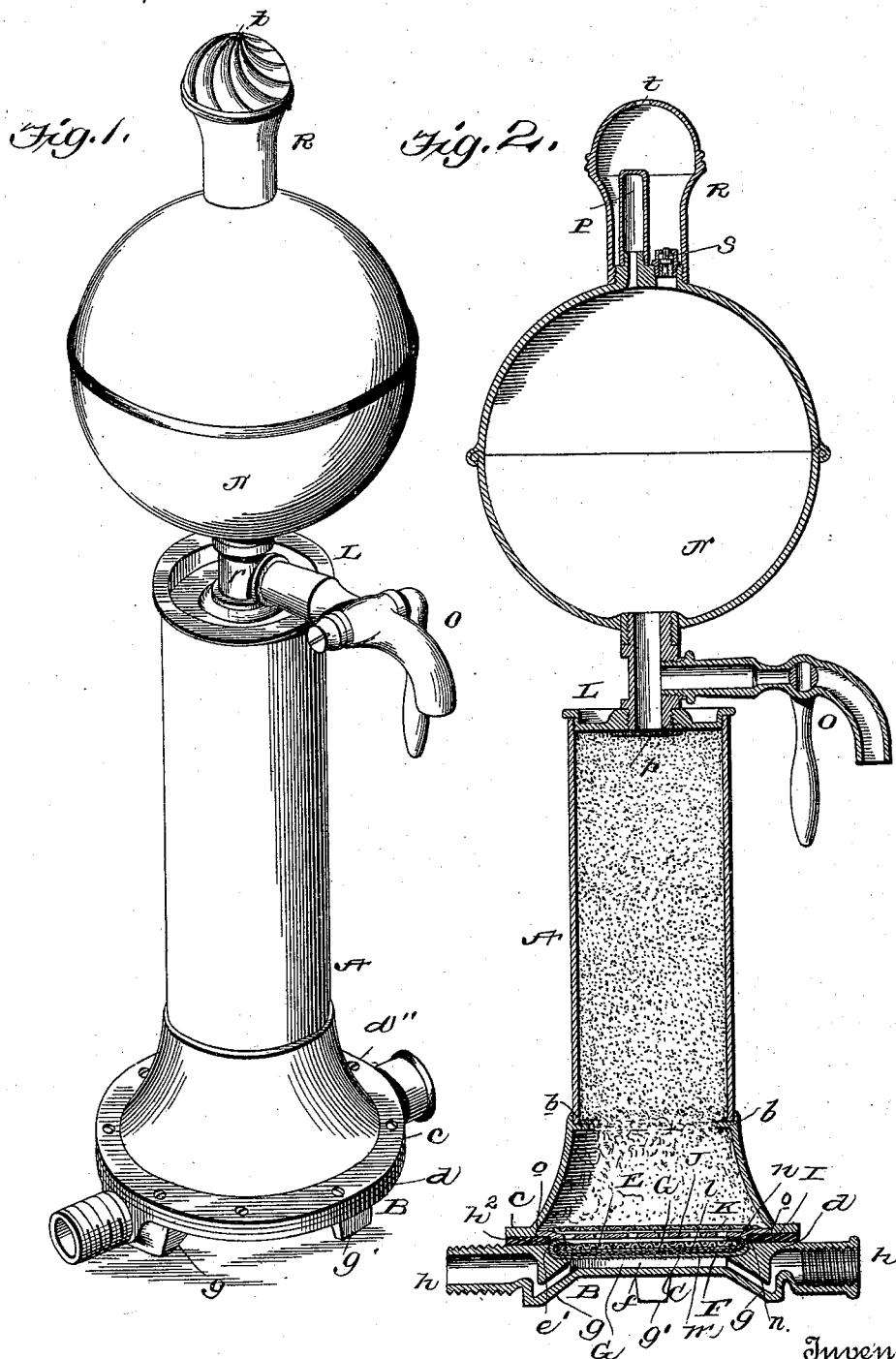


4 Sheets—Sheet 1.

Patented Mar. 28, 1893.

No. 494,426.



Witnesses
John Quincy
Chapman Fowler

Inventor
Edward M. Knight,
by- A. H. Evans & Co
Attorneys

(No Model.)

