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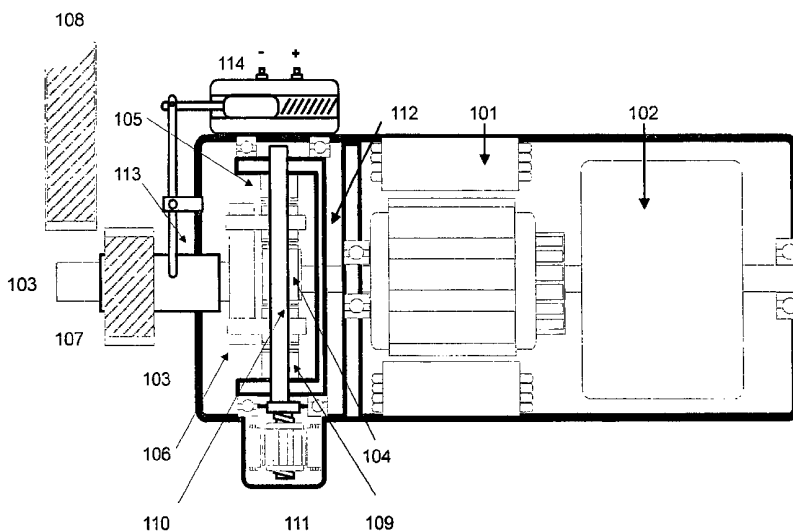
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- (71) Applicant and
(72) Inventor: SCHUURSMA, Johannes, Karel [NL/NL]; D. Klompweg 31, NL-1861 NA Bergen (NL).
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: FLYWHEELSTARTER/GENERATOR FOR I.C.-ENGINES



(57) Abstract: This invention relates to an electric machine which may act as a (flywheel)-starter-motor, and/or a generator for internal-combustion-engines (called i.c.engines or engines hereafter). A planetary gear/brake/clutch arrangement offers two gear-speeds and a freewheel. Thanks to the freewheel-mode, the machine may be permanently connected to the i.c.engine and is therefore perfectly suited for turbo-compounding, offering a fast shaft to combine an exhaust-turbine with a, preferably, non-turbo compressor. The invention moreover relates to the various practical forms, matching control-devices and auxiliaries which enable the machine to be used in a number of different applications. The electric configuration of the machines used, may differ, depending on the application.



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INTERNATIONAL SEARCH REPORT

International Application No

PL, NL 99/00626

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F02N5/04 F02N11/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F02N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, PAJ, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 006, no. 267 (M-182), 25 December 1982 (1982-12-25) & JP 57 159956 A (NISSAN JIDOSHA KK), 2 October 1982 (1982-10-02) abstract	1
A	--- WO 89 04081 A (SCHUURSMA JOHANNES KAREL) 5 May 1989 (1989-05-05) ---	
A	--- US 4 459 536 A (WIRTZ RAINER) 10 July 1984 (1984-07-10) cited in the application -----	

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

A document defining the general state of the art which is not considered to be of particular relevance	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
E earlier document but published on or after the international filing date	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
O document referring to an oral disclosure, use, exhibition or other means	*Z* document member of the same patent family
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
29 August 2000

Date of mailing of the international search report
02. 11. 00

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/NL 99/00626

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-3,8

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-3, 8

Electric machine for starting combustion engines where one side of the rotor of said machine is connected to the sun-wheel of a planetary gear and the other side of said rotor is connected to a flywheel [Claims 1-3, 8, and 9-11 (insofar dependent on claim 1)].

2. Claims: 4-7

Electric circuit for a flywheelstartmotor for diesel engines, whereby, in order to limit power-built-up during an occasionally preglow period, the glow plugs are connected in series with electrical machine [Claims 4-7, and 9-11 (insofar dependent on claim 4)].

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/NL 99/00626

Patent document cited in search report	A	Publication date	Patent family member(s)	Publication date
JP 57159956	A	02-10-1982	NONE	
WO 8904081	A	05-05-1989	NL 8702588 A	16-05-1989
			AU 2619888 A	23-05-1989
			EP 0391939 A	17-10-1990
US 4459536	A	10-07-1984	DE 3135891 A	24-03-1983
			FR 2512406 A	11-03-1983
			JP 1727318 C	19-01-1993
			JP 4013960 B	11-03-1992
			JP 58059367 A	08-04-1983