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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte LI LI and QUNZHU LI

Appeal 2019-003658
Application 13/576,565
Technology Center 1700

Before ROMULO H. DELMENDO, MICHAEL P. COLAIANNI, and MICHAEL G. MCMANUS, *Administrative Patent Judges*.

DELMENDO, *Administrative Patent Judge*.

DECISION ON APPEAL

The Appellant[1] appeals under 35 U.S.C. § 134(a) from the Primary Examiner's final decision to reject claims 1–7, 9, 10, and 13–23.[2,3] We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

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[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42—i.e., the Inventors (Application Data Sheet filed August 1, 2012 at 1), who are also identified as the real parties in interest (Substitute Appeal Brief filed October 15, 2018 ("Appeal Br.") at 2).

[2] *See* Appeal Br. 8–49; Reply Brief filed April 8, 2019 ("Reply Br.") at 1–26 (original document pagination incorrect); Final Office Action entered October 17, 2017 ("Final Act.") at 3–8; Examiner's Answer entered February 7, 2019 ("Ans.") at 3–16.

[3] We heard oral arguments from the Appellant's representative on October 1, 2020.

I. BACKGROUND

The subject matter on appeal relates to a method for circulating cooled regenerated catalyst in fluid catalytic cracking ("FCC") (Specification filed August 1, 2012 ("Spec.") at 1, ll. 5–8). Figure 2 (descriptions for reference numerals added) is reproduced from the Drawings filed August 1, 2012, as follows:

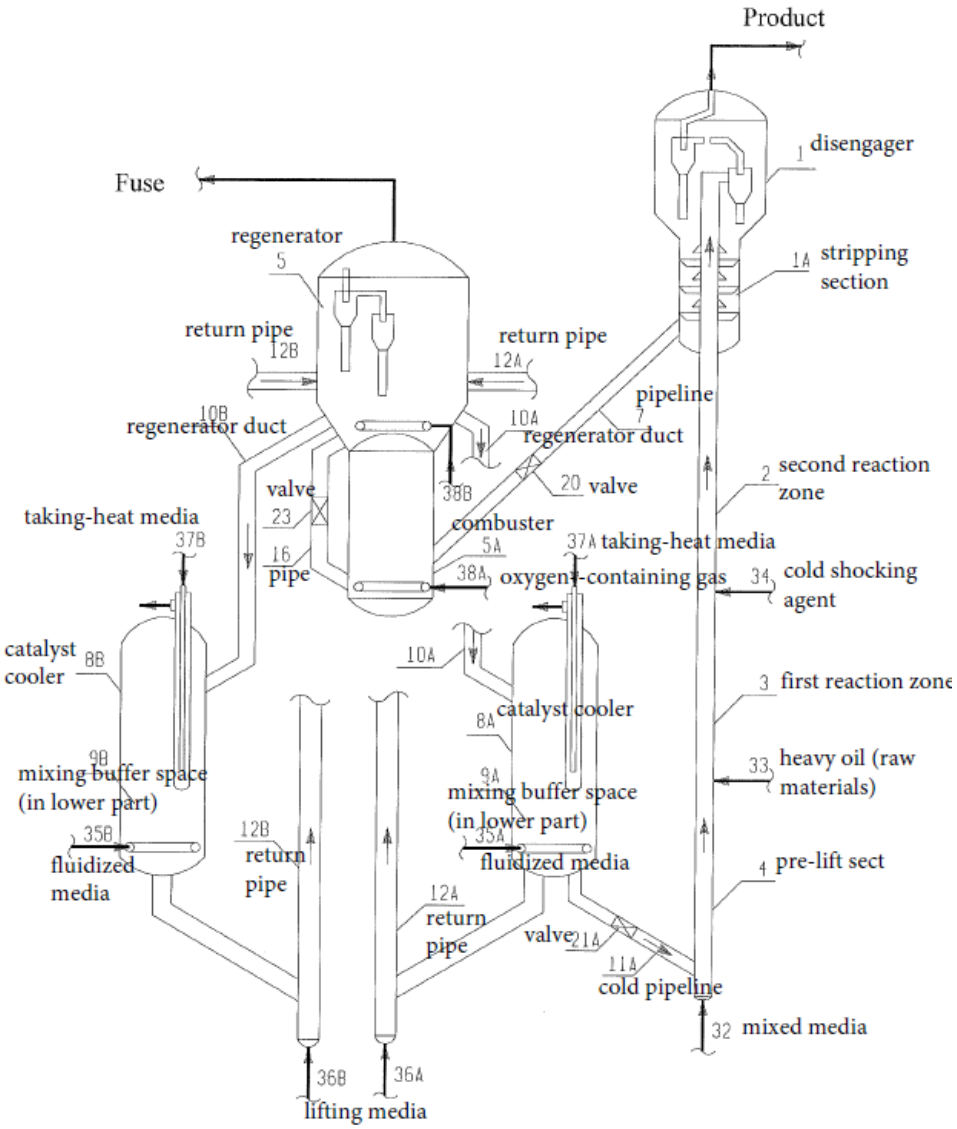

Figure 2

Figure 2 above is described as "a typical scheme of [a] heavy oil catalytic device of the present invention," wherein the figure illustrates a catalyst circulation process including, *inter alia*: introducing heavy oil into a first reaction zone **3** (presumably of a riser reactor) together with a mixed media **32** and a cold regenerated catalyst supplied through cold pipeline **11A**; further reacting the mixture in a second reaction zone **2** after adding a cold shocking agent **34**; stripping the catalyst in a stripping section **1A** of a disengager **1** where product is removed at the top of the disengager **1**; combusting and regenerating the stripped catalyst in a regenerator **5**; cooling the regenerated catalyst in catalyst coolers **8A** and **8B**, which contain mixing buffer spaces **9A** and **9B**; and reusing the cold regenerated catalyst from catalyst cooler **8A** by supplying the catalyst to the first reaction zone **3** (Spec. at 17, l. 19–20, l. 25).

Representative claim 1 is reproduced from the Claims Appendix to the Appeal Brief, as follows:

> 1. A method for circulating a cold regenerated catalyst, comprising
>
> reacting hydrocarbon materials with a catalyst in a riser reactor to generate gas and oil products and a reacted catalyst;
>
> separating the gas and oil products from the reacted catalyst in a settler;
>
> stripping the separated catalyst in a stripping section;
>
> burning and regenerating the stripped catalyst in a regenerator to obtain a hot regenerated catalyst;
>
> cooling the hot regenerated catalyst by a heat exchange element, the heat exchange element being located in a catalyst cooler and having a heat-taking medium inside;
>
> *adjusting a temperature of the cooling catalyst in a mixing buffer space in the catalyst cooler downstream of the heat exchange element, the mixing buffer space having distribution facilities for a fluidized medium at a lower portion and one or more outlets for exiting regenerated catalyst, to form a cold*

regenerated catalyst having a temperature in a range of 200°C to 720°C;[4] and

reusing the cold regenerated catalyst in the riser reactor directly through a transmission channel;

wherein *the riser reactor comprises at least one reaction zone, the stripping section, and the settler;*

the catalyst cooler is connected to the riser reactor and is used to adjust reaction temperature of each reaction zone of the riser reactor, the temperature in the regenerator, or both, respectively.[5]

(Appeal Br. Claims App. (original pagination incorrect; emphases added)).

II. REJECTIONS ON APPEAL

The claims on appeal stand rejected under 35 U.S.C. § 103(a) (pre-AIA) as follows:

A. Claims 1–7, 9, 10, and 13–20 as unpatentable over Li;[6] and

B. Claims 21–23 as unpatentable over Lin in view of Roux et al.[7] ("Roux").

(Ans. 3–16; Final Act. 3–8).

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[4] The Appellant refers to these highlighted limitations as "Feature[ ]2" (Appeal Br. 10 (emphasis omitted)).

[5] The Appellant refers to these highlighted limitations as "Feature 1" (Appeal Br. 10 (emphasis omitted)).

[6] CN 1664074 A, published September 7, 2005. The Examiner relies on the Drawings in the original document and on the disclosures in the verified English language translation filed June 1, 2016 (Ans. 3).

