

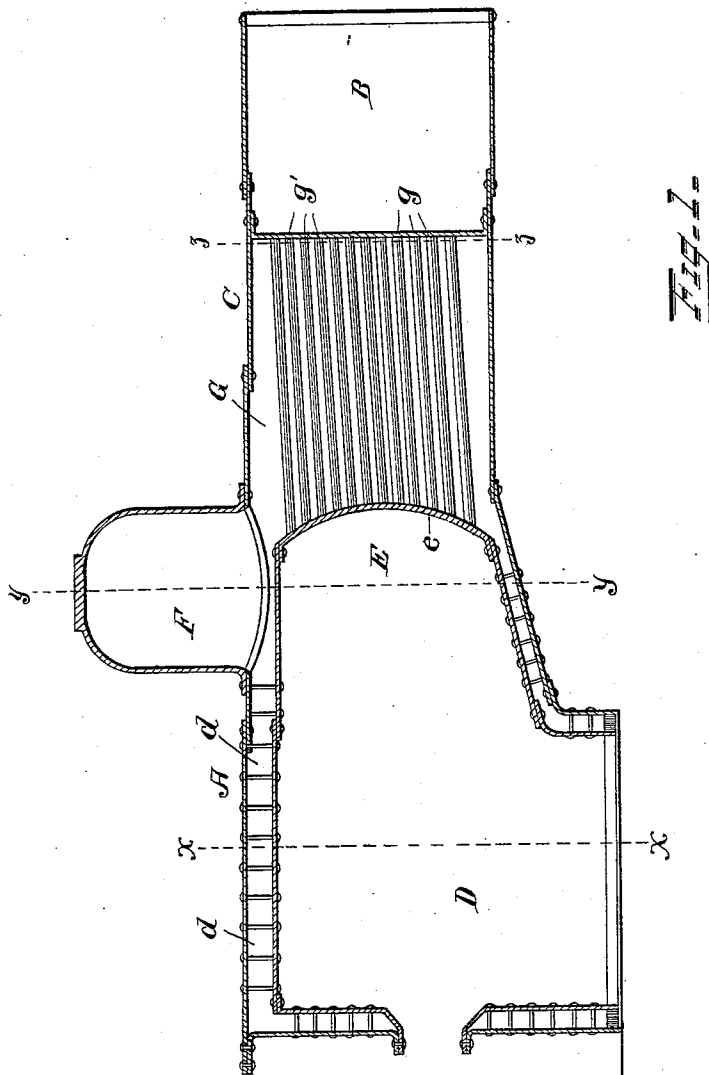
(No Model.)

2 Sheets—Sheet 1.

J. T. CONNELLY.
LOCOMOTIVE BOILER.

No. 532,768.

Patented Jan. 22, 1895.



WITNESSES.

Howard D. Orr.

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INVENTOR.

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James T. Connelly

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J. R. Little.

HIS ATTORNEY.

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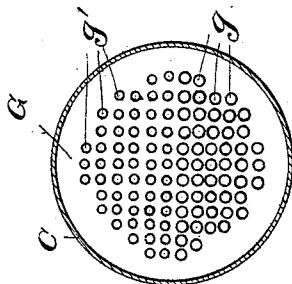


Fig. 4.

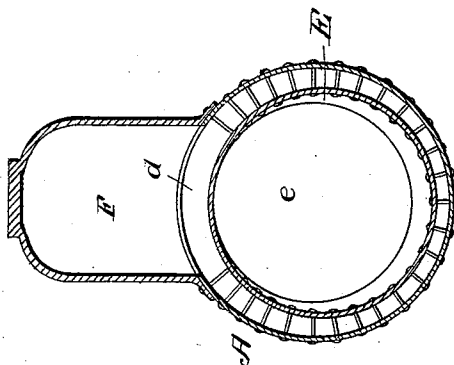


Fig. 5.

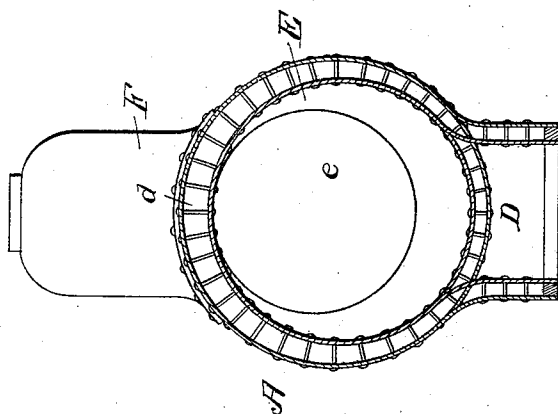


Fig. 6.

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UNITED STATES PATENT OFFICE.

