



- (51) **International Patent Classification:**
F02N 11/08 (2006.01) *B60R 16/02* (2006.01)
- (21) **International Application Number:**
PCT/EP2014/052469
- (22) **International Filing Date:**
7 February 2014 (07.02.2014)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (71) **Applicant:** AKTIEBOLAGET SKF [SE/SE]; S-41 550
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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, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,
MG, MK, MN, 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, SM, ST, SV, SY, TH, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM,
ZW.

- (84) Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, 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, 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))

- (54) Title:** START-AND-STOP SYSTEM FOR AN AUTOMOTIVE VEHICLE AND VEHICLE EQUIPPED WITH SUCH A SYSTEM

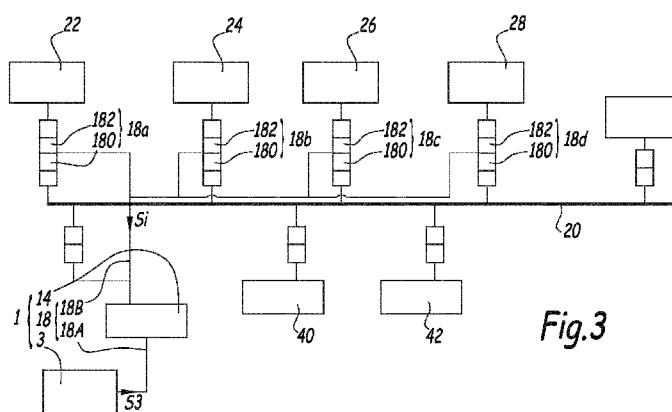


Fig.3

- (S7) Abstract:** This start-and-stop system (1) for an automotive vehicle (V), comprises a speed sensor (3) which senses the rotation speed of at least one wheel (5) of the vehicle (V), a control unit (14) for alternatively activating or deactivating an internal combustion engine of the vehicle (V), on the basis of a signal (S3) received from the speed sensor (3) and signals (Si) representative of the operating conditions of the vehicle (V). The control unit (14) is housed in a casing (16) remote from the wheel (5) of which the rotation speed is detected. The start-and-stop system (1) comprises an adaptation wiring harness (18) for connecting the control unit (14) to the speed sensor (3) and the engine, said adaptation wiring harness (18) being configured to be removably connected to a wiring harness (20) of the vehicle (V), which transmits the signals (Si) representative of the operating conditions of the vehicle.

START-AND-STOP SYSTEM FOR AN AUTOMOTIVE VEHICLE AND VEHICLE EQUIPPED WITH SUCH A SYSTEM

5 The present invention relates to a start-and-stop system for an automotive vehicle, such as a motorcycle or a car. The invention also relates to a vehicle equipped with such a system.

10 In heavy traffic conditions, especially when cars or motorcycles are stacked during long stops due to traffic jams or traffic signals, there is a waste of fuel. Emissions of carbon dioxide and other toxic gases also occur. In these situations, the use of the internal engine combustion in idle mode is not necessary and should be avoided. Thus, some vehicles are equipped with a start-and-stop system, which controls the operation of the internal combustion engine, to reduce waste of fuel and toxic gases emissions.

15 It is known from WO-A-2012/046122 to equip an automotive vehicle, such as a motorcycle or a car, with a bearing unit for switching off and on ignition in an internal combustion engine. Such a bearing unit comprises a sensor mounted for example in the fork of a motorcycle, which detects the rotation of a target ring coupled in rotation to the front wheel of the motorcycle. The bearing unit also includes a printed circuit board and an electronic switch mounted between the fork and the front wheel. The main issue of such a technique is that the start-and-stop system is entirely located in or near the wheel, and is therefore difficult to integrate. Moreover, the wiring harness of the vehicle needs to be heavily modified in order to permit electrical connections between the start-and-stop system and elements of the vehicle, such as the clutch, the battery and the throttle, that the start-and-stop system must control or receive information from. The front wheel of a motorcycle is also an area which is not easy to protect from dust, water or shocks.

20 The aim of the invention is to provide a new start-and-stop system, in which the integration in the vehicle is easier, and which does not need heavy modifications to the wiring harness of the vehicle.

