Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.
This is an appeal under 35 U.S.C. § 134(a) involving claims to a method of administering boron containing compounds to prevent osteochondritis which have been rejected obvious. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

STATEMENT OF THE CASE

The present invention is directed to administering boron containing compounds to an animal to treat or prevent osteochondrosis. Spec. ¶ 10. In an alternative embodiment, the administration of boron allows for the
reduction of phosphorous in animal feeds by decreasing the amount of phosphorous excreted by the animal. Spec. ¶¶ 11 and 12.

Claims 1–12 and 18–20 are on appeal. Claims 1 and 10 are illustrative and read as follows:

1. A method of preventing or treating osteochondrosis comprising administering at least about 25 ppm of supplemental elemental boron as a boron containing compound in a carrier to a mammal in need of such treatment.

10. A method of increasing the efficiency of absorption of phosphorus in an animal or of decreasing the amount of phosphorus excreted by an animal, comprising administering about 25 ppm to about 50 ppm supplemental boron to said animal.

Appeal Br. 25 and 27 (Claims Appendix).

The claims stand rejected as follows:

Claims 1–9 and 18–20 stand rejected under 35 U.S.C. § 112, first paragraph as not enabled.

Claims 1, 5–9 and 18–20 stand rejected under 35 U.S.C. § 112, second paragraph as indefinite.

Claims 1-12 and 18–20 stand rejected under 35 U.S.C. § 102(b) as anticipated by Rigby-Burdette.²

Claims 1, 2, 4-8, 10, 11 and 18-20 stand rejected under 35 U.S.C. § 102(b) as anticipated by Gribbins.³

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Claims 1–12 and 18–20 stand rejected under 35 U.S.C. § 102(a) as anticipated by Underwood⁴ or under 35 U.S.C. § 103(a) as obvious over Underwood.

Claims 1–12 and 18–20 stand rejected under 35 U.S.C. § 102(a) as anticipated by Arhola⁵ or under 35 U.S.C. § 103(a) as obvious over Arhola either alone or in combination with Underwood.

Claims 1–21 and 18–20 stand rejected under 35 U.S.C. § 102(a) as anticipated by Beres⁶ or under 35 U.S.C. § 103(a) as obvious over Beres alone or in combination with Underwood.

Claims 1–12 and 18–20 stand rejected under 35 U.S.C. § 102(a) as anticipated by Kurtoglu⁷ or under 35 U.S.C. § 103(a) as obvious over Kurtoglu.

Claims 1–12 and 18–20 stand rejected under 35 U.S.C. § 103(a) as obvious over Armstrong⁸ in view of Underwood.

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⁶ Beres et al., US 5,312,629, issued May 17, 1994 (“Beres”).
ENABLEMENT

Issue

In rejecting claims 1–9 and 18–20 for lack of enablement, the Examiner finds that the Specification does not enable a person skilled in the art to prevent osteochondrosis. Final Act.\(^9\) 4. The Examiner finds that the term “prevent”

is an absolute definition which means to stop from occurring and, thus, requires a higher standard for enablement than does “therapeutic” or “treat”, especially since it is notoriously well accepted in the medical art that the vast majority of afflictions/disorders suffered by mankind cannot be totally prevented with current therapies (other than certain vaccination regimes) – including preventing such disorders as osteochondrosis, which is clearly not recognized in the medical art as being a totally preventable condition.

*Id.* at 4–5.

Appellants contend that the claims are enabled. Appeal Br. 5. Appellants point to several examples in the Specification where osteochondrosis is prevented in pigs. *Id.* Appellants argue that by reading the Specification “[o]ne skilled in the art can readily conclude the boron supplementation prevented osteochondrosis.” *Id.*

The issue with respect to this rejection is whether the Examiner has made a prima facie case that the Specification’s disclosure of methods for

preventing osteochondrosis is insufficient to enable claims direct to the use of boron to prevent osteochondrosis.

Findings of Fact


FF2. In Example 4 of the Specification, pigs were administered 3-nitrophenylboronic acid (“3-NPB”) to induce osteochondrosis. Some of the pigs were given 50 ppm supplemental boron while others received no supplemental boron. Spec. ¶ 98.

FF3. After 10 days of feeding, the pigs who did not received supplemental boron exhibited clinical manifestations of osteochondrosis while only one of five pigs fed supplemental boron exhibited signs of osteochondrosis. Spec. ¶ 99.

FF4. In example 5 of the Specification it teaches that at [a]n Iowa farm treated a group of about 100 pigs with 50 ppm boron as boric acid. None of these pigs developed any signs of lameness or unsoundness. The farmer reported that these pigs are the most sound he has raised. The estimated previous lameness/unsoundness rate was about 25 to 30%, and zero in the test group. The pigs demonstrated excellent growth rate. The absence of lameness and hock swelling was observed. Two pigs with hock swelling were euthanised from among the younger and older pigs not treated with boric acid. The younger pig of about 50 pounds body weight showed evidence of early OC changes in the hock. An older pig of about 250 pounds body weight with severe lameness in the right hock was euthanised. Severe advanced OCD was observed in the hock, and growth plate abnormalities were observed when the bones were sectioned.
Culture of the hock joints was negative, ruling out bacterial infection and indicating that OC is the likely cause of lameness.

Spec. ¶ 110.

Principles of Law

During examination the PTO must interpret terms in a claim using the “broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant’s specification.” In re Morris, 127 F.3d 1048, 1054 (Fed, Cir. 1997).

The Examiner must therefore “determine[] the scope of [the] claims in patent applications not solely on the basis of the claim language, but upon giving claims their broadest reasonable construction ‘in light of the specification as it would be interpreted by one of ordinary skill in the art.’” Phillips v. AWH Corp., 415 F.3d 1303, 1316 (Fed. Cir. 2005) (emphasis added) (quoting In re Am. Acad. Of Science Tech Center, 367 F.3d 1359, 1364 (Fed. Cir. 2004).

Similarly, in the context of enablement, in In re Cortright, 165 F.3d 1353, 1359 (Fed. Cir. 1999), the court concluded that the claim language “restoring hair growth” was enabled by a specification that disclosed procedures yielding “‘only three times as much hair growth as two months earlier,’ ‘filling-in some,’ and ‘fuzz.’” Id. At 1357–58. In doing so, the court explicitly rejected this Board’s broad literal interpretation of ‘restoring hair growth” as meaning “returning the user’s hair to its original state.” Id. At 1359. Rather, the court concluded that when the claims at
issue were interpreted in a manner consistent with the specification and prior art, the language meant simply increasing the amount of hair growing on the scalp. *Id.* Given that interpretation, and the Specification’s disclosure of formulations, dosages, and procedures adequate to produce the result, the court concluded that the Specification had provided an enabling disclosure of the claim under consideration. *See id.*

**Analysis**

We agree with the Appellants that, when the claims are properly interpreted consistent with the Specification, the Examiner has not made a prima facie case of lack of enablement.

