

J. W. WHITE.
Feed-Water Heater and Filter.

No. 226,814.

Patented April 20, 1880.

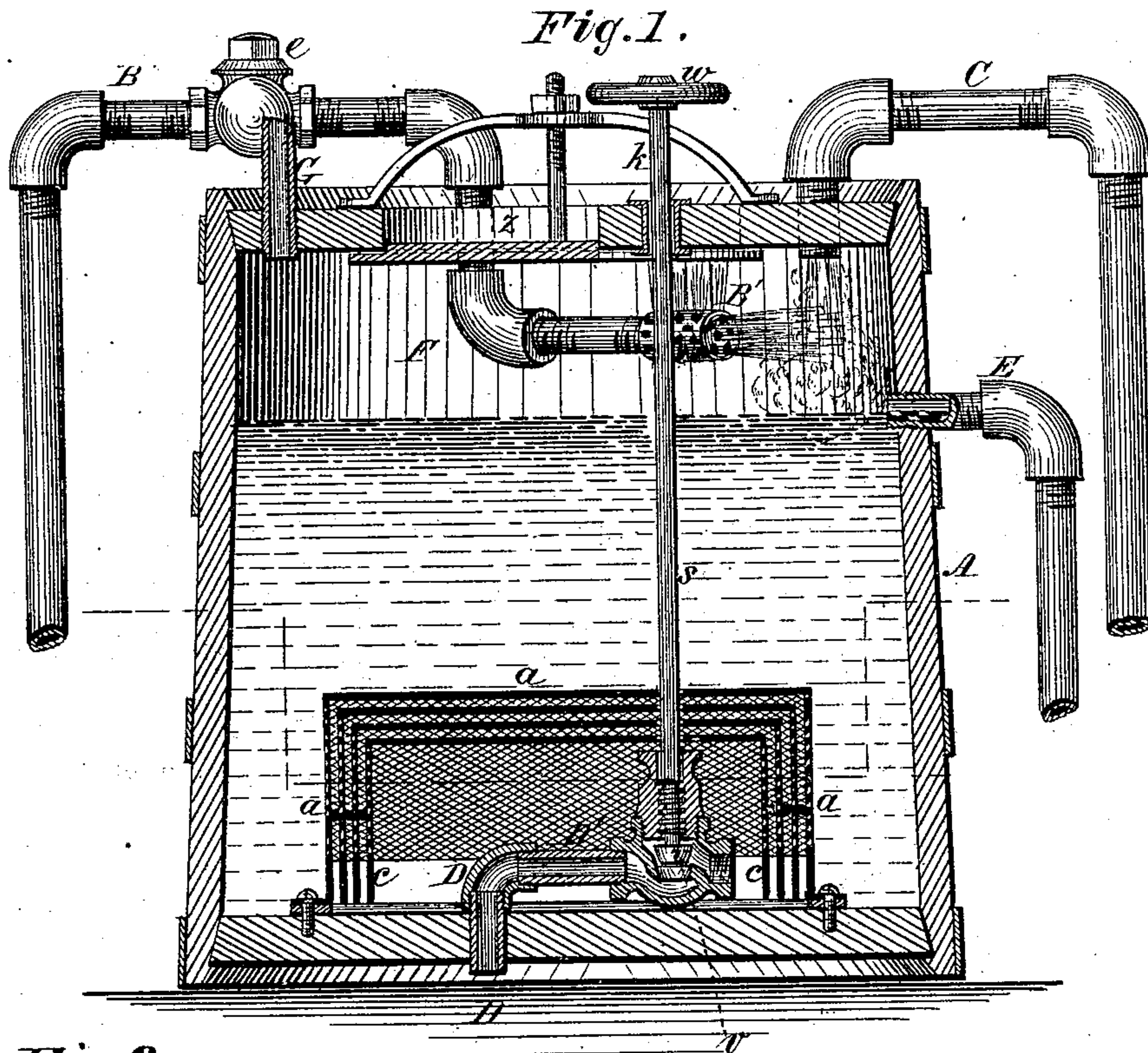


Fig. 2.

