

Before The Controller of Patents

under

The Patents Act, 1970 (as amended) and The Patents Rules, 2003 (as amended)

And

Under section 14 and the Pre-grant Opposition u/s 25(1) on 29/06/2022

Suman Das (opponent)

Vs

Arcelormittal (Applicant)

Application Details	
Application number	201717013441 (hereinafter to be referred as '3441')
Application type	PCT National Phase Application
PCT int. details	PCT/IB2015/001944 [WO 2016/063118], 20/10/2015
Date of filing	15/04/2017
Title of invention	Method of production of tin containing non grain oriented silicon steel sheet steel sheet obtained and use thereof
E-mail (as per record)	Applicant: srinivasan.t@lakshmisri.com , prashant.phillips@lakshmisri.com, parul.varshney@lakshmisri.com Opponent: s.prasad@lsdavar.in, aastha.s@lsdavar.in
Hearing attended by	Applicant: Mr. T Srinivasan, IN/PA-507 Mr. Prashant Phillips, IN/PA-1229 Ms. Parul Varshney, IN/PA-3369 Opponent: Ms. Suman Lata Prasad, IN/PA-1752 Ms. Aastha Sharma, IN/PA-3456
Hearing dated	14/07/2023 17/07/2023
Hearing Submission	Applicant: Hearing u/s 14- 31/08/2023 (extension of one month filed) Pre-grant hearing- 06/09/2023 (extension of one month filed) Opponent: 20/09/2023 (15 days within the pre-grant hearing submission by the applicant)

1. The written submissions post-hearing appear to be timely, in accordance with the rules and directions outlined in the order dated 17/07/2024.

2. Claims Summary

No. of claims at the time of filing of application	No. of claims post-FER	No. of claims post-hearing
14	10	5

Subject matter in '3441

3. The subject matter in patent application '3441 seeks protection of a method of production of an annealed cold-rolled non grain-oriented Fe-Si steel consisting of Carbon (C), Silicon (Si), Aluminum (Al), Manganese (Mn), Nitrogen (N), Tin (Sn), Sulphur (S), Phosphorus (P), Titanium (Ti), Niobium (Nb), Vanadium (V), Copper (Cu), Nickel (Ni), Chromium (Cr), Boron (B) [in a certain quantity as claimed in claim 1] and balance being Fe, casting into a slab, Reheating, hot rolling, coiling, annealing, Cold rolling, heating and soaking and cooling.

Understanding Magnetic Property and grain-orientation in the steel

4. The applicant has asserted that imparting magnetic property in the Fe-Si steel is the most economical source of magnetic induction. Adding silicon to iron is a common method to enhance electrical resistivity, thus improving magnetic properties and reducing overall power losses. Currently, two families of steels are utilized for electrical equipment construction: grain-oriented and non-grain-oriented steels. Non-grain-oriented steels exhibit magnetic properties that are nearly uniform in all magnetizing directions, making them suitable for applications involving rotational movements, such as motors or generators. In contrast, grain-oriented steels have directional magnetic properties, optimized for applications where magnetic flux predominantly flows in one direction, such as transformers.
5. In crystallography, a grain refers to a distinct crystalline structure within a metal or alloy. These grains are formed during the solidification process when the metal or alloy transitions from a

liquid to a solid state. Each grain has its own orientation of atoms, resulting in a specific arrangement that contributes to the material's overall properties. The size, shape, and orientation of grains can significantly impact the mechanical, thermal, and electrical properties of the material.

6. A rough analogy can be made with a group of kids admitted to a nursery class. Their behavior can be likened to grains; each child behaves differently, akin to different grains in a classroom. Over time, there emerges a coherence in their behavior, which can be roughly equated to grain orientation in a particular direction.

Class:: Alloy

Children:: Grains

Children after 6 months:: Oriented grains

Citations

7. The citations considered in the instant case are tabulated as below:

	Section 14	Citations		Pre-grant
D1	JP2008127612A	FER stage	PG1	US7846271 B2
D2	WO2000065103A2		PG2	JP 2008-127600 A
D3	EP2602335A1		PG3	JP 2008-127612 A
D4	JP2006219692A	At hearing stage	PG4	JP 2000-129409 A

8. Apparently, I have to make separate decisions regarding the pre-grant opposition and the Section 14 hearing due to the presentation of different sets of citations. Additionally, if the pre-grant opposition is successful, there will be no need to decide on the Section 14 hearing.

