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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte WALDFRIED PLIETH, URSULA RAMMELT, NILS HEBESTREIT, MARTIN STRATMANN, MICHAEL ROHWERDER, HANS-JURGEN ADLER, KARIN POTJE-KAMLOTH, EVELIN JAHNE, ANDRIJ PICH, HERIBERT DOMES, JULIA SCHNEIDER, and GRAZYNA PALIWODA-PROBESKA

Appeal 2019-000819
Application 13/277,510
Technology Center 1700

Before CATHERINE Q. TIMM, BEVERLY A. FRANKLIN, and N. WHITNEY WILSON, *Administrative Patent Judges.*

TIMM, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 31, 33, 34, 38, 40–49, 55, 56, 63, 66–

[1] We use the word Appellant to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as BASF, Gmbh. Appeal Br. 1.

71, 97, 100, 103, 112, and 113. *See* Final Act. 1. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

CLAIMED SUBJECT MATTER

The claims are directed to a process for coating metallic surfaces with an anti-corrosive composition and drying the composition. *See, e.g.*, claims 31, 97, 100, and 103. The composition includes conductive particles having an inorganic core coated with a conductive polymer. The conductive polymer (e.g., polyfuran, polypyrrole, polythiophene) is charged with at least one anti-corrosive mobile anion (e.g., hexafluorotitanate or hexafluorozirconate). *Id.* Claim 31, reproduced below, is illustrative of the claimed subject matter:

> Claim 31. A process comprising:
>
> coating a metallic surface with an anti-corrosive composition that is a dispersion, wherein the anti-corrosive composition forms a corrosion resistant coating on the metallic surface, and
>
> the anti-corrosive composition comprises
>
> (A) at least one water-soluble or water dispersible organic polymer;
>
> (B) conductive particles comprising an inorganic core particle coated with a conductive polymer,
>
> wherein the conductive polymer contains at least one member selected from the group consisting of polyphenylene, polyfuran, polyphenanthrene, polypyrrole, polythiophene and polythiophenylene,
>
> wherein the conductive polymer is charged with at least one anti-corrosive mobile anion selected from

the group consisting of benzoate, nitrosalicylate, salicylate, tartrate, hexafluorotitanate, hexafluorozirconate, an anion based on a vanadium-containing acid, and tungstate;

(C) water;

(D) optionally at least one organic solvent; and

(E) optionally at least one additive; and

drying the coated metallic surface at a temperature in a range from 30°C to 80°C.

Appeal Br. 16 (Claims Appendix).

REJECTIONS

The Examiner maintains the following rejections.

A. Claim 46 is rejected under 35 U.S.C. § 112 ¶ 2. Final Act. 2.

B. Claims 31, 33, 34, 38, 41, 45–49, 55, 66, 67, 69, 70, 97, 100, 103, and 113 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kinlen[2] in view of Domes,[3] Sinko,[4] and Hartwig,[5] as evidenced by Harper.[6] Final Act. 4.

[2] Kinlen, WO 03/102034 A1, published Dec. 11, 2003.
[3] Domes et al., WO 2004/076717 A1, published Sept. 10, 2004. The Examiner relies on US 2006/0127681 A1, published June 15, 2006 as an English equivalent without objection by Appellant. Thus, we will cite to the U.S. document.
[4] Sinko et al., US 2004/0149963 A1, published Aug. 5, 2004.
[5] Hartwig et al., US 2004/0168748 A1, published Sept. 2, 2004.
[6] Harper et al., Plastics Materials and Processes: A Concise Encyclopedia, Wiley, (2003).

C. Claim 40 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Kinlen, Domes, Sinko, Hartwig, as evidenced by Harper and Duc.[7,8] Final Act. 4.

D. Claim 63 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Kinlen, Domes, Sinko, Hartwig, as evidenced by Harper and Pal.[9,10] Final Act. 4.

E. Claims 43, 44, and 63 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kinlen, Domes, Sinko, Hartwig, as evidenced by Harper, and further in view of Oka[11] and Gros.[12] Final Act. 11.

F. Claim 112 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Kinlen, Domes, Sinko, and Hartwig, as evidenced by Harper, and further in view of Paar.[13] Final Act. 12.

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[7] Duc, "The Role of Anions in the Corrosion Protection of Iron and Zinc by Polypyrrole" PhD Dissertation, Technical University of Dresden (September 4, 2005).

[8] The Examiner includes claim 40 and the citation to Duc in the rejection we list as Rejection B. Because the Examiner only relies on Duc to reject claim 40, we list the rejection separately.

[9] Pal, Rheology of Particulate Dispersions and Composites, CRC Press, (2006).

