

MAGNETIZED FILTERING DEVICE

FIELD OF THE INVENTION

[0001] The present invention relates to a system for purifying or filtering liquids such as water, milk, oil, organic fuels, alternative fuels, reformulated gasoline and other liquids, using a multi step process, which includes a magnetic field.

BACKGROUND OF THE INVENTION

[0002] Liquid Filtering systems and methods are designed to purify a liquid by extracting or neutralizing pre-specified elements, which are present in liquid. The specific design of a filtering system depends on the substance it is supposed to filter (water, oil, sewer, etc.), and on the elements, which need to be extracted or neutralized. Accordingly a variety of filtering systems were developed over the years, to meet these various requirements.

[0003] The different filtering systems combine different approaches for improving liquid quality. One classic approach includes passing the liquid through a grid-mesh with small size pores. Particles, which are larger than the diameter of the pores, cannot pass through and are therefore filtered out. In another approach active materials are used to absorb undesired particles and substances from the filtered media. However, some of these substances are considered harmful, to some extent, to the environment and to the user's health.

[0004] Another approach exposes the filtered liquid to some type of energy field, usually a magnetic field. A liquid passing through a magnetic field becomes magnetized. Evidence show that magnetized water changes some of its characteristics, in a way that the liquid quality is improved, on one hand, and the filtering process is improved on the other.

[0005] More specifically, when water passes through a magnetic field, the hydrogen ions and dissolved minerals in the water will become charged. This charge causes a temporary

separation of the minerals from the molecular water clusters resulting in improvements in taste. The water will then behave like natural soft water.

[0006] Another example is the influence of magnetized water on scale, bacteria, fungus and Legionella, in water. Scale, sludge, bio-film, bio-growths and corrosion in liquid and water process systems, provide the nutrients for bacteria, fungus and algae to live. Legionella lives on bacteria in the water. Magnetic liquid treatment, or magnetic water treatment as it is more commonly known, alters the size and shape of scale forming crystals, prevents scale from forming and cleans away existing scale and, as it lowers the surface tension of the water, scale and sludge settles out more efficiently and the water becomes cleaner. As result bacteria, fungus, algae and Legionella growth is significantly reduced in the water.

[0007] In addition, compared to regular tap water, magnetized drinking water is characterized by a high alkaline pH, and smaller water molecular clusters. There is evidence that drinking magnetized water aids in preventing and treating many diseases. It is especially beneficial in treating digestive, nervous, urinary disorders, and chronic degenerative diseases. Furthermore, magnetized drinking water is believed to help in slowing aging and preventing aging diseases. There is also some evidence that animals and plants watered with magnetized water are healthier. Some researchers even point out difference between water exposed to the north versus the South poles. It is believed that water magnetized by the North Pole stops the growth of bacteria and works as an antibiotic. Water magnetized by the South Pole takes care of pain, swelling and weakness.

[0008] Based on the various effects of magnetizing water, Magnetic Technology Australia, (MTA) provides magnetic liquid conditioners (MFCs), for the control of scale in commercial and large industrial liquid process. The Scale-X MFC, is a non-chemical solution aimed at preventing inorganic and organic scales, for example, calcite, gypsum, lime, barite, zinc phosphate, milk stone, wax, asphaltene, paraffin and biofilm, from forming in a pipe, pump, valve, vessel, heat exchanger, chiller, condenser, evaporator, concentrator, cooling tower and an oil well (downhole), and in the reduction and/or control of corrosion. The water system biological problems of algae and legionella can be significantly reduced by eliminating scale and biofilm by the application of magnetic water treatment. The MFC systems use permanent magnets to apply magnetic fields on the water, and their products

range from applications applied externally to pipes (clamp on units with permanent magnet), to applications installed internally in pipes and/or vessels.

[0009] Gal-Al (Israel) manufactures filters under the brand name “Hardless”, which is usually installed on the water pipes, just before they enter the house. The “Hardless” filters combine a stainless-steel grid-mesh structure to filter out particles, with chemical substances such as Phosphorus and a magnet, to further purify and improve the water.

[0010] Several patents disclose the use of magnets in filtering systems.

