Decision on Opposition

Opposition No. 2020-700820

Patentee ARCELORMITTAL

Patent Attorney KAWAGUTI & PARTNERS INTELLECTUAL PROPERTY LAW FIRM

Opponent Maeda, Hiroshi

The case of opposition to the granted patent for the invention of Patent No. 6685244, titled "METHOD FOR PRODUCING A HIGH STRENGTH STEEL SHEET HAVING IMPROVED STRENGTH, DUCTILITY, AND FORMABILITY" has resulted in the following decision.

Conclusion

The patents according to Claims 8-10 of Japanese Patent No. 6685244 are maintained.

Reason

No. 1 History of the procedures

The application regarding the patents according to Claims 1-10 of Japanese Patent No. 6685244 (hereinafter, referred to as "the Patent") was internationally applied for on July 3, 2015 (Heisei 27) (priority claim under the Paris Convention: reception by the foreign receiving office on July 3, 2014 (Heisei 26) by the International Bureau (IB)), the registration and establishment of the patent right thereof was registered on April 2, 2020, and a gazette containing the patent was issued on April 22 of the same year.

After that, a demand for trial for correction was made with respect to the Patent from ArcelorMittal that is the patentee on June 9 of the same year, a trial decision to the effect that "the corrections to delete Claims 1-7 of the scope of claims are approved" was made as of August 24 of the same year, and the relevant trial decision has become final and conclusive afterward.

After that, with respect to the Patent, the patent opponent Hiroshi Maeda (hereinafter, referred to as "Opponent") filed opposition to the granted patent regarding the patents according to Claims 8-10 of the Patent (the whole claims) on October 22 of

the same year.

No. 2 The Invention

As shown in the above-mentioned No. 1, regarding the demand for trial for correction on June 9, 2020, a trial decision to the effect that "the corrections to delete Claims 1-7 of the scope of claims are approved" was made as of August 24 of the same year, and the relevant trial decision became final and conclusive afterward. Accordingly, Claims 1-7 of the Patent have been deleted.

Each of the inventions concerning the patents of Claims 8-10 of the Patent (hereinafter, each referred to as "the Invention 8" and the like) is one that is specified by the matters recited in each of Claims 8-10 of the scope of claims thereof as follows.

"[Claim 8]

A steel sheet containing a chemical composition of

$0.15\% \leq C \leq 0.25\%$

$1.2\% \leq Si \leq 1.8\%$

$2.1\% \leq Mn \leq 2.3\%$

$0.1\% \leq Cr \leq 0.25\%$

$Nb \leq 0.05\%$

$Ti \leq 0.05\%$

$Al \leq 0.5\%$

by weight %, the remainder being Fe and unavoidable impurities,

the steel sheet comprising: yield strength of at least 850 MPa, tensile strength of at least 1180 MPa, total elongation of at least 14%, and a hole expansion ratio HER of at least 30%, and the steel sheet having a structure including 3% to 15% of residual austenite, and 85% to 97% of martensite and bainite, without ferrite, wherein the fraction of martensite is at least 50%.

[Claim 9]

The steel sheet according to Claim 8, wherein the yield strength exceeds 950 MPa.

[Claim 10]

The steel sheet according to claim 8 or claim 9, wherein

the chemical composition of steel is a composition in which $Al \leq 0.05\%$."

No. 3 Outline of grounds for opposition

The opponent alleges, in "3. Grounds for opposition" of the written opposition,

to the effect that, due to the following grounds for opposition 1 and 2, the patents concerning Inventions 8-10 should be revoked.

1 Ground for opposition 1 (requirements for support)

(1) Reason of deficiency in description

In Invention 8 and Inventions 9 and 10 that refer to Invention 8, relating to the steel composition thereof, "Nb ≤ 0.05%" and "Ti ≤ 0.05%" are stipulated.

However, the only matter described specifically in [Examples] (in particular, paragraph [0035]) of the description of the Patent as a matter for solving the problem to be solved is a steel sheet having "composition: C = 0.19%, Si = 1.5%, Mn = 2.2%, Cr = 0.2%, the remainder being Fe and impurities"; that is, a steel sheet that does not contain Nb and Ti. In other words, it has not been proved specifically that the problem to be solved is solved when containing Nb and Ti.

In addition, it cannot be said that it is obvious for a person skilled in the art, from the descriptions of the description of the Patent in which it has only been proved specifically that the problem to be solved is solved in the case not containing Nb and Ti, that the problem to be solved is solved similarly when the contents of Nb and Ti are more than 0% to less than 0.05%, and, therefore, this means that Inventions 8-10 that stipulate "Nb ≤ 0.05%" and "Ti ≤ 0.05%" are reciting a broader scope of claims exceeding the technical matters disclosed in the description (the detailed description of the invention) of the Patent.

