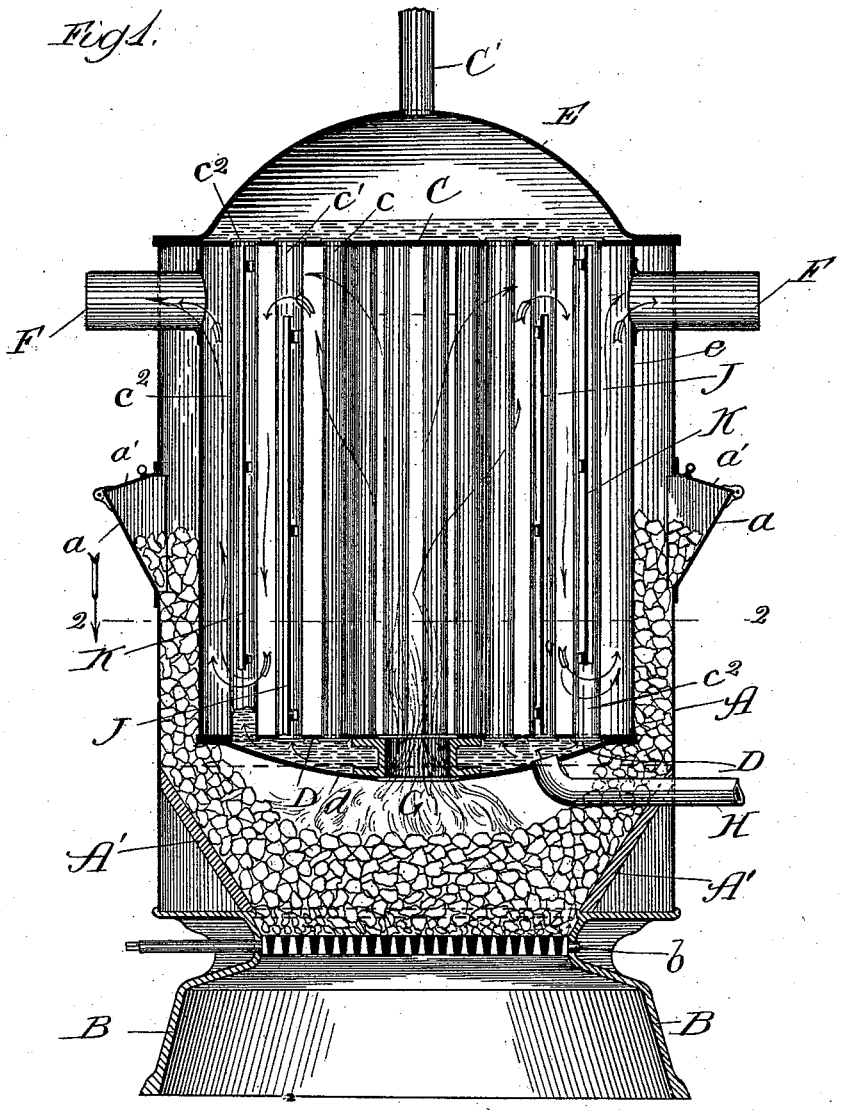
(No Model.) 2 Sheets—Sheet 1.

J. J. LONG.

BOILER.

No. 523,672. Patented July 31, 1894.

Fig 1.



Witnesses:
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(No Model.) 2 Sheets—Sheet 2.

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BOILER.

No. 523,672. Patented July 31, 1894.

Fig. 2.

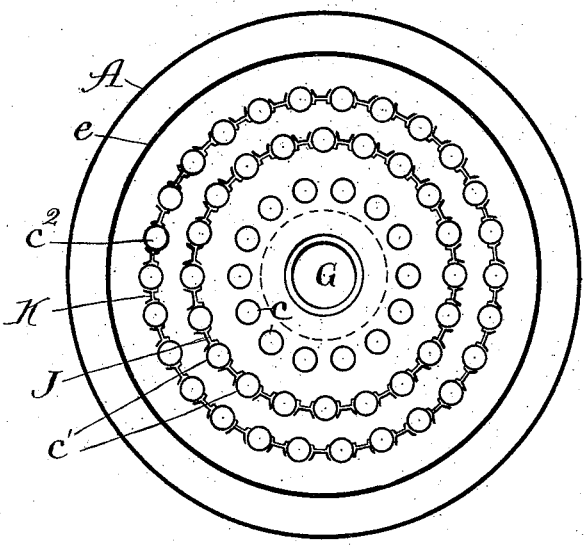


Fig. 3.

