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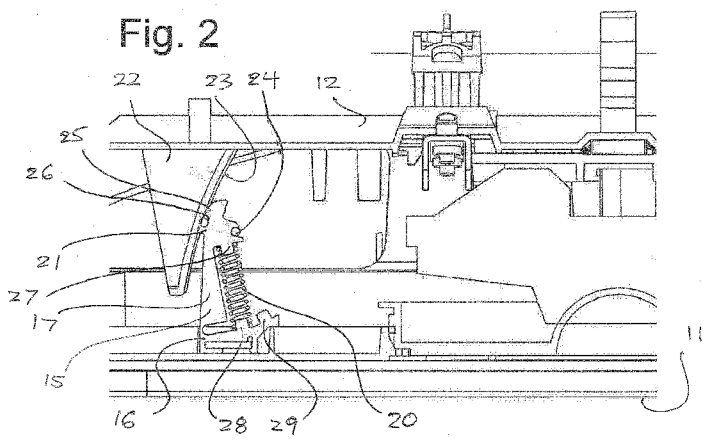
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(54) Title: MIRROR DAMPER

Fig. 2



(57) Abstract: A damper is provided for a rear view mirror with motorised actuation. A damper is provided between the mirror and its frame assembly for the purpose of shock absorption or vibration reduction. Each damper comprises a bracket and a boss. A polymer contact material such as an O-ring 24 is mounted onto the free end of the bracket and contacts the boss. The frictional and elastic properties etc. of the contact material determine the damping and frictional characteristics of the movement of the mirror with respect to the boss.

Mirror Damper

Field of the Invention

The present technology relates to dampers, in particular, mirror dampers for vehicles.

Background of the Invention

Mirrors, such as adjustable and motorised or manual side view mirrors or rear view mirrors, are fitted on motor vehicles so that drivers can perform safety checks while driving. Some of these mirrors may be electrically powered and controlled. The mirrors may vibrate when the vehicle to which they are attached is in motion. The vibration may cause poor visibility for the driver, a loosening and also the gradual wearing out of the parts used for the mirrors, for example those used to support the mirrors on the vehicle or those used to power or control electric mirrors. Minimization of the vibration is desirable and, *inter alia*, helps mechanically protect various components used for the mirrors.

Objects and Summary of the Invention

It is an object of the present invention to minimize vibration in a mirror mounted on an automobile.

It is another object of the present invention to provide a damper for a mirror.

In some embodiments it is an object of the present invention to provide a mirror damper that has an adjustable spring.

Brief Description of the Drawing Figures

In order that the invention be better understood, reference is now made to the following drawing figures in which:

Figure 1	is an exploded perspective view of a mirror that has a mirror damper;
Figure 2	is a cross section view of the mirror where the damper is visible;

Figure 3 is a perspective view showing the damper, where the spring is in a first position; and

Figure 4 is a perspective view showing damper with the spring in the second position.

Best Mode and Other Embodiments

The present technology is a modification to the rear view mirror described in the Applicant's Australian application No. 2007904749, incorporated herein by reference.

As shown in Figure 1, a rear view mirror with motorised (or manual) actuation 10 comprises a mirror assembly 11 that is mounted onto a frame assembly 12. The mirror assembly may comprise a backing for the mirror etc. The frame assembly comprises all of the parts of the rear view mirror except for the mirror assembly. A damper 13 is provided between the mirror 11 and the frame assembly 12 for the purpose of shock absorption or vibration reduction. In the embodiment shown, there is one damper 13 on each side of (or above and below) the actuator 14 for the mirror 11. Each damper 13 comprises a bracket 15, one end of which is an optional mounting portion 16 where the bracket 15 is mounted onto or in mechanical communication with a back side of the mirror 11. Alternatively the bracket 15 can be integral with a backing element of the mirror and thus lack a distinct mounting portion 16. From this mounting portion 16 or base area or base of the bracket (or otherwise), an upright member or beam 17 extends away from the mirror 11. The upright member 17 and the mounting portion 16 may be perpendicular to each other. The upright member 17 extends toward a free end 18 of the bracket 15. A rubber contact material such as an O-ring 24 is mounted onto the free end 18. The frictional and elastic properties etc. of the contact material determine the damping and frictional characteristics of the movement of the mirror with respect to the boss 22 onto which it impinges. The contact material may be the same material as the bracket or be a softer attachable/replaceable part such as the O-ring 24. A small pad, textile or felt or other material may be used depending on the damping characteristics required for a particular application of this technology. Lubricants may be

