

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ewald Dörken AG,
Petitioner

v.

Schaeffler Technologies AG & Co. KG,
Patent Owner

Case No. IPR2024-01365

U.S. Patent 11,098,756
Title: WHEEL BEARING ARRANGEMENT HAVING A COATING

DECLARATION OF RICHARD A. HABER, PH.D.

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I. BACKGROUND AND QUALIFICATIONS

1. My name is Richard Haber, and I am over 21 years and otherwise competent to make this Declaration. I make this Declaration based on facts and matters within my own knowledge and on information provided to me by others, and, if called as a witness, I could and would competently testify to the matters set forth herein.
2. I have been retained as a technical expert witness in this matter by Counsel for the Petitioner, Ewald Dörken AG (“Petitioner”) to provide my independent opinions on certain issues requested by Counsel for Petitioner relating to the accompanying Petition for *Inter Partes* Review of U.S. Patent No. 11,098,756 (“the ‘756 patent”), challenging Claims 1-7 (the “Challenged Claims”). My compensation in this matter is not based on the substance of my opinions nor on the outcome of this matter.
3. I have been informed that Schaeffler Technologies AG & Co. KG (“Patent Owner”) is the purported owner of the ‘756 patent. I note that I have no financial interest in the Petitioner nor the Patent Owner, and I have no other interest financially or otherwise in the outcome of this matter.
4. I have over 40 years of experience in the field of Materials Research and Engineering, including a substantial portion of which was spent working in powders, films and coatings. I have summarized in this section my educational background, career history, and other qualifications relevant to this matter. I have also included a current

version of my *curriculum vitae* as Exhibit 1010.

5. I hold a Ph.D. (1984) and a M.S. (1982) degree in Ceramic Science and Engineering and a B.S. degree (1980) in Ceramic Science and Engineering from Rutgers University. I have been a Professor of Materials Science and Engineering at Rutgers University since 1984. I am also the Director of the Ceramic, Composite, and Optical Materials Center at Rutgers University. I also serve as the Lead, US Army Research Laboratory Cooperative Agreement, Synthesis and Processing of Ultrahigh Temperature Ceramics. I have been Director of the National Science Foundation Ceramic, Composite and Optical Materials Center (CCOMC) for 19 years. The CCOMC is an Industry/Cooperative Research Center, which addresses relevant industry problems requiring advanced engineering and science solutions. In my role as Center Director, I run the largest laboratory of materials in the university.
6. I am a Fellow of the American Ceramic Society and have served as Vice President of the American Ceramic Society, President of the Ceramic Manufacturing Council, Trustee for the Materials and Equipment Division and Ceramic Manufacturing Council of the American Ceramic Society. I have consulted internationally on the use of powders in the productions of pastes, slurries and coatings.
7. Over the course of my career, I have also had experience with inorganic coatings, primarily in applying metal, oxide, carbide and nitride coatings on both particles and

components, in both aqueous and non-aqueous suspensions. I have also spent three decades formulating metal and ceramic suspensions and pastes, and I have worked with Aluminum (Al) particulates in formulating composites.

8. I have published over 220 materials science papers in engineering and materials journals. I am also the coauthor or editor of twelve books. I have been the thesis advisor for 62 graduate students. These publications are listed, along with some of my other work, in Exhibit 1010.
9. I have taught undergraduate and graduate courses in engineering and materials sciences. Many of these courses focus on slurry and paste processing and applications. I have taught Engineering Design for 37 years which examines how various materials are used in industrial applications.
10. I am also a Reviewer for the journals *Materials Science and Engineering* and *Acta Materialia*.
11. As part of my work in forming my opinions in connection with this proceeding, I have reviewed the following materials, which I believe those in the field would reasonably rely upon in forming opinions regarding the subject matter of this proceeding:

Exhibit No.	Description
1001	U.S. Patent No. 11,098,756 (The '756 Patent)

1002	U.S. Patent Publication 2005/0254741 (The '741 publication)
1003	U.S. Patent Publication 2012/0177835 (The '835 publication)
1004	U.S. Patent Publication 2012/0009340 (The '340 publication)
1005	U.S. Patent Publication 2010/0175794 (The '794 publication)
1006	U.S. Patent Publication 2009/0148091 (The '091 publication)
1007	U.S. Patent Publication 2017/0219013 (The '013 publication)

II. LEGAL FRAMEWORK

a. Obviousness

12. I am a technical expert and do not offer any legal opinions. However, I have been informed about certain legal principles regarding patentability and related matters under United States patent law, which I have applied in performing my analysis and arriving at my technical opinions in this matter.

b. General Framework

13. I am informed that a person cannot obtain a patent on an invention if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious to a person having ordinary skill in the art at the time of the invention. I am informed that a conclusion of obviousness may be founded upon more

than a single item of prior art. I am also informed that obviousness is determined by evaluating the following factors: (1) the scope and content of the prior art, (2) the differences between the prior art and the claim at issue, (3) the level of ordinary skill in the pertinent art, and (4) secondary considerations of non-obviousness. In addition, I have been informed that obviousness inquiry should not be done in hindsight or utilizing hindsight reconstruction. Instead, the obviousness inquiry should be done through the eyes of a person having ordinary skill in the art at the time of the alleged invention.

14. In considering whether certain prior art renders a particular patent claim obvious, I am informed that one must consider the scope and content of the prior art, examples of which include disclosures in patents, trade publications, journal articles, conference papers, industry standards, product literature and documentation, texts describing competitive technologies, requests for comment published by standard-setting organizations, and materials from industry conferences.
15. I am informed that for a patent claim to be found obvious, the proper perspective to consider is that of a person having ordinary skill in the art (often referred to as a “POSITA”) at the time of the alleged invention. I am informed that the factors to consider in determining the level of ordinary skill in the art include (1) the educational level and experience of people working in the field at the time the invention was

made, (2) the types of problems faced in the art and the solutions found to those problems, and (3) the sophistication of the technology in the field.

c. Analogous Art

16. I am informed that for a prior art reference to be proper for use in an obviousness analysis, the reference must be “analogous art” to the claimed invention. I am informed that a reference is analogous art to the claimed invention if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). For a reference to be “reasonably pertinent” to the problem, it must logically have commended itself to an inventor’s attention in considering the problem at hand. In determining whether a reference is reasonably pertinent, one should consider the problem faced by the inventor, as reflected either explicitly or implicitly, in the specification. I believe that all of the references I considered in forming my opinions in this IPR are well within the range of references a person having ordinary skill in the art would have consulted by the time of the invention to address the type of problems described in the Challenged Claims.

d. Combining Known Elements in the Art, Common Sense

17. I am informed that to establish a claimed invention was obvious based on a combination of prior art elements, a clear articulation of the reason(s) why a claimed invention would have been obvious must be provided. Specifically, I am informed that, under the U.S. Supreme Court's *KSR* decision, a combination of multiple items of prior art renders a patent claim obvious when there was an apparent reason for a person having ordinary skill at the time of the invention to combine or modify the prior art. I am informed that such reason may include, but is not limited to, one or more of the following rationales: (A) combining prior art methods according to known methods to yield predictable results; (B) substituting one known element for another to obtain predictable results; (C) using a known technique to improve a similar device in the same way; (D) applying a known technique to a known device ready for improvement to yield predictable results; (E) trying a finite number of identified, predictable potential solutions, with a reasonable expectation of success; (F) identifying that known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; or (G) identifying an explicit teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine the prior art references to arrive at the claimed invention.

18. I am informed that the test for obviousness is not whether the features of a secondary reference may be *bodily incorporated* into the structure of the primary reference, but rather whether one of skill would have been motivated to combine the teachings of the prior art references to achieve the claimed invention. Nevertheless, I am informed that to be non-obvious and that, even where one or more motivations to combine exist, claims are not necessarily obvious unless a person having ordinary skill in the art would have had a reasonable expectation of success in implementing or applying the proposed combination at the time of the invention.
19. I also am informed that in conducting an obviousness analysis, a precise teaching directed to the specific subject matter of the challenged claim need not be sought out, for it is appropriate to take account of the inferences and creative steps that a person having ordinary skill in the art at the time of the invention would employ. In other words, the prior art need not be directed towards solving the same specific problem as the problem addressed by the patent. Further, the individual prior art references themselves need not all be directed towards solving the same problem. The prior art considered can be directed to any need or problem known in the field of endeavor at the time of invention and can provide a reason for combining the elements of the prior art in the manner claimed. Common sense teaches that familiar items may have obvious uses beyond their primary purposes, and a person having

ordinary skill in the art will often have been able to fit the teachings of multiple prior art references like pieces of a puzzle. I am informed that, under the *KSR* standard, common sense is important and should be considered in assessing obviousness.

20. I also am informed that the fact that a particular combination of prior art elements was “obvious to try” may indicate that the combination was obvious even if no one attempted the combination. If the combination was obvious to try (regardless of whether it was actually tried) or leads to the anticipated success, then it is likely the result of ordinary skill and common sense rather than innovation. I am further informed that in many fields it may be that there is little discussion of obvious techniques or combinations, and it often may be the case that market demand, rather than scientific literature or knowledge, will drive the design of an innovation. 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 having 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.

e. Claim Construction

21. I am informed that in performing an obviousness analysis, it is necessary to understand the scope of the claims. I am also informed the first step in an

unpatentability analysis therefore involves construing the claims. Second, the construed claim language is then compared to the disclosures of the prior art.

