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(56) Documents Cited:
GB 2424334 A GB 2405474 A
WO 2009/038304 A1 WO 2003/099610 A1
DE 202007000782 U US 20120286974 A1
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(54) Title of the Invention: **Apparatus and method for protecting a parked vehicle**
Abstract Title: **Collision prevention apparatus for a parked vehicle.**

(57) Apparatus for protecting an unattended parked vehicle 10 from collisions comprises a plurality of distance sensors 12, 14 mounted to the front and/or rear of the vehicle, and an external alarm 16 which is triggered if another vehicle approaches to within a predetermined distance of the parked vehicle. A camera may also be triggered and a series of images stored and later retrieved, or they may be transmitted to the mobile phone of the vehicle's owner. The camera may also be triggered by pressure on retractable projections which extend outwardly from the bodywork when the vehicle ignition is off. If the unattended vehicle is accidentally damaged, a keypad or sound recording device can be used by the driver of the offending vehicle to leave contact details.

Figure 1

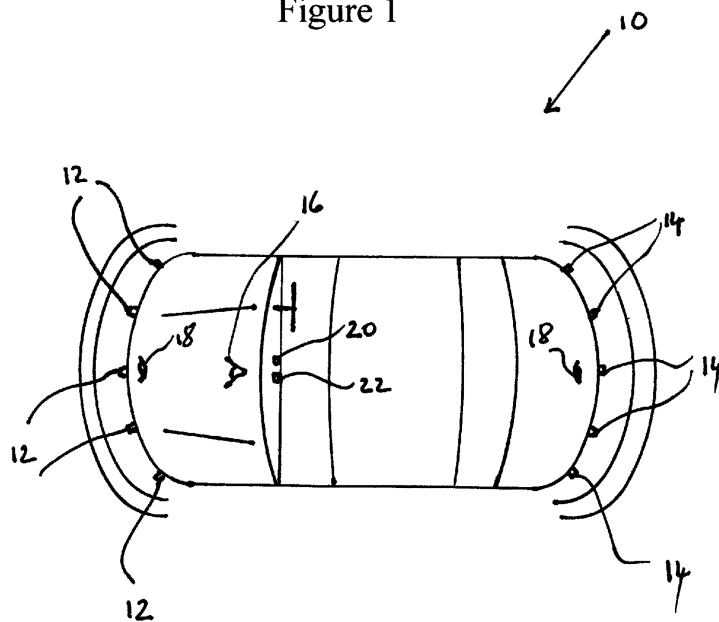
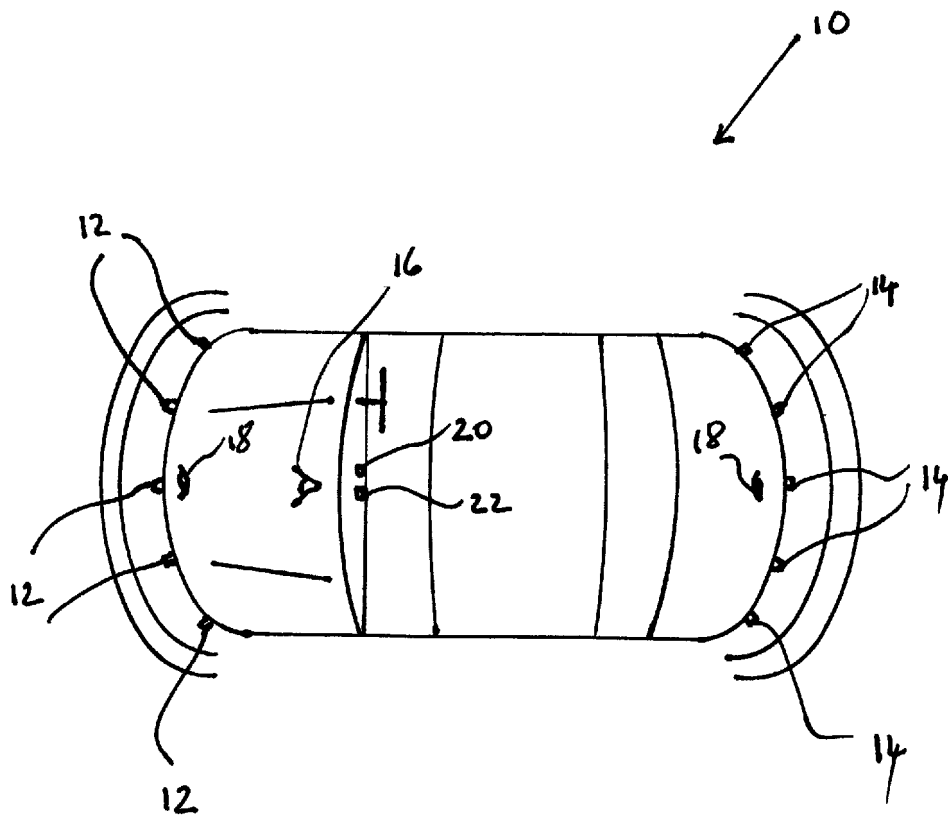


