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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte CHARLIE JING and DENNIS E. WILLEN

Appeal 2019-000934
Application 14/165,326
Technology Center 2100

Before MIRIAM L. QUINN, DANIEL N. FISHMAN, and JON M. JURGOVAN, *Administrative Patent Judges.*

QUINN, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1–20. *See* Final Act. 1. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

[1] 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 ExxonMobil Upstream Research Company. Appeal Br. 2.

CLAIMED SUBJECT MATTER

The claims are directed to an inversion of geophysical data on computer system having parallel processors. Claim 1, reproduced below, is illustrative of the claimed subject matter:

> l. A method for efficient use of a computing system of parallel processors to update a geophysical model, the method comprising:
>
> assigning at least one control processor to control sequence of operations and to reduce load imbalance between the processors, and
>
> assigning a first dedicated processor group of one or more processors to update one or more model parameters in the geophysical model;
>
> assigning a second dedicated processor group of one or more processors to simulate forward modeling simulated data; and
>
> performing an iterative geophysical model optimization, wherein each iteration comprises:
>
> generating simulated measurement data from the geophysical model with the second dedicated processor group;
>
> comparing the simulated measurement data to measured data; and
>
> updating, with the first dedicated processor group, one or more model parameters of the geophysical model to lessen misfit based on the comparing,
>
> wherein the at least one control processor dynamically balances processing load resulting from the iterative geophysical model optimization across the first dedicated processor group and the second dedicated processor group.

Appeal Br. 12 (Claim Appendix).

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Wang	US 5,991,695	Nov. 23, 1999
Carazzone	US 7,808,420 B2	Oct. 5, 2010

REJECTION

Claims 1–20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Wang and Carazzone.

OPINION

This appeal presents one dispositive issue: whether the Examiner erred in determining that the combination of Wang and Carazzone teaches "a first dedicated processor group" and "a second dedicated processor group," as recited in claim 1, and similarly recited in claims 13 and 14 (argued together with claim 1). We therefore decide the appeal for this rejection based on claim 1. *See* 37 C.F.R. § 41.37(c)(1)(iv).

Having reviewed the Examiner's rejections in light of Appellant's arguments, as presented in the Appeal Brief and Reply Brief, we are persuaded that the Examiner has erred as Appellant alleges.

Claim 1 requires two groups of processors, each group dedicated to performing a particular function. For instance, the "first dedicated processor group" is assigned "to update one or more model parameters in the geophysical model" (hereinafter referred to as the "updating task") and the "second dedicated processor group" is assigned "to simulate forward modeling [of] simulated data" (hereinafter referred to as the "simulation task"). These groups of processors are "dedicated" to performing the recited functions during an interactive process. For example, the claim requires that

the second dedicated group of processors group perform the simulation tasks, and then the first dedicated group of processors perform the updating task based on a comparison of the output of the simulation with measured data. Appellant argues that the combination of Wang and Carazzone does not teach these groups of processors dedicated as recited to perform the required tasks. We are persuaded by Appellant's argument.

The Examiner relies on Wang, either alone or in combination with Carazzone, as teaching the two groups of processor. We discuss each of these positions below.

Analysis of Wang, Alone

The Examiner finds that Wang alone teaches the two processor groups. For instance, the Examiner states that naming the groups as first or second "show[s] that the two groups [of processors] are performing different tasks independently." Ans. 3. The Examiner therefore finds that Wang discloses "multiple groups [of processors] . . . performing at least an initial simulation assigned to a second group of processors . . . as claimed." *Id.* (internal citations omitted). According to the Examiner, Wang teaches the second dedicated group of processors, which is assigned to perform the simulation tasks, and also teaches a first dedicated group of processors to update a model. *Id*. We do not agree.

Wang describes an initial simulation process at column 9, lines 2–4 and 18–20 (cited by the Examiner). The initial simulation process, as Appellant correctly notes, is performed in one of Wang's processor groups and for the purpose of determining how many processors in each group are needed to carry out the actual traveltime calculations. Reply Br. 3 (citing Wang, 9:10–18, 25–32). This description of the initial simulation in column

9 yields two factual determinations regarding Wang's assignment of groups of processors. First, Wang's groups of processors, which are not assigned to the initial simulation, perform no other task. Second, when Wang completes the initial simulation, all of Wang's groups of processors perform traveltime calculations, i.e., simulation tasks. *See* Ans. 4 (stating that Wang teaches at one point assigning the second group of processors for simulation tasks, pointing to Wang's disclosure of the initial simulation process which performs the traveltime calculations). Notwithstanding these facts, the Examiner states that "it appears Wang . . . also discloses updated one or more model parameters" because Wang describes performing a Schneider process. *Id.* at 3–4 (citing Wang, 11:14–16). The Examiner, however, does not explain which or how any processor group, separate and distinct from the second processor group performing the simulation tasks, would perform in Wang the updating task alleged to be performed by executing the Schneider process. That is, even if Wang suggests performing an updating task, which is not entirely clear from the Examiner's explanation of Wang, all the Wang processors are actually programmed to perform the simulation, i.e., traveltime calculation (using the Schneider process). *See* Wang, 11:14–16 ("The process of calculating traveltimes in each [processing element] is discussed with reference to FIG. 3, which follows the steps given by Schneider.").

The Examiner has not shown that Wang assigns to any *other* processor group the updating tasks. And, as Appellant correctly notes, Wang does not teach or suggest dividing different tasks among different processor groups. Appeal Br. 7; Reply Br. 3. Therefore, we are persuaded by Appellant's argument that Wang alone does not teach or suggest the "first

dedicated processor group" and the "second dedicated processor group" as claimed.

Analysis of Wang in Combination with Carazzone

The Examiner states that "for clarity," he relies on Carazzone in combination with Wang. Ans. 4. In particular, the Examiner states that Carazzone discloses assigning a dedicated group of processors, i.e., M processors shown in Figure 1, item 13 of Carazzone, as performing the updating task because Carazzone describes adjusting parameters to reduce misfit between data. *Id.* (citing Carazzone, Fig. 1, 7:24–31, 8:22–24). The Examiner further states that Wang and Carazzone are "analogous arts that teach performing computations and organizing operations on a system of parallel processors." *Id.* Therefore, the Examiner finds that the first and second groups of processors are "general purpose processors as no details of specific processors are claimed," that Wang "teaches at one point assigning [a] second group of processors for simulation tasks," and that "it would have been obvious to use the other (first) group[] of processors for updating the parameters as shown by the second reference (Carazzone et al) . . . ." *Id.* (citations omitted). Thus, according to these findings, Carazzone contributes the teaching of using a group of processors for updating tasks, which would have been obvious to assign to a group of processors in Wang. This combination of teachings, however, is erroneous.

As Appellant argues, and we agree, "Wang makes no such reservation of dedicated processor groups to tasks other than traveltime calculations." Reply Br. 4. Both Wang and Carazzone describe groups of processors performing certain tasks, but both Wang and Carazzone assign the same task to the groups of processors. As stated above, Wang assigns the traveltime

calculations to all of its groups of processors, notwithstanding that it performs an initial simulation of the traveltime calculation for the purpose of determining how many processors to assign to each group. Wang, 9:1–32. Carazzone is no different. Each of Carazzone's groups of processors, referred to as a "bank" of processors, performs Maxwell's equations for a particular data slice. Carazzone, 7:24–27 ("This requires N banks with M processors per bank, which must be arrayed physically and provided with communication, each bank being programmed to solve Maxwell's equations."). Thus, we agree with Appellant that there is no dividing of tasks among Carazzone's groups of processors because Carazzone teaches that each bank performs the same simulation task, albeit on a particular data slice, and computes the total error misfit contribution for the data slice. Reply Br. 4; Carazzone, 7:51–54.

With neither Wang nor Carazzone teaching or suggesting two groups of processors each performing a different task, a person of ordinary skill in the art would not have reason to either modify Wang or Carazzone to perform the assignment of tasks to different processor groups or to combine the teachings to result in the claimed groups of processors. It is not enough to state that the processors are general purpose processors. Ans. 4. Such a statement fails to show *why*, having two references where all the processor groups are assigned the same calculations, a person of ordinary skill in the art would dedicate one group of processors to an assigned task of performing simulations, while another group of processors is dedicated to updating the model after the simulation reveals a misfit. Indeed, Carazzone's teachings support the contrary, because each of Carazzone's groups of processors

performs the simulation *and* also the misfit calculation. *See* Carazzone, 7:51–54.

Accordingly, we are persuaded that the Examiner erred in finding that Wang, alone, or in combination with Carazzone, teaches or suggests the recited "first dedicated processor group" and "second dedicated processor group," as recited.

CONCLUSION

For the above-stated reasons, we do not sustain the Examiner's rejection of claims 1–20 over Wang and Carazzone.

DECISION SUMMARY

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–20	103(a)	Wang and Carazzone		1–20

REVERSED