UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/735,374	09/16/2010	Monika Reuter	A-11664	3241

20741 7590 12/01/2016
Welsh Flaxman & Gitler
2000 Duke Street , Suite 100
Alexandria, VA 22314

EXAMINER
PROUTY, REBECCA E

ART UNIT	PAPER NUMBER
1652	

MAIL DATE	DELIVERY MODE
12/01/2016	PAPER

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MONIKA REUTER, VERA DUCHOW, and DANIEL VATER[1]

Appeal 2014-001111
Application 12/735,374
Technology Center 1600

Before ULRIKE W. JENKS, TINA E. HULSE, and TAWEN CHANG, *Administrative Patent Judges*.

CHANG, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134(a) involving claims to a process for the generation of biomethane, which have been rejected as obvious. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

STATEMENT OF THE CASE

"Biogas plants generate methane through a process of microbial degradation of organic substances." (Spec. 1.) According to the Specification,

---

[1] Appellants identify the Real Party in Interest as Schmak Biogas GmbH. (Appeal Br. 1.)

> increasing the yield of end products from a given quantity of educts is . . . a priority target in operating the process in the case of the production of biogas. . . . [T]his means that as great as possible a quantity of methane should be formed from a given quantity of organic fermentation substrate.
>
> At the same time, as high as possible a volume loading of the fermenter should be achieved. Volume loading of a fermenter is understood to mean the quantity of substrate fed into the fermenter.

(*Id*. at 2.) Further according to the Specification, "it has been found that, through the addition of microorganisms of the species *Clostridium sartagoformum* to the fermentation substrate, both the volume loading of the fermenter can be increased and also the quantity of biogas formed is markedly increased." (*Id*. at 3.)

Claims 39–46 are on appeal. Claim 39 is illustrative and reproduced below:

> 39. A process for the generation of biomethane from biomass in a fermentation reactor, comprising the step of adding a micro-organism of the species *Clostridium sartagoformum* to the biomass in a form of a culture of microorganisms, wherein the microorganism of the species *Clostridium sartagoformum* makes up at least 1% of the total number of microorganisms present in the culture, thereby enhancing a production of the biomethane in the biomass.

(Appeal Br. 19 (Claims App'x).[2])

---

[2] Claims 40–45 depend from claim 39 and additionally require that *Clostridium sartagoformum* make up at least 10% of the total number of microorganisms present in the culture (claim 40), that a pure culture of *Clostridium sartagoformum* is added (claim 41), that *Clostridium sartagoformum* is added to the biomass as a component of at least one immobilized culture of microorganisms (claim 42), that an additional biomass is added to the fermentation reactor close to a time of the addition of *Clostridium sartagoformum* whereby volume loading in the fermentation reactor is continuously increased by continuous addition of biomass (claim

The Examiner rejects claims 39–46 under 35 U.S.C. § 103(a) as being unpatentable over Kovacs,[3] Cox,[4] and Sakka,[5] as evidenced by Nagy.[6] (Ans. 2.)

DISCUSSION

Issue

The Examiner finds that Kovacs teaches "methods of biogas generation in a biogas fermentation system comprising adding a culture of an anaerobic hydrogen-producing bacteria to the biomass" and further teaches that "suitable bacteria are from the genus *Clostridium*." (Ans. 3.) The Examiner finds that Kovacs does not specifically teach *Clostridium sartagoformum* as the anaerobic hydrogen-producing bacteria to be used. (*Id*.) However, the Examiner finds that Cox and Sakka both teach the use of *Clostridium sartagoformum* for anaerobic hydrogen production. (*Id*.)