[0011] Some patents use magnets merely to attract metallic particles suspended in the liquid, thus separating them from the liquid. US 6,649,054 discloses such a magnetic filtering device. In GB2361441 a filtering system for filtering impurities from liquid such as oil and the like is disclosed. A magnetic filter is used for attracting and retaining ferrous particles and the like, located in proximity to the magnetic filter, and a porous filter, is used for retaining other particulate matter. US6267875 discloses a disposable filter used in connection with internal combustion engines. In this filter again a magnet is used to trap suspending metal filings in oil flow.

Another group of patents use an energy field, created usually by a magnet, to purify-“filter” liquids as explained above. In US patent application 20050006592 a method and apparatus for activating water (changing their energy state) is disclosed. Water passes through an energy field, which is generated by particles, selected from a group of silicon, titanium, nickel and samarium or composed of fluorocarbon. The activated water is considered to have changed some of its characteristics and qualities. Among other things, the energy field breaks the water to smaller clusters (groups). In PCT publication WO2005026058 a self cleaning water purification system is disclosed. The external walls of the water storage unit possess a series of magnetic elements that have the function of aligning molecules and breaking down clusters molecules, thus improving the oxygenation and conservation of water over a longer period of time. In another patent JP2004261799 an apparatus for providing purified household water using a powerful permanent magnet is disclosed. The system provides purified water, which acts favorably on the human body, prevents dirt, such as rust, from sticking to a tank to be fed with water, and consumes less detergent so as to be

environment-friendly. In JP10305284 another apparatus, which uses magnets to treat water, is disclosed. The raw water is introduced from an inlet and magnetized by the magnetic field generated from a magnet group outside the inner cylinder. The raw water receives an alternating field at right angle to the raw water flow, hence free electrons are generated in the water, and the Ca ion and Na ion are activated. The treated water, leaving the inner cylinder, is sent downward between the inner cylinder and outer cylinder, passes upward through a filter medium, hence various minerals are eluted, and the impurities, trihalomethane, chlorine, malodorous matter, etc., are removed. Another patent describing water filtering is JP60094190, which describes a method for purifying and activating water using 3 different columns. An activating tank is constructed with a stainless steel wall housing a purification/activation tank, and is provided with an inlet of water at its bottom and an outlet of treated water at its top. The purification/activation tank is constituted of a desalting column, an activating column, and a magnetic column. The desalting column is packed with calcareous ceramic particles, which adsorb free chlorine remaining in the water and decompose combined chlorine. The activating column is packed with inorganic. or organic. particles such as oolite, active carbon, etc. which activate water and remove decomposed chlorine by adsorption. In the activating column, magnetic balls are packed which make the quality of water milder. A device, for preventing lime scale and rust deposits in water pipes, is disclosed in patent DE4220105. The apparatus consists of a pot which is inserted in the water pipe and which contains a replaceable filter comprising a filter sleeve surrounding a filter tube. A detachable stationary bar magnet which produces a magnetic fields is inserted in the filter tube. The pot is made of steel or is surrounded by a steel casing for intensifying the magnetic fields and has a removable lid provided with water inlet and outlet connections. The bar magnet may consist of a series of magnets with intermediate pole plates, fitted in a brass housing. Another patent, JP2000271572, discloses an embodiment where a magnetic treatment of a large amount of liquid is achieved by setting a magnetic cage in a way that a magnetic field from a permanent magnet is made to cross the filtered liquid.

SUMMARY OF THE INVENTION

[0012] There is thus provided, in accordance with some preferred embodiments of the present invention, a system for purifying or filtering liquids, the system comprising:

[0013] a conduit with a central bore, where the liquid pass through;

and an oscillating magnetic field, enclosing the central bore, used to magnetize the liquid.

[0014] Furthermore, in accordance with some preferred embodiments of the present invention, the oscillating magnetic field comprises one or more magnetic components, wherein each of said magnetic components includes at least two magnet elements, separated by one or more resilient elements.

[0015] Furthermore, in accordance with some preferred embodiments of the present invention, each magnetic component includes at least two magnet elements, and at least one spring spacer.

[0016] Furthermore, in accordance with some preferred embodiments of the present invention, each magnetic component includes two magnet elements, and three spring spacers.

