



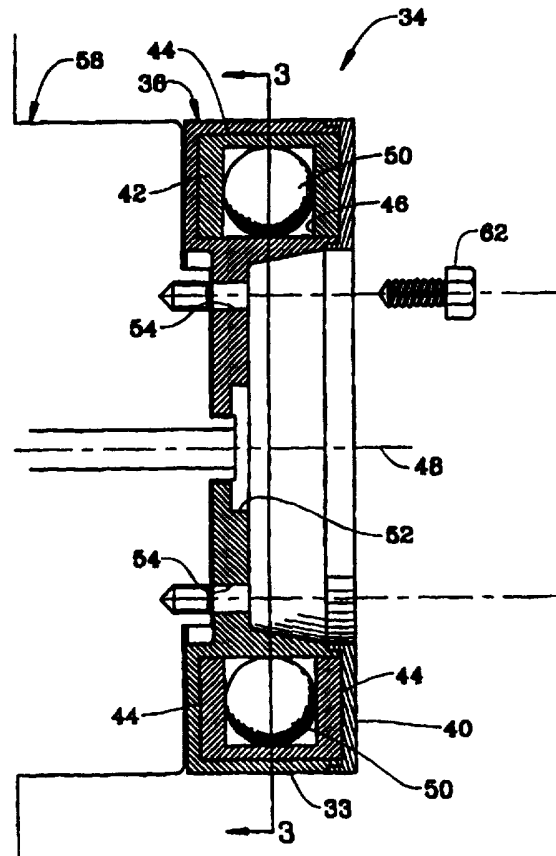
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : F16F 15/14, 15/173, 15/36</p>	<p>A3</p>	<p>(11) International Publication Number: WO 97/40286 (43) International Publication Date: 30 October 1997 (30.10.97)</p>
<p>(21) International Application Number: PCT/IB97/00505 (22) International Filing Date: 18 April 1997 (18.04.97) (30) Priority Data: 08/634,721 19 April 1996 (19.04.96) US (71) Applicant: ETI TECHNOLOGIES INC. [BB/GB]; La Plaiderie House, P.O. Box 79, St. Peter Port, Guernsey GY1 3DQ (GB). (72) Inventors: WIERZBA, Paul; 1116 Lake Placid Drive, S.E., Calgary, Alberta T2J 5H1 (CA). PERUSSE, Randy, W.; 200 Southampton Drive, S.W., Calgary, Alberta T2W 0V1 (CA). (74) Agent: SCHNEIDER, Matthew, L.; Burns, Doane, Swecker and Mathis, L.L.P., George Mason Building, Washington and Prince Streets, P.O. Box 1404, Alexandria, VA 22313-1404 (US).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p> <p>(88) Date of publication of the international search report: 19 February 1998 (19.02.98)</p>

(54) Title: TORSIONAL AND TRANSLATIONAL VIBRATION REMOVING DEVICE

(57) Abstract

A torsional and translational vibrational removing device (34) or balancer includes the combination of at least one annular torsional vibration damping mass (42) and a plurality of translational vibration compensating masses (50). The annular torsional vibration damping mass (42) can be positioned within an annular groove (46) in a housing so as to be capable of freely rotating during rotation of the balancer (34). The annular torsional vibration damping mass (42) can also be provided with an annular groove (46) that receives the translational vibration compensating masses (50). The compensating masses (50) are free to rotate within the annular groove (46) in the torsional vibration damping mass (42) so that during rotation of the balancer (34), the compensating masses (50) move within the annular groove (46) of the damping mass (42) to assume a position which reduces translational vibration while the torsional vibration damping mass (50) rotates to reduce torsional vibration.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakistan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB 97/00505

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 F16F15/14 F16F15/173 F16F15/36

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 6 F16F

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 practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 93 23687 A (BALANCE TECH LP) 25 November 1993 see the whole document ---	1-5, 8-15, 18, 20-24
A	US 5 460 017 A (TAYLOR GARY R) 24 October 1995 see the whole document ---	1-5, 8-15, 18, 20-24
A	US 4 905 776 A (BEYNET PIERRE A ET AL) 6 March 1990 see the whole document ---	1-3, 5, 8, 9, 13, 15, 18, 20, 23
	-/--	

Further documents are listed in the continuation of box C.

Patent family members are listed in 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 document 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

7 January 1998

Date of mailing of the international search report

14/01/1998

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Van der Veen, F

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 97/00505

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 010, no. 073 (M-463), 22 March 1986 & JP 60 215137 A (TOMIO INO), 28 October 1985, see abstract ---	1-5,8, 10-15, 18,20-24
A	DE 38 39 436 A (RENK TACKE GMBH) 31 May 1990 see the whole document -----	1,10-12, 20-22

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB 97/00505

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9323687 A	25-11-93	CA 2069120 A	22-11-93
		AT 145266 T	15-11-96
		AU 668565 B	09-05-96
		AU 4057493 A	13-12-93
		CA 2136317 A	25-11-93
		CN 1089700 A	20-07-94
		CZ 9402856 A	13-09-95
		DE 69305988 D	19-12-96
		DE 69305988 T	06-03-97
		EP 0640192 A	01-03-95
		ES 2096285 T	01-03-97
		FI 945459 A	18-01-95
		HU 71566 A	28-12-95
		IL 105733 A	31-10-96
		JP 8511076 T	19-11-96
		MX 9303010 A	28-02-94
		NO 944434 A	10-01-95
		NZ 252088 A	28-05-96
		SI 9300272 A	31-12-93
		SK 140194 A	10-05-95
ZA 9303518 A	10-12-93		
US 5460017 A	24-10-95	US 5613408 A	25-03-97
		US 5605078 A	25-02-97
		ZA 9403513 A	20-02-96
		US 5592858 A	14-01-97
US 4905776 A	06-03-90	NONE	
DE 3839436 A	31-05-90	NONE	