

No. 668,006.

Patented Feb. 12, 1901.

H. BRABY.
STEAM GENERATOR.

(Application filed May 11, 1900.)

(No Model.)

4 Sheets—Sheet 1.

FIG. 1

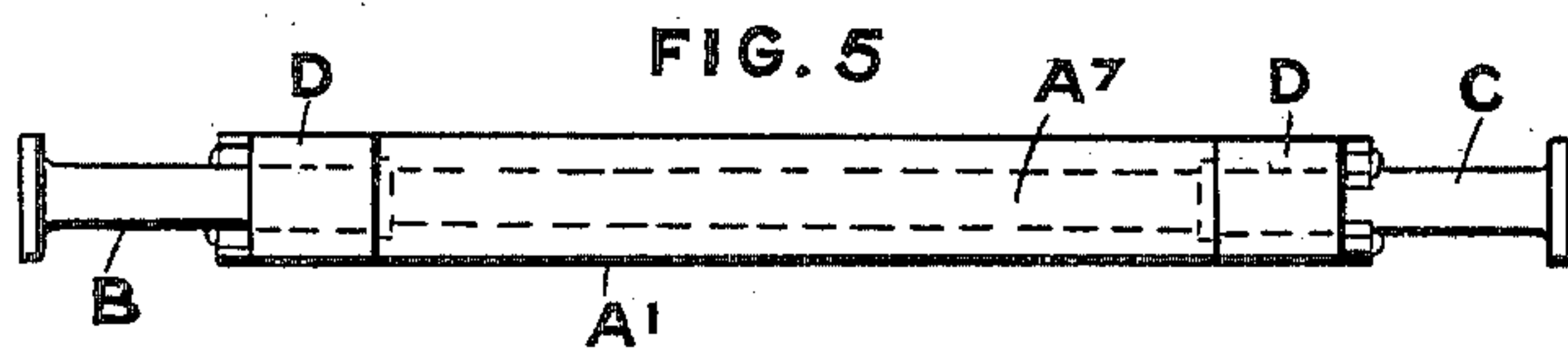
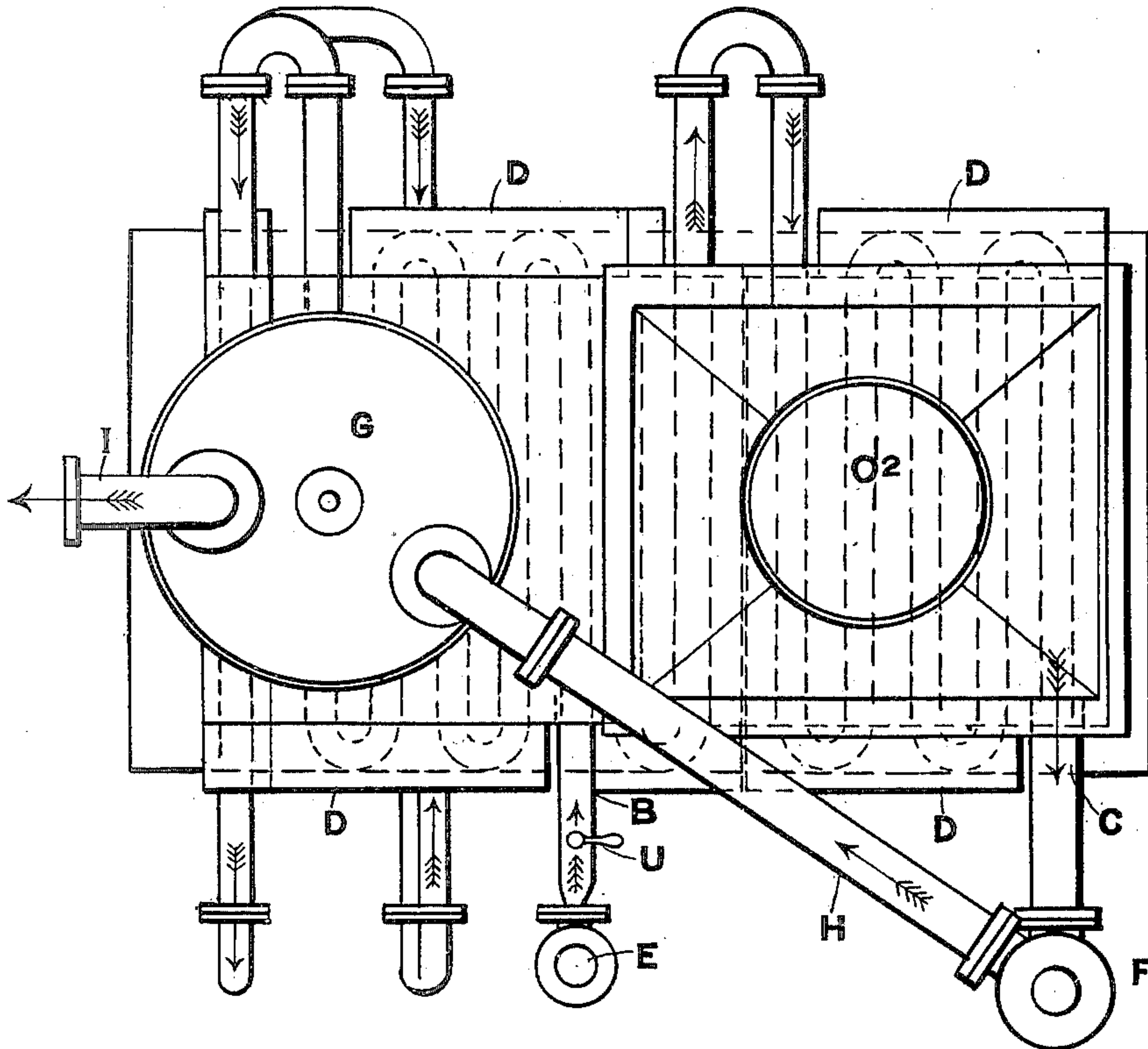


