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(54) **WHEEL ASSEMBLY FOR A VEHICLE**

(57) Wheel assembly for a vehicle comprising a rim body (11) formed in a cylindrical shape, a first cover element (13), and a second cover element (14). The rim body comprises at least a wheel disc element (12) arranged in an axial direction of the rim body. The first cover element is arranged at a first side of the wheel disc element and the second cover element is arranged at a sec-

ond side of the wheel disc element along the axial direction of the rim body. The rim body comprises a first material. The first cover element and the second cover element comprise a second material. The first material differs from the second material, and the first cover element and the second cover element are formed differently from each other.

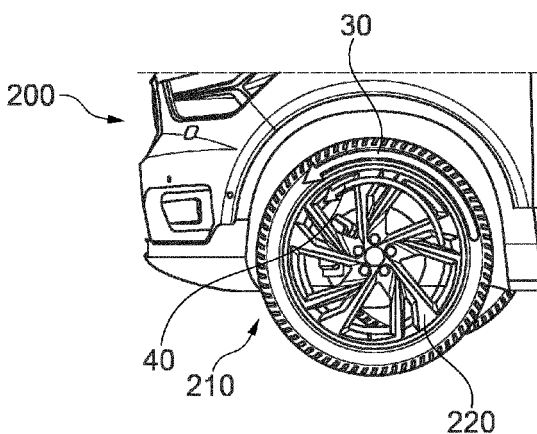


Fig. 1a

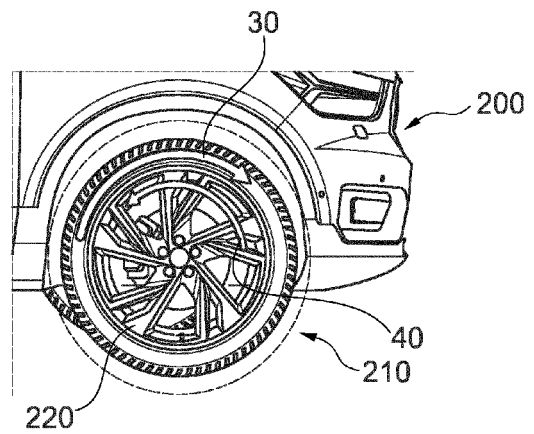


Fig. 1b

Description

TECHNICAL FIELD

[0001] The present disclosure relates to a wheel assembly for a vehicle, a wheel system comprising such a wheel assembly, a vehicle comprising such a wheel system and a method for manufacturing a wheel assembly for a vehicle.

BACKGROUND ART

[0002] Car aerodynamics is an important factor affecting performance of a car. Particularly, wheels of the car have a crucial influence on the aerodynamic performance by causing aerodynamic drag when driving the car.

[0003] Most car wheels are made of casted or forged aluminum, which is usually designed for only one side of the vehicle, e.g. left-hand side. The same wheel are generally used on both sides. This may cause the wheel to "roll backwards" on the other side, e.g. right-hand side. Even if the design of the wheel is focused on aerodynamics for the left side wheel, when putting the same wheel at the right side, the total aerodynamics of the car will be unbalanced. Furthermore, a turbulent airflow may occur inside the wheel, such as in a wheel box, due to structural reasons of the wheel.

SUMMARY

[0004] Hence, there may be a need to provide an improved wheel assembly, which may enhance aerodynamics of a vehicle.

[0005] The problem is at least partially solved or alleviated by the subject matter of the independent claims of the present disclosure, wherein further examples are incorporated in the dependent claims. It should be noted that the aspects of the disclosure described in the following apply to the wheel assembly for a vehicle, the wheel system comprising such a wheel assembly, the vehicle comprising such a wheel system and the method for manufacturing a wheel assembly for a vehicle.

[0006] According to the present disclosure, a wheel assembly for a vehicle is presented. The wheel assembly comprises a rim body formed in a cylindrical shape, a first cover element, and a second cover element. The rim body comprises at least a wheel disc element arranged in an axial direction of the rim body. The first cover element is arranged at a first side of the wheel disc element and the second cover element is arranged at a second side of the wheel disc element along the axial direction of the rim body. The rim body comprises a first material. The first cover element and the second cover element comprise a second material. The first material differs from the second material, and the first cover element and the second cover element are formed differently from each other.

[0007] The wheel assembly according to the present

disclosure may be formed individually and/or differently for a left side and a right side of the vehicle. Accordingly, wheel aerodynamics of the vehicle may be improved and energy efficiency of the vehicle may be increased. Further, by providing two separate cover elements, a shape and a material of the rim body may be individually selected. Hence, tooling costs of the rim body may be reduced despite variations in the design of the wheel assembly.

[0008] The wheel assembly may be suitable to be mounted at a motor vehicles such as cars, trucks, busses, mobility scooters, etc. The rim body, in other words a barrel portion of the wheel assembly, may be shaped cylindrically. The rim body may be formed to fixedly hold a tire along a circumference of the rim body. The rim body may comprise a front surface and a rear surface, wherein the front surface may be directed outside the vehicle and the rear surface may be directed inside, e.g. to a platform chassis of the vehicle.

[0009] The rim body may comprise one or more wheel disc element. The wheel disc element may be formed in a circular shape and arranged at the front surface, the rear surface of the rim body or inside the rim body. Accordingly, the rim body and the wheel disc element may be arranged coaxially. The rim body and the wheel disc element may be formed separately and fixedly attached together, for instance by welding or they may be integrally manufactured.

[0010] The wheel disc element may comprise a plurality of spokes arranged in a radial direction of the wheel disc element. The spokes may be rib-shaped and extend from a center of the wheel disc element to an outer edge of the wheel disc element. Between the spokes an opening may be positioned to facilitate airflow inside the rim body.

