

Title (en)

Reciprocating engine for use as a vacuum pump for medicinal purposes

Title (de)

Kolbenmaschine zum Einsatz als Vakuumpumpe für medizinische Zwecke

Title (fr)

Machine à pistons pour l'utilisation comme pompe à vide à des fins médicales

Publication

EP 2333336 A3 20120822 (DE)

Application

EP 10193640 A 20101203

Priority

DE 102009057070 A 20091204

Abstract (en)

[origin: EP2333336A2] The machine e.g. piston pump (10), has cylinders (12a, 12b), and cylinder heads (18a, 18b) for closing an opening of the cylinders. Pistons (22a, 22b) are arranged partially within the cylinders, where the pistons are arranged movably in a longitudinal direction relative to the cylinders and the cylinder heads using connecting rods (28a, 28b). The pistons have an opening that runs in the longitudinal direction. A partial area of guiding elements (30a, 30b) is arranged within the opening of the pistons, where the guiding elements are firmly connected to the cylinder heads.

IPC 8 full level

F04B 1/04 (2006.01); **F04B 3/00** (2006.01); **F04B 27/04** (2006.01); **F04B 39/00** (2006.01); **F04B 53/14** (2006.01); **F04B 53/16** (2006.01)

CPC (source: EP US)

F04B 3/003 (2013.01 - EP US); **F04B 27/0409** (2013.01 - EP US); **F04B 39/0005** (2013.01 - EP US); **F04B 39/0022** (2013.01 - EP US); **F04B 53/144** (2013.01 - EP US); **F04B 53/147** (2013.01 - EP US); **F04B 53/16** (2013.01 - EP US)

Citation (search report)

- [XA] US 1731044 A 19291008 - CARREY JOHN O
- [X] DE 2844719 A1 19790426 - SOCSIL SA
- [XI] DE 7623119 U1 19761125
- [XI] EP 0726393 A1 19960814 - CRYOGENIC GROUP INC [US]
- [X] DE 19541593 A1 19960515 - THOMAS INDUSTRIES INC [US]
- [X] DE 29701678 U1 19970327 - YANG HSI KUNG [TW]
- [XA] DE 1751949 A1 19710902 - PARKER HANNIFIN CORP

Cited by

CN104314787A

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

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EP 2333336 A2 20110615; **EP 2333336 A3 20120822**; **EP 2333336 B1 20150211**; BR PI1005342 A2 20130326; CN 102086853 A 20110608; CN 102086853 B 20160302; DE 102009057070 A1 20110609; DE 102009057070 B4 20121122; DE 102009057070 B9 20121129; JP 2011117453 A 20110616; JP 5637828 B2 20141210; KR 101533124 B1 20150709; KR 20110063303 A 20110610; PL 2333336 T3 20150731; RU 2010149726 A 20120610; RU 2468252 C2 20121127; US 2011132190 A1 20110609

DOCDB simple family (application)

EP 10193640 A 20101203; BR PI1005342 A 20101202; CN 201010571303 A 20101203; DE 102009057070 A 20091204; JP 2010270252 A 20101203; KR 20100117433 A 20101124; PL 10193640 T 20101203; RU 2010149726 A 20101203; US 94883310 A 20101118