FIG. 7

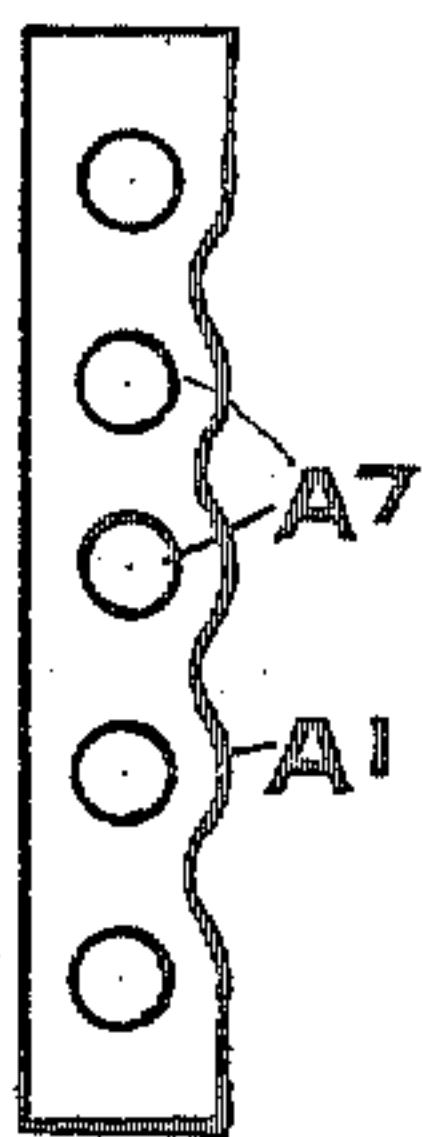


FIG. 4

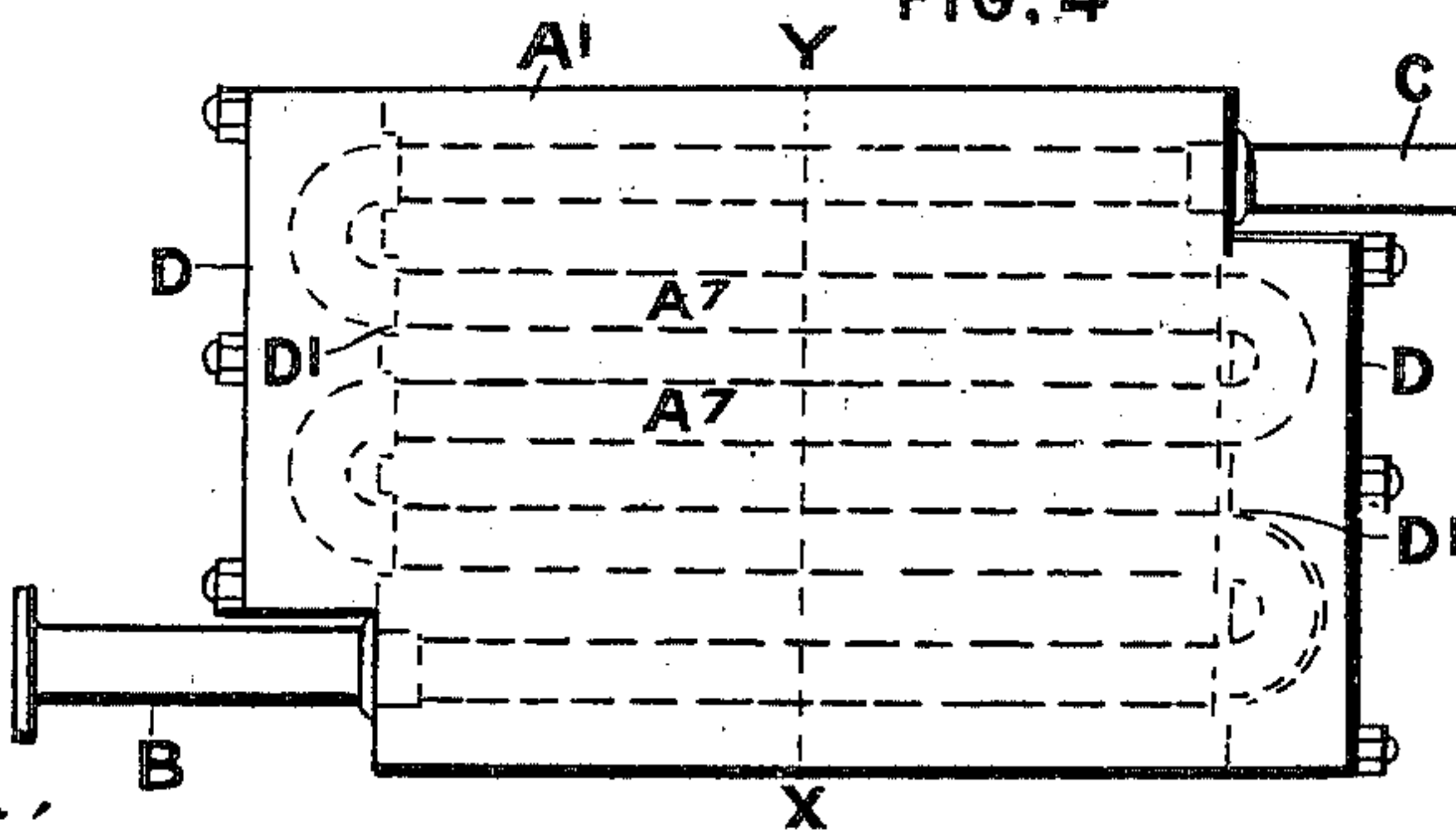


FIG. 6



Witnesses:

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No. 668,006.

