(No Model.)

J. B. DE BARTHE.

BOILER.

No. 396,731. Patented Jan. 29, 1889.

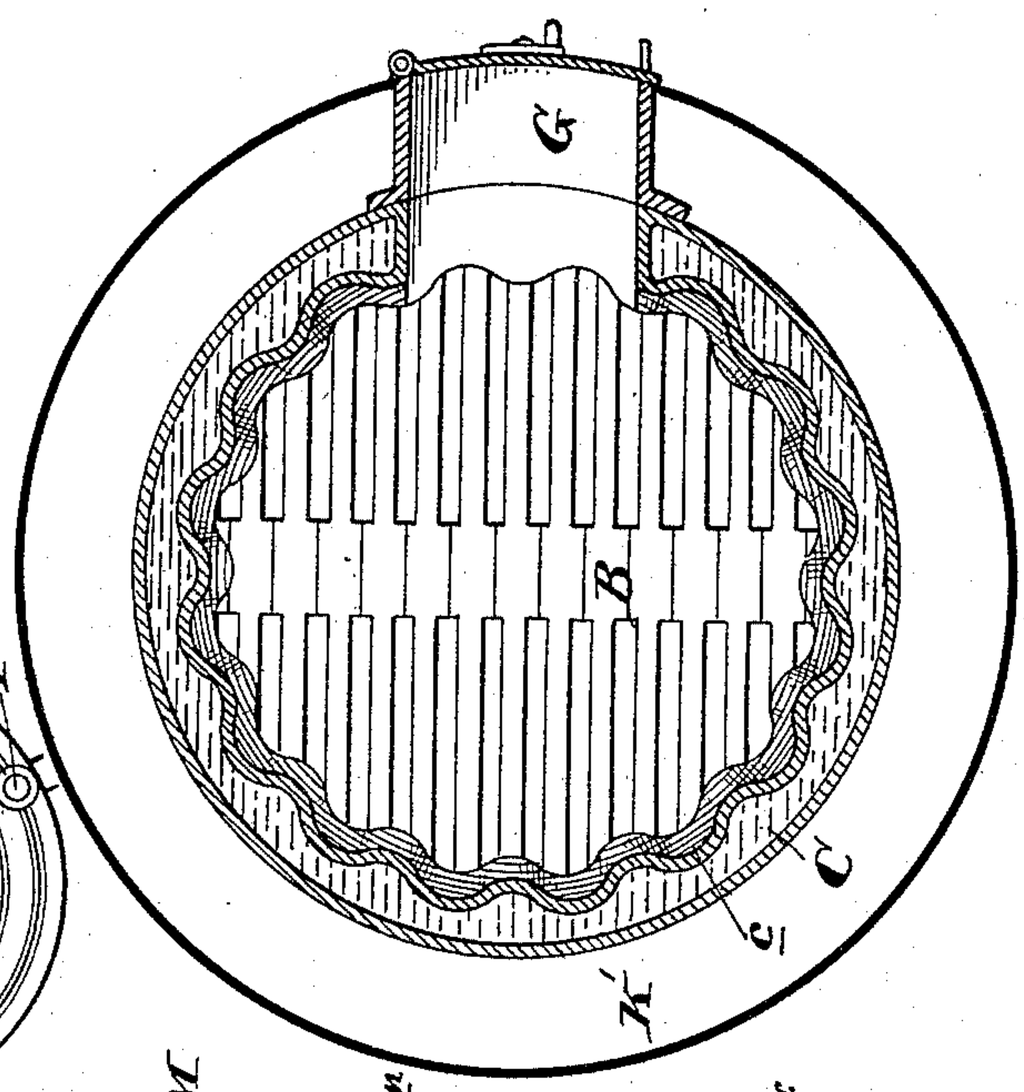

FIG. 2

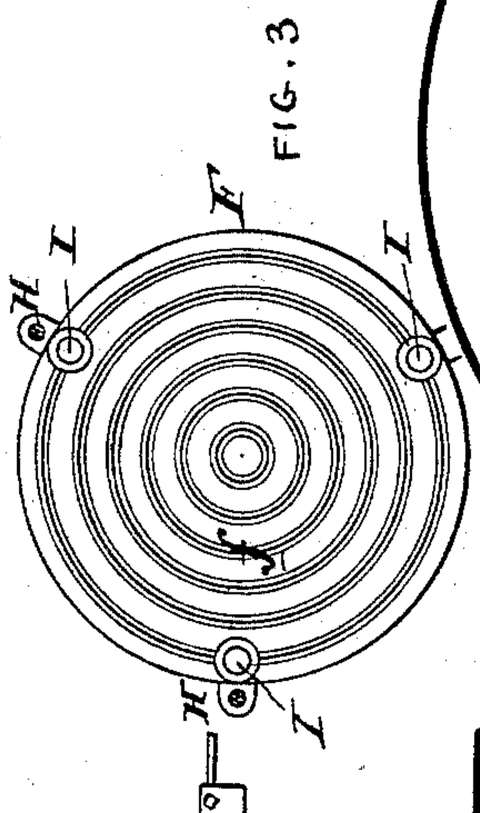

FIG. 3

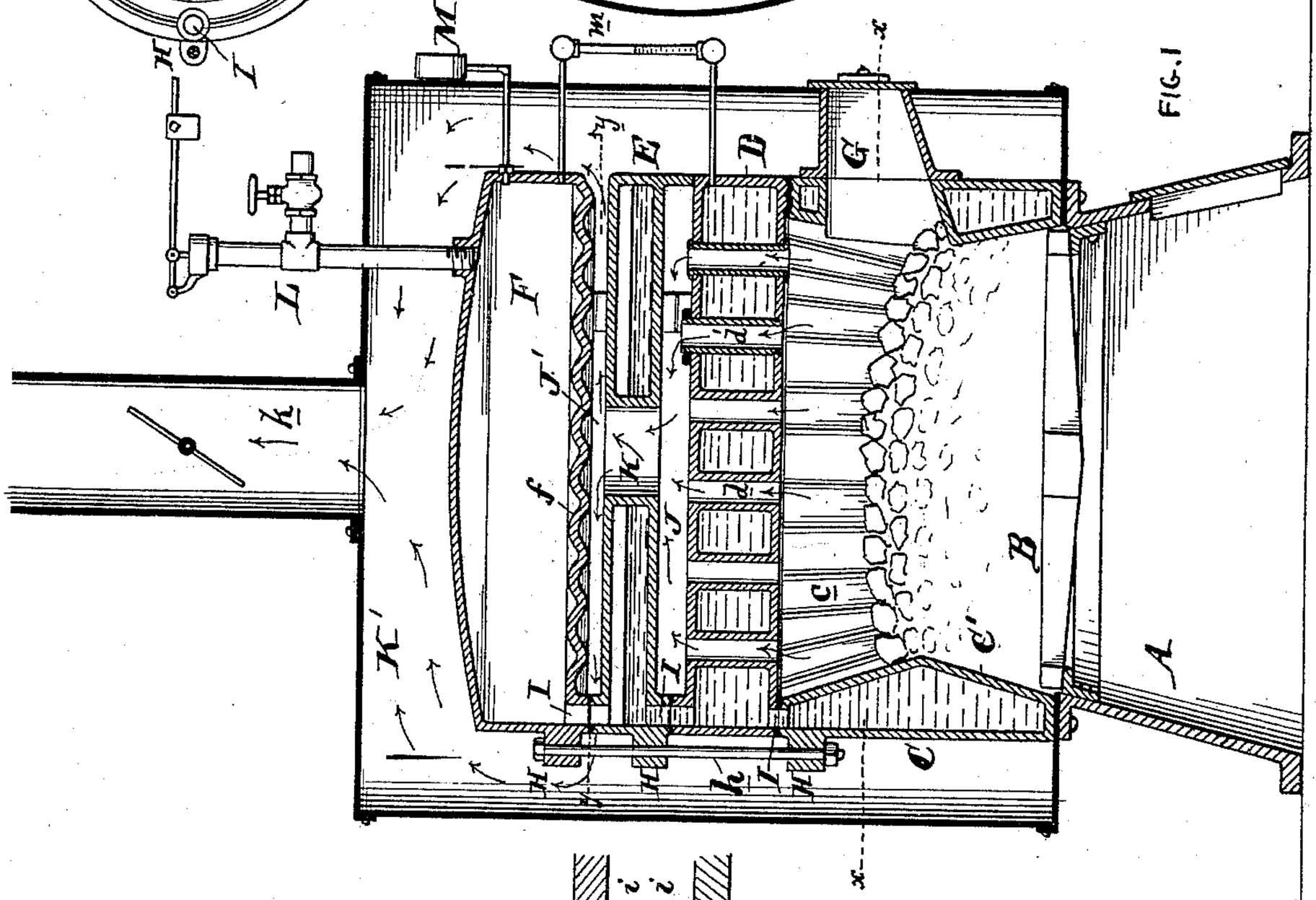

FIG. 1

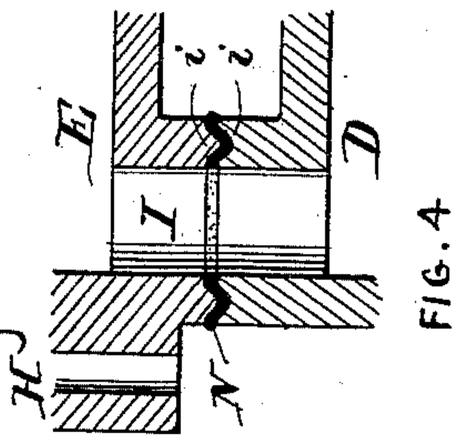

FIG. 4

Witnesses:
Henry Drury
C. W. Breckinridge

Inventor:
John B. DeBarthe.
By his Atty
Thos. Drury

UNITED STATES PATENT OFFICE.