[10] The Examiner includes claim 63 and the citation to Pal in Rejection B, but because the Examiner only relies on Pal to reject claim 63, we list the rejection separately.

[11] Oka et al., US 6,451,433 B1, issued Sept. 17, 2002.

[12] Gros et al., WO 2004/063294 A1, published July 29, 2004. The Examiner relies on US 2006/0228481 A1, published Oct. 12, 2006 as an English language equivalent without objection by Appellant. Thus, we cite to the U.S. document.

[13] Paar et al., US 2002/0091195 A1, published July 11, 2002.

G. Claim 42 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Kinlen, Domes, Sinko, Hartwig, as evidenced by Harper, in view of Oka and Gros, and further in view of Paar. Final Act. 13.

H. Claims 38 and 56 under 35 U.S.C. § 103(a) as being unpatentable over Kinlen, Domes, Sinko, and Hartwig, as evidenced by Harper, and further in view of Assaf.[14] Final Act. 13.

I. Claims 68 and 71 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kinlen, Domes, Sinko, and Hartwig, as evidenced by Harper, and further in view of Tomono.[15] Final Act. 15.

OPINION

Rejection A: Indefiniteness of Claim 46

The Examiner rejects claim 46 under 35 U.S.C. § 112 ¶ 2 as indefinite. Final Act. 2.

Claim 46 depends from claim 31 and requires a step of pretreating the metallic surface prior to claim 31's step of coating the metallic surface with an anti-corrosive composition. Claim 46 recites several alternative pretreating steps one of which is providing the metallic surface with a thin coating that contains conductive polymer.

[14] Assaf, "Inhibiting Effects of Group 6 Oxo-Anions on the Pitting Corrosion of Tin in Citrate-Chloride Solution," *Bull. Chem. Soc. Jpn*, 73, 561–568 (2000).
[15] Tomono et al., US 5,762,772, issued June 9, 1998.

The Examiner determines that "thin" is unclear and indefinite because it is a relative term and the Specification provides no standard for ascertaining the requisite degree. Final Act. 3.

Appellant relies on page 25, lines 22–29 of the Specification to support a contention that "[a] person skilled in the art, after reading the specification of the application would understand the meaning of the term 'thin.'" Appeal Br. 7–8.

The Specification does not support Appellant's contention.

The portion of the Specification cited by Appellant introduces four thicknesses, "ultra-thin, thin, thick or very thick," and then provides five example thickness ranges of "from 0.5 to 10 nm, from > 1 to 100 nm, from > 10 to 1000 nm (1 μm), from > 100 nm to 10 μm, or from > 0.5 μm to 50 μm." Appeal Br. 8, citing Spec. 25 ll. 25–29. The Specification does not equate "thin" coatings with any of the five recited ranges and the five ranges overlap each other and are termed example thicknesses.

The Specification does not support Appellant's contention because the ranges recited in the Specification do not provide any reasonably clear boundary for "thin," but instead indicate that "thin" might mean several different things. It might be referring to the "from > 1 to 100 nm" range or the "from > 10 to 1000 nm (1 μm)" range. Or "thin" might not correlate with the ranges at all. Thus, the claim language is not as reasonably precise as the circumstances permit. *See In re Packard*, 751 F.3d 1307, 1314 (Fed. Cir. 2014) (Affirming an indefiniteness rejection because Packard had been given the opportunity to bring clarity to his claim language stating that "[i]n some cases it is difficult enough for courts to construe claims when the draftsperson has made every effort to be clear and concise, let alone when

the claims have readily observable ambiguities or incoherencies within them.").

Appellant has not identified a reversible error in the Examiner's determination of indefiniteness.

Obviousness

> *Rejections B–D: The obviousness of claims 31, 33, 34, 38, 40, 41, 45–49, 55, 63, 66, 67, 69, 70, 97, 100, 103, and 113 over Kinlen in view of Domes, Sinko, and Hartwig, as evidenced by Harper, Pal (for claim 63), and Duc (for claim 40)*

Turning to the Examiner's rejection of claims 31, 33, 34, 38, 40, 41, 45–49, 55, 63, 66, 67, 69, 70, 97, 100, 103, and 113 as obvious over Kinlen in view of Domes, Sinko, and Hartwig, as evidenced by Harper, Pal (for claim 63), and Duc (for claim 40), we note that Appellant does not argue any claim apart from the others. Appeal Br. 9–12. We select claim 31 as representative to resolve the issues on appeal.

