Aug. 12, 1924. 1,504,329

O. EDELSTEIN

APPARATUS FOR BASE EXCHANGING SUBSTANCES

Filed Dec. 31, 1920 2 Sheets-Sheet 1

Fig. 2.

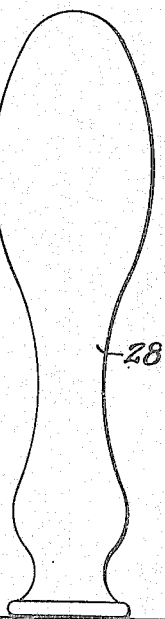


Fig. 1.

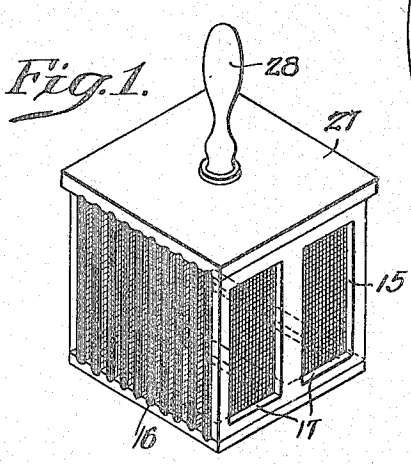
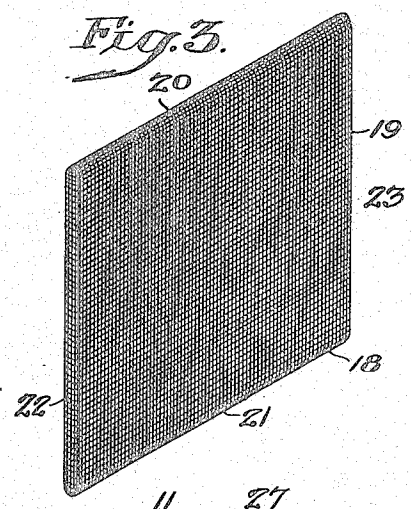
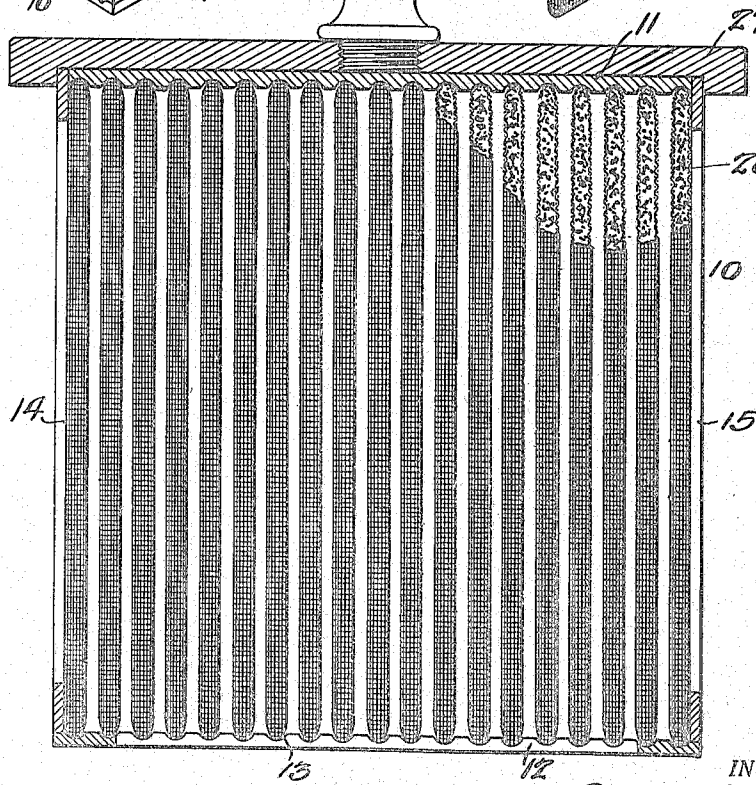


Fig. 3.





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Fig. 5.

