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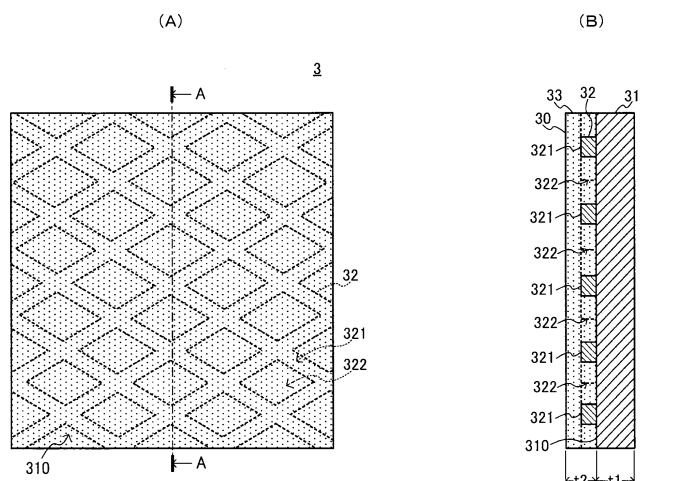
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(54) **SLIDING PLATE AND FLOOR PLATE FOR TURNOUT**

(57) Provided are: a sliding plate, the thickness and performance of which can be easily adjusted; and a floor plate for a turnout, using the sliding plate. A sliding plate (3) is provided with a backing material (31) comprising a steel plate or the like, a punching metal (32) disposed on the backing material (31), and a sintered metal powder layer (33) formed on the upper surface (310) of the backing material (31) so as to cover the punching metal (32). The sintered metal powder layer (33) is formed by subjecting an alloy powder for sintering to sintering and rolling, and is impregnated with a lubricating resin through

heat melting. The sintered metal powder layer (33) formed on a metal area (321) of the punching metal (32) has undergone high-pressure compression and therefore exhibits a high sintered density and excellent resistance to impact, load and wear. Meanwhile, the sintered metal powder layer (33) formed in empty spaces (322) of the punching metal (32) has undergone low-pressure compression and therefore exhibits a low sintered density and a high impregnation rate of the lubricating resin, thus attaining excellent lubrication.

Fig.2



Description

Technical Field

[0001] The present invention relates to a sliding plate, and particularly to a sliding plate suitable for slidably supporting a tongue rail and to a self-lubrication type floor plate for turnout, which uses the sliding plate.

Background Art

[0002] Patent Literature 1 discloses a floor plate for turnout (hereinafter, also referred to as turnout floor plate), which can maintain sliding performance stably for a long period of time, thereby allowing reduction in the frequency of maintenance and inspection work. This turnout floor plate comprises: a substrate for placing and fixing a stock rail on it; and a sliding plate, which is fixed on the substrate so that a tongue rail is placed on the sliding plate and supported slidably.

[0003] The sliding plate comprises: a backing material, which is a steel plate having an upper surface in which a plurality of recessed portions and projected portions are formed; and a metal-powder sintered layer formed on the upper surface of the backing material. The metal-powder sintered layer is formed on the upper surface of the backing material as follows. Alloy powder for sintering is dispersed on the upper surface of the backing material, and is sintered, and then is rolled. Thereafter, a lubricating resin having superior weather resistance such as polytetrafluoroethylene (PTFE), perfluoroalkoxyalkane (PFA), polyamide-imide (PAI), polyimide (PI), or the like is heated and melted so as to melt into the metal-powder sintered layer.

[0004] The metal-powder sintered layer formed on the projected portions of the upper surface of the backing material is compressed under high pressure, and therefore has a higher sintered density and is superior in impact resistance, load bearing, and abrasion resistance. On the other hand, the metal-powder sintered layer formed on the recessed portions of the backing material is compressed under lower pressure in comparison with the metal-powder sintered layer on the projected portions, and therefore has a lower sintered density and a higher impregnation rate of the lubricating resin, and is superior in lubrication property.

Citation List

Patent Literature

[0005] Patent Literature 1: Japanese Unexamined Patent Application Laid-Open No. Hei9-221701

Summary of Invention

Technical Problem

[0006] Usually the turnout floor plate described in Patent Literature 1 uses checkered steel plate as the backing material of the sliding plate. Checkered steel plate is sold as ready-made product by a plurality of manufacturers. However, ready-made checkered steel plate is limited in the number of types of plate thickness. Thus, in many cases of producing the sliding plate, it is difficult to procure checkered steel plate having the thickness corresponding to the thickness of the sliding plate to produce, among ready-made products of checkered steel plate. As a result, it is necessary to adjust the thickness of the metal-powder sintered layer depending on the thickness of the sliding plate to produce. Accordingly, it is necessary to change the sintering conditions, rolling conditions, and the like for each thickness of the sliding plate to be produced, and thus management of the thickness of the sliding plate becomes troublesome.

