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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte FRANK REISS, ULRICH ORTH, and
HOLGER HUITENGA

Appeal 2018-009227
Application 13/509,329
Technology Center 3700

Before STEFAN STAICOVICI, JAMES P. CALVE, and
JEREMY M. PLENZLER, *Administrative Patent Judges*.

CALVE, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the decision of the Examiner to reject claims 11–14, 16–26, and 29–31. Appeal Br. 3.

We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ “Appellant” refers to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies MAN Diesel & Turbo SE as the real party in interest. *See* Appeal Br. 1.

CLAIMED SUBJECT MATTER

Claim 11, the sole independent claim, is reproduced below.

11. A burner for a turbine comprising:
 - a flame tube (10) defining a combustion space (11);
 - a casing (20) enclosing said flame tube (10) from radially outward at a predetermined distance from said flame tube (10) and forming an oxidant collection chamber (21) between said flame tube (10) and said casing (20);
 - a burner bottom (30) bounding said oxidant collection chamber (21) and said combustion space (11) at an axial end of said burner;
 - a swirler (40) arranged axially between said flame tube (10) and said burner bottom (30) axially adjoining said burner bottom (30) and radially adjoining said oxidant collection chamber (21) for supplying a fuel-oxidant mixture into said combustion space (11), said swirler (40) comprising a plurality of guide vanes (41) extending from the burner bottom (30) of the swirler and arranged at a circumferential distance from one another along a circumferential direction (UR) of said burner so that the respective distances between said guide vanes (41) form a plurality of radial inlet passages (42) to said combustion space (11), said radial inlet passages having a tangential component along its path;
 - a single fuel supply pipe (43a, 43b, 43c, 43d) provided in the burner bottom (30) of each respective inlet flow region of at least some of said inlet passages (42), said fuel supply pipe (43a, 43b, 43c, 43d) having a length and extending lengthwise through said respective inlet passage (42) in an axial direction (AR) of said burner and traverse to an oxidant flow direction (OR), and wherein each fuel supply pipe (43a, 43b, 43c, 43d) comprises a wall having at least one fuel output opening (44, 45) radial to said fuel supply pipe (43a, 43b, 43c, 43d) for mixing fuel (BS) into said respective inlet passage (42) with a directional component extending transverse to the oxidant flow direction (OR),
 - wherein at least one of said fuel supply pipes (43d) is arranged off-center in the burner bottom (30) of said respective

inlet passage (42) with respect to a center longitudinal axis (L)
of said respective inlet passage (42).

REJECTIONS

Claims 11–14, 16–26, and 29–31 are rejected under 35 U.S.C. § 112,
second paragraph, as being indefinite.

Claims 11–14, 16–18, 20, 22–26, 29, and 30 are rejected under
35 U.S.C. § 103(a) as unpatentable over Kesseli (US 5,450,724, iss. Sept.
19, 1995) and Milosavljevic (WO 2009/121780 A1, pub. Oct. 8, 2009).

Claim 19 is rejected under 35 U.S.C. § 103(a) as unpatentable over
Kesseli, Milosavljevic, and Puri (US 6,094,916, iss. Aug. 1, 2000).

Claim 20 is rejected under 35 U.S.C. § 103(a) as unpatentable over
Kesseli, Milosavljevic, and Corr, II (US 7,093,445 B2, iss. Aug. 22, 2006)
(hereinafter “Corr”).

Claim 21 is rejected under 35 U.S.C. § 103(a) as unpatentable over
Kesseli, Milosavljevic, Corr, and ELKady (US 2008/0163627 A1, pub. July
10, 2008).

Claim 31 is rejected under 35 U.S.C. § 103(a) as unpatentable over
Kesseli, Milosavljevic, and Rokke (US 6,609,376 B2, iss. Aug. 26, 2003).

Claims 11–14, 16–18, 20, 22–26, 29, and 30 are rejected under
35 U.S.C. § 103(a) as unpatentable over Kesseli and Lam (US 8,484,979 B2,
iss. July 16, 2013).

Claim 19 is rejected under 35 U.S.C. § 103(a) as unpatentable over
Kesseli, Lam, and Puri.

Claim 20 is rejected under 35 U.S.C. § 103(a) as unpatentable over
Kesseli, Lam, and Corr.

Claim 21 is rejected under 35 U.S.C. § 103(a) as unpatentable over Kesseli, Lam, Corr, and ELKady.

Claim 31 is rejected under 35 U.S.C. § 103(a) as unpatentable over Kesseli, Lam, and Rokke.