25 To this end, the invention concerns a start-and-stop system for an automotive vehicle, comprising:

- a speed sensor which senses the rotation speed of at least one wheel of the vehicle, and
- a control unit for alternatively activating or deactivating an internal combustion engine of the vehicle, on the basis of a signal received from the speed sensor and signals representative of the operating conditions of the vehicle,

This start-and-stop system is characterized in that:

- the control unit is housed in a casing remote from the wheel of which the rotation speed is detected,
- the start-and-stop system comprises an adaptation wiring harness for connecting the control unit to the speed sensor and the engine, said adaptation wiring harness being configured to be removably connected to a wiring harness of the vehicle, which transmits the signals representative of the operating conditions of the vehicle.

Thanks to the invention, the start-and-stop system can be partly separated from the wheel of which the rotation speed is detected, and therefore more easily integrated in the vehicle. Moreover, as the control unit is removably connected to the wiring harness of the vehicle, the need for modifications of the harness of the vehicle is reduced.

According to further aspects of the invention which are advantageous but not compulsory, such a start-and-stop system may incorporate one or several of the following features:

- The adaptation wiring harness is configured to be removably connected between the wiring harness of the vehicle and at least respectively a dashboard, a throttle, a clutch and/or a battery set of the vehicle, from which the signals representative of the operating conditions of the vehicle are generated.

- The adaptation wiring harness comprises at least one electrical connection assembly for connecting each of the dashboard, throttle, clutch and/or battery set of the vehicle, whereas each electrical connection assembly comprises a first connection device for connecting the adaptation wiring harness to the wiring harness of the vehicle, and a second connection device for connecting the adaptation wiring harness to the dashboard, the throttle, the clutch or the battery set.

- The speed sensor is non-removably connected to the adaptation wiring harness.
- The speed sensor is integrated in a bearing assembly of the wheel of which the rotation speed is detected and which belongs to the start-and-stop system.

- The speed sensor is removably connected to the adaptation wiring harness.

- The adaptation wiring harness comprises a connection assembly for connecting the adaptation wiring harness between the speed sensor and the wiring harness of the vehicle.

- The connection assembly comprises a first connection device for connecting the adaptation wiring harness to the wiring harness of the vehicle, and a second connection device for connecting the adaptation wiring harness to the speed sensor.

- The casing in which the control unit is housed is adapted to be mounted under a dashboard of the vehicle.

- The casing in which the control unit is housed is adapted to be mounted under a seat of a motorcycle.

5 The invention also concerns a vehicle comprising a start-and-stop system as mentioned here-above.

According to further aspects of the invention which are advantageous but not compulsory, such a vehicle may incorporate one or several of the following features:

- The casing in which the control unit of the start-and-stop system is housed is
10 mounted under a dashboard of the vehicle.

- The vehicle is a motorcycle, whereas the casing in which the control unit of the start-and-stop system is housed is mounted under a seat of the motorcycle.

The invention will now be explained in correspondence with the annexed figures, as an illustrative example. In the annexed figures:

- Figure 1 is an exploded perspective view of a start-and-stop system according
15 to a first embodiment of the invention, and a sensor holder for holding a bearing unit of the start-and-stop system;

Figure 2 is a block diagram of the start-and-stop system of figure 1 integrated in a vehicle;

- Figure 3 is a schematical view of the start-and-stop system of figures 1 and 2,
20 integrated into a wiring harness of a vehicle;

- Figure 4 is a view similar to figure 3, of a start-and-stop system according to a second embodiment of the invention.

A start-and-stop system 1 is represented on figures 1 to 3. Start-and-stop system 1
25 is designed to control an internal combustion engine of an automotive vehicle V, such as a motorcycle or a car, in order to switch off the internal combustion engine when vehicle V is stopped in traffic jams or waiting at a traffic signal. The aim of start-and-stop system 1 is to spare fuel and reduce toxic gases emissions.

For switching on or off the internal combustion engine, start-and-stop system 1
30 controls a throttle 24 of the internal combustion engine, this throttle being visible on figure 3. In a variant, start-and-stop system 1 may control the internal combustion engine in a different way.

