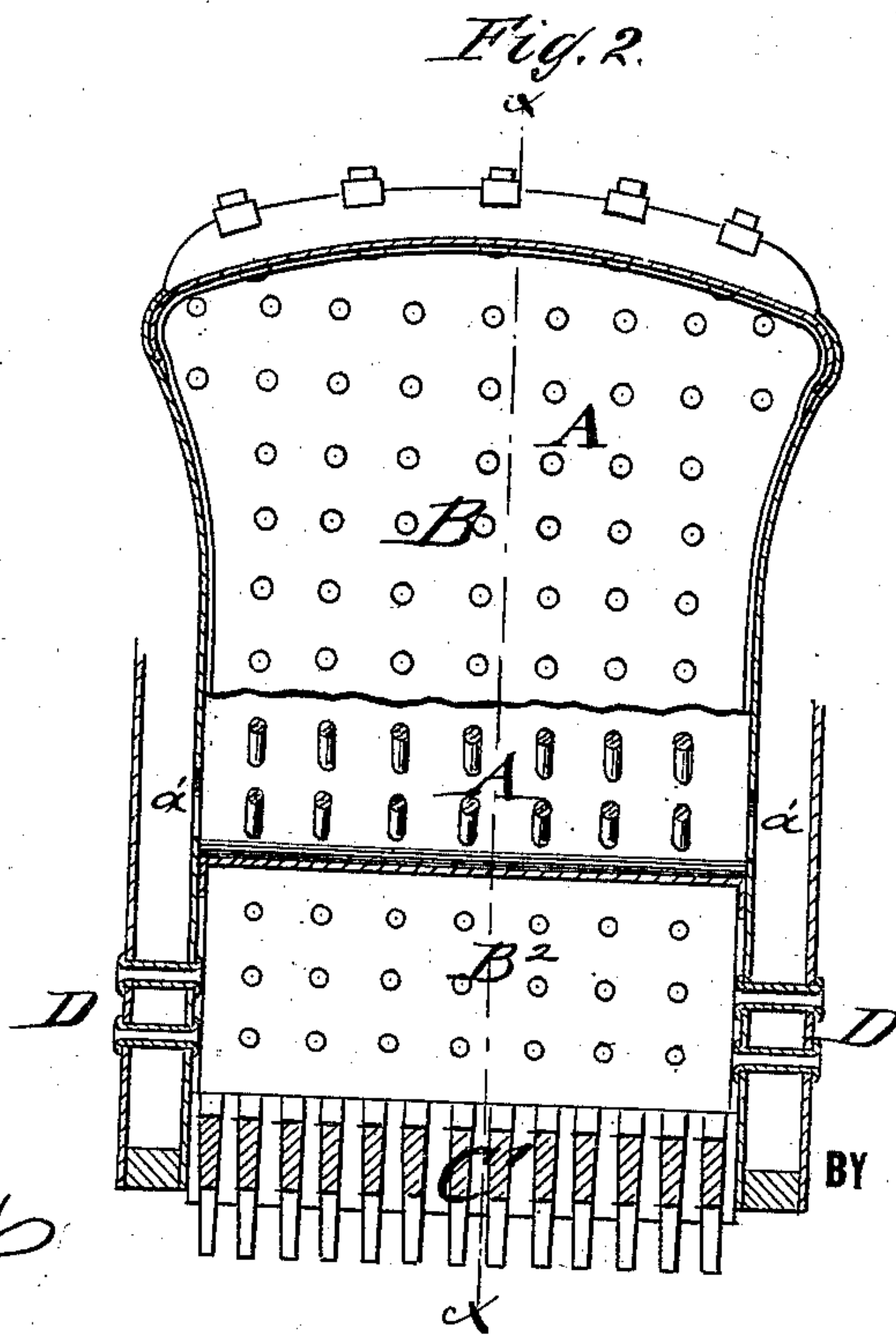
