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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/453,203	08/06/2014	Jeffrey Niederst	4918.131US02	6594
145378	7590	05/22/2020	EXAMINER	
Patterson Thuente Pedersen, P.A. 80 South Eighth Street 4800 IDS Center Minneapolis, MN 55402			REDDY, KARUNA P	
			ART UNIT	PAPER NUMBER
			1764	
			NOTIFICATION DATE	DELIVERY MODE
			05/22/2020	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JEFFREY NIEDERST, RICHARD H. EVANS,
ROBERT M. O'BRIEN, KEVIN ROMAGNOLI, and
MARK S. VON MAIER

Appeal 2019-004120
Application 14/453,203
Technology Center 1700

Before ROMULO H. DELMENDO, MICHAEL G. McMANUS, and
MERRELL C. CASHION, JR., *Administrative Patent Judges*.

McMANUS, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant¹ seeks review of the Examiner's decision to reject claims 2, 3, 5–7, 9–12, 14, 17, 21–27, 30–33, and 42–47. We have jurisdiction under 35 U.S.C. § 6(b).

Oral argument was held May 11, 2020.

We affirm.

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 Sherwin-Williams Company. Appeal Brief dated Jan. 3, 2019 (“Appeal Br.”) at 3.

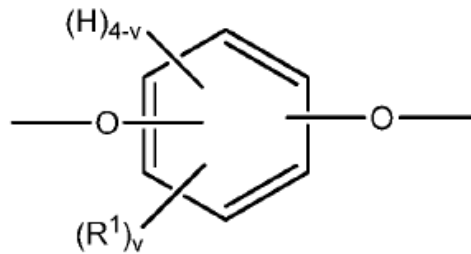
CLAIMED SUBJECT MATTER

The present application generally relates to coatings for packaging containers such as metal food and beverage cans. Specification filed Aug. 6, 2014 (“Spec.”) ¶ 2. Coatings are applied to the interior of such containers to prevent contact between the food and metal. *Id.* ¶ 3. The Specification teaches that such coatings should be safe for food contact, not adversely affect the taste of the packaged food or beverage product, have excellent adhesion to the substrate, and resist staining and other degradation over long periods of time. *Id.* Certain coatings conventionally used for this purpose incorporate bisphenol A (BPA). *Id.* ¶ 4. The Specification teaches that there is, however, “a desire by some to reduce or eliminate certain BPA-based compounds commonly used to formulate food-contact epoxy coatings.” *Id.*

The Specification teaches a coating composition that is free of any polyhydric polyphenol or any epoxide thereof. *Id.* ¶ 6. The Specification further teaches that “[u]se of a polyhydric monophenol having no appreciable estrogenic activity may be beneficial in the event that any unreacted, residual polyhydric phenol may be present in a cured coating composition.” *Id.* ¶ 95.

Claim 2 is illustrative of the subject matter on appeal and is reproduced below with certain limitations bolded for emphasis:

2. An article comprising:
a food or beverage container, or a portion thereof, having:
a metal substrate; and
a coating disposed on at least a portion of the substrate, the coating formed from a coating composition comprising:
a polyether polymer that includes at least 25% by weight of aryl or heteroaryl groups, exhibits a glass transition temperature of at least 30°C, **does not include any structural units derived from polyhydric polyphenol** or any structural units derived from a compound exhibiting estrogen agonist activity greater than or equal to that exhibited by bisphenol S, and includes one or more segments of the below **Formula (II)**:



II

wherein:

each of the depicted oxygen atoms in Formula (II) is present in an ether linkage,

H denotes a hydrogen atom, if present,

each R¹, if present, is independently an atom or group having an atomic weight of at least 15 Daltons,

v is 0 to 4, and

wherein two or more R¹ groups can join to form one or more cyclic groups;

wherein the polyether polymer is a reaction product of reactants including a diepoxide and a dihydric monophenol; and

wherein if the diepoxide comprises a diepoxide of a dihydric monophenol, the dihydric monophenol used to form the diepoxide includes a phenylene ring having one or more organic substituent groups positioned ortho to one or more hydroxyl groups.

Appeal Br. 27–28 (Claims App.) (emphasis added; reformatted for clarity).