[0017] Furthermore, in accordance with some preferred embodiments of the present invention, each magnetic component is packed in a housing.

[0018] Furthermore, in accordance with some preferred embodiments of the present invention, the magnetic components are located around the central bore.

[0019] Furthermore, in accordance with some preferred embodiments of the present invention, adjacent magnetic elements comprise magnets with same poles facing.

[0020] Furthermore, in accordance with some preferred embodiments of the present invention, adjacent magnetic elements comprise magnets with opposite poles facing.

[0021] Furthermore, in accordance with some preferred embodiments of the present invention, the system is provided with a filter.

[0022] Furthermore, in accordance with some preferred embodiments of the present invention, the filter is in a shape of a cylinder surface.

[0023] Furthermore, in accordance with some preferred embodiments of the present invention, the filter is located externally to the magnetic components.

[0024] Furthermore, in accordance with some preferred embodiments of the present invention, the filter is located internally to the magnetic components.

[0025] Furthermore, in accordance with some preferred embodiments of the present invention, the conduit comprises a flow control element for forcing a flow back and forth through the magnetic field.

[0026] Furthermore, in accordance with some preferred embodiments of the present invention, the flow control element comprises a body with a central bore with an inlet port through which liquid may enter the central bore, and one or more lateral passageways, directing the liquid through channels substantially parallel to the central bore.

[0027] Furthermore, in accordance with some preferred embodiments of the present invention, the channels comprise external grooves on the flow control element.

[0028] Furthermore, in accordance with some preferred embodiments of the present invention, the magnetic field is generated by magnetic elements incorporated in the flow control element.

[0029] Furthermore, in accordance with some preferred embodiments of the present invention, the conduit comprises a closed flow control element for forcing a flow back and forth through the magnetic field, while the closed flow control element comprises two or more integrated containers, which contain one another, and an inner container comprises a central bore with an inlet port through which liquid may enter the central bore, and each one of the other containers comprises one or more lateral passageways, directing the liquid through channels substantially parallel to the central bore, and an outer container which comprises liquid outlets directing the liquid out of the closed flow control element.

[0030] Furthermore, in accordance with some preferred embodiments of the present invention, the oscillating magnetic field is incorporated in the closed flow control element.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] In order to better understand the present invention, and appreciate its practical applications, the following Figures are provided and referenced hereafter. It should be noted that the Figures are given as examples only and in no way limit the scope of the invention. Like components are denoted by like reference numerals.

[0032] Fig. 1 is a drawing showing a filter housing of a magnetized filtering device, according to a preferred embodiment of the present invention.

[0033] Fig. 2 is an exploded view of a magnetized filtering device with a filter core, according to a preferred embodiment of the present invention.

[0034] Fig. 3 is a drawing of the filter core.

[0035] Fig. 4 is a drawing of a filter core, according to another preferred embodiment of the present invention.

[0036] Fig. 5 is a drawing of a magnet assembly according to a preferred embodiment of the present invention.

[0037] Fig. 6 is a cross section drawing (along AA, figure 7) of a filter core.

[0038] Fig. 7 top view of a filter core.

[0039] Fig. 8 is a cross section drawing of a filter housing with a filter core.

[0040] Fig. 9 is a drawing of a filter with a cooling system.

[0041] Fig. 10 is a drawing of a filter with a heating system.

[0042] Fig. 11 is a drawing of another embodiment of a filter with a cooling system.

[0043] Fig. 12 is a drawing of another embodiment of a filter with a heating system.

[0044] Fig. 13 is a drawing of another embodiment of a filter using a power source.

[0045] Fig. 14 is an exploded view of a filter core with improved flow control, in accordance with another preferred embodiment of the present invention.

[0046] Fig. 15 is a cross section drawing of a filter core with improved flow control, in accordance with another preferred embodiment of the present invention.

[0047] Figure 16a illustrates a top view of the flow control element shown in Fig. 14, with two cross section lines relating to the following figures.

[0048] Figure 16b illustrates a cross sectional view of the flow control element across line A-A.

[0049] Figure 16c illustrates a cross sectional view of the flow control element across line B-B.

[0050] Figure 16d illustrates a side view of the flow control element.

[0051] Figure 16e is an elevated (isometric) view of the flow control element.