With respect to the dependent claims, the Examiner finds that Kovacs teaches that "the bacteria [suitable for use in its method] can be bound to a carrier[,] i.e., immobilized[,] and that the biomass and microorganism can be

---

43), that the generation of biomethane from biomass is performed at a particular volume loading (claim 44), or that *Clostridium sartagoformum* is added in quantity such that after addition *Clostridium sartagoformum* makes up between 10^{-4}% and 10% of microorganisms in the fermentation substrate (claim 45). Claim 46 depend from claim 45 and further require that, after addition, *Clostridium sartagoformum* makes up between 10^{-3}% and 1% of microorganisms in the fermentation substrate.

[3] Kovacs et al., WO 2006/056819 A1, published June 1, 2006 ("Kovacs").

[4] Cox et al., WO 2006/119052 A2, published Nov. 9, 2006 ("Cox").

[5] Sakka et al., WPI Accession No. 2005-670421 ("Sakka").

[6] Gábor Nagy and Ágnes Wopera, *Biogas Production From Pig Slurry—Feasibility and Challenges*, 37 Materials Science and Engineering 65 (2012) ("Nagy").

added continuously or at specified regular intervals." (*Id*. at 3.) The Examiner further finds that Example 8 of Kovacs

> teaches a biogas generation method in which 1.5 m^3 of pig slurry was added daily to a 15 m^3 fermenter which included a preseeded bacterial consortium from spent waste water sludge and a pure culture of bacteria was added on day 31. As Figure 3 of Nagy . . . shows that an average pig slurry has a density of approximately 1000 kg/m^3 and is composed of from 1–4% dry matter, 1.5 m^3 of pig slurry would be 15–60 kg of oDS and thus a volume loading of 1–4 kg oDS/m^3d depending o[n] the particular pig slurry used by Kovacs . . . .

(*Id*.)

The Examiner concludes that it would have been obvious to a skilled artisan to select *Clostridium sartagoformum* as the anaerobic hydrogen-producing bacteria for use in Kovacs' method, as Kovacs "particularly point[s] to *Clostridia* as a suitable genus" and Cox and Sakka "teach that *Clostridium sartagoformum* in particular has the properties that Kovacs . . . teach[es] are necessary." (*Id*. at 4.) Likewise, although the Examiner finds that Kovacs does not teach "the particular ratio of the anaerobic hydrogen-producing bacteria to other bacteria present in the fermenter following inoculation [with the culture of microorganisms]," the Examiner finds that Kovacs' disclosure suggests that determining such a ratio is a matter of routine optimization. (*Id*. at 4.)

Appellants contend that the cited references do not teach and would not suggest to a skilled artisan a method of enhancing production of biomethane by adding *Clostridium sartagoformum*. (Appeal Br. 8–9, 12–15.) Appellants also argue that the Examiner failed to provide a basis to support rejection of the dependent claims. (*Id*. at 16–17.) Appellants further

argue that Nagy, which the Examiner cites to as evidence in the rejection of claim 44, is not prior art. (*Id*. at 8.)

The issue with respect to this rejection is whether the evidence of record supports the Examiner's conclusion that claims 39–46 are obvious over Kovacs, Cox, and Sakka, as evidenced by Nagy.

Findings of Fact

1. Kovacs teaches that

> [i]t has been known for a long time that methane-rich biogas is formed when organic material from various sources is decomposed under anaerobic conditions. Numerous microbial strains participate in the process . . . . [T]he microbes taking part in the degradation of organic material and in the generation of biogas depend on each others' metabolic activity; they form a consortium when functioning properly.

(Kovacs 1:10–20.)

2. Kovacs teaches that the role of hydrogen in the biogas technology has been ambiguous. (*Id*. at 2:11–12.) However, Kovacs teaches that authors of an earlier paper has suggested that "in mesophilic biogas production systems one of the rate limiting steps is the availability of hydrogen, which can be increased by adding hydrogen producing bacteria to the natural consortium." (*Id*. at 2:20–22.)