[0007] Further, since checkered steel plate is originally intended to be used for anti-slip purpose in floor surface, passageway, stairway, and the like, only a few kinds of checker patterns are available for ready-made checkered steel plate. Thus, in the case where ready-made checkered steel plate is used for producing the sliding plate, it is not possible to change flexibly the ratio between the portions of the high sintered density (i.e. the portions superior in impact resistance, load bearing, and abrasion resistance) and the portions of the low sintered density (i.e. the portions that are higher in impregnation rate of the lubricating resin and thus superior in lubrication property) in the metal-powder sintered layer formed on the checkered steel plate. Thus, it is also difficult to adjust the performance of the sliding plate, considering which is more important the impact resistance, the load bearing and the abrasion resistance or the lubrication property.

[0008] Although it is possible to solve the above problem by using custom-ordered checkered steel plate of the desired sheet thickness and the desired checker pattern, this largely increases the manufacturing cost.

[0009] The present invention has been made considering the above situation. An object of the present invention is to provide a sliding plate whose thickness and performance can be easily adjusted and a turnout floor plate, which uses this sliding plate.

Solution to Problem

[0010] To solve the above problems, for example in a sliding plate of the present invention, a metal plate having mesh structure such as perforated metal, expanded metal, or a metal plate with recessed portions and projected portions formed on its surface is placed as a reinforced member on a backing material such as a steel plate; sintering alloy powder is sprinkled on the backing material on which the reinforced member is placed, and the back-

ing material on which the reinforced member is placed and the sintering alloy powder is sprinkled is sintered and rolled to form a metal-powder sintered layer. Thereafter, the metal-powder sintered layer is impregnated with at least one of a lubricating resin and lubricating oil.

[0011] For example, a sliding plate of the present invention comprises:

- a backing material;
- a reinforcing member, which is placed on one surface of the backing material and forms recessed portions and projected portions in its surface; and
- a metal-powder sintered layer, which is formed to cover at least the recessed portions formed by the reinforcing member on the one surface of the backing material and is impregnated with at least one of a lubricating resin and lubricating oil.

[0012] Further, a turnout floor plate of the present invention comprises:

- a substrate for placing and fixing a stock rail on one surface of the substrate;
- the above-mentioned sliding plate, which is fixed on the substrate and supports a tongue rail slidably on a side of one surface of the substrate.

Advantageous Effects of Invention

[0013] According to the present invention, the metal-powder sintered layer, which covers at least the recessed portions between the recessed portions and the projected portions formed by the reinforcing member in the upper surface of the backing material, is formed on the side of the upper surface of the backing material on which the reinforcing member is placed. As for the metal-powder sintered layer formed on the projected portions between the recessed portions and the projected portions, the metal-powder sintered layer is compressed under high pressure, and thus has a higher sintered density and is superior in impact resistance, load bearing, and abrasion resistance. On the other hand, the metal-powder sintered layer formed on the recessed portions between the recessed portions and the projected portions is compressed under lower pressure in comparison with the metal-powder sintered layer formed on the projected portions. Thus, the metal-powder sintered layer formed on the recessed portions has a lower sintered density and a higher impregnation rate of at least one of the lubricating resin and the lubricating oil, and is superior in lubrication property. As the backing material, the present invention uses steel plate or the like, for which there are ready-made products of more various plate thicknesses in comparison with checkered steel plate, so that sliding plates of various thickness can be realized without changing the thickness of the metal-powder sintered layer, making it easy to adjust the thickness of the sliding plate. Further, according to the present invention, by us-

ing a metal plate having mesh structure, such as perforated metal, expanded metal, or the like, as the reinforcing member, the shapes and arrangement pattern of the holes of the mesh can be changed easily. Accordingly, it is possible to change flexibly the ratio between the high sintered density area and the low sintered density area of the metal-powder sintered layer, making it easy to adjust the performance of the sliding plate.

Brief Description of Drawings

[0014]

Fig. 1(A) is a front view showing a turnout floor plate 1 according to one embodiment of the present invention, and Fig. 1 (B) is a top view showing the turnout floor plate 1 according to the one embodiment of the present invention; and Fig. 2(A) is a top view showing a sliding plate 3, and Fig. 2 (B) is an A-A cross-section of the sliding plate 3 shown in Fig. 2(A).