Start-and-stop system 1 comprises a speed sensor 3 which senses the rotation
35 speed of at least one wheel 5 of vehicle V. Speed sensor 3 comprises a rotating target ring 31, which is coupled in rotation to wheel 5. Speed sensor 3 also includes a sensing element 33 adapted to detect the rotation speed of target ring 31. Sensing element 33 is

mounted on a sensor holder 7 which is fixed to a non-rotatable part of vehicle V, such as a fork 9 represented by a block on figure 2.

The rotation between fork 9 and wheel 5 is permitted by a bearing 12 including an inner ring 120 fixed to fork 9 and an outer ring 122 coupled in rotation with wheel 5.

Advantageously, target ring 31 is integrated on outer ring 122.

Start-and-stop system 1 also includes a control unit 14 for alternatively activating or deactivating the internal combustion engine, on the basis of a signal S3 received from speed sensor 3 and signals Si representative of the operating conditions of vehicle V. Control unit 14 is housed in a casing 16 remote from wheel 5, so that control unit 14 is more easily integrated in vehicle V than in the start-and-stop systems of the prior art. Besides, control unit 14 is less exposed to dust, water or shocks that may be frequent around wheel 5, than in a start-and-stop system mounted in the front wheel of a motorcycle. Casing 16 is advantageously mounted under a non-represented dashboard of vehicle V, or, in the case when the vehicle is a motorcycle, under a seat. Casing 16 can be attached to vehicle V by an elastic rubber collar or any other fastening mean adapted to prevent displacement of casing 16 with respect to vehicle V and to absorb vibrations.

Control unit 14 is connected to speed sensor 3 and to the internal combustion engine by an adaptation wiring harness 18, which is removably connected to a wiring harness 20 of the vehicle. Wiring harness 20 embodies the various electrical connections between electrically powered equipments of the vehicle, and more specifically a dashboard 22, a throttle 24, a clutch 26, a battery set 28, lights 40, a horn 42. The fact that control unit 14 is connected to wiring harness 20 via an adaptation wiring harness 18 removably connected to wiring harness 20 permits to more easily integrate start-and-stop system 1 in the vehicle without heavy modifications of wiring harness 20.

Adaptation wiring harness 18 comprises a first sub-harness 18A which connects control unit 14 to speed sensor 3, and a second sub-harness 18B which connects control unit 14 to wiring harness 20.

Control unit 14 implements a logic control which is the same as the one disclosed in WO-A-2012/046 122. Control unit 14 uses the speed of vehicle V, and the gear in which a non-shown gearbox of vehicle V is, and is connected to throttle 24 in order control the operation of the internal combustion engine. Each of dashboard 22, throttle 24, clutch 26, battery 28, lights 40 or horn 42 are removably electrically connected to wiring harness 20. Wiring harness 20 transmits signals Si.

In order to more easily connect control unit 14 to wiring harness 20, sub-harness harness 18B is removably connected between wiring harness 20 and dashboard 22, throttle 24, clutch 26 and battery 28. Sub-harness 18B comprises, for each of dashboard

22, throttle 24, clutch 26 and battery 28, an electrical connection assembly 18a, 18b, 18c, 18d which comprises a first connection device 180 for connecting sub-harness 18B to wiring harness 20, and a second connection device 182 for connecting sub-harness 18B to each of dashboard 22, throttle 24, clutch 26 and battery 28.

5 When start-and-stop system 1 must be installed on vehicle V, dashboard 22, throttle 24, clutch 26 and battery 28 are disconnected from wiring harness 20 and connection devices 180 of electrical connection assemblies 18a, 18b, 18c, 18d are connected on wiring harness 20. Then each of dashboard 22, throttle 24, clutch 26 and battery 28 are connected on connection devices 182 of sub-harness 18B. Start-and-stop system 1 is therefore easy to integrate, and does not need heavy modifications of wiring harness 20. Moreover, this permits to quickly change start-and-stop system 1 in case it is damaged.

10 In the example of figures 1 to 3, speed sensor 3 is connected non-removably to sub-harness 18A. In such a case, bearing 12 belongs to start-and-stop system 1.

15 A second embodiment of the invention is presented on figure 4. In this embodiment, elements similar to the first embodiment have the same references and work in the same way. Only the differences from the first embodiment are detailed hereafter.

