No. 776,550. PATENTED DEC. 6, 1904.

N. B. RICE.

FILTER.

APPLICATION FILED NOV. 16, 1899.

NO MODEL. 3 SHEETS—SHEET 1.

FIG. 1.

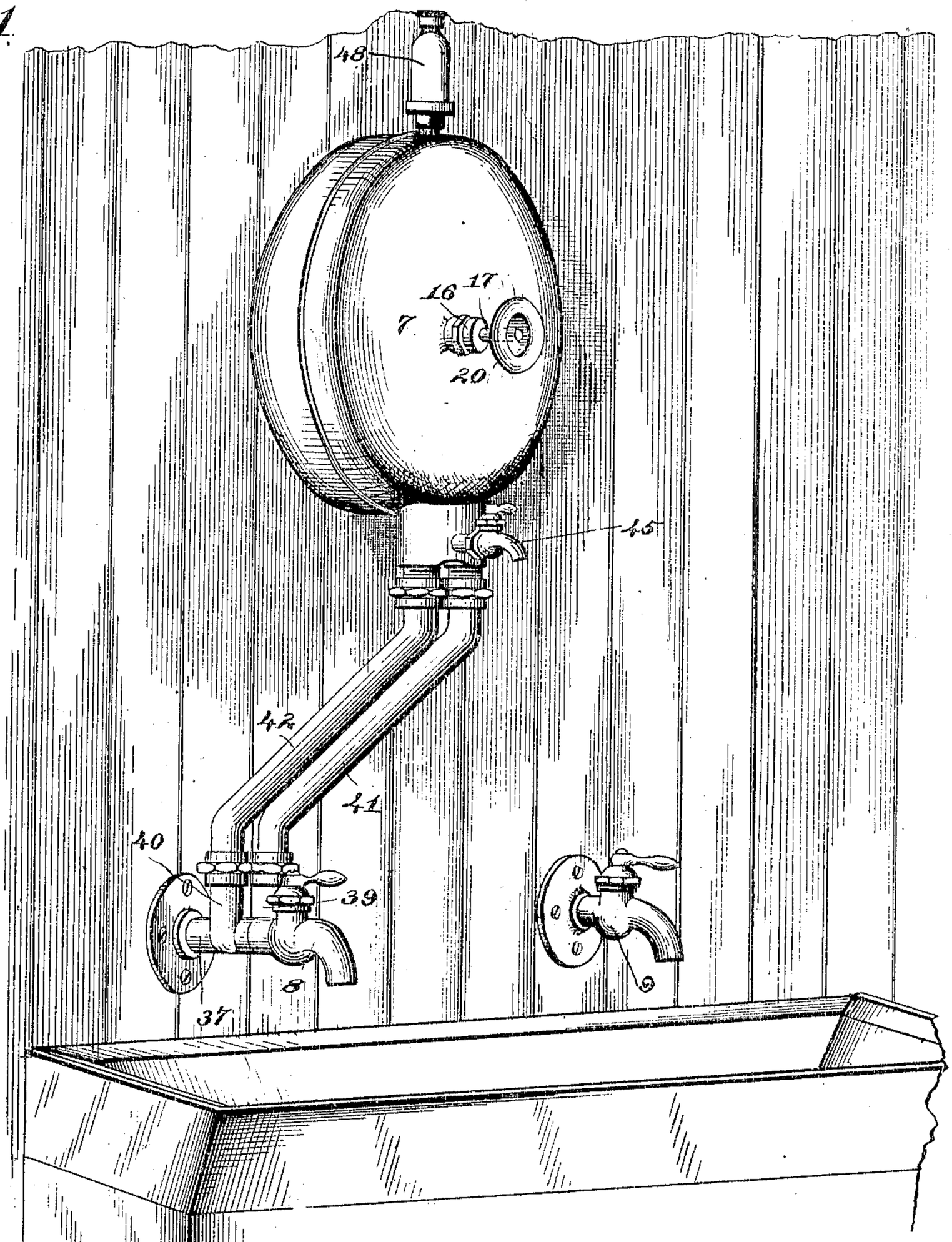
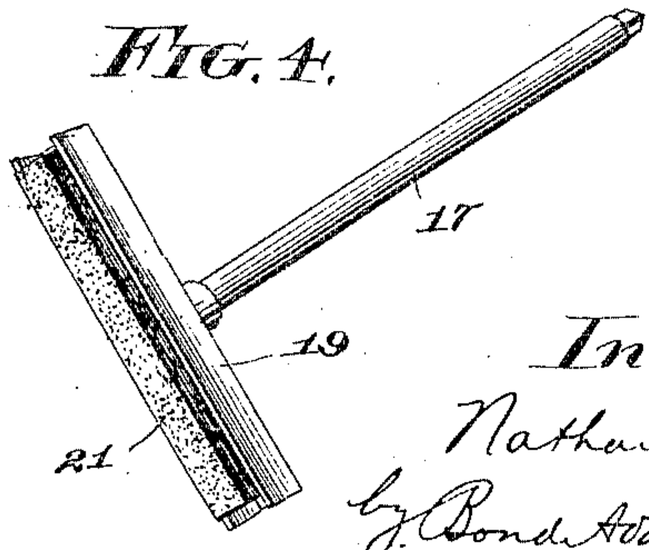