applied to the contact material if required. The rubber contact material 24 is fitted between the roof 21 and the free end 18.

The damper may be installed or utilised without regard for which components of the damper are associated with the mirror or frame assemblies. That is the bracket or boss may be fastened to or affixed to or formed into or part of either assembly, as required.

Further, a spring 20 is received by and fitted between a first, cantilevered roof or spring mounting element 21 located adjacent to the free end 18 and the one or more spring mounting elements 28,29 located opposite the first and near or on a base area of the bracket 15 or on the mounting portion 16.

Each damper 13 further comprises a boss 22 that cooperates with the bracket 15. The material of the boss may be tailored to a particular application of the technology, particularly with regard to the co-efficient of friction of the contact surface of the boss. The boss 22 can be integral with or mounted onto the frame 12. In this embodiment the boss 22 is screwed onto the frame 12. Each boss further has a central curved ramp (or "ramped face") 23. This ramp 23 is preferably curved across its width 33 and also along its length 34, with the result that the ramp 23 is generally convex. This configuration accommodates the mirror's vibrations in various directions. The curvature of the ramp 23 may vary, depending on factors such as the size of the mirror and the amount of vibration the damper is designed to handle. In the preferred embodiment, the curved ramp 19 corresponds to an arc of an imaginary circle if curved in one plane, or two planes (e.g. a section of a sphere) if a complex curve is used.

As shown in Figure 2, the bracket 15 and the boss 22 for each damper 13 are slightly offset from each other when the mirror 11 and the frame 12 are assembled. The free end 18 of the bracket 15 comes into contact with the ramped face 23 when the travel of the bracket, because of the action of the motor or actuator etc. is enough to unseat the contact material 24 from the boss. In particular, the free end 18 has a preferably curved ramp contact surface 25 for contacting, when required, the ramped face 23. A groove 26 is formed below the ramp contact 25. The polymer contact material 24 is preferably secured within this groove 26. In this embodiment the groove is a

circumferential groove located adjacent to the free end 18 of the bracket, and the rubber contact material 24 is an O-ring. As the mirror 11 vibrates the rubber contact material 24 contacts and rides on the ramped face 23. The friction between the soft polymer of the contact material 24 and the ramped face 23 dampens the vibration of the mirror.

In this embodiment, the cantilevered roof 21 is provided such that its orientation is approximately perpendicular to the ramped face 23 when the damper 13 is assembled. A first spring locating or mounting element 27 extends away from the roof 21 and toward the mounting portion 16 of the bracket 15. It receives one end of the spring. A second and a third spring mounting elements 28, 29 are located adjacent to one another on the mounting portion 16 and extend generally toward the roof 21 and mounting element 27. The second and third spring mounting elements are positioned adjacent to each other and each can, in turn, receive an opposite end of the spring, as required. The second and third spring mountings 28, 29 are both angled, to different degrees, toward the ramped face 23. A resilient member such as the coil spring 20 can be fitted between the first and second mounting elements 27, 28 (see Figures 2 and 3) and take a first position. The resilient member or metal coil spring 20 can alternatively and optionally be fitted between the first and third spring mounting elements 27, 29 and take a second position (see Figure 4). Depending on its position, the spring 20 is tensioned differently and is angled differently with respect to the ramped face 23. A different damping force is achieved by tensioning the spring 20 differently. The spring 20 is therefore adjustable for the damper to handle different tensions. Different springs may be used depending on the vibration characteristics of the mirror. A range of other resilient materials with shape memory may be used in place of the coil spring.

