

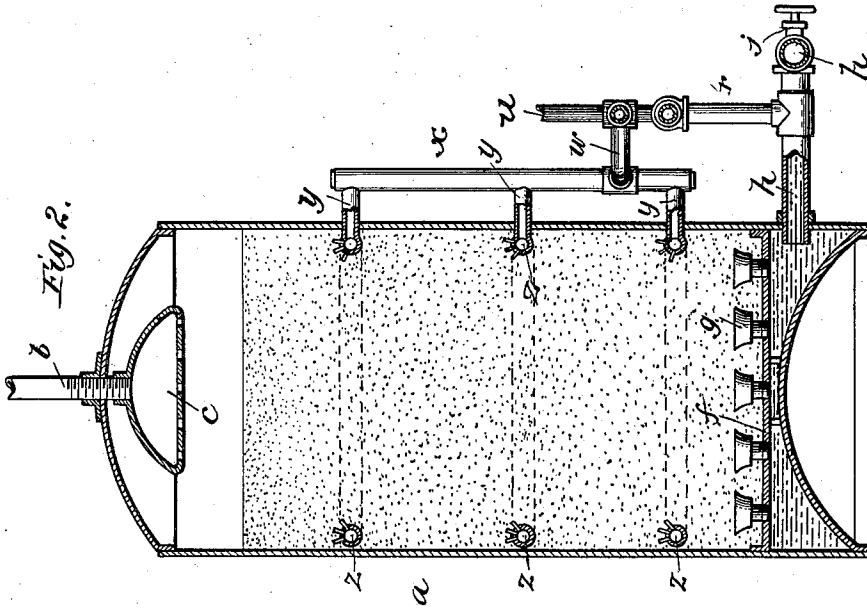
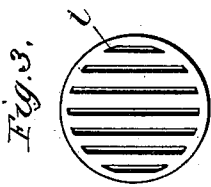
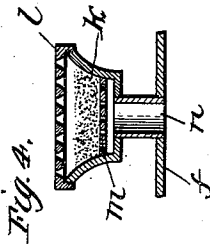
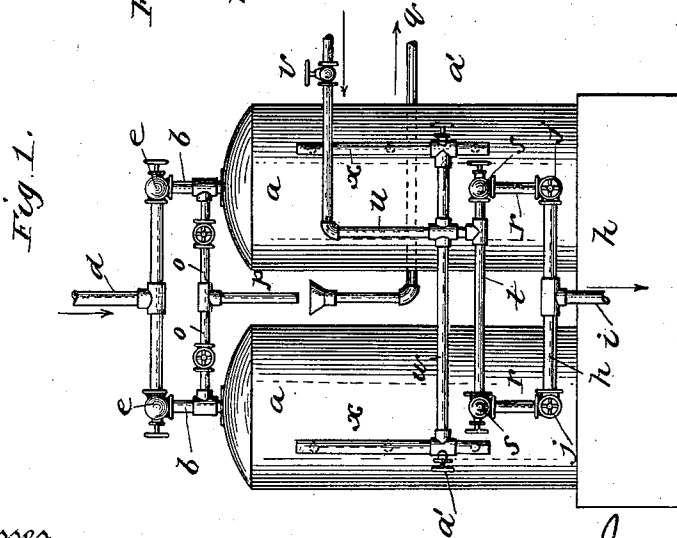
No. 648,105.

Patented Apr. 24, 1900.

J. B. GREER.
FILTER.

(Application filed Feb. 21, 1900.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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FILTER.

SPECIFICATION forming part of Letters Patent No. 648,105, dated April 24, 1900.

Application filed February 21, 1900. Serial No. 6,052. (No model.)

To all whom it may concern:

Be it known that I, JAMES B. GREER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Filters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved apparatus; Fig. 2, a vertical section of the apparatus; Fig. 3 a plan view of one of the strainer-nozzles, and Fig. 4 a vertical section thereof.

This apparatus is especially designed for use in connection with my improved apparatus for chemically purifying water, filed May 15, 1899, Serial No. 716,904; but it is of course evident that it may be used alone or in connection with other systems.

Referring to the drawings by reference-letters, *a* describes a pair of vertical cylindrical filter-tanks, into the upper end of each of which extends an inlet-pipe *b*, terminating within the tank, near the top thereof, in a distributing or spray nozzle *c*. The inlet-pipes are connected to the supply-pipe *d* and are each provided with a valve *e*. Near the lower end of each tank a horizontal partition *f* is permanently secured, within which are secured a series of upright drain-nozzles *g*, which form passages leading into the clear-water space between the partition *f* and the bottom of the vessel. The outlet-pipes *h* of the vessels connect with the clear-water chambers, and these two pipes are connected to a common discharge-pipe *i*, which may lead to the boiler or other vessel into which the filtered water is to be discharged, each of said outlet-pipes *h* being provided with a valve *j*.

The drain-nozzles *g* each consist of a hollow body *k*, preferably of inverted-bell shape, provided with a removable end cap *l*, slitted to permit the ingress of water, a perforated diaphragm *m* within the cup or body *k* near its bottom, and a filling of suitable coarse filtering material between the cap and the diaphragm, a suitable tubular stem *n* connecting the cup or body to the partition *f*. The slits or apertures in the cap *l* are of increasing cross-sectional area from the upper surface of the cap downward through the thick-

ness of the same, so that any grains of filtering material which are small enough to enter the slits will drop through into the body of the nozzle and not lodge within the slits to obstruct the passage of water therethrough. Such fine sand as enters the strainer-nozzles from the body of the filter-bed will be caught and retained by the coarse quartz in the nozzles and be thereby prevented from passing on to the boilers and clogging and injuring the same. With these peculiarly-formed slits the full capacity of the filter will be maintained at all times, which is a desideratum, especially with filtering apparatus used in connection with steam-boilers.

