

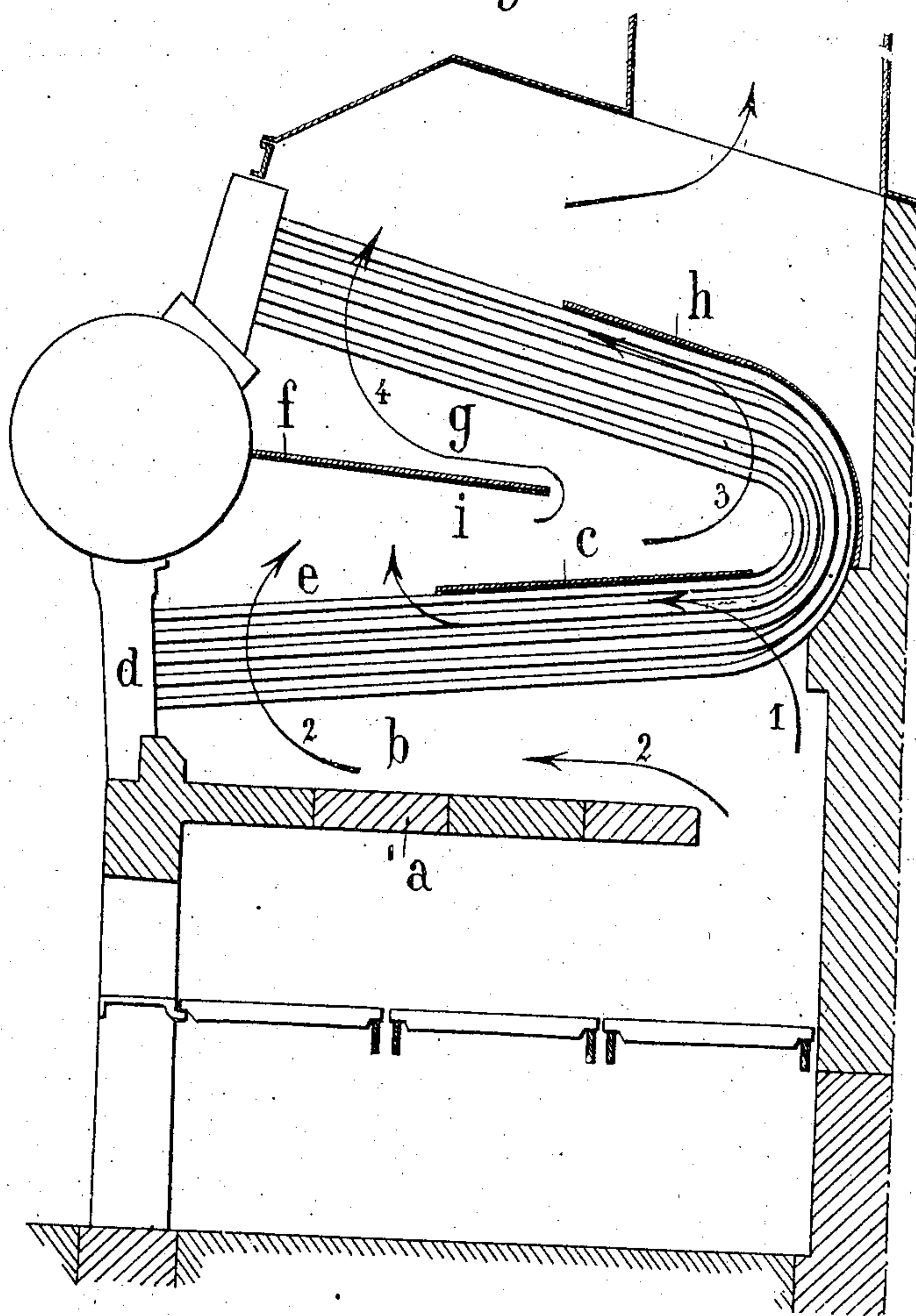
No. 834,903.

PATENTED NOV. 6, 1906.