20 In the embodiment of figure 4, speed sensor 3 is removably connected to sub-harness 18A. This permits to use a speed sensor 3 which is already present on the vehicle. In such a case, sub-harness 18A comprises a connection assembly 18f for connecting sub-harness 18A between speed sensor 3 and wiring harness 20. Connection assembly 18f comprises a first connection device 180 for connecting sub-harness 18A to wiring harness 20, and a second connection device 182 for connecting sub-harness 18A to speed sensor 3.

25 The features of the above mentioned embodiments and variants can be combined to obtain new embodiments of the invention.

CLAIMS

1.- Start-and-stop system (1) for an automotive vehicle (V), comprising:

- a speed sensor (3) which senses the rotation speed of at least one wheel (5) of the vehicle (V),
- a control unit (14) for alternatively activating or deactivating an internal combustion engine of the vehicle (V), on the basis of a signal (S3) received from the speed sensor (3) and signals (Si) representative of the operating conditions of the vehicle (V),

wherein:

- the control unit (14) is housed in a casing (16) remote from the wheel (5) of which the rotation speed is detected,
- the start-and-stop system (1) comprises an adaptation wiring harness (18) for connecting the control unit (14) to the speed sensor (3) and the engine, said adaptation wiring harness (18) being configured to be removably connected to a wiring harness (20) of the vehicle (V), which transmits the signals (Si) representative of the operating conditions of the vehicle.

2.- Start-and-stop system according to claim 1, wherein the adaptation wiring harness (18) is configured to be removably connected between the wiring harness (20) of the vehicle and at least respectively a dashboard (22), a throttle (24), a clutch (26) and/or a battery set (28) of the vehicle (V), from which the signals (Si) representative of the operating conditions of the vehicle are generated.

3.- Start-and-stop system according to claim 2, wherein the adaptation wiring harness (18) comprises at least one electrical connection assembly (18a, 18b, 18c, 18d) for connecting each of the dashboard (22), throttle (24), clutch (26) and/or battery set (28) of the vehicle (V), and wherein each electrical connection assembly comprises a first connection device (180) for connecting the adaptation wiring harness (18) to the wiring harness (20) of the vehicle, and a second connection device (182) for connecting the adaptation wiring harness (18) to the dashboard (22), the throttle (24), the clutch (26) or the battery set (28).

4.- Start-and-stop system according to any preceding claim, wherein the speed sensor (3) is non-removably connected to the adaptation wiring harness (18).

5.- Start-and-stop system according to claim 4, wherein the speed sensor (3) is integrated in a bearing assembly (12) of the wheel (5) of which the rotation speed is detected and which belongs to the start-and-stop system (1).

5

6.- Start-and-stop system according to any of claims 1 to 3, wherein the speed sensor (3) is removably connected to the adaptation wiring harness (18).

7.- Start-and-stop system according to claim 6, wherein the adaptation wiring harness (18) comprises a connection assembly (18f) for connecting the adaptation wiring harness (18) between the speed sensor (3) and the wiring harness (20) of the vehicle (V).

10

8.- Start-and-stop system according to claim 7, wherein the connection assembly (18f) comprises a first connection device (180) for connecting the adaptation wiring harness (18) to the wiring harness (20) of the vehicle (V), and a second connection device (182) for connecting the adaptation wiring harness (18) to the speed sensor (3).

15

9.- Start-and-stop system according to any preceding claim, wherein the casing (16) in which the control unit (14) is housed is adapted to be mounted under a dashboard of the vehicle (V).

20

10.- Start-and-stop system according any of claims 1 to 8, wherein the casing (16) in which the control unit (14) is housed is adapted to be mounted under a seat of a motorcycle.

25

11.- Vehicle (V) comprising a start-and-stop system (1) according to one of the previous claims.

12.- Vehicle according to claim 11, wherein the casing (16) in which the control unit (14) of the start-and-stop system (1) is housed is mounted under a dashboard (22) of the vehicle (V).

30

13.- Vehicle according to claim 11, wherein the vehicle (V) is a motorcycle, and wherein the casing (16) in which the control unit (14) of the start-and-stop system (1) is housed is mounted under a seat of the motorcycle.

