

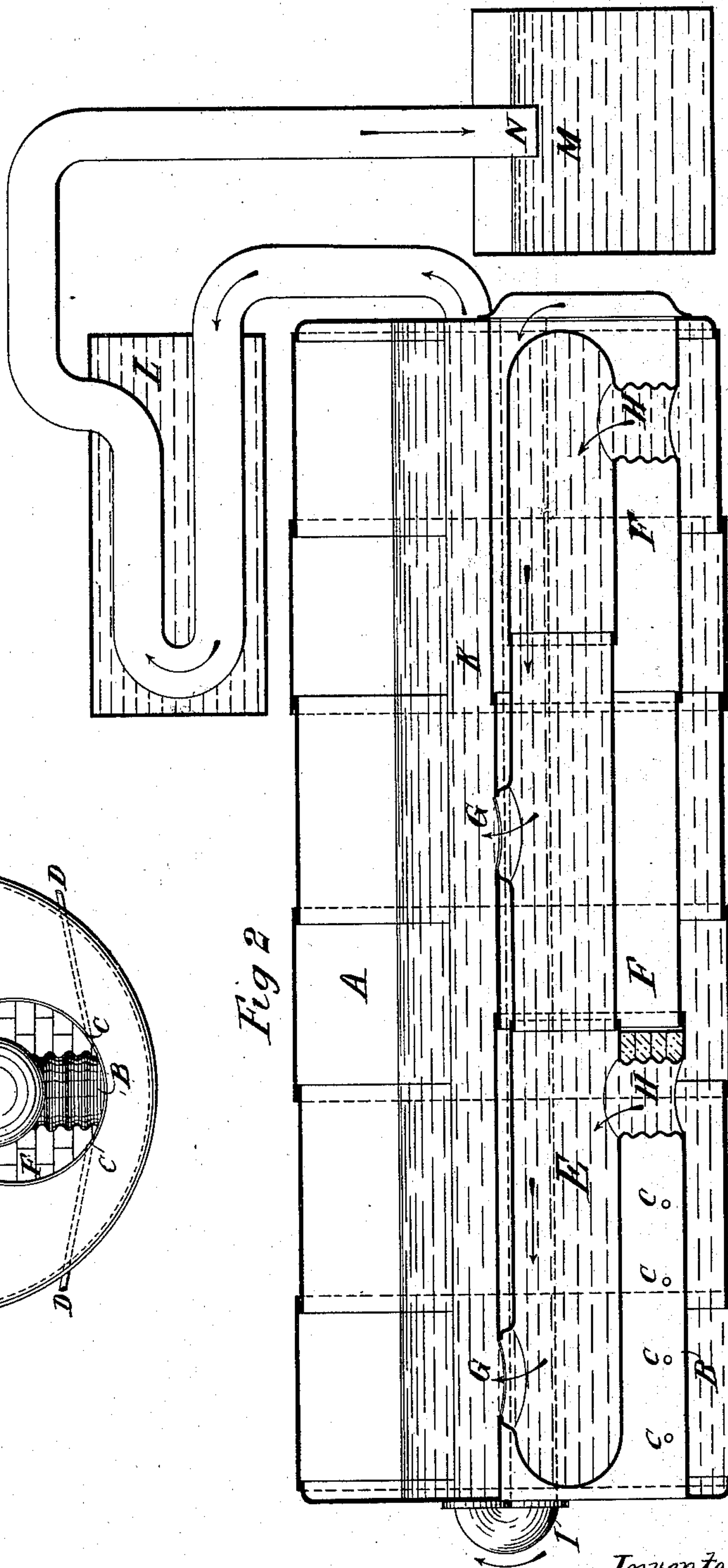
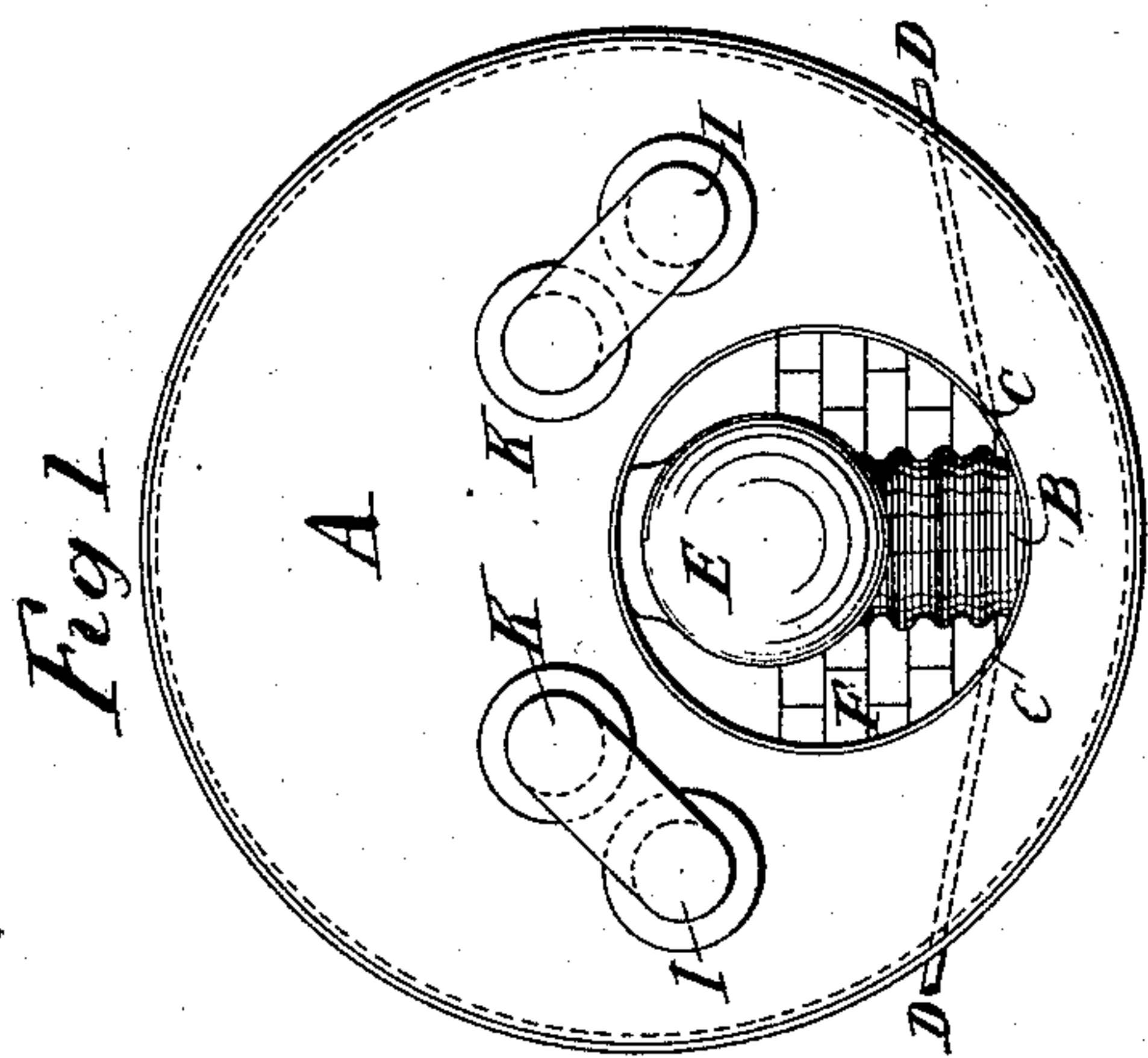
(No Model.)

2 Sheets—Sheet 1.

R. SCOTT.
STEAM GENERATOR.

No. 416,957.

Patented Dec. 10, 1889.



Witnesses:

Fred W. Ruben
Mr. L. Brinkley.

Inventor:
Robert Scott
by Singer & Ebnert
Attorneys.

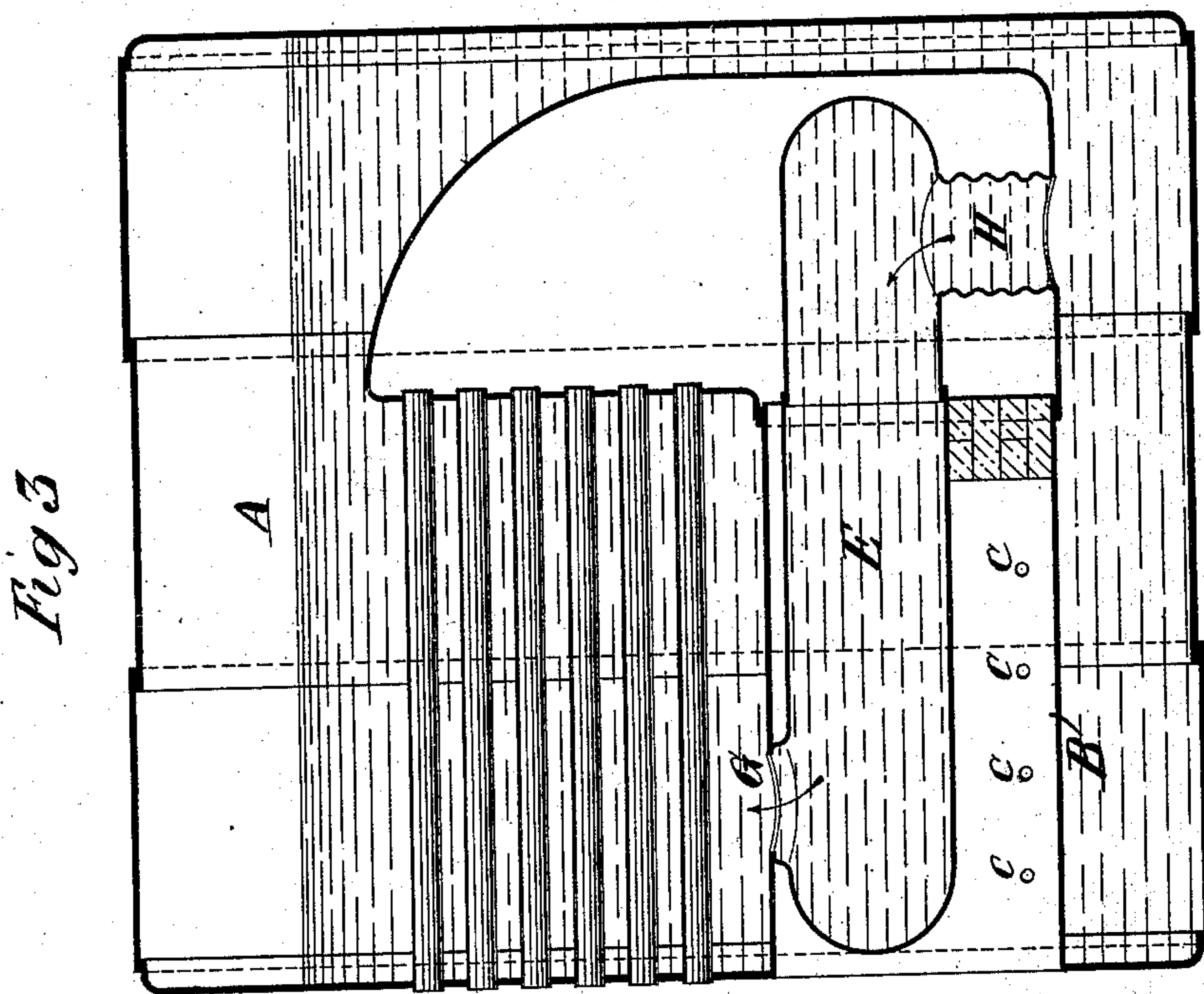
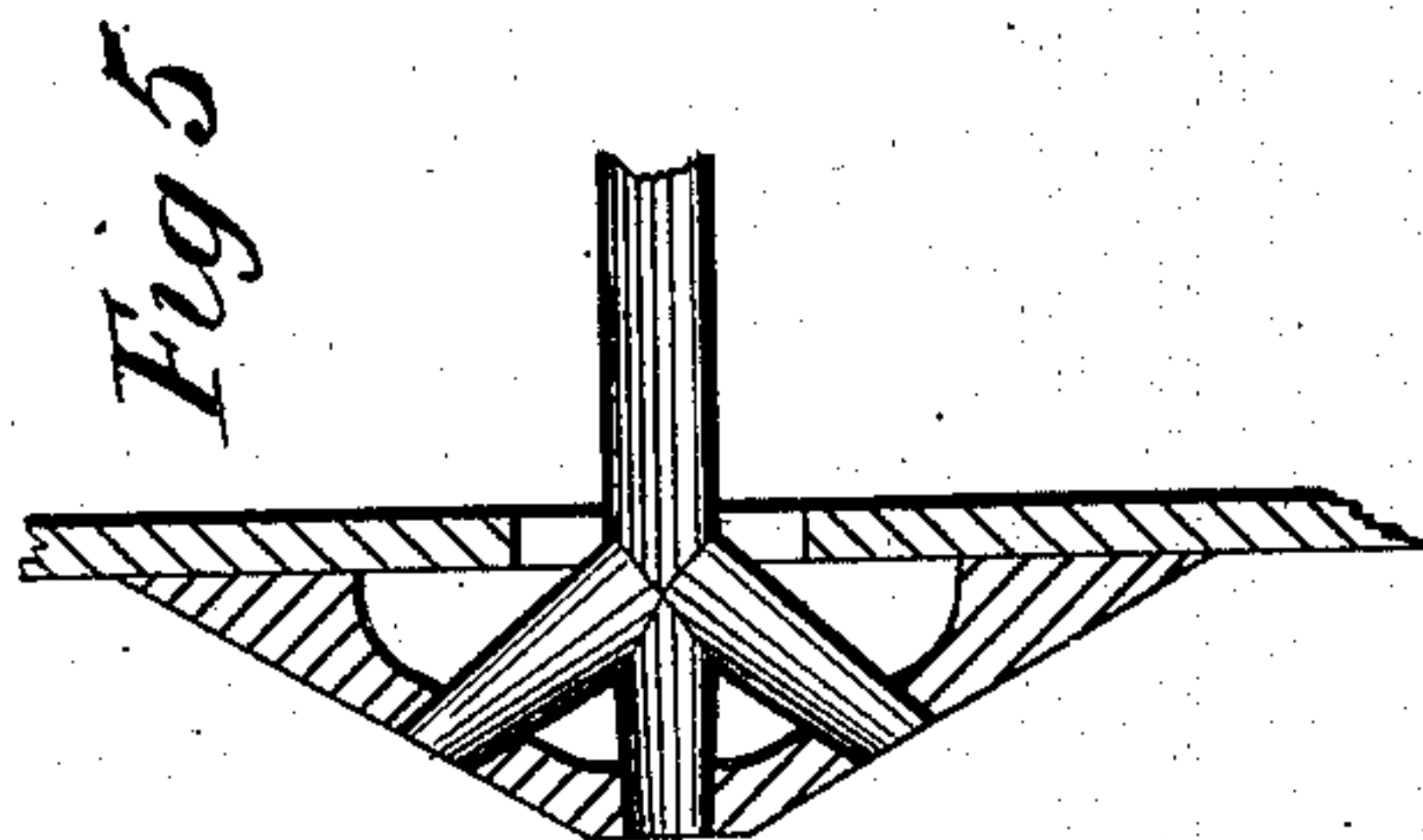
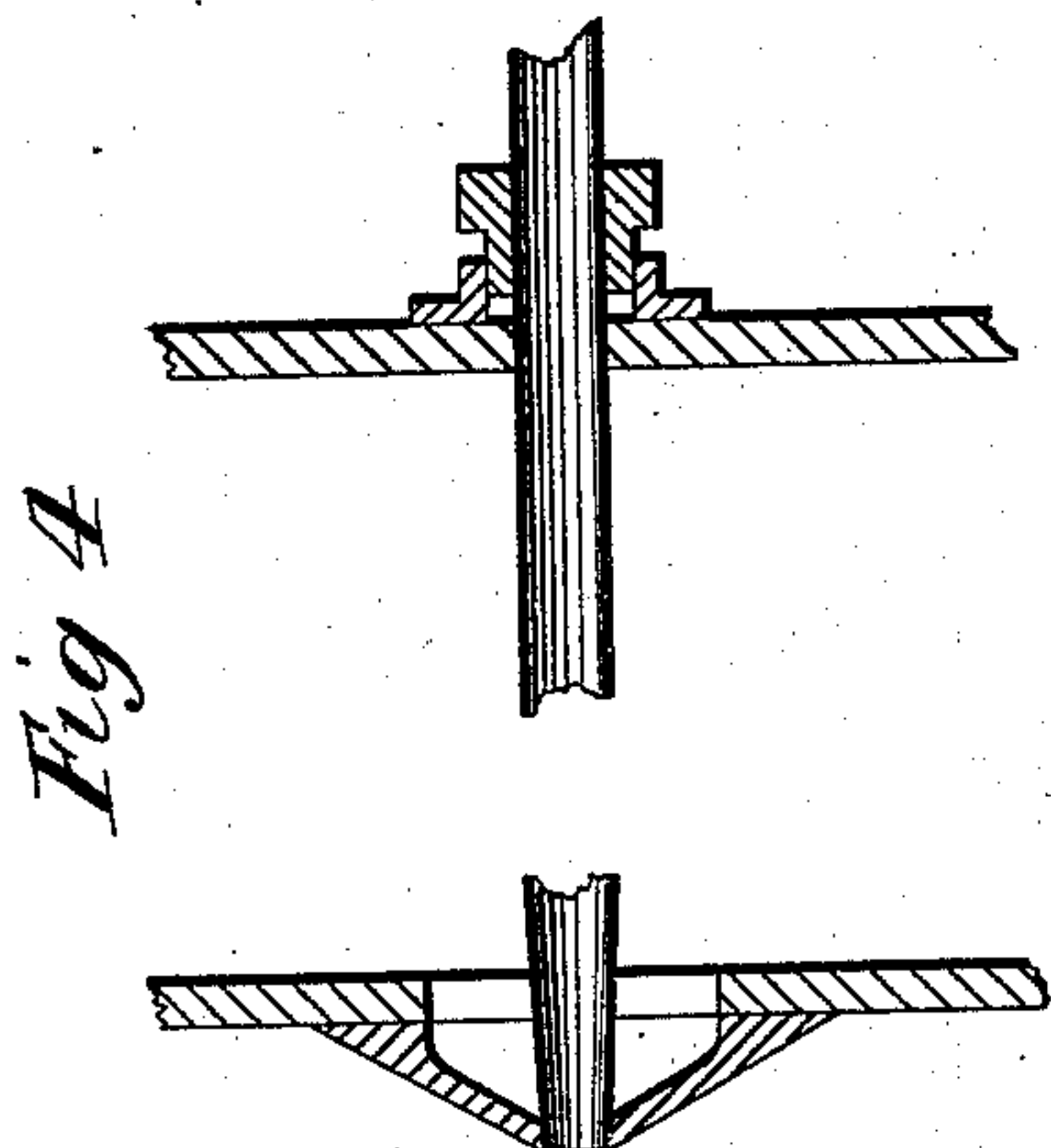
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2 Sheets—Sheet 2.

