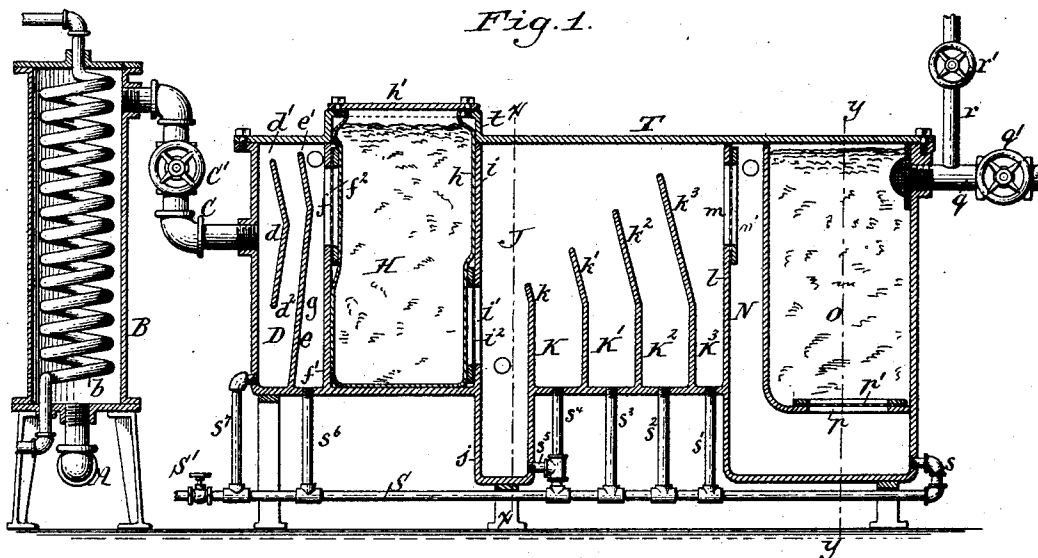
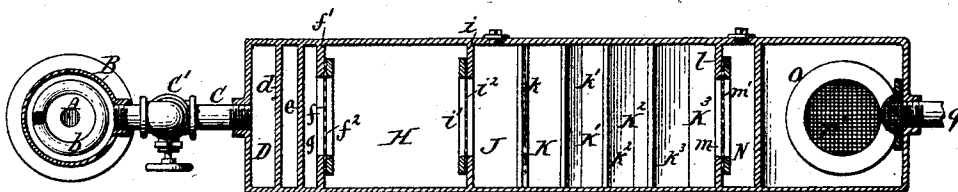
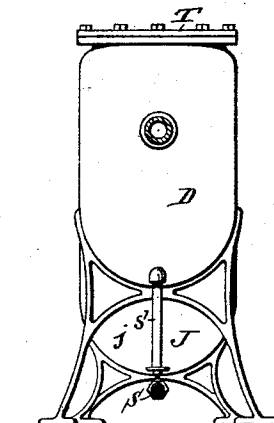
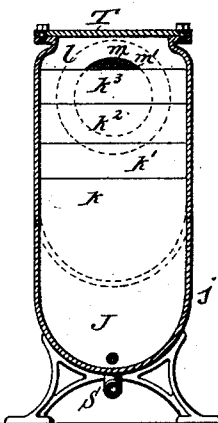
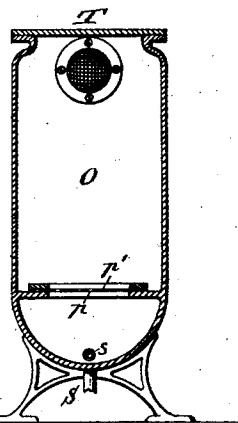


V. H. McCONNELL.
FEED WATER PURIFIER.

Patented Apr. 5, 1887.



V. A. McCannell Inventor.
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UNITED STATES PATENT OFFICE.

VIRGIL H. McCONNELL, OF BUFFALO, NEW YORK, ASSIGNOR OF ONE-THIRD
TO BURRITT E. McCONNELL, OF SAME PLACE.

