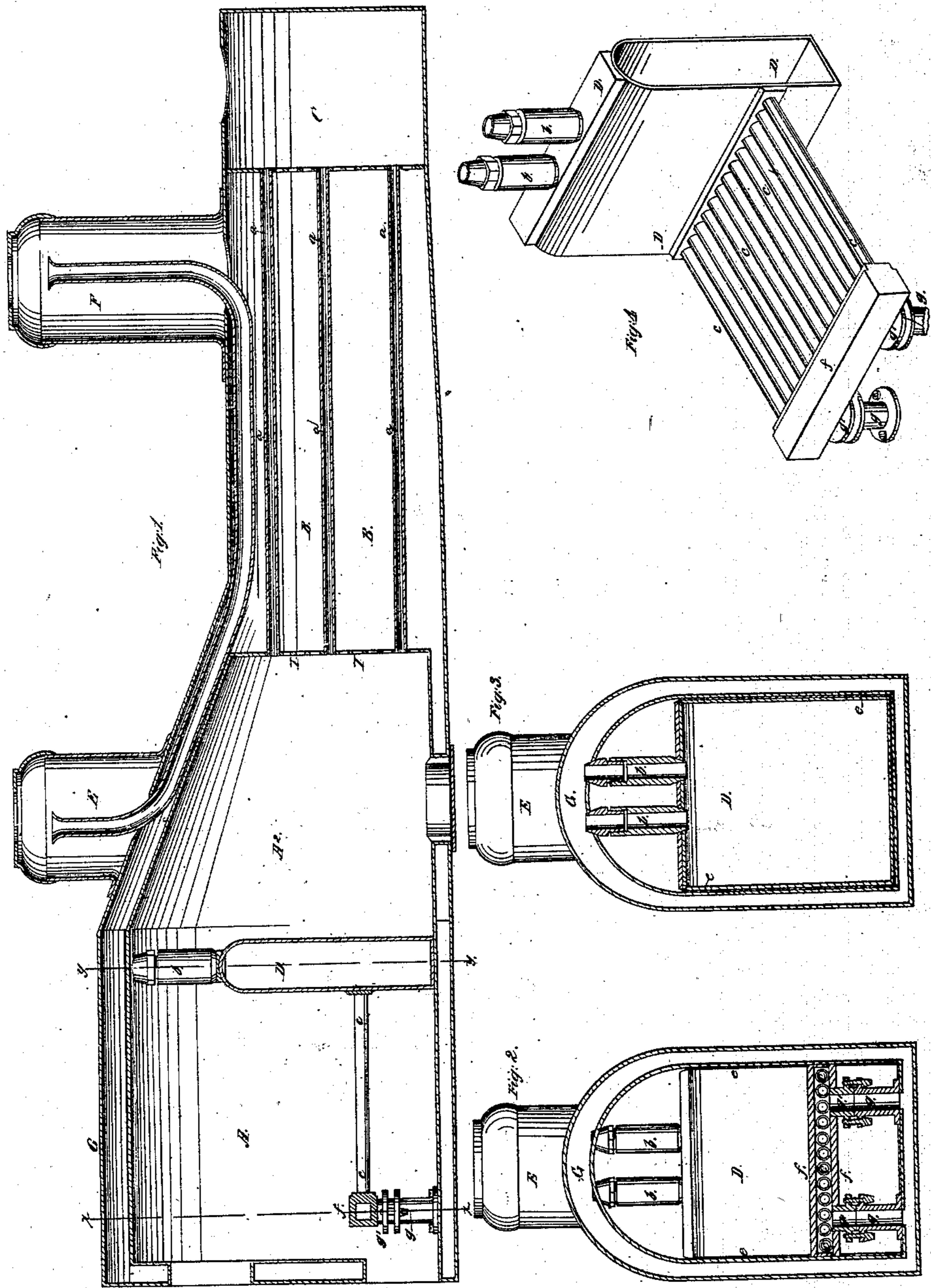


*S. Norris,*  
*Steam-Boiler Fire-Box.*

*N<sup>o</sup> 26,701.*

*Patented Jan. 3, 1860.*



*Witnesses:*  
*John A. Norris*  
*William Geo. Norris*

*Inventor:*  
*Septimus Norris*

# UNITED STATES PATENT OFFICE.

SEPTIMUS NORRIS, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. 26,701, dated January 3, 1860.

*To all whom it may concern:*

Be it known that I, SEPTIMUS NORRIS, of Philadelphia, county of Philadelphia, in the State of Pennsylvania, have invented a new and useful Improvement in Steam-Boilers; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

It has been customary in the construction of steam-boilers to form between the tube-sheet and the fire-chamber a close combustion-chamber by the interposition of a water wall or box connected with the water-spaces of the boiler, and such water-walls have had arranged with them water-grates. It has also been customary to arrange within the fire-chamber a series of water-boxes in connection with water-grates in such manner that said boxes and water-grates might be removed at pleasure, and when in the boiler the said boxes should form a chamber between the fire and tube-sheet, having spaces left open to allow air to enter, and also means for admitting or forcing in a constant supply of fresh air. The two constructions of boilers just mentioned are entirely different from each other, one having formed between the fire-chamber and tube-sheet a close chamber or box, the other an open chamber or one to which air is admitted, and in view of the difference in result between the two constructions Letters Patent of the United States were granted for the formation of the close chamber between the fire and tube-sheet after the use of an "air-fed" or open chamber similarly arranged in the boiler.

