

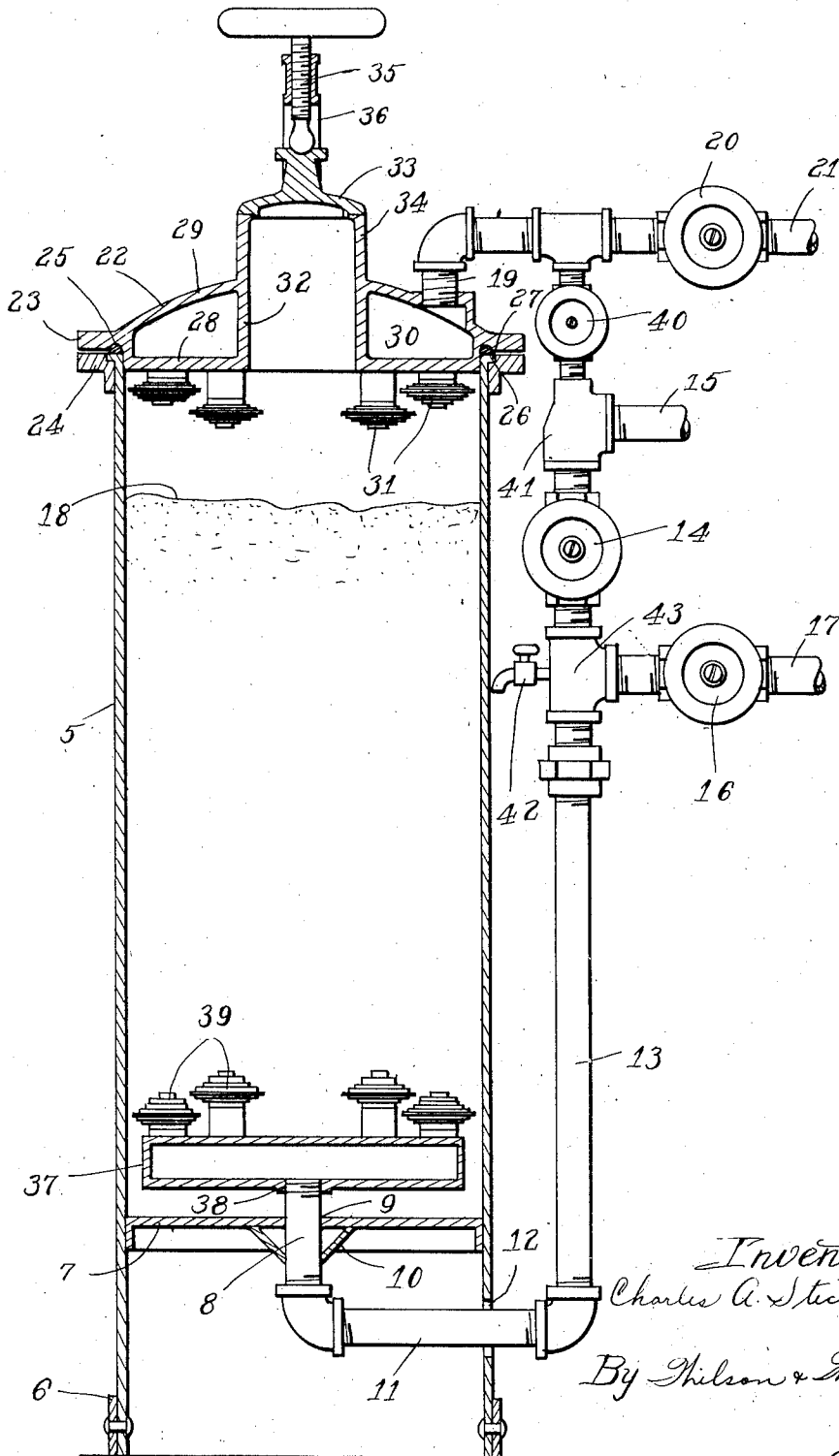
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HAND CONTROLLED WATER SOFTENER

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UNITED STATES PATENT OFFICE.

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HAND-CONTROLLED WATER SOFTENER.

Application filed April 18, 1927. Serial No. 184,520.

This invention relates to base-exchange water softeners and is more particularly devoted to the hand type such as are more commonly provided for domestic use where a low priced unit is desired.

The principal object of my invention is to provide a softener tank of improved construction enabling the building of a more compact unit than would otherwise be permitted, and one which is cheaper in manufacture, easier to assemble or disassemble, and likewise more convenient to service in regeneration.

The invention is illustrated in the accompanying drawing showing a vertical section through a hand controlled softener constructed as hereinafter described.

The softener comprises a tank 5 preferably of galvanized iron, or other suitable material, reinforced at the lower end by a rim 6 to form a proper base. The bottom 7 of the tank is riveted, welded, or otherwise suitably secured, to the side wall of the tank in elevated relation to the base, as shown, and receives an inlet pipe 8 at the center thereof. The latter is properly sealed at the joint 9 and braced, as indicated at 10, and has connection with a pipe 11 extending out through an opening 12 provided in the side wall of the tank just above the base. The pipe 11 is in turn connected with a pipe 13 communicating by way of a valve 14 with the hard water supply pipe 15. The pipe 13 also has connection through a valve 16 with the sewer by way of the waste pipe 17. The hard water supplied through the pipe 15 and injected into the softener through the pipe 8 passes upwardly through the bed of water softening material, indicated at 18, and is discharged through a pipe connection 19 and through valve 20 to the service system by way of the pipe 21. The details thus far generally described form a part of most zeolitic or base-exchange water softeners and no invention is, therefore, claimed therein, except only in so far as they contribute toward the novel construction and arrangement herein-after more fully described.