FIG. 4.



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NO MODEL. 3 SHEETS—SHEET 2.

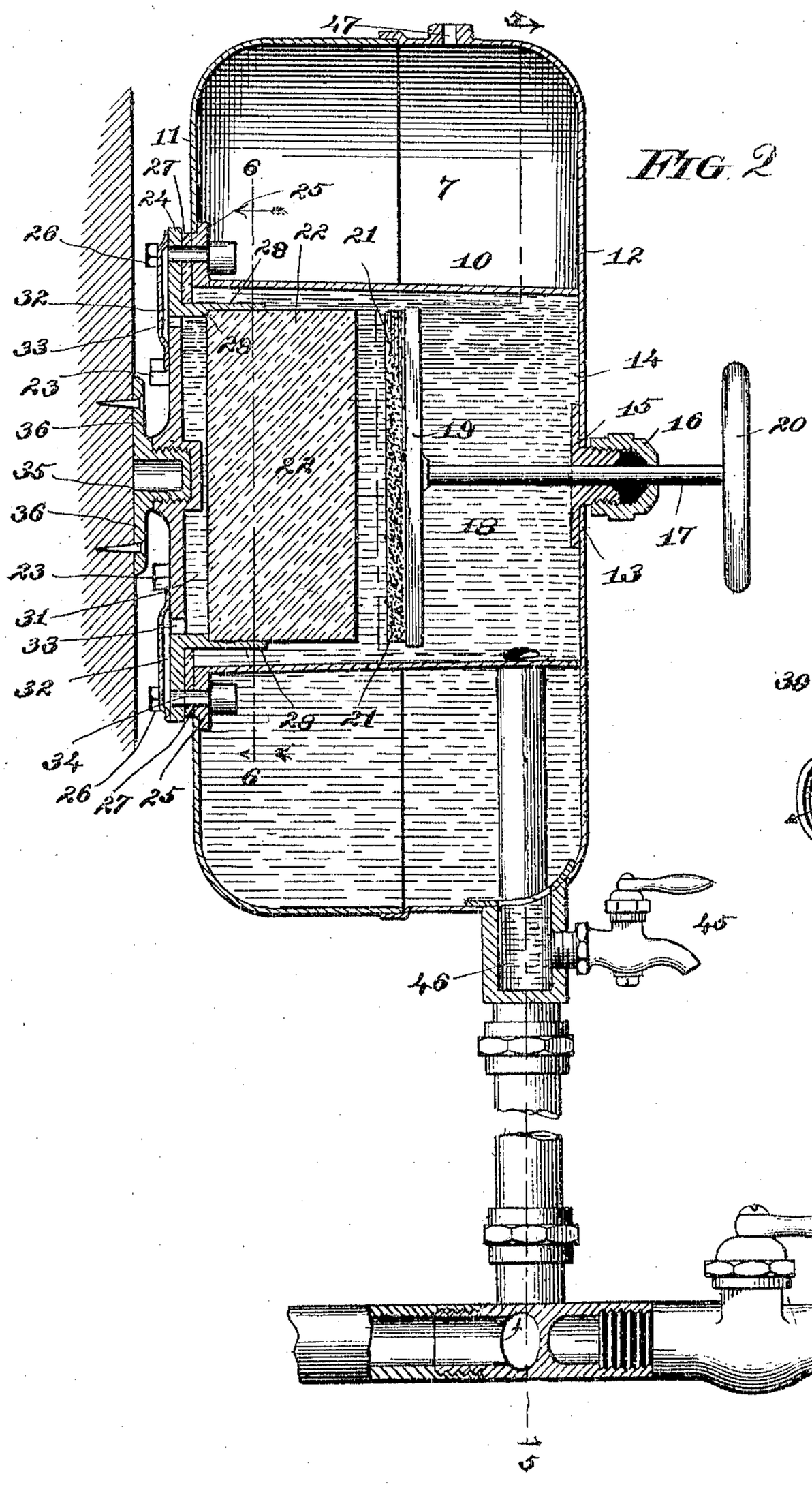
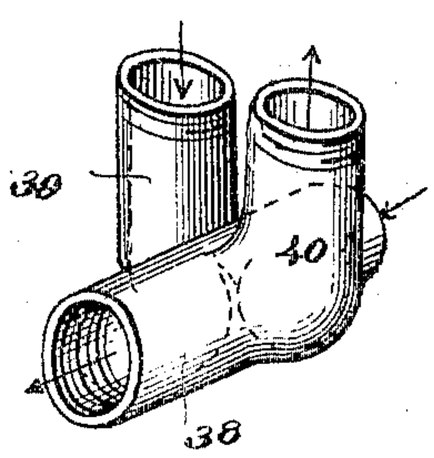


