No. 624,580. Patented May 9, 1899.

W. G. TOUSEY.

WATER FILTER.

(Application filed Jan. 29, 1898.)

(No Model.) 2 Sheets—Sheet 1.

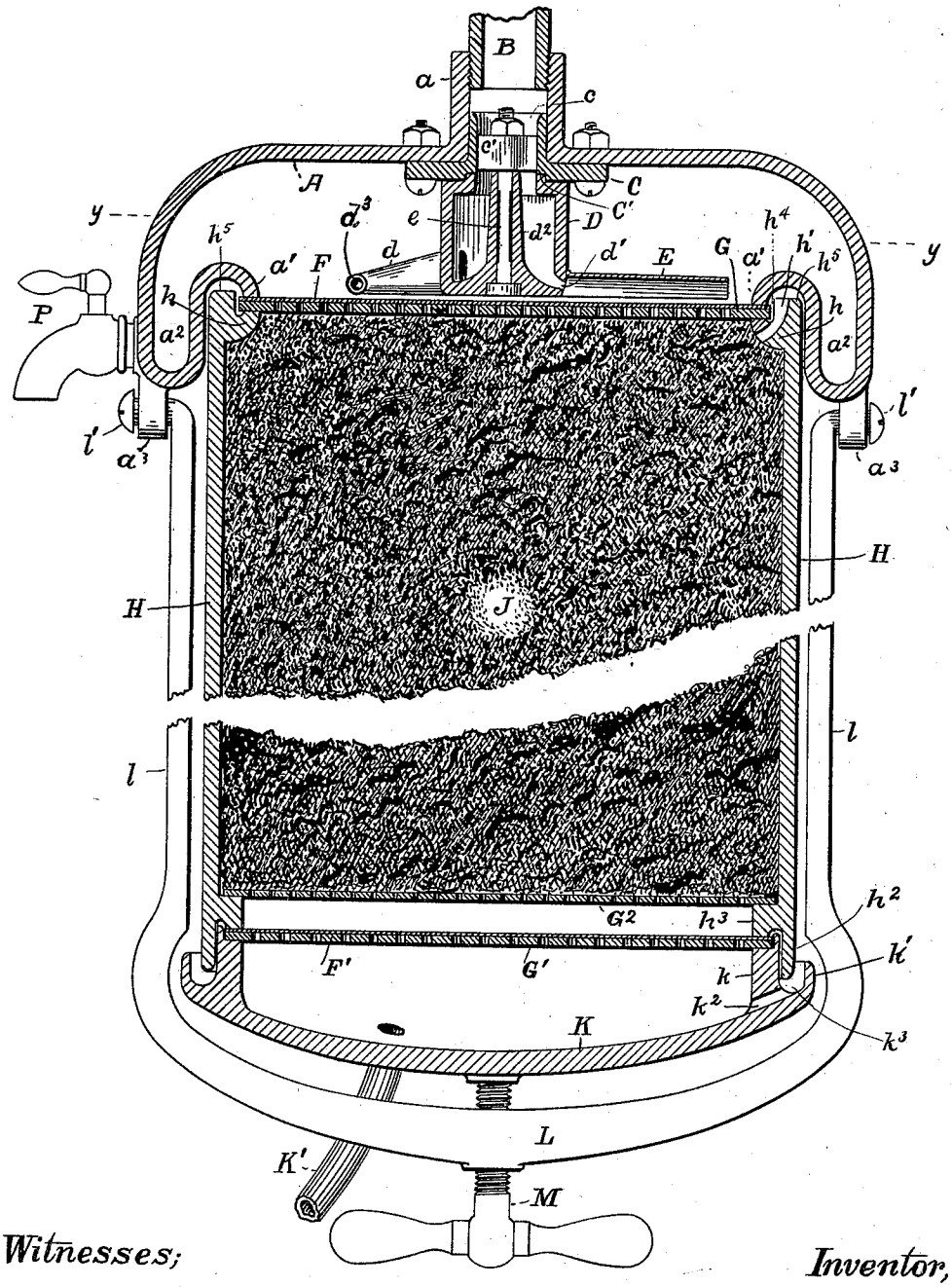


Fig. 1.

