Abstract: A spoked wheel (1) for tubeless tyres, particularly for motorcycles, cars and similar vehicles comprises a rim (2), a hub (13), a plurality of spokes (4) suitable for fixing said rim (2) to the hub (13), each spoke (4) is connected to the rim (2) by means of fastening means (5) inserted in at least two opposite ears (7, 8) located in the inner surface (6) of the rim (2).
"SPOKED WHEEL FOR TUBELESS TYRES."

BACKGROUND OF THE INVENTION

The invention relates to a spoked wheel for tubeless tyres, also called tubeless, particularly for motorcycles, cars and similar vehicles.

Tubeless tyres have been preferred for some time now in the motorcycle industry as well, especially for high-performance motorcycles.

It is a known fact that tubeless tyres have numerous advantages compared to tyres with inner tubes.

Tubeless tyres are safer and are not subject to bursting, and because they have no inner tube, this cannot be lacerated. In case of a flat tyre, they deflate fairly slowly, making it possible to ride the motorcycle as far as a tyre-repair shop.

Furthermore, they are not subject to any sliding or rotation of the tyre with respect to the rim, which in the case of tyres with inner tubes could cause the valve to tear away from the inner tube.

For operation and assembly, tubeless tyres require an airtight rim with a special seal profile for the tyre bead. For this reason, in most cases, cast or pressed rims are used, almost always with rigid spokes.

In fact, because, traditionally, a spoked wheel comprises a rim with through holes to fix the spokes using nipples, it is very difficult to seal the hole area where the fixing nipples are fitted.

Alternatively, e.g. in the patent EP-B-O 143 394, rims for spoked wheels have been presented with the spoke fitting seats arranged on the edges of the rim, so as to allow fitting tubeless tyres. The rim of the patent EP-B-O 143 394 has considerably thick sides, because it also has to contain the
spoke seats, and is therefore heavier than standard type rims. Furthermore, manufacturing the rim is also more difficult with increase in production costs.

Another problem as regards the rims currently in use for spoked wheels, and in particular for off-road, enduro or supermotard motorcycle competitive use, is that of the relevant lack of sturdiness of the rim.

In fact, the traditional manufacture of spoked wheels for motorcycles envisages that the rim be made of aluminium alloy by extrusion with subsequent rolling until a round element is obtained that is then closed by welding.

The structure of the rims obtained in this way is not sturdy enough to withstand off-road stresses, and therefore often breaks. On the other hand, spoked wheels are preferred in the off-road sector for their greater elasticity and their ability to withstand the stresses of off-road, enduro, motocross riding, etc.

OBJECTS OF THE INVENTION

One object of the invention is to upgrade spoked wheels for tubeless tyres of the known type.

Another object of the invention is to present a spoked wheel for tubeless tyres that is particularly strong and lightweight.

Another object of the invention is to present a spoked wheel for tubeless tyres that can absorb high stresses and/or hard knocks, and therefore be advantageously used in the off-road motorcycle industry.

In conformity with one aspect of the invention, a spoked wheel for tubeless tyres is presented according to the specifications of claim 1.
The dependent claims refer to preferred and advantageous embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS
The invention can be better understood and implemented with reference to the attached drawings, which illustrate an exemplary and non-limitative form of embodiment, in which:
the figure 1 is a partial side perspective view of the spoked wheel according to the invention;
the figure 2 is a partial section of the spoked wheel in figure 1;
the figure 3 shows an enlarged detail of the spoked wheel in the previous figures; and
the figures 4, 5 and 6 show other enlarged details of the spoked wheel in the previous figures.

EMBODIMENTS OF THE INVENTION
With reference to the figures, 1 denotes in its entirety a spoked wheel comprising a rim 2 of the type suitable for accommodating a tubeless tyre (not shown), a series of spokes 4 and a hub 13, connected together according to methods explained in detail below.
The rim 2 has a channel 3 having a specific profile for fitting the beads of the tyre so that a perfect air seal is obtained, including without inner tube.
In this respect, it should be noticed that the channel 3 of the rim is totally devoid of holes, in fact, the spokes 4 are connected to the rim 2 by means of fastening means 5 not passing through the channel 3.
The rim 2 has an inner surface 6 opposite the channel 3 on which are obtained a series of ears 7, 8 placed on two circumferences which are in a
substantially symmetric position with respect to a centre line plane of the rim 2.

Each of the fastening means 5 is connected to the rim 2 by means of two opposite ears 7, 8 which are in a corresponding and symmetric position on the two circumferences of the inner surface 6.

