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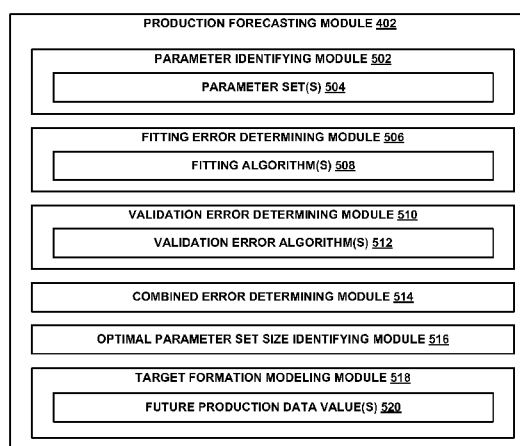
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(54) Title: METHODS AND SYSTEMS FOR RESERVOIR HISTORY MATCHING FOR IMPROVED ESTIMATION OF RESERVOIR PERFORMANCE

**FIG. 5**

(57) **Abstract:** The present disclosure presents methods and apparatuses for forecasting geological formation production data. For example, some example methods include identifying an array of parameter sets, determining a fitting error between a first set of the historical production data and modeled production data, wherein the modeled production data is obtained through execution of a simulation model based on each parameter set of the array, determining a validation error between a second set of the historical production data and extrapolated production data for each parameter set of the array, determining a combined error for each parameter set of the array based on the fitting error and the validation error, and identifying an optimal parameter set size for modeling the target geological region, wherein the optimal parameter set size is determined in reference to a minimum combined error of the combined errors determined for each parameter set of the array.