Appeal decision

Appeal No. 2018-8713

Appellant SUMITOMO RUBBER INDUSTRIES LTD.

Patent Attorney SUMITOMO, Shintaro

The case of appeal against the examiner's decision of refusal of Japanese Patent Application No. 2014-53888, entitled "Pneumatic Tire" (the application published on October 5, 2015, Japanese Unexamined Patent Application Publication No. 2015-174594) has resulted in the following appeal decision.

Conclusion

The appeal of the case was groundless.

Reason

No. 1 History of the procedures

The present application was filed on March 17, 2014, a notice of reasons for refusal was issued on August 31, 2017, and a written opinion and a written amendment were submitted on October 26, 2017. An examiner's decision of refusal was issued on March 16, 2018, an appeal against the examiner's decision of refusal was made on June 26, 2018, and a written amendment was submitted at that time. A written statement was submitted on October 2, 2018.

No. 2 Decision to dismiss an amendment according to the amendment dated June 26, 2018

[Conclusion of decision to dismiss an amendment]

The amendment dated June 26, 2018 shall be dismissed.

[Reason]

1 Contents of the amendment dated June 26, 2018

The amendment (hereinafter referred to as "the Amendment") according to the written amendment submitted on June 26, 2018 includes matters of amending the description of Claim 1 of the scope of claims indicated in the following item (1), which had been amended according to the written amendment submitted on October 26, 2017,

to the description of Claim 1 of the scope of claims indicated in the following item (2). The amended parts are underlined.

(1) Claim 1 of the scope of claims before the Amendment

"[Claim 1]

A pneumatic tire comprising a carcass which leads from a tread part to a bead core of a bead part through a sidewall part, an inner liner formed of air-impermeable rubber arranged on the side of a tire inner cavity of the carcass, and a tread reinforcement layer arranged radially outside of the carcass and inside of the tread part,

wherein the sidewall part includes a thinnest part with a thickness of 2.0 mm or less in a tire meridian cross-section including a tire rotation axis,

an insulation layer is arranged between the inner liner and the carcass in a buttress area which is an external area in the tire radial direction of the sidewall part,

the insulation layer is harder than the inner liner, and is formed of rubber having a JISA hardness of 50-98 degrees,

the insulation layer has an inner end and an outer end in the tire radial direction,

the inner end of the insulation layer is located outside of a tire maximum width position in the tire radial direction,

a distance in the tire radial direction between the inner end and the tire maximum width position is 5 to 15 mm,

the outer end of the insulation layer is located inside, in the tire axial direction, an outer edge in the tire axial direction of the tread reinforcement layer, and

a distance in the tire axial direction between the outer end and the outer edge of the tread reinforcement layer is 6 to 15 mm."

(2) Claim 1 of the scope of claims after the Amendment

"[Claim 1]

A pneumatic tire comprising a carcass which leads from a tread part to a bead core of a bead part through a sidewall part, an inner liner formed of air-impermeable rubber arranged on the side of a tire inner cavity of the carcass, and a tread reinforcement layer arranged radially outside of the carcass and inside of the tread part,

wherein the sidewall part includes a thinnest part with a thickness of 2.0 mm or less in a tire meridian cross-section including a tire rotation axis,

an insulation layer is arranged between the inner liner and the carcass in a buttress area which is an external area in the tire radial direction of the sidewall part,

the insulation layer is harder than the inner liner, and is formed of rubber having

a JISA hardness of 50-98 degrees,

the insulation layer has an inner end and an outer end in the tire radial direction,

the inner end of the insulation layer is located outside of a tire maximum width position in the tire radial direction,

a distance in the tire radial direction between the inner end and the tire maximum width position is 5 to 15 mm,

the outer end of the insulation layer is located inside, in the tire axial direction, an outer edge in the tire axial direction of the tread reinforcement layer,

a distance in the tire axial direction between the outer end and the outer edge of the tread reinforcement layer is 6 to 15 mm,

the bead part includes a bead apex formed of hard rubber extending from the bead core to the outside in the tire radial direction in a tapered shape, and a clinch rubber is arranged on the tire outer surface side of carcass and the bead apex, and

the clinch rubber includes a body, and a surface layer part which forms an outer surface of the body and comes into contact with a rim when the tire is mounted on the rim, and the surface layer part is formed of rubber harder than the body."

2 Propriety of the Amendment

(1) Purpose of the Amendment

The Amendment on Claim 1 of the scope of claims adds the following limitation regarding the "bead part", which is the matter specifying the invention of the invention according to Claim 1 of the scope of claims prior to the Amendment:

"the bead part includes a bead apex formed of hard rubber extending from the bead core to the outside in the tire radial direction in a tapered shape, and a clinch rubber is arranged on the tire outer surface side of carcass and the bead apex, and

the clinch rubber includes a body, and a surface layer part which forms an outer surface of the body and comes into contact with a rim when the tire is mounted on the rim, and the surface layer part is formed of rubber harder than the body". The Amendment is to restrict matters required to identify the invention stated in a claim pursuant to Article 36(5) of the Patent Act, and the industrial applicability of the invention stated in Claim 1 of the scope of claims prior to the Amendment is identical with that after the Amendment.

As a result of the limitation, the invention described in Claim 1 of the scope of claims after the Amendment solves the problem to "improve handling stability by preventing deformation of a bead part 4 during travel" and the problem to "effectively prevent damage to a surface layer part 25 due to friction with a rim R" in addition to the

problem to "provide a pneumatic tire which maintains reduced tire mass while maintaining handling stability". The invention described in Claim 1 of the scope of claims prior to the Amendment solves the problem to "provide a pneumatic tire which maintains reduced tire mass while maintaining handling stability." However, it does not solve the problem to "improve handling stability by preventing deformation of a bead part 4 during travel" or the problem to "effectively prevent damage to a surface layer part 25 due to friction with a rim R." Therefore, it cannot be said that the problem to be solved by the invention stated in Claim 1 of the scope of claims prior to the Amendment is identical with that after the Amendment.

Accordingly, it cannot be said that the Amendment is intended for the restriction of the scope of claims as provided in Article 17-2(5)(ii) of the Patent Act.

