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Declarations under Rule 4.17:

— as to the identity of the inventor (Rule 4.17(i))

[Continued on next page]

(54) Title: DECORATIVE RING POINTER CAP ILLUMINATION

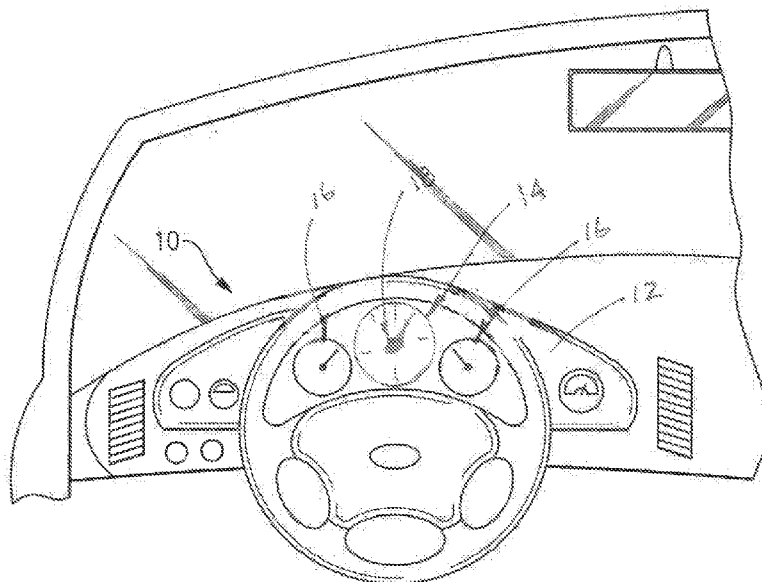


FIG. 1

(57) Abstract: A pointer assembly for a vehicle instrument panel includes a pointer arm, a cap, and a shroud. The pointer arm includes a platform portion disposed about an axis of rotation and an arm portion extending outward from the platform portion. The platform portion includes an illuminable perimeter. The cap is secured to the platform portion of the pointer arm inside of the illuminable perimeter. The shroud is secured to the platform portion of the pointer arm outside of the illuminable perimeter, and the illuminable perimeter is visible between an outer perimeter of the cap and an inner perimeter of the shroud.



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- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*
- Published:**
- *with international search report (Art. 21(3))*

DECORATIVE RING POINTER CAP ILLUMINATION

FIELD

[0001] The present disclosure relates to vehicle instrument panels and clusters, and more specifically to a pointer assembly that provides illumination of the pointer and a perimeter ring about an axis of rotation.

BACKGROUND

[0002] Vehicles include instrument panels to communicate information indicative of operation to an operator. Motor vehicles include instrument panels with several gauges and dials that communicate vehicle conditions such as speed, engine rpm, temperature, oil pressure along with many other operational parameters. A pointer rotates about an axis and points to a scale to communicate the vehicle condition to a vehicle operator. The pointer is sometimes illuminated to provide visibility and a desired look to the instrument panel.

[0003] The background description provided herein is for the purpose of generally presenting a context of this disclosure. Work of the presently named inventors, to the extent it is described in this background section, as well as aspects of the description that may not otherwise qualify as prior art at the time of filing, are neither expressly nor impliedly admitted as prior art against the present disclosure.

DRAWINGS

- [0004] Figure 1 is a schematic view of an example vehicle dashboard and instrument panel.
- [0005] Figure 2 is isometric view of an example disclosed pointer assembly.
- [0006] Figure 3 is a top view of a disclosed pointer assembly.
- [0007] Figure 4 is a cut-away view of a disclosed pointer assembly.
- [0008] Figure 5 is a perspective view of an example pointer arm.
- [0009] Figure 6 is a top view of the example pointer arm.
- [0010] Figure 7 is a cross-sectional view of the example pointer arm.
- [0011] Figure 8 is another cross-sectional view of the example pointer arm.
- [0012] Figure 9 is another cut-away view of the disclosed pointer assembly.
- [0013] Figure 10 is an enlarged view of a portion of the pointer assembly.
- [0014] Figure 11 is an enlarged view of another portion of the pointer assembly.

DESCRIPTION

[0015] Referring to Figure 1, a vehicle dashboard 10 is shown and includes an instrument panel 12 that includes a main gauge 14 and accessory gauges 16. The gauges 14 and 16 include a pointer assembly 18 for indicating a vehicle operating parameter.

