

No. 627,594.

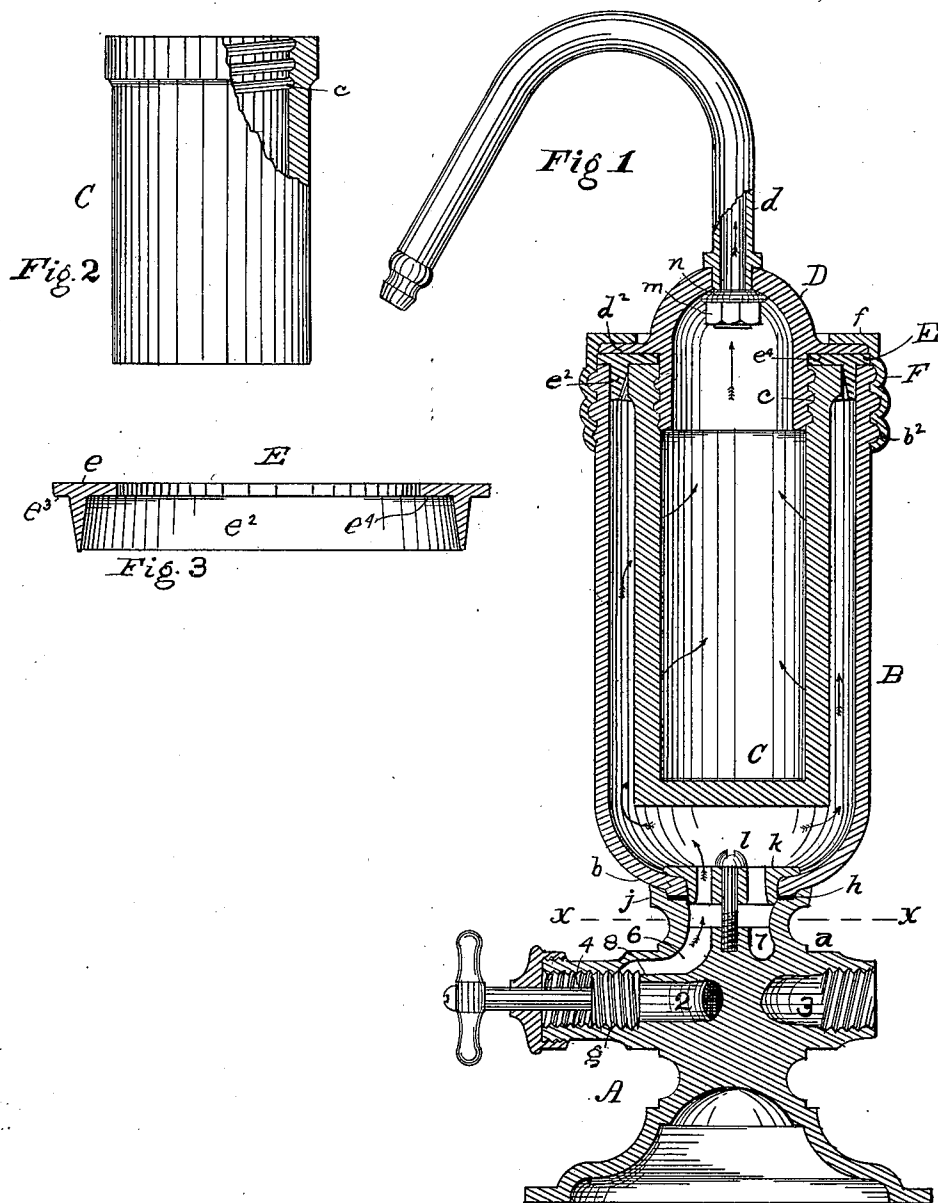
Patented June 27, 1899.

W. E. SAUNDERS.
FILTER.

(Application filed Mar. 24, 1898.)

(No Model.)

