

No. 703,995.

Patented July 8, 1902.

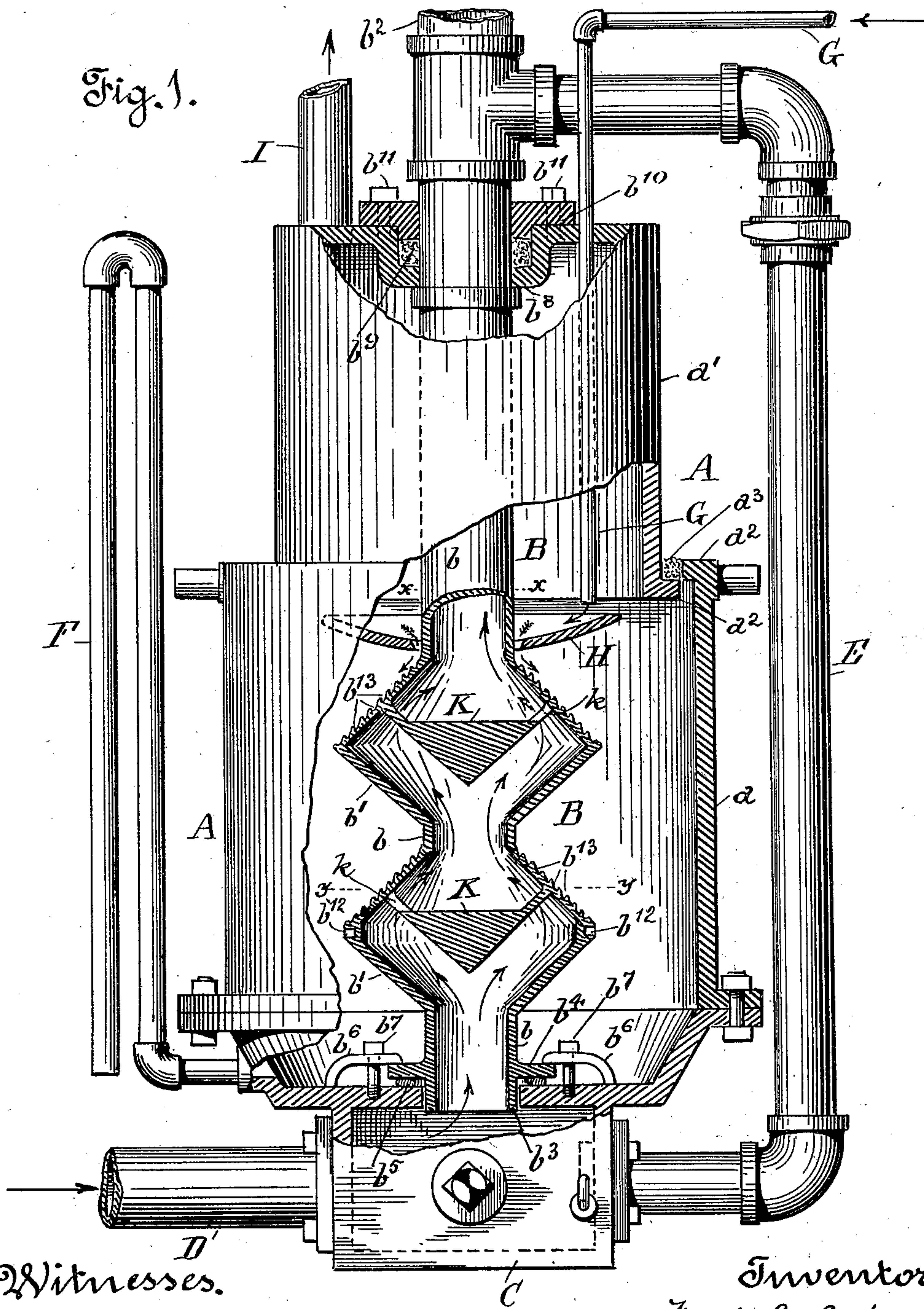
F. E. CATON & F. B. WARRING.

GAS GENERATOR.

(Application filed Mar. 1, 1902.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses.