JAMES THOMAS CONNELLY, OF MILTON, PENNSYLVANIA.

LOCOMOTIVE-BOILER.

SPECIFICATION forming part of Letters Patent No. 532,768, dated January 22, 1895.

Application filed April 3, 1894. Serial No. 506,178. (No model.)

To all whom it may concern:

Be it known that I, JAMES THOMAS CONNELLY, a citizen of the United States, residing at Milton, in the county of Northumberland and State of Pennsylvania, have invented certain new and useful Improvements in Locomotive-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to locomotive boilers, and it has for its object to provide a simple and improved locomotive boiler which will possess material advantages in steam generating power, economization in fuel, strength and durability, effectiveness, and general efficiency.

My present improvements are especially adapted for application in the improved form or class of locomotive boilers embodied in my previous patent, No. 488,919, granted December 27, 1892, upon which patent my present invention embodies in some respects certain improvements; but my present invention is also designed for effective application upon other forms or constructions of locomotive boilers or upon stationary boilers, especially in relation to that class of boilers which have been heretofore constructed with a large or wide steam space between the crown of the fire box and the top of the shell.

My invention consists in certain improvements in the construction, arrangement, and relative location of parts, substantially as hereinafter described and particularly pointed out in the claims.

In the drawings—Figure 1 is a vertical longitudinal sectional view of a locomotive boiler embodying my improvements. Fig. 2 is a vertical transverse sectional view, taken on the line $x-x$, Fig. 1. Fig. 3 is a vertical transverse sectional view, taken on the line $y-y$, Fig. 1. Fig. 4 is a vertical transverse sectional view, taken on the line $z-z$, Fig. 1.

Corresponding parts in all the figures are denoted by the same letters of reference.

Heretofore, in the construction of locomotive boilers of this class, a large space has been formed between the crown of the fire box and the top of the shell. The distance

forming this space has been usually from twenty-one inches to twenty-four inches, about six inches of this space being occupied by the water above the crown, leaving from fifteen inches to eighteen inches of steam space above. With this large space, the generating power does not maintain the proper steam pressure under all circumstances, it being understood that the pressure must be kept up in said space. While the supposition is that there is always sufficient steam held in reserve to meet all demands, it is well known that a locomotive, constructed with this large space, starting at the base of a heavy grade with, say, one hundred and eighty pounds pressure will have materially reduced the steam pressure several pounds, say, to one hundred and sixty pounds, when the top of the grade is reached, the generating power being thus not equal to the demands of the engine and the large space being thus a disadvantage in generating and maintaining the steam pressure. In my invention, this large space is practically converted into heating surface, it being designed by my general construction and arrangement to materially increase the generating power, say, seventy-five per cent., and to properly maintain the steam pressure under all circumstances and when the engine is doing its maximum degree of work.

Referring to the drawings, A designates the boiler; B, the smoke box; C, the barrel, and D the fire box, the latter being provided with an extension, E, at its forward end projecting within the barrel, substantially as shown.

The foregoing general structure is similar to that shown in my above-mentioned patent, to which reference may be had.

In carrying out the improvements constituting my present invention, the fire box is extended or enlarged at the top, so that a comparatively small or narrow space, as shown at d , is provided between the crown of the fire box and top of the shell, and the forward extension E is correspondingly raised or extended at its top. This improved construction produces a fire box which is relatively of very large size, and enables the employment of a true circular form for the fire box and shell, thus insuring the maximum of

strength and simplicity in form. This construction also materially increases the heating surface and correspondingly enhances the generating power without increasing the consumption of fuel.

The distance between the crown of the fire box and the top of the shell, forming the narrow space d , is preferably about seven inches, thus allowing room for the dry pipe. This narrow space will be filled with water when the boiler is in service, and when the locomotive is running either up or down grade the water will remain substantially in nearly the same position or level as when the locomotive is running on a level plane, thus preventing over-heating of the crown or extension.

The steam space in my improved boiler is formed by the dome, F , which is proportionately enlarged, its preferred dimension being about thirty-four inches diameter by thirty-six inches height, these dimensions forming a steam dome having approximately twice the usual capacity. The dome is preferably located over the front end of the extension E of the fire box, as shown, but it may be otherwise located if desired.

The fire box, extension, and outer shell, are of true cylindrical or circular form in transverse section (see Figs. 2 and 3), which insures great strength and enables the employment of stay-bolts of approximately a uniform length, thus enhancing the strength and durability of the bolts in service and securing uniform contraction and expansion upon the stay-bolts and upon the inner and outer shells.

The extension E is preferably a little more than one-third the length of the flues, the space between the head of the extension and the smoke box, forming the front shell, being filled with flues, G , leaving only room for the dry pipe.