22. I am informed that claims are generally given their ordinary and custom meaning as understood by one of ordinary skill in the art at the time of the invention, in light of the patent specification. I am informed that, for the purposes of claim construction, while expert testimony may be helpful to provide background on the technology at issue, to explain how an invention works, to ensure an understanding of the technical aspects of the patent is consistent with that of a person having ordinary skill in the art, or to establish that a particular term in the patent had a particular meaning in the pertinent field at the time of the invention. However, I am also informed that testimony from a technical expert is generally less reliable than the patent itself and its prosecution history in determining the meaning of claim terms, and it is not the role of technical experts to supplant courts and PTAB judges in applying principles of claim interpretation. However, the “Background of the Technology” that I provide in Section III.C of my opinion sheds light on background on the technology at issue in this proceeding and, hopefully, provides the adjudicators with an understanding of certain pertinent technical aspects that a person having ordinary skill in the art would have appreciated by the time of the '756 Patent.
23. At this time, I have not been instructed to apply any specialized constructions of the

claim terms notwithstanding their ordinary meanings. Therefore, I have applied the meaning of the claim terms of the Challenged Claims that is generally consistent with their ordinary and customary meaning, as a person having ordinary skill in the art would have understood them in the context of the '756 Patent at the time of the alleged invention.

III. OPINIONS

a. Level of Skill of a Person Having Ordinary Skill in the Art

24. I was asked to provide my opinion as to the level of skill of a person having ordinary skill in the field of the '756 Patent at the time of the claimed invention (referred to herein as a "POSITA"). I have been instructed to assume that the time of the claimed invention of the '756 Patent is July 21, 2017. In determining the characteristics of a POSITA, I was told to consider several factors, including the type of problems encountered in the art, the solutions to those problems, the rapidity with which innovations are made in the field, the sophistication of the technology, and the education level of active workers in the field. I also placed myself back in the time frame of the claimed invention.
25. In my opinion, a POSITA would be a person having, as of July 21, 2017: (1) at least an undergraduate degree in engineering and/or material science, or similar education;

and (2) two or more years of experience with coatings. Such a person of ordinary skill in the art would have been capable of understanding the '756 Patent, the general state of the art and the prior art references discussed herein.

26. Based on my education, training, and professional experience in the field of the claimed invention, I am familiar with the level and abilities of a POSITA. Additionally, I met at least these minimum qualifications at least as of July 21, 2017. Further, although my qualifications may exceed those of the hypothetical person defined above, my analysis and opinions regarding the '756 Patent have been rendered from the perspective of the defined POSITA during the relevant time frame.

b. Summary of my Opinions

27. In my opinion, a POSITA would have found Claims 1-7 of the '756 Patent to be an obvious combination of the prior art available to the public prior to the earliest filing date of the '756 Patent, based on my review of the '756 Patent, the scope of the prior art discussed herein, the knowledge and skill a POSITA would have had by the time of the '756 Patent, and additional background materials discussed below. While three bases challenging the validity of Claims 1-7 of the '756 Patent are presented herein, if the Patent Owner submits additional evidence pertaining to the patentability of the '756 Patent, I intend to review such materials and update my analysis and conclusions as appropriate and as permitted under the rules of this proceeding.

c. Background of the Technology

28. The '756 Patent relates to a wheel bearing arrangement for a motor vehicle and methods of improving the resistance of the wheel bearing arrangement to corrosion. The '756 Patent describes a wheel bearing arrangement for a motor vehicle comprising a wheel hub connected to a wheel flange with a multi-row anti-friction bearing having an outer ring and at least one separate bearing inner ring arranged axially on the outside mounted on the wheel hub. The bearing inner ring is axially pretensioned by a collar, which acts on an end surface of the inner ring. This wheel bearing arrangement has at least a partial surface coating for improving corrosion protection formed on the wheel bearing. The surface coating is formed as a zinc flake coating, wherein a coating medium used to form the surface coating comprises zinc powder, aluminum powder, titanium tetrabutanolat and further constituents, wherein the surface coating has a layer thickness of at least 10 μm and at most 20 μm . The '756 Patent disclosure extends to a motor vehicle with such a wheel bearing arrangement. The '756 Patent t also describes methods for coating a wheel arrangement with various steps. The first step states that a fluid cleaning medium is used to clean at least one component of the wheel bearing arrangement. The coating is applied to the clean surface and the coating contains zinc powder, aluminum powder, titanium tetrabutanolat, and further constituents. The coating is cured at a

temperature of at least 15°C to at most 80°C, with a curing period of at least 10 minutes. The '756 Patent claims at least one component surface is coated by a spraying process. The '756 Patent claims that the cleaning solution contains a solvent.

d. Claims 1-7 of the '756 Patent are Obvious over the '741 Publication in view of the '835 Publication

i. Overview of US Patent Publication No. 2005/0254741

29. The '741 publication describes a vehicle wheel bearing apparatus to support a driven wheel of a vehicle. See, Abstract of the '741 publication. This publication specifically describes, in paragraphs [0003] and [0036] and [0048], a “so called third generation type wheel bearing apparatus” and provides an illustration (FIG. 4) and a detailed description of “the third generation type [vehicle wheel bearing apparatus] of the prior art.” See, [0004]. In paragraph [0010], this publication also explains why corrosion is a problem arising from environmental conditions that can lead to rust and ultimately destruction of the wheel bearing apparatus:

In addition, this kind of bearing apparatus is usually subjected to severe external environments above a road surface and frequently suffers from exposure to muddy water. Especially in coastal regions, the bearing apparatus is exposed to salt water. Further, in cold environments, it is exposed to muddy water which includes salt or anti-freezing agents. Since the inner ring 53 is exposed to these conditions, as a naked steel surface, it would become rusty. If the generation of rust progresses in the inner ring 53, it sustains a large hoop

stress. Diffusive hydrogen present in the environment enters into the metallographic structure of the inner ring 53 and causes a so-called “delayed fracture” causing the hydrogen embrittlement which causes destruction of the metallic grain boundancy.

The ‘741 publication, paragraph [0010]

30. The ‘741 publication teaches that a “preservation film” is formed on the surface of the inner ring, and this prevents the generation of rust on the naked portion of the inner ring exposed to the ambient environment. See, [0018]. The preservation film is a plated layer formed from a zinc/nickel alloy. Because the zinc/nickel alloy is superior in corrosion resistance, it is possible to exhibit a strong, rust resistive effect under severe environmental conditions. Also, high resistance against abrasion is attained by the high hardness of the zinc/nickel alloy. See, [0019].

ii. Overview of US Patent Publication No. 2012/0177835

31. The ‘835 publication describes a coating for preventing cathodic corrosion, which is electrode or electronic corrosion. See, Abstract, [0006] and [0010]. ‘835 further explains that cathodic protection is effectively prevented by applying a room temperature curing coating agent to prevent contact corrosion in substrates consisting of different metals. See, [0007]-[0010].
32. Paragraph [0002] of the ‘835 publication describes metallic coatings of the prior art, which were based on zinc or zinc alloys with thicknesses from 7µm to 60µm, and

paragraph [0005] describes zinc flake coatings showing very good corrosion resistance, even at thin layers of 5 to 10µm and how these coatings can be spray coated but at higher temperatures of at least 250°C, which are needed to cure them, making them unsuitable for spray applications. Paragraph [0010] of the '835 publication describes an advantageous inventive coating that can be cured at room temperature. The corrosion protection is achieved by a controlled reduction in the activity of the metal being covered with a conductive or semi-conductive metal oxide coating, for example titanium dioxide coating on zinc. The metal particles are passivated "*in situ*" by a metal alkoxide, preventing the formation of white rust typical of conventional zinc coatings that cure at room temperature. See, [0014]. The coating agent of the invention is described as capable of being sprayed, in particular from an aerosol can or spray gun. See [0015]. The coating can be in layer thicknesses of 5 to 60µm, preferably in layer thicknesses of 5 to 25µm and even more preferably in layer thicknesses of 10 to 15µm. See [0017]. Preferred embodiments of the coating are described as containing a metal alkoxide selected from the group consisting of titanium alkoxide, in particular titanium butylate (which chemical name is a synonym for titanium tetrabutanolate). See, [0017]. Further, the '835 publication states the metal pigment in these coatings is selected from the group consisting of zinc, aluminum, and magnesium, as well as mixtures and alloys thereof, and specifically

notes that “alloys of zinc and aluminum are preferred.” See, [0018] and [0019]. The '835 publication describes in detail the solvent used in the preparation of these coatings to contain water, alcohol, protic and aprotic solvents. See, [0020] This is important in explaining the room temperature curing because, when used as an aerosol, the solvent concentration is critical. See, [0022].

**iii. All features of claim 1 of the '756 Patent are present in the
Combination of US 2005/0254741 and US 2012/0177835**

1. Claims 1-7

33. Claim 1 of the '756 Patent states:

1. A wheel bearing arrangement for a motor vehicle, comprising a wheel hub, wherein the wheel hub is connected to a wheel flange, wherein a multi-row anti-friction bearing having an outer ring and an inner ring is arranged on the wheel hub, wherein the inner ring comprises two bearing inner rings, wherein an axially outer bearing inner ring is formed in one piece on the wheel hub and wherein an axially inner bearing inner ring is a separate component which is mounted on the wheel hub and is axially pretensioned by a collar, that acts on an end surface of the inner bearing inner ring, of the wheel hub, wherein at least partially a surface coating for improving corrosion protection is formed on the wheel bearing arrangement, wherein the surface coating is formed as a zinc flake coating, wherein a coating medium used to form the surface coating comprises zinc powder, aluminum powder, titanium tetrabutanolat and further constituents, wherein the surface coating has a layer thickness of at least 10 µm.

