

Steam-Boiler Water-Tube.

N^o 13,619.

Patented Oct. 2, 1855.

Fig. 1.
B

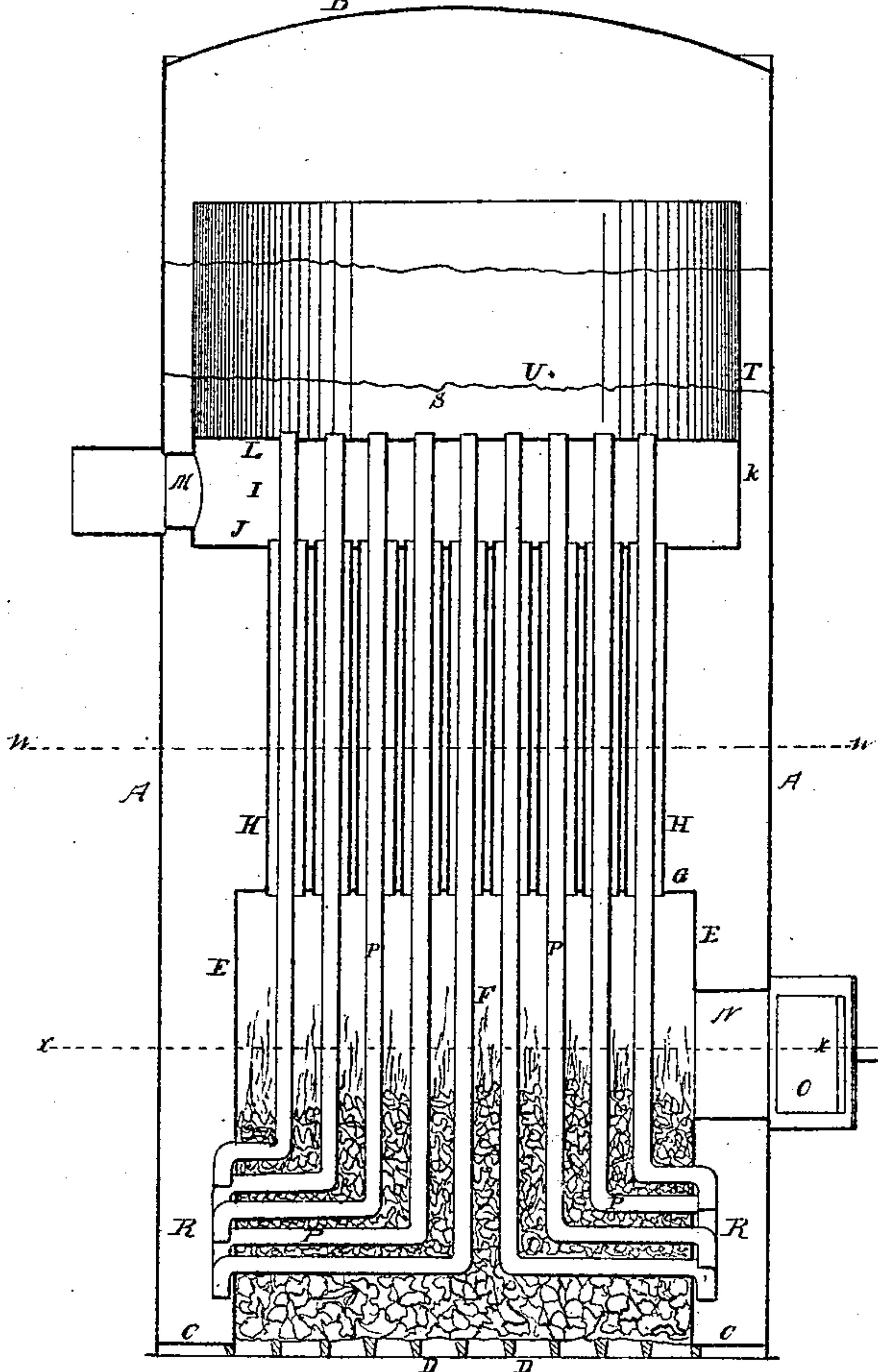
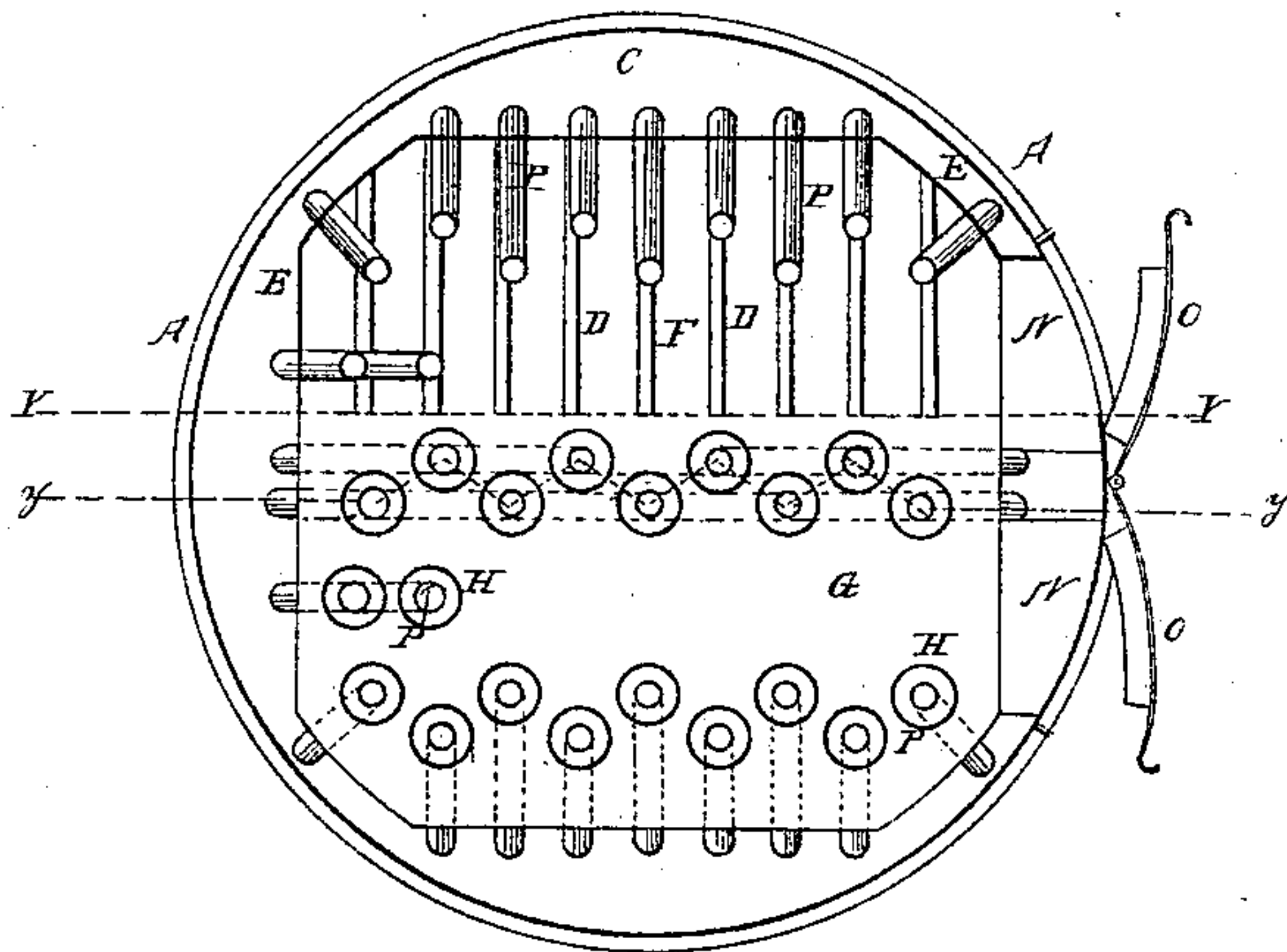


