(No Model.) 3 Sheets—Sheet 1.

G. LEUCHS.

STEAM GENERATOR.

No. 532,570. Patented Jan. 15, 1895.

Fig. 1.

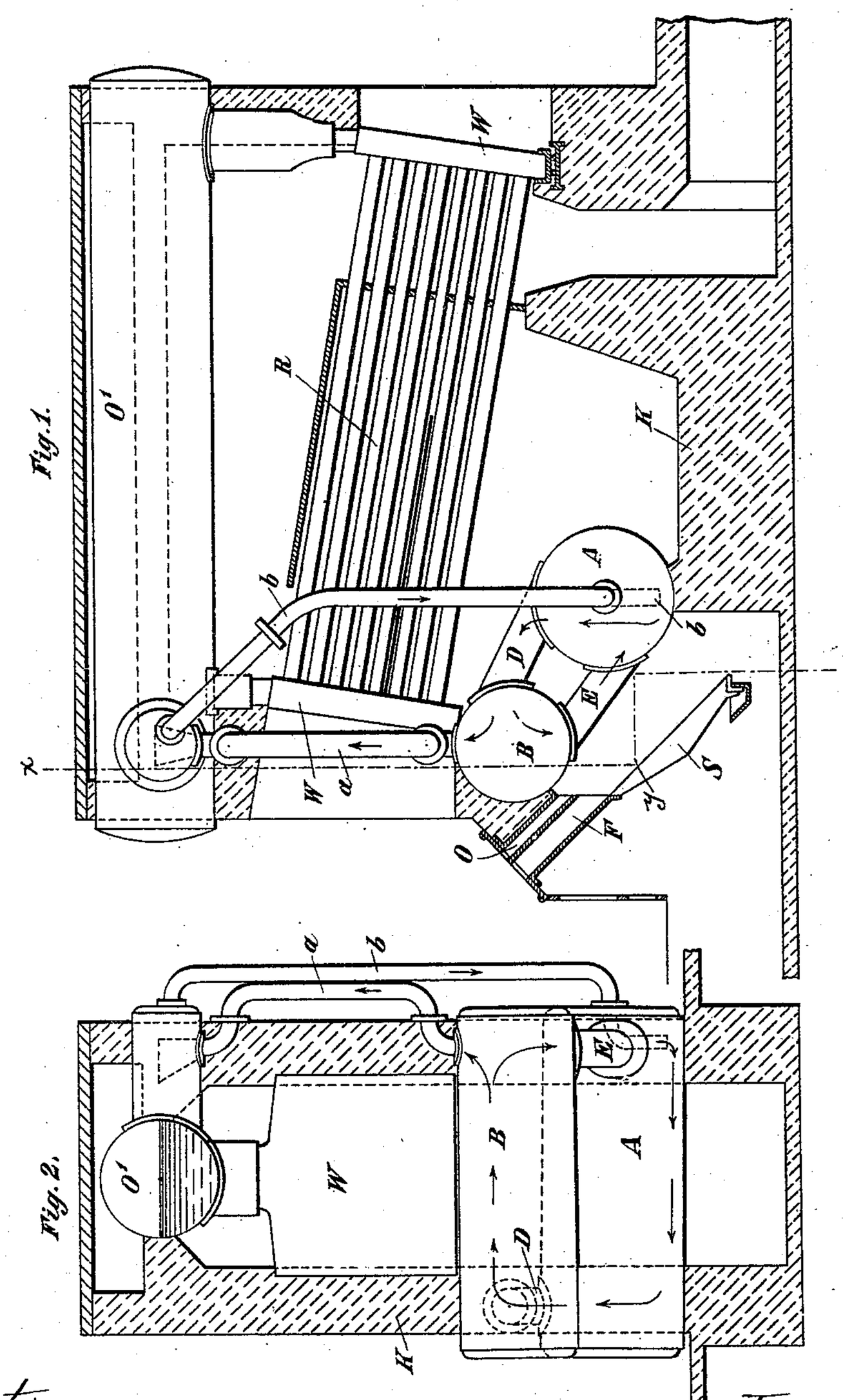


Fig. 2.

Attest
Fuller Donaldson
F. L. Middleton

Inventor
Gustav Leuchs
by Richards & Co
Attys

(No Model.)

3 Sheets—Sheet 2.

G. LEUCHS.

STEAM GENERATOR.

No. 532,570. Patented Jan. 15, 1895.

