E-mail : delhi-patent@nic.in
http://ipindia.nic.in

**GOVERNMENT OF INDIA MINISTRY
OF COMMERCE & INDUSTRY
Tel.: 25300200, 28032253
Fax: 28034301-02**

**PATENT OFFICE DELHI
BAUDHIK SAMPADA BHAWAN
PLOT NO. 32, SECTOR-14
DWARKA, NEW DELHI-110078**

The Patents Act, 1970 (Section15)

In the Matter of Patent Application no. 1241/DEL/2009

MAN TRUCK & BUS AG**.....Applicant**

Present:

Aashique Chakraborty [Registered IN/PA No. 2117] Of
Groser & Groser Agent for the Applicant

DECISION

The Application filed on 17/06/2009 this instant CONVENTIONAL APPLICATION **t**itled "PARTICLE SEPARATOR AND METHOD FOR SEPARATING PARTICLES OUT OF AN EXHAUST STREAM IN AN INTERNAL COMBUSTION ENGINE", with a request for examination 5414/RQ-DEL/2012 dated 20/06/2012 for grant of patent. Representation of opposition u/s 25(1) has not been filed.

1. The first examination report (FER) was issued on **26/02/2018**.
2. In response to the objections raised in the said FER, the applicant's agent vide their letter Dated **23/08/2018** submitted their arguments.
3. After considering the reply filed against first examination report by the applicant's agent and the report of the examiner on such reply, it was observed that the said patent application was not in order for grant. In order to dispose of the application, hearing was offered to the applicant and accordingly hearing was fixed on 29/10/2020. The intimation of said hearing was sent to applicant's agent vide e-mail dated 05/10/2020 along with the following objections which were found outstanding in the application:

Objections

Definitiveness

1. The claims are indefinite, too broad and do not define the scope of the invention. The use of terms: "at least" in the claims, the term "and/or" in the claims, term "substantially" in the claims and term "can be" in the claim; make the claims too broad and vague. Therefore the claims do not comply with the requirements of section 10(4)(c) of The Patents Act, 1970.

Formal Requirement(s)

1. Proof of right shall be filed along with necessary petition.

Invention u/s 2(1)(j)

1. **D1: EP1072765 A2 31/01/2001 D2: EP1546515 A2 29/06/2005 D3: US5281245A 25/01/1994 D4: RU55636U1**
   D1 discloses the features of the claimed invention and technical advancement. Features with depiction are as, a particle separator is constructed without a filter. An Independent claim is included for equipment oxidizing particles from the exhaust gases of engines. The particles are separated by thermophoresis, and the surfaces of the particle separator are cooled. Preferred Features: Particles are separated by

thermophoresis onto surfaces colder than the gas stream. They are separated by convection with the aid of structured surfaces and/or as a result of repeated flow reversals. They are separated through diffusion into dead zones for flow, and/or in narrow flow channels. The particles are separated by a combination of all three methods: thermophoresis, convection and diffusion (see abstract line 1-9). A process for the deposition of ultrafine particles from the exhaust gas of internal combustion engines, consisting in particular of carbon or condensed hydrocarbons, in which the NO-containing exhaust gas is oxidized on a platinum- containing oxidation catalyst to form NO and the enriched with NO gas into contact with a catalyst-coated is brought particle separator which can be coated catalytically, characterized in that the particle separator is formed without filters (see claim 1 line 1-7). In order to improve the diffusion deposition, dead zones created in the flow, such as those arising in the lee of baffles. There goes the flow rate to zero to allow a longer residence time for the relatively slow process of diffusion. In addition, the diffusion can be improved by shortening diffusion paths by reducing the cross-section of the flow channels. Thus, cross-sections between 25 microns and 250 microns have proved to be useful. The diffusion is primarily a practical way to separate particles <30 nm. (See description para26 line 5- 9). The oxidation catalyst and the particle separator are combined, so that the effective for the formation of NO2 surface can be lowered by cooling in its temperature. Here, the cooler with a catalytically active wash coat is enabled for the NO2 oxidation to NO2, coated, so that prevail, for a close to a wall higher equilibrium concentrations of NO2 and the particles at the same time deposited by thermophoresis on the wall 6. Thus stands at the partikelabscheidenden surface, is required in the NO2, a particularly high concentration of NO2 for the combustion of the particles are available (see description para20 line 4-10).