Description of Embodiments

[0015] In the following, an embodiment of the present invention will be described referring to the accompanying drawings.

[0016] Fig. 1(A) is a front view showing a turnout floor plate 1 according to the present embodiment. And Fig. 1 (B) is a top view showing the turnout floor plate 1 according to the present embodiment. In these figures, a stock rail 4, a tongue rail 5, and a rail press 6 are shown in dotted lines so that disposition of these parts on the turnout floor plate 1 can be easily grasped.

[0017] The turnout floor plate 1 of the present embodiment is used as a self-lubrication type floor plate at a point where a turnout for railroad line is installed. As shown in the figures, the turnout floor plate 1 of the present embodiment comprises: a substrate 2 for placing and fixing the stock rail 4 on one surface (i.e. upper surface) 20; and a sliding plate 3, which is fixed on the upper surface 20 of the substrate 2 and used for placing and supporting the tongue rail 5 slidably on the side of the upper surface 20 of the substrate 2.

[0018] In the upper surface 20 of the substrate 2, are formed two parallel grooves (a stock rail fixing groove 24 and a sliding plate fixing groove 25) running from one side surface 22 to the other side surface 23 along to the lengthwise direction L. The stock rail fixing groove 24 receives the base 41 of the stock rail 4. The sliding plate fixing groove 25 accommodates the sliding plate 3 such that an upper surface 30 of the sliding plate 3 is exposed in the upper surface 20 of the substrate 2.

[0019] Further, in the upper surface 20 of the substrate 2, a rail press fixing groove 26 is formed on the opposite side of the stock rail fixing groove 24 for the sliding plate fixing groove 25. The rail press fixing groove 26 runs from the one side surface 22 of the substrate 2 to the other

side surface 23, obliquely to the stock rail fixing groove 24. In addition, in the substrate 2, is formed a bolt support hole 27 which passes through the upper surface 20 of the substrate 2 and the other surface (i.e. lower surface) 21 of the substrate 2. The stock rail 4 is placed on the bottom surface 242 of the stock rail fixing groove 24. The rail press 6 is in contact with the base 41 of the stock rail 4 on the side opposite to the side on which the tongue rail 5 is placed, for the stock rail 4. And a hook portion 61 of the rail press 6 is engaged with the rail press fixing groove 26. In this state, when the rail press 6 slides along the rail press fixing groove 26 in the direction D of narrowing the distance between the rail press fixing groove 26 and the stock rail fixing groove 24, the rail press 6 presses the base 41 of the stock rail 4 against one side surface 241 (the side surface on the side of the sliding plate fixing groove 25) of the stock rail fixing groove 24 by the wedge effect, while the rail press 6 supports the stem 42 of the stock rail 4 from the side opposite to the side on which the tongue rail 5 is placed. This prevents a fall of the stock rail 4. When, in this state, the rail press 6 is bolted to the substrate 2 by using the bolt support hole 27, the stock rail 4 is fixed strongly to the substrate 2.

[0020] At each widthwise end portion 28 of the substrate 2, are formed a plurality of bolt holes 29 each running through the upper surface 20 of the substrate 2 to the lower surface 21 of the substrate 2, in order to fix the turnout floor plate 1 at the installation point.

[0021] The sliding plate 3 has the length W2 narrower than the length W1 of the substrate 2. Accordingly, when the sliding plate 3 is accommodated in the sliding plate fixing groove 25 of the substrate 2, the bottom surface 251 of the sliding plate fixing groove 25 is partly exposed on the sides of both the side surfaces 22 and 23 of the substrate 2. By using these exposed parts, the sliding plate 3 is fixed to the substrate 2 by fillet welding.

[0022] Fig. 2(A) is a top view showing the sliding plate 3, and Fig. 2(B) is an A-A cross-section of the sliding plate 3 shown in Fig. 2(A).

[0023] As shown in the figures, the sliding plate 3 has laminated structure. The sliding plate 3 comprises: a backing material 31 made of, for example, steel plate; a perforated metal 32 placed on the backing material 31; a metal-powder sintered layer 33 formed on the side of the upper surface 310 of the backing material 31, to cover the perforated metal 32.

[0024] As the backing material 31, is used metal plate available in many thicknesses t1 such as, for example, ready-made sheet steel. For example, SPHC (hot-rolled soft sheet steel JIS G3131) can be mentioned as such sheet steel.