It cannot be also said that the Amendment is intended for the deletion of a claim or claims as provided in Article 17-2(5)(i) of the Patent Act, the correction of errors as provided in Article 17-2(5)(iii) of the Patent Act, or the clarification of an ambiguous statement as provided in Article 17-2(5)(iv) of the Patent Act.

Thus, the Amendment violates the provisions of Article 17-2(5) of the Patent Act.

(2) Consideration on requirement for independent patentability

We examine below whether or not the invention (hereinafter referred to as "the Amended invention") according to Claim 1 of the scope of claims after the Amendment is independently patentable if the Amendment is intended for the restriction of the scope of claims.

A Matters described in the Cited documents

(A) Matters described in Cited Document 1 and Cited Invention

a Matters described in Cited Document 1

Japanese Unexamined Patent Application Publication No. 2001-138708 (hereinafter referred to as "Cited Document 1") which is cited in the reasons for refusal of the examiner's decision and was distributed in Japan before the filing of the application includes the following descriptions (hereinafter sequentially referred to as "Described matter 1a", or the like, and generally referred to as "Matters described in Cited Document 1") on a "pneumatic tire", basically. The underlines were added by the body. The same applies to other documents.

1a "[0001]

[Field of the Invention] This invention relates to a pneumatic tire formed by partially

reinforcing a carcass ply with high-hardness rubber, and it is especially useful as a technology for reducing the weight by thinning a sidewall part of the tire.

[0002]

[Conventional Art] <u>Recently</u>, for reasons of environmental problems, or the like, reduction in weight of tires is required, and tires are thinned, generally. Thickness of a sidewall part or periphery thereof is reduced. However, if the sidewall part, or the like, is thinned, tire rigidity especially against lateral force is reduced, resulting in impaired handling stability. For high-performance tires used at high speed, there are requirements for improving carcass rigidity by arranging an organic material reinforcement layer in a sidewall part to increase carcass rigidity. Thus, reduction in thickness of the sidewall part is incompatible with improvement in carcass rigidity. An important matter is how to efficiently perform partial reinforcement in order to sufficiently maintain handling stability while thinning a sidewall part, accordingly.

[0003] Regarding the partial reinforcement, Japanese Unexamined Patent Application Publication No. H05-32104, for example, discloses a tire formed by arranging a reinforcement rubber pad with a shore hardness of 65-75 degrees on an outside surface of a carcass layer from a vicinity of an end of a first belt layer to a sidewall part (vicinity of a buttress part).

[0004] Japanese Unexamined Patent Application Publication No. H07-1914 discloses a tire formed by arranging a high-hardness rubber sheet covering both ends of a belt layer and having an end extended to a top surface of a carcass layer. Furthermore, Japanese Unexamined Patent Application Publication No. H07-25205 discloses a tire formed by arranging a reinforcement rubber layer with a JISA hardness of 70 to 85 degrees between a belt layer and a carcass layer.

[0005]

[Problem to be solved by the invention] However, the conventional arts described above are to arrange a reinforcement rubber layer on the outside of a carcass layer. According to examinations by the inventors, such reinforcement turns out not to maintain sufficient carcass rigidity of a tire with a thinned sidewall part against lateral force.

[0006] Japanese Unexamined Patent Application Publication No. H03-157210 discloses a pneumatic radial tire reinforced by arranging high-hardness rubber on the inside of a carcass layer in a significantly wide area from a bead part to the center of a belt layer end; however, it cannot efficiently perform partial reinforcement for reducing tire weight.

[0007] Thus, the object of the invention is to provide a pneumatic tire which can

efficiently reinforce a carcass layer and sufficiently maintain handling stability even if a sidewall part is thinned."

1b "[0008]

[Means for solving the problem] The inventors studied hard about partial reinforcement using high-hardness rubber in order to achieve the above purpose, and <u>found that the</u> purpose can be achieved by arranging high-hardness rubber on both the inside and <u>outside of a specific area of a carcass layer for reinforcement</u>, resulting in completion of the invention."

1c "[0013] [Function and effect] According to the invention, as shown by the results of the examples, <u>a carcass layer can be efficiently reinforced</u> by arranging high-hardness rubber on both the outside and inside of a specific area of the carcass layer for reinforcement, and <u>even if a sidewall part is thinned, handling stability can be sufficiently maintained</u>. The detailed reason why is not clear, but the following can be inferred.

[0014] In order to increase carcass rigidity against lateral force, it is effective to increase rigidity against bend (change in curvature) of a carcass layer in the vicinity of a buttress part, to reduce a distance (hereinafter referred to as "aperture") between adjacent organic fibers (cords) in the vicinity of the buttress part, to improve reinforcement effect with a belt layer in the vicinity of an end, and the like. The inside and outside reinforcement rubber in this invention is effective in all of the above aspects. Shearing force of lateral force on a tire bends a carcass layer. Bending repulsion can be increased, in the case of turning inside, with high-hardness reinforcement rubber, and especially, inside reinforcement rubber applies compressive repulsion, thereby effectively increasing carcass rigidity against bending. As for the case of turning outside, bending repulsion can be increased by arranging high-hardness rubber on the outside, and compressive repulsion is also applied, thereby increasing carcass rigidity against tension more effectively. In the vicinity of the buttress part of the carcass layer, an aperture may be generated during travel, and when lateral force is applied, reinforcement effect of the carcass layer may be reduced. However, by arranging high-hardness rubber in the vicinity of the buttress part, the aperture can be prevented and reinforcement effect of the carcass layer can be increased. Furthermore, in the vicinity of the end of a belt layer, a reinforcement effect (hoop effect) with respect to the carcass layer may be insufficient due to a relationship with fiber arrangement, resulting in insufficient carcass rigidity against lateral force. However, by arranging

high-hardness rubber on the inside of the part, carcass rigidity against lateral force can be increased. Since the reinforcement rubber is arranged to hold the carcass layer from both sides, the above bending force is effectively converted to compressive force and tensile force of the reinforcement rubber, thereby effectively reinforcing thin reinforcement rubber, which is advantageous in reduction of tire weight, in particular. [0015] Where the reinforcement rubber is effectively arranged, as described above, corresponds to a range from a position closer by 1/4 of the maximum width of the belt layer to the belt layer end than the tire equator to a position of the tire maximum width. When JIS hardness of the reinforcement rubber is 65 to 97 degrees, the above reinforcement effect can be obtained, while extremely high hardness causes damage to the tire due to fatigue characteristics or rupture characteristics. In addition, it is impractical, because ride comfort may be reduced depending on tire structure."

