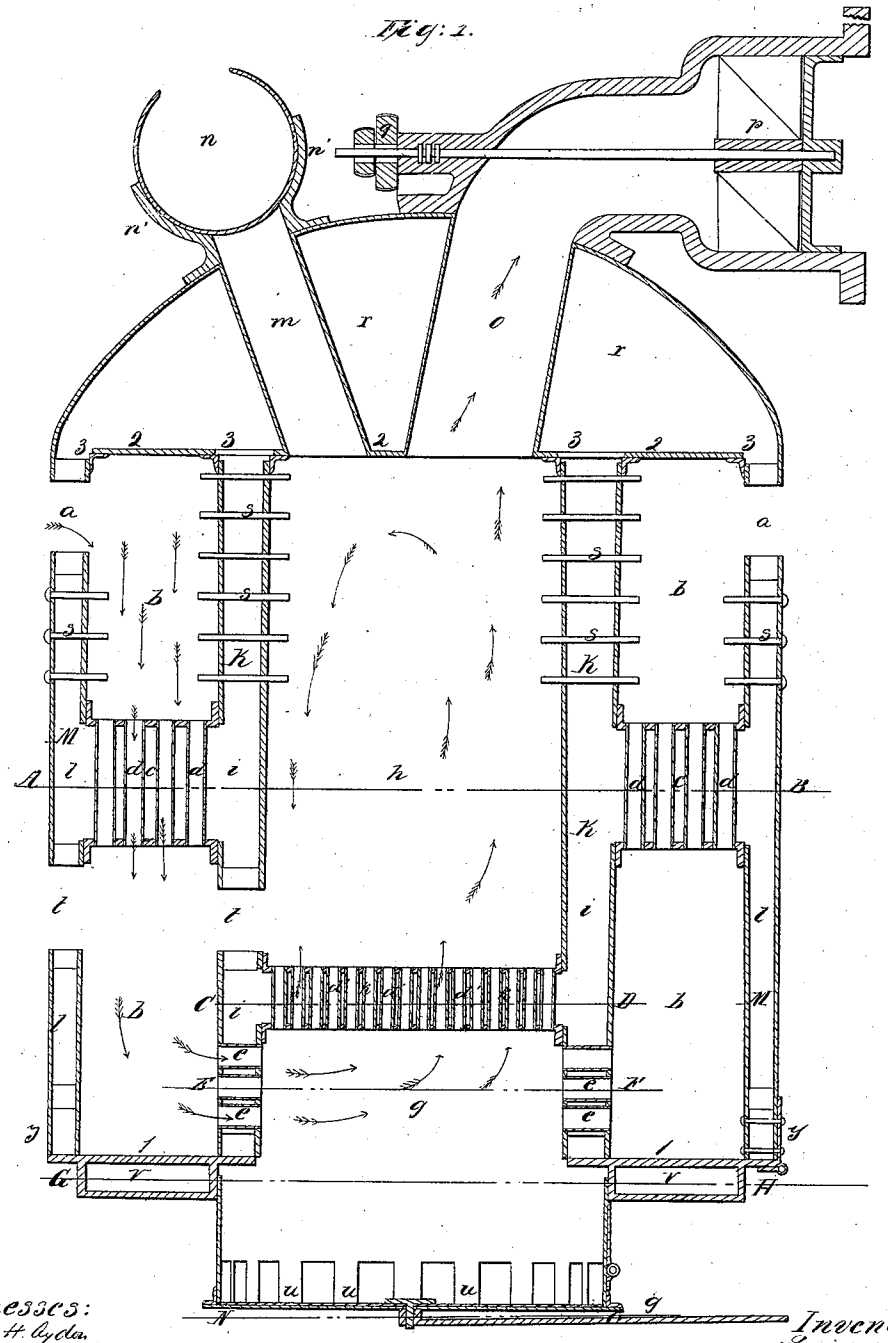
3 Sheets. Sheet 1.

L. E. C. Martin,

Steam-Boiler Fire-Tube.

