

(No Model.)

3 Sheets—Sheet 1.

J. W. HYATT. Filter.

No. 243,265.

Patented June 21, 1881.

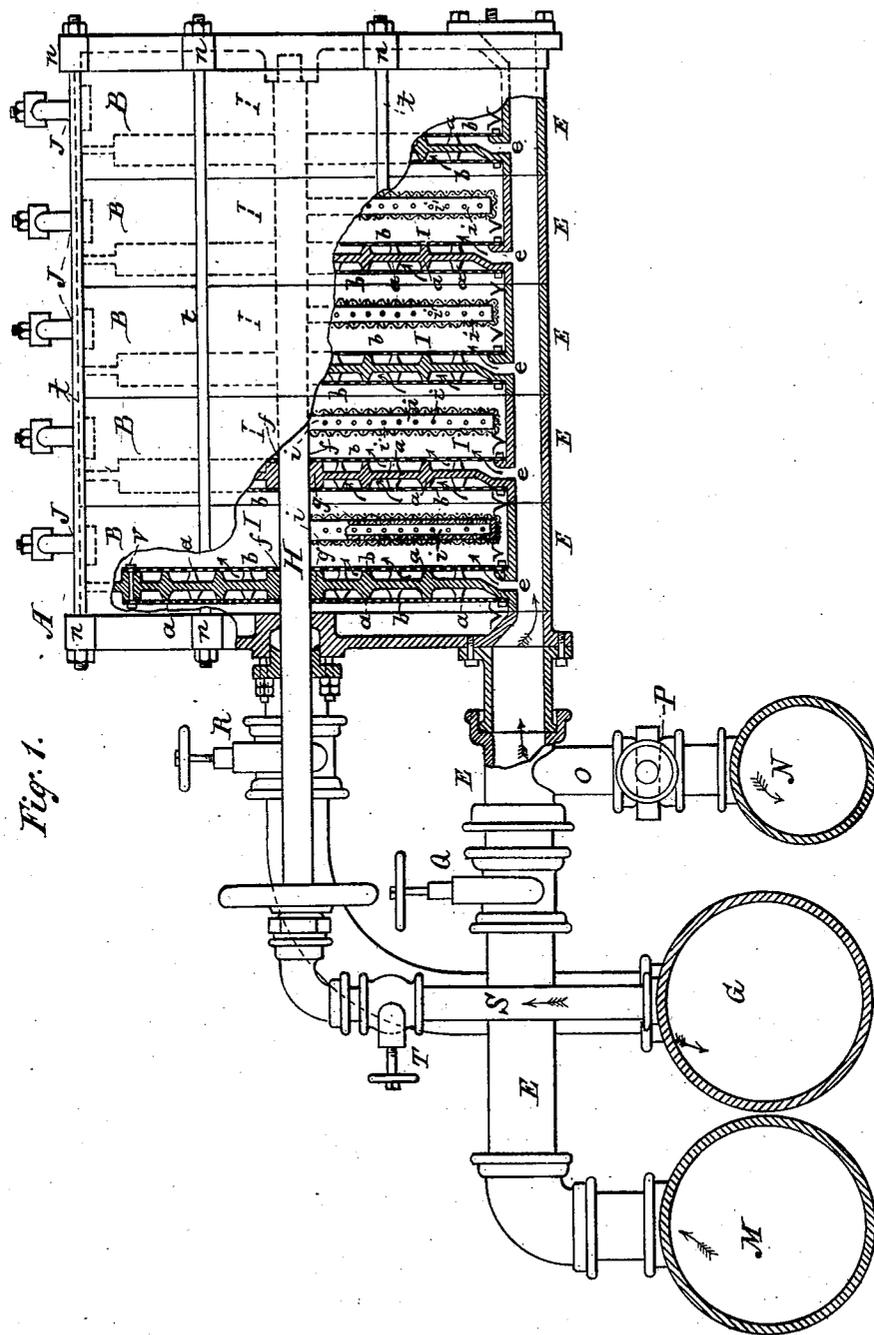


Fig. 1.

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INVENTOR:

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BY *Bowland Fox*
his ATTORNEY.

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Fig. 2.