3. Kovacs teaches that it has found that "the efficacy of thermophilic biogas production technologies [also] can be increased by adding a suitable hydrogen producing thermophilic microbial culture to the already existing natural biogas production [microbe] consortium." (*Id*. at 3:13–17; *see also id*. at Abstract, 3:27–28 ("[I]n situ hydrogen production is a crucially important beneficial step in all thermophilic systems investigated so far.") In particular, Kovacs teaches that "[a]ccording to [its] invention

production [o]f methane containing biogas is significantly increased." (*Id*. at Abstract.)

4. Kovacs teaches that, according to its method of biogas production, "[u]pon fermentation thermophilic conditions are provided" and "preferably the temperature is set to 45–70ºC, more preferably to 50–60ºC." (*Id*. at 4:12–13.) Kovacs teaches that "'[t]hermophilic conditions' mean an environment that is suitable for microbial growth and has a minimum temperature of 40ºC, preferably of 45ºC, and more preferably of 45–75ºC or at least 50ºC, highly preferably [] 50–60ºC." (*Id*. at 6:1–3, *see also id*. at 6:22–24, 20:2–12 (claim 1).)

5. Kovacs teaches that "[b]ased on prior information it is assumed that good and suitable intensifying microorganisms is likely to be found among the following species: . . . *Clostridium* genus, for example *Clostridium thermocellum, Clostridium butyricum* . . . ." (*Id*. at 7:27–8:2; *see also id*. at 20:19–21 (claim 3).)

6. Kovacs teaches adding "[p]ure culture" of hydrogen producing bacterium (*Caldicellulosiruptor saccharolyticus*) to a biogas producing system. (*Id*. at Abstract (*Caldicellulosiruptor saccharolyticus* is an example of hydrogen producing bacteria), 5:5–6, 5:9–11.)

7. Kovacs teaches that, in a preferred embodiment, "[microbial] cells can be bound to carriers (immobilized to), e.g., rhyolitic tuff." (*Id*. at 4:31–32, 5:2–3, 5:9–11 (bacteria immobilized on perlite), 11:14–18 (teaching that "[s]everal high specific surface carrier material can be used for immobilization of the hydrogen producing bacteria"), 20:33–34 (claim 7).)

8. Kovacs teaches a method of biogas production where "[a]bout 10–20% of the digested (fermented) biomass is replaced continuously or at specified and regular time intervals by adding fresh biomass to the system through a closed, anaerobic system." (*Id*. at 9:1–2.)

9. Kovacs' Table I is reproduced below:

Table I

Summary table of the results

Substrate	Hőmérséklet (°C)	Note	total gas volume at 30° per 1 g dry matter (ml)
Bagasse	30	Control	49
Bagasse	30	Entero	88
Bagasse	55	Control	96
Bagasse	**55**	**Caldi**	**169**
Sweet sorghum	30	Control	48
Sweet sorghum	30	Entero	75
Sweet sorghum	55	Control	118
Sweet sorghum	**55**	**Caldi**	**205**
Jerusalem artichoke, tuber	30	Control	74
Jerusalem artichoke, tuber	30	Entero	109
Jerusalem artichoke, tuber	55	Control	143
Jerusalem artichoke, tuber	**55**	**Caldi**	**223**
Jerusalem artichoke, green biomass	30	Control	42
Jerusalem artichoke, green biomass	30	Entero	71
Jerusalem artichoke, green biomass	55	Control	85
Jerusalem artichoke, green biomass	**55**	**Caldi**	**119**
Waste water sludge	30	Control	47
Waste water sludge	30	Entero	68
Waste water sludge	55	Control	67
Waste water sludge	**55**	**Caldi**	**110**

Kovacs' Table I summarizes a comparison of volume of biogas produced in mesophilic and thermophilic systems utilizing different substrates and with or without hydrogen producing bacteria. (*Id*. at 13:1–16:5 (Example 6).)

