



(51) International Patent Classification:

H02K 21/24 (2006.01) H02K 1/27 (2022.01)
H02K 7/09 (2006.01) H02K 15/03 (2025.01)

(21) International Application Number:

PCT/US2024/035521

(22) International Filing Date:

26 June 2024 (26.06.2024)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

63/510,169 26 June 2023 (26.06.2023) US

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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,

CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG,
KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY,
MA, MD, MG, MK, MN, MU, MW, MX, MY, MZ, NA,
NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO,
RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH,
TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS,
ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, CV,
GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST,
SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ,
RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ,
DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT,
LU, LV, MC, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE,
SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN,
GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments (Rule 48.2(h))

(88) Date of publication of the international search report:

03 April 2025 (03.04.2025)

(54) Title: AXIAL FLUX MOTOR

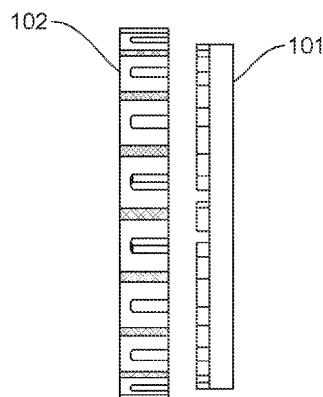


FIG. 1A

(57) Abstract: An axial flux motor with a modular design that can help to simplify manufacturing processes. The design also permits the use of various material types, such as mixed materials, rare earth containing, and rare earth free designs with high power density. The motor may include a rotor arranged in one or more rings and a stator arranged in one or more rings. The stator is positioned proximate to the rotor. The rotor, the stator, or both are formed of individual wedge segments to provide a modular design. The rotor and/or stator assemblies may include a structural bearing material mixed with magnetic materials.



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2024/035521

A. CLASSIFICATION OF SUBJECT MATTERIPC: **H02K 21/24** (2025.01); **H02K 7/09** (2025.01); **H02K 1/27** (2025.01); **H02K 15/03** (2025.01)CPC: **H02K 21/24; H02K 15/03; H02K 7/09; H02K 1/2795**

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)

See Search History Document

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

See Search History Document

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

See Search History Document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/0189388 A1 (HASHIMOTO et al.) 09 October 2003 (09.10.2003) entire document	1-3, 9, 10
X	CN 214543840 U (ZHEJIANG PANGOOD POWER TECHNOLOGY) 29 October 2021 (29.10.2021) see machine translation	1, 4, 5, 11
X	US 2021/0211007 A1 (CARNEGIE MELLON UNIVERSITY) 08 July 2021 (08.07.2021) entire document	1, 6
X	KR 10-1892136 B1 (KOREA ELECTRONICS TECHNOLOGY INSTITUTE) 28 August 2018 (28.08.2018) see machine translation	1, 8
A	US 2020/0161912 A1 (GENESIS ROBOTICS AND MOTION TECHNOLOGIES CANADA ULC) 21 May 2020 (21.05.2020) entire document	1-11

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“D” document cited by the applicant in the international application

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“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

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“&” document member of the same patent family

Date of the actual completion of the international search

01 February 2025 (01.02.2025)

Date of mailing of the international search report

27 February 2025 (27.02.2025)

Name and mailing address of the ISA/US

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P.O. Box 1450
Alexandria, VA 22313-1450
UNITED STATES OF AMERICA**

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Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

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

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claims 1-11, is drawn to a segmented axial flux motor, comprising: a rotor arranged in a first ring.

Group II, claims 12-24, is drawn to a segmented axial flux motor, comprising: a rotor assembly having a plurality of rotor segments.

The inventions listed as Groups I-II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical feature of the Group I invention: a rotor arranged in a first ring; and a stator arranged in a second ring, wherein the stator is positioned proximate to the rotor, wherein the rotor, the stator, or both are formed of a plurality of individual wedge segments as claimed therein is not present in the invention of Group II. The special technical feature of the Group II invention: a rotor assembly having a plurality of rotor segments; a stator assembly having a plurality of stator segments; and a structural bearing material mixed with magnetic materials within the rotor assembly or the stator assembly, wherein the rotor assembly and the stator assembly are configured in a modular design as claimed therein is not present in the invention of Group I.

Groups I and II lack unity of invention because even though the inventions of these groups require the technical feature of a segmented axial flux motor, comprising: a rotor; and a stator, this technical feature is not a special technical feature as it does not make a contribution over the prior art.

Specifically, US 2020/0161912 to GENESIS ROBOTICS AND MOTION TECHNOLOGIES CANADA, ULC teaches a segmented axial flux motor, comprising: a rotor; and a stator (the motor may be an axial flux motor, and the one or more stators may be two stators and the rotor may be arranged between the two stators, para. 0009).

Since none of the special technical features of the Group I or II inventions are found in more than one of the inventions, unity of invention is lacking.

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 additional fees, this Authority did not invite payment of additional fees.
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.: **1-11**

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.