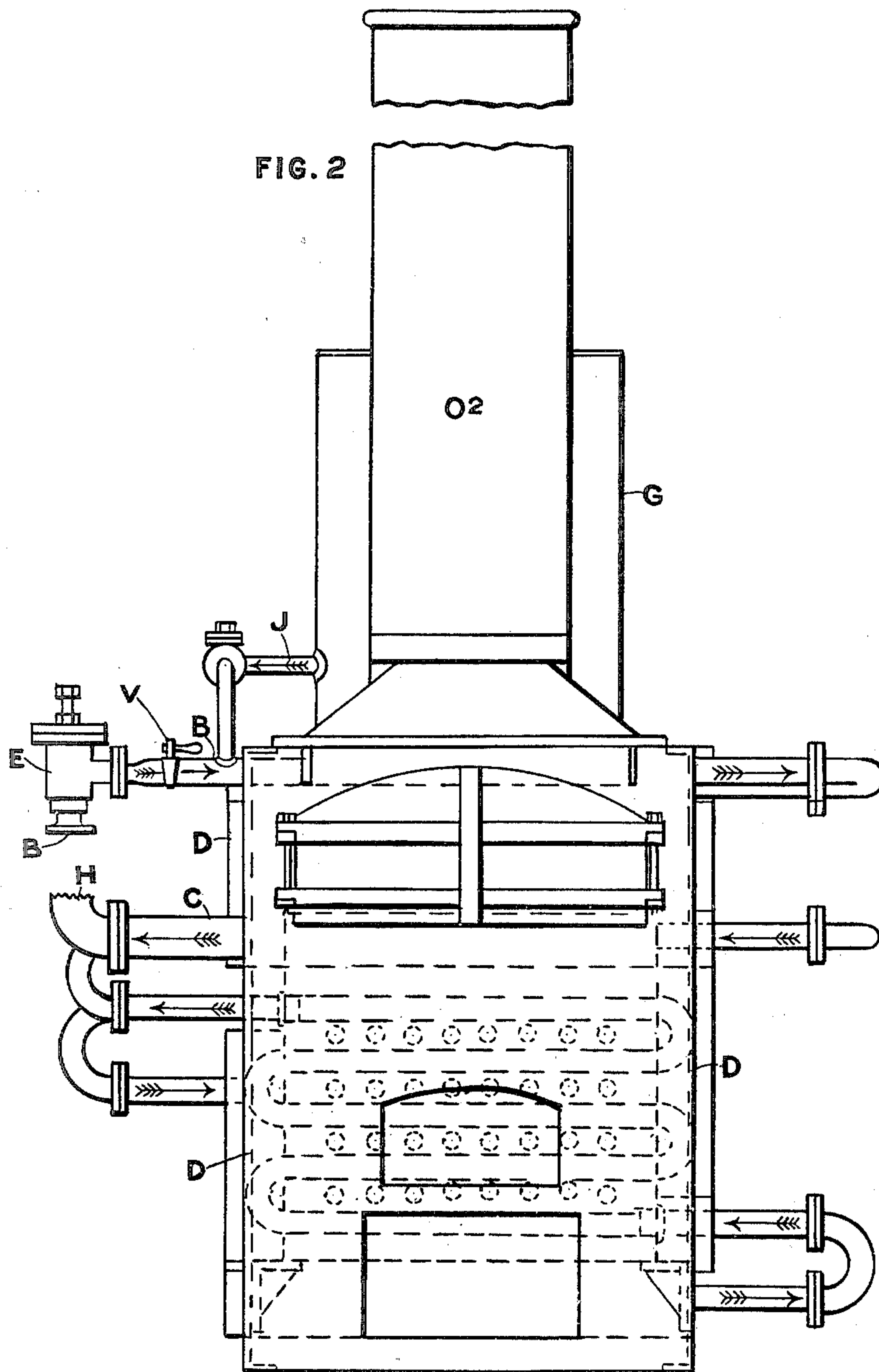
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4 Sheets—Sheet 2.