Therefore, it cannot be said that Inventions 8-10 are ones described in the description (the detailed description of the invention) of the Patent.

(2) Conclusion

For the reason that the scope of claims (Claims 8-10) at the time of the decision to grant a patent was made with respect to a patent application that does not meet the requirement stipulated in Article 36(6)(i) of the Patent Act, it should be revoked under the provisions of Article 113(4) of the same Act.

2 Ground for opposition 2 (enablement requirement)

(1) Reason of deficiency in description

In Invention 8, it is stipulated, relating to a microstructure thereof, as "including 3% to 15% of residual austenite, and 85% to 97% of martensite and bainite, without ferrite, wherein the fraction of martensite is at least 50%".

However, in the description of the Patent, it is not described specifically

regarding an identification method or a quantitative method of each structure, and, regarding "the fraction of martensite is at least 50%", it is described in paragraph [0034] that "martensite and bainite are very difficult to distinguish", and an identification method or a quantitative method thereof is not indicated at all.

In addition, in [Examples] of the description of the case, there is only a description that "its structure contains 11.2% of residual austenite and 88.8% of the sum of martensite and bainite" (paragraph [0040]), and it has not been proved that "the fraction of martensite is at least 50%".

Furthermore, since there is no description about an identification method or a quantitative method concerning "the fraction of martensite is at least 50%" in the description of the Patent, the description of the Patent "is not described clearly so as to be able to carry out" Inventions 8-10 by a person skilled in the art, and, relating to each structure such as martensite, since it cannot be said that an identification method or a quantitative method is uniquely determined, a person skilled in the art who tries to carry out Inventions 8-10 needs to perform quantitative determination and the like by every possible method, and to inspect whether it has a desired effect or not, thereby "forcing excessive supplementary examination" to the person skilled in the art.

Therefore, the description (the detailed description of the invention) of the Patent is not described clearly and sufficiently to the extent that a person skilled in the art can carry out Inventions 8-10.

(2) Conclusion

Since the descriptions of the detailed description of the invention of the description of the Patent have a deficiency, and Inventions 8-10 were made with respect to a patent application that does not meet the requirement stipulated in Article 36(4)(i) of the Patent Act, these should be revoked under the provisions of Article 113(4) of the same Act.

No. 4 Judgment by the body

As will be described hereinafter, the patents for Claims 8-10 of the Patent cannot be revoked by the grounds for opposition 1 and 2.

1 Regarding the descriptions of the detailed description of the invention

In the detailed description of the invention of the description of the Patent, there are the following descriptions (underlines were added by the body, and "..." indicates abbreviation).

"[0001]

The present invention relates to a method for producing a high strength steel sheet having improved strength, ductility and formability, and to the sheets obtained with the method.

[Background Art]

[0002]

To manufacture various pieces of equipment such as body structural members and parts of body panels for automotive vehicles, it is usual to use sheets made of DP (dual phase) steels or TRIP (transformation induced plasticity) steels.

[0003]

...

[0004]

Due to the wish to reduce the weight of automobiles in order to improve their fuel efficiency in view of global environmental conservation, it is desirable to have steel sheets having improved yield strength and tensile strength. But such steel sheets must also have a good ductility and a good formability and, more specifically, good stretch flangeability.

[0005]

In this respect, it is desirable to have a steel sheet having a yield strength YS of at least 850 MPa, a tensile strength TS of about 1180 MPa, a total elongation of at least 14%, and a hole expansion ratio HER measured according to ISO standard 16630: 2009 of at least 30%. It must be emphasized that, due to differences in the methods of measuring, the values of hole expansion ratio HER according to the ISO standard are very different from and not comparable to the values of the hole expansion ratio λ according to the JFST 1001 (Japan Iron and Steel Federation standard).

[Summary of Invention]

[Problem to be solved by the invention]

[0006]

Therefore, an object of the present invention is to provide such steel sheet and a method of producing the same.