10. Kovacs discloses a field experiment using an anaerobic fermenter having a total volume of 15 m^3 (*id*. at 17:5–6) and filled with 6 m^3 of pig slurry (*id*. at 17:7–8), where the fermenter "works in a semi-continuous mode of operation" such that "every day 10% of the fermenter volume is replaced with fresh substrate" (*id*. at 17:14–15.) Kovacs teaches that "[o]n day 31 the fermenter was inoculated with a precultivated culture of *Caldicellulosiruptor saccharolyticus* at a volumetric concentration of 10 V/V%." (*Id*. at 17:32–33.) Kovacs further teaches that "biogas production increased significantly after the inoculation and has been stable at this elevated level for at least two months." (*Id*. at 17:35–36.)

11. Cox teaches "methods and compositions . . . directed to the production of hydrogen and other chemical products via the anaerobic bacterial fermentation of biomass, and the production of hydrogen and other chemical products via bacterial conversion of products obtained from anaerobic fermentation." (Cox 1:3–5.)

12. Cox teaches an embodiment of its invention in which the bacterial strains used to anaerobically ferment biomass to obtain chemical products are substantially purified bacterial strains selected from a group consisting of, among others, *Clostridium sartagoforme*. (*Id*. at 1:39–4:3, 6:9.)

13. Cox claims "[a] method of anaerobically producing hydrogen comprising . . . fermenting [a] concentrated, sterilized and deoxygenated

biomass material with . . . isolated non-heatshocked bacterial species from the *Clostridium* genus under anaerobic conditions so as to produce hydrogen." (*Id*. at 60:1–5 (claim 1).)

14. Sakka teaches a fermentation apparatus for producing hydrogen, in which microorganisms ferments substrates containing saccharides. (Sakka 1–2.) Sakka discloses that the fermentation portion of the apparatus "controls the moisture-content ratio of substrate to 15% or more and pH to 6–10, at 30–45ºC and an anaerobic atmosphere state." (*Id*. at 1.)

15. Sakka teaches that preferred bacteria contained in the fermentation portion are *Clostridium acetobutyricum*, *Clostridium tertium*, *Clostridium sartagoforme*, *Clostridium butyricum*, and/or *Clostridium fimetarium*. (*Id*. at 2.)

16. Figure 3 of Nagy is reproduced below:

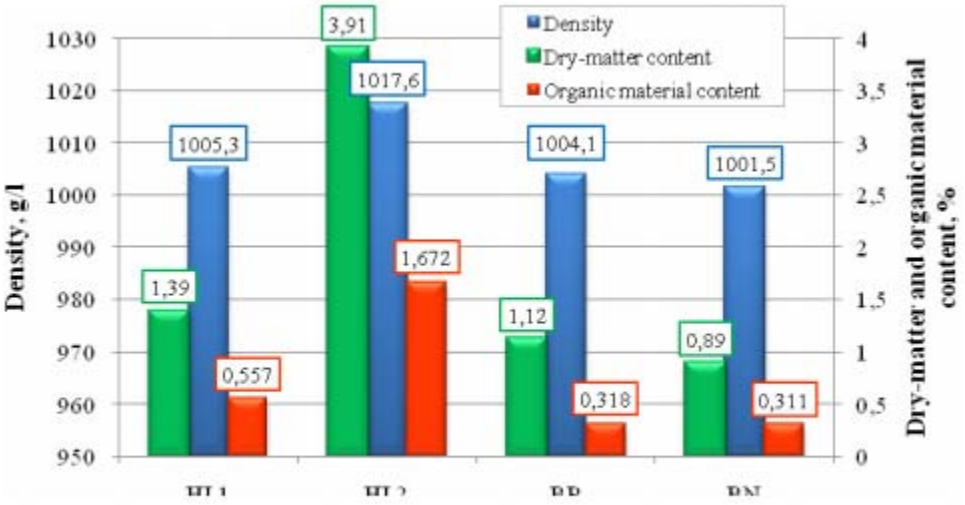

Figure 3. Density, dry-matter content and organic material content of the pig slurry samples

Figure 3 of Nagy sets forth the density, dry-matter content and organic material content of four pig slurry samples. (Nagy 70.)

