

No. 609,771.

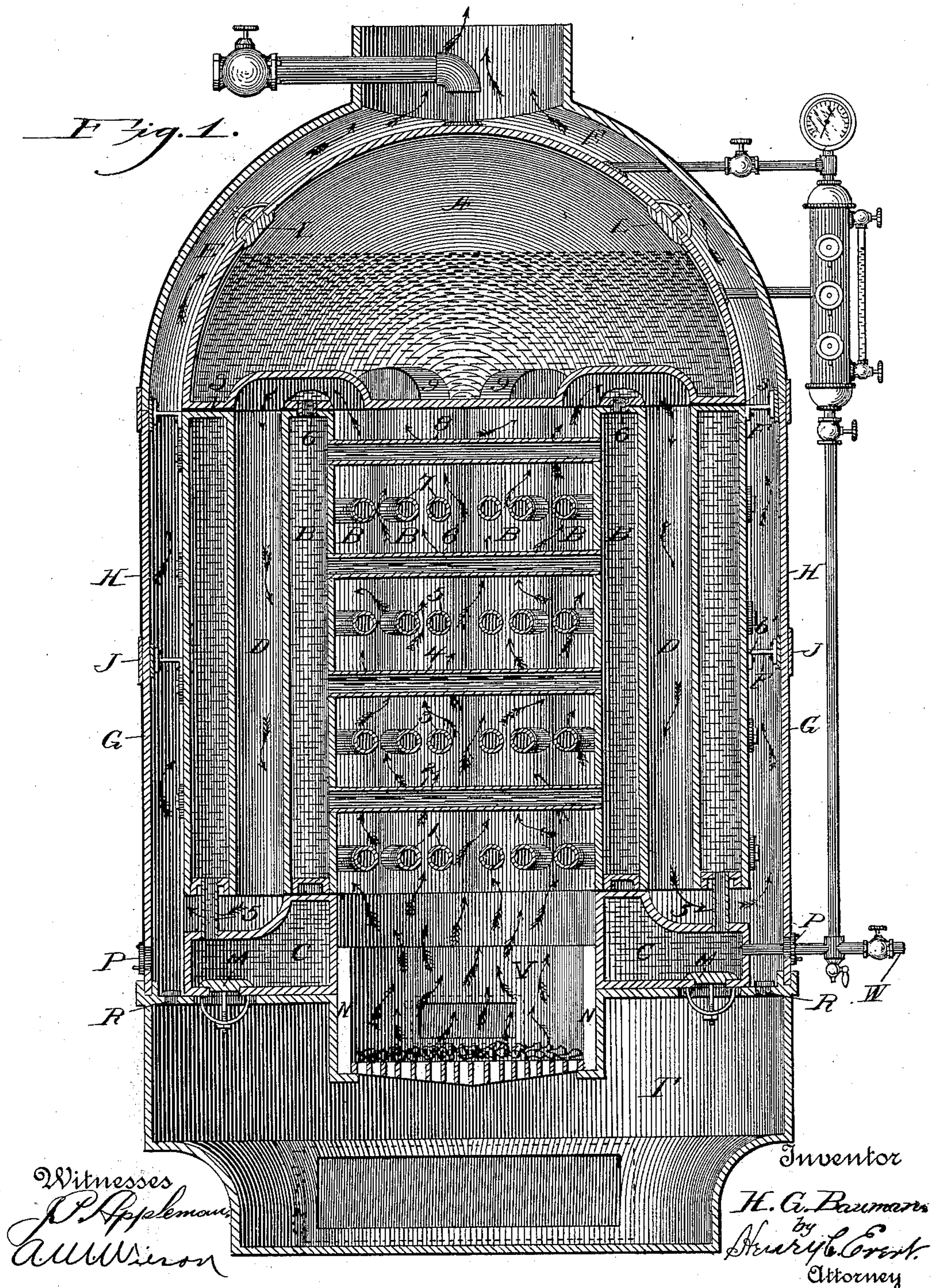
Patented Aug. 30, 1898.

H. G. BAUMAN.  
STEAM AND HOT WATER BOILER.

(Application filed July 14, 1897.)

(No Model.)

