Title (en)

Method for balancing rotating bodies

Title (de)

Verfahren zum Auswuchten von rotierenden Körpern

Title (fr)

Procédé pour l'équilibrage de corps tournants

Publication

EP 1096050 A2 20010502 (DE)

Application

EP 00122114 A 20001012

Priority

DE 19952464 A 19991029

Abstract (en)

The method involves using a balance device with ball weights (13) moving freely in a circular track (12) concentric to the drum (2). An imbalance detection unit (6b,c) produces an imbalance signal during rotation or fluctuations in rotation speed. The system is rotated at a speed below its critical rotation speed, or that of its bearing system. The balancing unit is made so that the ball weights are carried in the track at this rotation speed. An evaluation unit (6d) produces the curve of imbalance amount and accelerates the bodies to a rotation speed above the critical speed in the area of the curve minimum or on exceeding a threshold value.

Abstract (de)

Die Erfindung betrifft ein Verfahren zum Auswuchten eines Körpers, der durch einen geregelten Antrieb in Rotation versetzt wird, unter Verwendung einer Auswuchtvorrichtung, bestehend aus mindestens einer mit dem Körper umlaufenden, konzentrisch zu seiner Rotationsachse angeordneten kreisringförmigen Laufbahn, innerhalb der Gewichte frei beweglich angeordnet sind, und unter Verwendung einer Unwuchterkennungseinrichtung, die die unwuchtbedingten Auslenkungen des aus dem Körper und der Auswuchteinrichtung bestehenden Systems während der Rotation oder dessen unwuchtbedingte Drehzahlschwankungen in ein Unwuchtsignal umwandelt, wobei das System in einem ersten Verfahrensschritt zur Unwuchterkennung mit einer Drehzahl unterhalb seiner kritischen Drehzahl oder unterhalb der kritischen Drehzahl seines Lagersystems gedreht wird und wobei die Auswuchteinrichtung derart beschaffen ist, dass die Gewichte bei dieser Drehzahl von der (den) Laufbahn(en) mitgenommen werden. Um sicher und in möglichst kurzer Zeit eine Kompensation der Unwucht vor dem Durchgang durch den kritischen Drehzahlbereich bzw. seine Resonanzfrequenzen zu erreichen, wird vorgeschlagen, dass eine Auswerteschaltung die Hüllkurve des Betrags des Unwuchtsignals ermittelt und im Bereich ihres Minimums oder bei Unterschreiten eines Grenzwertes den Körper auf eine Drehzahl oberhalb seiner kritischen Drehzahl oder der kritischen Drehzahl seines Lagersystems beschleunigt. <IMAGE>

IPC 1-7 (main, further and additional classification)

D06F 37/22

IPC 8 full level (invention and additional information)

D06F 37/20 (2006.01); **D06F 37/22** (2006.01)

CPC (invention and additional information)

D06F 37/225 (2013.01); **D06F 37/203** (2013.01)

Cited by

EP1950336A1; EP2083109A1; EP1918447A1; EP1921196A3; EP2000576A3; KR101287536B1; EP2821538A1; CN102510916A; CN102575408A; EP2470707A4; EP2470704A4; WO2011025317A1; US7669267B2; US9039786B2; US8341787B2; US9493897B2

Designated contracting state (EPC)

AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

EPO simple patent family

EP 1096050 A2 20010502; EP 1096050 A3 20020814; EP 1096050 B1 20050817; AT 302300 T 20050915; DE 19952464 A1 20010523; DE 19952464 C2 20020508; ES 2244383 T3 20051216

INPADOC legal status

2017-02-28 [PG25 ES] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO

- Ref Country Code : ES
- Free text : LAPSE BECAUSE OF NON-PAYMENT OF DUE FEES
- Effective date : 20151013

2016-11-29 [REG ES FD2A] ANNOUNCEMENT OF LAPSE IN SPAIN

- Effective date : 20161129

2016-08-31 [PG25 FR] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO

- Ref Country Code : FR
- Free text : LAPSE BECAUSE OF NON-PAYMENT OF DUE FEES
- Effective date : 20151102

2016-07-29 [PG25 DE] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO

- Ref Country Code : DE
- Free text : LAPSE BECAUSE OF NON-PAYMENT OF DUE FEES
- Effective date : 20160503

2016-07-29 [PG25 IT] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO

- Ref Country Code : IT
- Free text : LAPSE BECAUSE OF NON-PAYMENT OF DUE FEES
- Effective date : 20151012

