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(71) Applicant: **Towa Corporation Ltd.**
Kurume-shi
Fukuoka 830-0047 (JP)

(72) Inventors:
- **TAKAHASHI Hisaya**
  Kurume-shi, Fukuoka 830-0047 (JP)
- **KOJIO Mai**
  Kurume-shi, Fukuoka 830-0047 (JP)
- **SHIBATA Kaori**
  Kurume-shi, Fukuoka 830-0047 (JP)
- **NAKAGAWA Risa**
  Kurume-shi, Fukuoka 830-0047 (JP)

(74) Representative: **Bandpay & Greuter**
30, rue Notre-Dame des Victoires
75002 Paris (FR)

(54) ANTI-SLIPPING STRUCTURE FOR ARTICLE SURFACE, ARTICLE, ANTI-SLIPPING BODY, AND GLOVESPROVIDED WITH COATING FILM LAYER IMPARTING ANTI-SLIPPING EFFECT, AND METHOD FOR FORMING COATING FILM LAYER AND METHOD FOR MANUFACTURING GLOVES

(57) Provided are an anti-slipping structure for a surface of an article where dust is minimally filled in recessed portions and a larger friction force can be generated compared to anti-slipping obtained by a powder adhesion method, an article provided with a coating film layer imparting an anti-slipping effect, an anti-slipping body, gloves, a method for manufacturing gloves and the like.

An article has a coating film layer that covers the article. A plurality of recessed portions are formed on the coating film for imparting an anti-slipping effect to the article. The plurality of recessed portions are formed of: a plurality of hemispherical recessed portions having an approximately circular shape as viewed in a plan view; and a plurality of diaphragm provided recessed portions formed such that two or more hemispherical recessed portions are connected to each other in a partially overlapping manner and a connection boundary between the recessed portions is partitioned by a diaphragm. In a method for forming a coating film layer which covers a surface of an article and on which a plurality of recessed portions are formed so as to impart an anti-slipping effect to the article, wherein a liquid droplet of a solidifying agent is made to impinge on an unsolidified elastic material that adheres to the surface of the article so as to recess and solidify impinged portions thus forming the recessed portions.

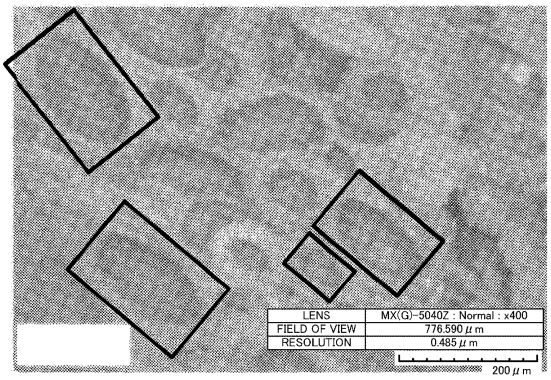

Fig. 1A

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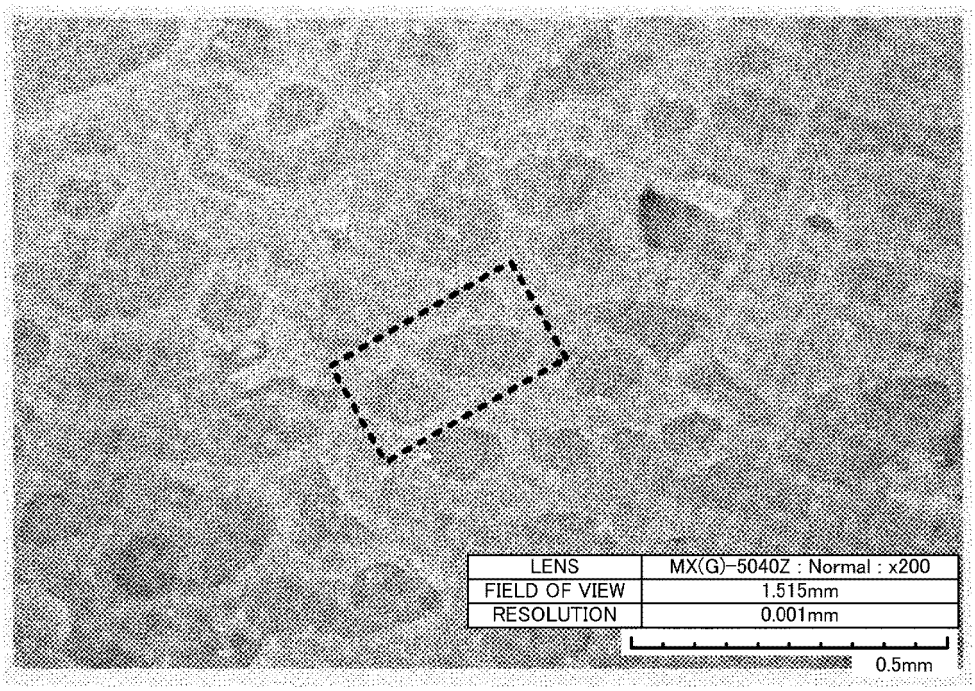

LENS
MX(G)-5040Z : Normal : x200
FIELD OF VIEW
1.515mm
RESOLUTION
0.001mm
0.5mm

Fig. 1B

Description

Technical Field

[0001] The present invention relates to an anti-slipping structure for a surface of an article, an article provided with coating film layer imparting an anti-slipping effect, an anti-slipping body, gloves, a method for forming coating film layer, and a method for manufacturing gloves.

Background Art

[0002] Conventionally, a user wears gloves for protecting his/her hands during an operation.

[0003] Among various types of gloves, gloves that are coated with a coating film layer made of an elastic material such as natural rubber, synthetic rubber, polyvinyl chloride, polyurethane have been popularly used. This is because such gloves exhibit excellent functions such as high waterproof property, high oil resistant property and high chemical resistant property while maintaining flexibility.

[0004] However, when a surface of the coating film layer is made flat and smooth, for example, when the surface of the coating film layer is wetted, a friction generated between the coating film layer and the gripping article is small and hence, there may be a case where it is difficult for a user to grasp the article.

[0005] In view of such a circumstance, there has been proposed a method where an elastic material before solidification is made to adhere to a surface of a glove base body that forms a base of the glove, predetermined powder is further made to adhere to the elastic material before its solidification, the elastic material is solidified and, thereafter, the powder is removed by melting or the like so that fine recessed portions are formed on a surface of a coating film layer that covers an outermost portion of the glove. Such a method is also referred to as a powder adhesion method (for example, see patent literature 1).

[0006] With such a configuration, a friction force that acts between the glove and a grasping article can be increased and hence, operability of a user in a state where the user wears the gloves can be enhanced.

Citation List

Patent Literature

[0007] Patent Literature 1: Japanese Patent Laid-Open No. 2008-274521

Summary of Invention

Technical Problem

[0008] However, the conventional gloves formed by the above-mentioned powder adhesion method have a drawback that small dust is likely to be filled in the fine recessed portions formed on the surface of the coating film layer.

[0009] Further, although gloves formed by a powder adhesion method are gloves having excellent operability, there has been a demand for gloves having a larger friction force.

[0010] In view of the above-mentioned problems, the inventors of the present invention have made extensive studies so as to develop gloves where dust is minimally filled in recessed portions and a larger friction force can be generated compared to gloves that are obtained by a powder adhesion method. As a result, the inventors cast off the conventional technical concept that requires powdery body as an indispensable constituent for forming recessed portions, and have found a novel method that can overcome such problems of the conventional method by making use of a property of a liquid, and also have found that the novel method is not only applicable to surfaces of gloves simply but also applicable to the prevention of a slippage relating to articles in a broad range. The present invention has been made based on such finding. Solution to Problem

[0011] To overcome the above-mentioned conventional drawback, (1) according to an aspect of the present invention, there is provided an anti-slipping structure for an article surface that includes, on a surface of a coating film layer that covers a surface of an article, a plurality of hemispherical recessed portions each having an approximately circular shape as viewed in a plan view, and a plurality of diaphragm provided recessed portions formed such that two or more hemispherical recessed portions are connected to each other in a partially overlapping manner and a connection boundary between the recessed portions is partitioned by a diaphragm.

[0012] (2) According to another aspect of the present invention, there is provided an article having a coating film layer which covers a surface of an article and on which a plurality of recessed portions are formed for imparting an anti-slipping effect to the article, wherein the plurality of recessed portions are formed of: a plurality of hemispherical recessed portions

having an approximately circular shape as viewed in a plan view; and a plurality of diaphragm provided recessed portions formed such that two or more hemispherical recessed portions are connected to each other in a partially overlapping manner and a connection boundary between the recessed portions is partitioned by a diaphragm.

[0013] (3) According to another aspect of the present invention, there is provided an anti-slipping body, wherein the anti-slipping body is the article described in the configuration (2), and is disposed on other articles so as to impart an anti-slipping effect to the other articles.

