(No Model.)

J. K. TAYLOR & H. G. BURGESS.

Fire Box for Locomotive.

No. 232,780. **Patented Sept. 28, 1880.**

Fig. 4.

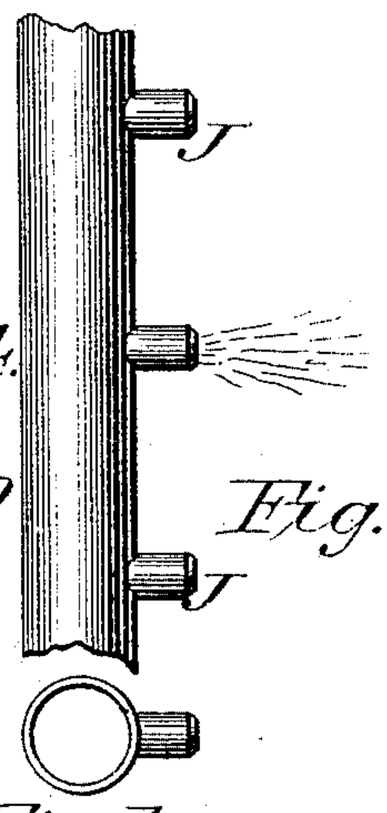


Fig. 3.

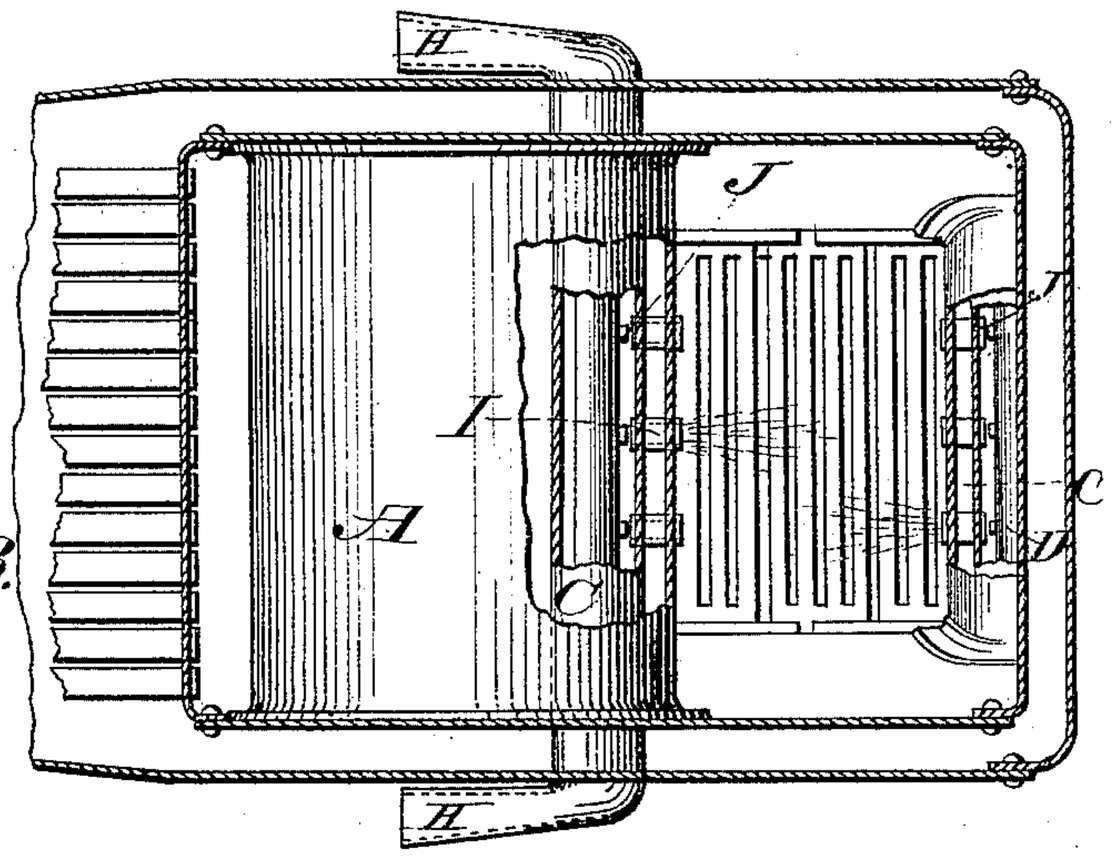


Fig. 1.

