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**Datasheet for the decision
of 29 September 2016**

Case Number: T 1408/13 - 3.2.07

Application Number: 00976238.6

Publication Number: 1216286

IPC: C10B29/00, C10B47/02, C10B57/00

Language of the proceedings: EN

Title of invention:
Energy recovery coke oven facility producing high quality
metallurgical coke

Patent Proprietor:
Sesa Goa Limited

Opponent:
ThyssenKrupp Industrial Solutions AG

Headword:

Relevant legal provisions:
EPC Art. 108, 101(1), 56
EPC R. 99(2)

Keyword:

Admissibility of appeal - (yes)

Inventive step - (yes)

Decisions cited:

Catchword:



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Boards of Appeal
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Case Number: T 1408/13 - 3.2.07

D E C I S I O N
of Technical Board of Appeal 3.2.07
of 29 September 2016

Appellant: ThyssenKrupp Industrial Solutions AG
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted on 11 April 2013 rejecting the opposition filed against European patent No. 1216286 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	H. Meinders
Members:	V. Bevilacqua
	I. Beckedorf

Summary of Facts and Submissions

I. The appellant (opponent) lodged an appeal against the decision rejecting the opposition against European patent 1 216 286.

II. The following documents were mentioned, among others, in the appealed decision:

D1: GB-A-1 555 400;

D2: Thyssen Still Otto/PACTI, Non-recovery cokemaking system; W.E.BUSS et Al. Iron and Steel Engineer, Vol. 76, Nr. 1, January 1999, pages 33-38;

D3: Start up and operation of Jewells non-recovery coke battery; J.J.KNOERZER, Iron and Steel Engineer, Vol. 69, Nr 3, March 1992, pages 50-53;

D6: US-A-4 287 024;

D16: "GESCHICHTE DER KOKEREITECHNIK",
STEINKHOLENBERGBAUVEREIN, ESSEN, 1957, oindex,
pages 138-149 and 438-445.

The following additional documents were mentioned in the statement setting out the grounds of appeal:

D18: <http://www.illawarracoke.com.au/1990s%20Coalcliff%20Cokeworks/1990s/20index.htm>; Illawara Coke Company Historical Archive;

D19: DE 19 545 736 A1;

D20: "GESCHICHTE DER KOKEREITECHNIK",
STEINKHOLENBERGBAUVEREIN, ESSEN, 1957, pages
106-145 and 231.

III. The appellant requested that the decision under appeal be set aside and that the patent in suit be revoked.

- IV. The respondent (patent proprietor) requested that the appeal be rejected as inadmissible or, in the alternative, that the appeal be dismissed or that the case be remitted to the opposition division for further prosecution, or as a further alternative that when setting aside the decision under appeal the patent be maintained in amended form on the basis of one of the sets of claims filed as auxiliary request 1 with letter of 13 December 2012 and as auxiliary requests 2 to 17 with letter of 17 December 2012.
- V. Oral proceedings took place before the Board on 29 September 2016. Although having been duly summoned, the respondent did not attend the oral proceedings, as announced with letter of 23 September 2016. According to Rule 115(2) EPC and Article 15(3) RPBA, proceedings were continued without that party. The present decision was given at the end of oral proceedings.
- VI. The text of independent claim 1 of the **main request** is as follows:

"A top charging plant for producing metallurgical coke by the non-recovery method with coke ovens (0) made of refractories, and a common flue duct (8), the coke-ovens each comprising a coking chamber (000), a floor (00), an underflue system, a root (1) with charging openings (2), and a foundation (21), wherein the ovens (0) are arranged side by side with dividing walls (19) and are interconnected with the common flue duct (8), the underflue system is provided with an air inlet duct and a feeder flue duct (9) that is connected to the common flue duct (8), with the common flue duct (8) being provided with a damper valve (170) to control inlet of tertiary air, and the foundation is provided with air ducts (11) for cooling, wherein the exhaust

ends thereof are connected with the coking chamber and the air inlet duct of the underflue system."