witnesses

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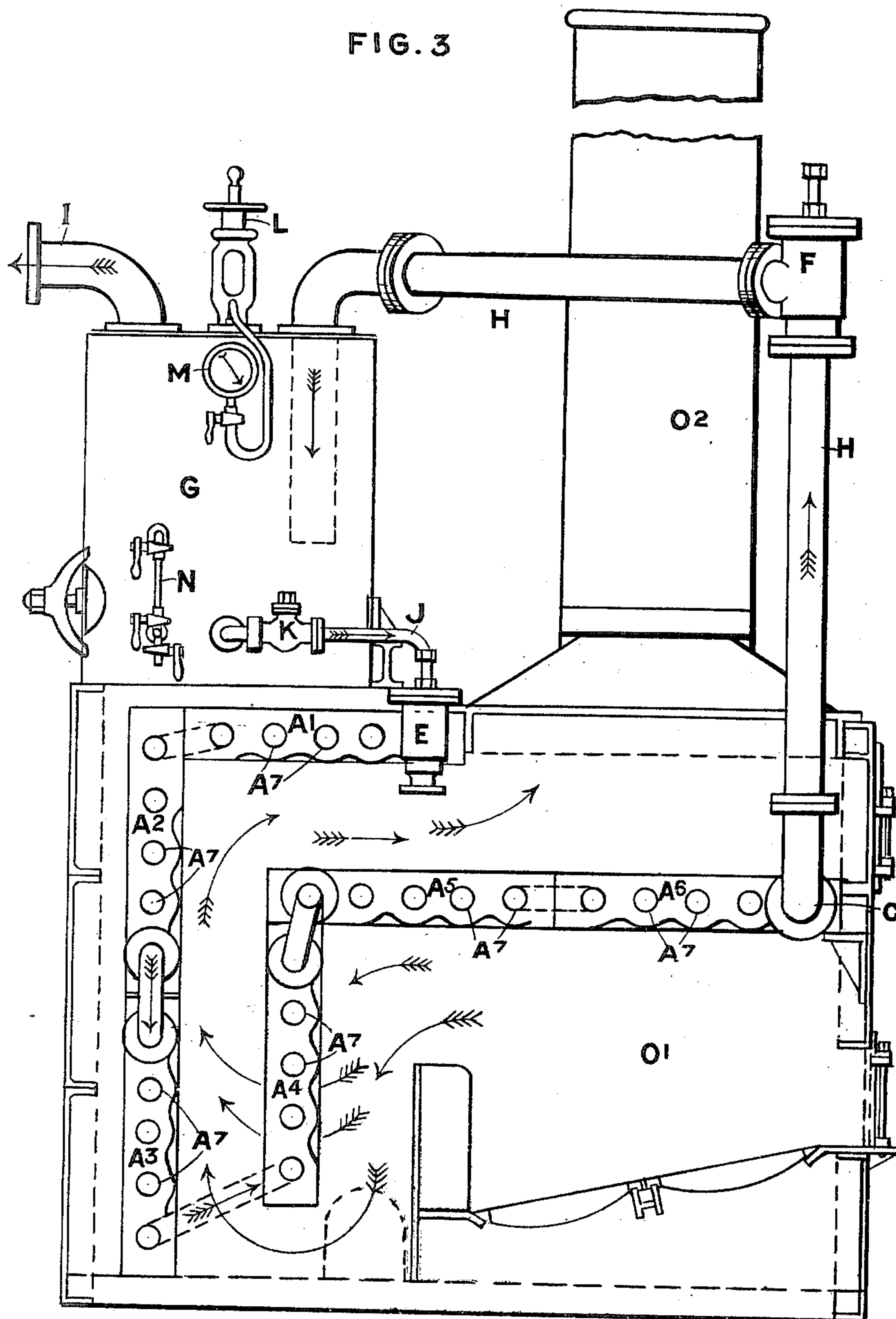
H. BRABY.
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(No Model.)

