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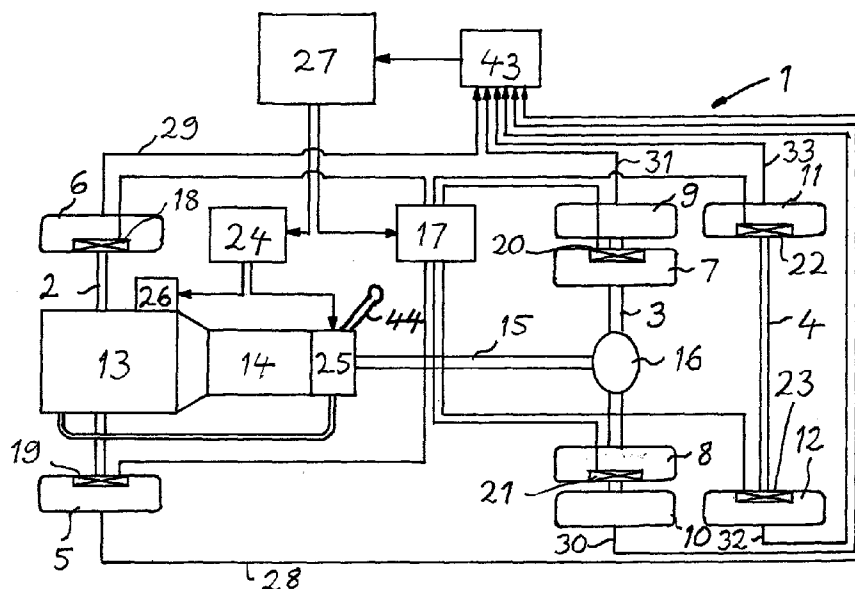
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(54) Title: BRAKING CONTROL SYSTEM



(57) Abstract: A system for controlling braking of a motor vehicle provided with service brakes (18-23) acting upon all wheel axles of the vehicle and auxiliary brakes (25, 26) acting upon a driven wheel axle (3) of the vehicle, and means for sensing possibly occurring blocking of wheels of the vehicle and/or mutually different rotational speeds of wheels of the vehicle and upon such an occurrence create an ABS- signal, comprises a braking control means (27) adapted to select an auxiliary braking mode and adapted to automatically activate said service brakes to act upon at least two wheel axles of the vehicle when braking according to said auxiliary braking mode is carried out and the braking control means receives a said ABS-signal.

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Description**BRAKING CONTROL SYSTEM****TECHNICAL FIELD**

[0001] The present invention relates to a system for braking of a motor vehicle provided with a service frictional braking device adapted to act upon a plurality of wheels of the vehicle for obtaining a braking action, an auxiliary braking device adapted to act upon a driven wheel axle of the vehicle for obtaining a braking action, and means for sensing possibly occurring or incipient blocking of wheels of the vehicle and/or mutually different rotational speeds of wheels of the vehicle and upon such an occurrence send an ABS-signal to a braking control means, in which the system comprises a braking control means adapted to select an auxiliary braking mode to act when it is desired to obtain a braking action for reducing the speed of the vehicle or keeping it at a constant speed or reducing the speed increase during downhill driving, said braking control means being adapted to reduce or switch off said auxiliary braking device when a said ABS-signal is received. The invention also relates to a method for controlling braking of such a motor vehicle. Furthermore, the invention relates to a computer program comprising computer program code for implementing such a method, a computer program product comprising a data storage medium readable by an electronic control unit and having said computer program stored thereon, and an electronic control unit.

BACKGROUND ART

[0002] The present invention is applicable to motor vehicles provided with an auxiliary braking device, such as a retarder brake or an exhaust brake, especially heavy motor vehicles such as lorries, towing vehicles and buses. Such a retarder brake is a hydraulic brake, which acts upon a driven wheel axle of the vehicle for instance by acting on the output shaft of a gearbox of the vehicle. The exhaust brake also indirectly acts upon the driven wheel axle of the vehicle by causing a resistance to the rotation of the output shaft of the engine of the motor vehicle by regulating the flowing resistance of exhaust gases from the engine. It is preferred to use

such an auxiliary braking device when a braking action is to be applied to such a vehicle for saving service brakes, normally called wheel brakes, of said service frictional braking device.

[0003] However, said auxiliary braking device only acts upon drive axles of the vehicle, so that there is an immediate risk of slipping sideways with the vehicle when braking on a slippery road by such auxiliary braking devices, and when the vehicle comprises a tractor and a trailer the risk is high of an occurrence of a so-called jack knife effect, which may cause a lot of damage to the vehicle as well as a dangerous traffic situation for other vehicles. This is why a system for controlling braking according to the introduction is provided with said sensing means, so that such slipping sideways and the occurrence of the jack knife effect may be avoided by switching said auxiliary braking device off when a said ABS-signal is created. It is pointed out that "ABS-signal" is here to be interpreted broadly and covers any type of signal indicating that at least an incipient wheel slip of the vehicle is detected.