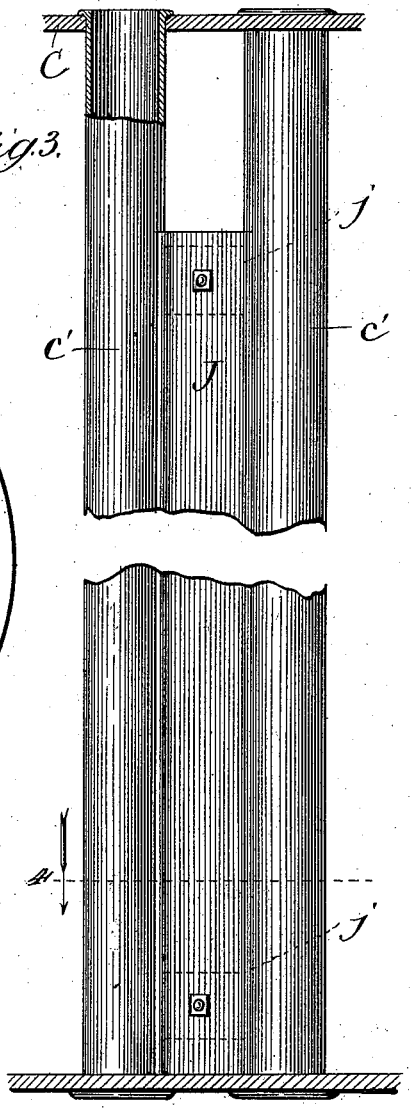
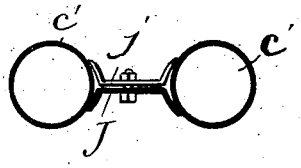


Fig. 4.



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UNITED STATES PATENT OFFICE.

JEREMIAH J. LONG, OF CHICAGO, ILLINOIS.

BOILER.

SPECIFICATION forming part of Letters Patent No. 523,672, dated July 31, 1894.

Application filed December 23 1893. Serial No. 494,517. (No model.)

To all whom it may concern:

Be it known that I, JEREMIAH J. LONG, a citizen of the United States, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Boilers, of which the following is a specification.

The object of my invention is to provide a simple and efficient boiler of the type commonly known as the water tube boiler, and capable of use either for hot water systems or for the generation of steam.

My boiler is designed to secure the advantages of a rapid heating boiler having a perfect circulation, and avoiding the injurious effects of heat, as experienced in other forms of boiler, upon the rolled ends of the water tubes.

By the use of my invention, I am enabled to construct a boiler both durable and economical in construction and operation; and my invention consists in the features and details of construction hereinafter described and claimed.

In the drawings, Figure 1 is a vertical section of my improved boiler; Fig. 2 a cross sectional view of my boiler, on line 2 2 of Fig. 1; Fig. 3 an elevation of two water tubes enlarged to show the partitions therebetween; and Fig. 4 a sectional view, taken on line 4 of Fig. 3.

In constructing my improved boiler, I make preferably a cylindrical outer shell or casing, A, of suitable material—preferably boiler iron—and resting upon any suitable base or support, B. Within the base are arranged the usual grate bars, *b*, with an ordinary fire pot, A′, located above them. The upper flue head, C, is made preferably of iron and adapted to cover the open end of the outer shell, and into it are rolled the upper ends of a series of vertical water tubes, *c c′ c²*, of suitable number and dimensions. Upon the head is secured a curved supplemental head, E, whereby a steam dome or chamber is formed above the flue head and at the top of the boiler. The lower ends of the tubes are in like manner rolled into another flue head, D, to which is secured a similar supplemental head or plate, *d*, forming a water chamber at the bottom of the boiler and below the lower ends of the water tubes. This chamber is situated adjacent to the fire chamber and communicates with the tubes. The rolled ends of the tubes are not, therefore, exposed to the intense heat of the fire, being surrounded with water, and they are consequently rendered more durable in use. Surrounding the tubes I preferably arrange an inner shell or casing, *e*, having openings at its sides and near the top thereof, to accommodate suitable smoke flues, F F, which pass through the outer shell, as indicated in the drawings. Preferably through the center of the water chamber, an opening or flue, G, is provided, allowing communication from the fire chamber to the water tubes and to the interior of the shell.