34. The '741 publication discloses every mechanical element of the claimed wheel bearing apparatus of the '756 Patent. The '835 publication is cited for teaching a metal surface coating for improving corrosion protection identical to the coating recited in independent claims 1 and 3 of the '756 Patent. Combined, these two prior art documents teach the claimed wheel bearing arrangement for a motor vehicle comprising a surface coating for improving corrosion protection as set forth in the claims of the '756 patent.
35. The following chart identifies the claim limitations of the '756 Patent and the corresponding elements of the '741 publication and the '835 publication where all claimed limitations are shown:

Claim 1 of the '756 Patent	Citations within the '741 publication and the '835 publication
A wheel bearing arrangement for a motor vehicle, comprising,	A vehicle wheel bearing apparatus for supporting a driven wheel of a vehicle (The '741 publication - Abstract) The coating agent of the invention may be applied by spraying, in particular from an aerosol can or a spray gun, brushing or roller application onto a metallic substrate, in particular steel, alloy steels, zinc, galvanized steel sheet, aluminium or aluminium alloys, and subsequently dried at room temperature. The substrate may also be a composite material comprising two or more of these metals joined together, for example by means of welding, bolting or riveting. (The '835 publication [0014])

a wheel hub, wherein the wheel hub is connected to a wheel flange,	The inner member 1 includes a wheel hub 2 and an inner ring 3 press-fit on the wheel hub 2 . The wheel hub 2 is integrally formed, at its outboard side end, with a wheel mounting flange 4 to mount a wheel (not shown) on the vehicle. (The '741 publication [0032]; FIG. 1)
wherein a multi-row anti-friction bearing having an outer ring and an inner ring is arranged on the wheel hub,	The wheel hub 2 has an inner raceway surface 2 a on its outer circumferential surface and a cylindrical portion 2 b axially extending from the inner raceway surface 2 a. (The '741 publication [0033]; FIG. 1) The outer member 10 is integrally formed with a body mounting flange 10 b and has double row outer raceway surfaces 10 a and 10 a on its inner circumferential surface. (The '741 publication [0035]; FIG. 1)
wherein the inner ring comprises two bearing inner rings,	Double row rolling elements 6 and 6 are contained between the double row outer raceway surfaces 10 a , 10 a and the opposing inner raceway surfaces 2 a , 3 a . (The '741 publication [0035]; FIG. 1)
wherein an axially outer bearing inner ring is formed in one piece on the wheel hub and	The wheel hub 2 has an inner raceway surface 2 a on its outer circumferential surface and a cylindrical portion 2 b axially extending from the inner raceway surface 2 a . (The '741 publication [0033]; FIG. 1)
wherein an axially inner bearing inner ring is a separate component which is mounted on the wheel hub and is axially pretensioned by a collar, that acts on an end surface of the inner bearing inner ring, of the wheel hub,	The inner ring 3 with an inner raceway surface 3 a formed on its outer surface is press-fit on the cylindrical portion 2 b of the wheel hub 2. The inner ring 3 is secured on the wheel hub 2 by a caulked portion 2 c. (The '741 publication [0033]; FIG. 1) The caulked portion 2 c is formed by plastically deforming the end of the axially extending cylindrical portion 2 b radially outward to prevent the inner ring 3 from slipping off of the wheel hub 2. According to this embodiment, the adoption of a so-called self-retaining structure, enables control of the preload of the bearing without using any fastening means, such as a nut, and thus makes it easy to assemble the bearing to

	a vehicle and to maintain the preload for a long term. (The '741 publication [0034]; FIG. 1)
wherein at least partially a surface coating for improving corrosion protection is formed on the wheel bearing arrangement,	The object of this invention is thus to create a room-temperature-curing coating agent that provides cathodic corrosion protection and is applicable as an aerosol and as brush-on paint. (The '835 publication [0006])
wherein the surface coating is formed as a zinc flake coating,	It is within the scope of the invention that the metal pigment is selected from the group consisting of zinc, aluminium and magnesium, as well as mixtures and alloys thereof. (The '835 publication [0018]) Zinc and mixtures or alloys of zinc and aluminium are preferred. (The '835 publication [0019])
wherein a coating medium used to form the surface coating comprises zinc powder, aluminum powder, titanium tetrabutanolate and further constituents,	Zinc and mixtures or alloys of zinc and aluminium are preferred. (The '835 publication [0019]) coating agent being produced according to the following method: Mixing 5 to 95 wt. % metal alkoxide with 5 to 95 wt. % metal pigment . . . (The '835 publication [0007], [0008]) A preferred embodiment of the invention consists in that the metal alkoxide is selected from the group consisting of titanium alkoxide, in particular titanium butylate (The '835 publication [0017]) tetra-n-butyl-orthotitanate are stirred into the reaction mixture under an atmosphere of dried nitrogen, the mixture homogenized for 1 h with a slow stirrer and then refluxed for 12 h. The zinc and aluminium particles are surface-modified with the organometal component during this process. (The '835 publication [0030])

wherein the surface coating has a layer thickness of at least 10 µm.	the coating agent is applied in layer thicknesses of 5 to 60 µm, preferably in layer thicknesses of 5 to 25 µm and even more preferably in layer thicknesses of 10 to 15 µm. (The '835 publication [0015])
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Claim 2 of the '756 Patent	Citations within the '741 publication and the '835 publication
The wheel bearing arrangement as claimed in claim 1, wherein the surface coating has a layer thickness of at most 20 µm.	the coating agent is applied in layer thicknesses of 5 to 60 µm, preferably in layer thicknesses of 5 to 25 µm and even more preferably in layer thicknesses of 10 to 15 µm. (The '835 publication [0015])

Claim 3 of the '756 Patent	Citations within the '741 publication and the '835 publication
A method for coating a wheel bearing arrangement as claimed in claim 1, wherein the method comprises the following method steps: cleaning at least one component surface to be coated of the wheel bearing arrangement by means of a fluid cleaning medium;	The spray-can content is applied by way of the cross-hatch technique to degreased and cleaned steel sheet (The '835 publication [0033])
at least partial removal of the cleaning medium from the at least one component surface;	The spray-can content is applied by way of the cross-hatch technique to degreased and cleaned steel sheet (The '835 publication [0033])
coating the at least one component surface with a coating medium for generating a surface coating formed as a zinc flake	The object of this invention is thus to create a room-temperature-curing coating agent that provides cathodic corrosion protection and is applicable as an aerosol and as brush-on paint. (The '835 publication [0006])

coating,	It is within the scope of the invention that the metal pigment is selected from the group consisting of zinc, aluminium and magnesium, as well as mixtures and alloys thereof. (The '835 publication [0018])
wherein the coating medium used to form the surface coating comprises zinc powder, aluminum powder, and titanium tetrabutanolate;	Zinc and mixtures or alloys of zinc and aluminium are preferred. (The '835 publication [0019]) coating agent being produced according to the following method: Mixing 5 to 95 wt. % metal alkoxide with 5 to 95 wt. % metal pigment . . . (The '835 publication [0007], [0008]) A preferred embodiment of the invention consists in that the metal alkoxide is selected from the group consisting of titanium alkoxide, in particular titanium butylate (The '835 publication [0017]) tetra-n-butyl-orthotitanate are stirred into the reaction mixture under an atmosphere of dried nitrogen, the mixture homogenized for 1 h with a slow stirrer and then refluxed for 12 h. The zinc and aluminium particles are surface-modified with the organometal component during this process (The '835 publication [0030])
and curing the surface coating at a curing temperature of at least 15° C. and at most 80° C.	The coating agent of the invention may be applied by spraying, in particular from an aerosol can or a spray gun, brushing or roller application onto a metallic substrate, in particular steel, alloy steels, zinc, galvanized steel sheet, aluminium or aluminium alloys, and subsequently dried at room temperature. (The '835 publication [0014]) The spray-can content is applied by way of the cross-hatch technique to degreased and cleaned

	steel sheet and dried for 1 day at room temperature (20 to 25° C.) (The '835 publication [0033])
Claim 4 of the '756 Patent	Citations within the '741 publication and the '835 publication
The method as claimed in claim 3, wherein the coating of the at least one component surface is performed by means of a spraying process.	The object of this invention is thus to create a room-temperature-curing coating agent that provides cathodic corrosion protection and is applicable as an aerosol and as brush-on paint. (The '835 publication [0006]) The coating agent of the invention may be applied by spraying, in particular from an aerosol can or a spray gun (The '835 publication [0014])
Claim 5 of the '756 Patent	Citations within the '741 publication and the '835 publication
The method as claimed in claim 3, wherein the cleaning medium contains solvent.	The spray-can content is applied by way of the cross-hatch technique to degreased and cleaned steel sheet (The '835 publication [0033])
Claim 6 of the '756 Patent	Citations within the '741 publication and the '835 publication
The method as claimed in claim 3, wherein the curing of the surface coating is performed over a curing period of at least 10 minutes.	The spray-can content is applied by way of the cross-hatch technique to degreased and cleaned steel sheet and dried for 1 day at room temperature (20 to 25° C.) (The '835 publication [0033])
Claim 7 of the '756 Patent	Citations within the '741 publication and the '835 publication
A motor vehicle, comprising a wheel bearing arrangement as claimed in claim 1.	A vehicle wheel bearing apparatus for supporting a driven wheel of a vehicle (The '741 publication Abstract)

36. Prior to the filing date of the '756 Patent, it would have been obvious to a POSITA to substitute the zinc/nickel alloy plating 'preservation film' on the vehicle wheel bearing apparatus of the '741 publication with the zinc and aluminum coatings disclosed of the '835 publication because the mere substitution of one element for another known in the field would have been obvious. The '741 publication teaches that such third-generation type vehicle wheel bearing hubs are routinely exposed to cold, muddy water including salt and anti-freezing agents, and that a corrosion-resistant zinc plating exhibits a strong rust resistive effect under these severe environmental conditions (The '741 publication [0018], [0019]) and the '835 publication teach several advantages of the disclosed zinc and aluminum coatings over the zinc/nickel alloy plating of the '741 publication, such as better protection against the formation of white rust as well as the scratch-proof and abrasion resistant properties of the zinc and aluminum coatings.

2. Motivations to Combine the '741 publication and the '835 publication

37. A POSITA would have been motivated to apply the zinc and aluminum metal coating agents of the '835 publication to the vehicle wheel bearing hubs of the '741 publication because the '835 publication teaches and demonstrates the formation of an abrasion-resistant coating with good, active corrosion protection that provides a

good adhesion surface for polyurethane sealants and silicone sealants, and advantageously cures at room temperature. The POSITA would have had a reasonable expectation of success in doing so because the '835 publication teaches and demonstrates that the disclosed zinc and aluminum coatings can be easily formed, applied as an aerosol to steel or steel alloys (such as the steel components of the vehicle wheel hub of the '741 publication), and cured at room temperature.