(Application filed May 11, 1900.)

4 Sheets—Sheet 3.

FIG. 3



witnesses;

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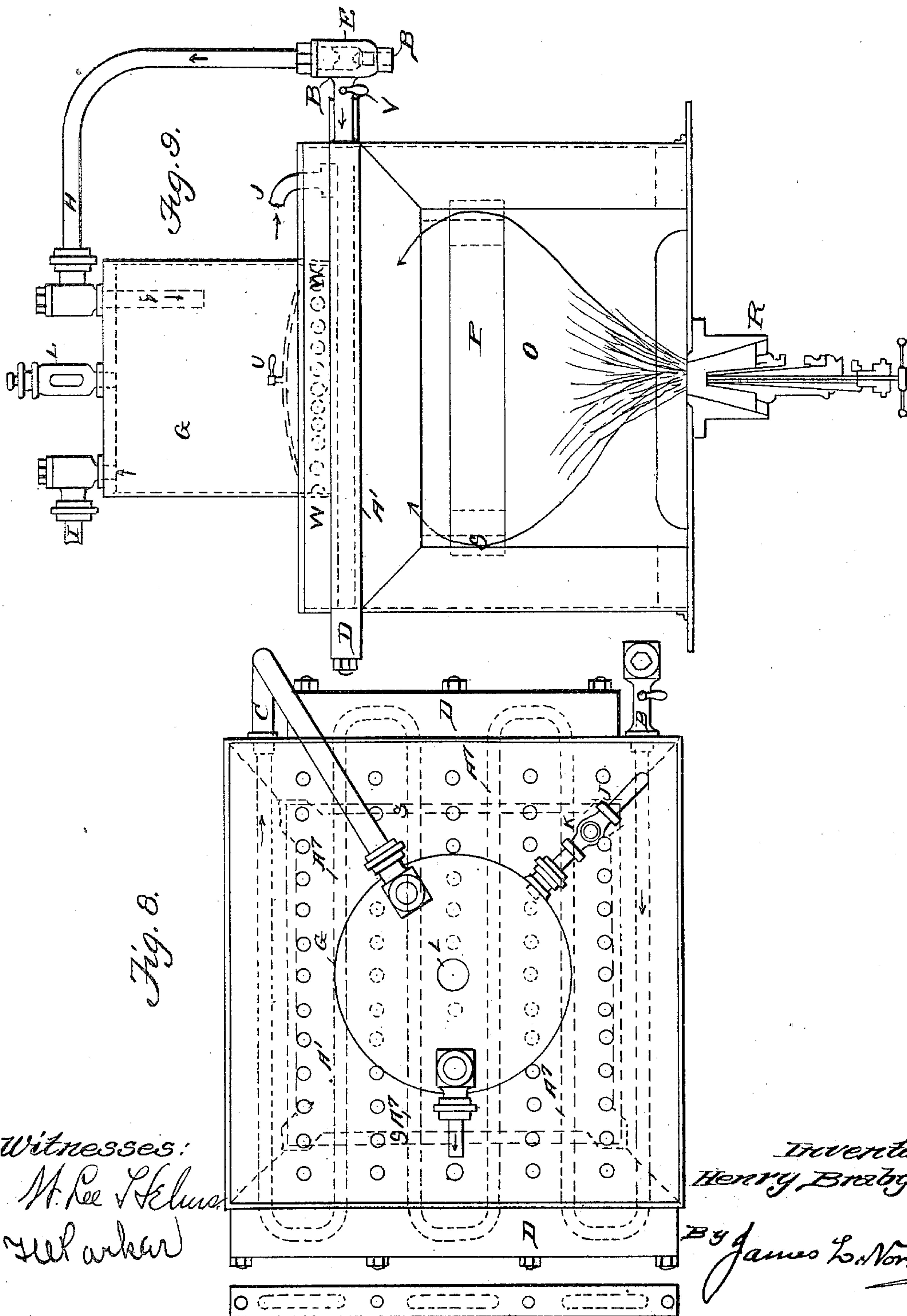
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H. BRABY.
STEAM GENERATOR.