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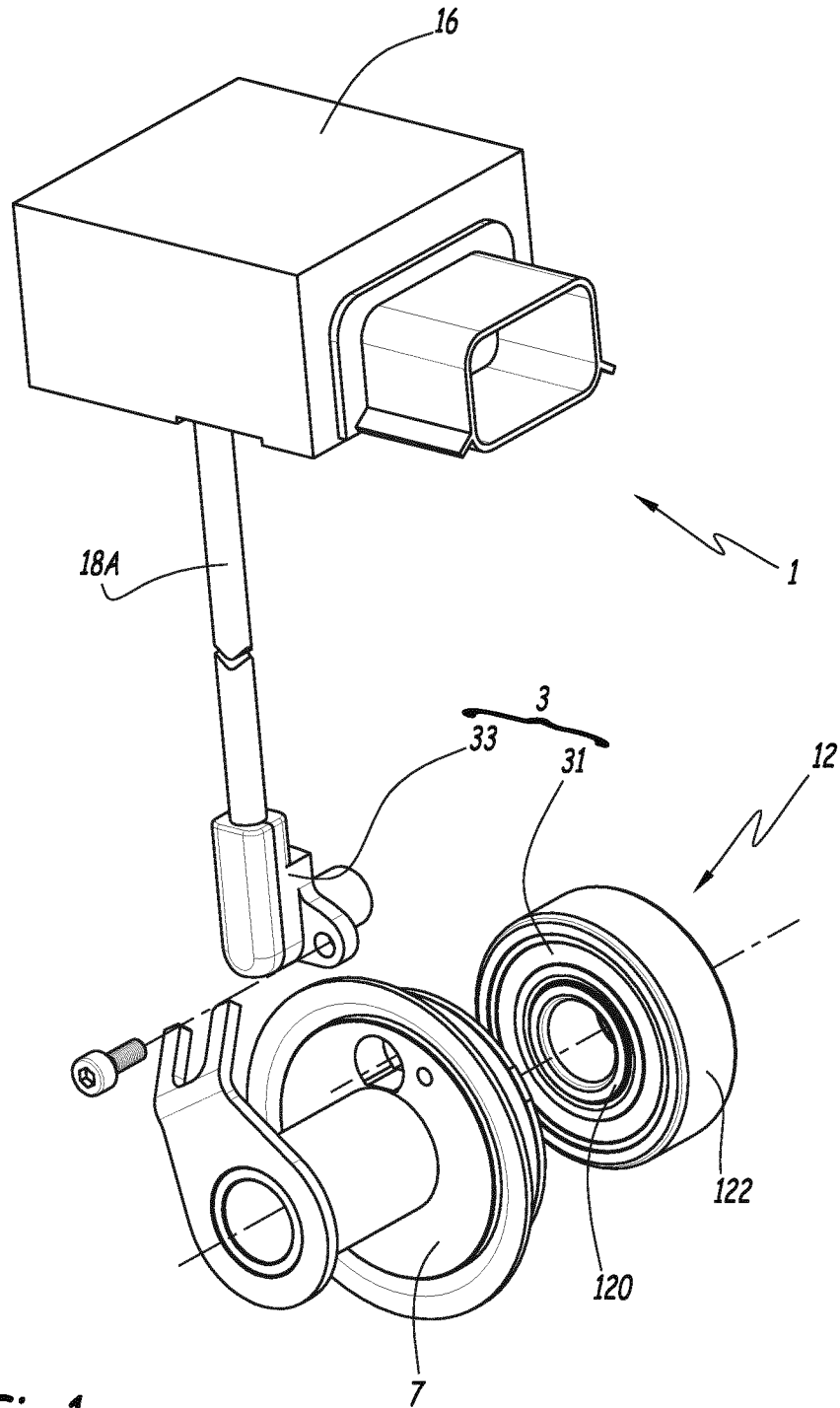