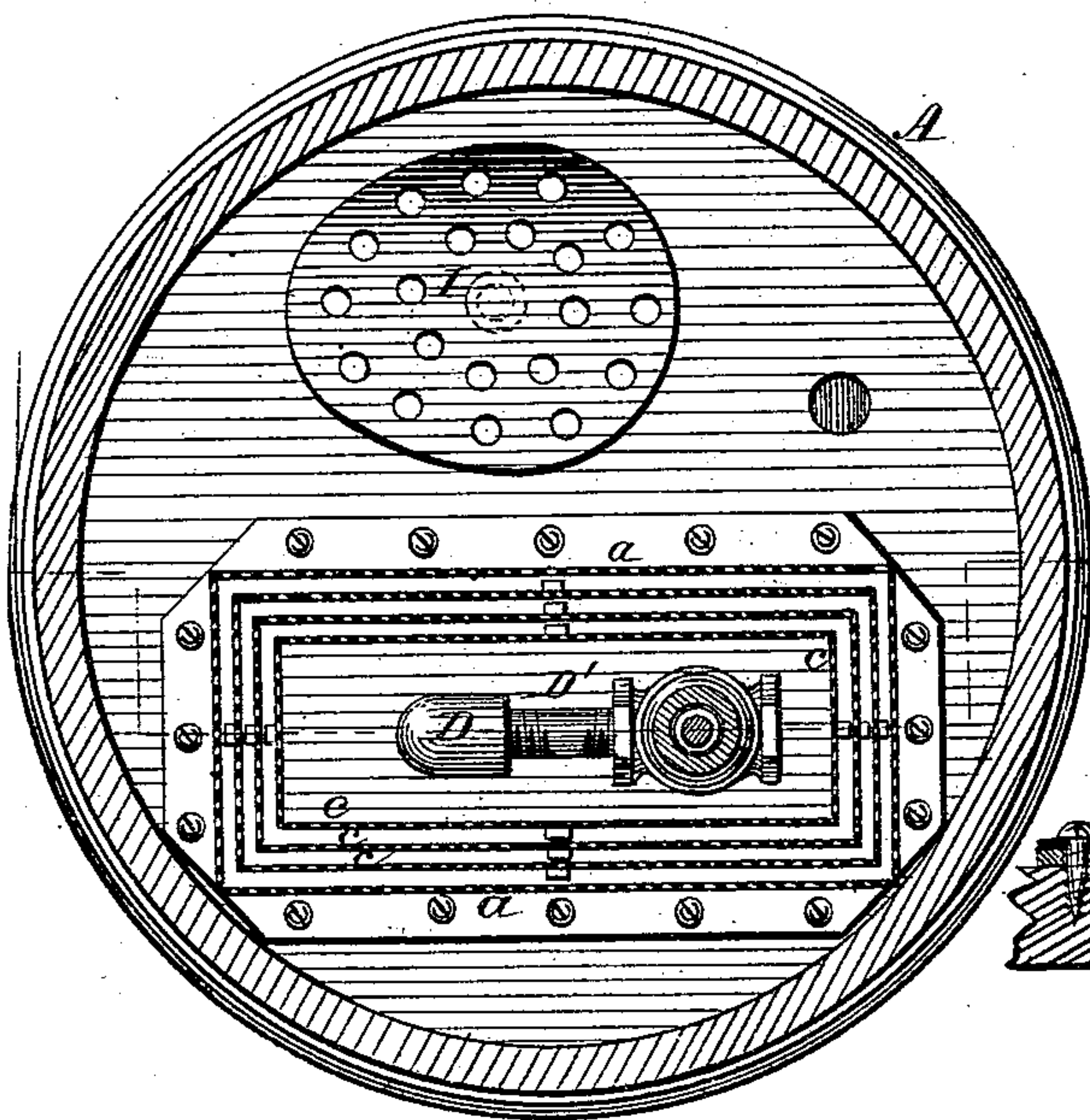
