



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:  
**30.08.2000 Bulletin 2000/35**

(51) Int. Cl.<sup>7</sup>: **B60K 28/02, F02D 41/14**

(43) Date of publication A2:  
**24.03.1999 Bulletin 1999/12**

(21) Application number: **98117674.6**

(22) Date of filing: **17.09.1998**

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE**  
Designated Extension States:  
**AL LT LV MK RO SI**

(30) Priority: **18.09.1997 JP 25369597**

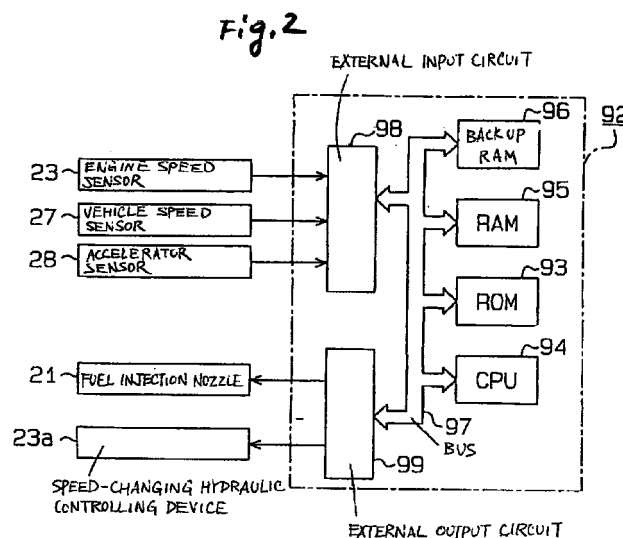
(71) Applicant:  
**TOYOTA JIDOSHA KABUSHIKI KAISHA**  
**Aichi-ken 471-8571 (JP)**

(72) Inventor: **Kato, Yuichiro**  
**Toyota-shi, Aichi-ken, 471-8571 (JP)**

(74) Representative:  
**Pellmann, Hans-Bernd, Dipl.-Ing. et al**  
**Patentanwaltsbüro**  
**Tiedtke-Bühling-Kinne & Partner**  
**Bavariaring 4-6**  
**80336 München (DE)**

(54) **Torque controlling apparatus for vehicle-mounted internal combustion engine**

(57) When an accelerator pedal (25) is suddenly stamped on, the amount of fuel injected into an engine (12) increases sharply, and the rotating force of a crankshaft (14) is increased, so that when the rotation is transmitted from the shaft (14) to an automatic transmission (23), a force which tends to twist an automobile (11) in the rotating direction of the shaft (14) is applied to the automobile (11). Consequently, the automobile (11) vibrate in the back-and-forth direction, and variations occur in the engine speed. The variations in the engine speed and the vibrations of the automobile (11) are suppressed by executing fuel-injection-amount correction corresponding to the variations in the engine speed with a predetermined phase difference and an incremental pattern with respect to the variations. As the phase difference ( $\theta$ ) is thus provided, the output torque of the engine (11) which changes by lagging behind the fuel-injection-amount correction can be suitably regulated so as to suppress the variations in the engine speed.





European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 98 11 7674

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                  |                                                         |                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Citation of document with indication, where appropriate, of relevant passages                                                                                                    | Relevant to claim                                       | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | US 4 909 224 A (NISHIYAMA RYOJI ET AL)<br>20 March 1990 (1990-03-20)<br>* column 2, line 60 - column 3, line 12 *                                                                | 1-4,6                                                   | B60K28/02<br>F02D41/14                       |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | * column 3, line 62 - column 4, line 20 *<br>* column 4, line 38 - line 64 *<br>* column 4, line 68 - column 5, line 8 *<br>* figures 4-6 *                                      | 5,7                                                     |                                              |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | EP 0 690 225 A (GEN MOTORS CORP)<br>3 January 1996 (1996-01-03)<br>* abstract *                                                                                                  | 1,2                                                     |                                              |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | * page 3, line 28 - page 4, line 1 *<br>* page 4, line 31 - line 42 *<br>* page 5, line 9 - line 17 *<br>* page 5, line 45 - page 6, line 36 *<br>* figures 2,4; tables 1-3 *    | 3-7                                                     |                                              |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | PATENT ABSTRACTS OF JAPAN<br>vol. 015, no. 190 (M-1113),<br>16 May 1991 (1991-05-16)<br>& JP 03 047444 A (NISSAN MOTOR CO LTD),<br>28 February 1991 (1991-02-28)<br>* abstract * | 3-7                                                     |                                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                  |                                                         | TECHNICAL FIELDS<br>SEARCHED (Int.Cl.6)      |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | US 5 070 841 A (FUJIMOTO SACHITO ET AL)<br>10 December 1991 (1991-12-10)<br>* column 1, line 5 - column 2, line 10 *<br>* column 4, line 65 - column 5, line 8 *                 | 1,2,4-6                                                 | F02D<br>F02P<br>G01M                         |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | EP 0 315 171 A (HITACHI LTD)<br>10 May 1989 (1989-05-10)<br>* the whole document *                                                                                               |                                                         |                                              |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                  |                                                         |                                              |
| Place of search<br><b>THE HAGUE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                  | Date of completion of the search<br><b>12 July 2000</b> | Examiner<br><b>Libeaut, L</b>                |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons</p> <p>&amp; : member of the same patent family, corresponding document</p> |                                                                                                                                                                                  |                                                         |                                              |

EPO FORM 1503 03.82 (P04C01)

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

EP 98 11 7674

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.

12-07-2000

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| US 4909224 A                              | 20-03-1990          | JP 63212740 A              | 05-09-1988          |
|                                           |                     | DE 3805823 A               | 08-09-1988          |
|                                           |                     | KR 9007818 B               | 20-10-1990          |
| EP 0690225 A                              | 03-01-1996          | US 5573474 A               | 12-11-1996          |
|                                           |                     | DE 69511481 D              | 23-09-1999          |
|                                           |                     | DE 69511481 T              | 09-12-1999          |
| JP 03047444 A                             | 28-02-1991          | NONE                       |                     |
| US 5070841 A                              | 10-12-1991          | NONE                       |                     |
| EP 0315171 A                              | 10-05-1989          | JP 1121570 A               | 15-05-1989          |
|                                           |                     | JP 2701270 B               | 21-01-1998          |
|                                           |                     | DE 3888289 D               | 14-04-1994          |
|                                           |                     | DE 3888289 T               | 07-07-1994          |
|                                           |                     | KR 9205850 B               | 23-07-1992          |
|                                           |                     | US 4919098 A               | 24-04-1990          |