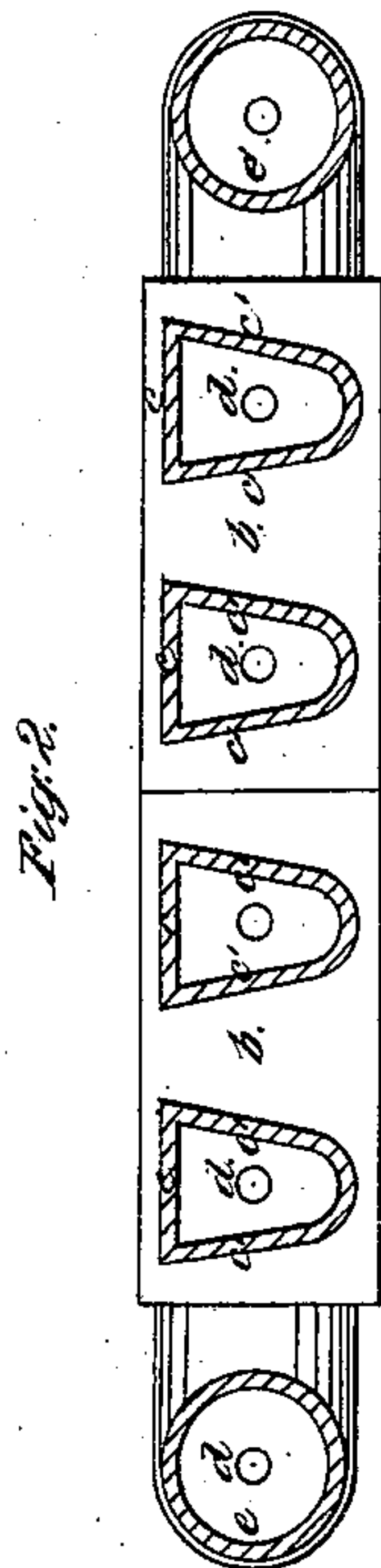
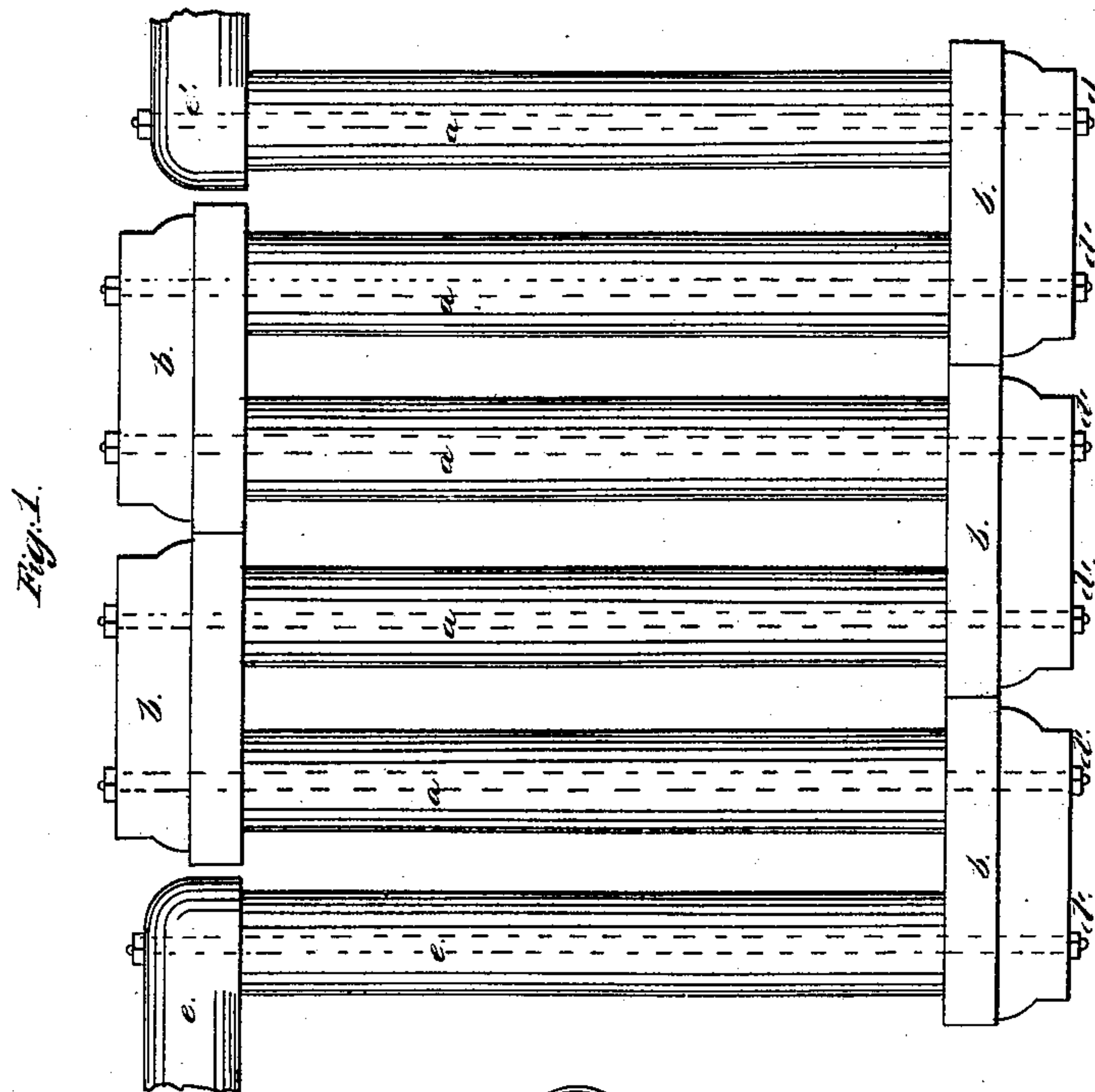


