(No Model.)

J. J. MINER.

WATER HEATER, CLEANSER, AND SCALE PREVENTER.

No. 527,616. Patented Oct. 16, 1894.

Fig. 1.

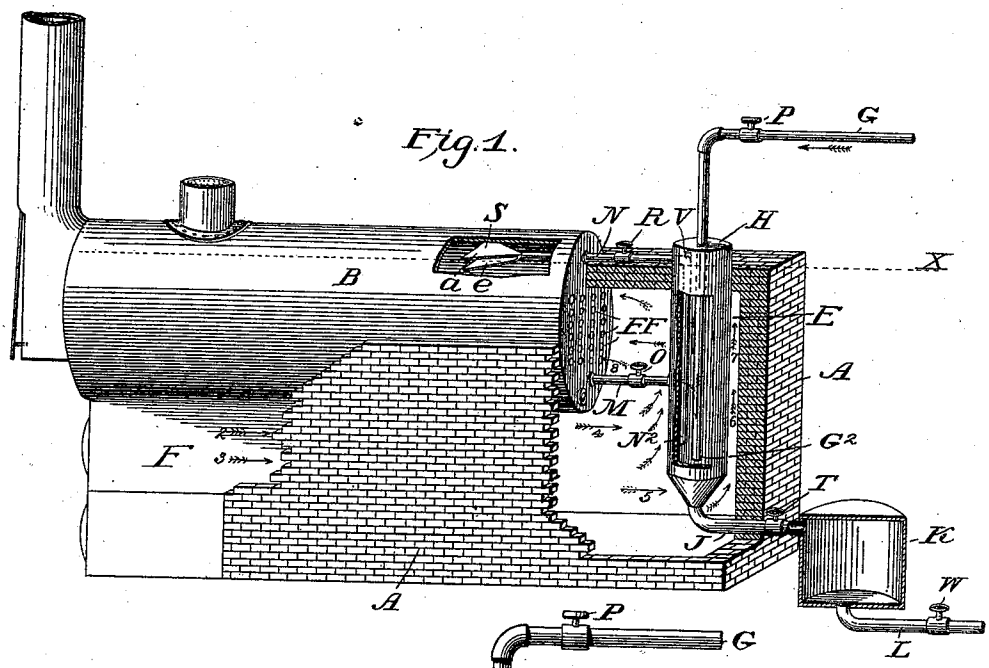
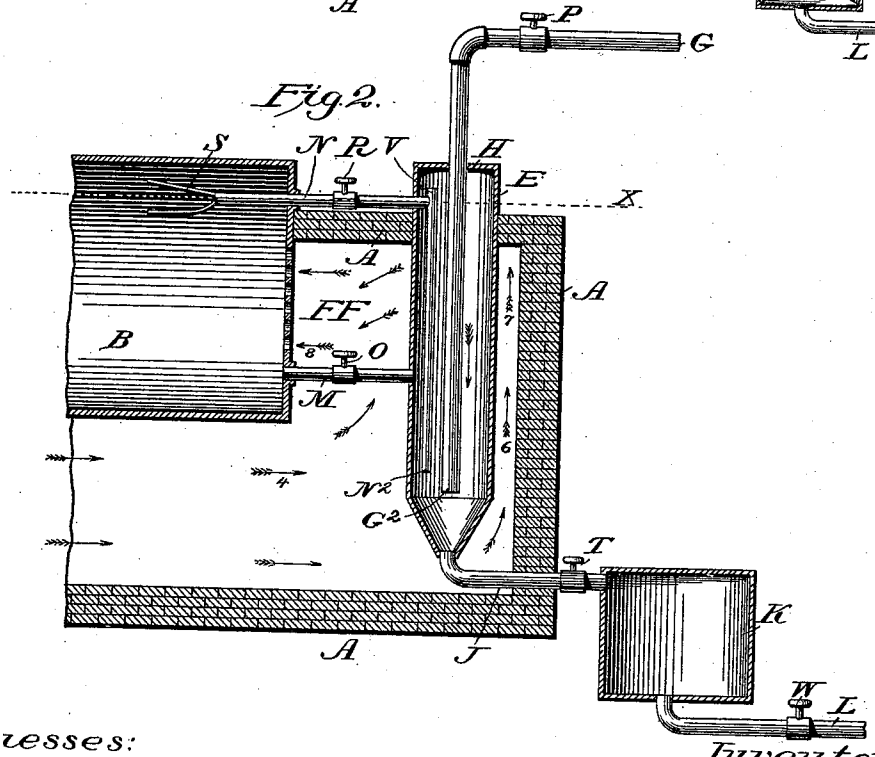


Fig. 2.



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UNITED STATES PATENT OFFICE.

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WATER-HEATER, CLEANSER, AND SCALE-PREVENTER.

SPECIFICATION forming part of Letters Patent No. 527,616, dated October 16, 1894.

Application filed May 4, 1894. Serial No. 510,120. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. MINER, a citizen of the United States, residing at Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Water-Heaters, Cleansers, and Scale-Preventers; and I do 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 the letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in water heaters and scale preventers when used in connection with steam boilers, and the principal objects of my invention are, first, to provide means for heating the water and thus separating the sediment therefrom by precipitation before it enters the boiler, and, second, to provide means for skimming and removing from the water after it enters the boiler, the frothy foamy sediment that rises to the surface and thus prevent the formation of scale within the boiler.