The text of independent claim 7 of the **main request** is as follows:

"A process for producing metallurgical coke by the non-recovery method in a top charging plant, wherein coal is charged into coke ovens, heated by combustion of evolving fuel gases of coking by means of air in order to produce coke, the coke is discharged from the coke ovens and quenched, the exhaust flue gases are fed into a common flue duct which is maintained at a negative pressure, are combusted in the common flue duct and are transported to a stack and/or a waste heat boiler, air is introduced into the common flue in a controlled manner in order to combust products in the exhaust flue gases, and the coke oven foundation is cooled by means of ambient air and the heated air is fed into the coke oven chamber and the underflue system."

VII. Insofar as relevant to the present decision the appellant argued substantially as follows.

D6 is a suitable starting point to discuss inventive step of the subject-matter of independent claims 1 and 7 of the main request.

This document fails to disclose the following features of claim 1 as granted:

- that the plant is a top charging plant, having a roof with charging openings;
- that the exhaust ends of the air ducts provided within the foundation are connected with the coking chamber.

The contribution to inventive step of each of these two distinguishing features can be discussed separately with the partial problems approach.

Charging the plant from above, through charging openings in the roof, is substantially equivalent to charging it frontally, as disclosed in D6, and does not have any further effects on the temperature of the foundation or of the coking chamber.

The problem to be solved by this feature alone is therefore limited to finding an alternative to the frontal charging known from D6.

As top charging is well known in this technical field, this feature cannot justify the presence of inventive step (see D3, page 52, left column, second paragraph, see also D2, page 35, left column, paragraph 8).

Connecting the exhaust ends of the air ducts provided within the foundation **also** with the coking chamber has the effect that air which is already hot is supplied to the coking chamber, resulting in a more even temperature distribution.

This also increases the temperature in the coking chamber and saves thermal energy by not having to heat the air which was before introduced at ambient temperature.

No inventive step should be acknowledged for that, because the skilled person would immediately understand that a temperature increase in the coking chamber would be achieved by connecting the exhaust ends of the air ducts provided within the foundation with it.

This is because D6 explicitly mentions this effect (column 3, lines 35-51) when the introduction of hot air in the underflue system is discussed.

Connecting the exhaust ends of the air ducts provided within the foundation with the coking chamber is a way to recover the heat subtracted to the foundation.

The objective technical problem can therefore be also defined as providing an alternative use of the available hot air in this plant to recover thermal energy.

No inventive step should again be acknowledged because there are only two locations in the plant of D6 to introduce combustion air (underflue, coking chamber), and as a consequence of that the skilled person looking for an alternative would immediately connect the exhaust ends of the air ducts provided within the foundation with the coking chamber, as it is the only possibility left.

Lack of inventive step is also evident when the content of D20 is taken into consideration.

This is because in this document there is a clear teaching that the exhaust ends of the air ducts provided within the foundation are to be connected with the coking chamber.

Claim 7 lacks inventive step for the same reasons.

VIII. The respondent argued, insofar as relevant to the present decision, substantially as follows.

The appeal is not within the same legal and factual framework of the opposition, and should therefore be ruled inadmissible. None of the objections raised in the statement setting out the grounds of appeal was discussed during first instance proceedings, thereby creating a "fresh case". Further, new documents D18 and D19 were filed.

D6 is a suitable starting point to discuss inventive step of the subject-matter of claims 1 and 7 of the main request.

The distinguishing features have been correctly identified by the appellant.

All these features solve together the problem of improving the efficiency of this known coking plant, which already has the capability of recovering energy in an environmental friendly process.

The skilled person would not, based on his knowledge alone, connect the exhaust ends of the air ducts provided within the foundation of D6 additionally with the coking chamber thereof to solve the above mentioned problem, nor does D20 teach this measure as a solution either.

Inventive step should therefore be acknowledged.