R. SCOTT.
STEAM GENERATOR.

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Witnesses:
Fred W. Ruben
M. L. Bulkley.

Inventor:
Robert Scott
by Singer & Ebner.
Attorneys.

UNITED STATES PATENT OFFICE.

ROBERT SCOTT, OF NEWCASTLE-ON-TYNE, COUNTY OF NORTHUMBERLAND,
ENGLAND.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 416,957, dated December 10, 1889.

Application filed August 29, 1888. Serial No. 284,084. (No model.) Patented in England January 30, 1886, No. 1,352, and June 8, 1887, No. 8,226; in France August 24, 1888, No. 192,568; in Belgium August 24, 1888, No. 82,993; in Germany August 25, 1888, No. 46,656, and in Italy September 30, 1888, XXII, 23,951, XLVII, 152.

To all whom it may concern:

Be it known that I, ROBERT SCOTT, a subject of the Queen of Great Britain and Ireland, residing at Newcastle-on-Tyne, in the county of Northumberland, England, have invented new and useful Improvements in Boilers and Steam-Generators, (for which I have obtained British Patents No. 1,352, dated January 30, 1886, and No. 8,226, dated June 8, 1887, and for which I have filed an application, No. 16,831, dated December 7, 1887, and received provisional protection only; in France August 24, 1888, No. 192,568; in Belgium August 24, 1888, No. 82,993; in Germany August 25, 1888, No. 46,656, and in Italy September 30, 1888, XXII, 23,951, XLVII, 152,) of which the following is a specification.