D2 discloses the features of the claimed invention and technical advancement. Features with depiction are as, a diesel exhaust after-treatment system for the cleanup of regulated and unregulated pollutants from an exhaust of a diesel engine, the system comprising: an oxidation catalyst; an exhaust cooling system for cooling the exhaust; a diesel particulate converter for the agglomeration and separation of particulate matter; and a soot collection chamber for collecting and retaining entrapped soot; an exhaust gas re-circulation system circulating the clean exhaust leaving the particulate collection chamber to a port downstream from an engine air filter (see claim 1 line 1-8). The system can be utilized for the aftertreatment of exhaust gases from a variety of internal combustion engines operating at lean conditions and having appreciable amounts of particulate matter such as diesel engines, compressed and liquid natural gas engines. The system of the present invention can be designed to collectively destroy/separate/remove all pollutants from the exhaust gases. This includes: particulate matter and nano-size particles, volatile organic compounds, nitrogen oxide, hydrocarbon, carbon monoxide as well as sulfur dioxide. Through combined processing, the exhaust gases released in the atmosphere can be stripped of all the

stated pollutants at high efficiencies that can render such high polluting engines environmentally very clean (see detailed description of preferred embodiment para01 line 4-14). An oxidation catalyst is connected to an engine exhaust manifold. The catalyst 10 can be either a diesel oxidation catalyst or active precious metal catalyst (as in gasoline engine applications). Following the catalyst is the exhaust system designed to have maximum possible cooling of the exhaust gases before entering the particulate converter (see detailed description of preferred embodiment para03 line 3-8).

D3 discloses the features of the claimed invention and technical advancement. Features with depiction are as, A treatment system for separating contaminants from a flue gas; said contaminants include a combination of large and small sized finesolid particles, and gaseous contaminants; said treatment system comprising: means for removing said large sized finesolid contaminants from said flue gas; means for removing said small sized fine-solid contaminates from said flue gas, including an outer container, an inner container and a shroud; means for supplying compressed gas into said means for removing said small sized fine-solid contaminates from said flue gas; means for supplying said flue gas to said means for removing said small sized fine-solid contaminates from said flue gas; and wherein said inner container is generally funnelshaped and is arranged within said outer container such that a narrow portion of said inner container is directed toward said means for supplying said flue gas, and a wide portion of said inner container is directed toward said means for supplying compressed air; and said inner container, said outer container, and said shroud are arranged to allow said flue gas to flow between said inner and outer containers and into said shroud (see claim 1).

D4 discloses model is intended for the deposition and removal of finely dispersed and aerosol liquid and solid particles from a gas stream in a field of centrifugal forces and is used in the oil, gas, machine-building, food, chemical and other industries.

In view of the above documents D1-D4, the present invention lacks inventive step according to section 2(1)(ja) of The Patents Act, 1970 and a person skilled in the art will be motivated by the above cited documents to conclude the invention.

4. *Request for adjournment of hearing under rule 129a filed on [**19/10/2020** (online)].* As the applicant requires further time to fully prepare the arguments before attending the hearing, applicant requested that the scheduled hearing be adjourned by at least 30 days under rule 129A of the Patents (Amendment) Rules, 2016.

5. After considering the request for adjournment of hearing under rule 129a filed on [19-10-2020]. New hearing was offered to the applicant and accordingly hearing was fixed on 18/01/2021. The intimation of said hearing was sent to applicant's agent vide e-mail dated 28/12/2020:

6. *Request for adjournment of hearing under rule 129a filled on [**14/01/2021** (online)].* As the applicant requires further time to fully prepare the arguments before attending the hearing, applicant requested that the scheduled hearing be adjourned by at least 30 days under rule 129A of the Patents (Amendment) Rules, 2016.

7. After considering the request for adjournment of hearing under rule 129a filled on [14-01-2021]. New hearing was offered to the applicant and accordingly hearing was fixed on 02/03/2021. The intimation of said hearing was sent to applicant's agent vide e-mail dated 15/02/2021:

8. In respect of the said hearing notice, hearing was duly held and attended by the authorized Agent on 02/03/2021. Consequently, hearing submissions and accompanying documents were submitted at the office on 15/03/2021.