1d "[0019]

[Embodiments of the invention] The embodiments of the invention are described with drawings below. The first embodiment shows arrangement of planar reinforcement rubber on the inside and outside of a carcass layer, and the second embodiment shows arrangement of reinforcement rubber having a crescent cross-sectional shape on the outside of the carcass layer.

[0020] [First embodiment] The pneumatic tire of the invention includes, as shown in FIG. 1, a carcass layer 5 for reinforcing a gap between a pair of annular bead parts 1 with organic fibers arranged substantially radially, and a belt layer 6 disposed outside the carcass layer 5 near a tread part 4. In the example shown in FIG. 1, the carcass layer 5 is bent to the outside and fixed at a bead core 1a which is an aggregate of bead wires arranged in the bead part 1. The carcass layer 5 is formed of the organic fibers arranged substantially radially (radially or semi-radially) and rubber covering them, and includes one or a plurality of layers. For reducing the weight, a single layer (1 ply) is preferable.

[0021] The belt layer 6 is formed of steel cords, or the like, arranged at an angle (e.g., about 20 degrees) from the tire equation direction and rubber covering them, and typically includes multiple layers so that arrangement direction (or reinforcement direction) of the cords may be symmetrical. In the example shown in FIG. 1, there are an inside belt layer 6a, and an outside belt layer 6b, which is slightly shorter than the inside belt layer 6a. On the outside surface of the belt layer 6 inside the tread rubber 4a, a belt reinforcement layer is formed when appropriate.

[0022] This invention is characterized by arranging, in the tire described above, an

inside reinforcement rubber 10 with JISA hardness of 65 to 97 degrees inside the carcass layer 5, for at least a part in a range from a position P2 on the end of the belt layer by 1/4 of a maximum width Wb of the belt layer 6 from a tire equator P1 to a position P3 of a tire maximum width W.

[0023] When JISA hardness of the inside reinforcement rubber 10 is 65 degrees or less, the above reinforcement effect cannot be obtained, while when JISA hardness exceeds 97 degrees, it is impractical due to reduction of ride comfort or trouble. Therefore, JISA hardness is preferably 65 to 90 degrees, more preferably 70-85 degrees.

[0024] For the inside reinforcement rubber 10, a rubber material with hardness adjusted by a known method, such as adjusting the kind or the amount of additive, e.g., carbon black, may be used. The kind of the rubber is typically selected in consideration of adhesion with covering rubber of the carcass layer 5 or the inner liner 7.

[0025] The only requirement is to arrange the inside reinforcement rubber 10 in a part or the whole (including the case of reinforcing a wider area) of the range from the position P2 to the position P3, and it is preferable to reinforce a range of 30 to 70% of the above range around a central position P4 of the range from the position P2 to the position P3. Preferably, the inside reinforcement rubber 10 is brought into internal contact with the carcass layer 5.

[0026] A width of the inside reinforcement rubber 10 is 20 to 70 mm, and a thickness thereof is preferably 0.3 to 1.5 mm. For effectively improving bending repulsion and preventing stress concentration at both ends, the inside reinforcement rubber 10 preferably has a cross section shaped so that the width gradually decreases from the center or the vicinity thereof toward both ends.

[0027] In the first embodiment, planar outside reinforcement rubber 11 having a JISA hardness of 65-97 degrees is arranged along an outside surface of the carcass layer 5 with respect to at least a part of the range from the position P2 to the position P3. The term "planar" means a sheet-like shape or a shape similar to a sheet-like shape, and is not limited to a sheet-like material having a uniform thickness.

[0028] JISA hardness of the outside reinforcement rubber 11 is, for the same reason as for the inside reinforcement rubber 10, preferably 65 to 90 degrees, more preferably 70 to 85 degrees. It is also preferable, for the same reason as for the inside reinforcement rubber 10, to arrange the planar outside reinforcement rubber 11 in a range of 30 to 70% of the above range around the position P4. Preferably, an end on the side of the belt layer is arranged inside the belt layer 6. Preferably, a width of the outside reinforcement rubber 1 is 20 to 70 mm, and a thickness is 0.3 to 3 mm.

[0029] The rubber covering organic fibers of the carcass layer 5 has a JISA hardness of

preferably 60 degrees or higher, more preferably 65 degrees or higher. Polyester, nylon, or the like is used as the organic fiber. Other reinforcement layers are appropriately formed near the bead part 1 of the carcass layer 5.

[0030] <u>In this invention, a thickness of outside rubber of the sidewall part 2; i.e., a</u> thickness of sidewall rubber 2a and covering rubber of the carcass layer 5, is preferably 3.0 mm or less, more preferably 2.5 mm or less. By thinning the sidewall part in this way, tire weight can be reduced. As for tire structures or materials other than those described above, conventional well-known arts can be employed."

1e "[0037]

[Examples] Examples, or the like, which show configuration and effect of the invention concretely are described below.

[0038] Examples 1-1 to 1-4 and Comparative Example 1

A pneumatic tire of size 205/55R16 was manufactured so that a hardness of pad-like outside reinforcement rubber, a hardness of inside reinforcement rubber, a hardness of covering rubber of a carcass layer, and sidewall total thickness, in a tire having a structure shown in FIG. 2, may satisfy the values in Table 1. In this example, the inside reinforcement rubber has a thickness of 1.0 mm and a width of 50 mm, and the outside reinforcement rubber has a maximum thickness of 2.5 mm and a width of 30 mm. As a comparative example, a pneumatic tire was manufactured without increasing the hardness of the outside reinforcement rubber and the inside reinforcement rubber. JISA hardness is employed for both tires. A sample was cut out from the tire by a cutter so as to form a smooth surface. A back side was buffed so as to be parallel to a measurement surface, to prepare a measurement sample. A microhardness tester manufactured by WALLACE was used for measurement.

