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MIRROR ADJUSTMENT ASSISTANCE SYSTEM FOR TRUCKS

(57)

A mirror adjustment assistance system for trucks having as part of a vehicle body at least a cabin (3) having a front side with respect to an intended main direction of travel, a driver side, and a co-driver side. At least three adjustable mirrors (5, 7, 9, 11, 13, 19) are attached to an exterior of the vehicle body or cabin (3), each of the at least three adjustable mirrors (5, 7, 9, 11, 13, 19) has an aiming marker (43, 45, 59, 61, 65, 69) on or adjacent its reflective surface. At least two vehicle body target markers (41, 57, 63, 67) are positioned on an exterior surface of the vehicle body (3), and at least a single one (41; 57) of the at least two vehicle body target markers is associated with two of the at least three mirrors (5, 9; 7, 11). Any aiming marker (43, 45, 59, 61, 65, 69) of the at least three adjustable mirrors (5, 7, 9, 11, 13, 19) can only be aligned with a single one of the at least two vehicle body target markers (41, 57, 63, 67).

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Title: MIRROR ADJUSTMENT ASSISTANCE SYSTEM FOR TRUCKS

The invention relates to a mirror adjustment assistance system for
5 trucks. The expression “trucks” is used in this specification as a generic
nominator for power-driven vehicles having at least four wheels, and
arranged for carrying goods or passengers, including towing vehicles such as
tractors coupled to a trailer, and also includes those for military, off-road
and agricultural use. By nature of this invention specifically also touring
10 cars for the transport of relatively large groups of passengers are also
included when reference is made to “truck”. In particular the invention
relates to such vehicles having more than one exterior mirror on the same
side (driver side or co-driver/passenger side).

Devices for indirect vision, particularly including rear view mirrors
15 and blind spot mirrors, and/or camera systems are important installations
to the above defined category of trucks in particular to eliminate the effect of
bodywork features that reduce the driver’s field of vision. A large collection
of different mirrors is now legally required equipment to this category of
vehicles in the interest of road safety.

20 Improper adjusted mirrors are nonetheless an important cause of
accidents involving trucks. Particular serious accidents are those between
trucks taking a right turn and cyclists. Although proper mirror adjustment
is the responsibility of the driver, research has revealed that about 80% of
professional truck drivers lack the necessary knowledge to properly adjust
25 their mirrors.

The currently mandatory interior and exterior mirrors for road
vehicles (e.g. Classes I to VII), and in particular their fields of vision are
defined in ECE-R 46. In addition the International Standard ISO 16505
gives minimum safety, ergonomic and performance requirements for
30 Camera-Monitor-Systems (CMS) as used in road vehicles to present the
required outside information of a specific in-vehicle field of view. In

particular ISO 16505 also defines a maximum distance from the driver eye reference point to the co-driver side class II, III and IV mirrors (as defined in ECE R46).

5 Proper mirror adjustment to meet present day complex legislation is quite a challenge and requires special knowledge and tools, such as knowledge about legislation (what the driver should see in each mirror), and a mirror adjustment area having the legally required fields of view mapped on its surface.

10 Governments, insurance companies and transport companies do recognize the importance of proper mirror adjustment and invest in solving this problem by creating mirror adjustment areas for example at truck parking lots, at petrol stations and at the premises of transport companies. In the Netherlands there are presently approximately 40 public mirror adjustment areas. Driver training is also offered to improve the driver's
15 mirror adjustment skills in the interest of road safety. These measures do help in solving the problem to some extent, but are costly, time consuming and not always readily available.

A system of lining up a target marker on a fixed vehicle body part, which is reflected in the adjustable mirror surface, with an aiming marker
20 on the mirror surface is already known for passenger cars. Examples are shown in US 2015/0224931 and US 5022747. Document US 2015/0224931 uses an aiming marker on the movable mirror glass surface and a target marker located on the fixed outer mirror housing. If these are lined up the mirror is adjusted properly. This specific mirror housing design with
25 integral marker can not be applied to vehicles where the mirror housing location is dependent on the configuration of the vehicle in respect of cab type, tire size, type of suspension, vehicle body and/or chassis type, such as is the case with trucks. Difference in height between lowest and highest truck cabs can amount to 600mm, and height differences between off-road
30 and low deck chassis of trucks can be as much as 500mm. This would

require dedicated mirror housing designs for each configuration to enable offering of the target marker on the outer mirror body, if possible at all.

Moreover there are also differences in the cabin size in relation to vehicle bodies. Cabins of trucks often come in several sizes, depending on whether

5 the chassis type is for a truck intended for light weight duties, such as making deliveries, or for heavy duty, such as long distance haulage. With the smaller version of cab type the vehicle body can often be wider than the cabin, and thereby interfere with the field of vision. Interference of vehicle body parts with the field of vision also requires reposition of the mirrors at a
10 greater distance from the cabin.

In US 5022747 an auxiliary mirror is located on the adjustable mirror surface for the specific purpose of lining up with a target marker on the exterior of the vehicle body. The auxiliary mirror is positioned at an angle relative to the reflective surface of the rear view mirror. The auxiliary
15 mirror interferes with a portion of the surface area of side view mirror and as a result reduces and obstructs the functional field of vision. Also the small dimensions of the auxiliary mirror make it difficult to find the target marker. Truck mirrors are located further away from the driver, and the distance between driver and co-driver class II main rearview mirrors can be
20 significantly more than 2 meters. This implies that such auxiliary mirrors as proposed by US 5022747 need to be relatively large in order to be usable on a truck. Furthermore it is not allowed to have obstructions in the legal field of vision that exceed more than about 10% thereof, and to accommodate the auxiliary mirror outside of the required field of vision on the mirror
25 surface would hence require larger mirrors. Enlarging the mirrors on trucks is generally objectionable, as it would increase the blind spots behind the mirror and also have a negative effect on aerodynamics, causing higher fuel costs. Also it would be undesirable to sacrifice the 10% legal margin for obstructions that do not have a continuous function. It is for instance
30 already impossible on the co-drivers side of a truck to prevent that part of

the field of vision of a class V kerb mirror is obstructed by the presence of the class II main rear view mirror, and the class IV wide-angle mirror in this close proximity field of kerb vision. It is clear that any unnecessary increase of mirror surface is to be avoided.

5 Therefore a need still exists for an easier, faster and more cost effective way to assist truck drivers in properly setting up their mirrors. In particular proper mirror adjustment should preferably be obtained without a need for special knowledge or availability of mirror adjustment areas.

 Accordingly it is an object of the present invention to propose an
10 improved mirror adjustment assistance system for trucks having more than one exterior mirror on the same side. In a more general sense it is thus an object of the invention to overcome or reduce at least one of the disadvantages of the prior art. It is also an object of the present invention to provide alternative solutions which are less cumbersome in construction and
15 in operation and which moreover can be obtained relatively inexpensively. Alternatively it is an object of the invention to at least provide a useful alternative.

 To achieve these objects the invention provides for a mirror adjustment assistance system as defined in one or more of the appended
20 claims. The mirror adjustment assistance system according to the invention in particular includes as part of a vehicle body at least a cabin having a front side with respect to an intended main direction of travel, a driver side, and a co-driver side. At least three adjustable mirrors are attached to an exterior of the cabin, each of these at least three adjustable mirrors has an
25 aiming marker on or adjacent to its reflective surface. At least one vehicle body target marker is positioned on an exterior surface of the vehicle body, and the at least one vehicle body target marker is associated with at least two of the at least three adjustable mirrors. Any of the aiming markers of at least two of the at least three adjustable mirrors can only be aligned with
30 the at least one vehicle target marker. The at least one vehicle body target

marker in one embodiment can be one of at least two vehicle body target markers. At least a single one of those at least two vehicle body target markers can then be associated with two of the at least three mirrors, and any aiming marker of the at least three adjustable mirrors will preferably
5 be alignable with only a single one of the at least two vehicle body target markers. Position markers on the mirrors and position markers on the side of the truck can be provided as simple stickers, or alternatively as lamps, elements protruding from the cabin, three-dimensional shapes, local raised portions, fender cutouts etc. The position marker on the mirror is thereby
10 then used as a reference to adjust the mirror to the correct angle. When the driver is in the driving position and looks at the mirror then the markers need only to be lined up by adjusting the mirrors. When both markers are lined up, with the position marker on the vehicle in the correct spot in the mirror surface, the mirrors are properly adjusted. This solution allows the
15 driver to properly set up his mirrors in seconds without requiring any special knowledge, tools or the use of a mirror adjustment area.

Because the position marker on the vehicle has a fixed relation with respect to the legal fields of vision it can be used as a target for adjusting the mirrors, irrespective of driver size or sitting position. Because of the fixed
20 relation between the marker on the vehicle and the legal fields of view the mirror is automatically at the proper position to meet legal requirements, when both the marker on the vehicle and the marker on the mirror are lined up as seen from the driving position. The driver's eye points in normal driving position are depending on two degrees of freedom: (i) seat position:
25 forward or backwards (horizontal), and (ii) height: driver size and seat height adjustment (vertical). Mirror adjustment is needed to compensated these different eye positions, by tilting up or down to adjust to eye point height, and by turning left or right to adjust to eye point distance. By adjusting the mirrors each driver can line up the markers from each
30 personal driving position. The advantages of the present invention in

relation to existing prior art are simplicity of design. The obtained mirror adjustment assistance system is easy to use, accurate, and cost effective. It also avoids any redesign of the mirror or mirror housing, which avoids negative effects such as larger mirror required in order to stay within legal requirement concerning indirect vision. Further advantages include no increased blind spot, larger mirrors takes away more direct vision; no increase of cost price, as larger mirrors would require more material; no negative effect on aerodynamics, which would lead to an increase in fuel consumption; no need for many different mirror variants due to large number of vehicle configurations; and no increasing of costs due to impact on manufacturing (such as increased tooling costs, handling at the factory etc.). The system can be easily applied to any existing mirror, and thus can also be offered as a stand alone (aftermarket) product that takes into account the relevant vehicle variant. The aiming marker on the reflective mirror surface is not obtrusive; it does not compromise the quality of the view in the mirror by adding auxiliary mirrors. Only small and subtle markers are required. The system also in particular is applicable to vehicles equipped with more than one mirror where it is important to prevent any confusion about which marker applies to which mirror. This is realized by locating the markers in such a way that only one marker will ever be visible in each single mirror. For example, by using the same marker for class II and class IV mirror.

