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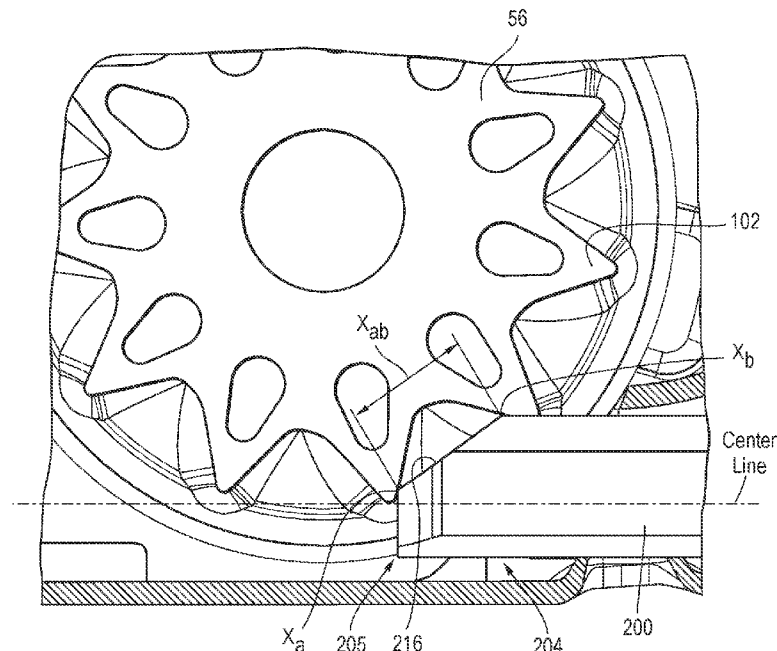
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(54) Title: RETRACTOR PRETENSIONER ASSEMBLY

FIG. 8B



(57) Abstract: A seatbelt pretensioner system includes a pretensioner tube in fluid communication with a gas generator and a pretensioner rod having a proximal end portion disposed toward the gas generator and a distal end portion disposed at an exit of the pretensioner tube. The pretensioner rod is disposed inside the pretensioner tube in a pre-actuation state and adapted to travel within the pretensioner tube toward a pretensioner wheel upon an actuation of the gas generator in a post-actuation state. The pretensioner rod includes a protrusion formed in a radial direction of the rod to couple with the pretensioner tube to restrict the rod from moving out from the pretensioner tube in the pre-actuation state. The pretensioner rod is configured to avoid the stripping of the rod and reduce energy consumption when the polymer rod is deformed during pretensioning.





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- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2024/033713

A. CLASSIFICATION OF SUBJECT MATTER

INV. B60R22/28 B60R22/46
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)

B60R

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)

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	US 10 328 895 B2 (AUTOLIV ASP INC [US]) 25 June 2019 (2019-06-25) column 6, line 54 - line 62 column 8, line 1 - line 6 column 8, line 53 - column 9, line 16 column 14, line 3 - line 21 column 15, paragraph 55 - paragraph 60 figures 4,10b -----	1 - 7
X	US 2020/353892 A1 (WANG BIN [US] ET AL) 12 November 2020 (2020-11-12) paragraph [0053] - paragraph [0068] figures 5-9d -----	8 - 15

☐

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

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"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

9 December 2024

Date of mailing of the international search report

02/01/2025

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2024/033713

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims;; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☒ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2024/033713

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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-7

Pretensioner rod

2. claims: 8-15

Pretensioner wheel
