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Marshall, Gerstein & Borun LLP (Emerson)
233 South Wacker Drive
6300 Willis Tower
Chicago, IL 60606

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte XU CHENG, RICHARD W. KEPHART, CHENG TAO WEN, and B. ERIK YDSTIE

Appeal 2015-007545
Application 12/628,821
Technology Center 2100

Before JOHN A. JEFFERY, BRADLEY W. BAUMEISTER, and DENISE M. POTHIER, *Administrative Patent Judges*.

BAUMEISTER, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's Final Action rejecting claims 1–7, 11–17, 25–29, and 33–35. Claims 8–10, 18–24, and 30–32 are objected to as being dependent upon a rejected base claim but would otherwise be allowable if rewritten in independent form to include all of the limitations of the base claims and any intervening claims.

We reverse.

STATEMENT OF THE CASE

Claims 1–6, 11–16, 25–27, 29, and 33–35 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Blevins (US 7,110,835 B2; issued Sept. 19, 2006) and Itou Akio et al., *EJX910 Multivariable Transmitter*, Yokogawa Technical Report English Edition, No. 42 (2006) ("Itou"). Final Act. 8–14.[1]

Claims 7, 17, and 28 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Blevins, Itou, and Fabricius S.M.O, et al., *Modelica Library for Hybrid Simulation of Mass Flow in Process Plants,* in Proc. of the 2d Int'l Modelica Conf., 225–34 (Mar. 18, 2002) ("Fabricius"). Final Act. 15.

We have jurisdiction under 35 U.S.C. § 6(b). We review the appealed rejections for error based upon the issues identified by Appellants, and in light of the arguments and evidence produced thereon. *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential).

SUMMARY OF THE INVENTION

Appellants' invention simulates a physical plant through which mass flows. Spec ¶ 14. One embodiment simulates a plant element using information from downstream elements. *Id.* ¶ 47. Successive simulation cycles use this downstream feedback to create a more accurate overall simulation. *Id.*

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[1] Throughout this opinion, we refer to (1) the Final Action mailed November 6, 2014 ("Final Act."); (2) the Appeal Brief filed March 11, 2015 ("App. Br."); (3) the Examiner's Answer mailed July 2, 2015 ("Ans."); and (4) the Reply Brief filed August 11, 2015 ("Reply Br.").

Independent claim 1, reproduced below with our emphasis, is illustrative:

> 1. A distributed simulation system for simulating the operation of a set of physical plant elements through which mass flows, comprising:
>
> a computer network including a plurality of drops and a communication network that communicatively couples the plurality of drops, wherein each of the plurality of drops includes a processor; and
>
> a multiplicity of processor implemented simulation modules, each of the multiplicity of simulation modules including a process model that models the operation of a different one of the physical plant elements,
>
> wherein a first one of the simulation modules is an upstream simulation module located in a first drop of the plurality of drops that models the operation of a first one of the set of physical plant elements and a second one of the simulation modules is a downstream simulation module located in a second drop of the plurality of drops different from the first drop that models the operation of a second one of the set of physical plant elements disposed downstream of the first one of the set of physical plant elements;
>
> *wherein the downstream simulation module operates via a processor to communicate a value of a process variable calculated by the downstream simulation module to the upstream simulation module, and the process model of the upstream simulation module operates via a processor to use the value of the process variable calculated by the downstream simulation module to produce an output associated with the operation of the physical plant element modeled by the upstream simulation module*, so that the upstream and downstream simulation modules communicate calculated process variable information between one another to perform simulation of mass flow between the first physical plant element and the second physical plant element.

SUMMARY

In the Final Action, the Examiner finds that Blevins does not teach a downstream simulation module communicating a calculated variable to an upstream simulation module that uses that variable. Final Act. 8–10. In the Answer, however, the Examiner changes the thrust of this rejection by making additional findings regarding communications between Blevins's modules. *See* Ans. 5–7 (citing Blevins, Fig. 8; col. 29, l. 66–col. 30, l. 5). In particular, the Examiner makes new findings, which concern Blevins's Figure 8. *Compare* Ans. 6–7 *with* Final Act. 8–10 (citing neither Figure 8 nor the corresponding description in columns 29 or 30). In the Reply Brief, Appellants rebut these new findings. Reply Br. 6–8.

Although these two rationales are not designated as separate grounds of rejection, we nevertheless separately address the Examiner's reasoning in the Final Action (Final Act. 8–10) and the Answer (Ans. 5–7).

THE FINAL ACTION'S OBVIOUSNESS REJECTION OVER BLEVINS AND ITOU

Contentions

In the Final Action, the Examiner finds that Blevins teaches every recited element of claim 1 except a downstream simulation module communicating a calculated variable to an upstream simulation module. Final Act. 9. In concluding that claim 1 would have been obvious, the Examiner finds that Itou teaches this limitation. *Id.* at 9–10. According to the Examiner, Itou's EJXMVTool corresponds to the recited upstream simulation module, and Itou's EJX910 transmitter corresponds to the recited downstream simulation module. Ans. 10–11. The Examiner finds that

Itou's EJX910 transmitter has a simulation module. *Id.* at 7 (citing Itou 16). The results of Itou's mass-flow calculations (Ans. 8–9), in the Examiner's view, are verified by the EJX910 transmitter (downstream) and incorporated at the EJXMVTool (upstream). *Id.* at 11.

Appellants contend that Itou lacks upstream and downstream modules that communicate in the manner recited in claim 1. App. Br. 13–14; Reply Br. 3–9. In Appellants' view, Itou's EJX910 transmitter (the Examiner-mapped downstream module) calculates the mass-flow rate using measured quantities and parameters. App. Br. 13; Reply Br. 4. But according to Appellants, Itou's EJX910 transmitter is a measurement system that does not simulate anything. Reply Br. 4. Moreover, Appellants argue that the EJXMVTool (the Examiner-mapped upstream module) simulates the EJX910 transmitter, not a different physical element, as claimed. *Id.* Accordingly, in Appellants' view, Itou lacks a module simulating a downstream element and communicating a value to an upstream module to be used in the simulation of a different physical-plant element. *Id.* at 9.

Analysis

Claim 1 expressly imposes two relevant requirements. First, the recited downstream module communicates a value to an upstream simulation module (i.e., "the downstream simulation module operates via a processor to communicate a value of a process variable calculated by the downstream simulation module to the upstream simulation module.") Second, the recited upstream and downstream simulation modules must model the operation of different physical-plant elements (i.e., "each of the multiplicity of simulation modules including a process model that models the operation of a different one of the physical plant elements.") We are persuaded by Appellants'

contention that the Examiner, in the Final Action, has not shown that it would have been obvious to perform a communication that satisfies both of these requirements. *See* App. Br. 13–14; Reply Br. 3–9.

For instance, the Examiner has not shown that the cited *simulated* flow-rate calculations or any other process model are performed by the EJX910 transmitter—i.e., the Examiner-mapped downstream module. *See* Ans. 10 (quoting Itou 16). Rather, Itou attributes the simulated calculations to the EJXMVTool—i.e., the Examiner-mapped upstream module. *See* Itou 15–16. Whereas Itou's EJXMVTool simulates mass-flow rate calculations (*id.* at 16, item (7)), Itou's EJX910 transmitter calculates mass-flow rates from actual measurements (*id.* at 14).

On this record, we agree with Appellants that the EJXMVTool simulates the EJX910's calculation, instead of a downstream simulation communicating values to another different simulation upstream, as claimed. *See* Reply Br. 4. That is, the Examiner has shown only that Itou simulates, at most, one process—not two different processes that communicate from downstream to upstream. *See id.*

To be sure, the EJXMVTool and EJX910 transmitter exchange data. *Accord* Ans. 11, *citing* Itou, Fig. 6. For example, Itou's EJX910 transmitter calculates mass-flow rate using parameters downloaded from the EJXMVTool and is part of the mass flow rate measurement system, as stated and shown in Figure 4. Itou 14. Itou's EJXMVTool creates files and reports from parameters sent from the EJX910 transmitter as well as downloads these files to the transmitter. *Id.* at 15. But the Examiner has not shown that this exchange is between two simulations of different elements, as claimed (e.g., the recited process models of an upstream simulation module and a

downstream simulation module, each module modeling the operation of a different physical plant element). *See* Final Act. 9–10; Ans. 10–11. At best, Itou teaches "the sensor inputs in Figure 9 [are] applied as simulated inputs." Itou 15, Fig. 9. Although the Examiner cites to this figure in passing (Ans. 10), the Examiner has not elaborated sufficiently to establish that one sensor input is from the downstream simulation module. *See id.*; *see also* Final Act. 9–10.

Rather, Itou's communication outputs involve parameters for the same mass flow calculation, but with two different inputs—one simulated (Itou 16, item (7)) and another based on actual measurement (*id.* at 14). Additionally, the Examiner focuses on the upstream and downstream pressure of a single element (e.g., an orifice) and not different elements, as recited. Ans. 8 (stating "EJX910 measures the difference between the upstream and downstream pressure of the orifice in the process.") Accordingly, we are persuaded that the Examiner erred in finding that Itou teaches a downstream simulation module communicating a calculated variable to an upstream simulation module for use in its simulation (Final Act. 9).

Accordingly, we will not sustain the Examiner's rejection of claim 1 (*id.* at 8–10). Nor do we sustain the rejections of claims 2–6, 11–16, 25–27, 29, and 33–35, which are based on the Examiner's rationale for claim 1 (*see id*. at 8–14).

THE ANSWER'S UNDESIGNATED NEW GROUND OF REJECTION

Contentions

In the Answer, the Examiner cites Blevins's Figure 8[2] in responding to Appellants' arguments against claim 1's rejection. *See* Ans. 5–7 (citing Blevins, Fig. 8; col. 29, l. 66–col. 30, l. 5). For example, the Examiner quotes Blevins's discussion of process module 202 communicating with a control module 200. Ans. 7.

In response to these findings, Appellants argue that Blevins's control module 200 is not a simulation module. Reply Br. 6–7 (citing Blevins, col. 29, l. 66–col. 30, l. 5). According to Appellants, Blevins's control module performs actual control of the same physical element simulated by the process module (the Examiner-mapped simulation module). Reply Br. 7. So in Appellants' view, the Blevins-Itou combination still lacks a downstream simulation module "to communicate a value of a process variable calculated by the downstream simulation module to the upstream simulation module" to be used in the upstream simulation, as recited in claim 1. *Id.*

Analysis

We are persuaded by Appellants' argument (*id.*) that the Examiner has not shown Blevins's downstream simulation element communicates a value to an upstream module that, in turn, uses it in a different simulation of a different physical plant element.

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[2] Blevins's Figure 8 labels element 202 as "CONTROL MODULE." But the corresponding description calls it the "process module." *See* Blevins, col. 29, l. 66–col. 30, l. 5. Consistent with this description (*id.*), we understand Blevins's element 202 to be the process module.

As the Examiner points out, Blevins's *upstream* elements communicate values to *downstream* elements. *See* Blevins col. 26, ll. 1–24, *quoted in* Ans. 6; *accord* Ans. 7. But here, the Examiner does not identify a *downstream* element communicating values to one *upstream*. *See* Ans. 7. Although Blevins system can connect elements in various ways (*see* Blevins col. 25, ll. 3–28), the Examiner does not identify the recited downstream-to-upstream connection in Blevins. *See* Ans. 5.

Blevins's Figure 8 does show two elements with connections between them. *See* Blevins Fig. 8 (showing modules 202 and 200). In the Answer, the Examiner reproduces Blevins's Figure 8 with annotations. *See* Ans. 6 (showing annotations to elements 206 and 217). But the Examiner's annotations are illegible. And the Examiner's comments that follow Figure 8 do not clarify the meaning of these illegible annotations. *See id.* at 7.

Nevertheless, to the extent that the Examiner intends to map Blevins's modules 200 and 202 to the respectively recited upstream and downstream simulation modules, the Examiner has not identified a simulation performed by Blevins's control module 200 that is used in some other upstream simulation module. *See id.* at 6–7. To the contrary, we agree with Appellants that Blevins's control module 200 controls an actual physical element. *See* Reply Br. 7. For example, control module 200 produces values that control the mixer's input valve actuator elements to control the amount of different fluids provided to the plant's *actual* mixer. Blevins col. 29, ll. 36–40.

Blevins does state that control module 200 may run in a simulated mode. Blevins col. 30, ll. 16–17. However, Blevins further explains that this simulated mode entails using the "valid simulation data (as provided by

the simulation process module 202) . . . during off-line operator training or to test the control module 200." That is, both stated examples of the simulation mode still entail sending simulation signals to an actual control module—not to a simulation module.

Moreover, even if we were to assume, without deciding, that control module 200 reasonably could be interpreted as constituting a simulation module when operating in control mode, it would not change our conclusion. That is, the Examiner has not explained sufficiently on the record how this discussed control module 200 and the process module 202 in Blevins relate to different *physical* plant elements, as recited. *See* Ans. 5–7; Final Act. 9. Therefore, the Examiner has not shown that Blevins's process module 202 constitutes a *downstream* simulation module that communicates a value to an *upstream* simulation module, which, in turn, uses the value in a simulation of a *different* physical plant element.

Accordingly, we will not sustain the Examiner's rejection of claim 1[3] (Final Act. 8–10; Ans. 5–7). Nor do we sustain the rejections of claims 2–6, 11–16, 25–27, 29, and 33–35, which are based on the Examiner's rationale for claim 1 (*see* Final Act. 8–14).

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[3] We take no position whether it was known to provide feedback from a downstream module to an upstream module—either in simulation systems or in actual practice. Our review of the rejections for error is limited to the issues identified by Appellants, and in light of the arguments and evidence produced thereon. *See Frye*, 94 USPQ2d at 1075. Here, the Examiner has not provided sufficient evidence that this feature would have been obvious in view of the Blevins-Itou combination.

THE OTHER OBVIOUSNESS REJECTIONS

We do not sustain the Examiner's rejection of dependent claims 7, 17, and 28 (*id.* at 15) for the same reasons discussed above in connection with claims 1, 14, and 27. The additional reference, Fabricius, was not relied upon to teach the recited limitation that is missing from Blevins and Itou, and, thus, does not cure the deficiency explained previously.

DECISION

The Examiner's decision rejecting claims 1–7, 11–17, 25–29, and 33–35 is reversed.

REVERSED