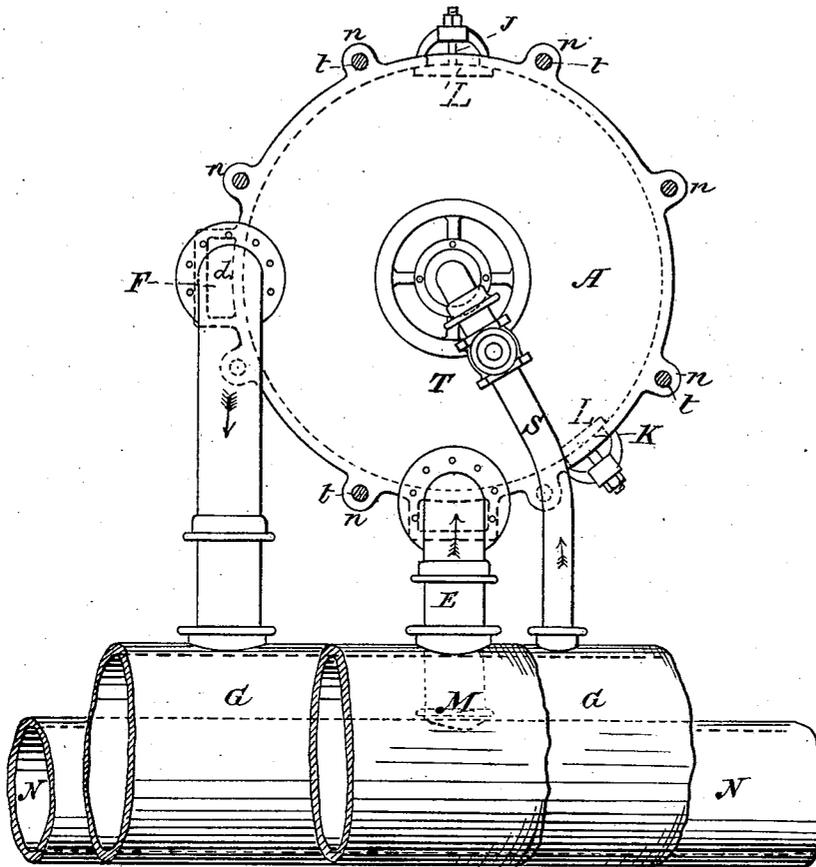
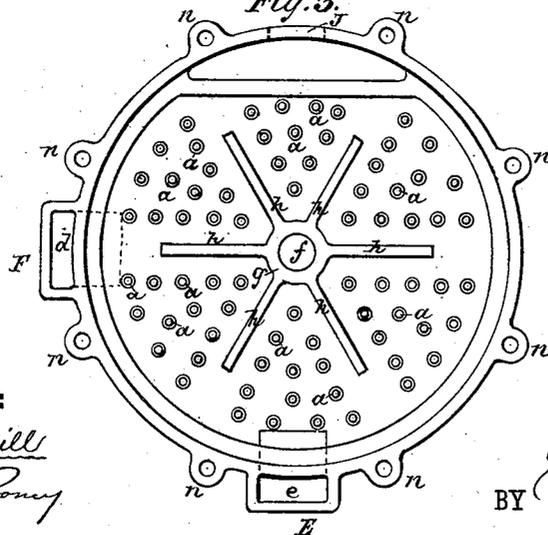


Fig. 3.



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Fig. 4

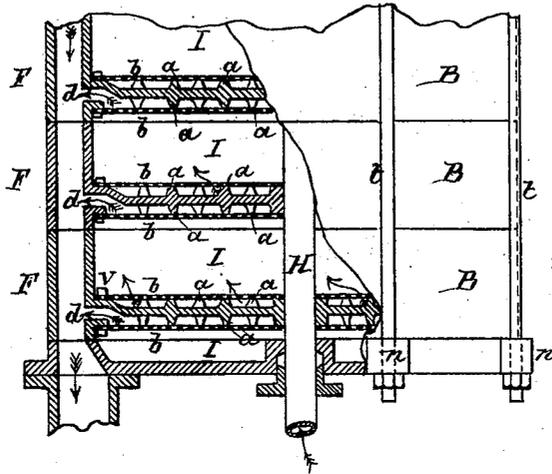


Fig. 5.

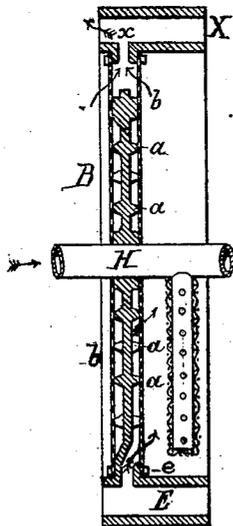
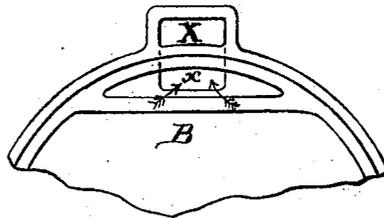


Fig. 6.