[0004] WO 03/064228 describes a system of the type defined in the introduction, in which an auxiliary braking device in the form of a retarder brake is partially or entirely switched off when such an ABS-signal is created. US 6 697 727 also describes a system of the type defined in the introduction providing a reduction of the braking torque from a retarder brake when a wheel slip of a vehicle is detected.

[0005] However, should a vehicle having such a known system for controlling braking of the type defined in the introduction be in a downhill slope when a said ABS-signal is created and the auxiliary braking device is switched off, the speed of the vehicle will increase until the vehicle regains the grip with respect to the road surface again and the auxiliary braking device may try to apply a braking action to the vehicle again.

DISCLOSURE OF THE INVENTION

[0006] The object of the present invention is to provide a system for controlling braking of a motor vehicle, by means of which the above-indicated problems may be reduced.

- [0007] This object is according to the invention obtained by providing a system of the type according to the introduction, in which said braking control means is adapted to automatically activate said service frictional braking device to act upon at least two wheel axles of the vehicle when braking according to said auxiliary braking mode is reduced or switched off upon receipt of a said ABS-signal. By such a request of external braking from said service frictional braking device the actual speed of the vehicle may be automatically obtained or even lowered as soon as said auxiliary braking device is reduced or switched off as a consequence of the occurrence of a said ABS-signal. Since the service frictional braking device is acting upon at least two wheel axles of the vehicle the risks of slipping sideways and the occurrence of the so-called claps knife effect are reduced. Thus, said motor vehicle may be driven while having said auxiliary braking mode selected also under slippery conditions and the advantages of braking with the service frictional braking device when this is really needed may still be automatically obtained. The auxiliary braking device comprises a retarder brake, and said braking control means is adapted to control said retarder brake to act upon a driven wheel axle of the vehicle in said auxiliary braking mode. The braking control means is adapted to select said auxiliary braking mode upon activation of a retarder lever activating said retarder brake. The braking control means is adapted to, after a predetermined time after the moment of said switching off of said auxiliary braking device, control said auxiliary braking device to act upon a driven wheel axle of the vehicle again. Thus, this means that the auxiliary braking mode of the vehicle being preferred for saving said service brakes is in this way resumed. The braking control means is adapted to select said auxiliary braking mode by switching the action of said service frictional braking device off after said predetermined time.
- [0008] According to an embodiment of the invention said braking control means is adapted to activate said service frictional braking device to act upon all wheel axles of the vehicle in said automatic activation of said service frictional braking device. This means that the risk of slipping sideways is considerably reduced with respect to braking by only the auxiliary braking

device acting upon only one wheel axle of the vehicle. The risk of an increase of the speed of the vehicle when driving downhill on a slippery road is also reduced.

- [0009] According to another embodiment of the invention said system is adapted for controlling braking of a motor vehicle comprising a tractor and a trailer, and said braking control means is adapted to activate said service frictional braking device to only act upon the wheel axles of said trailer in said automatic activation of said service frictional braking device. This means that the service brakes of the tractor may be saved and still the advantages of braking by said service frictional braking device with respect to a reduced risk of slipping sideways and of an increase of the speed of the vehicle when driving downhill may be obtained in spite of having said auxiliary braking mode selected for braking the vehicle.
- [0010] According to another embodiment of the invention said system is adapted to control braking of a motor vehicle comprising a tractor and a trailer, and said braking control means is adapted to activate said service frictional braking device to act upon all wheel axles of the vehicle for said automatic activation of said service frictional braking device. Such braking of all wheel axles of the vehicle may under some circumstances be preferred for reducing the risk of slipping sideways and the occurrence of said jack knife effect as much as possible.
- [0011] According to a further embodiment of the invention said auxiliary braking device comprises an exhaust brake, and said braking control means is adapted to control said exhaust brake to act upon a driven wheel axle of the vehicle in said auxiliary braking mode. It is of course possible to combine the retarder brake and exhaust brake in an auxiliary braking device in a said motor vehicle.
- [0012] According to another embodiment of the invention said braking control means is adapted to select said auxiliary braking mode by switching said service frictional braking device off with a delay with respect to said predetermined time, which means that the action of the auxiliary braking device and the service frictional device will slightly overlap each other, which may increase the possibility that said auxiliary braking mode may be

the appropriate mode when it has to take care of any requested braking action alone.