Appellant's arguments are directed to the Examiner's combination of the teachings of Kinlen with those of Domes, Sinko, and Hartwig. Appeal Br. 9–12; Reply Br. 1–5. Appellant contends the combinations are made using impermissible hindsight and that they lack supporting evidence. *Id.*

After considering the evidence relied on by the Examiner and Appellant, we determine a preponderance of the evidence supports the Examiner's findings of suggestions within the prior art to make the necessary modifications to arrive at the claimed invention.

The Combination with Domes

There is no dispute that, as found by the Examiner, Kinlen teaches a method of coating a metallic surface with an anti-corrosive composition that is a dispersion containing a solvent, a curable resin binder system, and a corrosion responsive agent (CRA), i.e., the formulation of Kinlen is a dispersive film-forming coating composition. *Compare* Final Act. 4, *with* Appeal Br. 9–12, *and* Reply Br. 1–5. Domes, Sinko, and Hartwig also evince that it was known in the art to incorporate anti-corrosive compositions into various types of dispersive film-forming coatings. *See* Domes ¶¶ 1, 128, 130–159, 163 (aqueous dispersion of resin such as acrylate, epoxide along with anti-corrosion additives silane and chelate); Sinko ¶¶ 4–5 (inherently conductive polymers (ICPs) used as additives in paint formulations and known to interact with metal surfaces to inhibit corrosion); Hartwig ¶¶ 4, 17–18, 34 (teaching adding hexafluorotitanate or hexafluorozirconate anions as a corrosion inhibitor to paints).

Kinlen's coating composition is radiation curable and is, for instance, a UV curable coating composition. Kinlen ¶¶ 29, 59. Kinlen disperses the corrosion-responsive agent in the radiation curable resin binder system (¶¶ 29, 57). Although Kinlen does not particularly limit the radiation curable binder system, Kinlen teaches a preference for UV curable systems such as those including oligomers such as epoxy acrylates and diacrylates, urethane acrylates, polyurethane diacrylates, bisphenol A epoxy acrylates, amine modified polyether acrylates, aromatic urethane acrylates, polybutadiene acrylates, polyester acrylates, and mixtures thereof. Kinlen ¶ 60. As a specific example, Kinlen teaches a urethane acrylate oligomer/acrylate monomer blend. Kinlen ¶¶ 64, 96.

Kinlen does not teach drying the coated metallic surface at elevated temperature and, thus, the Examiner turns to Domes. Final Act. 5. Domes teaches an aqueous-based coating composition containing silane and metal chelate as anti-corrosion agents. Domes ¶ 1. Domes's coating composition, like Kinlen's coating composition, may be acrylate-based. Domes ¶¶ 130–159. Domes advises that the final drying of the films can take days or weeks, but that curing can be accelerated or intensified by irradiating, e.g., with UV irradiation, or by heating. Domes ¶ 164. The Examiner concludes that it would have been obvious to the ordinary artisan to heat the coating composition of Kinlen because elevated temperature would facilitate or quicken the curing and drying of the coating and the temperature the ordinary artisan would use would be arrived at through routine optimization. Final Act. 5–6.

Appellant contends that "there is no evidence that quickening the curing or [drying] would be beneficial to the coatings disclosed in Kinlen." Appeal Br. 10. However, based on the similarities in chemistry between the two coating formulations and the suggestion in both Kinlen and Domes of using UV curable coating compositions, a preponderance of the evidence supports the Examiner's finding. Domes teaches that either heat or UV radiation will speed curing in particular types of coating compositions. Appellant has not provided persuasive evidence that faster curing would not have been desired when using such compositions.

Appellant contends that different curing methods are not necessarily interchangeable. Appeal Br. 10–11. Although true, this does not negate the evidence tending to show that heat would speed curing in the type coating system used by the prior art.

The Combination with Sinko

There is no dispute that Kinlen's coating composition includes a conductive polymer, such as polyfuran, polypyrrole, or polythiophene, and that the conductive polymer is doped with an anti-corrosive or corrosion-inhibiting mobile anion. *Compare* Final Act. 5, *with* Appeal Br. 9–12, *and* Reply Br. 1–5. The conductive polymers are termed intrinsically conductive polymers (ICPs). Kinlen ¶ 8. Acknowledging that Kinlen does not teach coating the ICP onto an inorganic core particle, the Examiner turns to Sinko. Final Act. 6–7.