Witnesses;

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His Attorney

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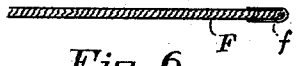


Fig. 6.

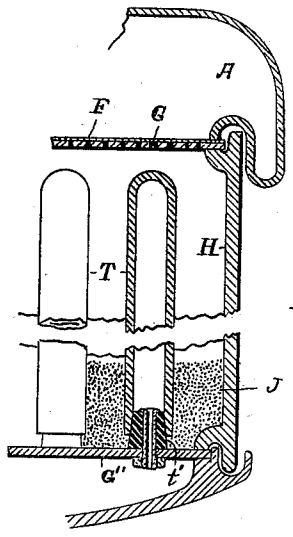
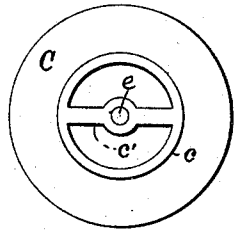


Fig. 3.

Fig. 4.



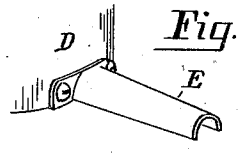


Fig. 5.

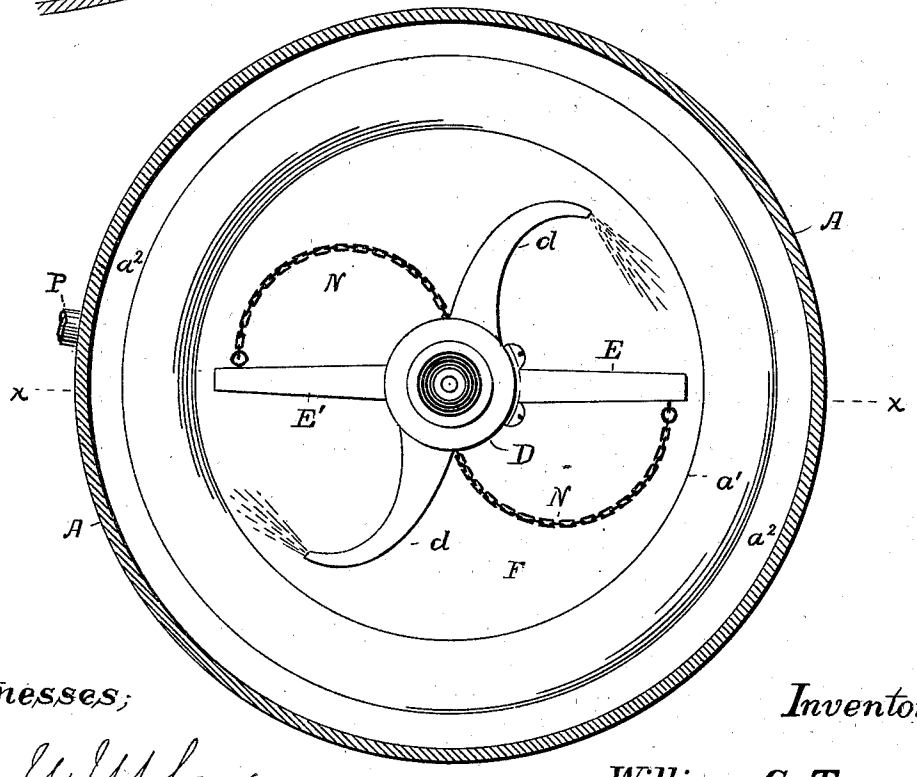


Fig. 2.

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UNITED STATES PATENT OFFICE.

WILLIAM G. TOUSEY, OF SOMERVILLE, MASSACHUSETTS.

WATER-FILTER.

SPECIFICATION forming part of Letters Patent No. 624,580, dated May 9, 1899.

Application filed January 29, 1898. Serial No. 668,376. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM G. TOUSEY, a citizen of the United States, residing at Somerville, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Water-Filters, of which the following is a full, clear, and exact description.