My invention relates to that construction of boiler in which a close chamber or "simple combustion-chamber" is formed between the fire and tube-sheet, and has for its object to so construct such a boiler that the water-wall forming the "close chamber" and connected with water-grates shall have no permanent connection with the other parts of the boiler, but may be removed therefrom at pleasure, by which peculiarity of construction I am enabled not only to economically repair or replace such parts of the boiler, but also to readily convert an old wood-burning boiler-furnace into a simple combustion-chamber boiler to burn coal by simply cut-

ting off the ends of the tubes, moving the tube-sheet back, and inserting the detachable water-wall and water-grates; and to these ends my invention consists in the employment of a removable "water-wall" so arranged within the boiler as to form between the fire and tube-sheet a close box or simple combustion-chamber and connected with the water-grates and water-spaces of the boiler.

In the accompanying drawings, forming part of this specification, Figure 1 represents a vertical longitudinal section through the center of a steam-boiler embodying my improvement. Fig. 2 represents a vertical cross-section at the line *xx* of Fig. 1. Fig. 3 represents a vertical cross-section at the line *yy* of Fig. 1, and Fig. 4 represents a perspective view of the water-wall and water-grates detached from the boiler.

Similar letters denote the same parts in the different views.

A represents the fire-box; A<sup>2</sup>, the close or simple combustion-chamber; B, the waist of the boiler; I, the tube-sheet; *a*, the tubes, and C the smoke-box.

D is the removable water-wall, which consists of a box, as represented, fitting closely to the bottom and sides of the fire-chamber A, and connected to the water-space G in the crown of the boiler by means of the circulating-pipes *b*, and communicating with the water-grates *c* at the rear ends of the latter, which are supported at their forward ends by the water-bar *f*, sustained by the pipes *g g'*, which communicate with it and with the lower water-space of the boiler.

It will be observed that by the construction as represented a perfect circulation of the water is kept up from the lower water-space (or where the water may be supplied to the boiler) through the pipes *g g'*, water-bar *f*, water-bars *c*, water-wall D, and pipes *b* to the water-space G at the crown of the boiler.

The pipes *b* are constructed in two parts, coupled together by a screw-joint and fitting into the crown-sheet at their upper and into the top of water-box D at their lower ends, with cone-joints tightened and loosened at pleasure by means of the screw-joint.

The pipes *g g'* are made in two parts, as illustrated, (see Figs. 1, 2, and 3,) bolted together by flanges in the ordinary pipe-coup-

ling manner, and the lower one, *g*, bolted to the floor of the ash-pit, and the upper one, *g'*, secured to or formed on the lower side of the water-bar *f*. The gate-bars *c* are screwed into the water-bar *f* and into the water-box *D* in the usual manner.

As already mentioned, the water-box *D* is constructed to fit closely to the bottom and sides of the fire-chamber, and when placed therein packed air-tight with clay packing, as illustrated by the yellow lines *e*, (see Figs. 2 and 3,) the object of which is to form an air-tight close chamber, *A*<sup>2</sup>, between said water-wall and the tube-sheet *I*.

It will be seen that by my invention a simple combustion-chamber boiler may be made which will be precisely similar in its operation to those now made, and at the same time be capable of having its water-wall and grate-bars readily removed to repair or replace them; but the greatest advantage gained by my invention is the economy and facility with which by my invention an old wood-burning locomotive may be converted to a coal-burner—viz., by simply cutting off the forward end of the tubes, moving the tube-sheet farther back into the waist of the boiler, and inserting the water-box *D* and its attachments.

I am aware a steam-boiler has been made in which the water-grates were removable, and also water-boxes supporting their rear ends and partially separating the fire-chamber and ash-pit from a chamber between the fire-chamber and tube-sheet; but I do not consider such a construction of boiler at all analogous to my invention, which is intended for and produces a result altogether different from that attained by the construction of boiler referred to.

I do not claim as of my invention the employment of removable water-grates or such feature in connection with removable water-boxes partially separating the fire-chamber from an air-fed combustion-chamber; but

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

The employment of the removable water-wall *D*, fitting closely to the bottom and sides of the fire-chamber, substantially in the manner described, for the purposes set forth.

In testimony whereof I have hereunto set my hand this 14th day of April, 1859.

SEPTIMUS NORRIS.

Witnesses:

JAS. A. NORRIS,

WILLIAM GEO. NORRIS.