Garrin & Pettibone,

Furnace Grate.

No. 62,022. Patented Feb. 12, 1867.

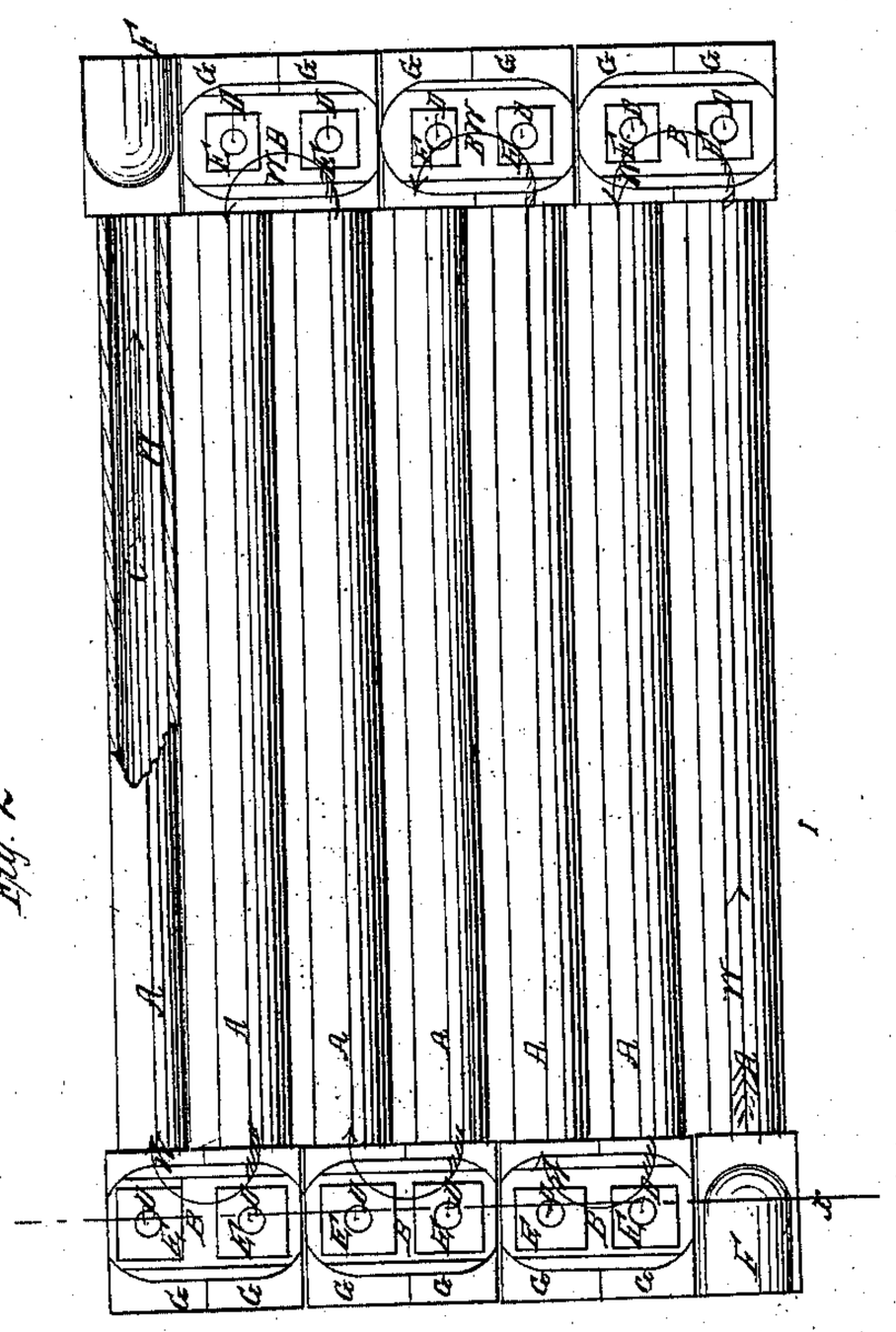
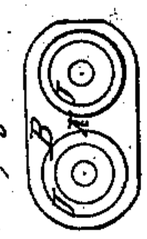


Fig. 2



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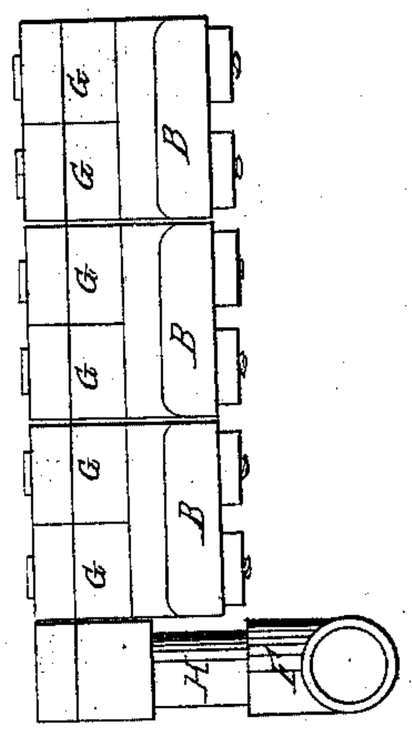