Pre-grant Opposition

9. The grounds of pre-grant opposition taken by the opponent are followings:

- a. [Section 25 (1) (b)]- Prior claiming/ novelty.
- b. [Section 25 (1)(e)]- no inventive step.
- c. [Section 25(1)(f)]- not an invention or not patentable under the Act.
- d. [Section 25(1)(g)]- sufficiency of the disclosure

10. The applicant has opposed the opposition, alleging it to be a benami/proxy opposition, wherein the learned agent, Ms. Das, is considered a straw-man with no direct or indirect interest. Additionally, it was stated that the opponent has not disclosed its real identity and failed to provide Aadhar Card/Voter ID Card/Passport/Driving License to authenticate its identity.

11. In the context provided above, it is noted that the pre-grant opposition and post-grant opposition in the Act indeed have fundamental differences in terms of their allowable filing:

- a. For opposition to the grant of a patent / granted patent, the Patents Act of 1970 draws the eligibility of a person. Relevant sections 25(1) and 25 (2) are reproduced below:

Section- 25(1)

“(1) Where an application for a patent has been published but a patent has not been granted, **any person may**, in writing, represent by way of opposition to the Controller against the grant of patent on the ground”

Section- 25(2)

“(2) At any time after the grant of patent but before the expiry of a period of one year from the date of publication of grant of a patent, **any person interested** may give notice of opposition to the Controller in the prescribed manner on any of the following grounds, namely:—”

- b. Section 2 (t) of the Act defines “person interested” as below:

“"person interested" includes a person engaged in, or in promoting, research in the same field as that to which the invention relates;”

- c. Prima facie, the Act grants more power to **a common person** to file a pre-grant opposition, thus limiting a monopoly right to any party based on grounds outlined in sections 25(1)(a)-(k) of the Patents Act, 1970. In contrast, post-grant opposition can only be filed by a **person with a direct interest**. It is justified to view pre-grant opposition as a mechanism for public oversight and as assistance provided to the adjudicating authority/government. There is no

requirement for a common person to demonstrate a direct or indirect interest. Furthermore, there is no legal provision mandating a common person to disclose their identity to the Controller of Patents, unless specifically directed by the Controller under section 77(1) of the Act.

- d. In the context of benami/proxy opposition, it is worth noting that the term "benami" has been used in pre-grant opposition since the observation made by the Hon'ble High Court of Bombay in the case of Dhaval Diyora vs Union of India and Ors, dated 05/11/2020. However, it is important to recognize that the facts and circumstances of the aforementioned case are different from those of the current situation.

The matter pertains to the rejection of a patent application by a Controller. Subsequently, a review before the patent office was denied. The IPAB at that time remanded the case back to the patent office for fresh consideration, taking into account developments in the European Opposition Division. Despite this, the patent application was once again refused. An appeal was then filed before the appellate board, which concluded the hearing on August 10, 2020.

A pre-grant opposition was filed on 18 August 2020; the petitioner's advocate sent an e-mail to the Appellate Board for the pre-grant opposition. **Hence, when the pre-grant opposition was filed, the matter was in the IPAB.**

The filing of a pre-grant opposition when the matter is under the jurisdiction of the Controller, as opposed to when it is being heard by a Board/Court, presents entirely different scenarios. Prima facie, the contentions of the opponents in the aforementioned case seemed malicious and a delaying tactics, leading the court to refute the opponent's claims. However, since the facts and circumstances considered by the Hon'ble Court were entirely different, it is not appropriate to draw an analogy in the instant opposition."

- e. In the cases of Anagaya Million Pharma LLP v. Nippon Soda Co. Ltd and Ors (MANU/IC/0074/2020), and Pfizer Products Inc. v. The Controller of Patents & Designs (2020 SCC OnLine IPAB 19), the recommendations of the IPAB were not enacted into law.

This opposition in that case seemed to be malicious and ill-intended, therefore was considered a tool of harassment. As relevant citations are provided by an opponent and the opposition is duly represented, I cannot consider the opposition to be a tool of harassment. In the present case, I have observed that relevant prior art has been cited by the opponent.

Technical Analysis

12. PG1-PG4 were cited in the opposition.

	Pre-grant
PG1	US7846271 B2
PG2	JP 2008-127600 A
PG3	JP 2008-127612 A
PG4	JP 2000-129409 A

13. The method steps can be pictorially represented as below:

CT1

Steps		'3441	PG1	Reference (in spec. of PG1)
1	M1.12+ M1.13	Melting and casting	General step	
2	M1.14	Reheating (1050-1250°)	reheating (Ar1- 1250 °C) Ar1 is 960-1060 °C	claim 1; line nos. 18-26, column 3
3	M1.15	Hot rolling (750-950°)	Ar1+50- Ar1-80 °C	claim 1; line no. 29, column 3
4	M1.16	Coiling (500-750°)	Winding (650 – 800 °C)	claim 1; line no. 35-36, column 3
5	M1.17	Annealing (650-950°)	Optional annealing and pickling	line no. 16-18 column 7
6		Holding at 5 for 10s-48 hrs		
7	M1.18	Cold rolling	Cold rolling	claim 1; line no. 37, column 3
8	M1.19	heating (850-1150°)	Final annealing (800 °C - Ar1+50 °C) 10-40 °C/sec	claim 1; line no. 39, column 3
9	M1.20	Holding at 8 for 20-100s		
10	M 1.21	Cooling	Cooling to room temp (RT)	