No. 43,749. Patented Aug. 2, 1864.

Fig: 1.



Witnesses:
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Inventor:
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Steam-Boiler Fire-Tube.

No. 43,749. Patented Aug. 2, 1864.

Fig: 3.

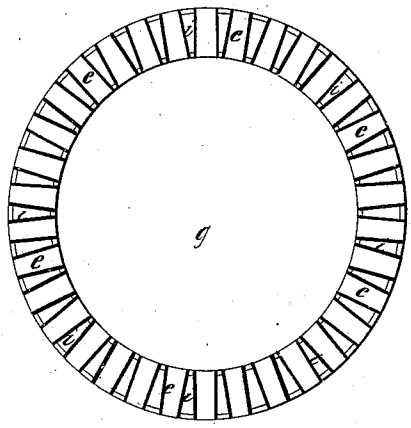
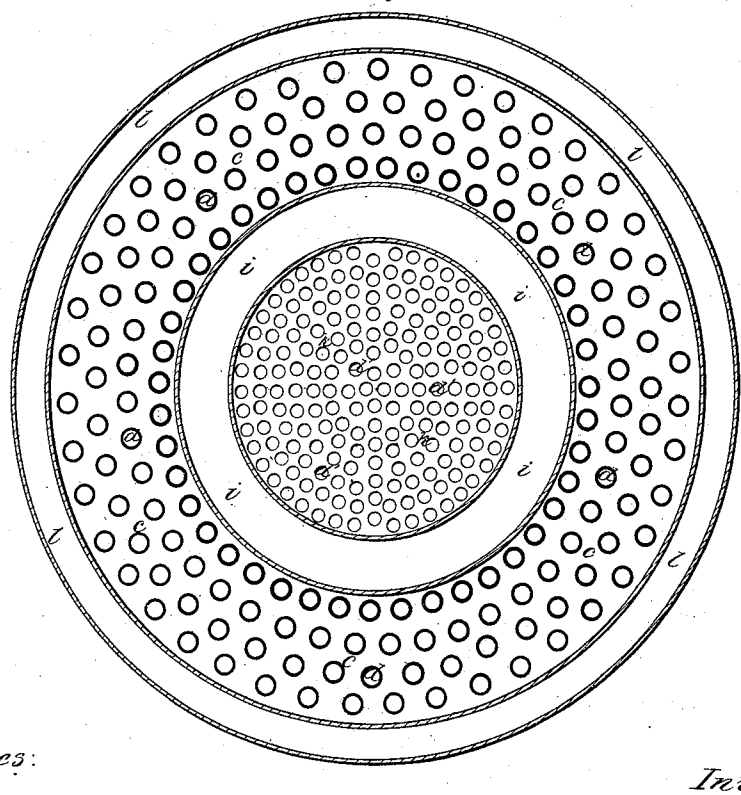


Fig: 2.



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3 Sheets. Sheet 3

L. E. C. Martin,

Steam-Boiler Fire-Tube.

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Fig: 4.

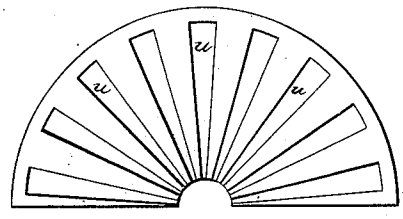
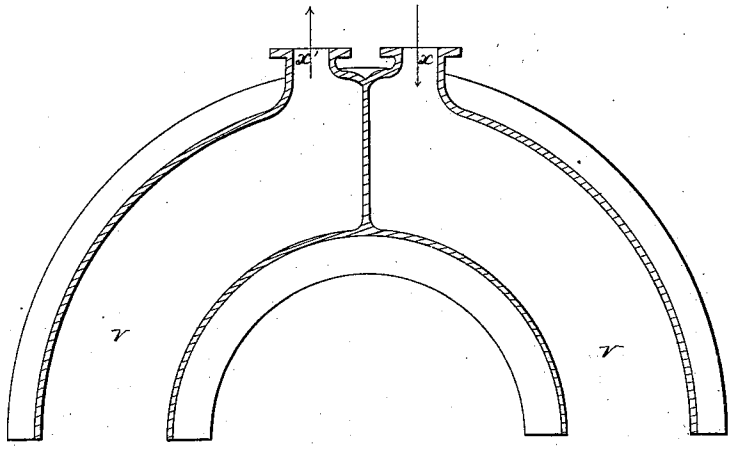


Fig: 5.



