(No Model.)

T. POORE.

LOCOMOTIVE BOILER

No. 343,278. Patented June 8, 1886.

Fig 1.

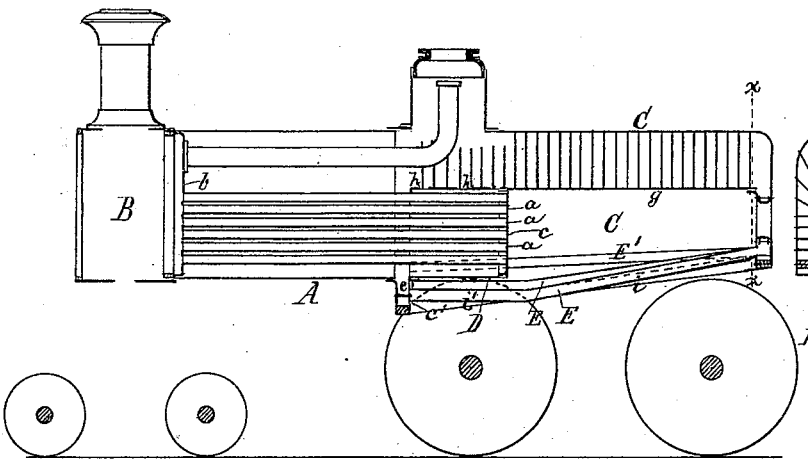


Fig 2.

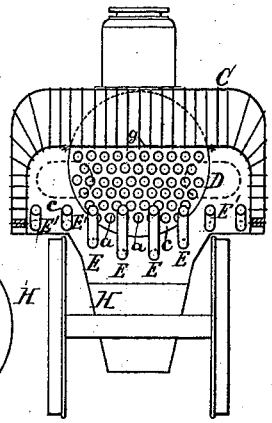


Fig 3.

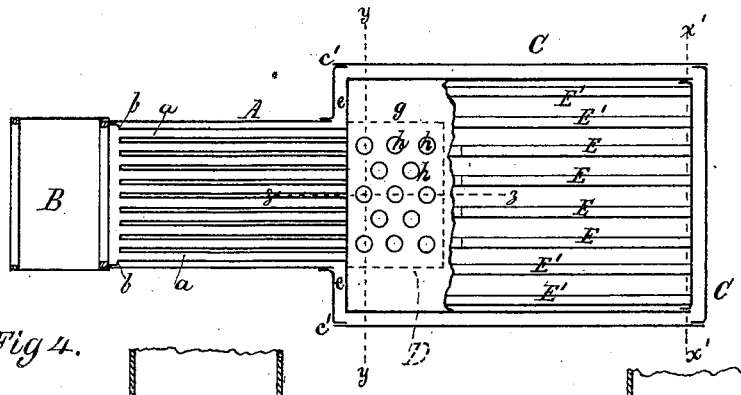


Fig 4.

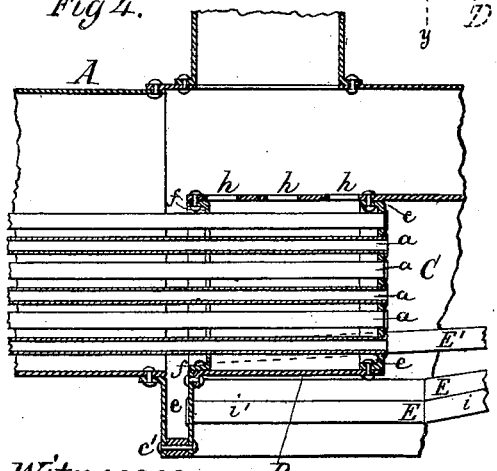
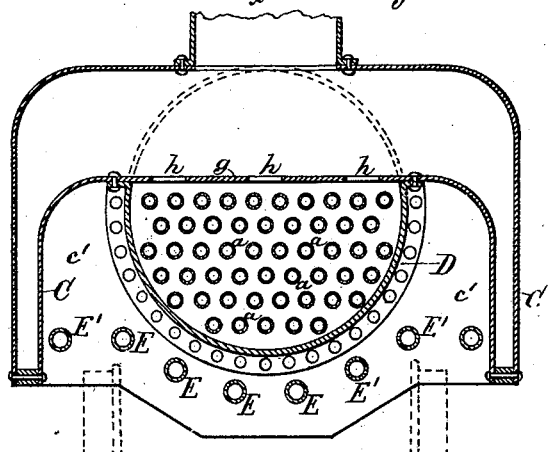


Fig 5.