[7] US 2011/0220548 A1, published September 15, 2011.

III. DISCUSSION

REJECTION A

1. Grouping of Claims

Unless separately argued within the meaning of 37 C.F.R. § 41.37(c)(1)(iv), the claims subject to this rejection stand or fall with claim 1, which we select as representative pursuant to the rule. Skeletal arguments based merely on what a claim recites, such as offered for claim 2 (Appeal Br. 32–33), are not arguments for separate patentability that require our separate consideration. *In re Lovin*, 652 F.3d 1349, 1357 (Fed. Cir. 2011).

2. The Examiner's Position

The Examiner finds that Li describes, or would have suggested to a person having ordinary skill in the art, all the operational steps and limitations recited in claim 1, as currently drafted, taking account of the description in the remainder of the Specification (Ans. 3–5, 9; Final Act. 4–6). As for secondary considerations of nonobviousness, the Examiner states that the entered declarations[8] in support of commercial success or unexpected results have been considered but explains that the objective evidence as a whole does not include sufficient factual showings in support of commercial success or unexpected results (Ans. 13–15; Advisory Action entered April 16, 2018; Advisory Action entered February 23, 2018).

3. The Appellant's Contentions

[8] *See* Declaration of Qunzhu Li filed March 19, 2018 ("Second Li Declaration" or "Second Li Decl."); Declaration of Qunzhu Li filed January 17, 2018 ("First Li Declaration" or "First Li Decl."); Declaration of Jinglin Gao filed October 30, 2015 ("Gao Declaration" or "Gao Decl."); Declaration of Nan Zhang filed October 30, 2015 ("Zhang Declaration" or "Zhang Decl.").

As for claim 1, the Appellant's contentions focus only on two limitations as highlighted above in reproduced claim 1—i.e., Feature 2 and Feature 1. Regarding Feature 2 (i.e., the "mixing buffer space" limitations), the Appellant acknowledges that the Specification's description "[i]n the downstream, there is a buffer space for mixed buffer catalyst," as currently recited in the Specification (Spec. 4, ll. 21–22), is "wrong or incorrect" (Appeal Br. 10). The Appellant states that the error occurred from a mistranslation of the original Chinese document and that the description should actually read "[i]n the downstream, there is a catalyst mix and buffer zone for mixing and buffering catalyst" (*id.* (emphasis omitted; citing MPEP § 2163.07)). While apologizing for the error, the Appellant argues that "mixing buffer space" in the phrase "mixing buffer space in the catalyst cooler downstream of the heat exchange element" in claim 1 should be interpreted to be "an independent space downstream of the catalyst cooler for mixing and buffering the cooled regenerated catalyst" (*id.* at 11–12 (emphasis omitted; citing published Specification ¶¶ 16–17 (Spec. 4, l. 18–5, l. 6)). Under this newly proposed interpretation, the Appellant argues that Li does not disclose or teach a "mixing buffer space" as specified in claim 1 because "there is no specific space reserved in [Li's] cooler **8A** or **8B**" and "**35A** or **35B** mentioned in Li is just a fluidizing media rather than a space" for mixing and buffering (Appeal Br. 19 (bolding added)). According to the Appellant, "Li has the same inventors and applicants as the present application" but "the reference numbers 9Aand 9B[, which]are specifically indicated in the lower part of the cooler in the description of the invention . . . are not indicated in the corresponding position of the figures of Li," thus

"indicat[ing] that there is a difference in this feature between them" (*id.* at 19–20).

The Appellant argues further that "the recited 'adjusting temperature of the cooling catalyst in a mixing buffer space' is a new special process step that distinguishes substantively and overwhelmingly over the more or less or even negligible a little bit of mixing effect existing in Li" (*id.* at 22). The Appellant argues that "those skilled in the art have always believe understand [sic] that, conventionally, the catalyst bed of the fluidized bed including an external heat exchanger (i.e. the catalyst cooler) is isothermal (i.e. temperature is uniform)" but "this is a long-standing technical prejudice, which departs from the objective fact and teaches away from the claimed 'adjusting temperature of the cooling catalyst itself in a mixing buffer space, in order to eliminate the radial temperature difference existing inherently in the catalyst cooler'" (*id.* at 23). According to the Appellant, it was "unexpectedly discovered after performing numerous experiments that a mixing buffer space arranged downstream of the catalyst cooler can effectively further mix and buffer the cooled regenerated catalyst, and thus eliminate uneven radial temperature – making the catalyst temperature more uniform, and the pressure tend to be more stable" (*id.* at 24). According to the Appellant, "Li is never aware of [a] 'radial temperature difference' problem, let alone of applying the mixing buffer space which is technical means in Chemical filed [sic] FCC fields to solve the problem" (*id.* at 24–25 (emphases omitted)).

