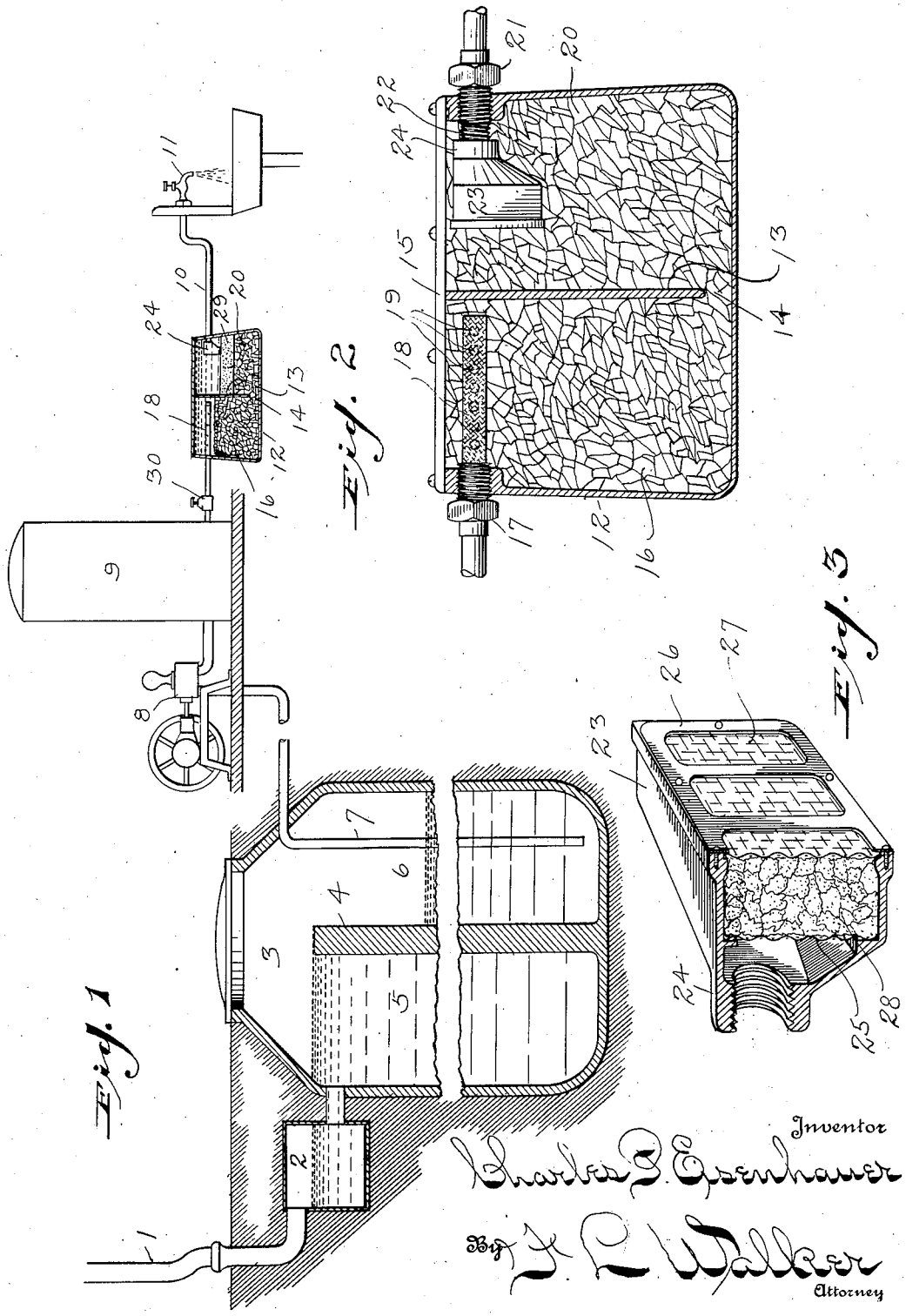
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FILTER

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# UNITED STATES PATENT OFFICE.

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## FILTER.

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My invention relates to a water distribution system and more particularly to a pneumatic pressure soft water system for residences and the like wherein rain water will be filtered and clarified under pressure for delivery through distribution lines and at the faucets.

In numerous localities wherein the natural water is impregnated with lime or other minerals and known as "hard" water it is the custom to collect rain water drained from the roofs into underground cisterns. This rain water is used for washing, bathing, and general cleansing purposes in preference to the natural or "hard" water in which soap will not lather because of its "hardness" or mineral contents. The drainage of such water from a roof carries with it more or less dust and dirt and particularly soot which may have been deposited upon the roof from adjacent chimneys. Although ordinarily such rain water is passed through a settling chamber and is filtered into the supply cistern much of the impurities are carried with the water in a state of suspension and the water becomes discolored.

