US 20220360144A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2022/0360144 A1

Keum et al. (43) Pub. Date: Nov. 10, 2022

(54) **INTERIOR PERMANENT MAGNET MOTOR HAVING CONTROLLABLE COOLANT DISTRIBUTION**

(71) Applicant: **GM Global Technology Operations LLC**, Detroit, MI (US)

(72) Inventors: **SeungHwan Keum**, Northville, MI (US); **Insu Chang**, Troy, MI (US); **Jun-mo Kang**, Ann Arbor, MI (US); **Young J. Kim**, Troy, MI (US)

(21) Appl. No.: **17/315,730**

(22) Filed: **May 10, 2021**

Publication Classification

(51) **Int. Cl.**

H02K 9/19	(2006.01)
H02K 5/20	(2006.01)
H02K 3/28	(2006.01)

(52) **U.S. Cl.**

CPC ***H02K 9/19*** (2013.01); ***H02K 5/203*** (2021.01); ***H02K 3/28*** (2013.01)

(57) **ABSTRACT**

An interior permanent magnet motor having controllable coolant distribution is provided. The motor comprises a motor housing and a rotary shaft connected to a rotor rotatably disposed in the housing. The motor further comprises a stator unit disposed in the housing and comprising conductive windings arranged about the rotor. The windings have a straight portion radially extending to an end-turn portion. The motor further comprises an oil sump disposed on the housing above the stator unit. The oil sump comprises a reservoir having an inner side and an outer side. The reservoir has at least one aperture formed therethrough over the end-turn portion. The motor further comprises a movable nozzle having a first open end extending to a second open end. The first open end is connected to the at least one aperture such that the movable nozzle and reservoir are in fluid communication. The second open end extends from the at least one aperture and positioned adjacently above the end turn portion for coolant distribution. The motor further comprises a connector movably disposed in the housing proximate to the movable nozzle. The motor further comprises a cam connected to the connector and in contact with the nozzle. Upon movement of the connector, the cam is arranged with the connector to move the second open end of the nozzle over the end turn portion for distribution of coolant oil from the oil sump to the end turn portion.