WITNESSES:

Chas. C. Hill
Col. J. Rooney

INVENTOR:

John W. Hyatt
BY *Rowland T. Cox*
ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN W. HYATT, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE NEWARK
FILTERING COMPANY, OF SAME PLACE.

FILTER.

SPECIFICATION forming part of Letters Patent No. 243,265, dated June 21, 1881.

Application filed February 11, 1881. (No model.)

To all whom it may concern :

Be it known that I, JOHN W. HYATT, of Newark, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Filters, of which the following is a specification, reference being had to the accompanying drawings.

The invention relates to an improved method and apparatus for filtering water. It is based primarily upon the theory of dividing a stream so that the divisions of the stream are separately purified by means of independent filters and the purified streams united for purposes of delivery; and inasmuch as the cardinal purpose is to purify large quantities of water rapidly and economically, the filters are constructed and arranged in a novel manner, so as to permit of the use of the forms of filter-beds best adapted to the effectuation of the objects of the invention. Instead of a single large bed, a number or series of small ones are employed, whereby the requisite surface is provided, upon which the water is fed in separate divisions or streams, and after being purified returned to a common delivery-pipe. The apparatus is provided with a means of washing the beds, and otherwise appropriately adapted to the end for which it is designed.

The construction and operation will be understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation, partly in section, of a filter embodying the elements of the invention. Fig. 2 is an end view of same. Fig. 3 is a face view of one of the sections of which the filter is composed. Fig. 4 is a plan, with a portion in section on the central horizontal center of the apparatus. Figs. 5 and 6 are detached views, showing a modification, which is described hereinafter.

A indicates the apparatus as a whole, and B the sections or castings of which the apparatus is composed, the sections, by preference, all corresponding in size and being of circular form.

In constructing the filter as many of the sections B as may be desired may be employed, according to the quantity of the water to be filtered within any specified time and the space to be occupied by the apparatus. The sections B will be cast with the pipe E at their lower portions, and on one side, at about their

longitudinal center, with the pipe F, which pipes, when the sections are united, extend the whole length of the apparatus and are used for conducting the water to and from the filter-beds, the pipe E being to supply the water to the apparatus and the pipe F to conduct the pure water away. The sections B extend entirely across the interior of the apparatus, and have cast at suitable points upon their opposite faces the studs *a*, upon which the screens *b*, of fine wire-cloth or other material answering a similar purpose, are secured, and which prevent the said screens from being forced inward against the sections or partitions B. The sections B will also be provided at their longitudinal center with an aperture, *f*, encircled on each side of the section with a collar, *g*, from which radiate ribs *h*. The ribs *h* are supplied as a means of strengthening the sections, and in thickness will be equal to the elevation of the lugs *a*, so that the wire-cloth *b* can rest upon them. In the apertures *f* will be inserted a pipe, H, running through the longitudinal center of the apparatus, and provided in each compartment thereof, at right angles to its line of center, with a pipe or pipes, *i*, which extend outward to a point in near relation to the inner circumference of the outer portions of the castings, and which are provided with apertures *v* on one or more sides, from which the water may issue. The pipes, or that portion of them containing the apertures, will be covered with wire-cloth, so as to protect them from the entrance of the sand or other material used for the filtering-bed.

If it is desired to make the pipes *i* self-propelling, apertures for reaction-jets may be formed in their ends and protected from the entrance of sand by wire-cloth or analogous material. In this construction the pipes would revolve slowly on the well-known Barker-mill principle.

The apertures *f* will be adapted to loosely receive the pipe H, which, if desired, may be covered with short sections of wrought-iron pipe between the partitions, for the purpose of resisting any longitudinal strain on the latter.

The sections B at the ends of the apparatus will have a solid exterior, so as to effectually inclose its contents, and by preference will be cast with lugs *n* at suitable points on their edges, the lugs serving as means of connecting the said ends by bolts *t*, running from one end to the other of the apparatus, whereby the

intervening sections or castings are firmly secured together. When the sections B are united by bolts, as aforesaid, to form the apparatus, packing of rubber, leather, or other suitable material may be placed between the edges of the sections for the purpose of making the joints water-tight; or the packing may be omitted and the joints sealed or made water-tight by other means, according to circumstances.