[0025] The perforated metal 32 is a metal plate having mesh structure made by punching a metal plate by a dedicated punch press. The perforated metal 32 is satisfactorily held on the backing material 31 when the metal-powder sintered layer 33 (which covers at least the recessed portions between the recessed portions and projected portions formed by placing the perforated metal

32 on the backing material 31) is joined to the backing material 31. Fig. 2 shows an example of using the perforated metal 32 in which a plurality of diamond shapes are punched out into uniform arrangement. However, shape, size, and arrangement pattern of the holes of the perforated metal 32 are not limited to those shown in Fig. 2, as long as the perforated metal 32 has the aperture ratio corresponding to the ratio between the high sintered density area (i.e. the portions superior in impact resistance, load bearing, and abrasion resistance) and the low sintered density area (i.e. the portions that are higher in impregnation rate of the lubricating resin and thus superior in lubrication property) in the below-described metal-powder sintered layer 33. For example, the holes may be circular, or the holes of different sizes may be formed. Or, a plurality of holes may be arranged into areas having different aperture ratios.

[0026] The metal-powder sintered layer 33 is formed by sintering of mixed powder obtained by mixing sintering alloy powder with solid lubricant such as graphite, PTFE, molybdenum disulfide (MoS_2) or the like. Here, for the mixed powder, may be used various materials, including bronze type material containing copper, tin, a solid lubricant, and the like. Among others, a mixed powder containing 4 - 10 wt. % tin, 10 - 40 wt. % nickel, 0.1 - 4 wt. % phosphorus, 3 - 10 wt. % graphite, and the balance copper can realize the metal-powder sintered layer 33 giving the best sliding performance.

[0027] The metal-powder sintered layer 33 is impregnated with a lubricating resin superior in weather resistance. Examples of such a lubricating resin are PTFE, PFA, PAI, PI, PE (polyethylene), and PP (polypropylene). Also the lubricating resin may contain dispersed solid lubricant such as graphite, PTFE, molybdenum disulfide, or the like.

[0028] The sliding plate 3 of the above-described structure is produced as follows. First, the backing material 31 and the perforated metal 32 are each subjected to leveler processing so that the backing material 31 and the perforated metal 32 are flattened. Then, the perforated metal 32 is placed on the backing material 31; the above-described mixed powder is sprinkled to a prescribed thickness on the side of the upper surface 310 of the perforated metal 32; and primary sintering is performed to form an intermediate of the metal-powder sintered layer 33. Next, the backing material 31 provided with the intermediate of the metal-powder sintered layer 33 and the perforated metal 32 is subjected to rolling. At that time, there is a possibility that a defect such as a crack occurs in the intermediate of the metal-powder sintered layer 33. Therefore, the intermediate of the metal-powder sintered layer 33 is further subjected to secondary sintering to eliminate the defect such as crack. By this, a completed body of the metal-powder sintered layer 33 is formed. The completed body of the metal-powder has strength required to prevent a defect such as a crack due to external force at the time of use, has joint strength required to strongly join the backing material 31 and the

perforated metal 32 as a reinforcing member, and has hardness required to good abrasion resistance. Next, the backing material 31 provided with the completed body of the metal-powder sintered layer 33 and the perforated metal 32 is subjected to rolling, and thereafter the completed body of the metal-powder sintered layer 33 is subjected to leveler processing to obtain the uniform thickness t_2 of the completed body of the metal-powder sintered layer 33. Then, the sliding plate 3 with desired sliding performance is produced by heating and melting the above-mentioned lubricating resin to impregnate the completed body of the metal-powder sintered layer 33 with the lubricating resin.

[0029] Hereinabove, one embodiment of the present invention has been described.

[0030] According to the present embodiment, the metal-powder sintered layer 33 formed on the metal part 321 of the perforated metal 32 is compressed under high pressure as a result of the rolling and the leveler processing. Thus, the metal-powder sintered layer 33 formed on this part has a higher sintered density and is superior in impact resistance, load bearing, and abrasion resistance (the high sintered density area). On the other hand, as a result of the rolling and the leveler processing, the metal-powder sintered layer 33 formed in the holes (voids) 322 of the perforated metal 32 is compressed under lower pressure in comparison with the metal-powder sintered layer 33 formed on the metal part 321 of the perforated metal 32. Thus, the metal-powder sintered layer 33 formed in this part has a lower sintered density and thus a higher impregnation rate of the lubricating resin, and is accordingly superior in lubrication property (the low sintered density area). Further, the metal-powder sintered layer 33 contains the dispersed solid lubricant such as graphite. In this way, the metal-powder sintered layer 33 is a mixture of the high sintered density area (which is superior in impact resistance, load bearing, and abrasion resistance) and the low sintered density area (which is superior in lubrication property). Accordingly, plastic deformation or the like does not occur due to impact load applied to the tongue rail 5 at the time of train passing, and the tongue rail 5 can be slidably supported stably over a long period of time.

