April 14, 1936. E. M. LIEBERMAN 2,037,332

WATER SOFTENER

Filed Dec. 4, 1933

Fig. 1.

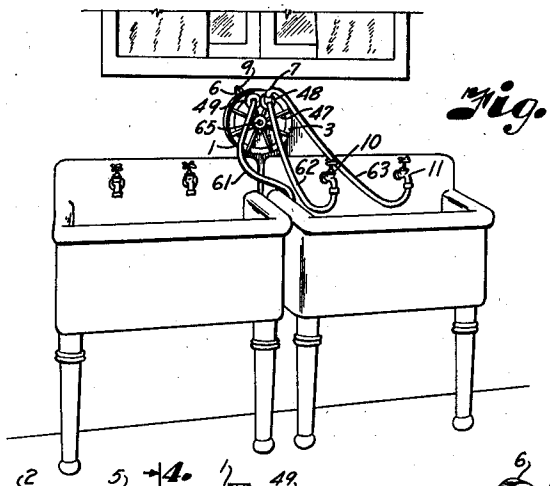


Fig. 2.

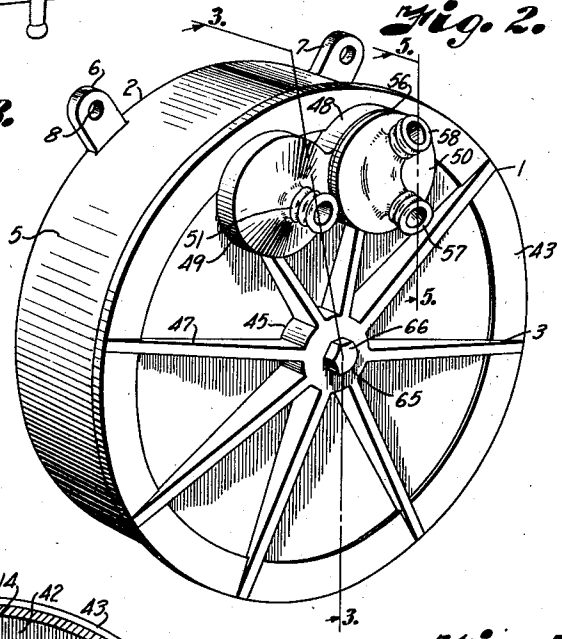


Fig. 3.

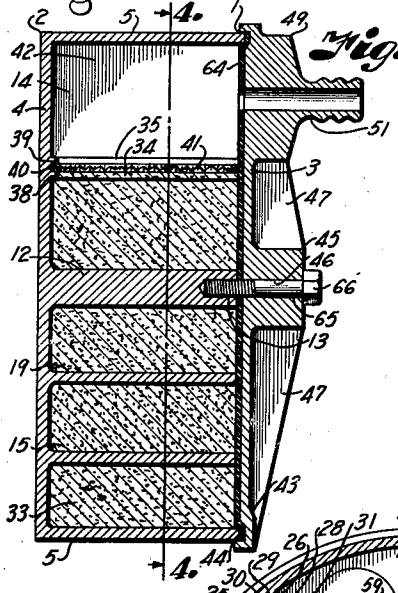


Fig. 4.

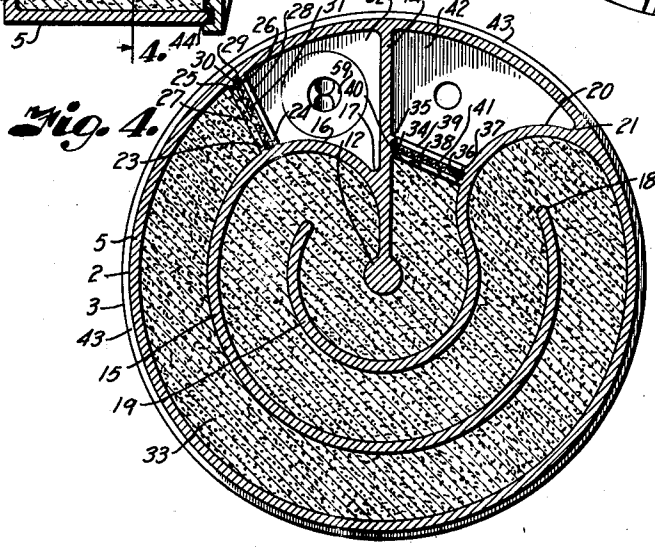
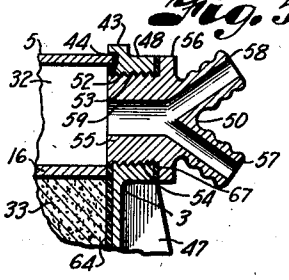


Fig. 5.