2 Sheets—Sheet 1.



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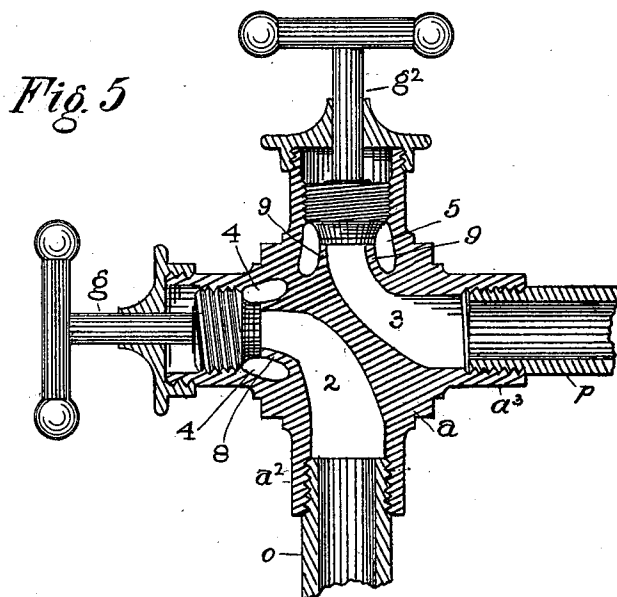
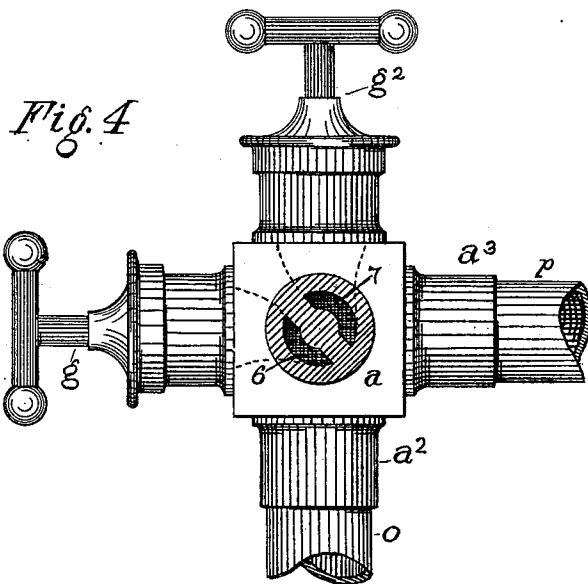
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(Application filed Mar. 24, 1898.)

(No Model.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

WILLIAM E. SAUNDERS, OF CLEVELAND, OHIO.

FILTER.

SPECIFICATION forming part of Letters Patent No. 627,594, dated June 27, 1899.

Application filed March 24, 1898. Serial No. 674,999. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. SAUNDERS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Filters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in filters.

The objects of the invention are to improve the construction, increase the efficiency, effect better sanitation, and secure increased durability of the apparatus; and it consists in the novel features of construction, arrangement, and combination of parts, as hereinafter fully described, and specifically pointed out in the claims.

While applicable to a variety of uses, my improved filter is especially designed for use in connection with the house water-supply in cities, &c.

In the drawings, Figure 1 represents in central vertical section a filter embracing my invention and showing the preferred form. Fig. 2 is a detached view in elevation of the preferred form of filtering-diaphragm. Fig. 3 is a sectional detail of my improved gasket. Fig. 4 is a sectional detail showing the construction of that part of the base containing the water ports and valves, the plane of section being shown on Fig. 1 by the broken line *xx*. Fig. 5 is a similar sectional detail of the base, taken horizontally through the center of the nipples $a^2 a^3$ and stop-cocks $g g^2$, further exhibiting the various ports and water-passages.

The essential structure comprises a base or body provided with an inlet-opening for the supply, (and preferably an outlet for the waste,) a porous filtering-diaphragm formed as a solid body, a cap secured to the body and inclosing the diaphragm, and a discharge-outlet for the filtered liquid opening on the opposite side of the diaphragm from the inlet and waste openings. The base or body may be an integral structure or composed of separate parts, and the discharge may open from the top or bottom of the apparatus, as preferred;

but the form which for constructional reasons is preferred is that shown in Fig. 1, in which—

A represents the base; B, the body or shell; C, the filtering diaphragm or cup; D, the cap; *d*, the discharge-tube; E, the gasket, and F a clamping-ring by which the cap, cup, and body of the preferred form are firmly but detachably secured together.

Upon the base A is a neck *a*, in which are formed the water-ports 2 3, leading from threaded nipples $a^2 a^3$ to chambers 4 5, closed by stop-cocks $g g^2$. The chambers 4 5 communicate by ports 6 7, which open on the upper surface of the neck *a*, upon which the body or shell B is secured, as by seating upon a gasket *h*, held by a rim *j*, and being pressed into water-tight contact therewith by a perforated plate *k*, held by a screw *l*, threaded into the upper end of the neck *a*, as seen in Fig. 1.