2 Sheets—Sheet 1.





**No. 609,771.**

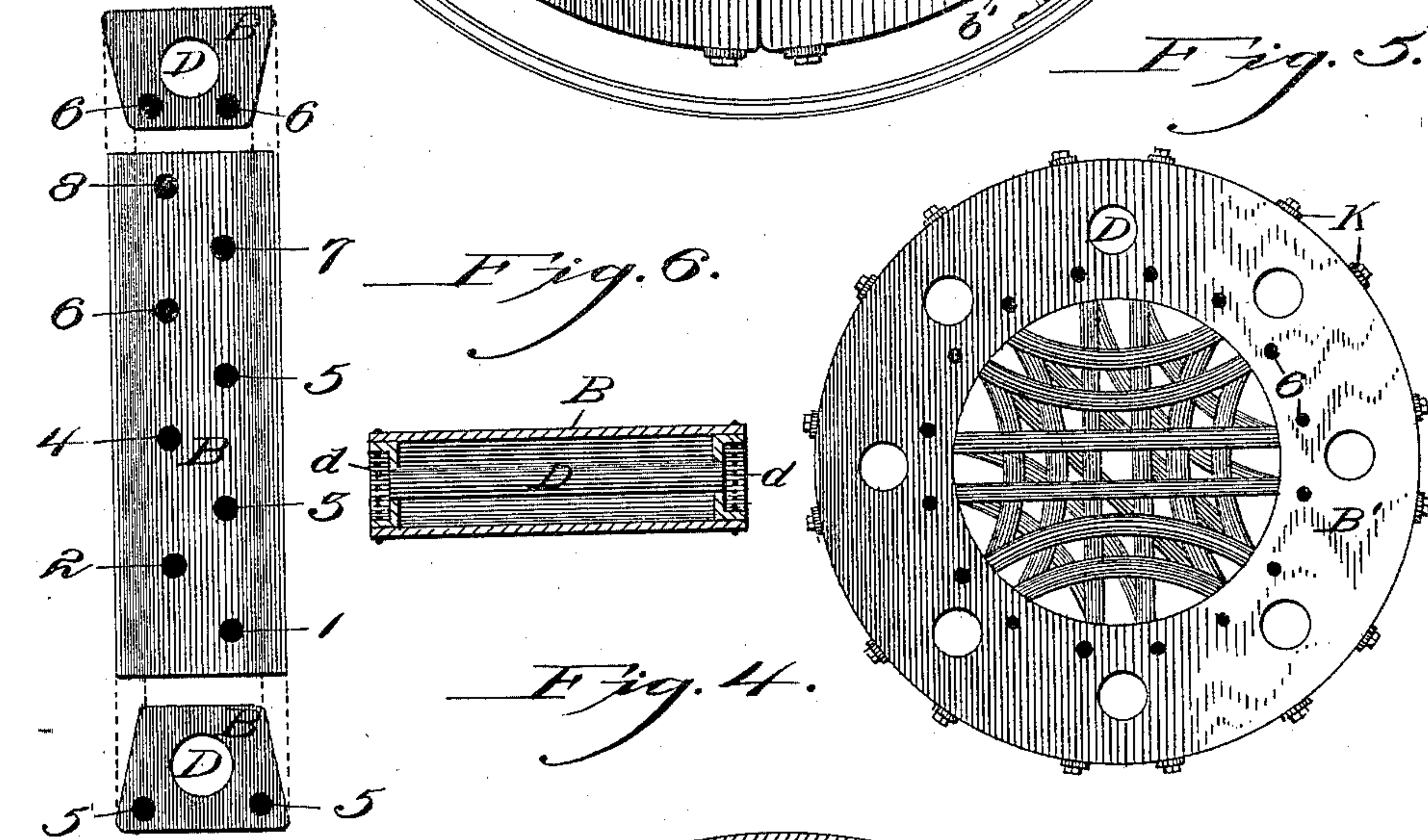
**Patented Aug. 30, 1898.**

**H. G. BAUMAN.**  
**STEAM AND HOT WATER BOILER.**

(Application filed July 14, 1897.)

(No Model.)

**2 Sheets—Sheet 2.**



Witnesses  
J. P. Appleman  
A. W. Wilson

Inventor  
H. G. Bauman.  
by  
Navy C. Evert.  
Attorney



# UNITED STATES PATENT OFFICE.

HENRY G. BAUMAN, OF PITTSBURG, PENNSYLVANIA.