In the side and in the lower portion of the partitions B are formed the ports *d e*, the ports *d* in the side leading from the compartments I between the sections or partitions to the pipe F, and the ports *e* in the lower portion leading from the supply-pipe E upward into each of the compartments I.

When the sections or partitions are united to form the apparatus, the spaces I between them will be supplied with a filtering agent of any kind and in any form that may be desired. The nature of the filtering agent will depend in some degree upon whether or not the washer H is made use of. If the washer is employed, the material will be of such a character that its agitation may be accomplished by rotating the washer, as hereinafter set forth; but if the washer is not used the filtering agent may be of any desired form, as may be preferred. As, however, the washer will generally be used by preference, the spaces I will be filled to within, say, about from two to four inches of their upper edges with sand, charcoal, or other suitable material in granular form, the material being separated from the partitions and prevented from entering the ports *d e* by the screens of wire-cloth *b*, resting against the lugs *a* and ribs *h*, before described.

For the purpose of affording a means for introducing the sand into the compartments I, suitable hand-holes, J, are formed in the upper portions of the castings, and as a means of withdrawing the sand when desired, hand-holes K are cast in the lower portions thereof, to one side of the pipe E, both hand-holes being supplied with lids or covers L, by means of which the holes are securely closed.

The inlet-pipe E is connected with a supply-pipe, M, and between the pipe M and the apparatus with the waste-pipe N, the connection between the waste-pipe N and the inlet being by a pipe, O, supplied with a valve, P. The inlet-pipe E will be provided with a valve, Q, between the waste and supply pipes. The outlet-pipe F will lead to the main G, and will be supplied with a valve, R, so as to break the connection when desired.

The washer-pipe H is connected by means of a pipe, S, with the main for clean water, G, and is furnished near its outer end with a wheel, crank, or other device by which it may be turned by hand; or the pipe may be rotated in other ways, if preferred. In the pipe S will be provided a valve, T, by which the connection with the main G may be broken when desired.

The upper portions of the vertical part of

the sections B—say to within about six inches of their upper edges—are cast without the lugs *a*, and will not be covered with the wire-cloth, the upper edges being secured to the sections or partitions by the straps V, screwed or bolted in place, as shown in Fig. 1.

In the operation of the apparatus, the valves T and P being closed and the valves Q R opened, the water to be cleansed is forced under pressure into the inlet-pipe E, whence it passes through the ports *e* into each compartment I. After leaving the ports *e*, the water passes upward around the lugs *a*, thence through the wire-cloth and filtering-beds, and out through the ports *d* into the outlet-pipe F.

When the filtering-beds and screens *b* become foul from silt and other sediment, in order to clean them thoroughly and at the same time loosen up the sand or other material employed for the filtering-beds, the valves T and P are opened and the valves Q and R closed, when the clean water is forced from the main G through the pipe S into the pipe H, and thence into the filtering-beds through the apertures *i'* in the shorter pipes *i*, while the pipe H is slowly moved by means of the hand-wheel or crank, or otherwise. As soon as the water begins to escape from the pipes *i* the granular material in immediate proximity to them is agitated and displaced, thus permitting the rotation of the washer. The pipes *i* will be rotated in the direction of the current of water to be filtered—that is, from the inlet-ports *e* toward the outlet-ports *d*—and the usual practice will be to have the perforations or apertures *i'* on the side of the pipes *i* facing the direction of its movement. If desired, the pipes *i* may be perforated on all their sides, in which case they may be rotated in either direction. One or more complete revolutions of the washer are made through the filter-beds, loosening the granular material and permitting the water issuing from the apertures in the said pipes to thoroughly wash it. The water employed in washing the beds passes through the ports *e* and pipe E into the waste-pipe N, and is thus carried away. After the washing has been accomplished the valves T and P are closed and the valves Q and R opened again, and the operation of filtering proceeded with as before.

It is plain that the apparatus may be employed in a vertical or in a horizontal position, as may be preferred; but in the employment of a large filter I prefer to arrange it in a vertical position.

If desired, in lieu of washing the filtering-beds by the agitator-pipe H, they may be cleansed by simply reversing the current of water through the apparatus. In this case the water will enter at the ports *d* and issue at the ports *e*, and the flow of the reversed current need only be permitted for a few minutes. In many instances—perhaps as a general rule—this means of washing will be found useful and effectual if practiced at short intervals; but to preserve the bed in a properly

pure condition and to render the current by reversal effectual, the operation of the washer H, whereby the entire bed is agitated, will be occasionally required. The employment of the two methods is a matter of judgment which will be governed by circumstances, and which will be readily understood by the skilled operator.