We note that an ordinary artisan might possibly define “prevent” as requiring the supplement to stop osteochondrosis in every instance as the Examiner urges. The Examiner, however, has offered no persuasive evidence that a person of ordinary skill in the art would interpret the claims in the asserted manner.

Moreover, while the claims must be given their broadest reasonable interpretation, that interpretation must be consistent with the Specification’s disclosure of the invention. *In re Morris*, 127 F.3d at 1054; *Phillips v. AWH Corp.*, 415 F3d at 1316.

In the instant case, the Specification discloses in Example 3 that for four of five pigs, administration of supplemental boron completely stopped the development of osteochondrosis when the pigs were administered 3-NPB. FF1–3. In example 5, only two out of 100 pigs developed osteochondrosis when administered supplemental boron when the expected number of pigs developing osteochondrosis was 25 to 30. FF4. Thus the
administration of boron prevented the development of osteochondrosis in a majority of the animals given supplemental boron.

The Examiner also argues that the data showing prevention of osteochondrosis is limited to pigs and does not show prevention in all mammals as recited in the claims. Ans. 24. The Examiner concludes that the claims are not enabled for the full scope of the claims. Id. We are unpersuaded. As the Specification points out

[i]t is generally considered that the pig is the archetypic model species for osteochondrosis in mammals (see Reiland S. Osteochondrosis in the pig. Acta Radiol 1-118, 1975) The cascade of pathophysiologic events that culminate in clinical manifestations of osteochondrosis (OCD) in the pig are generally believed to be those events that occur in the other mammalian species that develop OCD, particularly the horse, dog, ruminants and humans. Since the pig is the model for OCD in other mammals and it has been demonstrated that boron is useful for prevention and treatment of OCD in the pig, it logically follows that boron should have a similar effect in other mammals and the effect should be mediated by a similar biochemical mechanism.

Spec. ¶ 102. The Examiner has offered no persuasive evidence to contradict this teaching.

Conclusion of Law

We conclude that the Examiner has failed to establish a prima facie case that claims 1–9 and 18–20 are not enabled as required by 35 U.S.C. § 112, first paragraph.
INDEFINITENESS

Issue

In rejecting claims 1, 5–9 and 18–20 as indefinite under 35 U.S.C. § 112, second paragraph, the Examiner finds that the terms “‘at least about 25 ppm of supplemental boron’, ‘at least about 25 ppm to about 50 ppm’, and ‘supplement . . . in an amount of about 25 ppm to about 50 ppm’, are unclear in that the terms and do not recite how much boron in the boron-and-carrier material is required to treat or prevent osteochondrosis. Final Act. 6. The Examiner also finds that the claims are unclear because as disclosed the supplemental material in the amounts thereof (“at least about 25 ppm of supplemental boron”, “at least about 25 ppm to about 50 ppm”, and “supplement . . . in an amount of about 25 ppm to about 50 ppm”) is a material-and-boron amount thereof dependent upon a boron-variable object (the “carrier” or “feed material”), such that the objective standard by which a therapeutically effective amount for treating osteochondrosis for each animal (and the objective amount for all mammals) remains unclear.

Appellants contend that “[o]ne skilled in the art reading the claim and the specification, particularly ¶¶[0010] for example, would understand the supplemental boron is provided as about 25 ppm to about 50 ppm elemental boron.” Appeal Br. 6–7.

The issue presented is whether the Examiner has established a prima facie case that the claims are indefinite under 35 U.S.C. § 112, second paragraph.
Principles of Law

“[A] patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2124 (2014).

[I]t is the language itself of the claims which must particularly point out and distinctly claim the subject matter which the applicant regards as his invention, without limitations imported from the specification. . . . . Limitations in the specification not included in the claims may not be relied upon to impart patentability to an otherwise unpatentable claim.

*In re Lundberg*, 244 F.2d 543, 548 (CCPA 1957).

Analysis

We agree with the Examiner that the claims are indefinite. While the claims use the term 25 and 50 ppm, the claims and Specification do not make clear what the boron content is being compared with. Ans. 24.

Appellants argue that the Specification, particularly paragraph 10, provides one skilled in the art with guidance as to what is meant by ppm. Reply Br. 6. We are unpersuaded. In paragraph 10 of the Specification it suggests that ppm refers to parts per million of the base animal feed. Spec. ¶ 10. The claims, however, do not refer to the base animal feed. Rather, the claims refer to both a boron containing compound and a carrier. Appeal Br. 25 (Claims Appendix). It is unclear whether ppm refers to the boron compound, the carrier or the base feed. “[I]f a claim is amenable to two or more plausible claim constructions, the USPTO is justified in requiring the
applicant to more precisely define the metes and bounds of the claimed invention by holding the claim unpatentable under 35 U.S.C. § 112, second paragraph, as indefinite.” *Ex parte Miyazaki*, 2008 WL 5105055, at *5 (BPAI 2008) (precedential).

**Conclusion of Law**

We conclude that the Examiner has established by a preponderance of the evidence that claims 1, 5–9 and 18–20 are indefinite under 35 U.S.C. § 112, second paragraph.

**CLAIM CONSTRUCTION**

Our analysis of the prior art rejections relies, in part, on the construction of two terms – “supplemental elemental boron” and “at least about.” In construing these terms we apply

to the verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant’s specification.

*In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997).

**Supplemental Elemental Boron**

The present specification teaches that “[t]he animal feeds of the present invention contain supplemental boron in addition to the boron naturally present in the animal feed from plant material.” Spec. ¶ 10. The Specification goes on to teach that “the term supplemental boron as used herein refers to exogenously added boron that supplements the basal levels of boron already present in commonly used animal feeds.” Spec. ¶ 34.
Relying on these definitions, Appellants argue that certain references do not teach the administration of supplemental boron. Appeal Br. 9–11. Appellants argue that the boron present is limited to the basal levels found in the standard feeds. *Id.*

The Examiner discounts the term “supplemental elemental boron” as the feeds recited in the references contain boron within the recited ranges and would have intrinsically provided the claimed effects. Ans. 25. The Examiner goes on to argue that the claims do not require any further chemical structure to which the boron is supplemented and the claims are inclusive of plant material which can also be the basal feed material. *Id.*

While, as discussed above, we agree with the Examiner that the claims do not recite what the boron content of the supplement is compared to, we conclude that the Specification makes clear that the boron containing material is a supplement added to the base feed and does not include the base feed material.

