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**Makabe et al.**

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- (54) **TRANSMISSION SYSTEM FOR VEHICLE**
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(56) **References Cited**

U.S. PATENT DOCUMENTS

- 2010/0082210 A1\* 4/2010 Kobayashi ..... F16H 59/72 701/66
- 2011/0226080 A1\* 9/2011 Ieda ..... F16H 63/14 74/473.36
- 2011/0239805 A1\* 10/2011 Fujimoto ..... F16H 59/70 74/473.12

FOREIGN PATENT DOCUMENTS

- JP 11-082734 3/1999

\* cited by examiner

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CPC ..... **F16H 61/32** (2013.01); **F16H 63/18** (2013.01); **F16H 63/46** (2013.01); **F16H 2061/2823** (2013.01)

(58) **Field of Classification Search**

None  
See application file for complete search history.

(57) **ABSTRACT**

A transmission system for optimally re-engaging a shift clutch irrespectively of running conditions of the vehicle. In the transmission system for a vehicle in which a shift clutch is actuated interlockedly with a shift spindle rotationally driven by a shift motor, a target clutch torque for the shift clutch is calculated based on an estimated engine torque derived from an estimated engine torque map which prescribes the relation between engine rotational speed, throttle angle, and estimated engine torque, and a target shift spindle angle is calculated based on a value derived from a target shift spindle angle map which prescribes the relation between the target clutch torque and the target shift spindle angle. A control unit controls the shift motor based on the target shift spindle angle calculated by a target shift spindle angle calculator, at the time of effecting a gear shift of a transmission.

**12 Claims, 6 Drawing Sheets**