[0052] Figure 17a illustrates an isometric view of another preferred embodiment of a magnetized filtering device in accordance with the present invention comprising a closed flow control element integrated with the magnetic components.

[0053] Figure 17b illustrates a top view of the magnetized filtering device shown in Figure 17a, with two cross section lines relating to the following figures.

[0054] Figure 17c illustrates a cross sectional view of the magnetized filtering device shown in Figure 17a, across line A-A.

[0055] Figure 17d illustrates a cross sectional view of the magnetized filtering device shown in Figure 17a, across line B-B.

[0056] Figure 17e illustrates a top view of the magnetized filtering device shown in Figure 17a.

[0057] Figure 18 illustrates a common boiler device comprising the magnetized filtering device shown in Figure 17a.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0058] The disclosed filtering system and method use a multi step filtering scheme, which includes several approaches, and can be applied to different liquids such as water, milk, oil, fuel, sewer. The system uses a filtering element to filter out unwanted particles, together with a dynamic magnetic force field, which further purifies and improves the quality of the filtered liquid.

[0059] More specifically, a preferred embodiment of the filter housing system (21) is shown in figure 1. The entire filtering system is enclosed in a housing (21), which includes a container (20) and a covering cap (25). The housing can be made of any substance which is durable to out-side weather, and does not react with a magnetic field. An example of such a material is polycarbonate, stainless steel, copper. Combinations of several materials are possible as well. A tightening ring (28) helps obtain a hermetic binding between the container and cap, to prevent leakage. The cap includes an inlet port (24) which leads the liquid to be filtered into the system, and an outlet port (26), which leads the filtered liquid out of the system. At the bottom of the housing a ball valve (22) enables flushing the unwanted deposits periodically through a deposit outlet (30).

[0060] Figure 2 shows an example of the location of the filter core (35) in an open housing. The filter core includes several elements, which actually purify and filter the liquid. The filter core in this specific embodiment includes a supporting ring (36), which holds 4 magnet housings in a shape of columns (32). Each of these column housings encloses a magnetic component, to be detailed later. The ring (36) also supports an inner cylindrical mesh filtering element (34). The mesh filter has a typical pore size of 50 microns, and is responsible of filtering out particles, which are larger than 50 microns (the pore size may

vary). The mesh filter itself is made of a durable substance, which does not react with the magnetic field, for example a stainless steel gauze filter. In this specific embodiment the liquid enters through the inlet port (24), into the central bore (38). In the central bore the liquid is exposed to a magnetic field, originating from magnet components located in the magnet housing columns (32). The magnetized liquid flows through the inner mesh filter (34) into the peripheral cavity (39) in the container (20). Thus the liquid has undergone a two-step filtering process, one by a mesh-grid and the other by a magnetic field. From the peripheral cavity the purified and filtered liquid continues its flow to the outlet port (26). It should be pointed out that the flow direction can be reversed, in other words the liquid may flow to the filtering system through the filtering element, then flow to the central bore, while passing through the magnetic field, and then to the outlet port. Periodically the system should be cleaned: the deposit matter, accumulated at the bottom of the container (20), should be flushed out using the ball valve (22) through the deposit outlet (30). The mesh filter should be removed by opening the tightening ring (28) and disassembling the container from the covering cap. The filter can then be washed and returned back to its place. Alternatively an automatic valve can be used instead of the ball valve, enabling automatic release of the deposit of the accumulated deposit matter, when enough pressure is built. Alternatively, the automatic valve can be programmed to open periodically.

[0061] Figure 3 shows a specific embodiment of the filter core (35). In this embodiment, two supporting rings (36) hold four column housings, each of them enclosing a magnetic component, to be detailed later, and an inner cylindrically shaped mesh filter (34). The mesh filter is located in such a way that the four magnetic housings (32) surround it from the outside. The uniform distribution of the magnet systems around the central bore (38), where the liquid flows through, ensures that liquid particles pass through the magnetic field before they leave the system.

[0062] An alternative embodiment for the filter core (35) can be seen in figure 4. In this embodiment the supporting rings (36) hold only the four columned magnet housings (32). A separate cage structure (40) supports the cylindrical mesh filter (33). The cage structure (40) is positioned externally to the column shaped magnet housings (32), in such a way that it surrounds them.