Witnesses:
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by his Attys
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UNITED STATES PATENT OFFICE.

TOWNSEND POORE, OF SCRANTON, PENNSYLVANIA.

LOCOMOTIVE-BOILER.

SPECIFICATION forming part of Letters Patent No. 343,278, dated June 8, 1886.

Application filed April 2, 1886. Serial No. 197,511. (No model.)

To all whom it may concern:

Be it known that I, TOWNSEND POORE, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennslyvania, have invented certain new and useful Improvements in Locomotive-Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My improvements relate particularly to locomotive-boilers of the class in which a material increase of grate-surface is secured, relatively to that construction wherein the width of the grate-surface is determined by the distance between the inner faces of opposite driving-wheels, by the provision of a fire-box which is located above and extended laterally beyond the driving-wheels. In the first or older constructions, wherein this provision was made, the body of the boiler had to be elevated relatively with respect to the elevated grate, so as to have the fire-tubes at a proper height above the fuel, and in consequence of this the locomotive was rendered top-heavy.

Several patents have been granted for improvements on the above-mentioned well-known construction and arrangement of the grate above and laterally beyond the wheels, among which reference is here made to Patents Nos. 192,725, 254,581, and 291,120, as indicating the state of the art.

My invention consists in certain constructions and combinations of the combined fire-box and boiler, the grate, and the locomotive-frame, whereby the waist or barrel of the boiler with its tubes and the central portion of the grate can be constructed and applied so as to stand quite low with respect to the axis of the locomotive, the balancing and strength of the structure enhanced, and a large portion of the barrel containing the flues of the boiler extended into the fire-box, so as to be exposed to the direct fire of the grate, thus utilizing more of the heat than can be by any other construction.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of a portion of the locomotive frame and boiler, showing my invention. Fig. 2 is a cross-section of the same on the line *x x* of Fig. 1, looking toward the smoke-stack, the doors of the fire-box being indicated by dotted lines as they are in rear of the line of section. Fig. 3 is a horizontal section above the crown-sheet of the fire-box, a portion of said sheet being broken away to expose the grate beneath it. Fig. 4 is a broken enlarged longitudinal section of a portion of the locomotive-boiler on the line *z z* of Fig. 3; and Fig. 5 is an enlarged vertical cross-section in the line *y y* of Fig. 3, showing also portions of two of the locomotive-wheels.

The waist or barrel A of the boiler is fitted, as usual, with a series of fire-tubes, *a*, connected with and extending from a front flue-sheet, *b*, located at the rear of the smoke-box B, to a rear flue-sheet, *c*, located in the fire-box C, some distance from its front *c'*. Portions of the fire flues or tubes are inclosed by a portion of the barrel extended into the fire-box C, said barrel portion being constructed of a segmental sheet, D, and united to the rear flue-sheet, *c*, and to the inner rear sheet of the connecting water and steam way *e*, as shown, or in any other equivalent way, while the other portions of said tubes which are outside the fire-box are encircled and inclosed by the other portion of the barrel or waist A, which is united to the front of the fire-box, as shown. The rear flue-sheet and the intermediate stay-plate, *f*, are riveted directly to the crown-sheet *g* of the fire-box, instead of being connected to the crown-sheet by a flanged tube, as in my Patent No. 336,430, for 1886, and also in English Patent No. 591 for 1883; and by this means a much stronger boiler structure is produced, and the barrel or waist of the boiler with the portion formed of the segmental-shaped inclosing-sheet D can be constructed lower with respect to the axles and wheels of the locomotive, and the circulation of water and steam can be effected by perforating the crown-sheet, as shown at *h*.