[Means for solving the problem]

[0007]

For this purpose, the invention relates to a method for producing a high strength steel sheet having improved ductility and improved formability, the sheet having a yield strength YS of at least 850 MPa, a tensile strength TS of at least 1180 MPa, a total

elongation of at least 14%, and a hole expansion ratio HER according to the ISO standard of at least 30%, by heat treating a steel sheet whose chemical composition of steel contains, in weight %:

$0.15\% \leq C \leq 0.25\%$

$1.2\% \leq Si \leq 1.8\%$

$2\% \leq Mn \leq 2.4\%$

$0.1\% \leq Cr \leq 0.25\%$

$Nb \leq 0.05\%$

$Ti \leq 0.05\%$

$Al \leq 0.50\%$,

the remainder being Fe and unavoidable impurities. The heat treatment includes the following steps:

- annealing the sheet at an annealing temperature TA higher than Ac3 but less than 1000°C for a time of more than 30 s,
- quenching the sheet by cooling it down to a quenching temperature QT between 275°C and 325°C, at a cooling speed sufficient to have, just after quenching, a structure consisting of austenite and at least 50% martensite, the austenite content being such that the final structure; i.e., the structure after treatment and cooling to room temperature, can contain between 3% and 15% of residual austenite and between 85 and 97% of the sum of martensite and bainite, without ferrite,
- heating the sheet up to a partitioning temperature PT between 420°C and 470°C and maintaining the sheet at this temperature for the partitioning time Pt between 50 s and 150 s, and
- cooling the sheet down to room temperature."

"[0012]

The invention relates also to a steel sheet whose chemical composition contains in weight %:

$0.15\% \leq C \leq 0.25\%$

$1.2\% \leq Si \leq 1.8\%$

$2\% \leq Mn \leq 2.4\%$

$0.1 \leq Cr \leq 0.25\%$

$Nb \leq 0.05\%$

$Ti \leq 0.05\%$

$Al \leq 0.5\%$,

the remainder being Fe and unavoidable impurities, the sheet having a yield strength of at least 850 MPa, a tensile strength of at least 1180 MPa, a total elongation of at least

14%, and a hole expansion ratio HER of at least 30%, the structure consisting of 3% to 15% residual austenite and 85% to 97% martensite and bainite, without ferrite."

"[0019]

According to the invention, the sheet is obtained by hot rolling and optionally cold rolling of a semi product whose chemical composition contains, in weight %:

- 0.15% to 0.25%, and preferably more than 0.17% and preferably less than 0.21% carbon for improving the stability of the residual austenite which is necessary to ensure a satisfactory strength and to obtain a sufficient elongation. If the carbon content is too high, the hot rolled sheet is too hard to cold roll and the weldability is insufficient.

[0020]

- 1.2% to 1.8%, preferably more than 1.3% and less than 1.6% silicon in order to stabilize the austenite so as to strengthen a solid solution and to delay formation of carbides during overaging.

[0021]

- 2% to 2.4%, and preferably more than 2.1% and preferably less than 2.3% manganese to have a sufficient hardenability to obtain a structure containing at least 65% martensite, and a tensile strength of more than 1180 MPa, and to avoid having segregation issues which are detrimental for ductility.

[0022]

- 0.1 % to 0.25% chromium to stabilize the residual austenite in order to increase hardenability and to delay the formation of bainite during overaging.

[0023]

- up to 0.5% aluminum which is usually added to liquid steel for the purpose of deoxidation. If the content of Al is above 0.5%, the annealing temperature will be too high to reach and the steel will become industrially difficult to process. Preferably, the Al content is limited to impurity levels; i.e., a maximum of 0.05%.

[0024]

- Nb content is limited to 0.05% because, when exceeding such value, large precipitates will be formed and formability will decrease, making the 14% total elongation more difficult to reach.

[0025]

- Ti content is limited to 0.05% because, when exceeding such value, large precipitates will be formed and formability will decrease, making the 14% total elongation more difficult to reach.

[0026]

the remainder is iron and residual elements resulting from steelmaking. In this

respect, Ni, Mo, Cu, V, B, S, P, and N at least are considered as residual elements which are unavoidable impurities. Therefore, their contents are less than 0.05% for Ni, 0.02% for Mo, 0.03% for Cu, 0.007% for V, 0.0010% for B, 0.007 % for S, 0.02% for P, and 0.010% for N.

[0027]

The sheet is prepared by hot rolling and optionally cold rolling according to the methods known by those who are skilled in the art.

[0028]

After rolling, the sheets are pickled or cleaned, and then heat treated.

[0029]

The heat treatment to be carried out in a combined continuous annealing line preferably includes the following steps of:

- annealing the sheet, in order to be sure that the structure is completely austenitic, at an annealing temperature TA higher than the Ac3 transformation point of the steel, and preferably higher than Ac3 + 15°C; i.e., higher than 850°C for the steel according to the invention but less than 1000°C so as not to coarsen the austenitic grains excessively. The sheet is maintained at the annealing temperature; i.e., maintained between TA - 5°C and TA + 10°C, for a time sufficient to homogenize the chemical composition. This time period is preferably of more than 30 s but does not need to be of more than 300 s.