*At Least About 25 ppm*

Appellants contend that the term “about” is similar to the term “approximately” and is a term of approximation that provides some definitional leeway. Appeal Br. 7. Appellants go on to argue that the term “at least” is not a term of approximation but defines an endpoint of a limitation. *Id.* Using these definitions, Appellants argue that the term “at least about” does not extend down to values of 20 ppm or less. *See, e.g.*, Appeal Br. 13–14.

The Examiner takes the position that the term “at least about 25 ppm” extends down as low as 19 ppm. Final Act. 15. In support, the Examiner
notes that the Specification teaches that the boron supplement can be effective at levels as low as 1 ppm. Ans. 28.

We agree with the Examiner’s interpretation. While the term “at least” by itself is not a term of approximation, the use of the term “about” introduces an element of approximation and extends that scope of the term. When read in light of the Specification and the prior art, we find that the Examiner’s interpretation to be reasonable. *Modine Manufacturing Co. v. U.S. ITC*, 75 F.3d 1545, 1554 (Fed. Cir. 1996):

Such broadening usages as “about” must be given reasonable scope; they must be viewed by the decisionmaker as they would be understood by persons experienced in the field of the invention. Although it is rarely feasible to attach a precise limit to “about,” the usage can usually be understood in light of the technology embodied in the invention.

**THE RIGBY-BRUDETTE REFERENCE**

**Issue**

In rejecting claims 1–12 and 18–20 as anticipated by Rigby-Burdette the Examiner finds that Rigby-Burdette teaches

providing animal feed or making tea (broadly, providing water; providing a carrier; adding to an animal feed, oral carrier, or drinking water) containing alfalfa (broadly interpreted as a boron and carrier containing material having about 37 ppm (at least about 25, about 25-50 ppm) boron; plant material; (in)organic B-containing material; an amount effective to treat osteochondrosis and increase P absorption/decrease P excretion) (see entire document, e.g. “other forms” at page 2) and that alfalfa is useful as livestock (broadly interpreted as inclusive of pigs, horses, mules, donkeys, cattle, sheep, goats, and llamas) and pet feed including for rabbits, guinea pigs (mammals) or in salads (for mammals, humans) (e.g. page 1 at ln 1-2 and at “different kinds of alfalfa”). Accordingly, because
the reference teaches providing the same boron-containing compounds in the same amount to the same animals (mammals, humans, including asymptomatic or prediagnosed animals), then although the reference does not expressly recite the intended effects of the administering, the instantly claimed effects would have been inherent to the prior art administration, especially in the absence of objective evidence to the contrary.

Final Act. 8–9.

Appellants contend that Rigby-Burdette does not disclose a method for treating or preventing osteochondrosis. Appeal Br. 9. Appellants argue that Rigby-Burdette discloses iguana food and not food for a mammal. Id. Appellants go on to argue that reference does not teach supplementation of the basal amounts of boron found in the feed with exogenous boron. Id.

With respect to claim 10, Appellants argue that Rigby-Burdette does not disclose increasing the efficiency of absorption of phosphorous or decreasing the excretion of phosphorous by administering about 25 ppm to about 50 ppm of supplemental boron. Appeal Br. 10.

The issue with respect to this rejection is whether the Examiner has established by a preponderance of the evidence that claims 1–10 and 18–20 are anticipated by Rigby-Burdette.

Findings of Fact

FF5. Rigby-Burdette teaches inclusion of alfalfa into a salad feed for iguanas. Rigby-Burdette 1.

FF6. The alfalfa is available in several forms including alfalfa hay, alfalfa pellets or alfalfa sprouts. Id.

FF7. Alfalfa pellets are also known as rabbit pellets, guinea pig pellets, ferret pellets and chinchilla pellets. Id.
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FF8. The Specification teaches that alfalfa contains 37 ppm boron. Spec. ¶ 34.

Principles of Law

“Anticipation requires that all of the claim elements and their limitations are shown in a single prior art reference.” In re Skvorecz, 580 F.3d 1262, 1266 (Fed. Cir. 2009).

Analysis

We agree with Appellants that Rigby-Burdette does not anticipate the pending claims. While Rigby-Burette teaches the use of alfalfa as a supplement for salad fed iguanas and that alfalfa can be fed to mammals, the Examiner has pointed to nothing in Rigby-Burdette that alfalfa is fed as a supplement to provide a supplemental amount of boron to mammals. Thus Rigby-Burdette does not teach all of the limitations of the claims.

Conclusion of Law

We conclude that the Examiner has failed to establish by a preponderance of the evidence that the pending claims are anticipated by Rigby-Burdette under 35 U.S.C. § 102(a).

THE GRIBBINS REFERENCE

Issue

In rejecting claims 1, 2, 4–8, 10, 11 and 18–20 the Examiner finds that Gribbins teaches feeding a mammal a “diet consisting of a grain concentrate, alfalfa hay and salt mixture.” Final Act. 9. The Examiner also finds that the feed mixture of Gribbins would have “at least 25 ppm boron, 25-50 ppm or in a boron-containing portion thereof.” Id.
Appellants contend that Gribbins does not disclose a method for treating osteochondrosis. Appeal Br. 11. Appellants also argue that Gribbins does not disclose administering supplemental boron above that which is contained in a base diet. *Id.* With respect to claim 10, Appellants contend that Gribbins does not disclose a method for increasing the efficiency of absorption of phosphorous or decreasing the amount of phosphorous excreted by a mammal. *Id.*

The issue with respect to this rejection is whether the Examiner has shown by a preponderance of the evidence that Gribbins anticipates claims 1, 2, 4–8, 10, 11 and 18–20 under 35 U.S.C. § 102(a).

Findings of Fact

FF9. Gribbins teaches feeding a steer a feed “consisting of a grain concentrate, alfalfa hay and a salt mixture.” Gribbins col. 6, ll. 27–29.


Analysis

We agree with Appellants that the claims are not anticipated by Gribbins. While Gribbins discloses a mammal feed comprising alfalfa hay as a part of a base diet, FF 9, the Examiner has not pointed to anything in Gribbins that teaches feeding alfalfa to provide supplemental boron to the mammals. The only supplement taught by Gribbins is a protein supplement. FF10. Gribbins does not disclose all the elements of the claims.
Conclusion of Law

We conclude that the Examiner has failed to establish by a preponderance of the evidence that claims 1, 2, 4–8, 10, 11 and 18–20 are anticipated by Gribbins under 35 U.S.C. § 102(a).

THE UNDERWOOD REFERENCE

Issue

In rejecting claims 1–12 and 18–20 as anticipated by or obvious over Underwood, the Examiner finds that

Underwood teaches that boron is a “well-tolerated element” and administering boron by feed or drinking water supplementation, and boron-containing materials therefor including boron-containing cereals, legumes and grasses (legumes, 14-78ppm; and Lucerne (alfalfa), 35-66ppm)(broadly, about at least 25 ppm B, about 25-50 ppm B; effective dose; oral administration)( e.g. pages 514-515, table 17.1: for example).

Final Act. 10. The Examiner goes on to conclude that

[t]he cited reference discloses a process comprising administering a well-tolerated amount (therapeutically effective dose) of a boron-containing compound to a mammal, which appears to be identical to the presently claimed boron-containing composition and carrier in the process thereof since the cited reference boron compounds and the administering and effects thereof remain inclusive of (not excluded from) the genus of boron-containing materials and administering of the instantly claimed method. Consequently, the claimed process appears to be anticipated by the reference.

In the alternative, even if the composition (with respect to phosphate metabolism or osteochondrosis) in the method and the process thereof are not identical to the referenced composition
and method, with regard to some unidentified characteristics, the differences between that which is claimed and that which is disclosed, is so slight that the referenced composition is likely to inherently possess the same characteristics of the claimed composition, particularly in view of the similar characteristics which they have been shown to share (e.g. B-containing compound, mammal-treating, oral administration). Thus, the claimed method and the composition effective therefor would have been obvious to those of ordinary skill in the art within the meaning of 35 USC § 103(a).

Underwood is relied upon for the reasons discussed above. If not expressly taught by Underwood, based upon the overall beneficial teaching provided by this reference with respect to boron-treating, dosing amounts, and administration including feeding or drinking, in the manner disclosed therein, the adjustments of particular conventional working conditions (e.g., determining one or more suitable dosing/concentration ranges in which to perform such an administration to a mammal), is deemed merely a matter of judicious selection and routine

Final Act. 10–11.

Appellants contend that “Underwood does not disclose, teach or suggest a method of preventing or treating osteochondrosis as called for by independent claim 1. Nor does it disclose, teach or suggest administering the mammal about 25 ppm to about 50 ppm of supplemental elemental boron as a boron containing compound added to a carrier.” Appeal Br. 12. Appellants also argue that Underwood does not teach administering about 25 ppm to about 50 ppm of supplemental boron to an animal as required by the claims. Appeal Br. 12.

Findings of Fact

FF11. Underwood teaches that “[b]oron is an essential nutrient for
plants, but the evidence for essentiality to animals is equivocal. Underwood 514.

FF12. Underwood teaches that legumes contain from 14 to 78 milligrams of boron per kilogram. Underwood 515, Table 17.1

FF13. Underwood teaches that “boron supplementation of the diet of men and women (particularly those receiving hormone supplements) has increased values for markers of copper, vitamin D and haematological status and has decreased bone turnover (Nielsen, 1994). However, boron deficiencies in farm livestock have yet to be reported.” Underwood 516.

FF14. Underwood discloses feeding sheep a diet of maize silage and soybean meal which contained 32 mg per kilogram boron. Underwood 514.

FF15. Underwood teaches that “[b]oron is a well-tolerated element, more than 300 mg B kg\textsuperscript{-1} being required to produce the first signs of toxicity in poultry.” Underwood 516.

Principles of Law

A proper § 103 analysis requires “a searching comparison of the claimed invention—including all its limitations—with the teaching of the prior art.” In re Ochiai, 71 F.3d 1565, 1572 (Fed. Cir. 1995).

“[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In re Aller, 220 F.2d 454, 456 (CCPA 1955).

Analysis

We agree with Appellants that Underwood neither anticipates nor renders obvious the rejected claims. The Examiner has pointed to no
persuasive evidence to show that Underwood discloses or suggests providing supplemental boron in an amount of from about 25 ppm to about 50 ppm. While Underwood discloses providing men and women supplemental boron, there is no discussion in Underwood of the amounts of supplemental boron given. FF13. Similarly, while Underwood discloses feeding sheep a diet containing 32 ppm boron, FF14, the Examiner has offered no persuasive evidence that the boron was supplemental boron over the amount that would be in the sheep’s base diet.

Conclusion of Law

We conclude that the Examin er has failed to establish by a preponderance of the evidence that the rejected claims are either anticipated by or obvious over Underwood under 35 U.S.C. §§ 102(b) or 103(a).

THE ARHOLA REFERENCE

Issue

In rejecting claims 1–12 and 18–20 as anticipated by or obvious over Arhola, the Examiner finds that Arhola teaches a food supplement comprising 20 ppm of boron. Final Act. 12. The Examiner finds that the supplement of Arhola would inherently act to prevent osteochondrosis and would aid in phosphorous retention. Id. The Examiner finds that “[t]he cited reference discloses a process comprising administering a dose of a boron-containing compound to a mammal and the bone, which appears to be identical to the presently claimed boron-containing composition and process thereof since the boron compounds and the administering and effects thereof
as taught by the cited reference are inclusive of the genus of boron-containing materials and administrations as instantly claimed.” Final Act. 12–13.

With respect to obviousness, the Examiner finds that

the differences between that which is claimed and that which is disclosed, is so slight that the referenced composition is likely to inherently possess the same characteristics of the claimed composition, particularly in view of the similar characteristics which they have been shown to share (e.g. B-containing compound, mammal-treating and P-modulating effect of oral administration). Thus, the claimed method and the composition effective therefor would have been obvious to those of ordinary skill in the art within the meaning of 35 USC § 103(a).

Final Act. 13. With respect to the amounts of boron administered, the Examiner finds that determining the proper dosages would be a matter of “judicious selection and routine optimization.” Id.