My invention relates to improvements in filtering-machines; and the objects aimed at are, first, superior filtration; second, prolonged efficacy of the filtering media, and, third, minimum requirement of attention and care. I attain these results by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of the entire machine through the line $x\ x$ in Fig. 2. Fig. 2 is a horizontal section through the line $y\ y$ in Fig. 1. Fig. 3 is a vertical section of the machine, showing a modified form with filtering-tube T, its plug t', the supporting-plate G″, and charcoal surrounding the filtering-tube. Fig. 4 is a detailed top view of the member C on an enlarged scale. Fig. 5 shows the elongated hood as fixed to the member D. Fig. 6 shows a sectional view of a portion of the filtering-disk F and the water-proofing solution f, applied to its margin.

The filter-case consists, as will be seen, of the segments A H K, clamped together by the screw M in the swinging yoke L. When, however, the segment H is dispensed with, the segment K is made by suitable modification to engage with segment A, and the segments are clamped together by the screw M, set in the yoke L, suitably modified.

A is the uppermost segment of the filter, having the inlet B, the waste-conduit a^2, with its outlet-valve P, the ears a^3, and the flange a', fitting upon the filtering-disk F.

c is a sleeve having the transverse bar c', affording a support to the spindle e, the shoulder C′, and the flange C, with screws for attaching it to the case A.

D is a revoluble self-actuated member having the function of cleaning the disk F and its inclosing chamber. It has the hollow stem or stump d^2, with bearings on the spindle e, the driving-arms d, the orifice d', and the elongated hood E.

H is the middle segment and is a cylinder having the shoulder h, fitting against the perforated plate G in opposition to the flange a'.

h' is a duct leading from a channel between the flange a' and the rim h^5 and is designed to conduct any drip from the joint between the flange a' and the shoulder h to the interior of the filter-case. This duct is designed, primarily, for the combination in which the charcoal-chamber H is dispensed with, and the segment K, suitably modified, is attached directly to segment A, as elsewhere set forth. When, however, a filtering medium is employed in segment H so compact as to produce pressure and backflow the duct h' is closed.

G^2 is a perforated plate supporting the bed of charcoal J.

G″ is a plate carrying the filtering-tubes when the modified form shown in Fig. 3 is employed.

T is an unglazed porcelain filter-tube seated on stopper t, clamped to the plate G″.

F′ is a filtering-disk resting upon the perforated plate G′.

The parts F′ G′ G^2 are dispensed with when the filtering-tubes T are employed, as in Fig. 3.

K is the lowermost segment of the filter. It has the flange k, opposed to the shoulder h^3, and supports the plate G′, with the filtering-disk F′. It has also the channel k^3, with the duct k^2, designed to collect and conduct any leakage of the filter-joints to the interior of the filter-case.

K′ is the outlet of the finished filtrate. This outlet K′ is made large enough to prevent pressure in the segment K and consequent backflow through the duct k^2.

L is a swinging yoke supported by the ears a^3. The screw-heads l' serve to hold the yoke in place.

The unfiltered water enters under pressure through the inlet-pipe B, passes into the small reactionary motor-wheel D, and issues thence through the orifices d^3 d'. It is then forced through the filtering-disk F, which rests on the perforated plate G. This filtering-disk removes all matter held in suspension. For this disk I ordinarily prefer felted cotton fiber, properly sterilized, but under some conditions would use porous stone, filter-paper, or unglazed porcelain, as circumstances might indicate.

