(No Model.)

H. HILL.

LIME EXTRACTOR FOR STEAM BOILERS.

No. 268,672. Patented Dec. 5, 1882.

Fig. 1.

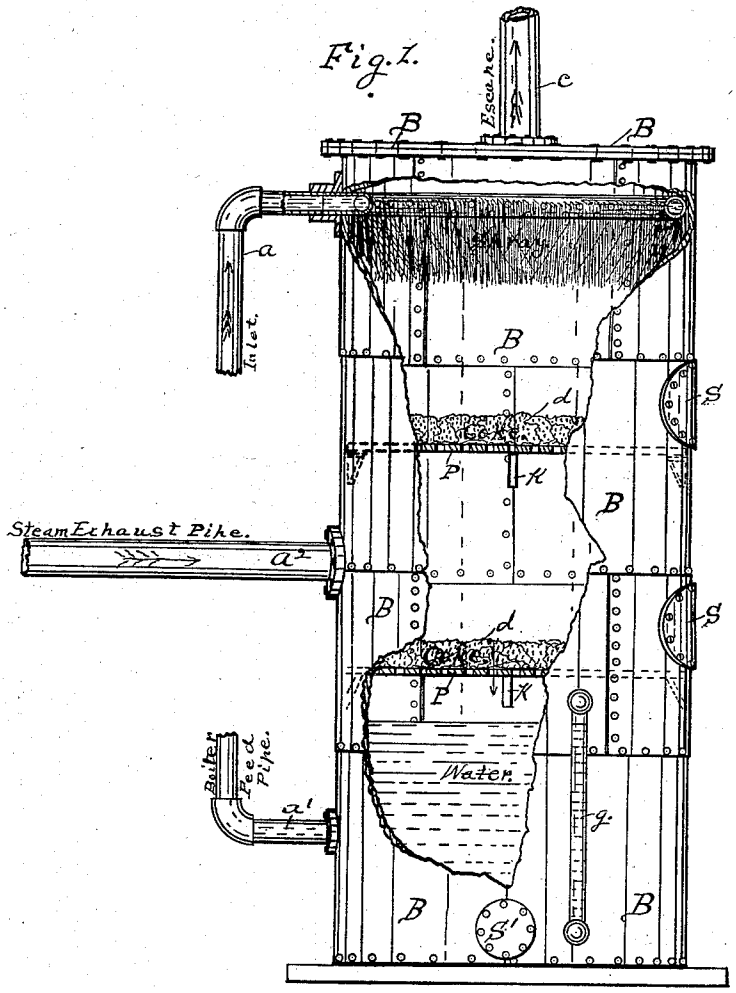
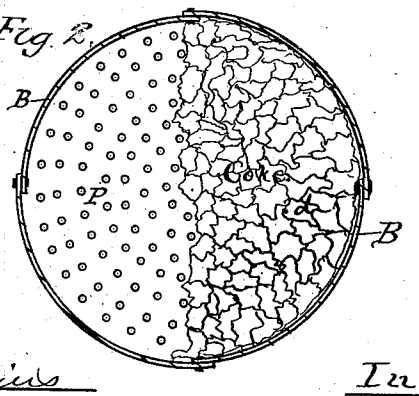


Fig. 2.



Witnesses.

Thos. H. Hutchins

Wm. J. Hutchins.

Inventor.

Henry Hill.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

HENRY HILL, OF JOLIET, ILLINOIS.

LIME-EXTRACTOR FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 268,672, dated December 5, 1882.

Application filed August 25, 1882. (No model.)

To all whom it may concern:

Be it known that I, HENRY HILL, of the city of Joliet, in Will county, and State of Illinois, have invented an Apparatus for Extracting Lime from Water to be Used in Steam-Boilers, the construction and operation of which I will proceed to explain, reference being had to the annexed drawings and the letters and figures thereon, in which—

Figure 1 is a side elevation with a portion broken out to see the interior, and Fig. 2 a plan view on the top of one of the interior shelves or partitions.

The nature and object of this invention is to extract and free water from any lime it may contain to render it fit for use in steam-boilers. Ordinary water contains more or less lime, which will deposit on the interior surface of steam-boilers, and in its flues sometimes, to such extent as to close them up entirely, all of which can be prevented by extracting the lime from the water before it enters the boiler, which is the purpose of this apparatus.

