

(No Model.)

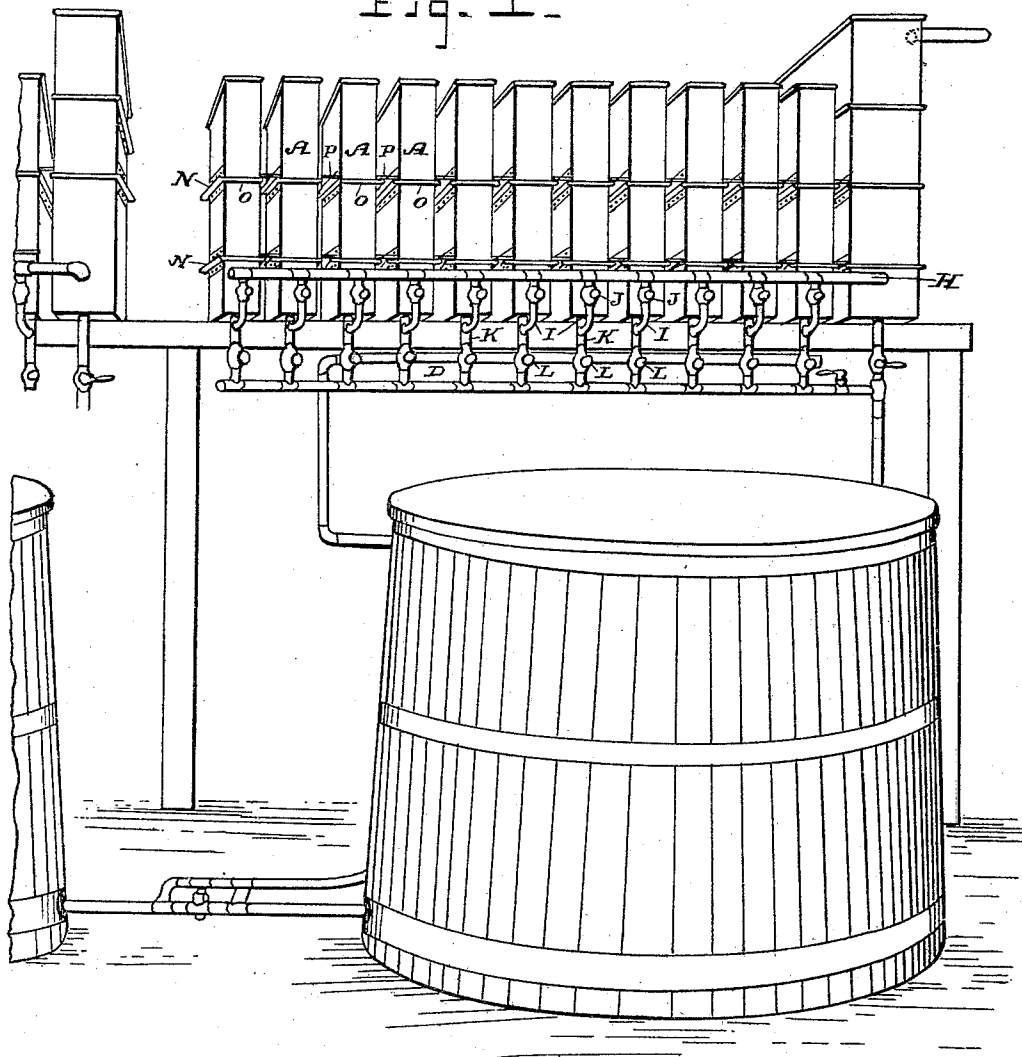
2 Sheets—Sheet 1.

E. M. KNIGHT.
FILTER.

No. 444,754.

Patented Jan. 13, 1891.

Fig. 1.



Witnesses,
Geo. H. Strong
G. H. Brouse

Inventor
Edward M. Knight
by Dewey & Co. attys

E. M. KNIGHT.
FILTER.

No. 444,754.

Patented Jan. 13, 1891.

Fig. 2.