- [0013] According to another embodiment of the invention said braking control means is adapted to reduce or switch the braking action of said service frictional braking device off upon receipt of an ABS-signal after said automatic activation of said service frictional braking device and to activate said service frictional braking device alone or both said service frictional braking device and said auxiliary braking device with a delay with respect to the moment of switching the action of said service frictional braking device off. Thus, the risk of slipping when braking by said service frictional braking device is by this considerably reduced.
- [0014] The invention also relates to a method having the features defined in claim 8 for controlling braking of a motor vehicle provided with a service frictional braking device adapted to act upon all wheel axles of the vehicle for obtaining a braking action, an auxiliary braking device adapted to act upon a driven wheel axle of the vehicle for obtaining a braking action, and means for sensing possibly occurring or incipient blocking of wheels of the vehicle and/or mutually different rotational speeds of wheels of the vehicle and upon such an occurrence create an ABS-signal.
- [0015] The invention also relates to a computer program having the features defined in claim 14, a computer program product having the features defined in claim 20 and an electronic control unit having the features defined in claim 21.

BRIEF DESCRIPTION OF THE DRAWINGS

- [0016] The invention will in the following be more closely described by means of embodiment examples, with reference to the appended drawings, where:
- [0017] Fig 1 is a schematic outline diagram illustrating a system according to the present invention,
- [0018] Figs 2-4 are schematic side elevations of a motor vehicle comprising a tractor and a trailer braking when driving downhill according to two different embodiments of the invention (Fig 3 and Fig 4),

- [0019] Fig 5 is a schematic outline diagram of an electronic unit for implementing the method according to the invention, and
- [0020] Fig 6 is a flow diagram illustrating a method according to an embodiment of the invention.

EMBODIMENTS OF THE PRESENT INVENTION

- [0021] Parts of a motor vehicle 1 in the form of a truck essential for explaining the present invention are very schematically shown in Fig 1. The vehicle has a front wheel axle 2, a first rear wheel axle 3 and a second rear wheel axle 4. These axles are provided with wheels 5-12, of which the wheels 5, 6 of the front axle 2 are used for steering the vehicle, whereas the wheels 7-10 of the first rear axle 3 are used to drive the vehicle through the drive axle 3. The wheels 11, 12 of the wheel axle 4 may be lifted from the ground and are only used when the vehicle is heavily loaded.
- [0022] The vehicle is further provided with an engine 13 with an output shaft (not shown) connected to a gearbox 14 having an output shaft 15 driving the wheel axle 3 through a differential 16.
- [0023] The vehicle is further provided with a service frictional braking device 17 adapted to act upon all wheel axles of the vehicle for obtaining a braking action by controlling service frictional brakes 18-23 arranged in connection with wheels of the wheel axles 2-4 always bearing on the ground when driving the vehicle.
- [0024] The vehicle also comprises an auxiliary braking device 24 adapted to control the braking of the driven wheel axle 3 of the vehicle for obtaining a braking action by controlling a retarder brake 25 and an exhaust brake 26 schematically indicated. The retarder brake 25 is associated with the gearbox 14 and here acts on the output shaft 15 of the gearbox. The retarder brake may operate differently, such as directly braking the motor or another drive line part. The exhaust brake 26 is adapted to apply a braking action upon the engine by regulating the opening degree for exhaust gases resulting from the combustion in the engine.
- [0025] The vehicle further comprises a system for controlling braking of a motor vehicle, and this system comprises a braking control means 27 in the form

of an electronic control unit. This braking control means is adapted to select an auxiliary braking mode under normal operation of the vehicle for saving the service brakes 18-23 to act when it is desired to obtain a braking action for reducing the speed of the vehicle or keeping it at a constant speed or reducing the speed increase during downhill driving. However, the braking effect of the different brakes of the vehicle may also be manually controlled by the driver through means not shown in the form of for instance a retarder lever 44 and a brake pedal.

- [0026] The vehicle has also means purely indicated through lines 28-33 running from each wheel for sensing possibly occurring or incipient blocking of wheels of the vehicle and/or mutually different rotational speeds of wheels of the vehicle by comparing signals from the sensing means in a calculating unit 43 and upon such an occurrence send an ABS-signal to said braking control means 27. Said braking control means is adapted to switch off said auxiliary braking device when a said ABS-signal is received from the calculating unit 43.
- [0027] The braking control means 27 is adapted to automatically activate the service frictional braking device 17 to act upon all the wheel axles 2-4 of the vehicle when braking according to said auxiliary braking mode is carried out and a said ABS-signal is received from the calculating unit 43.
- [0028] Fig 2 illustrates a vehicle comprising a tractor 34 substantially corresponding to the vehicle shown in Fig 1 and a trailer 35 driving downhill. It is assumed in Figs 2-4 that there exists a need to apply a braking action to the vehicle, and the axles upon which a braking action is applied are marked with an X. Fig 2 shows the normal case of having an auxiliary braking mode selected for saving the service frictional brakes, which means that a braking action is applied to only the driven axle 3 of the vehicle through auxiliary brakes, such as a retarder brake and/or an exhaust brake. We assume that the road surface is for any reason slippery, and when an ABS-signal is created as a consequence of possibly occurring blocking of wheels and/or mutually different rotational speeds of wheels of the vehicle the braking control means 27 will at least partially switch off the auxiliary braking device. This will in already known systems

for controlling braking of a motor vehicle of this type result in an increase of the speed of the vehicle before the braking control means tries to switch on said auxiliary braking device again. Furthermore, braking by only said auxiliary braking device acting only upon one axle of the vehicle would result in a high risk of slipping sideways on a slippery road and for a vehicle including a trailer a high risk of generating the so-called clasp knife effect when braking.