[0031] Here, in the present embodiment, as the backing material 31, it is possible to use ready-made sheet steel available in more types of sheet thickness t_1 in comparison with checkered steel plate. Accordingly, as the backing material 31, it is possible to use sheet steel whose thickness t_1 corresponds to the thickness of the sliding plate 3 to be produced, without changing the thickness t_2 of the metal-powder sintered layer 33. As a result, it is possible to realize the sliding plates 3 of various thicknesses without changing manufacturing conditions such as sintering conditions, rolling conditions, and the like. Thus, it is easy to adjust the thickness of the sliding plate 3.

[0032] Further, in the present embodiment, the perforated metal 32 placed on the backing material 31 forms

the high sintered density area and the low sintered density area of the metal-powder sintered layer 33. By changing shapes, sizes, and arrangement pattern of the holes (voids) 322 of the perforated metal 32, it is possible to change flexibly the ratio between the high sintered density area and the low sintered density area of the metal-powder sintered layer 33. Accordingly, it is easy to adjust the performance of the sliding plate 3. For example, by preparing in advance a plurality of types of perforated metal 32 which are different in shapes, sizes, and arrangement patterns of the holes, it is possible to realize the sliding plate 3 of desired performance only by changing the perforated metal 32 to one which has the aperture ratio corresponding to the ratio between the high sintered density area and the low sintered density area of the metal-powder sintered layer 33, while using the common backing material 31.

[0033] Further, according to the present embodiment, the performance of the sliding plate 3 can be adjusted also by changing the material of the perforated metal 32. For example, by using sheet steel SS400 (rolled steel for general structure JIS G3101) or the like as the material of the perforated metal 32, it is possible to produce the sliding plate 3 emphasizing impact resistance, load bearing, and abrasion resistance. On the other hand, by using bronze alloy type metal plate as the material of the perforated metal 32, it is possible to produce the sliding plate 3 emphasizing lubrication property.

[0034] Thus, according to the present embodiment, it is possible to provide the sliding plate 3 whose thickness and performance can be easily adjusted and to provide the turnout floor plate 1 using that sliding plate 3.

[0035] Although, in the sliding plate 3 of the above-described embodiment, the whole area is covered with the metal-powder sintered layer 33, the present invention is not limited to this. It is sufficient that the metal-powder sintered layer 33 covers at least a part of the perforated metal 32. For example, the surface of the metal part 321 of the perforated metal 32 may be exposed in a state of being flush with the surface of the metal-powder sintered layer 33. By exposing the surface of the metal part 321 of the perforated metal 32 to be flush with the surface of the metal-powder sintered layer 33, it is possible to produce the sliding plate 3 further emphasizing impact resistances, load bearing, and abrasion resistance.

[0036] Further, in the sliding plate 3 of the above-described embodiment, the metal-powder sintered layer 33 is impregnated with the lubricating resin. The metal-powder sintered layer 33, however, may be impregnated with lubricating oil instead of the lubricating resin or together with the lubricating resin.

[0037] Further, in the sliding plate 3 of the above-described embodiment, the perforated metal 32 is placed on the backing material 31, and the mixed powder comprising the sintering alloy powder and the solid lubricant is sprinkled onto the perforated metal 32 and then sintering and rolling are performed to form the metal-powder sintered layer 33. The present invention, however, is not

limited to this. The metal-powder sintered layer 33 may be formed by: sprinkling sintering alloy powder without containing solid lubricant onto the backing material 31; placing the perforated metal 32 on the backing material 31 on which the sintering alloy powder has been sprinkled; and sprinkling mixed powder comprising sintering alloy powder and solid lubricant onto the perforated metal 32, and then performing sintering and rolling. This can increase the joint strengths among the backing material 31, the perforated metal 32, and the metal-powder sintered layer 33.

[0038] Further, in the sliding plate 3 of the above-described embodiment, the perforated metal 32 is placed on the backing material 31. The present invention, however, is not limited to this. It is sufficient for the present invention that a reinforcing member allowing formation of recessed and projected portions on the side of the upper surface 310 of the backing material 31 is placed on the backing material 31. For example, instead of the perforated metal 32, a metal plate having other mesh structure, such as expanded metal, may be used to form the high sintered density area and the low sintered density area. Here, the expanded metal means a metal plate having solid mesh structure of seamless mesh.