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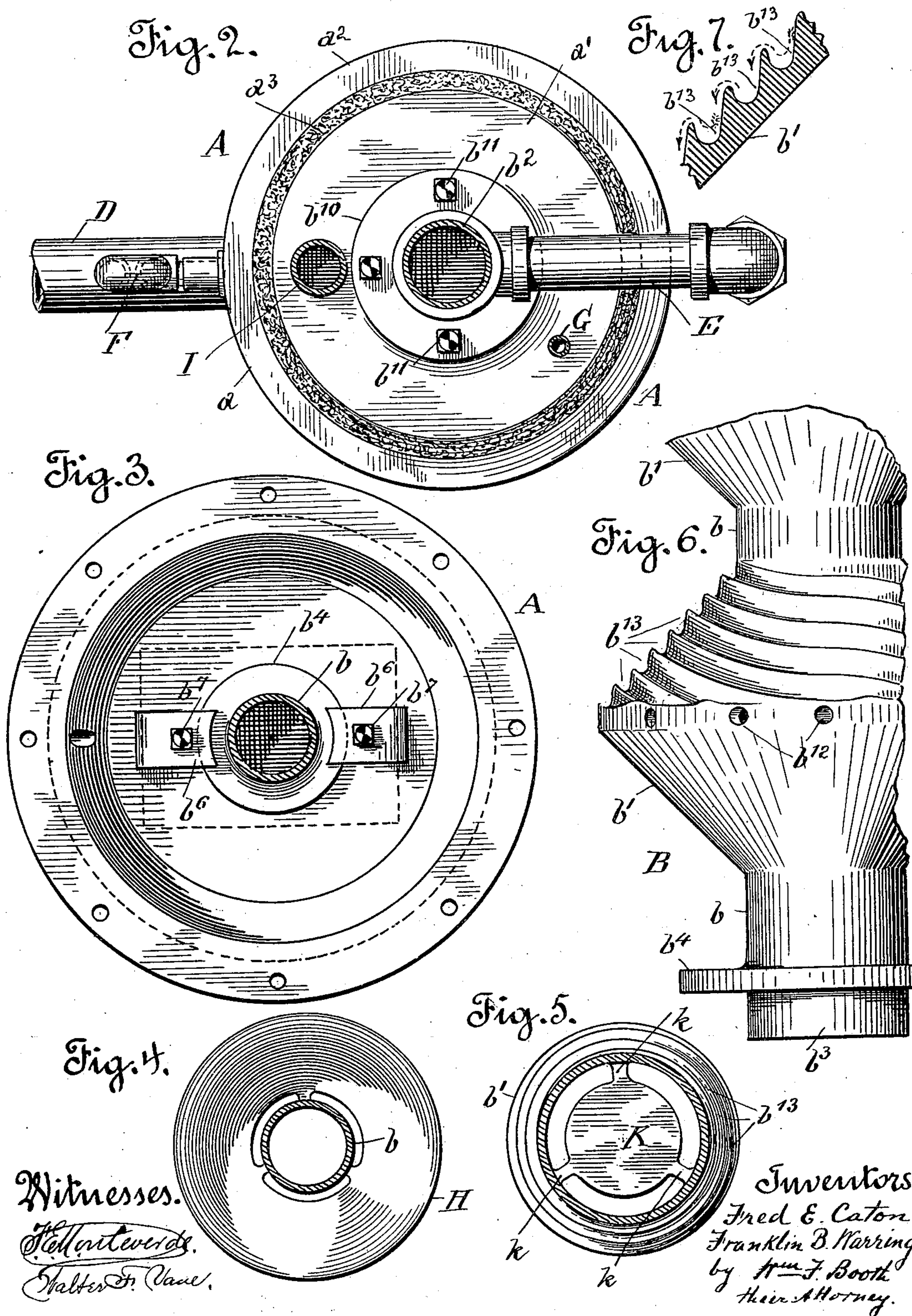
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UNITED STATES PATENT OFFICE.

FRED E. CATON AND FRANKLIN B. WARRING, OF SAN JOSE, CALIFORNIA,
ASSIGNORS TO CATON'S FOUNDRY AND MACHINE COMPANY, OF SAN
JOSE, CALIFORNIA, A CORPORATION OF CALIFORNIA.

