(No Model.) 3 Sheets—Sheet 1.

W. J. THOMPSON.

FEED WATER HEATER.

No. 454,781. Patented June 23, 1891.

Fig. 1.

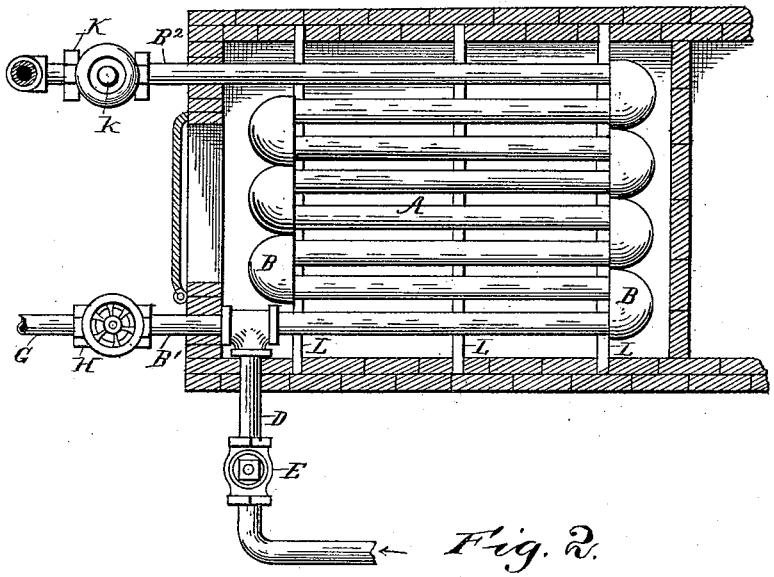
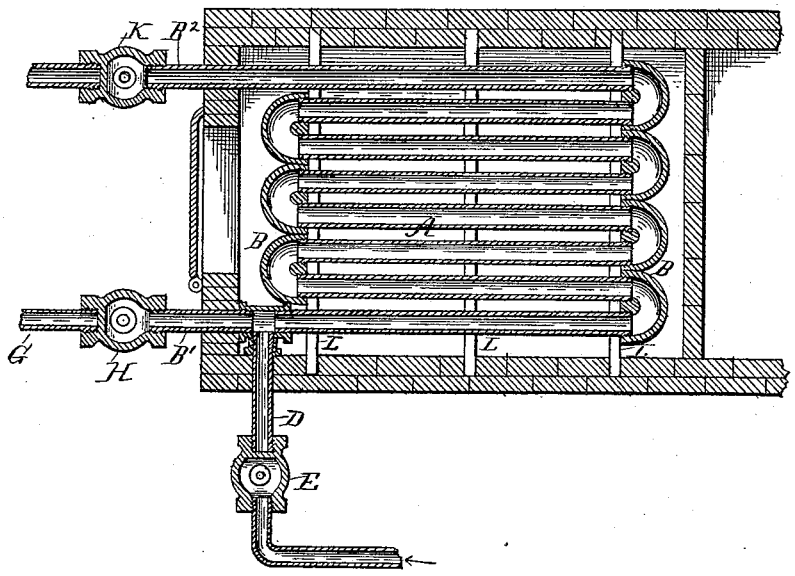


Fig. 2.



Witnesses
J. B. McGirr.
C. M. Buckley

Inventor:
William Jesse Thompson
by Connolly Bros
Attys.

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Fig. 3.

