

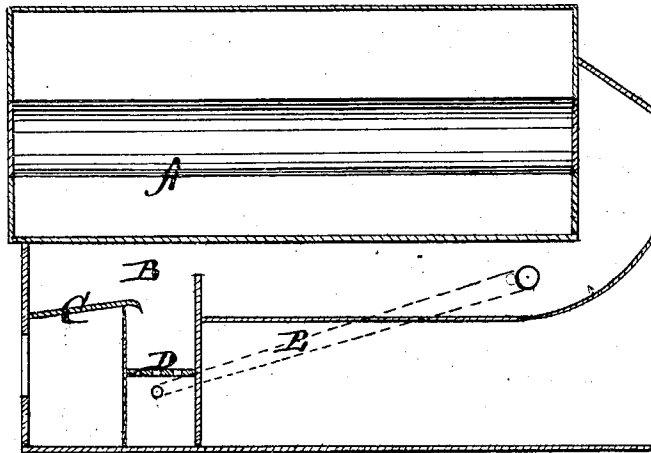
CHARLES J. HARRIS.

Improvement in Furnaces for Steam Boilers.

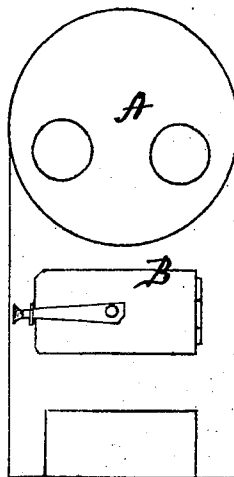
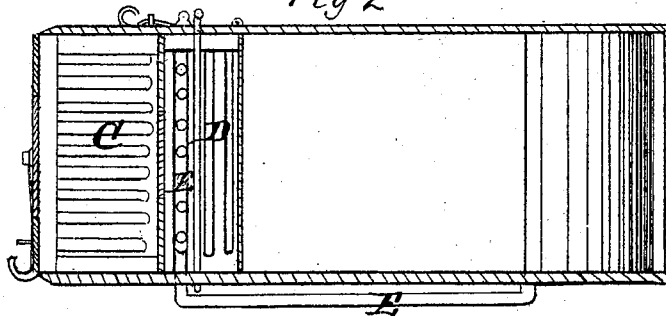
No. 119,605.

Patented Oct. 3, 1871.

*Fig 1*



*Fig 2*



Witnesses:

*J. L. Curand*  
*C. L. Cuent*

Inventor

*Chas. J. Harris*  
*per Alexander Murray*

*Attys-*

# UNITED STATES PATENT OFFICE.

CHARLES J. HARRIS, OF BLOOMINGTON, ILLINOIS.

## IMPROVEMENT IN FURNACES FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. 119,605, dated October 3, 1871.

*To all whom it may concern:*

Be it known that I, CHARLES J. HARRIS, of Bloomington, in the county of McLean and in the State of Illinois, have invented certain new and useful Improvements in Furnaces for Steam-Boilers; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon making a part of this specification.

The nature of my invention consists in an auxiliary grate, arranged in rear of and below the ordinary grate of furnaces for steam-boilers, the bars of the ordinary grate being hollow to supply air to the rear compartment; and also in conveying the exhaust steam from the engine under this auxiliary grate through the live cinders and into that part of the fire-box, all of which will be hereinafter more fully set forth.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawing, in which—

Figure 1 is a longitudinal vertical section; Fig. 2, a view from the under side; and Fig. 3, a front view of a return-flue boiler with my improvements attached.

Although I have in the drawing represented my improvements as attached to a furnace for a horizontal return-flue and tubular boiler, they may be applied to almost any or every kind of furnaces where the same may be of advantage.

A represents a horizontal return-flue or tubular boiler, with the fire-box B beneath the front end. In this fire-box is the usual grate C, composed of hollow grate-bars, upon which the fire is built. D represents a grate or set of grate-bars fixed across the furnace in rear of the ordinary grate C. This auxiliary grate is placed about eight inches below the other, for the purpose of pushing all the dirt and live cinders back instead of raking them out in front. By this means fuel is saved, and also the danger obviated of burning the firemen while raking their fires. The grate-bars composing the ordinary fire-grate C terminate just above and at the side of the rear compartment of the fire-box, and, being hollow, admit of a passage of air from the front of the main

entrance to the space above the rear grate. This air will thus be discharged where it will tend to burn up the smoke from the burning-fuel on the front grate, and will supply the rear compartment of the fire-box with air to keep alive and consume the fuel and smoke from the fire on the rear grate. This also keeps the grate-bars in front from burning out. These grate-bars should be flush, or nearly so, with the front surface of the furnace. These tubes can then be closed, or partly closed, as deemed advisable, by means of a sliding draught-damper perforated with holes to correspond in distance and dimensions with the hollow grate-bars or tubes.

In a recent patent granted to me for improvement in return-flue boilers I described and claimed conveying the exhaust steam from the engine by means of a suitable pipe to or near the rear end of the boiler to clean the same and create a draught. From this pipe I conduct the exhaust steam, or rather a portion thereof, by means of a pipe, E, under the auxiliary or rear grate D. The end of this pipe is provided with a number of slots or openings, to admit of the escape of the exhaust steam in many directions through the live cinders and into that part of the fire-box for the purpose of increasing the heat.

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

1. In a furnace for steam-boilers, the combination of the grates C and D, the latter being arranged in rear of and below the former, and the former composed of hollow bars to convey the outside air to and above the rear grate, all substantially as and for the purposes herein set forth.

2. The combination, in a furnace for steam-boilers, of the grates C and D, constructed and arranged as described, and a pipe for conveying the exhaust steam from the machinery to and beneath the rear grate D, substantially as and for the purpose herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 13th day of July, 1871.

CHARLES J. HARRIS.

Witnesses:

THOS. SLADE,  
N. T. PUSEY.

(72)