FEED-WATER PURIFIER.

SPECIFICATION forming part of Letters Patent No. 360,455, dated April 5, 1887.

Application filed July 7, 1886. Serial No. 207,294. (No model.)

To all whom it may concern:

Be it known that I, VIRGIL H. McCONNELL, of the city of Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Feed-Water Purifiers, of which the following is a specification.

This invention relates to that class of filters which are employed for removing impurities from water, and is especially designed for use in purifying the feed-water of steam-boilers in order to prevent incrustations in the same.

My invention has for its object to purify the water thoroughly and to provide means for removing the separated impurities quickly from the filter.

My invention consists to these ends of the improvements which will be hereinafter fully set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of my improved filter. Fig. 2 is a horizontal section of the same. Fig. 3 is an elevation of the front end of the filter. Figs. 4 and 5 are vertical cross-sections in lines *x x* and *y y*, Fig. 1, respectively.

Like letters of reference refer to like parts in the several figures.

A represents the feed-water pipe, which connects with the bottom of the shell B of a feed-water heater. The latter is provided with an internal steam-coil, *b*, which may be supplied with exhaust-steam, and which serves to heat the feed-water as it passes upwardly through the shell B.

C represents the feed-water pipe, which connects the upper end of the shell B with the preliminary settling-compartment D of the filter, and which is provided with a stop-cock, *C*. The pipe C enters the front side of the compartment D near its middle.

d represents a deflecting-plate arranged transversely in the compartment D opposite the pipe C. The compartment D is provided with water-passages *d'* above and below the deflecting-plate *d*.

e represents a transverse partition arranged in the compartment D and extending to the bottom thereof, while its upper edge is separated from the top of the compartment by a water-passage, *e'*.

f represents an outlet-opening formed in the

rear wall, *f'*, of the compartment D, and provided, preferably, with a wire-cloth screen, *f''*. The feed-water becomes gradually heated as it passes from the bottom to the top of the heater B, and a large portion of the impurities contained in the water assume a granular form by reason of the heat imparted to the water. The hot feed-water entering the preliminary separating-compartment D encounters, first, the deflecting-plate *d*, and then the partition *e*, whereby a large portion of the granular impurities are deflected toward the bottom of the compartment. The space *g* in the compartment between the partition *e* and the rear wall, *f'*, forms a settling-chamber, in which the water comes to a state of comparative rest and deposits the heavy impurities held in suspension.

H represents a chamber arranged in rear of the preliminary separating-chamber D, and provided with a bag or porous receptacle, *h*, which is filled with a suitable substance whereby impurities which are dissolved in the water are prepared for precipitation.

When the water contains bicarbonate of lime in solution, the chamber H is supplied with caustic lime, whereby the soluble bicarbonate of lime is reduced to carbonate and precipitated in the chamber J. When the water contains earthy salts, the chamber H is supplied with carbonate of soda, whereby these salts are broken up and converted into insoluble compounds, which are precipitated, and soluble compounds which do not injuriously affect the boilers. The rear wall, *f'*, of the compartment D forms the front wall of the chamber H, and the water enters the upper portion of the chamber H through the opening *f*. The bag *h* is preferably attached to the cover *h'* of the chamber H.

i represents the rear wall of the chamber H, which is provided near its bottom with an outlet-opening, *i'*, provided, preferably, with a wire screen, *i''*, through which the water passes from the chamber H into a settling-chamber, J, arranged in rear of the chamber H. The settling-chamber J is provided adjacent to the chamber H with a depending pocket, *j*, which receives the heaviest impurities, and in rear of the pocket *j* with transverse partitions *k k'* of gradually-increasing height, forming a

succession of settling-compartments, K K' K² K³, in which the remaining heavy impurities are deposited. The rear wall, *l*, of the chamber J is provided near its top with an outlet-opening, *m*, which is preferably covered with a wire screen, *m'*.