In one embodiment of the system of the invention a first of the at least three adjustable mirrors is a main rear view mirror, and a second of the at least three adjustable mirrors is a wide-angle blind spot mirror, and a first of the at least two body target markers is the single one body target marker associated with the first and second of the at least three adjustable mirrors for alignment with the aiming markers of these first and second adjustable mirrors. In a further modification of this embodiment the first body target marker is located at a rear edge of the cabin with respect to the

intended main direction of travel. This embodiment may optionally also be further modified in that the first and second adjustable mirrors are located on the co-driver side, wherein a third of the at least three adjustable mirrors is a close proximity kerb mirror on the co-driver side, and wherein a second
5 of the at least two body target markers is positioned for being exclusively alignable with the third adjustable mirror.

Optionally in an embodiment of the present invention some or all of the at least three adjustable mirrors can advantageously be remotely adjustable by electric power.

10 At least one of the aiming markers, and at least one associated body marker can be readily recognizable indicia contrasting with their immediately surrounding surface area.

Alternatively or even additionally at least one of the aiming markers, and at least one associated body marker can be arranged as
15 illuminated markers. In such an embodiment the adjustable mirrors are advantageously remotely adjustable by a remote control, and the illuminated markers can then also optionally be operated by this remote control.

The variant of illuminated markers, which can also include passive
20 illumination by reflective stickers or using “glow in the dark” material, offers the additional benefit of also enabling proper mirror adjustment in the dark, which is not yet available in any form and would particularly benefit road traffic safety.

When illuminated markers are used, it is also possible to guide a
25 truck driver through the steps of mirror adjustment by illuminating only one mirror marker for aiming and one body marker for targeting at the same time. With illuminated markers it also becomes possible to couple these to the operation of remote mirror adjustment devices so that only those markers are lit that are relevant to the mirror adjustment controls
30 selected by the driver. Illuminated body target markers may also enable

their reflections in the mirrors to become more readily recognizable without having to resort to large surface areas on the truck cabin bodies, which can sometimes be objectionable from aesthetic considerations.

The mirror adjustment assistance system of the invention can
5 further comprise a main rear view mirror, and a wide-angle blind spot
mirror on each the driver side and co-driver side of the cabin, and one single
associated body target marker on each of the driver and co-driver sides for
alignment with the aiming markers of respective adjustable mirrors, the
main rear view mirror, and the wide-angle blind spot mirror on the co-driver
10 side being part of the at least three adjustable mirrors. Such an embodiment
may additionally also comprise a close proximity kerb mirror, and a blind
spot front mirror both on the co-driver side, and each with an associated
target marker positioned on the exterior of the cabin for being exclusively
alignable with the relevant kerb or front mirror, the close proximity kerb
15 mirror being part of the at least three adjustable mirrors, and the target
marker positioned for exclusively alignment with the kerb mirror being the
second of the at least two body target markers.

In again another possible embodiment the aiming markers can
each be within a distance of 20 mm from a surface edge of the relevant
20 adjustable mirror and/or the aiming markers can each be spaced within 30
mm from a centre of a surface edge of the relevant adjustable mirror. In this
regard the aiming marker of at least one of the at least three adjustable
mirrors can advantageously be spaced within 10 mm from the centre of the
relevant surface edge.

25 Further advantageous aspects of the invention will become clear
from the appended description and in reference to the accompanying
drawings, in which:

Figure 1 shows a typical truck cabin with a legally required set of
mirrors:

Figure 2 shows a typical mirror adjustment area as provided on parking lots.

Figure 3 is another view of a mirror adjustment area similar to Figure 2, but with a truck positioned thereon;

5 Figure 4 is a side elevation of the driver's side of a truck with left hand steering, indicating the vertical fields of vision;

Figure 5 shows the driver's side main and wide-angle rear view mirrors (class II & IV) with relative body marker;

10 Figure 6(A) is a side elevation the co-drivers, or passenger side of a truck with left hand steering, indicating the required vertical fields of vision of class IV and V mirrors;

Figure 6(B) is a plan view of the truck of Figure 6(A), indicating the required horizontal fields of vision of class IV and V mirrors;

15 Figure 7 shows the co-driver's, or passenger side main and wide-angle rear view mirrors (class II & IV), with relative body marker;

Figure 8 shows the co-driver's side wide-angle rear view mirror (class IV) as seen from the driver's focal point in a yet inadjusted position;

Figure 9 shows the co-driver's side wide-angle rear (class IV) as seen from the driver's focal point in a fully adjusted position;

20 Figure 10 shows co-driver's side kerb mirror (class V), with its related body marker;

Figure 11 shows the front side of the truck cabin with the front (class VI) mirror with its related body marker; and

25 Figure 12 shows the preferred areas for the mirror markers of the main and wide-angle rear view mirrors (class II and IV) , the kerb mirror (class VI) and the front mirror (class VI).

For the benefit of road safety, trucks such a the tractor 1 (shown here without the usual trailer) are currently required by law to have their cabins 3 fitted with a main rear view mirror 5 on the driver's side, and a
30 similar main rear view mirror 7 on the co-driver's side, also called

passenger's side. These rear view mirrors in accordance with the ECE-R46 standard are commonly referred to as class II mirrors. In addition to the left and right hand main rear view mirrors 5, 7, there also need to be fitted a wide-angle (class IV) mirror 9 on the driver's side, and a similar wide-angle (class IV) mirror 11 on the co-driver's side. Further provided on the co-driver's or passenger's side is a close proximity or kerb (class V) mirror 13. All these mirrors should be visible to the truck driver through the respective door windows, such as the co-driver's side door window 15. Visible through the windscreen 17 is a front (class VI) mirror 19. All these mirrors should be visible to the truck driver through the respective door windows, such as the co-driver's side door window 15, while the front (class VI) mirror 19 that covers a blind spot directly in front of the cabin 3 is visible through the windscreen 17.

Proper adjustment of this set of mirrors especially those remote from the driver at the co-driver's side, can at present only be ensured by using specially provided mirror adjustment areas 21, such as illustrated in Figures 2 and 3. Such mirror adjustment areas 21 need to be provided either at the premises of the truck owner, or be at locations where these can be shared by several truck drivers, such as parking lots and fuel stations. The mirror adjustment area 21 as shown in Figures 2 and 3 is subdivided in first, second, third and fourth sub-sections 23, 25, 27, 29. These first, second, third and fourth subsections are commonly numbered "1", "2", "3" and "4" in large mirror image numbers to be readily recognized in the mirrors. The first sub-section 23 numbered "1", corresponds to the main (class II) mirror field of vision on the co-driver's side as defined by paragraph 15.2.4.2.2 of ECE-R46. The second sub-section 25 numbered "2" corresponds to the wide-angle (class IV) mirror field of vision on the co-driver's side as defined by paragraph 15.2.4.4.2 of ECE-R46. The third sub-section 27, numbered "3", corresponds to the kerb or close-proximity (class V) mirror field of vision as defined in paragraph 15.2.4.5.4 of ECE-R46. The fourth sub-section 29,

numbered “4”, corresponds to the front (class VI) mirror field of vision as defined in paragraph 15.2.4.6.1 of ECE-R46.

When as shown in Figure 3 a truck is positioned in the remaining unnumbered section, its cabin 3 adjoins the third and fourth sub-sections 27, 29. In this position the main mirror on the co-driver’s side (7 in Figure 1) can be adjusted so that the entire first sub-section 23 is visible therein. The wide-angle mirror on the same side (11 in Figure 1) can be adjusted so that both the first and second sub-sections 23, 25 can be viewed therein. The kerb mirror (13 in Figure 1) is adjusted to at least show the third sub-section 27, numbered “3”, therein, and the front mirror (19 in Figure 1) should be adjusted to show the fourth sub-section 29, numbered “4”, therein.

The mirror adjustment areas are mostly only concerned with the co-driver’s side of the vehicle, as on the driver side the mirrors can usually be adjusted by the driver without additional assistance, albeit that some drivers may still have insufficient experience to do this without assistance.

As shown in Figure 4 there is also a vertical overlap between a field of vision 31 provided by the main mirror 5 on the driver’s side, and a field of vision 33 provided by the wide-angle mirror 9 on the driver’s side.

To be more readily enabled to adjust the mirrors on the driver’s side, even in the absence of mirror adjustment area sub-sections or for less experienced truck drivers the invention proposes a solution as illustrated in Figure 5. A contrasting first marker 41, which will be used as a target marker, in this example is located on the cabin 3 of the truck or tractor or in an area of the cabin side wall where the vertical fields of vision of the main mirror 5 and the wide-angle mirror 9 overlap. This area is indicated as 35 in Figure 4. Preferably the first marker 41, as shown in Figure 5, is positioned as close as possible to the rear edge of the truck or tractor cabin 3. As an alternative the first marker can also be located on other visible parts of the vehicle, such as a truck or a trailer body behind the actual cabin. The main driver’s side mirror 5 at an inner edge in this example is

provided with a relatively small triangular second marker 43, which will be used as an aiming marker. Other forms of aiming markers can be easily conceived, and are not meant to be excluded by this example. The wide-angle driver's side mirror 9 at an inner edge is provided with a relatively
 5 small triangular third marker 45, also to be used as an aiming marker.

When the driver now simply aligns the second marker 43 with the image of the first marker 41 positioned on the cabin and reflected in the main mirror 5, the main mirror becomes properly aligned for the driver that has made this adjustment. By also aligning the third marker 45 of the wide-angle
 10 mirror 9 with the image of the first marker 41 on the cabin reflected therein, the wide-angle mirror 9 will be equally properly aligned. For this purpose the use of only a single first marker 41 on the cabin for mirrors that have partially overlapping fields of vision, any confusion as to which marker applies to which mirror can completely be avoided.

15 Figure 6(A) is a side elevation of a truck having a cabin 3, and indicating an overlap 51 between a field of vision 53 of the wide-angle mirror 11 and a field of vision 55 of the kerb mirror 13 in a vertical plane. Figure 6(B) shows the overlap 51 between the two fields of vision 53, 55 in a horizontal plane in relation to a top plan view of the truck and cabin 3.

20 Reference will now first be made to Figures 7, 8 and 9 which are relevant to the adjustment of the main and wide-angle mirrors 7, 11 on the co-driver's side. Similar to the explanation given in reference to Figure 5, it is seen in Figure 7 that the body of the cabin 3 is provided with a fourth marker 57, serving as a target marker, which is in a corresponding position
 25 at the rear edge of the respective cabin wall side as the first marker 41. Similarly again the main mirror 7 carries a fifth marker 59 at an inner edge of the mirror surface. The wide-angle co-driver's side mirror 11 carries a sixth marker 61 at an inner edge of its mirror surface. Both the fifth and the sixth markers 59, 61 are serving as aiming markers.