The mechanical construction of my invention is shown in Fig. 1, and consists of the vessel B, which is constructed of metal, generally of boiler-iron plates, similar to a steam-boiler, and of any suitable form, but preferably in the form of a cylinder and standing on one end, as shown in said figure. The cylinder B is provided in its interior with loose shelves P, resting on brackets; or they may be partitions, and perforated, as shown in Fig. 2. These shelves are for the purpose of holding a quantity of ordinary coke, *d*, covering them to the depth of several inches. Any number of these coke-shelves may be used; but generally only two are necessary, dividing the interior of the cylinder into three separate compartments, as shown in Fig. 1. The upper compartment has an inlet-pipe, *a*, which, after it enters the compartment, passes entirely around the interior wall of the compartment, and may also cross from wall to wall, if desired. The portion of said inlet-pipe *a* within the compartment is perforated, so that the water is forced through the perforations in the form of a spray and falls and filters through the coke on both the shelves *d* until it reaches the bottom compartment and is the supply for the boiler. Before the water enters the upper compartment through the inlet-pipe *a* it is heated by passing through an ordinary inspirator or by any other means desired, only so it enters the compartment hot. The next compartment below, or the middle compartment, receives the exhaust-steam from the engine through the exhaust-pipe a^2. This exhaust-steam escapes through the exhaust or escape pipe *c* on the top of the cylinder, as shown in Fig. 1. As it passes upward it comes in contact and commingles with the spray from the inlet-pipe *a*, bringing the said spray up to the boiling-point in temperature, so that the water from the inlet-pipe *a* is boiled before it filters down through the coke on the shelves *d*. The water, having been raised to a boiling temperature, is separated from the lime in it, and, as it falls and filters through the coke on the perforated partitions P, deposits the lime on and in the coke, where it is retained and collected on the coke in a solidified form, thus freeing the water collected in the lower compartment, and which is to be used to feed the boiler, from any lime, so that its use will not leave a deposit of lime sediment on the interior of the boiler or in its flues. The feed-pipe *a'* conducts the water from the lower compartment to the boiler. When the coke has become covered with the lime sediment and is unfit for further use, it is removed through man-holes *s* at the side and new coke placed on the shelves. The man-hole *s'* is for the purpose of cleaning out the lower compartment, if necessary, and a gage, *g*, on the exterior will indicate the height of the water inside.

By this simple apparatus any water may be entirely freed from lime sediment and be rendered fit for use in steam-boilers in a very inexpensive manner. Any other porous material than coke that will answer the purpose may be used, if desired. I do not wish to confine myself so much to the particular form or construction of this invention as I do to the process or manner of separating the lime sediment from the water by means of injecting a hot blast of steam into a fine spray of water until the water is raised in temperature to the boiling-point, and then filtering the water through the coke or any other porous substance

that will collect the lime sediment on it, as set forth.

I am aware vessels have been in use having compartments separated by shelves supporting filtering material for this purpose, and that simply filtering the hot water through a filtering material to extract the lime sediment from it is not new in itself; and I disclaim any other form of construction, particularly such as is shown in Patent No. 83,370, October 27, 1868, granted to R. R. Fenner; but I am not aware that any apparatus constructed like the one set forth in the foregoing specification, and for this purpose, has ever been in use.

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

In a lime-extractor for steam-boilers, the vessel B, containing the perforated shelves P P for supporting the coke *d*, and divided into three compartments by said shelves, the upper compartment having the perforated hot-water-inlet pipe *a*, extending around the interior wall of the vessel B, and the escape-pipe *c*, the middle compartment receiving the exhaust-pipe a^2 from the engine, and arranged so the exhaust-steam from the engine must pass up through the upper shelf, P, and coke *d* thereon and meet the spray from the inlet-pipe *a*, and the lower compartment having the feed-outlet pipe *a'* and gage *g*, all arranged to operate in the manner and for the purpose set forth.

his
HENRY × HILL.
mark

Witnesses:
THOS. H. HUTCHINS,
J. E. BUSH.