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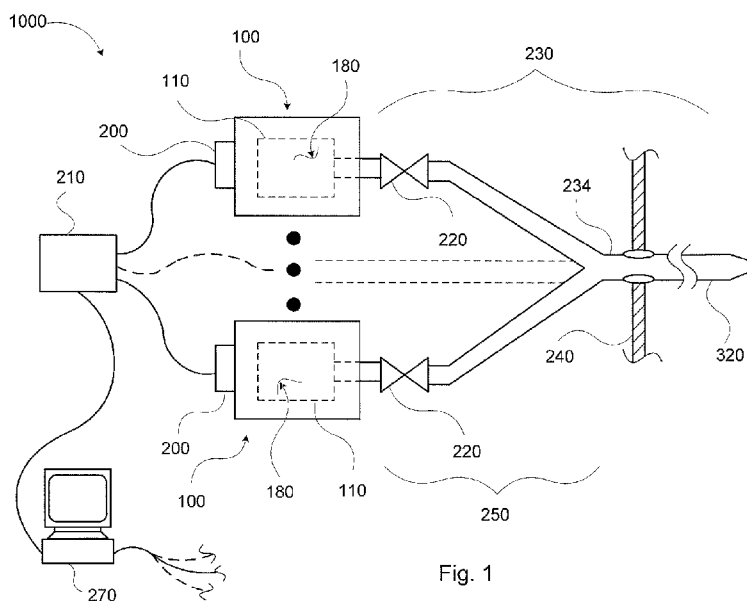


Fig. 1

(57) Abstract: A gas injection system for an energetic-beam instrument having a vacuum chamber. The system has a cartridge containing a chemical serving as a source for an output gas to be delivered into the vacuum chamber. The cartridge has a reservoir containing the chemical, which rises to a fill line having a level defined by an amount of the chemical present in the reservoir at a given time. An outlet from the reservoir is coupled to an output passage through an outlet valve and configured so that when the system is tilted the outlet remains above the level of the fill line. Embodiments include isolation valves allowing the cartridge to be disconnected without destroying system vacuum.

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