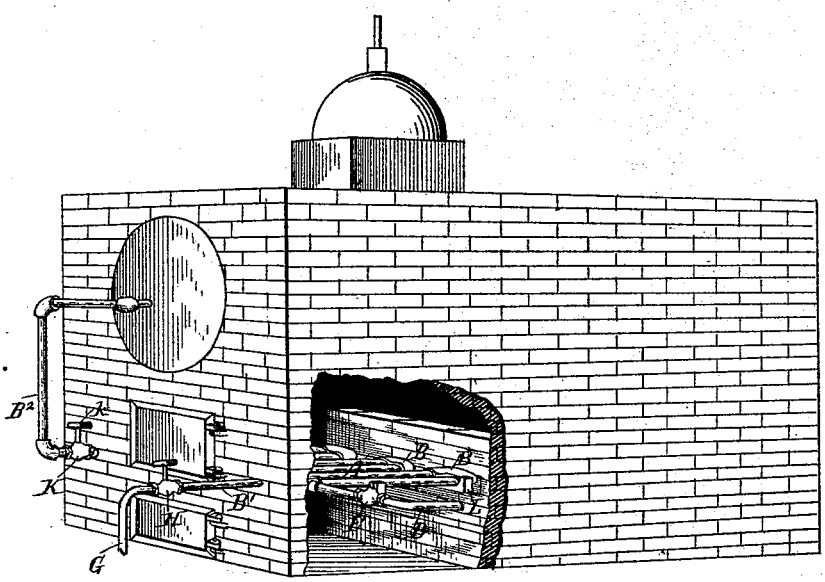
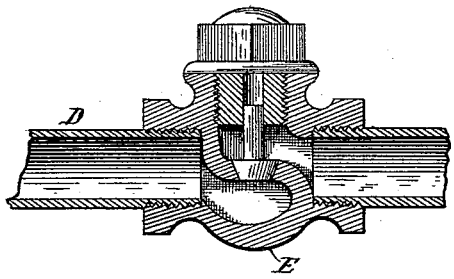


Fig. 4.



Witnesses:
J. B. McGirr.
C. M. Buckley

Inventor:
William Jesse Thompson
by Connolly Bros.
Attys

(No Model.) 3 Sheets—Sheet 3.

W. J. THOMPSON.

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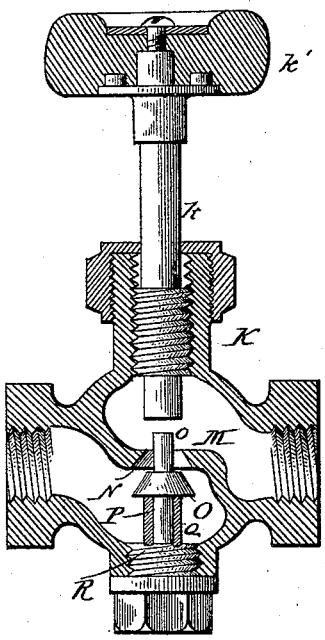
Fig. 5



Witnesses:
J. B. McGirr.
N. C. Evert.

Inventor:
Wm. J. Thompson
By Connolly Bros
Atty's.

UNITED STATES PATENT OFFICE.

WILLIAM JESSE THOMPSON, OF HIGH POINT, NORTH CAROLINA.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 454,781, dated June 23, 1891.

Application filed February 27, 1891. Serial No. 383,098. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM JESSE THOMPSON, a citizen of the United States, residing at High Point, in the county of Guilford and State of North Carolina, have invented certain new and useful Improvements in Combined Grates and Feed-Water Heaters; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification.

This invention has relation to combined grate-bars for boiler-furnaces and feed-water heaters; and it consists in the combination, with a hollow or tubular furnace-grate communicating with the boiler and the pump or water-supply, of suitable valves, whereby when the pump is in operation the feed-water is conveyed through the tubular grate and the latter maintained at a sufficiently low temperature to prevent overheating or burning, while the water passing through it is heated to the proper condition for admission to the boiler, and whereby when the pump is inactive or not in operation the grate is kept charged with water, and the water is prevented from being forced back through the pump by the boiler-pressure.

The invention also consists in the provision of means whereby in the event of the bursting or leaking of the hollow grate-bars the escape of water from the boiler is prevented, and in the further provision of means whereby, when desired, the hollow grate-bars may be blown out and cleaned.

In the accompanying drawings, Figure 1 is a plan view of a grate and its appurtenances embodying my invention. Fig. 2 is a horizontal sectional view of the same, and Fig. 3 is a perspective view of a steam-boiler and furnace with my improvements in position thereon. Figs. 4 and 5 are detail views.