My improved construction, embodying the narrow space d and the enlargement of the fire box D and its extension E at the top, enables the employment of a greater number of flues and the practical utilization of nearly all the space in the front shell, the space above the series of flues being correspondingly narrow and approximately the same as the space above the fire box. The flues are inclined upwardly toward the smoke box, the elevation being preferably two inches, which gives better draft and enables the more convenient cleaning of the flues. I also prefer to divide the flues into two sets, one set running from the upper half of the head of the extension of the fire box, and the other set running from the lower half of said head. The lower set, g , of flues are larger than the upper set, g' , the relative diameters being preferably two and one-half inches and two inches, respectively. This construction and arrangement of flues insures a better draft and prevents the lower flues from becoming choked or stopped up with dust.

The head, e , of the extension E is preferably of convex form, this construction being

designed to increase the strength and durability and prevent cracking of the flue head between the flue holes. In practice, it would require about three hundred pounds of steam pressure to affect a flue head of this construction, and if the head were subjected to excessive strain the effect would be to reduce the diameter of the flue hole and thus render it less liable to leak. A straight flue head for the extension E may, however, be employed, if desired.

The advantages and operation of my invention will be readily understood by those skilled in the art to which it appertains.

My improved construction combines simplicity with maximum strength and durability, increases the heating surface and correspondingly enhances the generating power, effects economy in fuel, and secures material advantages in operation.

It will be noted that under the construction and arrangement embodied in my invention, approximately the entire available interior area of the shell of the boiler is adapted to be utilized as the water space, whereby the water capacity is relatively increased with relation to the size of the shell.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. An improved locomotive boiler of the class described, comprising the fire box embodying the herein described convex flue head at its front end projecting convexly and forwardly into the shell proper, and the boiler or shell extending in front of the fire box, and having the upwardly and forwardly inclined flues extending from the convex front of the fire box forwardly into the boiler or shell, substantially as and for the purpose set forth.

2. In a locomotive boiler, the herein described series of flues divided into two sets, one set extending from the upper portion of the fire box and the other set extending from the lower portion of the same, the lower set being larger in relative diameter than the upper set, substantially as and for the purpose set forth.

3. An improved locomotive boiler, having a series of flues of relatively different diameters, the flues of larger diameter being arranged below the flues of the lesser diameter, substantially as and for the purpose set forth.

4. An improved locomotive boiler, having its series of flues inclined upwardly and forwardly from the fire box, the flues being divided into sets of relatively different diameters, the set of flues of larger diameter being arranged below the set of flues of lesser diameter, substantially as and for the purpose set forth.

5. An improved locomotive boiler of the class described, comprising the fire box having a forward extension projecting within the barrel and provided with a convex flue head, e , at its front end, and a series of upwardly and forwardly inclined flues extend-

ing from said convex head, the flues being arranged in sets of relatively different diameters with the flues of larger diameter below the flues of lesser diameter, substantially as and for the purpose set forth.

6. The herein described locomotive boiler, comprising the fire box and the forward extension of the same projecting within the barrel, the fire box and its forward extension being enlarged or extended at the top and forming the narrow space d , and the fire box and its extension and the shell being of circular form in cross section, the enlarged steam dome mounted with relation to the narrow space d and forming the steam space, and the flues extending forwardly from the forward extension of the fire box and inclined upwardly, the flues occupying approximately the full space in the barrel in front of the extension of the fire box, substantially as and for the purpose set forth.

7. An improved locomotive boiler, comprising the fire box and the forward extension of the same projecting within the barrel, the fire box and its forward extension being enlarged or extended at the top and forming the narrow space d , and the fire box and its extension and the shell being of circular form in cross section, the enlarged steam dome mounted with relation to the narrow space d and forming the steam space, and the flues extending from the fire box and occupying approximately the full space in the barrel corresponding to the enlarged fire box and

its forward extension, substantially as and for the purpose set forth.

8. An improved boiler of the class described, comprising the shell, the fire box and its forward extension arranged within the shell, the relative size and arrangement of the shell and the fire box and its forward extension being such that the relatively small or narrow space d is formed between the top of the shell and the crown sheet of the fire box and its forward extension, whereby the water level is at or a short distance below the top of the shell, and a relatively enlarged steam dome forming solely the steam space, substantially as and for the purpose set forth.

9. An improved boiler of the class described, comprising the shell, the fire box arranged within the shell, the relative size and arrangement of the shell and the fire box being such that the relatively small or narrow space d is formed between the top of the shell and the crown sheet of the fire box, substantially as described, whereby the water level is at or a short distance below the top of the shell, and the relatively enlarged steam dome forming solely the steam space, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES THOMAS CONNELLY.

Witnesses:

WILLIAM H. SHAW,
HOMER CONNELLY.