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[Continued on next page]

(54) Title: IMPROVED SPLINE STRESS DISTRIBUTION

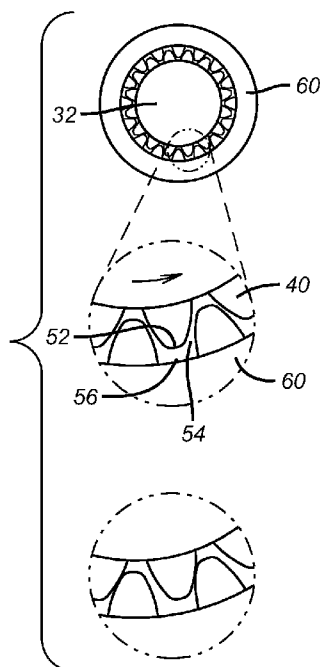


FIG. 6

(57) Abstract: A connection between a shaft and a coupling that preferably involves involute shaped splines is designed to reduce stress from torque applied to the shaft by a drive motor. To avoid stress concentration at the mouth of the coupling on startup, the shaft splines are made to taper from the shaft end down to the spline end. As a result, the initial contact with the coupling splines occurs within the coupling and removed from its mouth. The shaft is allowed to elastically twist in response to the applied torque as the contact area increases with shaft twisting and the contact line moves toward the mouth of the coupling. Stress concentration that formerly occurred at the coupling mouth is alleviated as some shaft elastic twist occurs without adding stress to the shaft splines until coupling contact is made.



EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU,
LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK,
SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

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- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2010/036934**A. CLASSIFICATION OF SUBJECT MATTER****F04D 29/20(2006.01)i, F04D 29/044(2006.01)i, E21B 17/02(2006.01)i, F04B 17/00(2006.01)i**

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)

F04D 29/20; F16D 1/04; B25B 23/00; F04B 27/08; F04B 25/04; F04D 29/04

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords:spline,stress,distribution

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2002-174197 A (KAWAMOTO PUMP MFG. CO., LTD.) 21 June 2002 See Paragraph [0011] - Paragraph [0016]; Claim 1; Figures 1-4.	1-20
Y	KR 10-0232069 B1 (TEXTRON INC.) 01 December 1999 See Page 8 - Page 9; Claim 33; Figures 16-18.	1-20
E	KR 10-2010-0065655 A (HALLA CLIMATE CONTROL CORP.) 17 June 2010 See Paragraph [0024] - Paragraph [0027]; Claims 1-4; Figures 4-5.	1-20

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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