(Application filed May 11, 1900.)

(No Model.)

4 Sheets—Sheet 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

HENRY BRABY, OF AYR, QUEENSLAND.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 668,006, dated February 12, 1901.

Application filed May 11, 1900. Serial No. 16,355. (No model.)

To all whom it may concern:

Be it known that I, HENRY BRABY, a subject of the Queen of Great Britain, and a resident of Ayr, in the county of Gladstone and Colony of Queensland, have invented certain new and useful Improvements in Steam-Generators, (for which I have applied for patents in Queensland, No. 5,234, filed October 20, 1899; in New South Wales, No. 9,897, filed January 12, 1900; in South Australia, No. 6,326, filed January 10, 1900; in Western Australia, No. 2,826, filed January 16, 1900; in New Zealand, No. 12,324, filed January 18, 1900, and in Victoria, No. 16,902, filed February 5, 1900,) of which the following is a description.

This invention is for generating steam by passing or circulating water through a waterway or passage formed in one or more blocks or plates of copper, gun-metal, or other good heat-conductor while under the application of heat.

My invention is based on the theory that the rate of transmission of heat by water-heating surfaces is proportional to the difference between the temperature of the plates, due to combustion on the outside, and that of the water in the interior of the plates, together with the heat-transmissive power of the metal as a heat-conducting medium, and that no more water should be brought into contact with the heating-surfaces within a given time than can be converted within that time. The extra thickness of metal is also an advantage in that it acts as an accumulator or storage of heat.

With my generator steam can be raised in a comparatively short time, while there is great economy in the consumption of fuel. There is also little or no possibility of explosion or danger to life in the event of an accident, more especially as there is no storage of boiling water under pressure.

In proportion to its efficiency for raising steam the generator is very light, occupies little space, and requires slight attention, while it is easily kept clean.

According to my invention I provide one or more generator blocks or plates, of good heat-conducting material, having passages or waterways therein through which the water

is made to circulate. One or more of the plates may be perforated, through which perforations or holes part of the furnace heat is made to pass. The caps, which return the waterways and give access for cleaning purposes, are jointed, preferably, by means of asbestos rings recessed into the plates. I provide a back-pressure valve for the water-inlet from a feed-pump or injector and preferably a back-pressure valve for the steam-outlet, which may lead to an equalizer or dome, from which a pipe connects to an engine or other steam-consumer. A return water-pipe provided with a check-valve leads from the equalizer to the water-inlet. The equalizer is so situated over the furnace or combustion-chamber as to receive part of its heat.

In the accompanying drawings, Figure 1 is a plan, Fig. 2 a front elevation, and Fig. 3 a side elevation, partly in section, of a generator having a comparatively large steam-raising capacity. Fig. 4 is a plan, Fig. 5 a side elevation, Fig. 6 an end elevation, and Fig. 7 a section through the line *xy*, Fig. 4, of a generator plate or block, while Fig. 8 is a plan, and Fig. 9 an elevation, of a simple form of generator suitable for driving small motors and preferably heated by a liquid-fuel burner.

The same reference-letters indicate the same or corresponding parts.