FIG. 2

FIG. 3.



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NO MODEL. 3 SHEETS—SHEET 3.

FIG. 5.

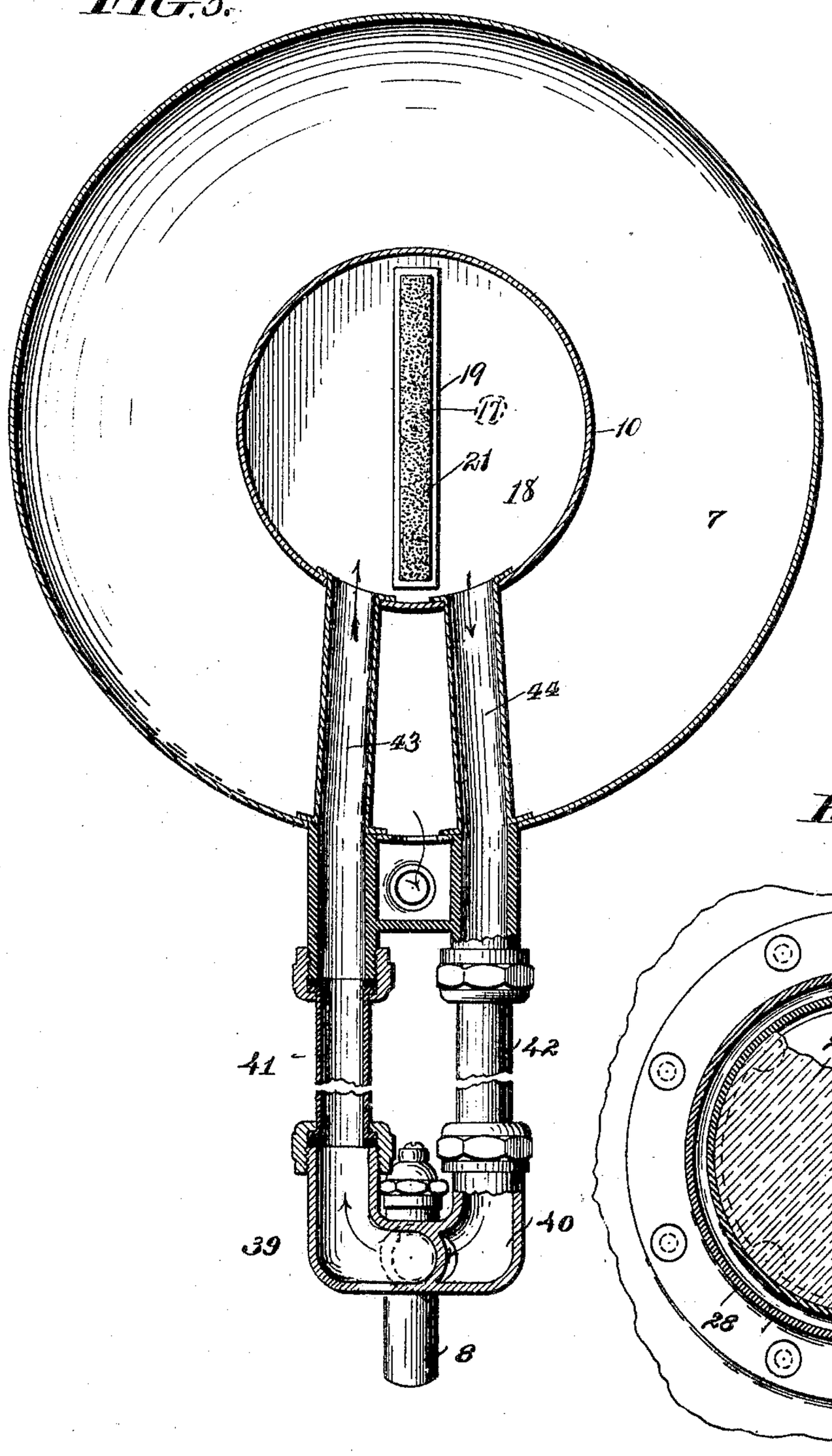


FIG. 7.

