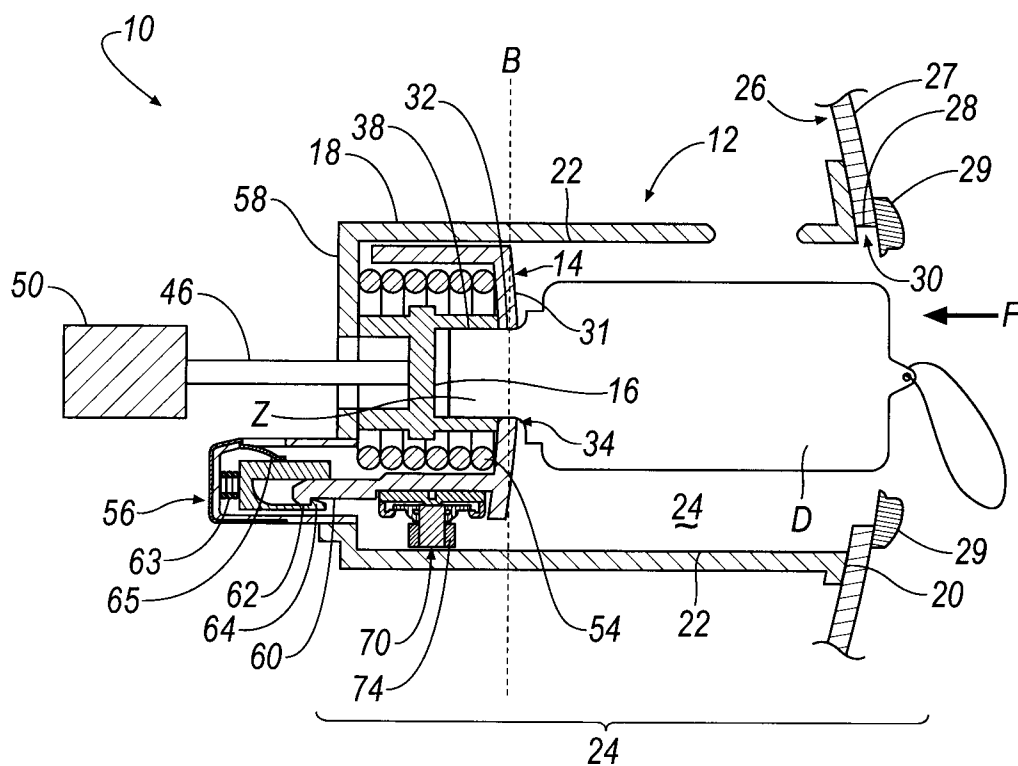


FIG. 4B

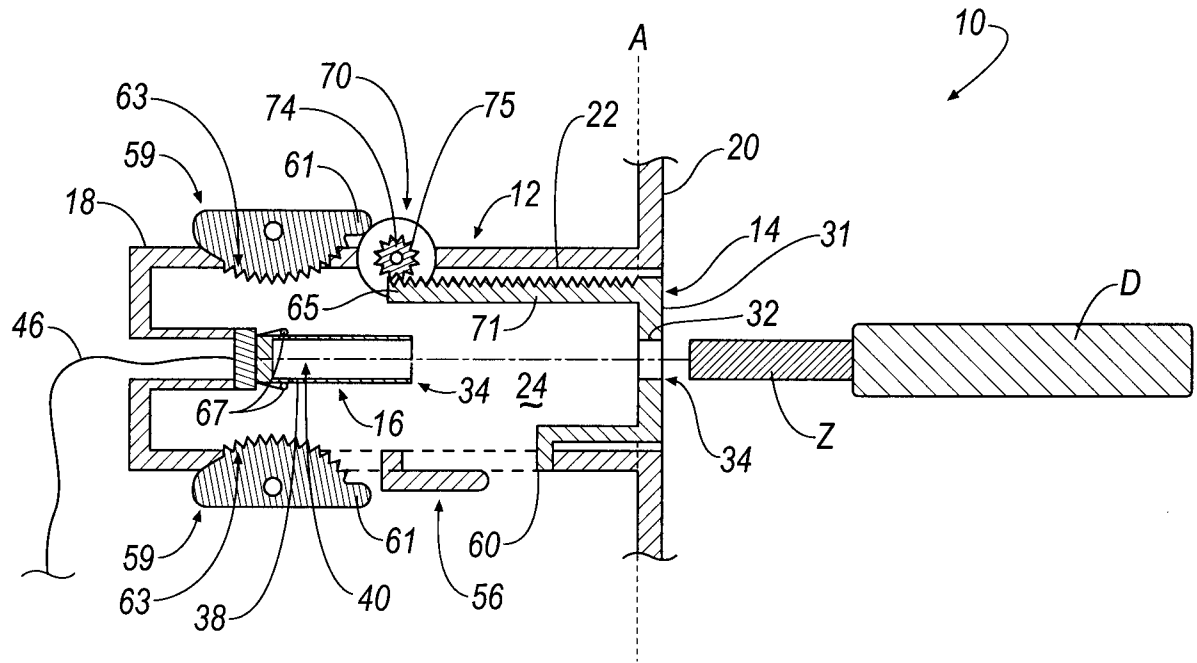


