No Model.)

4 Sheets—Sheet 1

D. I. NOVIKOFF.

STEAM BOILER.

No. 265,857. Patented Oct. 10, 1882.

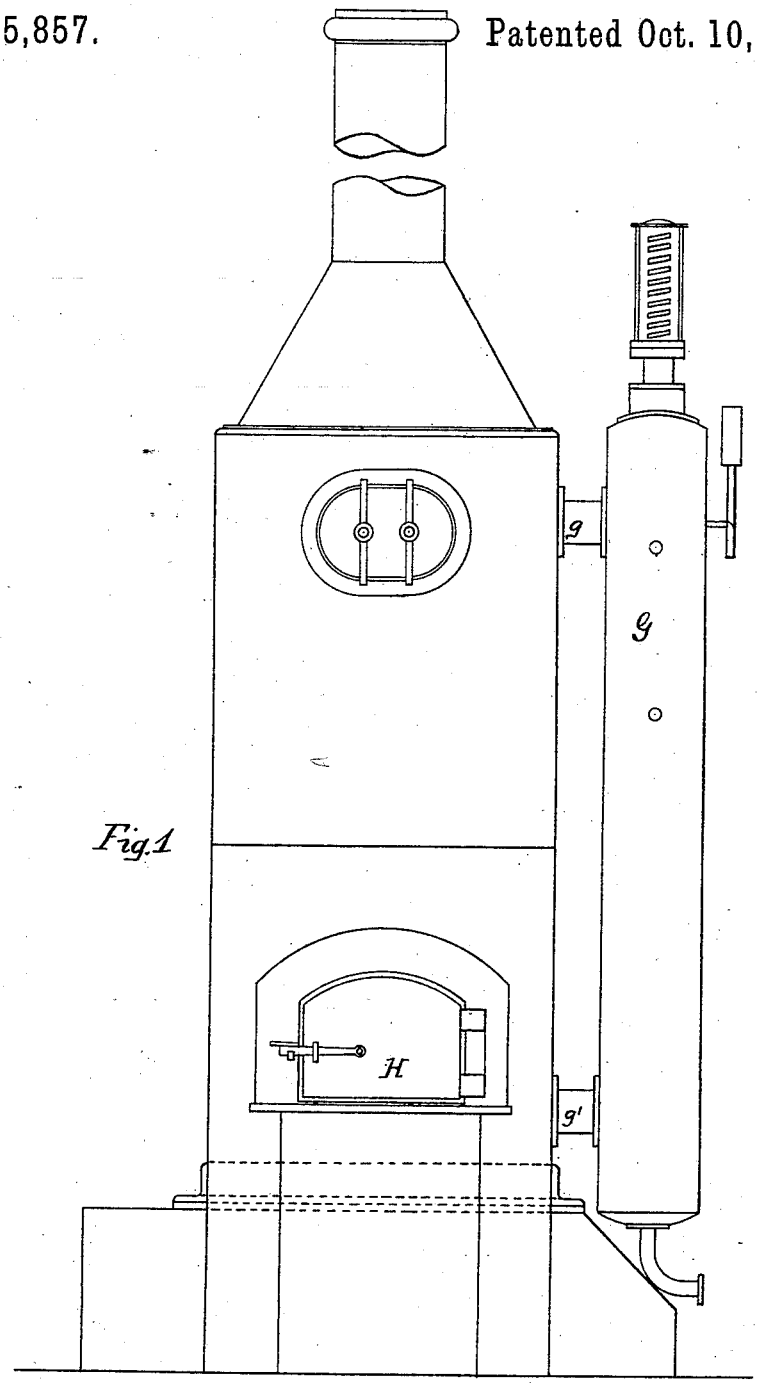


Fig. 1

WITNESSES:

Wm. H. Powell.

J. B. Connolly

INVENTOR

Demitrius I. Novikoff,

By Connolly Bros,

ATTORNEYS.