CT2: Compositional comparison

Elements		'3441	PG1 US7846271B
C	M1.3	≤ 0.006	≤ 0.005
Si	M1.4	2.2-3.3	1-3
Al	M1.5	0.1-3.0	0.1-1.5
Mn	M1.6	0.1-3.0	0.1-2.0
N	M1.7	≤ 0.006	≤ 0.003
Sn	M1.8	0.11-0.15	0.007-0.15 Sn or Sb
S	M1.9	≤ 0.005	≤ 0.003
P	M1.10	≤ 0.2	≤ 0.1
Ti	M 1.11	≤ 0.01	≤ 0.002
**Nb		≤ 0.005	≤ 0.002
V		≤ 0.005	

Cu		≤ 0.030	
Ni		≤ 0.030	
Cr		≤ 0.040	
B		≤ 0.0005	

** elements represented in purple were not the part of the originally filed claim. They have been added in final submission.

CT 3: Elemental comparison with PG1

Elements		'3441	PG1 US7846271B	Relevant Paragraph/ claim etc. for PG1
C	M1.3	≤ 0.006	≤ 0.005	claim 1; line no. 23-25, column 3
Si	M1.4	2.2-3.3	1-3	
Al	M1.5	0.1-3.0	0.1-1.5	
Mn	M1.6	0.1-3.0	0.1-2.0	
N	M1.7	≤ 0.006	≤ 0.003	claim 1; line no. 40-43, column 3
Sn	M1.8	0.11-0.15	0.007-0.15 Sn or Sb	
S	M1.9	≤ 0.005	≤ 0.003	
P	M1.10	≤ 0.2	≤ 0.1	claim 1; line no. 24, column 3
Ti	M 1.11	≤ 0.01	≤ 0.002	claim 1; line no. 43-44, column 3
**Nb		≤ 0.005	≤ 0.002	Table 9
V		≤ 0.005		
Cu		≤ 0.030		
Ni		≤ 0.030		
Cr		≤ 0.040		
B		≤ 0.0005		

CT 4: Resistivity, and Magnetic properties

Type	Resistivity	Losses at 1.5 T/50Hz (W/kg)	B5000(T)
Heat 1	—	2.98	1.663
Heat 2	—	2.92	1.695
Heat 3	—	2.40	1.666
Heat 4	—	2.34	1.688
Heat 5	53.07	2.17	1.673
Heat 6	55.54	2.12	1.682
PG1 (table 1-4)		2.72-3.65	B50(T)
Table 6 Without Sn or Sb		2.84-3.15	1.67-1.75 1.73-1.75
PG1 with Sn or Sb		2.81-2.93 (table 8)	1.74-1.74 (table 8)

Core losses at 1.5 T/50Hz (W/kg) in '3441 and PG1 are comparable under the same scientific conditions [1.5 T/50Hz]. The magnetic flux density/magnetic induction is represented as B₅₀₀₀ and B₅₀ in '3441 and PG1 respectively. Upon careful reading, I understand that PG1 explicitly states the condition for B50 as [B50: magnetic flux density occurring when a magnetic field of 5000 A/m at 50 Hz was applied]. However, for

B₅₀₀₀, the states are not defined. Nevertheless, since the losses are calculated at 50 Hz in '3441 as well, I believe that 5000 represents the magnetic field condition only."

Consideration of Method claim for Novelty [25(1) (b)]