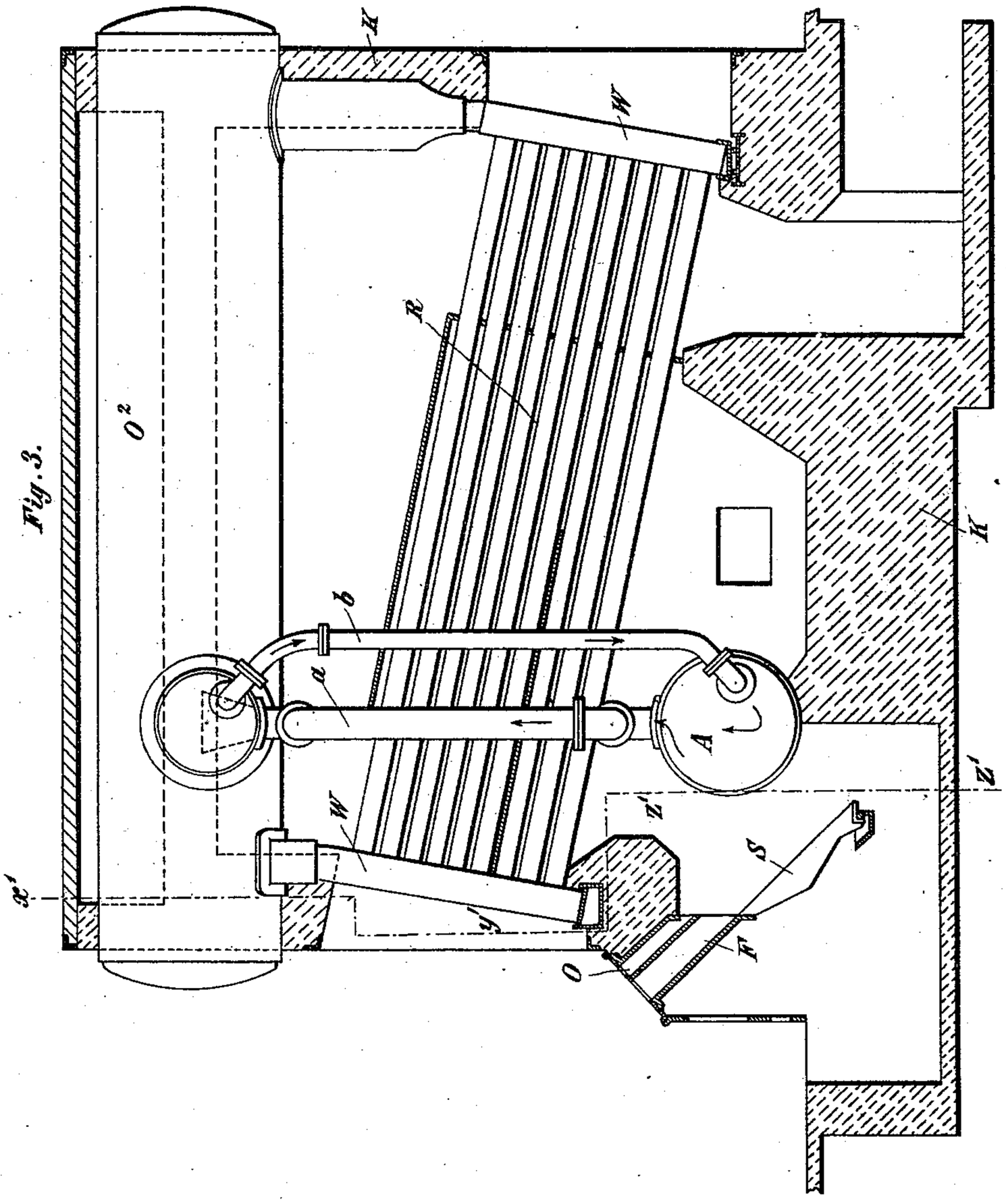


Fig. 3.

Attest
Walter Dwaddams
F. L. Middleton

Inventor
Gustav Leuchs
by Richards & Co
Attys

(No Model.) 3 Sheets—Sheet 3.

G. LEUCHS.

STEAM GENERATOR.

No. 532,570. Patented Jan. 15, 1895.

Fig. 3.

