

D. Matthen,
Steam-Boiler Furnace,

Nº 35,768,

Patented July 1, 1862.

Fig. 1

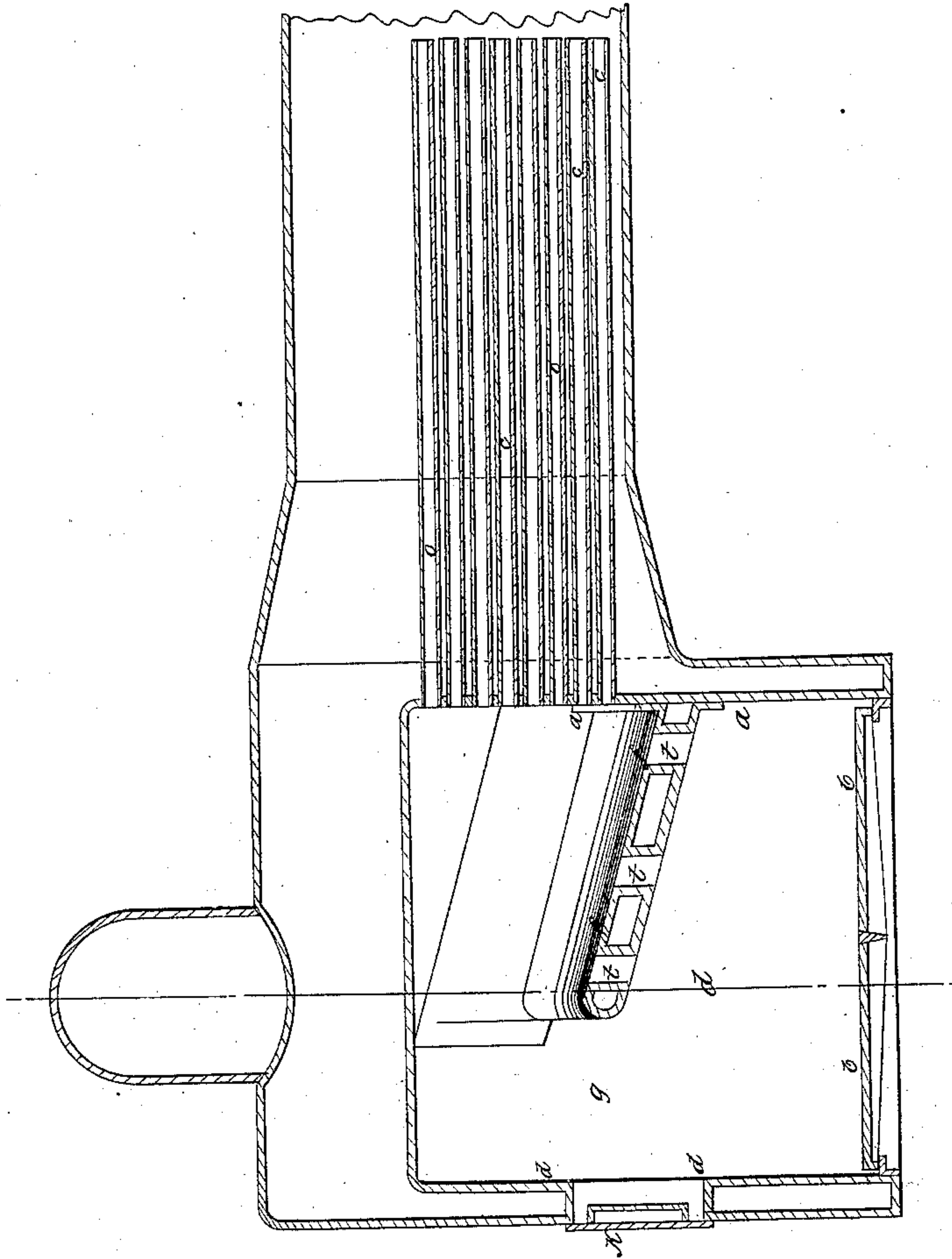
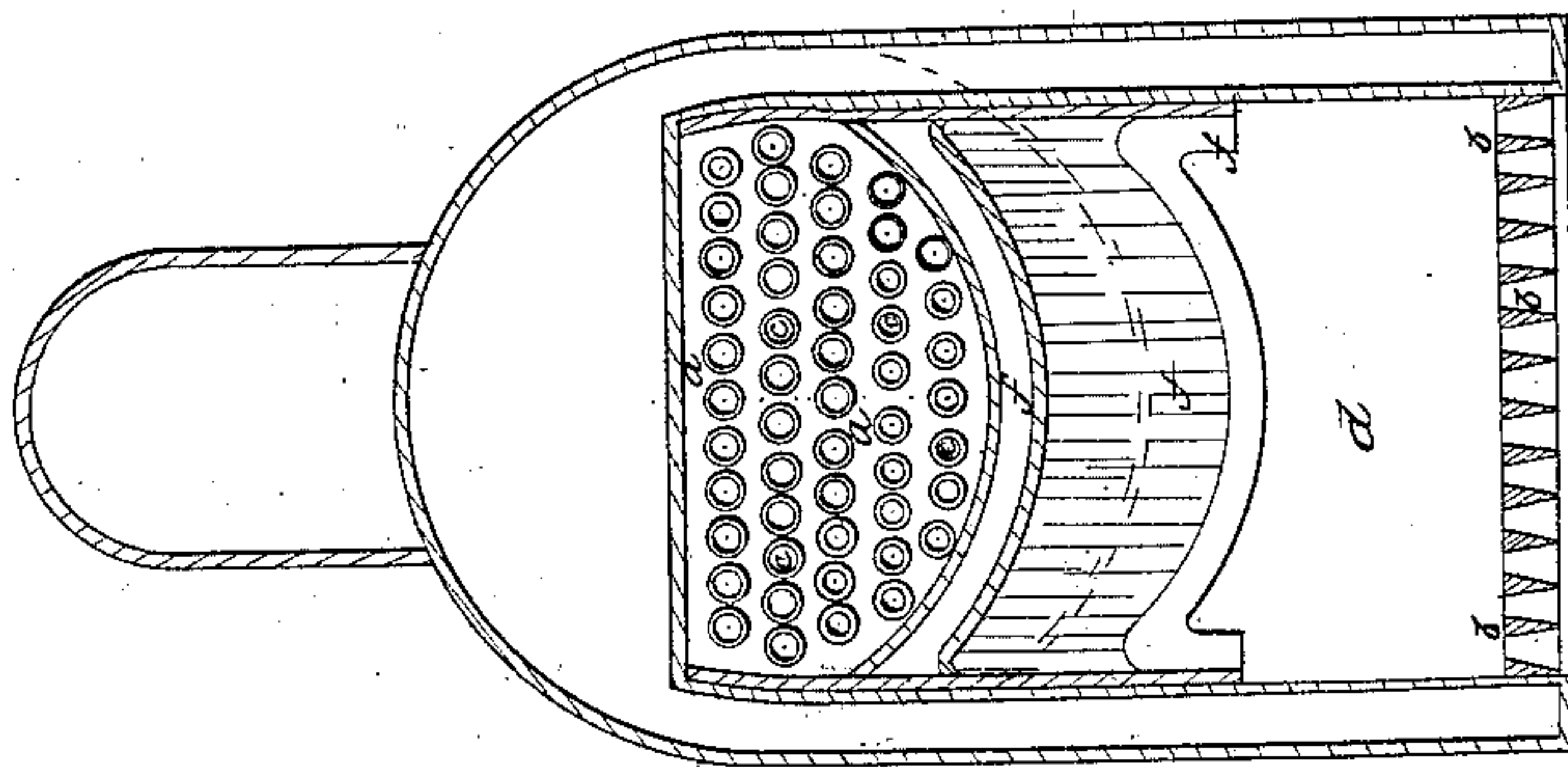


