

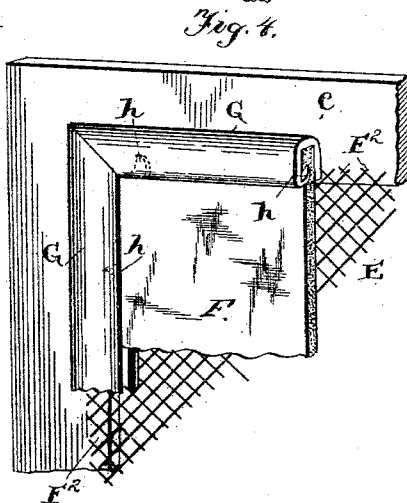
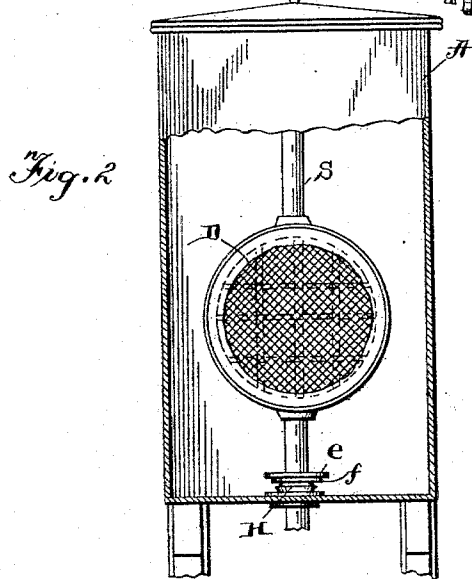
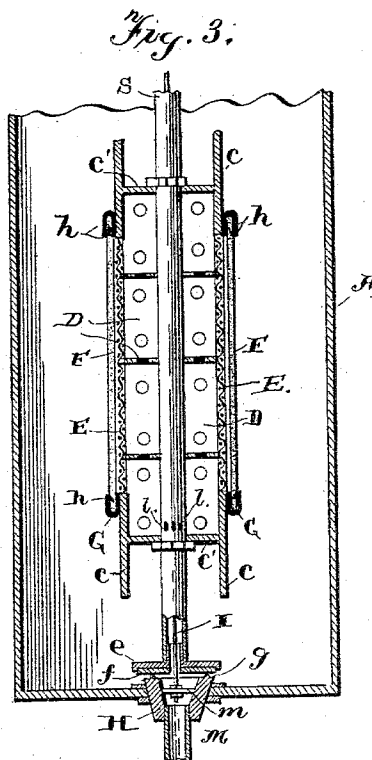
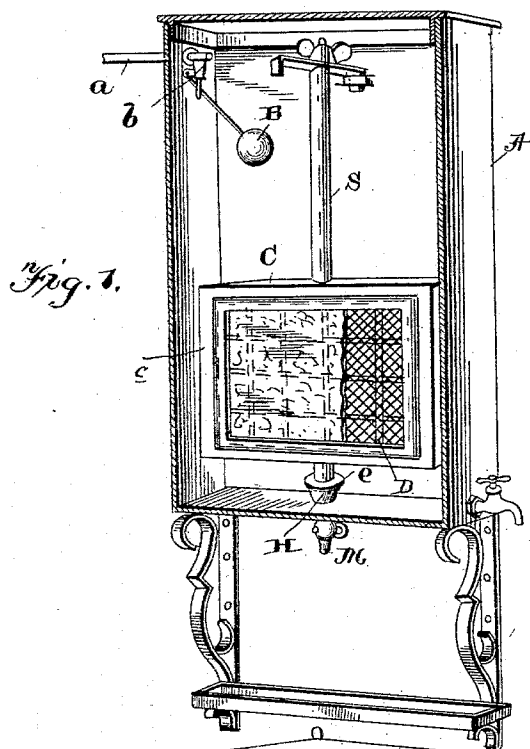
(No Model.)

2 Sheets—Sheet 1.

E. M. KNIGHT.
FILTER.

No. 546,335.

Patented Sept. 17, 1895.



WITNESSES

Geo. C. French,
Jas. W. Tyler

INVENTOR

Edward M. Knight,
by D. Walter Fowler
His Attorney

(No Model.)