[0016] Referring to Figure 2-4, the example disclosed pointer assembly 18 includes a pointer arm supported on a shaft of a stepper motor. The stepper motor is supported on a printed circuit board within a light housing. Light emitting devices are supported on the printed circuit board and within the light housing. In this example, the light emitting devices are light emitting diodes (LED), however other light emitting devices could be used and are within the contemplation of this disclosure.

[0017] The pointer arm functions as a light guide and is illuminable by the light emitting devices on the printed circuit board. The pointer arm includes a platform portion disposed about an axis of rotation and an arm portion that extends from the platform portion. A column extends downward from the platform portion and includes a central opening for the shaft of the stepper motor. The disclosed example platform portion is circular and includes outer perimeter walls that extend upward from an interior surface. The perimeter walls define a central space about the central opening. Light from the light generating devices in this example is received on a bottom side of the platform portion and is communicated throughout the pointer arm.

[0018] A cap is mounted to the platform portion and over the central space. The cap includes an outer perimeter that is disposed inside of the perimeter walls of the platform. A top surface of the cap includes an illuminable portion. In this example the illuminable portion is a separate portion or dial that is attached to a top surface of the cap. The dial is illuminated by light communicated through the pointer arm. In this example the illuminable portion is disposed along the axis of rotation. The cap includes an opening through the top surface to enable illumination of the dial. The example dial is circular, however it is within the contemplation of this disclosure that the illuminable portion of the dial could be any shape or graphic design providing a desired appearance.

[0019] A shroud is mounted to an outer surface of the perimeter walls of the platform portion of the pointer arm. A top surface of the perimeter wall is visible between

the cap and the shroud. The shroud surrounds the outer surface of the perimeter wall of the pointer arm to control or block light visible through the outer surface of the perimeter walls.

[0020] Referring to Figures 5-8 with continued reference to Figure 4, the pointer arm is fabricated from a material that provides for communication of light to all surfaces. Accordingly, the arm portion and the perimeter wall portion are illuminated by light communicated to a bottom surface of the pointer arm. The arm portion extends from the platform portion and receives light from the light emitting devices on the circuit board. The platform portion includes a groove on the interior surface that directs light from the bottom surface into perimeter walls and the arm portion. The interior surface further includes mounting holes that receive pins of the cap.

[0021] Referring to Figures 9, 10 and 11 with continued reference to the previous figures, the cap includes pins that extend through the mounting holes on the interior surface. Ends of the pins are heat staked to secure the cap to the pointer arm. The shroud includes an annular snap that fits into a corresponding chamfer defined on the perimeter wall. The shroud further includes a bottom lip portion that extends partially under the platform portion to prevent leakage into an area visible to a vehicle operator.

[0022] The groove on the interior surface includes a depth and shape for reflecting light through the pointer arm. In this example the groove reflects light through the interior surface of the platform portion into the perimeter wall. The intersection between the upward extending perimeter wall and the interior surface includes a cut that provides an angled reflecting surface that reflects light upward into the perimeter walls. Accordingly, the groove provides a first reflecting surface that directs light transverse to the axis of rotation and the cut provides a second reflecting surface that directs light within the interior surface upward in a direction substantially parallel to the axis of rotation. As is shown the perimeter walls are disposed substantially parallel to the axis rotation and the top surface is substantially transverse to the axis rotation.

[0023] Light reflects within the perimeter wall and to the top surface. Because the top surface is not covered by either the cap or the shroud, it is visible to the vehicle operator. In this example the perimeter wall is circular and therefore the visible top surface of the perimeter walls defines a circle about the axis of rotation. (Best show in Figure 3). Light is further reflected into the arm portion to illuminate the arm portion. Light is therefore

propagated through the pointer platform to the viewable surfaces. The depth and shape of the groove are defined to tailor light reflection into the arm and the perimeter walls. Similarly, the length and angle of the cut provides regulation of light transmitted into the perimeter walls. Regulation of the depth angle and shape of the groove enable tailoring of luminance in the top surface that provides the visible ring in the pointer assembly. Moreover, the surface roughness of the groove, cut and the top surface of the perimeter wall may also be modified to tailor luminance. Additional cuts and grooves could be provided to further tailor the propagation of light through the pointer arm.