W. S. Mackintosh,

Furnace-Grate Bar.

N^o 82,965.

Patented Oct. 13, 1868.



Witnesses:

W. D. Lavin.
W. H. Shuford.

Inventor:

William S. Mackintosh
by Bakewell & Christy
his Attys.

United States Patent Office.

WILLIAM S. MACKINTOSH, OF ALLEGHENY CITY, PENNSYLVANIA.

Letters Patent No. 82,965, dated October 13, 1868.

IMPROVEMENT IN GRATE-BARS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, WILLIAM S. MACKINTOSH, of Allegheny City, in the county of Allegheny, and State of Pennsylvania, have invented a new and useful Improvement in Grate-Bars; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, making part of this specification, in which—

Figure 1 is a plan view of a grate made by jointing together my improved grate-bar, and

Figure 2 shows the same in cross-section.

Like letters of reference indicate like parts in each.

The nature of my invention consists in making grate-bars of peculiar shape, and hollow, so that they will give a broad-bearing upper surface to support the fuel, and so that they will, when supplied with water by proper supply-pipes, be preserved against the destructive action of the fire thereon.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and manner of use.

The hollow grate-bars *a* are made either of wrought or cast-iron, in any of the ways known to the art. In cross-section they are of the shape shown in fig. 2, having a broad upper face, *c*, flat, or nearly so, or slightly rounded, as in fig. 1, if so preferred; a vertical depth sufficient to insure the strength required to sustain the fuel above, and water within, and the sides *c'* sloping in somewhat toward the bottom, so as to leave as much space as possible between the bars for the admission of air to the fire, and for the escape of ashes. These bars *a*, I connect together by the hollow couplings *b* in such way that each grate-bar *a* shall communicate at one end with the next grate-bar on one side, and at the other end with the next grate-bar on the other side, through the couplings *b*. The pipes are fitted into the couplings *b* in such way as to

give water-tight joints therewith, and both are held together by the headed bolts *d* and nuts *d'*. But other well-known modes of jointing, as by right and left-hand screw-thread, which will secure the same result, may be substituted in lieu thereof. Supply and escape-pipes *e e'*, one connecting with each end of the series of grate-bars *a*, supply water to the hollow bars *a*, and carry it off as rapidly as may be desired. Such hollow bars may, when used in the furnace of a steam-boiler, be connected therewith if so desired, and so aid in the generation of steam.

The water in the grate-bars *a* acts as a chill to prevent the undue heating of the bars, and to resist the destructive action of the fire thereon. By their peculiar shape I secure a broad bearing-surface in the bars, by which to support the fuel; also, the required vertical strength; and by sloping the sides inward toward the lower part of the bar; I obtain the proper apertures between the bars for the escape of ashes, and the admission of the air required to support combustion.

I do not claim broadly the construction and use of hollow grate-bars, being aware that hollow cylindrically-shaped bars, or gas-pipe, have long been in use; but

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

Grate-bars having a broad upper face, with sides tapering downward, when made hollow, for the passage of water through them, substantially as and for the purpose hereinbefore described.

In testimony whereof, I, the said WILLIAM S. MACKINTOSH, have hereunto set my hand.

WILLIAM S. MACKINTOSH.

Witnesses:

ELL TORRANCE,
G. H. CHRISTY.