Waiving for a moment the description of the device by which the filtering-disk is cleaned and the chamber in which it is held is flushed, let me point out the further operations to which the water undergoing filtration is subjected. Passing through the perforated plate G it enters the section H, which carries the charcoal J, as in Fig. 1, or filtering-tubes and charcoal, as in Fig. 3, or in some instances filtering-tubes without the charcoal. Charcoal, as is well known, has a special power over obnoxious odors, tastes, and soluble coloring-matter; but as commonly employed this efficacy is soon lost. Worse than that, the bed is liable to become the nest and breeding-place of organisms inimical to health. By my device of an antecedent filter-chamber I abstract all suspended matter from the water and so protect the charcoal bed, with its peculiar power of eliminating obnoxious elements, thus economizing and greatly prolonging its efficacy. After having been thus subjected to the action of the charcoal the filtrate passes on through the perforated plate G^2 and the filtering-disk F', as in Fig. 1, or through the filtering-tubes T, as in Fig. 3. This feature of the filter is esteemed of much importance as providing effectively against an obvious danger. The filtrate at length issues from the outlet K' in a highly-refined condition, When the porcelain tubes T, Fig. 3, are employed they are held firmly in position by the perforated plugs t', attached to the plate G'', as in Fig. 3. Unglazed porcelain, when combined of suitable materials, constitutes one of the most highly esteemed filtering materials that we have; but its practical use is attended with the grave disadvantage that it quickly clogs and requires frequent scouring. This scouring process is difficult, dirty, and attended with no little breakage. Now these disadvantages I overcome in a large measure by the protective action of the primary self-cleaning chamber A.

The self-cleaning device I will now return to and describe more fully.

D is a reactionary wheel revolving on the spindle *e*, which is supported by the transverse bar *c'*.

d^2 is a hollow stem or stump having bearings on the spindle *e*.

d are driving-arms.

d' is a concentrating-orifice whence issues the scouring-jet.

E is an elongated hood fixed to the member D and immediately above the orifice *d'*. This hood is intended to overarch the scouring-jet which issues from the orifice *d'*, keep it intact, and hold it to close and contiuous action on the filtering-disk F.

E' is an arm designed to carry one end of the sweep N when such a sweep is used.

a^2 is a waste canal or conduit with an outlet-valve at P. This conduit is made to encircle and to hang below the plane of the filtering-disk F. By this device of an encircling waste-conduit extending below the plane of the filtering-disk that disk is, when the chamber A is being flushed and the scouring process is in progress, drained of its load of superincumbent water and exposed to the direct and unembarrassed action of the scouring-jet which issues from the orifice *d'*. By opening the valve P the water is permitted to course with force into the motor-wheel D and to issue with energy from the contracted orifices *d d'*. The "kick" of the terminal jets *d* causes the wheel to revolve on the spindle *e*, and the revolution of the wheel brings the scouring-jet *d'* to play successively over all parts of the disk F, thus effectively scouring its surface and flushing the chamber. By concentrating the flow of water to the relatively small orifice *d'*, I get a jet of great energy and cleansing power, and by attaching it to the revolving wheel I bring it to act in turn on all parts of the surface to be cleaned. Where circumstances require it, I reinforce the action of the scouring-jet by a sweep of chain N or other suitable material attached to the member D, as shown in Fig. 2. After a brief interval the valve P is closed, and the machine will be found in condition to filter again freely.

The several segments or chambers are made readily accessible for the renewing of the filtering media by a slight retreat of the screw M and the swinging aside of the yoke L.

Where the most highly refined results are called for, I combine the filtering-disk F, the charcoal bed J, and the filtering-disk F', or in lieu of F', the unglazed porcelain tube T, substantially as shown in Figs. 1 and 2. Under less exacting conditions I detach the primary self-cleaning segment A and use it, with suitable modifications of the yoke L and the part K, as an independent filter; or, again, under other requirements I dispense with the charcoal bed J and the perforated plates G' G^2 and the filtering-disk F' and use porcelain tubes, as in Fig. 3, and as a result have a highly effective filter which is practically self-cleaning. Finally, I provide against lateral percolation through the filtering-disks F F' and secure good and easily-made joints by dipping the margin of the filtering-disks in a waterproofing solution, as shown in Fig. 6. Accidental drip or leakage of the joints is provided for by the channel between the rim *h* and the flange *a*, the channel k^3, and the ducts *h' k²*, leading to the interior of the filter-case, as shown in Fig. 1.

