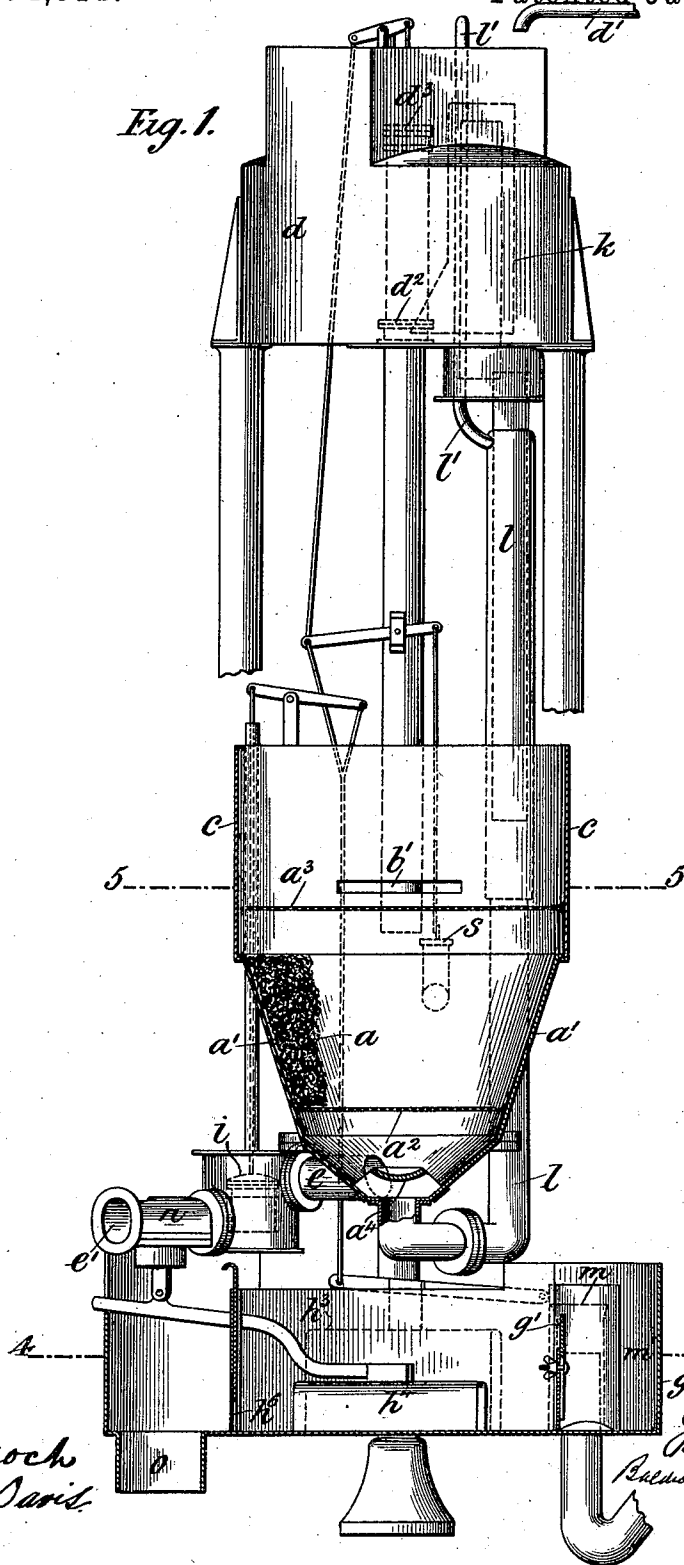


J. WILSON.
AUTOMATIC FILTER.

No. 574,511.

Patented Jan. 5, 1897.

Fig. 1.