[0030]

- quenching the sheet by cooling it down at a cooling rate sufficient to avoid ferrite and bainite formation to a quenching temperature QT lower than the Ms transformation point. The quenching temperature is between 275°C and 325°C in order to have, just after quenching, a structure consisting of austenite and at least 50% martensite, the austenite content being such that the final structure; i.e., after treatment and cooling to the room temperature, can contain between 3% and 15% residual austenite and between 85 and 97% the sum of martensite and bainite, without ferrite. The cooling rate is of at least 20°C/s, preferably at least 30°C/s. A cooling rate of at least 30°C/s is required to avoid the ferrite formation during cooling from the annealing temperature.

[0031]

- reheating the sheet up to a partitioning temperature PT between 420°C and 470°C. Although the reheating rate can be high when the reheating is done by an induction heater, a reheating rate between 5°C/s and 20°C/s has no apparent effect on the final properties of the sheet. Thus, the reheating rate is preferably between 5°C/s and 20°C/s. Preferably, between the quenching step and the step of reheating the sheet to the partitioning temperature PT, the sheet is held at the quenching temperature for a holding

time between 2 s and 8 s, preferably between 3 s and 7 s.

[0032]

- maintaining the sheet at the partitioning temperature PT for a time between 50 s and 150 s. Maintaining the sheet at the partitioning temperature means that, during partitioning, the temperature of the sheet remains between PT - 10°C and PT + 10°C.

[0033]

- cooling the sheet down to room temperature with a cooling rate preferably of more than 1°C/s in order not to form ferrite or bainite. Currently, this cooling speed is between 2°C/s and 4°C/sc.

[0034]

With such treatment, the sheet has a structure consisting of 3% to 15% residual austenite and 85% 97% of martensite and bainite, without ferrite. Actually, due to the quenching under the Ms transformation point, the structure contains martensite and its content is at least 50%. But for such steels, martensite and bainite are very difficult to distinguish. This is why only the sum of the contents of martensite and bainite is considered. With such structure, the sheet having a yield strength YS of at least 850 MPa, a tensile strength of at least 1180 MPa, a total elongation of at least 14%, and a hole expansion ratio (HER) according to the ISO standard 16630: 2009 of at least 30% can be obtained.

[Examples]

[0035]

As an example, a sheet of 1.2 mm in thickness having the following composition: C = 0.19%, Si = 1.5%, Mn = 2.2%, Cr = 0.2%, the remainder being Fe and impurities, was produced by hot and cold rolling. The theoretical Ms transformation point of this steel is 375°C and the Ac3 transformation point is 835°C.

[0036]

Samples of the sheet were heat treated by annealing, quenching, and partitioning; i.e., heating to a partitioning temperature and maintaining at this temperature, and the mechanical properties were measured. The sheets were held at the quenching temperature for about 3 s.

[0037]

The conditions of treatment and the obtained properties are reported in Table I where the annealing type column specifies if the annealing is intercritical (IA) or fully austenitic (full γ).

[0038]

[Table 1]

表I

試料	TA °C	焼鈍タイプ	QT °C	PT °C	Pt s	YS MPa	TS MPa	UE %	TE %	HER %	γ %	γ結晶粒径 μm	γ中C% %	F %	M+B %
1	825	IA	250	400	99	990	1200	7	11.7	24					
2	825	IA	250	450	99	980	1180	9	14						
3	825	IA	300	400	99	865	1180	8.2	13.2	-					
4	825	IA	300	450	99	740	1171	10.2	15.4	13	12.6	≤5	1.0	30	57.4
5	825	IA	350	400	99	780	1190	10.1	15.4						
6	825	IA	350	450	99	650	1215	11	15.5	8					
7	875	Full γ	250	400	99	1190	1320	3.5	8						
8	875	Full γ	250	450	99	1170	1250	6.1	10.5						
9	875	Full γ	300	400	99	1066	1243	7.2	12.8	31	12.3	≤5	0.98	0	87.7
10	875	Full γ	300	450	99	1073	1205	9.3	14.4	37	12				
11	875	Full γ	350	400	99	840	1245	7.5	11						
12	875	Full γ	350	450	99	760	1220	9.5	13.2	9					
13	825	IA	400	400	99	756	1232		15.2	13					
14	825	IA	450	450	99	669	1285		13.5	-					
15	875	Full γ	400	400	99	870	1301		11.7	24					
16	875	Full γ	450	450	99	784	1345		10.7	-					
17	840	Full γ	300	500	99	923	1170	7	9						

表１　Table 1
試料　Sample
焼鈍タイプ　Annealing type
γ 結晶粒径　γ grain size
γ 中Ｃ％ C% in γ

[0039]

In this table, TA is the annealing temperature, QT is the quenching temperature, PT is the partitioning temperature, Pt is the partitioning time, YS is the yield strength, TS is the tensile strength, UE is the uniform elongation, TE is the total elongation, HER is the hole expansion ratio according to the ISO standard, γ is the rate of residual austenite in the structure, γ grain size is the average austenitic grain size, C% in γ is the amount of carbon in the residual austenite, F is the amount of ferrite in the structure, and M + B is the sum of martensite and bainite in the structure.