38. In my opinion, a POSITA would have been motivated to substitute the zinc/nickel alloy plating “preservation film” on the third-generation type vehicle wheel bearing apparatus of the '741 publication with the zinc and aluminum coatings disclosed in the '835 publication because the '741 publication teaches that such third-generation type vehicle wheel bearing hubs are routinely exposed to cold, muddy water including salt and anti-freezing agents, and that a corrosion-resistant zinc plating exhibits a strong rust resistive effect under these severe environmental conditions (See, the '741 publication at [0018] and [0019]) and the '835 publication teaches several advantages of the zinc and aluminum coatings over the zinc/nickel alloy plating of the '741 publication, such as better protection against the formation of white rust as well as the scratch-proof and abrasion resistant properties of the zinc and aluminum alloy coatings.
39. Additionally, a POSITA would have been motivated to apply the zinc and aluminum

metal coating agents of the '835 publication to the vehicle wheel bearing hubs of the '741 publication because the '835 publication teaches and demonstrates the formation of an abrasion-resistant coating with good, active corrosion protection that provides a good adhesion surface for polyurethane sealants and silicone sealants, and advantageously cures at room temperature. The POSITA could expect to successfully make this substitution because the '835 publication teaches and demonstrates that the disclosed zinc and aluminum coatings can be easily formed, applied as an aerosol to steel or steel alloys (such as the steel components of the vehicle wheel hub of the '741 publication), and are cured at room temperature.

3. Claim 2

40. Claim 2 requires the application of the surface coating in a layer thickness of at most 20 μm .
41. As shown above, all limitations are shown in the references. Additionally, a POSITA, would have been motivated to apply the zinc and aluminum metal coating agents of the '835 publication to the vehicle wheel bearing hubs of the '741 publication in this thickness and could have successfully done so because the '835 publication specifically taught that the most preferred zinc and aluminum layer thickness is 10-15 μm and demonstrated that with such layer "An abrasion-resistant grey-metallic coating which provides good, active corrosion protection is obtained." See, [0033].

Thus, the '835 publication taught that sufficient corrosion protection is obtained using a layer thickness of 10-15µm and a POSITA would have understood that a greater layer thickness, for example up to and thicker than 20 µm, would needlessly increase material costs without necessarily providing any additional benefit. The resultant combination of features from the references, when combined, would result in the claimed combination.

4. Claim 3

42. Claim 3 recites:

3. A method for coating a wheel bearing arrangement as claimed in claim 1, wherein the method comprises the following method steps: cleaning at least one component surface to be coated of the wheel bearing arrangement by means of a fluid cleaning medium; at least partial removal of the cleaning medium from the at least one component surface; coating the at least one component surface with a coating medium for generating a surface coating formed as a zinc flake coating, wherein the coating medium used to form the surface coating comprises zinc powder, aluminum powder, and titanium tetrabutanolate; and curing the surface coating at a curing temperature of at least 15° C. and at most 80° C.

43. As shown above, all claimed limitations are shown in the references. Additionally, and in my opinion, a POSITA would have been motivated to apply the zinc and aluminum metal coating agents of the '835 publication to the vehicle wheel bearing hubs of the '741 publication using the method steps of claim 3 of the '756 Patent, and

could have successfully done so, because the ‘835 publication demonstrated that “An abrasion-resistant grey-metallic coating which provides good, active corrosion protection is obtained” on a steel sheet that is first “degreased and cleaned” prior to deposition of a layer of zinc and aluminum powder and tetra-n-butyl-orthotitanate from a spray-can and then “dried for 1 day at room temperature (20 to 25 C).” See, the ‘835 publication [0033]. Thus, a POSITA understood the ‘835 publication demonstrated that sufficient corrosion protection was obtained using this coating application method and additional energy expenditure was not required to cure the sprayed layer by heating above room temperature. The resultant combination of features from the references, when combined, would result in the claimed combination.

5. Claim 4

44. Claim 4 recites:

4. The method as claimed in claim 3, wherein the coating of the at least one component surface is performed by means of a spraying process.

45. As shown above, all limitations are shown in the references. Additionally, and in my opinion, a POSITA would have been motivated to apply the zinc and aluminum alloy coatings of the ‘835 publication by spraying these coatings onto the vehicle wheel bearing hubs of The ‘741 publication, and could have done so, because the ‘835

publication taught and demonstrated the application of a zinc, aluminum, and tetra-n-butyl-orthotitanate (another synonym for titanium tetrabutanolate) layers by *spraying from a spray can* to form "An abrasion-resistant grey-metallic coating which provides good, active corrosion protection." See, the '835 publication at [0014] and [0033]. The resultant combination of features from the references, when combined, would result in the claimed combination.

6. Claim 5

46. Claim 5 recites:

5. The method as claimed in claim 3, wherein the cleaning medium contains solvent.

47. As shown above, all limitations are shown in the references. Additionally, a POSITA would have known to apply the zinc and aluminum metal coating agents of the '835 publication to a substrate such as the vehicle wheel bearing hubs of the '741 publication by first cleaning the substrate with a solvent. In my opinion, any POSITA would have known to do so because it is common knowledge, especially amongst POSITA familiar with industrial coatings, that a surface to be coated with a functional coating should be clean before the coating is applied. In fact, the '835 publication demonstrated that "An abrasion-resistant grey-metallic coating which provides good, active corrosion protection is obtained" following '*degreasing and*

cleaning’ of the test substrate (the ‘835 publication at [0033]) and a POSITA would have understood that removing grease from a metal substrate requires the use of a solvent. The resultant combination of features from the references, when combined, would result in the claimed combination.

7. Claim 6

48. Claim 6 recites:

6. The method as claimed in claim 3, wherein the curing of the surface coating is performed over a curing period of at least 10 minutes.

49. As shown above, all limitations are shown in the references. Furthermore, and in my opinion, a POSITA would have cured the zinc and aluminum metal coating agents of the ‘835 publication on the wheel bearing hubs of the ‘741 publication for a period of “at least 10 minutes” as required by claim 6 of the ‘756 Patent, and would have been instructed to do so, because the ‘835 publication demonstrated that "An abrasion-resistant grey-metallic coating which provides good, active corrosion protection is obtained” on a steel sheet by deposition of a layer of zinc and aluminum powder and tetra-n-butyl-orthotitanate from a spray-can which is then “dried for 1 day.” See the ‘835 publication at [0033]. Thus, the ‘835 publication taught that sufficient corrosion protection was obtained using this claimed application method and curing time, and the application of additional energy would not be required to

cure the sprayed anti-corrosion layer in a time period of less than 10 minutes. The resultant combination of features from the references, when combined, would result in the claimed combination.

8. Claim 7

50. By my understanding, Claim 7 of the '756 Patent just states that the claimed wheel bearing apparatus of claim 1, including the anti-corrosion coating, should be used in a motor vehicle. In my opinion, a POSITA would have obviously used the vehicle wheel bearing apparatus of the '741 publication, including an anti-corrosion coating as described in the '835 publication, in a motor vehicle because the '741 publication teaches the use of the disclosed vehicle wheel bearing apparatus “for supporting a driven wheel of a vehicle.” As such, all limitations are shown in the references. The resultant combination of features from the references, when combined, would result in the claimed combination.

e. Claims 1-7 of the '756 Patent are Obvious over the '091 Publication in view of the '340 Publication

i. Overview of US Patent Publication No. 2009/0148091

51. The '091 publication describes a method of manufacturing a wheel bearing apparatus including an outer ring, a rolling element (double rows of ball groups), a hub spindle,

and an inner ring member. See, Abstract and Fig 1. The '091 publication explained that a wheel bearing apparatus will exhibit corrosion:

Accordingly, it is possible to prevent the generation of electric corrosion on the knuckle that would be caused by a combination of the steel outer member and the light alloy knuckle and thus to provide a wheel bearing having improved reliability.”

See, [0030]

52. The '091 publication then describes an “insulating coating” that prevents premature electric corrosion caused by combinations of different kinds of metals exposed to “corrosion circumstances.” See, [0086]. The '091 publication provides an example of “nickel plating or zinc plating, or cationic electro-deposition or fluorocarbon electro-deposition other than the dacrotized treatment may be used.” See, [0087].

ii. Overview of US Patent Publication No. 2012/0009340

53. The '340 publication describes a method for producing deformable corrosion protection layers on a metallic surface and how to use the method. It further describes a method for providing cathodic corrosion protection of metal for a broad range of applications.
54. The corrosion layers being comprised of mixtures of magnesium, zinc, aluminum or titanium particles or mixtures or alloys containing at least one of these metals, in the form of pigments, powders, pastes (flakes) or pellets with 5 to 95% wt. % of at least one metal compound, wherein a reaction between metal particles and metal

compound(s) results in surface-modified metal particles. Abstract of the '340 publication.