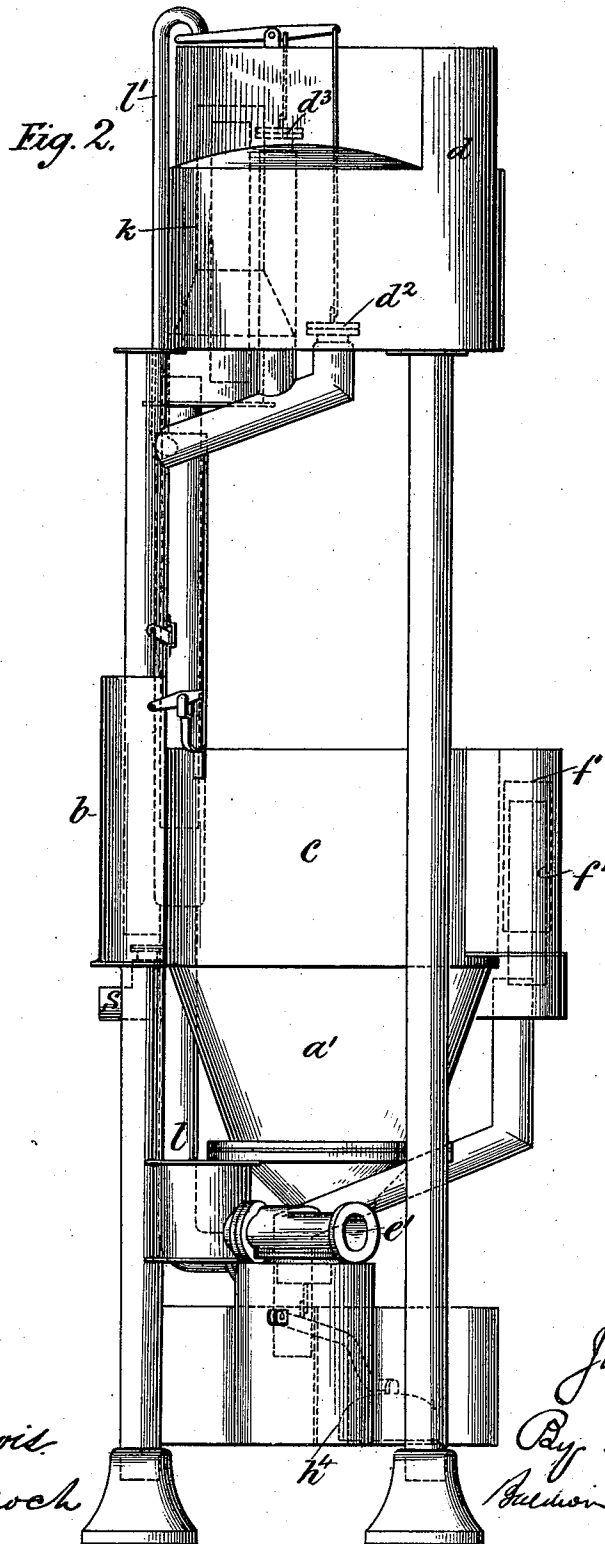
Witnesses
E. A. Balloch
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AUTOMATIC FILTER.

No. 574,511.

Patented Jan. 5, 1897.



Witnesses.
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(No Model.)

3 Sheets—Sheet 3.

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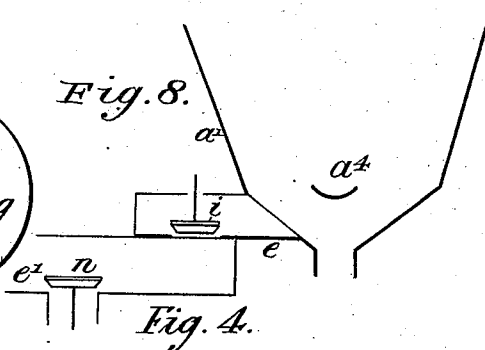
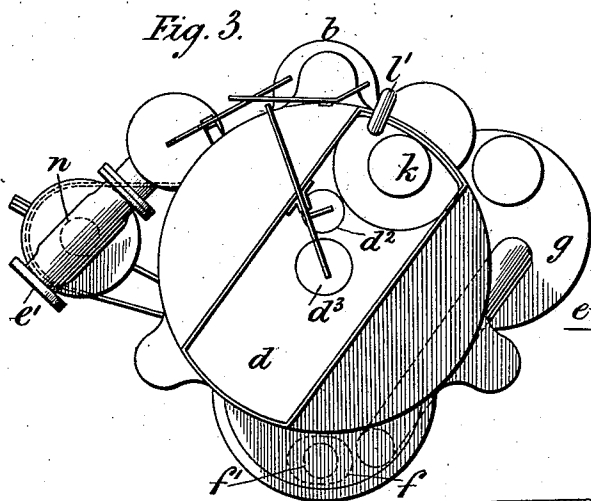


Fig. 7.