Additionally, the Appellant argues that Li does not disclose the limitations recited in the "wherein" clause of claim 1—i.e., Feature 1 (*id.* at 10, 25–26). According to the Appellant, Li uses two catalyst coolers to

adjust the reaction temperatures of a first reaction zone and second reaction zone of a riser, respectively, whereas only one catalyst cooler is used to adjust the reaction temperature in *each* reaction of the riser reactor in the claimed invention (*id.* at 25–26).

Lastly with respect to claim 1, the Appellant contends that evidence in support of nonobviousness (e.g., declaration evidence) was not properly considered (*id.* at 33–38). For example, the Appellant alleges that, unlike the claimed invention, which achieved "great [c]ommercial [s]uccess," no one has been willing to use the process disclosed in Li since 2008 (*id.* at 37–38).

4. Opinion

We have fully considered the Appellant's arguments but find them unpersuasive to identify reversible error in the Examiner's rejection. *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011). Because we detect no reversible error in the Examiner's factual findings, analyses, and conclusions, we adopt them as our own and add the following for emphasis. *In re Cree, Inc.*, 818 F.3d 694, 698 n.2 (Fed. Cir. 2016); *In re Brana*, 51 F.3d 1560, 1564 n.13 (Fed. Cir. 1995).

"During . . . original examination, the PTO must give claims their broadest reasonable construction consistent with the specification." *In re ICON Health & Fitness, Inc.*, 496 F.3d 1374, 1379 (Fed. Cir. 2007). Thus, "we look to the specification to see if it provides a definition for claim terms, but otherwise apply a broad interpretation." *Id.* "As [our reviewing] court has discussed, this methodology produces claims with only justifiable breadth." *Id.*; *see also Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2143, 2144–45 (2016) (the broadest reasonable interpretation standard

"helps ensure precision while avoiding overly broad claims, and . . . help[s] members of the public draw useful information from the disclosed invention and better understand the lawful limits of the claim").

Applying this mode of claim interpretation, we agree with the Examiner that Li describes Features 1 and 2, as recited in claim 1. As a preliminary matter, and contrary to the Appellant's suggestion to the contrary (Appeal Br. 10–11), the Inventors represented to the PTO that they reviewed and understood the contents of the as-filed application, including the current Specification and Drawings, by filing the application including an Oath on August 1, 2012. Neither the Specification, including the claims, nor the Drawings were properly amended to correct the alleged errors in the originally-filed application.[9] Indeed, the Appellant admits as much (*id.*). As the Examiner cogently explains, the claims must be examined as currently of record and, therefore, "[a]rguments addressing claim language as . . . intended are not persuasive or relevant until an amendment reflecting such language is entered" (Ans. 9). *See In re Hiniker Co*., 150 F.3d 1362, 1369 (Fed. Cir. 1998) (The "name of the game is the claim" and unclaimed features cannot impart patentability to claims); *In re Self*, 671 F.2d 1344, 1348 (CCPA 1982) ("[The A]ppellant's arguments fail from the outset because . . . they are not based on limitations appearing in the claims.").

