No. 648,043. Patented Apr. 24, 1900.

J. S. MILES.

PORTABLE FILTER.

(Application filed May 5, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1

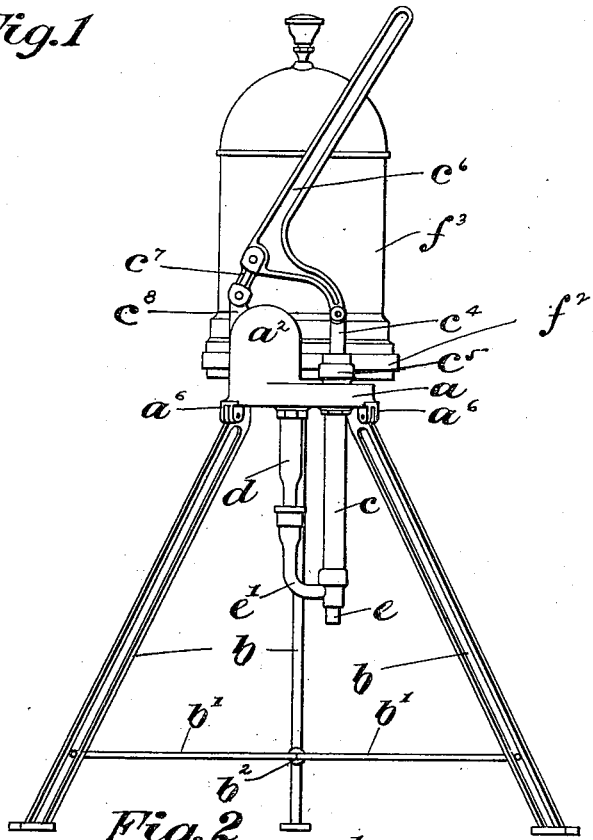


Fig. 2