4 Sheets—Sheet 2.

E. M. KNIGHT.
FILTER.

No. 494,426.

Patented Mar. 28, 1893.

Fig. 3.

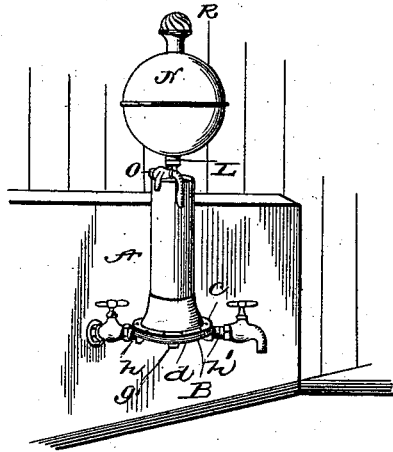


Fig. 4.

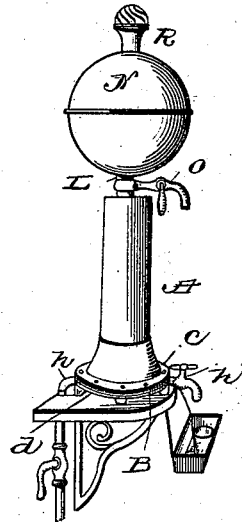


Fig. 5.

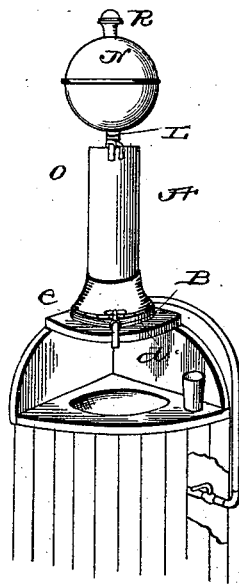
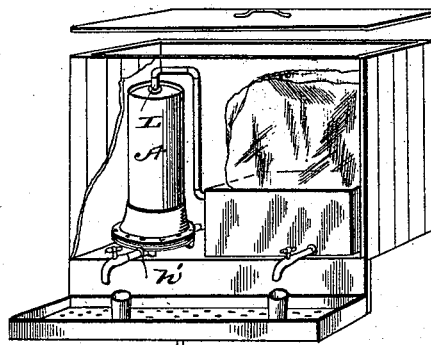


Fig. 6.



Witnesses

John D. ...
Chapman Fowler.

Inventor

Edward M. Knight

by A. H. Evans & Co.

Attorneys

(No Model.)

4 Sheets—Sheet 3.

E. M. KNIGHT.
FILTER.

No. 494,426.

Patented Mar. 28, 1893.

Fig. 7.

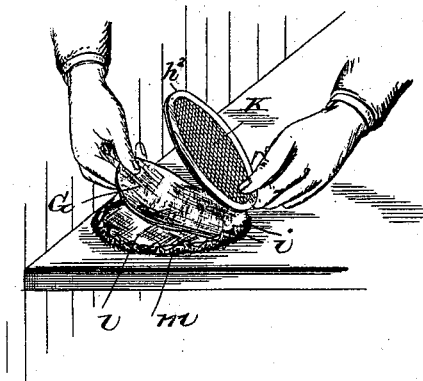


Fig. 8.

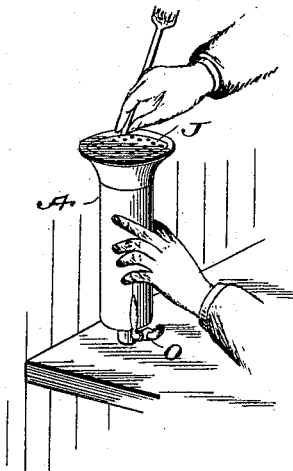


Fig. 9.