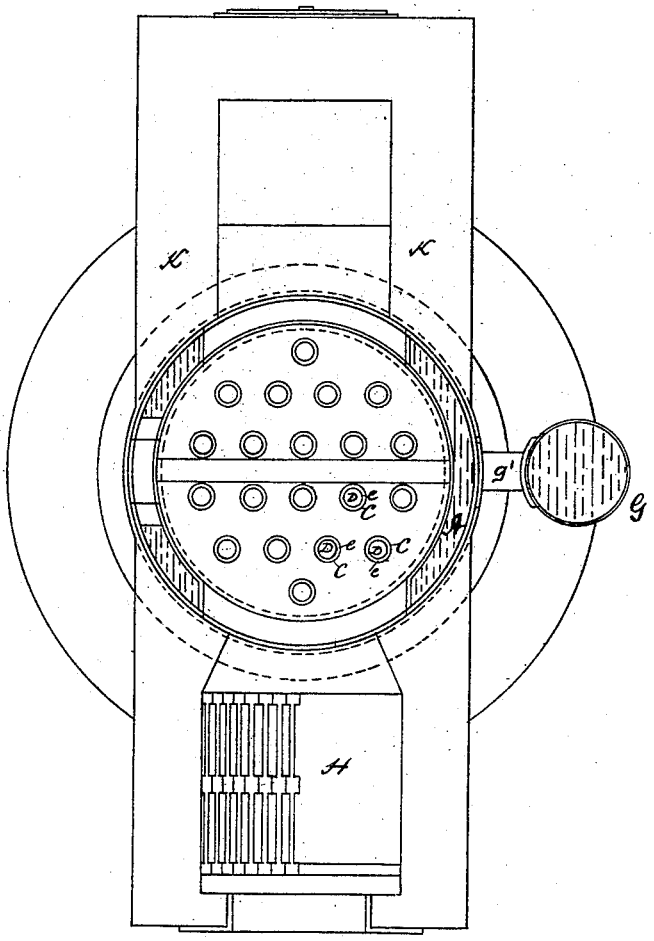
(No Model.) 4 Sheets—Sheet 2.

D. I. NOVIKOFF.

STEAM BOILER.

No. 265,857. Patented Oct. 10, 1882.

Fig. 2



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(No Model.) 4 Sheets—Sheet 3.

D. I. NOVIKOFF.

STEAM BOILER.

No. 265,857. Patented Oct. 10, 1882.