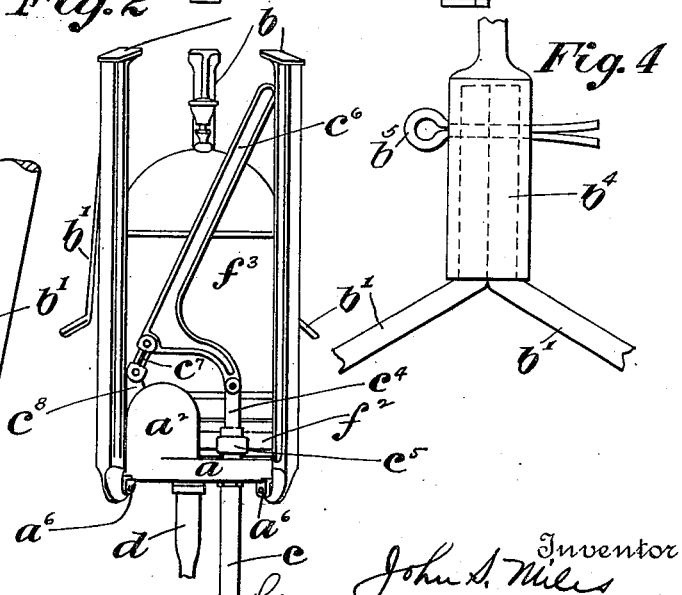


Fig. 3

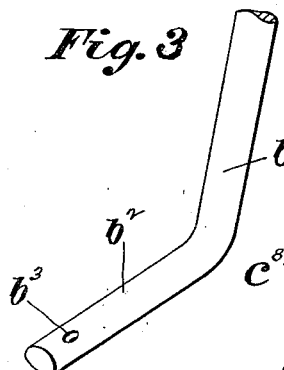


Fig. 4




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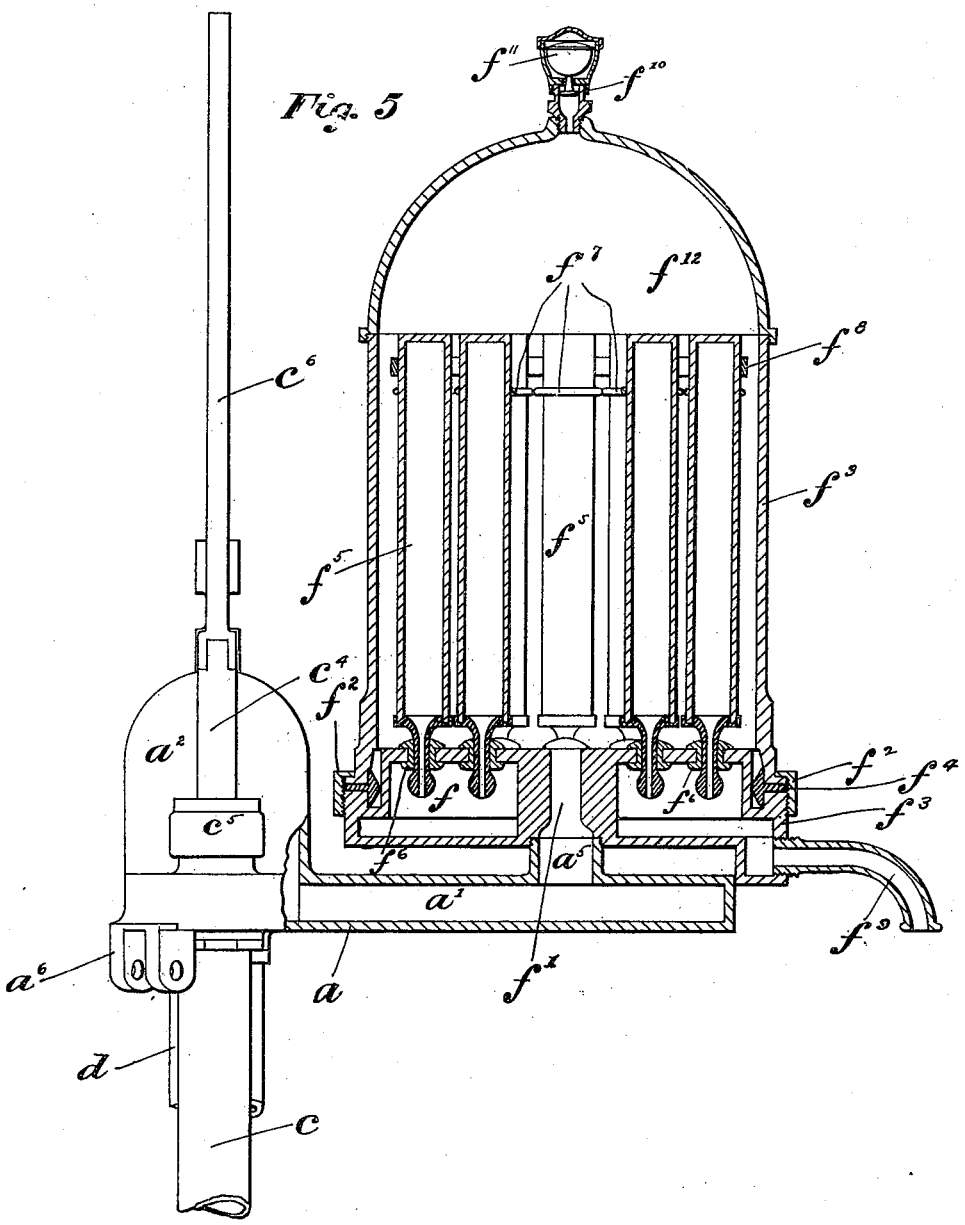
Fig. 5

