No. 628,884. Patented July 11, 1899.

W. M. DEUTSCH.

FILTER.

(Application filed Oct. 6, 1897.)

(No Model.) 3 Sheets—Sheet 1.

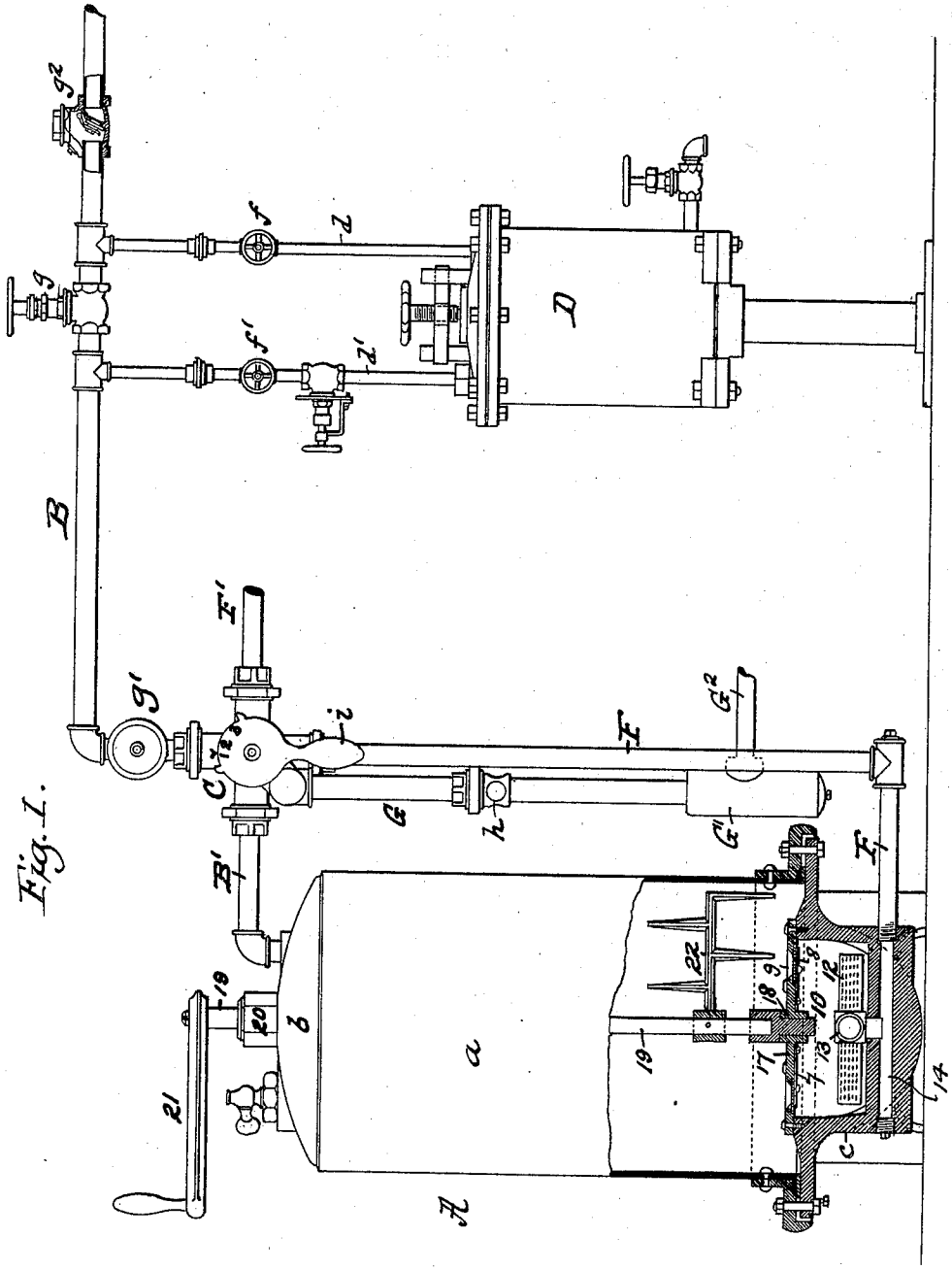

Fig. 1.

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3 Sheets—Sheet 2.