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

LOUIS EMILE CONSTANT MARTIN, OF LONDON, ENGLAND.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **43,749**, dated August 2, 1864.

To all whom it may concern:

Be it known that I, EMILE MARTIN, of the city of Paris, in the Empire of France, have invented certain new and useful Improvements in Boilers for Generating Steam; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a vertical central section through the apparatus. Fig. 2 is a horizontal section through Fig. 1 at the line A B and C D. Fig. 3 is a horizontal section through the line E F of Fig. 1. Fig. 4 is a horizontal half section through the line N O of Fig. 1, and Fig. 5 is a horizontal half-section through the line G H of Fig. 1.

The same letters refer to the same parts in each of the figures of the drawings.

It is the object of my invention to construct a compact boiler that shall have a large water-space and expose the greatest proportion of its surface to the direct action of the heat used to vaporize the water therein, and thus economize fuel, to which end my invention consists, first, in the construction of two vertical annular boilers, the one placed concentrically within the other, and uniting them with an annular horizontal water-space, having vertical heating-tubes therein to permit the free circulation of the caloric generated from the fuel in combustion between the boilers and cause these products to envelop the central one; second, in combining a horizontal water-space, having vertical heating-tubes within the inner boiler, with horizontal heating-tubes passing through the inner boiler below the water space, to permit the passage of the caloric generated from the fuel between the boilers beneath the water-space and through the vertical heating-tubes thereof; third, in the combination of an annular combustion-chamber between the boilers, with a central combustion chamber within the inner boiler, when the caloric from the former is caused to pass through the latter; fourth, in the combination of a fan and register with the central chamber in such manner as to control the circulation of air and the rapidity of combustion in both the annular and central combustion-chambers; and, fifth, in combining with the annular combustion-chamber between the boilers an annular chamber for superheating steam, whether generated in the boiler or elsewhere.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation,

A central vertical annular boiler, K, is made from two metallic cylinders, suitably secured together at the bottom upon an annular plate, 1. A second annular vertical boiler, made like the first, but of larger diameter, is placed around the inner boiler and secured at its lower end to the outer edge of the plate 1. At their top both these boilers are attached by each of their cylinders to a circular plate, 2, that constitutes the bottom of the steam-chamber *r*, into which both the boilers open at 3 freely, the steam chamber being divided by a pipe, *m*, through which fuel is passed from the cylindrical feed-box *n* to the central combustion-chamber, *h*, and an escape flue or pipe, *o*, through which passes the exhaust-draft created by the fan *p*. The central combustion-chamber, *h*, terminates on a diaphragm water space that is placed horizontally therein, opening into the boiler K, and having numerous heating-tubes passing vertically through it, as shown on the red line C D of Fig. 1 in section, and in plan in Fig. 2, where *k k* indicates the upper plate of the water space, and *d' d' d'* the heating-tubes which pass through it. Below the water-space in the central boiler horizontal pipes or heating-tubes *e e* pass through the boiler from the annular combustion chambers *b b* into the air-space *g*, as shown in Fig. 3, beneath which air space is situated the register *u*, for controlling the admission of air to the central combustion chamber. One-half of the register is shown in Fig. 4, the other portion being attached to and moved by the rod 5, passing through O of Fig. 1. Rods *s s* pass through and project beyond the outer and inner walls or cylinders of the central boiler into both combustion-chambers, so that their projecting ends may be heated and more rapidly vaporize the water in this portion of the boiler. These bolts *s s* may also be made to project from the inner walls of the outer boiler into the combustion chamber *b b*, as shown in the drawings, for the same purpose. The outer and inner boilers, K and M, are united by the annular water-space, shown in section on the line A B of Fig. 1, and in plan in Fig. 2,