- [0029] However, these problems are remarkably reduced by the system for controlling braking according to the present invention. Fig 3 shows what happens when an ABS-signal makes the braking control means to switch off the auxiliary braking device, i.e. the service frictional braking device acting upon all axles 2-4, 36 and 37 is activated avoiding a speed increase of the vehicle and reducing the risk of slipping sideways. This is obtained in spite of the fact that the braking control means is adapted to have the auxiliary braking mode as the braking mode of the vehicle, also when driving downhill.
- [0030] Fig 4 illustrates the function of a system for controlling braking according to a second embodiment of the invention, in which said braking control means is adapted to automatically activate the service frictional brakes to act only upon the wheel axles of the trailer when said auxiliary braking device is switched off by said braking control means upon receipt of an ABS-signal. This solution also addresses the problems of on one hand a speed increase when switching the auxiliary braking device off and on the other the risk of slipping sideways.
- [0031] The braking control means is preferably adapted to, after a predetermined time after the moment of said switching off of said auxiliary braking device, control said auxiliary braking device to act upon a driven wheel axle of the vehicle again, since it is preferred to return to the auxiliary braking mode when possible.
- [0032] It is pointed out that Fig 1 is only for explaining the idea of the invention in a comprehensive way, and the actual arrangement of different parts may be quite different. The calculating unit 43 may for instance be included in the braking control means 27. The service frictional braking device 17 and

the auxiliary braking device 24 may also be included in the same unit as the braking control means 27.

- [0033] A flow diagram illustrating a method according to an embodiment of the invention is shown in Fig 6. In a first step S1, it is determined whether or not a braking action is required. When the answer is yes the auxiliary braking device is in a second step S2 activated or kept active. It is then in a third step S3 determined whether an ABS-signal is present or not. When the answer to this question is yes the auxiliary braking device will in a fourth step S4 be switched off or reduced. In a fifth step S5 the service frictional brakes of the vehicle will then be activated for a predetermined time, such as for example 5 seconds. The question whether a braking is required will then be asked in step S1 again.
- [0034] Computer program code for implementing a method according to the invention is suitably included in a computer program, which is loadable directly into the internal memory of a computer, such as the internal memory of a braking control or engine control unit of the vehicle. Such a computer program is suitably provided via a computer program product comprising a data storage medium readable by an electronic control unit, which data storage medium has the computer program stored thereon. Said data storage medium is for instance an optical data storage medium in the form of a CD-ROM disc, a DVD disc etc, a magnetic data storage medium in the form of a hard disc, a diskette, a cassette tape etc, or a memory of the type ROM, PROM, EPROM or EEPROM or a Flash memory.
- [0035] The computer program according to an embodiment of the invention comprises computer program code for causing a computer, e.g. in the form of a micro processor of an electronic unit:
- to obtain selection of an auxiliary braking mode to act when it is desired to obtain a braking action for reducing the speed of the vehicle or keeping it at a constant speed or reducing the speed increase during downhill driving,
 - to reduce or switch said auxiliary braking device off when a said ABS-signal is received, and

- to automatically activate said service frictional braking device to act upon at least two wheel axles of the vehicle when braking according to said auxiliary braking mode is reduced or switched off upon receipt of a said ABS-signal.

[0036] Fig 5 very schematically illustrates an electronic control unit 38 comprising an execution means 39, such as a central processing unit (CPU) for executing computer software. The execution means 39 communicates with a memory 41, for instance of the type RAM, via a data bus 40. The control unit 38 also comprises data storage medium 42, for instance in the form of a memory of the type ROM, PROM, EPROM or EEPROM or a Flash memory. The execution means 39 communicates with the data storage medium 42 via the data bus 40. A computer program comprising computer program for implementing a method according to the invention is stored on the data storage medium 42.

[0037] The invention is of course not in any way restricted to the embodiments described above. On the contrary, many possibilities to modifications thereof will be apparent to a person with ordinary skill in art without departing from the basic idea of the invention as defined in the appended claims.

[0038] It is pointed out that "wheel axle" also includes the presence of only a geometrical axis, in which the wheels in question are individually suspended. As already mentioned, the motor vehicle may be of many other types than that illustrated in the Figures, such as a lorry with or without a trailer.