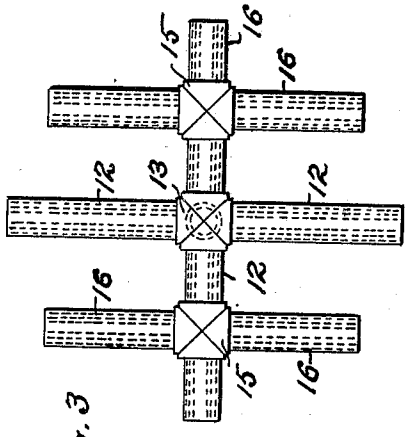

Fig. 3

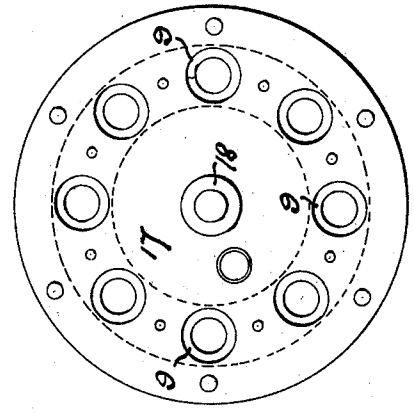

Fig. 4.

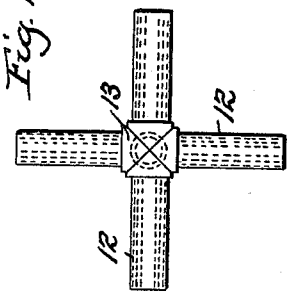

Fig. 2.

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(No Model.)

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Fig. 7.

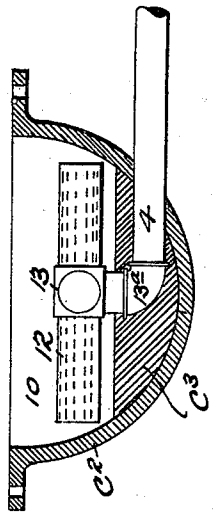


Fig. 8.

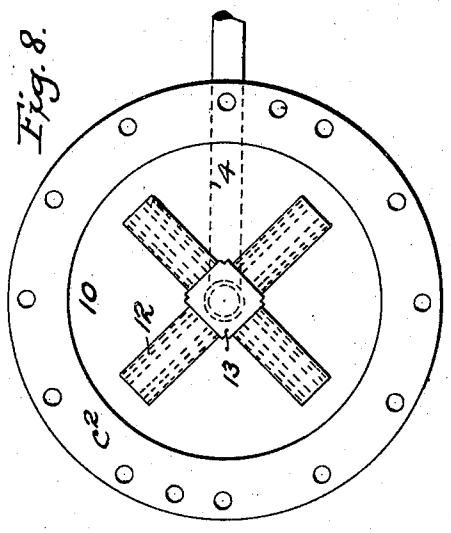


Fig. 5.

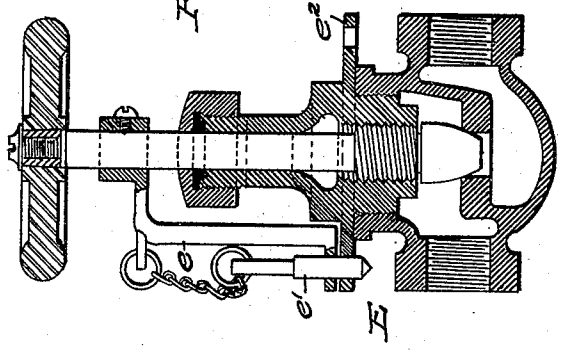
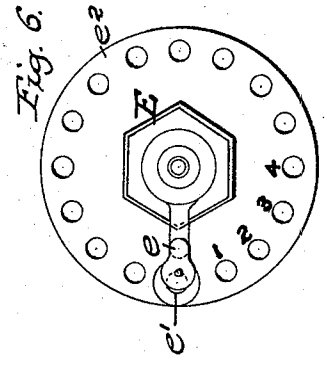


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM M. DEUTSCH, OF ELIZABETH, NEW JERSEY.

FILTER.

SPECIFICATION forming part of Letters Patent No. 628,884, dated July 11, 1899.

Application filed October 6, 1897. Serial No. 654,314. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. DEUTSCH, a citizen of the United States of America, residing at Elizabeth, county of Union, and State of New Jersey, have invented certain new and useful Improvements in Filters, of which the following is a specification.

The present invention relates generally to filters, and particularly to that class adapted to house or individual uses as distinguished from those which are employed in large systems of distribution for the supply of cities and towns, and has for its object to improve, simplify, and cheapen the construction of the filter, whereby it may be operated and adjusted by unskilled persons and by reason thereof to make it better adapted to general use.