2016-07-29 [PG25 GB] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO
- Ref Country Code : GB
- Free text : LAPSE BECAUSE OF NON-PAYMENT OF DUE FEES
- Effective date : 20151012

2016-07-29 [REG FR ST] NOTIFICATION OF LAPSE
- Effective date : 20160630

2016-06-29 [GBPC] GB: EUROPEAN PATENT CEASED THROUGH NON-PAYMENT OF RENEWAL FEE
- Effective date : 20151012

2016-05-03 [REG DE R119] APPLICATION DEEMED WITHDRAWN, OR IP RIGHT LAPSED, DUE TO NON-PAYMENT OF RENEWAL FEE
- Document : DE 50010961

2015-03-31 [PGFP IT] POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE
- Ref Country Code : IT
- Payment date : 20141029
- Year of fee payment : 15

2015-01-30 [PGFP FR] POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE
- Ref Country Code : FR
- Payment date : 20141021
- Year of fee payment : 15

2015-01-30 [PGFP ES] POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE
- Ref Country Code : ES
- Payment date : 20141024
- Year of fee payment : 15

2015-01-30 [PGFP DE] POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE
- Ref Country Code : DE
- Payment date : 20141031
- Year of fee payment : 15

2015-01-30 [PGFP GB] POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE
- Ref Country Code : GB
- Payment date : 20141024
- Year of fee payment : 15

2011-05-31 [PG25 SE] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO
- Ref Country Code : SE
- Free text : LAPSE BECAUSE OF NON-PAYMENT OF DUE FEES
- Effective date : 20091013

2010-10-29 [PG25 CH] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO
- Ref Country Code : CH
- Free text : LAPSE BECAUSE OF NON-PAYMENT OF DUE FEES
- Effective date : 20091031

2010-10-29 [PG25 LI] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO
- Ref Country Code : LI
- Free text : LAPSE BECAUSE OF NON-PAYMENT OF DUE FEES
- Effective date : 20091031

2010-08-31 [PG25 AT] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO
- Ref Country Code : AT
- Free text : LAPSE BECAUSE OF NON-PAYMENT OF DUE FEES
- Effective date : 20091012

2010-07-30 [PG25 NL] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO
- Ref Country Code : NL
- Free text : LAPSE BECAUSE OF NON-PAYMENT OF DUE FEES
- Effective date : 20100501

2010-06-02 [EUG] SE: EUROPEAN PATENT HAS LAPSED

2010-05-31 [REG CH PL] PATENT CEASED

2010-05-26 [REG NL V1] LAPSED BECAUSE OF NON-PAYMENT OF THE ANNUAL FEE
- Effective date : 20100501

2009-03-31 [PGFP SE] POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE
- Ref Country Code : SE
- Payment date : 20081027
- Year of fee payment : 9

2009-02-27 [PGFP AT] POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE
- Ref Country Code : AT
- Payment date : 20081023
- Year of fee payment : 9

2009-01-30 [PGFP CH] POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE
- Ref Country Code : CH
- Payment date : 20081027
- Year of fee payment : 9

2008-11-28 [PGFP NL] POSTGRANT: ANNUAL FEES PAID TO NATIONAL OFFICE
- Ref Country Code : NL
- Payment date : 20081023
- Year of fee payment : 9

2008-09-15 [REG CH PCAR] CHANGE OF THE ADDRESS OF THE REPRESENTATIVE
- Free text : ALDO ROEMPLER PATENTANWALT;BRENDENWEG 11 POSTFACH 154;9424 RHEINECK (CH)

2007-12-31 [BERE] BE: LAPSED
- Owner name : MIELE & CIE. K.G.
- Effective date : 20051031

2006-11-15 [REG GB 746] REGISTER NOTED 'LICENCES OF RIGHT' (SECT. 46/1977)
- Effective date : 20061020

2006-07-26 [26N] NO OPPOSITION FILED
- Effective date : 20060518

2006-05-26 [ET] FR: TRANSLATION FILED

2006-03-22 [REG IE FD4D] EUROPEAN PATENTS DESIGNATING IRELAND TREATED AS ALWAYS HAVING BEEN VOID

2006-01-17 [PG25 PT] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO
- Ref Country Code : PT
- Free text : LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION OF THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT
- Effective date : 20060117

2005-12-16 [REG ES FG2A] DEFINITIVE PROTECTION
- Document : ES 2244383 T3

2005-11-17 [PG25 DK] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO
- Ref Country Code : DK
- Free text : LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION OF THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT
- Effective date : 20051117