Figure 1



APPARATUS AND METHOD FOR PROTECTING A PARKED VEHICLE

The present invention relates to an apparatus and method for protecting a parked vehicle.

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BACKGROUND TO THE INVENTION

It is known to provide sensors on a vehicle to assist a driver in parking the vehicle, but not all vehicles have such sensors and even if sensors are fitted, they can optionally be
10 turned off.

Car parking spaces have not increased in size in recent years and a typical car space is around 2.4m wide by 4.8m long. The increased use of larger four-wheel drive sports utility vehicles and multi-purpose vehicles (MPVs) often means that standard car
15 spaces are not large enough to accommodate a vehicle in proximity to another vehicle in an adjacent space and to allow sufficient space to open the doors of the vehicle. Furthermore, in order to access such spaces, the driver has to have a good skill level and, even then, collisions with an adjacent vehicle occur often when reversing into a space. Sensors on vehicles to assist parking have mitigated this problem to a small
20 extent, but collisions in car parks are still common.

The roads are becoming increasingly crowded throughout the world, and especially in city centres. This is likely to result in an increased frequency of accidents as spaces at the kerbside become rarer and smaller.

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Although a driver is required by law to report any collisions to his or her insurance company and to leave contact details for the other vehicle driver, the driver causing the collision often drives away leaving damage to a parked car, without notifying the owner of the parked vehicle. This means that a driver returning to their car may find
30 it crash-damaged with no means of redress. They are forced to either make a claim against their own insurance if they have full liability cover or to pay to have the damage repaired.

It is an object of the invention to provide an apparatus and method for protecting a parked vehicle which reduces or substantially mitigates these problems.

STATEMENT OF INVENTION

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According to a first aspect of the present invention there is provided an apparatus for protecting a parked vehicle comprising a plurality of distance sensors and an external alarm, the distance sensors being adapted to be mounted to the front and/or rear of a vehicle, each distance sensor being adapted to detect the proximity of an approaching
10 vehicle and to trigger the external alarm when the approaching vehicle moves within a predetermined distance of the sensor for warning an approaching driver that they are in proximity to the parked vehicle. The external alarm will alert the approaching driver that he should stop immediately.

15 The invention is advantageous, because it provides a vehicle owner with the ability to warn other drivers of an impending collision with their vehicle, which is parked, before the collision occurs. The system is able to operate when the vehicle is unattended.

20 Optional features of the apparatus are described in appended claims 2 to 35.

The optional feature of the camera enables photographs to be taken prior to a collision, during the collision, and immediately following the collision, thereby enabling the driver of a parked car to identify the colliding vehicle irrespective of
25 whether or not the driver of that vehicle leaves their details.

The photographs can conveniently be downloaded for use in an insurance claim, police report, or similar purpose. The photographs may be timed and dated.

30 The optional feature of the input means provided externally of the vehicle provides for an honest driver to leave his or her details when he or she has damaged a parked vehicle. The input means may comprise for example of a keypad or microphone, connected with a storage means for storing the details once they have been input. The input means may be activated or exposed when a collision is detected, and a pre-

recorded voice message may draw a driver's attention to the input means and provide instructions for their use.

