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SHELL OIL COMPANY P O BOX 576 HOUSTON, TX 77001-0576			SUE-AKO, ANDREW B.	
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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* ERNESTO RAFAEL FONSECA OCAMPOS,  
CLAUDIA JANE HACKBARTH, ARTHUR HERMAN HALE,  
MAURICIO JOSE FARINAS MOYA,  
GUY LODE MAGDA MARIA VERBIST, BENJAMIN MOWAD, and  
PRASAD BALOO KERKAR

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Appeal 2019-005412  
Application 15/156,833  
Technology Center 3600

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Before BIBHU R. MOHANTY, MICHAEL C. ASTORINO, and  
KENNETH G. SCHOPFER, *Administrative Patent Judges*.

SCHOPFER, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant<sup>1</sup> appeals from the Examiner's decision to reject claims 1, 4, 5, and 8–12. We have jurisdiction under 35 U.S.C. § 6(b). We REVERSE.

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<sup>1</sup> We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as Shell Oil Company. Appeal Br. 1.

## BACKGROUND

The Specification discloses that “the invention relates to a method of treating a subterranean formation using a mortar slurry including cementitious material, water, and aggregates and optionally admixtures and/or additives.” Spec. ¶ 2.

## ILLUSTRATIVE CLAIM

Claim 1 is the only independent claim on appeal and recites:

1. A method of treating a subterranean formation, comprising:

preparing a mortar slurry designed to set to form a mortar with a compressive strength between 12 MPa and 84 MPa and that is also below a fracture closure pressure of the subterranean formation, the mortar slurry comprising a cementitious material and water;

injecting the mortar slurry into the subterranean formation at a pressure sufficient to create a fracture in the subterranean formation;

while maintaining a pressure higher than the fracture closure pressure, allowing the mortar slurry to set, forming the mortar in the fracture;

reducing the pressure below the fracture closure pressure;

allowing the mortar in the fracture to crack, forming a set cracked mortar; and

inducing additional permeability in the set cracked mortar by applying a pulse of pressure provided by a compressible gas or water [to] the fracture.

Appeal Br. 10.

## REJECTION

The Examiner rejects claims 1, 4, 5, and 8–12 under 35 U.S.C. § 103 as unpatentable over Fonseca<sup>2</sup> in view of Kaminsky.<sup>3</sup>

## DISCUSSION

As discussed below, we are persuaded of error in the Examiner’s reasoning in the rejection of claim 1.

With respect to claim 1, the Examiner finds that Fonseca discloses a method for treating a subterranean formation including preparing a mortar slurry; injecting the mortar slurry into a subterranean formation to create a fracture; allowing the slurry to set while maintaining a pressure above the fracture closure pressure; reducing the pressure below the fracture closure pressure; and allowing the fracture to crack, forming a set cracked mortar. Final Act. 2–3 (citing Fonseca ¶¶ 13, 14, 19, 42–46). The Examiner also finds that:

Fonseca describes some means of additional cracking, e.g., application of formation stress and slurry components that shrink or expand ([0011]). Fonseca also analogizes the mortar to proppant (e.g., [0016] “the mortar may crack while remaining in place and serving as a proppant” and [0030] “conventional proppant material may be added to the mortar slurry”).

*Id.* at 3. The Examiner also finds that “Fonseca does not describe reopening the fracture.” *Id.* The Examiner then relies on Kaminsky as teaching “a method of re-opening/re-fracturing a propped fracture (abstract)” that includes a first injecting step and a second injecting step using “slick water; carbon dioxide; propane; nitrogen; etc.” that “takes advantage of the flow

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<sup>2</sup> Fonseca et al., US 2013/0341024 A1, pub. Dec. 26, 2013.

<sup>3</sup> Kaminsky et al., US 2013/0306315 A1, pub. Nov. 21, 2013.

paths created in the first injecting step to re-open the fracture.” *Id.* at 3–4 (citing Kaminsky ¶ 18). The Examiner determines:

Therefore, it would have been obvious to one having ordinary skill in the art before the effective filing date of the claimed invention to have modified Fonseca to include re-opening/re-fracturing the fracture with a second fracturing fluid comprising slick water; carbon dioxide; propane; nitrogen; etc., as in Kaminsky, in order to “[take] advantage of the flow paths created in the first injecting step” and produce a narrower second fracture that is “better able to retain proppant in a well-distributed manner when pressure is released from the formation” and benefit from “the volume of proppant needed to fill the fracture is reduced over that of a wide fracture, thereby reducing overall cost.”

*Id.* at 4 (citing Kaminsky ¶ 116). The Examiner also determines that the combination would result in inducing additional permeability in the set cracked mortar of Fonseca because “Kaminsky teaches ‘applying a pulse of pressure provided by a compressible gas or water to the fracture,’ and Fonseca provides evidence that Kaminsky’s re-opening/re-fracturing step would necessarily ‘[induce] additional permeability in the set cracked mortar,’ similar to the formation stress or to the components that shrink/grow (Fonseca [0011]).” *Id.*

The key to supporting a conclusion of obviousness under 35 U.S.C. § 103 is the clear articulation of a reason why the claimed invention would have been obvious. The Court in *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) indicated that the analysis supporting a rejection under 35 U.S.C. § 103 should be made explicit. The Federal Circuit has stated that “rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of

obviousness.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006), *cited with approval in KSR*, 550 U.S. at 418.

Here, we determine that none of the proposed reasons provided by the Examiner amount to a sufficient articulated reason with rational underpinning to support the conclusion that the claimed method would have been obvious. As an initial matter, we note that the Examiner’s findings are problematic to the extent that the Examiner finds that “Fonseca does not describe reopening the fracture.” Final Act. 3. This finding indicates that the Examiner is interpreting the claim to require the reopening of a fracture. However, the claim does not appear to require that the pulse of pressure is used to reopen a fracture. Rather, we agree with Appellant that claim 1 provides a method in which “the pulse of pressure provided by the compressed gas or water is provided to an open fracture containing a cracked mortar,” i.e., the fracture is open and remains open because of the cracked mortar therein. Appeal Br. 8. Further, although we agree with the Examiner that Fonseca does not describe reopening a fracture, Fonseca does not describe doing so because Fonseca does not contemplate the fracture closing, much like the claimed fracture. Fonseca discloses using a mortar slurry to create a fracture and then allowing the mortar slurry to set and crack within the fracture. *See* Fonseca ¶ 5. Fonseca also discloses that as the mortar hardens, the fracture remains open. *Id.* ¶ 7. Thus, Fonseca does not contemplate reopening a fracture because the set mortar prevents the fracture from closing.

Based on the Examiner’s finding that “Fonseca does not describe reopening the fracture,” the Examiner relies on Kaminsky as teaching a method of reopening a fracture. *See* Final Act. 3–4. And the reasoning

relied upon by the Examiner relates only to a method of reopening a fracture. *Id.* at 4. Yet, the Examiner does not explain adequately how Kaminsky's method and stated advantages might be related to a method of inducing additional permeability in a cracked set mortar within a fracture that is already open. To the extent the Examiner determines that the combination would have been obvious to take advantage of flow paths created by a first injecting step, any advantage obtained by Kaminsky's method appears to relate to a second injecting step that occurs after a fracture is allowed to "substantially close." *See* Kaminsky ¶¶ 17, 18. It is not clear, without further explanation, how or whether such an advantage would be obtained by introducing a second injecting step into an open fracture with a set cracked mortar therein. Similarly, the proposed reasoning that the modification would produce a narrower second fracture that is better able to retain proppant and reduce the volume of proppant required relates to advantages of introducing a second injecting step to open a substantially closed fracture, and the Examiner does not explain adequately how this reasoning would apply with respect to the addition of a second injecting step into an open fracture with a set cracked mortar therein. *See* Kaminsky ¶ 116. In short, Kaminsky discloses methods, and advantages thereof, related to creating a second fracture in a substantially closed first fracture; the Examiner relies on such advantages to support the conclusion of obviousness; and the Examiner does not explain adequately how this reasoning would apply to a situation in which the fracture is not closed and instead remains open with a set cracked mortar therein.

Based on the foregoing, we determine that the Examiner has not set forth an adequate reason to support the conclusion that claim 1 would have

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been obvious over Fonseca in view of Kaminsky. Accordingly, we do not sustain the rejection of claim 1. With respect to the rejection of the remaining claims, the Examiner does not provide any further evidence or reasoning that cures the deficiency in the rejection of claim 1. Thus, we also do not sustain the rejection of dependent claims 4, 5, and 8–12.

### CONCLUSION

We REVERSE the rejection of claims 1, 4, 5, and 8–12.

In summary:

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
1, 4, 5, 8–12	103	Fonseca, Kaminsky		1, 4, 5, 8–12

REVERSED