GAS-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 703,995, dated July 8, 1902.

Application filed March 1, 1902. Serial No. 96,317. (No model.)

To all whom it may concern:

Be it known that we, FRED E. CATON and FRANKLIN B. WARRING, citizens of the United States, residing at San Jose, county of Santa Clara, State of California, have invented certain new and useful Improvements in Gas-Generators; and we do hereby declare the following to be a full, clear, and exact description of the same.

Our invention relates to that class of gas-generators especially intended for producing gas from the heavier liquid hydrocarbons, particularly crude oil, and in which the oil is caused to flow over a surface which is heated by the exhaust-gases from the engine with which the generator is connected and which the latter supplies with gas. This class of generators is illustrated by Letters Patent of the United States No. 670,259 to James Trullinger, March 19, 1901; and our invention consists in certain improvements which while applicable to any generator of this type are particularly in line with and applicable to the said Trullinger generator.

These improvements, in which our invention lies, may be stated briefly to consist of a novel construction of the generator-casing, affording means for exposing and gaining access to the interior heater or vaporizer to keep it clean, said construction serving also to provide a safety or relief joint against explosions, a novel means of mounting the heater or vaporizer within the casing, the object of which is to further in certain cases the reaching of all parts of said heater or vaporizer to clean it, a novel construction of the interior heat-deflectors whereby the heat is better communicated to the proper portions of the vaporizer, and, finally, a novel construction or arrangement of the oil paths or channels on said heater or vaporizer, all of which we shall hereinafter fully describe and claim.

Referring to the accompanying drawings, Figure 1 is a partly-broken sectional elevation of our gas-generator. Fig. 2 is a top view of same. Fig. 3 is a top view of the base-plate of the lower section of casing A, the casing-section being removed in order to show the lower journal for the heater or vaporizer. Fig. 4 is a detail section on line *x x* of Fig. 1

to show the distributing-plate H. Fig. 5 is a detail section on line *v v* of Fig. 1. Fig. 6 is a detail perspective showing the spiral groove on cones *b'*. Fig. 7 is an enlarged sectional detail of spiral groove *b*¹³.

A is the casing of the generator. B is the heater or vaporizer generally, which consists of tubular portions *b* with one or more hollow conical protuberances or cones *b'*. C is a base-chamber of the casing and which communicates with the hollow heater B. D is the exhaust-pipe from the engine, communicating with the chamber C. E is a damper-controlled relief-pipe issuing from the chamber C and opening into the atmosphere or extending up to and opening into the exhaust continuation *b*² of the heater B. F is the air-pipe, entering the base of casing A. G is the oil-supply pipe, having any usual automatic or other controlling device, said pipe entering the casing above and adapted to feed the oil to the heater or vaporizer B either directly or through the intervention of a distributing-plate H, as shown. I is the gas-pipe from the top of the generator-casing to the engine. These are the usual parts of this type of gas-generator, the operation of which may be briefly described as follows:

The oil is supplied through feed-pipe G, and it flows down over the heater or vaporizer B, following its exterior contour. To start the apparatus, gasolene may be used to initially run the engine, and thereby furnish the heated exhaust-gases to the generator, or a small fire may be kindled in chamber C. When the vaporizer B has been heated sufficiently to generate some gas from the oil, the gasolene or the fire in chamber C is dispensed with. The gas thus vaporized passes from the generator through pipe I to the engine and sets it in operation. Thereafter the exhaust-gases from the engine passing through pipe D enter chamber C and rising through the vaporizer B are discharged from the top *b*². In their passage they maintain the heat of the vaporizer, and thus the oil continues to be vaporized and to furnish gas to operate the engine.