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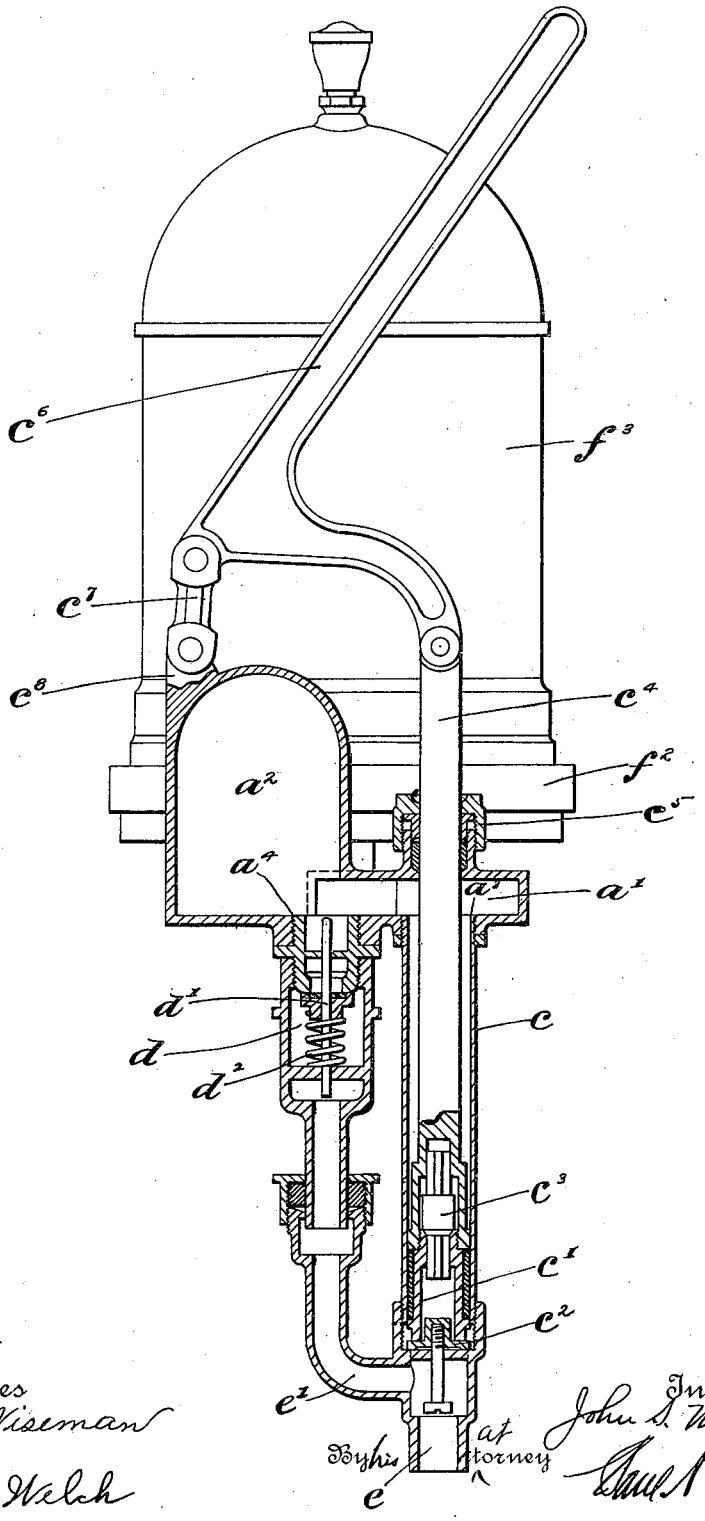
(No Model.) 3 Sheets—Sheet 3.

Fig. 6

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# UNITED STATES PATENT OFFICE.

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## PORTABLE FILTER.

SPECIFICATION forming part of Letters Patent No. 648,043, dated April 24, 1900.

Application filed May 5, 1899. Serial No. 715,754. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN S. MILES, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Portable Filters, of which the following is a specification.

This invention relates to that class of filters which are designed to operate under pressure, and it especially relates to filters employing the Chamberland bougie for filtering and operating under the "Systeme Pasteur."

