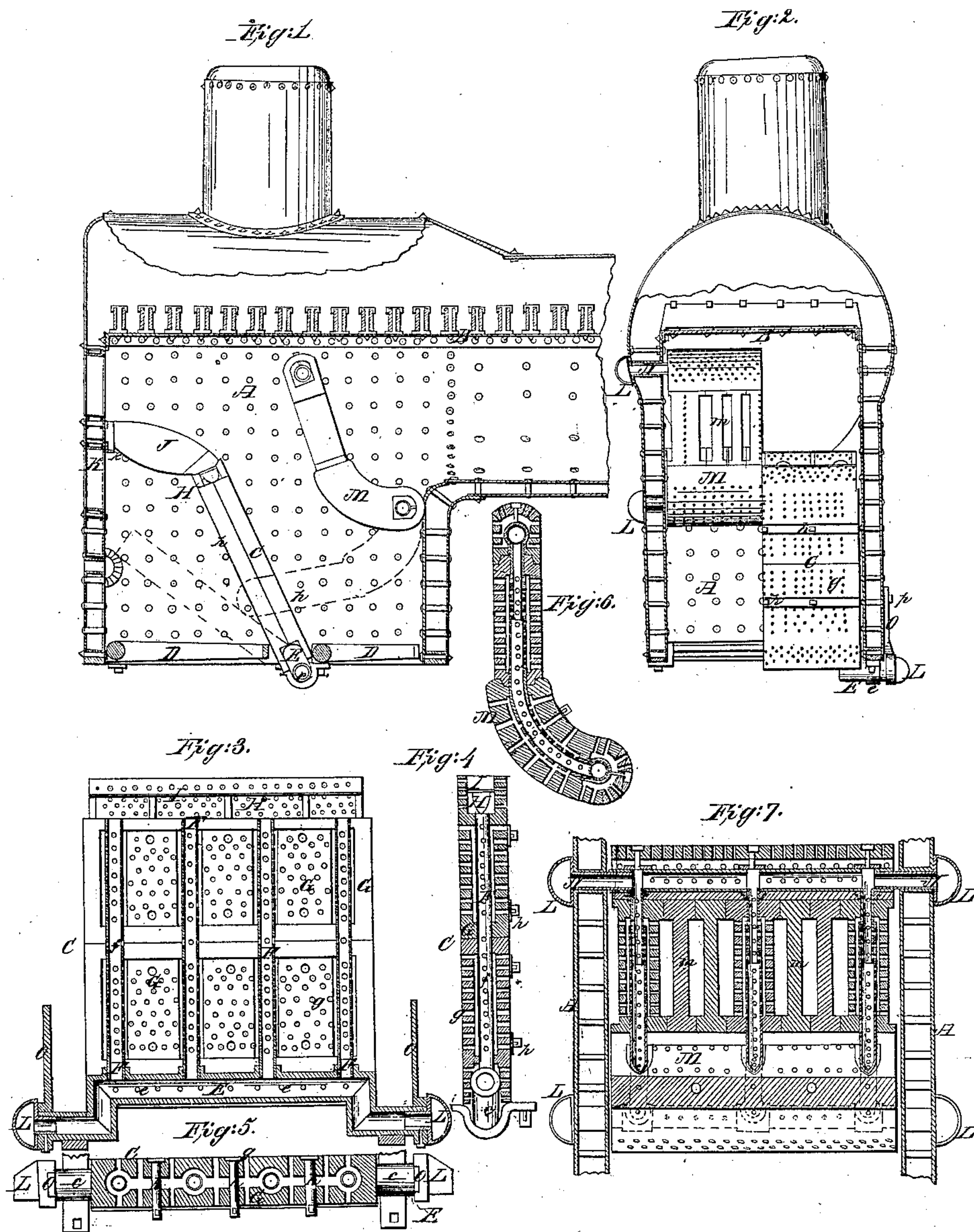


*W. G. Hamilton,*  
*Water Fire Box for Steam Boilers.*  
*N<sup>o</sup> 22,530.* *Patented Jan. 4, 1859.*



*Witnesses:*

*R. W. H. H.*  
*W. G. H. H.*

*Inventor:*

*W. G. Hamilton*



# UNITED STATES PATENT OFFICE.

WM. G. HAMILTON, OF NEW YORK, N. Y., ASSIGNOR TO JOHN C. HAMILTON, OF SAME PLACE.