[0014] (4) According to another aspect of the present invention, there is provided gloves where a plurality of recessed portions are formed on a coating film layer that covers surfaces of the gloves, wherein the plurality of recessed portions are formed of: a plurality of hemispherical recessed portions having an approximately circular shape as viewed in a plan view; and a plurality of diaphragm provided recessed portions formed such that two or more hemispherical recessed portions are connected to each other in a partially overlapping manner and a connection boundary between the recessed portions is partitioned by a diaphragm.

[0015] (5) According to another aspect of the present invention, there is provided a method for forming a coating film layer which covers a surface of an article and on which a plurality of recessed portions are formed so as to impart an anti-slipping effect to the article, wherein a liquid droplet of a solidifying agent is made to impinge on an unsolidified elastic material that adheres to the surface of the article so as to recess and solidify impinged portions thus forming the recessed portions.

[0016] (6) According to another aspect of the present invention, in the method for forming a coating film layer, the article is an anti-slipping body that imparts an anti-slipping effect to other articles by being disposed on the other articles.

[0017] (7) According to another aspect of the present invention, there is provided a method for manufacturing gloves where a plurality of recessed portions are formed on a coating film layer that covers surfaces of the gloves, wherein a liquid droplet of a solidifying agent is made to impinge on an unsolidified elastic material that adheres to the surface of an unfinished article formed in a profile of fingers so as to recess and solidify impinged portions thus forming the recessed portions.

[0018] (8) According to another aspect of the present invention, there is provided a method for manufacturing gloves where anisotropy is imparted to the recessed portions by applying a tension to the elastic material. Advantageous effects of Invention

[0019] According to the anti-slipping structure for an article surface of the present invention, the anti-slipping structure includes, on the surface of the coating film layer that covers the surface of the article, the plurality of hemispherical recessed portions each having an approximately circular shape as viewed in a plan view, and the plurality of diaphragm provided recessed portions formed such that two or more hemispherical recessed portions are connected to each other in a partially overlapping manner and the connection boundary between the recessed portions is partitioned by a diaphragm. With such a configuration, compared to an anti-slipping structure that is formed by powder adhesion method, dust is minimally filled in the recessed portions, and a larger friction force can be generated.

[0020] According to the article of the present invention having the coating film layer that imparts an anti-slipping effect, wherein the article is the article that includes the coating film layer which covers a surface of the article on which the plurality of recessed portions are formed so as to impart an anti-slipping effect to the article, and the plurality of recessed portions are formed of: the plurality of hemispherical recessed portions having an approximately circular shape as viewed in a plan view; and the plurality of diaphragm provided recessed portions formed such that two or more hemispherical recessed portions are connected to each other in a partially overlapping manner and the connection boundary between the recessed portions is partitioned by the diaphragm. With such a configuration, compared to an article that has an anti-slipping effect obtained by a powder adhesion method, it is possible to provide the article where dust is minimally filled in the recessed portions, and a larger friction force can be generated

[0021] Further, in the case where the article described above is formed of the anti-slipping body that is disposed on other articles so as to impart an anti-slipping effect to the other articles, it is possible to easily impart an excellent anti-slipping effect to various objects that are desirable to be imparted with an anti-slipping effect such as a chair, a table, a floor surface, treads of a stair and a handrail, for example.

[0022] According to another aspect of the present invention, there is provided gloves where a plurality of recessed portions are formed on a coating film layer that covers surfaces of the gloves, wherein the plurality of recessed portions are formed of: a plurality of hemispherical recessed portions having an approximately circular shape as viewed in a plan view; and a plurality of diaphragm provided recessed portions formed such that two or more hemispherical recessed portions are connected to each other in a partially overlapping manner and a connection boundary between the recessed portions is partitioned by a diaphragm. With such a configuration, compared to gloves obtained by a powder adhesion method, it is possible to provide the gloves where dust is minimally filled in the recessed portions, and a larger friction force can be generated

[0023] According to the method for forming a coating film layer on which a plurality of recessed portions are formed so as to cover a surface of an article for imparting an anti-slipping effect to the article, wherein a liquid droplet of a solidifying agent is made to impinge on an unsolidified elastic material that adheres to the surface of the article so as to

recess and solidify the impinged portions thus forming the recessed portions. With such a configuration, with respect to various articles, compared to gloves obtained by a powder adhesion method, it is possible to provide the gloves where dust is minimally filled in the recessed portions, and a larger friction force can be generated

[0024] In the case where the article is an anti-slipping body that imparts an anti-slipping effect to other articles by being disposed on the other articles, it is possible to easily impart an excellent anti-slipping effect to various objects that are desirable to be imparted with an anti-slipping effect.

[0025] According to the method for manufacturing gloves of the present invention where the plurality of recessed portions are formed on the coating film layer that covers the surfaces of the gloves, wherein a liquid droplet of a solidifying agent is made to impinge on an unsolidified elastic material that adheres to the surface of the unfinished article formed in the profile of the fingers so as to recess and solidify impinged portions thus forming the recessed portions. With such a method, compared to gloves that have an anti-slipping effect obtained by a powder adhesion method, it is possible to manufacture the gloves where dust is minimally filled in the recessed portions, and a larger friction force can be generated.

[0026] Further, in the case where anisotropy is imparted to the recessed portions by applying a tension to the elastic material, it is possible to easily remove dust that enters the recessed portion, it is also possible to impart anisotropy to a generated friction force.

Brief Description of Drawings

[0027]

Fig. 1 is an explanatory view illustrating a surface structure of gloves according to the present embodiment.
Fig. 2 is an explanatory view illustrating a surface structure of gloves formed by a powder adhesion method.
Fig. 3 is an explanatory view illustrating a cross-sectional structure of the gloves according to the present embodiment.

Description of Embodiments

[0028] The present invention relates to an anti-slipping structure for an article surface, and an article an anti-slipping body, and gloves having a coating film layer that imparts an anti-slipping effect, wherein a plurality of recessed portions are formed on the coating film layer that covers a surface of the article. The present provides the gloves where dust is minimally filled in the recessed portions and a larger friction force can be generated compared to gloves obtained by a powder adhesion method.

[0029] To further describe the present invention, the present invention relates to an article that includes a coating film layer that imparts an anti-slipping effect. Further, the present invention also proposes an anti-slipping structure that is formed on a surface of the article, a structure where one specific mode of the article is a so-called anti-slipping body itself, and a structure where a specific one mode of the article is gloves.

[0030] In this embodiment, the article is not particularly limited provided that the anti-slipping structure according to the embodiment can be formed. In this embodiment, the description will be made by focusing on gloves as one mode of the article. However, it is sufficient that the article is an article that satisfies the above-mentioned condition, and the article includes, various articles, for example, socks, slippers, shoes, mats, and a chair, a table, a floor surface, treads of a stair, a handrail as described above.

[0031] Further, it is sufficient that the anti-slipping body has configuration that can be disposed on articles that are desirable to be imparted with an anti-slipping effect. The anti-slipping body may take a mode such as an adhesive tape or a tacky adhesive pad, or may be formed in a plate shape so that the anti-slipping body can be fixed by bolts or the like, or may take a mode where the anti-slipping mode does not an adhering or fixing means and is only disposed.

[0032] The anti-slipping structure according to the present embodiment is the structure for anti-slipping that is commonly used by the article, the anti-slipping body, the gloves and the like according to the present embodiment, and is one large technical feature of the present invention. The specific technical features of the anti-slipping structure are described hereinafter with respect to the case where the object on which the anti-slipping structure or the object on which the anti-slipping body is disposed is gloves. Accordingly, the specific technical features are described together with the description of such a case.

[0033] The gloves according to the present invention are formed such that a plurality of recessed portions are formed on the coating film layer that covers the surface. With such a configuration, compared to glove that are obtained by a powder adhesion method, dust is minimally filled in the recessed portions and, further, a larger friction force can be generated.

[0034] The gloves according to the present embodiment may be unsupported-type gloves where a glove base body is not used and a coating film layer is formed on a surface of a resin film, or may be supported-type gloves that use a glove base body and a coating film layer is formed on a surface of the glove base body directly or by way of a predetermined resin film.

[0035] That is, a semi-finished article that is an object on which a coating film layer that covers a surface of the gloves may be either a type of semifinished article that does not use a glove base body or a type of semi-finished article that uses a glove base body. Using such a semi-finished article, it is possible to provide gloves according to the present embodiment on which an anti-slipping structure that includes a plurality of recessed portions on the coating film layer on the surface of the semifinished article is formed. The recessed portions on the surface of the gloves may be formed on the entire surface of the resin film or may be partially formed on the surface of the resin film. In this embodiment, the semifinished article means a semifinished article that is in a process of forming the gloves according to the embodiment. The semifinished article does not mean an article that is used in a case where the gloves according to the present embodiment is used as a semifinished article in a manufacturing process of a secondary processed article that uses the gloves according to the embodiment as a semifinished article. However, the present invention may include such a case.