Claims

1. A system for controlling braking of a motor vehicle provided with:
 - a service frictional braking device (17) adapted to act upon a plurality of wheel axles (2-4, 36, 37) of the vehicle for obtaining a braking action,
 - an auxiliary braking device (24) adapted to act upon a driven wheel axle (3) of the vehicle for obtaining a braking action, and
 - means (28-33) for sensing possibly occurring or incipient blocking of wheels of the vehicle and/or mutually different rotational speeds of wheels of the vehicle and upon such an occurrence send an ABS-signal to a braking control means (27),said system comprising a braking control means (27) adapted to select an auxiliary braking mode to act when it is desired to obtain a braking action for reducing the speed of the vehicle or keeping it at a constant speed or reducing the speed increase during downhill driving, said braking control means being adapted to reduce or switch off said auxiliary braking device (24) when a said ABS-signal is received,
said braking control means is adapted to automatically activate said service frictional braking device (17) to act upon at least two wheel axles of the vehicle when braking according to said auxiliary braking mode is reduced or switched off upon receipt of a said ABS-signal, and said auxiliary braking device (24) comprises a retarder brake (25), and that said braking control means (27) is adapted to control said retarder brake to act upon a driven wheel axle (3) of the vehicle in said auxiliary braking mode, characterized in that the braking control means (27) is adapted to select said auxiliary braking mode upon activation of a retarder lever (44) activating said retarder brake (25), that said braking control means (27) is adapted to, after a predetermined time after the moment of said switching off of said auxiliary braking device (24), control said auxiliary braking device to act upon a driven wheel axle (3) of the vehicle again, and that said braking control means (27) is adapted to select said auxiliary braking mode by switching the action of said service frictional braking device (17) off after said predetermined time.
2. A system according to claim 1, characterized in that said braking control means (27) is adapted to activate said service frictional braking device (17) to

act upon all wheel axles (2-4, 36, 37) of the vehicle in said automatic activation of said service frictional braking device.

3. A system according to claim 1 for controlling braking of a motor vehicle comprising a tractor (34) and trailer (35), characterized in that said braking control means (27) is adapted to activate said service frictional braking device (17) to only act upon the wheel axles (36, 37) of said trailer in said automatic activation of said service frictional braking device.
4. A system according to claim 1 for controlling braking of a motor vehicle comprising a tractor (34) and a trailer (35), characterized in that said braking control means (27) is adapted to activate said service frictional braking device (17) to act upon all wheel axles (2-4, 36, 37) of the vehicle for said automatic activation of said service frictional braking device.
5. A system according to any one of the preceding claims, characterized in that said auxiliary braking device (24) comprises an exhaust brake (26), and that said braking control means (27) is adapted to control said exhaust brake to act upon a driven wheel axle (3) of the vehicle in said auxiliary braking mode.
6. A system according to any one of the preceding claims, characterized in that said braking control means (27) is adapted to select said auxiliary braking mode by switching said service frictional braking device (17) off with a delay with respect to said predetermined time.
7. A system according to any one of the preceding claims, characterized in that said braking control means (27) is adapted to reduce or switch the braking action of said service frictional braking device (17) off upon receipt of an ABS-signal after said automatic activation of said service frictional braking device and to activate either said service frictional braking device alone or both said service frictional braking device and said auxiliary braking device (24) with a delay with respect to the moment of switching the action of said service frictional braking device off.
8. A method for controlling braking of a motor vehicle provided with:
 - a service frictional braking device (17) adapted to act upon a plurality of wheel axles (2-4, 36, 37) of the vehicle for obtaining a braking action,
 - an auxiliary braking device (24) comprising a retarder brake (25) adapted to act upon a driven wheel axle (3) of the vehicle for obtaining a braking action,

and

- means (28-33) for sensing possibly occurring or incipient blocking of wheels of the vehicle and/or mutually different rotational speeds of wheels of the vehicle and upon such an occurrence create an ABS-signal,

the method comprising steps of:

- selecting an auxiliary braking mode to act when it is desired to obtain a braking action for reducing the speed of the vehicle or keeping it at a constant speed or reducing the speed increase during downhill driving, wherein said auxiliary braking mode is selected by controlling the retarder brake (25) to act upon the driven wheel axle (3),

- reducing or switching off said auxiliary braking device when a said ABS-signal is created,

- automatically activate said service frictional braking device (17) to act upon at least two wheel axles of the vehicle when braking according to said auxiliary braking mode is reduced or switched off upon receipt of a said ABS-signal, characterized in that the method further comprises the steps of:

- selecting said auxiliary braking mode upon activation of a retarder lever (44) activating said retarder brake (25),

- controlling said auxiliary braking device to act upon the driven wheel axle (3) of the vehicle again after a predetermined time after the moment of said switching off of said auxiliary braking device (24), and

- selecting said auxiliary braking mode by switching the action of said service frictional braking device (17) off after said predetermined time.

