J. ARMSTRONG.

Feed Water Heater for Steam-Boiler.

No. 164,959. Patented June 29, 1875.

Fig. 1

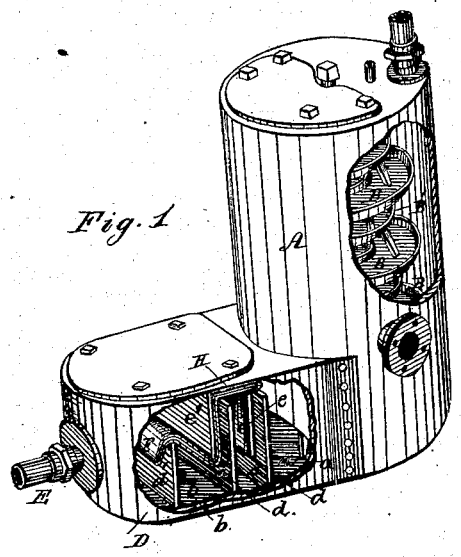
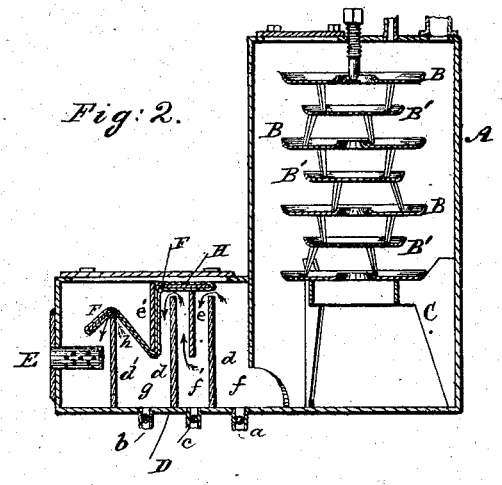


Fig. 2.



WITNESSES

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UNITED STATES PATENT OFFICE.

JAMES ARMSTRONG, OF TOLEDO, OHIO.

IMPROVEMENT IN FEED-WATER HEATERS FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. **164,959**, dated June 29, 1875; application filed March 4, 1875.

To all whom it may concern:

Be it known that I, JAMES ARMSTRONG, of Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Feed-Water Heaters and Purifiers for Steam-Boilers, of which the following is a specification:

The objects of my invention are to separate and collect the sediment and to remove the grease or oily substances from feed-water on its way to the boiler; to which ends my improvements relate more especially to the combination, with a feed-water heater of suitable construction, (such, for instance, as shown in Letters Patent of the United States granted to me December 31, 1872, No. 134,450,) of a series of partitions or dividing-plates, alternately over and under which the water passes so as to create a slow upward and downward flow or current of the water on its way to the boiler, and further relates to the employment of cloth or other absorbent material against which the water passes, or by and in contact with which the water flows.

The improvements claimed will hereinafter specifically be designated.

In the accompanying drawings, which show one way of carrying out my invention, my improvements are illustrated in connection with a heater of the same general construction as that shown in Letters Patent granted to me December 31, 1872, before referred to.

Figure 1 represents a view, in perspective, of a heater embodying my improvements, with parts broken away to show the interior construction; and Fig. 2 a vertical central section through Fig. 1.

