Sheet 1 2 Sheets.

C. F. Jauriet,

Steam-Boiler Furnace,

No 52,945. Patented Feb. 27, 1866.

Fig. 2.

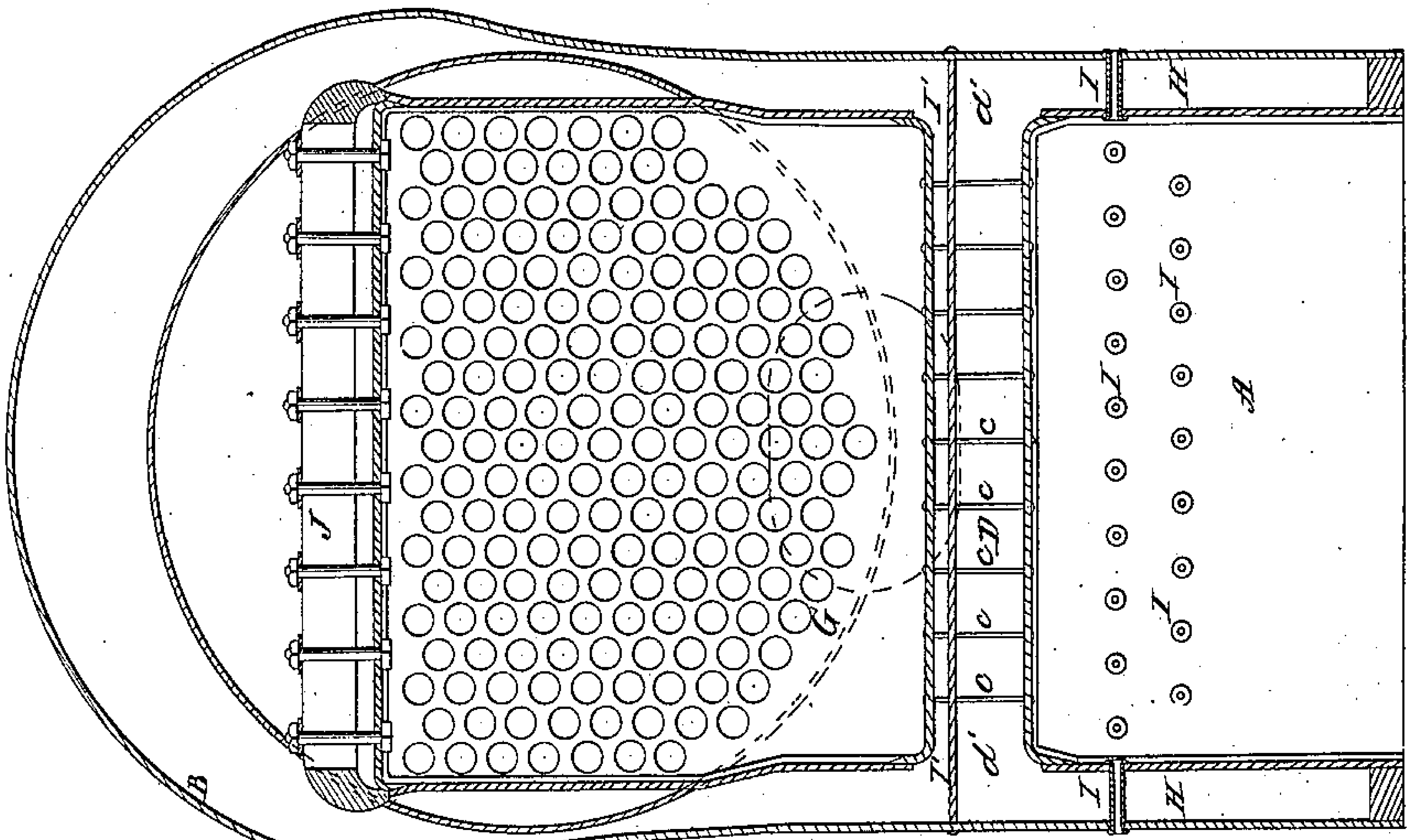