[0036] As the glove base body, for example, gloves that are formed using a knitted fabric or a woven fabric can be named. The raw material of the glove base body is not particularly limited, and the following various raw materials can be used. For example, as natural fibers, cotton, silk floss, hemp, wool and the like are named. As synthetic fibers, nylon, vinyl, polyvinyliden chloride, polyvinyl dichloride, polyester, polyurethane, rayon, cuprammonium rayon, acetate, acryl, polypropylene, polyethylene, fluorocarbon fibers, polychlal fibers, aramid fibers, cellulose, glass fibers and the like are named.

[0037] A material for forming a coating film layer that covers a surface of gloves according to the present embodiment, that is, an elastic material that is made to adhere to a surface of the glove base body that is also a semifinished product of the gloves in manufacturing steps of the gloves according to the present embodiment contains a solidifying agent that changes the elastic material from an unsolidified state to a solidified state. The solidifying agent can be prepared as a solution. Further, it is sufficient for the solidifying agent that the elastic material is speedily solidified to an extent that impingement traces remain at contact portions when an unsolidified elastic material comes into contact (impingement) with a liquid droplet of the solidifying liquid. As an elastic material used in general for forming a film by a solidification method, for example, natural rubber, synthetic rubber, (for example, acrylonitrile butadiene rubber (NBR), polyurethane and the like are named.

[0038] The solidification method is a method that forms a resin composition into a gel form by salt solidification, solidification by an acid, or solidification by an organic solvent.

[0039] A resin composition which is an object to be solidified is natural rubber or synthetic rubber, as a solidification agent for solidifying such resin composition using by salt solidification, for example, a methanol solution in which metal salt such as calcium nitride, calcium chloride is dissolved, or aquas solution can be used. Further, as an acid that forms a solidification agent for solidifying by an acid, an organic acid such as an acetic acid or citrate can be used. Although the solidification can be performed by performing either one of solidification using metal salt or solidification using an acid in a single form, both solidifications can be used in combination.

[0040] Further, when the resin composition that is an object to be solidified is polyurethan, as a solidification agent for solidifying polyurethan by solidification using an organic solvent, for example, an organic solvent such as a heptane can be used.

[0041] A thickness of the coating film layer is preferably 0.05 to 2mm. There is a tendency that the thicker the resin film, the harder the portion becomes.

[0042] The thinner a thickness of the coating film layer, the larger the flexibility of the coating film layer becomes and hence, fitting property or property that the coating film layer suits a hand can be improved. However, a strength of the gloves is lowered and hence, when the gloves are used for a heavy work, it is necessary for the coating film layer to have a certain amount of thickness. However, it must be particularly noted that there is a tendency that, compared to gloves formed by powder adhesion method, a surface portion and recessed portions of the coating film layer become smooth. Further, a depth of the recessed portion with respect to a diameter of an opening of the recessed portion is shallow and hence, a strength of the coating film layer when the coating film layer is formed with the substantially same thickness is increased compared to the gloves formed by a powder adhesion method.

[0043] The coating film layer fairly differs in softness and texture also depending on a raw material. For example, even when the coating film layer has the same thickness, there is a tendency that the coating film layer made of a low modulus raw material such as natural rubber or a soft polyvinyl chloride is soft, and the coating film layer made of high modulus raw material such as nitrile rubber becomes hard.

[0044] Further, as a technical feature of the gloves according to the present embodiment, a plurality of recessed portions of the anti-slipping structure according to the present embodiment formed on the coating film layer includes: hemispherical recessed portions having an approximately circular shape as viewed in a plan view; and diaphragm provided recessed portions where two or more hemispherical recessed portions are connected to each other in a partially overlapping manner, and a bonding boundary between the hemispherical recessed portions is partitioned by a diaphragm wall.

[0045] In such a configuration, "hemispherical shape" is not always limited to an accurately hemispherical shape, and also includes a recessed portion that is slightly shallower than a hemispherical shape, and a recessed portion having

an elliptical shape as viewed in a plan view. Further, the term "approximately circular shape" that expresses the shape as viewed in a plan view is also not limited to an accurate circle. That is, it is sufficient that a most portion of an opening edge of the recessed portion having an annular shape is protruding outward at an opening edge, and forms a substantially continuous curve. For example, in Fig. 1(a), the recessed portion indicated by a black flame is a hemispherical recessed portion. To facilitate the understanding of the present invention, the recessed portion indicated by the black frame exemplifies a portion of the hemispherical recessed portion illustrated in Fig. 1(a). That is, it must be noted that it is not always the case that only the recessed portions indicated by the black frame exhibit all hemispherical recessed portion, and some hemispherical recessed portions that are not indicated by the black frame exist together with the recessed portions that do not form the hemispherical recessed portions.

[0046] The diaphragm provided recessed portion is a recessed portion having the structure where two or more hemispherical recessed portions are connected with each other in a partially overlapping manner, and the bonding boundary is partitioned by the diaphragm wall. With respect to such a diaphragm provided recessed portion, a liquid droplet of a solidification solution impinges on an area extremely close to the hemispherical recessed portion that is already formed so that a new hemispherical recessed portion is formed in such a manner that a portion of the previously formed hemispherical recessed portion is eroded. As a result, for example, as indicated by a frame in a broken line in Fig. 1(b), the diaphragm provided recessed portion is formed of the eroded recessed portion derived from the previously formed hemispherical recessed portion and the hemispherical recessed portion.

[0047] Further, in the boundary portion between the eroded recessed portion and the hemispherical recessed portion, an elastic material whose thicknesses increased in an offset manner by an impingement of the solidification liquid when the above-mentioned new hemispherical recessed portion is formed forms the diaphragm wall that is bent in a convex shape toward the inside in the previous semispherical recessed portion. In many cases, this diaphragm wall is thinner than a wall around the hemispherical recessed portion formed independently. It is considered that the diaphragm wall plays a role of increasing a friction force by entangling with an object to be gripped.

[0048] Further, as a technical feature that is shared in common by the hemispherical recessed portion and the diaphragm provided recessed portion, most of these recessed portions do not have an overhung shape.

[0049] That is, as indicated by a black triangular arrow in Fig. 2(a) that is a cross-sectional view, a recessed portion formed by a powder adhesion method is derived from a particle embedded in a coating film layer and hence, an overhang portion is formed by an inner space having a diameter larger than a diameter of an opening of the recessed portion.

[0050] With respect to such a recessed portion having many overhung portions, dust that enters the recessed portion and worn-out debris of the coating film layer are hardly removed and hence, the recessed portion is filled with these dust and debris.

[0051] Further, a wall having an overhung shape that is formed between two recessed portions, for example, the wall indicated by a white triangular arrow and a white broken line in Fig. 2(a) is fragile or weak because the wall has a portion having a thin wall thickness ranging from a surface layer to a deep portion of the coating film layer and hence, the portion of the wall falls by friction so that the generation of dust is promoted.

[0052] As a result, as illustrated in Fig. 2(b), along with a shape of an opening edge as viewed in a plan view where the opening edge exhibits an uneven amorphous shape, a concentration of a stress derived from a friction force is brought about and hence, a lump of a portion of the coating film layer falls.

[0053] Further, as described above, in the structure described above where the wall thickness is gradually decreased from the surface layer to the depth portion, excessive flexibility is imparted to the wall. As a result, the coating film layer decreases an effect of sucking an object to be gripped like suction cups (a so-called suction cup effect). Accordingly, because of a rough surface shape where a base line is not determined as illustrated in Fig. 2(a), a leakage of air is likely to occur and hence, it is difficult to maintain a sufficient negative pressure in the recessed portion.

[0054] To the contrary, the recessed portion of the gloves according to the present embodiment does not have an overhung portion in most cases as illustrated in Fig. 3, that is, a cross-sectional view. Accordingly, even when dust or worn-out debris of the coating film layer enters the recessed portion, the dust or the debris can be easily removed and hence, it is possible to prevent the recessed portion from being filled with the dust or the debris. It is not always the case where a group of recessed portions that form the anti-slipping structure of the gloves according to the present embodiment exclude the recessed portions having the overhung structure in the strict meaning of the term. That is, the presence of the recessed portions having the overhung structure is allowed more or less to an extent that the superiority of the above-mentioned advantageous effects against the conventional products is not impaired.

[0055] Further, as indicated by a white triangular arrow and a white broken line in Fig. 3, the wall formed between two hemispherical recessed portions has a gentle mountain-like shape and also has a shape having a large wall thickness, that is, a shape having a large wall thickness and minimally generating the concentration of a stress. Accordingly, the generation of dust such as a lump of a portion of the coating film layer that falls is hardly promoted.

[0056] Further, the wall having a gentle mounting-like shape has appropriate flexibility. The wall has the structure where a base surface (base line) that corresponds to a surface before the recessed portions are formed is relatively clear and portions other than the recessed portions are relatively flat and smooth. Accordingly, a leakage of air is small

and hence, a negative pressure in the recessed portion can be sufficiently maintained whereby a suction cup effect can be effectively generated.