In order to permit the waist or barrel A, comprising the inclosing-sheet D and tubes therein, to be thus set down lower than heretofore, the tubular water-grate bars E E' are constructed and arranged as follows: The intermediate tubular water-grate bars, E, directly under the inclosing-sheet D, are constructed and set on an inclination greater than the water-grate bars E' for a portion of their length, as indicated at *i*, and then are con-

tinued on a horizontal or nearly horizontal plane, as indicated at *i'*, while the tubular water-grate bars E', which are outside the circle of the sheet D, are inclined on one plane from the rear water way or space to the intermediate water way or space of the boiler, as shown. This construction of the tubular water-grate gives all the room required for perfect circulation of the products of combustion beneath the flue or tube inclosing segmental portion D, while all the circulation-space required is afforded outside the circle of said inclosing portion D, and beneath this water-grate the ordinary ash-pan or chute H may be applied, as represented. Thus the style of locomotive-boiler, with reference to which my improvements are specially designed, can be constructed with a portion of the barrel inclosing the fire-flues extended into the fire-box; and, while this is the case, the height of the boiler will not be such as to render it top-heavy, a thing which must be guarded against, especially in fast-running locomotives.

One great advantage of my boiler having a portion of its barrel for containing the flues extended into the fire-box, as herein described, and with the grate above and extended laterally over the wheels of the locomotive-frame is that it affords facility for distributing the weight with reference to the extent of the length of the wheel-base by extending the flue-containing portion more or less into the fire-box as said wheel-base may require.

I am aware that boilers have had a portion of the barrel inclosing the fire flues or tubes extended into the fire-box and such extended portion suspended by a flanged tube, as instanced in English Patent No. 591 for 1883, and my Patent No. 336,430, for 1886. It is new to connect the said extended portion of the barrel of boiler directly to the crown and front sheets of the fire-box, and also to adapt this style of boiler for use with a grate above and extended laterally over the wheels, as I have herein described and shown.

By my construction a locomotive having its grate above and extended laterally over the wheels may be made shorter, with a given length of fire box and tubes than heretofore. A given length of locomotive can have the same length of flues or tubes and a longer fire-box. A given length of locomotive can have the same length of fire-box and longer flues or tubes; a locomotive with same length of fire box and tubes will have more fire-surface than with the ordinary construction, and the boiler, with the tube or flue inclosing sheet D extended into the fire-box and firmly riveted to the crown and front sheets of the fire-box, as shown, gives a much stronger construction than if said tube or flue inclosing sheet were only riveted to the front sheet and stayed by a pipe connected to the crown-sheet, the perforated crown-sheet at the top of the chamber formed by sheet D in my present construction giving the required strength against internal pressure on the top side. The extending of the tube-inclosing portion of the barrel of the boiler into the fire-box prevents clogging of the tubes with cinders and other obstructions, as the draft through the tubes creates a suction or current between the front *c'* of the fire-box and the flue-sheet *c*, and this circulation of air tends to keep the said ends of the tubes open and free from obstructions.

In locomotives which employ small wheels, as in freight or "goods" engines, it would not be necessary to give a different inclination to the intermediate tubular water-grate bars from that given to the side tubular water-grate bars, for, by reason of the small wheels, the boiler could be kept low enough with all of the said bars on the same inclination or plane; therefore, some of the features of my invention are not confined to the special grate herein described. Neither is it confined to a water-circulation grate, although I prefer to employ a water-grate. It might also be practicable to not perforate the crown to which the portion containing portions of the flues or tubes is riveted; but it is far better to perforate it.

What I claim is—

1. In a locomotive-boiler, a waist or barrel, A, having its portion D, containing portions of its flues or tubes, extended into the fire-box C, in combination with a fire-box above and extended laterally beyond the locomotive-wheels, substantially as and for the purpose described.

2. In a locomotive-boiler, a waist or barrel, A, having its portion D, containing portions of its tubes, extended into the fire-box, and said portion D riveted directly to crown and front sheets of the fire-box, in combination with a fire-box extended laterally over and beyond the wheels of the locomotive, substantially as and for the purpose described.

3. In a locomotive-boiler, a waist or barrel, A, having its portion D, containing portions of its tubes, extended into the fire-box, in combination with a grate extended laterally beyond the locomotive-wheels, and having the intermediate portion of its bars inclined to a greater extent than those on the sides thereof, substantially as and for the purpose described.

4. In a locomotive-boiler, the combination, with a fire-box having a perforated crown-sheet, of a waist or barrel, A, having its portion D, containing portions of the flues or tubes, extended into the fire-box C, and said portion D riveted directly to the crown-sheet of the fire-box, substantially as and for the purpose described.

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

TOWNSEND POORE.

Witnesses:
S. N. CALLENDER,
J. M. POORE.