Reasons for the Decision

1. *Admissibility of the appeal*

- 1.1 The respondent requested that the appeal be ruled inadmissible (Rule 101(1) EPC) by arguing that (see Rule 99(2) EPC in connection with Article 108, third sentence, EPC and the related jurisprudence) the appeal lies outside the legal and factual framework of the opposition.

This is because the statement setting out the grounds of appeal does not deal with the contested decision and sets up a fresh case based on D6 as a starting point, combined with either D2 or D3, alternatively D6 combined with D16 or D20 (for claims 1 and 7) or with D1 (only for claim 1). Further, new documents D18 and D19 are filed.

This was clearly not the basis of the opposition.

- 1.2 The Board disagrees. The ground of opposition of lack of inventive step was an essential part of the opposition proceedings and D6 was the starting point of the inventive step discussion in the impugned decision.

The documents D2, D3 and D1, providing a teaching to be combined with D6, were also extensively discussed in the opposition proceedings.

This means that in the statement setting out the grounds of appeal new arguments on inventive step are presented, based on already available documents. This neither constitutes a "fresh case", nor results in the appeal not dealing with the decision.

The jurisprudence of the Boards of Appeal on admissibility recognises, besides arguing that the decision is wrong, also as admissible an appeal of an opponent who, while staying within the same grounds of opposition, adduces facts and evidence which remove the legal basis from the decision (see Case Law of the boards of appeal, 8th Edition 2016, IV.E.2.6.5 a)). This is all the more guaranteed when having the same evidence as discussed in opposition.

2. *Claim 1 of the main request - Inventive step*

2.1 D6 as a starting point

As agreed by both parties D6 is a suitable starting point to discuss inventive step because it relates to the same technical field of smokeless coking of metallurgical coal (column 1, lines 6-14), and also addresses the environmental issues of this process (see column 2, lines 41-42).

D6 discloses:

a plant (see figures 1 and 2) for producing metallurgical coke by the non-recovery method (column 1, lines 6-14) with coke ovens (10) made of refractories (column 4, lines 47-50), and a common flue duct (60, see also column 6, lines 15-30), the coke-ovens (10) each comprising a coking chamber (16, see figure 6), a floor (18), an underflue system (30), a roof (17) with openings (80), and a foundation (34), wherein the ovens (10) are arranged side by side (as clearly shown in figure 1) with dividing walls (14) and are interconnected with the common flue duct (60, see figures 4 and 5), the underflue system (30) is provided with an air inlet duct (42, shown in figure 4) and a

feeder flue duct (48, shown in figure 5) that is connected to the common flue duct (60), with the common flue duct (60) being provided with a damper valve (68, see column 6, lines 27-30) to control inlet of tertiary air (i.e. air used for combustion of gases in the flue duct), and the foundation (34, see figure 6) is provided with air ducts (106) for cooling (as explained at column 8, lines 3-13).

As explained at column 7, lines 66-68, and column 8, lines 1 and 2, air flows through pipe 100 into the underflue system. Pipe 100 is therefore the air inlet duct of the underflue system.

As explained at column 8, lines 3-13, the exhaust ends of the air ducts (106) used for cooling the foundation are connected with the air inlet duct (100) of the underflue system.

2.2 Differences

D6 therefore fails to disclose the following features of claim 1:

- that the plant is a top charging plant and the openings in the roof of the ovens are charging openings;
- that the exhaust ends of the air ducts used for cooling the foundation are **also** connected with the coking chamber.

2.3 Effects - problems to be solved

- 2.3.1 The feature that the plant is a top charging plant and the openings in the roof of the ovens are charging openings has the effect that (see paragraph [19] of the

patent in suit, where the advantages over the Jewell Thompson plant having lateral charging are discussed, as explained at paragraph [12]) there is no coal spillage because all the charge falls into the ovens.