FIG. 5A

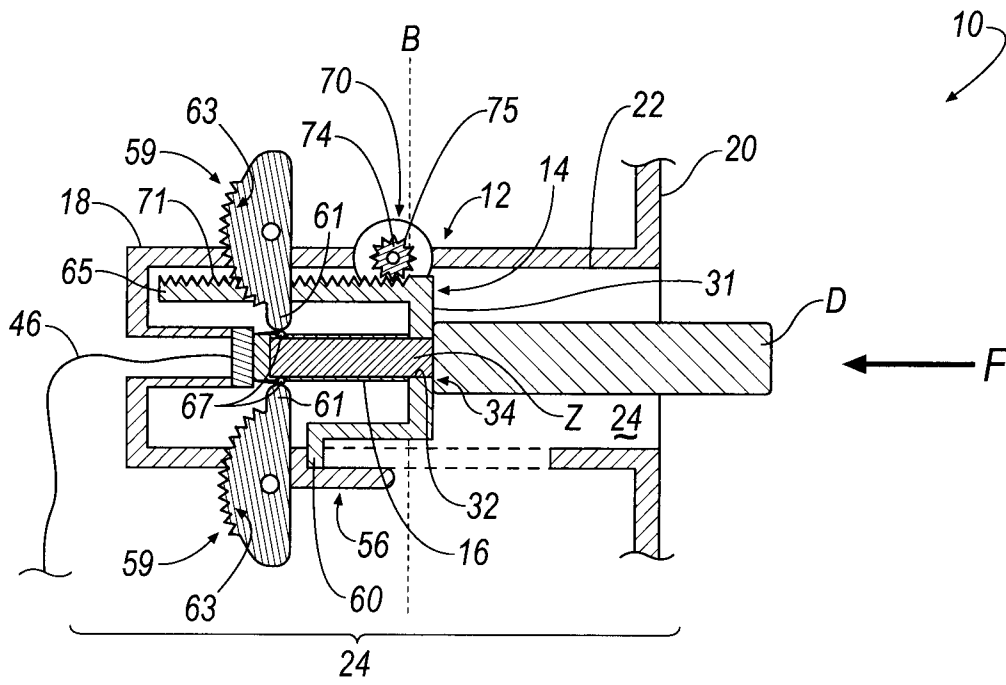
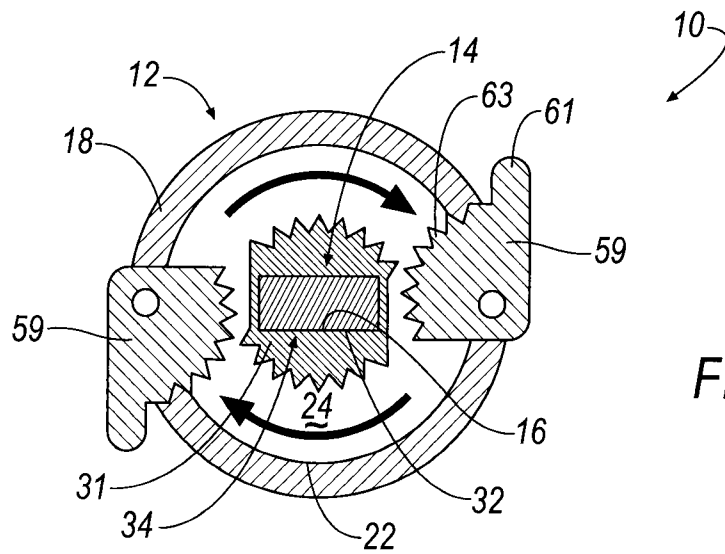
