(No Model.) 3 Sheets—Sheet 1.

P. E. J. & G. A. L. NICLAUSSE.

BOILER.

No. 460,254. Patented Sept. 29, 1891.

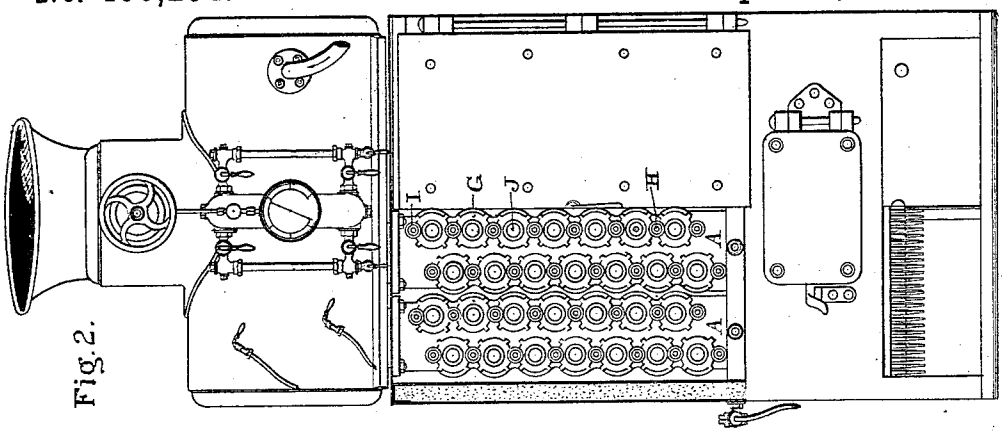


Fig. 2.

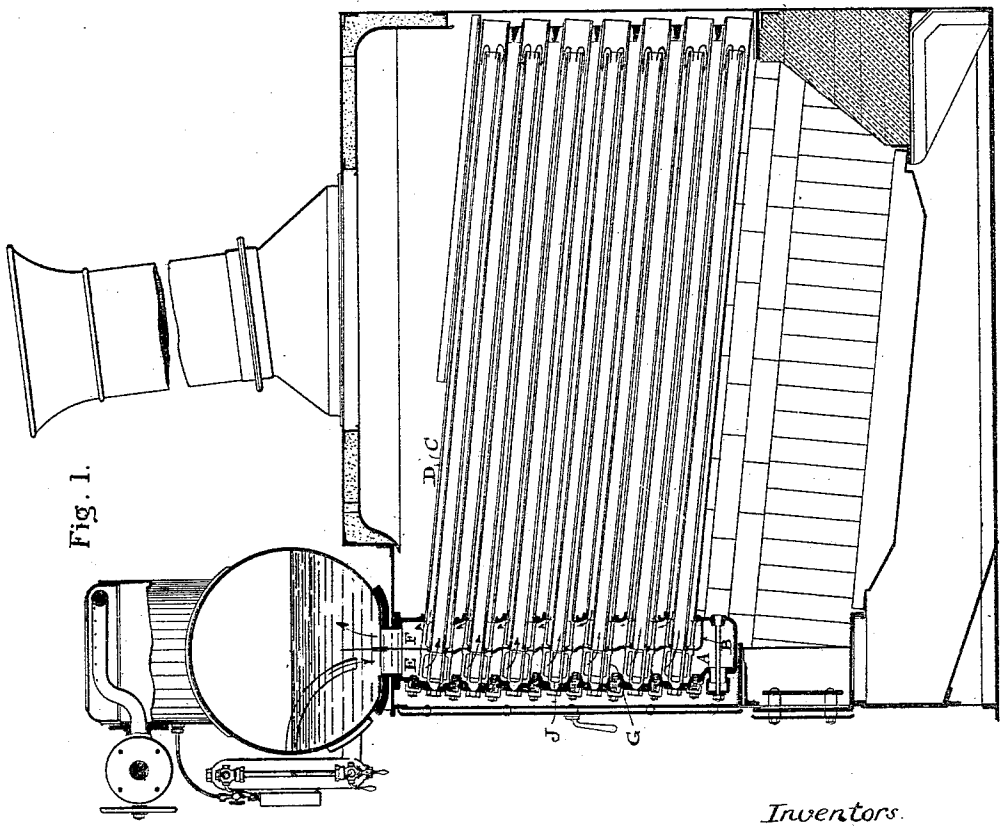


Fig. 1.

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Fig. 3.