For the purpose of supplying fuel to the magazine, hoppers, *a*, are located at suitable points around the outer shell and communicate with the interior. These hoppers are normally closed by doors, *a′*, as indicated in the drawings, where the fire chamber and magazine are shown filled with fuel.

A water inlet pipe, H, enters the bottom of the water chamber, and an outlet pipe, C′, is provided at the top of the upper head or dome, or at any other suitable point as desired. This outlet pipe is for the passage of steam or hot water as the case may be, depending upon whether the boiler is used as a hot water boiler or as a steam generator.

The water tubes may be of any desired number, and are arranged in sets or series, preferably along the circumference of circles down from the center of the boiler, that is to say, substantially, though not necessarily, equi-distant from the center, although I do not wish to be understood as unduly limiting myself to such exact location and arrangement of tubes, as some of the tubes of the same series may be arranged nearer to the center than others. Between the tubes of each series are secured partitions, J, K, which are a suitable length shorter than the tubes. These partitions consist of straight metallic strips, having their edges preferably turned at an angle to conform to the shape of the tube. In order to secure these partitions to the tubes, I provide suitable clamps, *j*, arranged preferably near the top and bottom, respectively, and consisting of a short strip, of construction similar to the partitions and clamped thereto by bolts, as shown in detail

in Fig. 4 of the drawings. Any other construction of partition and other means of clamping to the tubes may be adopted and still be within the scope of my invention.

In the drawings I have shown a preferred form of construction of boiler in which the first series of tubes is unprovided with partitions, but the adjacent set or series is provided with partitions, J. These partitions extend to within a short distance from the top of the tube chamber or head, C, leaving a space or passage, while the partitions, K, on the next adjacent series of tubes extend from the top to within a short distance from the bottom thereof, leaving a similar space or passage therebelow. In this manner, there is formed a series of concentric chambers communicating with each other, in such manner that the flames, heated gases, &c., must traverse their entire length before escaping from the smoke flues, F, F. The flames, gases, &c., from the fire chamber pass through the opening, G, striking the first series of tubes in their upward passage, and then pass over the top of the partitions, J, near the top of the boiler, and are then deflected downward between the second and the third series of tubes and returned to the base of the boiler, passing under the partitions, K, entering the next and last chamber, and finding exit through the flues, F, after passing up alongside of the last series of tubes.

Any number of series of water tubes may be used, and thereby a corresponding number of chambers made between the series of tubes.

The advantages secured by my style of boiler will be readily apparent to those skilled in the art of boiler making. One of the greatest difficulties experienced in the use of boilers is the burning out of the tubes where they are rolled into the head, and where the heat which acts directly upon them in all other forms is most intense. In my boiler, the ends of the tubes being surrounded by a water chamber are protected, imparting longer life to the tubes and insuring greater durability to the boiler. Furthermore, with the use of the partitions, I am enabled to secure a larger heating surface, and to utilize the flames, heated gases, &c., to their fullest extent without interfering with the draft. In every respect I claim that my boiler is thoroughly efficient, and simple in construction and operation, most economical in the matter of consumption of fuel, by reason of the partitions between the tubes, and more durable than any other type by reason of the protection afforded to the tubes.

Although I have shown my boiler in the drawings as intended to be used for the generation of steam, it will be understood that it can be advantageously used in connection with hot water systems by simply filling up the boiler and circuit pipes with water, and I contemplate so using it. Nor do I wish to be understood as limiting myself to the precise location and arrangement of the partitions shown in the drawings; and although I have shown more or less precise forms and details of construction, I do not intend to unduly limit myself thereto, except as expressly specified in the claim, as I desire to deviate therefrom, and contemplate changes in form, proportion of parts and the substitution of equivalents, as circumstances may suggest or render expedient, without departing from the spirit of my invention.

What I regard as new, and desire to secure by Letters Patent, is—

In a boiler the combination of a shell, upper and lower drums arranged within the shell, a series of water tubes communicating with the drums, concentric cylindrical partitions arranged among the tubes, said partitions being provided with openings alternately at the top and bottom and a combustion chamber arranged beneath the lower drum, substantially as described.

JEREMIAH J. LONG.

Witnesses:
GEORGE HIBBEN,
SAMUEL E. HIBBEN.