2 Sheets—Sheet 2.

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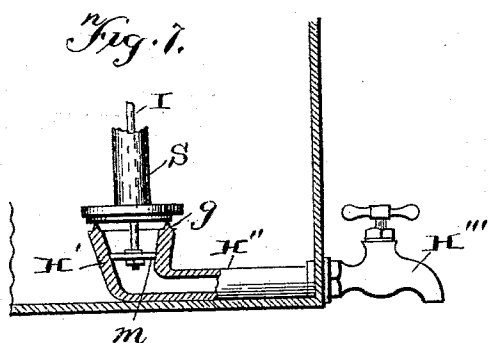
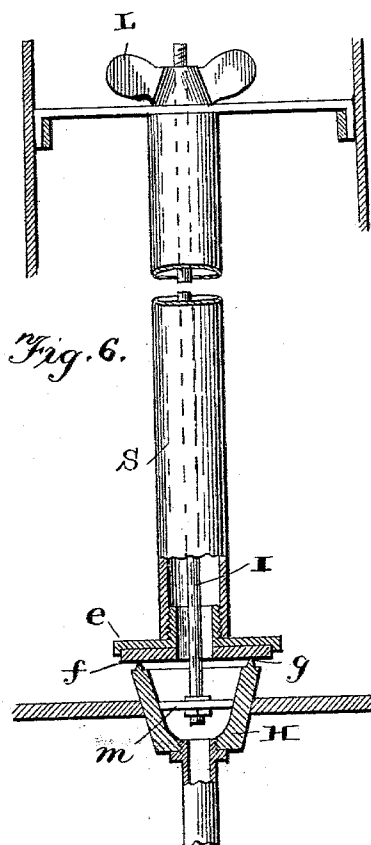
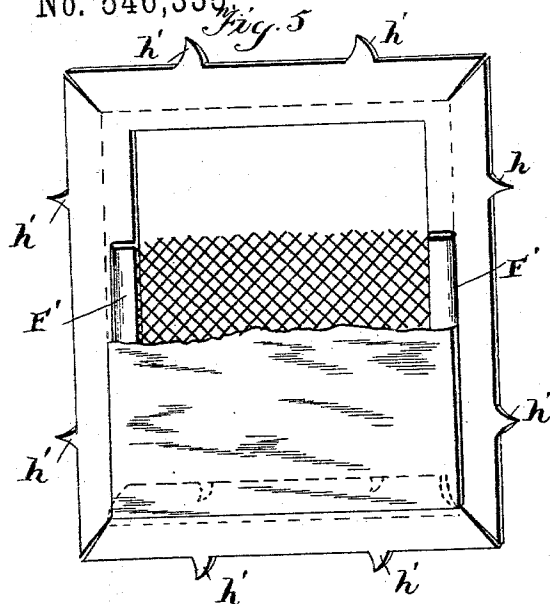
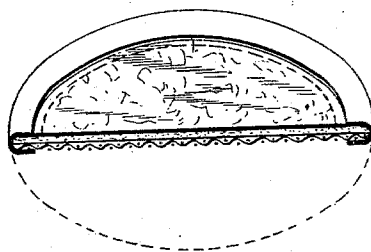


Fig. 8.



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UNITED STATES PATENT OFFICE.

EDWARD M. KNIGHT, OF NEW YORK, N. Y.

FILTER.

SPECIFICATION forming part of Letters Patent No. 546,335, dated September 17, 1895.

Application filed May 15, 1895. Serial No. 549,420. (No model.)

To all whom it may concern:

Be it known that I, EDWARD M. KNIGHT, a citizen of the United States, residing at New York, in the county of New York and State of New York, 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 present invention relates to filters generally, and particularly to that class employing a fibrous or porous material, such as asbestos, as an essential feature of its bed; and my invention consists of the parts and the construction, arrangement, and combination of parts forming the filter, as I shall hereinafter fully describe and claim.