Adjustment is again made by aligning the reflected image of the fourth marker 57 on the cabin in both mirrors 7, 11 with their respective fifth and sixth markers 59, 61 through angular adjustment of the mirror surfaces.

5 As additionally shown in Figures 8 and 9 for an example of the wide-angle mirror 11 the adjusting procedure is further explained. Figure 8 shows the unadjusted position where the sixth marker (aiming marker) 61 on the mirror surface, and the reflected image of the fourth marker (target marker) 57 are spaced from one another. By angularly adjusting the mirror
10 11 in a direction to bring the fourth (target) marker 57 and sixth (aiming) markers 61 together as shown in Figure 9 the wide-angle mirror 11 will be properly adjusted. It will be clear that the adjusting procedure of all the mirrors described herein will be substantially similar to the example of Figures 8 and 9.

15 Figure 10 illustrates the kerb (class V) mirror 13 in relation to an associated seventh marker 63 on the body of the truck cabin 3, and a corresponding eighth marker 65 on the upper edge of a mirror surface of the kerb mirror 13.

 Having reference to Figure 6 it is seen that there is an important
20 overlap 35 between the fields of vision of the kerb mirror 13 with the wide-angle mirror 11. To avoid confusion with the fourth marker (target) 57 for the rear view mirrors the eighth marker (aiming marker) 65 of the kerb mirror 13 should be in a position where it cannot be aligned with this fourth marker (target) 57. Conversely the seventh marker (cabin target) 63 for the
25 kerb mirror 13 should preferably be in a position where it cannot be aligned with either the fifth or the sixth markers (aiming markers) 59, 61 of the rear view (class II and IV) mirrors 7, 11. Within these preferred boundaries a suitable location for the seventh marker 63 has been found on the cabin door at a bottom edge of the side door window 15 on the co-driver's side of
30 the cabin 3.

In Figure 11 the front side of the truck cabin 3 is shown with the front (class VI) mirror 19 at a top edge of the windscreen 17. As shown in an enlarged detail view, a ninth marker 67 used as a target marker is positioned at a bottom edge of the windscreen 17, diagonally opposite to the location of the front mirror 19 at the top edge of the windscreen 17. The front mirror 19 is provided with a tenth marker (aiming marker) 69 along an outer edge of its mirror surface.

Illustrated in Figure 12 are the locations of the various reference makers on the mirror surface as they would appear to the driver through the side door window 15 and the windscreen 17. In particular the location of the aiming marker on the various mirror surfaces is restricted to a confined area. The aiming fifth marker 59 on the main (class II) rear view mirror 7 is best confined to a location not beyond a distance D of 20 mm from the inside edge, and not beyond 30 mm above or below the vertical center of the inside edge. The aiming sixth marker 61 on the wide-angle (class IV) rear view mirror 11 is again best located within a distance D of 20 mm from the inside edge, and not higher or lower than a spacing S of 10 mm from the vertical center of the inside edge. The aiming eighth marker 65 of the class V kerb mirror 13, and the aiming tenth marker 69 of the class VI front mirror 19 are best located within a distance D and spacings S from the vertical center of their respective edges that correspond to those of the class IV wide-angle mirror 11 (i.e. $D = 20 \text{ mm}$; $S = 10 \text{ mm}$). The location of the aiming markers, when restricted to these confined areas will enable use of position markers, or target markers on the cabin as described hereinabove. At the same time the aiming markers do not obstruct the field of vision to any obtrusive extent.

The size of the aiming marker on the mirror surface is possibly small, but should be large enough, at least on the co-driver's side of the cabin to be easily discernible from the driver's side of the cabin. The aiming fifth, sixth, eighth and tenth markers 59, 61, 65, 69 should preferably be

within a size range of a circular diameter or square size of 5 to 10 mm. The aiming second and third markers 43, 45 on the driver's side can be in accordance with the lower boundary of this 5-10 mm range.

For the cabin target first, fourth, seventh and ninth markers 41,
5 57, 63, 67 it is preferred for these to provide reflected images in the respective mirrors within a circular or square size range of 10 to 20 mm, i.e. to be at least twice as large as the related aiming marker.

Where in this specification reference has been made to a marker, it is to be understood that this expression, not only refers to passive markers, such as contrasting surface color indicia, patches or stickers, but also to
10 active markers, such as illuminated markers, such pilot lights or LED's. Illuminated markers also need not be of an active variety, but can also include those of a passive variety, such reflective or irradiating markers. The latter variant of illuminated markers offers the additional benefit of
15 enabling proper mirror adjustment in the dark, which is not yet available in any form and would be particularly beneficial to road traffic safety.

When illuminated markers are used, it is also possible to guide a truck driver through the steps of mirror adjustment by illuminating only one mirror marker for aiming and one body marker for targeting at the
20 time. Also it becomes possible with illuminated markers to couple these to the operation of remote mirror adjustment devices so that only those markers are lit that are relevant to the controls selected by the driver. Also when illuminated body target markers are used it becomes possible to obtain more readily recognizable reflections in the mirrors without having to
25 use large surface areas on the truck cabin bodies.

When using only passive markers it may be advantageous to have the best possible contrast between the color of the target markers and the truck cabin color. As truck cabin may come in a great variety of colors, it may sometimes be necessary to enhance recognition to the cabin target
30 marker by providing a border to the target marker that has a

complementary color. Such a complementary colored border preferably has a width of 2.5 to 5 mm.

Also markers may all have the same form such as circular, triangular or rectangular, but may also have different forms in accordance
5 with their purpose to be more readily recognizable.

Accordingly there is described a mirror adjustment assistance system for trucks having as part of a vehicle body at least a cabin 3 having a front side with respect to an intended main direction of travel, a driver side, and a co-driver side. At least three adjustable mirrors 5, 7, 9, 11, 13, 19 are
10 attached to an exterior of the cabin 3, each of these at least three adjustable mirrors 5, 7, 9, 11, 13, 19 has an aiming marker 43, 45, 59, 61, 65, 69 on or adjacent to its reflective surface. At least two vehicle body target markers 41, 57, 63, 67 are positioned on an exterior surface of the vehicle body 3, and at least a single one 41; 57 of these at least two vehicle body target markers
15 is associated with two of the at least three mirrors 5, 9; 7, 11. Any the aiming markers 43, 45, 59, 61, 65, 69 of the at least three adjustable mirrors 5, 7, 9, 11, 13, 19 can only be aligned with a single one of the at least two vehicle target markers 41, 57, 63, 67.

It is thus believed that the operation and construction of the
20 present invention will be apparent from the foregoing description and drawings appended thereto. For the purpose of clarity and a concise description features are described herein as part of the same or separate embodiments, however, it will be appreciated that the scope of the invention may include embodiments having combinations of all or some of the features
25 described. It will be clear to the skilled person that the invention is not limited to any embodiment herein described and that modifications are possible which may be considered within the scope of the appended claims. Also kinematic inversions are considered inherently disclosed and can be within the scope of the invention. In the claims, any reference signs shall
30 not be construed as limiting the claim. The terms 'comprising' and

‘including’ when used in this description or the appended claims should not be construed in an exclusive or exhaustive sense but rather in an inclusive sense. Thus expression as ‘including’ or ‘comprising’ as used herein does not exclude the presence of other elements, additional structure or additional
5 acts or steps in addition to those listed. Furthermore, the words ‘a’ and ‘an’ shall not be construed as limited to ‘only one’, but instead are used to mean ‘at least one’, and do not exclude a plurality. Features that are not specifically or explicitly described or claimed may additionally be included in the structure of the invention without departing from its scope.

10 Expressions such as: "means for ..." should be read as: "component configured for ..." or "member constructed to ..." and should be construed to include equivalents for the structures disclosed. The use of expressions like: "critical", "preferred", "especially preferred" etc. is not intended to limit the invention. To the extent that structure, material, or acts are considered to
15 be essential they are inexpressively indicated as such. Additions, deletions, and modifications within the purview of the skilled person may generally be made without departing from the scope of the invention, as determined by the claims.

Conclusies

1. Hulpsysteem voor spiegelinstelling van vrachtwagens voorzien van:
 ten minste een cabine als onderdeel van een voertuigopbouw met een
 voorzijde in relatie tot een voorgenomen hoofdrichting van voortbewegen, een
 bestuurderskant en een bijrijderkant;
- 5 ten minste drie verstelbare spiegels, bevestigd aan een buitenkant van de
 cabine, elk van de ten minste drie verstelbare spiegels beschikt over een
 richtmarkering op of in nabijheid van zijn reflecterende oppervlak; en
 ten minste één voertuigopbouw-doelmarkering op een buitenoppervlak van
 de voertuigopbouw,
- 10 waarbij de markering ten minste één voertuigopbouw-doelmarkering
 geassocieerd is met ten minste twee van de ten minste drie spiegels, en
 waarbij elke richtmarkering van ten minste twee van de ten minste drie
 verstelbare spiegels alleen kan worden uitgelijnd met de ten minste ene
 voertuigopbouw-doelmarkering.
- 15
2. Hulpsysteem voor spiegelinstelling volgens conclusie 1, waarbij de ten
 minste ene voertuigopbouw- doelmarkering tot ten minste twee voertuigopbouw
 doelmarkeringen behoort, waarbij ten minste één enkele van de markeringen van
 de ten minste twee voertuigopbouw-doelmarkeringen geassocieerd is met twee van
 de ten minste drie spiegels, en waarbij elk richtmarkering van het ten minste drie
 verstelbare spiegels uitlijnbaar is met slechts één enkele van de ten minste twee
 voertuigopbouw-doelmarkeringen.
- 20
3. Hulpsysteem voor spiegelinstelling volgens conclusie 1 of 2, waarbij een
 eerste van ten minste drie verstelbare spiegels een hoofdachteruitkijkspiegel is, en
 een tweede van de ten minste drie verstelbare spiegels een groothoek-
 blindehoekspiegel is, en waarbij het ten minste ene voertuigopbouw-doelmarkering
 of een eerste van de ten minste twee voertuigopbouw-doelmarkeringen de enkele
 voertuigopbouw-doelmarkering is die geassocieerd is met de eerste en de tweede
- 25

van de tenminste drie verstelbare spiegels voor instelling met de richtmarkeringen van deze eerste en tweede verstelbare spiegels.