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2,037,332

WATER SOFTENER

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9 Claims. (Cl. 210—24)

This invention relates to water softeners and more particularly to those of the filter type employing a chemically reacting filter material such as zeolite and has for its principal object to provide a simple, inexpensive apparatus which may be readily connected to a water supply and which will effectively condition the water as it is delivered therethrough to a point of use.

Other important objects of the invention are to provide a portable apparatus that may be readily connected to both the hot and cold faucets, that is readily moved from one set of faucets to another, that has a water course of sufficient length to allow time for adequately treating the water, to provide a structure for facilitating regeneration of the zeolite, and to provide a water course wherein all of the zeolite is effective.

In accomplishing these and other objects of the invention, I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawing, wherein:

Fig. 1 is a perspective view of a water softener embodying the features of my invention and showing the connection thereof with the hot and cold water faucets of a laundry tub.

Fig. 2 is an enlarged detail perspective view of the water softener.

Fig. 3 is a cross sectional view through the water softener on the line 3—3, Fig. 2.

Fig. 4 is a sectional view on the line 4—4, Fig. 3.

Fig. 5 is a detail sectional view through the water inlet connection of the softener on the line 5—5, Fig. 2.

Referring more in detail to the drawing:

1 designates a cylindrical casing including a body section 2 and a cover section 3. The body section 2 includes a disk shaped rear wall 4 and an integral cylindrical side wall 5 having radially extending lugs 6 and 7 projecting therefrom in the plane of the rear wall 4, the lugs 6 and 7 being provided with suitable openings 8 for engaging fastening devices 9 whereby the casing may be supported on a wall, or other support, adjacent the hot and cold water faucets 10 and 11, as illustrated in Fig. 1.

Formed on the inner face of the rear wall 4 on the axis thereof and having slightly less length than the depth of the wall 5 is a cylindrically shaped post 12 provided at its outer end with an internally threaded socket 13 for securing the cover section, as later described. Also formed integrally with the body section at a point midway between the lugs 6 and 7 is a partition 14 connecting the inner face of the wall 5 with the post 12, as clearly illustrated in Fig. 4 to separate the ends of a water course that is formed within the body section, as now described. Formed concentrically with the outer wall 5 and spaced inwardly therefrom is an arcuate partition wall 15 having one end terminating in a substantially semi-cylindrical portion 16 that is integrally connected at a tangent with the partition 14, as at 17.

The opposite end 18 of the arcuate partition terminates short of the opposite face of the partition 14 a distance substantially equal to twice the width of the spacing between the partition 15 and the wall 5, as clearly shown in Fig. 4.

Also formed concentrically with the wall 5 and spaced midway between the partition 15 and the post 12 is an inner arcuate partition wall 19 having the end adjacent the terminal end 18 of the partition 15 terminating in a semi-circular reverse curve 20 formed on a radius of curvature generated from the terminal end of the partition 15 and tangentially connected with the inner face of the wall 5, as at 21.

The opposite end 22 of the inner arcuate partition wall terminates on the axis of the cylindrical portion 16 of the outer partition wall 15, whereby a continuous water course is formed having one end positioned on one side of the partition 14 and its opposite end terminating on the opposite side of the partition 14, as shown in Fig. 4.

Formed on the outer face of the outer partition 15 at a point adjacent its juncture with the portion 16 are spaced ribs 23 and 24 that cooperate with similar ribs 25 and 26 on the inner face of the outer wall and with like ribs 27 and 28 on the inner face of the rear wall 4 to provide a substantially U-shaped groove 29 therebetween for supporting the edges of a rectangular frame 30 which carries a screen 31.

The screen 31 is preferably of finer mesh than the particles of filter material that is to be employed in the apparatus and cooperates with the partition 14 to form the ends of an inlet chamber 32.

The frame 30 of the screen is of substantially the same length as the depth of the arcuate partition walls so that the water course is closed thereby to retain the water treating material 33 from entering the inlet chamber.