The top 22 of the tank with which the soft water outlet pipe 19 is connected constitutes a separable unit arranged for detachable mounting on the upper end of the tank. It is in the form of a hollow casting providing an annular flange 23 arranged to bolt down upon a rim 24 and compress a packing 25 therebetween to provide a fluid tight joint.

The rim 24, as shown, is in the form of a separate ring providing an annular groove 26 into which the upper edge of the side wall of the tank is flared or swedged, as indicated at 27. The packing 25 is preferably interposed directly between the flange 23 and the flared end 27 of the side wall of the tank to insure a good joint. The top 22 provides an inner wall 28 and an outer wall 29 in spaced relation to leave a head chamber 30 therebetween with which the soft water outlet pipe 19 communicates. A plurality of strainer heads or nozzles 31 conforming to the design described and claimed in my co-pending application, Serial No. 184,519, filed April 18, 1927, depend from the inner wall 28 and, as described in said application, permit the passage of water therethrough through the interstices between the disks of which the heads are composed, while preventing the exit of the material of the bed from the tank. The use of the strainer means in the top of the tank permits of a considerable reduction in the overall length of the tank as it avoids the necessity for any considerable head room or settling space above the bed of water softening material. This, is, of course, of great importance in the case of the household installations, particularly.

The top 22 also has cast as an integral part thereof a tubular neck 32 providing a passage through the top affording direct communication from the outside of the tank with the inside thereof so that salt or brine may be introduced in the tank when the softener is to be regenerated. The neck has a close fitting cap 33 fitting the protruding rim 34 thereof. The cap 33 is suitably pressed and held in place by a hand screw 35 operating in a yoke 36 suitably mounted on the top 22.

In the assembling of the softener, before the top 22 is put in place, a hollow injector head 37 is entered through the open top of the tank and threaded onto the pipe 8, as indicated at 38. The head 37 has strainer heads or nozzles 39, similar to the nozzles 31, mounted thereon. After the head 37 is in place the zeolite mineral is poured in up to about the level indicated and then the top is mounted on the tank, as previously described. Manifestly, the matter of assembling or disassembling is relieved of all complications and the construction is, furthermore, much simpler and cheaper to manufacture.

In operation, the hard water during the

normal softening operation is supplied through the pipe 15, passes downwardly through pipe 13 and into the tank through the pipes 11 and 8 and through the injector head 5 37 by way of the nozzles 39. The nozzles are provided of a suitable number uniformly spaced about the top of the head 37 and serve to distribute the incoming water uniformly throughout the cross-sectional area of the 10 bed for intimate contact with the mineral. The water leaving the upper end of the bed passes out through the nozzles 31, the mineral being retained by reason of the small interstices between the disks of the nozzles, and 15 passes out through the pipe 19 to the service system communicating with the pipe 21. During this operation the valves 14 and 20 are opened and the valve 16 is closed, as is also a valve 40 interposed between the supply 20 pipe 15 and the service pipe 21 at the reducer T fitting 41. After a capacity run of hard water when the softener requires regeneration, the valves 14 and 20 are closed, and the valve 16 communicating with the waste pipe 25 17 is opened. The cap 33 is then removed and the water in the tank commences to drain through the waste pipe. It is usually advisable to close the valve 16 when enough water has drained out of the tank to admit 30 the salt or brine without overflowing. After the salt or brine has been poured in the cap is replaced and the valve 16, assuming it has been closed, is reopened. Then the valve 40 is opened to admit hard water from the supply 35 pipe 15 into the top of the softener tank. This water is, of course, distributed uniformly through the nozzles 31 to all parts of the bed of water softening material and the salt or brine is washed with it downwardly 40 through the bed to cause the "base-exchange" chemical action to occur between the salt and the mineral so as to revive the latter. The

waste water containing the released calcium, magnesium, and other hardness taken from the bed leaves the softener by way of the nozzles 39 and is discharged to the sewer through 45 the waste pipe 17. Here again the nozzles 39 serve to retain the mineral by reason of the small interstices between the disks of the nozzles. The regeneration flow is continued for 50 a certain length of time until a test of the waste water shows that all of the salt has been washed through the bed. A bib or faucet 42 may be provided on the T fitting 43 for test purposes. As soon as the regeneration is 55 known to be completed the valves 16 and 40 are closed and the valves 14 and 20 are reopened and the softener is then ready to continue the normal softening operation.

I claim:

60 In a tank adapted for use as a water softener; a closure for one end of said tank, and means for detachably securing said closure to said tank whereby the tank proper on the one hand and the closure on the other are 65 separable units, said closure being preferably in the form of a hollow casting providing an inner wall and an outer wall in spaced relation, the inner wall serving as a strainer wall permitting the passage of fluid there- 70 through but preventing the exit of material from said tank while the outer wall has means connected therewith providing fluid communication with said tank, and an integrally 75 cast tubular neck connecting the outer wall with the inner wall and opening through both walls to afford direct communication from the outside of the tank with the inside thereof for the purpose described, and a closure for 80 said neck arranged to be opened when desired.

In witness of the foregoing I affix my signature.

CHARLES A. STICKNEY.