[0039] The shapes, sizes or arrangement patterns of the holes of the metal plate which has the mesh structure and is placed on the backing material 31 may be changed depending on locations on the backing material 31. Or, metal plates having respective types of mesh structure different in shapes, sizes or arrangement patterns may be used at different locations on the backing material 31 in order to change partially the ratio between the high sintered density area and the low sintered density area of the metal-powder sintered layer 33 according to the performance required for the sliding plate 3. By this, it is possible to realize the sliding plate 3 which has different performances at the portions of the sliding plate 3 according to the required performances for those portions, for example, with the central portion emphasizing lubrication property and with the edge portion emphasizing impact resistance, load bearing, and abrasion resistance.

[0040] Further, as the reinforcing member which is placed on the backing material 31 and forms the recessed portions and projected portions on the side of the upper surface 310 of the backing material 31, it is possible to use a metal plate with recessed portions and projected portions formed in the surface of the metal plate (i.e. a metal plate whose recessed portions are not penetrating through). In that case, it is possible to increase the area of contact between the reinforcing member and the backing material 31 and the area of contact between the reinforcing member and the metal-powder sintered layer 33. Thus, it is also possible to increase the respective joint strengths among the backing material 31, the reinforcing member, and the metal-powder sintered layer 33, in comparison with the case of using a metal plate having mesh structure such as perforated metal, expanded met-

al or the like as the reinforcing member. As a method of joining the reinforcing member and the backing material 31, can be mentioned, for example, a method of plating at least one of the reinforcing member and the backing material 31 with metal (copper, nickel, tin, brass, or the like) to realize diffusion joining, a method of joining by brazing, and a method of mechanical joining such as by screwing.

[0041] Or, it is possible to plate at least one of the backing material 31 and the reinforcing member with the same metal as metal used in the metal-powder sintered layer 33. This can increase the joint strengths among the backing material 31, the reinforcing member, and the metal-powder sintered layer 33. For example, in the case of using bronze type sintering alloy powder for the metal-powder sintered layer 33, higher joint strength can be obtained by plating with copper.

[0042] Further, the sliding plate 3 of the above-described embodiment uses the metal-powder sintered layer 33 that contains the dispersed solid lubricant. However, it is not necessary to disperse the solid lubricant, and it is possible to use the metal-powder sintered layer consisting of sintering alloy powder only.

[0043] Further, the above embodiment has been described taking an example where the sliding plate 1 is used for the turnout floor plate 1. However, the sliding plate 3 can be used in various sliding applications such as a slide bearing.

Industrial Applicability

[0044] The sliding plate of the present invention can be used in various sliding applications such as a turnout floor plate, a slide bearing, and the like.

Reference Signs List

[0045]

1: turnout floor plate; 2: substrate; 3: sliding plate; 4: stock rail; 5: tongue rail; 6: rail press; 20: upper surface of the substrate; 21: lower surface of the substrate; 22: one side surface of the substrate, extending in the lengthwise direction of the substrate; 23: the other side surface of the substrate, extending in the lengthwise direction of the substrate; 24: stock rail fixing groove; 25: sliding plate fixing groove; 26: rail press fixing groove; 27: bolt support hole; 28: both end portions of the substrate; 29: bolt holes; 30: upper surface of the sliding plate; 31: backing material; 32: perforated metal; 33: metal-powder sintered layer; 41: base of the stock rail; 42: stem of the stock rail; 61: hook portion of the rail press; 241: side surface of the stock rail fixing groove; 242: bottom surface of the stock rail fixing groove; 251: bottom surface of the sliding plate fixing groove; 310: upper surface of the backing material; 321: metal part of the perforated metal; and 322: void of the perforated

metal.

a sliding plate of one of Claims 1 - 7, which is fixed on the substrate and supports a tongue rail slidably on a side of one surface of the substrate.

Claims

1. A sliding plate comprising:

a backing material;

a reinforcing member, which is placed on one surface of the backing material and forms recessed portions and projected portions in its surface; and

a metal-powder sintered layer, which is formed to cover at least the recessed portions formed by the reinforcing member on the one surface of the backing material and is impregnated with at least one of a lubricating resin and lubricating oil.

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2. A sliding plate of Claim 1, wherein:

the reinforcing member is a metal plate having mesh structure.

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3. A sliding plate of Claim 2, wherein:

the metal plate having the mesh structure is either expanded metal or perforated metal.

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4. A sliding plate of one of Claims 1 - 3, wherein:

solid lubricant is dispersed in the metal-powder sintered layer.

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5. A sliding plate of Claim 4, wherein:

the solid lubricant is not dispersed in the metal-powder sintered layer at a part intervening between the one surface of the backing material and a surface of the metal plate having the mesh structure on a side opposed to the backing material.

