

No. 697,789.

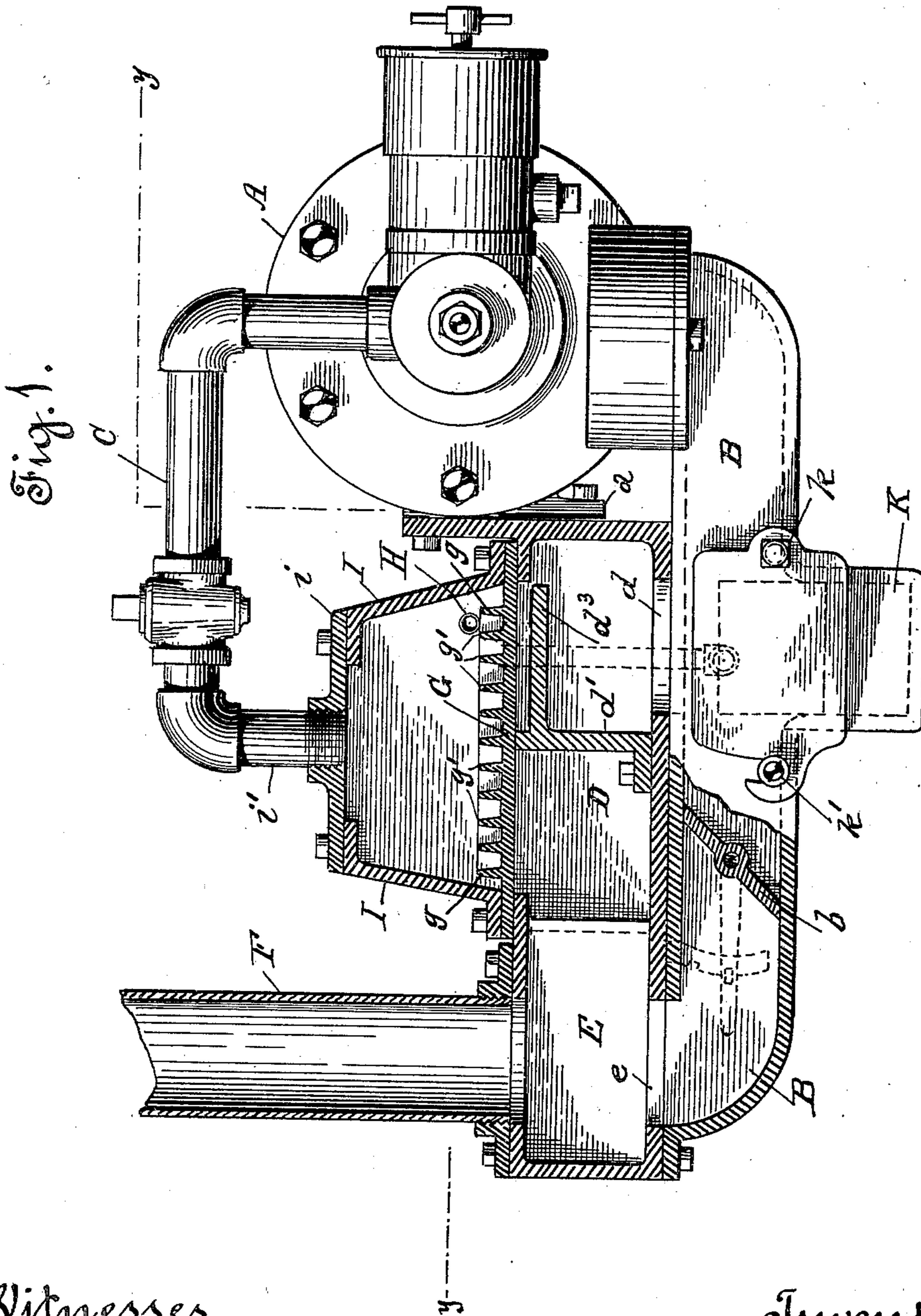
Patented Apr. 15, 1902.

G. W. BONDS.  
GAS GENERATOR FOR GAS ENGINES.

(Application filed Aug. 12, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses.