[0024] Although an example embodiment has been disclosed, a worker of ordinary skill in this art would recognize that certain modifications would come within the scope of this disclosure. For that reason, the following claims should be studied to determine the scope and content of this disclosure.

CLAIMS

1. A pointer assembly for a vehicle instrument panel comprising:
 - a pointer arm including a platform portion disposed about an axis of rotation and an arm portion extending outward from the platform portion, the platform portion including an illuminable perimeter;
 - a cap secured to the platform portion of the pointer arm inside of the illuminable perimeter; and
 - a shroud secured to the platform portion of the pointer arm outside of the illuminable perimeter, wherein the illuminable perimeter is visible between an outer perimeter of the cap and an inner perimeter of the shroud.

2. The pointer assembly as recited in claim 1, wherein the pointer arm includes column extending from the platform portion about the axis, the column including a central opening.
3. The pointer assembly as recited in claim 1, wherein the cap includes an illuminable area.
4. The pointer assembly as recited in claim 1, including a light housing supported on a circuit board, the circuit board including light generating devices disposed within the light housing for directing light into the pointer arm.
5. The pointer assembly as recited in claim 4, including a stepper motor having rotatable shaft for moving the pointer assembly about the axis.

6. An instrument panel assembly comprising:
- at least one gauge defining a scale representing a vehicle operating parameter; and
 - a pointer assembly for indicating on the scale to communicate a value of a vehicle operating parameter, the pointer assembly including:
 - a pointer arm including a platform portion and an arm portion extending outward from the platform portion, the platform portion including an illuminable perimeter;
 - a cap secured to the platform portion of the pointer arm inside of the illuminable perimeter; and
 - a shroud secured to the platform portion of the pointer arm outside of the illuminable perimeter, wherein the illuminable perimeter is visible between an outer perimeter of the cap and an inner perimeter of the shroud.