[0063] Other embodiments may include different types of filter elements, passive, such as the mesh filter or ring-shaped filter, or active, such as filters comprising activated charcoal, dolomite, clinoptilolite, zeolites, alumina or cation exchanger or the combination of such filter elements thereof. A square, rectangle, spiral or multi-step filter can be used instead of the cylindrical mesh filter shown in figures 2, 3 and 4. The size of the mesh filter pores can be selected according to the specific requirements from the filtering system.

[0064] Other embodiment of the filter core (35), which enables an improved flow control, is shown in figure 14. In this embodiment the filter core (35) includes a flow control element (83), which is designed to force the liquid to flow back and forth substantially parallel through the flow control element, so that the magnetic field of the magnets is maintained substantially aligned with the flow. The flow control element is enclosed by an external cylindrical mesh filter (33), which is supported by a cage structure (40). The flow control element (83) includes an optional four inner magnet bores (93), in which the magnet elements are placed. This specific embodiment is also provided with two optional gaskets (85) serving to ensure that the liquid passes through the mesh filter. The gaskets (85) are typically made from a compressible material such as rubber or silicon, and in compliance with the specific liquid characteristics and system requirements. It is recommended to use gaskets also in the other embodiments shown herein, which is, of course, elementary to persons skilled in the art.

[0065] A cross section drawing of a filter core (35) embodiment according to the present invention is illustrated in figure 15. The flow control element (83) includes an inlet port (87), which leads the liquid into the central bore (38a) of the flow control element. The liquid flows through the central bore (38a), where it is subjected to the magnetic field generated by the magnet component. The liquid then flows out of the flow control element (83) through at least one liquid passageway (89). The liquid passageway is an opening in the side panel of the flow control element (83) located near the far end of the flow control element opposite the inlet port (87). The liquid passageways lead the liquid into channels (91) engraved on the external surface of the flow control element (83). The liquid channels are narrow channels, which sprawl externally along the side of the flow control element (83). The liquid channels (91) create a space between the flow control element (83) and the

cylindrical mesh filter (33) in which the liquid is allowed to flow just before it meets the mesh filter. The above described characteristics of the flow control element (83) grant an improved liquid flow control by redirecting the liquid flow from the inlet port (87), through the passageways (89), to the liquid channels (91) and out through the mesh filter (33). Thus, the liquid is forced to flow in an aligned manner with respect to the magnetic field, facilitating maximal magnetic influence on the liquid. Additionally, as the liquid is made to substantially pass through the magnetic field back and forth, before it is let out of the filtering system, the time during which the liquid is affected by the magnetic field is greatly prolonged, thus improving the filtering process.

[0066] Figure 16a illustrates a top view of the flow control element shown in Fig. 14, with two cross section lines relating to the following figures.

[0067] Figure 16b illustrates a cross sectional view of the flow control element shown in Fig. 14 across line A-A. The flow control element includes inner magnet bores (93), sprawling along the wall surrounding the central bore of the flow control element (38a). Thus, liquid enters through the inlet port (87), flows in alignment with the magnetic field of the magnet elements placed inside the inner magnet bores (93), and out of the flow control element through the liquid passageways (89).

[0068] Figure 16c illustrates a cross sectional view of the flow control element across line B-B. This figure illustrates the flow control element liquid passageways (89) and liquid channels (91). As mentioned above, liquid enters the flow control element through the inlet port (87), flows along the central bore (38a), and let out through the liquid passageways (89). Then, the liquid passageways (89) direct the liquid flow to the liquid channels (93).

[0069] Figure 16d illustrates a side view of the flow control element. The liquid passageways (89) lead the liquid out of the flow control element and into the liquid channels (91).

[0070] Figure 16e is an elevated (isometric) view of the flow control element. This embodiment includes four magnet bores (93), four liquid passageways (89) and four liquid channels (91). Using more than one liquid passageway (89), and placing them in a uniform

distribution around the central bore (38a) of the flow control element, distributes the liquid pressure inside the filtering system providing a better flow control.