55. The '340 publication explains why zinc and aluminum are preferred for cathodic corrosion protection in the automotive industry. See, 0003. The '340 publication details why zinc flake coatings are used and have been known to the industry, detailing what organic binders or siloxanes are incorporated into formulations and how the corrosion protection is tested in salt spray tests to simulate the environmental conditions parts might see in use. See, 0004. The '340 publication details their invention (see, [0017]-[0023]) where the coating agent is applied in layer thicknesses of 2 to 25 μ m, preferably in layer thicknesses of 2 to 15 μ m and more preferably in layer thicknesses of 2-10 μ m. The '340 publication also describes use of the particle morphology including pigments, powders, pastes (flakes), or pellets. See, [0010]. It continues to describe the metal compound as a metal alkoxide, metal salt or a mixture of metal alkoxides and/or metal salts. See, [0022]. Titanium alkoxides such as titanium butylate (which chemical name is a synonym for titanium tetrabutanolate) are provided as examples. See, [0022]. The '340 publication also describes types of solvents that metal compounds can be dissolved into. See, [0025]. The described application methods for the coating on metal surfaces included wet-chemical processes including spray painting. See, [0029]. In paragraph [0031] of the

'340 publication a refinement on curing is described where the curing is carried out at temperatures ranging from room temperature to 500°C, preferably between room temperature and 350°C, ...for a period between 30s and 1 day... and more preferably for a period of between 30s and 5 minutes. "Hardening" to a POSITA is synonymous with curing. The '340 publication also lists potential uses for this coating technology, including:

Last but not least, the scope of the invention also includes use of the method of the invention for producing deformable corrosion protection layers on components for buildings, road, air, water, underwater, farm, construction, space and rail vehicles, in particular motor vehicles and motor vehicle attachments, farm machinery, construction machinery, bridges, cranes, shafts, cable cars, industrial plants, technical equipment, power plants, lamps, masts, housings, covers or protection devices, or on fasteners, in particular screws and bolts. See, [0033].

**iii. All features of claim 1 of the '756 Patent are present in the
Combination of US 2009/0148091 and US 2012/0009340**

1. Claims 1-7

56. Claim 1 of the '756 Patent states:

1. A wheel bearing arrangement for a motor vehicle, comprising a wheel hub, wherein the wheel hub is connected to a wheel flange, wherein a multi-row anti-friction bearing having an outer ring and an inner ring is arranged on the wheel hub, wherein the inner ring comprises two bearing inner rings, wherein an axially outer bearing inner ring is formed in one piece on the wheel hub and wherein an axially inner bearing inner ring is a separate

component which is mounted on the wheel hub and is axially pretensioned by a collar, that acts on an end surface of the inner bearing inner ring, of the wheel hub, wherein at least partially a surface coating for improving corrosion protection is formed on the wheel bearing arrangement, wherein the surface coating is formed as a zinc flake coating, wherein a coating medium used to form the surface coating comprises zinc powder, aluminum powder, titanium tetrabutanolate and further constituents, wherein the surface coating has a layer thickness of at least 10 µm.

57. The '091 publication discloses every mechanical element of the claimed wheel bearing apparatus of the '756 Patent. The '340 publication is cited for teaching an anti-corrosion zinc and aluminum coating identical to the coating recited in independent claims 1 and 3 of the '756 Patent. Combined, these two prior art documents teach the claimed wheel bearing arrangement for a motor vehicle comprising a surface coating for improving corrosion protection as set forth in the issued claims of the '756 Patent.
58. The following chart identifies the claim limitations of the '756 Patent and the corresponding elements of the '091 publication and the '340 publication where all limitations are disclosed:

Claim 1 of the '756 Patent	Citations within the '091 publication and the '340 publication
A wheel bearing arrangement for a motor vehicle, comprising,	A vehicle wheel bearing apparatus . . . (the '091 publication - Abstract) the scope of the invention also includes use of the method of the invention for producing deformable corrosion protection layers on . . . rail vehicles, in particular motor vehicles and motor vehicle

	attachments, motors/engines and motor/engine attachments (The '340 publication [0033])
a wheel hub, wherein the wheel hub is connected to a wheel flange,	The wheel hub 4 is integrally formed with a wheel mounting flange 6 at its one end. (The '091 publication [0054]; FIG. 1)
wherein a multi-row anti-friction bearing having an outer ring and an inner ring is arranged on the wheel hub,	includes an inner member 1 , an outer member 2 , and double row rolling element (ball) groups 3 , 3 rollably contained between the inner and outer members 1 , 2 . The inner member 1 has the wheel hub 4 and an inner ring 5 press fit onto the wheel hub 4 . (The '091 publication [0053]; FIG. 1)
wherein the inner ring comprises two bearing inner rings,	The inner member 1 has the wheel hub 4 and an inner ring 5 press fit onto the wheel hub 4 . (The '091 publication [0053]; FIG. 1) One (outer side) inner raceway surface 4 a is on its outer circumference. (The '091 publication [0054]; FIG. 1)
wherein an axially outer bearing inner ring is formed in one piece on the wheel hub and	The inner member 1 has the wheel hub 4 and an inner ring 5 press fit onto the wheel hub 4 . (The '091 publication [0053]; FIG. 1)
wherein an axially inner bearing inner ring is a separate component which is mounted on the wheel hub and is axially pretensioned by a collar, that acts on an end surface of the inner bearing inner ring, of the wheel hub,	The inner ring 5 is formed on its outer circumference with the other (inner side) inner raceway surface 5 a . It is adapted to be press fit onto the cylindrical portion 4 b of the wheel hub 4 to form a double row angular contact ball bearing of a back-to-back duplex type. It is axially secured by a caulked portion 4 c formed by plastically deforming the end of the cylindrical portion 4 b . (The '091 publication [0055]; FIG. 1)
wherein at least partially a surface coating for improving corrosion protection is formed on the wheel bearing arrangement,	a method for producing deformable corrosion protection layers on a metallic surface (The '340 publication - Abstract)
wherein the surface coating is formed as a zinc flake coating,	preparation of a corrosion protection layer containing zinc and aluminum as "pastes (flakes)" (The '340 publication - Abstract, [0021])

	Especially in corrosion tests such as the neutral salt spray test, these zinc flake coatings provide distinctly better corrosion protection than zinc-metal coatings of comparable thickness. (The '340 publication [0004])
wherein a coating medium used to form the surface coating comprises zinc powder, aluminum powder, titanium tetrabutanolate and further constituents,	Mixing 5 to 95 wt. % metallic magnesium, zinc, aluminium or titanium particles, or mixtures or alloys containing at least one of these metals, in the form of pigments, powders, pastes (flakes) or pellets with 5 to 95 wt. % of at least one metal compound, wherein a reaction between the metal particles and metal compound(s) results in surface-modified metal particles; (The '340 publication [0010]) A preferred embodiment of the invention consists in that the metal compound is a metal alkoxide, a metal salt or a mixture of metal alkoxides and/or metal salts. (The '340 publication [0022]) In this connection, it is preferable for the metal alkoxide to be selected from the group consisting of titanium alkoxide, especially titanium butylate, titanium propylate or titanium isopropylate, zirconium alkoxide, aluminium alkoxide and tin alkoxide. (The '340 publication [0023]) Example 3 describes the application of an anti-corrosion coating for press-hardened steel parts. The coating is composed of Al pigment paste and Zn pigment paste dissolved in tetrabutylorthotitanate and applied by a paint spray gun. (The '340 publication [0049]-[0051])
wherein the surface coating has a layer thickness of at least 10 µm.	the coating agent is applied in layer thicknesses of 2 to 25 µm, preferably in layer thicknesses of 2 to 15 µm (The '340 publication [0017])
Claim 2 of the '756 Patent	Citations within the '091 publication and the '340 publication
The wheel bearing arrangement as claimed in claim 1, wherein the surface coating has a layer	the coating agent is applied in layer thicknesses of 2 to 25 µm, preferably in layer thicknesses of 2 to 15 µm (The '340 publication [0017])

thickness of at most 20 μm .	
Claim 3 of the '756 Patent	Citations within The '091 publication and the '340 publication
A method for coating a wheel bearing arrangement as claimed in claim 1, wherein the method comprises the following method steps: cleaning at least one component surface to be coated of the wheel bearing arrangement by means of a fluid cleaning medium;	The coating material is applied by roll applicator to both sides of degreased and cleaned steel sheets (The '340 publication [0052])
at least partial removal of the cleaning medium from the at least one component surface;	The coating material is applied by roll applicator to both sides of degreased and cleaned steel sheets (The '340 publication [0052])
coating the at least one component surface with a coating medium for generating a surface coating formed as a zinc flake coating,	Surprisingly, it was found that the corrosion tendency of magnesium particles or zinc particles in the magnesium-containing or zinc-containing layers can be effectively prevented by coating the surface of each individual particle with a thin layer containing electrically conducting or semiconducting constituents, without preventing the active corrosion-protection effect of the magnesium or zinc, in themselves very base metals. The metal particles are passivated "in situ" by the metal compound, preventing the formation of white rust typical of conventional zinc coatings hardenable at room temperature. (The '340 publication [0015]) It is preferable for the particles, pigments, powders, pastes (flakes) or pellets to have an individual grain

	size of 100 nm to 100 μm , more preferably of 1 μm to 30 μm . (The '340 publication [0021])
wherein the coating medium used to form the surface coating comprises zinc powder, aluminum powder, and titanium tetrabutanolate;	The invention provides for the use of 10 to 80 wt. %, more preferably 25 to 75 wt. % and most preferably 40 to 60 wt. % metallic magnesium, zinc, aluminium or titanium particles in the form of pigments, powders, pastes (flakes) or pellets. (The '340 publication [0019])
and curing the surface coating at a curing temperature of at least 15° C. and at most 80° C.	It is within the scope of the invention that, in step c), hardening is carried out at temperatures ranging from room temperature to 500° C., preferably between room temperature and 350° C. (The '340 publication [0031])

Claim 4 of the '756 Patent	Citations within the '091 and the '340 publication
The method as claimed in claim 3, wherein the coating of the at least one component surface is performed by means of a spraying process.	It is within the scope of the invention that, in step b), application of the resulting surface-modified metal particles onto the metallic surface is by way of a wet-chemical process, in particular by spray (US'340 [0029])

Claim 5 of the '756 Patent	Citations within the '091 and the '340 publication
The method as claimed in claim 3, wherein the cleaning medium contains solvent.	The coating material is applied by roll applicator to both sides of degreased and cleaned steel sheets (US'340 [0052])