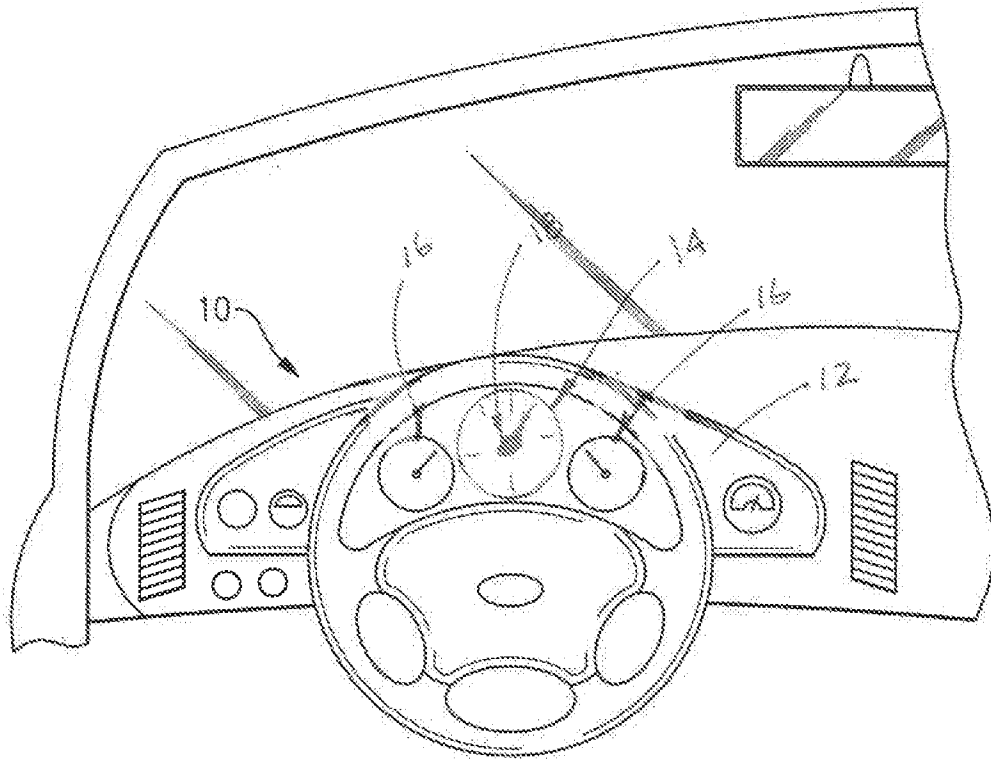


FIG. 1

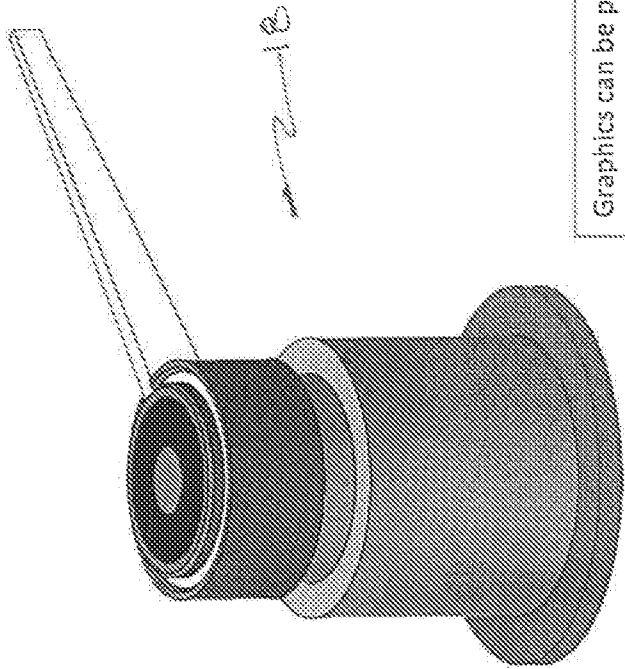


Fig. 2