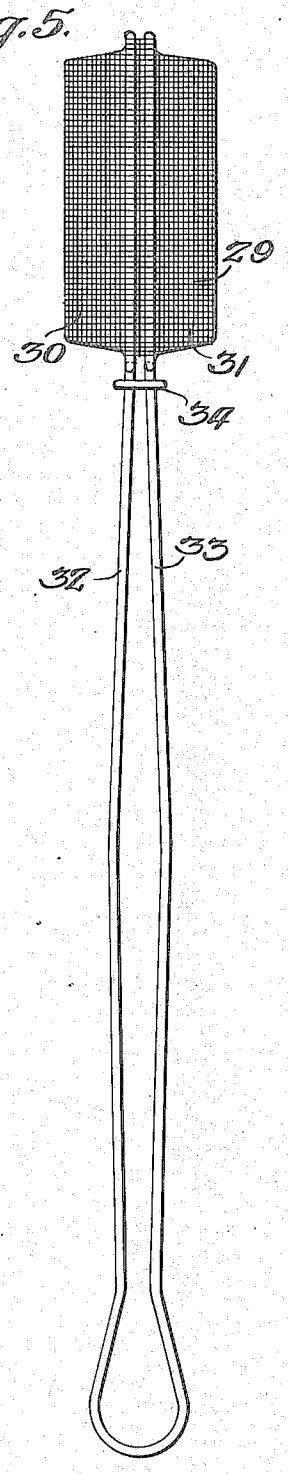


Fig. 6.

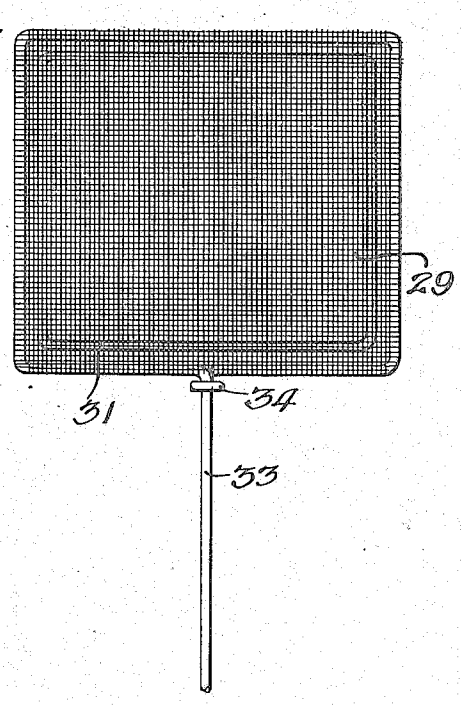
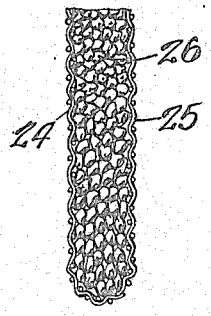


Fig. 4.



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Patented Aug. 12, 1924. 1,504,329

UNITED STATES PATENT OFFICE.

OSCAR EDELSTEIN, OF SHELTON, CONNECTICUT, ASSIGNOR TO AMERICAN ZEOLITE CORPORATION, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW YORK.

APPARATUS FOR BASE-EXCHANGING SUBSTANCES.

Application filed December 31, 1920. Serial No. 434,208.

To all whom it may concern:

Be it known that I, OSCAR EDELSTEIN, a citizen of the United States, residing at Shelton, in the county of Fairfield and State of Connecticut, have invented a certain new and useful Apparatus for Base-Exchanging Substances, of which the following is a specification.

My invention relates to water softeners of the base-exchanging silicate class and to methods of using them.

The purpose of my invention is to improve the convenience and completeness of contact of water with a base-exchanging body.

A further purpose is to support the base-exchanging body within a container having perforate walls and to move the container through the water.

A further purpose is to provide a convenient container permitting maximum contact of water with the silicate and to stir the water by means of the container.

A further purpose is to provide a preferably flat holder which is shallow enough to allow free access of the water to substantially the entire depth of the base-exchanging content.

A further purpose is to adapt the silicates to hand application in the home to water already drawn for domestic use.

A further purpose is to supply a hand operated frame adapted to hold a number of shallow containers, spacing the containers to allow free movement of water through them and through their contents.