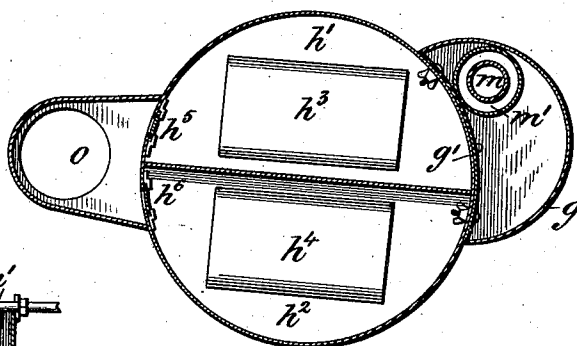
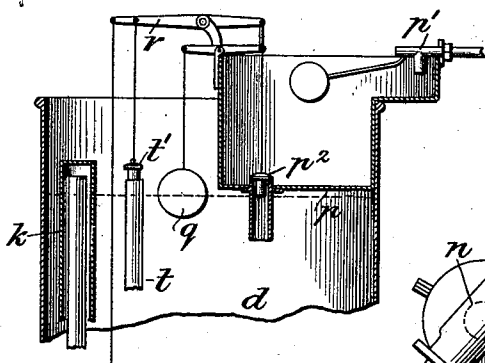


Fig. 5.

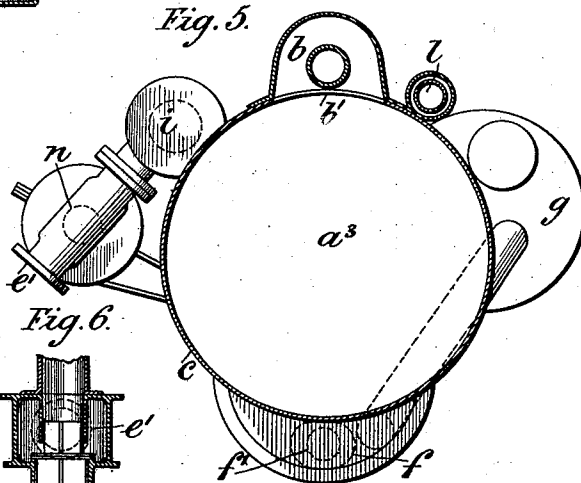
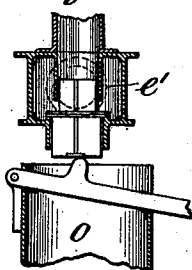


Fig. 6.



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UNITED STATES PATENT OFFICE.

JAMES WILSON, OF LONDON, ENGLAND.

AUTOMATIC FILTER.

SPECIFICATION forming part of Letters Patent No. 574,511, dated January 5, 1897.

Application filed July 14, 1896. Serial No. 599,148. (No model.)

To all whom it may concern:

Be it known that I, JAMES WILSON, plumber, a subject of the Queen of Great Britain, residing at 39 Borrodaile Road, Wandsworth, London, in the county of Surrey, England, have invented an Automatic or Self-Cleansing Filter, of which the following is a specification.

According to my invention the washing of the filter-bed is brought about by an automatic siphon which discharges the water when it accumulates above the filter-bed. The water delivered by the automatic siphon raises a float which closes the inlet and outlet valves by which the water passes onto and from the filter-bed, and the automatic siphon also determines the discharge of a measured quantity of water upward through the filtering-bed to cleanse the filter. The washing-water is drawn from a measuring-cistern by another automatic siphon. The rise of the float causes this automatic siphon to operate, and the water passes from the cistern through the filtering-bed in an upward direction. There is another float which is raised in the same way as the float previously mentioned. It controls a valve by which the portion of the washing-water which remains below the filter-bed is allowed to escape before filtered water is again collected. The floats are contained in troughs or open boxes having inlets and outlets regulated by slides.

In order that my said invention may be fully understood and readily carried into effect, I will proceed to describe the drawings annexed.

Figures 1 and 2 are elevations of an automatic self-cleansing filter in accordance with my invention. Fig. 1 is partly in section. Fig. 3 is a plan. Figs. 4 and 5 are respectively sections on the lines 4 4 and 5 5 in Fig. 1. Fig. 6 shows a modification of the valve by which the filtered water passes; and Fig. 7 is a vertical section of the upper part of the apparatus, showing a modification which is made when it is desired to wash the filter with a purer water than that which is passed through the filter. Fig. 8 is a diagram showing the arrangement of the valves in the outlet.