The improvements consist in the novel structures, arrangements, and combinations of parts fully hereinafter set forth.

The accompanying drawings show a practical embodiment of the improved filter, in which—

Figure 1 is an elevation thereof with its pipe connections, valves, and coagulating-tank, the lower portion of the filter proper being shown partially in central section. Figs. 2 and 3 are plan views of two arrangements of the perforated strainer-pipes located at the bottom of the filter. Fig. 4 is a detached plan view of the cover over the strainer-pipes. Fig. 5 is a sectional view, partially in elevation, of the coagulant-regulating feed-valve; and Fig. 6 is a plan view of the registering-disk detached from the valve. Fig. 7 is a sectional view of the lower portion of the filter of a slightly-modified form, and Fig. 8 is a plan view thereof.

Referring particularly to Fig. 1, the filter A is preferably of cylindrical form, arranged vertically and composed of a body portion *a* with a top or cap *b* and hollow base *c*, having legs, fins, or projections adapted to rest on the floor or foundation to firmly support the filter.

The hollow base *c* provides a chamber 10, in which is arranged the strainer pipe or pipes 12, horizontally disposed over its bottom and centrally connected by a T-coupling 13 with an outlet-passage 14, formed in the lower portion of the base directly beneath the chamber 10. The arrangement of strainer-pipes may be varied as desired. Thus, as shown in Fig. 2, four such perforated pipes 12 are supported by and project radially from the centrally-arranged coupling 13 at right angles to each other, with the object of covering as much as may be of the bottom of the chamber 10. In Fig. 3 a larger area of the chamber-bottom is covered by providing other couplings 15, each to receive and support three additional strainer-pipes 16, as well as the outer end of one of the pipes extending from the central coupling 13. The central coupling 13 is a five-way coupling, having four horizontal ways for connection with the four strainer-pipes and a lower vertical way for connection through the bottom of the chamber with the outlet-passage 14. The other couplings 15 are each a four-way coupling.

The chamber 10, surrounding and above the strainer-pipes, is filled with coarse granular material, such as gravel, and confined in place by a cover 17, removably secured to the top of the base C. This cover is formed with a series of perforations 9, the bottoms being guarded by finely-reticulated plates 8, confined in recesses on the under side of the cover 17 by a retaining-ring 7. The cover and its reticulated plates serve to confine the body of gravel within the chamber 10.

The cover 17 is provided with a central bearing 18 for the lower end of a vertically and centrally arranged stirring-shaft 19, extending through the body of the filter and finding an upper bearing in the top or cap *b*, where it projects through a suitable water-tight gland 20 and provided at its upper end with a stirring-crank 21. The shaft 19 within the filter-body is provided with one or more stirring blades or arms 22 for agitating the contents of the filter when desired.

The inlet-pipe B for supplying water to the filter is connected with a three-way valve C, (the "Blessing" variety preferred,) and thence by a pipe B′ to the top of the filter. The inlet-pipe, when desirable, may be connected with a coagulating-tank D. Sufficient pressure to cause the feed of the coagulant to the water passing through said pipe is had by a small connecting-pipe *d*, leading from the inlet-pipe to the tank and by a similar pipe *d′*, leading from the tank to said inlet-pipe.

To regulate the feed of the coagulant to the incoming water, the feed-pipe d' is provided with regulating-valve E, having means for determining exactly the proportion of coagulant supplied to each gallon of water flowing to the filter. Thus the stem of the valve carries an arm e, having a removable pin e', arranged to engage the holes in a disk e^2, fixed with the valve-body. The distance between the holes in the disk is preferably equivalent to one-half grain of the coagulant, so that starting with the stem-arm e at zero on the disk and moving the valve-stem so that its arm stands over the hole marked "2" the valve will have been sufficiently moved to allow a grain of coagulant per gallon of water flowing to the filter.

Each of the pipes d d' may have a stop-valve $f f'$, and the inlet-pipe B between its connections with said pipes with a stop-valve g and also with an additional valve g'. The inlet-pipe may also be provided with a check-valve g^2.

The outlet-passage 14 is connected with an outlet-pipe F, which in turn communicates with one of the passages of the three-way valve C and thence by another passage of said valve with the outlet-pipe F'. The outlet-pipe F, through the means of the said valve C, is arranged to be placed in communication with a waste-pipe G, terminating in a trap G', which in turn communicates with the waste-pipe G^2, leading to the sewer or other place of discharge. At some point in the waste-pipe G there may be interposed a sight-glass h to enable the attendant to view the water passing through said pipe.

