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(54) Title: CONTROLLING QUANTUM COMPUTING SYSTEM TO DETERMINE QUANTITY OF OBJECT

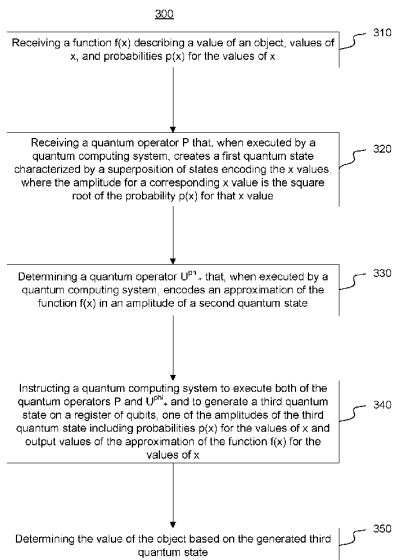


FIG. 3

(57) Abstract: A system may receive a function $f(x)$ describing a value of an object, values of x , and probabilities $p(x)$ for the values of x . The system may determine a quantum operator (I) that, when executed by a quantum computing system, encodes an approximation of the function $f(x)$ in an amplitude of a quantum state without calculating $|f(x)|$ for any of the values of x . The system may instruct the quantum computing system to execute quantum operators (including (I)) to generate a quantum state on a register of qubits, where one of the amplitudes of the generated quantum state includes probabilities $p(x)$ for the values of x and output values of the approximation of the function $f(x)$ for the values of x . The system may determine the value of the object based on the generated quantum state. Formula (I)

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