REFERENCES

The Examiner relies upon the following prior art:

Name	Reference	Date
Urano et al. (“Urano”)	US 4,880,892	Nov. 14, 1989
Evans et al. (“Evans”)	US 2007/0087146 A1	Apr. 19, 2007

REJECTIONS

The Examiner maintains the following rejections:

1. Claims 2, 3, 5–7, 9–12, 14, 17, 21–27, 30–33, and 42–47 are provisionally rejected on the ground of nonstatutory double patenting as obvious over claims 21–47 of Application No. 15/204,559, which later issued as US 10,294,388 B2 on May 21, 2019. Final Action dated July 30, 2018 (“Final Act.”) at 3.
2. Claims 2, 3, 5–7, 9–12, 14, 17, 21–27, 30–33, and 42–47 are rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Urano in view of Evans. *Id.* at 3–6.

DISCUSSION

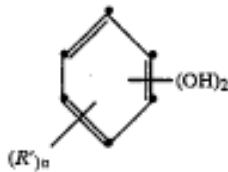
Rejection 1. The Examiner rejects all pending claims for nonstatutory double patenting. *Id.* at 3.

Appellant does not present argument contesting this rejection. *See* Appeal Br. 7 (“Only the rejection of the claims under pre-AIA 35 U.S.C. § 103(a) is being appealed.”); Reply Br. 3. Consequently, Appellant has waived any assertion of error and we summarily sustain the Examiner’s rejection of the claims for nonstatutory double patenting. *See In re Berger*, 279 F.3d 975, 984–85 (Fed. Cir. 2002) (holding that the Board did not err in sustaining a rejection that was not contested by the appellant).

Rejection 2. The Examiner rejects all pending claims as obvious over Urano in view of Evans. Final Act. 3–6.

In support of the rejection, the Examiner finds that Urano teaches a coating composition that comprises “(a) an epoxy resin having on average more than one epoxy per molecule,” and “(b) a mononuclear phenol having at least two phenolic hydroxyl groups per molecule.” *Id.* at 4.

The Examiner finds that the epoxy of Urano may include “polyglycidyl ethers of dihydric phenols such as resorcinol and hydroquinone.” *Id.* The Examiner further finds that examples of mononuclear phenol taught by Urano include compounds represented by the following formula:



Urano’s formula teaches a structure that is one of several phenols “to which the present invention is applicable.” Urano 3:43–44. The Examiner further finds that Urano teaches that the R’ group in the formula depicted above

may be a lower alkyl having 1 to 7 carbon atoms. Final Act. 4–5; *see also* Urano 3:62–4:11.

The Examiner additionally finds that the dihydric phenols that are reacted with the epoxy resin can be the same or different from the dihydric phenol used to prepare the 1,2-epoxy resin component. Final Act. 5. In this regard, Urano teaches that “[t]he dihydric phenols that are reacted with the epoxy resin . . . can be the same or different from the dihydric phenol used to prepare the 1,2-epoxy resin component.” Urano 4:49–52.

The Examiner relies on Evans as teaching that bisphenols are “perceived by some people as being potentially harmful to human health.” Final Act. 5; Evans ¶ 4. Accordingly, the Examiner determines that one of skill in the art would not have chosen these compounds, from among those disclosed by Urano, for use in a food coating composition. Final Act. 5–6; Evans ¶ 4.

The Examiner concludes that one of ordinary skill in the art would have had reason “to replace bisphenol glycidyl ethers in examples, of Urano et al, with diepoxides prepared from unsubstituted/ substituted dihydric monophenols, such as hydroquinone and resorcinol, in examples of Urano et al, and extend the said diepoxide with a mononuclear phenol to prepare the polyether polymer.” *Id.* at 5–6.

Appellant alleges error on several bases. Appeal Br. 10–25. Appellant organizes the claims into several groups for purposes of argument. *Id.* We consider Appellant’s arguments in the order presented.

Claims 2, 3, 5–7, 9–12, 17, 21–27, 30, and 47

Appellant argues that claims 2, 3, 5–7, 9–12, 17, 21–27, 30, and 47 were rejected in error. *Id.* at 10–22.