ANALYSIS

Claims 11–14, 16–26, and 29–31 for Indefiniteness.

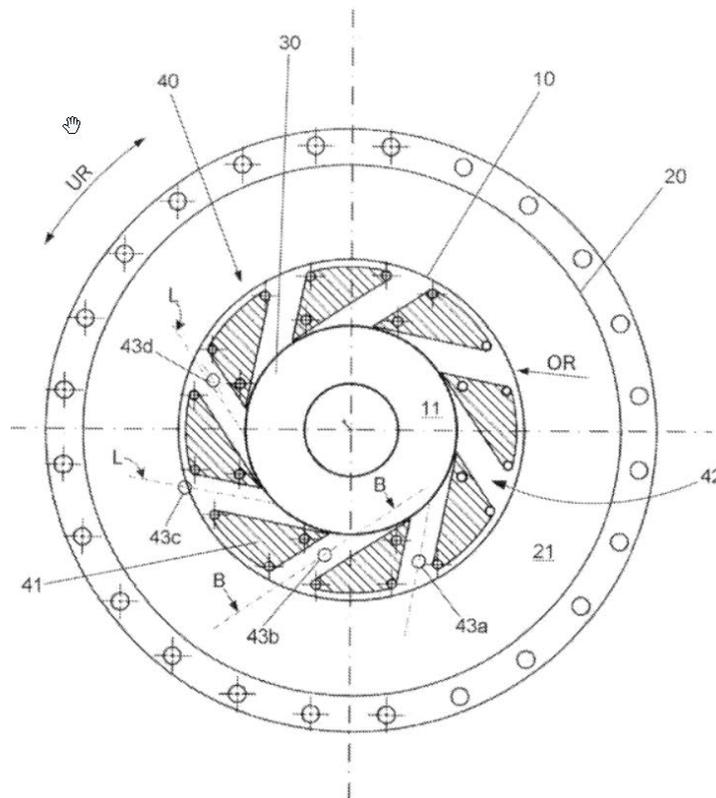
The Examiner determines that the limitation “wherein at least one of said fuel supply pipes (43d) is arranged off-center in the burner bottom (30) of said respective inlet passage (42) with respect to a center longitudinal axis (L) of said respective inlet passage (42)” renders claim 11 indefinite because “off-center” is a relative term that is undefined by the claim. Final Act. 3. The Examiner finds that the Specification lacks guidance as to how far the fuel supply pipe must be from the center longitudinal axis to be “off-center.” *Id.* at 4. The Examiner reasons that manufacturing tolerances may place a fuel supply pipe off-center, but the Specification does not indicate whether a manufacturing tolerance makes the fuel pipe “off-center.” *Id.* at 4–6. The Examiner also finds it is unclear whether “off-center” is measured relative to a center point or to the outer perimeter of the fuel pipe. *Id.* at 6, 8.

Appellant argues that “off-center” means “[n]ot centered; offset,” and the claims and Specification make clear that “off-center” in the inlet passage is measured relative to a center longitudinal axis (L) as shown in Figure 2. Appeal Br. 6–7. Appellant argues that a fuel supply pipe that is off-center due to a manufacturing tolerance “is not the same as purposefully arranging the fuel supply pipes off-center” as claimed. *Id.* at 5 (“‘off-center’ is used to mean arranged specifically off the center line, including engineering tolerances.”).

“[R]elative terminology in claim language, including terms of degree, does not automatically render the claim indefinite.” MPEP § 2173.05(b) (9th ed. rev. 08.2017 Jan. 2018). “Acceptability of the claim language depends on whether one of ordinary skill in the art would understand what is claimed, in light of the specification.” *Id.*

Here, claim 11 requires “at least one of said fuel supply pipes (43d) is arranged off-center . . . of said respective inlet passage (42) with respect to a center longitudinal axis (L) of said respective inlet passage (42).” Appeal Br. 3 (Claims App.).² Thus, “off-center” is determined in relation to a center longitudinal axis (L) of a respective inlet passage according to claim 11.

Appellant’s Figure 2, reproduced below, illustrates this relationship.



² Citations to the Claims Appendix are to Appeal Brief filed April 20, 2018. All other citations to the Appeal Brief refer to the Appeal Brief filed March 29, 2018.