[0040]

In Table I, Example 10 is according to the invention and all properties are better

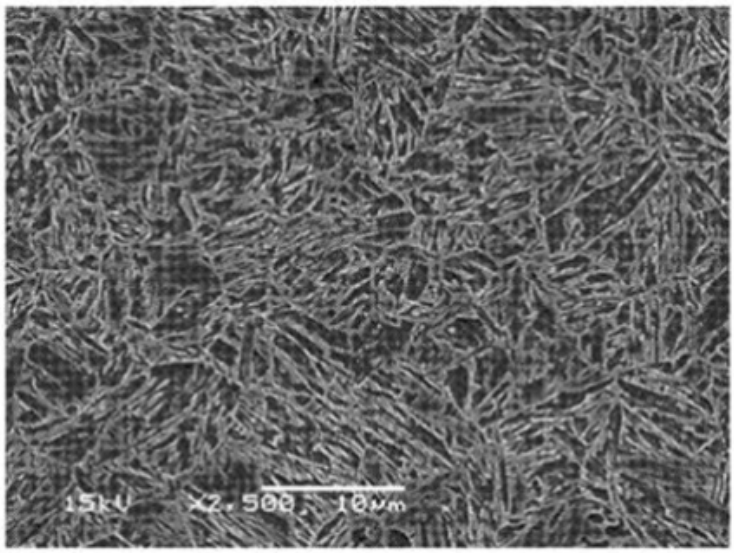
than the minimal required properties. As shown in the figure, its structure contains 11.2% residual austenite and 88.8% the sum of martensite and bainite.

[0041] Examples 1 to 6 which are related to samples annealed at an intercritical temperature show that, even if the total elongation is greater than 14%, which is the case only for samples 4, 5, and 6, the hole expansion ratio is too low.

[0042] Examples 13 to 16 which are related to prior art; i.e., to sheets that were not quenched under the Ms point (QT is above the Ms transformation point and PT is equal to QT), show that with such heat treatment, even if the tensile strength is very good (above 1220 MPa), the yield strength is not very high (below 780) when the annealing is intercritical, and the formability (hole expansion ratio) is not sufficient (below 30%) in all cases.

[0043] Examples 7 to 12 which are all related to samples which were annealed at a temperature higher than Ac3; i.e., to samples whose structures were completely austenitic, show that the only way to reach the targeted properties is a quenching temperature 300°C (±10) and a partitioning temperature 450°C (±10). With such conditions, it is possible to obtain a yield strength greater than 850 MPa and even greater than 950 MPa, a tensile strength greater than 1180 MPa, a total elongation greater than 14%, and a hole expansion ratio greater than 30%. Example 17 shows that a partitioning temperature higher than 470°C does not allow attainment of the targeted properties."

"[FIG. 1]



"

2 Regarding recitation of the scope of claims

The recitation of the scope of claims of the Patent is as mentioned in No. 2 above.

3 Regarding ground for opposition 1 (requirements for support)

(1) Regarding a viewpoint for examining requirements for support

Whether or not the recitation of the scope of claims complies with the requirements for support should be determined by: comparing recitation of the scope of claims and the descriptions of the detailed description of the invention; and examining whether or not an invention described in the scope of claims is an invention described in the detailed description of the invention, and it is one within a range in which a person skilled in the art can recognize that the problem to be solved of the invention can be solved by the descriptions of the detailed description of the invention; and, in addition, even if there is no description or suggestion in the detailed description of the invention, whether or not it is within a range in which a person skilled in the art can recognize that the problem to be solved of the invention can be solved in light of the common general technical knowledge at the time of application.

Hereinafter, from the above viewpoint, whether or not the recitation of the scope of claims of the Patent complies with to the requirements for support will be discussed.

(2) Regarding the problem to be solved by the invention in the Patent

With reference to [0001]-[0006] summarized in the above-mentioned 1, it is recognized that the problem to be solved by the invention of the Patent is "to provide" "a steel sheet having a yield strength YS of at least 850 MPa, a tensile strength TS of about 1180 MPa, a total elongation of at least 14%, and a hole expansion ratio HER measured according to the ISO standard 16630: 2009 of at least 30%".