The Examiner also rejected the pending claims as obvious over Arhola combined with Underwood. Final Act. 14. The Examiner finds that Underwood teaches that boron may be administered in amounts up to 300 mg/kg. Id. The Examiner concludes that

[i]t would have at least been obvious for one to have would have provided an amount of boron-containing material because the cited reference of Arhola teaches that providing (versus the instant claims) the same compounds in beneficial amounts to the same animals (mammals) and in general providing amounts of boron of about 25 mg/kg or greater was known in the art. One would have been motivated to have provided the claimed amounts in the method of Arhola because Arhola teaches providing an administrable/dietary/oral dose amount about 25 ppm (20ppm), and because Underwood further teaches that diets
may be supplemented up to 300 mg/kg boron-containing material. One would have had a reasonable expectation of success in providing the instantly claimed amounts, because success merely requires providing a dosing amount of about the amount of Arhola and/or within the amount of Underwood for the benefit of dietary supplementation of boron; and because if not taught by the references, supplementation as instantly disclosed is obtainable by the mere consumption of known naturally-occurring materials which would provide the claimed boron amount (e.g. 37 ppm boron by consuming alfalfa; page 20 at ln 10 for example).

Accordingly, the claimed invention as a whole was at least prima facie obvious, if not anticipated by the reference, especially in the absence of sufficient, clear, and convincing evidence to the contrary.


With respect to claim 10, Appellants contend that Arhola does not teach increasing the efficiency of the absorption of phosphorous nor does it teach reducing the amount of phosphorous excreted. Appeal Br. 14.

With respect to the combination of Arhola and Underwood, Appellants argue that

[t]he combination of Arhola and Underwood does not teach or suggest both increasing the efficiency of absorption of phosphorus as well as decreasing the amount of phosphorus excreted by supplementation with about 25 ppm to about 50
ppm boron, as called for by claims 10 through 12. *Arhola* suggests the interplay between magnesium, calcium and phosphorus and decreased secretion of same from the body. However, the combination of references does not teach or suggest a nexus between *Arhola*'s 0.002% boron and increasing the efficiency of absorption of phosphorus as well as decreasing the amount of phosphorus excretion, as required by the claims. (footnote omitted).

Appeal Br. 15.

The issue presented is whether the pending claims are anticipated by or rendered obvious by Arhola, either alone or in combination with Underwood.

*Findings of Fact*

FF16. Arhola teaches a food supplement containing boron which can be used to strengthen bone and cartilage. Arhola, Abstract.

FF17. The supplement of Arhola can be administered to trotting horses, athletes, racing animals, and “mammals suffering from problems relating to the bones, joints and metabolism.” Arhola col. 1, ll. 1–7.

FF18. The supplement contains 0.002% boron. Arhola, claim 1.

FF19. Arhola discloses that boron decreases the secretion of phosphorous from the body. Arhola col. 3, ll. 11–13.

*Analysis*

Claims 1 and 10 are representative of the rejected claims. Claim 1 is directed to the use of boron to treat or prevent osteochondrosis and claim 10 is directed to the use of boron to regulate phosphorous.

We agree with the Examiner that claims 1 and 10 are anticipated by Arhola. Arhola teaches supplementing an animal’s diet with elemental boron in an about of 20 ppm which is properly interpreted as falling within
about 25 ppm. Ans. 28. While Arhola does not specifically teach treatment or prevention of osteochondrosis, we agree with the Examiner that the compound administered by Arhola would have been expected to have intrinsically the same effect as the claimed compound absent any objective evidence to the contrary. Ans. 28–29.

We also agree with the Examiner’s alternative position that the subject matter of the claims 1 and 10 would have been obvious over Arhola at the time the invention was made. As the Examiner noted, the differences between the prior art and the claimed invention are so slight that the referenced compound is likely to inherently possess the same characteristics as the claimed composition. Ans. 13. Moreover, we agree with the Examiner that, with respect to the amounts administered, these parameters are deemed to be a matter of judicious selection and routine optimization which is well within the purview of the skilled artisan. *Id.* *In re Aller*, 220 F.2d at 456.

We further agree with the Examiner that the subject matter of claims 1 and 10 would have been obvious over Arhola combined with Underwood at the time the invention was made. Underwood teaches that diets may be supplemented with up to 300 mg/kg of boron. Ans. 11. As the Examiner notes “[o]ne would have had a reasonable expectation of success in providing the instantly claimed amounts, because success merely requires providing a dosing amount of about the amount of Arhola and/or within the
amount of Underwood for the benefit of dietary supplementation of boron.”

Id.

Conclusion of Law

We conclude that the Examiner has established by a preponderance of the evidence that claims 1 and 10 are anticipated by Arhola under 35 U.S.C. § 102(a).

We further conclude that the Examiner has established by a preponderance of the evidence that claims 1 and 10 would have been obvious over Arhola or Arhola combined with Underwood as defined by 35 U.S.C. § 103(a).

Claims 2–9, 11, 12 and 18–20 have not been argued separately and fall with claims 1 and 10. 37 C.F.R. § 41.37(c)(1)(iv).

THE BERES REFERENCE

Issue

In rejecting the pending claims as either anticipated by or obvious over Beres, the Examiner finds that Beres teaches administering a feed solution containing boric acid to an animal in need of the supplement. Final Act. 15. The Examiner finds that the boric acid is supplied in an amount equal to about 19 ppm boron. Id. The Examiner goes on to find that

[a]lthough the reference does not expressly recite administering for an intended use of treating osteochondrosis or phosphorus regulation (P-uptake, absorption, and excretion), this would have been intrinsic to the boron-containing compound administration to a mammal as taught by the reference and which is within the
genus of mammals and boron-containing compounds as instantly claimed.

Final Act. 15. The Examiner concludes that the claimed process is anticipated by the reference. Final Act. 16

With respect to obviousness, the Examiner finds that

the differences between that which is claimed and that which is disclosed, is so slight that the referenced composition in the method is likely to inherently possess the same characteristics of the claimed composition in the method, particularly in view of the similar characteristics which they have been shown to share (e.g. B-containing compound, mammal-treating effect, oral administration). Thus, the claimed method and the composition effective therefor would have been obvious in view of Beres to those of ordinary skill in the art within the meaning of 35 USC § 103(a).

If not expressly taught by Beres, based upon the overall beneficial teaching provided by this reference with respect to boron-treating, dosing amounts, and administration including feeding or drinking, in the manner disclosed therein, the adjustments of particular conventional working conditions (e.g., determining one or more suitable dosing/concentration ranges in which to perform such an administration to a mammal), is deemed merely a matter of judicious selection and routine optimization which is well within the purview of the skilled artisan.

Final Act. 16.

