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DECISION
of 27 November 1995

Case Number: T 0386/93 - 3.4.2

Application Number: 86730136.8

Publication Number: 0217733

IPC: B01D 53/36

Language of the proceedings: EN

Title of invention:
Process for the systematic treatment of exhaust gases

Patentee:
MITSUBISHI JUKOGYO KABUSHIKI KAISHA

Opponent:
Metallgesellschaft AG, Frankfurt/M

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - no"

Decisions cited:
-

Catchword:
-

Case Number: T 0386/93 - 3.4.2

DECISION
of the Technical Board of Appeal 3.4.2
of 27 November 1995

Appellant:
(Proprietor of the patent)
MITSUBISHI JUKOGYO KABUSHIKI KAISHA
5-1, Marunouchi 2-chome
Chiyoda-ku
Tokyo 100 (JP)

Representative:
Meissner, Peter E., Dipl.-Ing.
Meissner & Meissner
Patentanwaltsbüro
Postfach 33 01 30
D-14171 Berlin (DE)

Respondent:
(Opponent)
Metallgesellschaft AG, Frankfurt/M
-ZA Recht und Patente-
Reuterweg 14
Postfach 10 15 01
D-60271 Frankfurt am Main (DE)

Representative: -

Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 26 February 1993 revoking European patent No. 0 217 733 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: E. Turrini
Members: R. Zottmann
L. C. Mancini

Summary of Facts and Submissions

I. European patent No. 0 217 733 with the application No. 86 730 136.8 was revoked by decision of the Opposition Division on opposition by the Respondent, on the ground that its subject-matter does not involve an inventive step. During the opposition procedure, in particular the following documents were referred to:

D1: DE-A-3 403 995,

D2: English translation of JP-A-81/126425 submitted by the Appellant, and the drawings of JP-A-81/126425,

D3: German translation of JP-A-60/090028 submitted by the Respondent (Opponent), and the drawings of JP-A-60/090028, and

D4a: FR-A-2 290 242.

III. The Appellant (Patentee) lodged an appeal against this decision.

IV. In a communication the Board of Appeal expressed its provisional opinion that the requirements of Articles 52(1) and 56 EPC were not met, having regard to prior art D3 and

D4: DE-A-2 549 896 (corresponding to D4a).

V. Oral proceedings were held.

The Appellant requested that the appealed decision be set aside and the patent be maintained on the basis of a single claim defined as third auxiliary request in the letter dated 10 April 1995.

The Respondent requested that the appeal be dismissed.

VI. The single claim reads as follows:

"A treating process for exhaust gases from refuse incineration which comprises the steps of injecting a neutralizing absorbent into the exhaust gas to fix acidic gas components in the neutralizing absorbent, passing the gas through a filter to collect dust and redusing read "reducing" the nitrogen oxides in the exhaust gas in the presence of a denitrating catalyst and ammonia into nitrogen gas characterized by injecting an auxiliary agent powder whose particle size is 1 to 100 micrometers into the exhaust gas subsequent to the injection of the neutralizing absorbent and passing the exhaust gas through said filter which has been precoated with such an auxiliary agent as used above whereby the neuralizing read ""neutralizing" absorbent and the auxiliary agent are permitted to deposit as a layer on the precoated filter and are able to collect acidic gas components remaining in the exhaust gas and then blowing said ammonia into the purified gas and bringing the resulting mixture into contact with with (read only once "with") a denitrating catalyst containing vanadium pentoxide or titanium oxide wherein said neutralizing is a powder or slurry of $Ca(OH)_2$, $CaCO_3$ or a mixture thereof and wherein said auxiliary agent is at least one member selected from the group consisting of zeolite, alumina, diatomaceous earth, perlite, activated clay, kaolin, feldspar, quartz and mixtures thereof."

VII. The Appellant's arguing is summarized as follows:

In view of the considerable differences of the exhaust gas treating processes of D3 and D4, it is not obvious for the skilled person to combine the teachings of these documents. D3 does not teach or suggest the removal of sulphur oxide(s) (SO_x) and nitrogen oxide(s) (NO_x). However, removal of SO_x is a prerequisite for a successful subsequent catalytic denitration as taught in D4. According to D4, SO_x is removed by a wet method using electrostatic precipitation. Because of the low level of HCl removal (80 to 90%) afforded by the conventional dry method as described in D3 it was not clear to a skilled person whether the method of D3 can be used successfully in combination with the denitration step of D4.

VIII. The Respondent's arguing is summarized as follows:

If D1 is taken as nearest prior art, the skilled person would, to reduce the pressure loss of D1, take into account the teaching of D3 and would, to avoid the explosion risk of the active carbon catalysator, take into consideration D4 and thus arrive at a process according to the attacked claim. In D3, the layer on the filter improves the development of the pressure loss during the process compared to D1 where small particles have to be removed.

Reasons for the Decision

1. The appeal is admissible.

2. The Board of Appeal finds that all features of the claim can be identified in the originally filed documents and that the claim does not extend the protection of claim 1 as granted. Thus the claim complies with Article 123(2) and (3) EPC.