(3) Regarding the invention described in the detailed description of the invention

A In [0012] summed up in the above-mentioned 1, there is described a "steel sheet" as the means for solving the problem that

"relates also to a steel sheet whose chemical composition contains in weight %:

$0.15\% \leq C \leq 0.25\%$

$1.2\% \leq Si \leq 1.8\%$

$2\% \leq Mn \leq 2.4\%$

$0.1 \leq Cr \leq 0.25\%$
$Nb \leq 0.05\%$
$Ti \leq 0.05\%$
$Al \leq 0.5\%$,
the remainder being Fe and unavoidable impurities, the sheet having a yield strength of at least 850 MPa, a tensile strength of at least 1180 MPa, a total elongation of at least 14% and a hole expansion ratio HER of at least 30%, the structure consisting of 3% to 15% residual austenite and 85% to 97% martensite and bainite, without ferrite".

B From [0019] summed up in the above-mentioned 1, it is recognized that "0.15% to 0.25%" "carbon" is required "for improving the stability of the residual austenite which is necessary to ensure a satisfactory strength and to obtain a sufficient elongation".

C From [0020] summed up in the above-mentioned 1, it is recognized that "1.2% to 1.8%" "silicon" is required "in order to stabilize the austenite so as to strengthen a solid solution and to delay formation of carbides during overaging".

D From [0021] summed up the above-mentioned 1, it is recognized that "2% to 2.4%" "manganese" is required "to have a sufficient hardenability to obtain a structure containing at least 65% martensite, and a tensile strength of more than 1180 MPa, and to avoid having segregation issues which are detrimental for ductility".

E From [0022] summarized in the above-mentioned 1, it is recognized that "0.1 % to 0.25%" "chromium" is required "to increase the hardenability and to stabilize the retained austenite in order to i delay the formation of bainite during overaging".

F From [0023] summed up in the above-mentioned 1, it is recognized that it is necessary that "aluminum" is "up to 0.5%" in order to avoid that "the annealing temperature will be too high to reach and the steel will become industrially difficult to process".

G From [0024] summed up in the above-mentioned 1, it is recognized that it is necessary that "Nb" is "limited to 0.05%" in order to avoid that "large precipitates will be formed and formability will decrease, making the 14% total elongation more difficult to reach".

H From [0025] summed up in the above-mentioned 1, it is recognized that it is

necessary that "Ti" is "limited 0.05%" in order to avoid that "large precipitates will be formed and formability will decrease, making the 14% total elongation more difficult to reach".

I From [0026] summed up in the above-mentioned 1, it is recognized that "the remainder " other than "carbon", "silicon", "manganese", "chromium", "aluminum", "Nb" and "Ti" are needed to be "iron and residual elements resulting from steelmaking".

J With reference to [0027] and [0028] summed up in the above-mentioned 1, it is described that "steel sheets" are manufactured in such a way that, after rolling according to "hot rolling", they "are pickled or cleaned, and then heat treated".

K From [0029] summed up in the above-mentioned 1, it is recognized that, in the "heat treatment", it is necessary that "annealing the sheet" is performed at "the annealing temperature TA" that is "higher than the Ac3 transformation point of the steel" but "less than 1000°C", " in order to be sure that the structure is completely austenitic" and "so as not to coarsen the austenitic grains excessively".

L From [0030] summed up in the above-mentioned 1, it is recognized that, "in order to have, just after quenching, a structure consisting of austenite and at least 50% martensite", and "to avoid the ferrite formation during cooling from the annealing temperature", it is necessary that "quenching the sheet" is done by cooling it at a "cooling rate of at least 30°C/s" that is "a cooling rate enough to avoid ferrite and bainite formation to a quenching temperature QT lower than the Ms transformation point" to "quenching temperature" "between 275°C and 325°C", and, as a result, "the austenite content being such that the final structure; i.e., after treatment and cooling to room temperature, can contain between 3% and 15% residual austenite and between 85 and 97% the sum of martensite and bainite, without ferrite" will be realized.

M From [0031] and [0032] summed up in the above-mentioned 1, it is recognized that the step of "heat treatment" includes "reheating the sheet up to a partitioning temperature PT between 420°C and 470°C", and "maintaining the sheet at the partitioning temperature PT for a time between 50 s and 150 s".

N From [0033] summed up in the above-mentioned 1, it is recognized that "cooling the sheet down to room temperature with a cooling rate" "of more than 1°C/s" is needed "in

order not to form ferrite or bainite".

O From [0030] and [0034] summed up in the above-mentioned 1, it is recognized that, due to "quenching" indicated in the above-mentioned L, "structure" becomes one that "contains martensite and it is at least 50%".