Referring to Figures 3 and 4, the free end 18 may include a hook-like end so that the free end 18 may be easier to flex with a human finger or tool, so as to enable easier insertion or removal of the spring 20. In the present example the upright member 17 is like a flexible beam that is bendable to afford flexibility to the structure. An outer 30 and an inner portion or membrane 31 of the upright member 17 meet each other at a neck location 32 adjacent to the roof 21. The bracket 15 may be flexed at a narrowing or relief

area between the upright member and the base of the upright member so that the spring 20 can be inserted or removed. In some embodiments, there may further be an arched, flexible reinforcing bow 35 that is connected between the base area the bracket 15 and the roof area so that it is located "across" the opposite ends of the spring 20 or other resilient bias or material.

The vibration of the mirror 11 causes the spring 20 to exert forces against the free end 18, thereby causing the free end 18, and in the normal range of mirror travel, the rubber contact material 24, to rub against the ramped face 23. Therefore, the vibration that is translated to the frame 12 is reduced. This in turn helps reduce the vibration translated to components carried by the frame 12.

While the present invention has been disclosed with reference to particular details of construction, these should be understood as having been provided by way of example and not as limitations to the scope or spirit of the invention.

What is claimed is:

1. A damper for a mirror assembly, comprising:
a flexible bracket and a boss;
the bracket and boss being locatable between the mirror assembly and a frame assembly for the mirror;
the bracket comprising a beam having a free end and a base area, the free end having a first a mounting element and the base area having a second mounting element;
the bracket further comprising a contact material that impinges on the boss;
a resilient member extending between the first and the second mounting elements.

2. The damper of claim 1, wherein:
the contact material is a polymer that is softer than the material from which the bracket is made.

3. The damper of claim 2, wherein:
the contact material is an O-ring.

4. The damper of any one of claims 1-3, wherein:
the bracket further comprises a third mounting element, the second and third mounting elements each adapted to receive an end of the resilient member while an opposite end of the resilient member is received by the first mounting element.

5. The damper of claim 4, wherein:
the resilient member is a coil spring.

6. The damper of any one of claims 1-5, wherein:
the boss comprises a ramped face that is ridden by the contact material.

7. The damper of claim 6, wherein:
the ramped face is curved.

8. The damper of claim 7, wherein:
the ramped face is curved in two planes.

9. The damper of any one of claims 1-8, wherein:
the bracket and the boss are each separate parts that can be attached to the mirror assembly or the frame assembly as required.