[0071] The number of liquid passageways (89) and liquid channels (91) can vary according to the specific filtering system requirements. The magnet elements can be placed externally to the flow control element (83) or incorporated in the flow control element as described above. The gaskets (85) can be formed in different shapes' like 'L' or 'U' shapes, and can be placed externally to the flow control element (83) or incorporated in it.

[0072] A specific embodiment of the magnetic system is detailed in figure 5. In this embodiment, there are four identical magnetic components (46). Each magnetic component includes 2 strong magnetic elements (50) and 3 spacers (48). In a preferred embodiment, the magnetic elements are made from Neodymium, and the spacers are springs. In a preferred embodiment the two magnet elements are aligned with opposing poles. This means that the North Pole of one magnetic element faces a North Pole of the other magnet. The two magnets repel each other, therefore trying to move away from each other. However the spring forces them back towards each other. The result is an oscillating magnetic field, which provides better coverage of the filter area, as well as enhanced magnetization of the water. Thus the oscillating magnetic field improves the filtering performance of the system. Alternatively the magnets are aligned with opposite poles facing each other. The magnets are attracted but the spring repels them, allowing them to vibrate, forming an oscillating magnetic field.

[0073] The number of the magnetic elements can vary according to the specific requirements relating to the filtering system. The oscillating magnetic field can be generated by various types of magnetic field sources, and by various types of magnetic components such as bipolar magnetic elements, monopoles or blumlein-pola.

[0074] A cross section view, along line A-A (figure 7), of the housing (21) with the filter core (35) can be seen in figure 6. A more detailed view of the same cross section is presented in figure 8.

[0075] Any of the embodiments disclosed, can be combined with an environmental control system. The environmental control system is usually designed to maintain a specified

temperature within the filter, thus providing water at any predefined temperature, according to the user's preference. To enhance the effect of the temperature control, the filter housing is made from a heat conducting material such as stainless-steel, and an insulating layer is added to prevent unwanted heat transfer. An example of a filtering system, which includes a cooling system (70), is shown in figures 9 and 11. Cooling tubing (62) encloses the filter housing (26). The tubing (62) is connected to a compressor (64), and to a power source of any type (not shown in the drawing). An insulating layer (60) surrounds the entire system. In the present embodiment the cooling tubing is spirally shaped, but other embodiments are possible. Figure 11 shows a cooled filtering system with an automatic valve (57) and timer (72), to enable automatic flushing of the unwanted deposits periodically through a deposit outlet.

[0076] Another embodiment, which discloses an environmental controlled filtering system, is shown in figures 10 and 12. In this embodiment a heating system (80) is added to the filtering system. The heating of the water is done using a heating element (82), and an insulating layer (60). Figure 12 shows a heated filtering system with an automatic valve (57) and timer (72), to enable automatic flushing of the unwanted deposits periodically through a deposit outlet. The heated magnetic filtering system can be integrated with a boiler. The integration of the systems can be done by inserting the filtering system inside a boiler, or by installing the system, or even just the magnet system, externally to a boiler. Similarly, instead of, or additionally to the boiler the filtering system or solely the magnet components may be installed cooperatively with a cooler system.

[0077] Figure 13 discloses another embodiment of the present invention. In this embodiment the four column shaped magnet housings (32) are made from an electrical conducting material, and are electrically connected (78) to a power source, which can be an AC and/or a DC power source of any type. The electric current, further enhances the filters capabilities to purify the water.

[0078] Another preferred embodiment of a filtering system in accordance with the present invention comprising a closed flow control element, which enables an improved flow

control, integrated with the magnetic components (46), is shown in figures 17a, 17b, 17c, 17d and 17e (95).

[0079] Figure 17a illustrates an isometric view of the filtering system (95). The closed flow control element (henceforth indicated (95) as well) comprises an inner container (105) and an outer container (107). The closed flow control element further comprises magnet bores (93) (four in this specific embodiment) and liquid outlets (99) (also four in this specific embodiment). The liquid outlets are arranged so that in between every two magnetic bores there is one liquid outlet. The closed flow control element (95) in the specific embodiment shown in this figure comprises liquid passageway plugs (97). These plugs seal bores which are made during the process of manufacturing of the liquid passageways (detailed hereinafter).