9. A method according to claim 8, characterized in that in said step of automatic activation of said service frictional braking device (17) said service frictional braking device is activated to act upon all wheel axles (2-4, 36, 37) of the vehicle.
10. A method according to claim 8 for controlling braking of a motor vehicle comprising a tractor (34) and a trailer (35), characterized in that in said step of automatic activation of said service frictional braking device (17) said service frictional braking device is activated to only act upon the wheel axles (36, 37) of said trailer.

11. A method according to claim 8 for controlling braking of a motor vehicle comprising a tractor (34) and a trailer (35), characterized in that in said step of automatic activation of said service frictional braking device (17) said service frictional braking device is activated to act upon all wheel axles (2-4, 36, 37) of the vehicle.
12. A method according to any one of claims 8-11, characterized in that said auxiliary braking mode is selected by switching said service frictional braking device (17) off with a delay with respect to said predetermined time.
13. A method according to any one of claims 8-12, characterized in that the braking action of said service frictional braking device (17) is reduced or switched off when an ABS-signal is created after said automatic activation of said service frictional braking device and either said service frictional braking device alone or both said service frictional braking device and said auxiliary braking device (24) is/are activated with a delay with respect to the moment of switching said service frictional braking device off for obtaining a braking action again.
14. A computer program loadable into the internal memory of a computer, which computer program comprises computer program code for causing the computer, for a motor vehicle provided with a service frictional braking device (17) adapted to act upon a plurality of wheel axles of the vehicle for obtaining a braking action, an auxiliary braking device (24) comprising a retarder brake (25) adapted to act upon a driven wheel axle of the vehicle for obtaining a braking action, and means for sensing possibly occurring blocking of wheels of the vehicle and/or mutually different rotational speeds of wheels of the vehicle and upon such an occurrence create an ABS-signal:
 - to obtain selection of an auxiliary braking mode to act when it is desired to obtain a braking action for reducing the speed of the vehicle or keeping it at a constant speed or reducing the speed increase during downhill driving, wherein said auxiliary braking mode is selected by controlling the retarder brake (25) to act upon the driven wheel axle (3),
 - to obtain reduction of or switching said auxiliary braking device off when a said ABS-signal is created, and
 - to automatically activate said service frictional braking device to act upon at

least two wheel axles of the vehicle when braking according to said auxiliary braking mode is reduced or switched off upon receipt of a said ABS-signal, and characterised in that the computer program comprises computer program code for causing the computer to

- select said auxiliary braking mode upon activation of a retarder lever (44) activating said retarder brake (25),
- control said auxiliary braking device to act upon the driven wheel axle (3) of the vehicle again after a predetermined time after the moment of said switching off of said auxiliary braking device (24), and
- select said auxiliary braking mode by switching the action of said service frictional braking device (17) off after said predetermined time.

15. A computer program according to claim 14, characterized in that the computer program comprises computer program code for causing the computer:
 - to activate said service frictional braking device (17) to act upon all wheel axles of the vehicle when said frictional braking device is automatically activated.
16. A computer program according to claim 14, characterized in that the computer program comprises computer program code for causing the computer, for a vehicle comprising a tractor and a trailer:
 - to activate said service frictional braking device (17) to only act upon the wheel axles (36, 37) of said trailer (35) when said service frictional braking device is automatically activated.
17. A computer program according to claim 14, characterized in that the computer program comprises computer program code for causing the computer, for a vehicle comprising a tractor and a trailer:
 - to activate said service frictional braking device (17) to act upon all wheel axles (2-4, 36, 37) of the vehicle when said service frictional braking device is automatically activated.
18. A computer program according to claim 24, characterized in that the computer program comprises computer program code for causing the computer:
 - to obtain selection of said auxiliary braking mode by switching said service frictional braking device (17) off with a delay with respect to said predetermined time.

19. A computer program according any one of claims 14-18, characterized in that the computer program comprises computer program code for causing the computer:
- to switch off said service frictional braking device (17) when an ABS-signal is received after said automatic activation of said service frictional braking device, and
 - to activate either said service frictional braking device or said service frictional braking device and said auxiliary braking device (24) with a delay with respect to the moment of switching said service frictional braking device off for obtaining a braking action again.
20. A computer program product comprising a data storage medium readable by an electronic unit (38), a computer program according to any of claims 14-19 being stored on said data storage medium (42).
21. An electronic control unit (38) comprising an execution means (39), a memory (41) connected to the execution means and a data storage medium (42) connected to the execution means, a computer program according to any of claims 14-19 being stored on said data storage medium.