Appellant's Figure 2 above is a schematic sectional view of a portion of the burner. *Id.* at 6:6–7. The Specification discloses that the “fuel supply pipes 43a, 43b, 43c can be arranged centrally in the respective inlet passages 42 with respect to center longitudinal axes L of the respective inlet passages 42.” Spec. 7:27–29. In addition, “one or more or all of the fuel supply pipes 43d can also be arranged off-center in the respective inlet passages 42 with respect to center longitudinal axes L thereof.” *Id.* at 7:30–31.

Figure 2 illustrates *centrally arranged* fuel pipes 43a, 43b, 43c being centered on and bisected by longitudinal axis L. However, *off-center* fuel pipe 43d is not centered on or bisected by longitudinal axis L. Its circular cross-sectional area is divided into unequal portions by longitudinal axis L. Unlike centrally arranged fuel pipes 43a, 43b, 43c, the center of off-center fuel pipe 43d is offset from center longitudinal axis L in inlet passage 42.

Claim 11 requires the fuel supply pipe(s) to be “arranged off-center.” As Appellant argues, an ordinary meanings of “arrange” includes “to put into a proper order or into a correct or suitable sequence, relationship, or adjustment,” “to move and organize (things) into a particular order or position,” “to give a particular order or position to the parts of (something).” Appeal Br. 6 (citing <http://www.merriam-webster.com/dictionary/arrange>).

This meaning is consistent with the Specification, which discloses that the fuel supply pipes are arranged centrally or off-center in inlet passages 42 with respect to a center longitudinal axis L of each inlet passage 42. Spec. 7:27–31. These disclosures require “off-center” fuel pipes to be positioned with their centers offset from a center longitudinal axis L of an inlet passage. Fuel pipe 43b is described as being *arranged* off-center in passage 42 from axis L rather than as being offset due to a manufacturing tolerance. *Id.*

All three conditions illustrated by the Examiner (Final Act. 8; Ans. 4) would be considered “off-center” under this interpretation because none of the fuel supply pipes are centered on the inlet passage longitudinal axes. None of their circular cross-sections are bisected by any of the axes either.

The Examiner is correct that the Specification does not indicate how far a fuel supply pipe has to be from the center longitudinal axis to be “off-center.” *See* Final Act. 4–5. However, merely claiming broadly does not render a claim indefinite as long as its meaning is clear. *See In re Gardner*, 427 F.2d 786, 788 (CCPA 1970) (“Breadth is not indefiniteness.”).

Thus, we do not sustain this rejection.

*Claims 11–14, 16–18, 20, 22–26, 29, and 30
Rejected over Kesseli and Milosavljevic*

Regarding claim 11, the Examiner finds that Kesseli teaches a burner with a single fuel supply pipe 63, 64 in the burner bottom of each inlet flow region 67 of at least some inlet passages (mixing channels 61) but does not teach at least one fuel supply pipes is arranged off-center in inlet passage 61. Final Act. 12–13. The Examiner relies on Milosavljevic to teach a burner with fuel supply pipe 15 arranged off-center to a center longitudinal axis of the inlet passage formed by the adjacent swirler guide vanes 3a. *Id.* at 13.

The Examiner determines that it would have been obvious to a skilled artisan to modify Kesseli’s single fuel supply pipe to be off-center as taught by Milosavljevic to facilitate ultra-low emissions by efficiently mixing the fuel and air mixture and thereby avoid high temperature regions caused by fuel rich areas and concentration gradients at the flame front as taught by Milosavljevic. *Id.* at 13–14. The Examiner illustrates these findings with annotations on Figure 7b of Milosavljevic, reproduced below.