4. Hulpsysteem voor spiegelinstelling volgens conclusie 3, waarbij de eerste
5 voertuigopbouw-doelmarkering gepositioneerd is aan een achterste rand van de cabine in relatie tot de beoogde hoofdrichting van voortbeweging.
5. Hulpsysteem voor spiegelinstelling volgens conclusie 3 of 4, waarbij de eerste en tweede verstelbare spiegels gepositioneerd zijn aan de kant van de
10 bijrijder, waarbij een derde van de tenminste drie verstelbare spiegels een trottoirspiegel aan de kant van de bijrijder is, en waarbij een tweede van de ten minste twee voertuigopbouw-doelmarkeringen gepositioneerd is om uitsluitend met de derde verstelbare spiegel uitlijnbaar te zijn.
- 15 6. Hulpsysteem voor spiegelinstelling volgens één van conclusies 1 tot en met 5, waarbij ten minste twee van de ten minste drie verstelbare spiegels op afstand instelbaar zijn door elektrische kracht.
- 20 7. Hulpsysteem voor spiegelinstelling volgens één van conclusies 1 tot en met 6, waarbij ten minste één van de richtmarkeringen, en ten minste één bijbehorende voertuigopbouw-doelmarkering gemakkelijk herkenbare indicia zijn die contrasteren met hun onmiddellijk omliggend oppervlak.
- 25 8. Hulpsysteem voor spiegelinstelling volgens één van conclusies 1 tot en met 6, waarbij ten minste één van de voertuigopbouw-doelmarkeringen een dimensionale structuur is die uitsteekt vanaf een onmiddellijk omliggend oppervlak.
- 30 9. Hulpsysteem voor spiegelinstelling volgens één van conclusies 1 tot en met 8, waarbij ten minste één van de richtmarkeringen, en/of ten minste één bijbehorende voertuigopbouw-doelmarkering verlichte markeringen zijn.

10. Hulpsysteem voor spiegelinstelling volgens conclusie 9, waarbij ten minste sommige van de verstelbare spiegels op afstand instelbaar zijn door een afstandsbediening, en waarbij de verlichte markeringen ook worden bediend door de afstandsbediening.

5

11. Hulpsysteem voor spiegelinstelling volgens één van conclusies 1 tot 10, verder voorzien van een hoofd-achteruitkijkspiegel, en een groothoek-dodehoekspiegel aan elk van de bestuurderskant en de bijrijderkant van de cabine, en één enkele bijbehorende voertuigopbouw-doelmarkering op elk van de zijden van de bestuurder en bijrijder voor uitlijning met de richtmarkeringen van respectieve verstelbare spiegels, en waarbij de hoofd-achteruitkijkspiegel en de groothoek-dodehoekspiegel aan de kant van de bijrijder deel uitmaken van de ten minste drie verstelbare spiegels.

12. Hulpsysteem voor spiegelinstelling volgens één van conclusies 3 tot en met 11, waarbij de markering ten minste ene voertuigopbouw-doelmarkering tot ten minste twee voertuigopbouw-doelmarkeringen behoort, waarbij ten minste één enkele van de van de ten minste twee voertuigopbouw-doelmarkeringen geassocieerd is met twee van de ten minste drie verstelbare spiegels, en waarbij elke richtmarkering van het ten minste drie verstelbare spiegels uitlijnbaar is met slechts één enkele van de minste twee voertuigopbouw-doelmarkering en, waarbij het hulpsysteem verder voorzien is van een trottoirspiegel aan de kant van de bijrijder, en een bijbehorende trottoirspiegel-doelmarkering op de buitenkant van de voertuigopbouw om uitsluitend uitlijnbaar te zijn met de trottoirspiegel, waarbij de trottoirspiegel deel uitmaakt van de ten minste drie verstelbare spiegels, en waarbij de trottoirspiegel-doelmarkering die geplaatst is voor uitsluitend uitlijning met de trottoirspiegel de tweede van de ten minste twee voertuigopbouw-doelmarkering is.

13. Hulpsysteem voor spiegelinstelling volgens één van conclusies 1 tot en met 12, verder voorzien van een dodehoek-vooruitkijkspiegel aan de kant van de

30

bijrijder, en een bijbehorende vooruitkijkspiegel-doelmarkering die geplaatst is op de buitenkant van de voertuigopbouw om uitsluitend uitlijnbaar te zijn met de vooruitkijkspiegel.

- 5 14. Hulpsysteem voor spiegelinstelling volgens één van conclusies 1 tot en met 13, waarbij de richtmarkeringen zich elk binnen een afstand van 20 mm bevinden van een oppervlakterand van de desbetreffende verstelbare spiegel.
- 10 15. Hulpsysteem voor spiegelinstelling volgens één van conclusies 1 tot en met 14, waarbij de richtmarkeringen elk zijn geplaatst binnen 30 mm van een centrum van een oppervlakterand van de desbetreffende verstelbare spiegel.
- 15 16. Hulpsysteem voor spiegelinstelling volgens conclusie 15, waarbij de richtmarkering van ten minste één van de ten minste drie verstelbare spiegels binnen 10 mm van het centrum van de desbetreffende oppervlakte rand is geplaatst.