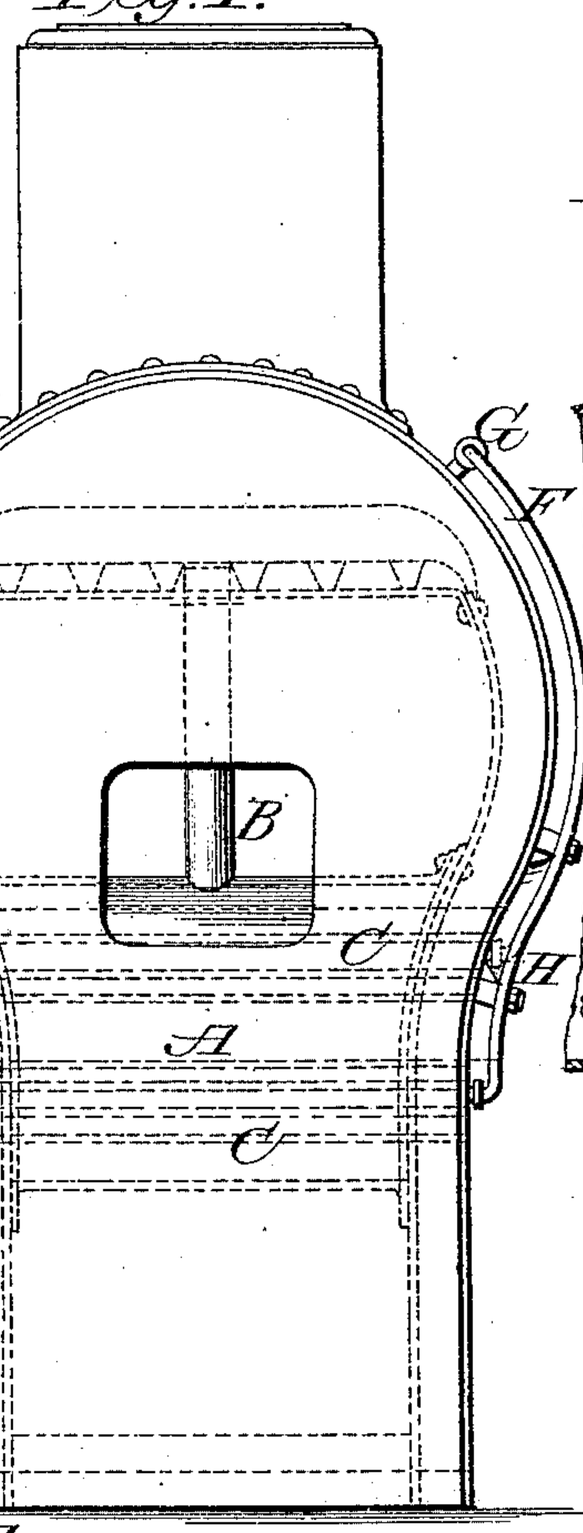
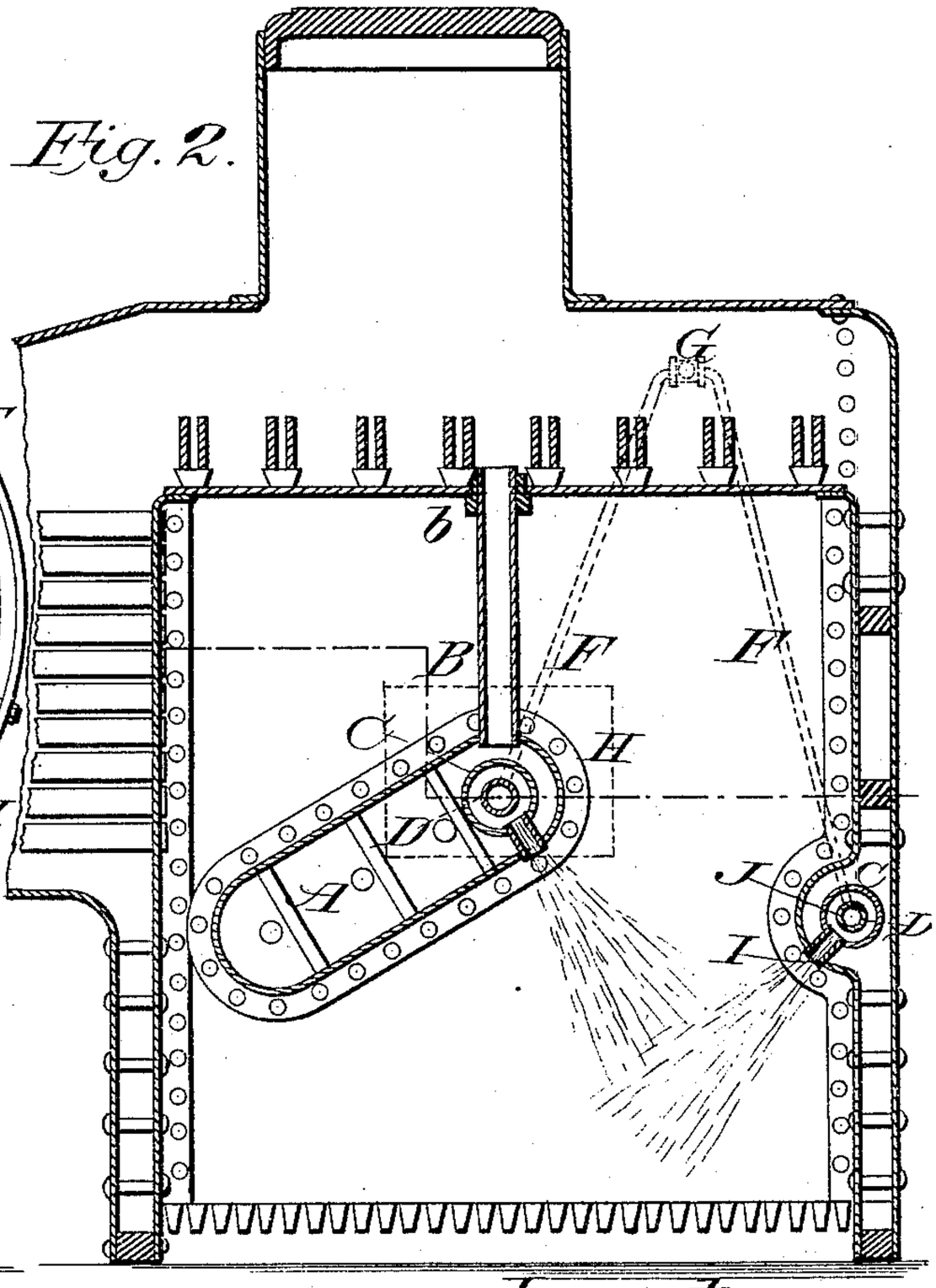


