

Title (en)

Variable valve timing control apparatus

Title (de)

Vorrichtung zur Regelung der variablen Ventilsteuerzeit

Title (fr)

Appareil de contrôle de la synchronisation d'une soupape variable

Publication

**EP 2428656 A1 20120314 (EN)**

Application

**EP 11179376 A 20110830**

Priority

JP 2010203234 A 20100910

Abstract (en)

A variable valve timing control apparatus, includes a housing (1) rotating in synchronization with a drive shaft (C) of an internal combustion engine (E), an inner rotor (2) arranged coaxially with the housing (1) and rotatable relative to the housing (1), a driven shaft (5, 101), an intermediate member (6) arranged between the inner rotor (2) and the driven shaft (5) and rotating in synchronization with the inner rotor (2) and the driven shaft (5), a first hydraulic fluid passage (43, 73), an inner room (43b, 73b) formed between the driven shaft (5) and the inner rotor (2) and constituting a portion of the first hydraulic fluid passage (43, 73), a second hydraulic fluid passage (44, 74), a passage (44b, 74b) formed in the intermediate member (6) and constituting a portion of the second hydraulic fluid passage (44, 74), and a contact portion (A, B) at which an axial surface of the intermediate member (6) is entirely in contact with the inner rotor (2) between the first hydraulic fluid passage (43) and the second hydraulic fluid passage (44).

IPC 8 full level

**F01L 1/344** (2006.01)

CPC (source: EP US)

**F01L 1/3442** (2013.01 - EP US); **F01L 2001/34433** (2013.01 - EP US); **F01L 2001/34483** (2013.01 - EP US); **F01L 2301/00** (2020.05 - EP US)

Citation (applicant)

JP 3965051 B2 20070822

Citation (search report)

- [XY] DE 102008057492 A1 20100520 - DAIMLER AG [DE]
- [XY] DE 102008050134 A1 20100415 - ENTEC CONSULTING GMBH [DE]
- [X] DE 102008030057 A1 20100107 - HYDRAULIK RING GMBH [DE]
- [X] DE 102007020526 A1 20081106 - SCHAEFFLER KG [DE]
- [X] US 2010175651 A1 20100715 - TAKENAKA AKIHIKO [JP]
- [Y] US 5836278 A 19981117 - SCHEIDT MARTIN [DE]
- [Y] DE 10134320 A1 20030123 - INA SCHAEFFLER KG [DE]
- [Y] DE 102008029692 A1 20100107 - HYDRAULIK RING GMBH [DE]
- [A] DE 19952275 A1 20000504 - AISIN SEIKI [JP]
- [A] DE 19817319 A1 19991028 - DAIMLER CHRYSLER AG [DE]
- [A] DE 19944535 C1 20010104 - DAIMLER CHRYSLER AG [DE]

Cited by

EP2843202A1; EP2843201A1; EP2894304A4; EP3051081A4; CN105745405A; EP3075971A4; US9267401B2; US10107150B2; WO2015090298A1; US9447710B2

Designated contracting state (EPC)

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated extension state (EPC)

BA ME

DOCDB simple family (publication)

**EP 2428656 A1 20120314**; **EP 2428656 B1 20150805**; CN 102400728 A 20120404; CN 102400728 B 20150513; JP 2012057578 A 20120322; JP 5585832 B2 20140910; US 2012060779 A1 20120315

DOCDB simple family (application)

**EP 11179376 A 20110830**; CN 201110268518 A 20110906; JP 2010203234 A 20100910; US 201113217486 A 20110825