Fig. 2.



UNITED STATES PATENT OFFICE.

CHARLES MOORE, OF TRENTON, NEW JERSEY.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. 13,619, dated October 2, 1855.

To all whom it may concern:

Be it known that I, CHARLES MOORE, of Trenton, in the county of Mercer and State of New Jersey, have invented certain new and useful Improvements in Boilers for Generating Steam; and I do hereby declare that the same are described and represented in the following specification and drawings.

To enable others skilled in the art to make and use my improvements, I will proceed to describe their construction and use, referring to the drawings, in which the same letters indicate like parts in each of the figures.

Figure 1 is a sectional elevation representing the interior of a boiler with my improvements, cut perpendicular near the center or through the line *z z* of Fig. 2. Fig. 2 is a cross-section. That portion of it above the line *y y* represents the boiler cut off at the line *x x* of Fig. 1, and that portion below the line *y y* represents the boiler cut off at the line *w w*, Fig. 1.

The nature of my invention consists in the construction and arrangement of a partition inside of the boiler to limit the circulation of the water by separating the water which is over the fire, or some portion of it, or the water which is highly heated or ascends through the tubes, from mixing with the water around the sides of the boiler, which is at a lower temperature; and so constructing and arranging the tubes in the fire-space that the burning fuel will surround the horizontal parts of the tubes and a portion of the perpendicular parts so as to generate the steam from the heat of the center of the fire and not depend entirely upon the heat from the surface of the fire; also, in extending the tubes downward, which pass through the fire-space after they leave said space and terminating them perpendicularly in the water-space, so as to prevent or retard the water which is highly heated or the steam generated in the tubes from escaping at the lower end into the coolest water.

In the accompanying drawings, A A is the outside of an upright cylindrical boiler, and B the top through which a hole should be made and a pipe attached to conduct the steam to the engine or wherever it is to be used.

C C is the bottom, and D D the grate-bars, both of which may be supported by brick-

work around the ash-pit in the usual manner.