C. J. A. GRILLE.
STEAM GENERATOR.
APPLICATION FILED JAN. 15, 1906.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

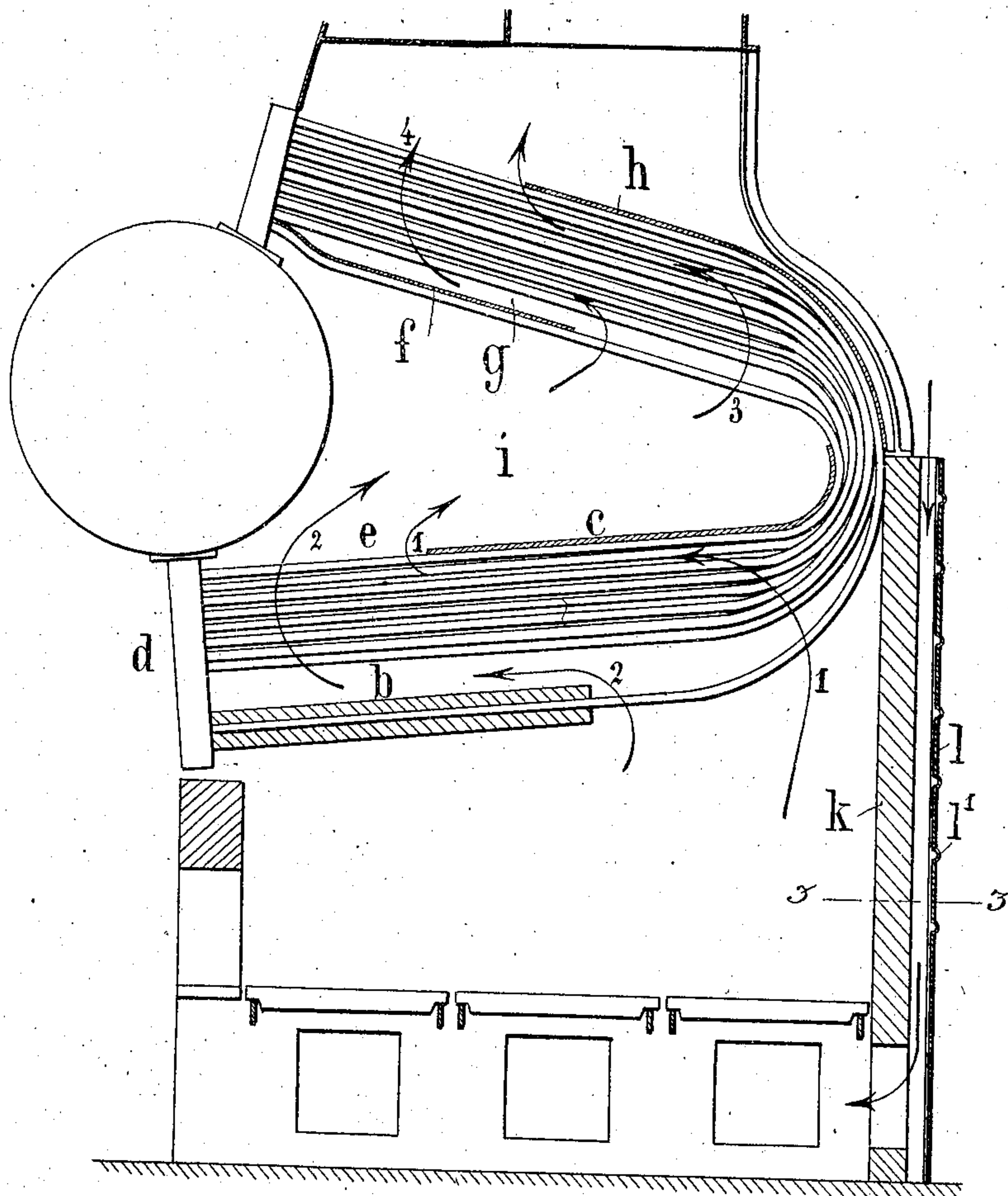
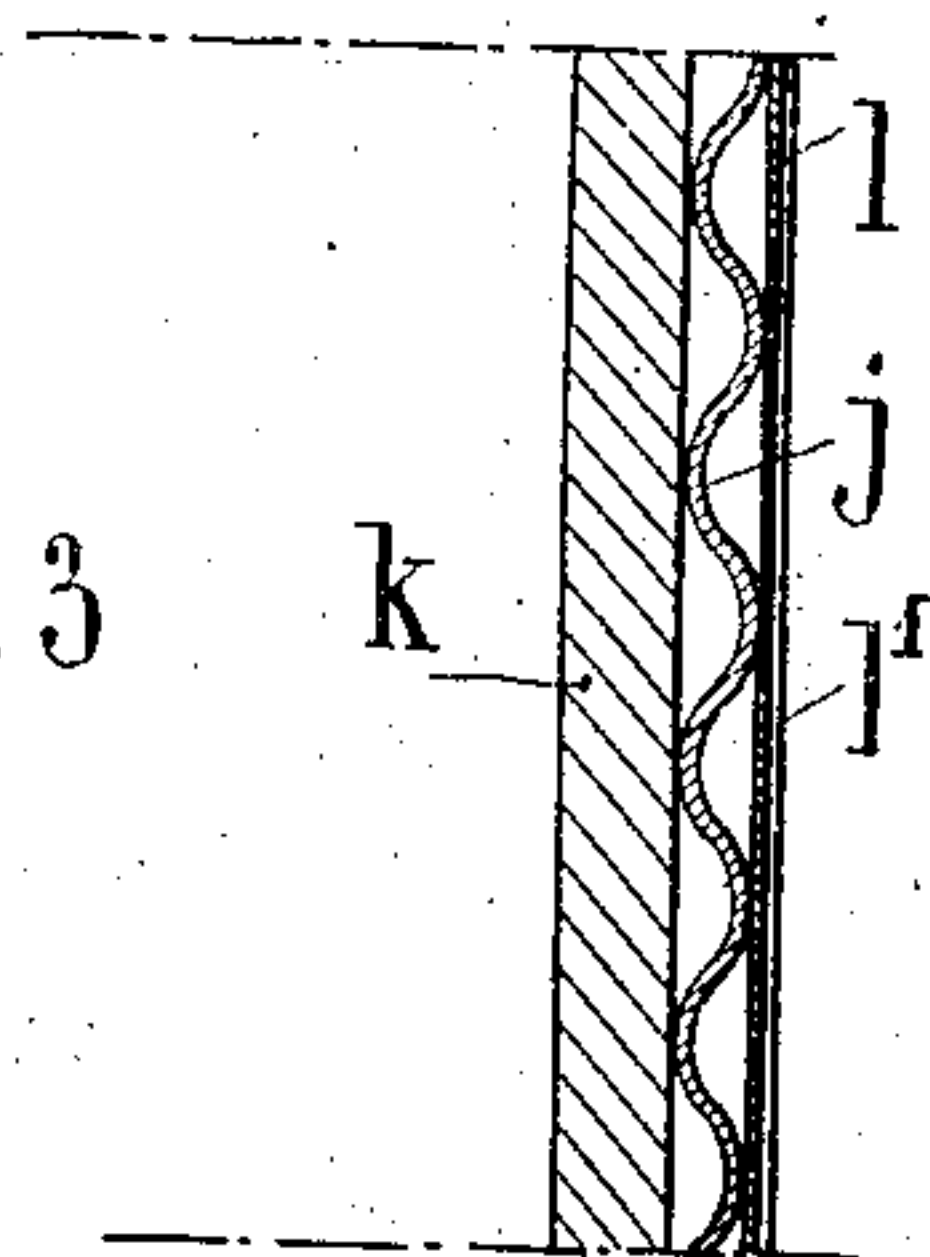