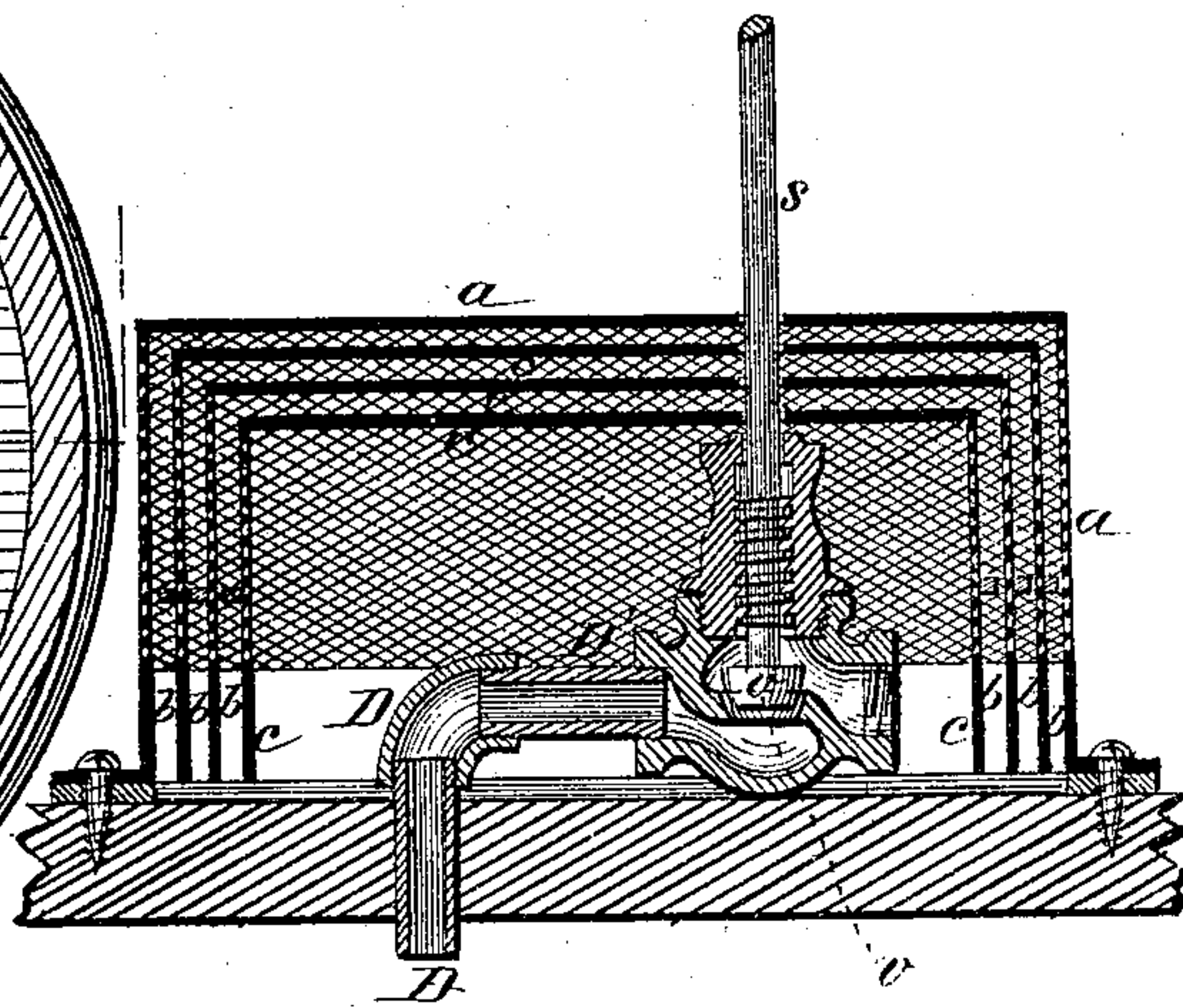