First, Appellant argues that the Examiner erred in relying upon Evans to narrow the range of diepoxides and phenols for use in the coating composition. *Id.* at 10–13.

In the Final Action, the Examiner finds that “[m]any current packaging coatings contain mobile or bound bisphenol based materials and are perceived as being potentially harmful to human health. There is a strong desire to eliminate these compounds from food contact coatings.” Final Act. 5. Appellant argues that the Examiner reads Evans too broadly. Appeal Br. 10–13. Appellant asserts that “Evans only describes a ‘strong desire’ to eliminate mobile or bound BPA and BPF based materials from packaging coatings” rather than *all* bisphenol based materials. *Id.* at 11 (emphasis omitted). In the Answer, the Examiner concedes that Evans does not teach to eliminate the use of all bisphenols. Answer 8–9. The Examiner maintains, however, that Evans teaches not to use bisphenol A and bisphenol F in food related coatings. *Id.* The Examiner further asserts that “[t]his replacement of BPA based compounds in examples of Urano with reaction product of dihydric phenols and epoxide obtained from the same dihydric phenol (taught in the general disclosure of Urano et al) would result in a polyether polymer of present claims and does not include polyhydric polyphenols.” *Id.* at 9.

We are not persuaded of error on this basis. Urano teaches as follows regarding the use of dihydric phenols:

The dihydric phenols particularly suitable in the practice of the invention include 2,2-bis(4-hydroxyphenyl)propane (bisphenol A), **resorcinol**, 1,4-dihydroxynaphthalene, 2,2-bis(4-hydroxy) methane (bisphenol F), bis(4-hydroxyphenyl)-sulfone, tetrabromo- and tetrachlorobisphenol A, **pyrocatechol**, **hydroquinone**, bis(4-hydroxyphenyl)methylphenyl-methane, bis(4-hydroxyphenyl)-tolyl-methane, 4,4' -dihydroxy biphenyl, phenolphthalin and 4,4'-dihydroxy-3, 3' ,5 ,5'-tetramethyl biphenyl. Among them, particularly preferred is bis(4-hydroxyphenyl)methane and 2, 2-bis(4-hydroxyphenyl) propane.

Urano 4:37–48 (emphasis added).

Thus, the dihydric phenols relied upon by the Examiner (resorcinol, pyrocatechol, and hydroquinone (*see Answer 7*)) are listed by name. The Examiner may rely on such disclosure. *See Merck & Co., Inc. v. Biocraft Labs. Inc.*, 874 F.2d 804, 807 (Fed. Cir. 1989) (“That the [reference] discloses a multitude of effective combinations does not render any particular formulation less obvious.”); *see also Purdue Pharma Prod. L.P. v. Par Pharm., Inc.*, 377 F. App’x 978, 982 (Fed. Cir. 2010) (finding claim obvious over argument that “a person of skill in the art would not have selected tramadol out of the myriad other possible active ingredients for use in a once-daily formulation” where the prior art reference listed tramadol as one of fourteen different opioid analgesics).

Second, Appellant argues that the Examiner lacks an adequate basis to find that Urano teaches a polyether polymer that does not include any structural unit derived from a compound exhibiting estrogen agonist activity greater than or equal to that of bisphenol S. Appeal Br. 13–18.

In the Final Action, the Examiner finds that, in view of the structural similarity of the polyether polymer taught by Urano derived from dihydric

monophenols, “one skilled in art at the time invention was made would have a reasonable basis to expect these compounds to not exhibit estrogen antagonist activity greater than bisphenol S and 4, 4'-(propane-2, 2-diyl)bis(2, 6-dibromophenol),^[2] absent evidence to the contrary.” Final Act. 6.

Appellant argues that neither Urano nor Evans discusses or even mentions estrogen agonist activity. Appeal Br. 13. Appellant further argues that the Examiner has failed to show that Urano or Evans regarded estrogen agonist activity as a recognized potential problem. *Id.* at 14. Appellant additionally argues that the Examiner has not shown that the references describe a finite number of identified, predictable solutions that would address estrogen agonist activity. *Id.* Appellant further argues that Urano’s listing of many preferred polyhydric polyphenols teaches away from the subject matter of claim 2. *Id.* at 15.