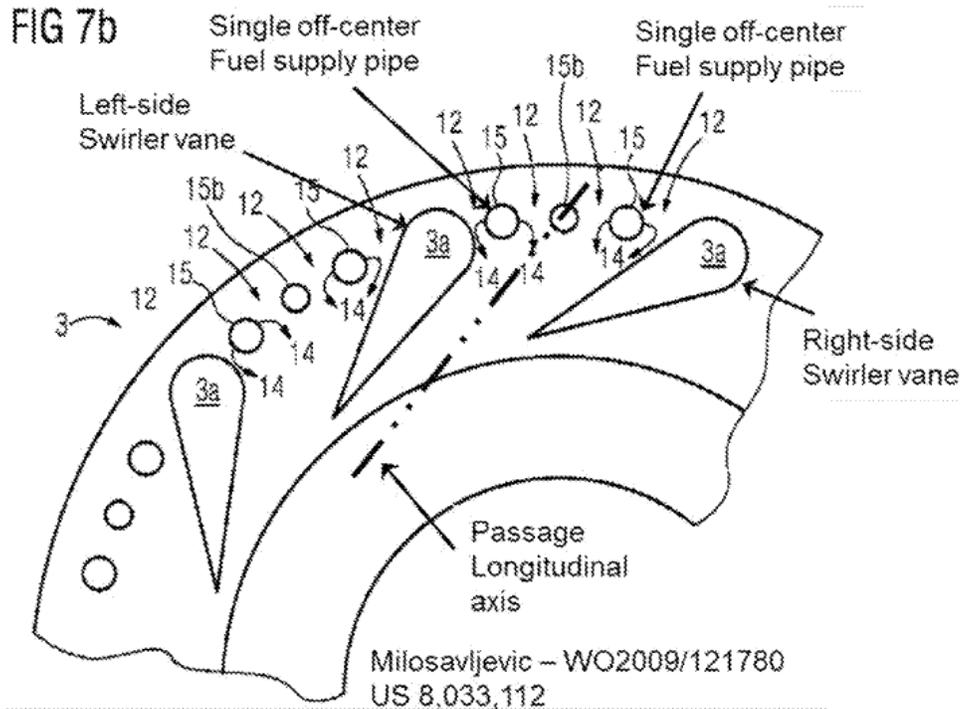


Figure 7b above illustrates two fuel tubes 15 arranged on each side of mixing rod 15b in an inlet passage formed by swirler wings 3a. Fuel tubes 15, 15 are placed so the air mass flow is constant through each passage. Milosavljevic, 19:23–31. The Examiner annotates the off-center fuel pipes.

The Examiner finds that Kesseli teaches a single fuel supply pipe in the fuel inlet flow region in the burner bottom as claimed (Ans. 8–9) and reasons it would have been obvious to modify the single fuel supply pipe of Kesseli in view of Milosavljevic’s teaching of one off-center fuel supply pipe to the left of the passage longitudinal axis or one off-center fuel supply pipe to the right of the passage longitudinal axis (*id.* at 10). The Examiner concludes that the combined teachings of Kesseli and Milosavljevic suggest to a skilled artisan to arrange Kesseli’s single fuel supply pipe at a location that is off-center in the burner bottom with respect to a center longitudinal axis of the inlet passage as recited in claim 11. *Id.* at 13.

Appellant argues that neither reference arranges a single fuel supply pipe in a single inlet passage at a location that is off-center with respect to a center longitudinal axis of that inlet passage as claimed. *See* Appeal Br. 9. Appellant argues that Milosavljevic uses two fuel tubes 15, 15 with a single mixing rod 15b in each inlet passage, and Milosavljevic would not function as intended if it was modified to use a *single* fuel supply pipe as claimed. *Id.* at 11; Reply Br. 4. As a result, Appellant argues that a skilled artisan would combine two fuel tubes and a mixing rod in each channel of Kesseli rather than a single off-center rod per channel as claimed. *Id.* at 11; Reply Br. 4.

The Examiner is correct that Kesseli teaches a single fuel supply pipe 63 arranged in each inlet passage 61. We also understand the Examiner to rely on teachings of Milosavljevic to modify Kesseli's teaching of a single fuel supply pipe in each inlet passage. However, we are not persuaded that a skilled artisan would have been motivated to arrange Kesseli's single fuel supply pipe "off-center" as claimed based on Milosavljevic's teachings.

The Examiner is correct that Milosavljevic teaches the arrangement in Figure 7b provides efficient mixing via multiple injection points from fuel tubes 15 and "perfect premixing" of gaseous fuel and air can achieve ultra-low emissions. Milosavljevic, 8:21–26, 19:23–26; Final Act. 13 (citing *id.*). However, a skilled artisan would understand the teachings of Milosavljevic in this regard to apply to the arrangement of one fuel tube 15 on each side of mixing rod 15 in each inlet passage. *See* Milosavljevic, 19:23–29. We are not persuaded that the benefits taught in Milosavljevic can be achieved with a single fuel supply pipe arranged off-center in an inlet passage as claimed. Therefore, we are not persuaded that a skilled artisan would have been motivated to arrange Kesseli's single pipe to be off-center as claimed.

