

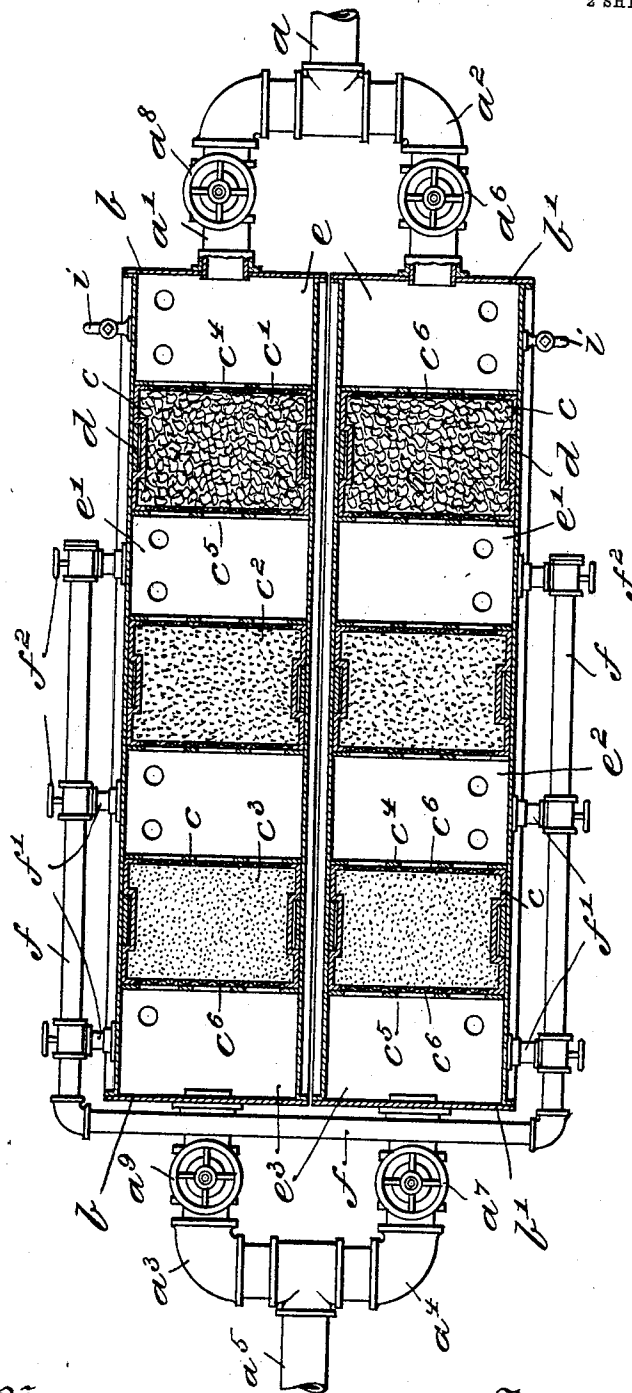
No. 813,516.

PATENTED FEB. 27, 1906.

D. M. PFAUTZ.
 FILTERING APPARATUS.
 APPLICATION FILED DEC. 27, 1904.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
 Jas. C. Wolensmith
 Wilhelm Vogt

