

way and should not be interpreted as a limiting feature. Stirring, mixing, moving, or agitating materials within a vessel, or any combination thereof, is contemplated within the scope of the invention.

When introducing elements of the present invention or the preferred embodiment(s) thereof, the articles “a”, “an”, “the” and “said” are intended to mean that there are one or more of the elements. The terms “comprising”, “including” and “having” are intended to be inclusive and mean that there may be additional elements other than the listed elements.

As various changes could be made in the above without departing from the scope of the invention, it is intended that all matter contained in the above description and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A magnetic stirring apparatus for moving a magnetic bar in a vessel to mix material in the vessel, the magnetic stirring apparatus comprising:

a frame;

a magnet supported by the frame and adapted to be magnetically coupled to the bar when the vessel is proximate to the magnet so that movement of the magnet causes movement of the bar;

a cooling system in heat transfer communication with the magnet for removing heat from the magnet;

a motor operatively connected to the magnet for producing said movement of the magnet, the motor comprising a pneumatic motor, the cooling system comprising an exhaust from the pneumatic motor that directs air from the motor to the magnet for cooling the magnet.

2. A magnetic stirring apparatus as set forth in claim 1 wherein the exhaust comprises a vent adjacent the magnet, the vent directing air to the magnet.

3. A magnetic stirring apparatus as set forth in claim 2 wherein the exhaust comprises an exhaust conduit, the exhaust conduit connecting the vent to the motor for carrying air from the motor to the vent.

4. A magnetic stirring apparatus as set forth in claim 1, wherein the magnet is a neodymium magnet.

5. A magnetic stirring apparatus as set forth in claim 4, wherein the neodymium magnet has a strength rating of about N40 or greater.

6. A magnetic stirring apparatus as set forth in claim 5, wherein the neodymium magnet has a strength rating of about N50 or greater.

7. A magnetic stirring apparatus as set forth in claim 1, wherein said magnet has a pulling force density of at least about 80 pounds per cubic inch.

8. A magnetic stirring apparatus as set forth in claim 7, wherein said magnet has a pulling force density of at least about 100 pounds per cubic inch.

9. A magnetic stirring apparatus as set forth in claim 1, wherein said exhaust comprises a muffler operable to reduce noise associated with operation of the pneumatic motor.

10. A magnetic stirring system comprising a magnetic stirring apparatus as set forth in claim 1 in combination with said vessel and said magnetic bar.

11. A magnetic stirring system as set forth in claim 10 wherein the magnetic bar is a stir bar and a portion of the vessel extends between the magnet and the stir bar and forms a barrier therebetween.

12. A magnetic stirring system as set forth in claim 11 wherein the magnetic stirring system is operable to substantially prevent release of materials from the vessel into the environment or vice versa.

13. A magnetic stirring system as set forth in claim 10 wherein the vessel has a capacity of at least about 20 liters.

14. A magnetic stirring system as set forth in claim 13 wherein the vessel has a capacity of at least about 70 liters.

15. A magnetic stirring system as set forth in claim 1 further comprising a heating element operable to heat a material contained in the vessel.

16. A magnetic stirring system as set forth in claim 15 wherein the frame comprises a stir-mantle for supporting the vessel, the stir-mantle containing the heating element for heating said material contained in the vessel while it is supported by the stir-mantle.

17. A magnetic stirring apparatus as set forth in claim 1 wherein the magnet is susceptible to a reduction in magnetic strength at temperatures above approximately 80 degrees Celsius.

18. A magnetic stirring apparatus for moving a magnetic bar in a vessel to mix material in the vessel, the magnetic stirring apparatus comprising:

a magnetic coupler comprising at least one magnet, the magnetic coupler being configured to permit magnetic coupling of the magnetic coupler with the magnetic bar in the vessel so that rotation of the magnetic coupler results in rotation of the magnetic bar for stirring a material contained in the vessel;

a pneumatic motor operable to expand a compressed gas in a manner that drives rotation of the magnetic coupler and results in an expanded gas exhaust; and

an exhaust conduit having an exhaust opening positioned with respect to the magnet for directing the expanded gas exhaust from the pneumatic motor to the magnet for cooling the magnet.

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