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Inventor,  
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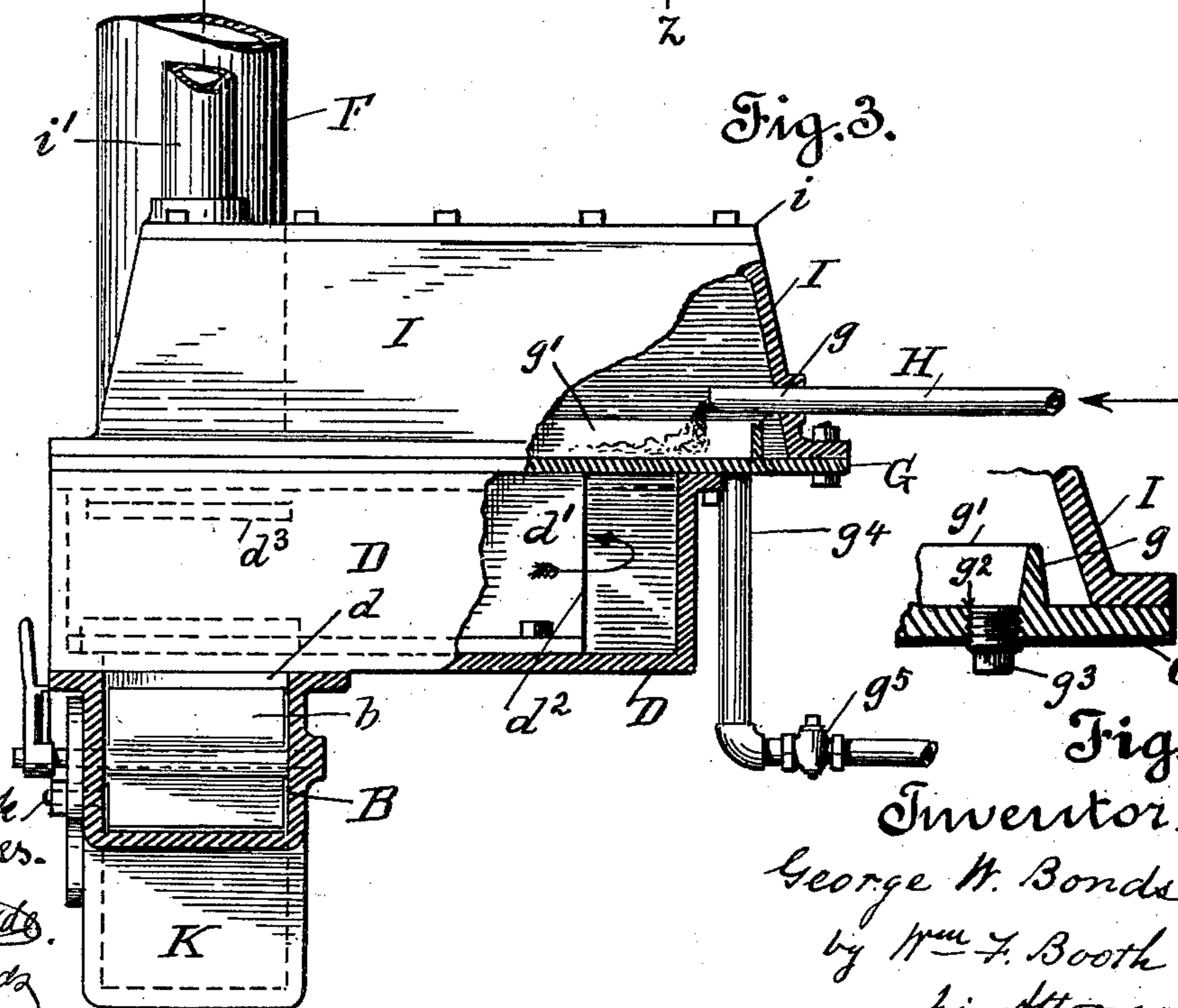
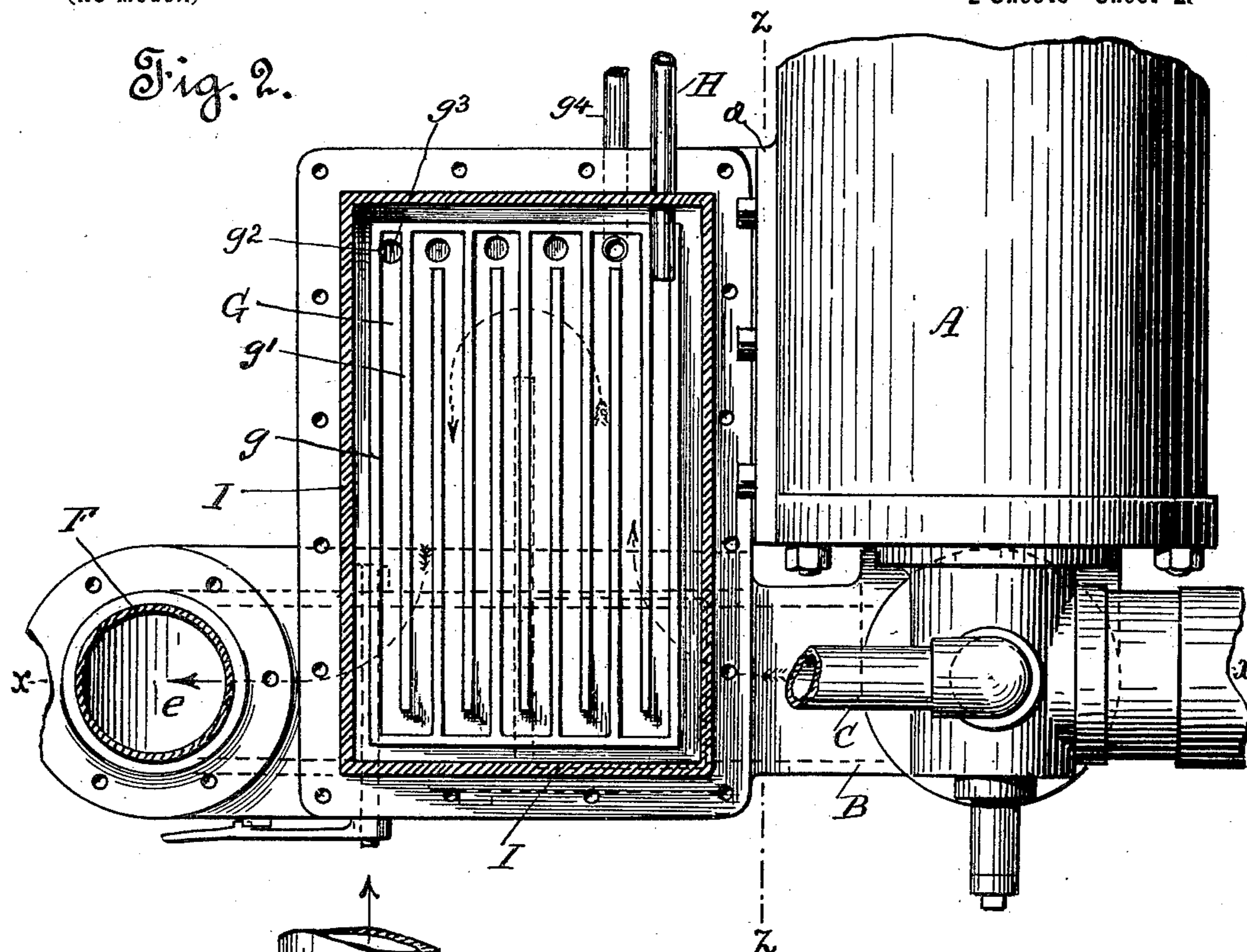
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(No Model.)