Inventor:
 Daniel M. Pfautz,
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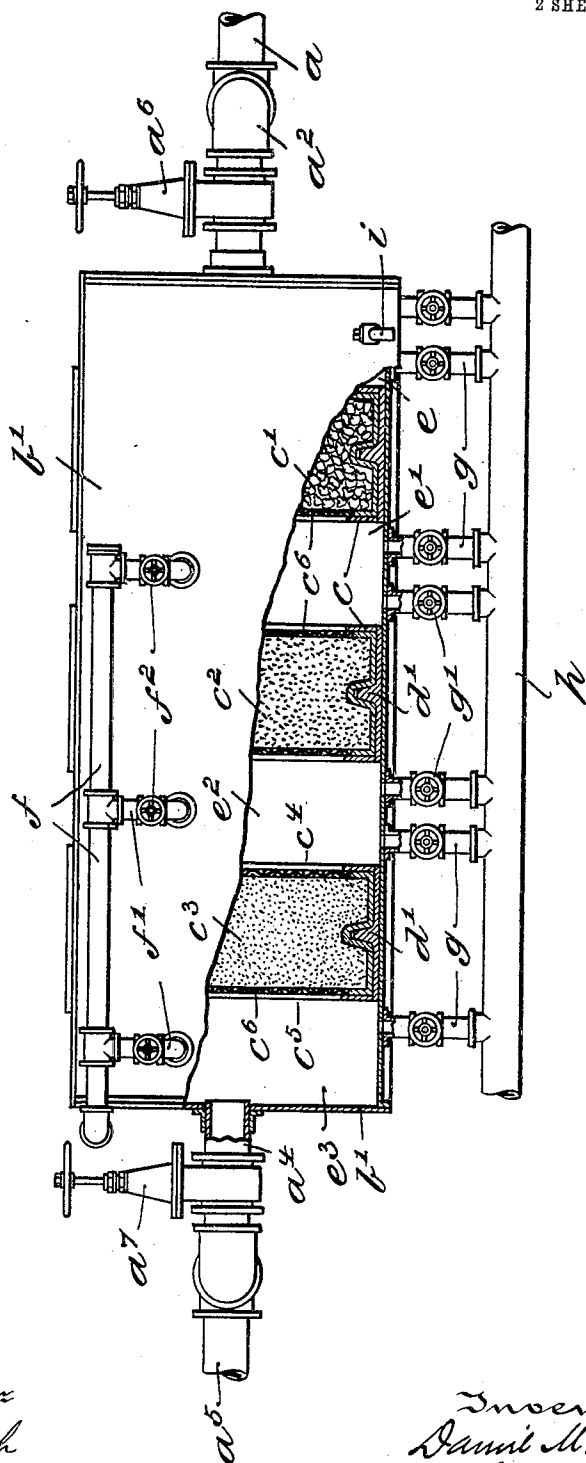
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

DANIEL M. PFAUTZ, OF GERMANTOWN, PENNSYLVANIA.

FILTERING APPARATUS.

No. 813,516.

Specification of Letters Patent.

Patented Feb. 27, 1906.

Application filed December 27, 1904. Serial No. 238,355.

To all whom it may concern:

Be it known that I, DANIEL M. PFAUTZ, a citizen of the United States, residing at Germantown, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Filtering Apparatus, of which the following is a specification.

My invention has relation to a filter especially adapted for the filtration of water under pressure; and in such connection it relates more particularly to improvements upon the filter system filed by me under date of July 2, 1904, under the Serial No. 215,066.

My invention consists, in a filtering system, of the apparatus and parts thereof constructed and arranged for operation in the manner hereinafter described and claimed.

The nature and scope of my present invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a horizontal sectional view of a filtering apparatus embodying main features of my invention; and Fig. 2 is a side elevational view, partly sectioned.

Referring to the drawings, *a* represents the main water-distributing pipe leading from a reservoir or other source of water-supply. (Not shown.) This pipe *a* by means of branch pipes *a'* and *a''* is connected with one end of two water-tight casings or housings *b* and *b'*, which so far as arrangement and construction are concerned are duplicates one of the other. At their other ends the casings *b* and *b'* by means of branch pipes *a'''* and *a''''* are connected with the continuation *a⁵* of the main *a*, so that the water is compelled to flow through the casings *b* and *b'* before it can reach the main *a⁵*.