Fig. 1

Prior Art

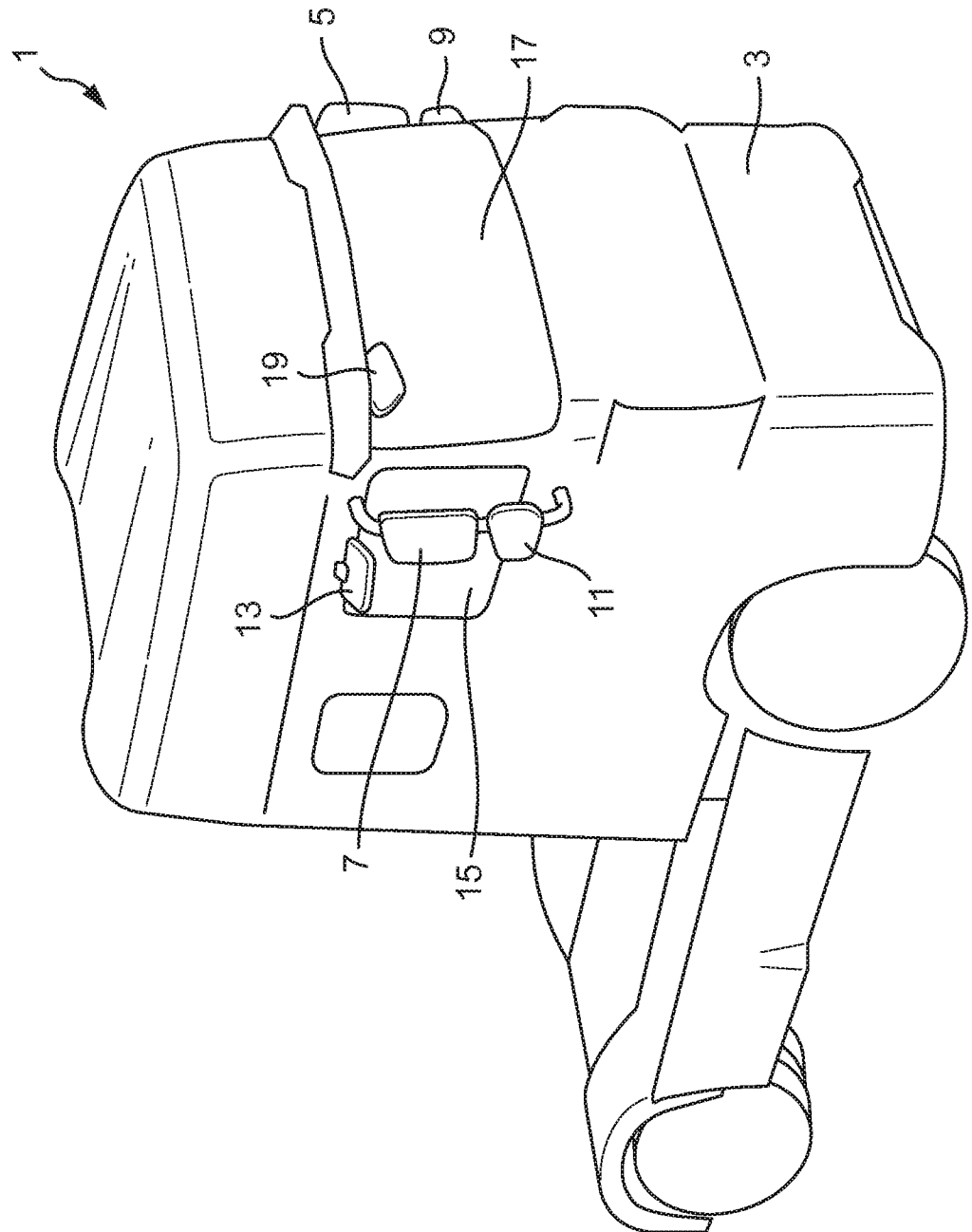


Fig. 2

Prior Art

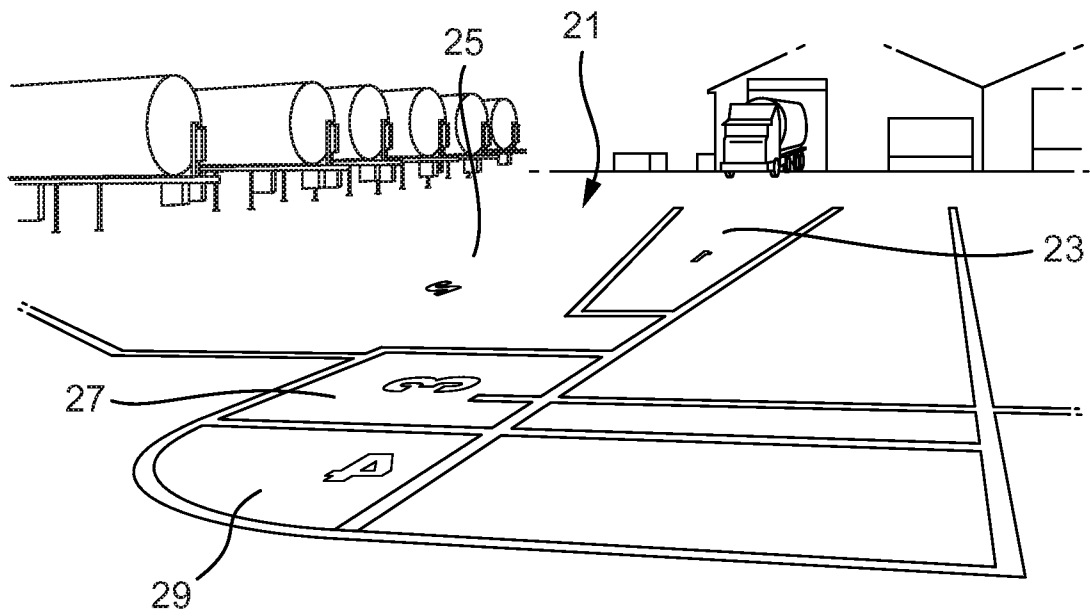


Fig. 3

Prior Art

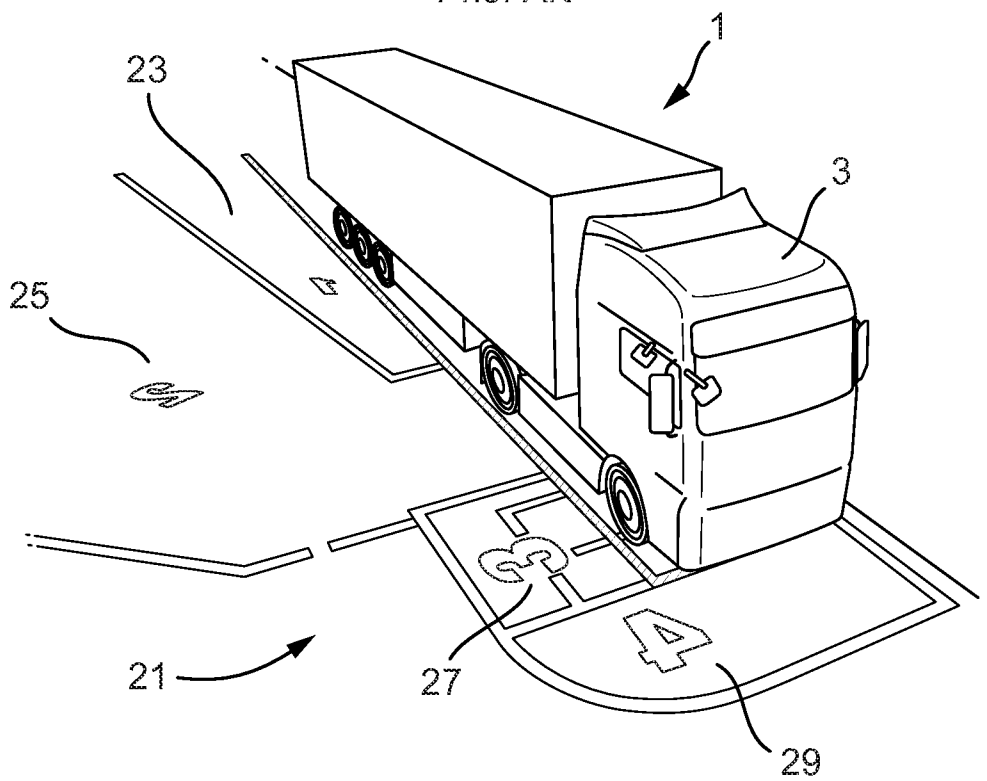


Fig. 4

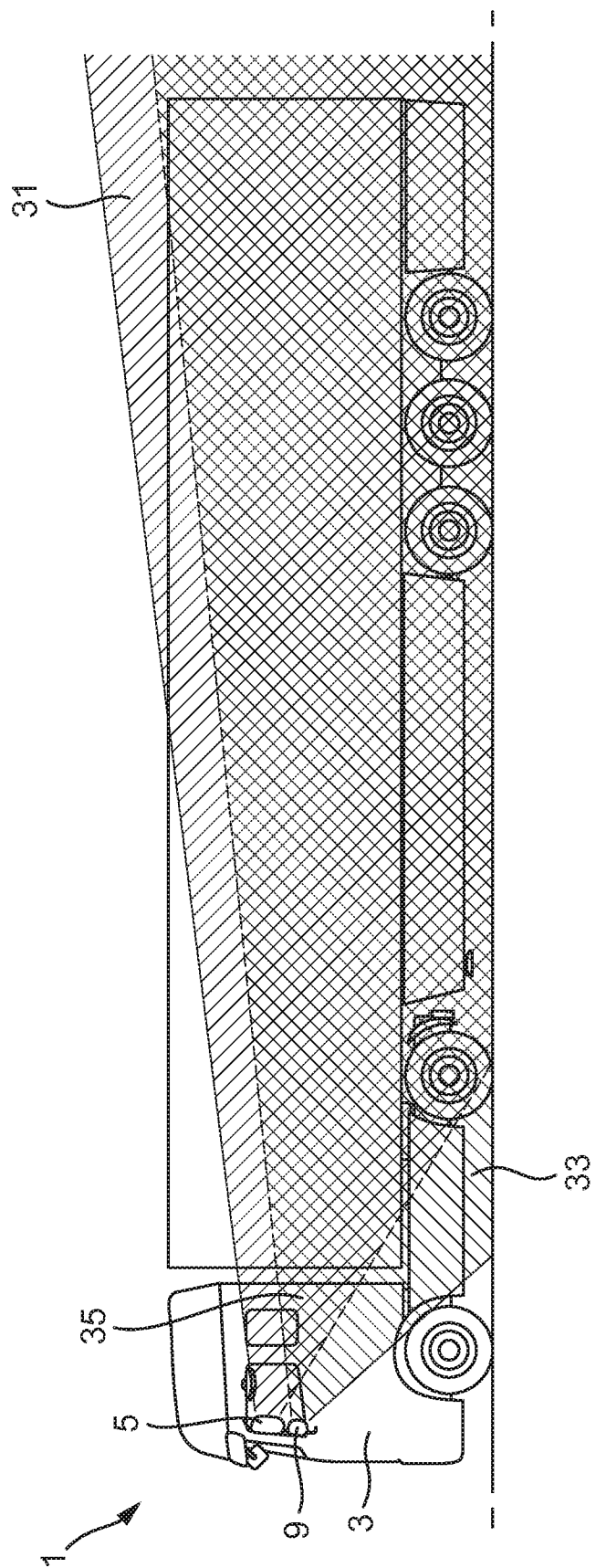
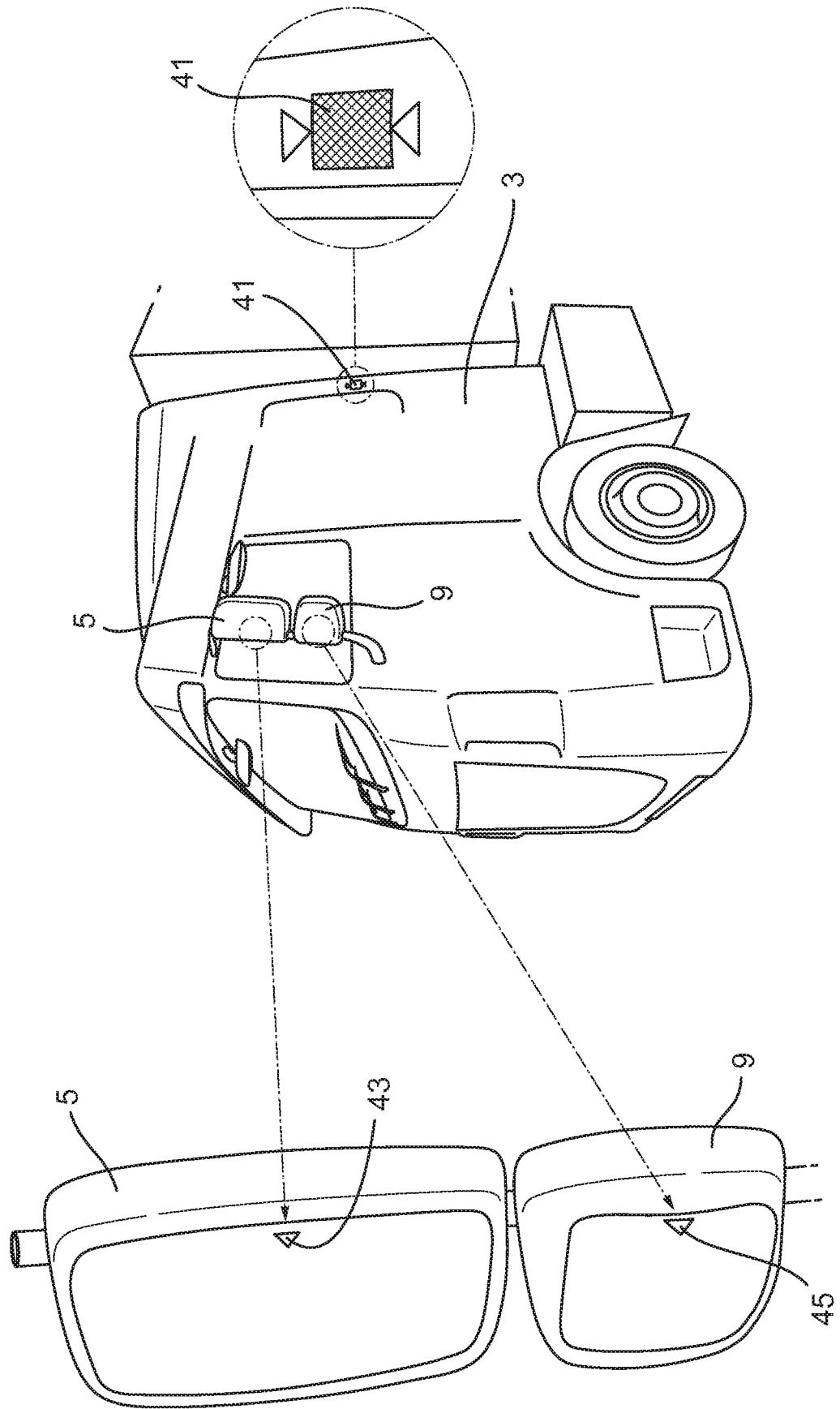