[0057] Further, to describe the unique structure of the gloves according to the present invention using another expression, for example, it is also safe to say that the structure of the gloves according to the present invention is the anti-slipping surface structure of the gloves where, while forming the main body by the flat smooth wall structure having a large wall thickness that is formed between a curved surface that forms a side wall of one flat smooth recessed portion having a hemispherical shape or a hemi-elliptical shape and a curved surface that forms a side wall of the other flat smooth recessed portion disposed adjacently to the former flat smooth recessed portion, portions also exist where the other ellipse is formed on one ellipse in an overlapping manner (one ellipse being formed by erosion by the other ellipse) so that a portion where a thin wall thinner than the flat smooth wall having the above-mentioned wall thickness in the above-mentioned one ellipse exists.

[0058] Further, to describe the unique structure of the gloves according to the present invention using different expression, for example, it is also safe to say that the structure of the gloves according to the present invention is the anti-slipping surface structure of the gloves where, while forming the main body by the flat smooth wall structure having a large wall thickness that is formed between a curved surface that forms an inner wall of one ellipse and a curved surface that forms an inner wall of the other ellipse disposed adjacently to the one ellipse, portions also exist where the other ellipse is formed on one ellipse in an overlapping manner (one ellipse being formed by erosion by the other ellipse) so that a thin wall that is thinner than the flat smooth wall having the above-mentioned wall thickness in the above-mentioned one ellipse.

[0059] Further, in this specification, a method for manufacturing gloves having such technical features is also provided. More specifically, in a method for manufacturing gloves where a plurality of recessed portions are formed on a coating film layer that covers surfaces of the gloves, a liquid droplet of a solidifying agent is made to impinge on an unsolidified elastic material that adheres to the surface of an unfinished article formed in a profile of fingers so as to recess and solidify impinged portions thus forming the recessed portions.

[0060] In this method, in the same manner as described above, the semifinished article may be a resin film formed in a shape of a profile of fingers without using a glove base body. Further, a glove base body formed using a knitted fabric or a woven fabric, or a glove base body having a surface on which a resin film is formed may be also used as the semifinished article.

[0061] Further, it is not always necessary for the semifinished article to accurately trace the shape of the profile of fingers, and it is also unnecessary for the semifinished article trace the entirety of the shape of the profile of fingers. For example, the semifinished article may have the shape of a mitten or the like, or may be formed such that some fingers are exposed from the semifinished article.

[0062] First, an unsolidified elastic material is made to adhere to the surface of such a semifinished article. The adhesion of the elastic material may be performed by applying an elastic material to the semifinished article by coating, or by immersing the semifinished article into the elastic material.

[0063] Liquid droplets of a solidifying agent that is an elastic material is made to impinge on the elastic material that adheres to the semifinished article. Although the impingement of the liquid droplets may be performed using a spray of the like, a method of generating the impingement of the liquid droplets is not particularly limited provided that kinetic energy can be imparted to the liquid droplets to an extent that recesses can be formed on the surface of the elastic material when the liquid droplets impinge on the elastic material. By performing such a step, the hemispherical recessed portions and the diaphragm provided recessed portions are formed on a surface of the elastic material.

[0064] Then, gloves are manufactured by solidifying the elastic material on which such recessed portions are formed to a deep portion when necessary.

[0065] Further, a compounding agent may be added to the elastic material when necessary. As the compounding agent, a stabilizer, a cross-linking agent, a cross-linked dispersion agent, an anti-aging agent, a thickener, a plasticizer, an antifoaming agent and the like can be used. Amounts of these compounding agents can be suitably adjusted depending on a usage of gloves.

[0066] Among the above-mentioned compounding agents, a cross-linked dispersion agent can be obtained by dispersing, besides a cross-linking agent such as sulfur or peroxide, a solid material such as a cross-linking promoter such as BT, TT, CZ, PZ, a cross-linking promoting aid such as zinc oxide or an anti-aging agent into water. The cross-linking dispersion agent is mainly used when a resin composition is a rubber latex. With the use of the cross-linking agent, rubber molecules are bonded to each other in a mesh shape so that physical property such as a strength of the resin film can be increased.

[0067] Further, in the method for manufacturing gloves according to the present embodiment, anisotropy may be imparted to the recessed portions formed by imparting a tension to the elastic material.

[0068] That is, although the recessed portions are formed, by imparting a tension in a predetermined direction among plane directions to the elastic material before the elastic material is completely solidified, for example, the respective recessed portions of a group of recessed portions formed in a circular shape can be deformed in an elliptical shape

having a major axis oriented in the respective predetermined directions thus imparting anisotropy. In the description made hereinafter, the directions of major axes of the group of recessed portions deformed in an elliptical shape are also referred to as orientation directions.

[0069] By applying such processing, dust in the recessed portions can be easily removed, and it is possible to generate anisotropy in the manner of generating a friction force.

[0070] An opening diameter of the recessed portion, for example, an opening diameter of the hemispherical recessed portion is not particularly limited. However, to estimate gloves having high general-used-property that does not particularly limit an object to be grasped, if the opening diameter is to be referred, the opening diameter can be set to 0.5 mm or less, further, approximately 0.01 to 0.5 mm, and more preferably approximately 0.05 to 0.25 mm.

[0071] The gloves according to the present embodiment can be manufactured through the following steps in general when the gloves are of a support type, for example.

(1) A hand mold is covered by a knitted glove base body, and a temperature of the mold is adjusted, and the glove base body is immersed in a solidifying agent.

(2) The glove base body is immersed in a resin composition, is pulled up, and is dried. Depending on necessity, the glove base body is immersed several times so that a film that acts as an infiltration prevention film is formed. The resin composition that forms this infiltration prevention film may be the same resin composition for forming a coating film layer described later or may be different from the resin composition for forming the coating film layer.

(3) Then, the glove base body is immersed in the resin composition for forming the coating film layer, and before the resin composition is solidified, while imparting kinetic energy for forming recessed portions to liquid droplets made of of a solidifying agent, the liquid droplets are made to impinge on a surface of the elastic material.

(4) The coating film layer is solidified through drying and cross-linking, and the glove is removed from the hand mold. A cross-linking step can be omitted depending on a resin used in the manufacturing method.

[0072] Except for the presence or absence of the glove base body, the gloves of an unsupported type are manufactured by substantially the same manufacturing method as gloves of a support type and hence, description of the method for manufacturing the gloves of an unsupported type is omitted. Further, flocking may be applied to the inside of the gloves.

[0073] Further, as a still another mode, bubbles may be contained in the coating film layer of the gloves according to the present embodiment. In this mode, the term "bubbles" is used with also a meaning that the bubbles indicate portions that contain a gas in a liquid body or solid body, and portions formed into recessed portions where a portion or most portion of the bubble opens on a surface of the solid body so that the recessed portions do not contain a gas, for example, traces after foam breaking.

[0074] As a method for allowing the coating film layer to contain bubbles or to form traces after foam breaking, a method that allows an elastic material that is a material for forming the coating film layer to contain bubbles is maned. As the method that allows the elastic material to contain bubbles, for example, a method that uses mechanical foaming or a method that uses chemical foaming can be named.

[0075] In the method for generating bubbles by a machine, for example, an elastic material in an unsolidified state is stirred by a stirrer such as a mixer thus allowing the elastic material to contain bubbles.

[0076] As a method for chemically generating bubbles, a foaming agent is added to an elastic material in an unsolidified state, and the foaming agent is formed into bubbles by applying heat to the foaming agent at the time of molding gloves thus allowing the elastic material to contain bubbles.

[0077] The foaming agent is a chemical that is also used in the manufacture of a sponge product. The foaming agent is decomposed when heat is applied to the foaming agent, and generates gasses such as a carbon dioxide gas, a nitrogen gas, and ammonia thus forming the bubble structure. As a specific examples of the foaming agent, an inorganic foaming agent such as soda or ammonium carbonate or an organic foaming agent such as a nitroso compound, an azo compound, or a sulfonyl hydrazide can be named.

[0078] In general, it seems that by adopting a mechanical foaming method rather than a chemical foaming method, bubbles can be easily uniformly or approximately uniformly dispersed in the elastic material. By dispersing the bubbles uniformly or approximately uniformly, bubbles contained in the coating film layer obtained by solidification of the elastic material can be also uniformly or approximately uniformly dispersed.

[0079] An amount of bubbles contained in the coating film layer may preferably be 5 to 30 vol% with respect to a unit volume of the coating film layer. When an amount of bubbles is less than 5 vol%, a sufficient anti-slipping effect cannot be obtained and hence, such amount of babbles is not preferable. When an amount of bubbles exceeds 30 vol%. although an anti-slipping effect and flexibility are sufficient, wear resistance is deteriorated so that durability is lowered. Accordingly, an amount of bubbles exceeding 30 vol% is not preferable.