The stop-cocks $g g^2$ are of the ordinary construction and seat upon the septums 8 9, which separate the ports 2 3 from the chambers 4 5 and are perforated to permit a free flow of water through the ports 2 3 and 6 7 when the cocks $g g^2$ are open.

The body or shell B is preferably made of glass, as being the most hygienic material available and for other reasons to be explained, although it is obvious that the shell B could be made of some incorrodible metal, as aluminium, brass, tin, or bronze, and still accomplish many of the ends aimed at by my invention.

The body or shell B is preferably of cylindrical form contracted at the lower end to a neck *b*, which seats tightly upon the gasket *h*, and at its upper end is provided with an external thread b^2 and is made flat on the upper edge to form a good seat for the gasket E.

The filtering-diaphragm C is formed of any porous solid body, but preferably of compressed carbon and of the cup shape shown, and it is also flat on its upper edge, so as to afford a tight seat for the gasket E. An internal thread *c* is formed at the top of the filtering-cup, into which is screwed the cap D, also preferably made of glass, and which is provided with a rim d^2 , extending over the top of the body or shell B.

The gasket E is formed of rubber or other

incorrodible elastic substance and has a flat upper surface e and a depending annular rib e^2 , nearly centrally disposed, so as to leave the external rim e^3 to rest upon the upper edge of the glass body B and the internal slightly-wider rim e^4 to rest upon the top edge of the filtering-cup C, as seen in Fig. 1.

The clamping-ring F fits the thread b^2 on the body B and has an inward-projecting flange or rim f , which bears upon the top of the rim d^2 of the cap D, so that when the ring F is firmly screwed home it binds the cap D tightly upon the gasket E, causing the depending annular rib e^2 to be compressed between the inner surface of the body B and the outer surface of cup C at the top and to closely hug the inner surface of the body B. The filtering-cup thus forms a diaphragm across the shell or body B and has the inlet and discharge openings on opposite sides of it.

By the construction above described and the use of the special form of gasket shown I have found it possible to maintain a water-tight joint between the cap D and the filtering-cup C, as also between the cap and the body B, which I have found impossible to accomplish with any ordinary form of gasket, as the filler is often required to stand a hydrostatic pressure of fifty or sixty pounds per square inch, more or less, according to the pressure maintained in the water-mains to which it is connected, and this it does perfectly by the use of this form of gasket.

The apparatus is assembled as follows: The delivery-tube d is secured to the cap, as by nut m , threaded upon its inner end and bearing against a gasket n , interposed between the nut and the inner surface of the cap, Fig. 1. The gasket E is then placed upon cup C and the cap D screwed tightly into the cup, compressing the rim e^4 between the cup and the rim d^2 . The cup, with cap D and gasket E attached, is then inserted into the body B, which has been previously secured to the neck of base A, as already described. The ring F is threaded upon the thread b^2 of the body B until the cap is clasped tightly upon the body, when the joints at gasket E will be found water-tight. Connection is made from one of the nipples a^2 a^3 , as by a pipe o , to the water-supply, and the other nipple is connected, as by pipe p , to the waste-pipe of the water system. Assuming both of the stop-cocks to be closed, opening that one whose chamber communicates with the port leading from the nipple connected to the water-supply water will enter, and, rising through the neck a , will enter and fill the body B, as indicated by the arrows in Fig. 1, and will filter through the walls of the filtering-cup, filling the cup and escaping through the discharge-tube d .

It is obvious that the form of the various parts might be more or less modified without departing from the essential features of my invention, and I have contemplated the use of several such modifications.

All animal and vegetable matter in the wa-

ter and all solid matter and impurities of every kind, however minute, will be stopped by the carbon filter and will accumulate upon the exterior surface thereof; but when the water is shut off the intercepted matter will largely subside and will rest at the bottom of the shell B and be visible through its transparent walls. By now opening the stop-cock leading to the waste the accumulated matter will escape, and by opening also the stop-cock leading to the supply water will enter and wash out all intercepted matter into the waste. Then when the waste-cock is closed water will pass through the filter as before.