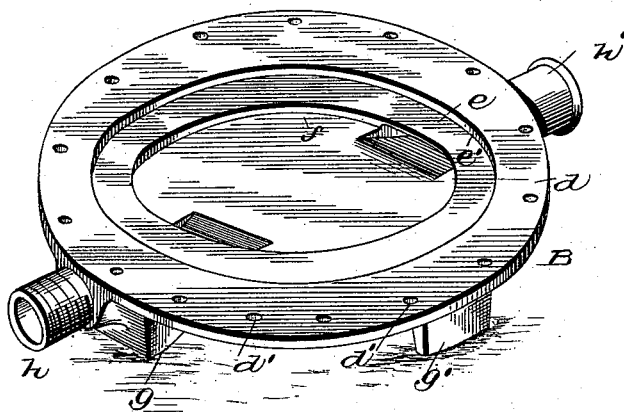
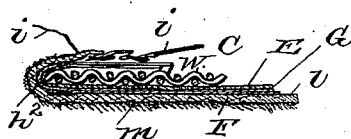


Fig. 10.



Witnesses

Chapman & Fowler.

Inventor

Edward M. Knight.

by A. H. Evans & Co.

Attorneys

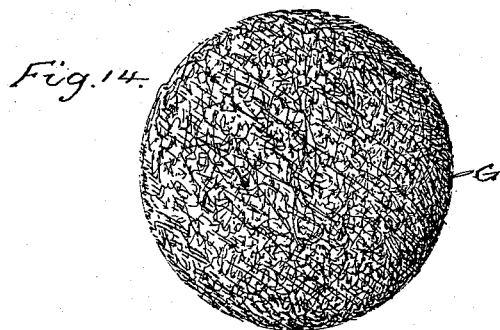
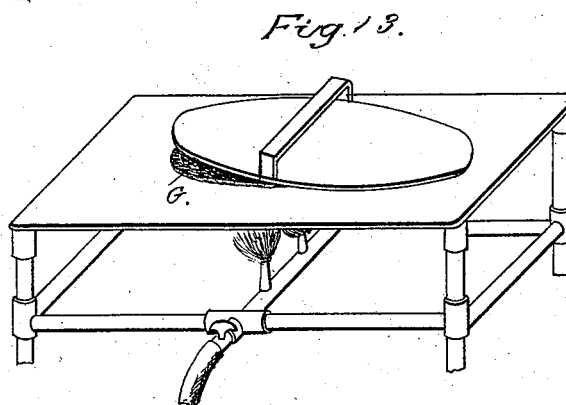
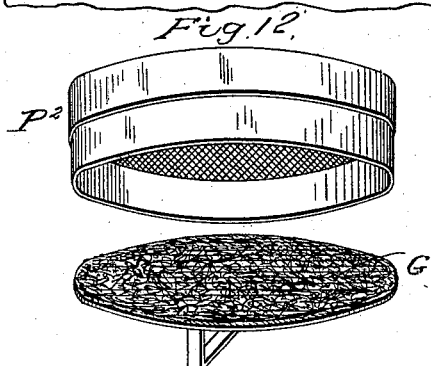
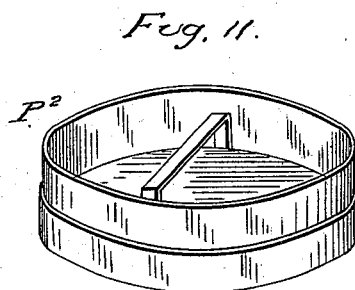
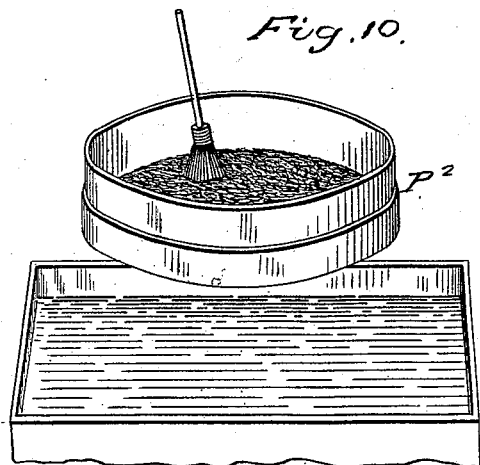
(No Model.)

4 Sheets—Sheet 4.

E. M. KNIGHT.
FILTER.

No. 494,426.

Patented Mar. 28, 1893.



WITNESSES

Thomas W. Fowler
Chas. Rhodes.