In the use of the heavier liquid hydrocarbons, especially crude oil, it is essential that

the flow of the oil shall be well distributed—"attenuated," so to speak—to present a thin layer, extensive and continuous. It is therefore apparent that the path of the flow must
 5 be as unobstructed as possible, especially as the paths usually employed to gain extent and distribution consist of corrugations, grooves, shelves, steps, or other comparatively narrow channels, all of which are liable to become
 10 clogged by the deposition of the non-volatile residue from the oil. It is necessary, therefore, to clean these channels out, and even where there are no distinct channels it is still necessary to clean the vaporizing-surface,
 15 both to utilize its heat in the best manner and to prevent the formation of irregular and undesirable channels by the formation of the deposit. To accomplish this cleaning, it is necessary to provide for ready and full access
 20 to the heater or vaporizer. With this end in view we construct the casing A in two sections adapted to telescope. In the present illustration we show the lower section *a* as larger in diameter than the upper section
 25 *a'*, so that upon releasing said lower section from its base-plate and lifting it it will slip up over the upper section and will thereby expose the heater or vaporizer B. Thus exposed said vaporizer can be thoroughly cleaned. As
 30 the joint between the two sections must be tight enough to prevent the escape of gas under any normal working pressure, we construct such joint not only to this end, but also with the further purpose of affording relief
 35 under abnormal pressure, such as results from an explosion. This joint consists of the adjacent lips or flanges *a*² on the meeting ends of the two sections, which said flanges are somewhat loosely juxtaposed and form
 40 a space in which is seated a suitable packing, such as clay or asbestos wicking, (designated by *a*³.) This joint is sufficient to prevent the escape of gas from the casing under ordinary pressure, but will blow out and furnish relief
 45 to any abnormal pressure. It is also sufficiently temporary to not give any trouble in lifting the lower section *a*.

When the generator-casing is constructed of the telescopic sections heretofore described,
 50 the vaporizer B may be firmly bolted in its place and may be stationary, because by the lifting or dropping of the casing-sections said vaporizer is completely exposed and access may be had to it from all sides; but where it
 55 may be impracticable or undesirable for any reason to make the casing in sections, as in large machines, and said casing is therefore made single and provided with a door or a removable section to reach the interior, as is
 60 customary, we so mount the vaporizer as to render it turnable upon its axis. To effect this, we provide suitable journal-bearings for it. In the present illustration we show the lower end *b*³ of the vaporizer fitted rotatably
 65 in the base-plate of the casing. On this lower end is a flange *b*⁴, which rests on the base-plate of the casing through the intervention

of a washer *b*⁵, such as a copper gasket. Clamps *b*⁶, secured by bolts *b*⁷ to the casing base-plate, overlap the flange *b*⁴ and hold it,
 70 forming a tight joint. The upper journal or bearing consists of a seat-flange *b*⁸, formed in the head of casing-section *a'*, a packing *b*⁹ in said flange, of asbestos wicking or other material, and a tightening-plate *b*¹⁰, secured to
 75 the casing-head by bolts *b*¹¹.

Upon opening the casing-door or otherwise exposing the vaporizer and upon loosening the clamps *b*⁶ a little the whole vaporizer may be turned on its axis, and thus every portion
 80 of it may be easily reached and cleaned. To facilitate the turning, we make sockets *b*¹² in the cone *b'*, adapted to receive a spanner.

Within each cone *b'* of the vaporizer B is a heat-deflector K, the object of which is to
 85 throw the heat outwardly against the cone. Heretofore this deflector has been carried upon a central post and has had no direct connection with the cone. In our improvement
 90 this deflector, which is preferably made in the shape of an inverted frustum of a cone, is connected with the inner wall of the cone *b'* by spaced arms *k*. In practice the cone *b'* and the deflector K, with its arms *k*, are cast
 95 together. The object and effect are to transmit the heat of the deflector itself directly to the cone *b'*, by reason of their being connected, in addition to deflecting the heat outwardly to said cone. The arms *k* being spaced or
 100 separated permit the upward passage of the exhaust-gases, while the conical shape of the deflector better directs said gases outwardly to the cone *b'*.