According to the figures 3 and 4, the fastening means comprise a cylindrical part 5, having a shoulder 9 resting on an inner side of one of the ears 7, 8 on the right, or on the left, when the spoke 4 connected to the cylindrical part 5 is tensioned.

More in detail, the cylindrical part 5 comprises two cylindrical portions with different diameter D1, D2, which define the above shoulder 9, which rests on an inner side of the ear, being of smaller diameter. Because the spokes 4 are alternately angled in opposite directions to provide the camber needed to provide the wheel with a certain stiffness, the ears 7,8 also have holes 10, 11 of different dimensions L1, L2 respectively.

The holes 10, 11 have a slot shape and the dimensions L1, L2 measured in a radial direction are respectively slightly greater than the diameters D1, D2 of the cylindrical part 5. From the figures 3 and 4 it is clear that the cylindrical parts 5 are resting on the lower part of the holes 10, 11, thereby providing the centring of the rim 2 with respect to the hub 13.

The purpose of the radial play allowed by the slot shape of the holes 10, 11 is to offset the knocks and the deformations that could affect the wheel, permitting a greater capacity to absorb stresses compared to the constructions of known type.
The spoke 4 is fixed to the cylindrical part 5 by means of a threaded hole 12, which is angled to the same extent as the spoke 4, and is substantially perpendicular to the axis of the cylindrical part 5.

It must be noticed that the threaded hole 12 is arranged in the space between two opposite ears 7, 8, and consequently the fixing of the spoke 4 is very reliable and sturdy.

The relative positions and angles of the cylindrical parts 5 with the shoulders 9, the positions of the ears 7, 8 and of the spokes 4 are determined during wheel planning, so as to favour the quick positioning of the rim 2 with respect to the hub 13, without the need for long centring operations.

The figure 5 shows the hub 13 with seats 14 for housing the spokes 4 with relevant heads 15. In this case as well, the seats 14 are shown with the same angle the spokes 4 must have to achieve wheel camber.

The spokes 4 have a straight head 15, with a special housing for a tool for tensioning the spokes themselves. The tensioning operation of the spokes 4 is done by rotating these so they can be screwed up or unscrewed with respect to the cylindrical part 5.

The cylindrical part 5 can in turn rotate with respect to an axis substantially parallel with that of the wheel 1, allowing a certain settlement of the whole assembly.

As a whole, the spokes 4 are perfectly straight and thus provide greater strength compared to rounded-head spokes. The spokes 4 can be made of any one of the following materials: stainless steel, titanium alloy, aluminium.
alloy or magnesium alloy with loaded matrix, or in pressable composite materials such as carbon fibres or the like.

The construction of the spokes 4 in composite material is made possible precisely because of their straight shape and if necessary, for the threaded part, an inserted metal bush can be provided. The cylindrical parts 5 can be made of stainless steel or titanium alloy.

Thanks to the fact that the seats 14 in the hub and the threaded holes 12 in the cylindrical parts 5 are already angled to obtain correct wheel camber, and that the cylindrical parts 5 are already arranged for their right position with respect to the rim by means of the shoulder 9, the assembly of the hub 13 with the rim 2 and the spokes 4 is much simpler and quicker compared to the constructions of known type.

According to an advantageous version of the invention, the rim 2 and/or the hub 13 are made of aluminium or magnesium alloy, using the forging or hot pressing forming method.

According to a further version of the invention, the rim 2 and/or the hub 13 can be made of aluminium or magnesium alloy with loaded matrix, or else of pressable composite materials, e.g., carbon fibres and the like.

Afterwards, the rim 2 and/or the hub 13 are finished by machining for the removal of shavings, e.g., using numerical control machines. It is thus possible to create the particular geometry that distinguishes the two above component parts.

The forming technology by forging is currently the best as regards the construction of monolithic light alloy wheels, but on spoked wheels it has thus far only been adopted in rare cases and for building the hub only.
Thanks to the construction by forging of the invention, the rim 2 is particularly resistant to the stresses and knocks that occur especially as regards off-road vehicles, and is therefore the ideal solution for such use, thanks also to the use of the straight spokes 4.

The spokes 4, being straight, are intrinsically stronger and can be made using sturdier and more resistant materials, such as aluminium alloy or magnesium alloy with loaded matrix, or of pressable composite materials, e.g., carbon fibres and the like.

The composite materials for the hub, the spokes and the rim also allow obtaining wheels of very reduced weight.

The invention thus conceived is susceptible to numerous modifications and variations, all of which falling within the scope of the inventive concept. Furthermore all the details can be replaced with others that are technically equivalent.