Claim 6 of the '756 Patent	Citations within the '091 publication and the '340 publication
The method as claimed in claim 3, wherein the curing of the surface coating is performed over a curing	It is within the scope of the invention that, in step c), hardening is carried out at temperatures ranging from room temperature to 500° C., preferably between room temperature and 350° C., . . . for a

period of at least 10 minutes.	period of between 30 s and 1 day, preferably for a period of between 30 s and 1 h (The '340 publication [0031])
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Claim 7 of the '756 Patent	Citations within the '091 publication and the '340 publication
A motor vehicle, comprising a wheel bearing arrangement as claimed in claim 1.	The present disclosure relates to a vehicle wheel bearing apparatus (The '091 publication [0002]) the scope of the invention also includes use of the method of the invention for producing deformable corrosion protection layers on . . . motor vehicles and motor vehicle attachments (The '340 publication [0033])

59. Prior to the filing date of the '756 Patent, it would have been obvious to substitute the zinc plating insulating coating on the third-generation type vehicle wheel bearing apparatus of the '091 publication with the zinc and aluminum coatings disclosed in the '340 publication because the mere substitution of one element for another known in the field would have been obvious. The '091 publication teaches that third-generation type vehicle wheel bearing hubs comprising such insulating coatings have reduced weight and size and increased rigidity, thereby improving the life of the bearing apparatus (The '091 publication [0015], [0016]) and the '340 publication discloses zinc and aluminum coatings that have several advantages over conventional zinc plating, such as the ability to form/deform the coatings without damage to the coating, and the metal substrate to which the coatings are applied can

also be deformed, overpainted, welded, coated and colored, without damage to the coatings. See, the '340 publication [0013]. The zinc and aluminum coatings of the '340 publication also advantageously reflect heat and provide a composite of steel and aluminum with cathodic corrosion protection. See, the '340 publication [0013].

2. Motivations to Combine the '091 publication and the '340 publication

60. It is my opinion that a POSITA would have been motivated to apply the zinc and aluminum metal coating compositions of the '340 publication to the vehicle wheel bearing hubs of the '091 publication because a POSITA would have understood that the '340 publication teaches zinc and aluminum coatings have several advantages, including relatively easy and economically preparation and application to vehicle components and they provide effective cathodic corrosion protection and protection from white rust. See, the '340 publication [0015]. Furthermore, it is my opinion that a POSITA would have a reasonable expectation of success in doing so because the '340 publication teaches that the disclosed zinc coatings can be applied by conventional means, such as spray painting, to motor vehicles attachments. See, the '340 publication [0029], [0033].
61. In my opinion, a POSITA would have been motivated to substitute the zinc plating to mitigate “electric corrosion” [0086] on the third generation type vehicle wheel

bearing apparatus of the '091 publication with the zinc and aluminum coatings disclosed in the '340 publication. The '091 publication teaches that corrosion is a problem in wheel bearings. See, [0030]. The '091 publication teaches that a zinc plating or zinc rich coatings can mitigate corrosion. See, [0087].

62. The '340 publication teaches an anticorrosion coating for use in vehicles including chassis components. It teaches zinc and aluminum pigments that have binders that can include titanium alkoxides, including, specifically, titanium butylate. See, [0022]. The '340 publication teaches coating thicknesses from 2 to 10µm are most desirable. The '340 publication teaches paint spraying can be used to apply this coating and drying/curing can take place from room temperature to 350°C. See, [0031].
63. In my opinion, a POSITA would have substituted the zinc and aluminum metal coating agents of the '340 publication onto the vehicle wheel bearing hubs of the '091 publication because the '340 publication teaches and demonstrates the formation of corrosion protection that provides a good adhesion surface and advantageously cures at room temperature. The POSITA could expect to successfully do so because the '340 publication teaches and demonstrates that the disclosed zinc and aluminum coatings can be easily formed, applied as an aerosol to steel or steel alloys (such as the steel components of the vehicle wheel hub of the

'091 publication), and cured at room temperature. See, [0031] and [0033].

3. Claim 2

64. Claim 2 requires the application of the surface coating in a layer thickness of at most 20 μm .

65. As shown above, all limitations are shown in the references. In my opinion, a POSITA would have applied the zinc and aluminum metal coating agents of the '340 publication as “deformable corrosion protection layers” on a metallic surface to the vehicle wheel bearing hubs of the '091 publication in a layer thickness of at most 20 μm , and could have done so because the '340 publication taught that the most preferred zinc and aluminum layer thickness is 2 to 25 μm . See, [0017]. Thus, the '340 publication taught that sufficient corrosion protection is obtained using a layer thickness of 2 to 25 μm and a POSITA would have understood that a greater layer thickness, for example thicker than 20 μm , would needlessly increase material costs without necessarily providing any additional benefit. The resultant combination of features from the references, when combined, would result in the claimed combination.

4. Claim 3

66. Claim 3 recites:

3. A method for coating a wheel bearing arrangement as claimed in claim 1, wherein the method comprises the following method steps: cleaning at least one component surface to be coated of the wheel bearing arrangement by means of a fluid cleaning medium; at least partial removal of the cleaning medium from the at least one component surface; coating the at least one component surface with a coating medium for generating a surface coating formed as a zinc flake coating, wherein the coating medium used to form the surface coating comprises zinc powder, aluminum powder, and titanium tetrabutanolate; and curing the surface coating at a curing temperature of at least 15° C. and at most 80° C.

67. As shown above, all claimed limitations are shown in the references. It is also my opinion that a POSITA would have applied the zinc and aluminum metal coating agents of the '340 publication as “a deformable corrosion protection layer” on metallic surfaces to the vehicle wheel bearing hubs of '091 using the method steps of claim 3 of the '756 Patent, and could have successfully done so, because the '340 publication demonstrated that the coating would consist of a metal compound dissolved in a solvent. See, [0025]. It would have been common sense to a POSITA that such a coating should be applied to a clean surface and that an appropriate surface should be cleaned to remove grease, oils, or other residues to promote adherence, as described in '340. See, [0039] and [0052]. Additionally, '340 taught that a hardening of the zinc and aluminum coating takes place at temperatures between room temperature and 500°C. See, [0031]. The resultant combination of features from the references, when combined, would result in the claimed

combination.

5. Claim 4

68. Claim 4 recites:

4. The method as claimed in claim 3, wherein the coating of the at least one component surface is performed by means of a spraying process.

69. As shown above, all limitations are shown in the references. A POSITA would have clearly understood to apply the zinc and aluminum metal coatings of the '340 publication as “deformable corrosion protection layers” on metallic surfaces to the vehicle wheel bearing hubs of the '091 publication by a spraying process as recited in claim 4 of the '756 Patent, and would have known how to do so, because the '340 publication taught the application of “the resulting surface-modified metal particles onto the metallic surface is by way of a wet-chemical process, in particular by spray painting.” See, [0029]. The resultant combination of features from the references, when combined, would result in the claimed combination.

6. Claim 5

70. Claim 5 recites:

5. The method as claimed in claim 3, wherein the cleaning medium contains solvent.

71. As shown above, all limitations are shown in the references. Regarding the cleaning

of the component surface(s) with a “cleaning medium” containing a solvent as stated in claim 5 of the '756 Patent, a POSITA would have understood to apply the zinc and aluminum metal coating agents of the '340 publication to the vehicle wheel bearing hubs of the '091 publication that had been degreased and cleaned, as exemplified in paragraphs [0039] and [0052] of the '340 publication. As I noted above, it is my opinion that a POSITA would have understood that removing grease from a metal substrate requires the use of a solvent, and a POSITA would understand that a clean surface is important to promote adherence of the zinc and aluminum metal coating agents. The resultant combination of features from the references, when combined, would result in the claimed combination.

7. Claim 6

72. Claim 6 recites:

6. The method as claimed in claim 3, wherein the curing of the surface coating is performed over a curing period of at least 10 minutes.

73. As shown above, all limitations are shown in the references. In my opinion, a POSITA would have cured the zinc and aluminum metal coating agents of the '340 publication on the vehicle wheel bearing hubs of '091 by curing the anti-corrosion spray coating for a period of at least 10 minutes, as required by claim 6 of the '756 Patent. A POSITA would have known that this curing time would have successfully

formed an effective corrosion protection layer, because the '340 publication taught that “deformable corrosion protection layers” deposited on metallic surfaces by wet-chemical processes such as spray painting, would harden over a period of between 30s and 1h. See, [0031]. Thus, the '340 publication taught that sufficient corrosion protection was obtained using this application method and the application of additional energy was not required to cure the sprayed anti-corrosion layer faster, i.e., in a period of less than 10 minutes. The resultant combination of features from the references, when combined, would result in the claimed combination.

8. Claim 7

74. Finally, regarding claim 7 of the '756 Patent, a POSITA would have been motivated to use the third-generation type vehicle wheel bearing apparatus of the '091 publication, including an anti-corrosion coating as described in the '340 publication, in a motor vehicle because the '091 publication describes the disclosed vehicle wheel bearing apparatus as “a third generation type used for a driven wheel.” See, [0053]. Thus, a POSITA would have clearly understood to use the vehicle wheel bearing apparatus of the '091 publication on a motor vehicle. As such, all limitations are shown in the references. The resultant combination of features from the references, when combined, would result in the claimed combination.