Fig. 5



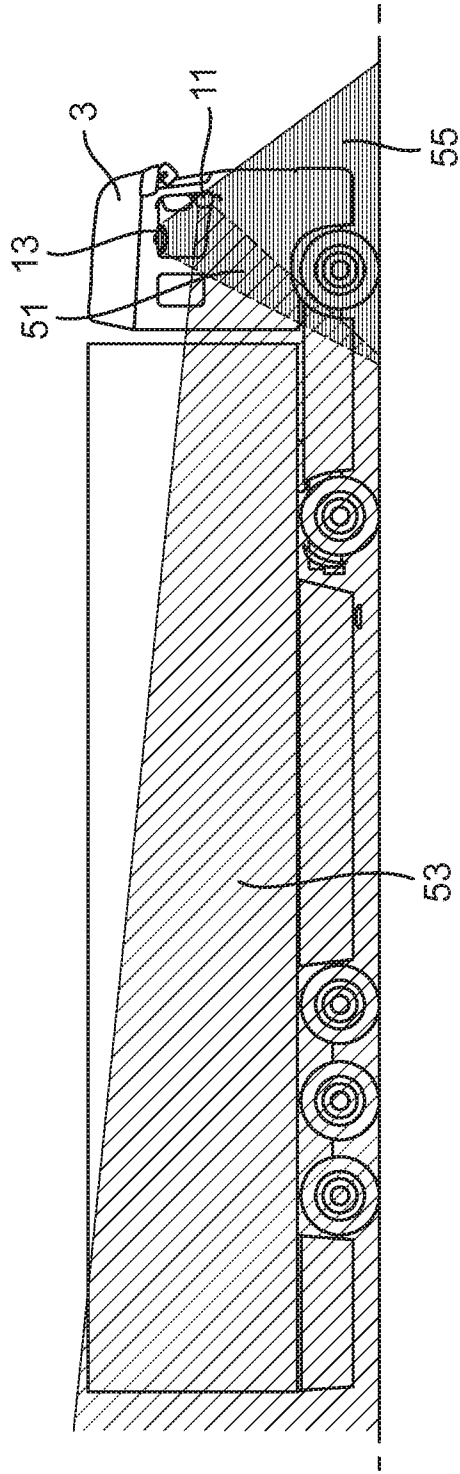


Fig. 6(A)

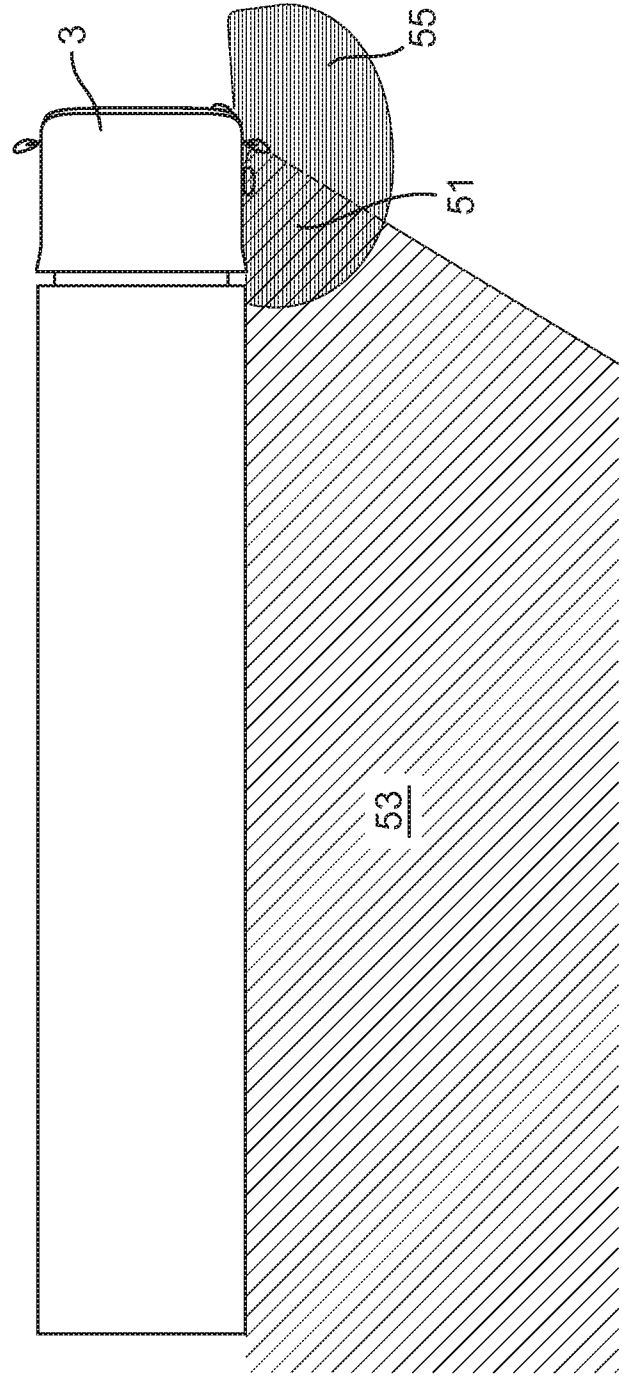


Fig. 6(B)