## BRIDGE-WALL OF BOILER-FURNACES.

Specification of Letters Patent No. 22,530, dated January 4, 1859.

*To all whom it may concern:*

Be it known that I, WILLIAM G. HAMILTON, of New York, in the county of New York and State of New York, have invented certain Improvements in Bridge-Walls for Steam-Boilers, the construction and operation of which I have described in the following specification and illustrated in its accompanying drawings with sufficient clearness to enable competent and skilful workmen in the arts to which it pertains or is most nearly allied to make and use my invention.

The increasing use of coal as a fuel in steam boilers has given rise to various efforts both in this country and Europe to devise means for the more perfect consumption of its smoke, or in other words to produce a more perfect combustion in the furnaces of steam boilers than has hitherto been attained. Among these may be mentioned a temporary brick wall placed in the upper part of the fire box, in front of the flues, to retain heat and thereby produce a more perfect combustion of the particles which rise unconsumed from the fuel. A water bridge has also been placed within the fire box to economize the heat of the fire; and for the purpose of burning wet tan bark, sawdust, and kindred substances, a sort of air bridge has been introduced. All these devices are more or less useful in their way; but they do not fully meet the requirements and necessities of the case in burning coal as a fuel in steam boilers, especially upon railways where it is not only an object to economize fuel but also a very great object to get rid of the smoke, which would otherwise be a very uncomfortable annoyance to the traveling public.

The object of my invention is to produce a bridge wall which while it shall produce a more perfect combustion than any of its predecessors, shall also be so constructed and arranged as to allow access to the parts for repairs.

My said invention then consists in the construction and arrangement of the parts hereinafter described by which the bridge wall is made capable of being folded down out of the way when it is necessary to get at the tubes, and also in the mode hereinafter described of hanging said bridge wall by which a strong and efficient blast of air through it is secured as hereinafter more fully set forth.

In the accompanying drawings Figure 1 is a longitudinal sectional elevation of a part of a locomotive boiler with my bridge walls attached. Fig. 2 is a rear elevation also in section, one half of the rear bridge wall being cut away to show that in front, and one half of the front one being omitted to prevent confusion in the representation of the other. Fig. 3 is a section showing the parts of the rear bridge wall that lie on the side toward the furnace door of the line X X as drawn across a portion of Fig. 1, at the left hand of the same line as drawn across Fig. 4, and back or toward the top of the page from the same line drawn across Fig. 5. Fig. 4 is a sectional elevation of the same bridge wall cut through from front to back, the view being taken at the center of one of the pipes, though the pipe is left entire. Fig. 5 is a view of the parts of the rear bridge wall that lie below the line Y Y as drawn across Figs. 1, 3 and 4. Fig. 6 is a vertical section of the forward bridge wall from front to back, the plane of section being taken through one of the pipes. Fig. 7 is a section showing those parts of the forward bridge wall that lie forward, or toward the right hand of the page, of the line Z Z as drawn across Figs. 1 and 6, and showing also its connection through that part of the boiler which forms the sides of the fire box and somewhat the mode of securing it in position.

A is a part of the fire box portion of the boiler of a locomotive engine, constructed in most respects in the usual way.

B is the crown sheet. This is also made and hung in the ordinary manner.