Appellant’s arguments regarding estrogen activity are not persuasive.

Urano teaches to combine an epoxy and a phenol. Urano 2:59–64. Urano specifically lists resorcinol, pyrocatechol, and hydroquinone (each of which is a dihydric monophenol) as “particularly suitable” phenols. *Id.* at 4:37–43. In its discussion of epoxides, Urano states “[e]xamples of said polyepoxide include epoxy novolac resins; polyglycidyl ethers of dihydric phenols such as . . . resorcinol and hydroquinone. Urano col. 3:15–19. Urano further teaches that “[t]he dihydric phenols that are reacted with the

² Claims 45–47 require that the polymer does not include any structural units derived from a compound exhibiting estrogen agonist activity greater than or equal to that exhibited by 4, 4'-(propane-2, 2-diyl)bis(2, 6-dibromophenol). Appeal Br. 34 (Claims App.).

epoxy resin according to the process of this invention can be the same or different from the dihydric phenol used to prepare the 1,2-epoxy resin component.” *Id.* at 4:49–52. Accordingly, the Examiner’s stated reason to combine is supported by Urano. Here, the reduced estrogen activity is an attribute that would flow naturally from the combined teachings of Urano and Evans. “The fact that appellant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the difference would otherwise have been obvious.” *Ex parte Obiaya*, 227 USPQ 58, 60 (BPAI 1985); *see also Par Pharm., Inc. v. TWi Pharm., Inc.*, 773 F.3d 1186, 1195–96 (Fed. Cir. 2014) (it may be appropriate “to rely on inherency to establish the existence of a claim limitation in the prior art in an obviousness analysis” where the limitation at issue is “the natural result of the combination of elements explicitly disclosed by the prior art.”).

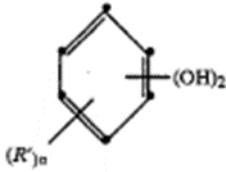
Third, Appellant additionally argues that the Examiner failed to establish that the references teach the following limitations:

wherein the polyether polymer is a reaction product of reactants including a diepoxide and a dihydric monophenol; and

wherein if the diepoxide comprises a diepoxide of a dihydric monophenol, the dihydric monophenol used to form the diepoxide includes a phenylene ring having one or more organic substituent groups positioned ortho to one or more hydroxyl groups.

Appeal Br. 18–22; *see also id.* at 28 (Claims App.).

In the Final Action, the Examiner finds that Urano teaches that [e]xamples of mononuclear phenol include compounds represented by formula



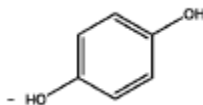
wherein R' may be a lower alkyl having 1 to 7 carbon atoms (col. 3, lines 7-63) and $n = 0$ to 3 (col. 2, lines 7-65) which reads on the structural unit of formula II in present claims 2, 6-7, and 10-12.

Final Act. 4–5. In the Final Action, the Examiner further finds as follows:

The dihydric phenols that can be reacted with the epoxy resin can be the same or different from the dihydric phenol used to prepare the 1,2-epoxy resin component. Hence, it is clear that **if mononuclear phenol is used to prepare the 1,2-epoxy resin component, it would include a substituent in either ortho, meta or para positions**, absent evidence of criticality to the position of substituent (i.e. ortho v/s meta[] and para) on dihydric phenol used to form diepoxide. . . . [The] secondary reference of Evans et al discourages the use of bisphenols. Hence, it is the office's position that it is within the scope of one skilled in art at the time invention was made to use any of the other dihydric phenols including mononuclear dihydric phenol, **such as hydroquinone and resorcinol having an alkyl substituent**, to form the polyether polymer.

Final Act. 8–9 (emphasis added).

In the Answer, the Examiner further determines that, in the case of hydroquinone, the “only positions that are open to substitution when $n = 1$ to 3 is ortho to hydroxyl groups in hydroquinone.” Answer 11.