Fig. 7

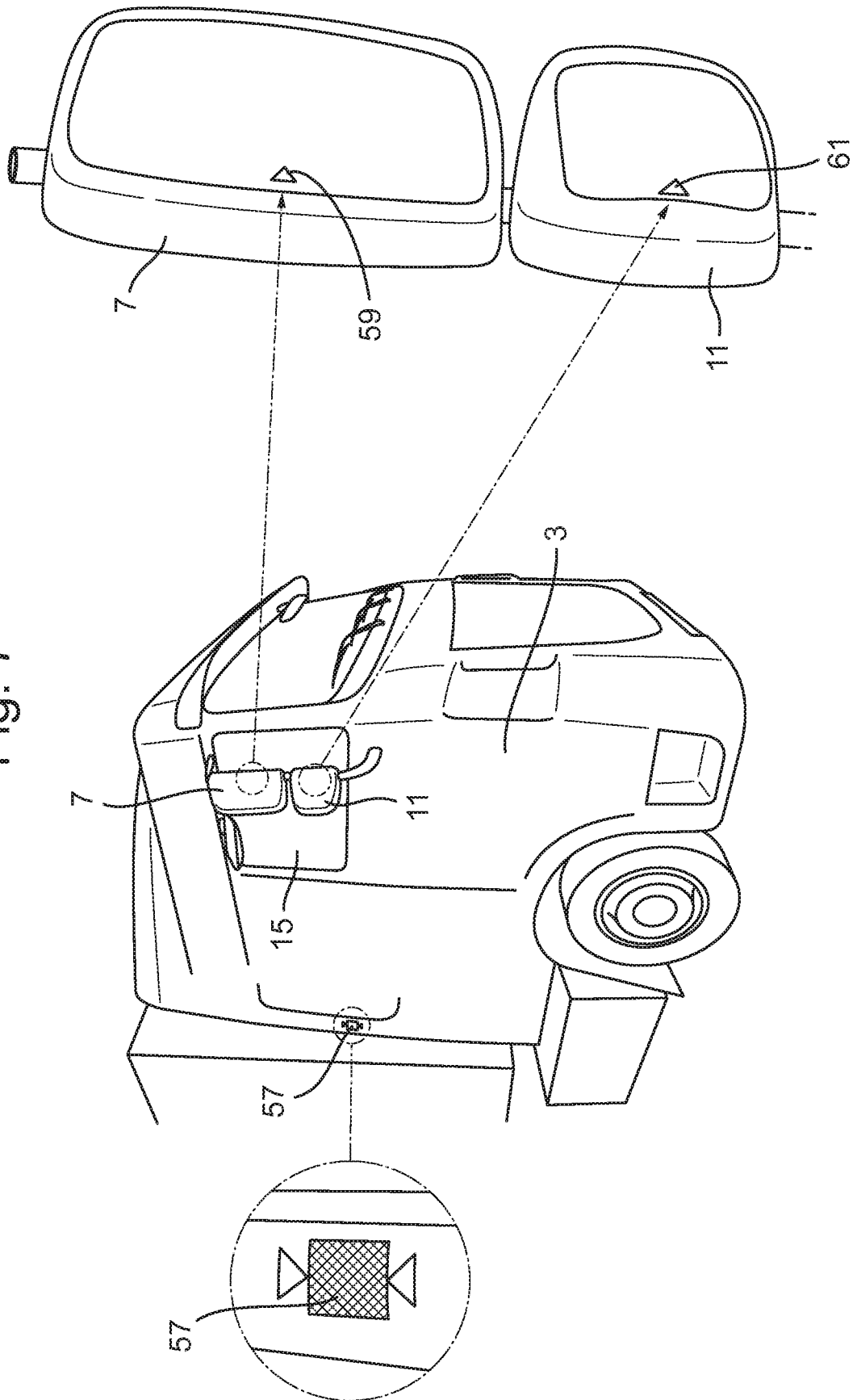


Fig. 8

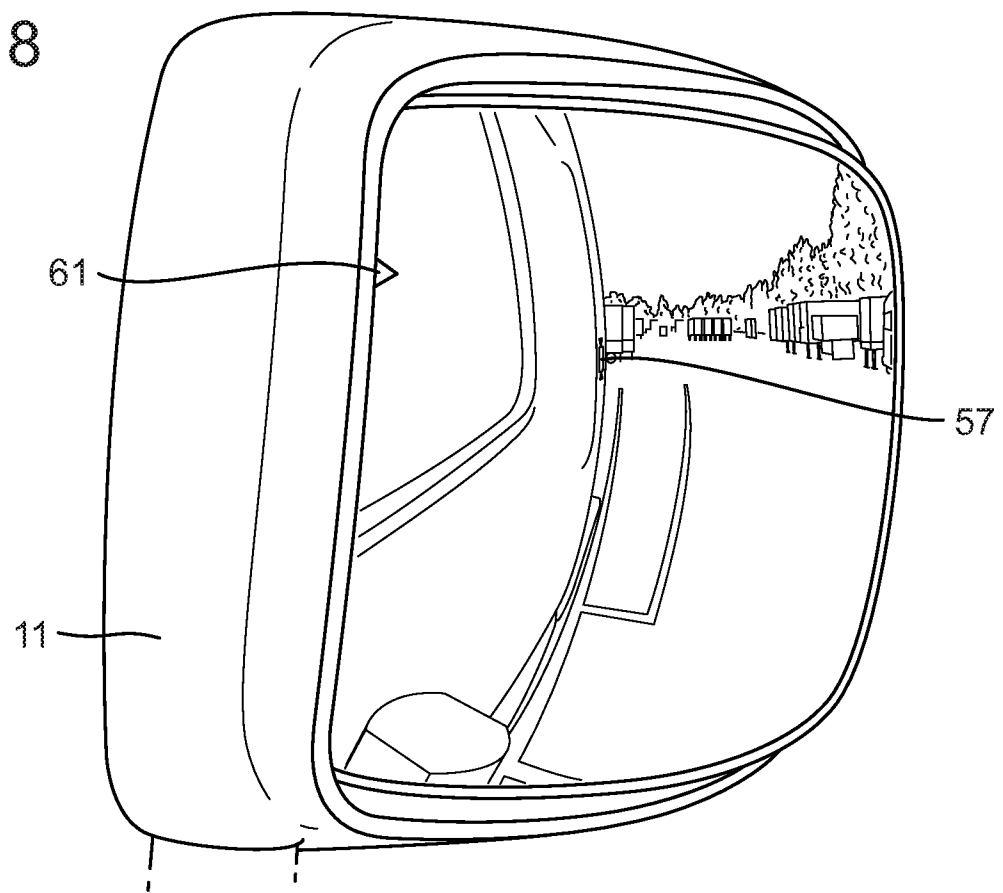


Fig. 9

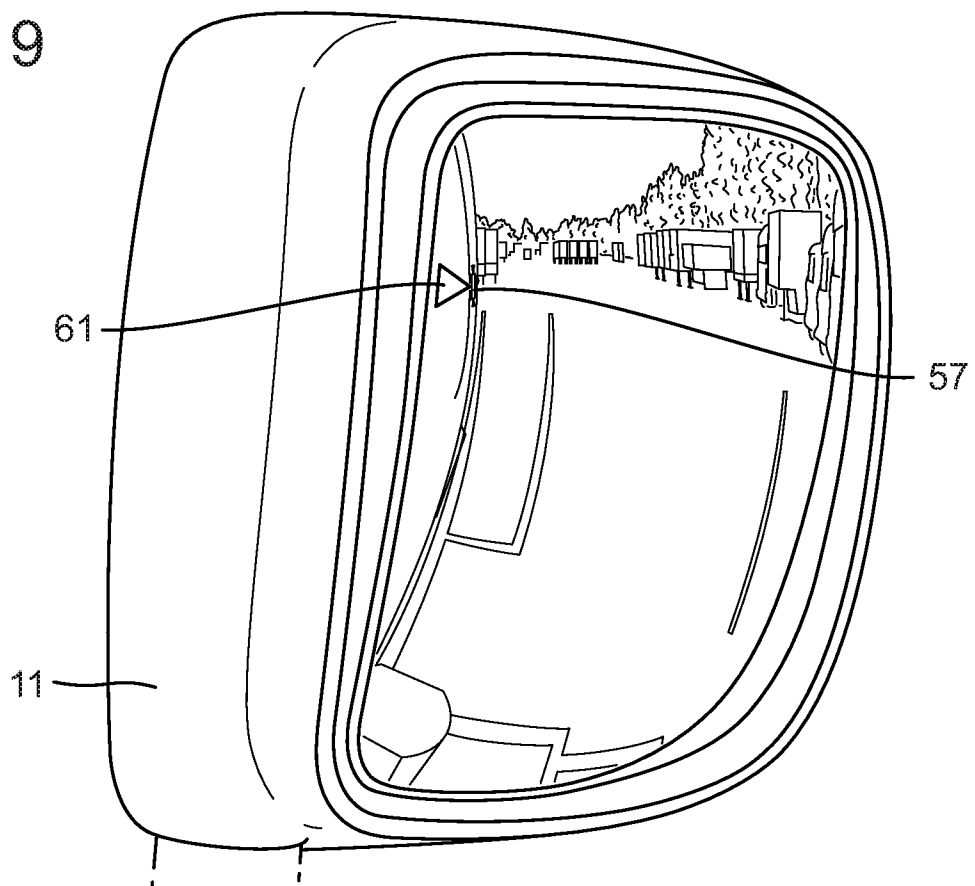


Fig. 10

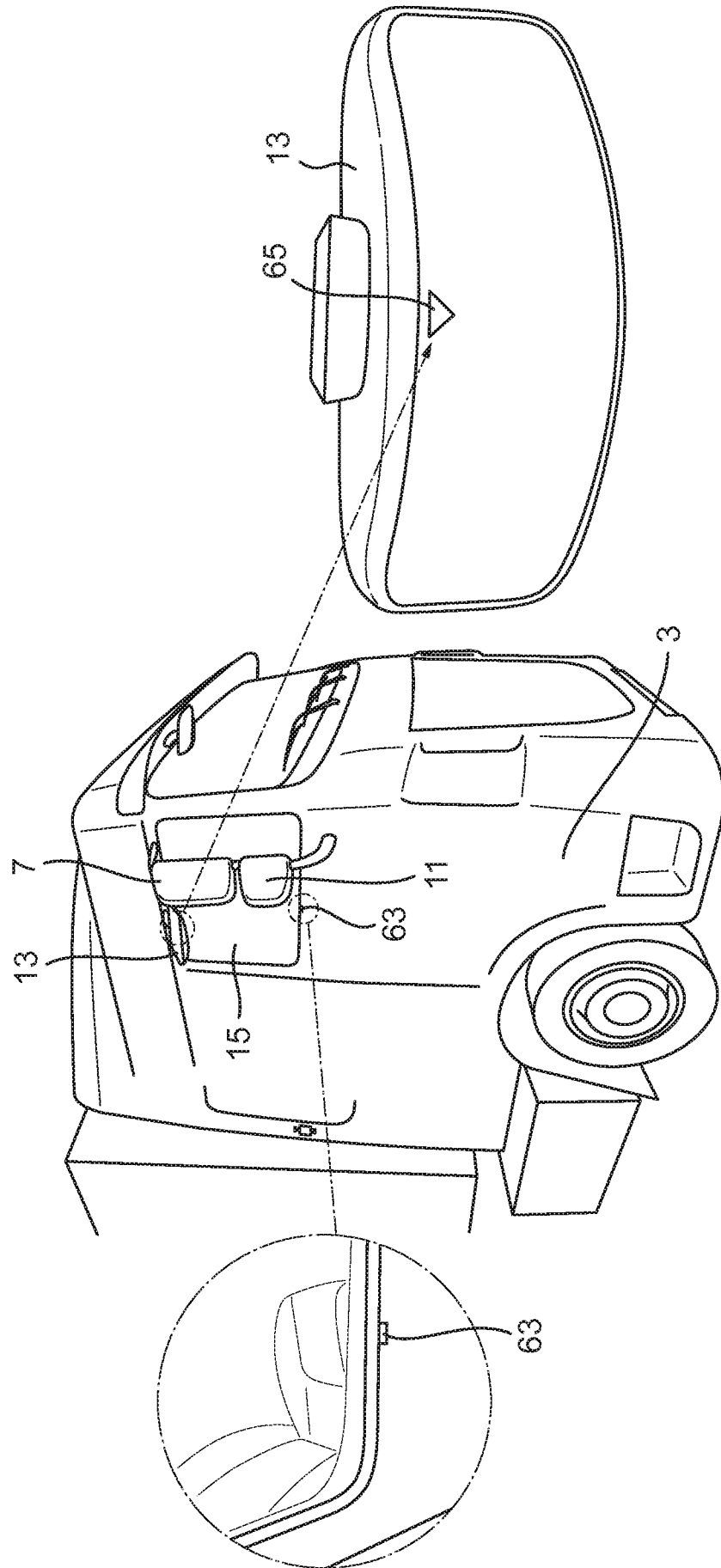
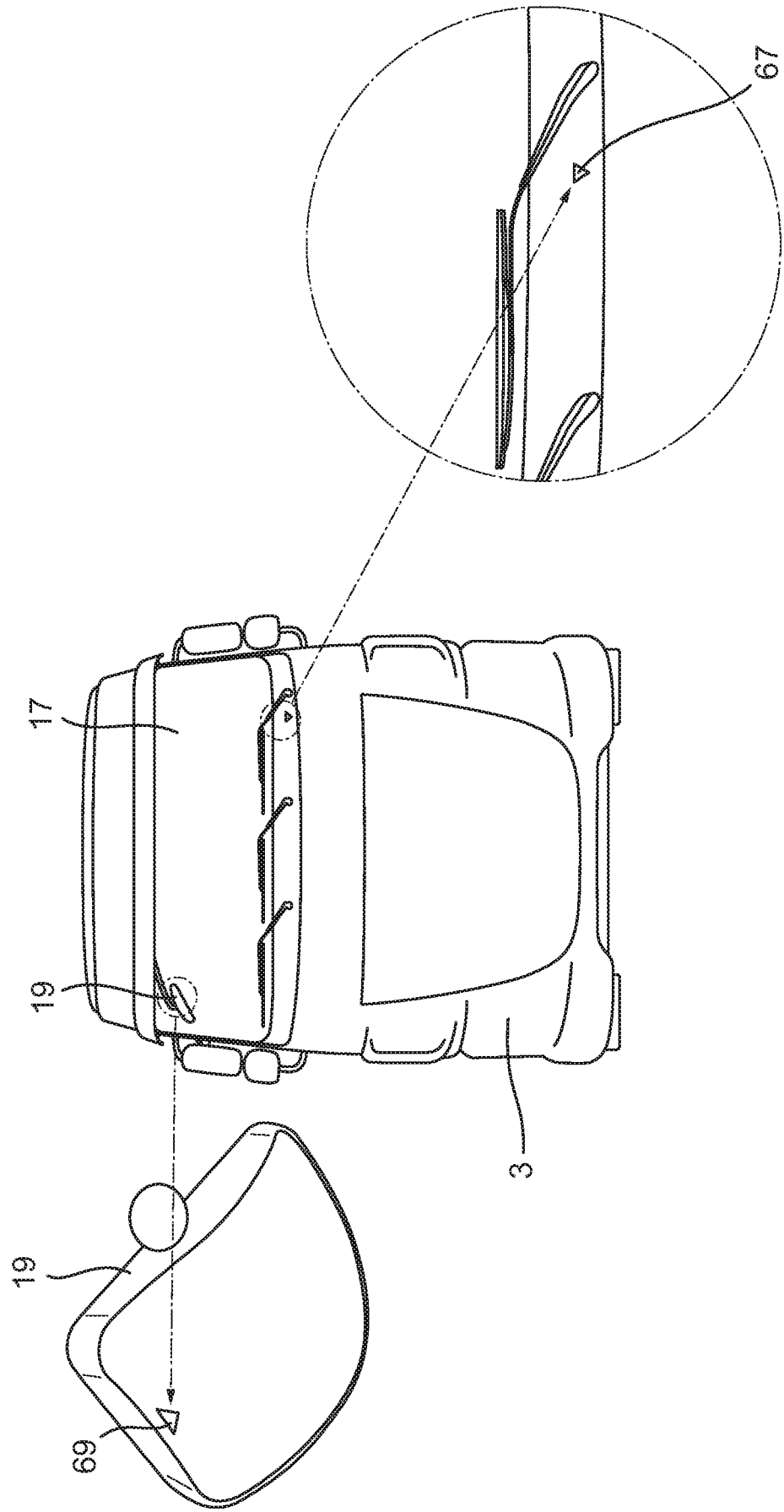
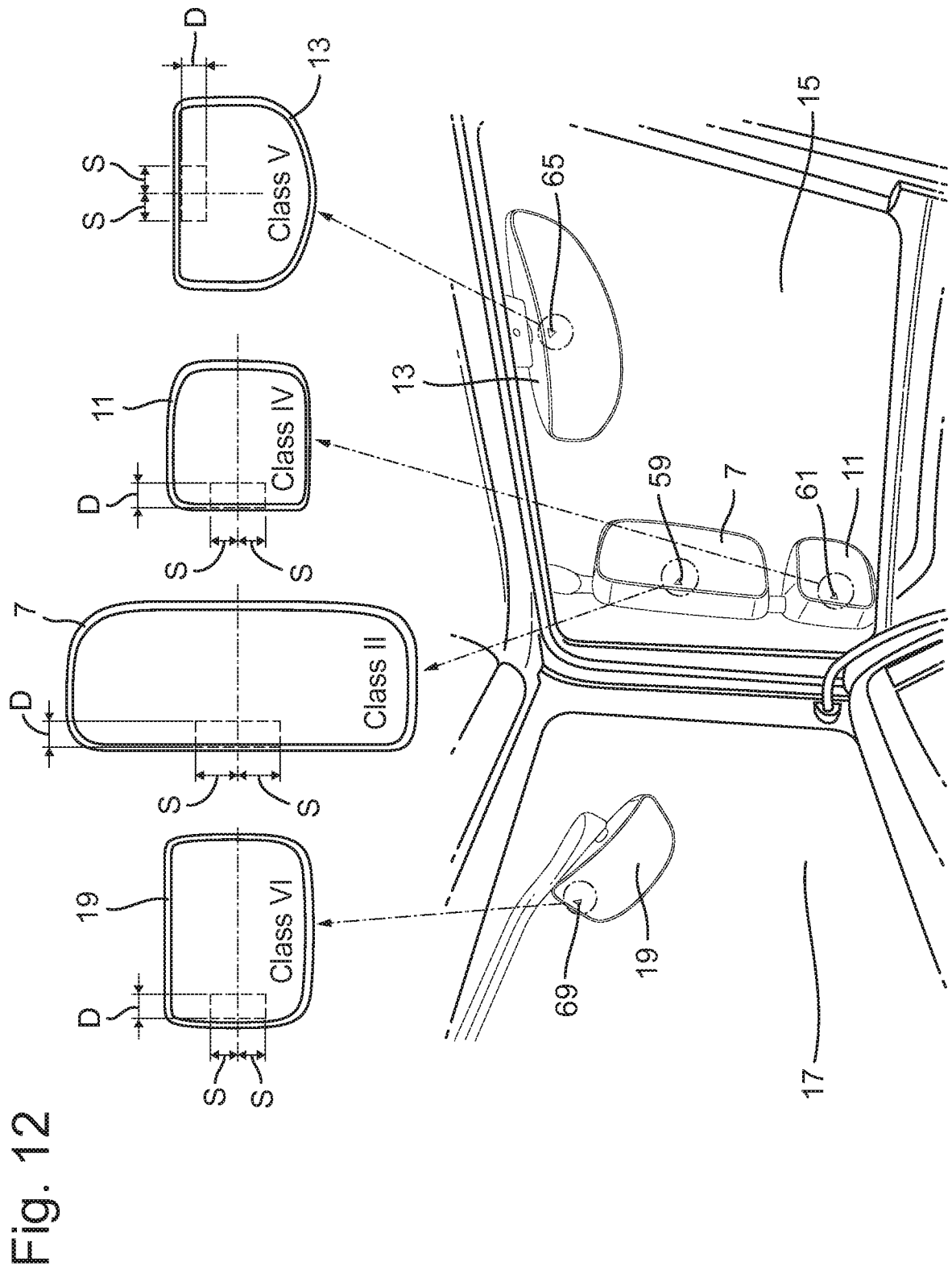