[0039] The pneumatic tires were mounted on rear-wheel drive domestic automobiles of 2500 cc displacement, and measured lap time and handling stability were evaluated in a test course (a circuit course where a car generally takes about 120 seconds for a lap). A shorter lap time is better, and -1.0 second is a significantly excellent value. The handling stability was evaluated on a scale of one to ten based on driver's feeling, including cornering stability. A higher score is better, and a difference of one point can be discerned by ordinary people."

1f "[FIG. 1]



"

b Cited invention

It is obvious that the "inside reinforcement rubber 10" described in Cited Document 1 has an inner end and an outer end in a tire radial direction.

Thus, by organizing the matters described in Cited Document 1 especially

regarding Embodiment 1, it is acknowledged that Cited Document 1 describes the following invention (herein referred to as "Cited Invention").

"A pneumatic tire comprising a carcass layer 5 which leads from a tread part 4 to a bead core 1a of a bead part 1 through a sidewall part 2, an inner liner 7 arranged on the side of tire inner cavity of the carcass layer 5, and a belt layer 6 arranged radially outside of the carcass layer 5 and inside of the tread part 4,

configured by arranging inside reinforcement rubber 10 with a JISA hardness of 65 to 97 degrees having an inner end and an outer end in the tire radial direction between the carcass layer 5 and the inner liner 7 with respect to at least a part in a range from a position P2 on the end of the belt layer by 1/4 of a maximum width Wb of the belt layer 6 from a tire equator P1 to a position P3 of a tire maximum width W, and arranging planar outside reinforcement rubber 11 with a JISA hardness of 65-97 degrees along an outside surface of the carcass layer 5 with respect to at least a part in the range from the position P2 to the position P3."

(B) Matters described in Cited Document 3

Japanese Unexamined Patent Application Publication No. 2013-241043 (hereinafter referred to as "Cited Document 3") which is cited in the reasons for refusal of the examiner's decision and was distributed in Japan before the filing of the application includes the following descriptions on a "pneumatic tire", basically.

. "[0016]

<u>The pneumatic tire 1 of the invention includes, as shown in FIG. 1, a bead filler 4</u> <u>arranged on an outer periphery of a bead core 3 embedded in a pair of left and right</u> <u>bead sections 2</u>, at least one carcass layer 5 (one layer in the figure) folded around the bead core 3 from the inside to the outside in the tire axial direction so as to wrap the bead filler 4, and a rim cushion 6 which is adjacent to the carcass layer 5, exposed to the tire axial outside on the tire axial outside of the bead section 2, and extended outward from the tire radial inside. A black sidewall 7 extending toward the tire radial outside from a tire-radial top end of the exposed part of the rim cushion 6 is laminated on the tire axial outside of the rim cushion 6.

[0017]

In this invention, a height Hr (see FIG. 2) of the top end 6a of the rim cushion 6 is varied in a wavelike form within a range from 0.5 to 0.7 times the tire cross-sectional height SH along a tire circumferential direction, an average height of the top end 6a of

the rim cushion 6 is set to 0.6 times the tire cross-sectional height SH or less, and <u>a</u> relationship between a hardness Ks of rubber constituting the black sidewall 7, a hardness Kr of rubber constituting the rim cushion 6, and a hardness Kf of rubber constituting the bead filler 4 is Ks<Kr<Kf. FIG. 3 is an image showing a wavelike height Hr of the top end 6a of the rim cushion 6 varied along a tire circumferential direction, as viewed from a tire side surface.

... (omitted) ...

[0021]

When the hardness Kr of the rubber constituting the rim cushion 6 is higher than the hardness Kf of the rubber constituting the bead filler 4, rolling resistance is worsened. When the hardness Kr of the rubber constituting the rim cushion 6 is lower than the hardness Ks of the rubber constituting the black sidewall 7, side rigidity is insufficient, thereby reducing handling stability. [0022]

In light of the above, <u>the pneumatic tire 1 in this invention preferably uses rubber</u> of a JISA hardness of 40-60 at 20°C for constituting the black side wall 7, rubber of a JISA hardness of 70-85 at 20 C for constituting the rim cushion 6, and rubber of a JISA hardness of 80-95 at 20°C for constituting the bead filler 4."

[図1]

[図2]





図1 FIG. 1 図2 FIG. 2

(C) Matters described in Cited Document 6

Japanese Unexamined Patent Application Publication No. 2011-105076 (hereinafter referred to as "Cited Document 6") distributed in Japan before the filing of the application includes the following descriptions on a "Pneumatic Tire for Heavy Load and Method of Manufacturing the Same", basically.

. "[0001]

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This invention relates to a pneumatic tire for heavy load configured to restrain molding failure, while maintaining bead durability, and to a method of manufacturing the same."

. "[Description of Embodiments] [0022]

One embodiment of the invention is described below based on drawings.

As shown in FIG. 1, the pneumatic tire for heavy load 1 of this embodiment includes a carcass 6 leading from a tread part 2 to a bead core 5 of a bead part 4 through a sidewall part 3, a belt layer 7 arranged on a tire radial outside of the carcass 6 and inside of the tread part 2, and an inner liner 9 arranged inside the carcass 6. [0023]

The carcass 6 is formed of at least one carcass ply 6A (one ply in this example) including a body 6a leading from the tread part 2 to the bead core 5 of the bead part 4 through the sidewall part 3, and a turn-up part 6b connected to the body 6a and folded from the inside to the outside in the tire axial direction around the bead core 5. [0024]

The carcass ply 6A of this embodiment has a radial structure in which carcass cords are arranged at an angle of 70 to 90 degrees with respect to a tire equator C. Steel cords are used for the carcass cords.

[0025]

The belt layer 7 of this embodiment has a four-layer structure including a belt ply 7A formed at the innermost by arranging belt cords using steel cords at an angle of about 60 ± 10 degrees, for example, with respect to the tire equator C, and belt plies 7B, 7C, and 7D arranged at a small angle of 30 degrees or less with respect to the tire equator C. The belt plies 7A, 7B, 7C, and 7D are superposed with one or more portions for allowing the belt cords to cross with each other between the plies, for

example.