2005-11-17 [PG25 GR] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO
- Ref Country Code : GR
- Free text : LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION OF THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT
- Effective date : 20051117

2005-10-31 [PG25 BE] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO
- Ref Country Code : BE
- Free text : LAPSE BECAUSE OF NON-PAYMENT OF DUE FEES
- Effective date : 20051031

2005-10-31 [PG25 LU] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO
- Ref Country Code : LU
- Free text : LAPSE BECAUSE OF NON-PAYMENT OF DUE FEES
- Effective date : 20051031

2005-10-31 [PG25 MC] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO
- Ref Country Code : MC
- Free text : LAPSE BECAUSE OF NON-PAYMENT OF DUE FEES
- Effective date : 20051031

2005-10-26 [GBT] GB: TRANSLATION OF EP PATENT FILED (GB SECTION 77(6)(A)/1977)
- Effective date : 20051003

2005-10-12 [PG25 CY] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO
- Ref Country Code : CY
- Free text : LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION OF THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT
- Effective date : 20051012

2005-09-27 [REG SE TRGR] TRANSLATION OF GRANTED EP PATENT

2005-09-22 [REF] CORRESPONDS TO:
- Document : DE 50010961 P 20050922

2005-09-21 [REG IE FG4D] EUROPEAN PATENTS GRANTED DESIGNATING IRELAND
- Free text : LANGUAGE OF EP DOCUMENT: GERMAN

2005-09-15 [REG CH NV] NEW AGENT
- Representative's name : PA ALDO ROEMPLER

2005-08-31 [REG CH EP] ENTRY IN THE NATIONAL PHASE

2005-08-17 [AK] DESIGNATED CONTRACTING STATES:
- Kind Code of Ref Document : B1
- Designated State(s) : AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

2005-08-17 [REG GB FG4D] EUROPEAN PATENT GRANTED
- Free text : NOT ENGLISH

2005-08-17 [PG25 FI] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO
- Ref Country Code : FI
- Free text : LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION OF THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT
- Effective date : 20050817

2005-08-17 [PG25 IE] LAPSED IN A CONTRACTING STATE ANNOUNCED VIA POSTGRANT INFORM. FROM NAT. OFFICE TO EPO
- Ref Country Code : IE
- Free text : LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION OF THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT
- Effective date : 20050817

2005-08-17 [RIN1] INVENTOR CHANGED BEFORE GRANT
- Inventor name : DYBALLA, CHRISTIAN, DR.

2005-08-17 [RIN1] INVENTOR CHANGED BEFORE GRANT
- Inventor name : GROSSE HUENDFELD, MAX

2005-08-17 [RIN1] INVENTOR CHANGED BEFORE GRANT
- Inventor name : HAMBROCK, JUERGEN

2005-08-17 [RIN1] INVENTOR CHANGED BEFORE GRANT
- Inventor name : HAPKE, ARMIN

2005-08-17 [RIN1] INVENTOR CHANGED BEFORE GRANT
- Inventor name : HERDEN, RUDOLF

2005-08-17 [RIN1] INVENTOR CHANGED BEFORE GRANT
- Inventor name : KAUFMANN, REINHARD

2005-08-17 [RIN1] INVENTOR CHANGED BEFORE GRANT
- Inventor name : KUKA, THORSTEN

2005-08-17 [RIN1] INVENTOR CHANGED BEFORE GRANT
- Inventor name : MUELLER, HELGE

2004-11-24 [17Q] FIRST EXAMINATION REPORT
- Effective date : 20041011

2003-07-09 [RAP1] TRANSFER OF RIGHTS OF AN APPLICATION
- Owner name : MIELE & CIE. KG

2003-05-07 [AKX] PAYMENT OF DESIGNATION FEES
- Designated State(s) : AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

2003-03-19 [17P] REQUEST FOR EXAMINATION FILED
- Effective date : 20030116

2002-08-14 [AK] DESIGNATED CONTRACTING STATES:
- Kind Code of Ref Document : A3
- Designated State(s) : AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

2002-08-14 [AX] REQUEST FOR EXTENSION OF THE EUROPEAN PATENT TO:
- Free text : AL;LT;LV;MK;RO;SI

2001-05-02 [AK] DESIGNATED CONTRACTING STATES:
- Kind Code of Ref Document : A2
- Designated State(s) : AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

2001-05-02 [AX] REQUEST FOR EXTENSION OF THE EUROPEAN PATENT TO:
- Free text : AL;LT;LV;MK;RO;SI