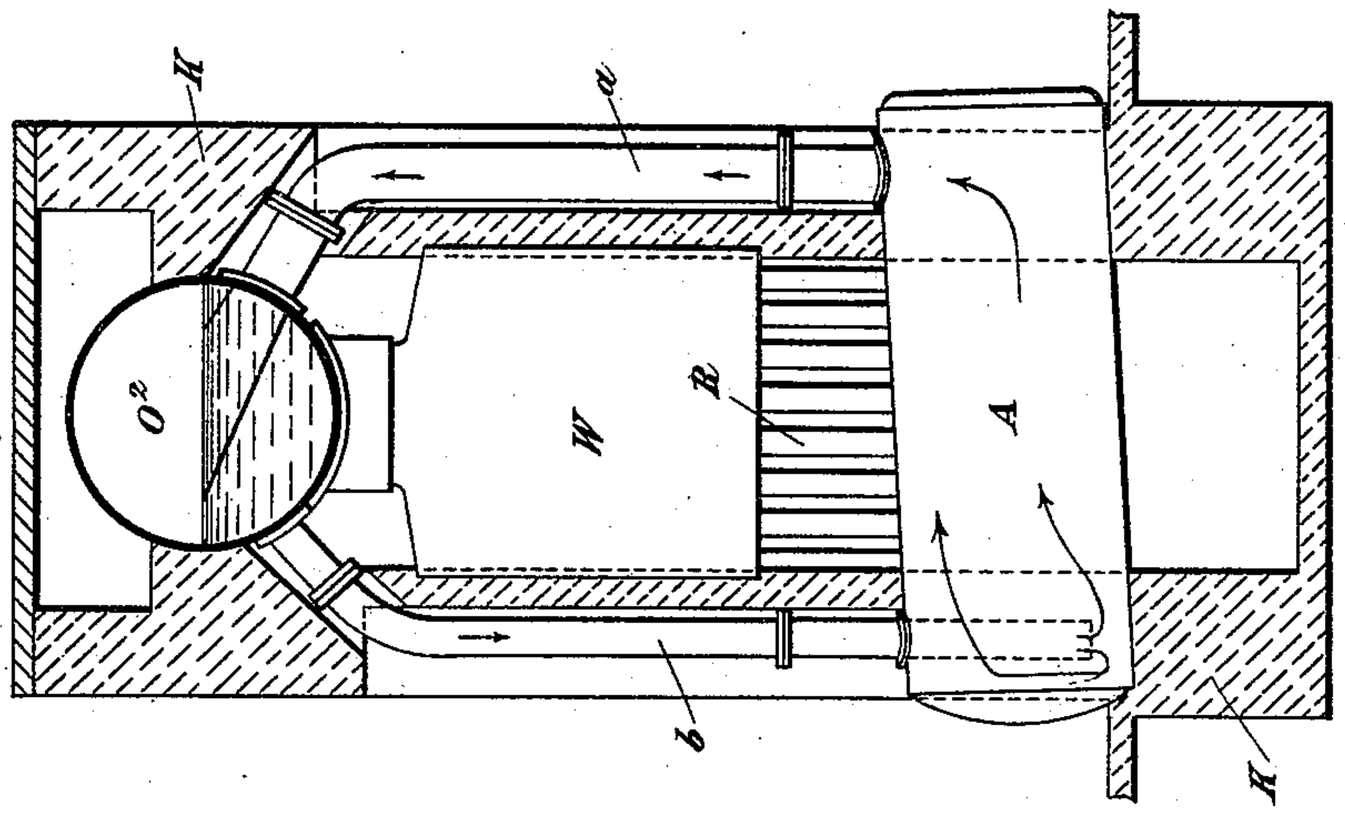
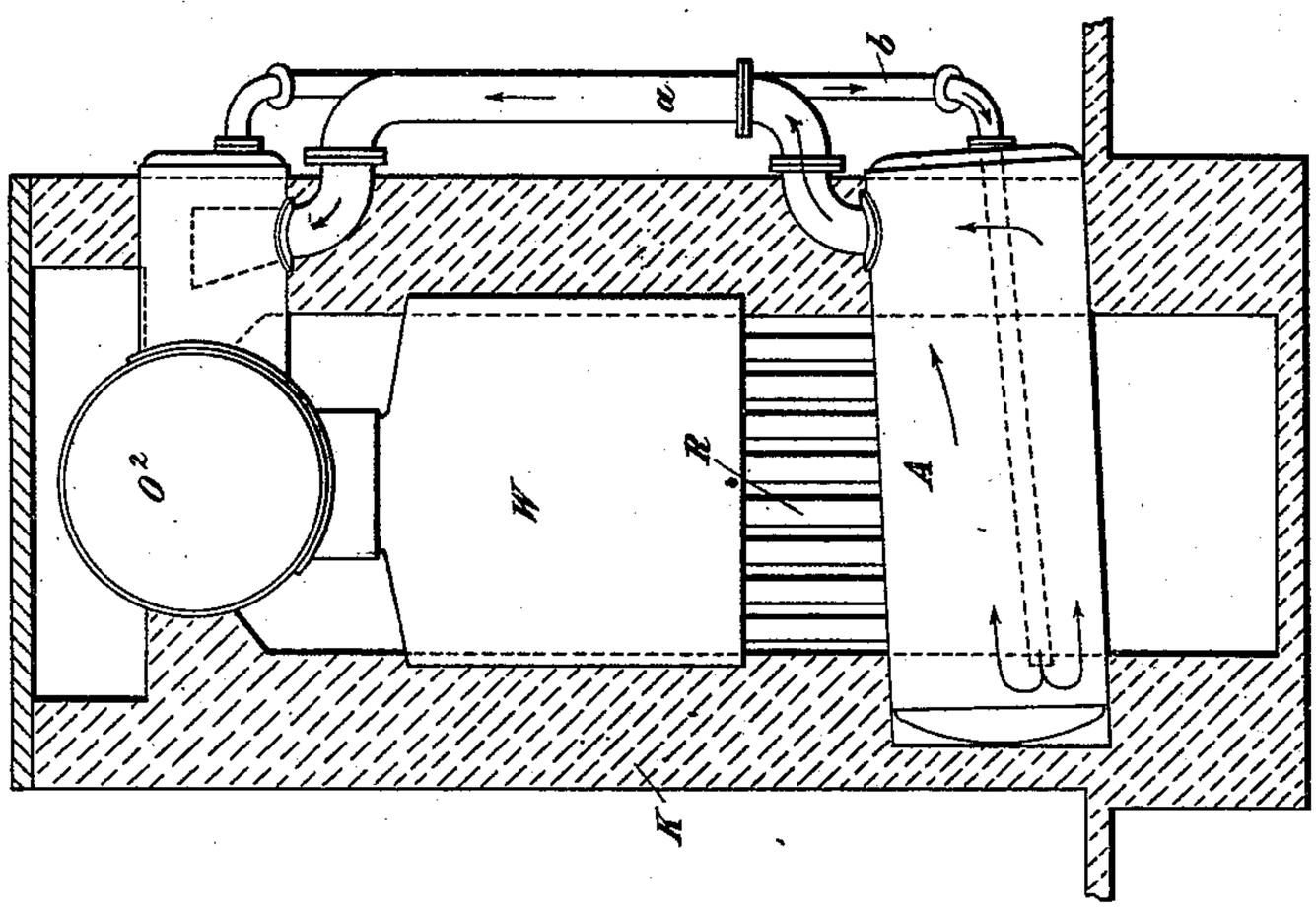