3. The novelty of the claim has not been contested by the Respondent.

4. *Inventive step*

4.1 Nearest prior art

D3 discloses a treating process for exhaust gases from refuse incineration (page 2, lines 18 to 22) or other exhaust gas sources comprising the following steps:

a powder of $Ca(OH)_2$ or $CaCO_3$ or a slurry of $Ca(OH)_2$ and thus a neutralizing absorbent which is suitable to fix acidic gas components (only HCl is mentioned, however said absorbent does absorb other acidic components such as HF, SO_2 or SO_3 present in the exhaust gas) in said absorbent is injected into the exhaust gas (page 4, lines 2 to 8);

an auxiliary agent powder is injected into the gas, the particle size of said powder being 1 to 100 µm, said powder being at least one member selected from zeolite, alumina, diatomaceous earth, perlite, activated clay, kaolin, feldspar and quartz (page 6, lines 3 to 8);

the gas is passed through a filter (11) to collect dust (13 in Figure 2; page 5, lines 9 to 22);

the filter is precoated with said agent powder (layer 12 of Figure 2; page 5, lines 18 to 22);

said absorbent and said agent powder are permitted to deposit as a layer on the precoated filter and are able to collect acidic gas components (13 and 14 in Figure 2; page 6 at the bottom to page 7, line 11).

Thus D3 discloses a process with almost all alternatives of the process defined by the attacked claim including the removal of acidic gas components by a wet process (the alternative of D3 where a slurry of $Ca(OH)_2$ is used) but not including the denitration step .

Document D1 discloses a dry method for removing acidic components of flue-gas in several steps. In a first step, fly ash and possibly additives such as lime, MgO and/or limestone are added simultaneously to the gas. In a second step the fly ash and the additives are precipitated, preferably on a hose filter. In the deposited layer a further contact of the exhaust gas and the additives is taking place. The remaining NO_x is removed in a third step by adding a reducing gas, preferably ammonia, and passing the mixture through a layer of activated carbon acting as catalysator. Thus though the process of D1 comprises a denitration step, it nevertheless differs considerably from that of the claim of the patent in suit.

D2 and D4 are much less relevant with respect to the subject-matter of the attacked claim than D1 and D3.

Therefore, D3 is considered as being the nearest prior art with respect to the subject-matter of the attacked claim from which it is distinguished by the additional step of removing NO_x.

Neither in the attacked claim nor in D3 a removal of SO_x is mentioned. However, the conditions and the results of the example of D3 except for the denitration step are identical with or quite similar to those of the example of the patent in suit. Thus, the known process does remove SO_x to a high degree if present in the exhaust gas.

4.2 In the example of the patent in suit the concentration of HCl is much greater than those of SO_2. Therefore and since the same neutralizing absorbent material in the same concentrations is used and since the skilled person knows that the neutralizing absorbent materials used in D3 are usual for absorbing SO_x in exhaust gases, the skilled person is well aware that the known process will be also suitable to remove SO_x and other acidic exhaust gas components such as HF - but not NO_x. This can, moreover, be verified by simple tests. The Appellant himself, states in the description of the prior art (column 1, lines 17 to 20 of EP-B-0 217 733), that sulphur oxides and HCl in the acidic gases can be relatively readily fixed with neutralizing absorbent such as lime, but the nitrogen oxides are not removed.

4.3 It remains, therefore, the problem of removing NO_x components when present in the exhaust gas from refuse incineration.

4.4 It is well known in the art that in exhaust gases NO_x can be reduced to nitrogen by blowing ammonia into the gas in the presence of a denitrating catalyst and that other acidic components, above all SO_x, should be removed before said step, since they would reduce the effectivity of the catalyst by poisoning and clogging.

To solve said problem, the person skilled in the art would take into account the prior art of D4 where essentially the same problem, i.e. removal of NO_x from exhaust gases after removal of dust and other acidic gas components than NO_x, is solved (page 3, lines 18 to 21). According to D4, NO_x in the gas is reduced by blowing NH_3 into the gas in the presence of a denitrating catalyst (claims 1 to 3, page 7). Thus the nitrogen oxides are removed as according to the attacked claim, and this very successfully (see there particularly page 3, line 18 to page 4, line 23, page 7, page 8, lines 9 to 11, page 9, lines 10 to 13 and page 16, lines 1 to 3).

The process of D4 is conditioned by a removal of SO_x before denitration takes place. This is achieved by the process of D3 as shown in 5.2 supra.

Moreover, in D4 the catalyst components titanium oxide and vanadium oxide are mentioned (page 8, lines 9 to 11, page 9, lines 10 to 13 and page 15, lines 17 and 18).

There can be seen no reason why the skilled person, when using the denitration step of D4 for solving the above problem should replace features of the process known from D3 by features of D4 relating to steps before the denitration step, moreover since the process of D3 is very successful in removing HCl (98,6% removal in the example which is much more than the percentage as alleged by the Appellant: 80 to 90%) which is important for purifying exhaust gases from refuse incineration, whereas D4 is silent in this respect.

4.5 Therefore, the skilled person would arrive at a process according to said claim when taking into account the prior art of D3 and D4. Hence, the subject-matter of claim 1 does not involve an inventive step in the sense of Article 56 EPC and claim 1 is not allowable Article 52(1) EPC.

5. Thus the grounds for opposition mentioned in Article 100(a) EPC prejudice the maintenance of the patent.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:	The Chairman:
P. Martorana	E. Turrini