F. Harbach,

Steam-Boiler Fire-Tube.

No. 6,076. Patented Jan. 30, 1849.

Fig. 1

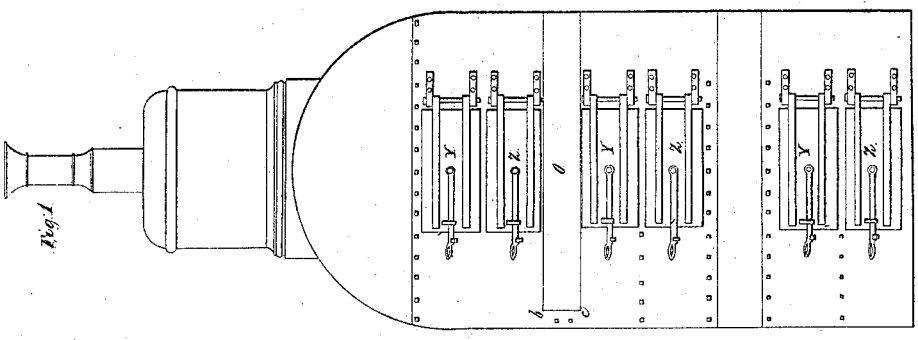


Fig. 3

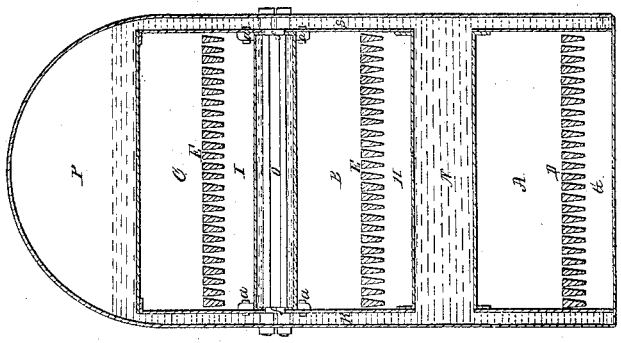
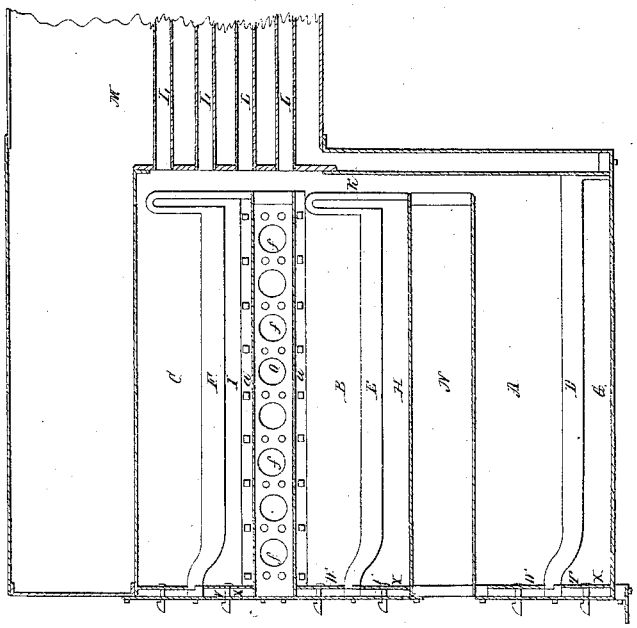


Fig. 2



UNITED STATES PATENT OFFICE.

FREDERICK HARBACH, OF CLEVELAND, OHIO.

MULTIPLE-GRATE FURNACE FOR LOCOMOTIVE-BOILERS.

Specification of Letters Patent No. 6,076, dated January 30, 1849.

To all whom it may concern:

Be it known that I, FREDERICK HARBACH, of Cleveland, in the State of Ohio, but late of Pittsfield, in the county of Berkshire and State of Massachusetts, have invented a new and useful improvement in the construction of locomotive-steam-engine boilers and their furnaces, whereby said boilers and their furnaces are peculiarly adapted to the combustion of anthracite coal; and I do hereby declare that the same is fully described and represented in the following specification and accompanying drawings, letters, figures, and references thereof.

Figure 1, of said drawings, denotes a front end view of a railway locomotive steam engine boiler or furnace exhibiting the fire and ash pit doors. Fig. 2 is a longitudinal vertical and central section of the rear furnace end, and a portion of the cylindrical body through which the stack of smoke pipes is usually carried. Fig. 3 is a transverse section of the fireplaces, ashpits, and rear part of the boiler and furnaces to be hereinafter described.

