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(54) Title: DESALINATION SYSTEM WITH ENERGY RECOVERY AND RELATED PUMPS, VALVES AND CONTROLLER

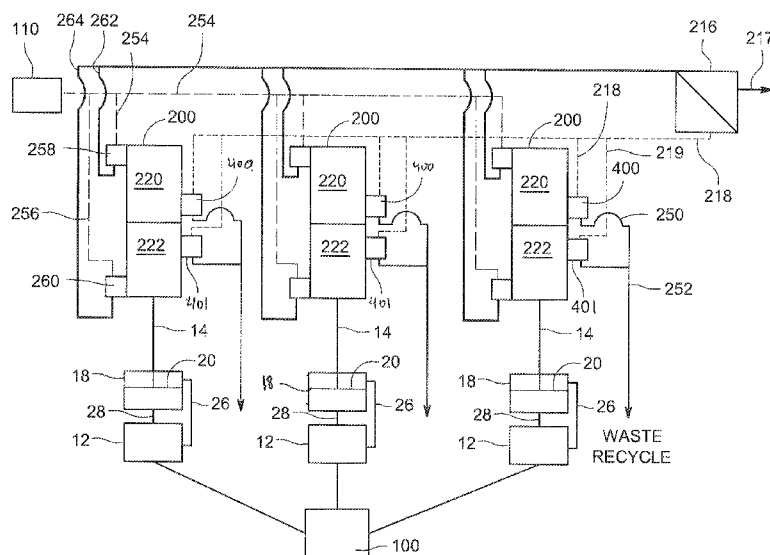


FIG. 1

(57) Abstract: A fluid pumping system with energy recovery features may be used to provide feed water to a reverse osmosis unit. The system includes an electronic controller unit that regulates the output of three hydraulic pumps. Each hydraulic pump drives the movement of a piston in a cylinder. The pistons collectively deliver a generally constant flow of high pressure feed water to the reverse osmosis unit. Concentrate valve bodies direct concentrate from the reverse osmosis unit to the back sides of the pistons to reduce the work required from the hydraulic pumps. The electronic controller coordinates the output of the hydraulic pumps with the actuation of the valve assemblies. Movement of the pistons is controlled, in part, by a feed back loop to verify whether a hydraulic pump is producing the desired output. Concentrate valve bodies are designed to begin closing when the velocity of a piston decreases. The concentrate valve body moves after a waiting time during a dwell period when an associated piston should not be moving. The piston and cylinder are designed for exposure to sea water and RO brine.

**Declarations under Rule 4.17:**

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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