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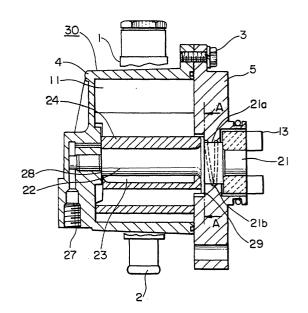
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#### (54) Automotive vane-type vacuum pump

(57)An automotive vane-type vacuum pump restrains seizure from taking place between an axial end surface of a rotor and a case, thereby permitting improved durability. The automotive vane-type vacuum pump for forcibly feeding a fluid from an inlet to an outlet includes a bottomed cylindrical case having an inlet and an outlet, a rotor eccentrically accommodated in the case, a shaft that is secured to the rotor, having both ends thereof rotatably supported by both bottom surfaces of the case, and rotates the rotor by an external driving force, and a vane that rotates slidably in contact with the inner peripheral surface of the case while moving in and out of the rotor as the rotor rotates. The axial movement of the shaft is restricted by slidable contact between axial movement restricting stepped portions provided on both ends of the shaft, and the case. Furthermore, a very small gap is formed between an axial end surface of the rotor and the case.

FIG. I



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## **EUROPEAN SEARCH REPORT**

Application Number EP 01 10 7401

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	The present search report has I	been drawn up for all claims  Date of completion of the search		
ı	Place of search  MUNICH	4 June 2003	Des	coubes, P
	TEGORY OF CITED DOCUMENTS	T : theory or principle		<del></del>
X : partic	ularly relevant if taken alone	E : earlier patent doc after the filing date	ument, but publis	
Y : partic	ularly relevant if combined with anoth nent of the same category	ner D : document cited in L : document cited fo	the application rother reasons	
	ological background rnten disclosure	& : member of the sa	ma natont famili	

EPO FORM 1503 03.82 (P04C01)



Application Number

EP 01 10 7401

CLAIMS INCURRING FEES
The present European patent application comprised at the time of filing more than ten claims.
Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.
LACK OF UNITY OF INVENTION
The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:
see sheet B
All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



## LACK OF UNITY OF INVENTION SHEET B

**Application Number** 

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claim: 1+2

Vane-type vacuum pump with restricted shaft axial movement made of different metals.

2. Claims: 1+3-4,6

Vane-type vacuum pump with restricted shaft axial movement fitted with an oil reservoir.

3. Claim: 1+5

Vane-type vacuum pump with restricted shaft axial movement, the rotor being integrally cast with the shaft.

4. Claim: 1+7

Vane-type vacuum pump with restricted shaft axial movement and a selected bearing portion length.

5. Claim: 1+8

Vane-type vacuum pump with restricted shaft axial movement and selected axial movement restriction flange dimensions.

# ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 01 10 7401

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-06-2003

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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