N represents a descending passage or conduit leading from the opening *m* to the bottom of the filter-chamber O, which is arranged in rear of the upper portion of the passage N. The bottom of the filter-chamber O is provided with an inlet-opening, *p*, covered with a diaphragm, *p'*, of wire-gauze or perforated metal. The chamber O is filled with gravel, charcoal, or other suitable filtering material, through which the water percolates, and by which it is freed from the remaining impurities. The purified water escapes from the filter-chamber O through a pipe, *q*, which is connected with the upper portion of the chamber O, and provided with a suitable stop-cock, *q'*.

r is a pipe which is connected with the water-supply, and which communicates with the outlet-pipe *q* between the stop-cock *q'* and the filter-chamber O.

s s' s² s³ s⁴ s⁵ s⁶ s⁷ represent outlet-pipes communicating with the several sediment-compartments of the apparatus and connected with a common discharge-pipe, S, which is provided with a suitable stop-cock, S'.

The chambers D J O and the passage N are closed by a single cover, T, which is provided above the chamber H with a raised portion, *t*, to which the cover *h'* is secured, as represented in Fig. 1.

The feed-water becomes heated in passing through the heater B, and deposits in the preliminary settling-compartment D such impurities as have been prepared for precipitation by the influence of the heat. The feed-water next percolates through the substance in the chamber H, whereby the dissolved impurities are prepared for precipitation, and these impurities are deposited in the chamber J. The water passes finally through the filtering material in the chamber O, whereby the remaining impurities are intercepted, and the water escapes finally through the discharge-pipe *q* in a purified condition. The deposited impurities are removed from the apparatus, from time to time, by opening the cock S' of the discharge-pipe S. When it is desired to cleanse the apparatus, the current of water through the same is reversed by closing the cock C' of the feed-pipe C and the cock *q'* of the discharge-pipe *q*, and opening the cock *r'* of the supply-pipe *r* and the cock S' of the discharge-pipe S.

My improved apparatus is especially de-

sirable for purifying the feed-water of steam-boilers, locomotives, &c., in localities in which the water carries a large amount of impurities, whereby the danger of incrustation is greatly reduced and the boilers are maintained in good working condition at comparatively small cost.

I claim as my invention—

1. The combination, with the preliminary settling-chamber D, provided with a water-inlet pipe, C, of the deflecting-plate *d*, provided with water-passages at its top and bottom, and a transverse partition, *e*, resting on the bottom of the settling-chamber and provided with a water-passage at the top, substantially as set forth.

2. The combination, with a filter, of a percolating-chamber, H, containing a precipitating ingredient, and a settling-chamber, J, arranged between the percolating-chamber and the filter, in which chamber the impurities are deposited before the water reaches the filter, substantially as set forth.

3. The combination, with the filter-chamber O, of the percolating-chamber H and the precipitating-chamber J, provided with a depending pocket, *j*, substantially as set forth.

4. The combination, with the filter-chamber O, of the percolating-chamber H and the precipitating-chamber J, provided with transverse partitions of gradually-increasing height, substantially as set forth.

5. The combination, with the filter-chamber O, of the preliminary settling-chamber D, the percolating-chamber H, the settling-chamber J, and the passage N, connecting the chamber J with the filter-chamber O, substantially as set forth.

6. The combination, with the filter-chamber O, provided with an inlet in its bottom and an outlet at its top, of the percolating-chamber H, the settling-chamber J, and the descending passage N, connecting the upper end of the chamber J with the bottom of the filter-chamber, substantially as set forth.

7. The combination, with the preliminary settling-chamber D, provided with an inlet-pipe, C, the settling-chamber J, the passage N, and the filter-chamber O, provided with an outlet-pipe, *q*, of a supply-pipe, *r*, connected with the outlet-pipe *q*, a sediment-discharge pipe, S, and branches connecting the pipe S with the several settling-chambers, substantially as set forth.

Witness my hand this 26th day of June, 1886.

V. H. McCONNELL.

Witnesses:

JNO. J. BONNER,
CARL F. GEYER.