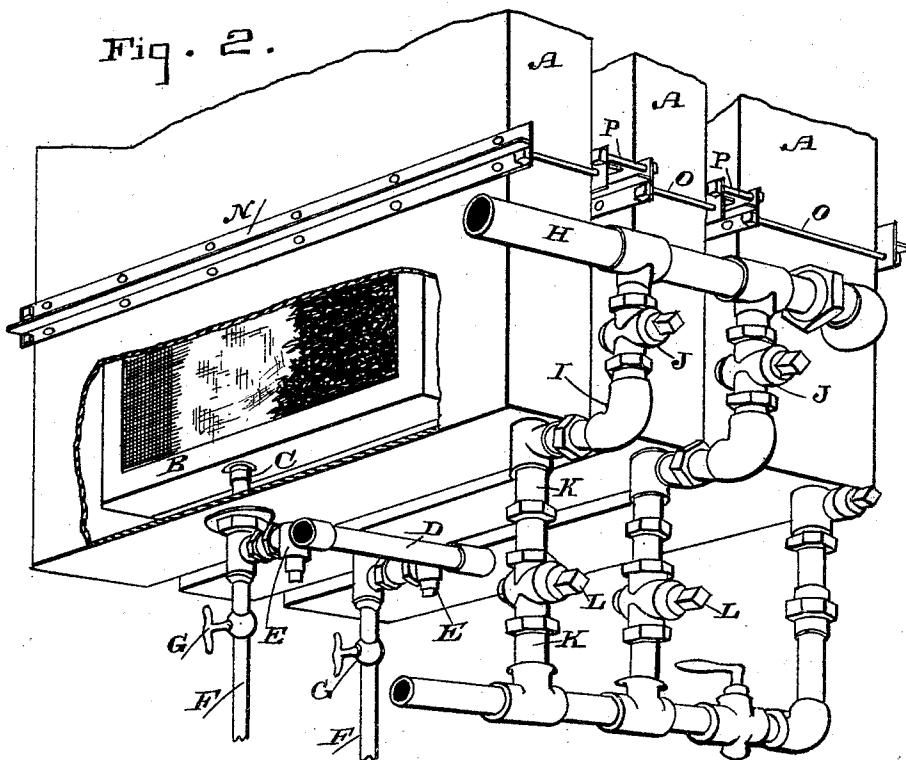
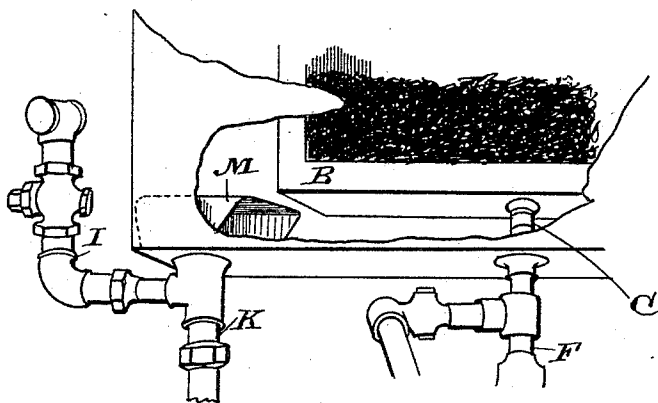


Fig. 3.



Witnesses,
Geo. H. Strong
J. H. H. H.

Inventor
Edward M. Knight
By Dewey & Co.
attys

UNITED STATES PATENT OFFICE.

EDWARD M. KNIGHT, OF SAN FRANCISCO, CALIFORNIA.

FILTER.

SPECIFICATION forming part of Letters Patent No. 444,754, dated January 13, 1891.

Application filed May 8, 1890. Serial No: 351,067. (No model.)

To all whom it may concern:

Be it known that I, EDWARD M. KNIGHT, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Filters; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to certain improvements in filters; and it consists of a series of independent tanks, a means for supporting and securing said tanks in a series or battery, exterior bracing-frames by which the tanks are supported and connected together, and a system of supply and discharge pipes whereby any one or more of the series may be cut out and removed or a new one introduced, and a system of testing each individual filter independently for leakage without disturbing any of the others.

It also consists in certain details of construction, all of which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is an exterior view showing a series of my filters with connecting-pipes. Fig. 2 is an enlarged view showing the lower part of three of the filters, connecting-pipes, cocks, and the testing devices. Fig. 3 is a view of the part of the bottom and interior of one of the tanks, showing the spreader for checking the flow of the water and preventing disturbance of the filter-beds.

A A are a series of filter-tanks, within each of which I place a filter-frame having the sides composed of fibrous filter-beds upon which the filtering material is spread in the form of a paste, so that when the exterior tanks are filled with unfiltered water it will gradually percolate through the filter-beds into the interior of the filter-frames B. From the interior of these filter-frames pipes C lead downward through the bottoms of the tanks and are connected with a single main pipe D, which extends along beneath the filter-tanks. Each of the pipes C is provided with a cock E by which it may be cut off from the main pipe D, and each of these pipes also has an extension F with a cock G, which ordinarily remains closed when the cocks E are open. These extensions are used in testing for leakage, as will be hereinafter described.