14. Based on the comparison with PG1, it is apparent that PG1 explicitly describes the presence of C, Si, Al, Mn, N, Sn/Sb, S, P, Ti, and Nb within similar ranges as in '3441. Also, the contention of the applicant through submission in paragraphs 27 and 28 seems misplaced, as Si and Sn are present in few examples [example steels 13-16 in table 7 of PG1] as indicated and compared in CT4. Since the product claim is deleted from the specification in '3441, it implies that the composition of the product is not important here. However, the composition may not be crucial for determining the novelty of the method step. It is noteworthy that for a similar initial composition, different sets of methods and treatments may lead to technical advancements in terms of mechanical, magnetic, or physical properties, thus making it suitable for various applications. Moreover, a method step can demonstrate technical advancement by consuming less energy overall, thereby enhancing its technical sophistication. Therefore, the contention of the applicant regarding the combination of features M1.3 to M1.12 of the pending claim 1 is not acceptable.
15. In the present case, I have observed that the applicant has asserted that features M1.3-M1.12 constitute a novelty step. However, this assertion is not agreed upon, especially due to the fact that steps M1.3-1.11 (involving collecting alloying elements) refer to alloying elements within certain weight percentages (in any order), and M1.12 involves a melting step. It is important to note that the composition should not be considered a defining feature of the method step; rather, melting should be considered the method step. Although weighing of elements is a method step, the said elemental step or step like melting are essential steps that cannot be considered for defining the novelty of a method step. Such elemental steps would not be method-defining features.
16. Without prejudice to the above, the applicant has stated in its submission that PG1 doesn't disclose steps M1.15 and M1.17. The opponent has reiterated its stand that these methods are not novel.

M1.15

It is noted that the opponent in the opposition stated that choosing a hot rolling temperature of 750-950°C would be obvious as PG1 teaches to choose a temperature range from Ar1+50 to Ar1-80°C. The Ar1 temperature is disclosed as 960-1060°C in PG1 for a similar composition as in '3441. The hot rolling temperature, therefore, appears to be in a range of 880-1100°C. The claimed temperature range of 750-950°C in '3441 falls within this range. Accordingly, M1.15 seems not considerable for novelty.

M1.17

Annealing in PG1 is an optional step. PG1 fails to disclose any temperature range and holding time. Therefore, novelty in the method step can be established.

25(1)(e)

17. Now, even if I don't consider my observations in paragraph 15 above, i.e., I consider having differences in alloying elements may render novelty, I have to see if the applicant is able to establish any technical advancement in terms of any advanced technical property in the material or energy-efficient method as compared to the prior art, owing to the alloying elements and method step M1.17. However, I would be liberal in noting any minor difference in any method step and assessing its economic or technical effect to consider the inventive step of the claimed invention.
18. The applicant has disclosed the presence of elements Nb, V, Cu, Ni, Cr, and B on page 5 of the specification in the international application under the Patent Cooperation Treaty as below:

The balance is iron and unavoidable impurities such as the ones listed here below with their maximum contents allowed in the steel according to the invention:

Nb ≤ 0.005 wt%

V < 0.005 wt%

Cu < 0.030 wt%

Ni < 0.030 wt%

Cr < 0.040 wt%

B < 0.0005

Other possible impurities are: As, Pb, Se, Zr, Ca, O, Co, Sb, and n, that may be present at traces level

It is therefore fair to assume that the applicant has by far not intentionally added the above elements to modify the properties. Rather, these elements are undesirable and unavoidable. The presence of these elements is likely to be in other cited cases (detectable or not detectable). Whatever the case may be, the presence of these elements is not to be considered for contributing to the novelty or the inventive step, especially in cases where any other cited prior arts do disclose the reference of these unavoidable impurities.

19. PG2(JP2008127600A) in the specification discloses as below:

“In addition to the above elements, the present invention may contain S, P, N, O, Cu, Ni, Cr, Ca, etc. as inevitable impurities as long as the mechanical properties and magnetic properties of the present invention are not impaired. However, as in the past, it is preferable that S, N, and O as impurities are small. Each of these components is preferably 0.001% or less, 0.0025% or less, and 0.003% or less.

Further, the ranges where it is confirmed that the target anisotropy is not inhibited are Cu <0.2%, Ni <0.1%, Cr <0.1%, Ca <0.01%, Nb < 0.002% and Ti <0.003%, these elements are preferably suppressed within the above ranges. Note that Sb should not be added because it reduces anisotropy. When Sb is unavoidably contained, it is preferably less than 0.001%.”

PG3 (JP2008127612A) in the specification discloses as below:

“In the present invention, in addition to the above elements, S, P, N, O, Cu, Ni, Cr, Ca, REM (rare earth elements) and the like are inevitable impurities, and the mechanical and magnetic properties of the present invention are not impaired. You may contain. However, as in the past, it is preferable that S, N, and O as impurities are small. Each of these components is preferably 0.003% or less, 0.0025% or less, and 0.003% or less.

Further, the ranges where it is confirmed that the target anisotropy is not inhibited are Cu <0.2%, Ni <0.1%, Cr <0.1%, Ca <0.01%, Nb <0.002%, Ti <0.003%, and R E M <0.01%, it is desirable to suppress these elements within the above ranges. Note that Sb should not be added because it reduces anisotropy. When Sb is inevitably contained, it is preferably less than 0.001%.”