The object of the invention is to provide a filter or filtering appliance adapted especially for the use of armies or for any other use which requires transportation from place to place, the construction being such that it may be readily folded to small compass for transportation or storage or set up complete for operation by simple appliances and be effective in use.

In the accompanying drawings, Figure 1 is an elevation showing the improved filter set up ready for operation. Fig. 2 is a similar view of the same folded for transportation, some of the parts being broken away. Figs. 3 and 4 are detail views showing the construction of some of the folding parts. Fig. 5 is a partial sectional view showing the arrangement of the filtering-tubes and the water-passages to and from the filtering medium. Fig. 6 is an elevation, partly in section, showing the arrangement of the pump or water-supplying devices.

Like parts are represented by similar letters of reference in the several views.

In constructing the improved filter there is employed a hollow frame or support $a$, which is provided with downwardly-projecting lugs or other suitable projections $a^6$, to which are hinged legs $b$. Three of these legs are preferably provided, forming with the frame or support a tripod upon which all the operating parts are supported. Hinged to each of the legs $b$ is a brace $b'$. Two of these braces are bent at an angle, as shown at $b^2$ in Fig. 3, and each is perforated with an opening $b^3$. The other brace $b'$ is formed at its inner extremity with a sleeve $b^4$, adapted to receive the bent ends $b^2$ of the other braces. This sleeve $b^4$ is also perforated to receive a pin or cotter $b^5$, which passes through the sleeve and through the perforations $b^3$ of the bent ends $b^2$, as shown in Fig. 4, thus joining the three braces together at a point central, or substantially so, with the tripod.

The frame or support $a$ is hollow to form a water-passage $a'$, one end of said frame or support being enlarged and extended upwardly in the form of a dome to form an air-chamber $a^2$, which communicates with the passage $a'$. There is formed in the bottom of this support or frame and communicating with the water-passage $a'$ two openings $a^3$ and $a^4$. In the first of these there is secured a pump-cylinder $c$, and in the other there is secured a valve-chamber $d$. A supply-pipe $e$, having a branch $e'$, leads to the pump-cylinder $c$ and also to the valve-chamber $d$. Within the pump-cylinder there is a plunger $c'$, having the usual arrangement of valves $c^2$ and $c^3$ to cause the water to be drawn from the supply-pipe $e$ into the pump-cylinder $c$ and discharge into the water-passage $a'$ in the usual way when the plunger is reciprocated. This plunger is connected by a suitable plunger-rod $c^4$, which extends upwardly through the water-passage $a'$ and a suitable stuffing-box $c^5$ and connects with an operating-handle $c^6$, this handle being journaled or pivoted to a link $c^7$, which in turn is attached to suitable lugs or ears $c^8$, formed on the air-chamber $a^2$, thus permitting the necessary movement to allow said plunger to move in a straight line as said handle is moved in the arc of a circle.

Within the valve-chamber $d$ is a valve $d'$, which is normally held closed by a spring $d^2$, the valve being adapted to open downwardly under pressure and permit the escape of the water or other liquid from the water-passage $a'$.

The water-passage $a'$ is provided at the top with a hollow hub or boss $a^5$, into which is secured a base portion $f$ of the filter proper. This base portion $f$ is hollow to form a chamber to receive the filtrate. There is, however, a central perforated column $f'$, which passes up through the base $f$, which communicates through the hollow boss $a^5$ with the water-passage $a'$.

To the base portion $f$ there is secured by a suitable clamping-ring $f^2$ an outer casing $f^3$, a tight joint being secured by a suitable packing-ring $f^4$. This outer casing $f^3$ forms the filtering-chamber $f^{12}$, within which is mounted the filtering media, which, as before stated, is preferably the Chamberland bougie or tube, as shown at $f^5$. These tubes are mounted within the chamber $f^{12}$, so that the outlet openings or nipples communicate with the filtrate-chamber $f$, this being preferably accomplished by projecting said nipples through suitable openings formed in the top of the base portion $f$ and surrounded by packing-rings $f^6$, preferably of rubber.