The references as a whole evince that it was known in the art to include conductive particles comprising the salt form of a conductive polymer, such as polyfuran, polypyrrole, or polythiophene (ICPs), in anti-corrosive coating compositions. *See* Kinlen ¶¶ 40–41 (disclosing that the corrosion-responsive agent (CRA) is the salt of an intrinsically conductive polymer (ICP) and a corrosion-inhibiting anion); Sinko ¶¶ 4–5 (noting it was known in the art to use ICPs as additives in paint formulations and disclosing the salt forms as protective against corrosion in oxidative environments). According to Sinko, "ICP's, being reversibly oxidizable and reducible, interact with metal surfaces to inhibit corrosion. Inherently conductive forms of ICP'S, i.e. the salt forms, appear to be protective against corrosion in oxidative environments." Sinko ¶ 5.

Sinko notes that in reductive, and specifically alkaline environments, conductive forms of ICPs are not as effective at inhibiting corrosion. Sinko ¶ 5. "Consequently, the inherently conductive state of ICP's can not [sic] be preserved in alkaline environments which are typically present in atmospheric conditions thereby significantly limiting the use of ICP's in protective organic primers." *Id.*

Sinko improves upon the ICP by coating the conductive polymer (ICP) around an inorganic core. Sinko ¶¶ 7–9.

Appellant contends Domes's organic film forming agent already includes synthetic resins that are stable at pH values less than or equal to 9 or, in particular, less than or equal to 5, and there would be no motivation for a person skilled in the art to add something else with the same effect. Appeal Br. 11 (citing Domes ¶ 167). Appellant further contends that Kinlen is silent as to pH and there is no suggestion in Kinlen that this would be a desirable property. Appeal Br. 11. According to Appellant, the fact that a property may be useful in some instances does not provide a motivation or suggestion that it will be useful or desirable in other instances. *Id.*

Appellant's arguments lack merit because Sinko articulates a need "for a conducting ICP that resists conversion to an insulating form when in the presence of alkaline environments" and teaches an inorganic core that fulfills this need. Sinko ¶ 5. Sinko's expressed desire is more than adequate to provide a reason to make the modification to Kinlen's conductive ICP particles. *See KSR Int'l v. Teleflex Inc.*, 550 U.S. 398, 420 (2007) ("[A]ny need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.").

Thus, a preponderance of the evidence supports the Examiner's finding of a reason to use the inorganic core particles coated with ICP of Sinko in anti-corrosion coating compositions, particularly those that are used in alkaline environments.

The Combination with Hartwig

Although Kinlen does not disclose using an anti-corrosive mobile anion of the type recited in claim 31, Hartwig teaches incorporating hexafluorotitanate (TiF_6^{2-}) or hexafluorozirconate (ZrF_6^{2-}) anions into polymers used in paints to inhibit corrosion. Hartwig ¶¶ 17–18. Given the desire of Kinlen to produce an anti-corrosion coating composition, a preponderance of the evidence supports the Examiner's finding of a suggestion to include Hartwig's hexafluorotitanate (TiF_6^{2-}) or hexafluorozirconate (ZrF_6^{2-}) anions in an anti-corrosion coating also including the conductive particles taught by Sinko. Hartwig specifically discloses that the combination with other known corrosion inhibitors offers advantages because it results in a product with a broad range of application. Hartwig ¶ 31.

Appellant contends that the ordinary artisan would only find a reason to use TiF_6^{2-} and ZrF_6^{2-} based on Appellant's disclosure. Appeal Br. 11. This argument ignores the teachings of Hartwig and is, thus, not persuasive.

Rejection E: Obviousness of Claims 43, 44, and 63 adding Oka, and Gros

We now turn to Rejection E, the Examiner's rejection of claims 43, 44, and 63 as obvious over Kinlen, Domes, Sinko, Hartwig, as evidenced by Harper, and further in view of Oka and Gros. Final Act. 11.

Claim 63 depends from claim 31 and further requires a step of "applying to the metallic surface having the corrosion resistant coating thereon a second composition that is a dispersion and contains a binder system."

In rejecting claim 63, the Examiner relies on Oka as teaching applying a second composition that is a dispersion and contains a binder system. Final Act. 11. Appellant contends that Oka's binders are inorganic binders while Appellant's binders are organic. Appeal Br. 12. But it is the two-step coating application that is relied on by the Examiner. Ans. 7. The Examiner is not relying on the binder system of Oka.

Appellant contends that "Kinlen, Domes, Sinko or Hartwig are all silent on the need for an additional binder, and the only motivation to include a binder comes from the present application." Appeal Br. 12. This is incorrect. Kinlen teaches applying multiple coatings containing binder. *See, e.g.*, Kinlen ¶ 97 (three coating/curing cycles).

Appellant points out limitations recited in claim 43, but does not set forth an argument that is specific enough to identify a reversible error in the Examiner's findings of fact or application of the law.