9. In view of the submissions, the objections for Definitiveness and Formal Requirement(s) are hereby waived off.

10. The main substantive issue for determination apart from other requirement rised vide Objection in Para 2 under the header " invention u/s 2(1)(j)" of the said hearing notice, is whether this instant application's claimed subject matter is novel and evinces technical advance (or inventive step) over the cited art i.e. whether it constitutes an invention U/S 2(1)(j) of the Act.

11. For this regards applicant/agent submitted that "the claims of the instant application have been revised. The revisions made to the claims can be summarized as follows:"

• Claim 1 has been amended.

Claim 1 has been amended to remove all iterations of "at least", "and/or", "substantially" and "can be". It is also submitted herein that the remaining dependent claims also do not contain any iterations of "at least", "and/or", "substantially" and "can be".

Claim 1 has also been amended as follows: "...are formed in the particle separator (1), and wherein the flow regions (5, 6) are configured, such that particles (3, 4)...". No matter is added by way of this amendment.

Claim 1 has further been amended as follows: "characterised in that different flow regions (5, 6), ~~preferably ones~~ which are spatially separated from one another…" –No matter is added by way of this amendment.

Claim 1 has also been amended to include the subject matter of pending claim 4 therein.

- Claims 2 and 3 have been amended;
- Claim 4 has been deleted;
- Claims 5 to 17 have been amended and re-numbered as claims 4 to 16 respectively;
- Claim 18 has been re-numbered as claim 17;
- Claims 19 to 21 have been amended and re-numbered as claims 18 to 20 respectively;
- Claim 22 has been re-numbered as claim 21;
- Claims 23 to 27 have been amended and re-numbered as claims 22 to 26 respectively;
- Claim 28 has been re-numbered as claim 27;
- Claims 29 to 30 have been amended and re-numbered as claims 28 to 29 respectively;
- Claim 31 has been re-numbered as claim 30;
- Claims 32 to 35 have been amended and re-numbered as claims 31 to 34 respectively;
- Claims 36 and 37 have been re-numbered as claims 35 and 36 respectively.

The dependencies have been changed accordingly.

This has necessitated retyping pages 14 to 19 of the specification which are submitted herewith along with a marked-up copy of the revised claims showing the amendments made therein

12. I now turn my attention to the claimed subject matter. The instant claimed subject matter describes *A particle separator for separating particles out of an exhaust stream of an internal combustion engine, it being possible for an exhaust stream to flow, through the particle separator, wherein flow regions which differ with regard to the flow conditions are formed in the particle separator, and wherein the flow regions are configured, such that particles of different, defined size or different, defined mass are adapted to be separated out of the exhaust stream in the different flow regions,*
Characterised in that different flow regions, which are spatially separated from one another, are formed for separate separation of defined ultrafine particles primarily by

diffusion and in contrast defined larger or heavier coarse particles owing to their mass moment of inertia, wherein the different flow regions are formed by different sizes of free flow cross-sections.

Thus main features I deduce are:

1. different flow regions which are spatially separated from one another;
2. separation of defined ultrafine particles, primarily by diffusion;
3. larger and/or heavier coarse particles are separated by mass moment of inertia;

13. I now consider the cited documents viz. D1-D4 as mentioned in the said hearing notice, and D5: US5865864 cited during hearing. It is noted that all these documents have publication dates prior to the priority of this instant application.

14. In view of the cited documents' relevant teachings and Applicant's reasoned arguments regarding the said teachings, reference is now made to Hon'ble IPAB Order No. 250/2012 dated 02/11/2012, where it is enunciated that "once the very subject-matter of the invention has been disclosed by the prior art..... the person skilled in the art is assumed to be willing to make trial and error experiments to get it to work." It further opined that the said person "is not a person of exceptional skill and; knowledge…..He must, however, be prepared to display a reasonable degree of skill and common knowledge of the art in making trials…." Regarding obviousness, the observations are noteworthy, "When there is a design need or market pressure to solve a problem and (there) are a finite number of identified, predictable solutions, a person of ordinary skill in the art has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense...." The aforementioned IPAB order concludes that non–obviousness "demands that the claimed invention be sufficiently removed from the prior art", and that non- obvious enquiry is "a more aggressive sentry". The order states that "The Court has to see a) what is the prior art b) the differences between the prior art and the invention and c) the skill of the imaginary ordinary man." The order describes this ordinary man as "He has read the prior art and knows how to proceed in the normal course of research with what he knows of the state of the art. He does not need to (be) guided along step by step. He can work his way through."