PG4 in claims and specification discloses

“impurity elements S: $\leq 0.0050\%$, N: $\leq 0.0040\%$, O: $\leq 0.0030\%$, Ti: $\leq 0.0030\%$, Zr: $\leq 0.0030\%$, V: $\leq 0.0050\%$, B: $\leq 0.0010\%$, Nb: $\leq 0.0050\%$ ”

20. Now, even if I disagree with my reasoning in paragraphs 14-15 above [that the presence and composition of the alloying elements can't be considered for novelty of a method step], the presence of the alloying elements Nb \leq 0.005 wt%, V < 0.005 wt%, Cu < 0.030 wt%, Ni < 0.030 wt%, Cr < 0.040 wt%, B < 0.0005 in '3441 can't be considered new. These elements are said to be unavoidable impurities and are present in feeble quantities. Also, the limits of these impurities are disclosed in PG2-PG4 as indicated in paragraph 19 have reported these elements to be present in the non-oriented electrical steel sheets.

CT5:

Impurities reported				
Elements	'3441	PG2 JP 2008-127600 A	PG3 JP 2008-127612 A	PG4 JP 2000- 129409 A
1	2	3	4	5
Nb	\leq 0.005	<0.002	<0.002	\leq 0.0050
V	\leq 0.005	0.001 (ex. 3)	—	\leq 0.0050
Cu	\leq 0.030	<0.2	<0.2	—**
Ni	\leq 0.030	<0.1	<0.1	—**
Cr	\leq 0.040	<0.1	<0.1	—**
B	\leq 0.005	—	—	\leq 0.0010
Ca	—	<0.1	<0.1	—
S	\leq 0.005	\leq 0.001	\leq 0.003	\leq 0.005
N	\leq 0.006	\leq 0.0025	\leq 0.0025	\leq 0.0040
O		\leq 0.003	\leq 0.003	\leq 0.0030
Zr	—	—	—	\leq 0.0030
Mo	—	—	\leq 0.002	—
P	\leq 0.02	—	\leq 0.02	—

** Cu, Ni, Cr, are optionally present in PG4.

The presence of P, S, and Ti is also observed to be in the same range. Therefore, the effect of these elements is bound to be similar. Since the elemental compositions of the alloying elements are in close proximity or in the same/similar ranges with respect to PG1, and the newly added elements (reported to be unavoidable impurities) are also in similar proximity, the presence of these elements and composition of alloying elements are understood to be known and well motivating to any person skilled in the art, and to add alloying elements in a manner to suppress any detrimental effect, if any.

21. It is noted that in the argument of the applicant vide paragraph 36, regarding the inventive step, the applicant has asserted [reproduce] as below:

49. The Applicant strongly disagrees with the Opponent's contentions in relation to lack of inventive step and submits that in said points the Opponent asserts the following:

- a. Features M1.1- M1.15 and M1.17- M1.18 of the claim 1 are disclosed D1-D4 # [PG1-PG4]*
- b. Feature M1.16 of the claim 1 is disclosed in D1-D2 and D4*
- c. Features M1.19-M1.20 of the claim 1 are disclosed in D1-D3*
- d. Feature M1.21 of the claim 1 is obvious to a person skilled in the art*

D1-D4 shall correspondingly refer to PG1-PG4

I find it surprising that features M1.16, M1.19-1.21 are mentioned, considering that the applicant did not rely on them to establish novelty. The opponent has made clear assertion in respect of process steps M1.16, M1.19-1.21 in their opposition [paragraphs 32 and 35] being not novel with respect to PG1. It seems reasonable to presume that the applicant understands these steps to be anticipated by PG1. This makes it difficult for me to understand the thoroughness of the applicant's submission. Since the applicant didn't use these steps to establish novelty in their written and oral arguments, it's unclear how they could be considered for inventive step. In assessing patentability, the order of precedence typically follows novelty before inventive step.

22. Without prejudice to the above, let me assess features as mentioned above to render justice in the instant case.

- M1.1 is preamble of the claim relating to an annealed cold-rolled non-grain oriented Fe-Si steel Sheet. The same is the subject matter of PG1-PG4.
- M 1.2 is a general melting step. The same is taught in all of the citations.
- M1.3-1.12 is regarding the composition of the alloying elements. The differentiation and consideration of the same has been discussed in the above paragraphs.
- M1.13 is a general step of casting into the slab. The same is taught in all of the citations.
- M1.1.4 discloses the heating range of 1050-1250⁰C which is within the range of Ar1- 1250°C (Ar1=960-1060°C) i.e 960-1250°C.