Aside from its mechanical filtering action, as above described, the well-known property of carbon of absorbing gases and purifying liquids containing impurities in solution renders it a far superior material to sand, sandstone, pottery, or fibrous material for filtering and wholly obviates the very objectionable use of chemical precipitants or coagulants. When the filter has been for some time in use, the carbon cup can be removed by unscrewing the ring F and its surfaced cleaned, when it can be replaced as before, and at longer intervals the cup can be removed, the cap and gasket removed, and the cup can be baked or heated to a temperature sufficient to carbonize any impurities which may have penetrated its outer surface or become lodged in its substance.

The transparent walls of the body B render it easy at all times to observe the condition of the carbon cup and the interior of the shell B, and by this means that care and attention is insured which all filters require, but which is very generally neglected where metal shells are used and the memory is depended upon to prompt the necessary attention to the filter. The use of glass also prevents electrolytic action which might affect a metal shell.

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

1. In a filter the combination of a base having valve-controlled inlet and outlet openings which open by ports on its upper surface, a shell secured to said base and inclosing said inlet and outlet ports, a cap detachably secured to said shell and having a discharge-pipe and a threaded rim, and a cup-shaped porous diaphragm of compressed carbon threaded upon said rim of said cap and inclosing the discharge-outlet, substantially as described.

2. In a filter the combination of a base having valve-controlled inlet and outlet openings which open by ports on its upper surface, a glass shell secured to said base and inclosing said inlet and outlet ports, a cap detachably secured to said shell and having a discharge-pipe and a threaded rim, and a cup-shaped porous diaphragm of compressed carbon threaded upon said rim of said cap and inclosing the discharge-outlet, substantially as described.

3. In a filter the combination of a base hav-

ing valve-controlled inlet and outlet openings which open by ports on its upper surface, a glass shell detachably secured to said base and inclosing said inlet and outlet ports, a cap detachably secured to said shell and having a discharge-pipe and a threaded rim, and a cup-shaped porous diaphragm of compressed carbon threaded upon said rim of said cap and inclosing the discharge-outlet, substantially as described.

4. In a filter the combination of a base having valve-controlled inlet and outlet which open by ports on its upper surface, a shell threaded at its upper edge and secured to said base inclosing said ports, a cap having a discharge-pipe, a threaded rim and a rim engaging the upper edge of the shell, a cup-shaped porous diaphragm of compressed carbon threaded upon the cap, and a clamping-rim threaded upon the upper edge of the shell and forcing the cap into tight engagement therewith, substantially as described.

5. In a filter the combination of a base having valve-controlled inlet and outlet which open by ports on its upper surface, a glass shell threaded at its upper edge and secured to said base inclosing said ports, a cap having a discharge-pipe, a threaded rim and a rim engaging the upper edge of the shell, a cup-shaped porous diaphragm of compressed carbon threaded upon the cap, and a clamping-rim threaded upon the upper edge of the shell and forcing the cap into tight engagement therewith, substantially as described.

6. In a filter the combination of a base having valve-controlled inlet and outlet which open by ports on its upper surface, a glass shell threaded at its upper edge and secured to said base inclosing said ports, a glass cap having a discharge-pipe, a threaded rim and a rim engaging the upper edge of the shell, a cup-shaped porous diaphragm of compressed

carbon threaded upon the cap, and a clamping-rim threaded upon the upper edge of the shell and forcing the cap into tight engagement therewith, substantially as described.

7. In a filter the combination of a base having valve-controlled inlet and outlet which open by ports on its upper surface, a glass shell threaded at its upper edge and secured to said base inclosing said ports, a glass cap having a discharge-pipe, a threaded rim and a rim engaging the upper edge of the shell, a cup-shaped porous diaphragm of compressed carbon threaded upon the cap, a gasket interposed between the cap and both the cup and the shell and having a depending rib extending between the shell and the porous cup, and a clamping-rim threaded upon the upper edge of the shell and forcing the cap into tight engagement therewith, substantially as described.

8. In a filter, in combination with the shell, cap, and filtering-diaphragm substantially such as described, the base having inlet and outlet passages each leading to a valve-seat, valves controlling said passages, and ports leading from the valve-chambers and opening centrally on the upper surface of the base, substantially as described.

9. In a filter, in combination with the filter-shell, the porous diaphragm and the cap, the T-shaped gasket having flanges to bear on the diaphragm and on the shell and an intermediate depending rib which tapers to a thin edge at its margin, substantially as and for the purpose described.

In testimony whereof I hereto affix my signature in presence of two witnesses.

WILLIAM E. SAUNDERS.

Witnesses:

ERNEST G. WILCOX,
LORIN PRENTISS.