E. E. HANCOCK & C. F. ARNOLD.

GAS GENERATOR.

APPLICATION FILED NOV. 9, 1909.

951,501.

Patented Mar. 8, 1910.

3 SHEETS—SHEET 1.

Fig. 1.

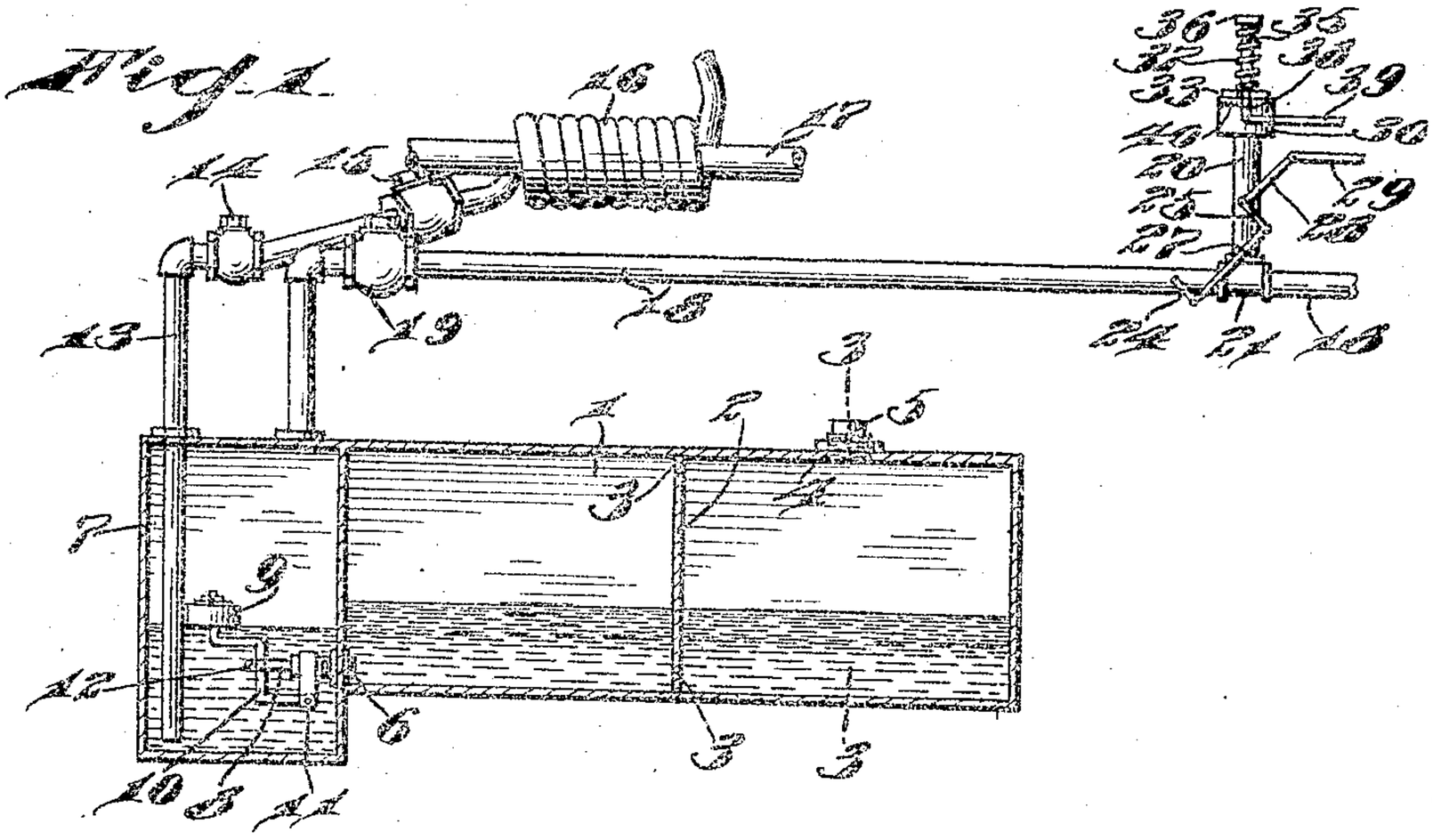


Fig. 2.