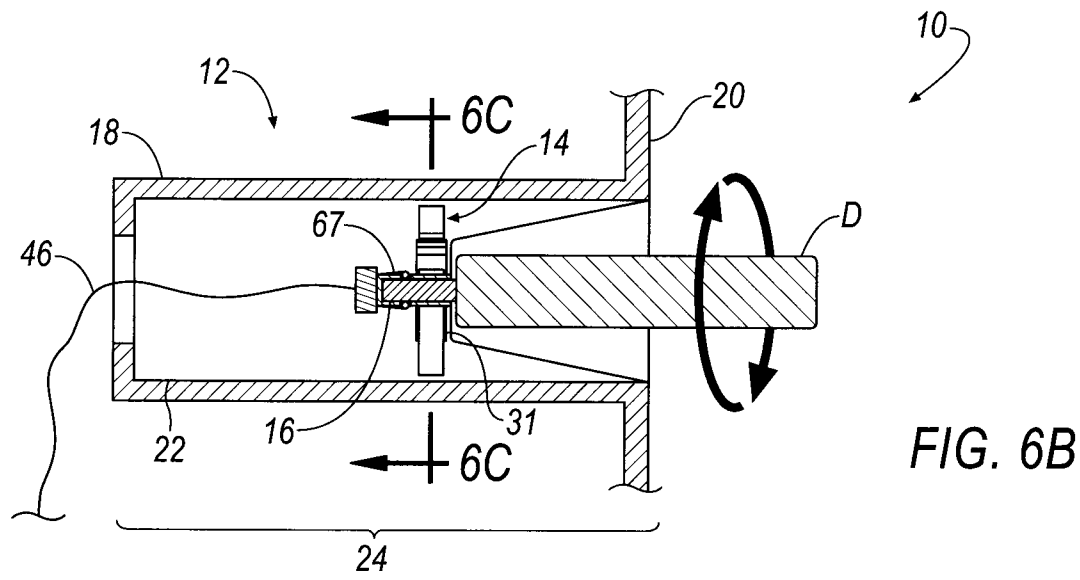
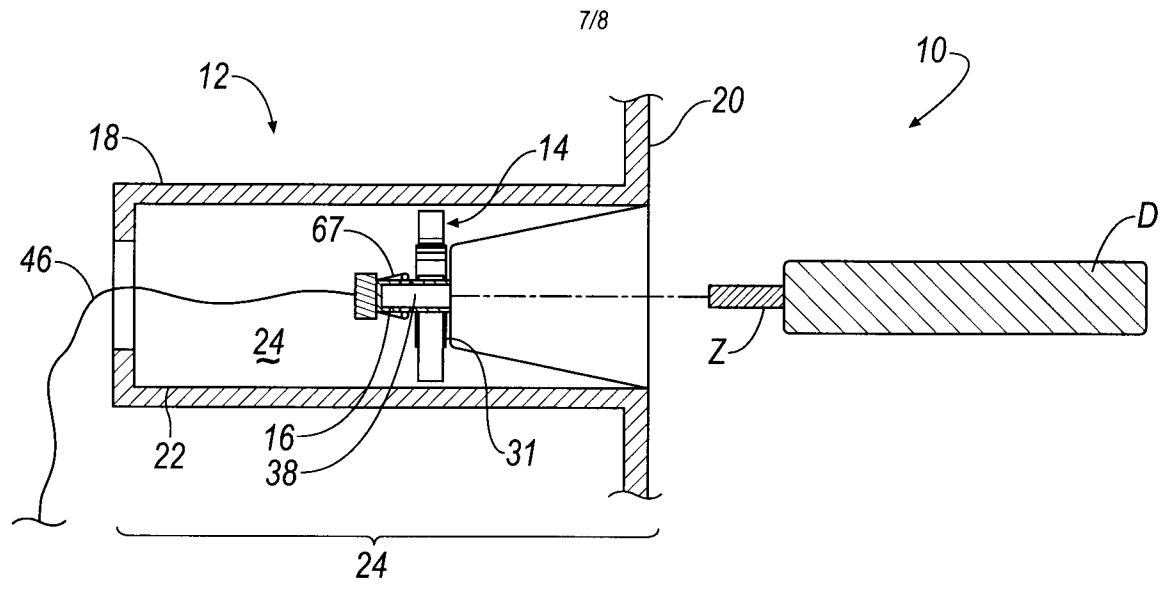