Rather, we agree with Appellant that a skilled artisan who desired to achieve the benefits taught in Milosavljevic would modify Kesseli to use the arrangement taught by Milosavljevic as needed to premix fuel and air better, namely two fuel tubes 15, 15 and mixing rod 12. As illustrated in Figure 7b above, fuel tubes 15, 15 and mixing rod 12 are centered in the inlet passage formed by adjacent swirler wings 3a, 3a. Furthermore, fuel tubes 15, 15 are placed between mixing rod 12 and a respective swirler wing 3a, 3a. We find no teaching or suggestion in Milosavljevic to arrange a single fuel pipe off-center in an inlet passage as claimed. Thus, we are not persuaded that a skilled artisan would have been motivated to arrange Kesseli's single fuel pipe off-center in an inlet passage, by itself, based on Milosavljevic's teachings to arrange mixing rod 12 in the center of an inlet passage with fuel tubes 15 arranged between mixing rod 12 and a respective swirler wing 3a.

Thus, we do not sustain the rejection of claim 11 or claims 12–14, 16–26, and 29–31, which depend therefrom.

Dependent Claims 19–21 and 31

The Examiner's reliance on Puri, Corr, ELKady, or Rokke to teach the respective features of claims 19–21 and 31 does not cure the deficiency of Kesseli and Milosavljevic described above as to claim 11. Thus, we do not sustain the rejections of these claims.

*Claims 11–14, 16–18, 20, 22–26, 29, and 30
Rejected over Kesseli and Lam*

Appellant argues the rejection of claims 11–14, 16–18, 20, 22–26, 29, and 30 as a group. *See* Appeal Br. 11–13. We select independent claim 11 as the representative claim. *See* 37 C.F.R. § 41.37(c)(1)(iv). Accordingly, claims 12–14, 16–18, 20, 22–26, 29, and 30 stand or fall with claim 11.

The Examiner finds that the drawings of Lam reasonably disclose and suggest to a skilled artisan that at least one fuel supply opening (5 or 6) is arranged off-center in the burner bottom of a respective inlet passage with respect to a center longitudinal axis of the inlet passage as indicated by the Examiner's annotations on Figure 1, as reproduced above. Ans. 13–15, 17–19, 21–22. The Examiner determines that it would have been obvious to a skilled artisan to substitute at least one off-center fuel supply opening of Lam for at least one fuel supply opening of Kesseli with no change in their respective functions to yield predictable results, namely, to supply fuel to a respective fuel supply pipe that would spray the fuel into the inlet passage to mix with the flow of oxidant forming a fuel-air mixture. Final Act. 24–25.

Appellant argues that Figure 1 of Lam is diagrammatic and not to scale so no teaching about the orientation of the components can be garnered from the drawings except what is disclosed in the Lam's disclosure about the drawings. Appeal Br. 11–12. Appellant also argues that “[t]here is nothing in Lam expressly teaching or suggesting that the fuel injection openings 5, 6 are arranged off-center in a respective channel.” *Id.* at 12. Appellant further argues in the Reply Brief that Lam describes fuel injection openings 5, 6 as identical from a design-engineering point of view but labelled with different reference numbers to indicate their respective group membership in the fuel-air premixing arrangement. Reply Br. 5.

The Examiner has the better position. It is well-settled that drawings in a utility or design patent can be cited against claims of a utility patent application. *See In re Aslanian*, 590 F.2d 911, 913–14 (CCPA 1979). Prior art teachings to include the drawings are evaluated on the basis of what they reasonably disclose and suggest to a skilled artisan. *Id.* at 914.

Furthermore, “a claimed invention may be anticipated or rendered obvious by a drawing in a reference, whether the drawing disclosure be accidental or intentional.” *In re Meng*, 492 F.2d 843, 847 (CCPA 1974) (citation omitted); *Aslanian*, 590 F.2d at 914 (holding “a drawing in a utility patent can be cited against the claims of a utility patent application even though the feature shown in the drawing was unintended or unexplained in the specification of the reference patent.”); *In re Mraz*, 455 F.2d 1069, 1072 (CCPA 1972) (“[W]e did not mean that things patent drawings show clearly are to be *disregarded*.”).

Lam teaches that “fuel injection openings 5, 6 are arranged in these swirler passages 4.” Lam, 4:22–23. Figure 1 of Lam, reproduced above with Examiner annotations, illustrates the claimed arrangement of a single fuel pipe 5/6 in each fuel inlet passage (swirler passage 4) with some fuel supply pipes 5, 6 arranged off-center. In response, Appellant argues that Figure 1 is diagrammatic/not to scale and cannot be relied on to teach any orientation of the components apart from what is described in the specification of Lam. Appeal Br. 11–12.