**f. Claims 1-7 of the '756 Patent are Obvious over '013 Publication in
view of '794 Publication**

i. Overview of US Patent Publication No. 2017/02119013

75. The '013 publication describes a method of manufacturing wheel bearing apparatus. See, Title and Abstract. The design and manufacturing process is described for the third generation wheel hub. See, [0037]. The use and effects of corrosion protection is described in paragraph [0006]: “Each surface of the outer ring and the hub spindle of such a wheel bearing apparatus can be coated with, for example, nickel plating or zinc plating to improve corrosion resistance and quality of appearance.”

ii. Overview of US Patent Publication No. 2010/0175794

76. The '794 publication describes an active anti-corrosion coating on steel components. See, Abstract. This publication describes the invention for producing anti-corrosive components or assemblies for vehicle construction, including “engines, and engine attachments, pistons, sealing rings, exhaust systems, ABS and braking system, brake discs, chassis components, wheels, rims.” See, [0046]. The '794 publication recognizes the need for special coating compositions consisting of a metal oxide and metal pigment, in particular zinc pigment or zinc pigment with aluminum pigment, for corrosion protection for steel. See, [0019]. The inventors stated that even when the coating thickness was in the lower micrometer range, effective corrosion

protection was provided. See, [0019]. '794 describes antiscaling layers consisting of zinc and/or aluminum alloys and pigments. See, [0023]. This publication also states that the layer is applied from the liquid phase in a wet-chemical process, in particular in a spraying, flooding, rolling or dipping process, and that the layer thickness is less than 50µm, preferably less than 20µm and best of all less than 10µm. See, [0027] and [0028]. The '794 publication also states that the anti-corrosion layer, once applied, is dried at a temperature between room temperature and 400°C, preferably between room temperature and 250°C. See, [0030]. A POSITA would understand that in the context of the '794 publication, the term “dried” would be similar to cured. The '794 publication describes the use of a binder containing in particular titanium, aluminum or zirconium oxides, and this binder is produced by the sol-gel process, silicones, siloxanes or waxes. See, [0034] and [0035]. A POSITA would understand that sol-gel processes include metal alkoxides such as titanium tetrabutanolate.

**iii. All features of claim 1 of the '756 Patent are present in the
Combination the '013 Publication in view of '794 Publication**

1. Claims 1-7

77. The '013 publication discloses every mechanical element of the claimed wheel bearing apparatus of the '756 Patent. US'794 is cited for teaching an active anti-

corrosion coating for steel parts identical to the coating recited in independent claims 1 and 3 of the '756 Patent. Combined, these two prior art documents teach the claimed wheel bearing arrangement for a motor vehicle comprising a surface coating for improving corrosion protection as set forth in the issued claims of the '756 patent.

78. The following chart identifies the claim limitations of the '756 Patent and the corresponding elements of the '013 publication and the '794 publication where all limitations are disclosed:

Claim 1 of the '756 Patent	Citations within the '013 publication and the '794 publication
A wheel bearing arrangement for a motor vehicle, comprising,	Provided is a method of manufacturing a wheel bearing apparatus (The '013 publication, Abstract) a process for producing an active anti-corrosion coating on steel components (The '794 publication, Abstract) “the scope of the invention extends to use of the process according to the invention for producing anti-corrosive components or assemblies for . . . engines and engine attachments, pistons, sealing rings, exhaust systems, ABS and braking systems, brake discs, chassis components, wheels, rims” (The '794 publication [0046])
a wheel hub, wherein the wheel hub is connected to a wheel flange,	FIG. 1 shows the wheel bearing apparatus 1 for a driving wheel of an automobile. On the axial first end side of the hub spindle 3, an annular flange portion 5 is formed integrally with the hub spindle 3, and extends outward in the radial direction from an outer periphery of the hub spindle 3. The flange portion 5 is provided with a plurality of bolt holes 5 a arranged in the circumferential direction and passing through the flange portion 5 in a thickness direction of the flange portion 5 (The '013 publication [0017], [0023]; FIG. 1)
wherein a multi-row anti-friction bearing having an	The rolling bearing 2 is, for example, a double row ball bearing and includes an outer ring 11 and an

outer ring and an inner ring is arranged on the wheel hub,	inner ring member 12 . (The '013 publication [0019]; FIG. 1)
wherein the inner ring comprises two bearing inner rings,	The inner ring member 12 has an inner ring raceway surface 13 a on an outer periphery of the inner ring member 12 . . . The spindle raceway surface 13 b faces the outer ring raceway surface 11 b that is on the axial first end side. (The '013 publication [0020]; FIG. 1)
wherein an axially outer bearing inner ring is formed in one piece on the wheel hub and	The hub wheel 4 has a cylindrical hub spindle 3 that serves as a raceway ring member for the rolling bearing 2 . The hub spindle 3 of the hub wheel 4 has a large-diameter portion 6 and a small-diameter portion 8 . The large-diameter portion 6 is formed on an axial first end side. The small-diameter portion 8 has a diameter smaller than that of the large-diameter portion 6 , and is formed continuously to the large-diameter portion 6 via a step surface 7 and extending from the large-diameter portion 6 toward an axial second end side. (The '013 publication [0018]; FIG. 1)
wherein an axially inner bearing inner ring is a separate component which is mounted on the wheel hub and is axially pretensioned by a collar, that acts on an end surface of the inner bearing inner ring, of the wheel hub,	An inner periphery of the inner ring member 12 is fitted on the small-diameter portion 8 of the hub spindle 3 . A spindle end portion 8 a of the small-diameter portion 8 , which is on the axial second end side, is clinched outward in the radial direction by using a clinching punch (not shown), and thus a clinched portion 9 is formed. The inner ring member 12 is fitted and fixed on the small-diameter portion 8 . (The '013 publication [0019]; FIG. 1)
wherein at least partially a surface coating for improving corrosion protection is formed on the wheel bearing arrangement,	“the scope of the invention extends to use of the process according to the invention for producing anti-corrosive components or assemblies for . . . engines and engine attachments, pistons, sealing rings, exhaust systems, ABS and braking systems, brake discs, chassis components, wheels, rims” (Thee '794 publication [0046])
wherein the surface coating is formed as a zinc flake coating,	the anti-corrosion layer contains between 10 and 100 wt. %, preferably between 50 and 100 wt. % and best of all between 70 and 95 wt. % metallic zinc pigment (The '794 publication [0032])

	It is also to advantage in this connection that the anti-corrosion layer contains up to 50 wt. % metallic aluminium pigment. (The '794 publication [0033]) coating is composed of Al pigment paste and Zn pigment paste dissolved in tetrabutylorthotitanate and applied by a paint spray gun. (The '794 publication [0050], [0051])
wherein a coating medium used to form the surface coating comprises zinc powder, aluminum powder, titanium tetrabutanolate and further constituents,	the binder used in the anti-corrosion layer contains 5 to 100 wt. % metal oxides, in particular titanium, aluminium or zirconium oxides. (The '794 publication [0034]) Example 1 demonstrates the application of an anti-corrosion coating for press-hardened steel parts. The coating is composed of Al pigment paste and Zn pigment paste dissolved in tetrabutylorthotitanate and applied by a paint spray gun. (The '794 publication [0050], [0051])
wherein the surface coating has a layer thickness of at least 10 µm.	the layer thickness of the anti-corrosion layer is less than 50 µm, preferably less than 20 µm (The '794 publication [0028])

Claim 2 of the '756 Patent	Citations within the '013 publication and the '794 publication
The wheel bearing arrangement as claimed in claim 1, wherein the surface coating has a layer thickness of at most 20 µm.	the layer thickness of the anti-corrosion layer is . . . preferably less than 20 µm (The '794 publication [0028])

Claim 3 of the '756 Patent	Citations within the '013 publication and the '794 publication
A method for coating a wheel bearing arrangement as claimed in claim 1, wherein the method comprises the following method steps:	Degreased 22MnB5A steel strip moving at 60

cleaning at least one component surface to be coated of the wheel bearing arrangement by means of a fluid cleaning medium;	m/min is roll-coated in a coil coating line with a coating material (The '794 publication [0048])
at least partial removal of the cleaning medium from the at least one component surface;	Degreased 22MnB5A steel strip moving at 60 m/min is roll-coated in a coil coating line with a coating material (The '794 publication [0048])
coating the at least one component surface with a coating medium for generating a surface coating formed as a zinc flake coating,	The object of the invention is to develop an active anti-corrosion coating that can be applied on an industrial scale using conventional means (e.g. dipping, spraying, flooding or rolling) and is intended for hot-formed and, in particular, press-hardened steel parts provided with antiscaling means. (The '794 publication [0009]) Surprisingly, it was found that special coating compositions consisting of a metal oxide and metal pigment, in particular zinc pigment or zinc pigment and aluminium pigment, protect steel effectively against corrosion even when the layer thickness is in the lower μm range and irrespective of whether these coating compositions are applied directly onto the metallic steel surface or onto the reaction layer formed from the antiscaling coating during annealing. (The '794 publication [0019])
wherein the coating medium used to form the surface coating comprises zinc powder, aluminum powder, and titanium tetrabutanolate;	23.6 g of an aluminium pigment paste (e.g. Decomet Hochglanz Al 1002/10 from Schlenk) and 138.1 g of a zinc pigment paste (Stapa TE Zinc AT from Eckart) are stirred into 74.4 g of 1-butanol solvent and mixed in homogeneously for 20 minutes using a dissolver running at a speed of 1000 rpm. 163.3 g tetrabutylorthotitanate (from Fluka) are stirred into this solution. (The '794

	publication [0050])
and curing the surface coating at a curing temperature of at least 15° C. and at most 80° C.	The coating solution hardens at room temperature within an hour of application (The '794 publication [0051])

Claim 4 of the '756 Patent	Citations within the '013 publication and the '794 publication
The method as claimed in claim 3, wherein the coating of the at least one component surface is performed by means of a spraying process.	The coating solution is applied to the entire surface of the press-hardened part using a paint spray gun (The '794 publication [0051])

Claim 5 of the '756 Patent	Citations within the '013 publication and the '794 publication
The method as claimed in claim 3, wherein the cleaning medium contains solvent.	Degreased 22MnB5A steel strip moving at 60 m/min is roll-coated in a coil coating line (The '794 publication [0048])

Claim 6 of the '756 Patent	Citations within the '013 publication and the '794 publication
The method as claimed in claim 3, wherein the curing of the surface coating is performed over a curing period of at least 10 minutes.	The coating solution hardens at room temperature within an hour of application (The '794 publication [0051])

Claim 7 of the '756 Patent	Citations within the '013 publication and the '794 publication
A motor vehicle, comprising a wheel bearing arrangement as claimed in claim 1.	A vehicle, such as an automobile, is provided with a wheel bearing apparatus used to install a wheel so as to rotate with respect to the body of the vehicle. (The '013 publication [0005])

	An object of the present invention is to provide a method of manufacturing a wheel bearing apparatus, and a wheel bearing apparatus. (The '013 publication [0010]) the scope of the invention extends to use of the process according to the invention for producing anti-corrosive components or assemblies for . . . engines and engine attachments, pistons, sealing rings, exhaust systems, ABS and braking systems, brake discs, chassis components, wheels, rims (The '794 publication [0046])
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79. Prior to the filing date of the '756 Patent, it would have been obvious to substitute the insulating zinc plating on the third-generation type vehicle wheel bearing apparatus of the '013 publication with the zinc and aluminum metal coating compositions of the '794 publication because the mere substitution of one element for another known in the field would have been obvious. The '013 publication teaches third-generation type vehicle wheel bearing hubs comprising nickel or zinc platings that are corrosion resistant but require a difficult and labor-intensive method of carefully applying a zinc plating to areas of the hub assembly and then removing the zinc plating from specified subsections on the hub assembly. See, the '013 publication [0025]-[0030], [0037]. The '794 publication teaches and demonstrates zinc and aluminum metal coating compositions that are relatively easy to prepare and apply to vehicle components and provide effective anti-corrosion rust resistance.