The filter-bed *a* may be of finely-granulated gas-coke free from dust. It is contained

within a conical or pyramidal casing *a'*. It rests on a bottom plate *a*², of perforated sheet metal or wire-cloth, and some distance above it there is another similar plate or wire-cloth *a*³. The perforations in both plates or cloths are sufficiently fine to retain the filtering material. The water to be filtered enters from a side pocket *b* by the opening *b'* into the open trough *c* and passes through the perforated plate *a*³, which forms a bottom to this trough. In one method of using the filter, which I will first describe, the water descends into the pocket *b* from the cistern *d*, which measures the washing-water and which is continuously supplied by a pipe *d'*. The filtered water passes off by a pipe *e* and after passing certain valves is delivered at *e'*. For a time the filter is able to carry off the whole of the water-supply; but when it becomes somewhat clogged the water accumulates in the trough *c*, in which there is an automatic siphon of a well-known type contained in a side chamber which communicates with a trough *c*. The automatic siphon consists of a bell *f*, covering an outlet-pipe *f'*. When the water in the trough has risen sufficiently to cover the open end of the pipe *f'*, it causes the siphon to operate, and the water is rapidly drawn out of the trough until it is empty, and the lower edge of the bell *f* becomes uncovered. The emptying of the trough occupies some little time, and in this interval the washing of the filtering material takes place and other changes are brought about.

The water delivered by the siphon is received first into a pocket *g*. Thence it overflows an adjustable weir *g'*, consisting of a plate which can be slid up and down the outer side of the open boxes *h'* *h*², in which are floats *h*³ *h*⁴. The water passes from the pocket *g* into these boxes, and both floats rise, and several valves are thereby operated upon. The float *h*³ is connected, as shown, with three valves. *d*² and *d*³ are exit-valves by which the water descends from the cistern *d*, and *i* is the outlet-valve by which the filtered water leaves the filter. All these valves, when the float *h*³ rises, fall to their seats. At the time when this takes place the cistern *d* is nearly full. Two outlet-valves are provided to insure that it shall be so. The lower valve will not deliver the full supply, so the water-level in the cistern

risers until the upper valve d^3 is reached, and there remains stationary until the valves close. In this cistern there is another automatic siphon k , and when the outlet-valves are closed the water soon rises in the cistern sufficiently to bring this siphon into action, more especially as the cistern is contracted at the upper part. Also, to render the action more prompt a second supply may be provided, controlled by a ball-cock, which opens as soon as the water commences to rise in the cistern on the closing of the outlets. Such an additional supply will not, however, in most cases be needed.

The siphon k comes into action before the siphon $f f'$ previously mentioned ceases to operate, and discharges the whole contents of the cistern d down the pipe l , air escaping from the pipe by the vent-tube l' . The pipe l delivers the water under the filter-bed. It is distributed by the baffle-plate a^4 , and it rushes up through the bed, thereby cleansing the same and carrying the mud up through the perforated plate a^3 . This goes on until the cistern d has been emptied by one siphon and the trough c by the other.

The water which first descends from the trough c fills the pocket g and the boxes h' and h^2 . Then the foul water which has washed the filter-bed follows, and reaching the raised outlet m flows away by it. Over the outlet m is a bell m' , constituting another automatic siphon, by which the pocket g is completely emptied. The outlet-pipe m is telescopic, and its mouth, together with the adjustable weir g' , is so set as to draw off the dirty water as soon as it arrives. When the flow from the trough c ceases, the boxes h' h^2 empty by the regulated outlets h^5 and h^6 , which are adjusted by hand, so that the escape of water thereby is much slower than the inflow over g' , and also so that the escape by h^6 is slower than by h^5 . Hence first the float h^3 falls and opens the valves d^2 and d^3 and i , but the float h^4 is slower to descend. Now this float h^4 controls a valve n , and it holds it open while the unfiltered water below the filter-bed is discharged by a passage o , which also receives the water which passes out by the apertures h^5 and h^6 . This water may either be allowed to run to waste or it may be collected and afterward filtered.

When the valve n closes, filtered water again commences to flow from the exit at e' , and filtering goes on as before.