Appellant has not identified a reversible error in the Examiner's rejection.

Rejections F and G: Obviousness of Claims 42 and 112 further in view of Paar.

We now turn to the Examiner's Rejections F and G, which add Paar to reject claims 42 and 112. Final Act. 12–13.

Claims 42 and claim 112 further require the binder system comprise "at least one organic polymer that is or becomes anionically or cationically stabilized."

Appellant acknowledges that Paar discloses the use of a cationically stabilized epoxy resin as a binder in aqueous coatings. Appeal Br. 12. Appellant contends that "[n]o evidence is provided to suggest that a binder

would be beneficial or desirable to the coating composition disclosed in Kinlen, Domes, Sinko or Hartwig" and that "all four cited references are completely silent on the need for an additional binder, and the only motivation to include a binder comes from the present application." Appeal Br. 12. However, Examiner provides a reason to use the binder of Paar, i.e., to provide stability and anti-corrosive properties. Final Act. 13; Ans. 8. Appellant has not identified a reversible error in that finding.

Rejection H: Obviousness of Claims 38 and 56 adding Assaf

To reject claims 38 and 56, the Examiner adds Assaf.

Claim 38 limits the at least one mobile anti-corrosive anion to the group consisting of TiF_6^{2-}, ZrF_6^{2-}, VO_4^{2-}, WO_4^{2-}, and WO_4^{4-}. Claim 56 further limits the group to VO_4^{2-}, WO_4^{2-}, and WO_4^{2-}.

As the Examiner found in the rejection of claim 31, Kinlen teaches using molybdate (MoO_4^{2-}) as a corrosion-inhibiting anion. Final Act. 14; Kinlen ¶¶ 24, 32. Hartwig provides evidence of the obviousness of using TiF_6^{2-} and ZrF_6^{2-} as corrosion inhibitors and alternatives to chromates and molybdates. Final Act. 7–8; *see also* Hartwig ¶¶ 28–29 (showing that TiF_6^{2-}, ZrF_6^{2-}, and molybdates were among the known corrosion inhibitors). Because Kinlen and Hartwig do not disclose the use of tungstate (WO_4^{2-}), the Examiner relies on Assaf as evidence that WO_4^{2-} was known to function as a corrosion inhibitor and to support the conclusion that it would have been obvious to use this known corrosion inhibitor in the corrosion inhibiting composition. Final Act. 14–15.

Appellant contends that there is no evidence to support the Examiner's conclusion. However, the evidence supports a finding that the various anions were known for their anti-corrosion affects in anti-corrosion

compositions including those recited in claims 38 and 56. "The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR Int'l*, 550 U.S. at 416. Using the known anions for the known anti-corrosive properties would have been obvious to one of ordinary skill in the art in the absence of a showing of unexpected results.

Appellant has not identified a reversible error in the Examiner's rejection.

Rejection I: Obviousness of Claims 68 and 71 adding Tomono

Appellant does not argue against the Examiner's Rejection I, i.e., the rejection of claims 68 and 71 under 35 U.S.C. § 103(a) as being unpatentable over Kinlen, Domes, Sinko, and Hartwig, as evidenced by Harper, and further in view of Tomono. Final Act. 15. Thus, Appellant has not identified a reversible error in this rejection.

CONCLUSION

The Examiner's rejections are affirmed.

DECISION SUMMARY

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
46	112 ¶ 2	Indefiniteness	46	
31, 33, 34, 38, 41, 45–49, 55, 66, 67, 69, 70, 97, 100, 103, 113	103(a)	Kinlen, Domes, Sinko, Hartwig, Harper	31, 33, 34, 38, 41, 45–49, 55, 66, 67, 69, 70, 97, 100, 103, 113	

40	103(a)	Kinlen, Domes, Sinko, Hartwig, Harper, Duc	40	
63	103(a)	Kinlen, Domes, Sinko, Hartwig, Harper, Pal	63	
43, 44, 63	103(a)	Kinlen, Domes, Sinko, Hartwig, Harper, Oka, Gros	43, 44, 63	
112	103(a)	Kinlen, Domes, Sinko, Hartwig, Harper, Paar	112	
42	103(a)	Kinlen, Domes, Sinko, Hartwig, Harper, Oka, Gros, Paar	42	
38, 56	103(a)	Kinlen, Domes, Sinko, Hartwig, Harper, Assaf	38, 56	
68, 71	103(a)	Kinlen, Domes, Sinko, Hartwig, Harper, Tomono	68, 71	
Overall Outcome			31, 33, 34, 38, 40–49, 55, 56, 63, 66–71, 97, 100, 103, 112, 113	

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED