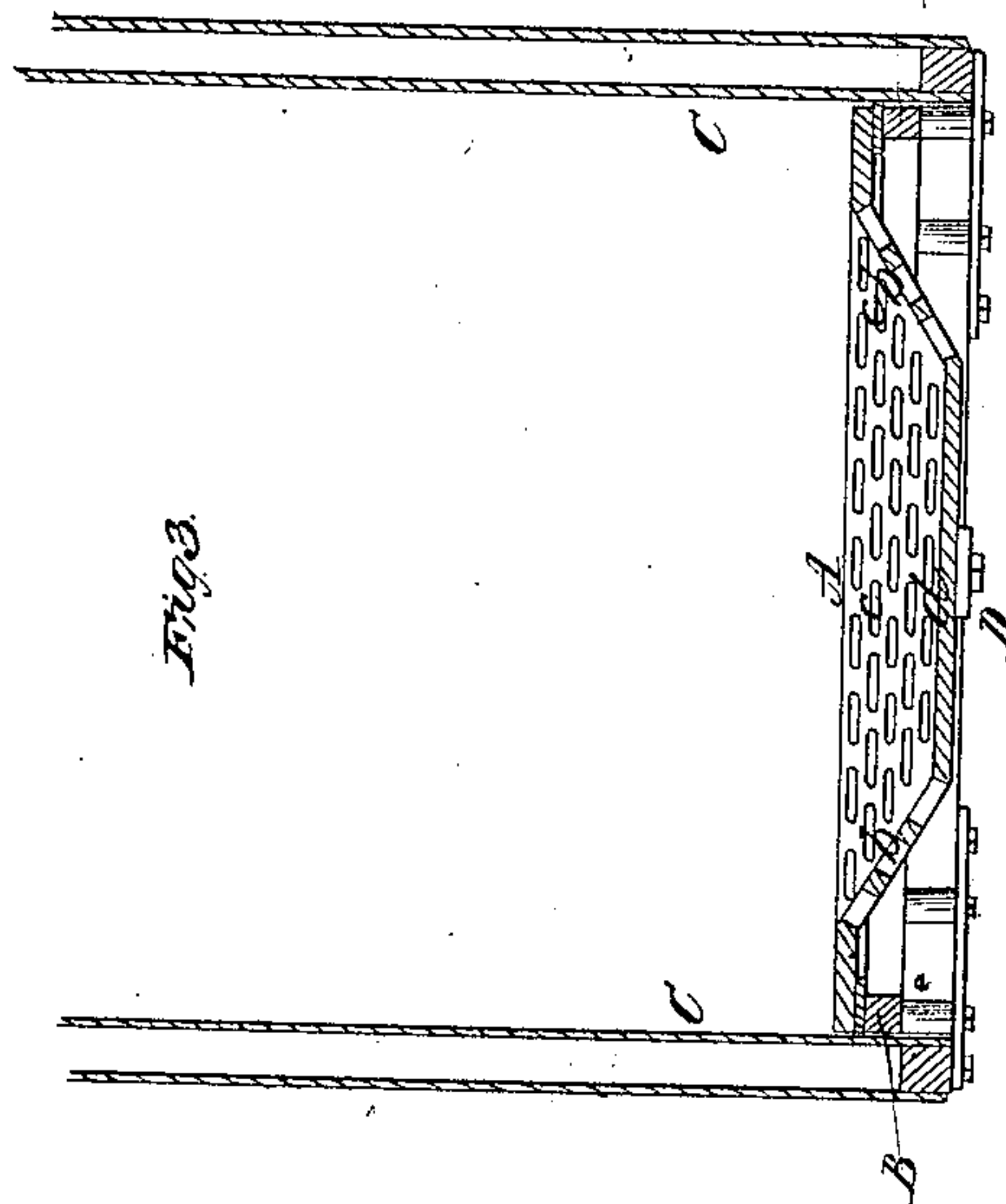


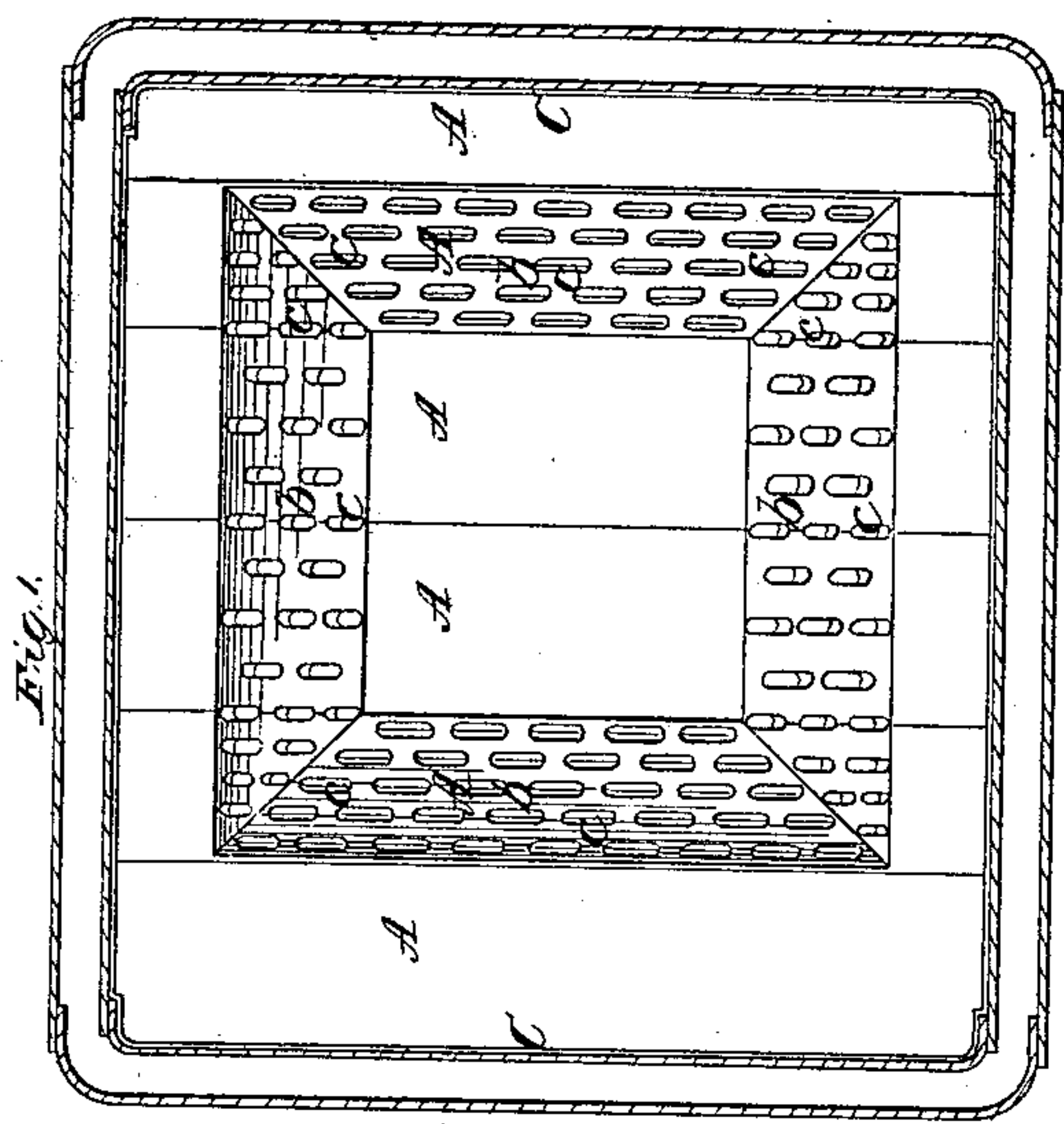
*D. Lister,*  
*Furnace Grate.*

*N<sup>o</sup> 41,225.*

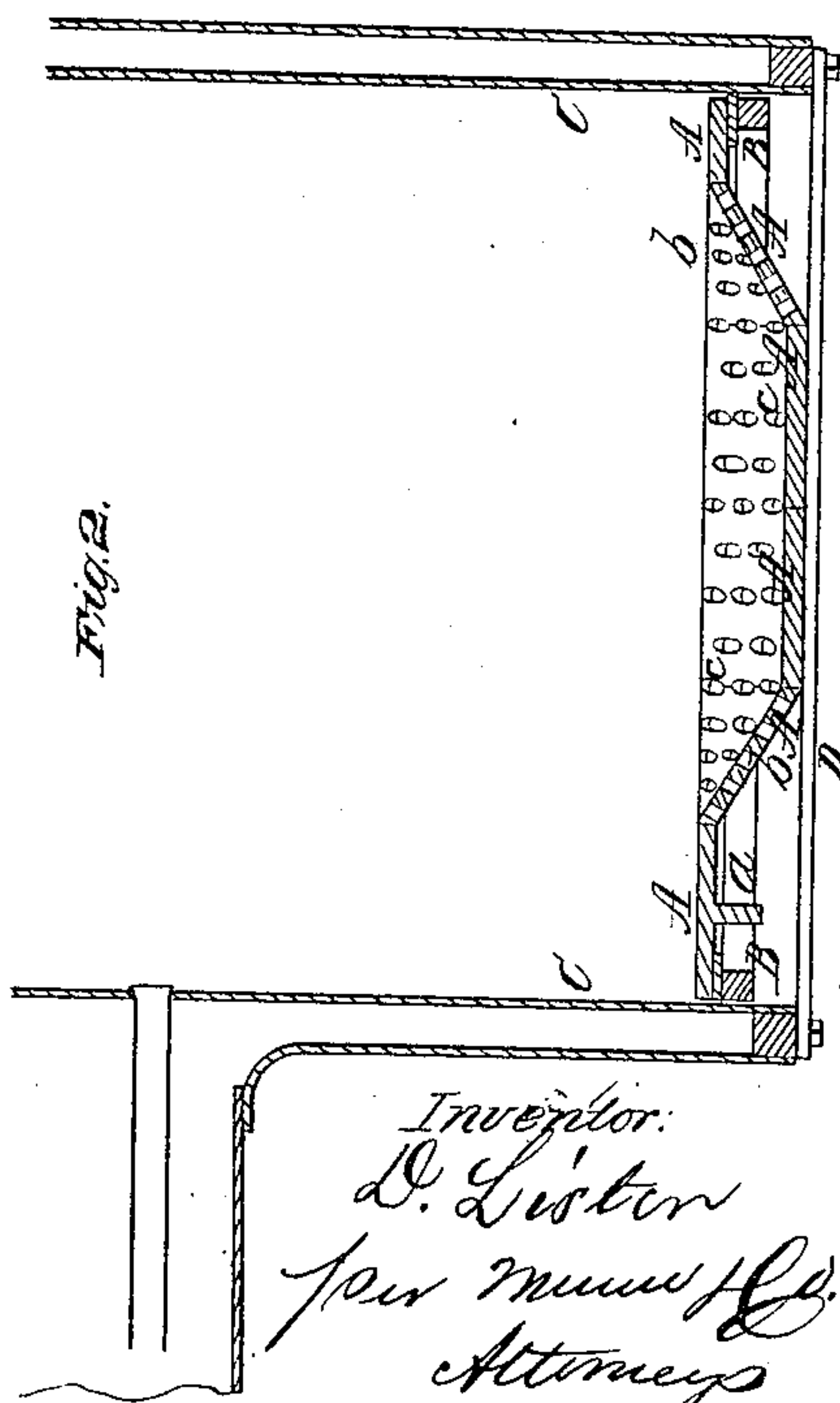
*Patented Jan 12, 1864.*



*Fig. 3.*



*Fig. 1.*



*Fig. 2.*

*Witnesses:*  
*J. W. Coombs*  
*G. W. Reed*

*Inventor:*  
*D. Lister*  
*per Munroe & Co.*  
*Attorneys*

# UNITED STATES PATENT OFFICE.

D. LISTER, OF GLASGOW, SCOTLAND.

## IMPROVEMENT IN GRATES.

Specification forming part of Letters Patent No. 41,225, dated January 12, 1864.

*To all whom it may concern:*

Be it known that I, D. LISTER, of Glasgow, in the county of Lanark, in the United Kingdom of Great Britain and Ireland, temporarily residing at Toronto, in the Province of Canada, have invented a new and useful Improvement in Fire-Grates for Locomotive and other Fire-Boxes or Furnaces; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which.

Figure 1 is a plan of the interior of a locomotive fire-box, to which my invention is applied. Fig. 2 is a vertical longitudinal section of the same. Fig. 3 is a transverse vertical section of the same.

Similar letters of reference indicate corresponding parts in the several figures.