Fig. 4.



Attest
J. Walter Donaldson
F. L. Middleton

Inventor
Gustav Leuchs
by Richards & Co
Attys.

UNITED STATES PATENT OFFICE.

GUSTAV LEUCHS, OF DARMSTADT, GERMANY.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 532,570, dated January 15, 1895.

Application filed April 5, 1894. Serial No. 506,394. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV LEUCHS, of Darmstadt, in the Grand Duchy of Hesse and German Empire, have invented a new and useful Steam-Generator, of which the following is a specification, reference being had therein to the accompanying drawings.

The object of the present invention is the novel arrangement of transverse boilers especially on water tube boilers having at the same time the object of making the most of the fuel and to effect a smokeless combustion of the same, and to promote a more sufficient circulation of the water.

The object of this invention is represented in the annexed drawings.

Figure 1, represents a longitudinal section through the brickwork of the boiler plant and a view of the whole plant with two cross boilers added. Fig. 2, is a cross section after the lines *x*, *y*, *z* of Fig. 1. Fig. 3, is a longitudinal section through the brickwork and a view of the whole plant with one cross boiler. Fig. 4, is a cross section on the lines *x'*, *y'*, *z'* of Fig. 3. Fig. 5, is a vertical section through the upper boiler showing a modification of the arrangement shown in Fig. 4.