[0080] Figure 17b illustrates a top view of the filtering system shown in Figure 17a (95), with two cross section lines relating to the following figures.

[0081] Figure 17c illustrates a cross sectional view of the filtering system (95) shown in Figure 17a across line A-A. The closed flow control element (95) comprises two integrated containers, inner container (105) and outer container (107), while the outer container contains the inner container. The inner container comprises an inlet port (87) through which liquid enters to the closed flow control element. The liquid then flows through the central bore (38a), which extends along the lateral walls of the inner container. From the inner container, the liquid flows through the liquid passageways (89) to the inner liquid channels (91a), which are located in the outer container, in the peripheral cavity created between the outer container and the inner container lateral walls. The liquid flows out of the inner flow control element through the liquid outlets (99), which are placed each at the end of each inner liquid channel (91a).

[0082] Figure 17d illustrates a cross sectional view of the filtering system shown in Figure 17a across line B-B. The inner container (105) comprises liquid passageways (89), which are located at the end of the inner container, opposite to the inlet port (87). The outer container (107) comprises magnet bores (93). The magnet bores extend along the lateral walls of the outer container and are located in the peripheral cavity created between the

outer container and the inner container lateral walls. The magnetic components (46) are placed in the magnet bores. The magnet bores are sealed by magnet bore plugs (109) to prevent liquid and other substances from entering and contaminating or oxidizing the magnets.

[0083] Figure 17e illustrates a bottom view of the filtering system shown in Figure 17a. The outer container (107) in this specific embodiment comprises four liquid outlets (99) and four magnet-bore plugs (109) which seal four magnet bores accordingly. The magnet bores are placed so that each magnet bore lies between two liquid channels (91a) and each liquid channel is placed between two magnet bores. This uniform distribution of the magnet bores and the liquid channels assures a uniform and effective influence of the magnetic field on the liquid, while it flows through the closed flow control element.

[0084] The structure of the closed flow control element (95) ensures that the liquid inside it passes twice, back and forth, through the magnetic field created by the magnetic components (46) and in an aligned manner with respect to the magnetic field. By that, the closed flow control element renders a uniform and enhanced magnetic influence on the liquid.

[0085] The number of the magnet bores (93), liquid passageways (89), liquid outlets (99) and the inner liquid channels (91a) are determined according to the specific filtering system requirements. The liquid passageway plugs (97) are optional and the need for them depends on the production method of the closed flow control element. The magnet bore plugs (109) are optional as well. Any other element or method that would ensure the insulation of the magnetic components (46) and sealing of the magnet bores (93) would suffice.

[0086] The closed flow control element may comprise more than two integrated containers. Thus, liquid would pass through the magnetic field generated by the magnetic components more than twice, and so enhancing the influence of the magnetic field on the liquid flowing through the inner liquid channels (91a) in the different containers.

[0087] The filtering system (95) shown in figure 17a does not comprise a mesh filtering element or a housing. Thus, it is light and relatively low cost. A preferred usage for this

filtering system is in boilers designated for heating or cooling water in order to prevent formation of scale. It also may be incorporated in swimming pools filters.

[0088] Figure 18 illustrates an application of the filtering system (95) shown in figure 17a in a common boiler (101). The main water supply pipe (103) of the boiler is connected to the inlet port (87), which is located in the inner container (105) of the filtering system (95). Thus, water, which flows into the boiler through the main water supply pipe, flows right into the filtering system through the inlet port. The main water supply pipe and the inner container (105) of the filtering system are joined together in a way that water can not flow into the boiler without first passing through the filtering system. The water then flows out of the filtering system through the liquid outlets (99), which are located at the outer container (107) and right into the boiler.

[0089] Furthermore, in this application, the filtering system functions as a flow restrictor of the boiler as well.

[0090] It is optional to add a slow release mechanism to a filtering system according to the present invention designated for filtering water in order to release different kinds of minerals or vitamins or other substances to the water flow. Minerals and vitamins such as natural medicinal stone, silica, magnesium or vitamin C, are believed to impart water a therapeutic effect and to induce into it a natural anti-bacterial and anti-fungal property.