[0011] Since the wheel disc element may be coaxially arranged with the rim body, the first side of the wheel disc element may be identical with or parallel to the front side of the rim body and the second side of the wheel disc element may be identical with or parallel to the rear side of the rim body and vice versa.

[0012] The wheel disc element, the rim body, first cover element and/or the second cover element may be arranged coaxially with each other. Preferably, the first cover element and the second cover element may be arranged along the axial direction of the rim body.

[0013] The first cover element and the second cover element may be arranged opposite one another relative to the wheel disc element. In other words, the wheel disc element may be surrounded by the first cover element and the second cover element. The first cover element may be directed to the front side of the rim body and the second cover element may be directed to the rear side of the rim body and vice versa.

[0014] A combination of the first cover element, the wheel disc element and the second cover element may be arranged together at the front side or the rear side of the rim body. Alternatively, they may be also arranged substantially at a middle of the rim body along the axial

direction of the rim body.

[0015] The first material for the rim body and the second material for the first cover element and the second cover element may comprise substantially different materials. The first material may be selected to ensure a light-weight and a high strength of the rim body. Whereas, the second material may be selected to ensure a light-weight as well, but also for an easy process to realize a desired cover design. Accordingly, the first cover element and the second cover element may be individually designed and manufactured regardless of an assembling position such as front-right side, front-left side, etc. at the vehicle. Alternatively, the first material and the second material may comprise the same material.

[0016] In an example, the first cover element and the second cover element may comprise the same material. Alternatively, the first cover element and the second cover element may comprise different material from each other. However, the selected materials for the first cover element and the second cover element may have to comprise a high machinability.

[0017] The first cover element, which may be directed outside the vehicle, may be adapted to fulfill requirements of design, vehicle's aerodynamic performances, such as total drag, surrounding airflow field resulting negative drift, etc. The second cover element, which may be directed inside the rim body or the vehicle, may be adapted to allow a smooth airflow through the wheel assembly to minimize a turbulent airflow. The first cover element and the second cover element may comprise substantially the same design. Preferably, however, the first cover element and the second cover element may be formed differently from each other, particularly in regard to the assembling position at the vehicle.

[0018] In an example, each of the first cover element and the second cover element comprises a plurality of venting holes. The first cover element may be adapted to allow an airflow through the first cover element to effectively ventilate the brake system, which may be also arranged adjacent to the wheel assembly. Similarly, the second cover element may be adapted to allow an airflow through the second cover element to effectively ventilate the brake system.

[0019] The plurality of venting holes may be arranged in a radial direction of the first cover element and the second cover element, respectively. For instance, the plurality of venting holes of the first cover element may be aligned with the openings of the wheel disc element to increase the aerodynamic performances of the wheel assembly, wherein the openings of the wheel disc element may be defined by the rib-shaped spokes of the wheel disc element. Alternatively or additionally, the plurality of venting holes of the second cover element may be aligned with the openings of the wheel disc element to increase the aerodynamic performances of the wheel assembly.

[0020] In an example, the plurality of venting holes of the first cover element is arranged aligned with the plu-

rality of venting holes of the second cover element forming a plurality of venting channels through the rim body. The plurality of venting holes of the first cover element, the openings of the wheel disc element and the plurality of venting holes of the second cover element may be aligned with each other such that each combination of a venting hole of the first cover element, an opening of the wheel disc element and a venting hole of the second cover element may form a venting channel.

[0021] In other words, the venting channel may be formed from the first cover element to the second cover element through the wheel disc element of the rim body. Accordingly, the airflow through the wheel assembly may be increased and cooling of the brake system may be enhanced. Further, the aerodynamic performances of the wheel assembly can be also improved.

[0022] In an example, the first side is an outer side of the wheel disc element exposed to an environment and the second side is an inner side of the wheel disc element directed to an interior of the rim body. In other words, the first side may be directed outside the vehicle and the second side may be directed to another wheel assembly mounted at an opposite side relative to a vehicle body, when mounted at the vehicle.

[0023] Accordingly, the first cover element may be arranged at the rim body, preferably at the wheel disc element, exposed to surroundings of the vehicle and the second cover element may be arranged at the rim body, preferably at the wheel disc element, adjacent to the platform chassis of the vehicle, when the wheel assembly is mounted at the vehicle.

[0024] In an example, the plurality of venting holes of the first cover element is formed to be compatible with a driving direction of the vehicle. The plurality of venting holes may be adapted to improve the aerodynamic performances by smoothly guiding the airflow over the first cover element. Specifically, if the first cover element is arranged at the outer side of the wheel disc element exposed to the environment, its surface structure may influence significantly the aerodynamic performances of the vehicle.

[0025] Generally, the plurality of venting holes may be formed regardless of its mounting position at the vehicle. However, if the venting holes of such conventional cover element are shaped having a specific structure, which may be inclined in a radial and/or tangential direction of the rim body, the conventional cover element may affect the aerodynamic performances of the vehicle differently depending on its mounting position. For instance, the venting holes of the conventional cover element may be suitably formed for a left side of the vehicle relative to the driving direction of the vehicle. If such cover element is arranged at a right side of the vehicle, the aerodynamic performances at the right side of the vehicle may be significantly deteriorated.

[0026] However, since the second material forming the first cover element may be selected for the easy machinability, the first cover element may be individually designed

and manufactured with respect to its mounting position at the vehicle, such as front left side, front right side, rear left side or rear right side. In other words, the first cover element may be formed in conformity with its mounting position and the driving direction of the vehicle to reduce the aerodynamic drag and maximize the aerodynamic performances of the vehicle.