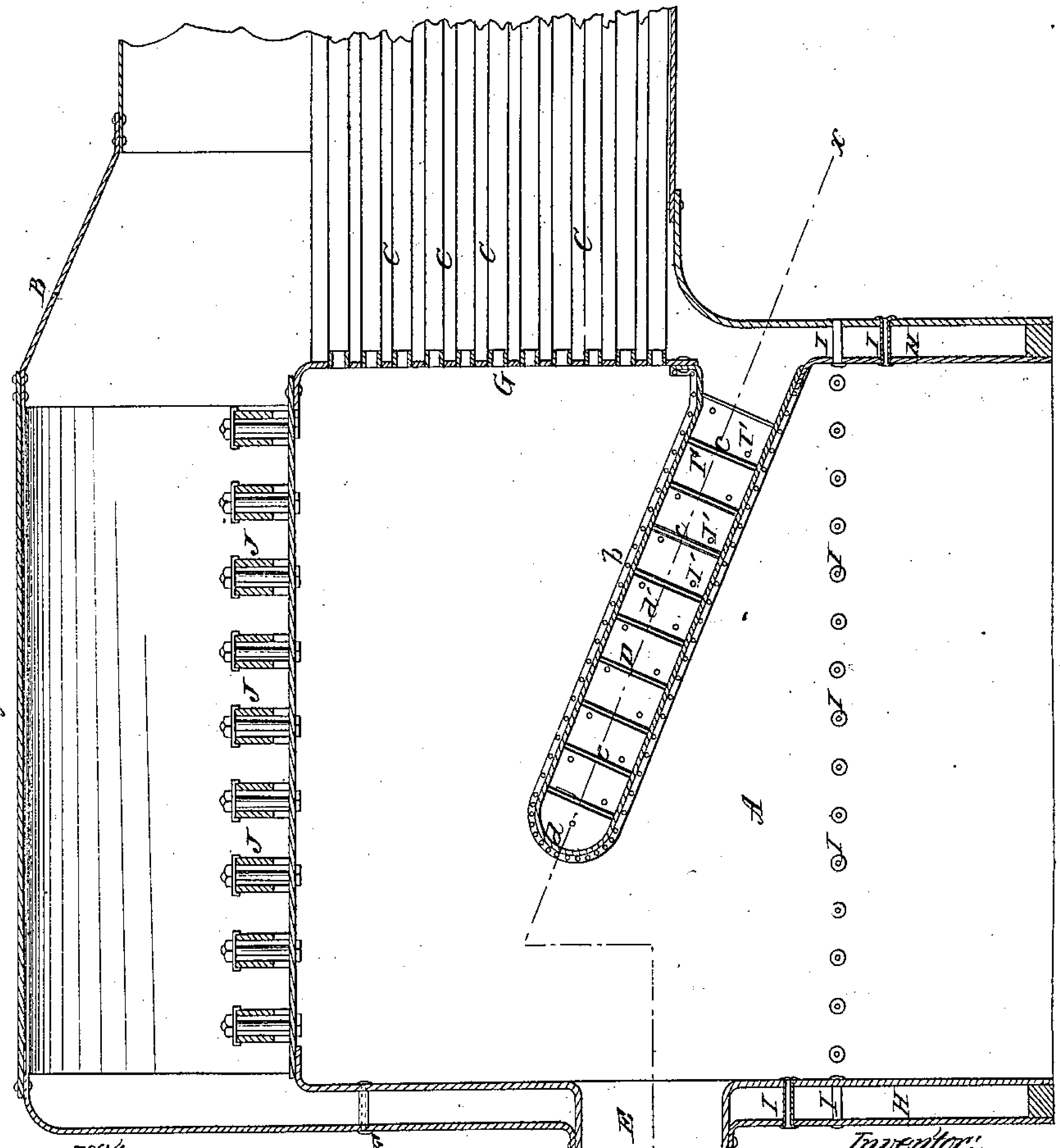


Fig. 1.



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Mason Fenwick & Lawrence

Sheet 2 · 2 Sheets.