In place of the two valves i and n I may employ the double valve shown by Fig. 6. When the valve is down, the filtered water passes over it and is delivered at e' . When it is up, being lifted by the float h^4 , it allows the water from beneath the filter-bed to pass away by the pipe o .

When the water to be filtered is not fit to wash the filter-bed, as, for example, sewage, then the apparatus is worked in a somewhat different manner. The valves d^2 and d^3 are disconnected and are kept constantly closed,

and cistern d is no longer supplied continuously, but intermittently, through a small auxiliary cistern p . (See Fig. 7.) The water for washing the filter is supplied by the ball-cock p' , which closes when the cisterns are full. p^2 is a valve which allows water to pass from the auxiliary into the main cistern. It is connected with a ball-float q in the main cistern and closes when this cistern has received its supply. The valve p^2 is also connected with a lever r , which at its other end is coupled with the float h^3 in such manner that the rise of the float causes the valve p^2 to be lifted and the contents of the auxiliary cistern to be discharged into the main cistern. Thus the siphon k is brought into operation and the contents of both cisterns are discharged beneath the filter-bed.

The sewage or impure water to be filtered enters the pocket b by a valve at s , and this valve being coupled with the float h^3 by means of a lever and cord drops to its seat when the float rises, so that this inlet is closed during the washing operation. t is an overflow-pipe with which, by way of precaution, the cistern d is provided. A valve t' is provided to close it. This valve is lowered to its seat by the rise of the float h^3 .

For filters of large size I provide two or more filter-beds, side by side, with washing arrangements common to the pair or series; or with a single filter-bed when of large size I may for the better distribution of the washing-water divide the space beneath the filter-bed into two or more sections.

It is obvious that the apparatus will, if required, filter liquids other than water.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The combination of a filter-bed, means for supplying liquid to be filtered to the upper side thereof, and for withdrawing the filtered liquid from its underside, an automatic siphon which withdraws liquid from the upper surface of the filter-bed when it ceases to pass through as rapidly as it is supplied, means connected with the supply and escape ports and operated by the descent of liquid through the siphon to arrest the supply to the upper surface of the filter-bed, and the escape from the underside thereof, and means also operated by the flow of liquid through the siphon for directing a flow of liquid upward through the filter-bed.

2. The combination of the filter-bed, means for supplying liquid to and withdrawing filtered liquid from the filter-bed, means for discharging liquid when it accumulates above the filter-bed, a cistern containing a measured quantity of liquid for washing the filter-bed, means operated by the descent of liquid from above the filter-bed for arresting the supply of liquid above the filter-bed, and for also effecting the discharge of the contents of the cistern upward through the bed.

3. The combination of a filter-bed, means for supplying liquid to and withdrawing filtered liquid from the filter-bed, an automatic siphon which discharges liquid when it accumulates above the filter-bed, a cistern containing a measured quantity of liquid for washing the filter-bed, means by which the descent of liquid through the said automatic siphon arrests the supply of liquid above the filter-bed, and discharges the contents of the cistern upward through the filter-bed.

4. The combination of a filter-bed, means for supplying liquid to and withdrawing filtered liquid from the filter-bed, an automatic siphon which discharges liquid when it accumulates above the filter-bed, a cistern containing a measured quantity of liquid for washing the filter-bed, a float raised by the liquid delivered by the said automatic siphon, valves connected with the float and means by which the rise of the float effects the discharge of the cistern upward through the filter-bed.

5. The combination of a filter-bed, means for supplying liquid to and withdrawing filtered liquid from the filter-bed, an automatic siphon which discharges liquid when it accumulates above the filter-bed, means govern-

ing the supply of liquid above the filter-bed, and the flow of liquid up through the filter-bed to wash the same, and means operated by the descent of liquid through said automatic siphon for arresting the supply of the liquid above the filter-bed and directing the flow of liquid up through the filter-bed, and a valve controlled by a float raised by the liquid discharged by the siphon which allows the washing liquid to escape from below the filter and prevents it from mixing with the filtered water.

6. The combination of a filter-bed, means for supplying liquid to and withdrawing filtered liquid from the filter-bed, an automatic siphon which discharges liquid when it accumulates above the filter-bed, a trough receiving liquid from the automatic siphon, regulated passages by which the liquid enters and leaves the trough, and a float in the trough controlling valves which regulate the passage of the liquid.

JAMES WILSON.

Witnesses:

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FRED C. HARRIS.