[0026]

The inner liner 9 is formed of air-impermeable rubber mainly made of butyl rubber, for example. An inner end part 9i in the tire radial direction of the inner liner 9 of this embodiment includes an inner end 9ie which is extended further inward in the tire radial direction than the bead core 5, bent outward in the tire axial direction in the vicinity of a bead toe 4t, and terminated in an inside area (area formed by projecting the bead core 5 inward in the tire radial direction) in the tire radial direction of the bead core 5. The inner liner 9 covers the bead core 5 also from the side of a bead bottom surface S2, to effectively prevent permeation of air and moisture into the bead core 5, thereby improving bead durability.

[0027]

An inside insulation rubber layer 11 formed of a rubber material having adhesion higher than that of the inner liner 9 is arranged between the inner liner 9 and the body 6a of the carcass ply 6A. An inner end part 11i in the tire radial direction of the inside insulation rubber layer 11 is terminated in an inward area of the bead core 5 across the inner end 9ie of the inner liner 9 outward in the tire axial direction. The inside insulation rubber layer 11 improves adhesion between the inner liner 9 and the body 6a of the carcass 6, thereby advantageously absorbing shear distortion thereof. [0028]

The term "adhesion" means here adhesion between rubber materials in unvulcanized state. As the rubber which exhibits such adhesion, NR rubber is preferably employed which is formed by containing natural rubber (NR) of 60 parts by mass or more, more preferably 80 parts by mass or more, in a rubber component of 100 parts by mass.

[0029]

The bead part 4 in this embodiment includes, as shown in enlarged FIG. 2, a bead reinforcement cord layer 12 covering in U-shape at an inner end in the tire radial direction of the carcass ply 6A, clinch rubber 13 forming a bead outside surface S1, and a chafer 14 connected to an inner end of the clinch rubber 13 and forming a bead bottom surface S2. On the tire axial outside of the turn-up part 6b of the carcass ply 6A and on the tire axial inside of the clinch rubber 13, there is formed an inner sidewall rubber layer 15 extended inward and outward in the tire radial direction.

[0030]

The bead reinforcement cord layer 12 is folded to wrap the bead core 5 with a substantially U-shaped cross-sectional shape, and the layer is one ply formed by

arranging, for example, steel cords or organic fiber cords side by side. The bead reinforcement cord layer 12 includes an inner turn-up part 12a arranged on the inside in the tire axial direction, and an outer turn-up part 12b arranged on the outside in the tire axial direction. The bead reinforcement cord layer 12 improves flexural rigidity of the bead part 4, thereby advantageously reducing distortion. [0031]

A length L3 between an outer end 12be of the outer turn-up part 12b of the bead reinforcement cord layer 12 and an outer end 6be of the turn-up part 6b of the carcass ply 6A can be appropriately set, while if the length is too short, large rigidity difference may be generated due to proximity between the outer ends 12be and 6be. In light of the above, the length L3 between the outer end 12be of the outer turn-up part 12b of the bead reinforcement cord layer 12 and the outer end 6be of the turn-up part 6b of the carcass ply 6A is preferably 6 mm or more, more preferably 8 mm or more, further preferably 10 mm or more.

[0032]

The clinch rubber 13 is connected to an inner end in the tire radial direction of sidewall rubber 3G and extended toward the inside in the tire radial direction up to the vicinity of a bead heal 4h. <u>The clinch rubber 13 is formed of rubber harder than the sidewall rubber 3G, and rubber hardness is set within a range from 70 to 85 degrees, for example. The clinch rubber 13 advantageously prevents wear or damage due to contact with a rim in the bead outside surface S1 of the bead part 4. [0033]</u>

In the specification, rubber hardness is based on JIS-K6253, and is durometer A hardness under an environment of a temperature of 23°C. [0034]

In this embodiment, the chafer 14 is extended from the vicinity of the bead heal 4h to the bead toe 4t, and terminated there. The chafer 14 of this embodiment preferably employs hard rubber with a rubber hardness set in a range of 70-85 degrees. The chafer 14 exerts high and stable fitting pressure with respect to the rim, and reliably prevents damage due to contact with the rim on the bead bottom surface S2 of the bead part 4.

[0035]

At an end on the side of the bead toe 4t of the chafer 14, a toe-inside rubber layer 16 is arranged which is extended while gradually decreasing in thickness toward the outside in the tire radial direction along a tire axial inside surface 9s of the inner liner 9, and forms a substantially triangular cross section. The toe-inside rubber layer 16 is

formed of hard rubber with a hardness of 70 to 85 degrees, for example, and can exert stable fitting pressure with respect to the rim as well as the chafer 14. [0036]

The inner sidewall rubber layer 15 of this embodiment is extended inward and outward in the tire radial direction between the turn-up part 6b of the carcass ply 6 and the clinch rubber 13. The inner sidewall rubber layer 15 has higher adhesion than the clinch rubber 13, and is formed of soft rubber having a hardness lower than the clinch rubber 13, particularly 50-65 degrees. Accordingly, the inner sidewall rubber layer 15 can mitigate and absorb distortion generated between the turn-up part 6b and the clinch rubber 13 during travel in a wide range. Therefore, formation of a crack along a boundary with the clinch rubber 13 due to the distortion can be prevented for a long time, thereby improving bead durability."



図1 FIG. 1 図2 FIG. 2

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B Comparison

The Amended Invention and the Cited Invention are compared below.

The "tread part 4" in the Cited Invention corresponds to the "tread part" in the Amended Invention. In the same way, the "sidewall part 2" corresponds to the "sidewall part", the "bead part 1" corresponds to the "bead part", the "bead core", the "carcass layer 5" corresponds to the "carcass", and the "belt layer 6" corresponds to the "tread reinforcement layer".

It is common general technical knowledge that an inner liner in a pneumatic tire is formed of air-impermeable rubber. Thus, the "inner liner 7" in the Cited Invention corresponds to the "inner liner formed of air-impermeable rubber" in the Amended Invention.

The description in the Cited Invention "at least a part in a range from a position P2 on the end of the belt layer by 1/4 of a maximum width Wb of the belt layer 6 from a tire equator P1 to a position P3 of a tire maximum width W" corresponds to the "buttress area " in the Amended Invention.