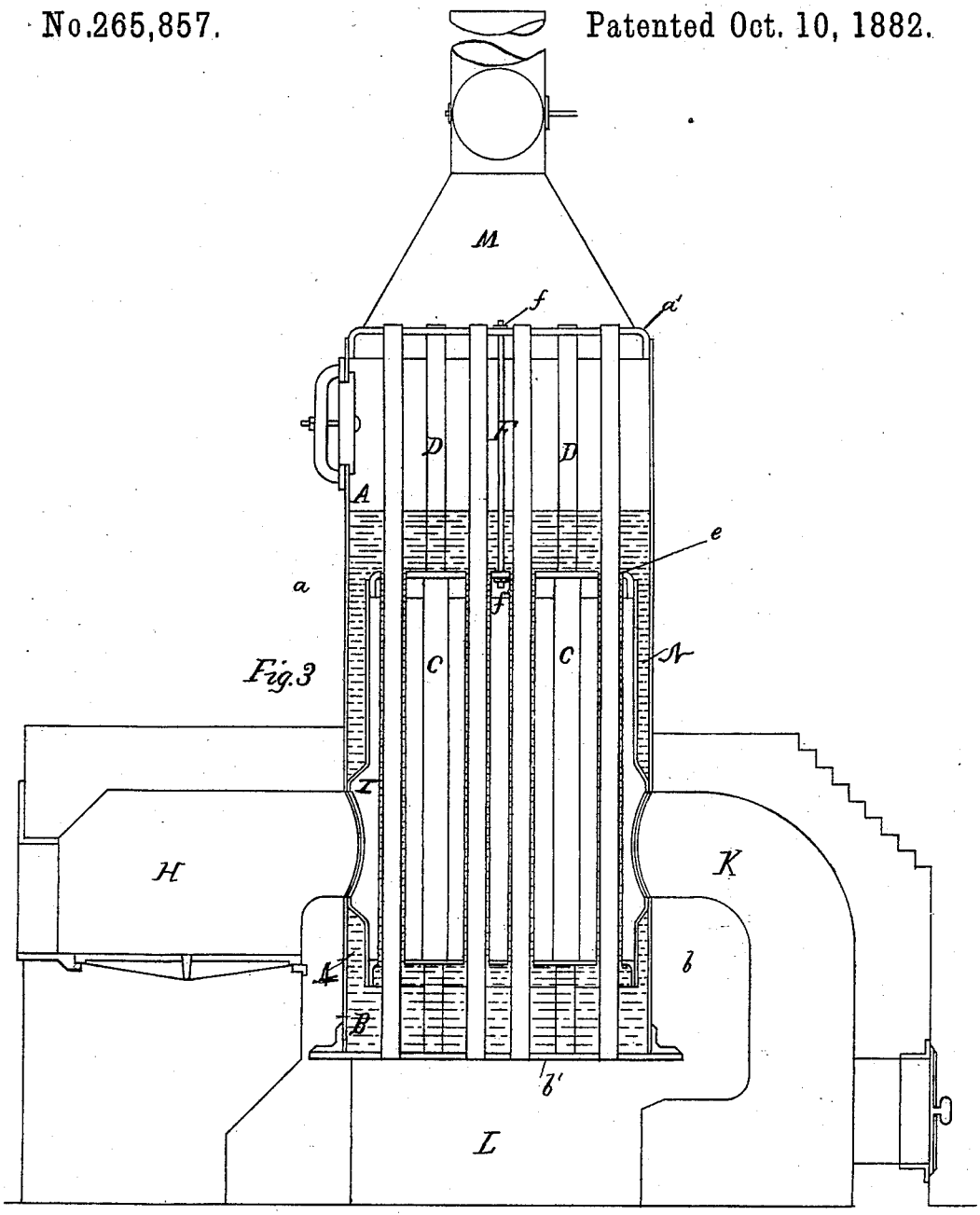

Fig. 3

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(No Model.) 4 Sheets—Sheet 4.

D. I. NOVIKOFF.

STEAM BOILER.

No. 265,857. Patented Oct. 10, 1882.

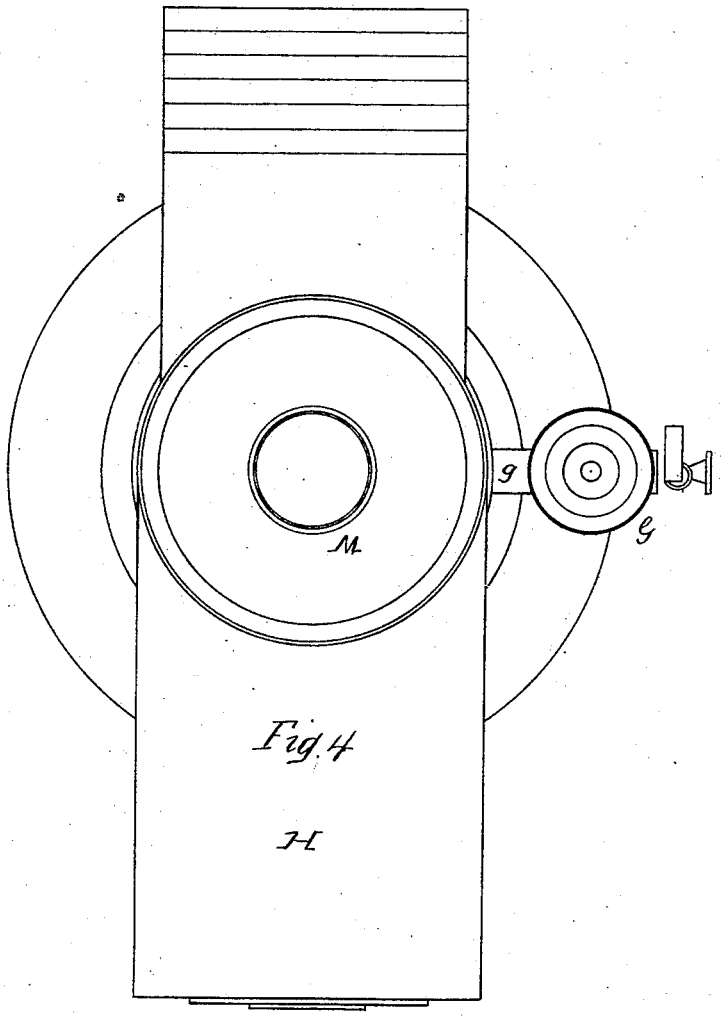

Fig. 4

WITNESSES:
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J. B. Connolly

INVENTOR
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ATTORNEYS.

UNITED STATES PATENT OFFICE.

DIMITRIUS I. NOVIKOFF, OF DRESNA, RUSSIA.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 265,857, dated October 10, 1882.

Application filed June 21, 1882. (No model.)

To all whom it may concern:

Be it known that I, DIMITRIUS IVANOVITCH NOVIKOFF, a subject of the Emperor of Russia, residing at Dresna, in the Moscow Government, Russia, have invented certain new and useful Improvements in Steam-Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification, in which—

Fig. 1 is a front elevation. Fig. 2 is a plan, partly in section. Fig. 3 is a vertical section, and Fig. 4 is a plan.

