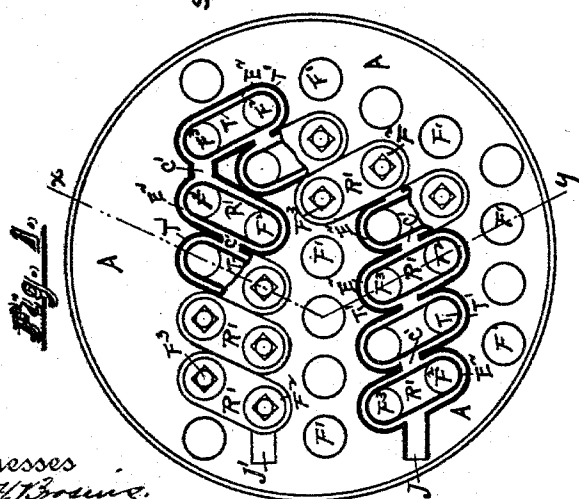
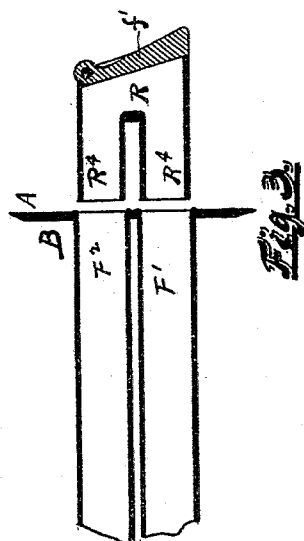
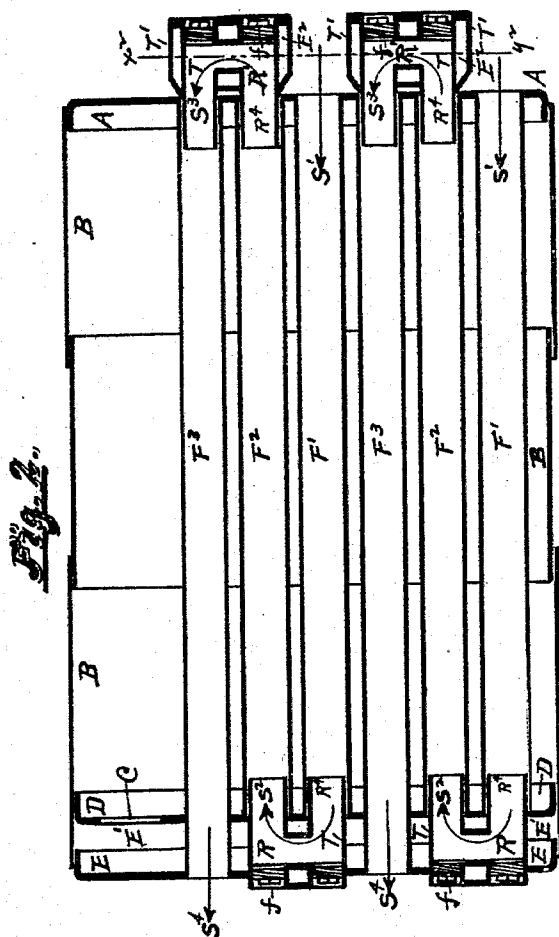


(No Model.)

S. G. BROSIUS.
BOILER.

No. 511,116.

Patented Dec. 19, 1893.



Witnesses
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UNITED STATES PATENT OFFICE.

SAMUEL GLENVILLE BROSIUS, OF SAVANNAH, GEORGIA.

BOILER.

SPECIFICATION forming part of Letters Patent No. 511,116, dated December 19, 1893.

Original application filed May 8, 1893, Serial No. 473,329. Divided and this application filed May 20, 1893. Serial No. 474,853.
(No model.)

To all whom it may concern:

Be it known that I, SAMUEL GLENVILLE BROSIUS, a citizen of the United States, residing at Savannah, in the county of Chatham and State of Georgia, have invented certain new and useful Improvements in Boilers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The object of my invention is to produce a boiler in which provision is made for returning the products of combustion through one or more return flues, whereby the full effect of the heat of the burning gases from such combustion is passed to the water; and producing a great economy in utilization of the heat, which in boilers of the usual construction is allowed to escape; and a further object, is to produce a boiler which will be especially adapted to locomotives. These and other objects are accomplished by constructions hereinafter described and shown in the drawings.

My invention consists of certain novel features of construction and arrangement hereinafter described, and particularly pointed out in the claims.

In the drawings Figure 1, represents an end view of the flue boiler, with parts of the head removed. Fig. 2, is a cross-section of the boiler, taken on the line $x-y$ Fig. 1, and showing the flues and return flue boxes in section. Fig. 3, is a detail view of one of the return flue boxes in section without the water jacket.