In Cited Document 1, there is no definition about "JISA hardness". A person skilled in the art is generally considered to comply with "JIS-K6253" which stipulates "Methods for determining hardness of vulcanized rubber and thermoplastic rubber" and "JIS-K6250" which stipulates "Rubber - General procedures for physical test methods". Thus, the "JISA hardness" in Cited Document 1 is considered to be identical with "JISA hardness" in the Amended Invention, which is defined by "durometer A hardness measured under an environment of a temperature of 23°C based on JIS-K6253" ([0026] in the specification). Therefore, the "inside reinforcement rubber 10 having a JISA hardness of 65-97 degrees" in the Cited Invention corresponds to the "insulation layer" formed of "rubber having a JISA hardness of 80-98 degrees" in the Amended Invention.

Accordingly, the inventions are identical with each other in the following feature:

"A pneumatic tire comprising a carcass which leads from a tread part to a bead core of a bead part through a sidewall part, an inner liner formed of air-impermeable rubber arranged on the side of tire inner cavity of the carcass, and a tread reinforcement layer arranged radially outside of the carcass and inside of the tread part,

wherein an insulation layer is arranged between the inner liner and the carcass in a buttress area which is an external area in tire radial direction of the sidewall part,

the insulation layer is formed of rubber having a JISA hardness of 50-98 degrees, and

the insulation layer has an inner end and an outer end in the tire radial direction."

The inventions are different in the following features:

<Different Feature 1>

In the Amended Invention, there is a specification that "the insulation layer is harder than the inner liner", while the Cited Invention is not defined by the specification.

<Different Feature 2>

In the Amended Invention, there is a specification that "the sidewall part includes a thinnest part with a thickness of 2.0 mm or less in a tire meridian cross-section including a tire rotation axis", while the Cited Invention is not defined by the specification.

<Different Feature 3>

In the Amended Invention, there is a specification that "the inner end of the insulation layer is located outside of a tire maximum width position in the tire radial direction,

a distance in the tire radial direction between the inner end and the tire maximum width position is 5 to 15 mm,

the outer end of the insulation layer is located inside, in the tire axial direction, an outer edge in the tire axial direction of the tread reinforcement layer, and

a distance in the tire axial direction between the outer end and the outer edge of the tread reinforcement layer is 6 to 15 mm", while the Cited Invention is not defined by the specification.

<Different Feature 4>

In the Amended Invention, there is a specification specifies that "the bead part includes a bead apex formed of hard rubber extending from the bead core to the outside in the tire radial direction in a tapered shape", while the Cited Invention is not defined by the specification.

<Different Feature 5>

In the Amended Invention, there is a specification that "a clinch rubber is arranged on the tire outer surface side of carcass and the bead apex, and

the clinch rubber includes a body and a surface layer part which forms an outer surface of the body and comes into contact with a rim when the tire is mounted on the rim, the surface layer part is formed of rubber harder than the body", while the Cited Invention is not defined by the specification.

Additionally, in the Cited Invention there is a specification that the "planar outside reinforcement rubber 11 has a JISA hardness of 65-97 degrees", while a member corresponding to the "planar outside reinforcement rubber 11 having a JISA hardness of 65-97 degrees" is not included in the Amended Invention. However, according to the description of Claim 1 of the scope of claims after the Amendment, a member corresponding to the "planar outside reinforcement rubber 11 having a JISA hardness of 65-97 degrees" is not excluded from the Amended Invention. Therefore, there is no difference as to whether or not a member corresponding to the "planar outside reinforcement rubber 11 having a JISA hardness of 65-97 degrees" is not excluded from the Amended Invention.

C Judgment on the Different features

The different features are examined below.

(A) Regarding Different Feature 1

According to the described matter 1c ([0014]), the "inside reinforcement rubber 10" in the Cited invention, which is "high-hardness reinforcement rubber" arranged for improving carcass rigidity against lateral force by increasing rigidity against bend (change in curvature) of the carcass layer in the vicinity of the buttress area, is highly likely to be harder than the "inner liner 7". Thus, Different Feature 1 is not a substantial different feature.

Even if Different Feature 1 is a substantial different feature, in the Cited Invention, a person skilled in the art could have easily conceived of the matters specifying the invention of the Amended Invention relating to Different Feature 1, making the "inside reinforcement rubber 10", which is "high-hardness reinforcement rubber" harder than the "inner liner 7" in order to improve carcass rigidity against lateral force with high rigidity near the vicinity of the buttress area against a bend (change in curvature) caused by the carcass layer.

(B) Regarding Different Feature 2

According to Described Matter 1a ([0001], [0002], and [0007]) and Described Matter 1c ([0013]), the Cited Invention assumes that the "sidewall part 2" is thinned to reduce tire weight.

According to Described Matter 1d ([0030]), for reducing tire weight, in the Cited

Invention, it is described that "a thickness of outside rubber of the sidewall part 2; i.e., a thickness of sidewall rubber 2a and covering rubber of the carcass layer" is "more preferably 2.5 mm or less".

According to the description in the specification, the numerical limitation of "2.0 mm or less" in the Amended Invention which defines that "the sidewall part includes a thinnest part with a thickness of 2.0 mm or less in a tire meridian cross-section including a tire rotation axis" only means that the thickness is small in terms of technical significance. Further, there is no significant difference in terms of effects between a tire satisfying the numerical limitation "2.0 mm or less". Thus, it cannot be acknowledged there is critical significance in defining the numerical limitation "2.0 mm or less".

Therefore, in the Cited Invention, a person skilled in the art could have easily conceived of making "a thickness of outside rubber of the sidewall part 2; i.e., a thickness of sidewall rubber 2a and covering rubber of the carcass layer", further smaller than "2.5 mm" for reducing tire weight, and configuring the "sidewall part 2" to "include a thinnest part with a thickness of 2.0 mm or less", " in a tire meridian cross-section including a tire rotation axis", for the matters specifying the invention of the Amended Invention relating to Different Feature 2.