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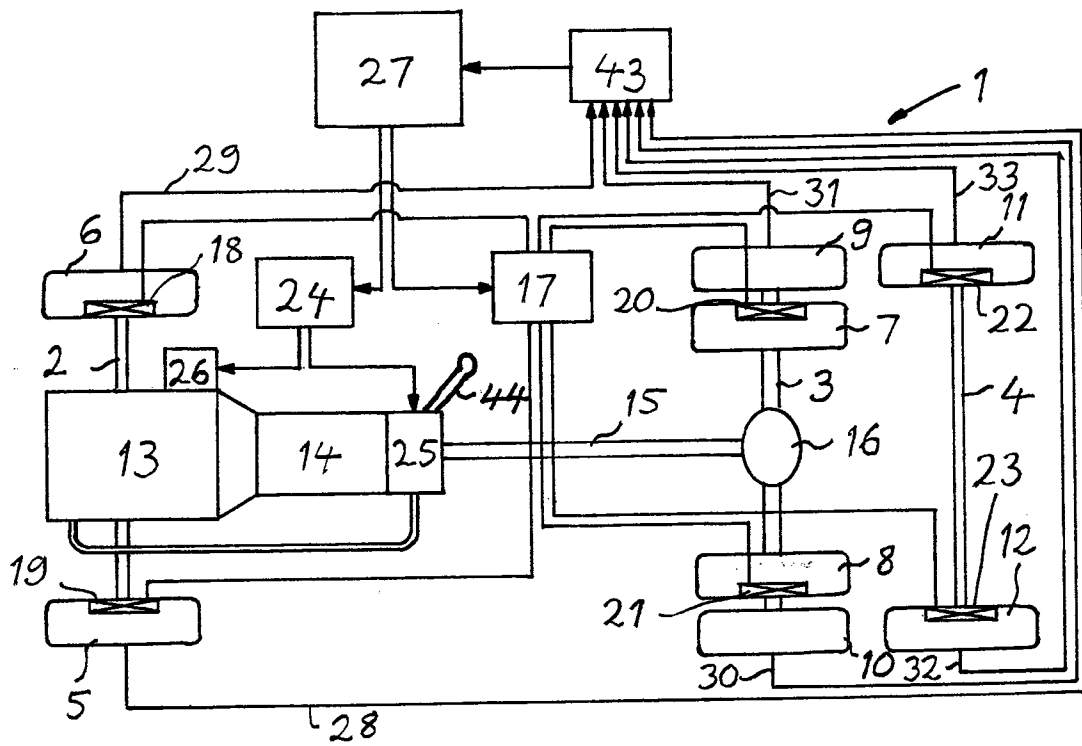


