

G. L. Smith,
Furnace Grate.

N^o 42,118.

Patented Mar. 29, 1864.

Fig. 1

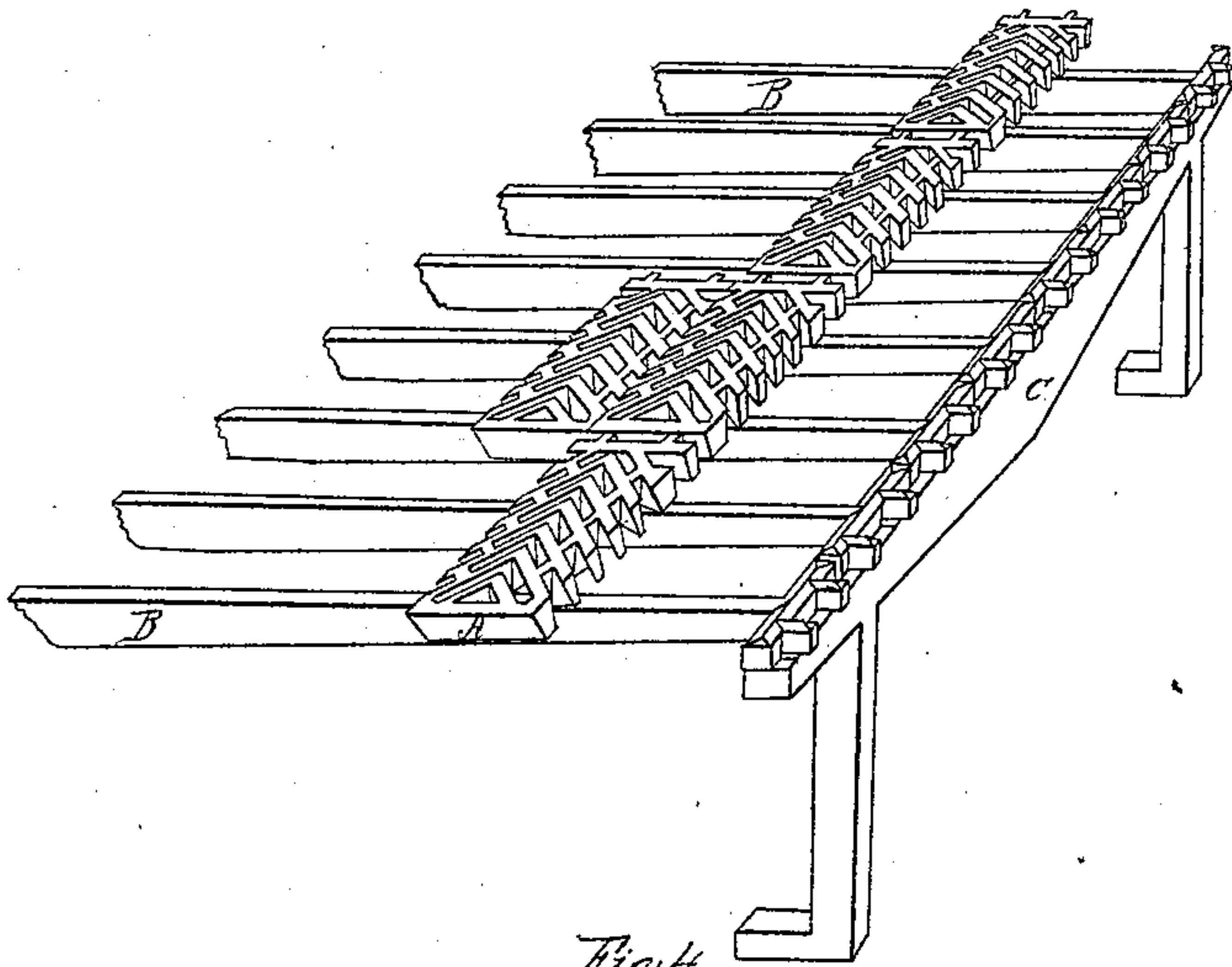


Fig. 4

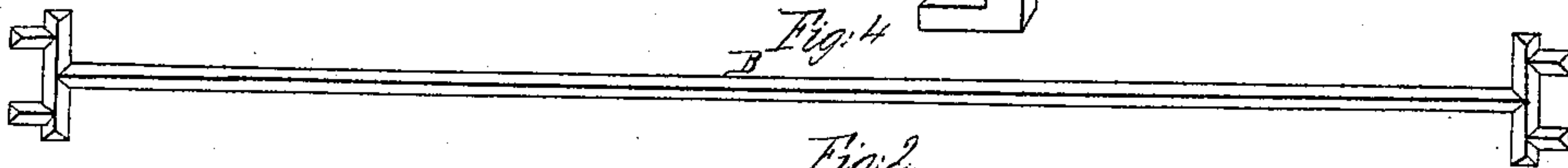


Fig. 2

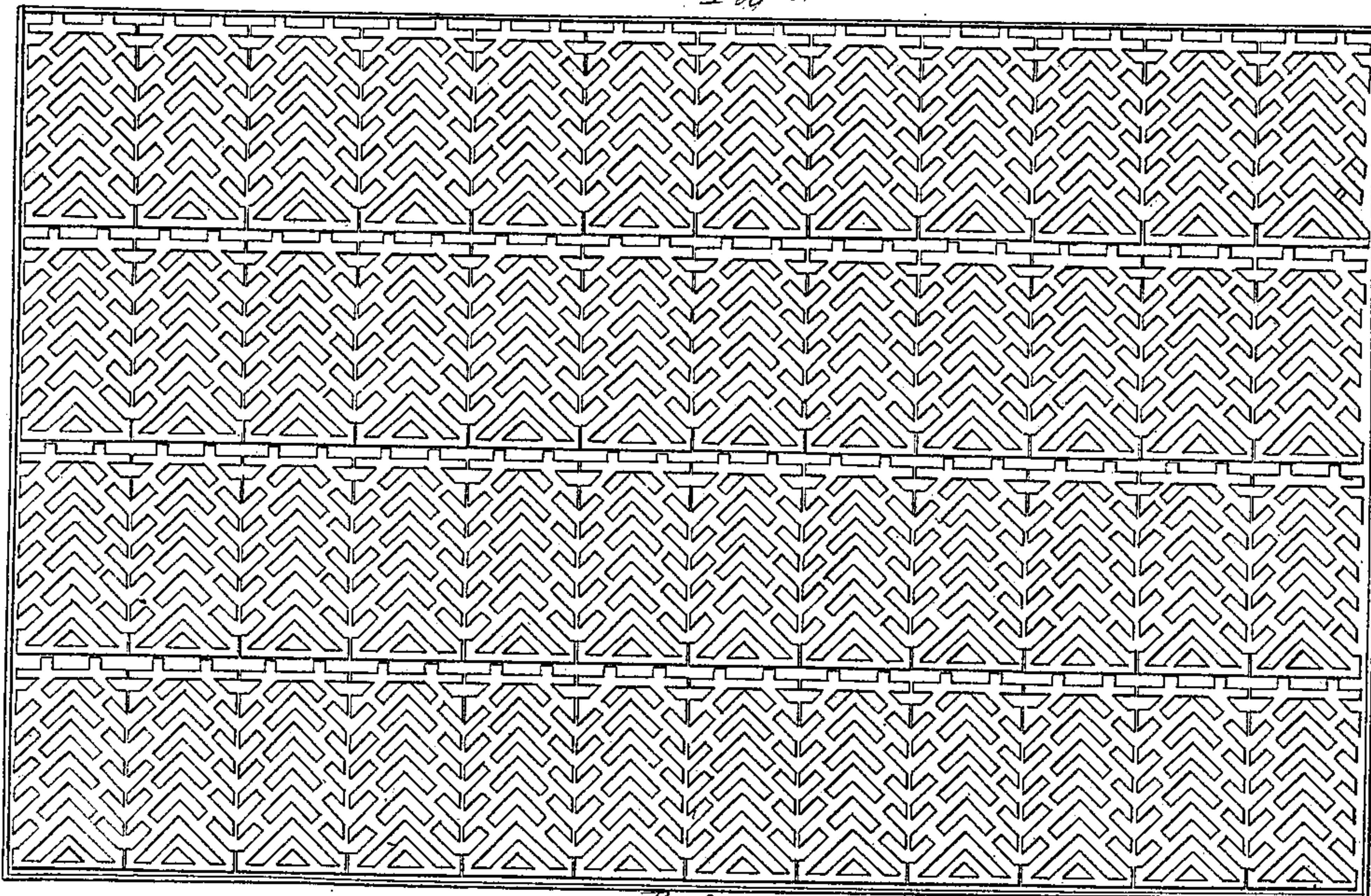
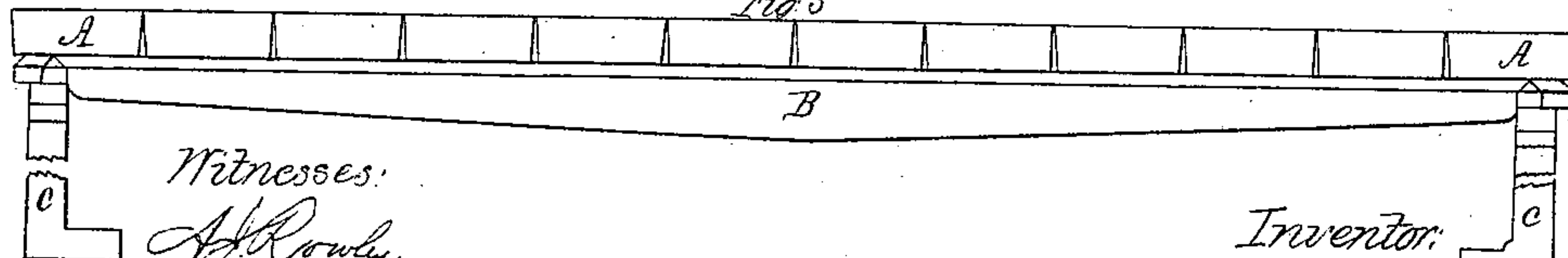


Fig. 3



Witnesses:

A. Rowley
[Signature]

Inventor:

Geo. L. Smith

UNITED STATES PATENT OFFICE.

GEORGE L. SMITH, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN GRATES.

Specification forming part of Letters Patent No. 42,118, dated March 29, 1864.

To all whom it may concern:

Be it known that I, GEORGE L. SMITH, of Brooklyn, county of Kings, and State of New York, have invented a new and Improved Grate for Boilers and other 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.

Figure 1 is a perspective sectional view of the supporting and bearing bars requisite for a boiler-furnace, and also a section of my improved grates located in position upon the same. Fig. 2 is a plan view of a "set" of grates as placed for use. Fig. 3 is a transverse longitudinal section of Fig 2; and Fig. 4 is a plan view of the bearing-bar B, which is made Λ shape in its upper face, so that the passage of air to the grate resting upon it shall be unobstructed.

Great difficulty has heretofore existed in forming and maintaining level and uniform surfaces of the grates (and air-passages in the same) of steam-boiler and other furnaces and a great variety of grate-bars, both single and in sections, or clusters of more than one, have been used. It is well known that equal temperature in any given piece of metal in its various parts produces equal expansion and contraction in the same without strain in any part, while unequal temperatures applied to the same piece of metal in its various parts produces great strain and often produces fractures, and always tends to spring or warp it out of shape. This principle applies to the grates of steam-boiler and other furnaces.