2 Sheets—Sheet 2.



Witnesses.  
*Edw. J. Richards*  
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Inventor.  
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# UNITED STATES PATENT OFFICE.

GEORGE W. BONDS, OF FRESNO, CALIFORNIA.

## GAS-GENERATOR FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 697,789, dated April 15, 1902.

Application filed August 12, 1901. Serial No. 71,706. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. BONDS, a citizen of the United States, residing at Fresno, county of Fresno, State of California, have invented certain new and useful Improvements in Gas-Generators for Gas-Engines; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of gas-generators for gas-engines in which the exhaust from the engine is used to maintain the required heat in the generator, whereby the gas is volatilized from the liquid hydrocarbon, the gas being thence supplied to the engine. In devices of this class in which the lighter oils are used, from which oils there is little, if any, residue, (their entire substance being readily volatilized,) the character of the generator-surface upon which the fuel is spread and subjected to the heat is not a serious problem, in that the heat is efficient for volatilizing such light oils, however it may be applied, and there is no residue to be taken care of either to prevent it from carrying over into the engine or to dispose of it properly outside of the engine; but where the heavier oils are used—such, particularly, as are known as “crude petroleum” or “crude oil,” which is very thick and has great specific gravity—the character, location, and connection of the generator with respect to its heating-surface become of moment. Crude petroleum or crude oil is not capable under the ordinary heat derived from the exhaust-gases of the engine of being entirely or even nearly volatilized, and there remains considerable residue which must be prevented from entering the engine to gum or choke it and which must be disposed of outside of the engine and discharged from the generator freely to keep it from clogging up the generator itself.