[0080] In a case where a liquid such as water or oil is treated, due to porosity of the coating film layer that contains bubbles, there is a possibility that a liquid infiltrates into the resin film. To prevent the infiltration of the liquid into the resin film and reaches a hand side, it is possible to form a resin film that does not contain bubbles and functions as an infiltration

prevention diaphragm against a liquid on a lower side of the coating film layer.

[0081] By providing the resin film that does not contain bubbles, a strength of gloves can be enhanced. The resin film that does not contain bubbles can be formed by using the same material as the elastic material that formed the coating film layer. From a viewpoint of an adhesion property, such usage is preferable. In a case of gloves that do not treat a liquid such as water or oil, a resin film that functions as an infiltration prevention film and does not contain bubbles can be omitted.

[0082] In this manner, the gloves and the method for manufacturing gloves according to the present embodiment include the above-mentioned configurations. However, as described above, it must be noted that these configurations are not always configurations that are limited to the gloves, and are applicable to various articles.

[0083] Hereinafter, with respect to the anti-slipping structure of the article surface, the article having the coating film layer that imparts an anti-slipping effect, the anti-slipping body, the gloves, the method for forming the coating film layers and the method for manufacturing the gloves according to the present embodiment, the gloves and the method for manufacturing the gloves according to the present embodiment are mainly described with reference to an actual manufacturing example. Hereinafter, the gloves of a support type that do not contain bubbles in the coating film layer are described as an example. However, it is needless to say that the present invention also includes the gloves that contain bubbles in the coating film layer as described above, and the gloves of an unsupported type.

[1. Manufacture of gloves]

[0084] In the manufacture of the gloves of a support type, first, the preparation of a natural rubber blended liquid for forming an infiltration prevention film and a coating film layer, and preparation of a solidifying liquid were performed. Specifically, with respect to 100 parts by weight of a rubber solid amount of a natural rubber latex (rubber solid amount 60 weight %), 1 parts by weight of a stabilizer, 1 parts by weight of sulfur, 0.5 parts by weight of vulcanization promoting agent EZ (zinc diethyldithiocarbamate), 1 parts by weight of zinc white, and 0.5 parts by weight of thickener are added, and these compositions are stirred so that natural rubber blended liquid was obtained. Further, the solidifying liquid was obtained by preparing 3 weight % of calcium nitrate methanol solution.

[0085] Next, using the natural rubber blended liquid obtained as described above, the following treatment was applied to the glove base body.

[0086] First, a hand mold was covered with a knitted glove base body. The hand mold covered with the glove base body was immersed into an immersion vessel willed with a solidifying agent (3 weight % of calcium nitrate methanol solution) and, thereafter, the mold is pulled out and was dried.

[0087] Next, the hand mold was immersed in an immersion vessel filled with a natural rubber blended liquid, and thereafter, the hand mold was pulled out, and was dried at a temperature of 70°C for 30 minutes. Accordingly, a semifinished article where an infiltration prevention film formed by a natural rubber blended liquid is formed on a surface of the glove base body was formed.

[0088] Next, the above-hand mold on which the semifinished article provided with the infiltration prevention film is again immersed in the immersion vessel filled with the natural rubber blended liquid. Then, after the mold is pulled up from the immersion vessel, before the natural rubber blended liquid on the surface of the hand mold was solidified, using a sprayer on which a spray nozzle is mounted, a solidifying agent is sprayed at a pressure of 0.1 to 1.0 MPa to the hand mold at a position spaced apart from the hand mold by 10 to 30 cm so as to impinge liquid droplet of the solidifying agent to the hand mold. The spray nozzle is not particularly limited, and a commercially available spray nozzle can be suitably adopted. For example, a hollow conical nozzle (No. K040) or a fan shaped nozzle (No. VEP90157) made by H. IKEUCHI Co., Ltd. can be used. Further, with respect to a liquid feeding pressure and a distance from the spray nozzle to a surface to be sprayed, the above-mentioned values exemplify one example and are not particularly limited. In short, it is sufficient that when liquid droplets of a solidifying liquid reach a surface of an elastic material adhering to the semifinished article, recessed portions can be formed by an impact of the liquid droplets. It is needless to say that such pressure and distance respectively differ depending on the configuration of the device or the like used for performing the above-mentioned operation. It is not difficult to find out these values, and can be determined by adopting conditions for forming recessed portions by observing several samples which differ in pressure and distance using a microscope or the like.

[0089] In case of forming the coating film layer described above that contains bubbles, the formation of such a coating film layer can be realized by allowing a natural rubber blended liquid to contain bubbles as an unsolidified elastic material that is made to adhere to the semifinished article. For example, the natural rubber blended liquid was stirred by a mixer thus performing mechanical foaming. Stirring can be performed until a volume rate of bubbles occupying in the entire natural rubber blended liquid becomes 5 to 30 vol%, as an example, approximately 20vol%. In this case, stirring is continuously performed until the volume of the natural rubber blended liquid of 100 mL contains bubbles exceeds 120 ml. By confirming a change in volume at the same weight before and after foaming using a measuring cylinder, an amount of bubbles contained in the natural rubber blended liquid can be confirmed.

[0090] Then, after drying the coating film layer at a temperature of 80°C for sixty minutes, cross linking is performed

at a temperature of 110°C for forty minutes. As a result, the gloves according to the present embodiment was obtained.

[2. Observation of structure of surface of gloves by microscope]

[0091] Next, a surface of the obtained gloves was observed by a microscope. As a result, it was confirmed that as illustrated in Fig. 1(a), a large number of (a plurality of) recessed portions are formed on the surface of the coating film layer, and the plurality of recessed portions include a large number of hemispherical recessed portions indicated by a block frame in Fig. 1(a) and a large number of diaphragm provided recessed portions indicated by a broken line frame in Fig. 1(b).

[0092] As illustrated in Fig. 1(a), the respective recessed portions in portions where a tension is applied to the gloves before the coating film layer is completely solidified are deformed into an elliptical shape, and a major axis of the elliptical shape is substantially directed in a fixed direction thus exhibiting anisotropy.

[3. Test for confirming that recessed portions are minimally filled with dust]

[0093] Next, a test was performed so as to confirm that the recessed portions are minimally filled with dust and dust can be easily removed from the recessed portions. Specifically, a comparison specimen having a size of 5 cm × 5 cm that was cut out from a palm portion of the glove manufactured by a powder adhesion method and a specimen obtained in the same manner from the glove according to the present invention are used. The specimen was made to adhere to an upper surface of a desk in a state where the coating film layer is directed upward, soil was rubbed against the coating film layer 10 times, a weight of coating film layer was measured except for surplus soil on the coating film layer, and an amount of dust filled in the recessed portion was obtained by obtaining the difference between the specimen on which the soil was not rubbed and a weight of the specimen before rubbing was performed.

[0094] Then, dust was shaken off by beating the specimen with a hand 100 times and, again, the weight of the specimen was measured and the difference between the measured weight and the weight of the specimen after soil was rubbed was obtained. As a result, an amount of dust that was removed from the recessed portion was confirmed.

[0095] Five specimens in total ware obtained such that one specimen was obtained from each of the five gloves manufactured by a powder adhesion method. In the same manner, five specimens in total ware obtained such that one specimen was obtained from each of five gloves according to the present embodiment. The substantially same test was performed five times for each glove. The result of the test performed with respect to the gloves manufactured by the powder adhesion method are described in Table 1, and the result of the test performed with respect to the gloves according to the present embodiment are described in Table 2.

[Table 1]

	gloves manufactured by powder adhesion method					
	first time	second time	third time	fourth time	fifth time	average
experimenter	A	B	C	D	E	
weight of specimen (W1)	1.757	1.730	1.812	1.784	1.894	1.795
weight after rubbing 10 times (W2)	1.796	1.770	1.897	1.821	1.924	1.842
weight after beating 100 times (W3)	1.766	1.739	1.825	1.792	1.904	1.805
weight of dust filled in recessed portion (W2-W1)	0.039	0.040	0.085	0.037	0.030	0.046
rate of removed dust (W2-W3)/(W2-W1)	76.9%	77.5%	84.7%	78.4%	66.7%	78.8%

[Table 2]

	gloves manufactured by present embodiment					
	first time	second time	third time	fourth time	fifth time	average
experimenter	A	B	c	D	E	
weight of specimen (W1)	2.178	2.383	2.405	2.208	2.480	2.331
weight after rubbing 10 times (W2)	2.190	2.392	2.414	2.221	2.484	2.340

(continued)

	gloves manufactured by present embodiment					
	first time	second time	third time	fourth time	fifth time	average
experimenter	A	B	c	D	E	
weight after beating 100 times (W3)	2.180	2.383	2.405	2.209	2.480	2.331
weight of dust filled in recessed portion (W2-W1)	0.012	0.009	0.009	0.013	0.004	0.009
rate of removed dust (W2-W3)/(W2-W1)	83.3%	100.0%	100.0%	92.3%	100.0%	93.6%

[0096] As can be also understood from Table 1, in the comparison specimens obtained from the gloves manufactured by the powder adhesion method, the recessed portion was filled with 0.046 g of dust in average per 25 cm^2 by rubbing of soil. On the other hand, in the glove according to the present embodiment, as illustrated in Table 2, am amount of dust filled in the recessed portion can be suppressed to 0.009 g in average per 25 cm^2. That is, an amount of dust generated in the present invention can be suppressed to approximately 1/5 of an amount of dust generated in the powder adhesion method.

[0097] With reference to a rate of dust removed from the recessed portion, in case of the glove that was manufactured by the powder adhesion method, only 78.8% of dust in average was removed out of dust filled in the recessed portion even when a shake off operation is performed. However, in case of the glove according to the present embodiment, 93.6% of dust can be removed.

[0098] Further, surprisingly, among the experiment performed five times, different experimenters confirmed a value of 100% that indicates the whole dust was substantially removed three times. As a matter of course, when the specimens after the experiment was observed, coloring of soil color was observed so that it was not the case that the whole dust was removed in the accurate meaning of the term. However, dirt in the recessed portion is minimally confirmed even with observation using naked eyes. Accordingly, Table 1 illustrates that in the present embodiment, dust is minimally filled in the recessed portions compared to the gloves obtained by the powder adhesion method, and dust filled in the recessed portion can be easily removed from the recessed portion compared to the gloves obtained by the powder adhesion method.

[4. Test for confirming friction performance in a dry state]

[0099] Next, a test was performed so as to confirm friction performance in a dry state. Gloves served in the test are four kinds of gloves consisting of gloves having no recessed portions (gloves P), gloves manufactured by the powder adhesion method (gloves Q), (isotropic) gloves according to the present embodiment where no anisotropy was applied to the recessed portion (gloves R), and gloves according to the present embodiment where anisotropy was applied to the recessed portion (gloves S).

[0100] The test was performed such that a palm portion of each glove on which the coating film layer is formed was cut out by a size of a width of 5.5cm and a length of 7.5 cm, the cut-out specimen was laminated to a surface of a plate that was fixed at a raised angle of 45 degrees, a flat-shaped metal circular columnar body having a weight of 23 g, and having a height of 0.6cm and a diameter of 3.0cm was placed on a surface of each specimen in a state where a bottom surface of the metal circular columnar body opposedly faces the surface of each specimen, and friction performance in a dry state was confirmed by measuring time until the circular columnar body slides down along the surface of the specimen. The test was performed on the gloves S in two patterns with respect to a case where the orientation direction is taken on the inclination direction (glove S1) and the case where the orientation direction is taken on the direction orthogonal to the inclination direction (glove S2). The result of the test was illustrated in Table 3.

[Table 3]

	time (second)
gloves P	2.12
gloves Q	32.43
gloves R	48.78
gloves S1	45.39

(continued)

	time (second)
gloves S2	51.46

[0101] As can be also understood from Table 3, the time that the circular columnar body slid down along the surface of the glove P on which recessed portions are not formed was 2.12 seconds, and the time that the circular columnar body slid down along the surface of the glove Q formed by a powder adhesion method was 32.43 seconds.

[0102] On the other hand, with respect to the gloves according to the present embodiment, the time that the circular columnar body slid down on the surface of the glove R to which anisotropy is not applied is 48.78 seconds that largely exceeds the corresponding times in the case of the glove P and the glove Q. Accordingly, the glove R exhibited an extremely excellent friction performance.

[0103] It must be particularly noted that, although the contact area of the glove R is smaller than the contact area of the glove P, such large enhancement of friction performance was observed. An analysis of such a phenomenon is expected by further extensive studies of the inventors of the present invention. However, the inventors consider that a suction cup effect described above was generated by the above-mentioned configuration.

[0104] Further, with respect to the glove according to the present embodiment, the time that the circular columnar body slid down along the surface of the glove S to which anisotropy was imparted was 45.39 seconds in case of the glove S1 where the inclination direction is oriented in the gradient direction, and is 51.46 seconds in the case of the glove S2 where the inclination direction is directed in the direction orthogonal to the gradient direction. Accordingly, it was confirmed that anisotropy appeared in the friction performance.

[0105] From these results, it was found that compared to the glove obtained by a powder adhesion method, the glove according to the present embodiment is the glove that can generate a larger friction force under a dry condition.

[5. Test for confirming friction performance in wet state]

[0106] Next, a test was performed so as to confirm friction performance in a wet state. Gloves served in the test are, in the same manner as the above-mentioned [4. Test for confirming friction performance in dry state], four kinds of gloves consisting of gloves having no recessed portions (gloves P), gloves manufactured by the powder adhesion method (gloves Q), (isotropic) gloves according to the present embodiment where no anisotropy was applied to the recessed portion (gloves R), and gloves according to the present embodiment where anisotropy was applied to the recessed portion (gloves S) .

[0107] The test was performed such that a palm portion of each glove on which the coating film layer is formed was cut out by a size of a width of 5.5 cm and a length of 7.5 cm, the cut-out specimen was laminated to a surface of a plate and was disposed at a fixed raised angle of 45 degrees. The surface of the specimen was made wet by spraying so that the specimen was brought into a wet state.

[0108] Next, a piece of ice cubicle produced by an ice making dish in a household use refrigerator is placed on a surface of each specimen in a state where a flat surface of the ice cubicle opposedly faces a flat surface, and friction performance in a wet state was confirmed by measuring the time until the ice cubicle slid down along the surface of the specimen. The test was performed on the gloves S in two patterns with respect to a case where the orientation direction is taken on the inclination direction (glove S1) and the case where the orientation direction is taken on the direction orthogonal to the inclination direction (glove S2). The result of the test was illustrated in Table 4.

[Table 4]

	time (second)
gloves P	0.165
gloves Q	0.204
gloves R	did not fall
gloves S1	did not fall
gloves S2	did not fall

[0109] As can be also understood from Table 4, the time that the ice cubicle slid down along the surface of the glove P on which recessed portions are not formed was 0.165 seconds, and the time that the ice cubicle slid down the surface of the glove Q formed by a powder adhesion method was 0.204 seconds. Compared to the above-mentioned test in a

dry state, it was found that the gloves Q on which the recessed portions are formed by the powder adhesion method is superior with respect to friction performance in a wet state.

[0110] On the other hand, with respect to the glove R according to the present embodiment where anisotropy is not imparted to the recessed portions and the gloves S1, S2 according to the present embodiment where anisotropy is imparted to the recessed portions, very surprisingly, the ice cubicle is not slid down at the same raised angle. Accordingly, it was found that the gloves according to the present embodiment are gloves that have extremely excellent wear performance also in a wet state compared to the gloves obtained by a powder adhesion method.

[0111] When the inventors have studied on an angle at which an ice cubicle slide down by further increasing the raised angle, a phenomenon that the gloves R did not slide down even at an angle exceeding 90 degrees and did not fall even at an angle of 180 degrees in an upside down state was observed several times. In this manner, a phenomenon that the ice cubicle did not slide down or fall even at an angle that exceeds 90 degrees where there is no vertical resistance so that no friction force is generated was observed and hence, it was considered that the above-mentioned suction cup effect was generated between the coating film layer and the ice cubicle.

[0112] Further, also with respect to the gloves S1 and the gloves S2, in the same manner as the gloves R, the ice cubicle did not slide down even at an angle that exceed 90 degrees and hence, it was considered that the above-described suction cup effect is generated between the coating film layer and the ice cubicle. Still further, the inventors increased the weight of the ice cubicle and confirmed a maximum angle by which the ice cubicle can be held with respect to the gloves R, the gloves S1, and the gloves S2. The gloves R could hold the ice cubicles by 53 degrees, the gloves S1 could hold the ice cubicle by 48 degrees, and the gloves S2 could hold the ice cubicle by 57 degrees. Accordingly, it was confirmed anisotropy appeared in friction performance.

[0113] From these results, it was found that the gloves according to the present embodiment are gloves that can generate a larger friction force even under a wet condition compared to the glove obtained by a powder adhesion method.

[0114] As has been described above, according to the article that includes the coating film layer that imparts an anti-slipping effect according to the embodiment, the article is an article that includes the coating film layer which covers the surface of the article and on which the plurality of recessed portions are formed so as to impart an anti-slipping effect, and the plurality of recessed portions are formed of: the plurality of hemispherical recessed portions having an approximately circular shape as viewed in a plan view; and the plurality of diaphragm provided recessed portions formed such that two or more hemispherical recessed portions are connected to each other in a partially overlapping manner and the connection boundary between the recessed portions is partitioned by a diaphragm. Accordingly, it is possible to provide the article where, compared to an article that has an anti-slipping effect obtained by a powder adhesion method, dust is minimally filled in the recessed portion for anti-slipping and, further, a larger friction force can be generated.