where *c* represents the upper plate of the water-chamber, and *d* the vertical heating-tubes that pass therethrough. The outer and inner boilers, M and K, are separated by an annular combustion chamber, *b b*, the top of which is closed by the plate 2 of the steam-chamber, and the bottom by the plate 1, on which the cylinders K and M are secured. The upper portion, or that above the water-space of the combustion-chamber *b b*, is provided with a door at *a*, which may have a register to introduce the fuel and regulate the draft, and both the outer and inner boilers have a man-hole, as shown at *t t* in the drawings. The air-space *g* beneath the central cylinder may have a door to give access between the water-space and register, and the outer boiler may have a door, *y*, near the bottom, to remove any ashes that may accumulate in the lower division of the annular combustion-chamber *b b*. A steam-superheating chamber is attached to the bottom of plate 1 and situated immediately beneath the combustion-chamber *b b*, as shown at *v* in Fig. 1, and in Fig. 5, where *x* forms the entrance-opening, and *x'* the escape opening for the steam.

It is obvious that the chamber *v* may be cast with the bottom plate or riveted thereto when the bottom plate, 1, is made of sheet metal.

For the supply of fuel to the central combustion-chamber I attach to the outer side of the steam-chamber a semi-cylindrical rest, *n'*, which surrounds the supply-pipe. Within the rest *n'*, and made to fit it neatly, is placed a drum, *n*, of any desired ascertained capacity, to register the quantity of fuel consumed in the central combustion-chamber. The drum *n* is closed on all sides but one, where an opening is left large enough to receive the fuel and discharge it into the combustion-chamber. It is rotated on pivots or studs that pass through the center of its heads and the heads of the seat *n'*; or it may be made to rest in and rotate on the rest *n'* in proper flanges.

It is obvious that my boiler must have a supply-pump, safety-valve, steam-gage, &c., and that these may be of the most approved of the several kinds in public use, and it is also manifest that a feed-measuring cylinder may be used for the supply of fuel to the annular combustion-chamber when it is desired to ascertain the consumption of fuel for my boiler for any given time.

To operate my boiler it is only necessary to fill the central and outer boiler and water-spaces with the proper quantity of water and ignite the fuel in the combustion-chambers. The heated products of combustion from the chamber *b* will pass around the internal surface of cylinder M and the external surface of cylinder K through the tubes *d d* in the connecting water-space and the pipes *e e* in the central boiler into the air-chamber *g*, and up through the tubes *d' d'* of the central water-space, where they meet and unite with the caloric generated from the fuel in chamber *h*, and after circulating through and around this chamber escape through the pipe *o* to the smoke-stack, as shown by the red arrows in Fig. 1, the draft being altogether under the control of the registers and fan, there being no air admitted into the central chamber, save what mingles with the fuel passed through the pipe *m*, for the drum closes this pipe while being filled, and leaves no opening from the pipe when turning or when turned to empty its charge. Thus the central boiler is surrounded by caloric on all sides, and the utmost economy of fuel effected.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. Constructing a steam-boiler by combining a central with an external boiler and uniting them by a tubular water-space, substantially as and for the purpose set forth.

2. The combination of the central horizontal water-space, having vertical heating-tubes within the central boiler, and the horizontal heating-tubes passing through the central boiler, substantially as and for the purpose set forth.

3. The combination of an annular combustion-chamber between the boilers with a central combustion-chamber, so that the heated products of combustion from the former shall pass through the latter, as and for the purpose set forth.

4. The combination of a fan and the register with the central combustion-chamber, substantially as described, to regulate the draft through the chamber and the quantity of combustion in both chambers, as set forth.

5. The combination of the annular combustion-chamber between the boilers with the base-plate of the whole boiler and the annular chamber beneath the plate for superheating steam, substantially as and for the purpose set forth.

EMILE MARTIN.

Witnesses:
ENOCH H. AYDON,
JOHN SULMAN.