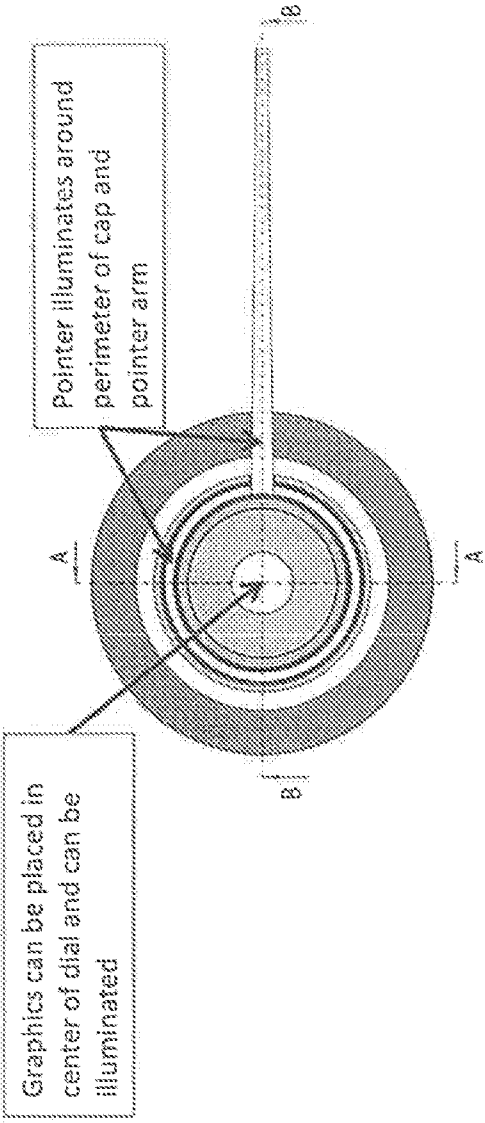


Fig. 3

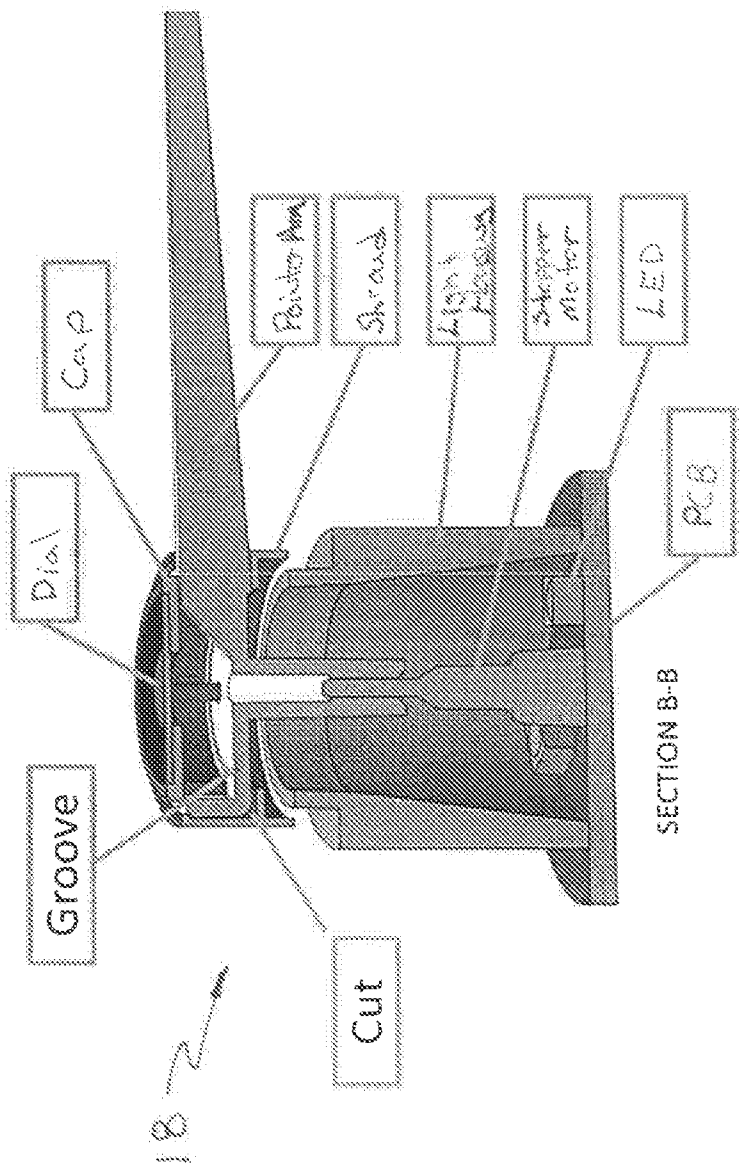
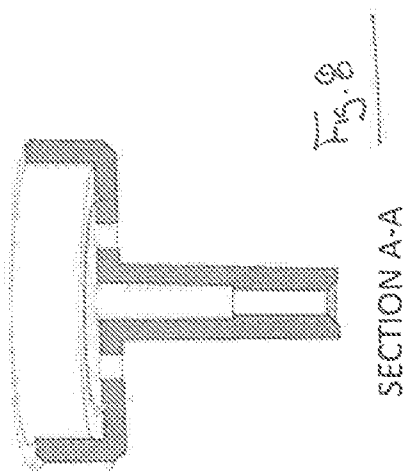