C. F. Jauriet,

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Fig. 3.

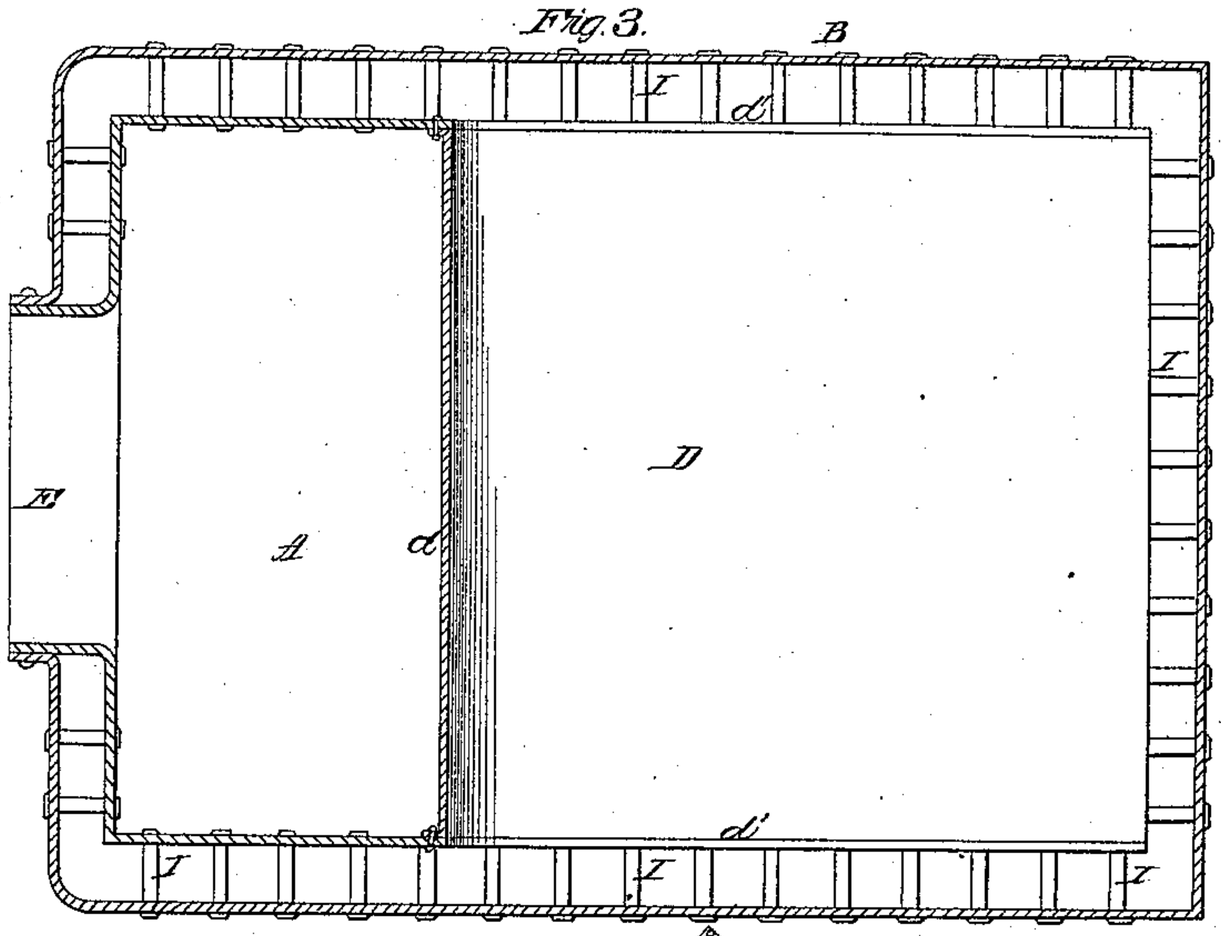


Fig. 5.