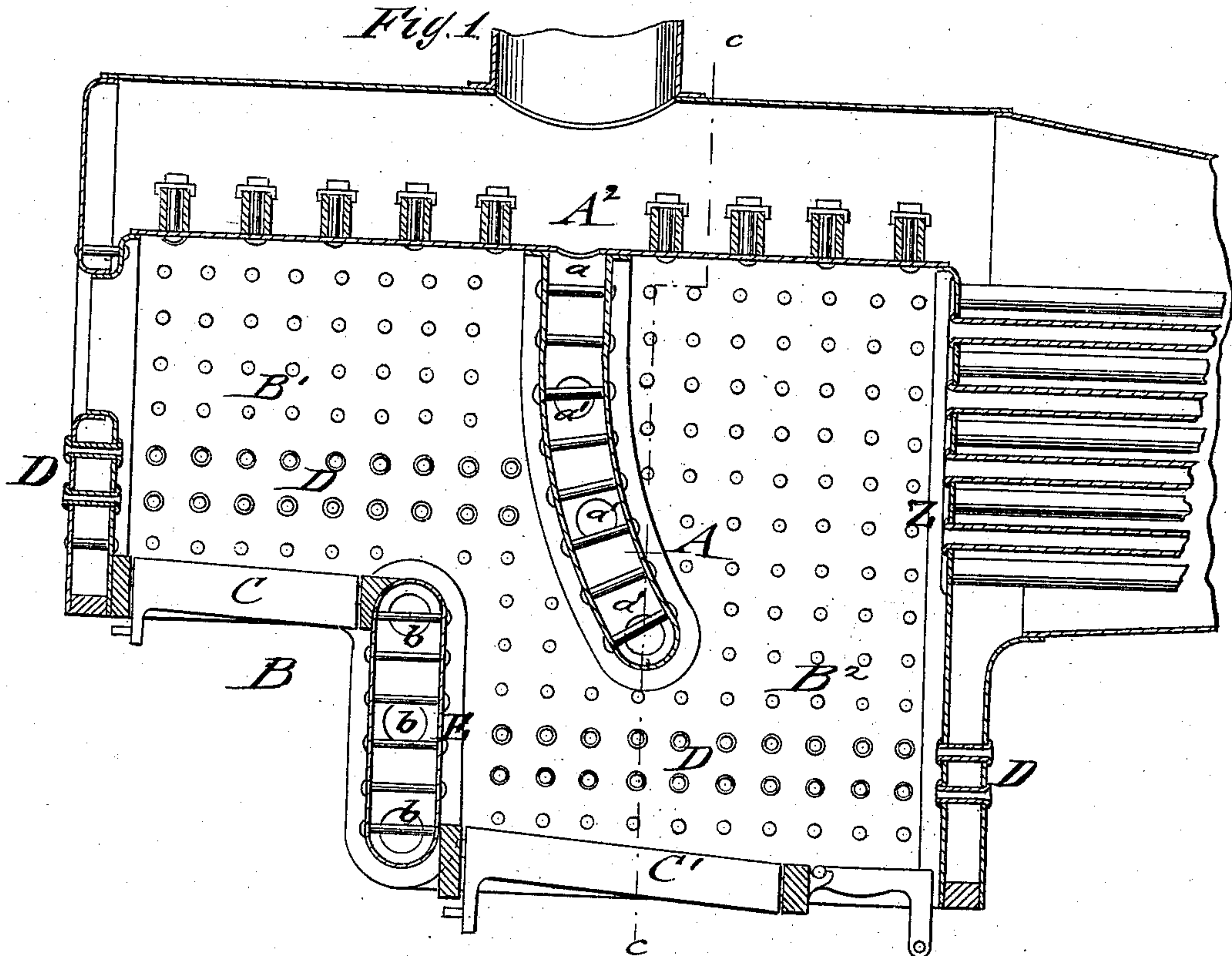