2.3.2 The feature that the exhaust ends of the air ducts used for cooling the foundation are **also** connected with the coking chamber has the effect that the air introduced into the coking chamber, which is hot, can also be used for coking. This increases temperature in the coking chamber, because no extra thermal energy is needed to heat the air which was before introduced at ambient temperature, thereby increasing the efficiency of the coking process.

2.3.3 The Board agrees with the appellant that the contribution to inventive step of each of these two differences, based on their effects, should be discussed separately, using the problem-solution approach individually, for each effect.

This is because there is no evidence on file that charging the plant from above, through charging openings in the roof, has any particular effect on the temperature of the foundation or of the coking chamber.

2.3.4 The problem to be solved by the first distinguishing feature is therefore limited to reducing spillage during loading.

2.3.5 The problem to be solved by the second distinguishing feature can be formulated as how to increase the efficiency of the known coking plant and process.

2.4 Discussion of inventive step

2.4.1 First partial problem

As argued by the appellant, a person skilled in the art would know that top charging is a possible way to overcome the disadvantages of lateral charging and would have no practical difficulties in applying it to the plant disclosed in D6, if the circumstances require it.

As noted by the appellant, this general knowledge of the skilled person is reflected also in D2 and D3.

D3 (see page 52, left column, second paragraph) and D2 (page 35, left column, paragraph 8) both disclose top charging of a plant for producing metallurgical coke.

According to D2 top charging has the advantage of being a quick operation, and the disadvantage that the weight of the full charging car is transferred to the oven.

According to D3 side charging allows a better control over the quantity of coal inserted in the oven, but is a relatively slow process.

As a consequence of that no inventive step can be acknowledged on the basis of the first distinguishing feature, which results from a simple weighing of advantages vs. disadvantages.

2.4.2 Second partial problem

The appellant argues that the skilled person would, based on his general knowledge, try to improve the efficiency of the known plant by connecting the exhaust

ends of the air ducts used for cooling the foundation not only with the underflue system but **also** with the coking chamber.

The Board disagrees.

D6 is mainly focused on reducing pollution, by aiming at a **complete combustion** of the exhaust gases (see column 3, lines 35-51, column 7, lines 21-37 and column 11, lines 22-30) before they leave the plant through the stack.

This combustion of gases is possible because there is combustion air introduced into the underflue system, and it is made particularly efficient because this air has been previously heated in the air ducts of the foundation (see column 3, lines 26-51).

The reader of D6 is given the information that (see column 11, lines 15-21) preheating the combustion air admitted to the underflue system not only increases the temperature therein, but surprisingly also results in an equally increased temperature in the upper portion of the combustion chamber (the "crown of the oven") and throughout the system, thereby also increasing the efficiency of the coking process.

D6 clearly teaches away from connecting the exhaust ends of the air ducts used for cooling the foundation **also** with the coking chamber, because this would deviate hot air from the underflue system, thereby not only having a negative effect on the completeness of the combustion of the exhaust gases but also impairing the efficiency of the coking process.

As a consequence of that the skilled reader of D6 aiming at improving efficiency would not, based on this document and his general knowledge, perform such a modification of the plant of D6.

In addition, the Board notes that there is no evidence on file according to which a connection between the exhaust ends of the air ducts used for cooling the foundation of a metallurgical coking plant with its coking chamber may be regarded as a known measure to improve efficiency which the skilled person would be able to apply, if the circumstances require it.

D2 and D3, for example, do not even disclose air ducts used for cooling the foundation of the respective plants.

2.4.3 Alternative way to recover the thermal energy

The appellant also argues that connecting the exhaust ends of the air ducts provided within the foundation with the coking chamber is an alternative way to recover thermal energy deviated from the foundation, and concludes that as there are only two locations in the plant of D6 to introduce combustion air (underflue, coking chamber), the skilled person looking for such an alternative would immediately connect the exhaust ends of the air ducts provided within the foundation with the coking chamber.

The Board disagrees.