These are the objects of my invention—namely, to provide a generator which by reason of the construction of its heating-surface, the location and control of its discharges, and the location of its gas-chamber is adapted for the use of crude petroleum or crude oil by enabling its volatile portions to be driven off and delivered to the engine without carrying over into the engine any of the oil itself or any of the residue; also, by a proper feed and continuous course of the oil through the genera-

tor to subject it during said course to a heat necessary to take from it a maximum practical percentage of its gas, according to the needs of the engine, and, finally, by a system of discharges to effect and control the disposition of the residue, retaining it for a greater or less period, according to whether the engine is running light or heavy.

To these ends my invention consists in the novel construction of the heating or gas-generating plate, which defines the continuous course of the oil through it, the series of controllable discharges for the residue from said plate, and the connection of the gas-generating chamber with the engine, all of which I shall hereinafter fully describe by reference to the accompanying drawings, in which—

Figure 1 is a part elevation and a vertical section on the line  $xx$  of Fig. 2. Fig. 2 is a part plan and a horizontal section on the line  $yy$  of Fig. 1. Fig. 3 is an elevation of the generator on line  $zz$  of Fig. 2. Fig. 4 is a detail of one of the outlets  $g^2$ .

A is the cylinder of a gas-engine. B is its exhaust, and C is its gas-inlet.

D is a box secured to a side flange  $a$  of the cylinder A. The exhaust B from the cylinder passes under this box and communicates with it through an opening  $d$ .

In the longitudinal center of box D is a wall  $d'$ , which extends from one end and terminates short of the other end, as shown at  $d^2$ , thus dividing the box into two communicating channels, whereby the heated exhaust-gases are forced to travel through an extended course and to thereby better distribute the heat. A shield or roof plate  $d^3$  extends from the upper portion of the wall in the plane of the opening  $d$ , so that the hot exhaust-gases will not strike directly upon the parts above. With the second channel of box D a chamber E communicates, and with this chamber the exit-pipe F communicates. The exhaust B continues on beneath box D and opens into chamber E at  $e$ , as shown. In the continuation of the exhaust B between its openings  $d$  and  $e$  is a damper or valve  $b$ , by which the exhaust-gases may be diverted wholly up into box D or wholly into chamber E and exit F or partly into either course, as the necessities may require.

On top of box D is the horizontally-dis-

posed heating-plate G. Upon the upper face of this plate is formed or secured a boundary-flange  $g$  all around it. This flange is low and forms the plate into a shallow pan. In the space inclosed by the boundary-flange are formed or secured parallel ribs  $g'$ , which extend alternately from opposite ends of the flange  $g$  and terminate short of the opposite ends alternately, thereby forming in said space a continuous path or channel extending forwardly and returning on itself alternately and continuously from one side of the plate to the other.

H is the feed-pipe for the oil. This communicates with the entrance end of the path or channel formed by the ribs  $g'$ . The feeder may be of any suitable character. As it forms no part of my present invention, it is sufficient to indicate its general function and connection by the pipe H. In the path or channel formed by the ribs  $g'$  is an outlet formed by a hole  $g^2$  through the plate G at a point where said plate, Fig. 3, projects beyond box D, so that said outlet opens to the outside. For the full regulation of the device to the needs of the engine there is a plurality of these outlets, as I show in Fig. 2. They may be suitably located. In the present instance I have shown them as situated at one end of the plate G at each place where the return of the path or channel communicates with the succeeding advance. All of these outlets but one are normally closed by screw-plugs  $g^3$ . The remaining one is fitted with a screw-pipe  $g^4$ , which is controlled by a cock  $g^5$ , Fig. 3. Over the plate G is fitted a casing I, forming a gas-chamber, and said casing has a removable cover  $i$ , with a top outlet  $i'$ , with which the gas-pipe C to the engine communicates.

To the exhaust B, directly under the opening  $d$ , is hung by a hinge  $k$  and catch  $k'$  a fire-pot K, having a dropped or chambered bottom.