As the Examiner finds (Ans. 9), the Appellant does not direct us to any description in the current Specification that would constitute a special

[9] The Appellant attempted to amend the claims on January 17, 2018, which is subsequent to the Final Action, but the Advisory Action entered February 23, 2018 indicates that these amendments were denied entry as raising new issues that would require further consideration and/or search as well as the issue of new matter.

definition for the language "mixing buffer space" in claim 1. Claim 1 merely specifies that the "mixing buffer space" is located "*in the catalyst cooler* downstream of the heat exchange element" (Claims App. (emphasis added)). Although the Specification includes the phrases "[i]n the downstream, there is a buffer space for mixed buffer catalyst" and that "[t]here are one, two or more catalyst exits set in the catalyst mixed buffer space in the downstream of the described catalyst cooler" (Spec. 4, ll. 18–25; published Spec. ¶¶ 16–17), claim 1 unequivocally specifies the "mixing buffer space" as being located "in the catalyst cooler *downstream of the heat exchange element*" (Claims App. (emphasis added)), as recited above—not a space that is downstream and separate from the entire catalyst cooler as the Appellant seems to argue (Appeal Br. 11). To the extent that paragraphs 16 and 17 of Specification may somehow be understood to disclose a mixing buffer space that is in a location independent and separate from the catalyst cooler, such a feature is not recited in claim 1, and, therefore, constitutes an unclaimed embodiment. The Drawings (e.g., Fig. 2 above), which show mixing buffer spaces **9A** and **9B** to be located *within* catalyst coolers **8A** and **8B** *downstream of the heat exchangers*, confirm the Examiner's interpretation. As neither claim 1 nor the Specification places any structural limitations (e.g., volumetric size) for the "mixing buffer space," we interpret the "mixing buffer space" to read on *any* volume of space that is downstream of the heat exchanger but within the catalyst cooler, whereby the cooled catalyst is mixed with the other materials and buffered to *any* degree.

Thus, under the broadest reasonable interpretation of the claim language (Feature 2) consistent with the remainder of the Specification and

Drawings, we find that Li describes Feature 2. Specifically, Li's Figure 1 (reference numerals descriptions added) is reproduced as follows:

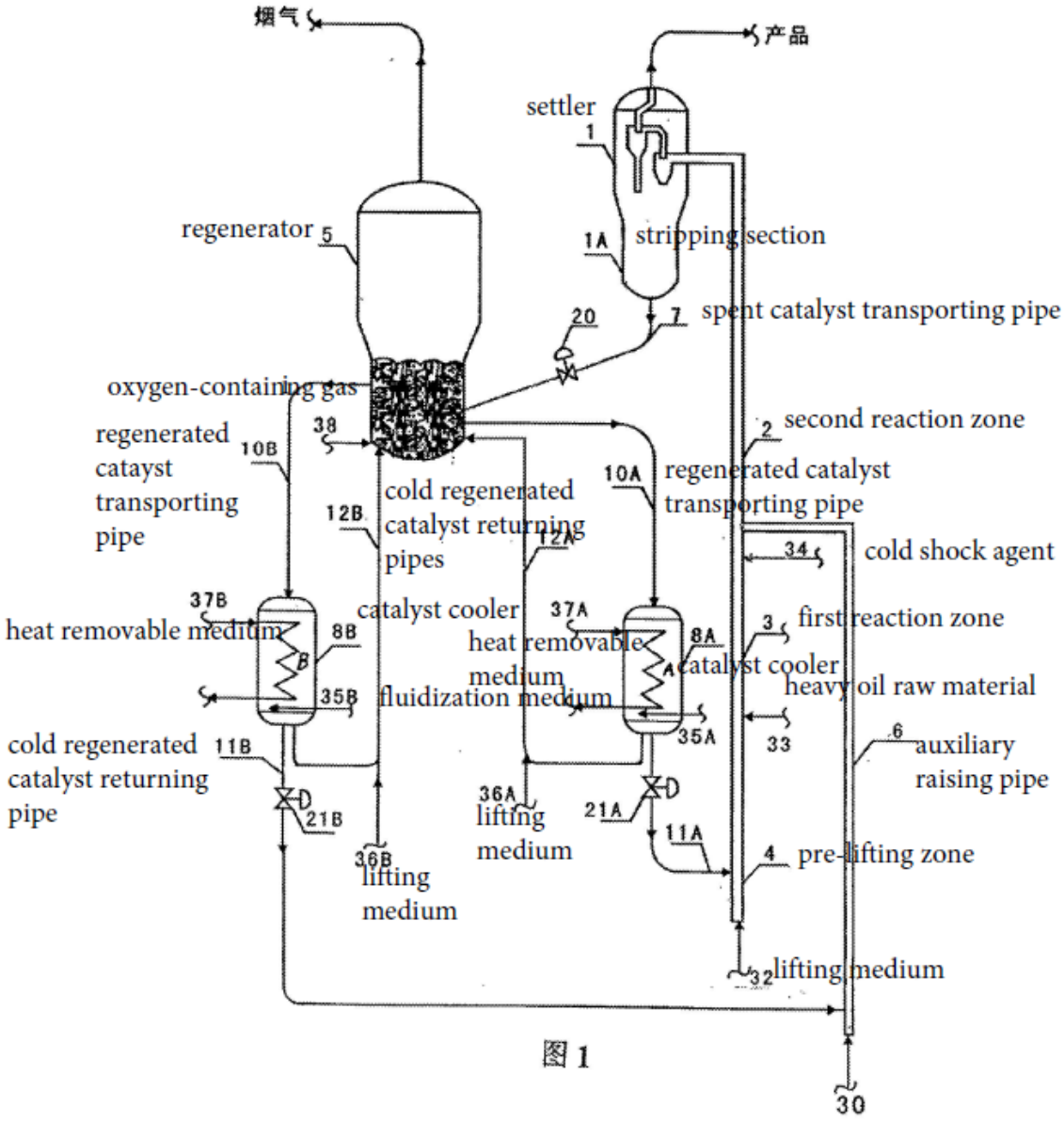

图 1

Li's Figure 1 above, shows, *inter alia*, two catalyst coolers **8A** and **8B** with respective units that convey heat removable media **37A** and **37B** and respective inlets for fluidization media **35A** and **35B** near the outlets for the catalyst coolers **8A** and **8B** (Li 18–21). Each of the spaces in Li's catalyst coolers **8A** and **8B** defined by the locations downstream of the heat

exchangers but before the outlets may properly be considered as a "mixing buffer space," as recited in claim 1. That Li (with the same inventive entity as in the current application) did not use the same reference numerals **9A** and **9B**, as in Figure 1 of the application, to identify the mixing buffer spaces is not dispositive (Appeal Br. 19–20). That is so because, e.g., Li also did not specifically identify the burner or combustor **5A** within regenerator **5**, even though Li teaches explicitly that coke is burned (i.e., combusted) in the regenerator (Li at 2). Therefore, we discern no reversible error in the Examiner's finding that Li describes a "mixing buffer space in the catalyst cooler downstream of the heat exchange element," as required by claim 1.

We are unpersuaded by the Appellant's argument that "Li neither teaches nor suggests 'adjusting temperature of the cooling catalyst in a mixing buffer space to obtain the uniform and stable temperature,' as claimed" (Appeal Br. 13). The quoted language is not recited in claim 1, which instead recites: "adjusting a temperature of the cooling catalyst in a mixing buffer space in the catalyst cooler downstream of the heat exchange element . . . to form a cold regenerated catalyst having a temperature in a range of 200°C to 720°C" (Claims App.). As the Examiner finds (Ans. 3), Li teaches cooling the regenerated catalyst to a temperature of 200–720°C in the catalyst cooler (Li at 3).

The Appellant's argument (Appeal Br. 13–14) that Feature 2 solves a problem or that the prior art would have taught away from it is inapposite because Li discloses Feature 2. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 420 (2007) ("The first error of the Court of Appeals in this case was to foreclose this reasoning by holding that courts and patent examiners should look only to the problem the patentee was trying to solve."); *cf. Celeritas*

Techs., Ltd. v. Rockwell Int'l Corp., 150 F.3d 1354, 1361 (Fed. Cir. 1998) ("[T]he question whether a reference 'teaches away' from the invention is inapplicable to an anticipation analysis.").