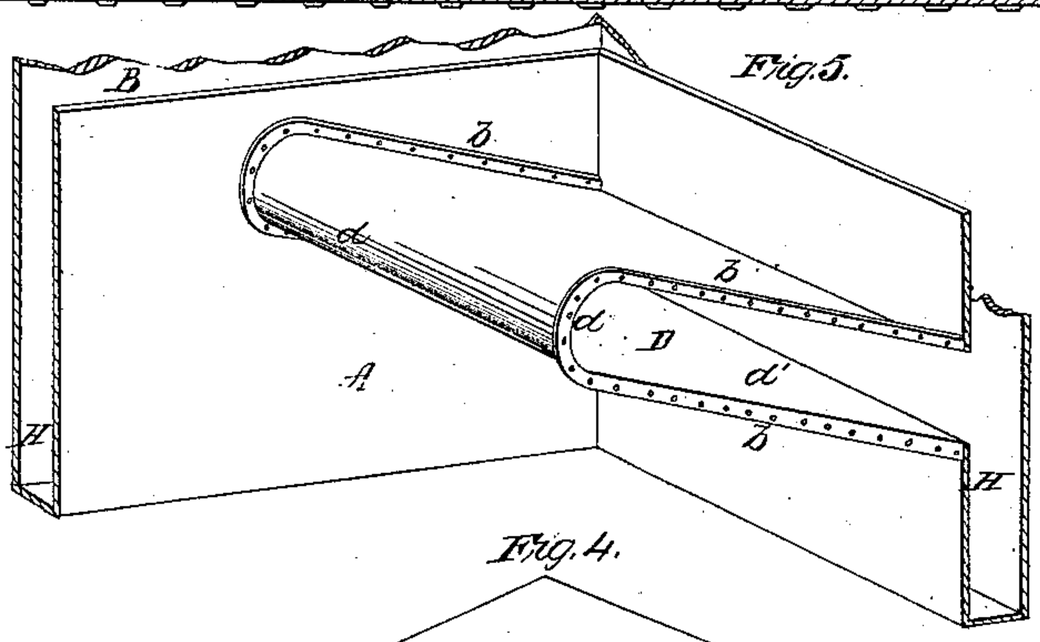
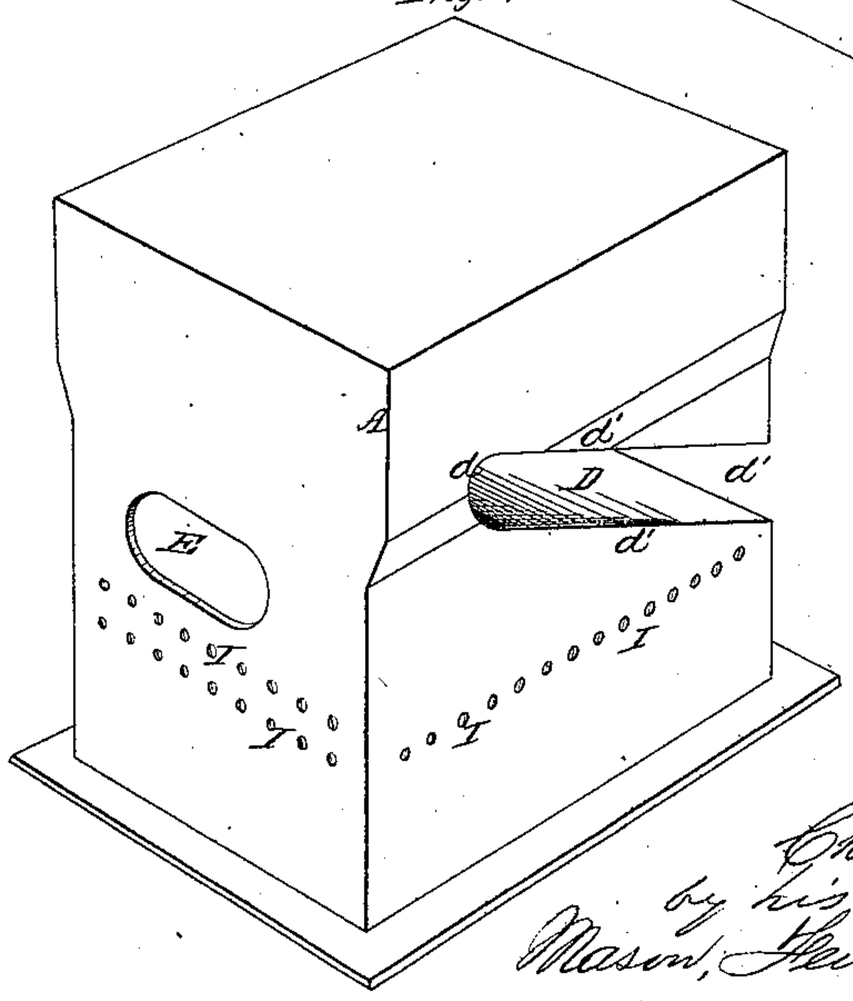