[0027] In an example, the second cover element comprises a seamless surface. The second cover element, which may be arranged at the inner side of the wheel disc element directed to the interior of the rim body, may be adapted to smoothly draw the airflow passing through the wheel assembly, e.g. the plurality of venting channels. In particular, the surface of the second cover element exposed to the interior of the rim body may comprise a smooth surface, i.e. seamless surface. Accordingly, the airflow sing through the plurality of venting channels may cause less turbulence, which may lead to less energy consumption.

[0028] In an example, the first material comprises a metallic material. The rim body may comprise a metallic material such as steel, aluminum or magnesium to ensure a light weight and a high strength of the rim body.

[0029] In an example, the second material comprises a plastic material. The plastic material may allow the high machinability or processability, which may allow each of the first cover element and the second cover element to be individually designed in regard to its mounting position at the vehicle. For instance, the plastic material may have a thickness of 3 mm or less. However, the thickness may be also larger than 3 mm. The plastic material may comprise, for instance, a polyphenylene ether-polyamide (PPE-PA) mixture. The plastic material may be a thermoplastic blend and permanently retain its impact strength, low density and temperature resistance.

[0030] In an example, the first cover element and/or the second cover element is mounted at the rim body by at least one clamping means. The first cover element and/or the second cover element may be fixedly attached to the rim body, particularly the wheel disc element by applying one or more clamping means. The clamping means may comprise a clip, a snap, or the like. The clamping means may be arranged at the first cover element, second cover element and/or the rim body.

[0031] The clamping means may be formed to ensure the smooth airflow surface to minimize the turbulent airflow at the rim body and/or a wheel house. Accordingly, the clamping means may be formed to hold the first cover element and/or the second cover element in direction to the wheel disc element. In an example, the first cover element and the second cover element may be engaged with each other via the wheel disc element by the clamping means.

[0032] In an example, the at least one clamping means is integrally formed with the first cover element and/or the second cover element. Such clamping means may enable a gapless engagement of the first cover element and the second cover element via the wheel disc element.

Thus, the turbulent airflow at the rim body and/or the wheel house may be minimized and the aerodynamic performances of the wheel assembly may be improved.

[0033] In an example, the first cover element and/or the second cover element is mounted at the rim body by at least one mechanical fixing means. Alternatively or additionally to the clamping means, the first cover element and/or the second cover element may be fixedly attached to the rim body by the mechanical fixing means such as screw, bolt, etc. However, such mechanical fixing means may be arranged at the first cover element and/or the second cover element to ensure the smooth airflow surface to minimize the turbulent airflow at the rim body and/or the wheel house.

[0034] In an example, the first cover element and/or the second cover element is mounted at the rim body using an adhering means. Alternatively or additionally to the clamping means and/or the mechanical fixing means, the first cover element and/or the second cover element may be also adhered to the wheel disc element of the rim body by applying a tape, a glue, etc.

[0035] According to the present disclosure, a wheel system is also presented. The wheel system comprises at least a first and a second wheel assemblies as described above. The first wheel assembly is arrangeable on a left side of the vehicle and the second wheel assembly is arrangeable on a right side of the vehicle relative to a driving direction of a vehicle. The wheel system may comprise at least two wheel assemblies, which may be arranged at the front side or rear side relative to the driving direction of the vehicle. Preferably, the first wheel assembly and the second wheel assembly may be adapted to be mounted at the vehicle to face each other.

[0036] In an example, a first cover element of the first wheel assembly and a first cover element of the second wheel assembly are formed mirrored relative to each other. The first cover element of the first wheel assembly may be designed to be compatible with the driving direction of the vehicle and the first cover element of the second wheel assembly may be designed to be compatible with the driving direction of the vehicle as well.

[0037] In other words, a plurality of venting holes of the first cover element is formed to be compatible with the driving direction of the vehicle. Likewise, a plurality of venting holes of the second cover element is formed to be compatible with the driving direction of the vehicle. Accordingly, the plurality of venting holes of each cover element may be formed to effectively guide the airflow along the driving direction of the vehicle.

[0038] A second cover element of each wheel assembly may be formed based on an arrangement of the venting holes of the respective first cover element. The second cover element of the first wheel assembly and the second cover element of the second wheel assembly may be shaped substantially same or differently from each other.

[0039] According to the present disclosure, a vehicle is also presented. The vehicle comprises a wheel system

as described above. The vehicle may be a motor vehicle such as cars, trucks, busses, mobility scooters, etc. The vehicle may comprise at least two, preferably four or more wheel assemblies, at each of which a tire may be mounted. Preferably, a pair of wheel assemblies may be arranged at a vehicle body, e.g. platform chassis of the vehicle, facing each other. A first cover element of a first wheel assembly may be formed same as a first cover element of a second wheel assembly. Alternatively, the first cover element of the first wheel assembly may be formed mirrored relative to the first cover element of the second wheel assembly. Accordingly, aerodynamic performances of the vehicle may be improved and an energy efficiency of the vehicle may be increased.

[0040] According to the present disclosure, a method for manufacturing a wheel assembly for a vehicle is also presented. The method comprises the steps of, but not necessarily in this order:

- providing a rim body formed in a cylindrical shape und comprising at least a wheel disc element arranged in an axial direction of the rim body, wherein the rim body comprises a first material
- providing a first cover element comprising a second material and a second cover element comprising a second material, and
- arranging the first cover element at a first side of the wheel disc element and arranging the second cover element at a second side of the wheel disc element along the axial direction of the rim body.

The first material differs from the second material, and the first cover element and the second cover element are formed differently from each other.

[0041] It should be noted that the above examples may be combined with each other irrespective of the aspect involved. Accordingly, the method may be combined with structural features and, likewise, the system may be combined with features described above with regard to the method.

[0042] These and other examples of the present disclosure will become apparent from and elucidated with reference to the embodiments described hereinafter.