P From [0027]-[0034] summed up in the above-mentioned 1, and, more particularly, [0030] and [0034], it is recognized that as a result of the processing of the above-mentioned J-N, a "structure" of a "steel sheet" "consisting of 3% to 15% residual austenite and 85% to 97% martensite and bainite, without ferrite", which "contains martensite and it is at least 50%", is obtained, and "the sheet having a yield strength YS of at least 850 MPa, a tensile strength of at least 1180 MPa, a total elongation of at least 14%, and a hole expansion ratio (HER) according to the ISO standard 16630: 2009 of at least 30% can be obtained".

Q With reference to the examples described in [0035]-[0043] and FIG. 1 summed up in the above-mentioned 1, it can be understood that, among the samples described in [Table 1], sample 10 that solely satisfies the composition of Invention 8 and the processing conditions of the above-mentioned J-N satisfies the requirement of "having a yield strength YS of at least 850 MPa, a tensile strength TS of about 1180 MPa, a total elongation of at least 14%, and a hole expansion ratio HER measured according to ISO standard 16630: 2009 of at least 30%", thereby solving the problem to be solved of the above-mentioned (2).

R In addition, in the description of the Patent, there is no description regarding a means that is able "to provide" "a steel sheet having a yield strength YS of at least 850 MPa, a tensile strength TS of about 1180 MPa, a total elongation of at least 14%, and a hole expansion ratio HER measured according to the ISO standard 16630: 2009 of at least 30%" besides the above composition of B-I and the "processing" of J-N.

S Then, the invention described in the detailed description of the invention is an invention of a "steel sheet" having the composition of above B-I, and "having a yield strength of at least 850 MPa, a tensile strength of at least 1180 MPa, a total elongation of at least 14%, and a hole expansion ratio HER of at least 30%", "the structure consisting of 3% to 15% residual austenite and 85% to 97% martensite and bainite, without ferrite"; that is, a "steel sheet" including all the matters indicated in the above-mentioned A, and

thus it can be recognized by a person skilled in the art that the problem to be solved of the above-mentioned (2) can be solved by the relevant invention of "steel sheet".

T Furthermore, in view of the above-mentioned O, it is recognized that, due to quenching for manufacturing a steel sheet including all the matters indicated in the above-mentioned A, the steel sheet will "have a structure consisting of at least 50% martensite".

(4) Comparison between the Invention and the invention described in the detailed description of the invention

Since Inventions 8-10 that are inventions of a "steel sheet" include all the matters indicated in the above-mentioned (3)A, it is recognized that Inventions 8-10 are inventions described in the detailed description of the invention indicated in the above-mentioned (3)S, and are included in the range in which a person skilled in the art can recognize that the problem to be solved of the inventions can be solved by the descriptions of the detailed description of the invention.

Therefore, Inventions 8-10 are not ones that exceed a range in which a person skilled in the art can recognize that the problem to be solved of the inventions can be solved by the descriptions of the detailed description of the invention.

(5) Regarding Opponent's allegation

The Opponent alleges as indicated in the above-mentioned 1 of No. 3.

However, referring to the descriptions of [0024] and [0025], it is recognized that it can be understood by a person skilled in the art that, if the content of Nb and Ti is more than 0% and less than 0.05%, an event that large precipitates are formed and formability decreases, making the 14% total elongation more difficult to reach, does not occur, and thus solution of the problem to be solved of the above-mentioned (2) is not prevented.

In addition, the Opponent only alleges that Nb and Ti is not included in the specific examples, and, besides this, does not indicate a specific reason (theoretical grounds or specific examples) that the above-mentioned problem to be solved cannot be solved in the condition of the content of Nb and Ti being more than 0% and less than 0.05%.

Therefore, the Opponent's allegation cannot be adopted.

(6) Summary of the ground for opposition 1 (requirements for support)

Accordingly, the patents according to Claims 8-10 of the Patent are not ones

made for a patent application having the recitation of the scope of claims not meeting the requirement stipulated in Article 36(6)(i) of the Patent Act and thus must be cancelled under the provisions of Article 113(4) of the same Act.

4 Regarding the ground for opposition 2 (enablement requirement)

(1) Viewpoints for examining the enablement requirement

Although Inventions 8-10 are inventions of a "steel sheet" and fall under the category of the invention of a product, since, in an invention of a product, carrying out of the invention means an action such as producing and using the product itself (Article 2(3)(i) of the Patent Act), it is understood that, in order for an invention of a product to comply with the enablement requirement stipulated in Article 36(4)(i) of the Patent Act, the detailed description of the invention must be one in which the invention is described to the extent that a person skilled in the art can produce and use that product based on the descriptions of the description and the drawings and the common general technical knowledge at the time of application, without the need for performing excessive trial and errors and complicated and sophisticated experiments and the like.

Therefore, from this viewpoint, the enablement requirement for Inventions 8-10 will be discussed below.