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES F. JAURIET, OF AURORA, ASSIGNOR TO HIMSELF AND A. I. AMBLER, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN FIRE-BOXES OF STEAM-GENERATORS.

Specification forming part of Letters Patent No. **52,945**, dated February 27, 1866.

To all whom it may concern:

Be it known that I, C. F. JAURIET, of Aurora, in the county of Kane and State of Illinois, have invented a new and useful Improvement in the Construction of Fire-Boxes with a Water-Bridge for Coal-Burning Engines; 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 vertical longitudinal section of the fire-box and a portion of the flue end of a coal-burning engine. Fig. 2 is a vertical transverse section of the same in the line *x x* of Fig. 1. Fig. 3 is a section of the fire-box with water-bridge in the line *y y* of Fig. 1. Fig. 4 is a perspective view of the fire-box with water-bridge as it appears detached, or when not inclosed by the outer jacket of the engine. Fig. 5 is a sectional perspective view of fire-box with water-bridge as it appears when inclosed by the outer jacket, said outer jacket also being shown as broken away and in section.

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

The nature of my invention consists in an improved construction of fire-boxes with water-bridges, whereby every part of the bridge of the fire-box is exposed to the circulating water, and thus an equable distribution of heat maintained over the whole surface of the bridge, and also whereby an uninterrupted circulating of the water through the chamber of the bridge, both at the back end and at both sides of the bridge, is secured, and thus the even temperature of the bridge at all points maintained, and much of the liability of explosions from imperfect circulation overcome, and whereby, also, all the known advantages resulting from the use of a partition or water-bridge in the fire-box of an engine are obtained without many of the inconveniences and without any additional outlay of money.

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

My water-bridge is limited in its application to a location in that part of the fire-box in which the first ignition or burning of the fuel takes place, and in arrangement its rear terminus is below the flues of the boiler, while its front end is about as high as the top of the feed-door of the fire-box, but some distance in rear of said door, as represented. This location and arrangement is not peculiar to my fire-box, as the same has long been adopted.

In the drawings, A represents the fire-box or furnace; B, the boiler or jacket to the fire-box and to the flues or tubes C C. D is the water-bridge; E, the door through which the fuel is introduced; F, the "peep-hole" through which the engineer inspects the internal condition of the flue-sheet G or any other part of the fire-box. H H designate what are usually termed the "water-legs" of the boiler.

I I are a series of tubular bolts passing through the inner and outer walls, for the purpose of supplying air to the fire-box and thus promoting combustion of the fuel.

J are the ordinary crown-bars, which, by means of stay-bolts, as shown, support the crown-sheet of the fire-box.

I make my water-bridge D by taking a flat sheet of copper or other suitable metal and bending it into the form of a semi-tube, the upper and lower sides of said semi-tube being flattened, so as to be on straight lines from the points where they leave the curved or rounded part *d* of the sheet which was bent. The form which I have attempted to describe is clearly shown in Figs. 1, 4, and 5 of the drawings. The flat sheet thus bent has its front ends and its side edges turned out at right angles, so as to form bolting-flanges *b b*, as shown. I thus have a bridge which is fully open at its rear terminus and at both of its sides, said opening extending to the front closed end of the bridge and entirely across the sheet, as represented. To stay this bridge vertically I introduce through the upper and lower portions of the bridge small screw-bolts *c c*, said bolts being tapped in the sheet of which the bridge is formed.