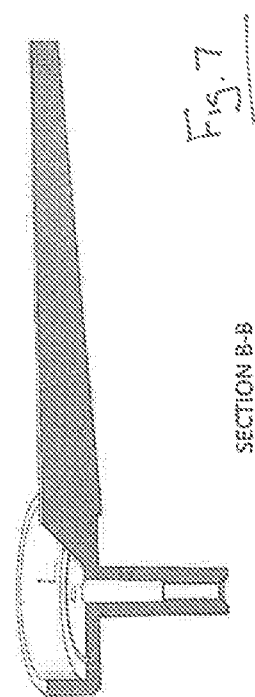
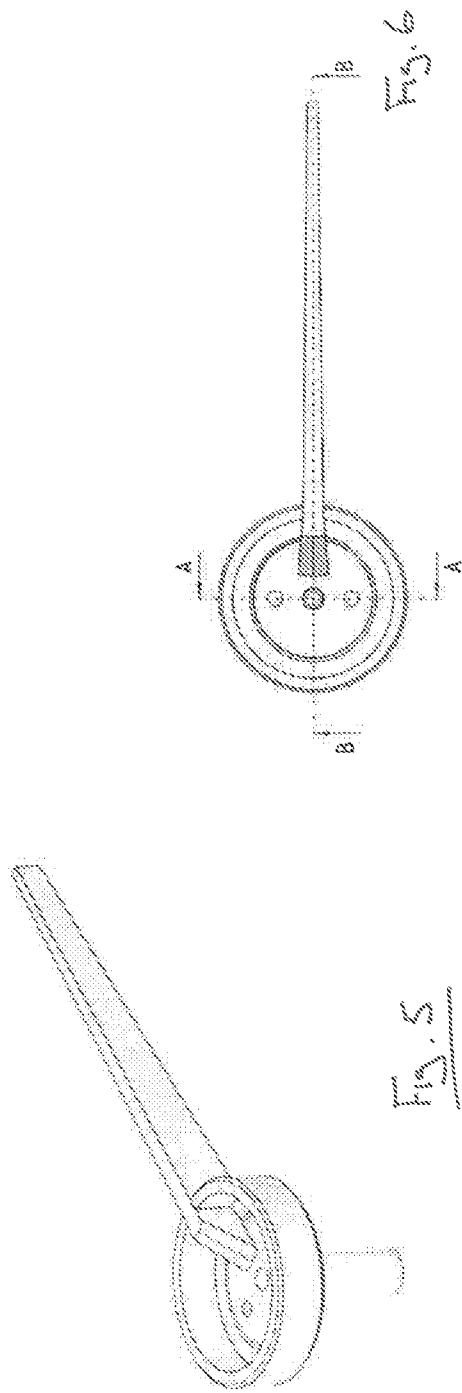
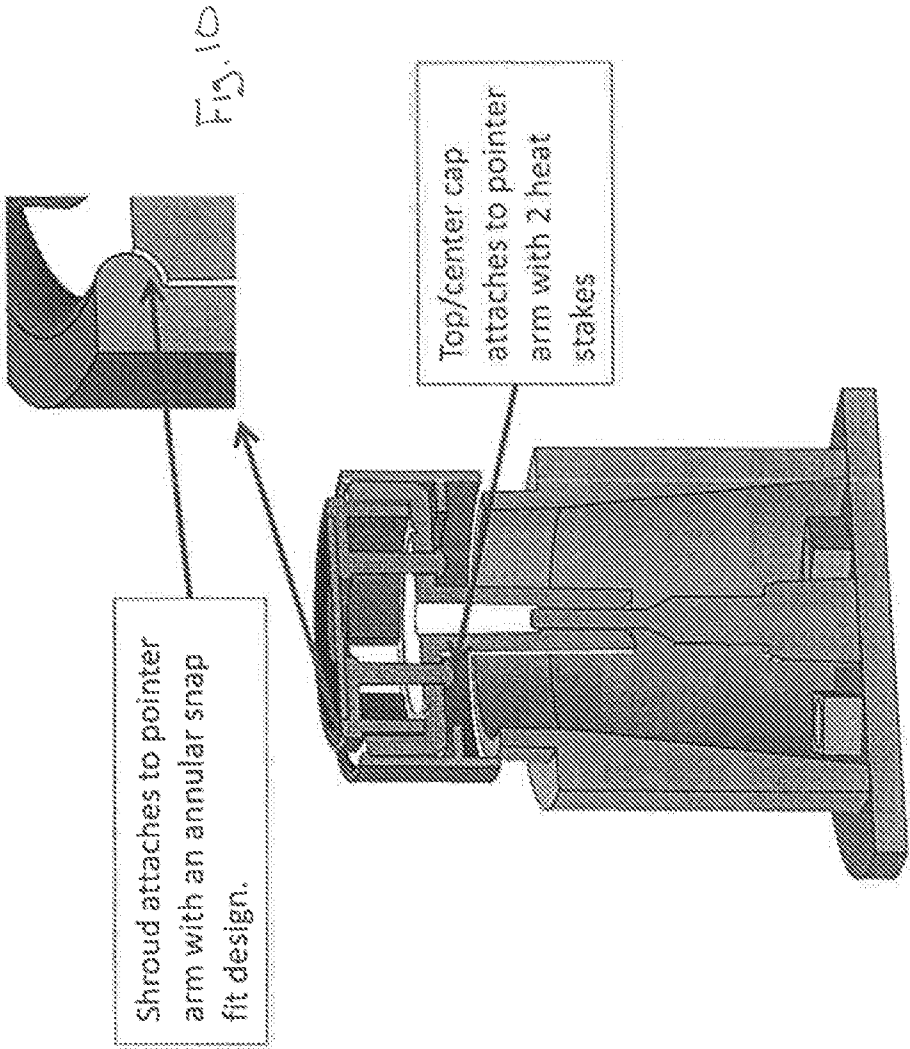