A further purpose is to provide a shaker holder for base-exchanging material, within which the content may shake freely to give full access of water thereto.

My invention relates to the container, to the holder for individual containers, and to the methods or processes involved.

Further purposes will appear in the specification and in the claims.

I have preferred to illustrate my invention by but two types of containers and a holder in which a number of containers of the one type are assembled, among the many forms in which the invention may obviously be applied, selecting forms which are practical, efficient, convenient and inexpensive and which at the same time well illustrate the principles of my invention.

Figure 1 is a perspective view of a holder carrying a plurality of containers.

Figure 2 is an enlarged end elevation of the construction seen in Figure 1.

Figure 3 is a perspective view of a single container such as is shown in Figure 2, capable also of individual use.

Figure 4 is a fragmentary section of a flat or shallow container such as is seen in Figure 3.

Figure 5 is an end elevation of a container of the shaker type.

Figure 6 is a fragmentary side elevation of the structure seen in Figure 5.

In the drawings similar numerals indicate like parts.

In the treatment of water, to remove the hardening constituent, for example, silicates known as zeolites have been used, which have the property of exchanging their sodium for the calcium or magnesium of the constituent in the water until substantially all of the sodium has been substituted, thus breaking up the calcium and magnesium compounds in the water as long as the zeolites are effective. Many artificial substances having the general properties of zeolites have been invented which are described in various United States and foreign patents. Most of the base-exchanging substances are silicates; but my invention is suited for application with any base-exchanging substance.

It has been the practice to pass the water through beds of the sodium-base silicate until the silicate has ceased to act effectively through their change to calcium or magnesium-base silicate and then to regenerate by treatment with salt solution to resubstitute sodium for the base attracted, when the material can again be used for treatment of water in the filter bed.

In all of these uses the silicate used is not only stationary during the treatment of the water but lies in masses of such volume that the porosity of the bed is affected by packing of the grains of the silicate.

Since the silicate bed performs a filtering function also the grains become coated with impurities from the water. The packing and coating clog the passage of water through the bed and reduce the capacity as well as the efficiency. Channels also form in the bed and cause the silicate along the channels to become saturated with the exchanged base quickly so that it ceases to act upon the water with which it comes in con-

tact while other parts of the bed have been but little affected.

Continued flow of water through the bed results in some of the water going through substantially unaltered. Mechanical stirring only breaks up the grains and backwash interrupts the service, so that the various efforts to redistribute the silicate in the bed to make the silicate which is still effective more accessible have been open to these objections.

I have discovered that these and other objections to the passage of the water through a stationary bed of silicate may be overcome by moving the silicate through the water. I obtain much better control over the condition of the silicate, make it possible to bring the same water in contact with various parts of the silicate and stir the water by the application of the silicate.

One very desirable application of this invention occurs in home use where the water in buckets, tubs and basins can be treated, in situ, to great advantage.

I contemplate the movement of the silicate with respect to a body of water stationary in its entirety as distinguished from a stationary silicate and the flow of water through it. The movement is obtained preferably by waving or stirring within the water a container holding the material.

For convenience I will refer to all such materials as zeolites, notwithstanding that I recognize that some of the artificial silicates may not fall within the strict definition of this term.

In the character of container within which the zeolite may be held, I recognize that considerable variation is permissible, and without attempting to illustrate many of the different forms, I indicate this fact by showing three different ways in which the zeolite may be presented; by a flat form which is perhaps most aptly described as a pad, by a holder which may contain a number of the flat pad like containers and by a box form.

In Figure 1, I show a holder or carrier by which a large number of relatively flat containers may be so supported as to allow access of the water through and between them. In it the frame 10 is made up primarily of a top 11 and a bottom 12 which are grooved or otherwise prepared, as at 13, to receive the several elements (containers) and which are held together by any connecting portions such as the sides 14 and 15. The bottom is open at 16 and the sides are open as at 17 to allow full access of water through the bottom and sides to the contents of the container 18 here shown as of flat form.