As we have before stated, it is essential in this class of generators using crude oil that
 105 the path of flow of the oil shall be extensive, unobstructed, capable of spreading the oil out, and of distributing it equally over the entire heating or vaporizing surface. Where
 110 no distinct channel is used, the flow of the oil is directly downward and the path is not extensive enough. Where a path is provided which tends to retard the flow, thereby giving more time, it may happen that on account
 115 of unequal distribution and of the unvaporizable residue forming obstructions and a number of diverted and too-direct paths there is still the difficulty of insufficient extent. This applies to shelves and steps, and
 120 when horizontal circumferential grooves or corrugations are used these soon fill up, and the oil thereupon seeks a number of short downward paths. For these reasons a continuous spirally-directed path we have found
 125 the best, and, moreover, this path should not be a mere shelf, but a distinct groove capable of forming a distinct and confining channel, which will force the oil to flow throughout the continuous course of the groove. Accordingly we provide the upper surface of
 130 the cones *b'* of our vaporizer with a spirally-directed groove *b*¹³, starting with its upper edge and thence continuing in helical course to the edge of greatest diameter. This groove

may be single or multiplex, and its shape in cross-section is such as to confine the oil within its borders, and its pitch is such as to insure and force its continuous flow, with no tendency to diversion or obstruction and yet providing a maximum length of heating-surface.

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

1. In a gas-generator having an interior heater or vaporizer over which the oil flows, an exterior casing inclosing said heater or vaporizer, said casing being constructed of telescopic sections, adapting a section to be slipped upon another to expose and afford access to the heater or vaporizer.

2. In a gas-generator having an interior heater or vaporizer over which the oil flows, an exterior casing inclosing said heater or vaporizer, said casing being constructed of telescopic sections, adapting a section to be slipped upon another to expose and afford access to the heater or vaporizer and a safety-joint between the sections to relieve abnormal gas-pressure within the casing.

3. In a gas-generator having an interior heater or vaporizer over which the oil flows, an exterior casing inclosing said heater or vaporizer, said casing being constructed of telescopic sections, adapting a section to be slipped upon another to expose and afford access to the heater or vaporizer, said sections having flanges on their adjacent ends, and a temporary packing seated between the flanges, to form a relief or safety joint against abnormal gas-pressure within the casing.

4. In a gas-generator having an exterior casing, a heater or vaporizer over the outer surface of which the oil flows, said heater or vaporizer being mounted in a journal-bearing within said casing adapting it to be rotated upon its axis.

5. In a gas-generator having an exterior casing with means for affording access to its interior, a heater or vaporizer over the outer surface of which the oil flows, said heater or vaporizer being mounted in a journal-bearing within said casing adapting it to be rotated upon its axis.

6. In a gas-generator having an exterior casing, with means affording access to its interior, a heater or vaporizer within said casing and mounted above and below in the top and bottom of the casing with journal-bearings adapting it to be rotated on its axis.

7. In a gas-generator having an exterior casing with means affording access to its interior, a heater or vaporizer within said casing having at its top a journal-bearing adapting it to be axially rotated, and a journal-bearing at its bottom consisting of an end projecting into the base-plate of the casing, a flange with intervening packing resting on said base-plate and releasable clamps bearing on the flange.

8. In a gas-generator the combination of the outer casing, a hollow cone within said casing, a means for feeding the oil to the outer surface of said cone, a means for directing the heating-gases through said cone, and a heat-deflector within and connected directly with said cone.

9. In a gas-generator and in combination with hollow cones of its heater or vaporizer, the conical heat-deflectors within the cones and connected directly therewith by spaced arms.

10. In a gas-generator, a hollow heater or vaporizer through which heated gases pass, and consisting of tubular portions and conical portions, the latter having formed upon their upper surfaces a spirally-directed groove forming a continuous channel for the oil.

11. In a gas-generator, a hollow heater or vaporizer through which heated gases pass, and consisting of tubular portions and conical portions, the latter having formed upon their upper surfaces a spirally-directed groove forming a continuous channel for the oil, and heat-deflecting cones within said conical portions and connected directly therewith.

12. A gas-generator consisting of a sectional telescopic casing, having an air-inlet and a gas-outlet, a hollow heater or vaporizer with conical portions, within said casing, said conical portions having upon their surfaces, spirally-directed grooves forming continuous channels for the oil, heat-deflectors within the conical portions and directly connected therewith, a connection for supplying heated gases to the interior of the heater or vaporizer and means for feeding oil to the surface of said heater or vaporizer.

In witness whereof we have hereunto set our hands.

FRED E. CATON.
FRANKLIN B. WARRING.

Witnesses:

HENRY FRENCH,
EZRA SPICER.