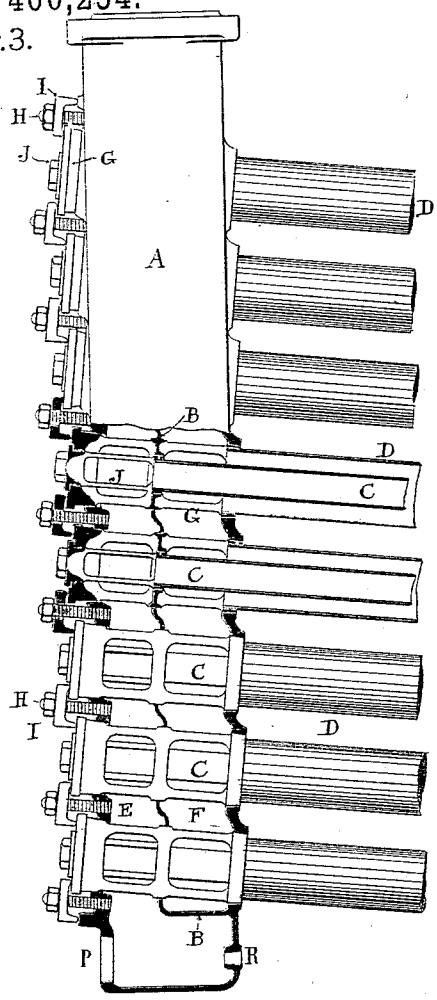


Fig. 4.

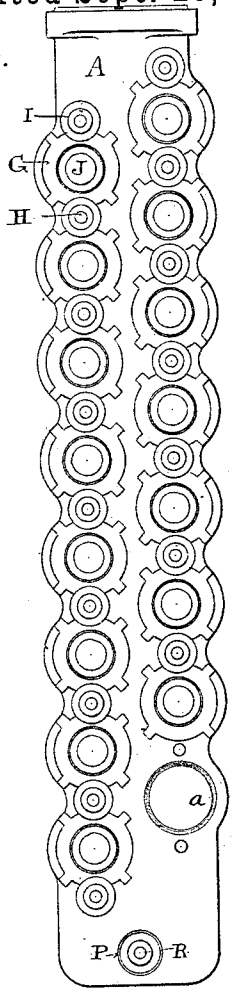
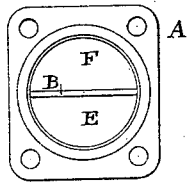


Fig. 5.



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Fig. 6.