S. MOSES.
Furnace for Steam Boilers.
No. 168,766. Patented Oct. 11, 1875.



WITNESSES:

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SANDBORN MOSES, OF CLINTON, IOWA.

IMPROVEMENT IN FURNACES FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. **168,766**, dated October 11, 1875; application filed January 18, 1875.

To all whom it may concern:

Be it known that I, SANDBORN MOSES, of Clinton, in the county of Clinton and State of Iowa, have invented a new and useful Improvement in Steam-Boilers, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings.

My invention refers particularly to the fire-box of locomotive or other boilers; and my object is to increase the heating-surface and evaporation from the fire-box by the combination, in a fire-box for locomotive and other boilers, of an upper front and a lower rear grate, and an intermediate water-back supporting the contiguous ends of the same, with a depending curved water-leg extending below the upper grate, and in which the latter and the rear lower grate are arranged to receive the fuel through the front door, and the transfer thereof from one to the other being effected over the water-back, the relative positions of the grates, water-back, and the depending leg being such that the latter shall extend below the top of the water-back and the upper grate, and, by its rearward-curved position, leave ample flame-room between the water-back and the water-leg, and giving the advantage of setting the latter sufficiently far from the flue ends to allow of resetting the flues without difficulty.

The water-back is arranged vertically across the fire-box, and serves to support the contiguous ends of the grates, and protect them from being burned out at the point where the heat is the greatest. By curving the water-leg downward and toward the flue-sheet it is thereby set away from both the flue-sheet and the upper grate, and gives an easy draft over the top grate and between the water-leg and the water-back, the construction and arrangement affording a most available combination for increasing the generation of steam, while protecting the grates from being burned out at the greatest point of heat.

In the accompanying drawings, Figure 1 represents a vertical longitudinal section of the fire-box portion of a steam-boiler, embracing my invention; and Fig. 2, a transverse section of the same, taken on the dotted line *c c* of Fig. 1.

My invention is designed for use with two separate grates, *C C'*, arranged at different heights, so that coal may be partially burned or coked on the front or highest grate *C*, and then driven down upon the second grate before replenishing the fire on the first grate, and thereby maintain a clear hot fire upon the second or lower grate. With these grates I employ a water-leg, *A*, and a water-back, *E*, in such manner that both shall co-operate to produce advantageous results with respect to the grate. The water-leg is arranged across the fire-box, and extends from the roof or "crown-sheet" thereof, curving rearward, and terminating below the front grate and the flue end *Z* of the boiler.

Two important advantages arise from bringing the leg toward the rear from the crown-sheet, inasmuch as it allows the leg to be set farther back from the "flue-sheet" to give ample room for access to the flues for repairs or resetting, and space enough between the leg and the front grate for flame and draft from the front section *B¹* of the fire-box *B²* thereof and beneath the water-leg. The rearward curve also facilitates the draft under the leg.

As usual, the water-leg *A* communicates with the boiler-space *A²* by openings *a* in the crown-sheet; but as these would not produce a circulation of the water within the leg, besides rendering it liable to constantly fill up with mud, I provide the leg with openings *a'* at the opposite ends of the leg, and thereby form a communication of the leg at different heights from its lower end with the water-spaces of the double walls, and thereby obtain a violent circulation through the leg from the top and at each end, so that mud cannot lodge therein. The curved construction of the leg tends also to increase this circulation. The water-back *E* crosses the fire-box in front of the water-leg, and forms the division and support for the grates, the inner bars of which are secured to the upper and lower ends of the water-back, and thereby prevented from being rapidly burned out, while the water-back, having end openings *b*, joins, like the water-leg, the side walls of the space, and afford a safe increase of steam-generating surface.

The water-back is of a height equal to the

distance between the upper and lower grates, and the flame, in passing from the first to the lower grate, is brought directly in contact with the rear side of the water-back and the front side of the water-leg, the flame-passage being thus formed by a circulating-water leg and a water-back, arranged, respectively, above and below the lowest grate. The smoke from the first grate, in passing under the curved water leg or chamber which divides the box, is brought into immediate contact with the clear hot fire on the lower grate and consumed, adding to the heat, and preserving the flues from being coated and filled with a non-conducting covering of soot.

The fire-box is connected to the outer front and side walls of the boiler by hollow stay-bolts D, arranged in two or more rows at some distance above the grates, for giving a great number of vent-holes for admission of air, and producing more complete combustion of the fuel.

The flue-sheet and flues are protected by the

water-leg from being damaged by currents of cold air when the fire is being replenished; also, by the arrangement of the separate grates, from the injurious action of the sulphur in the coal, and the violent attacks of the clinkers during the breaking up of the fire, so that a stronger, more effective, and economical fire-box for steam-boilers is obtained.

I claim—

The combination, in a fire-box for steam-boilers, of the upper front grate C and the lower rear grate C', and the intermediate water-back E, supporting the contiguous ends of the same, with the depending curved water-leg A, extending below the upper grate C, said grates being arranged to receive the fuel through the door, as herein shown and set forth.

SANDBORN MOSES.

Witnesses:

WM. H. VALENTINE,
GEO. W. PATERSON.