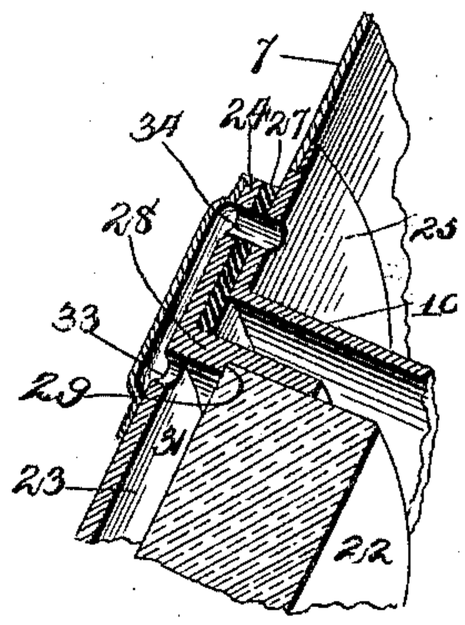
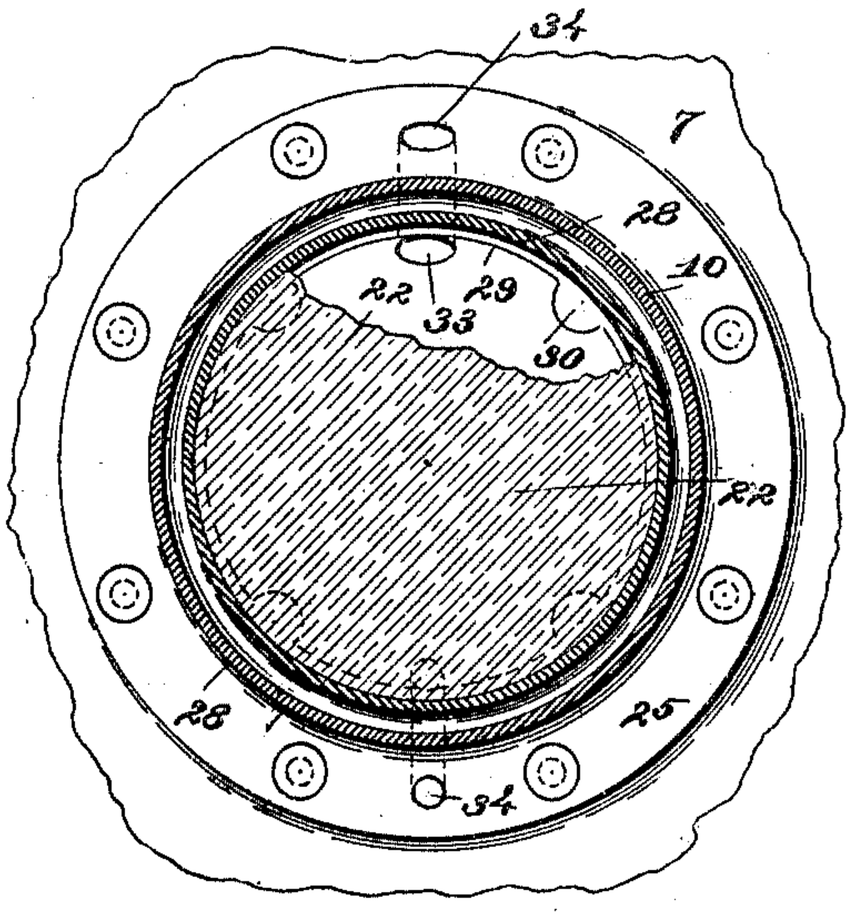


FIG. 6.



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No. 776,550. Patented December 6, 1904.

UNITED STATES PATENT OFFICE.

NATHANIEL B. RICE, OF CHICAGO, ILLINOIS.

FILTER.

SPECIFICATION forming part of Letters Patent No. 776,550, dated December 6, 1904.

Application filed November 16, 1899. Serial No. 737,196. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL B. RICE, a citizen of the United States, residing at 584 West Adams street, Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Filters, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to filters, and particularly to filters of the smaller type commonly used for domestic purposes.

It has for one of its objects to provide an efficient filter which will be equipped with a reservoir for filtered water and will be so constructed as to provide for the circulation of unfiltered water in contact with one or more of the walls of the reservoir, thereby cooling its contents.

A further object is to provide means for cleaning the filter-bed readily, so as to maintain it in a high state of efficiency, and also for removing the impurities from the filter-chamber.

Another object is to provide for readily removing and replacing the filtering material when necessary and to otherwise improve the construction of filters.

In the accompanying drawings, Figure 1 is a perspective view showing one form of my improved filter in place. Fig. 2 is a vertical section of the filter. Fig. 3 is a perspective view of the coupling by which the filter is connected with the water supply and discharge apparatus. Fig. 4 is a perspective view of a part of the cleaning apparatus. Fig. 5 is a section on line 5 5 of Fig. 2. Fig. 6 is a section on line 6 6 of Fig. 2, and Fig. 7 is a perspective sectional view illustrating the ducts by which the filtered water is conducted to the reservoir.

Referring to the drawings, 7 indicates the filter-reservoir, which is all that is visible when the apparatus is in place. The reservoir 7 in the construction shown is secured to the wall in a convenient position by means which will be hereinafter described. It is preferably located about half-way between and some distance above the cold-water faucet 8 and the hot-water faucet 9 usually provided in kitchens over the sink. The shell or casing of the reservoir 7 is somewhat globular in shape so far as its external appearance is concerned; but the water-space in the reservoir is annular in form owing to the fact that the reservoir is provided with a cylindrical partition 10. (Illustrated in Figs. 2 and 5.) The partition 10 extends from the inner side 11 of the shell of the reservoir 7 to the outer side 12 thereof, as shown in Fig. 2.