Fig. 3.



Witnesses:

P. C. Dietrich
Floyd Harris

Inventor.
James Washington White,
by *Johnson & Johnson*
Attys

UNITED STATES PATENT OFFICE.

JAMES W. WHITE, OF ROTHBURY, MICHIGAN, ASSIGNOR OF ONE-HALF OF
HIS RIGHT TO LEMUEL THAYER, OF SAME PLACE.

FEED-WATER HEATER AND FILTER.

SPECIFICATION forming part of Letters Patent No. 226,814, dated April 20, 1880.

Application filed January 23, 1880.

To all whom it may concern:

Be it known that I, JAMES WASHINGTON WHITE, a citizen of the United States, residing at Rothbury, in the county of Oceana and State of Michigan, have invented certain new and useful Improvements in Feed-Water Heaters and Filters for Steam-Boilers; 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, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in feed-water heaters and filters for steam-boilers; and the objects of my improvements are to provide a filter within the inclosing walls of which the feed end of the boiler-supply pipe is arranged, and within the supply-pipe so inclosed the stop-cock is also arranged within the inclosing walls of the filter, whereby to produce an effective filtration of the water that supplies the boiler and prevent the freezing of the boiler-supply pipe and its stop-cock. The filter is always beneath the level of the water in the heater, and consists of multiple filtering-walls, forming an interior compartment, within which the boiler-supply pipe opens and by which it is covered. This construction also places the stop-cock for the supply-pipe directly within the heater and within a nest of filtering-walls, which is very important in using the heater with boilers in mills and factories, where the supply-pipe and its stop-cock are liable to freeze when the engine is not running. Hitherto in such heaters the stop-cock has been placed in the supply-pipe outside of the heater, and both the pipe and the cock more or less exposed and liable to freeze when the engine is not in use, and in such event must be thawed out before the engine can be put to work with safety.

Figure 1 represents a vertical section of a feed-water heater and filter embracing my improvements; Fig. 2, a horizontal section of the same, taken through the filtering device which incloses the stop-cock of the boiler-supply pipe; and Fig. 3, an enlarged vertical sec-

tion of the filtering device and the stop-cock of the boiler-supply pipe.

The letters of reference refer to the same parts in the several figures.

The heater is designed for use with steam-boilers for mills and factories, and is especially adapted to prevent freezing in cold weather.

I use a wooden tank, A, for the heater, with which a pump or supply-tank connects by a pipe, B, entering the top of the heater. The exhaust-steam pipe C from the engine enters the top of the heater near the inlet end of the cold-water-supply pipe, while the pipe D, connecting the heater with the boiler, leads from the bottom of the heater.

The cold-water-supply pipe B terminates in a horizontal spraying-nozzle or atomizer, B', in the upper part of the heater and above the level of the water therein, and in such relation to the exhaust-steam pipe C as to project the cold water in spray or jets directly beneath and across the incoming steam, thereby heating the water quickly and uniformly.

I provide the heater with an overflow-pipe, E, entering it near its top, but below the level of the spraying-nozzle B', so as to keep the water from rising above said nozzle, and thereby form a steam-chamber, F, above the surface of the water, which, in connection with the cold-water and steam-exhaust pipes, entering said chamber in the relation stated, serves the important advantage of heating the incoming water in an atomized condition, as well as the water in the tank. I thus heat the water in a top chamber by the direct contact of the exhaust-steam, both upon the surface of the water in the heater and against incoming jets, so that the water is actually heated to a high temperature at the point at which it enters the heater and before it reaches the body of the water therein.

A pipe, G, from the top of the heater, allows the escape of the steam from the top chamber, to avoid too great pressure within the tank, such pipe being provided with a suitable cock for this purpose.

The supply-pipe D for the boiler has a horizontal bend, D', open at its end, which, entering the heater, stands three or four inches above its bottom, and is provided, back of its

open end, with a stop-cock of any suitable construction, a conical valve, *v*, operated by a screw-stem, *s*, being shown, whereby to cut off the water from the boiler when desired. The stop-cock being thus inclosed within the heater, it is prevented from freezing and the pipe from bursting.