BRIEF DESCRIPTION OF DRAWINGS

[0043] Examples according to the present disclosure will be described in the following with reference to the following drawings.

Fig. 1a, 1b show schematically and exemplarily an example of a vehicle comprising a conventional wheel assembly.

Fig. 2a, 2b show schematically and exemplarily an example of a vehicle comprising a

wheel assembly according to the present disclosure.

Fig. 3a, 3b, 3c show schematically and exemplarily an example of a wheel assembly according to the present disclosure.

Fig. 4 shows schematically and exemplarily an example of a wheel assembly according to the present disclosure.

DESCRIPTION OF EXAMPLES

[0044] Fig. 1a and 1b show a vehicle 200 comprising a conventional wheel assembly 210. Generally, an outer cover element 220 and/or an outer structure of the conventional wheel assembly 210 is adapted to fulfill design requirements. Accordingly, the conventional cover element 220 or the outer structure of the conventional wheel assembly 210 may be formed for one mounting position of the wheel assembly 210 as shown in Fig. 1a and the same wheel assembly 210 is generally mounted at another position of the vehicle 200 as shown in Fig. 1b.

[0045] In other words, a rotation direction 30 of the conventional wheel assembly 210 is same as a design direction 40 of the conventional wheel assembly 210 on a left side of the vehicle 200, as shown in Fig. 1a. However, the rotation direction 30 of the conventional wheel assembly 210 differs from the design direction 40 of the conventional wheel assembly 210 on a right side of the vehicle 200, as shown in Fig. 1b. In case of Fig. 1a, a smooth airflow around the wheel assembly 210 may occur. In contrast, in case of Fig. 1b, a turbulent airflow may not be avoided which may significantly deteriorate the aerodynamic performances of the vehicle 200.

[0046] Fig. 2a and 2b show a vehicle 100 comprising a pair of wheel assembly 10 of a wheel system 20 according to the present disclosure. As shown in Fig. 3a, each wheel assembly 10 comprises a rim body 11 formed in a cylindrical shape, a first cover element 13, and a second cover element 14. The rim body 11 comprises at least a wheel disc element 12 arranged in an axial direction A of the rim body 11. The first cover element 13 is arranged at an outer side of the wheel disc element 12 exposed to environment of the vehicle 100 and the second cover element 14 is arranged at an inner side of the wheel disc element 12 directed to an interior of the rim body 11.

[0047] The rim body 11 comprises a metallic material such as steel, aluminum or magnesium to ensure a lightweight and a high strength of the rim body 11. Whereas, the first cover element 13 and the second cover element 14 comprise a plastic material such as a polyphenylene ether-polyamide (PPE-PA) blend allowing a high machinability or processability. Accordingly, each of the first cover element 13 and the second cover element 14 can be individually designed in regard to its mounting position at the vehicle 100.

[0048] For instance, the first cover element 13 of a first wheel assembly 10 and the first cover element 13 of a second wheel assembly 10 may be formed mirrored relative to each other (see Fig. 2a and 2b) to maximize the aerodynamic performances of the vehicle. Hence, the rotation direction 30 of the wheel assembly 10 is same as the design direction 40 of the wheel assembly 10 on the left side of the vehicle 100, as shown in Fig. 2a. Further, the rotation direction 30 of the wheel assembly 10 is also same as the design direction 40 of the wheel assembly 10 on the right side of the vehicle 100, as shown in Fig. 2b.

[0049] As shown in Fig. 3a and 3b, each of the first cover element 13 and the second cover element 14 comprises a plurality of venting holes 15, 16. The first cover element 13 can be formed in conformity with its mounting position and the driving direction 30 of the vehicle to reduce the aerodynamic drag and maximize the aerodynamic performances of the vehicle 100. The plurality of venting holes 15 of the first cover element 13 is arranged aligned with the plurality of venting holes 16 of the second cover element 14 forming a plurality of venting channels 19 through the rim body 11. Accordingly, an effective ventilation of a brake system (not shown), which may be mounted adjacent to the wheel assembly 10, may be achieved.

[0050] Further, as shown in Fig. 3c, the second cover element 14 comprises a seamless surface, which may be adapted to smoothly draw the airflow passing through the plurality of venting channels 19.

[0051] Fig. 4 shows three sectional view of the wheel assembly 10, in which the first cover element 13 and/or the second cover element 14 is mounted at the rim body 11 by at least one clamping means 17. The at least one clamping means 17 is integrally formed with the first cover element 13 and/or the second cover element 14. The clamping means may form one or more resilient portions at each of the first cover element 13 and/or the second cover element 14 to be fit into the wheel disc element 12.

[0052] Such clamping means 17 may enable a gapless engagement of the first cover element 13 and the second cover element 14 via the wheel disc element 12. Thus, the turbulent airflow at the rim body 11 and/or the wheel house may be minimized and the aerodynamic performances of the wheel assembly 10 may be improved.

[0053] Alternatively or additionally to the clamping means 17, the first cover element 13 and/or the second cover element 14 may be fixedly attached to the rim body 11 by mechanical fixing means 18 such as screw, bolt, etc. (see also Fig. 3b). Further, the first cover element 13 and/or the second cover element 14 may be also mounted at the rim body 11 using an adhering means such as a tape, a glue, etc.

[0054] It has to be noted that examples of the disclosure are described with reference to different subject matters. In particular, some examples are described with reference to method type claims whereas other examples are described with reference to the device type claims.

However, a person skilled in the art will gather from the above and the following description that, unless otherwise notified, in addition to any combination of features belonging to one type of subject matter also any combination between features relating to different subject matters is considered to be disclosed with this application. However, all features can be combined providing synergetic effects that are more than the simple summation of the features.