In the present system of soft water supply there is provided intermediate the pressure tank and the discharge faucets a filter and clarifier through which the soft water supply is forced under pressure for the purpose of separating and removing any remaining impurities and for the purpose of clarifying the water by removing discoloration due to the particles of soot or other discoloring material which may be held in suspension.

The object of the invention is to simplify the structure as well as the means and mode of operation of such pneumatic pressure water supply systems whereby they will not only be cheapened in construction, but will be more efficient in use, positive in operation, uniform in action and unlikely to get out of repair.

A further and primary object of the invention is to provide in such pneumatic pressure system a separator and filter through which the water is forced under pressure to effect the removal and deposit of foreign material and coloring matter.

A further object of the invention is to provide a system wherein the water delivered at the faucets will be clarified and provide such clarifying means which will continue in operation for long periods of use without attention.

With the above primary and other incidental objects in view as will more fully appear in the specification the invention consists of the features of construction, the parts and combinations thereof, and the mode of operation or their equivalents as hereinafter described and set forth in the claims.

Referring to the accompanying drawings wherein is shown the preferred but obviously not necessarily the only form of the embodiment of the invention Fig. 1 is a general view, somewhat diagrammatic, of a soft water pneumatic pressure supply system in which the present invention has been embodied. Fig. 2 is a vertical sectional view of the separator or clarifying chamber through which the water supply is passed under pressure. Fig. 3 is a sectional perspective view of the poriferous filter forming the outlet of the clarifying chamber.

Like parts are indicated by similar characters of reference throughout the several views.

The soft water supply system as illustrated in Fig. 1 embodies the down spout 1 leading from the roof or rain collecting surface and discharging into a settling chamber 2. From the settling chamber 2 the water is discharged into the cistern or reservoir 3. These underground cisterns are ordinarily divided into separate compartments by an intermediate brick wall 4 which serves as a separator and through which the water percolates from the initial receiving compartment 5 into the supply compartment 6. The water supply is drawn from the compartment 6 through the suction pipe 7 by any suitable form of pump. In the present instance there has been shown a typical power pump as ordinarily used in cisterns of this character. The pump 8 delivers the water drawn from the cistern into a pressure tank 9. The pressure tank 9 contains a considerable volume of air in the upper portion or dome thereof which is placed under pressure by the entrance of water into the tank. The stored water in the tank 9 is discharged through the distribution line 10 and from the faucet 11 under pressure due to the volume of compressed air in the top of the tank 9. Even though the heavy particles of foreign

matter, dust and dirt are removed in the settling chamber 2 and by the percolation of the water through filter wall 4 the water supply remains discolored and dark due to the presence of soot and coloring matter in solution.

To remove such discoloration and clarify the water supply preparatory to its discharge through the distribution lines 10 and faucet 11 there is interposed in the system, preferably though not necessarily upon the high pressure side of the storage tank 9, a clarifying compartemnt 12. This purifier may however be interposed in the supply line between the pump 8 and the storage tank or to meet other conditions of use might be interposed in the suction line 7 between the cistern and the pump 8.

The water purifier 12 comprises a receptacle divided medially by a partition or wall 13 into two intercommunicating compartments. These compartments communicate one with another through a space or opening 14 adjacent to the bottom of the receptacle. The receptacle is provided with a removable lid or cover 15 by which access may be had for inspection and repairs and for recharging with purifying materials. The lid or closure is engaged with the receptacle by a hermetically sealed joint provided with a suitable gasket or packing means so that in effect the purifier 12 becomes a part of the water supply system through which the water may be discharged under pressure or if located upon the opposite side of the pump it may be drawn by suction. The initial compartment 16 of the clarifier is provided with a water inlet connection adjacent to the top of the receptacle. This consists of a union connection 17 screw threaded into the wall of the receptacle 12 and into which union connection in turn is threaded a perforated distributor pipe 18 having a plurality of orifices 19 distributed longitudinally upon the pipe. The end of this distributor pipe is preferably closed and the orifices 19 are screen covered by means of a section of woven wire screen or perforated sheet metal wrapt about the distributor pipe and secured thereto by soldering or otherwise.

Leading from the second compartment 20 of the purifier receptacle is an outlet connection comprising a union 21 for connection with the distribution line. This union 21 is screw threaded into the wall of the receptacle 12 and in turn receives the screw threaded connection 22 of a poriferous filtered chamber 23. This filter box or chamber comprises a housing open on its lateral inturned face and provided with a neck 24 for connection by the nipple 22 with the union or coupling 21. Located at a medial point within filter or housing 23 is a perforated diaphragm 25 preferably of screen material. The open face of the housing 23 is provided with a face plate 26 having enlarged screen covered openings or windows 27 therein. The plate 26 serves to support the screen 27. A similar apertured supporting plate is also preferably provided for the cover or screen diaphragm 25. The space intermediate the perforated diaphragms or screens 25 and 27 is packed with poriferous material. In practice sponge has been found quite practical and satisfactory for this purpose although other material of poriferous character may be used in lieu of the sponge.