10. A rear view mirror for a vehicle comprising one or more of the dampers disclosed in any one of claims 1-9.

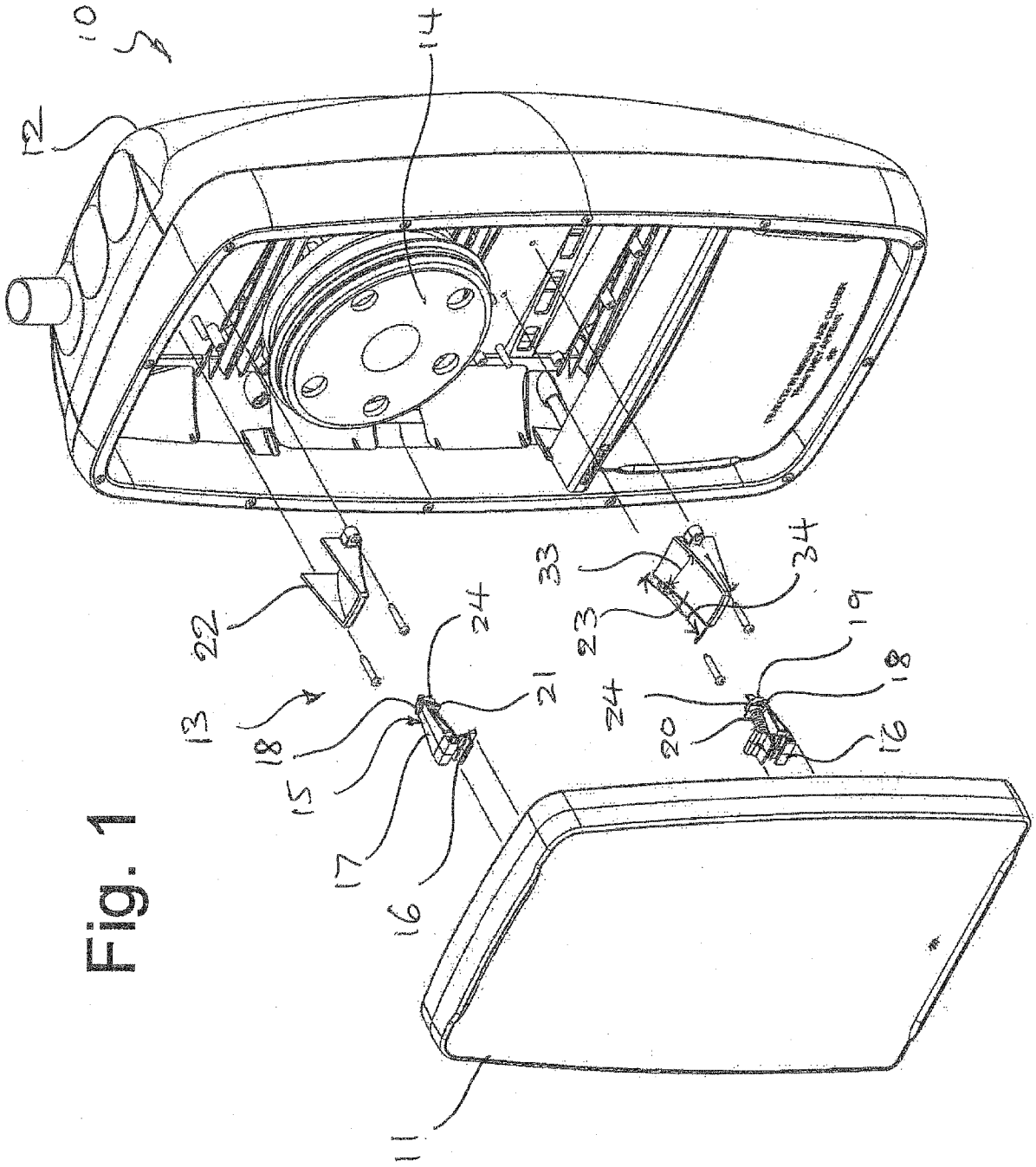


Fig. 1

Fig. 2

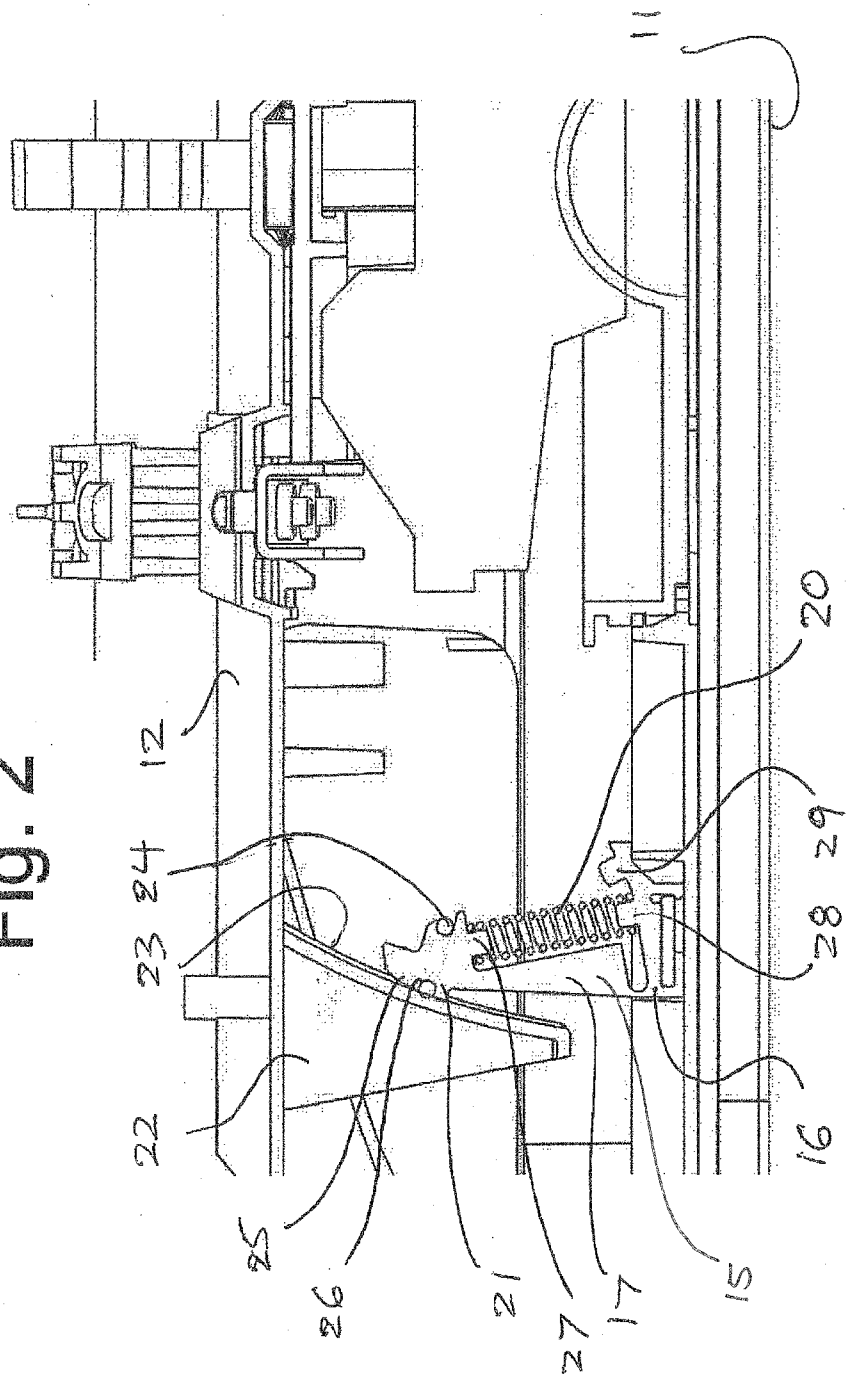