This invention for improvements in boilers and steam-generators has for its objects to support and stimulate combustion by conducting concentrated currents of air under pressure into the body of the burning fuel; to provide means for bringing the water into closer contact with the centers of heat than is the case with boilers and steam-generators as ordinarily constructed; to increase the intensity and radiation of the heat evolved and at the same time to destroy any smoke which would otherwise escape into the atmosphere, and, generally, to economize the consumption of fuel, and thereby increase their efficiency.

In a boiler or steam-generator constructed according to this invention fire-bars are entirely dispensed with, and the fuel is placed and burned directly upon the bare furnace-plates. Combustion is supported and stimulated to the extent desired by the introduction of concentrated currents of air under pressure direct to the top, sides, or bottom of the fuel. The said currents of air are led through the sides of the boiler and suitably-constructed tuyeres to the fuel in the furnace. The air-inlets are arranged alternately to each other, their number being regulated according to the size of the fire-chamber.

To increase the effective heating-surface and to bring the body of the water near the body of the fuel, I provide a large tube, ex-

tending nearly the whole of the length of the furnace or main flue and connect it to the top and bottom of the said furnace or main flue by suitable branches. By these latter means a rapid circulation of the water in the boiler is also promoted. The flame and heated gases are forced between this tube and the furnace, and the effectiveness of the heat is increased in consequence of its being concentrated.

The beforementioned internal tube varies in size according to the size of the flue. In a flue thirty-six inches in diameter I prefer to make it from twenty-two to twenty-three inches in diameter, and to place it about two inches from the top of the furnace.

In Lancashire and Cornish boilers, after the gases have passed through the flue they are diverted through return-tubes, and the remaining heat they possess is utilized for heating the feed-water.

In burning the fuel by forced draft it is necessary to retard the too rapid exit of the gases. This is accomplished by submerging the outlets from the furnace a few inches in a body of water or other fluid. By these means the gases are rendered more dense in the furnace and the radiation of the heat increased, while all smoke is effectually destroyed, the gases passing into the atmosphere in a perfectly invisible form. By this system inferior kinds of fuel can be fully utilized and their effectiveness greatly increased.

This invention can be applied to all boilers that have internal furnaces.

In the accompanying drawings, Figures 1 and 2 represent a front and longitudinal section, respectively, of a single-flued boiler constructed according to my invention. Fig. 3 is a longitudinal section of a marine boiler. Fig. 4 is an inlet and single-way tuyere for conveying concentrated currents of air direct to the fuel, and Fig. 5 is a section of a three-way tuyere for the same purpose.

In the boiler A the fuel is burned directly upon the furnace-plates B. Concentrated currents of air are introduced under pressure direct to the top, sides, or bottom of the fuel

through the sides of the boiler and suitably-constructed tuyeres C (see Figs. 4 and 5) to the fuel, as clearly shown. The air-inlets D are arranged alternately to each other in the furnace. The large tube E extends nearly the whole length of the furnace or main flue F, and is connected to the top and bottom of the furnace by the branches G H, which insure a rapid circulation of the heated water in the boiler. After passing through the main flue F the gases pass through the tubes I and K, and thence through a feed-water tank L to the tank M, the outlets N being submerged to a small depth in the water or other fluid contained therein.

The direction of the circulation of the water and of the motion of the gases are clearly indicated by the arrows.

I claim as my invention and desire to secure by Letters Patent—

In boilers and steam-generators, the combination, with a larger flue-boiler, a smaller

tubular boiler in said flue, and conduits, substantially as specified, connecting the water-space of the said larger boiler with the said tubular boiler, of a furnace within said flue under said tubular boiler, a bottom plate in said furnace in direct contact with the water in said larger boiler under said furnace, and so constructed and arranged that facility is afforded for burning fuel thereon, as described, conduits conveying air into said furnace, and a flue conveying the products of combustion in a heated state from said furnace through said larger boiler, through a water-heater, and into a tank, all substantially as and for the purpose set forth.

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

ROBERT SCOTT.

Witnesses:

THOMAS RUTTER BURDIS,
JOHN MORROW.