The flat containers 18 as shown have perforated, apertured, porous or other foraminous walls for which a fine netting is suitable. It should be made of material free from attack by the water and content used. It is closed at the top 20, at the bottom 21 and at the ends 22 and 23 as by bending at one of these edges and brazing, soldering or intertwining the wires at the others. The two face walls 24 and 25 are separated far enough to allow for a suitable charge of content 26. I get excellent results by filling the container nearly full of the silicate, preferably leaving some room to permit rearrangement of the grains, and I make the distance between the two walls 24 and 25 short enough for the water to permeate from the two sides to the center with some freedom so that the entire body of silicate is accessible to the water which is to be treated by it and, for the same reason, its surface will be cleansed freely by the water within which it is used.

The container such as shown in Figure 3 may be used separately by hand for the treatment of small quantities of water without the complication and inconvenience of fixed filters. In the case of a considerable quantity of water such as is used for laundry purposes in the home it is desirable to use a number of containers or at least a larger quantity of content than would be readily accessible to the water if placed within a single container of the type shown, in which case the holder shown in Figure 2 for a considerable number of such containers may be used without sacrificing the advantages of hand operation.

In order to secure greater convenience in handling the holder shown in Figure 2, the body or frame is reinforced by the supplemental body 27 to which a handle 28 is secured. Obviously even with this form of holder a wide variety of available constructions can be used.

With large quantities of water mechanical support and movement of the silicate can, of course, be applied.

My invention is therefore suited for general use for water treatment, for softening or for other purposes, is well adapted to household use where existing means fails to satisfactorily supply the need, is free from the objectionable features of fixed-bed silicate plants and filters and is at the same time simple, convenient, effective and inexpensive. In Figures 5 and 6 I show a box 29 also of perforate material preferably of wire adapted to contain a considerable quantity of the silicate and in which the silicate does not fill the box. It is to be noted that even if the box were initially filled with fresh silicate a little use would result in losing enough finely divided silicate or in dissolving enough out—particularly if used in hot water—so that the remainder will shake freely in the box. This permits the water to permeate the mass freely and, by frequent rearrangement of the grains, se-

cure maximum treating effect from the silicate.

I provide for opening of the box to change the zeolite and find the most convenient method of this to be the division of box into halves 30 and 31 carried by handles 32 and 33, here shown as the two ends of a spring wire. The retainer 34 is shown as holding these halves in closed position.

The containers shown are not only portable, in the sense that they can be moved, but are very freely portable so as to be capable of hand support and hand use.

After use of the silicate has resulted in the base of the water treated displacing a large part of the sodium of the silicate the rate of base-exchange with the compounds in the water becomes so much reduced that it is necessary to replace the silicate or regenerate it, as by salt solution and the silicate may be treated in salt solution so as to bring it back to nearly its original state of efficiency in the treatment of the water. This regeneration is accomplished with a minimum of salt (N_aCl) since the silicate—now having a base of calcium or magnesium—can be brought in contact with all of the salt solution by stirring the silicate about in the salt solution, without necessity for removal from the container.

This use and regeneration may be repeated a large number of times before it becomes necessary or desirable to substitute a new lot of silicate. When this point is reached the container may be refilled or a new container with its zeolitic content may be used.

It will be obvious that my disclosure herein will suggest to those skilled in the art much more than the forms and applications used as illustrations, showing my process of treating a body of water which is stationary as a body and securing circulation by stirring; I propose protecting herein all of the various forms and methods which will be suggested hereby and which come within the fair spirit and scope of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A holder adapted for hand use and having separated spaces therein in combination with a plurality of flat packages open for the passage of water therethrough and a base-exchanging content in said packages, the packages fitting within the spaces and being separated thereby.

2. A plurality of flat open-walled packages each removable in its entirety, base exchanging material within the packages and a support for the packages holding them apart to allow water passage between them.

3. A holder for applying zeolites by hand to water which comprises opposed holding plates and flat containers extending from one plate to the other and spaced by the plates to give free access of liquid therebetween.

4. A plurality of flat foraminous containers for base-exchanging substance, in combination with a hand operated holder, therefor, which receives and spaces the containers to give free water access thereto.

OSCAR EDELSTEIN.