Fig. 3



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UNITED STATES PATENT OFFICE.

CHARLES JOSEPH ANTOINE GRILLE, OF PARIS, FRANCE.

STEAM-GENERATOR.

No. 834,903.

Specification of Letters Patent.

Patented Nov. 6, 1906.

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To all whom it may concern:

Be it known that I, CHARLES JOSEPH ANTOINE GRILLE, mechanical engineer, of 67 Rue de la Victoire, in the city of Paris, Republic of France, have invented Improvements in Steam-Generators, of which the following is a full, clear, and exact description.

The means hitherto employed for heating steam-generators of the "Solignac-Grille" type have presented serious defects in respect of boiler efficiency, which defects are consequent upon their special characteristics.

In the Solignac-Grille generator the tubes are of small diameter, and on that account it is necessary to set them closely together in order to advantageously utilize the furnace-gases. On the other hand, the circulation in these tubes by means of regulatable nozzles produces, as compared with other generators, a vaporization per unit of surface so intense that the tubes are very much cooled by this vaporization. Hence it follows that the nest of tubes in a Solignac-Grille generator acts in presence of the hot gases in exactly the same way as would fine wire-gauze and is kept constantly cool. So long as these generators are working with a slow rate of combustion and with close-burning coal the disadvantages are not of serious consequence providing that the combustion-chambers are sufficiently high, because the gases being thoroughly burned before reaching the tubes are not extinguished by contact therewith; but if the firing is forced or if cannel-coal be employed the gases will pass through the nest of tubes before having become thoroughly burned and be extinguished by contact with the cool tubes.

This invention has for object to provide means for maintaining the gases at a high temperature at the lower member of the nest of tubes and for increasing the temperature in the space between the upper and lower members by the admission therinto of burning gases at a high temperature, which mixing with the gases already in the cool space reignite them before their arrival at the upper member of the nest.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a sectional elevation showing one form of my invention. Fig. 2 is a similar view of another form, and Fig. 3 is a partial horizontal section on line 3 3 of Fig. 2.

