

Title (en)
Improvements in vacuum pumps

Title (de)
Vakuumpumpen

Title (fr)
Pompes à vide

Publication
EP 0793019 A3 19990602 (EN)

Application
EP 97301303 A 19970227

Priority
GB 9604645 A 19960301

Abstract (en)
[origin: EP0793019A2] A vacuum pump which comprises a multi-stage reciprocating piston mode of operation in which piston reciprocation is effected by electromagnetic drive means and a counter-acting spring means and in which the pump stages are connected in series between a pump inlet and a pump outlet such that, in use, gas being transferred through the pump passes through the stages in turn. <IMAGE>

IPC 1-7
F04B 25/02; **F04B 35/04**

IPC 8 full level
F04B 25/02 (2006.01); **F04B 35/04** (2006.01); **F04B 37/14** (2006.01)

CPC (source: EP)
F04B 25/02 (2013.01); **F04B 35/045** (2013.01); **F04B 37/14** (2013.01)

Citation (search report)

- [X] WO 9301411 A1 19930121 - CHEN CHONGYUAN [JP]
- [Y] US 4954047 A 19900904 - OKUYAMA NOBUHISA [JP], et al
- [A] FR 2666853 A1 19920320 - TOYO ENGINEERING CORP [JP]
- [A] GB 2040361 A 19800828 - PIERBURG GMBH & CO KG
- [A] US 4699572 A 19871013 - BALKAU GUENTER K W [AU], et al
- [A] DE 2715102 A1 19781012 - SYNDICAT DES COPROPRIETAIRES D
- [A] US 4832578 A 19890523 - PUTT JAMES C [US]
- [Y] PATENT ABSTRACTS OF JAPAN vol. 013, no. 194 (M - 823) 10 May 1989 (1989-05-10)

Cited by

US10143783B2; EP1143146A3; EP1840375A1; US12029549B2; US11938231B2; US10537657B2; US11730876B2; US9801761B2; US11638666B2; US10299964B2; US10702418B2; US11253639B2; US11648342B2; US11931226B2; US9901664B2; US10881764B2; US11730877B2; US10307517B2; US11027051B2; US11534540B2; US11623039B2; US9642955B2; US10130526B2; US10682446B2; US10737002B2; US10780202B2; US10973965B2; US11141325B2; US11654228B2; EP1143146A2; US6857857B2; US9844473B2; US9956121B2; US10016309B2; US10231875B2; US10278869B2; US10555839B2; US10744041B2; US10842678B2; US11129751B2; US11179276B2; US11351064B2; US11364151B2

Designated contracting state (EPC)
CH DE FR GB LI

DOCDB simple family (publication)
EP 0793019 A2 19970903; **EP 0793019 A3 19990602**; GB 9604645 D0 19960501; JP H102281 A 19980106

DOCDB simple family (application)
EP 97301303 A 19970227; GB 9604645 A 19960301; JP 4759497 A 19970303