A schematic drawing of hydroquinone is reproduced, above, from the Examiner's Answer. *Id.*

Appellant argues that “Urano does not disclose or suggest selecting a dihydric monophenol having one or more organic substituent groups included in an ortho position to one or more hydroxyl groups for the purpose of forming a diepoxide.” Appeal Br. 19. Appellant asserts that none of the polyepoxides specifically enumerated by Urano exhibit such structure. *Id.*

This is not persuasive. The mononuclear phenol structure taught by Urano and relied upon by the Examiner teaches, inter alia, a dihydric monophenol having lower alkyl substituent groups. As found by the Examiner, in the case of hydroquinone, an R' group will always be ortho to a hydroxyl group.

Fourth, Appellant further argues that “Urano discourages using epoxides with hindering substituents.” Appeal Br. 19. This is not persuasive. Urano provides that “[i]f desired, [the epoxy resin] may have a non-hindering substituent such as halogen atom, hydroxyl group, ether group, ester group and the like.” Urano col. 3:12–14. Thus, Urano specifically teaches that certain substituents may be present. Further, the stated ether and ester groups would encompass a variety of “organic substituent groups.” Accordingly, we determine that Appellant has not shown error in the Examiner's prima facie case in this regard.

Fifth, Appellant additionally contends that “epoxides derived from a diepoxide of a dihydric monophenol having ortho positioning of substituent groups to a ring hydroxyl group have **unexpected benefits.**” Appeal Br. 21 (emphasis added). Specifically, Appellant asserts that a dihydric monophenol having an organic substituent group ortho to a hydroxyl group

could help avoid or reduce estrogen agonist activity. *Id.* Appellant further asserts that it unexpectedly discovered that “it may be advantageous to extend a diepoxide of a dihydric monophenol using a dihydric monophenol that does not include any R¹ groups at all, or any R¹ groups at an ortho position.” *Id.*

An applicant may overcome a prima facie case of obviousness by establishing “that the [claimed] range is *critical*, generally by showing that the claimed range achieves unexpected results relative to the prior art range.” *In re Geisler*, 116 F.3d 1465, 1469–70 (Fed. Cir. 1997) (alteration in original) (citation omitted). “Although it is well settled that comparative test data showing an unexpected result will rebut a prima facie case of obviousness, the comparative testing must be between the claimed invention and the closest prior art.” *In re Fenn*, 639 F.2d 762, 765 (CCPA 1981). Moreover, “[i]t is well settled that unexpected results must be established by factual evidence. Mere argument or conclusory statements in the specification does not suffice.” *In re De Blauwe*, 736 F.2d 699, 705 (Fed. Cir. 1984), *quoted with approval in In re Soni*, 54 F.3d 746, 750 (Fed. Cir. 1995).

“It is the established rule that ‘objective evidence of non-obviousness must be commensurate in scope with the claims which the evidence is offered to support.’” *Allergan, Inc. v. Apotex Inc.*, 754 F.3d 952, 965 (Fed. Cir. 2014) (quoting *In re Tiffin*, 448 F.2d 791, 792 (CCPA 1971)). This is as true for evidence of unexpected results as it is for any other type of objective evidence of non-obviousness. *See In re Peterson*, 315 F.3d 1325, 1330 (Fed. Cir. 2003) (“the applicant’s showing of unexpected results must be commensurate in scope with the claimed range”); *In re Clemens*, 622 F.2d

1029, 1035 (CCPA 1980) (“In order to establish unexpected results for a claimed invention, objective evidence of non-obviousness must be commensurate in scope with the claims which the evidence is offered to support.”).

Here, Appellant has not directed us to specific information comparing the estrogenic or genotoxic (or other) activity of a diepoxide of the claim (having an organic substituent located ortho to a hydroxyl group) to a similar diepoxide having an organic substituent located meta or para to a hydroxyl group. *See* Further Declaration of Richard H. Evans Under 37 C.F.R. § 1.132 dated May 15, 2018 (“2018 Evans Declaration”) ¶¶ 4–7.

Further, although Appellant’s briefing regarding unexpected results is terse, it appears that Appellant supplies RPE (Relative Proliferative Effect) data for just a single compound (2, 5-di-*t*-butylhydroquinone) that would fall within the scope of claim 2. Spec. ¶ 93 (Table). This is insufficient to demonstrate a beneficial effect throughout the claimed range of organic substituents.

Accordingly, Appellant has not shown that the objective evidence of non-obviousness is commensurate in scope with the claims at issue.