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

1. In a water-filter, the combination with a filtering-disk, of a water-supplied member revoluble upon an axis perpendicular to the center of said disk and close to the surface thereof, said member being self-actuated and having as near its center as practicable a concentrating-orifice whereby a powerful jet issuing therefrom is made by the revolution of

the said member to sweep the said disk from the center outward, and successively scour every part of the same.

2. In a water-filter, the combination with the receiving-chamber having the filtering-disk at the bottom thereof, and the movable water-supplied member adapted to project a scouring-jet over the surface of said disk, of an outlet-valve located in the wall of said chamber near the plane of said disk, whereby the accumulations scoured from said disk can be directly removed through said valve, substantially as set forth.

3. In a water-filter, the combination of the receiving-chamber having the jet-wheel with centrally-located orifice sweeping the same, the filtering-disk at the bottom of said chamber, the charcoal-containing chamber secured beneath said disk, and a compact filtering-body introduced between said charcoal and the water-discharge, substantially as and for the purpose set forth.

4. In a water-filter, the combination with a filtering-surface, of a self-actuated revolving member causing a concentrated jet of water to sweep the entire filtering-surface, and a drag resting upon said surface and moved along the same by said revolving member, substantially as and for the purpose set forth.

5. In a filter, the combination of a receiving-chamber, a filtering medium, a water-supplied member adapted to project a scouring-jet across the surface of the said filtering medium from the center outward, with a waste-conduit and outlet-valve, said conduit being made to encircle, and with its outlet-valve to hang below the plane of the aforesaid filtering-surface, thus relieving it of superincumbent water when the chamber is being flushed, and exposing it to the free unembarassed action of the scouring-jet, substantially as set forth.

6. In a filter, the combination of a receiving-chamber, a filtering medium, a water-supplied member revoluble about an axis perpendicular to the center of said filtering-surface and in close proximity thereto, and having near its center an orifice adapted to project a scouring-jet outward across the said filtering-surface, with an elongated hood fixed immediately above the said orifice in such a way as to closely overarch the issuing jet, keep it intact, and hold it in close contact with and energetic action upon the surface to be scoured, substantially as set forth.

7. In a filter, a filter-case consisting of a plurality of segments or chambers abutting and fitting against each other, in combination with a yoke hinged to one of the terminal segments, and carrying a clamping device fitting against the exterior of the other terminal segment, substantially as and for the purpose set forth.

8. In a filter, the combination of a receiving-chamber, the sleeve c having the flange C, the transverse bar c', and the shoulder C'; the spindle e seating in the bar c'; with the revoluble member D abutting the shoulder C', and having the hollow stump d^2 with bearings on the spindle e, and having also the driving-arms d, the orifice d', and the elongated hood E, substantially as and for the purpose set forth.

9. In a filter, the combination of a receiving-chamber, a filtering-disk, a seat of the said disk having a rim projecting by and above the edge of the said disk, a flange clamping down upon the margin of said disk and forming with the aforesaid rim a narrow canal, a duct leading from the said canal to the interior of the filter-case, whereby any leakage of the joint is conducted within the filter-case, substantially as set forth.

10. In a filter, the combination of a receiving-chamber, a filtering-disk, a seat of the said disk having a groove outside the margin of the said disk, and a duct leading from the said groove to the interior of the filter-case, whereby drip and leakage of the joints is conducted to the interior of the filter-case, substantially as set forth.

11. In a filter, the combination of a filter-chamber, an unglazed porcelain tube having one end closed and the other end opening out with a diverging mouth, with a stopper fitting said mouth, said stopper being perforated in the line of its axis and clamped to the floor of the said chamber, and so placed that the perforation of the stopper is made continuous with the perforation of the said floor, whereby the said tube is held in position, a water-tight joint secured, and a passage afforded the filtrate from the interior of the tube to the exterior of the aforesaid chamber, substantially as and for the purpose set forth.

In testimony that I claim the foregoing invention I have hereunto set my hand this 28th day of January, 1898.

WILLIAM G. TOUSEY.

Witnesses:

F. E. CALLER,

A. B. UPHAM.