[0055] While the disclosure has been illustrated and described in detail in the drawings and description, such illustration and description are to be considered illustrative or exemplary and not restrictive. The disclosure is not limited to the disclosed examples. Other variations to the disclosed examples can be understood and effected by those skilled in the art in practicing a claimed disclosure, from a study of the drawings, the disclosure, and the dependent claims.

[0056] In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality. A single processor or other unit may fulfil the functions of several items recited in the claims. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage. Any reference signs in the claims should not be construed as limiting the scope.

30 Claims

1. A wheel assembly (10) for a vehicle (100), comprising,

- a rim body (11) formed in a cylindrical shape,
- a first cover element (13), and
- a second cover element (14),

the rim body (11) comprising at least a wheel disc element (12) arranged in an axial direction (A) of the rim body (11), the first cover element (13) being arranged at a first side of the wheel disc element (12) and the second cover element (14) being arranged at a second side of the wheel disc element (12) along the axial direction of the rim body (11), the rim body (11) comprising a first material, the first cover element (13) and the second cover element (14) comprising a second material, the first material differing from the second material, and the first cover element (13) and the second cover element (14) being formed differently from each other.

2. The wheel assembly (10) according to claim 1, each

- of the first cover element (13) and the second cover element (14) comprising a plurality of venting holes (15, 16).
3. The wheel assembly (10) according to claim 2, the plurality of venting holes (15) of the first cover element (13) being arranged aligned with the plurality of venting holes (16) of the second cover element (14) forming a plurality of venting channels (19) through the rim body (11).
 4. The wheel assembly (10) according to any of the preceding claims, the first side being an outer side of the wheel disc element (12) exposed to an environment and the second side being an inner side of the wheel disc element (12) directed to an interior of the rim body (11).
 5. The wheel assembly (10) according to any of the claims 2 to 4, the plurality of venting holes of the first cover element (13) being formed to be compatible with a driving direction of the vehicle (100).
 6. The wheel assembly (10) according to any of the preceding claims, the second cover element (14) comprising a seamless surface.
 7. The wheel assembly (10) according to claim 1, the first material comprising a metallic material.
 8. The wheel assembly (10) according to claim 1, the second material comprising a plastic material.
 9. The wheel assembly (10) according to any of the preceding claims, the first cover element (13) and/or the second cover element (14) being mounted at the rim body (11) by at least one clamping means (17).
 10. The wheel assembly (10) according to the preceding claim, the at least one clamping means (17) being integrally formed with the first cover element (13) and/or the second cover element (14).
 11. The wheel assembly (10) according to any of the preceding claims, the first cover element (13) and/or the second cover element (14) being mounted at the rim body (11) by at least one mechanical fixing means (18).
 12. A wheel system (20) comprising at least a first and a second wheel assemblies according to any of the preceding claims 1 to 11, the first wheel assembly (10) being arrangeable on a left side of the vehicle (100) and the second wheel assembly (10) being arrangeable on a right side of the vehicle (100) relative to a driving direction (20) of a vehicle (100).
 13. The wheel system according to claim 12, a first cover element (13) of the first wheel assembly (10) and a first cover element (13) of the second wheel assembly (10) being formed mirrored relative to each other.
 14. A vehicle (100) comprising a wheel system (20) according to claim 12 or 13.
 15. A method for manufacturing a wheel assembly (10) for a vehicle (100)
 - providing a rim body (11) formed in a cylindrical shape und comprising at least a wheel disc element (12) arranged in an axial direction (A) of the rim body (11),
 - the rim body (11) comprising a first material,
 - providing a first cover element (13) comprising a second material and a second cover element (14) comprising a second material, and
 - arranging the first cover element (13) at a first side of the wheel disc element (12) and arranging the second cover element (14) at a second side of the wheel disc element (12) along the axial direction of the rim body (11),
 the first material differing from the second material, and
 the first cover element (13) and the second cover element (14) being formed differently from each other.

Amended claims in accordance with Rule 137(2) EPC.

1. A wheel system (20) for a vehicle (100), comprising at least a first and a second wheel assembly (10),
 - the first and the second wheel assembly (10) each comprising,
 - a rim body (11) formed in a cylindrical shape,
 - a first cover element (13), and
 - a second cover element (14),
 - the rim body (11) comprising at least a wheel disc element (12) arranged in an axial direction (A) of the rim body (11),
 - the first cover element (13) being arranged at a first side of the wheel disc element (12) and the second cover element (14) being arranged at a second side of the wheel disc element (12) along the axial direction of the rim body (11),
 - the rim body (11) comprising a first material,
 - the first cover element (13) and the second cover element (14) comprising a second material,
 - the first material differing from the second material,