To apply the bridge to the interior of the fire-box A, I cut out of each of the side walls of the fire-box a piece of metal corresponding exactly in form and size with a vertical longitudinal section of the bridge, as represented at *d'*, Fig. 4. This done, the bridge is set in its place, which is in line with the passages *d' d'*, Figs. 2 and 4, and securely bolted by its

flanges or flanches *b b* to the inner side of the side and back walls of the fire-box. The bridge is also bolted at its upper rear end to the flue-sheet, as represented.

In order to tie the outer or jacket walls together, through-bolts I′ I′ are passed from one side to another, as represented, the full opening which my mode of constructing and applying the water-bridge affords admitting of this being done without passing the bolts through that part of the fire-box where the flame circulates.

The tubular bolts I I serve to stay the fire-box and outer jacket with respect to one another, as will be evident from the drawings, while they serve the other function heretofore ascribed to them.

From an inspection of the drawings, in connection with the foregoing description, it will be seen that I have obtained an unobstructed communication between the chamber of the flues and the water-bridge, and also between the back and side legs of the boiler, which communications are all equal in size; that I also dispense entirely with boxes or partitions up through the bridge. In a word, every part of my bridge is of uniform thickness and uniformly exposed to the circulating water, and consequently an equable heating thereof is secured and unequal expansion and contraction prevented.

The leading object I have in view is to render perfectly practicable the use of a water-bridge in the fire-box of a coal-burning engine, and at the same time render the mode of manufacture of the fire-box with such a bridge as little objectionable as possible to those who are to adopt it.

The great importance of a water-bridge in a fire-box is well understood at the present time, but it may be proper to make the following statement here: When the fire-box is made without a water-bridge or a partition to arrest the flame temporarily in its passage toward the flues, as well as molify the influence of the draft, the exhaust-steam creates a draft so very powerful that it will tear up the fuel or coal and draw the smaller particles into and through the flues, depositing them at the front end of the boiler, at the same time injuring the joints of the flues and flue-sheet so as to produce leakage, and drawing the heat directly to the flues diagonally across the box, thereby producing very little effect upon the crown-sheet, whose heating power is consequently in a great measure lost; but by the employment of a water-bridge all of these difficulties and evils are wholly obviated and done away with, if such bridge be constructed so as to afford or allow a free and unobstructed circulation of the water through it, a smooth and easy passage of the flame under and over it, and so as to be equably acted upon by the heat at all points, and thus not be unduly expanded at one point or contracted at another during the various changes in temperature which it is subjected to while being used and when the fires are slackened or allowed to go out. With a properly-constructed water-bridge a large extra heating-surface is secured, and at the same time such a bridge serves as a deflector or reverberator, it deflecting the heat and fire forward and upward, thereby throwing it upon or against the crown-sheet, whose entire heating capacity is thereby made available. In addition to this it also effectually prevents the coal from being drawn violently against the flue-sheet and through the flues, as hereinbefore mentioned, and retains the gas from the coal in the fire-box long enough to be thoroughly consumed before passing into the flues.

My invention is equally applicable to stationary engines, locomotive-engines, and all engines in which coal is used as fuel.

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

1. The water-bridge which is arranged as specified, and is formed of a flat sheet of metal bent into the form of a semi-tube, with flat surfaces at top and bottom, and applied to a fire-box which has those portions of its side and back walls included within the area of the semi-tube entirely cut away, so that there is a perfectly free passage for the water in at the back and out at the sides of the bridge, substantially in the manner and for the purpose described.

2. The combination of the stay-bolts with the semi-tube water-bridge, substantially as and for the purpose described.

3. The combination of the through stay-bolts, semi-tube water-bridge, and the outer jacket of the fire-box, substantially as and for the purpose described.

C. F. JAURIET.

Witnesses:

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E. T. PRINDLE.