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NEW INVENTIONS

Magnetic Fluid Treatment, Inventors: La Vern L. Adam, H.J. Adam, J.D. Adam and M.A. Miller, Assignees: AZ Industries Inc., USA, Issued: 10 June 1997, Filed: 18 August 1995, Patent no.: US 563 7226.

A fluid is circulated through a region of single magnetic polarity within a complex magnetic field and with increased exposure time as compared to prior art devices. The fluid travels through a coil of tubing arranged between two magnetic fields that interact to form the region of single polarity. In a preferred embodiment, the fields are generated by two sets of magnets, one on the inside of the coil and one on the outside of the coil. The magnets are arranged such that like poles of all the magnets face the tubing in the coil, creating the region of single polarity. Treating fuel or recirculated exhaust gases prior to burning in internal combustion engines results in improved engine output characteristics.

Method for Magnetic Separation Featuring Magnetic Particles in a Multi-Phase System, Inventors: Yuzhou Wang, Weixin Tang, W.J. Cronin and P.A. Liberti, Assignees: Immunivest Corp., USA, Filed: 18 April 1994, Issued: 30 July 1996, Patent no.: 5541072.

Methods and devices are provided for separation of magnetic particles and/or magnetic-associated substances from non-magnetic associated substances and media. The methods are specifically applicable to biological separation, and utilise a phase phenomenon arising from mutual interactions between suspended magnetic particles and interactions with the suspension medium. The phenomenon is exploited to produce and maintain a distinct, structured phase of magnetic particles, or ferrophase, within a multi-phase liquid system. A ferrophase is established within a separation chamber prior to introducing therein a test sample containing the target substances to be separated. The formation of a ferrophase is used to transport target substances from regions of

relatively low magnetic field gradient to regions of relatively high magnetic field gradient within a high-gradient magnetic separation apparatus. Such transport of the ferrophase is accomplished at greater speed than the transport of individual magnetic particles within a single liquid phase, thereby enabling a more effective separation of magnetic from non-magnetic components.

Magnetic Fluid Composition, Inventors: T. Yabe, A. Yamamoto, A. Yokouchi and K. Esumi, Assignee: NSK Ltd., Japan, Filed: 5 January 1994, Issued: 30 January 1996, Patent no.: US 5487840.

A magnetic fluid composition comprising a low-volatile organic solvent as a carrier having dispersed therein ferromagnetic fine particles coated with a surface active agent having a lipophilic group having affinity to said low-volatile organic solvent, and a thixotropy-imparting agent is disclosed.

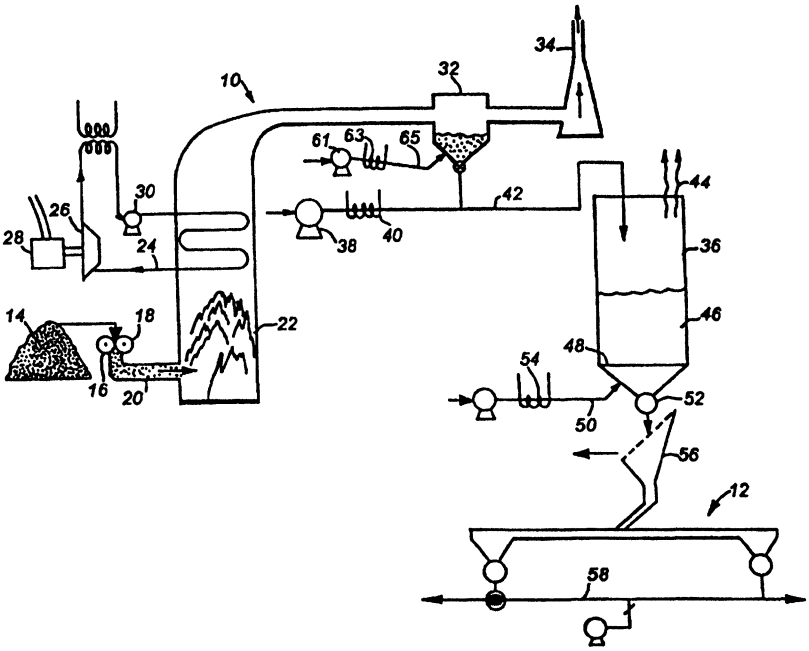
Magnetic Detection of Discontinuities in Magnetic Materials, Inventors: S. Hay, R. Street and R.G. Vanselow, Applicant: Technological Resources (Pty.) Ltd., Application no.: 97/4197, Date of acceptance: 10 December 1997, Priority date: 17 May 1996, Patent no.: AU PN 9925.

A method and apparatus for high speed magnetic detection of surface fatigue cracks in railway rails. The magnetic material of the rail is magnetised by touch magnetisation using a permanent magnet, leaving a remanent magnetic field. A sensor head having a plurality of Hall effect sensors senses stray flux generated in the vicinity of surface fatigue in the rail head by the remanent magnetic field. The apparatus may be mounted on a conventional track recording vehicle for use in routinely monitoring the surface fatigue severities in rail along a railway.

Method and Apparatus for Separation of Carbon from Flyash, Inventors: J.D. Bittner, Th.M. Dunn and F.J. Hrach Jr., Applicant: Separation Technologies, Inc., Application no.: 98/1525, Date filed: 24 February 1998, Date of acceptance: 23 September 1998, Priority date: 24 February 1997, US patent no. 08/805,157.

Apparatus and method for separating carbon particles from flyash includes one of increasing a relative humidity of the flyash or decreasing

the relative humidity of the flyash to within an optimum humidity range, and introducing the flyash within the optimum humidity range into a triboelectric separator so as to triboelectrically charge the carbon particles and the flyash and so as to electrostatically separate the charged carbon particles from the charged flyash.



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BOOK REVIEW

Scientific and Clinical Applications of Magnetic Carriers, U. Häfeli, W. Schütt, J. Teller and M. Zborowski (Eds.), Plenum Press, New York 1997, 644 pp., US$149.50.

Based on proceedings of the first conference on magnetic carriers held in 1996 in Rostock, Germany, this book reviews the recent developments in the field of medical and biological applications of magnetic carriers and magnetic fluids. For the engineering fraternity this is a fascinating area of applied magnetism and even a brief perusal of the book will reveal a considerable potential for the application of the physical and engineering principles of magnetism in medicine and biology.

The book is divided into eight sections, devoted to the following topics: (1) Preparation and modification of biodegradable magnetic particles, (2) Characterisation of magnetic particles, (3) Application in cell separation and analysis, (4) Applications in molecular biology, (5) Biomedical applications of magnetic carriers, (6) Drug delivery and radionuclide therapy, (7) MRI contrast agents and (8) Hyperthermia.

Most contributions are very interesting to read, although medical and biological details and jargon may cloud the full understanding of the value of new research findings. C. Grüttner *et al.*, for instance, describe the synthesis of new biodegradable magnetic nanospheres for the application in magnetic field-assisted radionuclide therapy. For this purpose, iron oxide cores were coated with hydrophilic polymers. To ensure the complexation of radionuclides, chelating agents were bound to the surface of the particles. W. Schüppel *et al.* show how glass crystallisation could be used for preparation of nanocrystalline oxide media. These particulate systems can be used, for instance, in novel ferrofluids and in the biomedical field. M.P. Pileni *et al.* describe how by using oil in water micelles; it was possible to make inverted spinel ferrite nanosized particles. Control of particle size was achieved by small changes in the