D D' is the grate which is divided near the middle, the rear part being so hung as to allow it to be lowered at the forward end to allow the folding down of the rear bridge wall C which is hung upon an axis at *c* just below the grate. This part of the grate is held up in place by any ordinary catch. The construction of this bridge wall C will be tolerably apparent from an inspection of the sectional views, Figs. 3, 4 and 5. The axis upon which this bridge wall C is hung is formed upon the end of a pipe or tube E, said pipe having a bend in it after it passes within the fire box to bring its middle portion into the proper position. This tube E has openings *e e* to discharge air into the lower part of the fire, and also opens into the tubes F which extend up



from it for the two-fold purpose of conveying air from it into the fire, and of supporting the fire bricks G which compose the most exposed part of the bridge wall. The tubes 5 F also have openings *f* for the discharge of air into the fire. The bricks G are so made as to allow space around the tubes F, and have also perforations *g* to allow air to pass into the fire. Said bricks are secured in position by the bolts *h h*. 10

The tubes F open at the upper end into a trunk H which is also perforated to allow the air to escape, and has the further provision for the discharge of air, of being cut 15 sufficiently short at the ends to allow space for discharge between them and the sides of the fire box. This trunk H is covered by the perforated plate I which is easily removable to allow the tubes and other parts 20 to be cleaned when necessary. When put up ready for use, this bridge wall C terminates at the top in a fire brick grating J, one end of which is supported by the bridge wall and the other rests upon a ledge *k* attached 25 to the back of the fire box immediately above the lower fire door K.

In order to give a circulation of air through the bridge the pipe E is made hollow to its extreme outer end, and to further 30 facilitate the reception of air while running, the pipe E terminates in a hood L which opens forward, to gather the air, and in consequence of this last device, the blast, it will be obvious, will be increased by an increase of the speed of the engine. 35

The construction of the forward bridge wall M represents in section in Figs. 6 and 7 is in many respects much the same as that of the bridge wall C, though its form is 40 somewhat different as shown, and it also differs from the other in receiving air at the top as well as at the bottom through the sides of the fire box by means of slip joints N N by which joints it is secured in position, these slip joints terminating in hoods 45 the same as the axis of the bridge wall C and for the same purpose. This bridge wall M is hung upon these slip joints both at the top and bottom. As the top and bottom 50 pipes are hung at fixed points it becomes necessary to provide for the expansion of the connecting pipes by heat, which is done by an expansion joint as shown in Figs. 6 and 7. A very considerable part of the middle por-

tion of the bridge wall M is made of open 55 fire brick grating *m* to allow the products of combustion to pass. These bridge walls are so constructed and arranged as to greatly facilitate the process of combustion, not only by supplying air at the points where it is 60 needed, but also retaining a very great heat in the upper portion of the fire box which aids very much in the ignition of the gases of combustion. Both these bridge walls are so made as to be capable of being turned 65 down upon their lower axis, it only being necessary for that purpose to disengage the upper fastenings which hold them in place, and in the case of the rear bridge wall to remove the brick grating which rests upon its 70 top.

The mode of fastening the upper end of the forward bridge wall has already been described in connection with the drawings. The rear bridge wall is secured in position 75 by the lever O attached to the hoods in which the axis terminates, and by the bolt *p* which passes through the lever O and is tapped into the side of the fire box. In the operation of letting down these bridge walls, the 80 forward end of the rear portion of the grate it first let down, the brick grating on the top of the rear bridge wall is then removed and the upper fastenings of the bridge walls being undone, they may with very great 85 facility, and without injury, be let down into the positions shown in red lines in Fig. 1, which being done gives abundant opportunity to get at the tubes and crown sheet for repairs with about the same convenience 90 as if the bridge walls had never been introduced.

The particular improvement which constitutes my said invention, and which I claim as having been originally and first invented 95 by me, is—

The hanging of the bridge wall upon an axis in the manner described or equivalent, by which it is made capable of being folded down out of the way as set forth, and also 100 the making of the axis hollow terminating with an opening forward, as described and shown, for the purpose stated.

WM. G. HAMILTON.

Witnesses:

R. WELLS,  
THOS. P. HOW.