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(54) **Title**: EXHAUST PROCESSING AND HEAT RECOVERY SYSTEM

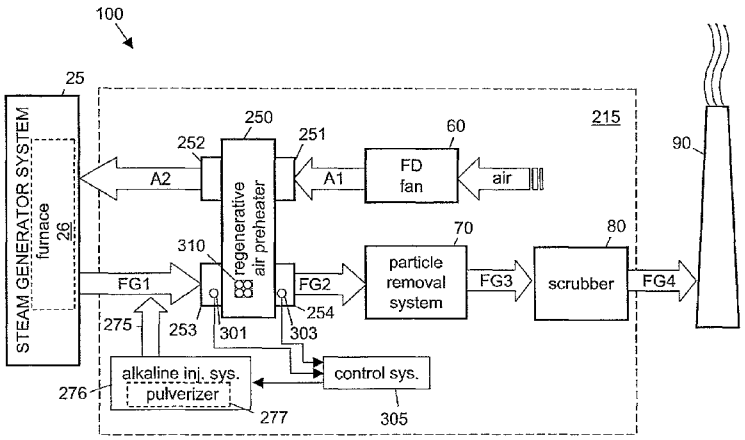


FIG. 2A

(57) **Abstract**: A thermally efficiency regenerative air preheater (250) extracts more thermal energy from the flue gas exiting a solid fuel fired furnace (26) by employing an alkaline injection system (276). This mitigates acid fouling by selectively injecting different sized alkaline particles (275) into the air preheater (250). Small particles provide nucleation sites for condensation and neutralization of acid vapors. Large particles are injected to contact and selectively adhere to the heat exchange elements (542) and neutralize liquid acid that condenses there. When the deposit accumulation exceeds a threshold, the apparatus generates and utilizes a higher relative percentage of large particles. Similarly, a larger relative percentage of small particles are used in other cases. Mitigation of the fouling conditions permits the redesign of the air preheater (250) to achieve the transfer of more heat from the flue resulting in a lower flue gas outlet temperature without excessive fouling.

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