Fig. 2



Witnesses:
Diene Lull and
Wm. A. Pyland

Inventor:
David Matthen

UNITED STATES PATENT OFFICE.

DAVID MATTHEW, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. 35,768, dated July 1, 1862.

To all whom it may concern:

Be it known that I, DAVID MATTHEW, of Philadelphia, county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Steam-Boiler Furnaces; 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.

My improvement relates more particularly to that class of locomotive or other boilers provided with a series of horizontal heat and smoke flues. It is well known to all persons practically acquainted with the use of this class of boilers how important it is that the combustion should be wholly effected in the furnace before the gaseous products reach the smoke-flues, because whenever part of the combustion takes place in the flues the high degree of heat thus evolved in the latter causes them to be burned out very soon, which renders the flues liable to crack or burst, producing thereby fearful explosions of the boiler.

Various constructions and arrangements of the boiler-furnaces have been proposed and applied to prevent the gaseous products from escaping incombusted into the smoke-flues, the gist of all of which consists in forming two combustion-chambers so as to prevent the gaseous products as they evolve from the coals or coke from escaping in a direct line toward the smoke-flues, in order that more time may be gained for the full combustion of the gases before they are enabled to reach the flues; but all the different plans of forming or arranging the two combustion-chambers as heretofore proposed present various objectionable features; and, moreover, in most of the cases a special construction of the whole furnace is required, which precludes their application to old boilers, or to boilers of a given construction.

As the most important practical objection to a general adaptation of the heretofore known or used arrangements of a double combustion-chamber in this class of boilers may be considered the fact that either the grate surface or the flue's space becomes thereby diminished in a boiler of a given size, and which consequently lessens its steam-generating capacity.

The nature of my improvement consists in

a special adaptation and arrangement in relation to the boiler-furnace of a partition of peculiar construction for the purpose of assisting to a full and most effectual combustion of the gaseous products within the furnace, the same being readily adaptable to boilers of the usual construction without requiring any changes in the construction of the furnace, and without the grate surface or flue space being lessened by its application.

My improvement is also peculiarly applicable for adapting readily to coal-fire such locomotive-boilers as were originally constructed for wood-fire.

To enable others skilled in the art to make, construct, and use my improvement, I will now proceed to describe it in detail, omitting the description of such parts of a steam-boiler as are not essential to the full understanding of my said improvement.

In the accompanying drawings, Figure 1 represents a vertical longitudinal section of a locomotive-boiler embracing my improvement, and Fig. 2 a vertical transverse section of the same.

The boiler is represented as being of the well-known construction commonly used for locomotives. Its fire-box *d* is of the usual square-box shape, the whole of the lower end of which is occupied by the grate *b*. The inner side, *a*, of the furnace is provided with a series of holes at its upper end for the reception of the smoke-flues *c*, which run horizontally, or nearly so, toward the smoke-stack. From the flue-sheet *a*, just below the flues *c*, extends the partition *f*, rising gradually upward toward the back part of the furnace and terminating somewhat above the door *k*, through which fuel is supplied to the furnace, at such a distance from the rear wall of the fire-box *d* as to leave but a sufficient open space or channel, *g*, through which the gases and heated air might pass upward along the rear wall of the furnace. This partition *f*, which may be secured or fastened to the sides of the fire-box in any suitable manner, is shaped into a curved form, as shown in Fig. 2, for the purpose of allowing of expansion and contraction of the metal without straining the sides of the fire-box. It may be made of a single sheet of metal, or, if desired, may consist of a double metallic casing, as shown in Fig. 1. On the lowest

line—that is to say, the middle portion—of this curved partition are arranged two or more small apertures, *t*, for allowing cinders which may be drawn upward by the current of heated air to fall back on the grate.

By the above-described arrangement of the partition *f* in relation to the furnace the heated air and the gaseous products evolving from the coals are caused to pass first upward to the rear end of the furnace before they can be drawn toward the smoke-flues, whereby not only time is gained for a more complete combustion within the furnace, but the heat acts more effectually upon the rear portion of the furnace-plates, so that the whole of the direct heating-surface is heated more advantageously for the generation of steam than in the usual furnaces, in which the heated air and gases are allowed either to pass in a direct line toward the flues, or, if deflected, are not sufficiently so to concentrate properly the heat at the rear end of the furnace.

From the foregoing description it will be perceived that my improvement may be readily

applied to boilers of the usual construction, whether constructed for coal-fire or whether originally designed for wood-fire and now intended to be adapted for coal-fire. Its application in the latter case is of great practical value, as it enables me to change the kind of fuel for locomotives or other similarly-constructed engines without the necessity of making great and expensive changes in the arrangement of the furnace.

Having thus described my improvement in locomotive or other steam boilers provided with a series of horizontal flues, I claim—

The special combination, with the fire-box *d*, of the partition *f*, as constructed and arranged in relation to said fire-box, for the purposes set forth.

In testimony whereof I hereunto set my hand in presence of witnesses.

DAVID MATTHEW.

Witnesses:

DUANE WILLIAMS,

HENRY D. BEYLAND.