5 Providing input means is advantageous, since it ensures that a colliding driver's details are kept secure and not lost. In comparison, a note left on a windscreen is vulnerable to wind and rain. A note may also contain inaccurate information, and so it is advantageous to capture the offending driver's registration number.

10 According to a second aspect of the present invention there is provided a method of protecting a parked vehicle comprising fitting distance sensors to the front and/or rear of a vehicle, each distance sensor being adapted to detect the proximity of an approaching vehicle and to trigger an external alarm when the approaching vehicle moves within a predetermined distance of the sensor for warning an approaching driver that they are in proximity to the parked vehicle.

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Optional features of the method are described in appended claims 37 to 64.

BRIEF DESCRIPTION OF THE DRAWING

20 For a better understanding of the present invention, and to show more clearly how it may be carried into effect, reference will now be made, by way of example only, to the accompanying drawing, in which:

25 Figure 1 shows a schematic plan view of a vehicle fitted with the apparatus of the invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

30 Referring to Figure 1, a vehicle is indicated generally at 10. The vehicle 10 is a conventional car, but could be any type of road going vehicle, which may be left parked in a public place, on private land or in a car park.

A plurality of distance or proximity sensors 12 are mounted to the front of the vehicle and similarly a plurality of distance or proximity sensors 14 are mounted to the rear of

the vehicle. The distance sensors 12, 14 are activated when the vehicle is parked, and sense when another vehicle moves into proximity with the parked vehicle 10. The sensors may be activated automatically by actuation of the parking brake, when ‘park’ or ‘neutral’ is selected on an automatic gearbox, and/or when the ignition is switched
5 off. Alternatively the sensors can be actuated manually by the driver of the vehicle, before the vehicle is left parked.

A speaker 16 is mounted to the vehicle and provides an audible warning external of the vehicle 10, as another vehicle approaches. The warning may be a voice warning,
10 saying for example, “Your vehicle is close to another vehicle, please be careful”. Alternatively, or in addition, the warning may be a “beep”, such as the vehicle horn. As the moving vehicle comes closer to the parked vehicle 10, the volume of warning may increase and the warning may be sounded repeatedly with decreasing time between each sounding. Similarly, as the moving vehicle moves away, the warning
15 may decrease in volume and the time interval between soundings may become greater until the warning stops when the moving vehicle is a predetermined distance away, for example, 0.5m away.

Projections, in the form of bump stops, may extend from the vehicle when parked and
20 may deploy around 25mm from the bodywork. The sensors 12, 14 may be mounted to the projections. Also, pressure sensors can be mounted to each projection, which indicate when the projection is hit by another vehicle, for example, in a parking collision.

25 Cameras 18 are mounted to both the front and rear of the vehicle at or near bumper plate level and have a wide angle lens for capturing number plate images of other vehicles. Each distance sensor is arranged to send a trigger to the camera to take a photograph when another vehicle moves within a predetermined distance of the vehicle 10. Furthermore, should the moving vehicle make contact with one of the
30 projections, then the pressure sensors will also trigger the camera to take a photograph. Once the camera is triggered, it will take continuous photographs at timed intervals of between 1 and 20 seconds for a predetermined amount of time, typically 5 minutes.

The cameras 18 are secured to the vehicle via fixed or movable mounts. The mounts may allow the camera to automatically tilt up and down, for changing the camera's view, i.e. the in-photograph space which is in sight of the camera. At least one of the cameras 18 may be movable between a downward-facing position and an upward-facing position. The camera in the downward-facing position may be used as part of a conventional parking assistance system, to allow the driver to see how far he is from an adjacent vehicle or other obstacle. When the vehicle 10 is parked, the camera may be tilted to the upward-facing position. In the upward-facing position, the view of the camera includes number plates of approaching vehicles, as well as possibly the driver of the approaching vehicle.

At least one of the cameras 18 may be tilted from the downward-facing position to the upward facing position, automatically when the parking brake is engaged, when the park or neutral position is selected on an automatic gear shift, or when the vehicle ignition is switched off. The camera may be returned to the downward-facing position when the vehicle 10 is driven, providing the driver with the best view of bumpers of adjacent vehicles for parking assistance.

