the exterior axial surface having at least one helix in the form an external screw thread, the tube also having a sidewall between the exterior axial surface and the longitudinal bore, the sidewall also defining at least one aperture through the sidewall for circulation of vapor; a base comprising, a disk having a top surface and a substantially flat bottom surface, the top surface having an area greater than an area of a bottom end of the tube, the bottom end of the tube being fixedly attached to the disk such that the rotational axes of the disk and the tube are substantially aligned and are substantially perpendicular to a substantially flat bottom end of the disk, at least one bar fixedly attached to or integrally molded with the top of the disk on an annular area of the top end of the disk outside of a perimeter of the tube, the bar aligned substantially radially from the rotational axis of the disk and a magnet disposed within the disk.

The present invention may further comprise a method for entraining vapor in liquids comprising: placing a tube in a container, the tube having an open top end and a longitudinal bore extending into the tube from the open top end to a closed bottom end, the closed bottom end forming a floor within the longitudinal bore, the tube also having an exterior bottom end, the tube further having an exterior axial surface between the open top end and the exterior bottom end, the exterior axial surface having at least one helix in the form of an external screw thread, the tube also having a sidewall between the exterior axial surface and the longitudinal bore, the sidewall also defining at least one aperture for circulation of vapor, providing liquid in the container; providing vapor in the container, rotating the tube to a speed sufficient to cause the liquid to be urged away from the tube, forming a vortex, such that a lowest point on a surface of the vortex is substantially level with the aperture, whereby the liquid is robustly mixed with the vapor in an area adjacent to the aperture, the vapor being drawn through the aperture, and the vapor being entrained into the liquid.

An advantage of the present invention is the robust mixing of a liquid that can be achieved within a containment vessel and the simultaneous entrainment of vapor into the liquid. The present invention provides superior results that have not hereto for been achievable by prior art devices.

Further advantages of the invention will be brought out in the following portions of the specification, wherein the detailed description is for the purpose of fully disclosing preferred embodiments of the invention without placing limitations thereon.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more fully understood by reference to the following drawings.

FIG. **1** is an elevation view of a tube and base assembly of the vapor entraining apparatus.

FIG. **2** is an elevation view including a partial cut-out of the tube and base assembly illustrating the longitudinal bore and the floor of the longitudinal bore within the tube.

FIG. **3** is an elevation view of the tube and base assembly in use with a containment vessel and magnetic stirring motor.

DETAILED DESCRIPTION OF THE INVENTION

For illustrative purposes, an implementation of the present invention is embodied in the apparatus generally shown in the drawings wherein like reference numerals denote like parts. It will be appreciated that the apparatus may vary as to configuration and as to details of the parts without departing from the basic concepts as disclosed herein. The present invention is disclosed in terms of use with fluids. It should be readily apparent, however, that the rotor of the invention may be utilized with a variety of mixing applications.

Referring to FIG. **1**, FIG. **2** and FIG. **3**, a magnetically driven mixing apparatus in accordance with the present invention is shown. The invention includes a tube **102** with a double external screw thread or helix **104**, **105** integrated onto the outer surface of the tube **102**. It will further be appreciated that the invention could be embodied in versions comprising a single screw thread or other numbers of multiple screw threads.

The screw threads are configured in "right-side" form, i.e., in elevation view of the tube in upright position; the external threads are higher on the right side of the tube than on the left side. The screw threads may have a thread height equal to three quarters of the diameter of the tube measured from the longitudinal axis of the tube to the root of the screw, i.e., to the bottom of the groove between the two flanking surfaces of the threads. The threads also preferably have a separation substantially as shown between each flanking surface of the threads. However, the threads may be varied in structure and configuration as required.

The tube **102** also has a longitudinal bore **106** from an open top end of the tube **102** to a closed bottom end, the closed bottom end defining a floor **202** of the longitudinal bore. Two holes **108** pierce the sidewall **204** of the tube **102**, preferably at the root of the external screw threads **104**, i.e., at the bottom of the groove between two flanking surfaces of the thread. The holes are also preferably positioned tangent to the floor **202** of the longitudinal bore **106**, i.e., so that the lowest point on the circumferential perimeter of each of the holes meets the plane formed by the floor **202**. The holes are also preferably symmetrically distributed about the longitudinal axis of the tube (i.e., for two holes, positioned at 180 degrees from each other on a plane perpendicular to the longitudinal axis of the tube **102**). It will further be appreciated that the invention could be embodied in versions comprising one or several holes similarly symmetrically distributed about the longitudinal axis of the tube. However, accommodation of more than three such holes in the sidewall of the tube may unduly compromise the structural integrity of the tube. The holes communicate with the longitudinal bore **106**, and serve dual purposes that are more fully described herein below. These holes may be drilled at an angle normal to the pitch diameter of the tube or at more optimal angles as required by a particular application.

The bottom end of the tube **102** is fixedly attached to a base assembly comprising a disk **112**, having a flat bottom surface, and a linear magnet **110**. The tube is fixedly mounted on or otherwise attached to or integrally molded with the disk **112**, such that the rotational axes of the tube and the disk are vertically aligned and preferably perpendicular to the flat bottom surface of the disk. The linear magnet is comprised of one bar, which extends radially from opposite exterior sides of the bottom of the tube. The bar is fixedly attached to or integrally molded with the top surface of the disk. The flat bottom surface **114** of the disk rests on the flat level floor of a containment vessel **302**. The tube and base assembly is preferably constructed from Delrin.

A nonconductive, preferably ceramic magnet **116** is mounted inside of the disk component **112** of the base. The magnet preferably comprises strontium carbonate—iron oxide. Any exposed surfaces of the magnet may be coated