To hold the filtering-tubes compactly and also to prevent the same from being knocked together or against the casing in transportation, there is provided a rubber or other suitable packing-ring $f^7$, which surrounds each tube, these packing-rings being adapted to contact with each other and to form buffers to keep the tubes separated and prevent them from knocking together. Surrounding the entire bunch of tubes there is another elastic ring $f^8$, preferably of rubber, which serves to tie the whole group of tubes together into one compact body, so as to prevent independent movement, and therefore breakage in transportation.

From the filtrate-chamber $f$ there leads a suitable discharge-orifice $f^9$, from which the filtrate is collected.

The filtering-chamber $f^{12}$ is surmounted by an air-valve $f^{10}$, having a float $f^{11}$, adapted to drop by gravity to permit the escape of air, but to close when the water or other liquid has filled the chamber in a well-known manner.

In operation the supply-pipe $e$ is attached to any desired source of supply. The handle $c^6$ is operated, thus operating the pump-plunger, drawing the water or other liquid to be filtered and forcing it into the passage $a'$, and also to a limited extent into the air-chamber $a^2$, thus forming a cushion in the usual manner for the column of water which is forced up by the pump $c$. In this manner the filtering-chamber is filled with the water or other liquid to be filtered, which passes through the walls of the filtering-tubes into the chamber $f$ and from thence through the outlet-opening $f^9$ into the vessels into which it is to be collected. The operation of pumping may be continuous, and the necessary pressure will thus be supplied to the filtering-chamber to cause the filter to operate to the best advantage. If there should be an excess of pressure, the valve $d'$ will be opened against the pressure of the spring $d^2$, permitting the excess to escape through the branch $e'$ into the supply-pipe $e$, the water or other liquid being thus permitted to escape until the excess of pressure is relieved, this valve forming a safety device to prevent the pressure from passing a predetermined limit.

When it is desired to transport the filter, the pin or cotter is removed from the braces $b'$ and the braces turned parallel with the legs $b$, after which the legs $b$ are folded so as to stand substantially parallel with the filter-case, so that the whole will occupy a very narrow space and can be readily packed into a suitable box or case for transportation.

Having thus described my invention, I claim—

1. In a filter, an outer casing and filtering media therein, a base or support therefor, said base or support being provided with hinged legs for supporting said filter, said legs being provided with inwardly-projecting braces at their lower ends, and means for joining the inner ends of said braces together, substantially as specified.

2. In a filter, a base or support therefor, said base or support being provided with three hinged legs forming with said base a tripod for supporting the parts, each of said legs being provided at its lower end with an inwardly-extending brace, the inner end of one of said braces being formed in the nature of a sleeve, the inner ends of each of the other braces being bent and extended into said sleeve, the bent ends and sleeve, respectively, being perforated to receive a pin or cotter, substantially as specified.

3. In a filter, a hollow base or support forming a water-passage and air-chamber, a filter-casing supported thereon, a water-supply connected to the water-passage of said base or support, and a pump therein, and a relief-valve communicating with the water-passage and water-supply, substantially as specified.

4. The combination with a filter of a hollow supporting-frame forming a water-passage, a pump, an air-chamber and a filtering device, each connected to the said water-passage, a connection from said water-passage to the supply-pipe of said pump and a relief-valve in said passage, substantially as and for the purpose specified.

5. In a filter, the combination of the hollow frame or support having the air-chamber and water-passage, with the lower openings for a pump and relief-valve, as described, and the upper opening for the filtering-case, the said frame being supported on hinged legs, and with the pump-handle connected to said supporting-frame so as to operate the pump, the parts being adapted to fold together, as and for the purpose specified.

In testimony whereof I have hereunto set my hand this 24th day of April, A. D. 1899.

JOHN S. MILES.

Witnesses:
J. P. GRIER,
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