15. In the light of the citations and the aforesaid IPAB order, I deduce the following:

I) D1 teaches: discloses the features of the claimed invention and technical advancement. Features with depiction are, a particle separator is constructed without a filter. An Independent claim is included for equipment oxidizing particles from the exhaust gases of engines. The particles are separated by thermophoresis, and the surfaces of the particle separator are cooled. Preferred Features: Particles are separated by thermophoresis onto surfaces colder than the gas stream. They are separated by convection with the aid of structured surfaces and/or as a result of repeated flow reversals. They are separated through diffusion into dead zones for flow, and/or in narrow flow channels. The particles are separated by a combination of all three methods: thermophoresis, convection and diffusion (see abstract line 1-9). A process for the deposition of ultrafine particles from the exhaust gas of internal combustion engines, consisting in particular of carbon or condensed hydrocarbons, in which the NO-containing exhaust gas is oxidized on a platinum- containing oxidation catalyst to form NO and the enriched with NO gas into contact with a catalyst-coated is brought particle separator which can be coated catalytically, characterized in that the particle separator is formed without filters (see claim 1 line 1-7). In order to improve the diffusion deposition, dead zones created in the flow, such as those arising in the lee of baffles. There goes the flow rate to zero to allow a longer residence time for the relatively slow process of diffusion. In addition, the diffusion can be improved by shortening diffusion paths by reducing the cross-section of the flow channels. Thus, cross-sections between 25 microns and 250 microns have proved to be useful. The diffusion is primarily a practical way to separate particles <30 nm. (See description para26 line 5- 9).

D2 teaches a diesel exhaust after-treatment system for the cleanup of regulated and unregulated pollutants from an exhaust of a diesel engine, the system comprising: an oxidation catalyst; an exhaust cooling system for cooling the exhaust; a diesel particulate converter for the agglomeration and separation of particulate matter; and a soot collection chamber for collecting and retaining entrapped soot; an exhaust gas re-circulation system circulating the clean exhaust leaving the particulate collection chamber to a port downstream from an engine air filter (see claim 1 line 1-8). The system can be utilized for the after treatment of exhaust gases from a variety of internal combustion engines operating at lean conditions and having appreciable amounts of particulate matter such as diesel engines, compressed and liquid natural gas engines. The system of the present invention can be designed to collectively destroy/separate/remove all pollutants from the exhaust gases. This includes: particulate matter and nano-size particles, volatile organic compounds, nitrogen oxide, hydrocarbon, carbon monoxide as well as sulfur dioxide. Through combined processing, the exhaust gases released in the

atmosphere can be stripped of all the stated pollutants at high efficiencies that can render such high polluting engines environmentally very clean (see detailed description of preferred embodiment para01 line 4-14). An oxidation catalyst is connected to an engine exhaust manifold. The catalyst 10 can be either a diesel oxidation catalyst or active precious metal catalyst (as in gasoline engine applications). Following the catalyst is the exhaust system designed to have maximum possible cooling of the exhaust gases before entering the particulate converter (see detailed description of preferred embodiment para03 line 3-8)

Applicant/agent submitted that embodiments of D2 diffusion is the primary mode and the other two modes are "simply set aside due to their small effect" , D2 in fact explicitly discounts separation by inertia (see paragraph [0133]) as having little effect.
But here I would like to draw attention that D2 talked Particle capturing mechanisms in wire mesh media are grouped into three modes: inertial impaction, interception, and diffusion. The first two modes of collection are not effective for small particle sizes, but will have appreciable single fiber efficiency once particle size increases.

D3 discloses the features of the claimed invention and technical advancement.
A treatment system for separating contaminants from a flue gas; said contaminants include a combination of large and small sized fine solid particles, and gaseous contaminants; said treatment system comprising: means for removing said large sized fine solid contaminants from said flue gas; means for removing said small sized fine-solid contaminates from said flue gas, including an outer container, an inner container and a shroud; means for supplying compressed gas into said means for removing said small sized fine-solid contaminates from said flue gas; means for supplying said flue gas to said means for removing said small sized fine-solid contaminates from said flue gas; and wherein said inner container is generally funnel shaped and is arranged within said outer container such that a narrow portion of said inner container is directed toward said means for supplying said flue gas, and a wide portion of said inner container is directed toward said means for supplying compressed air; and said inner container, said outer container, and said shroud are arranged to allow said flue gas to flow between said inner and outer containers and into said shroud (see claim 1).

