

Title (en)  
Multistage dry vacuum pump

Title (de)  
Mehrstufige trockene Vakuumpumpe

Title (fr)  
Pompe à vide sèche à étages multiples

Publication  
**EP 1536140 A1 20050601 (EN)**

Application  
**EP 04078222 A 20041126**

Priority  
JP 2003397520 A 20031127

Abstract (en)  
A multistage dry vacuum pump (1) includes a housing (2) having a series of pump chambers (8, 9, 10, 11), a rotor means (12a, 12b; 13a, 13b; 14a, 14b; 15a, 15b) provided in each pump chamber, a shaft (16a) connected to the rotor means and a rotation driving means (20) connected to the shaft. The multistage dry vacuum pump includes an intermediate exhaust conduit (30), one end thereof connected to the outlet of an intermediate pump chamber (10), being a pump chamber other than the most downstream pump chamber (11) and the other end thereof opened to outside and a first fluid flow control device (32) provided in the intermediate exhaust conduit for closing the same when fluid pressure at an outlet side of the intermediate pump chamber is lower than at the other end of the intermediate exhaust conduit, and for opening the same when fluid pressure at an outlet side of the intermediate pump chamber is higher than that at the other end of the intermediate exhaust conduit. <IMAGE>

IPC 1-7  
**F04C 23/00**; **F04C 25/02**; **F04C 29/10**; **F04C 18/12**

IPC 8 full level  
**F04B 49/06** (2006.01); **F04C 18/12** (2006.01); **F04C 23/00** (2006.01); **F04C 25/02** (2006.01); **F04C 28/02** (2006.01); **F04C 28/26** (2006.01)

CPC (source: EP US)  
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**F04C 2220/12** (2013.01 - EP US)

Citation (search report)  
• [X] US 2003077182 A1 20030424 - NAITO YOSHIHIRO [JP], et al  
• [X] AT 140808 B 19350225 - HEINL FRANZ DR ING  
• [X] PATENT ABSTRACTS OF JAPAN vol. 012, no. 098 (M - 680) 31 March 1988 (1988-03-31)  
• [X] PATENT ABSTRACTS OF JAPAN vol. 016, no. 212 (M - 1250) 19 May 1992 (1992-05-19)  
• [X] PATENT ABSTRACTS OF JAPAN vol. 2000, no. 08 6 October 2000 (2000-10-06)

Cited by  
CN110177947A; EP1906023A1; CN106321435A; CN109821093A; CN110214231A; EP1906022A1; FR3001263A1; EP2767717A1;  
US11578722B2; WO2018134610A1; US8702407B2; US10465686B2; EP2378125A3; EP3447297A1; EP3842642A1; WO2007015056A1;  
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