## STEAM AND HOT-WATER BOILER.

SPECIFICATION forming part of Letters Patent No. 609,771, dated August 30, 1898.

Application filed July 14, 1897. Serial No. 644,477. (No model.)

### *To all whom it may concern:*

Be it known that I, HENRY G. BAUMAN, a citizen of the United States of America, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Steam and Hot-Water Boilers, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to certain new and useful improvements in steam and hot-water boilers, and has for its object to provide a water-tube boiler that will be safe from explosion and wherein the details of construction will divide the different parts into small portions.

20 The invention has for its further object to provide a boiler in which the shell or dome, water-leg, and side sections may be composed of open-hearth steel, with tubes of the same material, or for low pressure the dome, water-leg, side sections, and base may be composed of cast iron or steel with wrought iron or steel tubes.

25 The invention further aims to provide a boiler in which the circulation of the water will be very rapid, insuring an equal temperature in all parts, and thereby obviating any strain due to unequal expansion, which serves to deteriorate the strength of the boiler.

30 The invention still further aims to provide a boiler of such construction as to admit of the utilization of a greater percentage of the heat and combustion than is attained through the ordinary construction and to provide an arrangement of the draft-flues, water-leg, and dome whereby the fire and hot gases will entirely surround all the water-surface in the boiler from the time these products leave the grate until the time they are discharged or drawn into the chimney at the top of the boiler.

45 With the above and other objects in view the invention finally consists in the novel construction, combination, and arrangement of parts to be hereinafter more specifically described, and particularly pointed out in the claims.

50 In describing the invention in detail reference is had to the accompanying drawings, forming a part of this specification, and

wherein like letters and figures of reference indicate similar parts throughout the several views, in which—

Figure 1 is a vertical sectional view of my improved hot-water and steam boiler, taken on the line Z Z of Fig. 2. Fig. 2 is a top plan view with dome removed. Fig. 3 shows a side view of one of the sections forming the flues and also a plan view of each end of the section. Fig. 4 is a horizontal sectional view of a portion of the shell and dome. Fig. 5 is a top plan view with dome removed, showing a modified form of flue. Fig. 6 is a longitudinal sectional view of one of the sections, showing a modified form of securing the tube therein.

Referring now to the drawings by reference letters and figures, A represents the dome at the top of the boiler and is shown cast in one piece, in the bottom of which are cast recesses 9, which serve to furnish egress for the hot gases in the combustion-chamber to the flues D, which are arranged in the center of the sections B. These sections B may be made of cast steel or iron with the flues cast in the center, or the cast flue may be omitted and wrought iron or steel tubes may be expanded into the top and bottom of the cast iron or steel sections.

80 In Fig. 6 of the drawings is shown a construction whereby the outer shell of sections B is made of wrought-steel with ends of same material. In this construction the ends of the sections B are flanged and riveted into the outer shell of section B, and the flue D is expanded into the ends, as shown at *d d*. Suitable hand-holes L are provided in the dome A for the purpose of inserting the expander into the top of the short tubes 6 and for cleaning out the dome when required, and this dome may also, if desired, be composed of sheet-steel formed in two sections, which would be pressed into the same shape as the cast section shown in Fig. 1.

95 The base or water-leg C of the boiler may be composed of cast steel or iron, or it may be made of two sections of pressed steel in the same manner as the dome A, said base or water-leg being provided with hand-holes M for cleansing the same or for inserting the expander into the ends of the short tubes 5.



Extending transversely across the heating-chamber are short tubes 1, 2, 3, 4, 5, 6, 7, and 8, which are expanded into sections B, each row of tubes having two straight and four bent tubes, which describe an arc of a circle. These tubes are inserted through the sections B in the openings provided therefor and which are shown closed by the plugs K. The short tubes 5 at the bottom of section C connect the base C with the sections B, and the short tubes 6 connect the top section C with the dome A. An asbestos or other suitable gasket S is placed on top of the sections B, between the same and the dome A, and also between the lower end of the sections B and the water-leg C, for the purpose of making the draft-flues tight and preventing the gases from leaving their proper channels. For this same purpose asbestos strips Y are also placed between each of the sections B.