My invention has for its essential objects, first, an improved means for securing the asbestos under proper tension and providing a water-tight joint around its edges; second, confining the edges of the asbestos so that none of its fibers will project and thereby interfere with the soldering of its frame in position or the parts of the frame to each other, and, third, to provide a water-tight joint between the unfiltered water-chamber and the pipe or outlet delivering into the filtered-water receptacle or chamber, with an improved means for locking the filter-frame in position. These objects are attained by the employment of the construction which I will hereinafter describe in connection with the accompanying drawings, in which—

Figure 1 represents one form of filter embodying my invention, and showing the filter-bed arranged for lateral filtration, and showing rectangular filter-frames. Fig. 2 is a similar filter having circular filter-frames. Fig. 3 is a sectional view of one of the filter-frames. Fig. 4 is an enlarged view of a portion of one of the frame-plates removed, showing the asbestos sheet with its surrounding binding strip or frame soldered thereto. Fig. 5 represents a modification. Fig. 6 is an enlarged detail of the joint between the filter and unfiltered water-chambers. Figs. 7 and 8 are modifications to be referred to.

In carrying out my invention I may use any of the well-known forms of filters, whether vertically or horizontally disposed, and adapted

for vertical or lateral filtration, and whether connected with the service-pipes or as a separate and independent portable filter. I therefore do not wish to be understood as limiting my present improvements to any particular form or class of filters.

In Fig. 1 I have disclosed one of the improved filters intended to be used for lateral filtration and in which A is the vessel or chamber adapted to receive unfiltered water through its inlet *a*, which, if desired, may have a valve *b* controlled by a rising and falling float B, which automatically closes the valve and cuts off the inflow of water when the water has reached a certain level in the chamber. Within this unfiltered water-chamber I have removably suspended or secured a filter-frame C, which consists, essentially, of two side plates *c* and an intermediate body *c'*, to which the side plates are secured, as by soldering, the said frame being of any suitable material—say of heavy sheet metal—with interior bracing-pieces D extending from side to side of the exterior frame and being perforated, so as to allow a free circulation of water through all parts of the interior of the frame, the said strips being about as wide as the depth of the frame from inner wall to inner wall, whereby when the side plates with their asbestos sheets are placed in position and secured to the outer faces of the body A of the frame the asbestos will be supported against the pressure of water against its outer faces.

The body of the frame A, whether it be of round or rectangular form, is of an essentially box-form open at both sides and the plates or flanges *c* are soldered or secured to the open faces to complete the frame and adapt it for holding the water which has filtered through the sides of the frames when the asbestos sheets are in place.

In some of the known forms of filters using asbestos as a part of the filter-bed a woven-wire backing has been used to stay or brace the asbestos and prevent its sagging under the pressure of the water against the opposite side. If desired, I may use such a backing, although I lay no claim to the same at this time. In using this woven-wire backing it has been the custom to place the asbestos sheet against the woven-wire backing and fold the edges of the asbestos over the pro-

jecting points of the wire and then bind the folded-over portion of the asbestos and the inclosed projecting points of the wire with a strip of metal folded over the same; also in some cases the asbestos has had its edges folded over an open-center frame. The objection to these arrangements lies in the fact that when thick asbestos has been used in connection with the wire-cloth it formed such a bulky mass around the edges of the filter-frame that it was almost if not quite impossible to clamp the usual binding strip or piece closely enough at all points to make the frame water-tight around its edges. There are always more or less small openings in said edges due to slight irregularities in the meeting faces of the side plates and the body of the filter-frame, and unless an absolutely tight joint is made at the edges the unfiltered water will be forced through said small openings and contaminate the filtered water within the frame. Another objection has been that when the edges of the asbestos sheet were over the edges of the open-center side plate of a filter-frame and bound by a folded piece, as before described, small bunches or fibers of asbestos would project outside of the edges of the binding-strip on the inner side of the plate and would be in the path of the soldering-iron used to solder the meeting faces of the side plate and frame proper, and thereby interfere with a perfect soldering of these parts at such points. This was another cause of leakage around the edges of the filter-frame. With the present improvements these objections are overcome, as the filter-frame is made, essentially, as follows:

The body of the filter-frame may be of square, rectangular, circular, or other form made of a piece of metal folded or bent to the desired shape, and the side pieces or plates have open centers and are adapted to be soldered or secured against the open faces of this body. I now take one or more pieces or sheets of asbestos *F* and inclose the edges thereof in a surrounding frame *G* or binding-strip of folded metal having an essentially *U* form in cross-section. This confines said edges and prevents any portions or fibers of the asbestos projecting about said edges. I next clamp this frame *G* or binding-strip tightly upon said edges and then place the frame or strip with its secured asbestos against the face of the plate *c* and solder it thereto by a line of solder along the bight of the folded strip where it lies closely against the plate, and as there is no projection of asbestos fibers or otherwise at this point I am enabled to complete the soldering in a very perfect manner and secure an absolutely-water-tight joint between the meeting faces of the binding strip or frame and the plate *c*, a similar effect being obtainable by soldering the opposite side of the plate *c* to the corresponding face of the open intermediate frame *c'*, which constitutes the body of the filter-frame.

In connection with the frame and asbestos sheet, as previously described, I prefer to use a woven-wire or other reticulated backing *E*. This backing may be secured in various ways, dependent largely upon the form of filter used.

In the case of filters using perpendicular filter beds or frames intended for lateral filtration I prefer to first secure the woven-wire or reticulated backing directly to the side plates *c*, as by soldering it to the face of the plate or by securing it between the walls of the open center of the frame in any well-known manner. I then bind the edges of the asbestos, as before described, and secure the binding frame or strip to the face of the plate *c*, so that the asbestos will be backed and braced by the opposing woven-wire or reticulated surface at its inner side.

Before securing the woven wire to its plate or support I may first bind its edges, as shown at *F'* in Fig. 5, and solder the binding-strip to the plate, or I may solder the raw edges of the woven wire to the plate, as shown at *F''* in Fig. 4.

In using round frames or disks for vertical filtration I may construct the parts as follows: I take a sheet of wire-gauze and cut it the proper size and shape, and over this I place a piece of asbestos of the requisite size and sew it to the woven wire, if preferred, after which the edges of both the asbestos and woven wire are bound by a binding strip or frame, as shown in the detail, Fig. 8.

In placing the asbestos sheet in position some care should be taken to see that it is tightly stretched, so that it will not sag when in use. With the old and well-known form of frames using asbestos sheets as a filtering medium it was difficult to do this, as the edges could not be held tight enough to prevent slippage. In the present construction I accomplish the desired results and overcome the former objections by providing the binding frames or strips *G* with points or tongues *h*, arranged in any suitable manner and at appropriate points, and adapted to engage and enter the fabric to hold and stretch the same. A desirable way of forming these tongues or points is to form them integral with that portion of the binding-strip which is to be folded and to slightly curve the points, so that when the asbestos is laid on the strip and the latter is folded over the edges thereof the points will be forced into the asbestos and will in turn be bent and locked thereto by reason of their action against the opposing side of the strip. This action also results in drawing the asbestos more tightly and holding it under tension. The binding-strip is then tightly clamped, so that its edges may make a tight joint, as before described.

The side plates *c* may receive the folded binding-frame with its asbestos sheet, as shown in Fig. 3 and as first described, or the asbestos may be laid directly against the side plate and the edges of this latter plate

folded over the edges of the asbestos, as shown in Fig. 5, in which latter instance the folded portion of the plate will be formed or provided with the penetrating-points *h'*, for the purposes before described.

In the form of filter shown in Fig. 1 a tubular stay *S* passes through the filter-frame and its contained bracing-frame *D* and is suitably secured thereto. This tube has openings *l* through it inside of the frame, through which the filtered water may enter the tube and finally be discharged into the filtered-water chamber. To the lower end of this tube is fitted a disk or plate *e* with a rubber or other packing strip *f* fitted to it.

In the outlet-opening between the filtered and unfiltered water chambers is fitted a sleeve or short tube *H*, around the upper face of which is formed an annular rib *g*, forming an edge against which the rubber or other packing strip *f* is forced to make a tight joint at this point.

The rod *I* is secured to a spider or cross-bar *m* in the sleeve or tube *H* and extends upwardly through the disk *e* and tubular stay *S* and is threaded at its upper end to engage a nut *L*, whereby when the nut is adjusted it bears upon the tube and causes the latter to force the packing-strip *f* closely against its sharp-edged seat *g*. This construction is much more desirable than those forms employing ground-joints between the tubular stay and sleeve or socket, for the reason that no extreme care need be exercised in fitting the parts, and the same filter-frame with its tubular stay and connections may be applied to other forms and sizes of filters employing the sleeve with its sharp-edged seat without difficulty, thereby making the parts interchangeable, a feature impossible, as I have found from practical experience, when using the ground-joints before noted.

