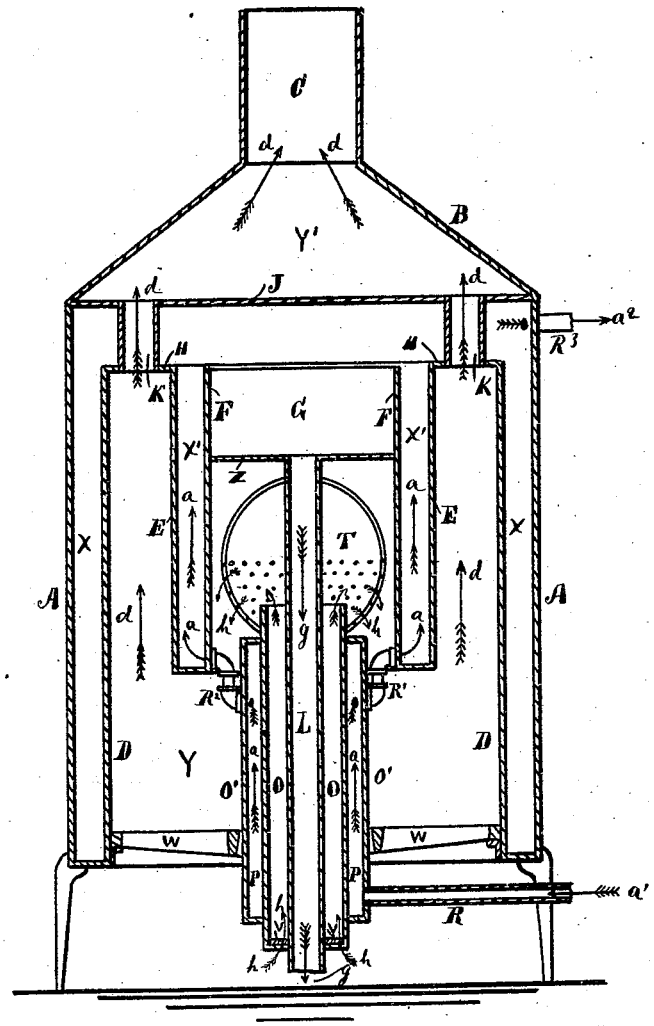
W. S. REYNOLDS.

WATER-HEATER.

No. 183,511. Patented Oct. 24, 1876.



Witnesses;
S. S. Whitney.
Thomas A. Cole

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UNITED STATES PATENT OFFICE.

WILLIAM S. REYNOLDS, OF LA FAYETTE, INDIANA, ASSIGNOR TO HIMSELF AND HELEN M. SEMPILL, OF SAME PLACE.

IMPROVEMENT IN WATER-HEATERS.

Specification forming part of Letters Patent No. **183,511**, dated October 24, 1876; application filed April 12, 1876.

To all whom it may concern:

Be it known that I, WILLIAM S. REYNOLDS, of La Fayette, in the county of Tippecanoe, State of Indiana, have invented a new and useful Improvement in Water-Heaters for Boilers, &c., of which the following is a description, reference being had to the accompanying drawings.

My invention relates to that class of apparatus designed to heat and circulate water for steam fire-engines, boilers, &c.; and it consists of the arrangement of an air-conducting tube arranged to pass through the grate-bars, and extend upward with a cone spreading above, in such a manner as to allow the cold air that is admitted from below the grate to become heated, and to be deposited on the top of the coal to increase the combustion.

The air-tube is surrounded by a water-jacket, which extends from below the grate to near the base of the spreader, and is designed to protect the air-pipe from the action of the fire, and at the same time to heat the water rapidly in its passage through the annular space around the air-tube to the main part of the boiler; also, in the arrangement of a blow-off pipe, arranged to communicate with the eddy-chamber of the boiler, and to pass through the air-conducting pipe to the outside of the boiler, so as to allow the sediment to be blown off when required; also, in the manner in which the water is conducted into the main portion of the heater by means of an inlet-pipe to the annular water-space around the air-pipe and from the annular water-space to the heater.

In the drawings, I represent my improved circulating-heater by a vertical section, which clearly shows the arrangement of parts, as hereafter described.

A A represent the outside shell of the heater, on the top of which is secured the smoke-chamber hood B and flue C. D D represent the inner shell of the main heater, which is united to the main outside shell A A at the bottom only, and forms the water-leg *x*, and the upper end of the inner shell D is united to the outer shell E of the inner water-leg *x'* by the crown-sheet H, as shown. The inner water-leg *x'* is annular in shape, and the shell E is united to the inner shell F at the bottom only. About the mid-height of the water-leg *x'* the inner shelf F is provided with a crown-sheet, Z, leaving sufficient room above to form a sediment or eddy chamber, G, as shown. At the upper edge of the outside shelf A is an upper crown-sheet, J, over the whole heater, and the flues K or thimbles unite the two crown-sheets J and H, leaving passages through from the fire-chamber Y into the smoke-chamber Y', through which the draft goes in the direction of the arrow *d*. Projecting downward from the crown-sheet Z of the eddy-chamber G is a blow-off pipe, L, which is provided with suitable valves to operate it when required, to blow off the sediment that may accumulate in the eddy-chamber G. This blow-off pipe is surrounded by an air-pipe, O, which also extends below the grate, and at the bottom is provided with a damper or register, V, through which air is admitted in the direction of the arrows *h h*. The air thus admitted passes up the air-tube O into the spreader T, which may be of any desired shape, and is perforated with a number of air-holes or slots, or other apertures, to allow the heated air to be forced downward onto the coal in the furnace to increase combustion. The spreader T is securely united to the blow-pipe L above, and is also securely united to the outside of the air-pipe O, as shown. On the outside of the air-pipe O is securely fastened, in any manner, the outside case or jacket O', which forms an annular water-space, P, between the air-pipe O and outside shell O'. The design of this outside case O' is to protect the air-pipe O from the fierce heat of the furnace, so as to save the air-pipe from being burned up, and is also designed to allow the water that is forced into the annular space P through the inlet-pipe R to receive the benefit of the fire and live coals, to heat it in its passage up the annular space P into the water-leg *x'* or outer water-leg *x*, the water passing in the direction of the arrow *a'*, into the annular space P, into the water-leg *x* or *x'*, by means of pipes R^1, properly arranged, and the heated water can then pass out of the heater A, through the pipe R^3, as shown, to any desired receptacle. The grate-bar W is circular in form, with a hole in its

center sufficiently large to allow the outer water-jacket O′ of the annular inside heater to pass through it, as shown.

What I claim as new, and wish to secure by Letters Patent, is—

1. In a circulating heater or boiler, the air-tube O, surrounded by the jacket O′, to form an annular water-space, P, between them, said air-tube and water-space projecting below the grate W, and extending upward through the fire-space, in the manner shown, for the purposes set forth and described.

2. In combination with an air-tube, O, provided with an annular water-space, P, on its outside, inclosed by means of an outlet-jacket, O, the inlet-pipe R, and outlet-pipes R^1 R^2, in the manner shown, for the purposes set forth and described.

3. In combination with an air-tube, O, surrounded with a water-space, P, a register, V, arranged at the bottom, to allow cold air to enter the air-tube, in the manner shown, for the purposes specified.

4. In combination with an air-tube, O, surrounded with a water-space, P, the air-spreader T, arranged above, to be operated in the manner shown, for the purposes described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM S. REYNOLDS.

Witnesses:
E. O. FRINK,
O. C. WHITNEY.