The general operation of the filter will have been understood in the main from the foregoing description, the water to be filtered passing by the pipe B B' to the top of the filter, passing thence downward through the body of sand therein to the cover 17, through its openings 9 to the chamber 10, through the body of gravel therein, and out by the perforated strainer-pipes 12, coupling 13, passage 14, and by outlet-pipes F F' to place of use. While water is thus being filtered, the handle i of the three-way valve C occupies the position indicated in Fig. 1. The first portion of the filtered water should, however, be allowed to go to the sewer through pipes F and G G^2 by turning the handle i so that its mark "2" registers with the fixed pointer on the valve C.

When the filter is to be washed—that is to say, when the body of sand has become more or less contaminated by the impurities removed from the water being filtered—the valve C is turned so that the mark "3" on its handle i registers with the pointer, whereupon the incoming water will be caused to flow by the pipe F to the bottom of the filter upward through the bodies of gravel and sand therein, out by the pipe B' to the waste-pipe G, trap G', and pipe G^2 to the sewer. During the washing-out process the handle of the stirring-shaft should be turned for some minutes to loosen the body of sand so that the impurities held thereby may be washed out by the upwardly-flowing water. The washing will continue until the passing water viewed through the sight-glass h is as clear as the incoming water. During the washing of the filter the coagulating-tank D will be cut out by closing the stop-valves $f f'$. When the filtering is again resumed, the handle of the stirring-shaft should be shaken to cause the body of sand within the filter to compact itself.

It may be desirable to frequently aerate the body of sand forming the filter-bed to sweeten and purify the filtering material, and for this purpose the top of the filter A will be provided with an air-cock k, which after the incoming water has been cut off by closing the stop-valve g' will be opened to allow air to replace the water which will siphon off. To refill the filter with water, the air-cock will be closed and the valve g' opened, but before allowing the water to pass outward as filtered water the three-way valve C should be turned so that it wastes by the pipe G until the water shows clear through the sight-glass h.

A modified form of the base of the filter is shown in Figs. 7 and 8, wherein the chamber 10 is formed by a semicylindrical base C^2, partially filled with a body of cement C^3 to form a horizontal bottom below the strainer-pipes 12, which are connected to a coupling 13 and thence to an elbow 13^a and outlet-pipe 4, embedded in and rigidly supported by the cement bottom C^3, the pipe 4 connecting with the outlet-pipe F, as in the other construction.

The perforations in each of the strainer-pipes described are preferably of the elongated kind, their length extending along the length of the pipe. These pipes are usually formed of flat sheets, first perforated and then curved and bent into pipe form, with the abutting edges of the sheet soldered or otherwise united together.

What I claim is—

1. In a filter, the combination of the filter-base, the perforated strainer-pipes therein connected to an outlet, a body of gravel above the pipes, and a perforated cover confining the gravel in place, as described.

2. In a filter, the combination of the filter-base, the perforated strainer-pipes therein, a T-coupling to which the pipes are connected, a passage in the base with which the coupling communicates, and an outlet-pipe leading from the passage, as set forth.

3. In a filter, the combination of the filter-base, the perforated strainer-pipes therein, a T-coupling to which the pipes are connected, a passage in the base with which the coupling communicates, an outlet-pipe leading from the passage, a body of gravel above the pipes, and a perforated cover confining the gravel in place, as described.

4. In a filter, the combination of the filter-

base, a coupling having a plurality of horizontal ways with connected strainer-pipes, and also having a vertical way for connection with an outlet, as set forth.

5. In a filter, the combination of the filter-base, a five-way coupling seated therein, one of the ways thereof communicating with an outlet, and the other four ways with strainer-pipes, as set forth.

6. In a filter, the combination of the inlet or supply pipe, the coagulating-tank, inlet and outlet pipes leading to and from said tank and both communicating with said supply-pipe, and a stop-cock interposed in the supply-pipe between the connections of said inlet and outlet pipes therewith, as set forth.

7. In a filter, the combination of the inlet or supply pipe, the coagulating-tank, inlet and outlet pipes leading to and from said tank and both communicating with said supply-pipe, a stop-cock interposed in the supply-pipe between the connections of the said inlet and outlet pipes therewith, and a coagulant-regulating feed-valve interposed in the said outlet-pipe, as set forth.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

WILLIAM M. DEUTSCH.

Witnesses:
GEO. H. GRAHAM,
R. J. HUGHES.