

US008161740B2

# (12) United States Patent Krause et al.

(54) FORCE TRANSMISSION DEVICE WITH A ROTATIONAL SPEED ADAPTIVE DAMPER AND METHOD FOR IMPROVING THE DAMPING PROPERTIES

 $(75) \quad \text{Inventors:} \quad \textbf{Thorsten Krause}, \\ \text{B\"{u}hl (DE)};$ 

Dominique Engelmann, Offendorf (FR)

(73) Assignee: Schaeffler Technologies AG & Co. KG,

Herzogenaurach (DE)

(\*) Notice: Subject to any disclaimer, the term of this

patent is extended or adjusted under 35

U.S.C. 154(b) by 0 days.

(21) Appl. No.: 12/800,961

(22) Filed: May 26, 2010

(65) Prior Publication Data

US 2010/0242466 A1 Sep. 30, 2010

### Related U.S. Application Data

(63) Continuation of application No. PCT/DE2008/001901, filed on Nov. 17, 2008.

(30) Foreign Application Priority Data

Nov. 29, 2007 (DE) ...... 10 2007 057 447

(51) Int. Cl. F16D 43/18 F16F 15/14

(2006.01) (2006.01) (10) Patent No.: US 8,161,740 B2 (45) Date of Patent: Apr. 24, 2012

(52) **U.S. Cl.** ...... 60/338; 192/30 V

See application file for complete search history.

#### (56) References Cited

### U.S. PATENT DOCUMENTS

6,026,940	A *	2/2000	Sudau	192/3.28
6.450.065	B1*	9/2002	Eckel et al	74/574.4

### FOREIGN PATENT DOCUMENTS

DE	198 04 227 A1	8/1999
DE	102 36 752 A1	2/2004
DE	10 2004 004 176 A1	8/2005
EP	1744074 A2 *	1/2007

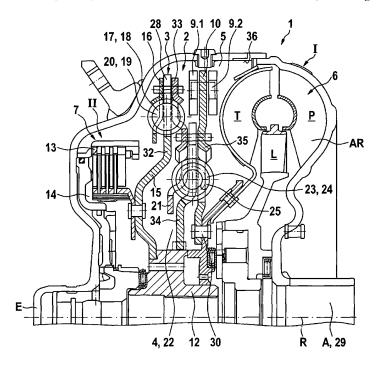
\* cited by examiner

Primary Examiner — Thomas E Lazo (74) Attorney, Agent, or Firm — Von Rohrscheidt Patents

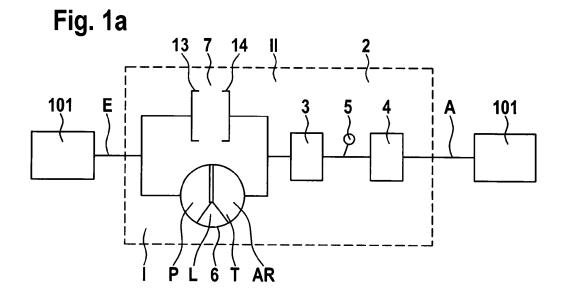
### (57) ABSTRACT

The invention relates to a force transmission device for power transmission between an input and an output, comprising at least an input and an output, and a vibration damping device disposed in a cavity that can be filled at least partially with an operating medium, in particular oil, the vibration damping device coupled with a rotational speed adaptive absorber, wherein the rotational speed adaptive absorber is tuned as a function of an oil influence to an effective order  $q_{\mbox{\tiny eff}}$  which is greater by an order shift value  $q_{\mbox{\tiny F}}$  than an order q of an exciting vibration of a drive system.

### 13 Claims, 5 Drawing Sheets







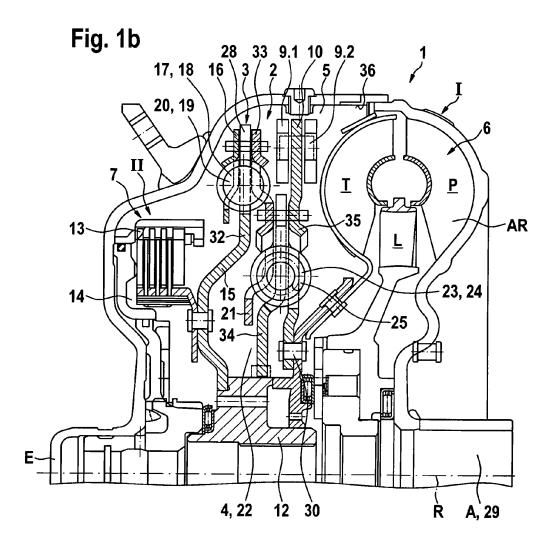


Fig. 2

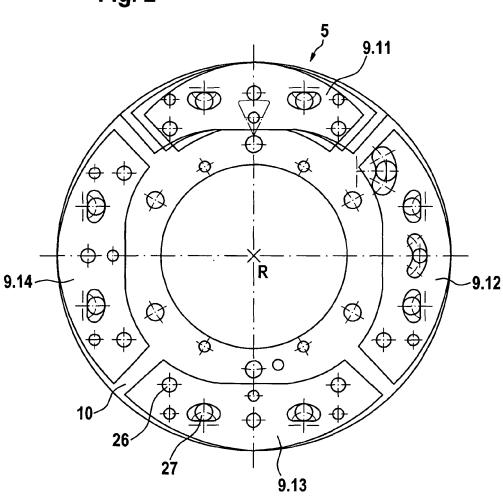
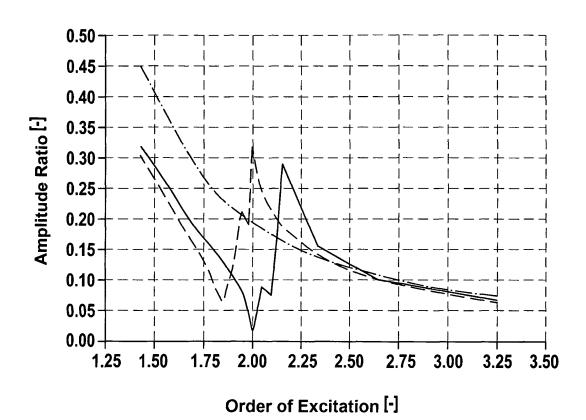


Fig. 3



without Oil

with Oil

**Dual Mass Flywheel without Centrifugal Force Pendulum** 



# DOCKET A L A R M

# Explore Litigation Insights



Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## **Real-Time Litigation Alerts**



Keep your litigation team up-to-date with **real-time** alerts and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

### **Advanced Docket Research**



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

### **Analytics At Your Fingertips**



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

### API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

### **LAW FIRMS**

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

### **FINANCIAL INSTITUTIONS**

Litigation and bankruptcy checks for companies and debtors.

### **E-DISCOVERY AND LEGAL VENDORS**

Sync your system to PACER to automate legal marketing.