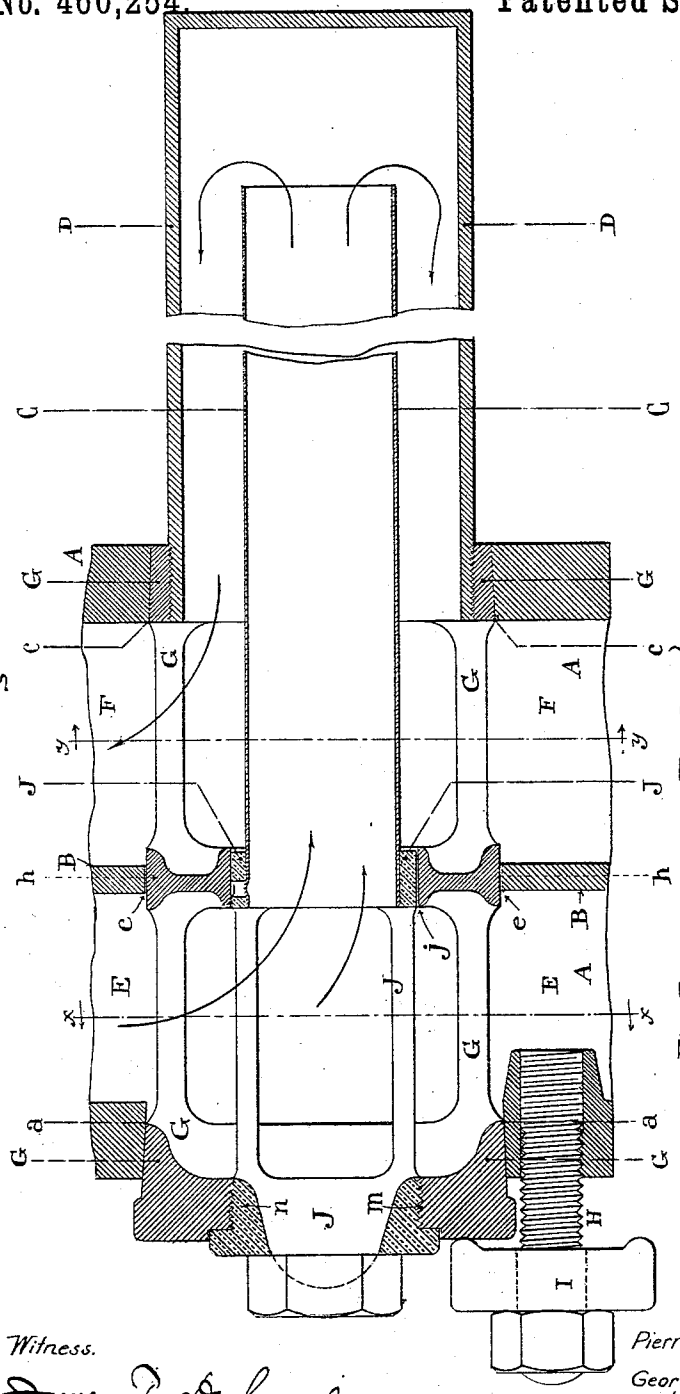


Fig. 8.

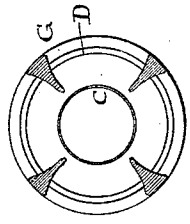
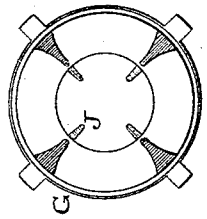


Fig. 7.



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UNITED STATES PATENT OFFICE.

PIERRE ELIE JULES NICLAUSSE AND GEORGES ALBERT LOUIS NICLAUSSE, OF PARIS, FRANCE.

BOILER.

SPECIFICATION forming part of Letters Patent No. 460,254, dated September 29, 1891.

Application filed April 4, 1891. Serial No. 387,705. (No model.) Patented in France October 6, 1890, No. 208,676, and in England January 20, 1891, No. 1,052.

To all whom it may concern:

Be it known that we, PIERRE ELIE JULES NICLAUSSE and GEORGES ALBERT LOUIS NICLAUSSE, civil engineers, both of 125 Rue de Flandre, Paris, in the Republic of France, have invented certain new and useful Improvements in Tubular Boilers, (for which we have received Letters Patent in France, dated October 6, 1890, No. 208,676, and in Great Britain, dated January 20, 1891, No. 1,052,) of which the following is a specification.

Our invention relates to tubular boilers, and has for its object the simplification of the construction of the same, as hereinafter fully set forth and claimed, whereby the removal of the tubes is facilitated and the equilibrium of the boiler maintained.

In the accompanying drawings, Figure 1 is a vertical sectional view of a boiler constructed in accordance with our invention; Fig. 2, a front face view, partly in section; Fig. 3, a side view, partly in section, of one of the collecting-chambers, showing the manner of mounting the tubes; Fig. 4, a front face view of one of the collecting-chambers; Fig. 5, a top plan view of the same; Fig. 6, an enlarged sectional view showing in detail the connection between the boiler and the circulating-tube and the frame to which said tubes are attached; Fig. 7, a transverse sectional view on the line $x\ x$ of Fig. 6, and Fig. 8 a similar view on the line $y\ y$, the said Figs. 7 and 8 being on a scale one-half of that represented in Fig. 6.

A indicates a substantially rectangular box or chamber which we term a "collecting-chamber." This box or chamber is provided, as shown in Figs. 1, 3, 5, and 6, with a diaphragm or partition B, which divides the collecting-chamber A into two separate compartments or chambers E and F, as is usual in this class of generators. The box or chamber A is further provided in its front and rear walls with openings a and c, which are advisably made tapering or conical, as more clearly shown in Fig. 6. The diaphragm or partition B is also provided with openings or perforations e in line with the holes or perforations in the walls of the chamber or compartment A.

Fitting into the openings thus formed is a skeleton frame G, to the inner end of which is screwed or otherwise connected the boiler-tube D, which latter will of course be closed at its rear end. The inner and outer ends of the frame G will advisably be turned to fit the conical openings made to receive them, and the said frame will be held in place by means of retaining-bolts H and plates or washers I, as clearly shown in Figs. 1, 2, 3, 4, and 6 and as is common in tubular boilers. At a point in line with the diaphragm or partition B of the collector A the frame G is provided with a diaphragm h, which in turn has an opening j to receive the inner end of a second skeleton frame J, carrying at its inner end the circulating-tube C, which latter projects into the boiler-tube, as clearly shown in Figs. 1, 3, and 6. At the outer end the skeleton frame G is provided with a threaded opening m to receive the threaded portion n of the frame J, as shown in Fig. 6, said frame being provided with an angular head, by means of which the said frame and the circulating-tube carried thereby may be detached from the frame G and the boiler-tube and removed without dismounting the said frame G and its tube D.