(C) Regarding Different Feature 3

According to the described matter 1f ([FIG. 1]), it is recognized that the end of the "inside reinforcement rubber 10" located near the belt layer in the Cited Invention is arranged closer to the center than the belt layer 6 like the end of the "outside reinforcement rubber 11" located near the belt layer. According to Described Matter 1d ([0028]), the end of the belt layer of the "outside reinforcement rubber 11" located near the belt layer arranged closer to the center than the belt layer of the "outside reinforcement rubber 11" located near the belt layer. According to Described Matter 1d ([0028]), the end of the belt layer of the "outside reinforcement rubber 11" located near the belt layer in the Cited Invention will be preferably arranged closer to the center than the belt layer 6. Thus, a person skilled in the art may understand that the end of the "inside reinforcement rubber 10" located near the belt layer in the Cited Invention is also arranged closer to the center than the belt layer 6.

According to Described Matter 1d ([0025]), the "inside reinforcement rubber 10" in the Cited Invention will be placed preferably in a range of 30 to 70% of the range from the position P2 (farther from the tire equator by 1/4 of the maximum width Wb of the belt layer 6) to the position P3 (farther from the tire equator by the maximum width W of the tire) around the mid position P4 assumed in the middle of P2 and P3.

According to Described Matter 1a ([0001], [0002], and [0007]), the Cited Invention is intended for maintain stabile handling sufficiently for pneumatic tires of

which the sidewall part is thinned by efficiently reinforcing the carcass layer. Thus, it is a matter of ordinary creativity of a person skilled in the art to optimize a position of the "inside reinforcement rubber 10" appropriately in accordance with the purpose thereof.

In order to arrange the "inside reinforcement rubber 10" in the Cited Invention in the above preferable location, or even when the sidewall part is thinned by effectively reinforcing the carcass layer, so as to achieve the purpose of sufficiently maintaining handling stability, a person skilled in the art could have easily conceived of optimizing the range where the "inside reinforcement rubber 10" in the Cited Invention is arranged, locating the inner end of the "inside reinforcement rubber 10" in the Cited Invention in a position outside the tire maximum width position in the tire radial direction and satisfying a requirement that a distance in the tire radial direction between the inner end and the tire maximum width position inside, in the tire axial direction, an outer edge in the tire axial direction of the "belt layer 6" and satisfying a requirement that a distance in the outer end and the outer edge of the "belt layer 6" is "6 to 15 mm", as matters specifying the invention of the Amended invention relating to Different Feature 3.

(D) Regarding Different Feature 4

According to Described Matter 1f ([FIG.1]), the Cited Invention includes a member corresponding to the "bead apex" in the Amended Invention, which is extended from the "bead core 1a" to the outside in the tire radial direction in a tapered shape.

Cited Document 3 describes that the member corresponding to the "bead apex" is preferably hard rubber, in the pneumatic tire, for improving rolling resistance or handling stability.

Therefore, in the Cited Invention, on the basis of the matter described in Cited Document 3, a person skilled in the art could have easily conceived of the matters specifying the invention of the Amended Invention relating to Different Feature 4 by using hard rubber as the member corresponding to the "bead apex."

(E) Regarding Different Feature 5

According to Described Matter 1f ([FIG. 1]), the Cited Invention includes a member corresponding to the "clinch rubber" in the Amended Invention, on the tire outer surface side of the member corresponding to the "carcass layer 5" and the member corresponding to the "bead apex".

Cited Document 6 describes the "clinch rubber 13" and the "inner sidewall rubber layer 15", for preventing wear or damage due to contact with a rim, on the outside of the "turn-up part 6b of the carcass ply 6", and that the "clinch rubber 13" which comes into contact with the rim when mounted on the rim is harder than the "inner sidewall rubber layer 15" which is not in contact with the rim.

Therefore, in the Cited Invention, on the basis of the matters described in Cited Document 6, a person skilled in the art could have easily conceived of making the member corresponding to the "clinch rubber" with harder rubber in the part touching the rim than that in the part not touching the rim. That is the matters specifying the invention of the Amended Invention relating to Different Feature 5.

(F) Regarding the effects

The effects performed by the Amended Invention are: "to reduce tire mass, while maintaining handling stability"; "to effectively increase rigidity of the buttress area 14"; "to effectively prevent separation of the insulation layer 20"; "to improve handling stability by preventing deformation of the bead part 4 during travel"; and "to effectively prevent damage to the surface layer part 25 due to friction with the rim R" according to the following descriptions in the specification of the application: "In light of the above, the pneumatic tire of this invention can reduce tire mass while maintaining handling stability" in [0015]; "The insulation layer 20 effectively increases rigidity of the buttress area 14 while minimizing increase of tire mass" in [0041]; "The insulation layer 20 effectively prevents the insulation layer 20 from peeling from an outer end 200 while minimizing increase of tire mass" in [[0043]; and "The clinch rubber 23 improves handling stability by preventing deformation of a bead part 4 during travel, and effectively prevents damage to a surface layer part 25 due to friction with a rim R" in [0048]. Additionally, the effects of "effectively preventing separation of the insulation layer 20" and "effectively preventing damage to the surface layer part 25 due to friction with the rim R" are not actually verified in the specification.

As for the effects of "reducing tire mass while maintaining handling stability", "effectively increasing rigidity of the buttress area 14", and "effectively preventing separation of the insulation layer 20", it can be said that the Cited Invention may perform similar effects according to Described Matters 1d, 1c, and 1f. The effect of "improving handling stability by preventing deformation of the bead part 4 during travel" can be predicted by a person skilled in the art according to the matters described in Cited Document 3. The effect of "effectively preventing damage to the surface layer part 25 due to friction with the rim R" can be predicted by a person skilled in the

art according to the matters described in Cited Document 6.

Therefore, it cannot be said that the effects performed by the Amended Invention are particularly remarkable in light of the Cited Invention and the matters described in Cited Documents 3 and 6.

D Appellant's allegation

The appellant alleges in the written statement submitted on October 2, 2018 that "First of all, the Cited Invention is a car pneumatic tire which is aimed at saving weight ([0001], [0039]), while the invention disclosed in Cited Document 6 is a pneumatic tire for heavy load ([Claim 1]). Actually, in the pneumatic tire of the Cited Invention a carcass layer is reinforced with organic fibers ([Claim 1]), while steel cords are used for a carcass in the pneumatic tire for heavy load in Cited Document 6 ([0024]). Therefore, the pneumatic tire in the Cited Invention and the pneumatic tire for heavy load in Cited Document 6 fall into different categories, and are not associated with each other in terms of technical field.