[0091] The described embodiments, as well as other possible embodiments, can be used for many applications. Although throughout this specification liquid was mentioned as the substance, which is filtered by the device of the present invention, other liquid may also be subjected to filtering by a device in accordance with the present invention. The device of the present invention can be used for filtering liquids, such as: drinking water, sewage, waste water from industrial factories, engine oil, fuel, alternative fuels such as bio-fuels, bio-diesel, and bioethanol, wine and more. They can be also used for filtering gas (for example air) by installing them in air passageways, central air conditioning system, ventilation devices, air purifiers, various controlled internal spaces, gas systems etc' in various localities like public buildings, hospitals, private homes, shopping centers, industrial factories, vehicles and more. Furthermore, the described embodiment can be used for

various types of bio-refineries, as part of the production and filtering process for manufacturing organic fuels. Alternatively the system can be used to enrich liquids with oxygen for pond water used to grow fish.

[0092] Note that throughout the present specification the terms "filtering" and "purifying" include any modification of composition or constitution of matter that involves an act of separation, elimination, neutralization, seclusion, removal or exclusion of specific particles or specific substance. Also note that throughout the present specification the terms "top", "bottom", "upper", "lower" and other terms referring to directions are substitutable unless specifically indicated otherwise.

[0093] It should be clear that the description of the embodiments and attached Figures set forth in this specification serves only for a better understanding of the invention, without limiting its scope.

[0094] It should also be clear that a person skilled in the art, after reading the present specification could make adjustments or amendments to the attached Figures and above described embodiments that would still be covered by the present invention.

CLAIMS

1. A system for purifying or filtering a liquid, the system comprising:

a conduit with a central bore, where the liquid passes through;

and an oscillating magnetic field, enclosing a central bore, for magnetizing the liquid passing through.
2. The system of claim 1, wherein the oscillating magnetic field is generated by one or more magnetic components, wherein each of said magnetic components includes at least two magnet elements, separated by a resilient spacer.
3. The system of claim 2, wherein each magnetic component includes at least two magnet elements, and at least one spring spacer.
4. The system of claim 2, wherein each magnetic component includes two magnet elements, and three spring spacers.
5. The system of claim 2, wherein each magnetic component is packed in a housing.
6. The system of claim 5, wherein the housing is made from a conducting material, and is electrically connected to a power source.

7. The system of claim 2, wherein the magnetic components are located around the central bore.
8. The system of claim 2, wherein adjacent magnetic elements comprise magnets with same poles facing.
9. The system of claim 2, wherein adjacent magnetic elements comprise magnets with opposite poles facing.
10. The system of claim 1, further provided with a filter.
11. The system of claim 10, wherein the filter is in a shape of a cylinder surface.
12. The system of claim 10, wherein the filter is located externally to the magnetic components.
13. The system of claim 10, wherein the filter is located internally to the magnetic components.
14. The system of claim 10, wherein the system further comprises an environmental control system.
15. The system of claim 14, wherein the environmental control system is used to cool the filtered water.

16. The system of claim 14, wherein the environmental control system is used to heat the filtered water.
17. The system of claim 14, wherein the environmental control system is installed in conjunction with a boiler.
18. The system of claim 1, wherein the conduit comprises a flow control element for forcing a flow back and forth through the magnetic field.
19. The system of claim 18, wherein the flow control element comprises a body with a central bore with an inlet port through which liquid may enter the central bore, and one or more lateral passageways, directing the liquid through channels substantially parallel to the central bore.
20. The system of claim 19, wherein the channels comprise external grooves on the flow control element.
21. The system of claim 18, wherein the oscillating magnetic field is generated by magnetic elements incorporated in the flow control element.
22. The system of claim 1, wherein the conduit comprises a closed flow control element for forcing a flow back and forth through the magnetic field, wherein the closed flow control element comprises two or more integrated containers, which contain one another, and wherein an inner container comprises a central bore with an inlet port through which liquid may enter the central bore, and each one of the other containers comprises one or more lateral passageways, directing the liquid through channels substantially parallel to the central bore, and an outer container which comprises liquid outlets directing the liquid out of the closed flow control element.
23. The system of claim 22, wherein the oscillating magnetic field is incorporated in the closed flow control element.

24. The system of claim 23, integrated in a boiler and connected to a supply pipe through which liquid is introduced into the boiler.