A designates the hollow or tubular grate forming part of my invention. This grate is conveniently constructed of a series of parallel sections of wrought-iron tubing connected together at alternate ends by means of return-bends B B, into which the threaded ends of the pipes are screwed. The outermost lengths of pipe B' B^2 are extended out beyond the furnace-walls, and form, respectively, the connections with the pump or water-supply and the boiler. The section B' is coupled by means of a T-coupling to a branch D, provided with a check-valve E, which in turn is coupled to the water-supply pipe F. One end of the T-coupling is connected to a branch G, leading to a waste-pipe, and is provided with a suitable valve or cock H. The section B^2, which leads to the boiler I, is provided with an automatic valve K, which, by means of a screw-stem *k*, may be positively opened, so as to allow a free flow of water back from the boiler, or may be so adjusted as to operate as a check-valve to prevent backflow, while admitting a free flow of water to the boiler.

The grate bars or tubes B B, &c., are braced and supported by the transverse recessed bars or bridges L L, and these are supported by the walls or brick-work of the furnace.

The purpose, as stated, of the hollow grate-bars is to allow the passage of water for the purpose of keeping the grate at a low temperature, and also for the purpose of sufficiently heating the feed-water before its admission to the boiler. When the pump is running, the water flows therefrom by way of the check-valve E and through the grate bars or tubes into the boiler, the check-valve preventing a backflow and shutting off the supply when the pump is not in operation.

The valve K is normally adjusted to operate as a check-valve and prevent the water from flowing back from the boiler into the grate-bars in the case of the bars bursting or leaking. When, however, it is desired to blow off and clean out the grate-bars, the valve K is adjusted so as to allow of a free flow of water from the boiler back through the grate-bars, and thence to the waste-pipe by way of branch G and cock H, the latter being opened for the purpose. The said valve K consists of a body or casing having suitable screw-threaded ports for the reception of the ends of the pipes, to which the valve is connected, and a horizontal partition M, with a conical hole N, that serves as a seat for a conical valve O, the stem *o* of which passes up through the hole N without filling the same and projects slightly above the upper surface of the partition M. The bottom of the valve O is

formed with a pin P, which is fitted into a boss Q, that rises from a screw-plug R, screwed into the bottom of the valve-casing. The diameter of the boss Q is somewhat less than the diameter of the bottom of the valve, so that the latter projects beyond the boss and serves to receive the impact of water passing through the valve from left to right, whereby the valve is forced up to its seat and closed in the manner of an ordinary check-valve. A stem *k*, having on its upper end a hand-wheel *k'*, is screwed into the valve-casing just over the valve-opening, and the lower end of said stem contacts with the upwardly-projecting valve-stem *o* of the valve O, and when the stem is screwed home serves to press the valve O away from its seat and down upon the boss Q, whereby a free passage-way for the water is secured, as before mentioned.

The advantages of the invention may be stated briefly as follows: The hollow or tubular grate made of sections of pipe costs less than grate-bars of the usual construction. The water being passed throught the grate-bars and heated before being admitted to the boiler prevents the steam-pressure from being lowered. The grate-bars being always filled with water are thereby prevented from burning out. The structure serves the double purpose of a grate and a feed-water heater and renders the use of a separate heater unnecessary.

Having described my invention, I claim as new and desire to secure by Letters Patent—

1. In a combined grate and feed-water heater, the combination, with the inlet-pipe D, check-valve E on said inlet-pipe, branch pipe B', and valve H on said branch pipe, of the hollow grate-bars A A, the pipe B^2, leading from said grate-bars to the boiler, and the valve K on said pipe B^2, said valve being adapted to operate both as an automatic check-valve and a blow-off cock, substantially as described.

2. The combination, with the hollow grate-bars communicating with the water-supply and having a pipe leading to the boiler, of an automatic valve fitted to the latter and adapted to operate both as a check-valve and a stem-valve or blow-off cock, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 19th day of January, 1891.

WILLIAM JESSE THOMPSON.

Witnesses:

D. A. STANTON,

D. G. DEVENISH,

E. D. STEELE.