[0115] Further, the gloves according to the present embodiment are the gloves where the plurality of recessed portions are formed on the coating film layer that covers the surface of the gloves, wherein the plurality of recessed portions are formed of: the plurality of hemispherical recessed portions having an approximately circular shape as viewed in a plan view; and the plurality of diaphragm provided recessed portions formed such that two or more hemispherical recessed portions are connected to each other in a partially overlapping manner and the connection boundary between the recessed portions is partitioned by a diaphragm. Accordingly, it is possible to provide the gloves where, compared to the gloves that have an anti-slipping effect obtained by a powder adhesion method, dust is minimally filled in in the recessed portion, further, a larger friction force can be generated.

[0116] Finally, the description of the above-mentioned respective embodiments exemplifies one example of the present invention, and the present invention is not limited by the above-mentioned respective embodiments. Accordingly, although other embodiments may be considered besides the above-mentioned embodiment, it is needless to say that various modifications are conceivable corresponding to designing and the like without departing from the technical concept of the present invention.

List of Reference Signs

[0117] P to S: gloves

Claims

1. An anti-slipping structure for an article surface that includes, on a surface of a coating film layer that covers a surface of an article, a plurality of hemispherical recessed portions each having an approximately circular shape as viewed in a plan view, and a plurality of diaphragm provided recessed portions formed such that two or more hemispherical recessed portions are connected to each other in a partially overlapping manner and a connection boundary between the recessed portions is partitioned by a diaphragm.

2. An article having a coating film layer which covers a surface of an article and on which a plurality of recessed portions are formed for imparting an anti-slipping effect to the article, wherein
the plurality of recessed portions are formed of: a plurality of hemispherical recessed portions having an approximately circular shape as viewed in a plan view; and a plurality of diaphragm provided recessed portions formed such that two or more hemispherical recessed portions are connected to each other in a partially overlapping manner and a connection boundary between the recessed portions is partitioned by a diaphragm.

3. An anti-slipping body that is the article according to claim 2, and is disposed on other articles so as to impart an anti-slipping effect to the other articles.

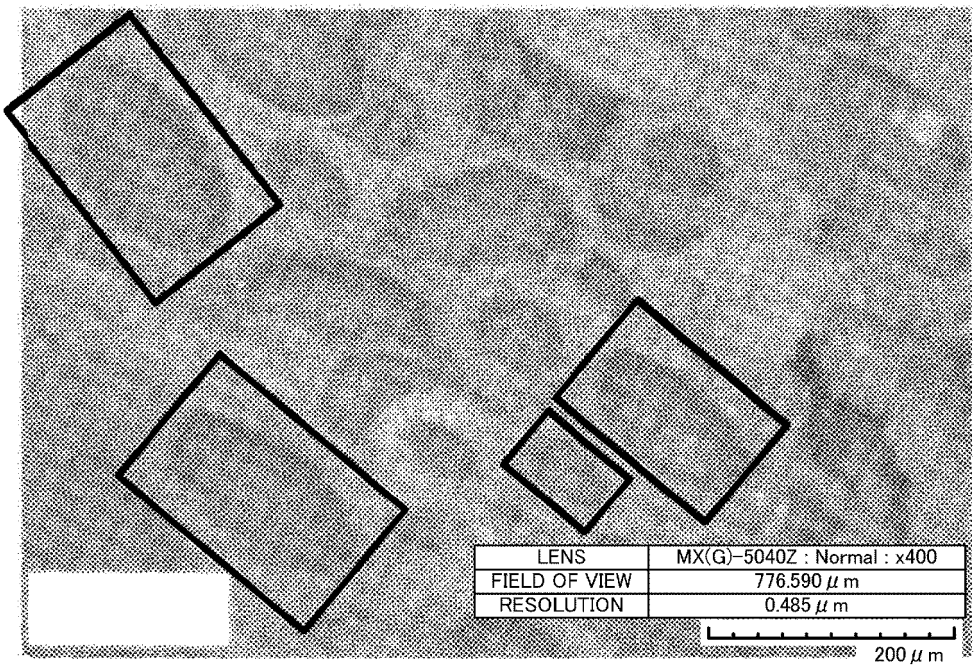
4. Gloves where a plurality of recessed portions are formed on a coating film layer that covers surfaces of the gloves, wherein
the plurality of recessed portions are formed of: a plurality of hemispherical recessed portions having an approximately circular shape as viewed in a plan view; and a plurality of diaphragm provided recessed portions formed such that two or more hemispherical recessed portions are connected to each other in a partially overlapping manner and a connection boundary between the recessed portions is partitioned by a diaphragm.

5. A method for forming a coating film layer which covers a surface of an article and on which a plurality of recessed portions are formed so as to impart an anti-slipping effect to the article, wherein
a liquid droplet of a solidifying agent is made to impinge on an unsolidified elastic material that adheres to the surface of the article so as to recess and solidify impinged portions thus forming the recessed portions.

6. The method for forming a coating film layer according to claim 5, wherein the article is an anti-slipping body that imparts an anti-slipping effect to other articles by being disposed on the other articles.

7. A method for manufacturing gloves where a plurality of recessed portions are formed on a coating film layer that covers surfaces of the gloves, wherein a liquid droplet of a solidifying agent is made to impinge on an unsolidified elastic material that adheres to the surface of an unfinished article formed in a profile of fingers so as to recess and solidify impinged portions thus forming the recessed portions.

8. The method for manufacturing gloves according to claim 7, wherein anisotropy is imparted to the formed recessed portions by applying a tension to the elastic material.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FIELD OF VIEW
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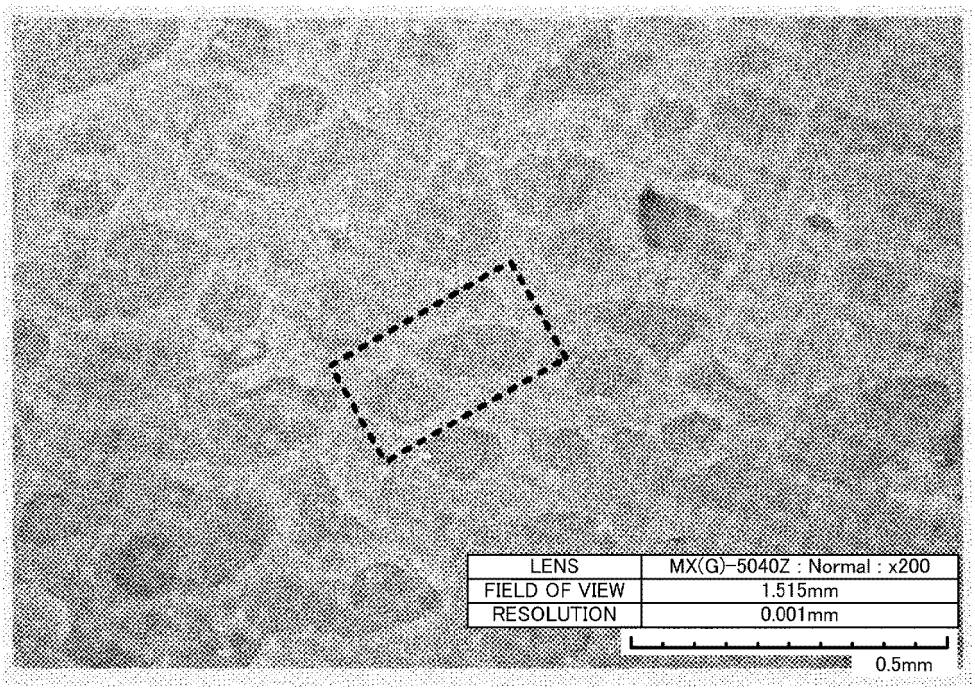
RESOLUTION
0.485 μm
200 μm

Fig. 1A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RESOLUTION
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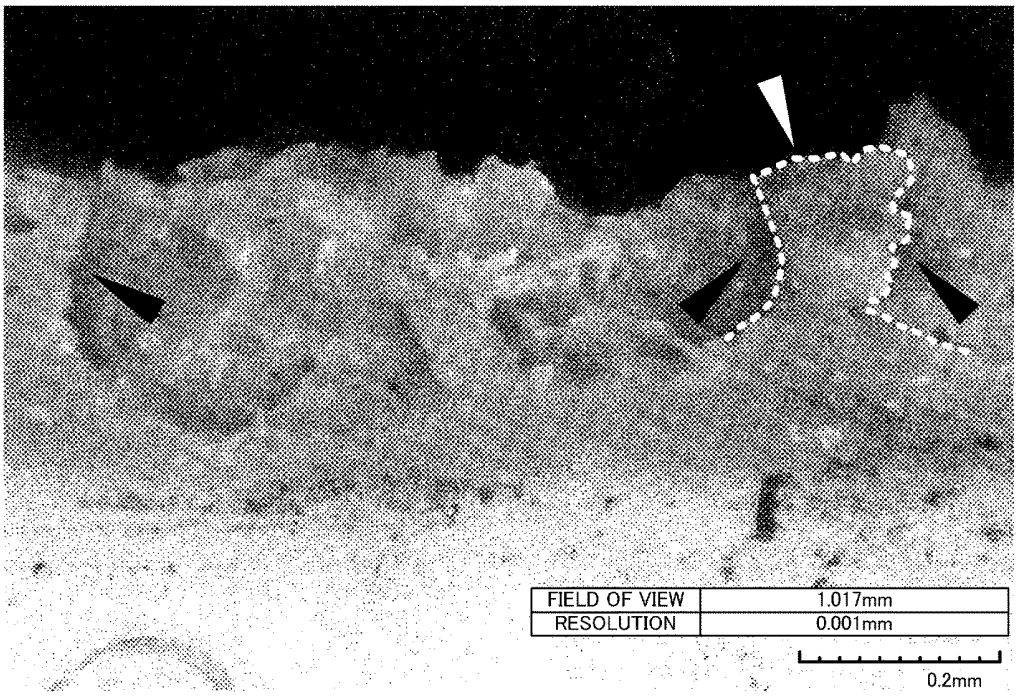
0.5mm