Fig. 11





Title: MIRROR ADJUSTMENT ASSISTANCE SYSTEM FOR TRUCKS

Abstract

A mirror adjustment assistance system for trucks having as part of a vehicle body at least a cabin (3) having a front side with respect to an intended main direction of travel, a driver side, and a co-driver side. At least three adjustable mirrors (5, 7, 9, 11, 13, 19) are attached to an exterior of the vehicle body or cabin (3), each of the at least three adjustable mirrors (5, 7, 9, 11, 13, 19) has an aiming marker (43, 45, 59, 61, 65, 69) on or adjacent its reflective surface. At least two vehicle body target markers (41, 57, 63, 67) are positioned on an exterior surface of the vehicle body (3), and at least a single one (41; 57) of the at least two vehicle body target markers is associated with two of the at least three mirrors (5, 9; 7, 11). Any aiming marker (43, 45, 59, 61, 65, 69) of the at least three adjustable mirrors (5, 7, 9, 11, 13, 19) can only be aligned with a single one of the at least two vehicle body target markers (41, 57, 63, 67).

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE P112106NL00		
Nederlands aanvraag nr. 2017200	Indieningsdatum 20-07-2016		
	Ingeroepen voorrangsdatum		
Aanvrager (Naam) DAF Trucks N.V.			
Datum van het verzoek voor een onderzoek van internationaal type 15-10-2016	Door de instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. SN67578		
I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)			
Volgens de internationale classificatie (IPC) B60R1/06			
II. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK			
Onderzochte minimumdocumentatie			
Classificatiesysteem	Classificatiesymbolen		
IPC	B60R		
Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen 			
III.	☐	GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES	(opmerkingen op aanvullingsblad)
IV.	☐	GEBREK AAN EENHEID VAN UITVINDING	(opmerkingen op aanvullingsblad)

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Nummer van het verzoek om een onderzoek naar
de stand van de techniek

NL 2017200

A. CLASSIFICATIE VAN HET ONDERWERP
INV. B60R1/06
ADD.

Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.

B. ONDERZOCHETE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimum documentatie (classificatie gevolgd door classificatiesymbolen)

B60R

Onderzochte andere documentatie dan de minimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden)

EPO-Internal, WPI Data

C. VAN BELANG GEACHTE DOCUMENTEN

Categorie	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	US 5 122 910 A (POLANYI MICHAEL L [US] ET AL) 16 juni 1992 (1992-06-16) * kolom 5, regel 56 - kolom 6, regel 10; figuren 11,12 *	1-16
X	US 4 730 926 A (WEDEMEYER GERALD T [US]) 15 maart 1988 (1988-03-15) * kolom 4, regel 11 - kolom 6, regel 2; figuren 1-8 *	1-16
A	US 2010/017071 A1 (RYU JIHAN [US] ET AL) 21 januari 2010 (2010-01-21) * het gehele document *	1

☐ Verdere documenten worden vermeld in het vervolg van vak C.

☒ Leden van dezelfde octrooifamilie zijn vermeld in een bijlage

* Speciale categorieën van aangehaalde documenten

"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft

"D" in de octrooiaanvraag vermeld

"E" eerdere octrooi(aanvraag), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven

"L" om andere redenen vermelde literatuur

"O" niet-schriftelijke stand van de techniek

"P" tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur

"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvraag, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding

"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur

"Y" de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht

"Z" lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid

21 maart 2017

Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type

Naam en adres van de instantie

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040
Fax: (+31-70) 340-3016

De bevoegde ambtenaar

Topolski, Jan

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar
de stand van de techniek

NL 2017200

In het rapport genoemd octrooigescrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
US 5122910	A	16-06-1992	GEEN
US 4730926	A	15-03-1988	GEEN
US 2010017071	A1	21-01-2010	CN 101628559 A 20-01-2010
			DE 102009031661 A1 11-02-2010
			US 2010017071 A1 21-01-2010

WRITTEN OPINION

File No. SN67578	Filing date (day/month/year) 20.07.2016	Priority date (day/month/year)	Application No. NL2017200
International Patent Classification (IPC) INV. B60R1/06			
Applicant DAF Trucks N.V.			

This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the application
- ☐ Box No. VIII Certain observations on the application

	Examiner Topolski, Jan
--	---------------------------

WRITTEN OPINION

Application number

NL2017200

Box No. I Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing:
 - ☐ contained in the application as filed.
 - ☐ filed together with the application in electronic form.
 - ☐ furnished subsequently for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes: Claims	
	No: Claims	1-16
Inventive step	Yes: Claims	
	No: Claims	1-16
Industrial applicability	Yes: Claims	1-16
	No: Claims	

2. Citations and explanations

see separate sheet

WRITTEN OPINION

Application number
NL2017200

Box No. VII Certain defects in the application

see separate sheet

Re Item V

1. Reference is made to the following documents:

- D1 US 5 122 910 A (POLANYI MICHAEL L [US] ET AL) 16 juni 1992
 (1992-06-16)
- D2 US 4 730 926 A (WEDEMEYER GERALD T [US]) 15 maart 1988
 (1988-03-15)

2. The present application does not satisfy the criterion relating to patentability because the subject-matter of claim 1 is not new in respect of the prior art.

2.1 With respect to independent claim 1:

Document D1 discloses (the reference signs in parenthesis applying to this document):

Hulpsysteem [*voor spiegelinstelling van vrachtwagens*] voorzien van:
ten minste een cabine als onderdeel van een voertuigopbouw met een voorzijde in relatie tot een voorgenomen hoofdrichting van voortbewegen, een bestuurderskant en een bijrijderkant;
ten minste drie verstelbare spiegels (2x "13", 2x "17"), bevestigd aan een buitenkant van de cabine, elk van de ten minste drie verstelbare spiegels beschikt over een richtmarkering op of in nabijheid van zijn reflecterende oppervlak; en
ten minste één voertuigopbouw-doelmarkering (18) op een buitenoppervlak van de voertuigopbouw,
waarbij de markering ten minste één voertuigopbouw-doelmarkering geassocieerd is met ten minste twee van de ten minste drie spiegels, en
waarbij elke richtmarkering van ten minste twee van de ten minste drie verstelbare spiegels alleen kan worden uitgelijnd met de ten minste ene voertuigopbouw-doelmarkering.

2.1.1 The subject matter of claim 1 is also not novel over D2; "richtmarkering (6; 36; 56)", voertuigopbouw-doelmarkering (5; 35; 55)

3 Dependent claims 2-16:

The dependent claims 2-16 do not appear to contain any additional features which, in combination with features of any claim to which they refer, meet the requirements with respect to novelty and/or inventive step, as all the features introduced with these claims seem to be either known from each of D1 or D2, or known while used with a known corresponding effect and/or seem to introduce slight constructional changes without inventive meaning and which come within the scope of the customary practice followed by persons skilled in the art.

Re Item VII

1. Independent claim 1 is not in the two-part form..
2. The features of claims 1-16 are not provided with reference signs (related to all embodiments) placed in parentheses.