The manner of connecting the circulating-tube to the inner end of the frame J, the manner of connecting the boiler-tube to the inner end of the frame G, the manner of locking the frame J to the frame G, and the manner of holding the frame G in position within the collector A are matters that may be varied considerably without departing from the nature of our invention.

As shown in Figs. 1 and 2, the upper end of the boxes or chambers A will be connected with a reservoir, which latter will be provided with the ordinary boiler-fittings.

The operation of our boiler is as follows: As soon as the water commences to heat a circulation is established in consequence of the difference of density which results in the different parts of the generator, the cold water descending by the inner circulating-tube coming from the front part of the collector, and the hot water which is between the two tubes ascending toward the upper part of the reservoir or collector through the rear part

of the latter. Bubbles of steam formed between the two tubes burst from the upper part of the reservoir after leaving the collector, while the water from the circulating-tubes replaces that which is evaporated. A good and active circulation depends upon the separation of the currents, and we obtain as complete a separation as is possible under our arrangement without the use of any mechanical means. By inclining the tubes, as shown, the descent of the water on one side and the disengagement of the steam-bubbles on the other is facilitated.

The arrangement above described affords the advantage of providing a boiler-tube in perfect equilibrium and one entirely free to expand. Furthermore, it can be removed at the front of the generator without dismounting the collector.

The collecting-chambers will of course be provided at their lower ends with suitable openings P R to facilitate the removal of deposits, &c., and will also advisably be connected one with the other, as indicated in Fig. 2.

Having thus described our invention, what we claim is—

1. In combination with a vessel or chamber A, having a diaphragm B, dividing the chamber into two compartments, the skeleton frame G, extending through openings formed in the walls of the chamber and its diaphragm, a boiler-tube secured to the inner end of the frame G, a circulating-tube projecting into the boiler-tube, and means for holding the frame G in position.

2. In combination with box or chamber A, having diaphragm B, the skeleton frame G, extending through openings formed in the box or chamber A, a boiler-tube D, secured to the inner end of the frame G, a second skeleton frame J, carried by the frame G, and a circulating-tube open at both ends and secured to the inner end of the frame J.

3. In combination with box or receptacle A, having a diaphragm B, the skeleton frame G, fitting into openings formed in the box or chamber A and having openings communicating with the respective compartments of the box or chamber A, and having also a flange or diaphragm in line with the diaphragm B of the box or chamber, a boiler-tube secured to the inner end of the frame G, a second skeleton frame J, mounted within openings formed in the outer end and in the diaphragm of the skeleton frame G, and a circulating-tube carried by the frame J, all substantially as shown and described.

4. In a steam-boiler, the combination, with the collecting-box divided into two compartments, as shown, of the removable frame G, carrying the boiler-tube, and the removable frame J, carrying the circulating-tube, the said circulating-tube being mounted concentrically within the boiler-tube.

5. In combination with the box or chamber A, having diaphragm B, a series of openings formed in the front and rear walls of the box and its diaphragm, a skeleton frame G, fitting into the openings, and having in line with the diaphragm B a flange with an opening, a boiler-tube secured to the inner end of the skeleton frame G, a second skeleton frame J, fitting at its inner end into the opening formed in the flange or diaphragm of frame G and screwing at its outer end into a threaded opening formed in the outer end of the said frame G, and a circulating-tube open at both ends and connected with the inner end of the frame J.

6. In a tubular boiler, the combination, with a box or chamber A, divided into two compartments E and F, as shown, of a frame G, provided at its inner end with a boiler-tube and carrying also a removable plug or frame J, to which is attached a circulating-tube, the combination and arrangement being such that the water shall pass through the frames J and G into the interior of the circulating-tube and from thence into the boiler-tube, from which it is discharged through openings in the frame G into the chamber F of the box or vessel A.

In testimony whereof we affix our signatures in presence of two witnesses.

PIERRE ELIE JULES NICLAUSSE.
GEORGES ALBERT LOUIS NICLAUSSE.

Witnesses:
ROBT. M. HOOPER,
G. DE MESTRAY.