FIG. 5B



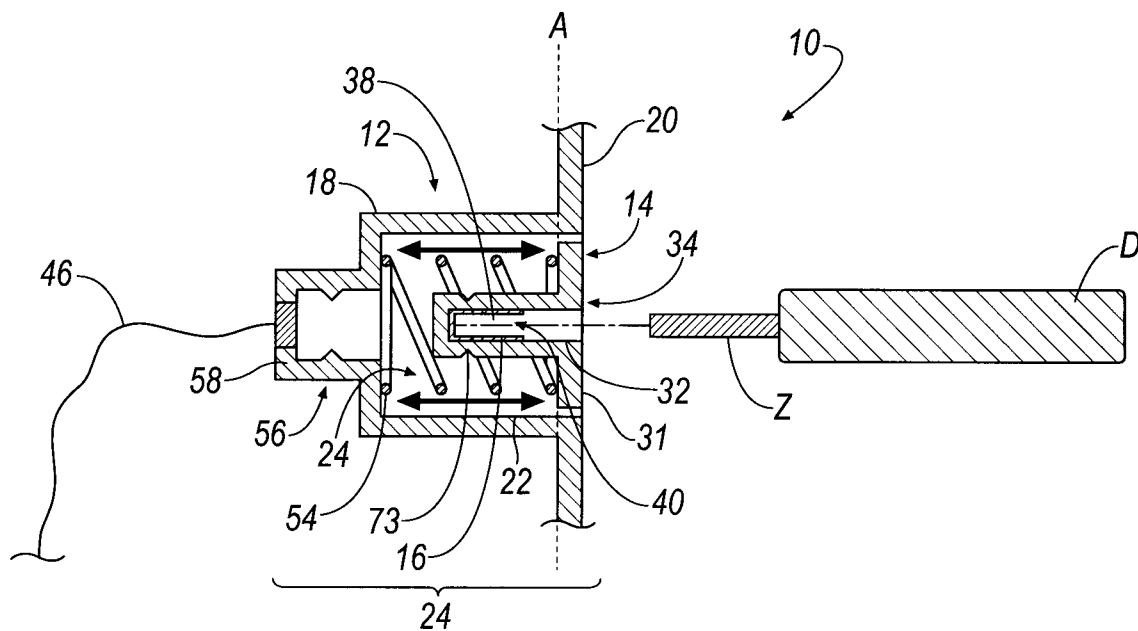


FIG. 7A

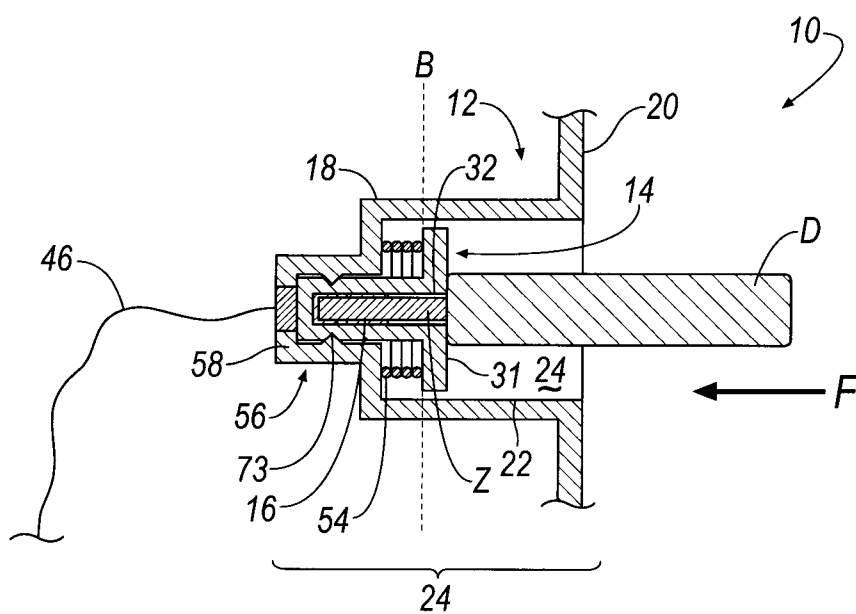


FIG. 7B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2007/001373

A. CLASSIFICATION OF SUBJECT MATTER

IPC: **B60R 16/02** (2006.01) , **G01C 21/36** (2006.01) , **H01R 13/58** (2006.01) , **H01R 13/639** (2006.01) ,
H01R 33/00 (2006.01) , **H01R 33/76** (2006.01) , **G01M 17/00** (2006.01)

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)

IPC: B60R, G01C, H01R

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

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)

Databases Searched: Delphion and US West Patent Database

Keywords: data port, interface port, connector, vehicle, faceplate, housing, communication

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,608,554 B2 (LESESKY et al.) 19 August 2003 (19-08-2003) Fig. 2 column 7, line 51 - column 8, line 6	1, 3, 13-15, 17, 19, 28, 29
A	US 6,939,155 B2 (POSTREL) 6 September 2005 (06-09-2005) see entire document	1-32
A	US 2005/0151422 A1 (GILMOUR) 14 July 2005 (14-07-2005) see entire document	1-32

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

19 December 2007 (19-12-2007)

Date of mailing of the international search report

20 December 2007 (20-12-2007)

Name and mailing address of the ISA/CA
Canadian Intellectual Property Office
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Authorized officer

Dennis Atkinson 819- 953-0816

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2007/001373

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