D4 discloses model is intended for the deposition and removal of finely dispersed and aerosol liquid and solid particles from a gas stream in a field of centrifugal forces and is used in the oil, gas, machine-building, food, chemical and other industries.

The difference between the Applicants/ agent claims and cited art D1-D4 is that the D1-D4 does not expressly mention that the particle separator has Different flow regions having different flow conditions so that particles having different, defined sizes and/or masses are adapted to be separated out of the exhaust gas in the different flow regions,

The D5 (US5865864) reference related to a honeycomb filter for treating the exhaust gases emitted from a diesel engine (please see col. 1 Ins. 16-22), wherein the D5 reference recognizes the problems associated with such prior art honeycomb engine exhaust treatment catalysts as experiencing eccentric and/or assymmetrical oncoming flow so that at certain points on the end surface of the honeycomb there will be damage and shortened service life of the honeycomb (see col. 1 ln. 66 to col. 2 ln. 7) as well as unconverted or inadequately converted fluid (please see col. 2 Ins. 37-47).

The D5 solves these problems associated with prior art honeycomb catalysts/filters so that catalytic conversion is approximately uniform for all flow regions of the honeycomb catalyst/filter (see col. 2 Ins. 50-59) by providing a honeycomb catalyst/filter wherein there is a first group of channels having a higher flow resistance and a second group of channels having a lower flow resistance (see col. 2 Ins.60-67). In particular, note that figures 3 and 6 in the D5 illustrate the honeycomb wherein certain cross-facial regions of the honeycomb catalyst/filter have relatively smaller openings and the other cross-facial regions of the honeycomb have relatively larger openings, so that this D5 honeycomb can also be said to have different flow regions wherein each flow region is configured to allow particles of essentially different sizes or masses to be separated out in the different regions *(which is required by the Applicants' independent claims).*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made *to have modified* teaching of D1-D4 *by ensuring* that the different flow regions that allow particles of different size and/or mass to be separated out of the exhaust gas.

This features discloses in document D1-D5 and with it is the basic design change in cited documents the normal technical engineer can easily come up to invention. Therefore claims invention can be invented by the normal technical engineer bases on the cited invention.

By utilizing the features of the cited documents D1-D5, it would have been obvious to one with ordinary skill in the art that he may easily add some normal features to these cited documents D1-D5 and can easily go for the features of the present invention. In view of the above, the claims claimed are obvious to a person skilled in the art

ii) Without prejudice, the claimed subject matter of the dependent claims 2 to 36 falls within the scope of the independent claims. Since the independent claims are found to involve no inventive step over the cited art as detailed in the preceding paragraphs, the claimed subject matter of their subsequent dependent claims is also rendered obvious and not inventive mutatis mutandis.

16. Therefore, in view of the aforesaid, it is concluded that the subject matter of claims 1 through 36 in this instant application lacks inventive step. As such, the substantive objection in Para 2 under the header "invention u/s 2(1)(j)" of the said Hearing notice still hold good. Therefore, the claimed subject does not constitute an 'Invention' as defined under section 2(1)(j) of The Patents Act, 1970 (as amended).
17. Without prejudice, although the hearing submissions have attempted to address the other requirements, yet the substantive requirement of the Act i.e. Sec. 2(1)(j) is not found complied with. Hence, in view of the above and unmet requirements, this instant application is not found in order for grant.
18. Thus, in view of the aforesaid and unsatisfactory submissions made by the Agents in respect of the pertinent requirements as raised in the said hearing notice, this instant application no. 1241/DEL/2009 title as "PARTICLE SEPARATOR AND METHOD FOR SEPARATING PARTICLES OUT OF AN EXHAUST STREAM IN AN INTERNAL COMBUSTION ENGINE" does not comply with the requirements of the Act. I, therefore, hereby order that the grant of a patent is refused under the provisions of Section 15 of the Patents Act.
19. This is to be noted that the aforesaid observations, and decision thereof, are based solely on the electronically uploaded documents to date.

This application is hereby refused patent u/s 15 of The Patent Act 1970 due to non compliance of requirement of inventive step u/s 2(1)(j), 2(1)(ja), section 10(4) of "The Patent Act 1970".
The matter stands disposed off.

Dated: 18/03/2021

Shailendra Singh Astt.
Controller Patents &Designs.