Formed on the face of the partition 14 on the side opposite to the inlet chamber are similarly spaced ribs 34 and 35 cooperating with ribs 36 and 37 formed on the outer face of the curved portion 20 of the inner partition and with ribs

38 and 39 formed on the inner face of the rear wall 4 to provide a channel shaped groove for accommodating a frame 40 carrying a screen 41 similar to the screen at the side of the inlet chamber previously described.

The screen 41 thus divides the end of the water course to form an outlet chamber 42 having approximately the same capacity as the inlet chamber 32.

The water course formed between the inner and outer arcuate partitions is completely filled with the water treating material such as zeolite, as shown in Fig. 3.

The cover section 3 includes a disk shaped casting of slightly larger diameter than the wall 5 of the body section to form an overlying rim 43 that is provided with an annular groove 44 to receive the projecting end face of the cylindrical wall 5 of the body section, as shown in Fig. 3.

Formed on the outer face of the cover section is an axial boss 45 having an opening 46 therethrough aligning with the socket 13 on the post 12 of the body section. The outer face of the cover section is further provided with radial ribs 47 connecting the boss 45 with the outer edges of the cover to stiffen and reinforce the cover and retain the inner face thereof in a plane parallel with the plane extending through the edges of the water course partition walls.

Also provided on the outer face of the cover and aligning with the inlet and outlet chambers respectively, are bosses 48 and 49 to mount inlet and outlet fittings 50 and 51. The boss 48 is provided with an opening 52 having internal threads 53 for engaging external threads 54 on the threaded base portion 55 of the inlet fitting 50. The inlet fitting 50 is also provided with a peripheral flange 56 adapted to clamp a gasket 67 against the end face of the boss 48 to prevent leakage therethrough.

Formed integrally with the body portion 55 of the fitting 50 are branch nipples 57 and 58 communicating with a common channel 59 formed in the axis of the body portion 55 and whereby both hot and cold water may be admitted to the inlet chamber, as hereinafter described.

The fitting 51 for the boss 49 may be formed integrally therewith and is provided with a hose 61 for dispensing the treated water delivered to the outlet chamber.

Water is admitted to the inlet chamber through hoses 62 and 63 that are connected with the branches 57 and 58 of the inlet fitting and to the hot and cold water faucets 10 and 11.

In assembling the water softener, the water course is filled with zeolite, after which a compressible gasket 64 is placed over the inner face of the cover, which is clamped tightly against the body section by a cap screw 65 extending through the opening 46 in the boss 45 and having a threaded shank engaging in the threaded socket of the post 12.

When the head 66 of the cap screw is drawn tightly against the inner face of the boss, the rim of the cover tightly wedges the gasket into sealing engagement with the peripheral edge of the outer wall 5 and the faces of the partitions forming the water course, so that when the water is admitted to the inlet chamber, it is made to flow completely through the tortuous course, as provided by the partitions.

In using the device, the casing is supported on the hooks 9 that are secured to a wall, or other support, adjacent the fixture at which the softener is to be used, for example, the wash tubs, as shown in Fig. 1.

The inlet branches 57 and 58 are then connected by the hoses 62 and 63 with the respective hot and cold water faucets and the faucets are opened to admit hot and cold water in desired proportions to the inlet chamber 32.

The water will flow through the screen 31 and through the water course between the wall 5 and the outer arcuate partition wall 15 to the end 18 thereof, thence between the inner and outer partition walls to the end 22 of the inner partition wall 19 and around the post 12 to the outlet chamber through the screen 41 from where it is delivered through the fitting 51 and hose 61 to the wash tub.

The hard constituents of the water will react with the zeolite during passage of the water through the water course and when the water is finally delivered to the inlet chamber, it will have been thoroughly treated thereby.

In case of a unitary hot and cold water faucet, the branch fitting 50 may be substituted by a single fitting similar to the outlet fitting 51.

After the softener has been in use for some time, the zeolite loses its water softening properties. It is then necessary to regenerate the zeolite.

This is accomplished by removing the screw fitting 50 and filling the inlet chamber with a quantity of revivifying material, such as salt. The fitting 50 will then be replaced and the hose connected with the water faucets. As soon as the water enters the inlet chamber, it forms a solution with the salt which is circulated through the water course to restore the water treating properties of the zeolite. After all of the salt has been washed from the inlet chamber, the zeolite is completely reconditioned and is ready to resume its water softening functions.

From the foregoing, it is apparent that I have provided a water softener which is simple and inexpensive to manufacture and which is readily connected to a water supply to effectively and efficiently condition water as it is delivered therethrough to a point of use.