The compartments 16 and 20 of the purifier are filled with porous material or water purifying chemicals. In practice these compartments are filled with "carbo-ash" or with charcoal. However in lieu thereof forms of porous clay, sand, minerals or chemicals are acceptable or other materials having the capabality for separating out and withholding the minute particles of foreign matter carried by the water while permitting the water to percolate or flow through such mass of purifying material under pressure. The water enters through the distributing inlet pipe 17 then passes downward through the compartment 16 percolating through the mass of separator material contained in such compartment and passes thence through the opening 15 at the bottom of the partition 13 and rises through the mass of separator material within the second compartment 20. The body 28 of poriferous material in the outlet filter 23 permits the free passage of the water therethrough but prevents any particles of the charcoal or other purifying and clarifying materials being carried from the receptacle 12 into the distribution line 10.

In Fig. 1 there is shown a slight modification wherein the compartments 16 and 20 are not completely filled with charcoal or other purifying or clarifying materials but a considerable space is left in the upper portion of the compartment 16 about the distribution pipe for a body of water to be purified and clarified and a like space is provided in the upper portion of the second compartment 20 for a supply quantity of treated water. Also in this instance the body of purifying and clarifying materials whether charcoal or otherwise in the second compartment 20 is overlaid with a stratum of sand 29 holding down the charcoal which is of light weight with tendency to float. In Fig. 2 the treatment material through which the water is percolated is held down or kept from floating by filling the receptacle to the top and compressing the material therein to greater or less degree by the application of the closure lid 15.

The screen covered distribution pipe 17 and the poriferous outlet filter 23 are readily

accessible for inspection or cleansing by removal of the cover lid 15 without the necessity of emptying the treatment material from the receptacle.

However by disconnection of the unions or couplings at the opposite side of the clarifier the entire receptacle may be removed from the distribution line to facilitate emptying and recharging the purifier. For this purpose a cutoff valve 30 is provided intermediate the pressure tank 9 and the clarifier 12.

While the invention has been described heretofore more particularly as a clarifier and purifier for a rain or soft water system to be installed on either the distribution side or the supply side of the pressure tank the same device may be applied to "hard" or natural water systems for the purpose of softening or neutralizing the mineral impregnated "hard" water. In such case the receptacle 12 would be charged with "zelites", soda ash, or chemical impregnated clays or materials which will have the effect of neutralizing or "breaking" the natural or "hard" water passing through the device.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific details shown, but that the means and construction herein disclosed comprises the preferred form of several modes of putting the invention into effect and the invention, is, therefore, claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:

1. A construction wherein water or the like is pumped from a source of supply and stored under pressure in a reservoir from which it is discharged under pressure though a distribution conduit to outlet faucets, characterized by a filter interposed in such system intermediate the pressure storage reservoir, and the outlet faucets, through which the water or the like is discharged under pressure comprising a box like container separated medially into two compartments intercommunicating at their bottoms, bodies of filter material in each of the compartments, a conduit connection between the reservoir and the top of one of the compartments through which the water or the like is admitted under pressure from the storage reservoir, and an outlet housing containing a body of poriferous material buried in the body of filter material adjacent to the top of the other compartment and connected to the outlet faucets.

2. In an apparatus of the character described, a filter box divided by a vertical partition into primary and secondary compartment intercommunicating with each other at their bottoms, bodies of filter material located in each of said chambers, a pressure tank, means for supplying water thereto under pressure, a conduit connection between said pressure tank and the upper portion of the primary compartment of the filter, an outlet housing embedded in and completely surrounded by the body of filter material in said secondary chamber, a body of poriferous material in said housing, and a valved conduit leading from the outlet housing in the secondary compartment.

3. In an apparatus of the character described, a filter chamber having inlet and outlet conduits, a body of filter material in the chamber, an enlarged housing communicating with the outlet conduit and projecting within the filter chamber, said housing being embedded in and surrounded by the body of filter material, a detachable face plate upon said housing comprising a marginal frame and transverse mullions dividing the face plate into a plurality of enlarged open spaces, a screen diaphragm located interiorly of the face plate and in contiguous relation thereto, and a body of poriferous material confined within said outlet housing independent of the filter body contained within the chamber.

4. The combination with a filter vessel having inlet and outlet orifices, a body of filter material substantially filling the vessel, of an outlet housing located within the vessel and buried within the body of filter material, said housing including a screw threaded tubular neck for engagement with the outlet orifice, a foraminous side wall for said housing, and a face plate overlying the foraminous side wall comprising a marginal frame and a plurality of transverse bars connected thereto and extending contiguous to the foraminous wall which is divided thereby into a plurality of separate areas, and a body of poriferous material confined within said housing by said foraminous wall.

In testimony whereof, I have hereunto set my hand this 18th day of July A. D. 1923.

CHARLES P. EISENHAUER.