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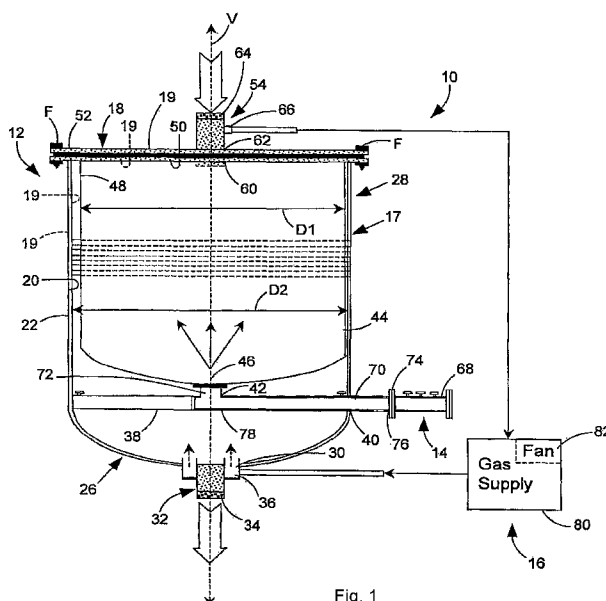


Fig. 1

(57) Abstract: A heating apparatus for removing volatiles from a saturated adsorbent is provided. The heating apparatus can include a vessel including a first end and a second end. The vessel can be adapted to receive the saturated adsorbent. The heating apparatus can also include a channel in communication with the first end of the vessel and a radiation source that provides energy to heat the vessel. The heating apparatus can further comprise a lateral waveguide coupled to the radiation source and disposed within the channel to transmit the energy from the radiation source to the vessel to heat the saturated adsorbent disposed within the vessel.

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15. The heating apparatus of Claim 13, further comprising a lid coupled to at least one of the dome and the vessel, wherein the lid further comprises:

a first member that mates with the dome to enclose a second end of the dome;

5 a second member that mates with the vessel to enclose the second end of the vessel;

a port received through the first member and the second member to enable at least one of the saturated adsorbent to enter the vessel and the purge gas to exit the vessel; and

10 wherein the first member includes a dielectric material that absorbs the energy from the radiation source.

16. The heating apparatus of Claim 10, wherein the radiation system further comprises:

15 a channel in communication with the first end of the vessel;
a radiation source in communication with the channel that provides energy to heat the vessel;

a lateral waveguide in communication with the radiation source and disposed in the channel to receive the energy from the radiation source;

20 a mode converter disposed in the channel and in communication with the waveguide to transmit the energy from the lateral waveguide to the vessel to heat the saturated adsorbent disposed within the vessel; and

wherein the mode converter is coupled to the dome to prevent adsorbent from contacting the mode converter.

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17. A heating apparatus for removing volatiles from a saturated adsorbent comprising:

a vessel adapted to receive the saturated adsorbent;

a channel coupled to the vessel;

30 a radiation source in communication with the channel to provide energy to heat the vessel;

a lateral waveguide coupled to the radiation source and disposed within the channel to transmit the energy from the radiation source to the vessel to heat the saturated adsorbent disposed within the vessel;

5 a dome disposed within the vessel adjacent to the second end of the vessel that protects the radiation source from contact by the saturated adsorbent and defines a channel between the vessel and the dome to enable the saturated adsorbent to pass between the vessel and the dome; and

wherein the vessel includes a dielectric material that absorbs the energy from the radiation system.

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18. The heating apparatus of Claim 17, wherein the vessel has a first end and a second end, and further comprises:

15 a port coupled to the first end that defines at least one passage that enables at least a purge gas to enter the vessel or the cleaned adsorbent to exit the vessel; and

wherein the vessel includes an interior surface and an exterior surface, with the dome disposed adjacent to the interior surface so that the saturated adsorbent passes between the dome and the inner surface of the vessel, and the dielectric material is disposed between the dome and the interior surface of the vessel, with the, dielectric material selected from the group comprising at least one of graphite, silicon carbide powder, alkaline silicate salts, ceramic, and combinations thereof.

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19. The heating apparatus of Claim 18, further comprising a lid coupled to at least one of the dome and the vessel that further comprises:

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a first member that mates with the dome to enclose a second end of the dome;

a second member that mates with the vessel to enclose the second end of the vessel;

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a port received through the first member and the second member to enable at least one of the saturated adsorbent to enter the vessel and the purge gas to exit the vessel; and

wherein the first member includes a dielectric material that absorbs the energy from the radiation source.

20. The heating apparatus of Claim 18, further comprising:

5 a mode converter disposed in the channel and in communication with the waveguide to transmit the energy from the lateral waveguide to the saturated adsorbent; and

wherein the mode converter is coupled to the dome to prevent adsorbent from contacting the mode converter.