The grate S is inclined in such a manner that the fuel consumed is replaced automatically by fresh fuel, coming from the feeding space F placed at the upper end of the grate. A perfectly smokeless combustion is produced by the sliding of the fuel over the grate, the same taking the place of that already consumed, in connection with the regulatable feeding of air by the channel O and by the peculiar position of the cross boilers A and B whereby the way of the smoke is determined, the same striking against the walls of the cross boilers, receiving a turning motion and is thus united with the hot fire gases. The best way is to take transverse boilers, the one A replacing the fire bridge, the boiler B being placed above the fuel feeding space F. Both these transverse boilers are connected by large but short pipes E and D at the top and at the bottom. These transverse boilers are connected with the upper boiler O' by the tube *b* serving for feeding the water, and for this purpose *b* goes from the water room of the upper boiler nearly to the bottom of the transverse boiler A. At the top of the transverse boiler B, opposite to the tube *b* is provided a tube *a*, of corresponding dimensions which goes almost to the steam room of the upper boiler O', the tube *a* having hereby the object to lead the steam bubbles produced in both transverse boilers back to the steam collector of the boiler. By this peculiar connection established between the two transverse boilers and between both and the upper boiler O' double circulation is effected in the whole plant. The one circulating current begins at the upper boiler O', from whence the water passes, by way of the tube *b*, to the bottom of the cross-boiler A through the pipe D to the transverse boiler B, and through said boiler to the opposite end, the hot water and steam passing through the tube *a* into the upper boiler and the cooler water through E into the cross boiler A following the same course.

One part of the water which enters the upper boiler O' by the tube *a* joins the cooler water in the upper boiler and flows with it through the tube *b* into the transverse boiler A, beginning here, in part, the above mentioned circuit again into the pipe E into the cross boiler B and from here through tube *a* back into the upper boiler.

Because the circulating water passes always with a quick motion over the top and bottom of the transverse boiler all settling of mud therein becomes totally impossible and the steam power need not be wasted removing the bubbles adhering to the inside cover of the boiler.

Both transverse boilers may be placed horizontally or in an inclined position and instead of being connected with the upper boiler they may be connected with the water space W, whose one wall is made up by the tubes mentioned above.

If a plant of minor extension be employed the transverse boiler B may be omitted. In this case the tubes *a* and *b* are made larger for allowing the proper circulation and both *a* and *b* will be arranged in such a manner, that sufficient circulation is effected and joined in such a manner with boiler A that the water feeding tube *b* issues at the bottom of that smaller side of boiler A which side is opposite to that where the tube *a* enters.

Figs. 3 and 4 show a mode of execution wherein the water feeding tube *b* enters at the

same smaller outside of the boiler A where tube *a* enters, and goes from here longitudinally inside across this boiler finishing inside near the bottom of the other smaller outside of the same which is opposite to the first mentioned one, the most important feature of this construction being that the water feeding tube *b* issues at that side of the boiler which is opposite to that wherein the steam pipe enters.

In Fig. 5 a mode of execution is shown wherein the tubes *a* and *b* issue from different sides of the upper boiler O^2 and enter at different sides of the cross boiler A.

K is the masonry in the figures; R, the tube system carried by water room W.

The most important currents of water are indicated by arrows.

I claim—

1. In a steam generator, the fire chamber, the upper boiler O′, the inclined grate, the transverse boiler A acting as the fire bridge at the rear of the grate, the front transverse boiler B in a higher plane than the boiler A, the upper and lower inclined tubes D and E at different ends of the boilers, the pipe *a* extending from the upper part of the upper cross boiler to the boiler O′ and the pipe *b* extending from the said boiler O′ to the lower part of the fire bridge boiler, whereby the circulation will be upward through the pipe D from the boiler A to the boiler B thence through the pipe *a* boiler O′ and pipe *b* to the cross boiler A and also downward between the lower parts of the boilers through the pipe E, substantially as described.

2. In a steam generator, the fire chamber, the upper boiler O′, the inclined grate, the fire bridge cross boiler A, the cross boiler B in a higher plane, the pipe connections between the cross boilers and the pipe connections to the upper boiler O′ said boilers A, B, presenting a double flaring opening for the passage of the products of combustion with curved walls whereby the said products are given a rolling motion to be commingled with and ignited by the furnace gases, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

GUSTAV LEUCHS.

Witnesses:

ALVESTO S. HOGUE,

JEAN GRUND.