Appellant is correct that patent drawings cannot be relied on to teach precise proportions of elements or particular sizes if the specification is completely silent on the issue. *Id.* at 12 (quoting *Hockerson-Halberstadt, Inc. v. Avia Grp. Int’l*, 222 F.3d 951, 956 (Fed. Cir. 2000)). However, the Examiner is not relying on Figure 1 of Lam to teach precise proportions or particular sizes of claimed elements. The Examiner relies on Figure 1 of Lam to teach fuel supply pipes arranged off-center as claimed. Figure 1 of Lam illustrates several fuel pipe openings 5, 6 as off-center in passage 4 to the extent that some pipe openings almost touch a *wall* of passage 4.

Appellant's disclosure describes the claimed off-center fuel supply pipes similarly. Appellant's Figure 2, reproduced above, is "a *schematic* cross-sectional view of a portion of the burner." Spec. 6:6–7 (emphasis added). Appellant's Figure 2 illustrates "off-center" fuel supply pipe 43d as closer to one side wall of radial inlet passage 42 than to the other side wall.

Lam describes Figure 1 as illustrating a typical swirler 1 with fuel injection openings 5, 6, "arranged in these swirler passages 4." Lam, 4:15–23. Figure 1 of Lam illustrates some fuel outlets 5, 6 arranged off-center in swirler inlet passages 4 as the Examiner identifies with annotations of "Off-center Fuel outlets" on Figure 1 of Lam as reproduced above. The off-center fuel outlets are illustrated in the same manner as the claimed off-center fuel supply pipe 43d, namely, the "off-center" fuel outlets are closer to one side wall of swirler passage 4 than to the other. Some fuel outlets 5, 6 almost touch a side wall of swirler passage 4 as indicated in Figure 1 of Lam above.

Lam discloses that "[i]n FIG. 1, the fuel injection openings 5 and 6, although identical from a design-engineering point of view, are labelled with different reference numbers, indicating their different respective group membership in the fuel-air premixing arrangement 11." *Id.* at 4:31–35. This teaching relates to the fact that fuel injection openings 5 receive fuel via rail 16, which is controlled by valve 14, whereas fuel openings 6 receive fuel via rail 17 unimpeded. Lam, 4:41–52. This teaching indicates that fuel injection openings 5, 6 have the same configuration, but it does not address how fuel openings 5, 6 are arranged in swirler passages 4.

Even if we consider the off-center arrangements of fuel openings 5, 6 illustrated in Figure 1 of Lam to be unexplained or unintended, Figure 1 still clearly shows fuel pipes arranged off-center as claimed.

A skilled artisan would understand Figure 1 of Lam to teach fuel openings 5, 6 that may be arranged centrally or arranged off-center as claimed. Appellant has not identified any teaching in Lam that requires fuel openings 5, 6 to be centered in swirler passages 4. We find none.

Accordingly, for the foregoing reasons, we sustain the rejection of claim 11 and claims 12–14, 16–18, 20, 22–26, 29, and 30, which fall with claim 11.

Rejections of Dependent Claims 19–21 and 31

Appellant does not present arguments for the rejections of claims 19–21 and 31 apart from their dependence from claim 11. *See* Appeal Br. 12. This argument is not persuasive in view of our affirmance of the rejection of claim 11, and we sustain the rejection of these claims as well.

CONCLUSION

In summary

Claims Rejected	35 U.S.C. §	Reference/Basis	Affirmed	Reversed
11–14, 16–26, 29–31	112, para. 2	Indefiniteness		11–14, 16–26, 29–31
11–14, 16–18, 20, 22–26, 29, 30	103(a)	Kesseli, Milosavljevic		11–14, 16–18, 20, 22–26, 29, 30
19	103(a)	Kesseli, Milosavljevic, Puri		19
20	103(a)	Kesseli, Milosavljevic, Corr		20
21	103(a)	Kesseli, Milosavljevic, ELKady		21

Claims Rejected	35 U.S.C. §	Reference/Basis	Affirmed	Reversed
31	103(a)	Kesseli, Milosavljevic, Rokke		31
11-14, 16-18, 20, 22-26, 29, 30	103(a)	Kesseli, Lam	11-14, 16-18, 20, 22-26, 29, 30	
19	103(a)	Kesseli, Lam, Puri	19	
20	103(a)	Kesseli, Lam, Corr	20	
21	103(a)	Kesseli, Lam, Corr, ELKady	21	
31	103(a)	Kesseli, Lam, Rokke	31	
Overall Outcome			11-14, 16-26, 29-31	

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

AFFIRMED