13 indicates a boss which projects centrally from the front of the reservoir-casing, as shown in Fig. 2. The end of said boss is screw-threaded and provided with a stuffing-box 16, as shown in Fig. 2, thereby preventing the escape of water at that point. A stem 17 extends through the boss 13 and stuffing-box 16 into the chamber 18, formed by the partition 10, which chamber may be termed the filtering "chamber." At its inner end the stem 17 carries a cross-head 19 and at its outer end a handle 20, by which the stem and the cross-head may be rotated. The cross-head 19 is adapted to carry a grinding-block 21 for use in cleaning the filtering-stone, as will be hereinafter described.

22 indicates the filtering-stone, which is a disk of suitable porous material.

23 indicates a circular plate which is adapted to be secured over the open end of the partition 10. As shown in Fig. 2, said plate 23 is provided with a radial flange 24, which is adapted to fit against a similar flange 25, with which the partition 10 is provided, and said plate 23 is secured to the flange 25 by screws 26, which extend into bosses carried by the flange 25, as illustrated in Fig. 2. A gasket 27 is placed between the flanges 24 and 25 to prevent leakage. The plate 23 is also provided with an inwardly-projecting annular flange 28, which is adapted to receive the filtering-stone 22, as illustrated in Figs. 2 and 7. Said flange 28 is provided with an inwardly-projecting shoulder 29 a short distance from the inner face of the plate 23, upon which shoulder the filtering-stone 22 rests, and at suitable intervals lugs 30 are also provided which prevent the filtering-stone from mov-

ing too close to the plate 23. (See Fig. 6.) The filtering-stone is fitted into the annular flange 28, resting upon the shoulder 29 and lugs 30, and is then cemented in place, care being exercised to make a tight closure around the filtering-stone, so that unfiltered water cannot leak around it. By this construction a filtered-water chamber 31 is provided between the inner face of the filtering-stone 22 and the plate 23, as shown in Figs. 2 and 7. The filtered water is conducted from the chamber 31 to the reservoir 7 through passages 32 in the plate 23, said passages communicating with the chamber 31 through ports 33 and with the reservoir 7 through passages 34, as shown in Figs. 2 and 7.

As shown in Fig. 2, the plate 23 is provided with a screw-threaded socket in its outer face, which receives a projecting screw-threaded boss 35, carried by a plate 36, which is adapted to be secured to the wall by screws or otherwise. By this arrangement the plate 36 may first be secured to the wall and afterward the filter be secured to it by screwing the plate 23 upon the boss 35.

37 indicates a pipe which communicates with the water-supply and which will be termed the "water-main."

38 indicates a coupling which connects the cold-water faucet 8 with the main. The coupling 38 is provided with two branches 39 and 40, which are preferably arranged in U form, one of the branches, as 39, communicating with the rear end of the coupling and the other branch, as 40, communicating with the forward end of the coupling. The branches 39 and 40 are connected by pipes 41 and 42, respectively, with pipes 43 and 44, which pass through the reservoir 7 into the filtering-chamber 18, as shown in Fig. 5. By this arrangement all the water drawn from the faucet 8 passes from the main 37 up through branch 39 of the coupling 38 and pipes 41 and 43 to the filtering-chamber 18, thence down through pipes 44 and 42 and branch 40 of the coupling to the faucet. Whenever water is drawn from the faucet 8, therefore, a circulation of water through the filtering-chamber is established, washing out said chamber and carrying off any matter accumulated therein. The filtered water in the reservoir, furthermore, is subjected to the cooling action of the unfiltered water flowing through the filtering-chamber 18.

45 indicates a faucet for drawing off filtered water from the reservoir 7, said faucet communicating with said reservoir by means of a passage 46. (Illustrated in Fig. 2.)