The camera may be attached to a GSM modem, or similar wireless data transmitter. Once a photograph has been taken, it may be sent over the internet, via the GSM modem or other transmitter, to a portable device which is held by the driver or owner of the vehicle. For example, the apparatus may send a photograph to the driver's mobile telephone, alerting the driver to a possible collision and providing a photograph of the offender. If the driver is nearby, he can then confront the offending driver.

The speaker 16 will also warn the other driver that his vehicle is being photographed following a collision. A verbal warning will sound, for example, "Your vehicle has been photographed at this specific moment, doing damage to this vehicle. You may expect to hear from the owner, his insurance company, and the police".

A warning light 20 is provided on the dashboard of the vehicle 10, which indicates when a photograph has been taken. A download port 22, for example, a USB port, is also provided on the dashboard for connecting an external device enabling download

of any photographs taken. Any photographs may also be displayed on an integrated display screen and any photographs downloaded through a Bluetooth connection.

5 The invention is advantageous, because it warns of a collision with a parked car before it happens. Furthermore, if a collision does occur, then photographic evidence may be obtained by the owner of the parked car for use in tracing and claiming from the insurance of the person responsible for the collision. The camera is usefully positioned to take photographs of number plates, but also to capture the characteristics of the offending vehicle, such as vehicle type and colour. It may also capture an
10 image of the offending driver.

Features of the invention described may be utilised in any combination within the scope of the appended claims.

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CLAIMS

1. An apparatus for protecting a parked vehicle comprising a plurality of distance sensors and an external alarm, the distance sensors being adapted to be mounted to the front and/or rear of a vehicle, each distance sensor being adapted to detect the proximity of an approaching vehicle and to trigger the external alarm when the approaching vehicle moves within a predetermined distance of the sensor for warning an approaching driver that they are in proximity to the parked vehicle.
2. Apparatus as claimed in claim 1, in which the external alarm is a vehicle horn.
3. Apparatus as claimed in claim 1, in which the external alarm is a pre-recorded voice warning approaching drivers of their proximity to the parked vehicle.
4. Apparatus as claimed in any one of claims 1 to 3, in which the external alarm increases in volume, the closer the approaching vehicle moves towards the or each sensor.
5. Apparatus as claimed in any of claims 1 to 4, in which at least one camera is adapted to be mounted to the front and/or rear of the parked vehicle, the camera being triggered to take a photograph by the or each distance sensor when an approaching vehicle moves within a predetermined distance of the sensor and/or contacts the parked vehicle.
6. Apparatus as claimed in claim 5, in which a plurality of photographs are taken at timed intervals following the triggering of the camera.
7. Apparatus as claimed in claim 6, in which the timed intervals are between 1 and 20 seconds.
8. Apparatus as claimed in any one of claims 5 to 7, in which a warning light connected to the camera is mountable on a dashboard of the vehicle for indicating that a photograph has been taken.

9. Apparatus as claimed in any one of claims 5 to 8, in which a connector is connected to the camera for facilitating download of any pictures taken by the or each camera.

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10. Apparatus as claimed in claim 9, in which the connector is a USB port.

11. Apparatus as claimed in any of claims 5 to 9, in which the camera is provided with a movable mount for fitting the camera to the vehicle.

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12. Apparatus as claimed in claim 11, in which the mount is movable between a downward-facing and an upward-facing position.

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13. Apparatus as claimed in claim 12, in which the mount moves automatically from the downward-facing position to the upward-facing position when a parking brake is engaged, when the park or neutral position is selected on an automatic gear shift, or when a vehicle ignition is switched off.

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14. Apparatus as claimed in claim 13, in which the mount moves automatically from the upward-facing position to the downward-facing position when the parking brake is disengaged, when the automatic gear shift is moved to a position other than park or neutral, or when the vehicle ignition is switched on.

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15. Apparatus as claimed in any of claims 5 to 14, in which a transmitter is provided to transmitting a photograph from the camera to a portable device.

16. Apparatus as claimed in claim 15, in which the transmitter is a GSM transmitter.

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17. Apparatus as claimed in claim 15 or claim 16, in which the portable device is a mobile telephone.

18. Apparatus as claimed in any preceding claim, in which a pre-recorded voice warning sounds externally of the vehicle when a photograph has been taken.