My invention has for its object to provide a generator in which steam may be generated more quickly and at less expense than in any steam-boiler heretofore produced.

My invention consists of a tubular flue-boiler so constructed that heat will be applied to water contained in tubes on two sides—*i. e.*, externally and internally.

In carrying my invention into effect I construct the generator with a reservoir communicating with a series of vertical tubes. Inside these tubes are heat or gas flues, one flue in each tube, water occupying the narrow annular spaces between the tubes and flues. The flames direct from the fire-box or furnace strike against the outsides of the tubes, while the products of combustion, gases, &c., pass up the external tubes to the stack or chimney.

Referring to the accompanying drawings, A represents an upper and B a lower reservoir with which the boiler is constructed. These reservoirs are connected by pipes or tubes C. Boiler-flues D are inserted into the tubes C, leaving annular spaces *e* between them, said tubes, like the flues, extending from the bottom of reservoir A. The tubes C reach only to the top of reservoir B, while the flues D extend to the bottom of said lower reservoir. The tubes C are fastened to the reservoirs by having their ends expanded in suitable openings in the bottom of reservoir A and top of reservoir B, and the flues D are fastened in the top *a'* of reservoir A and bottom *b'* of reservoir B in like manner, or they may be secured by rods F, having nuts *f f'* at their upper and lower ends, respectively.

G represents a column for feeding water to the boiler, communicating with the reservoirs A B by the upper and lower branches, *g g*.

H represents the furnace or fire-box, which is external to the boiler, and I is a combustion-chamber within the latter, and through which the flues and tubes pass, said chamber being located between the upper and lower reservoirs.

K is a diving-flue leading from the combustion-chamber I to a smoke-chamber, L, below the reservoir B, the bottom of the latter being the top or ceiling of the former. M is the smoke-stack or chimney, with which the flues D communicate.

In operation the flames from the furnace circulate in the combustion-chamber I between and around the tubes C, the products of combustion passing through the flue K into the smoke and gas chamber L, and thence upwardly through the flues D into the smoke-stack. In this manner heat is applied both externally and internally to the vertical annular columns of water between the flues and their surrounding tubes, and steam is generated very rapidly, the columns of water being replenished, as evaporation proceeds, from the reservoirs A and B.

The advantages of my invention are briefly as follows: First, rapidity of generation of steam; second, economy of space, the heating area being relatively very large; third, safety, as danger of explosion is largely avoided, the production of steam being effected only in the pipes; fourth, economy of fuel.

The spaces between the heating-flues and water-pipes communicate with the upper and lower reservoirs, A and B, the latter also communicating by means of the annular space N, which surrounds said flues and pipes. By means of this arrangement a circulation is constantly maintained in the boiler with advantageous results. The steam is most readily generated in the spaces between such tubes and pipes, causing an upward circulation in such spaces and a downward circulation in the space N, so that all the water in the boiler is subjected to the heating action of flames, gases, &c., applied both externally and internally.

I am aware that steam-boilers have been heretofore constructed in which water-tubes with internal fire-flues have been employed. Hence I do not broadly claim the same. My

invention therefore is an improvement in this class of boilers, whereby I attain a better construction than heretofore and superior results. In my construction all the fire-pipes are surrounded by water-tubes with annular water-spaces between them, so that every particle of heat generated is applied directly to annular water-columns. These columns connecting the upper and lower reservoirs, the most perfect water circulation of the water is secured. The flames and products of combustion are in the first instance caused to surround all of these annular water-columns at their bases, and then to ascend through the internal flues direct to the stack or chimney. The heat is thus applied externally and at the base in the first instance, and then internally and upwardly, the path of the gases, &c., being directly up from the smoke-chamber, whereby a free and perfect draft and steady combustion are secured.

What I claim as my invention is—

The steam-boiler constructed substantially as described, having upper and lower reservoirs, A B, respectively, water-tubes C, connecting said reservoirs, fire-flues D, passing through said tubes and extending completely through said reservoirs, fire-box or furnace H, combustion-chamber I, through which said tubes and flues pass, smoke-chamber L below said combustion-chamber, and diving-flue K, connecting said chambers, the parts specified being constructed substantially as shown and described, whereby the flames, &c., will first surround the water-tubes at their bases, and then pass upwardly through the flues D direct to the smoke-stack or chimney, as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 27th day of May, 1882.

DIMITRIUS IVANOVITCH NOVIKOFF.

Witnesses:

ADOLPH STERN,

JOHANN LUDWIG KOSTKO.