INVENTOR

Edward M. Knight,
by J. Walter Fowler
Attorney

UNITED STATES PATENT OFFICE.

EDWARD MARTIN KNIGHT, OF BROOKLYN, NEW YORK.

FILTER.

SPECIFICATION forming part of Letters Patent No. 494,426, dated March 28, 1893.

Application filed September 26, 1892. Serial No. 446,892. (No model.)

To all whom it may concern:

Be it known that I, EDWARD MARTIN KNIGHT, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Filters, as set forth in the accompanying drawings, forming part of this specification, in which—

Figure 1, is a perspective view of a filter embodying my invention. Fig. 2, is a vertical sectional view of the same. Figs. 3, 4, 5 and 6 show some of the methods of using my filter. Fig. 7, illustrates the method of replacing the asbestos film. Fig. 8, illustrates the manner of removing the perforated plate which holds the filtering medium in place. Fig. 9, is a perspective view of the base plate of the filter. Figs. 10 to 13 inclusive are steps in the process of making the films. Fig. 14, is a view of one of the films. Fig. 15 is a sectional view of a portion of the filter bed.

My invention relates to filters and consists of the constructions and combinations of parts hereinafter described and claimed.

My invention also consists of the method of making the intermediate asbestos films hereinafter disclosed and specifically pointed out in the claims.

To enable others skilled in the art to which my invention appertains to make and use the same, I will now describe its construction and indicate the manner in which the same is carried out.

Referring to the accompanying drawings for a more complete explanation of my invention A represents the body of the filter case made cylindrical or otherwise and constructed of suitable metal, the said case, or cylinder as I shall hereinafter term it, being open at both ends. If preferred I may make the lower end of the cylinder flaring so as to give a larger diameter at the bottom than at the top; this enables me to insert a larger asbestos disk than I otherwise could do, thus increasing the area of the filtering bed. At a point near the bottom of the cylinder is an inwardly extending flange *b* which serves to deflect the course of the water and to assist in guiding it toward the center of the cylinder. The lower or conical end of the cylinder has an outwardly turned flange *c* adapted to be seated upon the base plate or casting B by

means of which the filter is coupled to the service water pipes or otherwise disposed. This base plate or casting B is of one piece and has the following construction: Its upper flanged surface *d* corresponds with the flange *c* of the cylinder and has holes *d'* corresponding with holes in the latter to receive bolts *d''* whereby the base section or casting and body of the filter or cylinder are securely united together. The face of the casting or bottom plate is recessed at *e* to form the annular shoulder *e'* and seat for the asbestos covered filter bed C, and below said recess *e* the plate or casting is further recessed at *f* to form a flushing chamber or a direct draw-off chamber for water used for domestic purposes or for other purposes not necessarily requiring it to be filtered. From the bottom of the base plate or casting on two opposite sides are hollow lugs *g*, terminating in outwardly extending horizontal nipples or couplings *h h'* to one of which the supply pipe connects and to the other a draw-off cock is connected. From the two other sides of the base are the supports or feet *g'*. As before stated the lugs *g* are hollow and their inner, top and bottom walls are approximately V-shaped in cross-section, whereby the water entering the supply nipple or inlet *h* is deflected downward and spread out and then passing under the apex of the walls it strikes the upwardly inclined walls and is discharged into the recess or chamber at an angle, and striking the under surface of the asbestos covered bed will thoroughly wash and cleanse the latter of the sedimentary matter adhering to it.

In order that the entire surface of the asbestos covered bed may be washed by the current of water flowing through the inlet *h* the inner side walls of the lugs *g* are made flaring at their inner ends to impart a fan-shape to the water injected into the chamber below the filter bed.

The sedimentary matter washed from the disk, or which settles upon the floor of the bottom plate or casting C will be readily directed into the flaring inner end of the discharge *h'* and be drawn off through its draw-off cock. Thus the filter may be readily flushed; in fact every time water is drawn at the draw-off cock, as when wanted for washing or domestic purposes, the filter is flushed,

therefore the liability of its becoming surcharged with sediment is reduced to a minimum, and the periods in which the filter bed should be removed for cleansing are greatly
5 lengthened.