The means for accomplishing the purpose

of my invention in the form illustrated by Fig. 1 of the accompanying drawings consist, essentially, first, of a screen *a* of refractory bricks situated above the furnace and serving to maintain a high temperature in the furnace-gases to direct them toward the rear of the grate and to provide below the lower member of the nest a free space *b*, which should be proportional to the rate of combustion and to the number of rows of tubes; second, a baffle *c* mounted above the lower member of the nest of tubes and extending from the rear forwardly, leaving between its forward extremity and the lower header *d* a passage *e* of an area determined according to the rate of combustion and proportional to the draft desired; a device of any suitable character for regulating the area of this passage according to requirements may be provided; third, a baffle *f* extending from the front of the generator rearwardly and situated a certain distance below the upper member of the nest of tubes, so as to form below said member a free space *g*, similar to the space *b* and proportional, like the latter, to the rate of combustion and the number of rows of tubes, and, fourth, a baffle *h*, extending forwardly from the rear of the generator and situated above the upper member of the nest of tubes. The employment of these baffles will have the following result: The ignited gases in issuing from the furnace are caused to pass toward the rear end of the screen *a*, and upon reaching the point they pass around the end of the screen and separate into two currents, one of which consisting entirely or chiefly of extinguished gases flows, as shown by arrows 1, directly between the tubes at the back of the nest and striking baffle *c* is caused to pass along under it into the free space *i*, while the other current, which consists entirely or chiefly of still burning gases, flowing, as indicated by arrow 2, along screen *a* directly into space *b*, escapes the cooling effect of the tubes until its flow, heretofore substantially horizontal, becomes vertical, so as to be delivered after passing through space *e* into the space *i* between the two members of the tubes. Since this latter current of gases only passes through the lower member of the nest of tubes, it is subjected to only a slight cooling action, and on arriving in space *i* it is still in a state of ignition, and its temperature is sufficiently

high to reignite the gases of the first current, which has followed the course indicated by arrow 1, and which have become partly extinguished by reason of their having become cooled by prolonged contact with the tubes of the lower member. The gases thus reignited in space *i* then come in contact with baffle *f* and pass around the rear end of the latter and again separate into two currents, one of which flows between the tubes of the upper member, as indicated by arrow 3, while the other, as indicated by arrow 4, passes into the space *g* and rises so as to pass directly through the whole depth of the upper member of the nest of tubes. Thus the upper member of the nest of tubes is heated throughout its length by the burning gases, its rear portion by the stream of gas 3, and its forward portion by the stream 4. This combination of baffles insures the perfect utilization of the furnace-gases for the regular heating of the two members of the nest of tubes throughout their entire length.

In order to increase the quantity of the burning gases admitted directly to space *b*, the screen *a* may be formed with openings, so as to establish direct communication therewith for a part of the burning gases from the furnace.

The reignition of the gases in spaces *b* and *i* may be provoked by the employment of suitably-disposed steam-jets.

The baffles *a*, *c*, *f*, and *h* may be formed by juxtaposed tubes.

Fig. 2 shows a modification of the invention in which the screen *a* and deflector or baffle *f* are respectively carried by tubes of the lower and upper branches, the said tubes being set at a distance from the remaining tubes, as shown in the drawings, in order to provide the two spaces *b* and *g*.

The screen *a* may equally well be constituted by a metal block provided with internal steam-passages and forming a superheater or by a number of metal tubes through which the superheated steam flows either uncovered or protected by metal or by refractory brick.

For the purpose of still further raising the temperature of the gases the apparatus may, in addition, comprise means for reheating the air prior to its arrival beneath

the grate, as shown in vertical section in Fig. 2 and in horizontal section in Fig. 3.

The metal casing of the boiler is formed by a corrugated plate *j*, placed between the brick wall *k* and a metal sheet *l*, preferably having ribs or beads *l'* on its surface, the corrugations of the plate *j* forming vertical channels wherein the air is heated by contact with the brickwork and the corrugations of the plate *j*. The said channels deliver into the ash-pit, so that the air arrives at the grate already heated.

It is to be understood that the corrugated plate may be replaced by any other device which will insure a circulation of air in contact with the refractory brick wall. This circulation of air has the further advantage of maintaining the external wall of said casing at a low temperature, and thus preventing excessive heat in the stoke-hole, at same time reducing the temperature of the bricks, thus prolonging their life.

I claim—

In a boiler-furnace, a fire-box, a screen located above the fire-box and extending to within a distance from the rear wall of the furnace so as to leave an upward passage along said wall, a nest of water-tubes extending from front to rear above said passage and at a distance from said screen so as to leave a forward passage for extinguished and burning gases above the screen, a baffle located above said nest of tubes at their rear portion only so as to leave an upward passage at the front portions of the water-tubes, another nest of water-tubes located above the first-named nest and connected therewith at the rear of the furnace, another baffle located between the two nests at their forward portions only so as to leave an upward passage at the rear of said baffle, and a third baffle located above the upper set of water-tubes at their rear portions only so as to leave an upward passage at the front portions of said water-tubes.

The foregoing specification of my improvements in steam-generators signed by me this 29th day of December, 1905.

CHARLES JOSEPH ANTOINE GRILLE.

Witnesses:

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