A heating-chamber, A, pans B B′, and other parts connected with the chamber are similar in construction and operation to those represented in my patent above referred to, except that, instead of fixed brackets for supporting the pans, I prefer to employ a removable tripod or stand, C, resting on the bottom and against the sides of the heating-chamber A, upon which the lower pan of the series rests. A purifying-chamber, D, projects from the lower portion of the shell of the heating-chamber A, the two chambers communicating near or at the bottom, and for a suitable distance upward therefrom, as shown in the drawings. The sediment or purifying chamber D is provided with a series of partitions or dividing-plates, *d d d′ e e′*, alternately projecting upward from the bottom of the chamber to near the top, and downward from the top some distance below the tops of the plates projecting from the bottom. These plates cross the chamber, fit snugly against its sides, and are secured in position in any suitable way. It is not essential that any particular number of these plates should be employed, or that they should be arranged precisely as shown. The last one, *d′*, of these plates I prefer to locate farther from the plate next to it than the other plates are apart for the location and support of a filter when one is used. By these partitions the water, as it flows into the purifying-chamber from the heating-chamber, is forced to pass upward between the shell of the heating-chamber and the first one of the plates *d*, and then down over said plate, then up again under the second plate *e*, and so on, as indicated by the arrows, Fig. 2. In this manner a slow upward and downward flow is imparted to the water. The sediment is separated from it and collects in the spaces or receptacles *f f′ g*, from which it may be removed at suitable intervals by means of openings or valves *a b c*, of suitable construction. The water, after passing over the final partition, *d′*, is drawn off through a pipe, E, in the usual manner. It will thus be seen that a portion of the sediment (the heaviest particles) will be deposited in the lower part of the heating-chamber, a portion of the sediment (the next heaviest) will settle in the receptacle or space *f*, and so on, the lightest or final deposit being in the receptacle *g*. In this manner, without the use of a filter, I am enabled to free the water to a sufficient extent of foreign substances, for it is obvious that any sediment that would escape over the last of the series of plates would float or be constantly moving in the boiler and not settle or clog therein. The motion of the water in its course over and under the partitions is slow and regular, creating but little agitation, and consequently does not stir up and keep the sediment in motion.

To guard against the passage to the boiler of grease or oily substances, as well as other light floating matter, I prefer to employ burlaps or other cloth or fibrous or absorbent ma-

terial arranged so that the water in passing over one or more of the partitions shall pass with its surface just beneath or in contact therewith. Such material may also be carried along the side of one or more of the partitions. In this instance I have shown the cloth F as secured, by means of a plate, H, around which it is passed, in position above the upper ends of the upwardly-projecting plates or partitions *d*, and as extending down along the inner side, or that side along which the water flows, of the last downwardly-projecting plate, the cloth being then carried upward and hung or hooked over the last plate, *d'*, thus forming an upward filter, *h*, supported by the plates *d' e'*. This filter, as before stated, although it is not deemed necessary to the proper purification of the water, may be desirable in some instances. When not to be used as a filter the end of the cloth may be removed from the final partition *d'* and allowed to hang down; or this end may be dispensed with entirely and the cloth terminated either at the bottom of the plate *e'* or be left extending only across and above the tops of the plates *d d*.

By the use of the cloth or equivalent material, which should be renewed at proper intervals, much of the grease floating on the water is caught and absorbed, and many light floating substances are retained, while the use of a filter or material through which the water passes is rendered unnecessary in most instances.

By inclining the filter, when one is used, as shown at *h*, it will be seen that a larger filtering area is secured in a given space than could be obtained were the filter extended horizontally between its supports, and as grease carried by the water floats on its surface, or at the highest point to which it can ascend unimpeded in the water, the grease would be presented only to the upper portion of the filter, leaving the larger part free to the direct action of the water.

It is obvious that instead of arranging the partitions in a purifying-chamber on the side, or forming a lateral extension of the heating-chamber, that they might be wholly or partially arranged beneath the heating-pans in the bottom of the heating-chamber itself, the water from the lower pan being conducted to one side so as properly to enter to the partitions.

I claim as my invention—

1. The feed-water heater and purifier, constructed as hereinbefore set forth, having a chamber in which the water is heated, a purifying-chamber communicating with the heating-chamber by an opening in the lower portion of its shell, a series of partitions crossing the purifying-chamber, extending alternately from the bottom of said chamber upward to near its top, and from its top downward below the tops of said upwardly-projecting partitions, and a pipe for drawing off the water after having passed over the last partition, whereby the sediment in the feed-water is deposited according to its weight upon the bottom of the heating-chamber, between the shell of the heating-chamber and the first partition in the purifying-chamber, and upon the bottom of the purifying-chamber between the partitions.

2. The combination of the purifying-chamber, partitions therein for directing the flow of the water, and cloth or absorbent material, arranged substantially as described, in contact with the water flowing through the chamber, whereby grease is caught without passing the water through filtering material.

3. The combination of the purifying-chamber, a series of partitions crossing the chamber and projecting alternately from the bottom of the chamber upward to near its top, and from the top downward below the tops of the upwardly-projecting partitions, and a filter, extending between the last two partitions and supported thereby, through which the water passes on its way to the pipe by which it leaves the chamber, these members being constructed and operating substantially as set forth.

In testimony whereof I have hereunto subscribed my name.

JAMES ARMSTRONG.

Witnesses:

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