- the first cover element (13) and the second cover element (14) being formed differently from each other, and
the first wheel assembly (10) being arrangeable on a left side of the vehicle (100) and the second wheel assembly (10) being arrangeable on a right side of the vehicle (100) relative to a driving direction (20) of the vehicle (100),
wherein the first cover element (13) of the first wheel assembly (10) and the first cover element (13) of the second wheel assembly (10) being formed mirrored relative to each other.
2. The wheel system (20) according to claim 1, each of the first cover element (13) and the second cover element (14) comprising a plurality of venting holes (15, 16).
 3. The wheel system (20) according to claim 2, the plurality of venting holes (15) of the first cover element (13) being arranged aligned with the plurality of venting holes (16) of the second cover element (14) forming a plurality of venting channels (19) through the rim body (11).
 4. The wheel system (20) according to any of the preceding claims, the first side being an outer side of the wheel disc element (12) exposed to an environment and the second side being an inner side of the wheel disc element (12) directed to an interior of the rim body (11).
 5. The wheel system (20) according to any of the claims 2 to 4, the plurality of venting holes of the first cover element (13) being formed to be compatible with a driving direction of the vehicle (100).
 6. The wheel system (20) according to any of the preceding claims, the second cover element (14) comprising a seamless surface.
 7. The wheel system (20) according to claim 1, the first material comprising a metallic material.
 8. The wheel system (20) according to claim 1, the second material comprising a plastic material.
 9. The wheel system (20) according to any of the preceding claims, the first cover element (13) and/or the second cover element (14) being mounted at the rim body (11) by at least one clamping means (17).
 10. The wheel system (20) according to the preceding claim, the at least one clamping means (17) being integrally formed with the first cover element (13) and/or the second cover element (14).
 11. The wheel system (20) according to any of the preceding claims, the first cover element (13) and/or the second cover element (14) being mounted at the rim body (11) by at least one mechanical fixing means (18).
 12. A vehicle (100) comprising a wheel system (20) according to any of the preceding claims.
 13. A method for manufacturing a wheel system (20) for a vehicle (100)
 - providing at least two rim bodies (11) each formed in a cylindrical shape and each comprising at least a wheel disc element (12) arranged in an axial direction (A) of the rim body (11), the rim bodies (11) comprising a first material,
 - providing a first cover element (13) comprising a second material to each rim body (11) and a second cover element (14) comprising a second material to each rim body (11),
 - arranging the first cover elements (13) at a first side of the wheel disc element (12) and arranging the second cover elements (14) at a second side of the wheel disc element (12) along the axial direction of each of the rim bodies (11),
 - attaching at least one rim body (11) including a first cover element (13) and a second cover element (14) to a left side of the vehicle (100) relative to a driving direction (20) of the vehicle (100), and
 - attaching at least one rim body (11) including a first cover element (13) and a second cover element (14) to a right side of the vehicle (100) relative to a driving direction (20) of the vehicle (100), the first material differing from the second material,
 - the first cover elements (13) and the second cover elements (14) being formed differently from each other, and
 - the first cover element (13) being arranged to the at least one rim body attached to the left side of the vehicle (100) relative to a driving direction (20) of the vehicle (100) and the first cover element (13) being arranged to the at least one rim body attached to the right side of the vehicle (100) relative to a driving direction (20) of the vehicle (100) being formed mirrored relative to each other.