FIG. 4





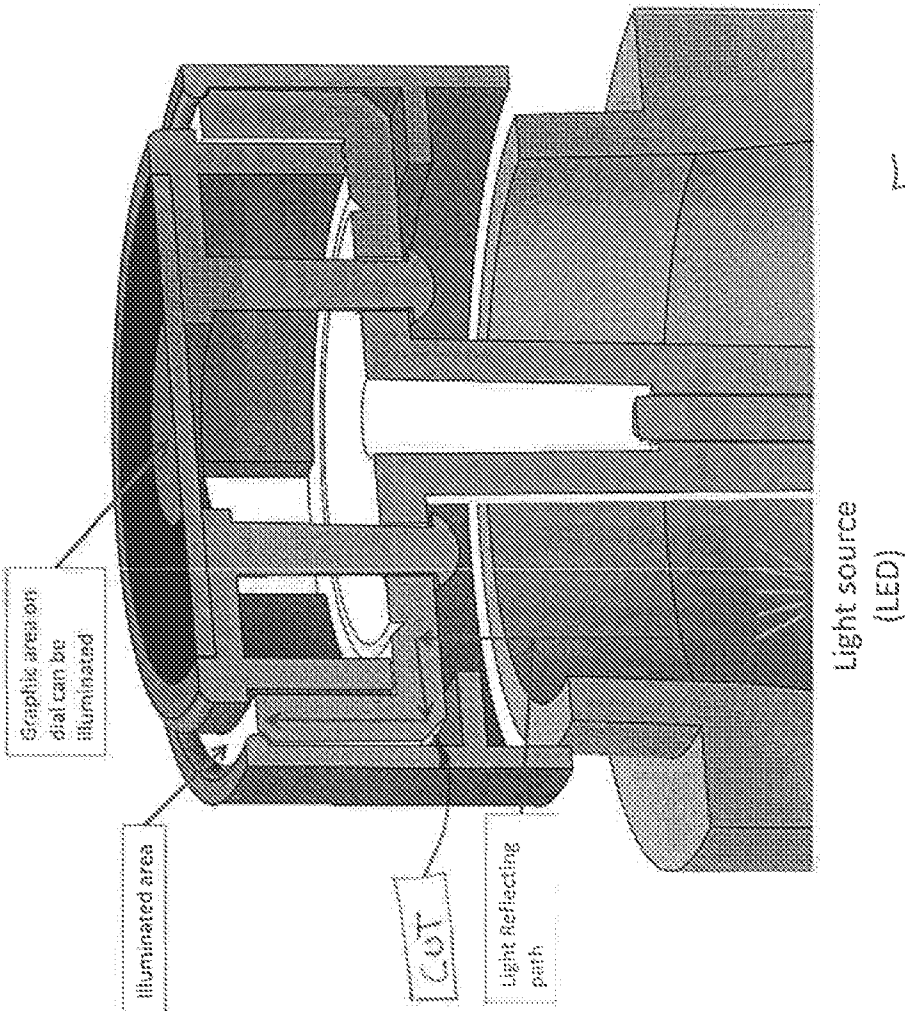


Fig. 11

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 17/19558

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B60Q 3/04, G01D 13/00, G01D 13/22 (2017.01)

CPC - G02B 6/00, G02B 6/0001, G02B 6/0011, G04B 19/00, G04B 19/30, B60K 35/00, B60K 37/00; B60K 37/02, B60K 2350/00, B60K 2350/20, B60K 2350/203, B60K 2350/2039, B60K 2350/40, B60K 2350/408

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)

See Search History Document

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

See Search History Document

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

See Search History Document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---- Y	CN 201921773 Y (ZHONGHUI SUN) 19 August 2009 (19.08.2009) entire document, especially, Translation, Title, Abstract, pg 3, figs. 1-2.	1, 3 ----- 2, 4-6
Y	US 2014/0165903 A1 (Birman et al.) 19 June 2014 (19.06.2014) entire document, especially Title, ABSTRACT, figs. 1-2, para[0015]-[0018].	2, 4-6
A	US 2015/0138751 A1 (Sherman et al.) 21 May 2015 (21.05.2015) entire document.	1-6
A	US 6,338,561 B1 (Ikashiki) 15 January 2002 (15.01.2002) entire document.	1-6

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

* 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
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"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 April 2017	Date of mailing of the international search report 22 MAY 2017
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774