Each of the casings *b* and *b'* is provided with filter-beds *c'*, *c''*, and *c'''*, each of which consists of a box *c*, having front and rear faces *c⁴* and *c⁵*, of netting *c⁶*, and provided with suitable filtering material. The casings have ribs *d* and *d'* at the sides and bottom, which by engaging grooves arranged in the boxes *c* render the filter-beds water-tight within the casings *b* and *b'* and compel the water entering from the main *a* to pass under pressure through the filter-beds before reaching the continuation *a⁵* of the main *a*. The filter-beds *c'*, *c''*, and *c'''*, arranged a certain distance apart in each of the casings *b* and *b'*, form in

the present instance, in conjunction with the casings *b* and *b'*, four chambers *e*, *e'*, *e''*, and *e'''*, the first chamber *e* being in front of the first bed *c'* and the last chamber *e'''* being in the rear of the last bed *c'''*. The chambers *e'*, *e''*, and *e'''* are in communication with each other by a pipe *f*, which by means of branch pipes *f'* is connected with the upper end of the chambers, as shown in Fig. 2. At the bottom all of the chambers *e*, *e'*, *e''*, and *e'''* by means of drain-pipes *g* are connected with a sewer-pipe *h* for a purpose to be presently fully explained.

The water to be filtered may be conducted from the main *a* through both of the casings *b* and *b'*. However, in practice one of the casings *b* or *b'* has proven sufficient to filter all the water coming from the main *a*. When one of the casings is used—for instance, the casing *b*—the casing *b'* is cut off from the main *a* by closing the valves *a⁸* and *a⁹* of the branch pipes *a''* and *a'''*, while the valves *a⁸* and *a⁹* of the branch pipes *a'* and *a''* are opened. Valves *f²* in the branch pipes *f'* and valves *g'* in the drain-pipes *g* of both casings *b* and *b'* are closed, and the water from the main *a* by entering the chamber *e* will thus be forced to pass through the first filter-bed *c'* into the second chamber *e'* and from thence in regular succession through the second filter-bed *c''* into the chamber *e''* and through the third filter-bed *c'''* into the last compartment or chamber *e'''*. The water when reaching this chamber *e'''* is in a sufficiently filtered or purified state to be ready for distribution through the main *a⁵*. A great amount of the impurities are precipitated at the bottom of each of the chambers and in this manner are separated from the water to be filtered without the aid of the filter-beds.

When it becomes necessary to clean the filter-beds—for instance, those of the casings *b'* which have been cut off from the main *a*—the valve *a⁸* of the branch pipe *a''*, controlling the outflow of water from the casing *b* into the main *a⁵*, is closed, and at the same time, preferably, the chamber *e'''* of the casing *b*, which being the last in the series will naturally contain purified or filtered water, is connected with the cleansing-pipe *f* by the opening of the valve *f²* of the branch pipe *f'*, leading to the chamber *e'''*. As shown in Fig. 1, the cleansing-pipe *f* partially surrounds both of the casings *b* and *b'* and being in communication with the chambers *e'*, *e''*, and *e'''* by its

branch pipes f'' permits the water from the chamber e^3 of the casing b to enter all the chambers of the casing b' with the exception of the first chamber e . However, it has been found that a more effective, thorough, or quicker cleansing can be obtained by conducting all the cleansing-water to one chamber only and to begin with the chamber e' , as the filter-bed c' being the first in each of the casings b and b' naturally will contain the greatest amount of impurities. The valves f^2 of the branch pipes f'' , leading to the chamber e' , and the valves g' of the drain-pipe g , leading from the chamber e into the sewer-pipe h , are opened. All the water from the chamber e^3 of the casing b is now conducted into the chamber e' of the casing b' and will pass through the same and through the filter-bed c' in a direction opposite to that in which water to be filtered passes through the same and also in a downwardly oblique direction. The flow of water in this direction is insured, since the drain-pipes of the chamber e only are opened, through which the water finds an outlet into the sewer-pipe h . The water entering the chamber e' at its upper portion and leaving the chamber e at the bottom will flow in an oblique downward direction and by entering the rear face c^5 of the filter-bed c' and leaving at its front face c^4 will dislodge and effectually remove the impurities that have settled in the filtering material of the bed c' , as well as sediment accumulating on the filter-bed and the walls and bottom of the chamber e . After the filter-bed c' has been cleansed the valve f^2 of the branch pipe f , leading to the chamber e' , as well as the valves g' of the drain-pipes g for the chamber e , are closed, and at the same time a communication is established between the cleansing-pipe f and chamber e^2 and between the sewer-pipe h and the chamber e' for the cleansing of the filter-bed c^2 , and so on in regular succession until the last of the filter-beds is thoroughly cleansed. In order to clean the bottom of a chamber and the faces of two adjacent filter-beds, the valves of the branch pipes f'' and of the drain-pipes g may be so manipulated as to cause the cleansing-water to flow through a chamber only. In this instance the water will remove all impurities collecting at the bottom of the chamber after having cleaned the faces of the filter-beds therein. It has been found that the first bed c' needs a cleansing at shorter intervals than the remaining filter-beds, and for that reason the cleansing of only this filter-bed is often sufficient to maintain the filter in operative condition. After all the filter-beds in the casing b' have been cleaned the water from the main a may now be conducted into the casing b' by the opening of the valves a^6 and a^7 of the branch pipes a^2 and a^4 and the closing of the valves a^8 and a^9 of the branch pipes a' and a^3 . Filtered water from the casing b'