E E is the inside of the boiler surrounding the fire-space F, which fire-space is covered by the plate G, which plate is perforated for the ends of the flues H H, which conduct the smoke into the flue-chamber I, the bottom J of the chamber I being perforated for the upper ends of the flues H H. The flue-chamber I is made a little smaller than the outside of the boiler and surrounded with a circular plate K, which connects the bottom J with the top L, and the pipe or flue M connects the plate K and the outside A, and forms the opening through which the smoke escapes from the boiler. There are two openings N N through the outside A and the fire-box E, through which the fuel is supplied, made in the usual manner, and provided with doors O O, as shown in the drawings.

There are a series of pipes P P, which enter the fire-space F near the grate D horizontally from the water-space R, and extend in toward the center until they come under the flues H H, where they are bent at right angles and pass up through the flues H H and through the flue-chamber I into the water-space S, which is surrounded by a circular partition T, extending up above the water-line U, so as to prevent the highly-heated water over the flue-chamber I and that which passes up through the pipes P P from mixing with the water next to the outside of the boiler, so as to limit the circulation of the water in the boiler to passing up through the pipes P P, and generate most of the steam in the pipes P P and over the flue-chamber I and inside of the partition T without heating all the water in the boiler so hot as it is necessary to do in boilers where the circulation of the water is not limited.

In order to compel the water which is highly heated and the steam which is generated in the horizontal portion of the pipes P P to pass up into the water-space surrounded by the partition T, and to prevent or retard its escape into the water-space R, the pipes P P are bent at right angles in the space R, and extend down toward the bottom of the boiler and terminate perpendicularly in the coldest water, which is the heaviest in the boiler and heavier than that which is highly heated in the tubes, which would ascend were it permitted to descend next to the outside of the boiler; but

as the partition T will not permit it to mix and descend next to the outside of the boiler, it is therefore compelled to remain in the tubes P P until it is converted into steam, except what is necessary to supply the water which is converted into steam within the partition T, which partition prevents the water from circulating through the tubes P P any faster than it is converted into steam within the said tubes or evaporates from the surface within the said partition.

This improved boiler may be supplied with water in the usual manner, and provided with a safety-valve, steam and water gage, and such other minor improvements as may be necessary or desirable.

The boiler having been constructed as above described and supplied with water, a fire is kindled upon the grate, and as the coal becomes ignited more coal should be added between and upon the tubes P P until it is even or higher than the bottoms of the doorways through which it is supplied, as represented in the drawings, so that the water is heated and converted into steam in the pipes P P near the bottom of and in the body of the fire, which fire may be made deep like the fires in the common cylindrical stoves, so as to save fuel or generate more steam from the consumption of a given quantity of coal. In most of the steam-boilers in common use where the surface of the fire and the consumption of the gases from the fuel is depended upon to generate steam, whenever a supply of coal is added to the fire, it is of very little service in generating steam until the coal supplied becomes ignited; but by my improvements this disadvantage is in great measure remedied, as the tubes pass through the body of burning fuel, which may be several times as thick or much deeper than the fires in common use under steam-boilers, so that adding coal to the fire does not materially diminish the quantity of steam generated while the coal so supplied is being ignited. Besides, in adding coal to a fire as hot as they usually are under steam-boilers much coal is wasted by snapping or flying off in scintillations, choking the draft or falling through to the ash-pit without burning, and much fuel is damaged by the intense heat of the fire expelling the gases from it prematurely, which are most essential to a perfect combustion, so that clinker is formed instead of ashes, the natural residuum of the fuel consumed.

By the use of my improvements much of the draft may be dispensed with, as a limited

draft will be sufficient, so that a large stack or chimney, which in many instances costs as much as the boiler, is not needed. The steam is generated far more uniformly by consuming the fuel around and in contact with the pipes than it is when the surface of the fire alone is relied upon for its production.

This boiler will be found to be very strong in proportion to the weight of metal employed in its construction, and a larger heating-surface is presented to the fire far more advantageously than it is in any other boiler, so that far more steam is generated in proportion to the fuel consumed. It also combines compactness with great strength, and it is also a cheap boiler of great durability in proportion to the quantity of steam that it is capable of supplying. I contemplate that it may be provided with the usual conveniences for cleaning, and that its construction may be varied so as to adapt my improvements to horizontal boilers with equal or greater advantages.

I believe I have described the construction, operation, and use of my improvements so as to enable any person skilled in the art to make and use them.

I will now specify what I desire to secure by Letters Patent, viz:

1. Limiting the circulation of the water in steam-boilers by means of a partition so constructed as to separate the water over the fire or some portion of it, or the water which is highly heated or that which ascends through the tubes from mixing with the water around the sides of the boiler, which is at a lower temperature, substantially as described, for the purposes set forth, and thereby prevent it from descending so as to enter the tubes again at their lower ends.

2. So constructing and arranging the tubes in the fire-space that the burning fuel will surround the horizontal parts of the tubes and a portion of the perpendicular parts, substantially as described, for the purposes set forth.

3. Extending the tubes downward which pass through the fire-space after they leave said space, and terminating them perpendicularly in the water-space, so as to prevent or retard the water which is highly heated or the steam generated in the tubes from escaping at the lower end, substantially as described.

CHARLES MOORE.

Witnesses:

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