The operation is as follows: The oil being fed to the heating-plate G through pipe H flows in the continuous path or channel of said plate and spreads over it in a thin layer or film. The fire-pot K is dropped open and some oil and inflammable waste are put into it and ignited. The pot is then closed, and when the heat from this initial source has heated the plate G sufficiently to generate gas from the oil said gas will pass to the engine and the latter may be started. Thereafter the exhaust from the engine passing through B, up through opening  $d$ , into and through box D, and out through chamber E and pipe F will maintain the heat of plate G and will continue to generate gas from the oil thereon, and thus supply the engine. The shield-plate  $d^3$  prevents the entering exhaust-gases from striking directly upon the plate G in one place, and the wall  $d'$  in said box causes a long and even distribution of the heat over the entire bottom of plate G. The long and continuous course of the oil through the path

or channel of the plate G provides for driving off all the available gas from the oil before it reaches the end of said path. The residue can be drawn off through any of the outlet-holes  $g^2$ . By having a number of these holes the residue can be drawn off at any point required—that is to say, when it is sufficiently deprived of its volatile portions to be ready for discharge. This will depend upon the amount of heat furnished, which will depend upon the work of the engine. For example, if the engine is running heavy and great heat is supplied the residue may be ready for discharge at the first hole  $g^2$ . In this case while all the other holes are closed by their plugs  $g^3$  the first hole will be fitted with the pipe  $g^4$ , through which the residue may be drawn off. If the engine is running lighter, the plug  $g^3$  from the second hole will be transferred to the first hole and the screw-pipe  $g^4$  will be fitted to the second hole and the residue drawn off at that point. So with all the holes, which, being thus controlled, will enable the residue to be drawn off at the proper point from the path or channel of the heating-plate.

By having the gas-casing I and the gas-outlet  $i'$  raised well above the oil-path there is no danger of any of the oil being raised by suspension high enough to pass over into the engine and clog or gum it.

By drawing off the residue as required the heating-plate does not become gummed or clogged; but if at any time it be necessary to clean it this is easily done by removing the cover  $i$  of the gas-casing, whereby access is had to the plate.

The damper  $b$  in exhaust B enables me to utilize the exhaust-gases as may be required.

The dropped bottom of the fire-pot K is well adapted to receive and confine the initial fuel without carrying any of its incombustible products through either the exhaust B or the box D.

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

1. In a gas-generator, a heating-plate having a continuous passage formed on the surface thereof, a plurality of outlets from said passage, all located adjacent to one edge of the heating-plate, and means for controlling said outlets; substantially as described.

2. In a gas-generator, a heating-plate having a boundary-flange and a series of parallel ribs extending alternately from opposite sides or ends of said boundary-flange and terminating at points short of the opposite sides, whereby a continuous passage is constructed, a plurality of outlets located adjacent to one edge of the heating-plate, one in each space formed by the shortening of the alternate ribs at said edge, and means for controlling said outlets; substantially as described.

3. In a gas-generator, a casing comprising a flat heating-plate formed with a continuous passage on its upper surface, and constituting the bottom of said casing, side walls se-

cured to said plate, an inlet through one of the side walls, a removable cover *i*, and an outlet through said cover; substantially as described.

5 4. A gas-generator comprising a heating-plate, a chamber above the same having a suitable inlet and outlet, a box D located immediately below the heating-plate, a division-wall *d'* in said box, an inlet into said box  
10 through the bottom thereof at one side of said division-wall and an outlet at the opposite side thereof, a chamber B adapted to contain a heating medium located directly below the  
15 box D and having two exhausts, one registering with the opening in the bottom of the box and the other registering with the exhaust from said box, and a controlling-damper in the chamber B; substantially as described.

20 5. A gas-generator comprising a heating-plate, a chamber above the same having a suit-

able inlet and outlet, a box D located immediately below the heating-plate, a division-wall *d'* in said box having the laterally-extending shield-plate *d*<sup>3</sup>, an inlet into said box  
25 through the bottom thereof at one side of said division-wall and an outlet at the opposite side thereof, a chamber B adapted to contain a heating medium located directly below the  
30 box D and having two exhausts, one registering with the opening in the bottom of the box and the other registering with the exhaust from said box, and a controlling-damper in the chamber B; substantially as described.

In witness whereof I have hereunto set my hand.

GEORGE W. BONDS.

Witnesses:

WALTER F. VANE,  
D. B. RICHARDS.