

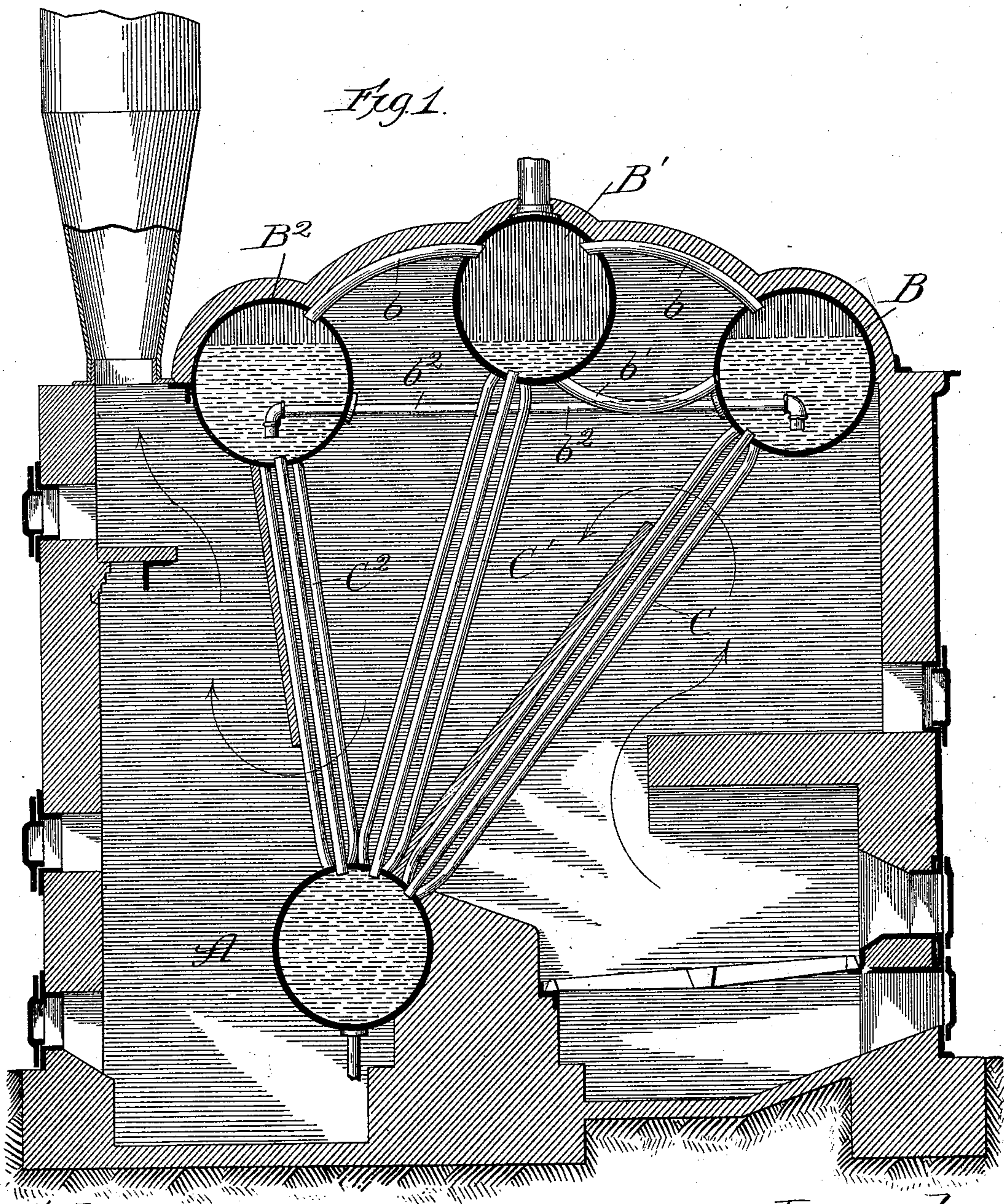
(No Model.)

2 Sheets—Sheet 1.

E. R. STETTINIUS.  
BOILER.

No. 549,031.

Patented Oct. 29, 1895.



Witnesses:  
Chas. E. Gaylord,  
Lute J. Allen.

Inventor:  
Edward R. Stettinius.  
By Panning & Panning & Schaidt,  
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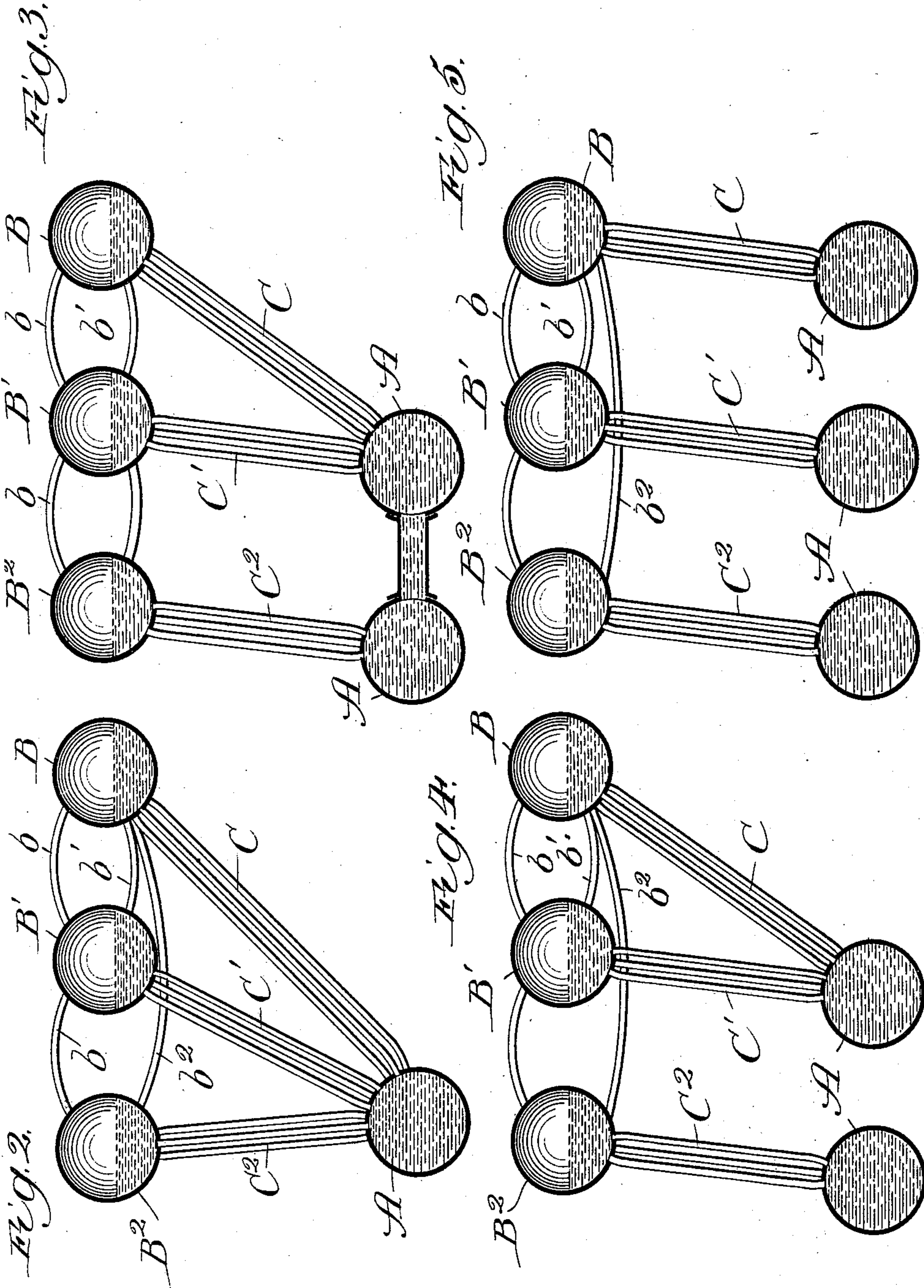
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BOILER.

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Witnesses:  
*Carl E. Chyford,*  
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Inventor:  
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# UNITED STATES PATENT OFFICE.

EDWARD R. STETTINIUS, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE STIRLING COMPANY, OF SAME PLACE.

## BOILER.

SPECIFICATION forming part of Letters Patent No. 549,031, dated October 29, 1895.

Application filed April 15, 1895. Serial No. 545,774. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD R. STETTINIUS, a citizen of the United States, residing at Chicago, Illinois, have invented a new and useful Improvement in Boilers, of which the following is a specification.

The object of my invention is to improve the Stirling type of boiler by providing for the passage of water from the front upper drum to the rear upper drum; and the invention consists in the features and combinations hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a central vertical sectional view of an ordinary Stirling boiler provided with my improvement; and Figs. 2, 3, 4, and 5, similar views illustrating modifications.

A is the lower mud-drum; B B', elevated steam and water drums, and B<sup>2</sup> an elevated water-drum, which in some cases may also be a steam and water drum; C, C', and C<sup>2</sup>, banks of tubes connecting the elevated drums with the lower mud-drum; and b, b', and b<sup>2</sup>, steam and water pipes connecting the several elevated drums.