It will be observed that the water will normally flow through both vessels and filter-beds therein (which beds consist of quartz-sand filling the vessel to near its inlet-nozzle *c*) and out through the drain-nozzles to the common discharge-pipe *i*. While the water is thus flowing through the apparatus, all the valves but *e* and *j* are closed.

The means for reversing the direction of flow of the water through the tanks for agitating the filtering material in order to clean out or discharge the sediment collected are constructed as follows: Connecting to each of the inlet-pipes *b*, between valve *e* and the tank, is a discharge-pipe *o*, and these two pipes *o* connect with a common discharge-pipe *p*, which latter empties into a suitable pipe *q*, leading to the sewer or other point of discharge. Rising from each of the outlet-pipes *h* is a short pipe *r*, provided with a valve *s* at its upper end. These two pipes are connected at their upper ends by a cross-pipe *t*, and connected with this pipe is a pipe *u*, provided with a valve *v*, this pipe being connected with any extraneous source of water under pressure. The pipe *u* has connected to it, near where it connects the pipe *t*, a horizontal pipe *w*, which connects at its ends with two vertical pipes *x*, one adjacent to each of the filtering vessels and each being provided with branch pipes *y* at suitable points in its length, which branch pipes extend into the adjacent filter and are connected each to an annular pipe *z*, extending horizontally around the wall of the filter vessel and provided at frequent intervals throughout its length with a series of small jet-nozzles radiating from

the pipe in porcupine fashion. With this arrangement of pipes the filters may be washed out from some extraneous source of water supplied through pipe *u*, or the filtered water from either vessel may be directed through the other vessel to perform the agitating and cleaning operation. To wash the filter-beds from an outside source through pipe *u*, it is simply necessary to close valves *e* and *j* and open the remaining valves, whereupon the water will be forced through pipes *u w x y z*, issuing from the porcupine jet-nozzles with great force, and thereby lift the filter material and agitate it violently, the sediment being loosened and carried out through the inlet-pipes *b* and supplemental outlet-pipes *o*. The water will also pass down through the pipes *t* and *r* and *h* and up through the drain-nozzles *g*, thereby thoroughly cleaning the drain - nozzles and violently agitating the lower part of the filter-beds. To clean the right-hand tank by the filtered water of the other tank, valve *v*, right-hand valves *e* and *j*, and left-hand valve *a'* are closed and the left-hand valve *j* adjusted so that a portion of all of the filtered water from the left-hand tank shall pass up through pipes *r* and *t* and thence into the right-hand filter-bed through pipes *r*, *h*, *u*, *w*, *x*, *y*, and *z*, the valves *s* being of course open. To wash out the left-hand filter-bed, the action is reversed, as is evident.

From the foregoing it will be seen that this invention possesses several important features. The arrangement of the annular pipes, provided with radiating jets, and the drain-nozzles provide for a most efficient and thorough cleaning of the filter-beds, carrying the jets to all parts of the filter-beds and leaving none of the sand unagitated or uncleaned. The provision for passing the cleaning-water up through the drain-nozzles is also advantageous in that those nozzles may be thoroughly washed out without removing them. It will also be observed that by the system of pipes and the valves either filter may be entirely cut out without disturbing the other filter and while thus cut out may be cleaned separately by water from some extraneous source of supply or by a portion of the filtered water from the filter that is in operation, whereby the filtering-beds may be cleaned at will without stopping the supply of filtered water to the boiler or other vessel. The using of the filtered water of one vessel to wash out the other is of especial advantage when the apparatus is used in connection with steam-boilers and the water being filtered is heated, since in that case either of the filters may be cleaned without reducing its tempera-

ture, so that the obvious disadvantage of being compelled to feed cold water to the boiler every time one of the filtering-beds is cleaned is avoided. A further advantage of using the hot filtered water for cleaning purposes is that it more readily dissolves the sediment deposited in the sand of the filtering-bed.

What I claim, and desire to secure by Letters Patent, is—

1. A filtering-tank containing a filtering-bed and provided with an inlet-pipe at its upper end and an outlet-pipe at its lower end, a series of annular pipes embedded in the filtering-bed and provided with radiating jet-openings, a partition between said annular pipes and the bottom of the tank, drain-nozzles in this partition, and valved pipes for supplying a flow of cleaning-water to the annular pipes and the drain-nozzles, whereby the filtering-bed will be agitated and cleaned.

2. In a filtering apparatus, the combination with a pair of filters connected in parallel, of cross connections whereby the filtered water from either one of the pair may be passed through the other in a direction reversely to the normal flow, comprising a supply-pipe communicating with a source of water under pressure leading to each filter, a cock controlling each of said inlet-pipes, branch outlet-pipes communicating with the supply-pipes, each controlled by a cock, main outlet-pipes cross-connected to discharge through a common outlet, a cock interposed in each of said outlet-pipes at a point between the filter and the common outlet and a cross connecting-pipe, as *t*, extending between the two main outlet-pipes.

3. In a filtering apparatus, the combination with a pair of filters connected in parallel, of inlet-pipes, each controlled by a cock, interconnected supplemental outlet-pipes communicating with said inlet-pipes and having a common outlet, interconnected main outlet-pipes, *h h*, each controlled by a cock, a cross connecting-pipe *t* extending between said main outlet-pipes and provided with cocks, upright pipes arranged adjacent to each filter and communicating with the interior of the filters at various points throughout the height of the latter, and a valved piping connecting said risers with each other and with said cross connecting-pipe *t*, substantially as set forth.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 20th day of February, 1900.

JAMES B. GREER.

Witnesses:

E. J. KENT,
A. J. FAUTH.