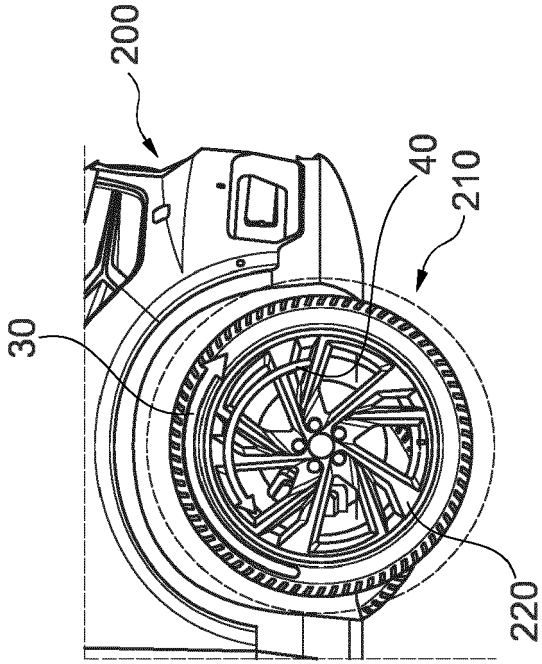


Fig. 1b

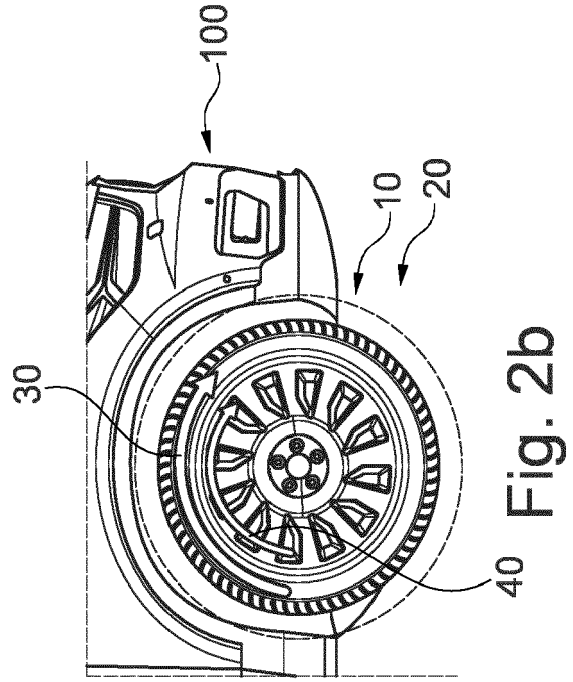


Fig. 2b

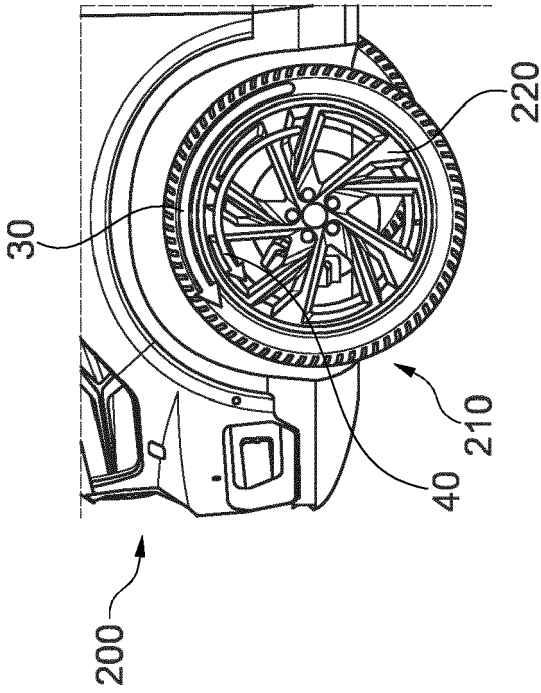


Fig. 1a

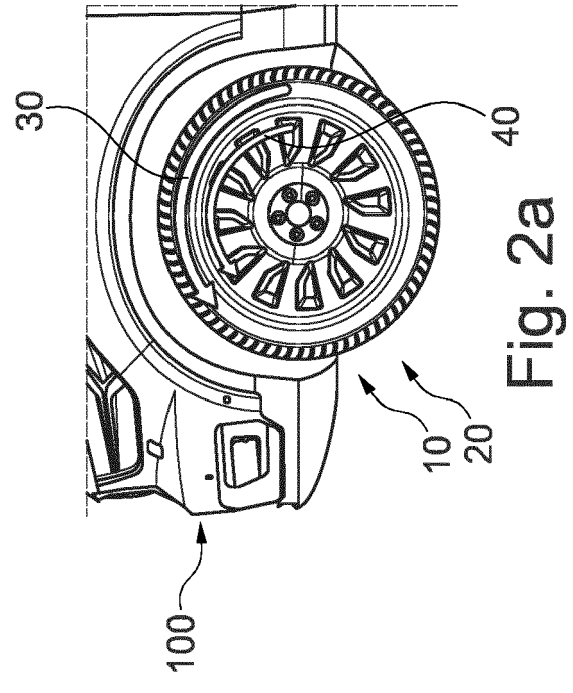


Fig. 2a

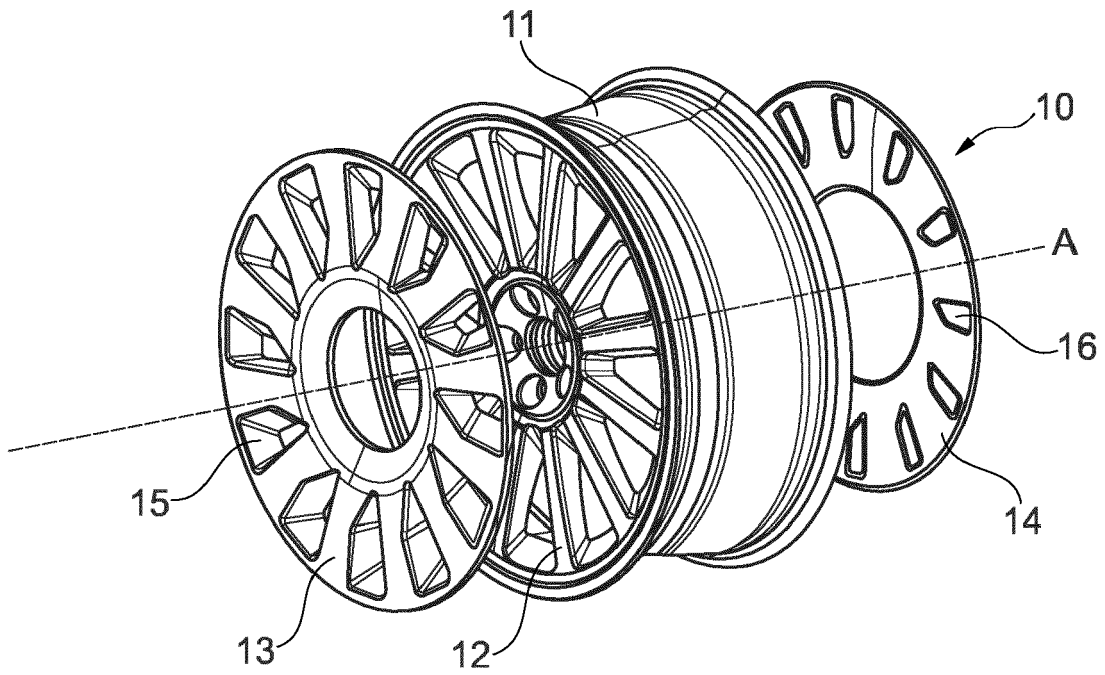


Fig. 3a

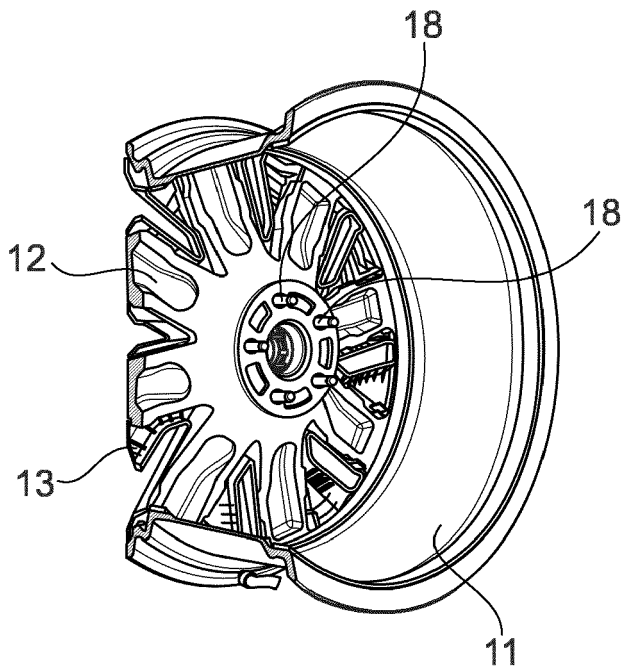


Fig. 3b

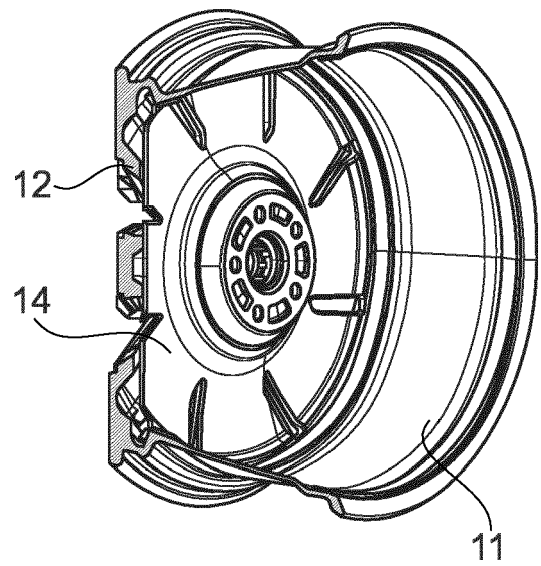


Fig. 3c

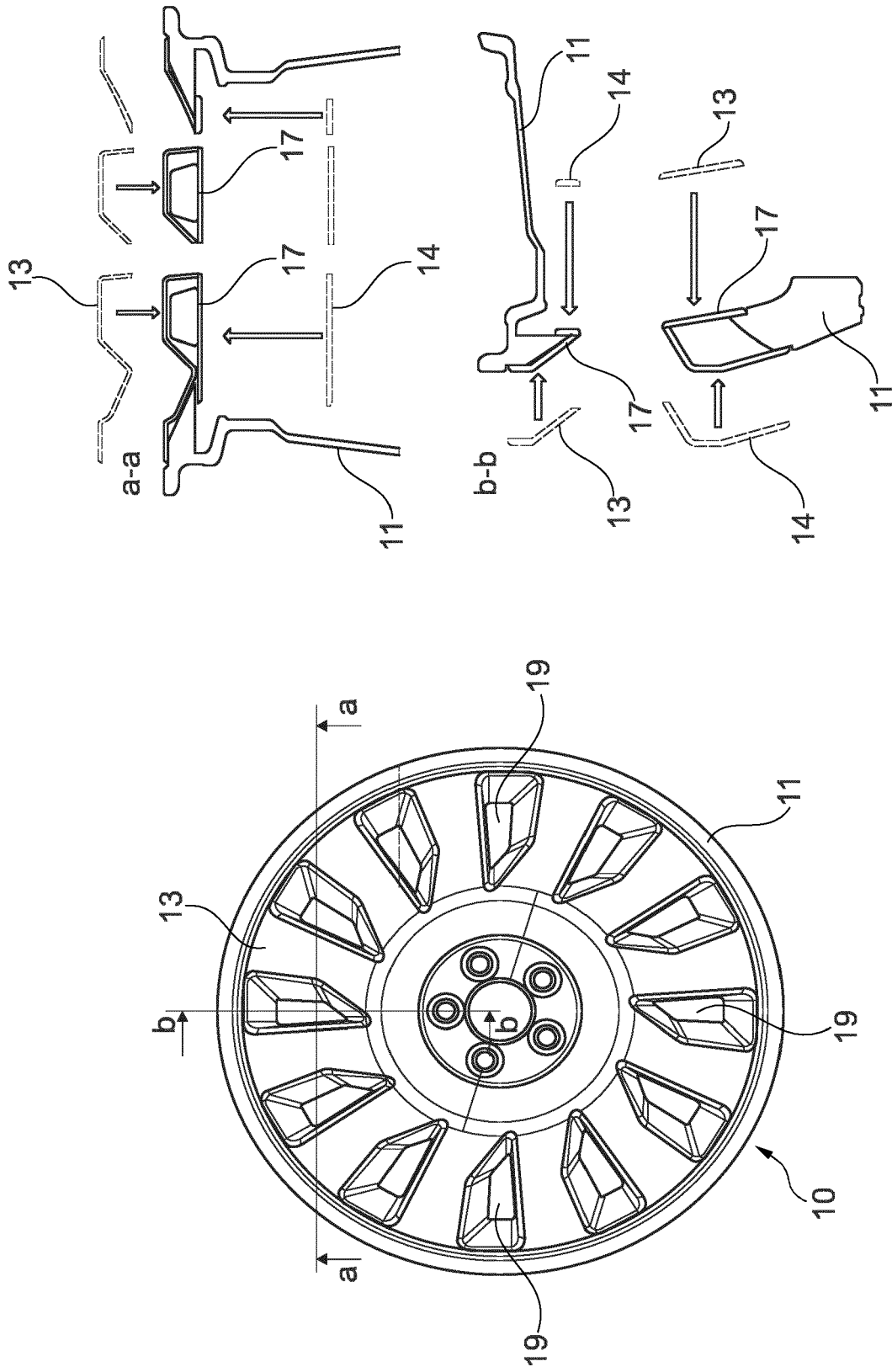


Fig. 4



EUROPEAN SEARCH REPORT

Application Number

EP 22 19 1003

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DOCUMENTS CONSIDERED TO BE RELEVANT

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* figures 1-8 * * paragraphs [0044] - [0046] * * claims 1,7,8 *	13	B60B7/02 B60B7/06 B60B7/18
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A	EP 0 808 728 A2 (DENNIS CRAIG WILLIAM [AU]) 26 November 1997 (1997-11-26) * column 3, line 56 - column 5, line 4 * * figures 5,6 *	1-15	

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B60B

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The present search report has been drawn up for all claims

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Place of search Munich	Date of completion of the search 2 February 2023	Examiner Christensen, Juan
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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02-02-2023

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