Turning to the combination of Beres and Underwood the Examiner finds that

[i]t would have at least been obvious for one to have provided an amount of boron-containing material because the cited reference of Beres teaches that providing (versus the instant
claims) the same compounds in beneficial amounts to the same animals (mammals) and in general providing amounts of boron of about 25 mg/kg was known in the art. One would have been motivated to have provided the claimed amounts in the method of Beres because Beres teaches providing an administrable, dietary, or oral dose amount about 25 ppm (about 19 ppm), and because Underwood further teaches that diets may be supplemented up to 300 mg/kg boron-containing material. One would have had a reasonable expectation of success in providing the instantly claimed amounts, because success merely requires providing a dosing amount of about the amount of Beres and/or within the amount of Underwood for the benefit of dietary supplementation of boron; and because if not taught by the references, supplementation as instantly disclosed is obtainable by the mere consumption of known naturally-occurring materials which would provide the claimed boron amount (e.g. 37 ppm boron by consuming alfalfa; page 20 at ln 10 for example).

Final Act. 17.

Appellants contend that Beres teaches the treatment of the reticuloendothelial system and does not teach treatment of osteochondrosis nor phosphorous regulation. Appeal Br. 15. Appellants argue that the Examiner has provided no reason why one skilled in the art reading Beres would have been led to the claimed invention. Id. Appellants further argue that the Examiner has failed to articulate the motivation for combining Beres with Harwood. Id. Finally, Appellants argue that nothing in the references teach the subject matter of the claims as a whole. Appeal Br. 19.

The issue before us is whether the Examiner has established by a preponderance of the evidence that the rejected claims are anticipated by
Beres under 35 U.S.C. § 102(b) or rendered obvious over Beres either alone or in combination with Underwood under 35 U.S.C. § 103(a).

Findings of Fact


FF21. The composition of Beres is for the treatment of “mucovisidosis and chronic pain deriving from degenerative locomotor diseases or accompanying diseases of tumorous origin.” Beres col.1, ll. 12–16.

FF22. The composition of Beres comprises boric acid in the amount of 0.01 to 1.0% by weight/volume. Beres col. 3, ll. 46–48.

Analysis

Claims 1 and 10 are representative of the rejected claims. Claim 1 is directed to the use of boron to treat or prevent osteochondrosis and claim 10 is directed to the use of boron to regulate phosphorous.

We agree with the Examiner that claims 1 and 10 are anticipated by Beres. Beres teaches administering a composition containing boric acid to humans. FF19–21. The boron content of the composition is about 19 ppm. Final Act. 15. We agree with the Examiner that

[although the reference does not expressly recite administering for an intended use of treating osteochondrosis or phosphorus regulation (P-uptake, absorption, and excretion), this would have been intrinsic to the boron-containing compound administration to a mammal as taught by the reference and which]
is within the genus of mammals and boron-containing compounds as instantly claimed.

Final Act. 15

We also agree with the Examiner that the subject matter of claims 1 and 10 would have been obvious over Beres or Beres combined with Underwood at the time the invention was made. As the Examiner noted, the differences between the claims and Beres are so slight that the compositions of Beres are likely to have the same properties as those of the claimed invention. Final Act. 16. Moreover, determining the correct amount to administer would be a matter of judicious selection and routine optimization. Final Act. 16–17. This is especially true as Underwood teaches that diets may be supplemented with up to 300mg/kg of boron without ill effect. Final Act. 17.

Appellants contend that Beres is irrelevant to the present invention as Beres is directed to treatment of muscovisidosis. Appeal Br. 17. We are unpersuaded. Beres is also directed to treatment of degenerative locomotion disorders. FF20.

Appellants also contend that Beres suggests the use of boric acid as only one of numerous components in a complex pharmacologic agent. Appeal Br. 17. Again we are unpersuaded. As the Examiner points out, the present claims do not exclude the presence of additional materials but only
call for “successful contacting of the boron compound with the mammal in the requisite dose.”  Ans. 29.

Conclusions of Law

We conclude that the Examiner has established by a preponderance of the evidence that claims 1 and 10 are anticipated by Beres under 35 U.S.C. § 102(b).

We also conclude that claims 1 and 10 would have been obvious over Beres alone or in combination with Underwood under 35 U.S.C. § 103(a).

Claims 2–9, 11, 12, and 18–20 have not been argued separately and fall with claims 1 and 10. 37 C.F.R. § 41.37(c)(1)(iv).

THE KURTOGLU REFERENCE

Issue

In rejecting the pending claims as either anticipated by or obvious over Kurtoglu the Examiner finds that the reference teaches providing diets with boron in addition to the base amount contained in the diet. Final Act.

18. The Examiner finds that

[Although the reference does not expressly recite administering for an intended use of treating osteochondrosis (OC) or phosphorus regulation (P uptake, absorption, and excretion), this would have been intrinsic to boron-containing compound administration to a mammal as taught by the reference and which is within the genus of mammals and boron-containing compounds as instantly claimed. The cited reference discloses a process comprising administering a dose of a boron-containing compound to a mammal, which appears to be identical to the presently claimed boron-containing composition and process]
thereof since the boron compounds and the administering and effects thereof as taught by the cited reference are inclusive of the genus of boron-containing materials and administrations as instantly claimed. Consequently, the claimed process appears to be anticipated by the reference.

Id.

With respect to the rejection under 35 U.S.C. § 103(a), the Examiner finds that even if the composition (with respect to P-metabolism or OC) in the method and the process thereof are not identical to the referenced composition and method, with regard to some amount or unidentified characteristics, the differences between that which is claimed and that which is disclosed, is so slight that the referenced composition is likely to inherently possess the same characteristics of the claimed composition, particularly in view of the similar characteristics which they have been shown to share (e.g. B-containing compound, mammal-treating, oral administration). Thus, the claimed method and the composition effective therefor would have been obvious to those of ordinary skill in the art within the meaning of 35 USC § 103(a). If not expressly taught by Kurtoglu, based upon the overall beneficial teaching provided by this reference with respect to boron-treating, dosing amounts, and administration including feeding or drinking, in the manner disclosed therein, the adjustments of particular conventional working conditions (e.g., determining one or more suitable dosing/concentration ranges in which to perform such an administration to a mammal), is deemed merely a matter of judicious selection and routine optimization which is well within the purview of the skilled artisan.
With respect to the combination of Kurtoglu and Underwood the Examiner finds that