Fig. 1B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RESOLUTION
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0.2mm

Fig.2A

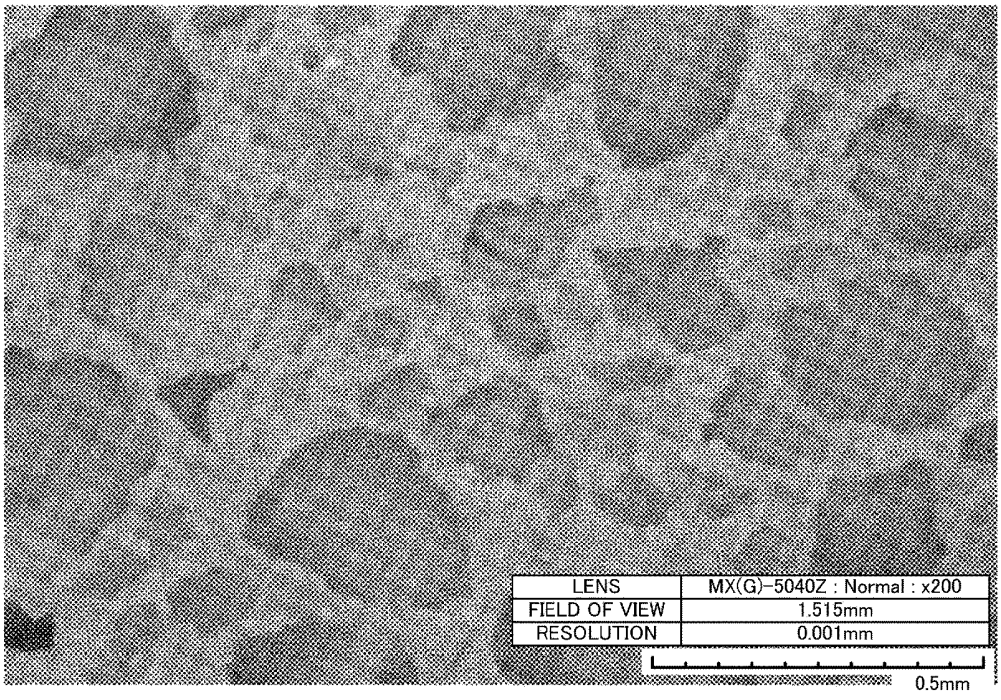
LENS
MX(G)-5040Z : Normal : x200
FIELD OF VIEW
1.515mm
RESOLUTION
0.001mm
0.5mm

Fig.2B

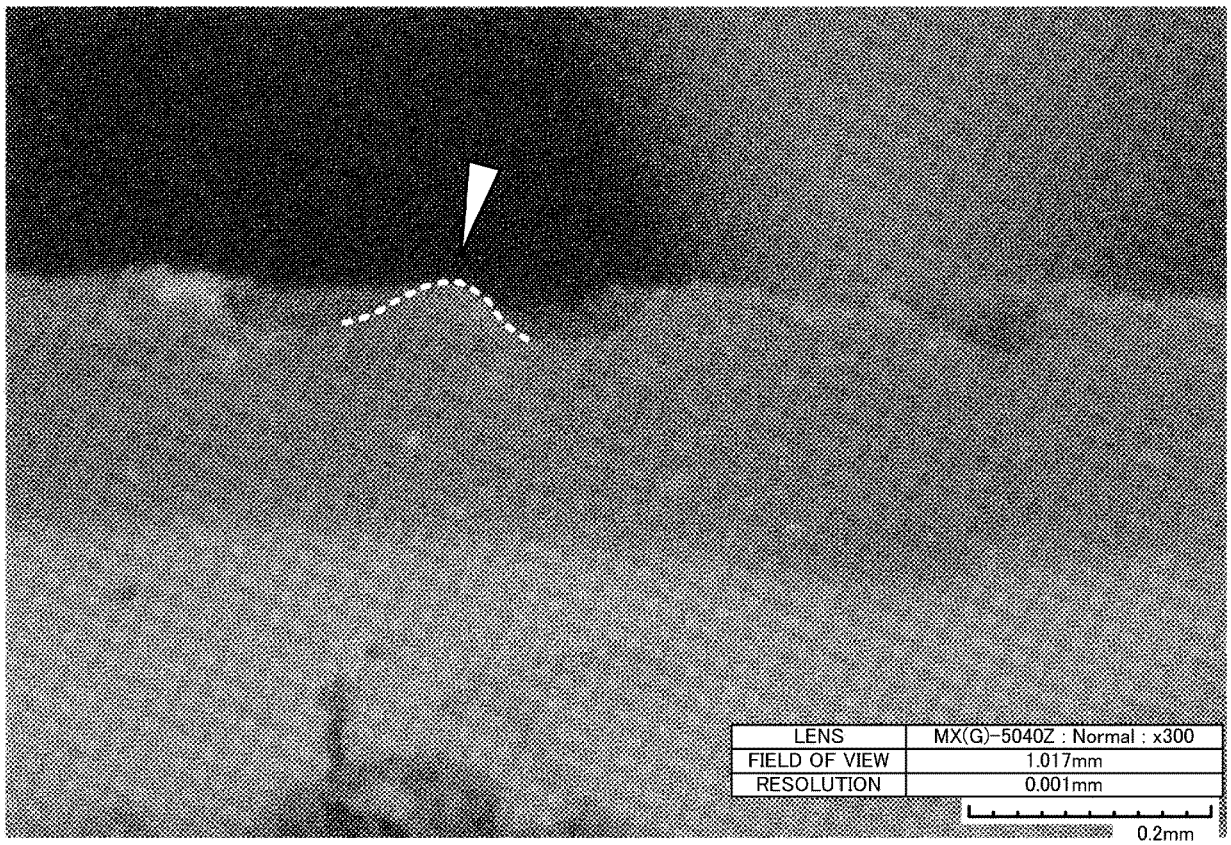
LENS
MX(G)-5040Z : Normal : x300
FIELD OF VIEW
1.017mm
RESOLUTION
0.001mm
0.2mm

Fig.3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2021/011468

A. CLASSIFICATION OF SUBJECT MATTER
A41D 19/015(2006.01)i; A41D 19/00(2006.01)i; A41D 19/04(2006.01)i
FI: A41D19/015 210A; A41D19/04 A; A41D19/00 N; A41D19/00 P

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A41D19/015; A41D19/00; A41D19/04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan	1922-1996
Published unexamined utility model applications of Japan	1971-2021
Registered utility model specifications of Japan	1996-2021
Published registered utility model applications of Japan	1994-2021

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 4329312 A (GANZ, Rudolph V.) 11 May 1982 (1982-05-11) column 2, line 16 to column 5, line 24, fig. 1-3	1-7 8
A	JP 2001-295114 A (NOOSU KASEI KOGYO KK) 26 October 2001 (2001-10-26) entire text, all drawings	1-8
A	JP 2002-129413 A (NOOSU KASEI KOGYO KK) 09 May 2002 (2002-05-09) entire text, all drawings	1-8
A	JP 2013-60683 A (TOWA CORPORATION LTD.) 04 April 2013 (2013-04-04) entire text, all drawings	1-8

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
03 June 2021 (03.06.2021)	15 June 2021 (15.06.2021)

Name and mailing address of the ISA/	Authorized officer
Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2021/011468

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
US 4329312 A	11 May 1982	GB 1326102 A DE 2056489 A FR 2069450 A	
JP 2001-295114 A	26 Oct. 2001	(Family: none)	
JP 2002-129418 A	09 May 2002	(Family: none)	
JP 2013-60683 A	04 Apr. 2013	US 2013/0091618 A1 entire text, all drawings WO 2012/046572 A1 EP 2612566 A1 CN 102970887 A	

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2008274521 A **[0007]**