In this regard, although the Appellant refers to several declarations in a rather skeletal and conclusory fashion (*see, e.g.,* Appeal Br. 14), such references are insufficient because, as the Examiner explains (Ans. 13) and as we discussed above, Li teaches the limitations on which the Appellant relies as critical or significant. *In re Kao,* 639 F.3d 1057, 1068 (Fed. Cir. 2011) ("[T]here is a more fundamental requirement that must be met before secondary considerations can carry the day. 'For objective evidence of secondary considerations to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the *claimed invention*.'") (internal citation omitted); *In re Baxter Travenol Labs.*, 952 F.2d 388, 392 (Fed. Cir. 1991) ("[W]hen unexpected results are used as evidence of nonobviousness, the results must be shown to be unexpected compared with the closest prior art . . . Mere recognition of latent properties in the prior art does not render nonobvious an otherwise known invention.").

To the extent that the Appellant can substantiate that "[n]o one is willing to utilize the solution of [Li] since 2008," whereas a total of 15 commercial units were successfully implemented from 2008–2014 (Second Li Decl. at 4 (emphasis removed)), such would merely demonstrate that something falling within the scope of claim 1 suffers from the same deficiencies as Li's method or system. Moreover, such conclusory statements in the declaration are entitled to little probative value as they are not accompanied by detailed comparisons and discussions as to what are being compared. *Cf. In re Borkowski*, 505 F.2d 713, 718 (CCPA 1974)

("The affidavits for the most part consist of vague and general statements in the broadest terms as to what the exhibits show along with the assertion that the exhibits describe a reduction to practice. This amounts essentially to mere pleading, unsupported by proof or showing of facts."); *In re Lindner*, 457 F.2d 506, 508 (CCPA 1972) ("[M]ere conclusory statements in the specification and affidavits are entitled to little weight when the Patent Office questions the efficacy of those statements.").

With respect to Feature 1, we find no merit in the Appellant's position that Li lacks a teaching of this feature. Contrary to the Appellant's erroneous belief (Appeal Br. 26), claim 1 does not limit the method to a single catalyst cooler. Although claim 1 states that "the catalyst cooler is connected to the riser and is used to adjust reaction temperature of each reaction zone of the riser reactor, the temperature in the regenerator, ***or*** both" (Claims App. (emphasis added)), the catalyst cooler need not be *directly* connected to the riser reactor and need not adjust the temperature of each reaction zone of the riser reactor by virtue of the conjunction "or." Instead, the claim broadly encompasses a catalyst cooler that is directly connected to, e.g., the regenerator only, the riser reactor only, or both and adjusts the temperature in the regenerator and only one of the reaction zones in the riser reactor (e.g., Li, Fig. 1, catalyst cooler **8B**). In any event, Li teaches a catalyst cooler that is directly connected to the riser reactor and, from a thermodynamics standpoint, necessarily adjusts the temperatures of each reaction zone in the riser reactor (*id.* Fig. 1, catalyst cooler **8A**, the outlet of which is connected to the riser reactor somewhere upstream of the first reaction zone **3** in a manner indistinguishable from that shown in Figure 2 of the current application).

Relying on the Specification (published Spec. ¶¶ 59–60; Spec. 12, ll. 16–19), the Appellant argues that Feature 1 provides advantages such as increased processing capacity (Appeal Br. 30). This argument is misplaced because Li teaches Feature 1. Moreover, the Appellant offers no direct and fair comparison between the claimed method and Li's method. In this regard, we are in complete agreement with the Examiner's assessment (Ans. 14–15).

As for separately argued claims 6 and 16, the Appellant argues that Li uses single-parameter adjustment of the catalyst-to-oil ratio to realize the control of reaction temperature (Appeal Br. 38). We agree with the Examiner's findings, which we adopt as our own (Ans. 16). Li does in fact adjust the ratio of the amount of regenerated catalyst mixture that enters the riser reactor to the feed of the hydrocarbon materials (e.g., Li at 4).

REJECTION B

The Appellant does not offer any additional arguments for claims 21–23 (Appeal Br. 39). Therefore, we uphold Rejection B for the same reasons discussed above.

For these reasons, and those well-stated by the Examiner, we uphold the Examiner's rejections.

IV. CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–7, 9, 10, 13–20	103(a)	Li	1–7, 9, 10, 13–20	
21–23	103(a)	Li, Roux	21–23	
Overall Outcome			1–7, 9, 10, 13–23	

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