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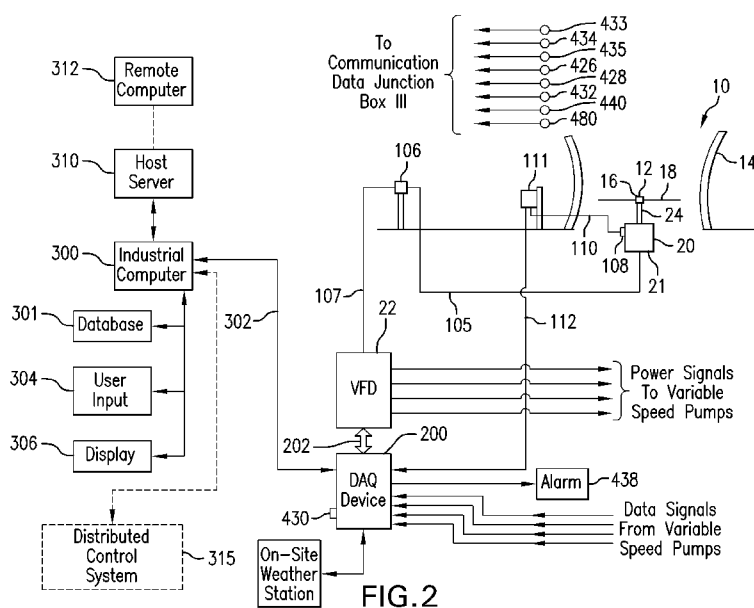
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(54) Title: DIRECT DRIVE FAN SYSTEM WITH VARIABLE PROCESS CONTROL



(57) Abstract: The present invention is directed to a direct-drive fan system and a variable process control system for efficiently managing the operation of fans in a cooling system such as a wet-cooling tower or air-cooled heat exchanger (ACHE), HVAC systems, mechanical towers or chiller systems. The present invention is based on the integration of key features and characteristics such as tower thermal performance, fan speed and airflow, motor torque, fan pitch, fan speed, fan aerodynamic properties, and pump flow. The variable process control system processes feedback signals from multiple locations in order to control a high torque, variable speed, permanent magnet motor to drive the fan. Such feedback signals represent certain operating conditions including motor temperature, basin temperature, vibrations, and pump flow rates. Other data processed by the variable process control system in order to control the motor include turbine back pressure set-point, condenser temperature set-point and plant part-load setting. The variable process control system processes this data and the aforesaid feedback signals to optimize the operation of the cooling system in order to prevent disruption of the in-

dustrial process and prevent equipment (turbine) failure or trip. The variable process control system alerts the operators for the need to conduct maintenance actions to remedy deficient operating conditions such as condenser fouling. The variable process control system increases cooling for cracking crude and also adjusts the motor RPM, and hence the fan RPM, accordingly during plant part-load conditions in order to save energy.