The fire-box V may be of any suitable construction and is preferably lined with fire-brick, tile, or other suitable material, as shown at N, which will serve to protect the surrounding parts from a direct fire. The sections B are provided with lugs b', cast on the sides thereof, to which are fastened the brackets F, which form the support for a flat iron ring or band I, to which is fastened the casing G, composed of hair, felt, and asbestos, or other suitable material of a like nature, and having an outer casing or covering H, preferably composed of iron and held in place by the brass or iron bands J.

For the purpose of cleaning out the dust and soot which may accumulate on top of the water-leg C, I have provided in the casing a hand-hole P, when by lifting the covering off the opening R the dust may be readily deposited into the ash-pit T.

In Fig. 2 I have shown the top of the sections B with one of same in section to show the water-line, and I also illustrate in this view the manner of placing the tubes 1 2 3 4, &c. These tubes, as well as the expander for fastening the same, are inserted through the openings at plugs K. The sections B are shown as provided with but two openings in their top for the reception of the short tubes 6, but four tubes may be used to better advantage. By this arrangement of the tubes 1, 2, 3, and 4 it will be observed that the sections B are not only connected with their opposite sections, but each section is also connected with every section in the boiler.

It will be observed also that for the purpose of illustration I have shown but eight sections and eight rows of tubes; yet I do not wish to limit myself to this amount, for as many rows of tubes and as many sections may be employed as is necessary to increase the capacity of the boiler to any practical size.

In Fig. 5 I have shown a modification of the construction illustrated in the other views. In this construction the sections are dispensed with and a shell B' is substituted therefor, all

other parts of the construction being the same.

The operation will, it is thought, be readily apparent from the views shown and from the foregoing description, and an extended detailed description of the same is thought unnecessary, as it will be observed that the water flowing into the water-leg C through the inlet W, fills said water-leg and passes through the tubes 5 into the sections B or the shell B', as the case may be, equalizing the tubes 1 2 3 4 5 6 7 8 and passing through short tubes 6 to the dome A. The heat from the products of combustion passing upward from the grate comes in contact with the cross-tubes, passes through the recesses 9 into the flues D, and from there to the draft-space E, where it is emitted to the chimney at the top of the boiler.

I desire to call particular attention to the advantage obtained by constructing the boiler in sections, as by this means the same may be easily handled and taken into a building through any narrow space, which cannot be accomplished where the boiler is set up in the form in which it is to be used before the same is shipped from the factory, and it will also considerably reduce the expense for repairs, as, being composed of small sections, they may be cheaply and readily replaced.

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

1. In a boiler, the combination of the casing, a dome, a series of sections arranged in a circle, tubes extending transversely of the boiler, said tubes connecting said section internally of the boiler in pairs and in series, substantially as shown and described.

2. In a steam or hot-water boiler, a series of sections arranged in a circle, a series of tubes connecting said sections in pairs and in series, said tubes extending transversely of the interior of the boiler, and a suitable dome above said sections and connected thereto, substantially as shown and described.

3. A boiler consisting of a series of sections, tubes connecting said sections in pairs and in series, a dome above said sections, connections between each section and the dome, and a suitable casing for the sections and dome, substantially as shown and described.

4. A boiler consisting of a series of sections, a dome arranged above the sections, nipples connecting each section with the dome, a series of tubes connecting the sections from the inside in pairs and in series, substantially as shown and described.

5. In a boiler, a series of sections, a series of tubes connecting the sections together in series from the inside of the boiler, in combination with a suitable dome, and a casing for said sections and dome, substantially as shown and described.

6. In a boiler the combination of the sections arranged above the water-leg, a dome



arranged above said sections, a series of tubes  
extending transversely of the interior of the  
boiler, said tubes connecting the sections in  
pairs and in series, substantially as shown  
5 and described.

7. A boiler consisting of a series of mani-  
fold sections, a series of tubes connecting the  
sections in pairs and in series, a dome, a base,  
nipples connecting each of said sections with

the dome and base, substantially as shown 10  
and described.

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

HENRY G. BAUMAN.

Witnesses:

W. H. TIMMERMANN,  
THOS. M. BOYD, Jr.