may now be conducted by the cleansing-pipe f into the casing b , and the filter-beds therein may be cleaned in the same manner as hereinbefore described in conjunction with the filter-beds of the casing b' . In order to determine whether the filter-beds are thoroughly cleaned, a testing-spigot i is arranged at the bottom of each of the chambers e , e' , e^2 , and e^3 , which when opened will indicate by the outflowing water the cleansed condition of the respective filter-beds.

Having thus described the nature and objects of my invention, what I claim as new; and desire to secure by Letters Patent, is—

1. In a filtering apparatus, casings, a series of filter-beds arranged in each of said casings forming chambers and having an inlet for water to be filtered and an outlet for filtered water, outlets in the bottom of each of said chambers, a pipe connecting the upper ends of certain of the chambers of both casings with each other, said pipe adapted to conduct partially or completely filtered water from certain of the chambers of one casing into certain of the chambers of the other casing and by the opening of certain of said outlets to permit the introduced water to divide to cause the same to pass through certain of said chambers and in opposite directions through contiguous filter-beds, without changing the downward flow of the same through the said casing.

2. In a filtering apparatus, casings, a series of filter-beds arranged in each of said casings forming chambers therein, an inlet for water to be filtered and an outlet for the filtered water leading into and from each casing and adapted to permit of the flow of water to be filtered in one direction therethrough, a pipe for cleansing partially surrounding both of said casings and connecting certain chambers with each other, outlets arranged in the bottom of said chambers opposite the inlets thereto from said pipe, said pipe and the outlet of one casing adapted, when opened, to permit of a flow of cleansing-water through certain of the chambers of said casing, and through contiguous filter-beds in opposite directions and in a transverse direction with respect to the flow of the water to be filtered.

3. In a filtering apparatus, casings forming receptacles for filter-beds, said filter-beds in conjunction with said casings forming chambers to permit of the separation of a portion of the impurities from the water by gravity, and free of said filter-beds, outlets arranged in the bottom of each of said chambers and adapted to form exits for impurities from the same and the filter-beds, a U-shaped pipe surrounding one end of each of said casings and connected with certain of the chambers thereof at the upper portion, said pipe adapted to permit of the introduction of partially or completely filtered water from one of the casings into the upper end or ends of

one or more of certain of the chambers of the
other of said casings to cause the same by the
opening of certain outlets thereof to be di-
vided, one portion flowing directly through
5 a chamber and other portions in opposite di-
rections through contiguous filter-beds, with-
out changing the downward flow of the so-
divided cleansing-water.

In testimony whereof I have hereunto set
my signature in the presence of two subscrib- 10
ing witnesses.

DANIEL M. PFAUTZ.

Witnesses:

J. WALTER DOUGLASS,
THOMAS M. SMITH.