In practice, the materials used, as well as the contingent shapes and dimensions, may be any according to requirements without because of this moving outside the protection scope of the following claims.
CLAIMS

1. Spoked wheel (1) for tubeless tyres, particularly for motorcycles, cars and similar vehicles, comprising a rim (2) with a channel (3) suitable for housing a tubeless tyre, said rim (2) having an inner surface (6) opposite the channel (3), a hub (13), a plurality of spokes (4) suitable for fixing said rim (2) to said hub (13), characterized in that each spoke (4) is connected to the rim (2) by means of fastening means (5) inserted in at least two opposite ears (7, 8) located in the inner surface (6) of said rim (2).

2. Spoked wheel according to claim 1, wherein said fastening means comprise at least a cylindrical part (5) having the axis substantially parallel with that of the wheel (1).

3. Spoked wheel according to claim 1 or 2, wherein said fastening means comprise at least a cylindrical part (5), having a shoulder (9) resting on an inner side of one of the ears (7, 8) on the right, or on the left, when the spoke (4) connected to the cylindrical part (5) is tensioned.

4. Spoked wheel according to any of the preceding claims, wherein said fastening means comprise at least a cylindrical part (5), having two cylindrical portions with different diameter (D1, D2), which define a shoulder (9).

5. Spoked wheel according to any of the preceding claims, wherein said fastening means comprise at least a cylindrical part (5) inserted in holes (10, 11) with a slot shape, said holes (10, 11) being obtained in the ears (7, 8) and being of different dimensions (L1, L2).

6. Spoked wheel according to claim 5, wherein said cylindrical part (5) is
inserted with its cylindrical portions of diameter (D₁, D₂) inside the slot-shaped holes (10, 11) of the ears (7, 8) having slightly greater dimensions (L₁, L₂), in a radial direction, than the dimensions (D₁, D₂) of the cylindrical portions, so as to allow a certain play, in a radial direction, between said cylindrical part (5) and said slot-shaped holes (10, 11).

7. Spoked wheel according to any of the preceding claims, wherein said fastening means comprise at least a cylindrical part (5) with a threaded hole (12) suitable for housing a respective threaded portion of a spoke (4), said threaded hole (12) being arranged between the two opposite ears (7, 8).

8. Spoked wheel according to claim 7, wherein said threaded hole (12) is angled to the same extent as the spoke (4), and is substantially perpendicular to the axis of the cylindrical part (5).

9. Spoked wheel according to any of the preceding claims from 3 to 8, wherein the positions and angles of the cylindrical parts (5) with the shoulders (9), the positions of the ears (7, 8) and of the spokes (4) are determined during wheel (1) planning, so as to favour the quick positioning of the rim (2) with respect to the hub (13).

10. Spoked wheel according to any of the preceding claims, wherein said hub (13) comprises seats (14) for housing the spokes (4), said seats (14) having the same angle the spokes (4) must have to achieve wheel camber.

11. Spoked wheel according to any of the preceding claims, wherein said spokes (4) are straight and have a head (15) arranged in the hub (13).
12. Spoked wheel according to any of the preceding claims, wherein said spokes (4) are made of stainless steel, titanium alloy, aluminium alloy or magnesium alloy with loaded matrix, or in pressable composite materials such as carbon fibres or the like.

13. Spoked wheel according to any of the preceding claims, wherein said cylindrical part (5) is made of stainless steel or titanium alloy.

14. Spoked wheel according to any of the preceding claims, wherein said rim (2) is made of aluminium alloy or magnesium alloy, using the forging or hot pressing forming method.

15. Spoked wheel according to any of the preceding claims from 1 to 13, wherein said rim (2) is made of aluminium alloy or magnesium alloy with loaded matrix, or in pressable composite materials such as carbon fibres or the like.

16. Spoked wheel according to any of the preceding claims, wherein said hub (13) is made of aluminium alloy or magnesium alloy, using the forging or hot pressing forming method.

17. Spoked wheel according to any of the preceding claims from 1 to 15, wherein said hub (13) is made of aluminium alloy or magnesium alloy with loaded matrix, or in pressable composite materials such as carbon fibres or the like.

18. Spoked wheel according to any of the preceding claims from 14 to 17, wherein said rim (2) and/or said hub (13) are finished by machining for the removal of shavings, e.g., using numerical control machines.
19. Motorcycle, car or similar vehicle comprising at least a spoked wheel
(1) according to any of the preceding claims.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

INV. B60B21/06

According to International Patent Classification (IPC) and both national classification and IPC.

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B60B

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

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of Box C.

See patent family annex.

Date of the actual completion of the international search: 17 February 2009

Date of mailing of the international search report: 26/02/2009

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