Upon the seat formed by the recess *c* the filter bed *G* is adapted to be firmly seated and when forced to its seat will form a water tight joint between its outer edge or periphery
10 and the shoulder *e'*.

The filter bed is of peculiar construction as I shall now describe; and performs a two-fold purpose: first, it serves as a screen to hold back and separate the sedimentary mat-
15 ter, and second, its inner removable films minutely filter the water which has passed the preliminary screening point. To make this clear I would state that this bed is formed upon a woven wire or foraminous plate *W*
20 which, being at the inner end of the filtering disk or bed forms a stout resistance to the inward pressure of the water and thereby prevents the destruction, sagging or "bulging in" of the filter bed. Over the lower sur-
25 face of this woven wire or foraminous plate; is stretched a sheet or piece of asbestos of open weave, by which I mean that well defined interstices are formed in the cloth for the free passage of water. After being
30 stretched over the plate the edges of the cloth are turned over the edges of the plate and then secured by a surrounding clamping flange or ring *h*² as shown in Fig. 2. Over
35 this open-weave asbestos sheet a second closely woven asbestos sheet *F* is placed and its edge is turned over the flange *h*² and gathered, and this sheet *F* is drawn tight over the other sheet *E* by means of a drawcord *i* or
40 equivalent means. The asbestos sheet *F* is, as before stated, a closely woven fabric, and its inner side *l* has a finished or smooth appearance, while its outer or under side has a roughened furred or what is technically
45 termed a "jigged" surface *m* produced either in the weaving of the fabric or by scratching it so that minute fibers are released and stand out from the body of the cloth. The object
50 obtained in producing this peculiar form of cloth is that when the filter is in operation the pressure of water against the under or
"jigged" surface of the cloth will drive the loose adhering fibers into the interstices or meshes of the body of the cloth so as to
55 produce a close compact surface that will resist the too free circulation or passage of the water.

Between the inner sides of the two asbestos sheets *E* and *F* I place what I designate my asbestos films *G*, and to these I now draw
60 special attention both because of the office of these films and the method by which they are produced.

The number of films introduced into the filter bed as above formed will depend upon the
65 pressure of the water, therefore when using one or two films if the pressure is so great as to force some of the impurities contained in

the water through the filter bed, additional films may be added until the pressure is reduced because of the additional resistance offered. Under ordinary pressure one film will
70 be found sufficient. These films are made as follows: A sufficient quantity of dry and comminuted asbestos is placed into a vessel or pan *P*² see Figs. 10, 11 and 12 having a wire
75 gauze or foraminous bottom. This forms a holder and is submerged partly in a pail or tank containing water whereby the loose asbestos is held in a state of flotation. Then
80 with a brush see Fig. 10 or with the finger this loose floating material is tamped to cause its particles to adhere with its fibers running in all directions and crossing each other in
85 every conceivable manner. The holder or vessel is now lifted from its tank see Fig. 11, when the asbestos may be further tamped to drive out any surplus water, after which the
90 thin and saturated film in the bottom of the holder is transferred to a plate or other support (Fig. 12), by introducing the latter into the holder and then turning the latter bottom
up. The film being thus removed from the holder is now placed upon or in a heater (Fig. 13) and is thoroughly dried by heat, when it
95 is ready for use. These films are mere wafers of tissue-like form having a close or compact appearance and yet are strong because of the intimate interlocking of their fibers. They
100 are placed between the adjoining surfaces of the close and open woven fabric sheets *E* and *F* and when two or more films are placed together and examined after the filter has been
used, they will be found to practically unite or amalgamate to form a surface pervious to
105 the water but whose fibers are so intimately crossed that even the minutest particles of impurities in the water are held back by them and prevented from passing into the body of
the filter. From this description it will be
110 seen that the fabric which is clamped to the wire disk serves merely as a resisting bed for the films and is of open mesh so as not to impede the flow of water. It does not serve
as a filter because the filtering is done by the
115 closely woven fabric having the "jigged" surface and whatever impurities may be driven through this fabric by the pressure of the water, will be caught and held by the films. If the
films become foul by reason of continued use they may be readily removed by releasing the
120 drawing-string and removing the fabric *F* so as to expose the films. New films may then be inserted and the fabric secured as before noted.