Analysis

We adopt the Examiner's findings of fact and reasoning regarding the scope and content of the prior art. (Ans. 3–18; FF1–16.) Below we highlight certain points for emphasis and address Appellants' arguments.

Claim 39

Kovacs teaches that generating methane-containing biogas by fermenting biomass is well-known. (FF1.) Kovacs teaches that the efficacy of biogas production can be increased by adding a suitable hydrogen producing microbial culture to the microbe consortium taking part in the fermentation process. (FF2, FF3.) Kovacs provides an example in which such hydrogen producing microbial culture consists of a single hydrogen producing species (i.e., where the particular hydrogen producing species makes up at least 1% of the total number of microorganisms present in the culture). (FF6, FF10.) Kovacs teaches that microorganisms suitable for its invention is likely to be found, among others, in microbes within the genus *Clostridium*. (FF5.) Cox and Sakka both teach using *Clostridium sartagoforme* in anaerobic fermentation to produce hydrogen. (FF11–15.) In light of the above, we agree with the Examiner that "it would have been obvious to one of ordinary skill in the art to select *Clostridium sartagoformum* as the anaerobic hydrogen-producing bacteria to use in the method of Kovacs" to arrive at the method of claim 39. (Ans. 3–4.)

Appellants contend that the cited references do not teach and would not suggest to a skilled artisan a method of enhancing production of biomethane by adding *Clostridium sartagoformum*. (Appeal Br. 8–9, 12–15.) Appellants first contend that none of the cited references teaches

enhancing production of biomethane by adding *Clostridium sartagoformum*. (Appeal Br. 8–9.) In particular, Appellants contend that Kovacs only discloses the *Clostridium* genus generally and two species not within the instant claims, and then only as examples among "an extensive list of bacteria." (*Id*. at 9, 12–13.) Likewise, Appellants argue that, "[w]hile Cox may teach the genus Clostridium to be hydrogen producing" and "Sakka may teach the use of *Clostridium Sartagoformum* in a [thermophilic] hydrogen producing fermentation process," Cox does not teach that any specific Clostridium species will enhance hydrogen production and neither reference teaches enhancing biomethane production through the use of a fermentation culture comprising at least 1% *Clostridium Sartagoformum*. (*Id*. at 13, 15.)

This argument is not persuasive. "Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references. . . . [The reference] must be read, not in isolation, but for what it fairly teaches in combination with the prior art as a whole." *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). In this case, while Kovacs, Cox, and Sakka do not individually teach using *Clostridium Sartagoformum* to enhance biomethane production, together they fairly suggest doing so because Kovacs teaches that adding hydrogen producing microbes will enhance biomethane production (FF2, FF3) and Cox and Sakka teach that *Clostridium Sartagoformum* is a hydrogen producing microbe (FF11–15).[7]

[7] Appellants argue that Cox discloses *Clostridium Sartagoforme* only as part of "hundreds of species of anaerobic bacteria which can potentially be used for the anaerobic fermentation of a biomass in order to produce chemical products" and that "there is no recognition [in Cox] of using a specific

Appellants also contend that the combined teachings of Kovacs, Cox, and Sakka do not suggest the claimed method.

Appellants contend, first, that Kovacs does not support the conclusion that "methane formation in ***mesophilic*** systems may be increased by increasing the supply of in situ produced hydrogen using a hydrogen producing bacterium." (Appeal Br. 9–10 (emphasis added and internal quote marks omitted), 13; *cf. id*. at 15 (making similar argument that Sakka only relates to hydrogen production under thermophilic conditions.) We are not convinced. As an initial matter, the claim is not limited to mesophilic systems. Indeed, the Specification states that in the context of the claimed invention "the generation of biogas from biomass preferably takes place at a temperature of 20ºC to 80ºC and particularly preferably at a temperature of 40ºC to 50ºC" (Spec. 11), which Appellants admits encompasses