Like letters of reference refer to like parts throughout the several views.

The boiler B is provided with fire flues F^1 F^2 F^3 . The flues F^1 receive the products of combustion directly from the furnace, and pass them through the return flue box R^1 to flue F^2 , thence through return flue box R to flue F^3 , and so carry the said products to and fro through the said boiler, while being burned, and before they escape to the stack or chimney, by which means the heat of the products of combustion is brought several

times in contact with the water surrounding the said tubes, thereby causing said products of combustion to give up their full heat to the surrounding water.

As shown in the figures I have constructed a return flue box which is adapted to connect two corresponding flues together, and the said box is secured in place by being forced within the tubes, and held in place by the internal sleeves or extensions which may be made smooth on their exterior R^4 . The caps f at the ends of the flue boxes, by which access is afforded to the flues may be constructed as shown in Fig. 2 or as shown in Fig. 3, in which f' represents a hinged cap which can be raised said caps may be placed in line with the flues and thereby give ready access to the flues. The flue boxes R^1 are provided with the jacket T^1 which with the inner wall T forms a circulation chamber E^2 through which water is passed, being forced through the inlet J and discharged at the outlet J' ; where the flue boxes are formed as shown in Fig. 1 they may be joined and provided with circulation openings C' , so that the flow of water will be continuous through them. The flue boxes R or R^1 may be used as found advisable, either in combination or singly, and on one or both heads; with or without the water box E^1 .

At one end of the boiler as shown in Fig. 2, there is provided a water box E^1 which may be formed by the continuation of the boiler shell and supplemental head E and openings C are provided in the head D , which induce a circulation of water between said box and the main boiler; the said water box in addition to causing a circulation, also protects the return flue boxes R from burning out, by taking up the heat from said boxes. These boxes R may be of any desirable material, such as iron, copper, steel or fire clay, but when under pressure as shown in Fig. 2 they should be made of suitable metal to stand the steam pressure in the boiler.

The arrows S^1 , S^2 and S^3 indicate the course of the products of combustion through the boiler, the arrow S^4 indicating the outlet but the order may be reversed so that the flue F^3 receives, and the flue F^1 discharges. The flues F^3 are secured to the supplemental head

E, and said head is caught or secured tightly around the return flue boxes R.

If desired an additional water box could be arranged in front of head A in a similar manner to that in front of head D.

The water in the jackets surrounding the flue boxes may be in free communication with the boiler, or if desired the feed water can be passed through said jackets and thereby heated on its way to the boiler.

I do not limit myself to the arrangements and constructions as shown, as the same may be varied without departing from the spirit of my invention.

This application is a division of my application for improvements in boilers filed May 8, 1893, Serial No. 473,329.

Having thus ascertained the nature and set forth the construction of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a steam boiler, the combination with the flues of a return flue box provided with extensions smooth on the exterior by which said box is secured in place, in the ends of said flues, substantially as set forth.

2. In a steam boiler, the combination with the flues, of a return flue box, provided with extensions, smooth on the exterior, by which said box is secured in place in the ends of said flues, the said flue box having an opening or openings which permit ready access thereto, substantially as set forth.

3. In a steam boiler, the combination with the flues, of a return flue box adapted to connect the corresponding ends of two flues, and an independent water jacket surrounding said return flue box, substantially as set forth.

4. In a steam boiler, the combination with

the flues of return flue boxes adapted to connect the corresponding ends of two flues, and a water jacket surrounding each return flue box and in communication with a water jacket of another flue box, substantially as set forth.

5. In a steam boiler, the combination with the flues, of return flue boxes adapted to connect the corresponding ends of two flue boxes and having caps which permit access thereto, and a water jacket surrounding each return flue box, substantially as set forth.

6. In a steam boiler, the combination with the flues, of return flue boxes, each adapted to connect the corresponding ends of two flues, and water jackets surrounding said return flue boxes, said jackets being connected in series, substantially as set forth.

7. In a steam boiler the combination with the flues, of return flue boxes, each adapted to connect corresponding ends of two flues and water jackets surrounding said return flue boxes, the said jackets being provided with circulation openings and connected in series substantially as set forth.

8. In a steam boiler, the combination with the flues, of a return flue box, provided with extensions, smooth on the exterior, by which said box is secured in place in the ends of said flues, the said flue box having an opening or openings which permit ready access thereto, and are provided with suitable caps, substantially as set forth.

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

SAMUEL GLENVILLE BROSIUS.

Witnesses:

E. H. BROSIUS,

SAML. HARTMAN.