Fig. 1

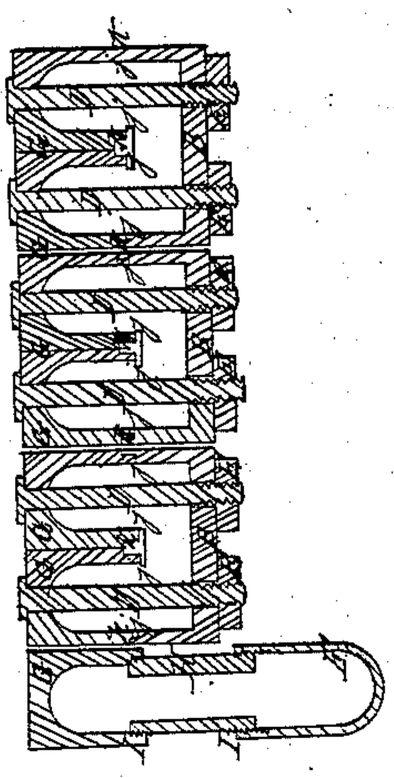

Fig. 3.

Witnesses:

L. W. Halsey.

Charles Dann.

Inventor.

Benja Garrin

B. G. Pettibone

By their attorney

Geo. L. Chapin

United States Patent Office.

BENJAMIN GARVIN AND R. J. PETTIBONE. OF OSHKOSH, WISCONSIN.

Letters Patent No. 62,022, *dated February* 12, 1867.

IMPROVEMENT IN TUBULAR GRATES.

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

TO ALL WHOM IT MAY CONCERN:

Be it known that we, BENJAMIN GARVIN and R. J. PETTIBONE, of Oshkosh, in the county of Winnebago, and State of Wisconsin, have invented a new and useful Improvement in Tubular Grates for Fire-Boxes; and we do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings and letters of reference marked thereon, making a part of this specification, in which—

Figure 1 is an end view of the grate, showing the manner of connecting the tubes.

Figure 2 is a plan view of the under side of the grate.

Figure 3 is a transverse section of the grate, taken through red line *x x*, fig. 2.

The nature of our invention consists in connecting the two alternate ends of the tubes together by means of tubular caps, so arranged that the expansion of the grates will not be so great as to cause breakage, as is now the case when the grates are firmly secured together by clamps or rods. A material object is gained by means of our device for continuing the current of water through the tubular grate-bars, from the fact that the tubes can be divided in pairs, and adjusted to suit the capacity of any ordinary fire-box, by simply connecting the requisite number of tubular grates, by means of the caps, to fill the space desired, either at the top, bottom, or sides of the fire-box. By this arrangement, our device can be readily applied to the fire-boxes of locomotives, and any kind of stationary engines. And we claim, further, that the objection heretofore found in the use of tubular grates is obviated, because the liability of breakage is removed, and the full benefit of water passing through heated grates is retained. It is a well-known fact that the heat of the common fire-box is, in a great measure, lost, from the fact that the grate imparts no direct heat to the water in the boiler; and that, no matter how large the surface, the blaze, passing through the boiler flues, has to be relied upon for heating the water in the boiler. We claim that, by the use of our tubular grate, a large portion of the fuel now used for producing steam may be dispensed with, for, the water passing through the tubular grate, may be heated, and enter the boiler in such a state as to prevent the possibility of an explosion from too great a flow of water (which is cold) into the boiler, creating a vacuum, which frequently causes the boiler to collapse.

To enable others skilled in the art to make and use our invention, we will describe its construction and operation.

A represents a series of tubes, connected together by means of our connecting caps B. C shows one of the tubes broken away, in order to give a view of the water-passage. D are the bolts, and E the nuts which are used to clamp the caps B firmly to the ends of the tubes A. J, figs. 2 and 3, show rabbets made in the face of the caps B, and *k* the tongues which fit into countersinks made in the enlarged ends G of the tubes A, for the purpose of making the joints steam-tight, without the use of packing. F and F′ show pipes attached to the opposite extreme ends of the tubes A, by means of the short pipes H, made fast by the screw-joints I, as seen at fig. 3. The water may be made to enter the tubes A through the pipes F′, and enter the boiler after passing through the pipe F. The darts W indicate the direction of the water through the tubes A and tubular caps B. In operating our grate, it may be necessary to attach a pipe to one of the grates A, and extend it upward, and into the boiler above the water line, in order to prevent the steam in the tubes from blowing or conducting back the heated water or steam into the pump before the water is heated in the boiler. We use the same kind of material for constructing our tubular grate that is now used for similar purposes. When setting the grates in the fire-box, care must be taken not to clamp them so as to prevent expansion; all that is required is, to simply hold the grate in place. The bottom and top grates can be held in position by means of lugs or flanges, but the side grate should be supported by common grooves or similar devices.

Having thus fully described our tubular grate, what we claim, and desire to secure by Letters Patent of the United States, is—

The combination of the tubes A with the caps B, when constructed and applied substantially as and for the purpose set forth.

BENJ. GARVIN,
R. J. PETTIBONE.

Witnesses:
L. W. HALSEY,
CHR. SWAN.