H is the main supply-pipe through which

water passes, it being of sufficient diameter to carry as much water as will be needed to supply all of the filter-tanks at once. Opposite each of these tanks a branch pipe I connects with this main and is provided with the cock J, which may be opened or closed at pleasure. These branch pipes connect with the pipes K, opening into the lower part of the filter-tanks, and these pipes K extend downward and have in them cocks L, which ordinarily remain closed when the supply-cocks from the main are open, but when the supply-cocks are closed these cocks L may be opened so that the unfiltered water can be entirely discharged from the interior of as many of the filter-tanks as may be desired.

Within the filter-tanks and just above the mouths of the inlet-pipes I have shown a spreader M, which consists of a plate fixed a short distance above the bottom of the tank and directly over the mouth of the inlet-pipe, so that all water which flows into the tank through this pipe will impinge upon this spreader, and will have its direction changed so as to flow out gradually toward each side, and thus any current which may have a tendency to form from the inlet-pipe will be broken up and destroyed, and the material of which the filter is composed will not be disturbed or agitated in any way. It will be manifest by this arrangement of pipes and cocks that water may be admitted into any one or more of the whole series of filters, and it may also be cut off from as many as may be desired, and the unfiltered water contained within the tanks may be discharged from the tanks so cut off without in any way interfering with the operation of the others.

If any leakage is detected whereby the purity of the water is in any way lessened, I am enabled to test for and locate this leakage immediately by means of the series of discharge pipes or extensions F, which connect with the interiors of the filter-chambers. Each tank may be cut off successively from the general discharge-pipe into which the filtered water ordinarily flows, and the cock G in the extension F, which projects downwardly from the filter-chamber, being opened, water may be drawn directly from the interior of the filter through this pipe, and so on through the whole series until the one which leaks or

shows contamination is detected. It may then be closed off and temporarily removed or repaired.

5 In order to hold this series of filters together and also to enable me to manufacture the containing-tanks of light material, and at the same time in such a manner as to withstand the pressure of a considerable column of water, I have shown supporting-bars N extending along each side of the filter-tanks. 10 As many of these supporting-bars may be used as may be necessary between the bottom and top of the tank. I prefer to make them of light angle-iron which is sufficiently 15 stiff, and they project a slight distance beyond each end of the filter-tanks. Through the flanges of these angle-iron bars holes are made, and by means of bolts O the bars upon each side of any one tank are firmly connected 20 together, while by means of the bolts or rods P the side bars of each adjacent tank may be connected together, and the whole thus rigidly and firmly united into a solid frame-work.

25 Whenever it is necessary to remove any one of the tanks it is done by loosening the frame-bolts to release the tank, and disconnecting the pipes, as previously described; but the frames remain connected so that there 30 is no danger to the tanks remaining.

I do not claim in this application the filter-frame and its fibrous filter-bed, as substantially the same subject-matter is fully disclosed and claimed in my two other applications, Serial Nos. 351,068 and 351,069, filed of 35 even date with this application.

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

40 1. In a filter, a series of tanks set side by side and having the inclosing bands or bars, and connecting-bolts whereby the sides of each tank are supported and a series of tanks connected together, substantially as herein 45 described.

2. In a filter, a series of tanks set side by side and united together, a common supply-pipe having branch pipes with cocks delivering water into the bottom of each tank independently, other pipes connecting with the 50 same inlet-passages and provided with cocks and connecting with the common discharge-pipe, through which the unfiltered water within any of the tanks may be discharged independent of the others, substantially as 55 herein described.

3. A filter consisting of a series of tanks supported and united, as shown, a common supply-pipe having a branch pipe and cock opening into the bottom of each of the filter-tanks, discharge-pipes connecting with the 60 same openings and having cocks and a common discharge-pipe with which they are connected, pipes connected with the filter-frames within the tanks and a common receiving- 65 pipe for the filtered water with which said pipes are connected, and cocks whereby any one or more of the filter-chambers may be cut off from the receiving-pipe, substantially as herein described. 70

4. A filter consisting of a series of tanks having interior filter-chambers, pipes or passages leading from said interior chambers through the bottom or sides of the tanks and connecting with a common receiving and discharge pipe for filtered water, cocks whereby 75 said pipes may be cut off from the common discharge-pipe, and other pipes connecting with said discharge-pipes and provided with cocks through which water may be drawn 80 directly from any one or more of the filter-chambers independently of the others, whereby leakages may be detected and located, substantially as herein described.

In witness whereof I have hereunto set my 85 hand.

EDWARD M. KNIGHT.

Witnesses:

S. H. NOURSE,
H. C. LEE.