As generally constructed, an ordinary Stirling boiler consists, essentially, of elevated steam and water drums, a lower mud-drum, and banks of tubes connecting the steam and water drums with the lower mud-drum, proper steam and water communication being also provided between the several elevated steam and water drums. As the front bank of tubes and the front upper drum are subjected to the highest heat, the water is hottest in this part of the boiler and of course most steam is generated therein. In order to induce proper circulation, it has been common to provide for the passage of water back from the front upper drum into the middle upper drum, and for this purpose suitable pipes communicating with the water-space in each of these drums have generally been employed. In this way provision is made for a powerful circulation from the lower mud-drum, up the front bank of tubes to the front upper drum, across through the water-circulating pipes to the middle upper drum, down through the middle bank of tubes to the lower mud-drum, and so on in circuit. It has never been the practice, however, to provide for conducting

the mingled water and steam back from the front upper drum to the rear upper drum so as to enable it to mingle with the feed-water and again pass down through the rear bank of tubes into the lower mud-drum. On the contrary, it is generally been considered advisable to have no water communication between the rear upper drum and the front and middle upper drums, except through the lower mud-drum, and as a result to provide for only a local or secondary circulation in the rear drum and bank of tubes. In my improvement, however, I provide for circulation of water from the front upper drum to the rear upper drum, this circulation being through pipes inside the furnace and outside the middle upper drum, or connecting therewith, so that the circulation is independent of the middle upper drum or through the same, as desired.

In the form of boiler shown in Fig. 1 I provide for a continuous circulation down through the rear bank of tubes to the lower mud-drum, up through the front bank of tubes to the front upper drum, across through water-circulating pipes to the rear upper drum, and so on in circuit. I do this by connecting suitable pipes b<sup>2</sup> to the water-spaces of the front and rear upper drums, respectively. These water-pipes may be made to take the place of the water-pipes b' now used to connect the front and middle upper drums, in which case there will be no direct communication between the water-spaces of the front and middle upper drums, or they may be used in addition to the present water-pipes, in which case the water-space of the front upper drum will have direct communication with the water-spaces of the middle and rear upper drum, respectively. In the former case the main circulation is up through the front bank of tubes to the front upper drum, across to the rear upper drum, down through the rear bank of tubes to the lower mud-drum, and so on in circuit, while the local or secondary circulation is in the middle upper drum and middle bank of tubes. In the latter case there are two general circulations, each partaking somewhat of the nature of a main circulation, but no local or secondary circulation, these terms being used not technically



but in a general sense and to indicate the general course of water in the boiler when under normal operation.

In Figs. 2, 3, 4, and 5 I have shown various modifications, which will be readily apparent. The most important of these are the use of ordinary circulating-pipes between the rear and middle upper drums the same as between the front and middle upper drums, so as to require the passage of water through all the upper drums, (see Fig. 3,) and the use of multiple mud-drums communicating with each other (see Fig. 3) or entirely disconnected. (See Figs. 4 and 5.) Various other changes or modifications may be made. For instance, more than three upper drums may be used, in which case I intend the expression "rear upper drum" to mean any elevated drum back of the "middle upper drum," this latter expression being used to conveniently designate the drum next or adjacent to the front upper drum; and although it will generally be found advisable to have the water-circulating pipes enter the rear upper drum above the level of the water therein they may enter either above or below such water-level, as desired.

As the novel or distinguishing feature of my invention consists in providing for communication between the water-spaces of the front and rear upper drums and changing the circulations accordingly, it will of course be understood that I do not intend to limit myself to minor features or details of construction. On the contrary, I contemplate changing form and construction, omitting parts or using equivalents, as circumstances may suggest or render expedient.

I am aware of the Wheeler patent of December 15, 1891; but my invention differs from the one therein shown in several respects, particularly in that the pipes connecting the upper drums of the Wheeler boiler are outside the furnace—by which I mean the entire space or chamber containing the

heated gases and not any particular part thereof—while the pipes connecting the upper drums of my boiler are inside the furnace, and in that said pipes connecting the upper drums do not perform the same functions in the two boilers, the Wheeler pipes not being subjected to the heat of the furnace and consequently having but little steam therein, and my pipes being subjected to such heat and carrying mingled steam and water from the hottest parts of the boiler.

I claim—

1. In a water tube boiler, the combination of a lower drum, or drums, three elevated drums, banks of tubes connecting the lower drum or drums with the elevated drums, and a pipe or pipes inside the furnace connecting the front and rear elevated drums, whereby water may circulate from front to rear, substantially as described.

2. In a water tube boiler, the combination of a lower drum or drums, three elevated drums, banks of tubes connecting the lower drum or drums with the elevated drums, a pipe or pipes inside the furnace connecting the front and middle elevated drums, and a pipe or pipes inside the furnace connecting the front and rear elevated drums, whereby water may circulate from front to rear, substantially as described.

3. In a water tube boiler, the combination of a lower drum or drums, three elevated drums, banks of tubes connecting the lower drum or drums with the elevated drums, a pipe or pipes inside the furnace connecting the front and middle elevated drums, and a pipe or pipes inside the furnace connecting the rear and middle elevated drums, whereby water may circulate through all the elevated drums, substantially as described.

EDWARD R. STETTINIUS.

Witnesses:

IVER LEE,  
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