Fig 3

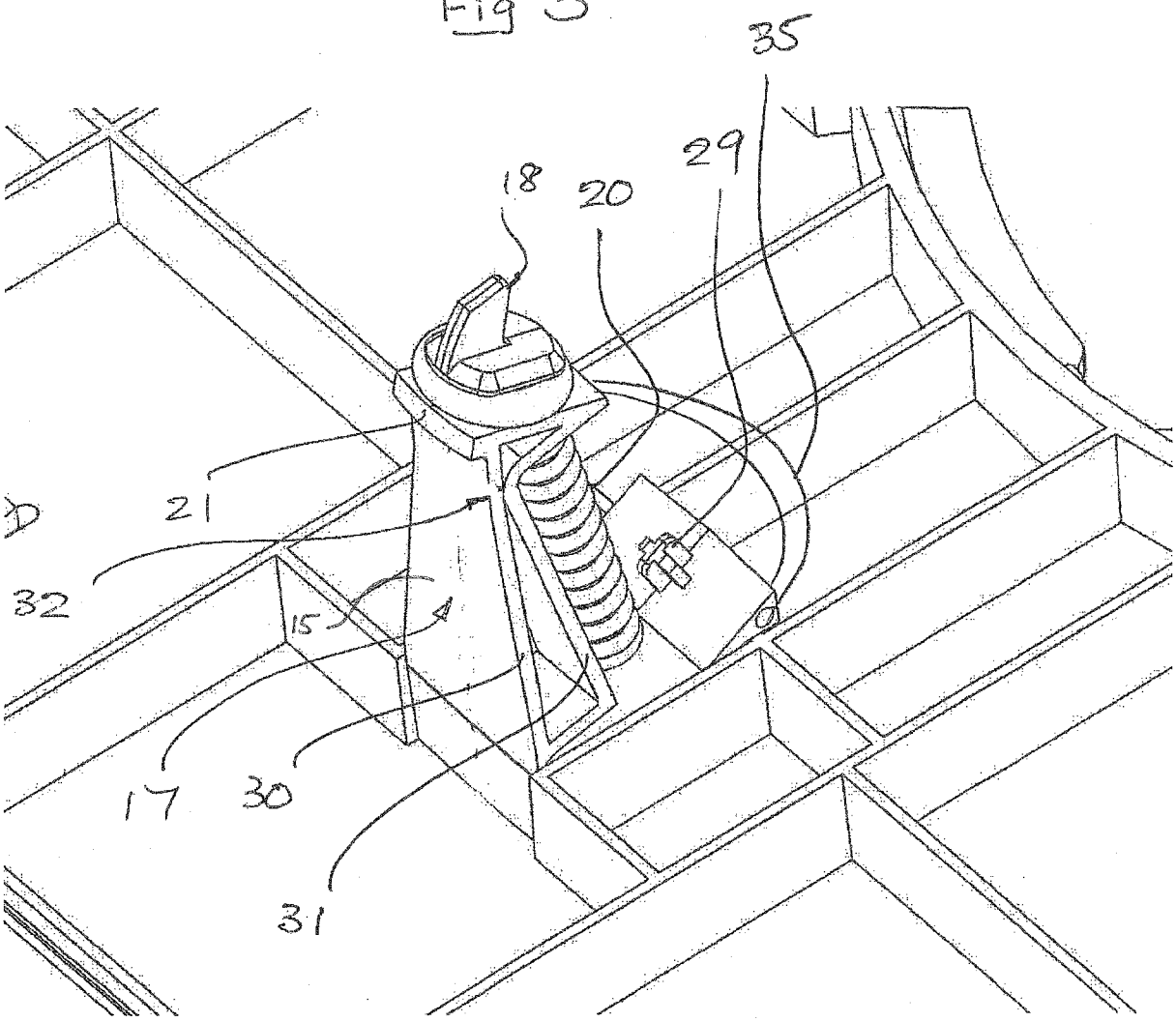
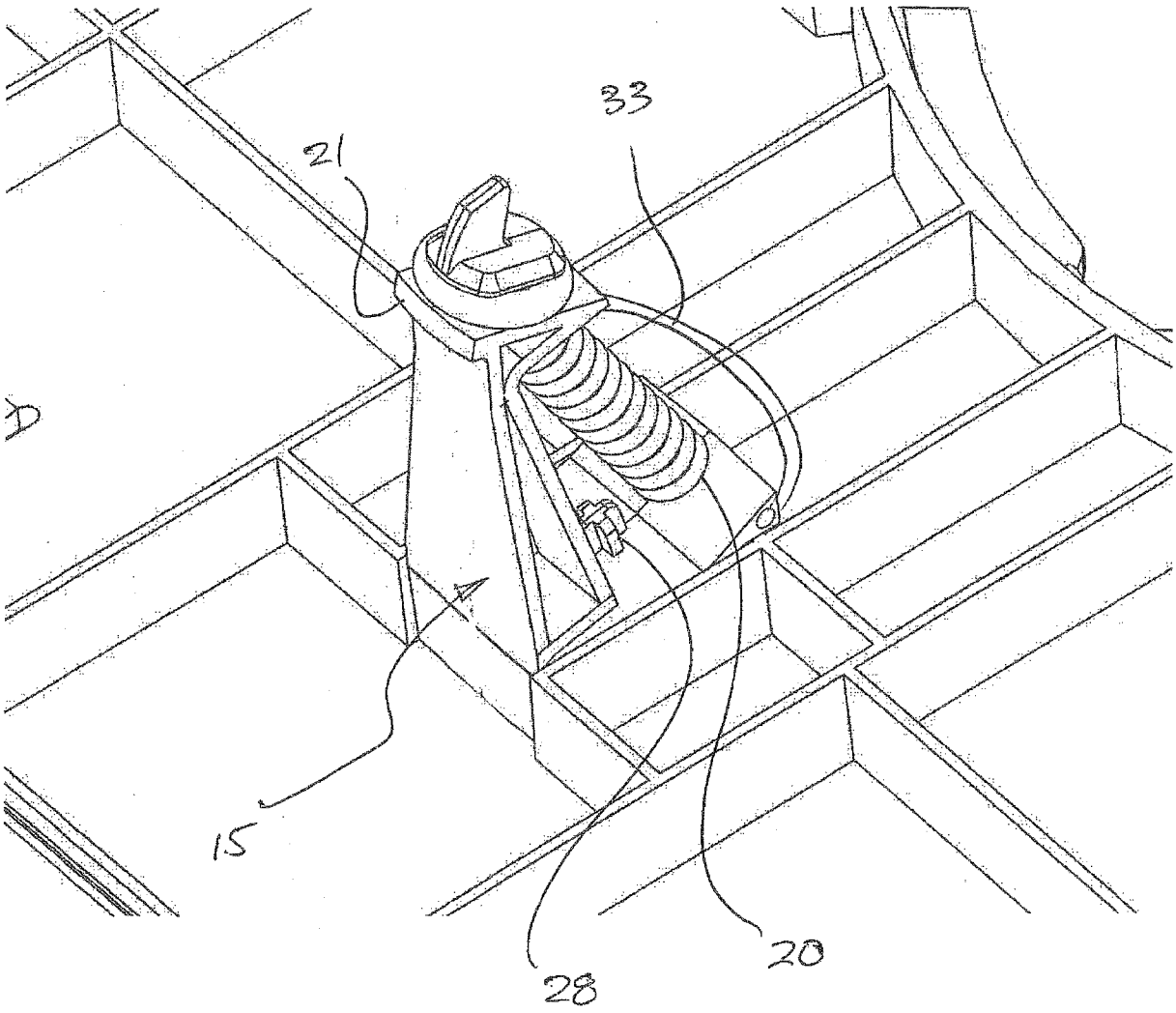