[it would have been obvious to a person of ordinary skill in the art at the time the instant invention was made to have provided the claimed amounts of boron containing material, because Kurtoglu teaches that providing (versus the instant claims) the same compounds in beneficial amounts to the same animals (mammals) and in general providing dietary amounts of boron non-deficient above 15 ppm (about 25 mg/kg) was known in the art and because Underwood teaches providing dietary amounts of boron up to 300 ppm. One would have been motivated to have provided the claimed amounts in the method of Kurtoglu because Kurtoglu teaches providing an administrable, dietary, or oral dose amount about 25 ppm (>15 ppm, for example), and because Underwood further teaches that diets may be supplemented up to 300 mg/kg boron-containing material. One would have had a reasonable expectation of success in providing the instantly claimed amounts, because success merely requires providing a dosing amount of about the amount of Kurtoglu and/or within the amount of Underwood for the known benefit of dietary supplementation of boron; and because if not taught by the references, supplementation as instantly disclosed is obtainable by the mere consumption of known naturally-occurring materials which would provide the claimed boron amount (e.g. 37 ppm boron by consuming alfalfa; page 20 at ln 10 for example).

Appellants contend that Kurtoglu does not teach or disclose the treatment or prevention of osteochondrosis or the regulation of phosphorous. Appeal Br. 20. Appellants go on to argue that the Examiner has offered no evidence that Kurtoglu would necessarily and inevitably result in the prevention or treatment of osteochondrosis or regulation of phosphorous and
that one skilled in the art would not recognize from Kurtoglu that such results could be achieved. *Id.* Appellants also argue that Kurtoglu does not teach supplementation in the amount of about 25 ppm to about 50 ppm for treatment of specific diseases. *Id.*

The issue is whether the Examiner has established by a preponderance of the evidence that the pending claims are anticipated by or obvious over Kurtoglu under 35 U.S.C. § 102(b) or 35 U.S.C. § 103(a).

*Findings of Fact*

FF23. Kurtoglu teaches providing the addition of 5 and 25 mg/kg to the diets of chickens. Kurtoglu 185.

FF24. Kurtoglu teaches that boron is necessary for normal cartilage and bone development in chicken. Kurtoglu 184.

*Analysis*

Claims 1 and 10 are representative of the rejected claims. Claim 1 is directed to the use of boron to treat or prevent osteochondrosis in a mammal and claim 10 is directed to the use of boron to regulate phosphorous.

We agree with the Examiner that claim 10 is anticipated by Kurtoglu. Kurtoglu teaches providing an animal a supplemental boron in about 25 ppm. FF22. While Kurtoglu does not specifically discuss regulation of phosphorous, we agree with the Examiner that the composition disclosed in Kurtoglu is identical to the composition administered in the claimed method.
and it would have been intrinsic that the compounds would have produced the desired effects. Final Act. 18.

We also agree with the Examiner that the subject matter of claim 10 would have been obvious to one skilled in the art at the time the invention was made. As the Examiner points out, the differences between the claimed method and the teachings of Kurtoglu are so slight that the referenced composition is likely to possess the same characteristics as the claimed composition. Final Act. 19. In addition, we agree with the Examiner that “the adjustments of particular conventional working conditions (e.g., determining one or more suitable dosing/concentration ranges in which to perform such an administration to a mammal), is deemed merely a matter of judicious selection and routine optimization which is well within the purview of the skilled artisan.” *Id.*

Appellants contend that the Examiner has not shown that the compound would intrinsically exhibit the claimed effects. Appeal Br. 20. We are unpersuaded. After a prima facie case is made out, the burden shifts to the applicant to show a difference between the prior art compounds and the claimed compound. The PTO lacks the resources to do comparisons. *In re Best*, 562 F.2d 1252, 1255 (CCPA 1977). Here the Examiner has shown that the two methods are nearly identical except for the expected results. Final Act. 19. It is incumbent on the Applicant to produce evidence to show the differences in the two methods. Appellants have offered no persuasive
evidence, other than attorney argument, that the method of Kurtoglu would not intrinsically produce the recited results.

Conclusion of Law

We conclude that the Examiner has established by a preponderance of the evidence that claim 10 is anticipated by Kurtoglu under 35 U.S.C. § 102(b).

We also conclude that the Examiner has established by a preponderance of the evidence that claim 10 would have been obvious over Kurtoglu under 35 U.S.C. § 103(a)

Claims 11 and 12 have not been argued separately and therefore fall with claim 10. 37 C.F.R. § 41.37(c)(1)(iv). As to claim 1 and its dependent claims, however, we note that Kurtoglu’s chickens (FF23) are not mammals, as claim 1 requires, and therefore reverse the rejection as to claims 1, 2–9, and 18–20.

THE ARMSTRONG REFERENCE

Issue

In rejecting the pending claims as obvious over Armstrong the Examiner finds that Armstrong teaches administering a boron-dosing amount of 5 mg to 15 mg/kg of a boron containing compound. Final Act. 21. The Examiner also finds that Armstrong teaches that boron effects calcium and phosphorous metabolism in humans and other mammals including reducing excretion of phosphorous. Id. The Examiner finds that the disclosed process appears to be “identical to the presently claimed boron-containing composition and process thereof and intrinsic to the compound
and chemical effects thereof, and since the boron compounds and the
administering and effects thereof as taught by the cited reference are
inclusive of the genus of boron-containing materials and administrations as
instantly claimed.” *Id.*

The Examiner goes on to find that while Armstrong does not recite the
specific parts per million called for in the instant claims, the teachings of
Underwood supply the requisite teaching. Final Act. 21–22. The Examiner
concludes that

[i]t would have been obvious to a person of ordinary skill in the
art at the time the instant invention was made to have provided
at least 25 ppm in the material in the process of Armstrong
because as taught therein, providing boron-containing materials
to supplement nutritional materials was known in the art and that
increasing dose (from 5 to 15 mg/kg; broadly, about 25 ppm
boron) provided the benefit of increasing bone shear force. One
would have been motivated to have provided boron in the amount
instantly claimed, because Armstrong teaches the benefit of
providing increasing boron and because Underwood further
teaches naturally occurring nutritional materials having the
claimed amounts including providing amounts up to 300 mg/kg
in a dietary amount (and showing the dose-dependent tissue
absorption (of about 5%) of dietary boron, e.g. page 516-517, at
table 17.2 and "toxicity"). If not expressly taught by Armstrong,
based upon the overall beneficial teaching provided by this
reference and as evidenced by Underwood with respect to boron-
treating, dosing amounts, and tissue uptake, and administration
including feeding or drinking, in the manner disclosed therein,
the adjustments of particular conventional working conditions
(e.g., determining one or more suitable dosing/concentration
ranges in which to perform such a boron administration to an
animal or mammal), is deemed merely a matter of judicious
selection and routine optimization which is well within the
purview of the skilled artisan. Also, please note, differences in
concentration (e.g. amounts, concentrations, proportions, ppm) do not patentability distinguish the claimed subject matter encompassed by the prior art unless there is objective evidence indicating such concentration are critical (and in view of both the original disclosure which teaches noncriticality, having effective amounts less than instantly claimed and (ii) that the compounds of the prior art and concentrations thereof would not provide (are precluded from) providing the instantly claimed effect upon the intended use of osteochondrosis.