47 indicates a vent at the top of the reservoir 7, which is provided with a suitable valve 48, which permits the escape of air, but not of water.

The operation of my improved filter is as follows: Water is supplied to the filtering-chamber 18 as already described, and consequently the pressure in the filtering-chamber 18 is always the same as the pressure in the water-main, except when water is being drawn through the faucet 8, which of course is usually only a very small part of the time. The pressure in the filtering-chamber 18 causes the water to percolate slowly through the filtering-stone 22 into the filtered-water chamber 31, from which it passes through the passages 32 to the reservoir 7 and thence may be drawn out through faucet 45. As already described, the circulation of unfiltered water through the filtering-chamber assists in cooling the water in the reservoir and carries off any free impurities in the filtering-chamber. In the course of time the surface of the filtering-stone becomes covered with a slimy accumulation and filtration is impeded thereby, so that it becomes necessary to clean it. This is accomplished by moving the stem 17 inward until the grinding-block 21 bears against the opposite face of the filtering-stone, when by rotating the stem, meanwhile pressing in upon it, the grinding-block will not only remove the accumulated matter in the filtering-stone, but will also grind away the surface sufficiently to present a perfectly pure clean surface for further filtration. This operation of cleaning may be continued from time to time until the filtering-stone is worn away level with the flange 28, when it is necessary to replace it with a new stone. The matter removed from the filtering-stone by the cleaning operation is removed from the filtering-chamber 18 by simply opening the faucet 8, permitting the water from the main to circulate through said chamber and carry off the impurities.

It will be understood that instead of using natural stone for filtering artifical stone or other solid filter-bed may be employed, or in some cases where it is not desired to arrange the filter in the position illustrated in the drawings a granular or other form of filter may be employed. Indeed, many of the features of my invention may be secured if filter-paper or similar filtering material be substituted for the stone. My invention therefore is not limited to the use of a stone filter, except in so far as relates to the features having special application to a stone filter, such as the devices for supporting the stone and the specific means for grinding down the surface to clean it. Furthermore, while the filter illustrated is designed to be screwed to the wall my invention is not limited to such arrangement, as various other devices may be employed for supporting it—as, for example, it may be mounted directly on the water-pipe. Various other modifications of the construction described and shown may also be made, not only in the mounting of the reservoir, but also in its arrangement with relation to the devices for supporting the filter material and in the

devices connecting the filtered-water chamber with the reservoir and for supplying unfiltered water to the filtering-chamber.

That which I claim as my invention, and desire to secure by Letters Patent, is—

1. A filter, comprising a casing forming an inner cylindrical filter-chamber open at one end, and an outer filtered-water reservoir surrounding said filter-chamber, a plate adapted to fit over the open end of said filter-chamber to close the same, a filtering medium carried by said plate, grinding means for cleansing the surface of the filtering medium, and means for conducting filtered water to said reservoir, substantially as described.

2. A filter, comprising a casing forming an inner cylindrical filter-chamber open at one end, and an outer filtered-water reservoir surrounding said filter-chamber, a plate adapted to fit over the open end of said filter-chamber to close the same, a filtering medium carried by said plate, a filtered-water space between said plate and the filtering medium, grinding means for cleansing the surface of the filtering medium, and means for conducting filtered water to said reservoir, substantially as described.

3. A filter, comprising a casing forming an inner cylindrical filter-chamber open at one end, and an outer filtered-water reservoir surrounding said filter-chamber, a plate adapted to fit over the open end of said filter-chamber to close the same, a filtering medium carried by said plate, grinding means for cleansing the surface of the filtering medium, means for conducting filtered water to said reservoir, and means for washing out said filter-chamber, substantially as described.

4. A filter, comprising a casing forming an inner cylindrical filter-chamber open at one end, and an outer filtered-water reservoir surrounding said filter-chamber, a plate adapted to fit over the open end of said filter-chamber to close the same, a filtering medium carried by said plate, grinding means for cleansing the surface of the filtering medium, means for conducting filtered water to said reservoir, and means for causing unfiltered water to flow through said filter-chamber, substantially as described.