Fig 4



INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2009/000189

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

B60R 1/02 (2006.01) ***B60R 1/06*** (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)
REFER ELECTRONIC DATABASE CONSULTED

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 practicable, search terms used)
WPI, EPODOC - B60R1/- and keywords rear view mirror, rear vision mirror, damp, vibrate, shock, absorb, bend, flex, resilient, impinge, contact, slide, glide and similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 3501915 A1 (REITTER & SCHEFENACKER KG) 24 July 1986 Column 3, line 26 – column 5, line 47	1-2, 4-10
X	CA 2043982 A1 (METAGAL INDUSTRIA E COMERCIO LTDA) 12 July 1992 Page 4 and figures	1, 4-10
A	WO 1999/000272 A1 (UT AUTOMOTIVE DEARBORN INC) 7 January 1999	
A	US 7175292 B2 (FLYNN) 13 February 2007	

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

"E" earlier application or patent but published on or after the international filing date

"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)

"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

"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

"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

"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
06 March 2009	19 MAR 2009
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. +61 2 6283 7999	Authorized officer **R Subbarayan** AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No : +61 2 6283 2377

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/AU2009/000189

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
DE	3501915	NONE					
CA	2043982	BR	9100197				
WO	9900272	NONE					
US	7175292	EP	1432596	US	2004184171	WO	03013908

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX