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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MIGUEL ARMANDO MACHADO,
SRIKANTH G. MASHETTY, MAHESH PUROHIT, and
HASSAN S. SUHEIL

Appeal 2018-004782
Application 14/179,266
Technology Center 3600

Before STEFAN STAICOVICI, LEE L. STEPINA, and
ARTHUR M. PESLAK, *Administrative Patent Judges*.

STAICOVICI, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Miguel Armando Machado et al. (“Appellants”)¹ appeal under 35 U.S.C. § 134(a) from the Examiner’s decision in the Final Office Action (dated June 6, 2017, hereinafter “Final Act.”) rejecting claims 1–6, 8–11, 13–15, 17–19, and 21–24.² We have jurisdiction under 35 U.S.C. § 6(b).

¹ Rockwell Automation, Inc. is the applicant and is identified as the real party in interest in Appellants’ Appeal Brief 2 (filed Nov. 20, 2017, hereinafter “Appeal Br.”).

² Claims 7, 12, 16, and 20 are canceled. *See* Appeal Br. 18–19, 21.

SUMMARY OF DECISION

We REVERSE.

INVENTION

Appellants' invention relates to a system for "controlling the flow of hydrocarbons from . . . [a] hydrocarbon well site." Spec., para. 1.

Claims 1, 9, and 15 are independent. Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. A system, comprising:

a multi-selector valve configured to couple to one or more outputs of one or more wells configured to extract hydrocarbons from one or more hydrocarbon reservoirs of the one or more wells, wherein the multi-selector valve is configured to divert a first flow of hydrocarbons extracted from a first well into an output pipe;

a separator configured to couple to the output pipe and configured to separate the first flow of hydrocarbons into gas and liquid components; and

a monitoring device configured to communicatively couple to the multi-selector valve and the separator, wherein the monitoring devices is configured to:

receive a first set of data associated with the first flow of hydrocarbons from the first well in the output pipe;

determine one or more virtual flow rates of the liquid and gas components of the first flow hydrocarbons based on the first set of data;

determine whether the one or more virtual flow rates of the liquid and gas components substantially match one or more flow rates of the liquid and gas components determined during a previous well test for the first well;

send a first signal to the multi-selector valve to divert the first flow of hydrocarbons to the separator to perform a well test for the first well in response to determining when the one or more virtual flow rates of the liquid and gas components do not substantially match the one or more flow rates of the liquid

and gas components determined during a previous well test for the first well; and

send a second signal to the multi-selector valve to divert a second flow of hydrocarbons extracted from a second well to the output pipe in response to determining when the one or more virtual flow rates of the liquid and gas components substantially match the one or more flow rates of the liquid and gas components determined during the previous well test for the first well.

REJECTIONS

The following rejections are before us for review:

- I. The Examiner rejects claims 1, 2, 4–6, 8–11, 14, and 21 under 35 U.S.C. § 103 as unpatentable over Furmaga (US 4,429,581, iss. Feb. 7, 1984), Ron Cramer et al. (“*Less Footprints in the Snow for Salym Field in Western Siberia*,” Society of Petroleum Engineers, SPE 133236 (2010), hereinafter “Cramer ’236”),³ and Khan (US 2014/0150520 A1, pub. June 5, 2014).
- II. The Examiner rejects claim 3 under 35 U.S.C. § 103 as unpatentable over Furmaga, Cramer ’236, Khan, and Rossi (US 2012/0095733 A1, pub. Apr. 19, 2012).
- III. The Examiner rejects claim 13 under 35 U.S.C. § 103 as unpatentable over Furmaga, Cramer ’236, Khan, and Carlson et al. (US 5,586,027, iss. Dec. 17, 1996, hereinafter “Carlson”).

³ According to the Examiner, Cramer ’236 incorporates by reference R. Cramer et al., “*Well Test Optimization and Automation*,” Society of Petroleum Engineers, SPE 99971 (2008) (hereinafter “Cramer ’971”). Final Act. 5.

IV. The Examiner rejects claims 15, 17–19, and 22–24 under 35 U.S.C. § 103 as unpatentable over Furmaga, Cramer '236, and Yusti et al. (US 2010/0023269 A1, pub. Jan. 28, 2010, hereinafter “Yusti”).

ANALYSIS

Rejection I

Independent claim 1 recites, in relevant part, to “determine whether the one or more virtual flow rates of the liquid and gas components substantially match one or more flow rates of the liquid and gas components determined during a previous well test for the first well.” Appeal Br. 17 (Claims App.). Independent claim 9 includes a substantially similar limitation. *Id.* at 19.

The Examiner finds that Furmaga discloses many of the features of independent claims 1 and 9, including performing a well test, but does not disclose determining virtual flow rates. *See* Final Act. 3–4 (citing Furmaga, col. 3, ll. 33–60, Fig. 1). Nonetheless, the Examiner finds that Cramer '236 discloses “measuring virtual flow rates based on temperature (THT) and pressure (THP) and initiating a well test if the virtual flow rates do not match pervious well test data.” *Id.* at 4 (citing Cramer '236, 3 (para. i), 4 (para. 2), Fig. 3).

The Examiner takes the position that Cramer '236 incorporates by reference Cramer '971, which “further details the comparison of virtual flow rates to previous well test data to determine if a test is necessary.” *Id.* at 5 (citing Cramer '236, 3). The Examiner explains that because in Cramer '971 the virtual flow rate is calibrated against the latest well-test result and a new well test is initiated when a significant change is observed in the derived

(virtual) flow rate, Cramer '236 discloses comparing the virtual flow rate to the latest well-test result. *Id.* (citing Cramer '971, 3, para. 4.1.1 (sub-paras. 1, 3)).

Appellants argue that Cramer '236 makes a different comparison than what is recited in independent claims 1 and 9 because Cramer '236 “uses the previous well test data to determine the modeled well oil, gas, and water flows” and then, “reconciles the modeled data with real time measurements.” Appeal Br. 8. Appellants assert that Cramer '971 is not incorporated by reference in Cramer '236 (*see id.* at 10), and, even if it were, Cramer '236 “initiates a well test based on comparison between two models, as opposed to . . . when virtual flow rates do not match flow rates of a previous well test.” *Id.* at 9 (citing Cramer '236, 3). Likewise, Appellants note that Cramer '971 “appears to teach comparing the derived liquid flow . . . to determine if well flow has changed significantly – rather than comparing between the derived liquid flow and a previous well test.” *Id.* at 10.

The Examiner responds that Cramer '236 meets the claimed feature because the model of Cramer '236 that “generates the virtual flow rate uses . . . [data] calibrated against the most recent [well] test data” such that the virtual flow rates generated first by the model “correspond to the latest and most accurate well test.” Examiner’s Answer 4 (dated Feb. 7, 2018, hereinafter “Ans.”). Hence, according to the Examiner, “comparing virtual flow rates at a later time . . . to the first virtual flow rates generated by the model equates to comparing virtual flow rates to the rates determined during a previous well test.” *Id.* (citing Cramer 2, paras. 4.1.1, 4.1.2).

We agree with Appellants that neither Cramer '236 nor Cramer '971 discloses comparing virtual flow rates of the liquid and gas components to flow rates determined during a previous well test, in order to decide whether they “substantially match,” as required by each of independent claim 1 and 9. *See* Reply Brief 3 (filed Apr. 3, 2018, hereinafter “Reply Br.”).

Specifically, each of independent claims 1 and 9 requires a comparison between one or more virtual flow rates of the liquid and gas components, and one or more flow rates of the liquid and gas components determined in a previous well test. *See* Appeal Br. 17, 19 (Claims app.). Such an interpretation is consistent with Appellants’ Specification, which describes performing a well test by sending a stream of hydrocarbon flow output into a test separator that divides the flow into streams of individual components such as oil, gas, and water. *Spec.*, para 92. The Specification then describes determining the flow rates for the oil, gas, and water components and comparing these flow rates to virtual flow rates. *See Spec.*, paras. 92, 109, Fig. 13.

In contrast, Cramer '236 discloses “continuously estimat[ing] well oil, gas and water flows” based on FieldWare Production Universe (hereinafter “FW PU”) models. Cramer '236, 3. Cramer '971 discloses that in the FW PU model real time data (i.e., pressure, temperature) is calibrated against previous well-test results to generate a model, which then is used along with future real-time data to derive continuous estimation of fluid flows. Cramer '971, 3, para. 4.1, 4, para. 4.1.2. Cramer '971 further discloses that “[a] significant change in the estimated well flow rates indicates the need to re-test the well.” *Id.* at 3, para. 4.1.

As such, we agree with Appellants that in Cramer '236 and Cramer '971 virtual flow rates derived from a model are compared “at *different times*.” Reply Br. 3. Although we appreciate that the model is based on previous well-test results, nonetheless, comparing the results of two models is not the same as comparing the results of a model to previously determined well-test results.⁴ Stated differently, because a model is a simplified representation of flow rate data, the model based on previous well test flow rate data is not the same as the flow rate data of the previous well test itself. Hence, neither Cramer '236 nor Cramer '971 compare one or more virtual flow rates of the liquid and gas components to one or more flow rates of the liquid and gas components of a previous well test, as required by each of independent claims 1 and 9.

In conclusion, for the foregoing reasons, we do not sustain the Examiner’s rejection under 35 U.S.C. § 103 of claims 1, 2, 4–6, 8–11, 14, and 21 as unpatentable over Furmaga, Cramer '236, and Khan.

Rejections II and III

The Examiner’s use of the disclosures of Rossi and Carlson does not remedy the deficiency of the rejection based on the combination of Furmaga, Cramer '236, and Khan discussed *supra*. See Final Act. 8–9. Therefore, for the same reasons as discussed above, we also do not sustain the rejections under 35 U.S.C. § 103 of claim 3 as unpatentable over Furmaga, Cramer

⁴ An ordinary and customary meaning of the term “model” is a “simplified representation of a system or phenomenon, as in the sciences or economics, with any hypotheses required to describe the system or explain the phenomenon, often mathematically.” See <https://www.dictionary.com/browse/model> (last visited November 21, 2018).

'236, Khan, and Rossi, and of claim 13, as unpatentable over Furmaga, Cramer '236, Khan, and Carlson.

Rejection IV

Independent claim 15 recites a substantially similar limitation to that of claim 1, namely, to “determine whether the one or more virtual flow rates of the one or more liquid and gas components substantially match one or more flow rates of the one or more liquid and gas components determined during a previous well test.” Appeal Br. 20 (Claims App.).

The Examiner rejects independent claim 15 based on the same findings with respect to Cramer '236 and Cramer '971, and Appellants rely on the same arguments discussed *supra* in Rejection I. *See* Final Act. 9–11; Appeal Br. 15.

As the Examiner does not rely on the disclosure of Yusti in any manner that would remedy the deficiencies of either Cramer '236 or Cramer '971 discussed above (*see* Final Act. 11), we also do not sustain the rejection of claims 15, 17–19, and 22–24 as unpatentable over the combined teachings of Furmaga, Cramer '236, and Yusti.

DECISION

The Examiner’s decision to reject claims 1–6, 8–11, 13–15, 17–19, and 21–24 is reversed.

REVERSED