A key-rod, *k*, passing through a stuffing-box in the top of the heater, and provided with a hand-wheel, *w*, serves to open and to close the valve.

The filter is placed over and incloses the open end of the boiler-supply pipe *D* and the stop-cock. It consists of a nest of filters, each inclosed within and by the other, with intervening spaces. Each is formed of sheet-iron, with perforated walls or sides, like a box, and the outer one, *a*, only is secured to the bottom of the heater. Each is open at the bottom only, and rests upon the bottom of the heater, and an intervening space, *b*, separates the interior ones, *c*, so that the water entering the outer one from the heater through the wall perforations fills the space around its inner side and passes successively through the perforations and spaces of the inner boxes to the boiler-supply pipe and into the boiler.

The filters are fitted over each other, so as to preserve the surrounding spaces *b*, and the outer one may be made in hinged sections, and provided with hooks to hold them closed, so that they may be opened to clean out the lime and mud that may gather in them from the water. They may, however, be held in place in any manner that will allow of their being opened or removed for cleaning the sediment. I prefer to use four such filters, of suitable size, the outer one being about fifteen inches high and the inner one wide or long enough to fit over the horizontal end *D'* of the boiler-supply pipe.

The perforations in the filters will be about four inches above the bottom, so that the water will be drawn through the filters without making a stir at the bottom of the tank, outside of the filters; and the end *D'* of the supply-pipe being on a level with the perforations, the water will pass out into the boiler at a point above the bottom of the filter, so as not to stir the sediment at the bottom.

The perforations in the several boxes may vary in size, and those in the inner one may be the smallest, so that each filter will form a separate sediment-collecting chamber, and the water will enter the inner box and pass to the boiler in a comparatively pure condition.

An iron shell, *I*, is placed on the bottom of the heater to separate and take up the lime in the water.

The top of the heater is provided with a man-hole, *z*, suitably covered, to allow of cleaning out the heater when desired.

The inlet-pipe *B* has a check-valve, *e*, which serves to prevent the steam in the chamber *F* of the heater from passing through said pipe when the water is not entering the heater.

The stem of the valve passes through the tops of the filters, and the latter are made as tight as possible, so that the water can only enter the supply-pipe through their perforations. All the pipes can be drained and the heater can be left full of water for several days without freezing in the coldest weather.

The heater is cleaned and drained through a bottom opening closed by a plug.

By having the steam-pipe open into the heater, so as to project the steam upon the surface of the water, I am enabled thereby to cause the cold water to be projected in spray or streams directly through the steam, instead of injecting steam under the water, so that I require less steam and less time to heat the water, because the incoming spray is heated as it enters the steam-chamber and before it falls into the body of the water.

I have shown that portion of the boiler-supply pipe within the filter as resting upon the bottom of the tank; but I intend to use it above said bottom, so that the water will enter it on a level with the perforations.

I claim—

1. The combination, with the feed-water heater *A* and the filtering device, of the boiler-supply pipe *D*, opening within a chamber in said filter, and the stop-cock *v*, arranged in said supply-pipe, within said chambered filter, substantially as and for the purpose herein set forth.

2. The combination, with the feed-water heater *A* and the boiler-supply pipe *D*, of a filtering device arranged within the heater, and consisting of a nest of boxes placed one within the other, with intervening spaces and perforated walls, the perforations being above the bottom of the heater and on a level, or thereabout, with the inward-projecting open end of the boiler-supply pipe, substantially as and for the purpose set forth.

3. A feed-water heater and filter consisting of the tank *A*, the inlet water-spraying pipe *B*, the steam-pipe *C*, and the overflow-pipe *E*, having the relation to each other as described, the boiler-supply pipe *D*, its stop-cock *v*, and the filtering device arranged within the heater in the relation to each other substantially as and for the purpose herein set forth.

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

JAMES WASHINGTON WHITE.

Witnesses:

PIETER PFANSTIEHL,
ORIN F. HILL.