Fig. 2.



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UNITED STATES PATENT OFFICE.

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FIRE-BOX FOR LOCOMOTIVES.

SPECIFICATION forming part of Letters Patent No. 232,780, dated September 28, 1880.

Application filed July 24, 1880. (No model.)

To all whom it may concern:

Be it known that we, JAMES K. TAYLOR and HORATIO G. BURGESS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Fire-Boxes for Locomotive and other Steam-Boilers; and we do hereby declare the following to be such a full and exact description of the same as will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Similar letters of reference indicate like parts in the different figures.

Figure 1 is an end elevation of a locomotive-boiler with our improvements attached. Fig. 2 shows a vertical longitudinal section of the fire-box and adjacent portions of the boiler. Fig. 3 is a section upon a horizontal plane, showing the water-bridge and other devices within the fire-box, and Fig. 4 is an enlarged section of the jet-pipe and jets.

This invention relates especially to the furnaces of boilers in which bituminous coal is used as a fuel, the object being to so improve their power of consuming the gases and other volatile products arising from the combustion of the fuel as to prevent the escape of large volumes thereof through the smoke-stack, to the detriment of surrounding objects and great inconvenience of passengers and employés on railway-trains, as well as the loss of that portion of the fuel which assumes the volatile form; and the invention consists, essentially, in the employment of a hollow water-bridge or double tube crossing the fire-box above the upper surface of the fuel therein, opening into the water-space at each side, so as to secure a free circulation of water from side to side, and also connected by a vertical pipe to the crown-sheet, to give a free escape to the steam-generator in the bridge, while the inner wall of the tube extends across the water-space of the fire-box at each side, opening to the outside air, and allowing a free flow of the same into the interior of the bridge and out into the fire-box above the fire through the tubular stay-bolts which connect the outer and inner tubes of the bridge.