5. A filter, comprising a casing forming an inner cylindrical filter-chamber open at one end, and an outer annular filtered-water reservoir surrounding said filter-chamber, a plate adapted to fit over the open end of said filter-chamber to close the same, a filtering medium carried by said plate, means for conducting filtered water to said reservoir, and means for cleansing the outer surface of the filtering medium, substantially as described.

6. In a filter, the combination of a filter-chamber, filtering means communicating therewith, a filtered-water reservoir, a partition separating the reservoir and the filter-chamber, an unfiltered-water pipe, and means for causing unfiltered water to flow from said pipe through said filter-chamber and back to said pipe, substantially as described.

7. In a filter, the combination of filtering means, a filtered-water reservoir, a filtered-water space in communication with said reservoir and arranged at one side of said filtering means, an unfiltered-water pipe, and means for causing the unfiltered water to flow from said pipe in contact with one of the walls of said reservoir and back to said pipe, substantially as described.

8. In a filter, the combination of a filter-chamber, filtering means communicating therewith, a filtered-water reservoir surrounding said filter-chamber, and unfiltered-water pipe, and means for causing unfiltered water to flow from said pipe through said filter-chamber and back to said pipe, substantially as described.

9. A filter, comprising a casing forming an inner cylindrical filter-chamber open at one end, and an outer annular filtered-water reservoir surrounding said filter-chamber, a plate adapted to fit over the open end of said filter-chamber to close the same, a filtering medium carried by said plate, means for conducting filtered water to said reservoir, and means supported by said casing and adapted to engage the outer surface of the filtering medium for cleansing the same, substantially as described.

10. A filter, comprising a casing forming an inner cylindrical filter-chamber open at one end, and an outer annular filtered-water reservoir surrounding said filter-chamber, a plate adapted to fit over the open end of said filter-chamber to close the same, a filtering medium carried by said plate, means for conducting filtered water to said reservoir, and a grinding device supported by said casing and adapted to engage the outer surface of the filtering medium for cleansing the same, substantially as described.

11. In a filter, the combination of a filter-chamber provided with an opening, a cover-plate for the said opening, filtering material supported by said plate, a filtered-water space between the filtering material and the said plate, a reservoir surrounding the said filter-chamber, means for conducting the filtered water from the said water-space to said reservoir, and means extending in said filter-chamber for cleaning the said filtering material.

12. In a filter, the combination of a filter-chamber provided with an opening, supply and outlet pipes for the unfiltered water in communication with said chamber, a cover-plate for the said opening, filtering material supported by said plate, a filtered-water space between the filtering material and the said plate, a reservoir surrounding the said filter-chamber, means for conducting the filtered water from the said water-space to the said reservoir, and means extending in said filter-

chamber for cleaning the said filtering material.

13. In a filter, the combination of a filter-chamber provided with an opening, a cover-plate for said opening, filtering material supported by said plate, a filtered-water space between the filtering material and the cover-plate, a reservoir surrounding the filter-chamber, means for conducting filtered water from said water-space to said reservoir, an unfiltered-water pipe, and a plurality of pipes connecting said unfiltered-water pipe with said filter-chamber, substantially as described.

14. In a filter, the combination of a filter-chamber, filtering material arranged in said chamber, a water-space for the filtered water at one side of said filtering material, a reservoir for filtered water surrounding said chamber, means for conducting filtered water from the water-space to said reservoir, an unfiltered-water pipe, and a plurality of pipes connecting said unfiltered water-pipe with said filter-chamber, substantially as described.

15. In a filter, the combination of a filter-chamber, filtering material arranged in the said chamber, a water-space for the filtered water at one side of the said filtering material, a reservoir for the filtered water surrounding the said chamber, means for conducting the filtered water from the water-space to said reservoir, means connected to said chamber for causing the circulation of unfiltered water therethrough, and means extending into said chamber for cleaning the said filtering material.

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