- M1.15 in '3441- The hot rolling temperature, appears to be in a range of 880-1100°C. The claimed temperature range of 750-950°C in '3441 falls within this range. [See paragraph 16 of this decision].
- M1.16- the process of coiling and winding are same. The temperature range of 500-750° is overlapping with disclose range 650 – 800 °C in PG1.
- M1.17 is recorded to be different in respect of holding time.
- M1.18 is a cold rolling step.
- M1.19+ M1.20 is recorded to be different in respect of holding time. The temperature range of heating in '3441 [850-1150] is overlapping with that in PG1 [800-1110°C as Ar1 is claimed to be 960-1060°C, see method step M1.14]
- M1.21 is a cooling step.

23. On careful reading of examples 1-3 [Heat 1-6] of the complete specification that represent the experimentally observed values and parameters, I observe the following:

CT6

S. No.	Steps	'3441	PG1	Ex.1	Ex.2	Ex. 3
A	B	C	D	E	F	G
1	M1.12+ M1.13	Melting and casting	General step	Yes		
2	M1.14	Reheating (1050-1250°)	reheating (Ar1- 1250 °C) Ar1 is 960-1060 °C	1150	1120	1150
3	M1.15	Hot rolling (750-950°)	Ar1+50- Ar1-80 °C i.e. 880-1100°C	950	870	850
4	M1.16	Coiling (500-750°)	Winding (650 – 800 °C)	530	635	550
5	M1.17	Annealing (650-950°)	Optional annealing and pickling	750	750	800
6		Holding at 5 for 10s-48 hrs		48hrs		
7	M1.18	Cold rolling	Cold rolling	Cold rolling		
8	M1.19	Heating (850-1150°)	Final annealing (800 °C - Ar1+50 °C) 10-40 °C/sec	1000	950	1040
9	M1.20	Holding at 8 for 20-100s		40s	60s	60s
10	M 1.21	Cooling	Cooling to room temp (RT)	Yes		

In columns E-G, I observed that the temperature range in method steps M1.15, M1.16, and M1.17 are different than the claimed range of PG1. Therefore, the apparent effects of these are to be observed for determining technical advancement.

Approach for determining the inventive step

24. Through above discussions, Through the above discussions, it can be concluded that the composition of the alloying elements would not add to a method step for the determination of novelty or inventive step. The method steps in '3441 have overlapping temperature ranges with respect to PG1 [see CT6]. On careful reading of the examples in '3441, certain differences are observed in the treatment conditions, such as temperature and time of holding, etc [see CT6, row no. 6 and 9].

Therefore, appropriately, there could be two kinds of comparative approaches with the cited prior arts to determine inventive step.

Energy approach for inventive step- Economic consideration

One consideration would be the evaluation of energy consumption. Additionally, a prima facie comparison with PG1 shows a differentiating step of M1.15, M1.16, M1.17, and M1.19. Though M1.15 and M1.16 are similar and essential steps claimed in '3441 and PG1, M1.17 is claimed to be an optional step in PG1. Furthermore, M1.17 and M1.19 involve higher holding times of around 48 hours (in examples of '3441) and 40-60 seconds, respectively. Therefore, concerning the energy approach, '3441 seems to lack qualitatively. However, in the absence of any real energy or cost values, this approach would be impractical to consider, as neither '3441 describes the energy or cost consumption approach in implying the claimed method step nor do any of the cited prior arts PG1-PG4.

Technical effect of method steps on material (in terms of property)- technical effect

The other approach would be comparing the differences in the technical effect due to the implication of the different method steps observed in '3441 and seeing any technical effect of the same. The technical effect in such cases would be on the property of the material. In the instant case, the applicant is trying to achieve an attractive iron loss value, which can be compared.

25. The magnetic properties reported in the specification are iron losses, flux density, and resistivity. In view of the above discussion, I find it appropriate to compare the technical properties as reported

CT 7: Resistivity, and Magnetic properties

	Type	Resistivity	Losses at 1.5 T/50Hz (W/kg)	B5000(T)
	1	2	3	4
1	Heat 1	—	2.98	1.663
2	Heat 2	—	2.92	1.695
3	Heat 3	—	2.40	1.666
4	Heat 4	—	2.34	1.688
5	Heat 5	53.07	2.17	1.673
6	Heat 6	55.54	2.12	1.682
7	PG11 (table 1-4) Table 6 Without Sn or Sb	Not provided	2.72-3.65 2.84-3.15	B50(T) 1.67-1.75 1.73-1.75
8	PG1 with Sn or Sb	Not provided	2.81-2.93 (table 8)	1.74-1.74 (table 8)
9	PG2	Not provided	Not comparable	Not provided
10	PG3	Not provided	Not comparable	Not provided
11	PG4	Not provided	2.3-2.6 (para 2, table 3) ^{##}	1.62-1.72 (para 2, table 3)

^{##} Iron losses and flux density calculated when magnetized at 1.5T, frequency 50 Hz, at magnetizing force of 5000A/m

Iron Loss

On comparing the iron loss data in column 3 of CT7 for '3441, the reported iron loss appears to be in the range of 2.12-3.65 at 1.5 T/50Hz (W/kg); the iron losses reported in PG1 and PG4 fall within 2.3-2.93. The lower the loss, the better the property is considered. The upper limit of 3.65 is not better than PG1 (2.93) and PG4 (2.6). The lower limits of 2.12 in '3441 and 2.3 in PG4 are comparable and may not be considered surprising. So it would be appropriate to refer to any general state of the art which could bring clarity on the comparability of 2.12 over 2.3 W/kg of iron losses in '3441 and PG4.