Between the base flange of the cylinder
125 and the base plate or casting is a rubber or other washer ring *I* whose inner edge overlaps the turned over edge of the cloth *F*, and when the body and base pieces are screwed together, a water tight joint is formed at this
130 point; and upon this packing ring is loosely seated a combined coarsely perforated plate *J* and fine screen *K*, the said plate *J* resting upon the inturned edge of the fabric *F* and

having a shoulder at *n* and against which the inner rim of the packing ring abuts as shown, while the fine screen *K* forms a bottom support for the column of carbon or purifying material contained within the cylinder while its edge fits within a shoulder *o* formed around the conical base of the filter cylinder or body. The upper end of the cylinder is closed by a head *L* having a water-way through it protected by a screen *p* to hold back particles of carbon that would otherwise pass into the filtered water reservoir *N*. This reservoir is here shown of spherical form and the pipe *r* which connects it with the upper head of the filter has a cock or faucet *O*, through which the filtered water may be drawn. At the top of the reservoir is a check valve *s* to allow air to escape from the reservoir and which closes against the pressure of water in the reservoir and also extending above the reservoir is a closed air chamber *P* with its under side in open communication with the interior of the reservoir. This chamber *P* serves as a cushion or relief for the pressure in the reservoir due to a sudden closing of the draw-off cocks, which pressure is excessive and would be destructive to the material of which the reservoir is constructed, if some such means as the closed chamber or cushion were not provided to relieve it.

Surrounding the chamber *P* and the seat for the valve *s* is a hollow ornamental cap *R* with air inlet *t* for the valve.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. As an article of manufacture, a film for a filter having a thin wafer-like form and composed wholly of comminuted asbestos fibers of which interlock to produce a surface pervious to water but of sufficient density to hold back impurities in the water, substantially as herein described.

2. As an article of manufacture, a thin film composed wholly of comminuted asbestos whose fibers are interlocked, said film adapted for insertion in a filter bed to hold back impurities that have passed the preliminary screening point.

3. The method herein described of making films for use in filters, consisting essentially in first floating comminuted asbestos in water while contained in a foraminous holder; then tamping the saturated asbestos to cause its fibers to interlock; then removing the holder from the water; then expelling the surplus

water in the material by pressure; then transferring the wet films from the holder to a support; and finally transferring the films from said support to a heater and applying heat to evaporate the moisture and thoroughly dry the film, substantially as herein described.

4. In a filter, a filter bed composed of asbestos cloth the outer surface of which is "jigged" to produce a roughened surface of loose adhering fibers adapted to be forced by the pressure of water into the meshes of the cloth to produce a close compact filtering surface, substantially as herein described.

5. In a filter, the filter bed consisting of the foraminous plate with its asbestos cloth of open weave, and a second piece of asbestos stretched over the first named piece having a finished inner surface and a roughened outer surface formed of loose adhering fibers adapted to be forced into the meshes of the outer cloth by the pressure of water to form a close compact filter surface, substantially as herein described.

6. In a filter the filter bed composed of a foraminous plate having asbestos stretched over its surface, a second sheet of asbestos stretched over the first named sheet and having its outer surface roughened or "jigged" as described, and thin wafer-like films of asbestos introduced between the adjacent faces of the asbestos sheets and serving to hold back any impurities that have escaped or passed through the outer sheet, substantially as specified.

7. In a filter, the body portion or cylinder, with its conical flanged lower end, the base casting with its recessed seat and chamber, and the inlet and outlet openings communicating with opposite sides of the chamber and a draw-off for filtered water at the upper end of the filter body or cylinder, in combination with a filter bed on said recessed seat and formed of a plurality of sheets of asbestos as described, with interposed and removable asbestos films, a packing ring between the base flange of the body and base casting and a combined coarse foraminous disk and fine woven wire disk united together and adapted to be seated over the inner side of filter bed and against a shoulder on the base of the cylinder or body of the filter, substantially as herein described.

EDWARD MARTIN KNIGHT.

Witnesses:

H. ADOLPH WICKOFF,
JOHN L. CARLISLE.