The invention disclosed in Cited Document 6 is aimed at preventing molding defect with bead durability ([0007]) maintained, while Cited Document 1 does not address the aim. Even if improvement in durability of a bead part is a well-known problem to be solved in a technical field of tires, since in the Cited Invention saving weight is fulfilled by thinning the sidewall part ([0001]), the improvement in durability of a bead part goes against the aim of the Cited Invention. Thus, there is no commonality between the problem to be solved in the pneumatic tire of the Cited Invention and that of the pneumatic tire for heavy load of Cited Document 6.

In addition, Cited Document 1 and Cited Document 6 do not address combination thereof.

As described above, the Cited Invention and Cited Document 6 have no association in terms of technical field or commonality in problems to be solved, and there is no such indication in Cited Document 1 and Cited Document 6. Accordingly, there is no motivation to apply the configuration described in Cited Document 6 to the Cited Invention, and I am convinced that the decision made by the examiner is unreasonable."

The above allegation is examined below.

Since in Cited Document 1 there is no description excluding a pneumatic tire for heavy load, the Cited Invention does not exclude a pneumatic tire for heavy load. Thus, it can be said that the Cited Invention and the matters described in Cited Document 6 are associated with each other in terms of technical field.

23 / 26

Improvement in durability of a bead part is required for a pneumatic tire having a bead part without exception, and it is also inherent in the Cited Invention. Thus, it can be said that the Cited Invention and the matters described in the Cited Document are associated with each other in terms of the problem to be solved.

In addition, as described above, the problem to be solved (improvement in durability of a bead) in the matters described in the Cited Document 6 is also inherent in the Cited Invention. Thus, it can be said that there is a motivation to combine the Cited Invention with the matters described in Cited Document 6.

Therefore, the appellant's allegation cannot be accepted.

E Summary

Therefore, since the Amended Invention could have been easily made by a person skilled in the art on the basis of the Cited Invention and the matters described in Cited Documents 3 and 6, it could not have been patented independently at the time of the filing of the patent application under the provisions of Article 29(2) of the Patent Act.

(3) Closing

As described above, the Amendment violates the provisions of Article 17-2(5) of the Patent Act.

Even if the Amendment is intended for restriction of the scope of claims stipulated in Article 17-2(5)(ii) of the Patent Act, since the appellant should not be granted a patent independently for the Amended Invention at the time of filing of the patent application, the Amendment violates the provisions of Article 126(7) of the Patent Act which is applied mutatis mutandis in the provisions of Article 17-2(6) of the Patent Act.

Therefore, the Amendment should be dismissed under the provisions of Article 53(1) of the Patent Act which is applied mutatis mutandis in the provisions of Article 159(1) of the Patent Act.

Thus, the decision shall be made as described in the [Conclusion of Decision to Dismiss Amendment].

No. 3 Regarding the Inventions of the application

1 The Inventions

Since the Amendment was dismissed as describe above, the Inventions according

to Claims 1 to 6 of the scope of claims of the application are acknowledged as specified by the matters described in Claims 1 to 6 of the scope of claims, according to the description of scope of claims amended by the written amendment submitted on October 26, 2017, and the specification and the description of drawings originally attached to the application. The invention (hereinafter referred to as "the Invention") according to Claim 1 of the scope of claims is as described in No. 2 [Reason] 1 (1).

2 Outline of reasons for refusal stated in the examiner's decision

The reasons for refusal stated in the examiner's decision basically include the following matter: the inventions according to Claims 1 to 4 and Claim 6 of this application could have been easily made by a person ordinarily skilled in the art of the inventions before the filing of the application on the basis of inventions described in the following publications distributed in Japan before the filing of the application, and the appellant should not be granted a patent under the provisions of Article 29(2) of the Patent Act.

Cited Document 1. Japanese Unexamined Patent Application Publication No. 2001-138708

Cited Document 2. Japanese Unexamined Patent Application Publication No. 2012-176694

Cited Document 3. Japanese Unexamined Patent Application Publication No. 2013-241043

Cited Document 4. Japanese Unexamined Patent Application Publication No. 2013-129346

3 Matters described in Cited Document 1

Matters described in Cited Document 1 and the Cited Invention are as described in No. 2 [Reason] 2 (2) A (A).

4 Comparison / Judgment

As examined in No. 2 [Reason] 2 (1), the Amended Invention is formed by adding the following limitation, regarding the "bead part", which is the matter specifying the invention of the Amended Invention: "the bead part includes a bead apex formed of hard rubber extending from the bead core to the outside in the tire radial direction in a tapered shape, and a clinch rubber is arranged on the tire outer surface side of carcass and the bead apex,

the clinch rubber includes a body, and a surface layer part which forms an outer surface of the body and comes into contact with a rim when the tire is mounted on the rim,

the surface layer part being formed of rubber harder than the body". Therefore, the Invention is formed by deleting the limitation from the Amended Invention.

Thus, in comparison between the Invention and the Cited Invention, the inventions are identical in the coincidence in the comparison between the Amended Invention and the Cited Invention in No. 2 2 (2) B, while they are different in the Different Features 1 to 3.

As indicated in No. 2 (2) C (A) to (C), Different Features 1 to 3 could have been easily conceived by a person skilled in the art in the Cited Invention, and the effects of the Invention are not particularly remarkable as indicated in No. 2 (2) C (F).

5 Closing

The Invention could have been easily made by a person skilled in the art on the basis of the Cited Invention. The appellant should not be granted a patent under the provision of Article 29(2) of the Patent Act.

No. 4 Concluding remarks

As described in No. 3, as for the Invention; i.e., the invention according to Claim 1, the appellant should not be granted a patent under the provisions of Article 29(2) of the Patent Act. The present application should be rejected without examining inventions concerning the remaining claims.

Therefore, the appeal decision shall be made as described in the conclusion.

June 3, 2019

Chief administrative judge:OSHIMA, ShogoAdministrative judge:KATO, TomoyaAdministrative judge:UEMAE, Mitsuji