It further consists in the combination and employment, in connection with the hollow bridge, of a steam-pipe provided with jets or short branches which enter the tubular stay-bolts of the bridge, and allow the current of air through them into the fire-box to be increased or diminished at will by regulating the quantity of steam passing through the jets; and it further consists in the employment of deflecting-plates attached to the outside of the fire-box in such a manner as to cause the air entering the hollow bridge to impinge against the side of the fire-box and become heated, all as will be hereinafter fully described.

The figures in the drawings show parts of a boiler of the ordinary locomotive type, which is so well known as not to require a detailed description. It will therefore be confined principally to the novel devices employed. Among these A represents the tubular bridge, having an oval or approximate section, and placed across the fire-box in an inclined position in front of the tube-sheet, and formed of an outer and inner shell. The ends of the inner shell are flanged and riveted to the inner sides of the fire-box, which have an opening cut in them corresponding in size and shape with the internal section of the outer shell of the bridge. The inner shell of the bridge forms the air pipe or chamber C, and passes through the opening in the inner walls of the fire-box, and has its ends flanged and riveted, or is otherwise secured to the outer walls of the fire-box.

It will be seen that this mode of constructing and uniting the bridge with the sides of the fire-box will allow a perfectly free circulation of water through the bridge, while the ready escape of steam, which will be generated very fast in the bridge owing to its being in a position to receive the fiercest heat of the fire, is provided for by the pipe B, one end of which enters the highest part of the bridge, while the other passes upward through the crown-sheet of the fire-box, and is secured in place by thimbles or in any other suitable manner. It thus becomes not only a means of exit for the steam within the bridge, but forms an additional support for the crown-sheet.

It will also be observed that a space is left between the rear of the bridge and the tube-sheet, which gives a free passage down into the fire for any cinders which may be carried over the front of the bridge, and which, were it not for this free opening, would soon accumulate in sufficient quantity to choke up the lower tiers of flues. Connecting the outer shell of the bridge, nearly over the middle of the fire, with the air-chamber C are a series of tubular stay-bolts, I, through which the air passes from the chamber C to mingle with the volatile matters rising from the fuel resting on the grate below.

In order to control the quantity of air to be thus used, and to increase its efficiency by an admixture of dry steam, a steam-pipe, F, is carried from the upper part of the boiler or other suitable point into the air-chamber C, traversing the latter from end to end, and is provided with a series of jets, J, (see Fig. 4,) which enter the tubular stays I a short distance. The flow of steam to these jets through the pipe F is regulated by the cock G, and when applied, acting upon well-known principles, will cause a powerful blast through the tubular stays and directly upon the surface of the fuel. The strength of the blast, and consequently the amount of air supplied, being regulated by the pressure and quantity of steam admitted to the jets.

In order that the air supplied may be heated to a certain extent before entering the air-chamber, deflecting-plates H are secured to the sides of the fire-box, and force the air before entering the chamber to pass some distance in contact with the heated surface of the boiler, thus imparting to it a certain amount of heat before it enters the air-chamber.

An additional air-chamber may be placed, if desired, in the front of the fire-box, constructed in substantially the same manner as the one heretofore described—that is, surrounded with a water-chamber pierced by tubular stays, through which the mixed blast is thrown into the combustion-chamber above the fuel.

It is well known that a certain amount of superheated steam mingled with a proper quantity of air also heated greatly increases the heating powers of certain kinds of fuel by causing a more perfect combustion of its volatile portion. Especially is this the case when bituminous coals are burned and the mixture of air and superheated steam is allowed to enter the combustion-chamber above the incandescent fuel.

Having thus described our invention, we claim as new, and desire to secure by Letters Patent, the following:

The combination, in a locomotive fire-box, of the water-arch A, firmly riveted to the side walls of the furnace-pipe B, connecting the arch to the crown-sheet, steam and air jet pipe D, provided with nipples J, and side air-heating pockets, H, the said arch being arranged so as to leave a space between it and the tube-sheet for the clearance of dust and sparks, in the manner and for the purpose set forth.

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