It is obvious that the apparatus may be modified in some respects without departing from the essence of the invention. For instance, the inlet may be constructed near the outlet; and in place of the partitions being in their present precise form, the screens *b* may be prevented from collapsing by a filling of gravel, which would also allow a free passage of the water over the surfaces of the filter-beds.

Instead of the screens *b*, made of wire-cloth, perforated plates or other expedients which will permit the water to escape, and at the same time prevent the escape of the granular material, may be employed, the purpose of the screens being to form a space between the filter-beds and the solid part of the partitions in which the water can circulate freely and come in contact with both sides of the said filter-beds, the entire filtration-surfaces being thereby brought into use.

I do not limit myself to any special arrangement of the pipes for agitating and cleaning the filter-beds, as they may be arranged in various ways and still operate with satisfactory results. One modification would be to have them project from a supply-pipe downward into the beds without being capable of rotation. In this case the filtering material is agitated by the water which is caused to issue from the pipes rising through it.

In the foregoing description I have emphasized particularly the construction and operation of an apparatus in which a washer is used in connection with beds of material of a granular or reduced form; but I do not limit my claim to such an apparatus, even though I greatly prefer to employ it. Thus the washer may be entirely dispensed with and the sections I filled with sponge or other materials or agents in connection with which the washer could not possibly be successfully employed.

The modification shown in Figs. 5 and 6 consists simply in the addition of the pipe X to the apparatus and its connection, by means of ports *x*, with the filter-beds on each side of the partitions. The pipe X will preferably be formed at the upper portions of the apparatus, and is supplied as affording one method of cleaning the filter-beds. If used, the pipe X will be connected by a suitable pipe with the waste-pipe N, the connecting-pipe being supplied with a valve. In the employment of the pipe X, the valve P is closed, so that the water will be compelled to rise through the entire body of the bed and find an outlet at the upper portion of the apparatus.

If preferred, in lieu of the pipes *i*, a series of blades or arms may be made use of, the blades

or arms extending into the beds, substantially as indicated, where the pipes are employed.

It is not intended to embrace in the first clause of the claim of this instrument anything shown in the patent to A. Wegelin, dated October 14, 1879, which is therefore disclaimed.

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

1. A filtering apparatus consisting of a series of sections, B, having lugs *a*, or equivalent devices, upon their surfaces, for supporting the screens *b*, and each provided with the inlet-port *e* and outlet-port *d*, protected by the screens, and connecting with a supply and delivery pipe, the sections forming, when united, a series of compartments, I, containing beds of sand or other material in reduced or granular form, substantially as set forth.

2. A filtering apparatus consisting of a series of independent filter-beds of granular or reduced material and a washer or agitator, the beds being each provided with inlet and outlet ports connected with a common supply and delivery pipe, and the washer or agitator consisting of a series of subordinate agitators upon a common shaft, whereby the separate beds are simultaneously agitated to effect a separation of obnoxious material and permit of a removal of the same, substantially as set forth.

3. In a filtering apparatus consisting of a casing containing a bed of filtering material in reduced or granular form, the washer-pipe H, having a pipe or pipes, *i*, containing an outlet or outlets protected with wire-cloth or analogous material, the pipe or pipes being arranged to enter the bed, substantially as and for the purpose set forth.

4. A filtering apparatus consisting of a receptacle containing a series of beds of sand or other suitable filtering material, separated by hollow perforated partitions provided with inlet and outlet ports connecting with a supply and delivery, in combination with washer-pipes adapted to be rotated and issue jets of water in each of said beds, substantially as set forth.

5. In a filtering apparatus consisting of a series of sections, B, forming hollow partitions between beds of filtering material, the central washer-pipe, H, passing through the partitions and supplied in the compartments between them with shorter pipes *i*, substantially as set forth.

6. The sections B, cast with the lugs *a*, upon which screens *b* are placed, and forming the compartments I, containing filter-beds, in combination with the rotating pipe H and pipes *i*, substantially as set forth.

In testimony that I claim the foregoing improvement in filters, as above described, I have hereunto set my hand this 29th day of January, 1881.

JOHN W. HYATT.

Witnesses:

CHAS. C. GILL,
WM. R. SANDS.