General state of Art

Without prejudice to the above, I have also noted that the general state of the art, as presented in Sung et al., via the Journal of Applied Physics, 113, 17A338 (2013); DOI: 10.1063/1.4795418,

teaches the magnetic property of Fe-Si alloy (without Sn though) in Table 2. The core loss W1.5/50 is reported to be 2.7 and 2.0, which is again comparable with respect to '3441 (lower limit of 2.12) and PG4 (lower limit of 2.3). Therefore, the value of 2.12 W/kg is comparable with the general state of the art. Accordingly, a value of 2.12 W/kg would not be compared surprising given Iron losses reported in PG1 and PG4 falls in 2.3-2.93. Therefore, I don't consider the reported iron loss to be technically advanced in '3441.

Resistivity

Regarding the resistivity, I note that PG1-PG4 fails to disclose the measured value for any composition for the given set of treatments. Since many similarities are observed in the treatment method steps and compositions, a layman assumption at this point, given the iron loss is comparable, can be that resistivity will not be surprising. Table 2 of Sung et al. (a general state of art) clears any doubt in my mind, as the disclosed resistivity value is better for Fe-1 Si and comparable for 35H210.

Flux Density

On comparing the flux density data in column 4 of CT7, the reported flux density appears to be in the range of 1.66-1.75 at 1.5 T/50Hz and at a magnetizing force of 5000A/m. The flux density reported in PG1 and PG4 falls within 1.62-1.74. The reported values are comparable and cannot be considered surprising or technically advanced.

Conclusion on section 25(1) (e)

26. Based on my understanding, as observed in paragraphs 21-23, it is fair and appropriate to consider method steps M1.15, M1.16, M1.17, and M1.19 differently for the purpose of understanding the surprising effect or technical advancement. It was observed that there could be two approaches in determining the same: the energy approach and/or the technical property approach. Though there seem to be some extra steps in '3441 which would likely increase energy consumption, unfortunately, neither '3441 nor PG1-PG4 discloses the total energy consumption. Therefore, the said approach can't

be considered. The technical properties (iron loss and magnetic flux density) of the alloy reported in '3441 were found to be comparable with PG1-PG4. Also, and without prejudice, with the help of a general state of art like Sung et al., I understand that better iron loss/resistivity values than those reported in '3441 are known for Fe-Si alloys in the prior art. Based on the above, I consider the claimed subject matter not meeting the criteria of section 2(1)(ja) of the Patents Act, 1970.

25(1) (f)

27. The opposition under section 25(1) (f) seems not to be standing the ground. The applicant has challenged the non-patentability under section 3(d) of the Act, stating the composition to be a new form of a known substance. On carefully reviewing the arguments of the applicant and further submissions of the opponent, I understand that the claimed subject matter now refers to a method step implied on a composition range. It is also understood that a composition would not render a method claim novel or inventive; rather, the approach related to energy or achieved technical property needs critical analysis. Therefore, as it is claimed as a method, there would be no requirement to analyze the composition of claims to categorize the subject matter under the umbrella of a new form of known substance.

As far as the **discovery of a new property** is concerned, this may hold true only in the case where the material property in its naturally existing form is claimed or novelty of a material is in question. In cases where artificial composition materials are tuned by implying method steps, the same will not render the discovery of a new property since the same is associated with micro-structural changes.

As far as the **new use of a known substance** is concerned, it is observed that the substance is not used in its natural form, but alloying elements are added. Although the alloying elements are known to exist within overlapping ranges in the prior art, I am not inclined to consider them as relevant, given that a method step is claimed where the composition would be irrelevant. This is without prejudice to any required disclosure under section 10(4) considered relevant.

Regarding the **known process**, annealing, and heat-treatment steps are well-known metallurgical techniques; however, the shuffling of the order, periodicity, and scientific ranges have, in principle, proven to be both economical and effective in modifying the desired properties. Without prejudice, the opponent has failed to establish whether all the steps and associated parameters were known in the same order or different in this case. Therefore, I am not convinced of the applicability of section 3(d) at all.