(2) Examination regarding the enablement requirement for Inventions 8-10

A As indicated in the above-mentioned 3(3)A-I, in [0012] and [0019]-[0026] summed up in the above-mentioned 1, there is specified the composition of a "steel sheet" that is a "raw material".

Therefore, it is recognized that there is specified, in the description of the detailed description of the invention of the Patent, a "raw material" of Inventions 8-10.

B As indicated in the above-mentioned 3(3)J-N, in [0027]-[0034] summed up in the above-mentioned 1, it is recognized that conditions of the processing of "steel sheet" are specified, and, along with this, as a result of such processing, a "structure" of a "steel sheet" "consisting of 3% to 15% residual austenite and 85% to 97% martensite and bainite, without ferrite", which "contains martensite and it is at least 50%" is obtained, and "the sheet having a yield strength YS of at least 850 MPa, a tensile strength of at least 1180 MPa, a total elongation of at least 14%, and a hole expansion ratio (HER) according to the ISO standard 16630: 2009 of at least 30% can be obtained".

Then, it is recognized that there are specified, in the description of the detailed description of the invention of the Patent, "processing steps" of a "raw material" in the

manufacturing method of Inventions 8-10, and a "product" thereof.

C With reference to the examples described in [0035]-[0043] and FIG. 1 summed up in the above-mentioned 1, it is described that, among samples 1-17, only in sample 10 that satisfies all of the composition of Invention 8 and the processing conditions indicated in the above-mentioned 3(3)J-N, the requirement of "the sheet having a yield strength YS of at least 850 MPa, a tensile strength of at least 1180 MPa, a total elongation of at least 14%, and a hole expansion ratio (HER) according to ISO standard 16630: 2009 of at least 30% can be obtained" is satisfied.

D From the above-mentioned A-C, since there are clearly and sufficiently specified in the descriptions of the detailed description of the invention of the Patent, regarding the manufacturing method of Inventions 8-10, (i) a raw material, (ii) processing steps of the raw material, and (iii) a product, it is recognized that the descriptions of the detailed description of the invention of the Patent are described in such a way enabling a person skilled in the art to manufacture the "steel sheet" of Inventions 8-10.

E In addition, as also described in [0002] summed up in the above-mentioned 1, since it is a matter of common general technical knowledge that a "steel sheet" is capable of being used for body structural members and pieces of equipment for automotive vehicles, and other structure materials and the like, it is obvious that the descriptions of the detailed description of the invention of the Patent are ones described to the extent to enable a person skilled in the art to use the "steel sheet" of Inventions 8-10.

F Therefore, the descriptions of the detailed description of the invention of the Patent are described clearly and sufficiently to the extent that Inventions 8-10 can be carried out by a person skilled in the art.

(3) Regarding the Opponent's allegation

The Opponent alleges as indicated in the above-mentioned 2 of No. 3.

However, it is a matter of common general technical knowledge that a generation amount of martensite is increased if cooling is done at a sufficient speed at the time of quenching, and, further, as also indicated in the above-mentioned 3(3)O, from [0030] and [0034] summed up in the above-mentioned 1, it can be understood that, due to "quenching the sheet" by cooling at "a cooling rate of at least 30°C/s" that is "a cooling rate enough to avoid ferrite and bainite formation to a quenching temperature QT"

"between 275°C and 325°C" "lower than the Ms transformation point", the steel sheet comes to have a "structure" that "contains martensite and it is at least 50%".

Then, even if it is very difficult to distinguish martensite and bainite, and an identification method or a quantitative method of a fraction of martensite is not indicated at all, it is not recognized that excessive trial and errors or complicated and sophisticated experiments are required so as to make a structure having a fraction of martensite of at least 50%, because at the time of manufacturing a "steel sheet" of Inventions 8-10 by a person skilled in the art, it is possible to refer to the cooling condition at the time of quenching described in [0030].

Therefore, the relevant Opponent's allegation cannot be adopted.

(4) Summary of the ground for opposition 2 (enablement requirement)

Accordingly, the patents according to Claims 8-10 of the Patent are not ones made with respect to a patent application in which the descriptions of the detailed description of the invention do not meet the requirement stipulated in Article 36(4)(i) of the Patent Act, and must not be revoked under the provisions of the same Act Article 113(4).

No. 5 Closing

As above, the patents according to Claims 8-10 of the Patent cannot be revoked by the grounds for oppositions 1 and 2 described in the written opposition.

Furthermore, no other reason for revoking the patents according to Claims 8-10 of the Patent is found.

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

January 13, 2021

Chief administrative judge: NAKAZAWA, Noboru
Administrative judge: INOUE, Takeshi
Administrative judge: MASHIYAMA, Shinya