---

species or strain to produce more hydrogen and therefore more biomethane." (Appeal Br. 13; *see also* Reply Br. 2.) Cox teaches methods and compositions "directed to the production of hydrogen and *other* chemical products" and claims a method of producing hydrogen comprising fermenting biomass with species from the *Clostridium* genus. (FF11–FF13.) Thus, we do not find convincing Appellants' apparent argument that Cox would not suggest to a skilled artisan that *Clostridium Sartagoforme* produces hydrogen during fermentation. Neither is it necessary that Cox teach *Clostridium Sartagoforme* produce *more* hydrogen than other listed bacteria in order to render its use in Kovacs' method obvious. "[T]he question is whether there is something in the prior art as a whole to suggest the *desirability*, and thus the obviousness, of making the combination, not whether there is something in the prior art as a whole to suggest that the combination is the *most desirable* combination available." *In re Fulton*, 391 F.3d 1195, 1200 (Fed. Cir. 2004) (citation omitted). In any event, as mentioned above, we find that Sakka discloses *Clostridium Sartagoforme* as one of five bacterial species that functions in fermentation to produce hydrogen. (FF14–FF15.)

temperatures in the thermophilic range (Appeal Br. 11 (thermophilic systems encompasses temperatures between 45 to 122ºC).) Thus, even if we assume Appellants' contention to be true, the contention does not render claim 39 non-obvious. Moreover, assuming that *Clostridium Sartagoformum* is a mesophilic organism as Appellants apparently claim (Ans. 6–7), we agree with the Examiner that Kovacs fairly suggests that "it was known . . . that methane formation in mesophilic systems may be increased by increasing the supply of *in situ* produced hydrogen using a hydrogen producer bacterium." (*Id*. at 7; FF2.)

Appellants also appear to argue more broadly that Kovacs provides only "a suggestion and not a positive conclusion that the availability of hydrogen is a rate limiting step in biogas production." (Appeal Br. 11.) Likewise, Appellants argue: (1) that it is unclear whether it is bacteria or certain enzymes that produce hydrogen gas in biomass fermentation (Appeal Br. 11), (2) that a skilled artisan would not conclude that all hydrogen producing bacteria function the same during biogas production or increase biomethane production (*id*. at 11–15; *see also* Reply Br. 1–2), (3) that Kovacs provided experimental data showing increased biogas production only for *Caldicellulosiruptor saccharolyticus* and not for microbes of the genus *Clostridium* (*id*. at 12), and (4) that Sakka does not teach that *Clostridium Sartagoformum* is the component that enhances hydrogen production in its hydrogen producing fermentation process (*id*. at 13).

We are not persuaded. These arguments at most amount to an assertion that a skilled artisan could not be certain in light of the prior art that *Clostridium Sartagoformum* would work to increase biomethane production in a fermentation process. However, in an obviousness analysis

the expectation of success need only be reasonable, not absolute. *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1364 (Fed. Cir. 2007). In this case, we find that such reasonable expectation exists based on the combination of Kovacs' disclosure that "suitable intensifying microorganisms" for its method are likely to be found in the *Clostridium* genus, among others (FF5), and on Cox and Sakka's respective disclosures of the usefulness of *Clostridium sartagoforme* in hydrogen production during fermentation (FF11–FF15).[8]

Finally, Appellants appear to argue that Cox teaches away from biomethane production because Cox "describes a whole series of drawbacks of biomethane production [that] could deter a person skilled in the art from using these methods" and "in one instance . . . mentions methane as a 'contamination gas' and . . . corresponding bacteria as an 'undesirable bacteria.'" (Appeal Br. 14 (citing Cox ¶¶ 116–120, 184.) We are not