Sixth, Appellant argues that the Examiner errs in failing to establish that the applied references disclose or suggest a polyether polymer that “exhibits a glass transition temperature of at least 30 °C” as required by claim 2. Appeal Br. 22. In response, the Examiner determines that there is a reasonable basis to expect that the polyether taught by the combination of Urano and Evans would have had the presently claimed glass transition temperature. Answer 15. In view of such reasonable expectation, the

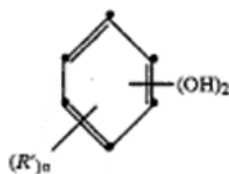
burden shifts to the applicant to show that the claim differs from the prior art. *Id.* at 15–16 (citing *In re Best*, 562 F.2d 1252 (CCPA 1977)).

Appellant has not shown error in the foregoing determination.

Claims 14 and 42

Appellant additionally argues that claims 14 and 42 (Group 2) were rejected in error. Appeal Br. 23. Claim 14 depends from claim 2 and further requires that “the diepoxide comprises a diepoxide of a dihydric monophenol.” *Id.* at 29 (Claims App.). Thus, this would invoke the last limitation of claim 2 (“wherein if the diepoxide comprises a diepoxide of a dihydric monophenol . . .”) requiring an organic substituent group. *Id.* at 28 (Claims App.). Similarly, claim 42 depends from claim 14 and further requires that “the dihydric monophenol used to form the diepoxide has at least two organic ortho substituent groups, and wherein the organic ortho substituent groups each include one to four carbon atoms.” *Id.* at 32 (Claims App.). Appellant argues that neither the polyglycidyl ethers of resorcinol or hydroquinone is taught to bear an organic substituent. Appeal Br. 23.

This is not persuasive. As discussed above, Urano discloses a monocyclic phenol having the following structure:



In regard to the structure above, Urano teaches that “the phenols to which the present invention is applicable are compounds represented by the following formulae.” Urano 3:42–44. Urano further teaches that R’ may be

a lower alkyl group having 1 to 7 carbon atoms. *Id.* at 3:62–63. Urano additionally teaches that n may be an integer from 0 to 3. *Id.* at 4:17.

Urano further teaches that “[t]he dihydric phenols that are reacted with the epoxy resin . . . can be the same or different from the dihydric phenol used to prepare the 1,2-epoxy resin component.” *Id.* at 4:49–52. The Examiner finds that this, in context, would have taught one of skill in the art that the epoxide may be derived from a monocyclic phenol as taught by Urano (structure reproduced above). Final Act. 5–6. Appellant has not shown error in this reasoning. Accordingly, Urano teaches the limitations of claims 14 and 42.

Claims 32, 33, and 46

Appellant additionally argues that claims 32, 33, and 46 (Group 3) were rejected in error. Appeal Br. 24. Claim 32 is an independent claim and claims 33 and 46 depend from claim 32. *Id.* at 31–32, 34 (Claims App.).

Appellant relies on the same arguments it presents with regard to claim 2. Appeal Br. 24. As we do not find such arguments to be persuasive, we determine that Appellant has not shown error with regard to the rejection of claims 32, 33, and 46.

Claims 43–45

Appellant additionally argues that claims 43–45 (Group 4) were rejected in error. Appeal Br. 24–25. Appellant relies on the same arguments it presents with regard to claim 2. *Id.* As we do not find such arguments to be persuasive, we determine that Appellant has not shown error with regard to the rejection of claims 43–45.

CONCLUSION

For the reasons set forth in the Final Action, the Examiner's Answer, and above, the Examiner's rejections are affirmed.

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
2, 3, 5-7, 9-12, 14, 17, 21-27, 30-33, 42-47		Nonstatutory Double Patenting	2, 3, 5-7, 9-12, 14, 17, 21-27, 30-33, 42-47	
2, 3, 5-7, 9-12, 14, 17, 21-27, 30-33, 42-47	103(a)	Urano, Evans	2, 3, 5-7, 9-12, 14, 17, 21-27, 30-33, 42-47	
Overall Outcome			2, 3, 5-7, 9-12, 14, 17, 21-27, 30-33, 42-47	

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

AFFIRMED