The grate-bars of ordinary form are subject to the objections, first, that their expansion and contraction by change of temperature, in consequence of the unequal heat in the various parts of the bars or grates, warp and change their shape, so as to unfit, or at least materially injure, them after a short term of usage, so as to require a frequent removal and substitution of new bars or grates; second, the warping and changing of form, last named involves both a waste of fuel through the enlarged interstices of the bars when they are warped apart and decreased air-openings or draft when the bars are warped together, so that the ashes and cinders close up the openings for air; third, the bars when warped badly require to be taken out and

new ones substituted, involving expense, trouble, and time in the operation; fourth, in the ordinary grate-bar, when they become burned in the parts of the furnace most heated and unfit for further use, there is a large percentage of good metal sacrificed as waste or old metal.

In the ordinary grate in use from ten to thirteen per cent. of the grate area is obstructed and becomes inefficient from the solid iron ends of the bars, which not only obstruct the passage of air necessary for combustion and collects ashes, but from the want of air the grate-bars become overheated and are sacrificed as waste or old metal from this cause.

In view of the principles and facts above stated, and with a view of saving the great expense resulting from these difficulties, the object of my invention is to overcome the above objections by constructing my entire grate-surface for all furnaces, either large or small, in such small sections or blocks, having numerous air spaces through them and of uniform size, either square, oblong, or other shape that will, when fitted together, form a continuous grate-surface, as that each section or block will be in all its parts subjected substantially to a uniform or even temperature, and thus removing all tendency in the metal to warp or spring out of true. This I accomplish by providing grates of limited size A A, so that in case of the destruction or failure of the portion of them subjected to the most intense heat they can be replaced at small expense and little time, and to so form the openings in A A for the passage of air through them to the fire that the said openings shall effect the double object of giving increased area for the admission of air to support combustion in the furnace where they are placed, and of giving increased opportunity of clearing the surface from cinders and clinkers by the use of the slice-bar, which object I effect, first, by forming the grate, Fig. 2, in small sections, and, second, forming the air passage or openings through them in the form shown in the attached drawings, so that the slice-bar in passing over the openings shall have a shearing or cutting action against the clinker or cinder, lying over or upon or which project down into the openings, tending to crush and remove more speedily than if the openings

were parallel to or transverse to the line of depth of the furnace.

The advantages realized by the first part of my invention are, first, a uniform distribution of oxygen or air to all parts of the fuel; second, economy in weight of metal and expense in first cost; third, a uniformity of temperature throughout each section or block by itself, thus insuring greater durability; fourth, replacing the burned part only, after they are burned out and unfit for further use; fifth, a more easy interchange or substitution of unburned for burned sections; sixth, security against warping, both by its construction and its equal temperature; seventh, its level and even surface.

The advantages of the second part of my invention consist in the greater ease and facility of removing the cinder and clinker from the grate-surface by the shearing-like action of the slice-bar or hoe, due to the diagonal or angular openings.

Fig. 2 in the accompanying drawings shows the form and proportion I have adopted, and the accompanying model is a casting of one of the sections or blocks like those I now have in successful practical use.

A A on the drawings are the small grates,

as described herein. B B are longitudinal bearers supporting A A, and C C is the ordinary grate-bar bearer supporting the whole.

Having thus fully described my invention, I do not claim to have invented the principle of making grate bars in sections or clusters, so as to substitute one for another, as one or more grate-bars joined together, forming a section of a grate-surface, may be substituted one for another; but

What I do claim as new, and desire to secure by Letters Patent of the United States therefor, is—

1. The forming the air passages or openings in sections of grates diagonal or angular to the length or width of the grate, in combination with a grate constructed of a series of sections, substantially as shown, and for the purpose described.

2. Forming the air passages or openings in sections of grates diagonal or angular to the length or width of the grate, as shown and described, and for the purpose set forth.

GEO. L. SMITH.

Witnesses:

ROBT. F. SMITH,
ELIZA B. FOLGER.