[8] Appellants argue for the first time in the Reply Brief that the fermentation methods taught by Sakka and Cox are very different than the fermentation method of Kovacs and the instant claims because Sakka and Cox "deliberately destroy the microbial background community [in the biomass]" whereas "the present claimed invention is based on the fact that *Clostridium sartagoformum* is added to a biogas fermenter containing hundreds of different living microorganisms." (Reply Br. 2–3.) This argument is untimely. *See Ex parte Borden*, 93 USPQ2d 1473, 1474 (BPAI 2010) (informative) ("[T]he reply brief [is not] an opportunity to make arguments that could have been made in the principal brief . . . but were not."). In any event, the argument is unconvincing. Obviousness does not require that the methods of cited references be physically combinable with each other. *Orthopedic Equip. Co. v. United States*, 702 F.2d 1005, 1013 (Fed. Cir. 1983) ("Claims may be obvious in view of a combination of references, even if the features of one reference cannot be substituted physically into the structure of the other reference.") Moreover, as already noted, obviousness only requires a reasonable, not absolute, expectation of success. *Pfizer*, 480 F.3d at 1364.

persuaded. "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994). Here, Cox acknowledges that "[b]io-methane production through anaerobic digestion of wastes and wastewater using mixtures of bacteria species is an established technology." (Cox 30:5–6.) The fact that Cox mentions disadvantages of methane production and describes methane as a contamination gas *in the context of a method of hydrogen production* does not suggest that when methane is the desirable end product hydrogen producing bacteria should not be added as taught by Kovacs to enhance efficiency.

Accordingly, we affirm the Examiner's rejection of claim 39.

Claims 40–46

As discussed above, the Examiner cites to Nagy as evidence in the rejection of dependent claim 44. (Ans. 3.) Appellants argue that the Examiner's reliance upon Nagy is improper, "since Nagy was published at least four years after the priority date of the instant invention." (Appeal Br. 8.) We are not persuaded. Later publications may be used as "evidence of art existing on the filing date of an application." *In re Hogan*, 559 F.2d 595, 605 & n.17 (CCPA 1977); *see also In re Wilson*, 311 F.2d 266, 268–269 (CCPA 1962) (finding later publication to be properly cited to show a state of fact, i.e., the characteristics of prior art foam products). In this case, the Examiner cites Nagy as evidence of the characteristics of the prior art pig

slurry used in Kovacs, and Appellants have made no persuasive argument that Nagy is not probative of such characteristics.

Appellants also argue that dependent claims 40–46 are non-obvious for the same reasons set forth above for claim 39, that none of the references discloses the additional limitations of claims 40–46 (*see supra* n.2) and that "[n]o basis to support a rejection has been provided in the final office action" with respect to these claims. (Appeal Br. 16–17.)

As an initial matter, as noted by the Examiner in the Final Action, the obviousness rejection over Kovacs, Cox, and Sakka, as evidenced by Nagy, including the rejection of the dependent claims, was explained in an earlier Office Action. (Final Act. 3; Office Act. 3–5 (Nov. 2, 2012); *see also* FF6–FF10, FF16.) The Examiner also reiterated and further clarified the basis of the rejection of these claims in the Answer (Ans. 16–18), to which Appellants failed to respond in the Reply Brief.

Where "claims are not separately argued, they all stand or fall together." *In re Kaslow*, 707 F.2d 1366, 1376 (Fed. Cir. 1983); 37 C.F.R. § 41.37(c)(1)(iv). Separately arguing a claim requires "more substantive arguments in an appeal brief than a mere recitation of the claim elements and a naked assertion that the corresponding elements were not found in the prior art." *In re Lovin*, 652 F.3d 1349, 1357 (Fed. Cir. 2011). With the exception of the argument regarding the use of Nagy in the rejection of claim 44, addressed above, we find that Appellants have not separately argued claims 40–46. Accordingly, they fall with claim 39.

SUMMARY

For the reasons above, we affirm the Examiner's decision rejecting claims 39–46.

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