Fig 1

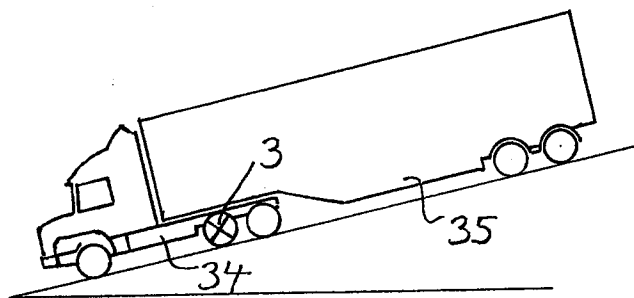


Fig 2

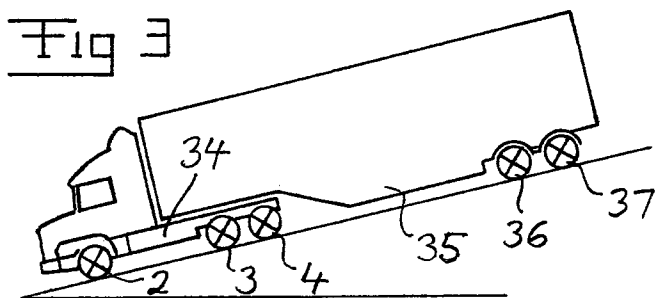


Fig 3

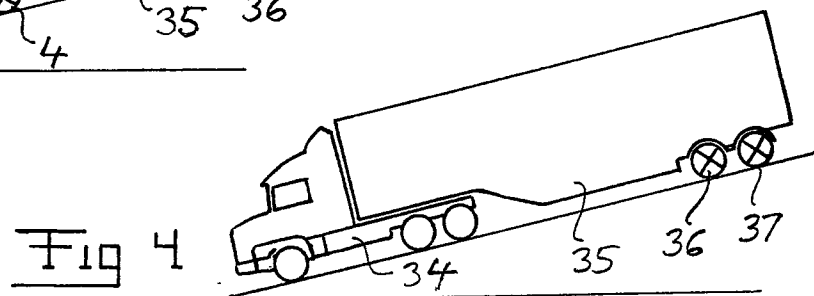


Fig 4

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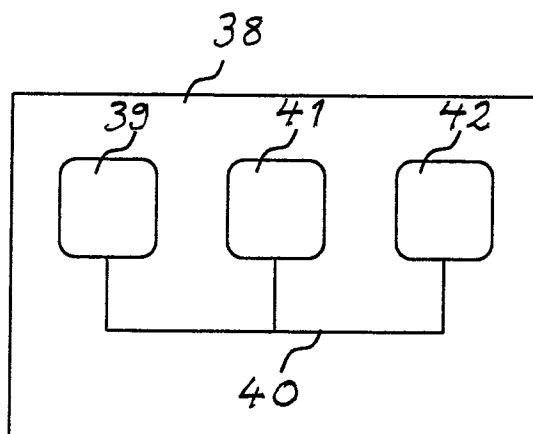


Fig 5

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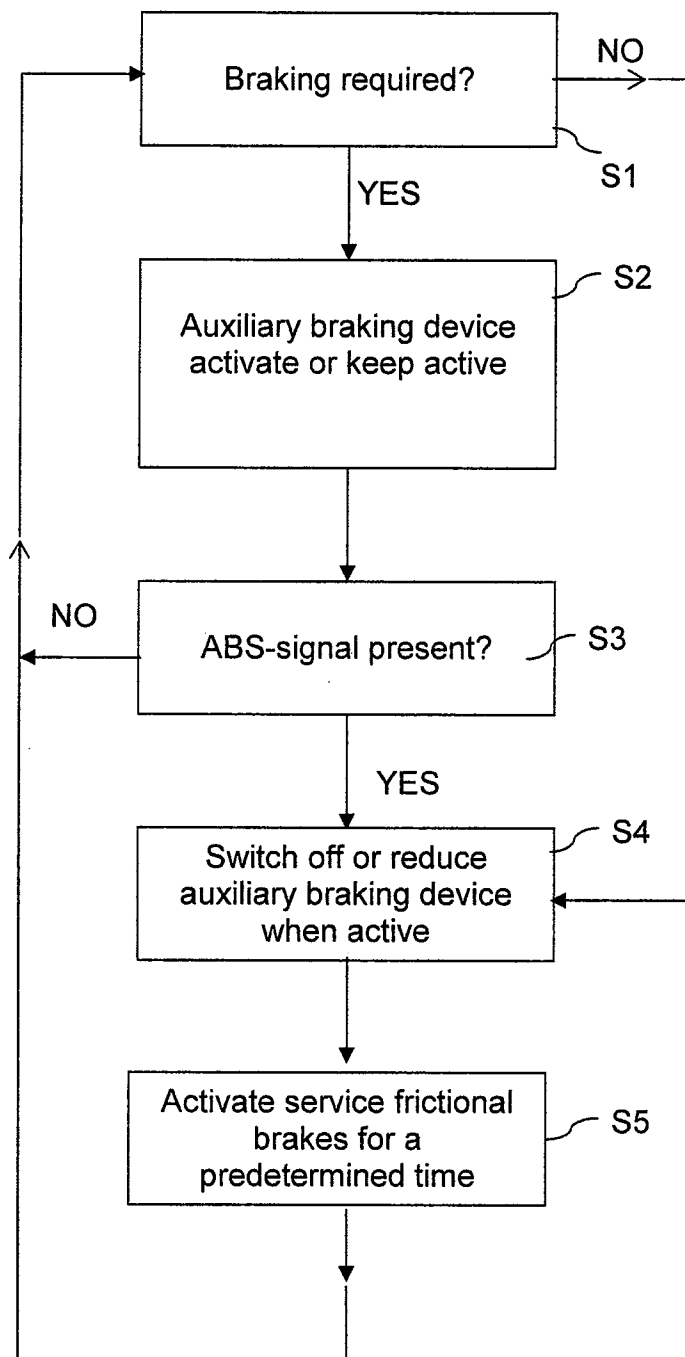


Fig 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE2007/050347

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

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)

IPC: B60T

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

SE,DK,FI,NO classes as above

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

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5496098 A1 (BREARLY), 5 March 1996 (05.03.1996), see the whole document -- -----	1-21

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search

11 Sept 2007

Date of mailing of the international search report

11 -09- 2007

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2007/050347

International patent classification (IPC)

B60T 13/58 (2006.01)

B60T 10/02 (2006.01)

B60T 8/1761 (2006.01)

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Paper copies can be ordered at a cost of 50 SEK per copy from PRV InterPat (telephone number 08-782 28 85).

Cited literature, if any, will be enclosed in paper form.

INTERNATIONAL SEARCH REPORT

Information on patent family members

31/07/2007

International application No.

PCT/SE2007/050347

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				GB	9206344	D	00/00/0000
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				WO	9318949	A	30/09/1993