This invention is especially designed for burning wood. It consists in the construction of a fire-grate in the form of a hopper having its bottom closed, but having openings in its slanting sides, by which construction a more perfect combustion of fuel is obtained, the cost of the grate is reduced, and its durability increased, and I am enabled to obtain other advantages, as will be hereinafter specified.

To enable others skilled in the art to make and apply my invention, I will proceed to describe it with reference to the drawings.

A A represent a series of cast-iron plates or broad bars, of which the grate is composed, arranged close together, and respectively so formed that they combine to produce the form of a hopper with a closed bottom and a flat shelf all around its upper part, as shown in Figs. 2 and 3. These plates may be about six inches wide and one inch thick, and of a length to extend across the fire-box, and any one or more of them may be strengthened by ribs or brackets on their under sides, as shown at *a* in Fig. 2. The slanting portions *b b* of

the said plates or bars, which form the sides of the hopper-like cavity in the grate, have numerous apertures *c c* for the admission of air to the fuel; but the other portions of the grate are all closed. In the grate of a locomotive or other tubular boiler I propose to make the aggregate area of the apertures *c c* equal to the aggregate area of the transverse sections of the tubes.

The grate thus constructed is supported upon a frame, B, which is fitted and secured within the fire-box C, substantially like the fire-box frame in common use in locomotive-engines. The middle plates, which form the bottom *d* of the hopper-like cavity in the grate, are further supported by a wrought-iron bar, D, arranged below them transversely to the length of the plates and bolted to the bottom of the fire-box.

This kind of grate can be applied to any locomotive without any alteration of the fire-box or of the fire-bar frame.

By enabling a more perfect combustion of fuel to be produced, it effects a saving in the quantity of fuel used, and, as its first cost is less than that of a set of fire-bars of the usual kind and is more durable, it will effect a very great economy in the running of locomotives, besides which, as it will not allow any sparks to drop out on the track, it will save much of the destruction of property which occurs in the use of wood on railroads in the summer season.

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

The construction of a grate of a hopper shape, with a closed bottom and with apertures in its slanting sides, substantially as and for the purpose herein specified.

D. LISTER.

Witnesses:

EDWD. MURPHY,  
JOHN S. NELSON.