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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 BENJAMIN MOSELEY

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Appeal 2019-004611
Application 14/994,295
Technology Center 2800

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Before KAREN M. HASTINGS, MICHAEL G. McMANUS, and
JANE E. INGLESE, *Administrative Patent Judges*.

McMANUS, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant[1] seeks review of the
Examiner's decision to reject claims 1–15. We have jurisdiction under
35 U.S.C. § 6(b).

We affirm.

CLAIMED SUBJECT MATTER

The present application generally relates to seismic exploration and seismic imaging. Specification filed Jan. 13, 2016 ("Spec.") ¶ 2. The Specification indicates that "seismic exploration is the seismic survey through which data representative of a subterranean formation is acquired." *Id.* ¶ 3. This may include imparting a signal into a subterranean formation where it interacts with various structural features of the subterranean formation. The signal is reflected to the surface where it is recorded and analyzed to yield information regarding the structure of the subterranean formation. *Id.* ¶ 4.

The Specification teaches that "[m]arine seismic surveys suffer from a phenomenon known as 'ghost reflections' that cause some data to be canceled from the record of the survey." *Id.* ¶ 5. A ghost signal arises in a marine environment where a part of a signal propagates upward through the water and is then reflected downward at the water's surface. *Id.* ¶ 6. This reflected signal "will enter the ground, propagate through the subterranean formation, and be returned back to the seismic receivers a short time after the first arrival of the primary seismic signal. That is, it is a ghost of the primary seismic signal." *Id.* This is called a "source side" ghost reflection. *Id.* ¶ 8. In addition, the primary seismic signal, returning toward the sensors after reflection by the subterranean formation, may be further reflected by the water's surface and propagate toward the formation a second time yielding a second ghost reflection. *Id.* ¶ 7. This is called a "receiver side" ghost reflection. *Id.* ¶ 8.

It is desirable to improve the quality of seismic data by removing the ghost effect. *Id.* ¶ 9. The Specification teaches that "[t]he presently disclosed technique offers broadband processing that can be used in the post-stack domain with a 1 D model-based approach that may be called Stack Ghost Suppression ('SGS')." *Id.* ¶ 29. The Specification teaches that the "SGS workflow model" may be expressed as a particular equation (Equation 3) where the amplitude and phase components are separated across two separate values rather than being aggregated together. *Id.* ¶ 30. The Specification additionally teaches that "[t]he filter is the model as described above into which selected values for one or more of the parameters r_{amp}, r_{ph}, and f_n have been assigned. The filter compensates for amplitude due to the presence of the ghost reflection separately from the phase." *Id.* ¶ 42.

Claims 1 and 13 are illustrative of the subject matter on appeal and is reproduced below with certain language bolded for emphasis:

1. A method, comprising:

designing a filter for suppressing the effect of a ghost reflection in a set of stacked, marine seismic data representative of a subterranean formation, **the filter compensating for amplitude due to the presence of the ghost reflection separately from the phase due to the presence of the ghost reflection**, the designing including:

iteratively defining at least one parameter of the filter and applying the defined filter to the seismic data;

evaluating each iteration of the filter's application to at least a subset of the seismic data; and

selecting a defined filter from one of the evaluated iterations; and applying the filter to the seismic data to suppress the effect of ghost reflection.

13. A computer-implemented process, comprising:

accessing a set of stacked, marine seismic data;

receiving at least one input parameter to a one-dimensional model of a ghost reflection, **the model separating the amplitude and the phase of the ghost reflection**;

applying the model using the input parameter to the seismic data to suppress the ghost reflection;

iterating the receipt of the input parameter and the application of the model;

receiving a selection for one of the input parameters from the iterative application of the model; and

applying the model using the selected input parameter to the seismic data to suppress the ghost reflection;

wherein the accessing, the applying, and the iterating, are performed by a processor.

Appeal Br. 15 (Claims App.) (emphasis added).

REFERENCES

The Examiner relies upon the following prior art:

Name	Reference	Date
Parkes et al. ("Parkes")	US 2013/0201791 A1	Aug. 8, 2013
Fletcher et al. ("Fletcher")[2]	US 2013/0107665 Al	May 2, 2013

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[2] The Examiner does not specifically rely on Fletcher in concluding that claims 1–15 are obvious over Parkes. The Examiner cites Fletcher as "pertinent to applicant's disclosure." Final Act. 13.

DISCUSSION

The Examiner rejects claims 1–15 under 35 U.S.C. § 103 as being unpatentable over Parkes. Final Action dated May 21, 2018 ("Final Act.") 5–10.[3]

In support of the rejection of claim 1, the Examiner finds that Parkes teaches "applying the filter to the seismic data to suppress the effect of ghost reflection (¶ 0031: correct for the phase- and/or amplitude-spectrum)." *Id.* at 6. The Examiner further finds that

> [a]lthough Parkes does not explicitly teach the filter compensating for amplitude due to the presence of the ghost reflection separately from the phase due to the presence of the ghost reflection, Parkes does teach the filter compensates for the amplitude and phase (¶ 0039), and further teaches separately correcting for phase effects (¶ 0040).

Id. In view of the foregoing, the Examiner determines that one of skill in the art would have had reason "to configure the process taught by Parkes to further comprise compensating for amplitude separately from the phase, as a means to provide the separate phase processing taught by Parkes (¶ 0040)." *Id.* The Examiner makes similar findings with regard to independent claim 13. *Id.* at 8–9.

Appellant argues that the rejection is in error. Appeal Br. 11–13 (arguing claims collectively). Appellant contends that, "while Parkes teaches one embodiment that compensates solely for phase, in the embodiment where it compensates for both amplitude and phase it teaches

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[3] In the Final Action, the Examiner rejected claims 1–15 under 35 U.S.C. § 101 as directed to ineligible subject matter. Final Act. 2–5. This rejection was withdrawn in the Examiner's Answer. Answer 3.

that such compensation occurs at the same time." *Id.* at 12. Accordingly, Appellant argues, the filter of Parkes does not compensate for amplitude separately from phase. *Id.*

In regard to the Examiner's stated reason to modify the teachings of Parkes, Appellant states that "the Office infers a suggestion of separately compensating for amplitude and phase as recited in the claims from Parkes embodiment in which he compensates solely for phase." *Id.* at 13. Appellant argues that "Parkes actually discloses an embodiment that compensates for both amplitude and phase and it does not do so separately. There consequently is no legitimate reason to infer such a suggest[ion] other than to read on Applicants' claims." *Id.*

In the Answer, the Examiner asserts that independent claims 1 and 13 do not require separating the reflection parameter (r) into amplitude (r_{amp}) and phase (r_{ph}) components. Examiner's Answer dated March 19, 2019 ("Answer") 4. The Examiner additionally finds that "Parkes discloses a de-signature filter with phase compensation (time shift of one set of sub-source seismic data) separate from amplitude compensation (two sets of sub-sources are subtracted)." *Id.* As a result, the Examiner determines that "this embodiment of Parkes includes two separate steps, one for phase correction of a seismic data sub-set, and one for summing two sub-sets of the seismic data for amplitude correction." *Id.*

Claim 1 requires "a filter for suppressing the effect of a ghost reflection . . . the filter **compensating for amplitude** due to the presence of the ghost reflection **separately from the phase** due to the presence of the ghost reflection." Appeal Br. 15 (Claims App.) (emphasis added). We first

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consider the claim limitation requiring "compensating for amplitude . . . separately from the phase."

In this regard, the Specification teaches an embodiment where "the ghost reflection coefficients r_{amp} and r_{ph} and the ghost reflection frequency, f_n, **can be set independently**." Spec. ¶ 35 (emphasis added). The Specification further teaches that "one aspect of the presently disclosed technique is that it can control the amplitude and phase of the ghost reflection in the filter design separately. Figure 3A and Figure 3B illustrate this separate control." Spec. ¶ 50. Figures 3A and 3B are reproduced below.
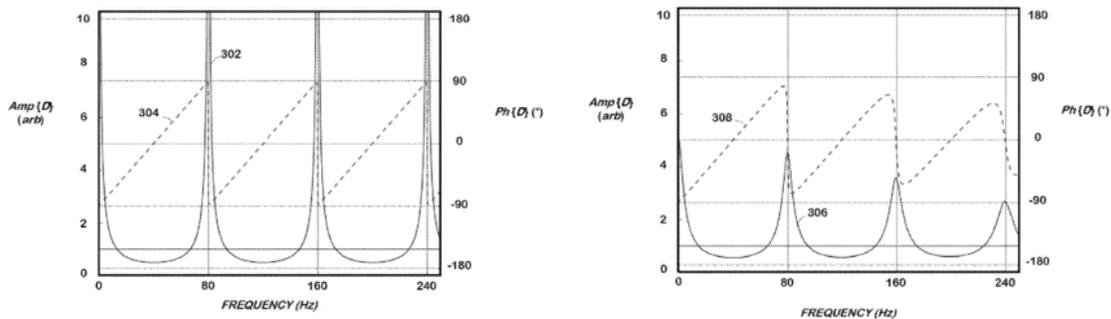
The Specification teaches that "Figure 3A plots the amplitude 302 and the phase 304 of a filter obtained using Eq. (1), which is a filter known to the art. Figure 3B plots the amplitude 306 and the phase 308 of a filter obtained using Eq. (3)." *Id.* The Specification additionally teaches that "[t]he post-stack SGS operator used in Figure 3B achieves stability by both accounting for notch diversity and allowing the user to **separately reduce and vary the strength of the amplitude and phase corrections** in the 1 D operator design." *Id.* ¶ 51 (emphasis added).

Based on the foregoing, we determine that claim 1's limitation of "compensating for amplitude . . . separately from the phase" requires that the values be determined independently such that compensation for one does not directly affect the value of the other.

In the Answer, the Examiner finds that Parkes' teaching of the "time shift of one set of sub-source seismic data" satisfies the phase compensation limitation. Answer 4. The Examiner further finds that Parkes' teaching that "two sets of sub-sources are subtracted" satisfies the amplitude compensation limitation. *Id.* Accordingly, the Examiner finds that the "compensating for amplitude . . . separately from the phase" limitation is met. The Examiner further finds, in the context of designing a designature filter, that Parkes teaches to "correct for the phase- and/or amplitude-spectrum." *Id.* (citing Parkes ¶ 31).

In its Reply Brief, Appellant argues that "Parkes uses two steps because it uses two different filters-one solely for amplitude and one solely for phase." Reply Brief dated May 17, 2019 ("Reply Br."), 4. Appellant, however, does not cite to evidence that specifically supports such assertion. *Id.* Nor is such support apparent from review of Parkes. Nor does Appellant offer a proposed construction of the term "filter." Accordingly, Appellant has not shown error in this regard.

Appellant additionally argues that "Parkes applies the two separate filters to two separate data sets." *Id.* Again, Appellant does not cite to evidence that specifically supports such assertion nor is it apparent from review of Parkes. Nor does Appellant offer briefing regarding the specific requirements of the limitation "suppressing the effect of a ghost reflection in a set of stacked, marine seismic data representative of a subterranean

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formation." *Id.* (citing claim 1). Accordingly, Appellant has not shown error in this regard.

Appellant additionally makes certain general allegations of error (*see* Reply Br. 5) but does not offer sufficient support for such allegations to present an issue for appeal. *See* 37 C.F.R. § 41.37(c)(1)(iv) ("the brief shall contain . . . . The arguments of appellant with respect to each ground of rejection, and the basis therefor, with citations of the statutes, regulations, authorities, and parts of the Record relied on. The arguments shall explain why the examiner erred as to each ground of rejection contested by appellant.").

CONCLUSION

The Examiner's rejection is affirmed.

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–15	103	Parkes	1–15	

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