25(1) (g)

28. Regarding section 25(1) (g) of the Act, I observe that the opponent has opposed the composition of alloys, mechanical properties of the alloy (yield strength, tensile strength), and grain size disclosure. I have observed that the applicant has not supplied any micro-structure/micrograph for claiming a certain size range of the grains. In this matter, I note that the sufficiency of disclosure is a mechanism to enable technology transfer on the principle of *quid pro quo*. The same is implied on reading section 10(4) with section 64 (1) (h) of the Act. It enables a person of average skill and average knowledge in the art to be able to work the invention. If some data are not experimentally observed and only extrapolated in some cases, it would pass an undue burden of performing and verifying through experiments for understanding the claimed scope of the invention of an applicant for which he was given protection without giving full and particular disclosure. This would be against the spirit of the Act, especially in the case of subjects like Metallurgy and Material Engineering, where the micro-composition of the alloy is critically important. Even a scientific paper can't extrapolate the claim but state an extrapolated possibility. We can't confer patent rights for extrapolation in the above-mentioned field. This will open a Pandora's box which would promote extrapolation but hinder technology transfer.
29. Without prejudice to the above observation, I have noted that the applicant has deleted the product claim and associated mechanical and micro-structural properties. Regarding the composition of the alloy, I find it appropriate to compare the disclosed and claimed data of the applicant in '3441. The applicant has provided six examples (Heat 1 - Heat 6). The other portions of the specification merely

reiterate the claimed composition ranges of elements in claim 1 without any experimental data. They are mere statements. The comparison is as below:

CT 8

Elements		*3441 Claimed	Disclosed	Remarks on claimed range	PG1 US7846271B
1	2	3	4	5	6
C	M1.3	≤ 0.006	0.0009-0.0053		≤ 0.005
Si	M1.4	2.2-3.3	2.3-3.3		1-3
Al	M1.5	0.1-3.0	0.38-.77	~ 3 time on lower side, 4 times on higher side	0.1-1.5
Mn	M1.6	0.1-3.0	0.13-0.24	~14 time on higher side	0.1-2.0
N	M1.7	≤ 0.006	0.0004-0.0021	~3 times on higher side	≤ 0.003
Sn	M1.8	0.11-0.15	0.005-0.12		0.007-0.15 Sn or Sb
S	M1.9	≤ 0.005	0.004-0.005		≤ 0.003
P	M1.10	≤ 0.2	0.0165-0.0180		≤ 0.1
Ti	M 1.11	≤ 0.01	0.0015-0.0060		≤ 0.002

Based on the above, it can be fairly established that the claimed ranges of the alloying elements are not supported by the experimental data. The presence of alloying elements is anticipated, and furthermore, the range of alloying elements overlaps with that of PG1. I have previously noted that the composition at the micro-level also affects the properties and microstructure of the alloy. Even the cited documents (PG1-PG4) disclose the micro range of composition of elements. Additionally, the mere mention of the ranges of alloying elements in the process step would restrict any other competitor or the general public from working on the claimed range of alloy with the same method steps if it were to be granted. Therefore, I am inclined to consider that the composition of the claimed range of elements in claim 1, which is otherwise a process claim (where novelty and inventive step would not be determined by the content or fraction of alloying element), is not fully and particularly disclosed. Even if the above range of alloying elements is considered, it has been established in previous paragraphs that no technical advancement is observed. The opposition under section 25 (1) (g) is valid.

Decision on the Pre-grant Opposition

30. The opposition under sections 25(1)(b) and (f) is not proven.

31. From my understanding of the paragraphs above, I am of the opinion that the claimed subject matter is not inventive and is not fully and particularly disclosed (due to a lack of experimental data). Accordingly, I conclude that the grounds of the pre-grant opposition, namely sections 25(1)(e) and 25(1)(g), are valid. Therefore, I refuse to proceed with the grant of instant subject matter.

Section 14

32. Without prejudice, it is also observed that the hearing notice under section 14 did have an objection on the sufficiency of the disclosure with respect to the elemental compositions that is decided in favor of the opponent. Also, in CT6 of this decision, I have observed that the claimed parameters of the treatment, like holding time in M1.18 and 1.20, are not fully and particularly disclosed. In the absence of any explicit objection in this respect in the hearing notice, I can't decide on the same. However, since pre-grant opposition is accepted, there will be no requirement for further hearing under section 14 of the Act.

33. I am of the opinion that no decision on the section 14 hearing can be considered pending, as the pre-grant opposition is successful. To expedite the process of examination, only the hearing under section 14 was concluded.

07th May 2024

Patent Office, Kolkata

Kundan Kumar

Assistant Controller of Patents and Designs