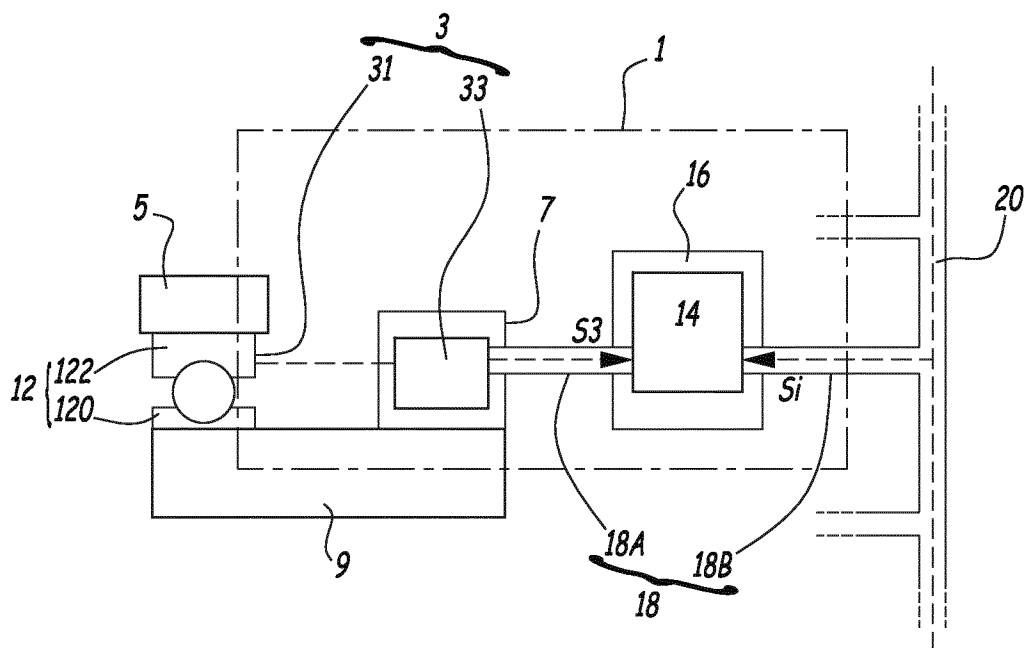
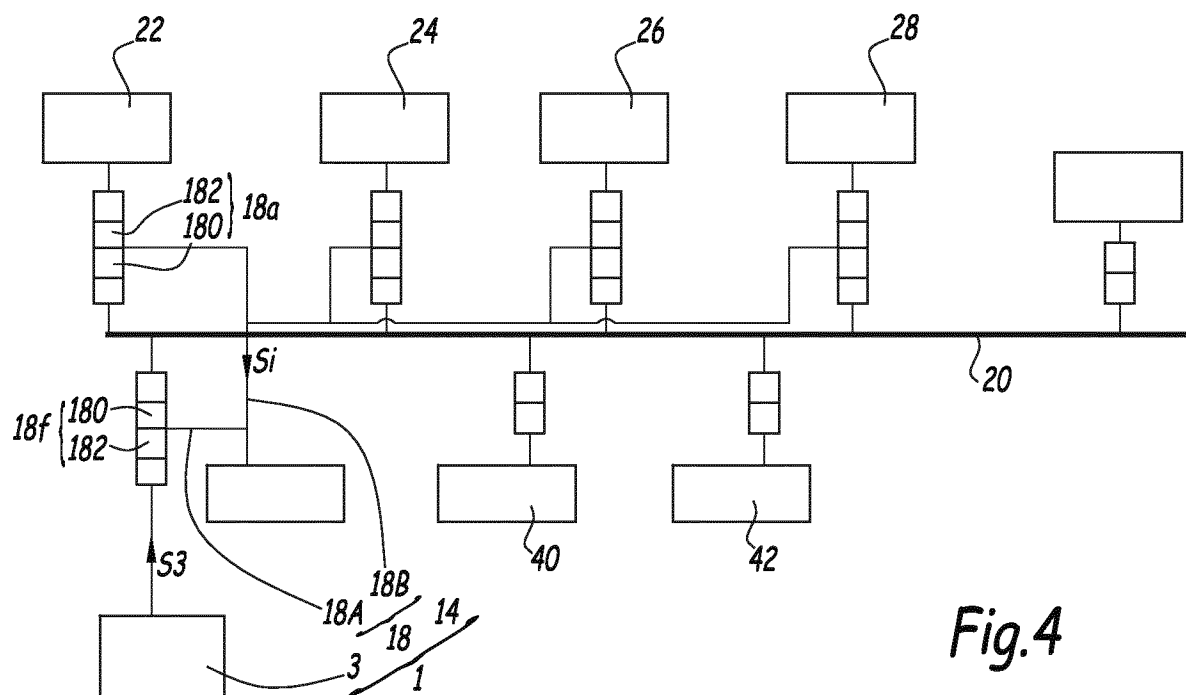
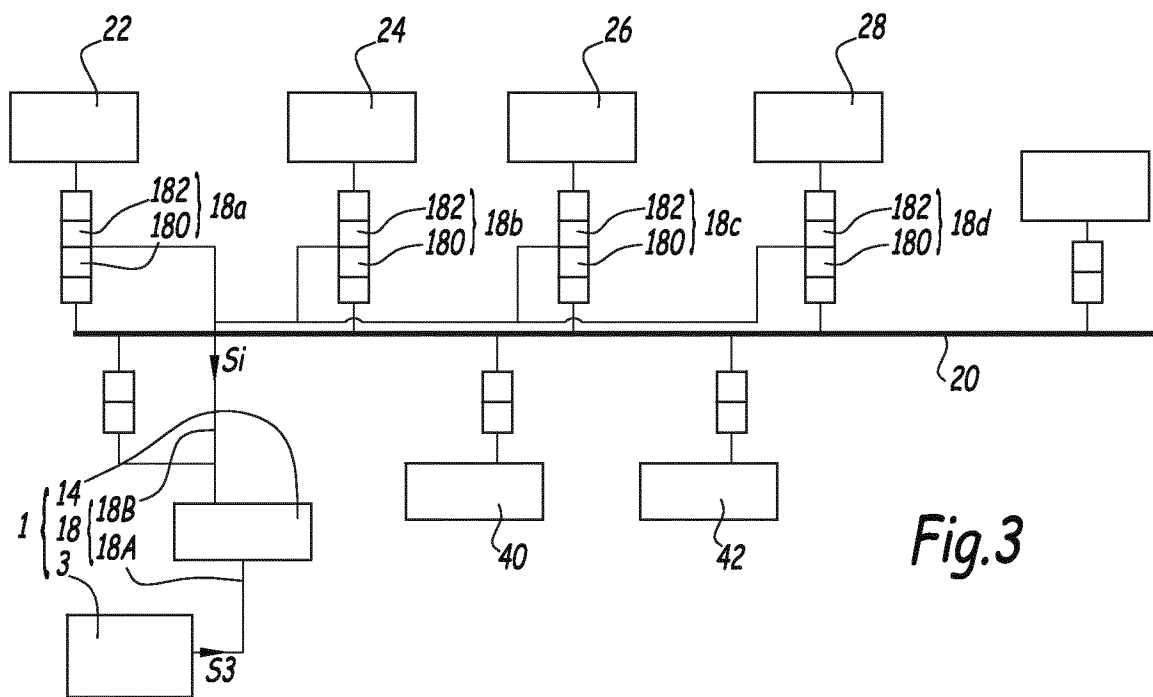