The skilled person would not, based on D6 alone and looking for an alternative way to use the hot air coming from the foundation, convey it to the coking chamber.

This is because this modification would (see D6, column 11 lines 11-21) both increase pollution and decrease efficiency.

2.4.4 Teaching of D20

The appellant also argues that the subject-matter of claim 1 of the patent as granted lacks inventive step over the combination of teachings of D6 and D20.

This is because D20 teaches a way to recover thermal energy, as it describes an oven for production of non-metallurgical (railway) coke having air ducts used for cooling its bottom wall (Ofensohle), where the exhaust ends thereof are connected with the coking chamber (see page 106, second paragraph, relating to a railway coking oven installed in Altona).

The Board disagrees again.

The passage to which the appellant refers is related to a very old railway coking plant, and not to the production of metallurgical coke.

As the structure of this plant is unknown (because figure 73, which is mentioned in this passage, is not available), the skilled person would have no reason for considering this plant as being suitable for the production of metallurgical coke at the priority date of the patent in suit.

A skilled person would therefore not have considered the information given at page 106 of D20 as a concretely applicable teaching for increasing efficiency and reducing pollution in the field of

production of metallurgical coke at the priority date of the patent in suit.

Be that as it may, a skilled person applying directly and straightforwardly to the plant of D6 this teaching as it is given in D20 would disconnect the exhaust ends of the cooling air ducts from the inlet duct of the underflue system, and connect them with the coking chamber **only**.

By doing that he would not arrive at the subject-matter of claim 1 according to which these exhaust ends are connected with the coking chamber as well as with the air inlet duct of the underflue system.

As a consequence, the subject-matter of claim 1 of the main request is considered as involving an inventive step over the combination of the teachings of documents D6 and D20.

3. *Claim 7 - Inventive step*

3.1 D6 as a starting point

D6 discloses a process for producing metallurgical coke (see column 1, lines 6-14) by the non-recovery method in a lateral charging plant (as clearly shown in figure 12, see also column 9, lines 14-40), wherein coal is charged into coke ovens, heated by combustion of evolving fuel gases of coking by means of air in order to produce coke (see column 3, lines 3-60), the coke is discharged (with a ram, see column 9, 56-68) from the coke ovens and quenched (see column 10, line 2), the exhaust flue gases are fed into a common flue duct (60, as explained at column 6, lines 15-30) which is maintained at a negative pressure (see the stacks 92 in

figure 1, and column 7, lines 21-36), are combusted in the common flue duct and are transported to a stack and/or a waste heat boiler, air is introduced into the common flue in a controlled manner (through valves 68, see figure 2 and column 6, lines 26-30) in order to combust products in the exhaust flue gases, and the coke oven foundation is cooled by means of ambient air (column 8, lines 6-21) and the heated air is fed into the underflue system (column 8, lines 28-37).

3.2 Differences

D6 therefore fails to disclose that the plant used in the process is a top charging plant, and that the cooling air of the oven foundation is fed, once heated, also into the coke oven chamber.

3.3 Effects - Problems - Discussion of inventive step

These differences are substantially the same as those already discussed in relation to claim 1.

As a consequence, the same effects can be identified, and the same partial problems can be formulated and discussed (*mutatis mutandis*) leading to the same positive assessment of inventive step.

3.3.1 In the written proceedings, the appellant also questioned inventive step of the subject-matter of claim 7 on the basis of the combination of the teachings of documents D6 and D1.

The Board disagrees, because D1 does not disclose cooling of the foundation at all, and cannot therefore provide any teaching on what to do with the air used for this purpose. D1 discloses that hot gases are sent

to a heat recuperator (see figure 2 and column 4, lines 100-113), where they are cooled by air, and that this air is subsequently sent to the coking chamber.

D1 therefore does not teach to feed coking air coming from the foundation into the coke oven **and** the underflue system.

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar:

The Chairman:



G. Nachtigall

H. Meinders

Decision electronically authenticated