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6. A sliding plate of one of Claims 1 - 5, wherein:

the lubricating resin is one of polytetrafluoroethylene, perfluoroalkoxyalkane, polyamide-imide, polyimide, polyethylene, and polypropylene.

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7. A sliding plate of one of Claims 1 - 6, wherein:

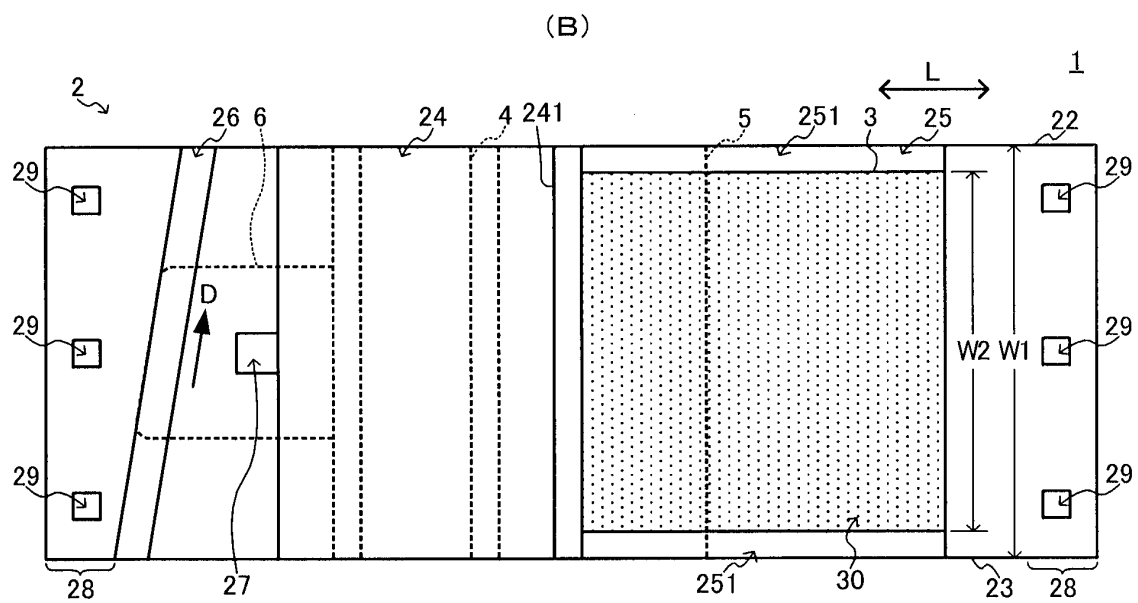
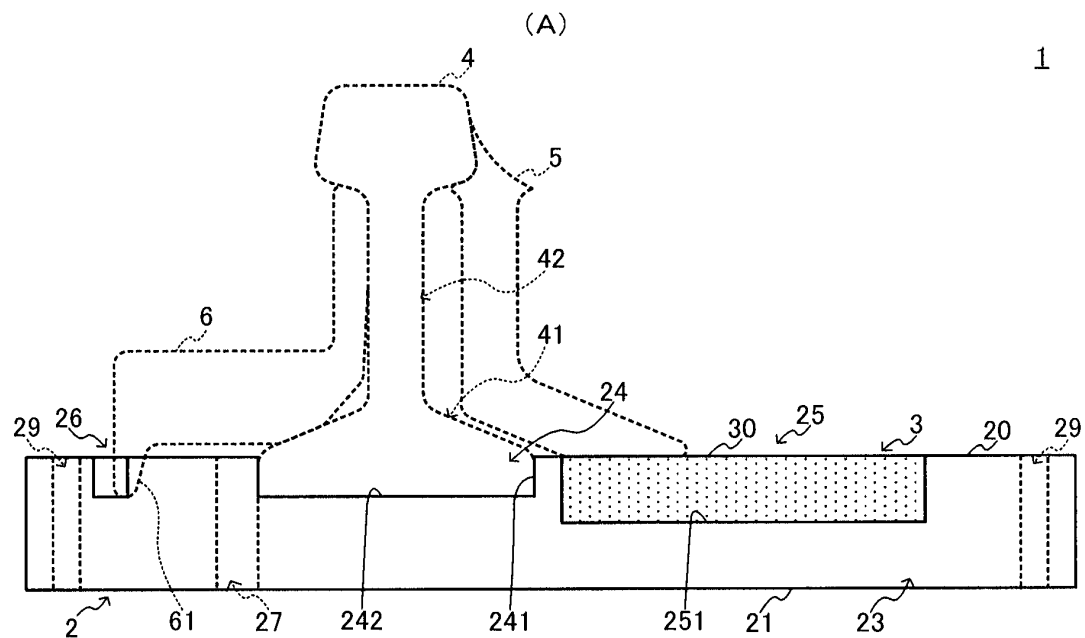
solid lubricant is dispersed in the lubricating resin.