In the apparatus shown in Figs. 1 to 7, *A'*, *A*², *A*³, *A*⁴, *A*⁵, and *A*⁶ are the generator-plates, having the passages or waterways *A*⁷, one or more of the plates being perforated for the passage of a portion of the heat from the furnace or other source. *B* is the water-inlet and *C* the steam-outlet connecting pipes. *D* represents the caps, preferably of cast-iron, which return the waterways and give access for cleaning purposes, being jointed by asbestos rings *D'*, recessed into the plates, as shown in Figs. 4, 5, and 6. *E* is the back-pressure valve for the water-inlet from the feed-pump, while *F* is the back-pressure valve for the steam-outlet to the equalizer or dome *G*. *H* is the connecting steam-pipe to the equalizer. *I* is the connecting-pipe from the equalizer to the engine or other steam-consumer. *J* is the return water or drain pipe from the equalizer to the water-inlet pipe, and *K* the check-valve

on said pipe. L is a safety-valve, M a pressure-gage, and N a water-gage. O' is a furnace, and O² a chimney. U V are try-cocks.

The following shows the working of the apparatus shown in Figs. 1 to 7: The water is forced through the inlet-valve E and pipe B into the waterways A⁷ in the generator-plate A' and thence through the waterways in the plates A², A³, A⁴, A⁵, and A⁶, and being vaporized passes outlet C and the delivery back-pressure valve F as superheated steam and thence by the connecting-pipe H to the equalizer G.

It is necessary to keep up a constant circulation of water preferably by means of a feed-pump of the double-ram type. Hot-water feed is preferably used and the supply regulated by means of a supply-cock fitted with a graduated circle-plate and pointer.

If at any time too much water be forced into the generator, it will be detected in the equalizer by means of the water-gage N and will return automatically through the pipe J to the generator, when the supply from the pump is reduced, or it can be returned to the feed-tank. Should insufficient water be passed into the generator, it would merely result in less steam being generated and an increase in the temperature of the generator, which heat is given back when the water-supply is increased.

In the apparatus illustrated in Figs. 8 and 9 A' is the generator-plate. A⁷ represents the waterways through which the water and steam circulates. B shows the inlet and C the outlet connecting pipes. D represents the caps, preferably of gun-metal, for returning the waterways A⁷. E is the back-pressure valve for the water-inlet. G is the equalizer, and H the pipe leading from the generator to the equalizer. I is the connecting-pipe from the generator to the engine. J is the return water or drain pipe from the equalizer. K is the check-valve on the return water-pipe. L is a safety-valve. O is the combustion-chamber, consisting of a wrought-iron box lined with fire-bricks, tiles, or asbestos composition. P is a plate or tile composed of fire-clay or asbestos composition, on which the heat first impinges. B is a liquid-fuel injector or burner of any suitable kind. S repre-

sents slits or spaces through which the heat ascends from the combustion-chamber. U V are try-cocks for ascertaining whether there is water in the equalizer and waterways, respectively. W represents perforations around the base of the equalizer for circulation of heat below the dished bottom. The operation of this apparatus is as follows: The burner is started, and at the same time water is forced into the waterways A⁷ of the generator-plate. As soon as steam-pressure is obtained the feed-pump or injector is started to keep up the circulation of water, and steam is generated, as hereinbefore described.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a steam-generator, the combination of a plate or block having parallel passages extending therethrough and caps or end portions provided with passages adapted to form continuations of the passages of said block or plate, substantially as set forth.

2. In a steam-generator, the combination of a plate or block having parallel passages extending therethrough, and caps or end portions having passages adapted to form continuations of the passages of said plate or block, said plate or block also having a series of channels or perforations traversing it intermediately, and in lines at right angles to the longitudinal plane, of its passages, substantially as set forth.

3. In a steam-generator, the combination of a furnace-chamber, a plate or block having a series of parallel passages extending there-through, end portions or caps having passages adapted to form continuations of the passages of said block or plate, an equalizer or dome arranged upon said furnace-chamber, pipe connections between the block or plate passages and said equalizer, and inlet and outlet valves supplied to said pipe connections, substantially as set forth.

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

HENRY BRABY.

Witnesses:

THOMAS BURLTON IRVING,
JOHN DOSSETT.