Fig.1

*Fig.2*



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/052469

A. CLASSIFICATION OF SUBJECT MATTER INV. F02N11/08 B60R16/02 ADD.		
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) F02N B60R		
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 practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2013/231848 A1 (ROBERTS JASON LEE [US] ET AL) 5 September 2013 (2013-09-05)	1-4,6-9, 11,12
Y	abstract; figures 5-7 paragraphs [0007], [0029] - [0050] -----	5,10,13
Y	WO 2012/046122 A1 (SKF PUBL AB [SE]; KUMAR VIVEK [IN]; MATTOO ROHIT [IN]; HUBERT MATHIEU) 12 April 2012 (2012-04-12)	5
A	cited in the application the whole document -----	1-4,6-13
Y	EP 2 687 705 A1 (HONDA MOTOR CO LTD [JP]) 22 January 2014 (2014-01-22) paragraphs [0052] - [0064] -----	10,13
A	DE 195 32 521 A1 (TUNGER HENRY [DE]) 6 March 1997 (1997-03-06) figure 2 column 3, lines 34-36 -----	10,13
☐ 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 "E" earlier application or patent but published on or after the international filing date "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) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "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 "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 "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 "&" document member of the same patent family		
Date of the actual completion of the international search 5 November 2014	Date of mailing of the international search report 12/11/2014	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Röttger, Klaus	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2014/052469

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