The nature of my improvement consists in arrangement or combination with the main tubular flue and water section of the boiler of a locomotive engine, of a series of two or more fire boxes (each including a fireplace, grate and ashpit) and one or more water chambers or spaces between or connected with each two of said fire boxes; the whole being so disposed and made to operate, as not only to greatly increase what is usually termed the grate surface, but the water surface also exposed to the action of the flame or heat proceeding from the fuel in combustion. Each of the said fire boxes, is to have all the usual appendages for burning coal (whether anthracite or bituminous) separate from the other; oxygen or atmospheric air containing the same, in addition to the ordinary draft created by the exhaust steam, being supplied by a blower driven by the main engine or a separate one as circumstances may require.

In the drawings above alluded to A, B, C, represent three chambers of combustion, each having a grate D E, or F, and ashpit G H or I disposed beneath it, each of said chambers and its ash pit constituting what may be termed a fire box. The several fire boxes are made to communicate with one main upright flue space K, disposed with respect to them as seen in Fig. 2 of the drawings, and made to connect with the stack or series of horizontal flue pipes L, L L, &c., placed and extending through the cylindrical body M, of the boiler. Between each two of the said fire boxes, a steam tight water chamber N, or O, is arranged; each of the said water chambers being made to connect with the main water space P, of the boiler by one or more pipes (disposed in any convenient manner) or by being made to open directly into one or more lateral and vertical narrow water chambers or spaces R, S, made in any convenient manner to open or communicate directly or indirectly into the main water and steam space P. There may or may not be a vertical water space T, U, or V, arranged in front of each fire box, and surrounding the openings for the supply of fuel and removal of ashes and to which the fire and ash pit doors are applied; the said water spaces T U, V, being made respectively to open into or communicate with the main steam and water space, or the lateral spaces R, S, in any suitable manner.

As one or more of the water chambers may be disposed directly in front of the stack of smoke pipes L, L, &c., and so as to render it difficult to obtain access to the same when repairs or removal of any one or more of said pipes may be requisite I apply said water chamber or chambers to the remaining parts in such manner as to enable it to be readily removed, or in other words, I construct it as a rectangular or other proper shaped box and support it on and by ways or horizontal ledges *a*, *a*, *a*, *a*, in a manner similar to that in which a common drawer is supported. I make an opening *b*, *c*, *d*, *e*, through the front end of the boiler, through which the said water box may be passed into or drawn out of its place as occasion may require. I also make water passages *f*, *f*, &c., through the sides of said box and into the side spaces R, S, so as to allow the water from the boiler to freely circulate into and out of the box, and I secure said box in place by bolts, rivets, thimbles, or such other contrivances as will make the joints between the sides of the said box, and the adjacent wall plates or sides of the water spaces R, S, water and steam tight.

The combination or arrangement above specified is particularly intended for the generation of steam by the combustion of anthracite coal, it having been invented ex-

pressly with this view; but other coal or fuel may be employed.

The openings for the supply of fuel, and removal of ashes are seen at W, W, W, X, X, X, the doors of the same being seen at Y, Y, Y, Z, Z, Z.

In the employment of several separate fire boxes (all communicating with one main flue and the stack of pipes) and water chambers between them or between and around them, and connected with the main boiler space as above specified, several important advantages are gained not only in the combustion of fuel but in the generation of steam. The grate surface and surface of water exposed to the action of the fuel in combustion or volatile products thereof in a state of combustion or heated are very much augmented beyond that which can be obtained in the ordinary method of using but one fire box. Besides one or more of the fire boxes may at any time be kept in active operation while the combustion of the fuel in the remainder may be slackened or arrested as occasion may require.

The main flue space by which the several fire boxes or chambers of combustion are connected with the stack of smoke pipes may be changed in form or direction as circumstances may require. Or if deemed more advantageous, each fire box may be provided with a separate and distinct flue, made to lead from it and communicate with the stack of smoke pipes.

What I claim as my invention is—

The combination and arrangement of two or more fire boxes and the water chamber or chambers between them with each other, and the main boiler and flues when said fire boxes are arranged vertically over each other the whole being arranged, constructed, connected, and made to operate substantially as above specified, and for the purpose of using anthracite coal, and increasing the fire and water surface in boilers whose position is such that it is difficult to extend the fire surface horizontally, and thereby improving the capacity of the boiler to generate steam as set forth.

In testimony whereof I have hereto set my signature this 16th day of October A. D. 1848.

FREDERICK HARBACH.

Witnesses:

WM. BECKWITH,

SETH. C. BALDWIN.