JOHN B. DE BARTHE, OF NORTH WALES, PENNSYLVANIA.

BOILER.

SPECIFICATION forming part of Letters Patent No. 396,731, dated January 29, 1889.

Application filed August 31, 1888. Serial No. 284,236. (No model.)

To all whom it may concern:

Be it known that I, JOHN B. DE BARTHE, of North Wales, county of Montgomery, and State of Pennsylvania, have invented an Improvement in Steam and Hot-Water Boilers, of which the following is a specification.

My invention relates to steam and hot-water boilers; and it consists of certain improvements, which are fully set forth in the following specification, and shown in the accompanying drawings, which form a part thereof.

My invention contemplates the construction of the boiler especially adapted to heating purposes in sections formed of cast-iron adapted to hold water or steam and united by necks or flues, the lower of said sections forming the fire-box, the middle section having tubes, and the upper section acting as a steam-dome and superheater.

The novelty in the invention consists in the general features fully set out in the specification hereinafter.

A boiler of this kind is adapted for low-pressure steam only, and is especially notable for cheapness of construction and large heating-surface, and consequent high degree of efficiency.

In the drawings, Figure 1 is a sectional elevation of my improved boiler. Fig. 2 is a cross-sectional view of the same through the line *x x* of Fig. 1. Fig. 3 is an inverted plan view of the superheater or steam-dome section corresponding to line *y y* of Fig. 1. Fig. 4 is an enlarged sectional view of a portion of Fig. 1, showing the method of uniting the sections of the boiler together for the passage of steam and water.

A is the ash-pit, and B the grate.

C is the fire-box section, made cylindrical in shape and like a water-back. This fire-box has its lower portion, C′, inclining outward and its upper part, *c*, inclining inward in descending, and between these inwardly and outwardly inclining walls and the external wall of the fire-box is formed the water-space. The upper portion, *c*, I prefer to make corrugated to present a greater heating-surface, and the lower portion, C′, may be similarly constructed, though I do not consider it necessary.

D is a cylindrical section of cast-iron provided with a number of tubes, which may be either cast in it, as at *d*, or made independent and secured in it, as shown at *d′*.

E is a similar section of cast-iron having a central flue, K. This section E has a flange around its lower portion extending downward for forcing the products of combustion from tubes *d* to pass to the flue K, and is also provided with necks I, forming passage-ways into the interior of the section E. The section D is similarly provided with these necks I, which fit under the necks of the section E, and thus form a passage-way for the water from the section D to the interior of the section E, while the products of combustion pass from the fire-box through the tubes *d* into the compartment J, between the sections D and E, and thence pass through the flue.

F is a cast-iron cylindrical section forming a steam-dome or superheating-compartment, and has its lower face, *f*, preferably corrugated to present a greater heating-surface, as shown in Figs. 1 and 3. This section F is also provided with necks I on its lower face, which fit upon similar necks I on the upper face of the section E, and thus form passage-ways for the steam or water from the section E to the superheating-section F. The number of the necks I forming the passage-ways for the steam and water from one section to another is, of course, immaterial to my invention, though I prefer in practice to use three, as shown.

The sections F E and the fire-box section C are provided with lugs H on the outer portions, by which they are tightly clamped together through the mediation of bolts or rods *h*. Of course the particular location or number of these lugs is unimportant, though they would be arranged at least close to the necks; but any other means may be employed to clamp the sections together. The necks I between the sections E and F form a compartment, J′, between these two sections open into the outer shell, K′, whence the products of combustion emerging from the flue K pass into the outer shell, K′, and thence to the smoke-stack *k*, having during their passage completely enveloped the steam-dome or superheating-section F.

L is a steam-pipe, by which the steam is conducted for use from the steam-dome or superheating-section F to the heating apparatus.

M is a steam-gage, and *m* a water-gage.

While I prefer to use three sections, F, E, and D, as shown, more of the sections E and D may be used, if desired, to increase the heating-surface and evaporation capacity.

The necks or flues I, by which the passages for the water and steam are made from one section to another, I prefer to construct in the manner shown in Fig. 4, with projections and indentations or circular corrugations *i* in the opposite parts, and between these I place an asbestus packing, N, so that when the sections are clamped together these passage-ways are water and steam tight and unaffected by the heat. By this construction the sections are connected together and made steam and water tight at the necks I, preventing leakage, and that, too, without expensive fitting.