It is also apparent that by the peculiar construction of the water course, there are no ineffective zones in the zeolite.

What I claim and desire to secure by Letters Patent is:

1. A device of the character described including a cylindrical casing, a partition connected with the cylindrical wall of the casing, radially spaced arcuate partitions each having opposed ends respectively connected with the cylindrical wall of the casing and with said first named partition and cooperating with the opposite ends of the respective arcuate partitions to form a tortuous water course about the axis of the casing, screen members extending transversely across the water course and spaced from the ends thereof to form inlet and outlet chambers, an inlet fitting connected with the inlet chamber, an outlet fitting connected with the outlet chamber, and a water treating material filling the water course between said screen members.

2. A device of the character described including a cylindrical casing having a radial partition and concentric arcuate partitions forming a tortuous water course in the casing, screens extending across the water course and spaced from the ends thereof to provide inlet and outlet cham-

bers, a water treating material filling the water course, an inlet fitting connected with the casing for admitting water to be treated into the inlet chamber, and an outlet fitting connected with the outlet chamber.

3. A device of the character described, a casing including an open side cylindrical body section provided with a central post and having arcuate partitions extending parallel to the axis of the body section to form a tortuous water course therein, a removable cover closing said open side of the body section, means carried by the cover for admitting water to be treated into one end of the water course, means carried by the cover for dispensing the water delivered at the opposite end of the water course and a cap screw extending through the removable cover and engaging the post to secure said cover to said body section.

4. A device of the character described including a cylindrical casing comprising a body section having a radial partition and concentric arcuate partitions forming a tortuous water course in the casing having an open side, screens extending across the water course and spaced from ends thereof to provide inlet and outlet chambers, a water treating material filling the water course, a cover section fixed to the body section to close the open side of the water course, an inlet fitting connected with the casing for admitting water to be treated into the inlet chamber, and an outlet fitting connected with the outlet chamber.

5. A device of the character described including a cylindrical casing having a radial partition and concentric arcuate partitions forming a tortuous water course in the casing, screens extending across the water course and spaced from the ends thereof to provide inlet and outlet chambers, a water treating material filling the water course, an inlet fitting connected with the casing having branches for admitting hot and cold water to be treated into the inlet chamber, and an outlet fitting connected with the outlet chamber.

6. In a device of the character described, a cylindrical casing including an open side body section, a partition connected with the cylindrical wall of the body section, radially spaced arcuate partitions in the body section each having opposed ends respectively connected with the cylindrical wall of the body section and with the first named partition and cooperating with the opposite ends of the respective arcuate partitions to form a tortuous water course therein, a removable cover section closing the open side of the body section, means extending axially through the cover and engaging the body section for clamping the cover to the body section, means carried by the cover for admitting water to be treated into one end of the water course, and means carried by the cover for dispensing the water delivered at the opposite end of the water course.

7. A device of the character described comprising a casing including a cylindrical body section having a cover securing post formed in the axis thereof, means in the body section forming a tortuous water course therein, screen members extending across the water course at the ends thereof to form inlet and outlet chambers, an inlet fitting connected with the inlet chamber, an outlet fitting connected with the outlet chamber, a water treating material filling the water course between said screen members, a cover for the body section, and a fastening device extending through the cover and into said post to clamp the cover to the body sections.

8. A device of the character described including a casing having a cylindrical wall and an integral end wall, a post formed in the casing on the axis thereof, a radial partition wall connecting the post with the cylindrical wall, inner and outer arcuate partition walls formed concentrically with the cylindrical wall, curved partition walls connecting the outer partition wall with the radial partition wall and the inner partition wall with the cylindrical wall to form a tortuous course in the casing, means forming inlet and outlet chambers at the ends of said course, a cover closing the side of the casing opposite said end wall, and means securing the cover to said post.

9. A device of the character described including a casing having a cylindrical wall and an integral end wall, a post formed in the casing on the axis thereof, a radial partition wall connecting the post with the cylindrical wall, inner and outer arcuate partition walls formed concentrically with the cylindrical wall, curved partition walls connecting the outer partition wall with the radial partition wall and the inner partition wall with the cylindrical wall to form a tortuous course in the casing, screens extending across said course and forming inlet and outlet chambers at the ends of said course, a cover closing the side of the casing opposite said end wall, and means securing the cover to said post.

EDGAR M. LIEBERMAN.