Accordingly, the claimed invention as a whole was at least *prima facie* obvious, if not anticipated by the reference, especially in the absence of sufficient, clear, and convincing evidence to the contrary.

Final Act. 22–23.

Appellants contend that the Examiner has failed to provide any rationale for combining the references. Appeal Br. 22–23. Appellants also argue that Armstrong does not teach or suggest the effect of boron on osteochondrosis nor does it teach the effect on phosphorous regulation. Appeal Br. 23. Appellants argue that Underwood is silent as to treating osteochondrosis and actually teaches about bone turnover, which teaches away from the present invention. *Id.*

The issue presented is whether the Examiner has established by a preponderance of the evidence that the rejected claims would have been
obvious over Armstrong combined with Underwood under 35 U.S.C. § 103(a).

**Findings of Fact**

FF25. Armstrong teaches feeding barrows 5 mg/kg and 15mg/kg supplemental boron. Armstrong 3121.

FF26. Armstrong teaches that the “[u]ltimate shear force of the fibula was increased (P<0.05) in barrows consuming diets supplemented with 15 mg B/kg diet compare with pigs supplemented with 5 mg B/Kg diet.” Armstrong 3124.

**Analysis**

Claims 1 and 10 are representative of the rejected claims. Claim 1 is directed to the use of boron to treat or prevent osteochondrosis and claim 10 is directed to the use of boron to regulate phosphorous.

We agree with the Examiner that the subject matter of claims 1 and 10 would have been obvious to one of ordinary skill in the art at the time the invention was made. Armstrong teaches providing barrows (pigs) with supplemental boron in an amount of up to 15 ppm of the base feed. FF24. Armstrong also teaches that increasing the amount of supplemental boron increases the benefit provided by the boron. FF25. Armstrong teaches that animals can tolerate up to 300 ppm of supplemental boron. FF15. As the Examiner found,

[o]ne would have been motivated to have provided boron in the amount instantly claimed, because Armstrong teaches the benefit of providing increasing boron and because Underwood further teaches naturally occurring nutritional materials having the claimed amounts including providing amounts up to 300 mg/kg
in a dietary amount (and showing the dose-dependent tissue absorption (of about 5%) of dietary boron, e.g. page 516-517, at table 17.2 and “toxicity”).

Final Act. 22–23.

Appellants argue that Underwood teaches away from the claimed invention. Appeal Br. 23. We are unpersuaded. Underwood’s teaching with respect to bone turnover does not “criticize, discredit, or otherwise discourage the solution claimed,” therefore it cannot be said to teach away from the claimed method. In re Fulton, 391 F.3d 1195, 1201 (Fed. Cir. 2004).

Appellants also argue that the Examiner has failed to provide a rationale for combining the cited references. Appeal Br. 22–23. Again, we are unpersuaded. As noted above, the Examiner explicitly explained the motivation to combine the cited references. The Examiner found that

[i]n this case, Armstrong and Underwood each teach feeding boron materials and providing boron-containing materials in feed materials for the purpose of providing a nutrient (boron) in the diet, and further Underwood teaches that the boron materials are well-tolerated up to amount in excess of those instantly claimed, including up to 300 mg B/kg material in the daily diet.

Ans. 31.

With respect to claim 10, Appellants argue that Armstrong teaches away from using supplemental boron to effect phosphorous regulation as Armstrong teaches that supplemental boron does not affect apparent absorption of phosphorous. Appeal Br. 23. We remain unpersuaded. While Armstrong reports that boron had marginal effects on the metabolism in the
present study, Armstrong also reported that other studies reported that boron did affect metabolism of phosphorous. Armstrong 3124. Armstrong does not unequivocally criticize or discredit the use of boron to regulate phosphorous.

Conclusions of Law

We conclude that the Examiner has established by a preponderance of the evidence that claims 1 and 10 would have been obvious over Armstrong combined with Underwood under 35 U.S.C. § 103(a).

Claims 2–9, 11, 12 and 18–20 have not been argued separately and therefore fall with claims 1 and 10. 37 C.F.R. § 41.37(c)(1)(iv).

SUMMARY

We reverse the rejection of claims 1–9 and 18-20 under 35 U.S.C. § 112, first paragraph.

We affirm the rejection of claims 1, 5–9 and 18-20 under 35 U.S.C. § 112, second paragraph as indefinite.

We reverse the rejection of claims 1–12 and 18–20 under 35 U.S.C. § 102(b) as anticipated by Rigby-Burdette.

We reverse the rejection of claims 1, 2, 4-8, 10, 11 and 18–20 under 35 U.S.C. § 102(b) as anticipated by Gribbins.

We reverse the rejection of claims 1–12 and 18–20 under 35 U.S.C. § 102(a) as anticipated by Underwood and the rejection under 35 U.S.C. § 103(a) as obvious over Underwood.
We affirm the rejection of claims 1–12 and 18–20 under 35 U.S.C. § 102(a) as anticipated by Arhola and the rejection under 35 U.S.C. § 103(a) as obvious over Arhola combined with Underwood.

We affirm the rejection of claims 1–21 and 18–20 under 35 U.S.C. § 102(a) as anticipated by Beres and the rejection under 35 U.S.C. § 103(a) as obvious over Beres combined with Underwood.

We affirm the rejection of claims 10–12 under 35 U.S.C. § 102(a) as anticipated by Kurtoglu and the rejection of claims 10–12 under 35 U.S.C. § 103(a) as obvious over Kurtoglu, but reverse those rejections as to claims 1, 2–9, and 18–20. We affirm the rejection of claims 1–12 and 18–20 under 35 U.S.C. § 103(a) as obvious over Armstrong in view of Underwood.

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).

AFFIRMED