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8. A floor plate for turnout, comprising:

a substrate for placing and fixing a stock rail on one surface of the substrate;

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Fig.1



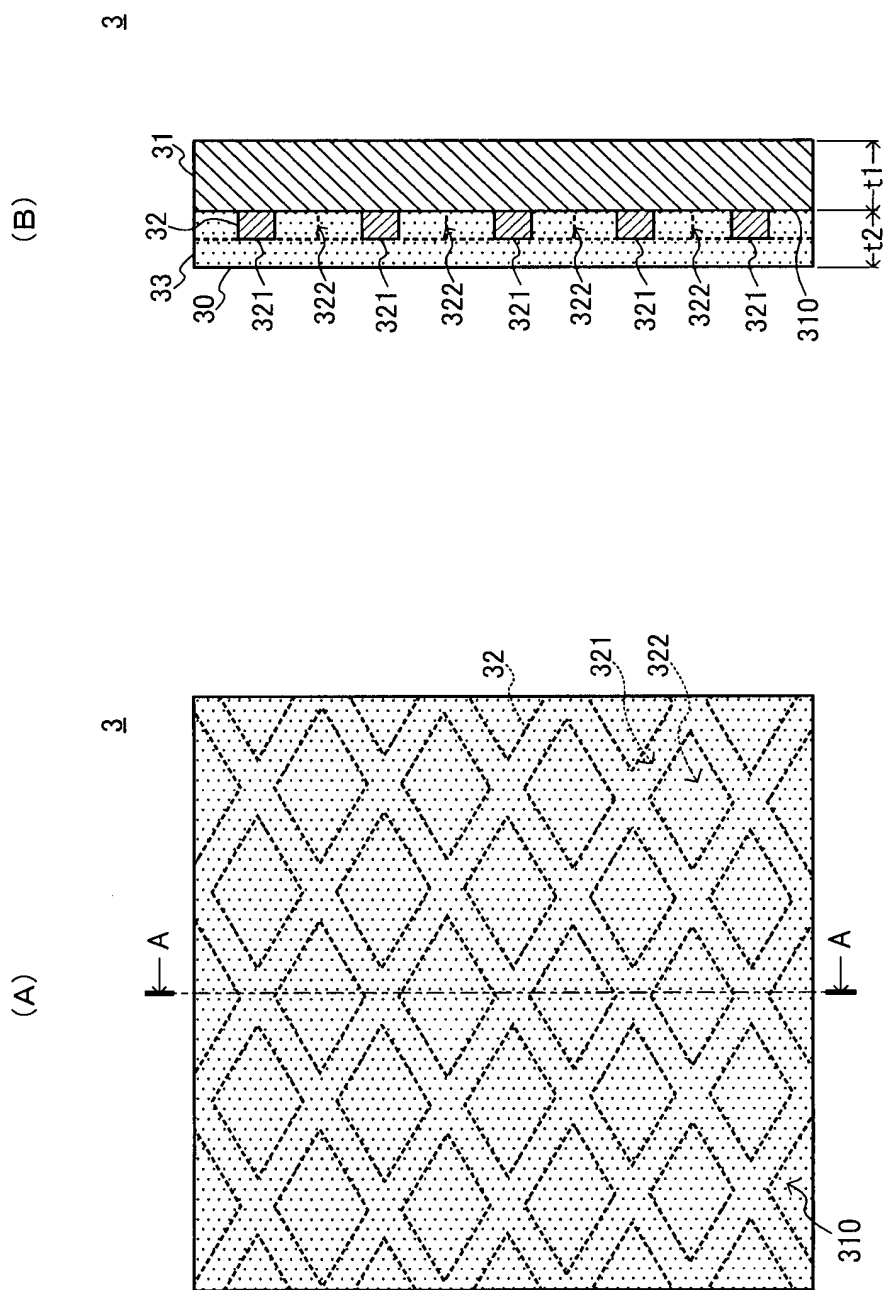


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2014/050443

A. CLASSIFICATION OF SUBJECT MATTER

B22F7/04(2006.01)i, E01B7/00(2006.01)i

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)

B22F7/04, E01B7/00

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

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2014
Kokai Jitsuyo Shinan Koho	1971-2014	Toroku Jitsuyo Shinan Koho	1994-2014

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.
Y	JP 09-221701 A (Taiho Kogyo Co., Ltd.), 26 August 1997 (26.08.1997), claims (Family: none)	1-8
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