I accomplish the aforesaid objects substantially as herein described and as illustrated in the accompanying drawings, in which similar letters of reference indicate corresponding parts throughout the several views, and in which—

Figure 1 is a side elevation and general view in perspective of my improved water heater and its connections with an ordinary steam boiler. Fig. 2 is a vertical, longitudinal, central, sectional view of the heater, boiler, and connected parts.

In Fig. 1 the boiler, heater, and fire-shield are each shown partly cut away in order to expose to view interior portions of my invention.

A shows a fire shield of metal, brick-work, or other suitable material surrounding a portion of an ordinary boiler, B, and including therewith within said shield the heater E and its connections with the boiler and other parts; F, the location of the ordinary fire-box, from which the fire or heated air passes under the boiler as shown by arrows 2, 3, 4; E, the water heater; M, a pipe provided with stop-cock O, and connecting the heater and boiler; G, the cold-water supply pipe through which the cold water is pumped into the heater through lower opening G^2 of pipe G, said pipe G passing through heater head H as shown; P, a check-valve adapted to pipe G; N, a pipe connecting the heater and boiler as shown, provided with stop-cock R, extending into the boiler and carrying on its inner end a skimmer S, for gathering and conducting through pipe N back into the heater any sediment floating on the surface of the water in the boiler.

Arrows 5, 6, 7, 8, &c., show the directions of the currents of heated air passing near or around the heater within the shield and entering boiler flues F, F, at the rear end of the boiler.

J, is the heater outlet pipe provided with stop cock T, and extending through the shield to a settling basin K, of any desired form, and L shows a blow-off pipe, provided with stop cock W, and adapted to empty basin K.

The practical operation of my invention is substantially as follows: The boiler and heater being filled with water up to about their mutual water line, X, and fire being applied under the boiler the heat passes to all parts of the hot-air chamber within the shield, around and against the heater, against the rear end of the boiler and into its flues as indicated by the arrows,—the hottest water in the heater rising to the top thereof and the coolest descending to the bottom and the sediment therein settles to the bottom and finally passes into the settling basin K, from which it may be blown off at pleasure by opening stop-cocks T and W. As steam is generated in the boiler and is utilized or exhausted therefrom, cold water is pumped into the heater through pipe G, from the lower end of which it emerges at about G^2, near the bottom of the heater, the water therein being nearly at boiling heat, which causes the precipitation of the greater part of the lime, magnesia or other sediment contained in the cold water thus introduced. The coldest water, by its greater specific gravity, falls to the lower part of the heater, passes therefrom into the boiler through pipe M with but a small quantity of lime or other

impurities remaining suspended in the water, and thereby, to a great extent, frothing and foaming of the hot water in the boiler and the formation of scale on the inner surface thereof, are prevented; and such impurities as do remain in the water after it has been heated in the heater and passes into the boiler through pipe M, rise to the surface and are caught in skimmer S, and returned to the heater through pipe N by the flow of water through it from the boiler and skimmer.

The skimmer is connected with and carried by pipe N within the boiler and is made sufficiently wide at its inner open end *a* to extend from side to side of the boiler in which it is set with its wide, flat bottom *e*, on a plane with the level of the upper surface of the water in the boiler, and at a height at which the sediment on the surface of the water readily passes into the widely open mouth *a* of the skimmer and moves toward the rear head of the boiler, and as it passes backward the converging shape of the rear of the skimmer guides it out through pipe N into the heater.

The heater is placed near the rear end of the boiler and the fire-shield A, surrounds and incloses together said rear end of the boiler and the heater, thus forming a hot-air chamber in which the heater derives and utilizes a great portion of the heat passing from the fire-box under the boiler, around the heater and finally into the boiler flues, F F,—thus heating the water before it enters the boiler, causing the precipitation of the sediment and the prevention of scale in the boiler and effecting a great saving of fuel in all cases in which my improved water-heater, cleanser and scale preventer is used.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

The heater, supplied through a cold water inlet pipe provided with a check-valve and penetrating the heater head above and outside of the fireshield and delivering cold water in the lower interior portion of said heater,—the boiler, and heater connected by the pipe N outside of and above the fireshield and by the pipe M inside of and below the fireshield and within the hot-air chamber,—the fireshield inclosing the entire heater except its upper end or head projecting through and above the fireshield,—the hot-air chamber within the fireshield and thereby inclosed with the rear end of the boiler, the open ends of the boiler flues, pipe M, and the entire heater except the head thereof,—the pipe M provided with a stop-cock and connecting the heater and boiler within said hot-air chamber or smoke space,—the pipe N provided with a stop-cock and connecting the heater and boiler outside of and above the fireshield,—pipe N^2 connecting at its upper end with pipe N within the heater,—the pipe N, connecting the heater and boiler above the fireshield, extending within the boiler and carrying on its inner end a skimmer converging rearwardly to the exit for sediment from the boiler to the heater through said pipe N,—the outlet pipe provided with a stop-cock and leading from the heater to the settling basin,—the settling basin provided with a blow-off pipe and the stop-cock adapted to open and close said pipe,—all constructed, combined and arranged in the manner and to effect the purposes set forth and described.

In testimony whereof I hereunto subscribe my name in the presence of two witnesses.

JOHN J. MINER.

Witnesses:
O. H. WOODWORTH,
C. C. MINER.