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<tr><td rowspan="2">Patent Right</td><td>Date</td><td>September 29, 2020</td><td rowspan="2">Court</td><td rowspan="2">Intellectual Property High Court, First Division</td></tr>
<tr><td>Case number</td><td>2019 (Gyo-Ke) 10128</td></tr>
<tr><td colspan="5">- A case in which the court determined that the patented invention titled "Low iron loss grain-oriented electrical steel sheet" conforms to the support requirement.</td></tr>
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Case type: Rescission of Trial Decision to Maintain

Result: Dismissed

References: Article 29, paragraph (1), item (iii) and paragraph (2), and Article 36, paragraph (6), item (i) of the Patent Act

Related rights, etc.: Invalidation Trial No. 2018-800121, Patent No. 5241095

Summary of the Judgment

1. This case is a lawsuit against a trial decision made by the JPO in which the Plaintiff, that had requested a trial for patent invalidation against the Defendant's patent for the invention titled "Low iron loss grain-oriented electrical steel sheet," seeks rescission of the JPO's trial decision that maintained the Defendant's patent. In this case, the Plaintiff alleges that the trial decision should be rescinded on the grounds of errors in the determination on the support requirement and in the determinations on novelty and inventive step.

2. In this judgment, the court dismissed the Plaintiff's claim, holding as summarized below with regard to the conformity to the support requirement.

(1) Statement in the claim

A low iron loss grain-oriented electrical steel sheet characterized in that, at one or more locations inside the sheet thickness of the steel sheet, areas where stress against the through-thickness direction is tensile stress and the maximum value of that stress is 40 MPa or more but not more than the value of the yield stress of the steel sheet material are formed at intervals of not more than 7.0 mm in the rolling direction of the steel sheet (Claim 1).

(2) Statement in the detailed explanation of the invention

According to the statement in the detailed explanation of the invention included in the Description, it is found that Invention 1 adopts the structure wherein tensile stress against the through-thickness direction of the steel sheet is introduced, and areas where the maximum value of that stress is 40 MPa or more but not more than the value of the yield stress of the steel sheet material are formed inside the sheet thickness of the steel sheet at intervals of not more than 7.0 mm in the rolling direction of the steel sheet, thereby dividing the iron loss of the grain-oriented electrical steel sheet into hysteresis loss and eddy current loss, and, especially from the perspective of reducing eddy current loss through domain refinement, controlling the distortion and stress distribution under quantitatively appropriate conditions not only on the surface of the sheet but also inside the sheet thickness, and through this, Invention 1 has solved the problem in terms of providing an excellent grain-oriented electrical steel sheet.

(3) Conformity to the support requirement

According to the statement in the detailed explanation of the invention included in the Description, it can be understood that Invention 1 aims at reducing the iron loss of a grain-oriented electrical steel sheet from two perspectives, i.e., hysteresis loss and eddy current loss, and in particular, that the reduction in the eddy current loss is achieved through domain refinement and the introduction of tensile stress makes a grain-oriented electrical steel sheet excellent in low iron loss.

On the other hand, the "excellent grain-oriented electrical steel sheet" involved in the problem targeted by the Inventions can be understood as meaning a grain-oriented electrical steel sheet that is excellent in low iron loss, according to the entire statement in the Description, and in particular, the statement that "it is possible to provide a grain-oriented electrical steel sheet that is considerably excellent in low iron loss" and the statement that the grain-oriented electrical steel sheet in the embodiment example was more excellent in low iron loss than that in the comparative example.

Therefore, from the statement in the detailed explanation included in the Description, a person ordinarily skilled in the art would recognize that the problem targeted by the Inventions can be solved. In addition, the statement in the claim for Invention 1 is included in the statement in the detailed explanation.

(4) Regarding the Plaintiff's allegation

The Plaintiff alleges that the conclusion that the "maximum value" of tensile stress against the through-thickness direction is "40 MPa or more" has been drawn based on Figure 5 in the Description, and that the numerical value obtained under such specific conditions cannot be generalized to the Inventions.

However, in general, when magnetization and stress exist, they cause interaction energy, $-C\times M\times\sigma\times\cos^2\theta$, between the magnetization and the stress within an electrical steel sheet (where: C=a positive constant; M=the degree of magnetization; σ=the degree of stress; and θ=the angle formed by the direction of the magnetization and the stress).

Using this formula, the Description logically explains that: when θ is 0° or 180°, the interaction energy between the magnetization and the stress within an electrical steel sheet becomes low and energetically stable; when tensile stress is introduced in the through-thickness direction, given that σ is a positive constant, the magnetization becomes energetically stable when it is oriented in the direction of the stress, that is, the through-thickness direction; and as a result, a closure domain is formed, promoting reconfiguration of the magnetic domain of the entire steel sheet, refining the 180-degree magnetic domain width, and finally reducing eddy current loss.

It is true that Figure 5 and the embodiment example are examples obtained under specific conditions, respectively, but considering that the abovementioned formula does not include any elements regarding contributions from the through-thickness of the electrical steel sheet, distribution width, laser mark width, laser spot shape, laser irradiation intervals, angle of the band range against the rolling direction, tensile stress in the rolling direction, composition, or the irradiation condition (in the air or in water), these examples are not affected by any of these conditions. In consideration of the mechanism of the Inventions as well, even if an experiment is conducted using a sample by changing any of the conditions pointed out by the Plaintiff, such as the through-thickness, the distribution width, and laser mark width, there would be no influence on the interaction energy between the magnetization and the stress within an electrical steel sheet, and hence, it cannot be considered that any such change in the conditions could cause considerable interference with or a complete change in the mechanism of the abovementioned means to solve the problem targeted by the Inventions.

In addition, the mechanism of inhibition of a hysteresis loss increase is that, when the value of the tensile stress reaches or exceeds the value of stress in the plastic range, that is, the value of the yield stress, the plastic range inside the sheet thickness functions as a pinning site of the domain wall, resulting in an increase in hysteresis loss, which is part of iron loss, and based on this relationship, a hysteresis loss increase can be inhibited if the maximum value of the tensile stress is controlled on a par with or below the value of the yield stress. This can also be understood from the statement in the detailed explanation of the invention.

Based on this, it can be understood that reduction of the iron loss can be achieved if the "maximum value" of the tensile stress against the through-thickness direction is "40 MPa or more but not more than the value of the yield stress of the steel sheet material."

Consequently, it can be concluded that the Inventions are stated in the detailed explanation of the invention included in the Description and that these inventions are disclosed to the extent that a person skilled in the art would recognize that the problem to be solved by the inventions would actually be solved.