See, the '794 publication [0009], [0019], [0046].

2. Motivations to Combine the '091 publication and the '340 publication

80. In my opinion, a POSITA would have been motivated to apply the zinc and aluminum metal coating compositions of the '794 publication to the vehicle wheel bearing hubs of the '013 publication because the '794 publication teaches a metal oxide and metal pigment, in particular zinc pigment and aluminum pigment, that protect steel effectively against corrosion even when the layer thickness is in the lower micron range and that impart highly resistant edge protection to the coated steel component. See, the '794 publication, [0019]. The '794 publication also teaches that the anti-corrosion coating advantageously can be overpainted, phosphated, or dip-coated without any problem. See, the '794 publication, [0019], [0062].
81. In my opinion, the POSITA would have had a reasonable expectation of success in making this substitution because the '794 publication teaches and demonstrates that the disclosed zinc and aluminum coatings can be applied on an industrial scale by conventional means, such as spraying, and hardened at room temperature to components and assemblies used in vehicle construction. See, the '794 publication, [0009], [0046], [0051].

82. In my opinion, a POSITA would have been motivated to substitute the zinc plating “corrosion resistant plating” on the third generation type vehicle wheel bearing apparatus of the '013 publication with the zinc and aluminum coatings disclosed in the '794 publication, because the '013 publication teaches that corrosion is a problem in wheel hubs, in particular “third generation wheel hubs,” and that a zinc plating can mitigate corrosion, while the '794 publication teaches an effective anticorrosion coating for use in vehicles including chassis components composed of zinc and aluminum pigments. The '794 publication teaches the use of binders in the anticorrosion coating that can include titanium derived from sol-gel processes. A POSITA would understand that sol-gel processes include metal alkoxides such as titanium tetrabutanolate.
83. In my opinion, a POSITA would have applied the zinc and aluminum metal coating agents of the '835 publication as an “active anti-corrosion coating” to the vehicle wheel bearing hubs of the '013 publication because the '794 publication teaches and demonstrates the formation of an abrasion-resistant coating with good, active corrosion protection that provides a good adhesion surface for steel components. See, [0019]. The POSITA could expect to do so because the '794 publication teaches and demonstrates that the disclosed zinc and aluminum coatings can be easily formed, applied using conventional means (e.g., spraying) to steel components, such

as the vehicle wheel hub of '013, and cured at room temperature. See, [0009] and [0030].

3. Claim 2

84. Claim 2 requires the application of the surface coating in a layer thickness of at most 20 μm .
85. As shown above, all limitations are shown in the references. The '794 publication instructs a POSITA to apply the zinc and aluminum anticorrosion coating agents as an “active anti-corrosion coating” in a preferred layer thickness less than 20 μm as recited in claim 2 of the '756 Patent. See, [0028]. The '794 publication also demonstrated that with such zinc and aluminum layers, active corrosion protection is obtained. See, [0048]-[0051] and [0062]. Thus, the '794 publication taught that sufficient corrosion protection is obtained using a layer thickness of less than 20 μm and a POSITA would have understood that a greater layer thickness, for example thicker than 20 μm , would needlessly increase material costs without necessarily providing any additional benefit. The resultant combination of features from the references, when combined, would result in the claimed combination.

4. Claim 3

86. Claim 3 recites:

3. A method for coating a wheel bearing arrangement as claimed in claim 1, wherein the method comprises the following method steps: cleaning at least one component surface to be coated of the wheel bearing arrangement by means of a fluid cleaning medium; at least partial removal of the cleaning medium from the at least one component surface; coating the at least one component surface with a coating medium for generating a surface coating formed as a zinc flake coating, wherein the coating medium used to form the surface coating comprises zinc powder, aluminum powder, and titanium tetrabutanolate; and curing the surface coating at a curing temperature of at least 15° C. and at most 80° C.

87. As shown above, all claimed limitations are shown in the references. In my opinion, a POSITA would have formed and applied the zinc and aluminum metal coating agents of the '794 publication as an "active anti-corrosion coating" to the vehicle wheel bearing hubs of the '013 publication using the method steps of claim 3 of the '756 Patent, and would have expected to have successfully done so, because the '794 publication demonstrated that a coating which provides good, active corrosion protection is obtained on a steel strip that has sprayed layer of zinc and aluminum pigments and titanium oxides that can be produced by sol-gel processes. See, [0034] and [0048]-[0051]. A POSITA would understand that the sol-gel processes include metal alkoxides such as tetrabutylorthotitanate (which is a synonym for titanium tetrabutanolate). See, [0050]. Furthermore, as I explained above, it is my opinion that a POSITA would have understood that cleaning or degreasing a metal substrate is important to promote adherence of the zinc and aluminum metal coating agents

and would therefore have, as a matter of common sense, cleaned the surface of the wheel hubs of the '013 publication prior to applying the anti-corrosion coatings of the '794 publication. Lastly, a POSITA would have dried the anti-corrosion coatings of the '794 publication “at a temperature between 15°C and 80°C because the '794 publication instructs drying the coatings in this temperature range and a POSITA would have wanted to avoid the unnecessary energy expenditure required to heat the coating and the wheel bearing above 80°C. See, the '794 publication at [0030]. The resultant combination of features from the references, when combined, would result in the claimed combination.

5. Claim 4

88. Claim 4 recites:

4. The method as claimed in claim 3, wherein the coating of the at least one component surface is performed by means of a spraying process.

89. As shown above, all limitations are shown in the references. A POSITA would have been motivated to apply the zinc and aluminum metal coatings of the '794 publication as an active anti-corrosion coating by spraying these coatings onto the vehicle wheel bearing hubs of the '013 publication as required by claim 4 of the '794 Patent because the '794 Patent taught and demonstrated the application of a zinc and aluminum anticorrosion layer by spraying the liquid phase in a wet-chemical

process. See, [0027]. The resultant combination of features from the references, when combined, would result in the claimed combination.

6. Claim 5

90. Claim 5 recites:

5. The method as claimed in claim 3, wherein the cleaning medium contains solvent.

91. As shown above, all limitations are shown in the references. As I noted above, with respect to claim 3 of the '756 Patent, in my opinion it would have been obvious to a POSITA to apply the zinc and aluminum metal coating agents of the '794 publication to the vehicle wheel bearing hubs of the '013 publication that had been cleaned, and the '794 publication further demonstrates the anticorrosion efficacy of the zinc, aluminum, and tetrabutylorthotitanate coating to a degreased steel strip. See, the '794 publication at [0048] and [0050]. In my opinion, it would have been obvious to a POSITA that the surface would be cleaned with a solvent to remove grease and oils to promote adherence of the deposited anticorrosion layer. The resultant combination of features from the references, when combined, would result in the claimed combination.

7. Claim 6

92. Claim 6 recites:

6. The method as claimed in claim 3, wherein the curing of the surface coating is performed over a curing period of at least 10 minutes.

93. As shown above, all limitations are shown in the references. In my opinion, a POSITA would have been motivated to apply the zinc and aluminum metal coating agents of the '794 publication over a curing period of at least 10 minutes as stated in claim 6 of the '756 Patent, because the '794 publication teaches the formation of an active anti-corrosion coating by applying the zinc, aluminum, and tetrabutylorthotitanate coating as a spray that “hardens at room temperature within an hour of application” and a POSITA would have recognized the energy savings in drying or curing at room temperature for a period of an hour. The resultant combination of features from the references, when combined, would result in the claimed combination.

8. Claim 7

94. Finally, regarding claim 7 of the '756 Patent, a POSITA would have been motivated to use the third-generation type vehicle wheel bearing apparatus of '013 including an anti-corrosion coating as described in '794, in a motor vehicle because '013 describes the use of the disclosed vehicle wheel bearing apparatus “for supporting a driven wheel of a vehicle” and a POSITA would have clearly been motivated to use the disclosed wheel bearings for their states purpose in a motor vehicle. The resultant

combination of features from the references, when combined, would result in the claimed combination.

IV. CONCLUSION

95. As discussed in detail above, I am of the opinion that there are at least three combinations of references that render obvious Claims 1-7 of the '756 Patent. I have also provided several rationales that support my various conclusion of obviousness including one or more of:

- (A) Combining prior art elements according to known methods to yield predictable results;
- (B) Simple substitution of one known element for another to obtain predictable results;
- (C) Use of known technique to improve similar devices (methods, or products) in the same way;
- (D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
- (E) "Obvious to try" – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- (F) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art

reference teachings to arrive at the claimed invention.

96. I have also provided explanations of how and why a POSITA would have arrived at the claimed features.

97. I hereby declare that all statements made herein of my own are true and that all statements made on information and belief are believed to be true; and further that the statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the subject patent application or any patent certificate issuing therefrom.

By: 

Date: 8/28/24

Dr. Richard Haber