19. Apparatus as claimed in any preceding claim, fitted to a vehicle, in which projections are adapted to extend from bodywork of the vehicle.
- 5 20. Apparatus as claimed in claim 19, in which the projections extend outwardly when a parking brake of the vehicle is applied.
21. Apparatus as claimed in claim 19 or 20, in which the projections retract inwardly when the parking brake is released.
- 10 22. Apparatus as claimed in claim 19, in which the projections extend outwardly when the parking position is selected on an automatic gear shift.
23. Apparatus as claimed in claim 22, in which the projections retract inwardly when an automatic gear shift is moved to a position other than parking.
- 15 24. Apparatus as claimed in claim 19, in which the projections extend outwardly when neutral is selected on the protected vehicle.
- 20 25. Apparatus as claimed in claim 24, in which the projections retract inwardly when a gear is selected on the protected vehicle.
26. Apparatus as claimed in claim 19, in which the projections extend outwardly when the vehicle ignition is switched off.
- 25 27. Apparatus as claimed in claim 19 or claim 26, in which the projections retract inwardly when the vehicle ignition is switched on.
28. Apparatus as claimed in any of claims 19 to 27, in which the projections extend outwardly from the vehicle bodywork around 25mm.
- 30 29. Apparatus as claimed in any one of claims 19 to 28, when dependent on any one of claims 5 to 18, in which a pressure sensor is connected to at least one of

the projections, the or each pressure sensor triggering the or each camera to take a photograph, when it detects a force applied to the projection.

5 30. Apparatus as claimed in any one of the preceding claims, in which input means are provided externally of the vehicle, for accepting details from a driver of a collided vehicle when the protected vehicle is unattended.

31. Apparatus as claimed in any of claims 1 to 18 or claim 30, fitted to a vehicle.

10 32. Apparatus as claimed in any of the preceding claims, in which the sensors are activated by a button on a remote control.

33. Apparatus as claimed in claim 32, in which the remote control is a vehicle key.

15 34. Apparatus as claimed in any of claims 5 to 18, in which the camera may be triggered to take a photograph by a button on a remote control.

35. Apparatus as claimed in claim 34, in which the remote control is a vehicle key.

20 36. A method of protecting a parked vehicle comprising fitting distance sensors to the front and/or rear of a vehicle, each distance sensor being adapted to detect the proximity of an approaching vehicle and to trigger an external alarm when the approaching vehicle moves within a predetermined distance of the sensor for warning an approaching driver that they are in proximity to the parked
25 vehicle.

37. A method as claimed in claim 36, in which the external alarm is a vehicle horn.

30 38. A method as claimed in claim 36, in which the external alarm is a pre-recorded voice warning approaching drivers of their proximity to the parked vehicle.

39. A method as claimed in any one of claims 36 to 38, in which the external alarm increases in volume, the closer the approaching vehicle moves towards the or each sensor of the parked vehicle.

5 40. A method as claimed in any of claims 36 to 39, in which at least one camera is mounted to the front and/or rear of the parked vehicle, the camera being triggered to take a photograph by the or each distance sensor when an approaching vehicle moves within a predetermined distance of the sensor and/or contacts the parked vehicle.

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41. A method as claimed in claim 40, in which a plurality of photographs are taken at timed intervals following the triggering of the camera.

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42. A method as claimed in claim 41, in which the timed intervals are between 1 and 20 seconds.

43. A method as claimed in any one of claims 41 to 42, in which a warning light connected to the camera is mounted on a dashboard of the vehicle and indicates that a photograph has been taken.

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44. A method as claimed in any one of claims 40 to 43, in which a connector is connected to the camera for facilitating download of any pictures taken by the or each camera.

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45. A method as claimed in claim 44, in which the connector is a USB port.

46. A method as claimed in any of claims 40 to 45, in which the camera is secured to the vehicle on a movable mount.

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47. A method as claimed in claim 46, in which the mount is movable between a downward-facing and an upward-facing position.

48. A method as claimed in claim 47, in which the mount moves automatically from the downward-facing position to the upward-facing position when the

parking brake is engaged, when the park or neutral position is selected on an automatic gear shift, or when the vehicle ignition is switched off.