I am enabled to take the castings as they come from the foundry and put them together into an operative boiler. The asbestus is non-combustible, and hence is a good packing; but any other substance may be used. While the corrugations *i* in the necks I are desirable, they are not at all necessary, and may be dispensed with, if desired, and flat surfaces employed instead.

The lower part of the casing K′ protects the sections C, D, and E against chilling effects of drafts, and the upper part acts as a smoke-flue or casing around the superheating-section F.

My invention is applicable to hot-water generating and circulating boilers, as well as for steam purposes.

The operation of my invention will be readily understood from this description. The products of combustion from the fire-box pass up through the tubes *d* into the closed compartment J, converting the surrounding water into steam, which passes up through the passage-ways or necks I into the superheating-section F. The products of combustion are then caused to pass to the central flue, K, whence they emerge in the compartment J′ and pass out in all directions under the face of the superheating-compartment F, thereby more effectively superheating the steam.

I do not limit myself to the mere details of construction here shown, as it is apparent that they may be varied without departing from the principles of my invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in a steam-boiler, of a fire-box section having its interior formed with walls inclining inwardly at the top and outwardly at the bottom on descending, and forming a water-back, the upper part of said section having its walls formed with corrugations, steam and water sections above said fire-box section, provided with flues or passage-ways for the passage of water and steam from said water-back into said steam and water sections, flues through said steam and water sections opening into said fire-box section, a superheating-section surmounting said steam and water sections and provided with openings into the topmost of them, and means, substantially as described, to clamp said sections together.

2. The combination, in a steam-boiler, of a fire-box section having its interior formed with walls inclining inwardly at the top and outwardly at the bottom on descending, and forming a water-back, the upper part of said section having its walls formed with corrugations, steam and water sections above said fire-box section provided with flues or passage-ways for the passage of water and steam from said water-back into said steam and water sections, flues through said steam and water sections opening into said fire-box section, a superheating-section having a corrugated lower surface surmounting said steam and water sections and provided with openings into the topmost of them, and means, substantially as described, to clamp said sections together.

3. In a steam-boiler, the combination of a fire-box section having its interior formed with walls inclining inwardly at the top and outwardly at the bottom on descending and forming a water-back, a water-section opening into said water-back, located above said fire-box, and provided with a series of tubes passing through it opening from said fire-box, a second water-section located above said tube-section and opening into it provided with a central flue for the passage of the products of combustion, said sections having a closed compartment between them, whereby the products of combustion which are divided in passing through said tubes are again collected together in passing through the central flue, and a superheating-section opening into said water or steam sections located above said sections and having a space or compartment between it and the upper of said sections provided with lateral outlets for the products of combustion, and means, substantially as described, to clamp said sections together.

4. The combination, in a steam-boiler, of a fire-box section having a water-back, a water-section opening into said water-back, located above said fire-box section, and provided with a series of tubes passing through it opening from said fire-box and having necks upon its upper surface, a second water-section having a single central flue and provided with necks upon its upper and lower surfaces, and a downwardly-extending flange adapted to rest upon said first section, so that the necks upon its lower edge will rest upon the necks of the first section, forming passage-ways for water and steam from one section to another, but forming by said flange a closed compartment between said sections, and a steam-dome or

superheating-section provided with necks upon its lower surface adapted to rest upon the necks on the upper surface of said second section for the passage of steam therefrom into said steam-dome, but having an open space between said steam-dome and second section for the escape of the products of combustion.

5. The combination, in a steam-boiler, of a fire-box section having a water-back, a water-section opening into said water-back, located above said fire-box section, and provided with a series of tubes passing through it opening from said fire-box and having necks upon its upper surface, a second water-section having a single central flue and provided with necks upon its upper and lower surfaces, and a downwardly-extending flange adapted to rest upon said first section, so that the necks upon its lower edge will rest upon the necks of the first section, forming passage-ways for water and steam from one section to another, but forming by said flange a closed compartment between said sections, a steam-dome or superheating-section provided with necks upon its lower surface adapted to rest upon the necks on the upper surface of said second section for the passage of steam therefrom into said steam-dome, but leaving an open space between said steam-dome and second section for the escape of the products of combustion, and means, substantially as described, to clamp said sections together.

6. In a steam-boiler, the combination of a fire-box section having its interior formed with walls inclining inwardly at the top and outwardly at the bottom on descending, forming a water-back, and in which both of the said walls are formed with corrugated or fluted surfaces, steam and water sections above said fire-box section, and means, substantially as described, to clamp said sections together.

In testimony of which invention I hereunto set my hand.

JOHN B. DE BARTHE.

Witnesses:
A. D. JOHNSON,
F. LIGHT, Jr.