The filter as thus described is simple in its construction and rapid in its operation. It is composed of few pieces and the joints are so made that leakage of unfiltered water into the filtered water is prevented, thereby insuring clear filtered water at all times.

In Figs. 3 and 6 the sleeve or short tube *H*, which forms a seat for the packing *f*, and the discharge for the filtered water are shown as discharging through the bottom of the tank or vessel, and has fitted to it a valve-controlled draw-off pipe or nozzle *M*. This arrangement may be modified—for instance, as shown in Fig. 7, in which the sleeve or tube *H'* is closed at the bottom and is cast or formed integral with a lateral extension or pipe *H''*, adapted to pass through the side of the tank or vessel and having a draw-off faucet *H'''* fitted to its outer end. This will be the preferred construction in many instances. The tube or sleeve *H* or *H'* may be of conical or tapering form or with straight and parallel sides, as desired.

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

1. In a filter, an open center filter frame, in combination with an asbestos sheet or strip and a binding strip or frame inclosing the edges of the asbestos sheet or strip, and clamped thereto, said binding strip or frame and open center frame being fitted face to face and secured one to the other, and said open center frame having a woven wire backing secured directly to it in contradistinction to the binding strip or frame which clamps the asbestos sheet.

2. In a filter, an open center frame forming a chamber for filter water, and a tank or vessel for unfiltered water, in which the said frame is placed, in combination with sheets of asbestos fitted against or proximate to the open faces of the frame, a binding strip or frame of U-shape, in cross section inclosing the edges of the fabric and having its side face secured to the adjacent face of the open center frame to form a water-tight joint, and a reticulated plate behind the asbestos sheet and secured permanently to the open center frame, in contradistinction to the frame or strip which carries the asbestos sheet.

3. In a filter, an open center frame forming a receptacle for filtered water, and having a woven wire or reticulated backing secured directly and permanently to it, and a tank or vessel for unfiltered water, in which said frame is secured in combination with a filter bed placed contiguous to the open sides of the frame, and consisting of a sheet of asbestos having its edges inclosed and bound by a frame or binding strip of U-form in cross section, adapted to lie flatwise against the outer or exterior face of open center frame.

4. In a filter, a filter frame, in combination with means for securing a fabric thereto consisting of a folded frame or strip binding the edges of the fabric, and having points or tongues adapted to engage and enter the fabric to secure the same and hold the same under tension said binding frame being fitted to the filter frame.

5. In a filter, a filter bed composed, essentially, of asbestos or fabric, and a frame or strip surrounding and inclosing the edges of the same and having bendable points or tongues to engage the fabric and secure the same under tension.

6. In a filter, the combination, of a frame supporting a filter bed and adapted to serve as a chamber or vessel for filtered water, an exterior tank or vessel for unfiltered water, and means for securing the filter frame within said tank comprising a stay or tube passing into the filter frame and having perforations or openings through which the filtered water passes, a discharge for filtered water, having a raised rib forming a seat, a packing on the lower end of the stay or tube adapted to form a tight joint with the rib, and means for maintaining said joint consisting of a fixed rod projecting upwardly from said outlet and through the stay or tube and an ad-

justing nut on the rod adapted to bear upon the stay or rod to force its packing tightly against the seat and form a water tight joint.

7. In a filter, the combination, of a tank or vessel for unfiltered water, a filter frame having means for filtering the water, sustained within the tank or vessel, a discharge pipe or tube in the tank or vessel having an integral lateral extension projecting through a wall of the tank, a hollow tube passing through the filter frame having perforations through which filtered water passes to the interior of the tube, a packing strip or piece on the lower

open end of the tube adapted to close water tight against a raised rib or seat on the discharge pipe or tube, and means for locking the filter frame to said discharge pipe consisting of a rod secured to the latter and extending through the tube and a nut on the rod engaging the tube to draw it tightly to said seat.

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

EDWARD M. KNIGHT.

Witnesses:

H. ADOLPH WINKOPP,
ALEX. KRAEMER.