5 49. A method as claimed in claim 48, in which the mount moves automatically from the upward-facing position to the downward-facing position when the parking brake is disengaged, when an automatic gear shift is moved to a position other than park or neutral, or when the vehicle ignition is switched on.

10 50. A method as claimed in any one of claims 36 to 49, in which a pre-recorded voice warning sounds externally of the vehicle when a photograph has been taken.

15 51. A method as claimed in any of claims 36 to 50, in which a transmitter is provided to transmitting a photograph from the camera to a portable device.

52. A method as claimed in claim 51, in which the transmitter is a GSM transmitter.

20 53. A method as claimed in claim 52, in which the portable device is a mobile telephone.

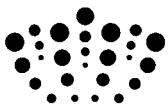
54. A method as claimed in any one of claims 36 to 53, in which projections are adapted to extend from the bodywork of the parked vehicle.

25 55. A method as claimed in claim 54, in which the projections extend outwardly when the parking brake is applied.

56. A method as claimed in claim 55, in which the projections retract inwardly when the parking brake is released.

30 57. Apparatus as claimed in claim 54, in which the projections extend outwardly when the parking position is selected on an automatic gear shift.

58. Apparatus as claimed in claim 57, in which the projections retract inwardly when an automatic gear shift is moved to a position other than parking.
59. Apparatus as claimed in claim 54, in which the projections extend outwardly when neutral is selected on the protected vehicle.
60. Apparatus as claimed in claim 59, in which the projections retract inwardly when a gear is selected on the protected vehicle.
61. Apparatus as claimed in claim 54, in which the projections extend outwardly when the vehicle ignition is switched off.
62. Apparatus as claimed in claim 61, in which the projections retract inwardly when the vehicle ignition is switched on.
63. A method as claimed in any of claims 54 to 62, in which the projections extend outwardly from the vehicle bodywork around 25mm.
64. A method as claimed in any one of claims 54 to 63, when dependent on any one of claims 40 to 52, in which a pressure sensor is connected to each projection, the or each pressure sensor triggering the or each camera to take a photograph, when it detects a force applied to the projection.
65. Apparatus for protecting a parked vehicle substantially as described herein with reference to and as illustrated in Figure 1 of the accompanying drawings.
66. A method of protecting a parked vehicle substantially as described herein with reference to and as illustrated in Figure 1 of the accompanying drawings.



Application No: GB1303832.8

Examiner: Dr Rhys Williams

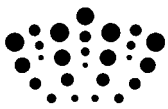
Claims searched: 1-66

Date of search: 5 August 2013

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-3, 5, 6, 8, 15-17, 30, 36, 37, 40, 41, 43, 51-53	WO03/099610 A1 (DANZ) See abstract, description.
X,Y	1, 2, 9, 36, 37, 44; 5, 6, 8, 15-17, 40, 41, 43, 51-53	US2012/0286974 A1 (CLAUSSEN) See figure 1, paragraphs [0005], [0006], [0039], [0042].
X,Y	1, 2, 4, 36, 37; 5, 6, 8, 15-17, 40, 41, 43, 51-53	US2006/0187009 A1 (KROPINSKI) See paragraph [0007], [0008], claim 1.
X,Y	1, 2, 36, 37; 5, 6, 8, 15-17, 40, 41, 43, 51-53	GB2405474 A (BURBRIDGE) See page 2, lines 3-12, page 4, lines 1-3.
X,Y	1, 2, 36, 37; 5, 6, 8, 15-17, 40, 41, 43, 51-53	US2007/0080584 A1 (ZHITAO) See figure 3, paragraphs [0004], [0006], [0007], [0011].
Y	5, 15-17, 40, 51-53	GB2424334 A (DRIVER) See whole document.
Y	5, 6, 40, 41	WO2009/038304 A1 (YOO) See figure 2, paragraphs [12], [45].



Y	5, 8, 40, 43	DE202007000782 U (VETTERMANN) See paragraphs [0001], [0002], [0003], [0004].
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Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

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Worldwide search of patent documents classified in the following areas of the IPC

B60Q; B60R; G08G

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
G08G	0001/16	01/01/2006
B60R	0025/30	01/01/2013