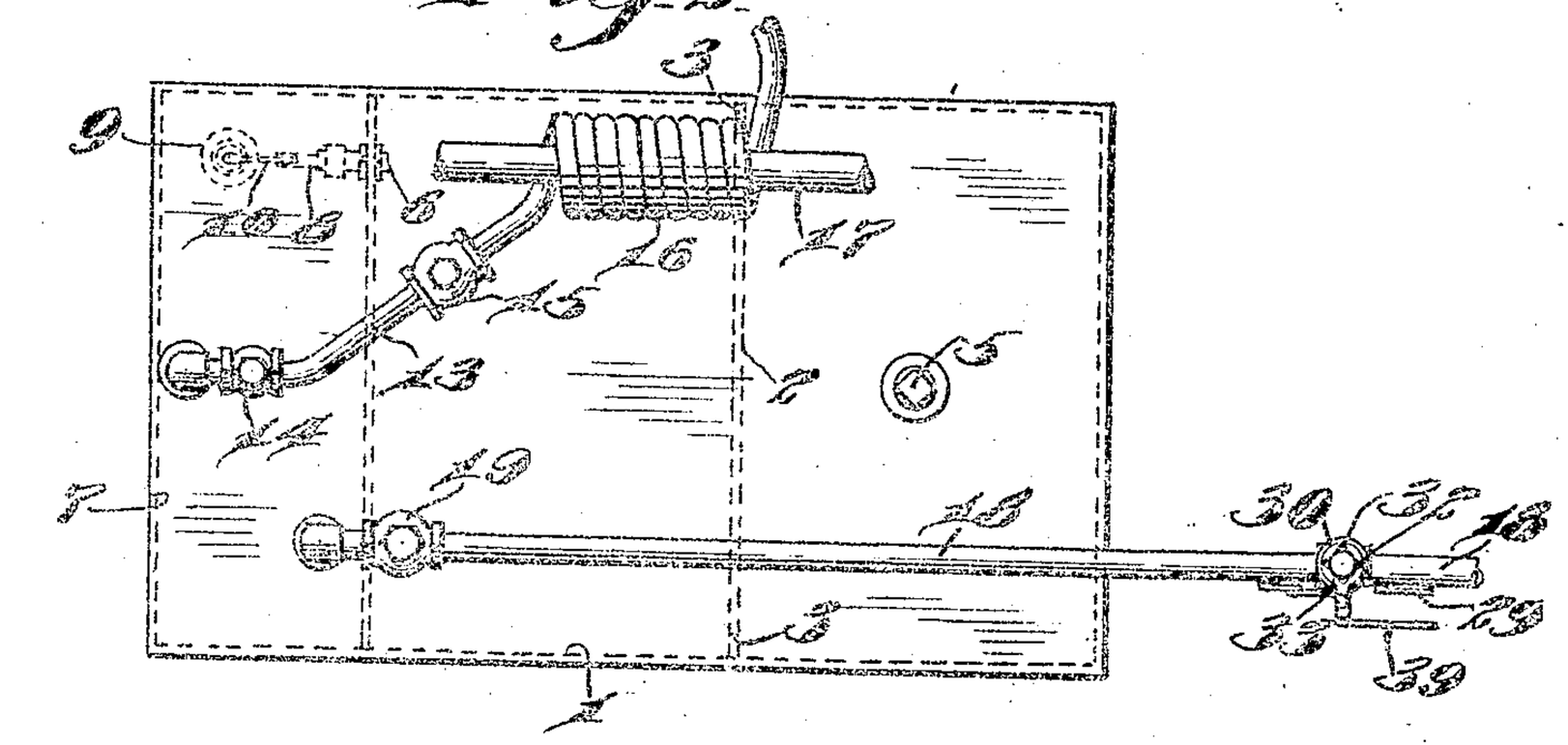
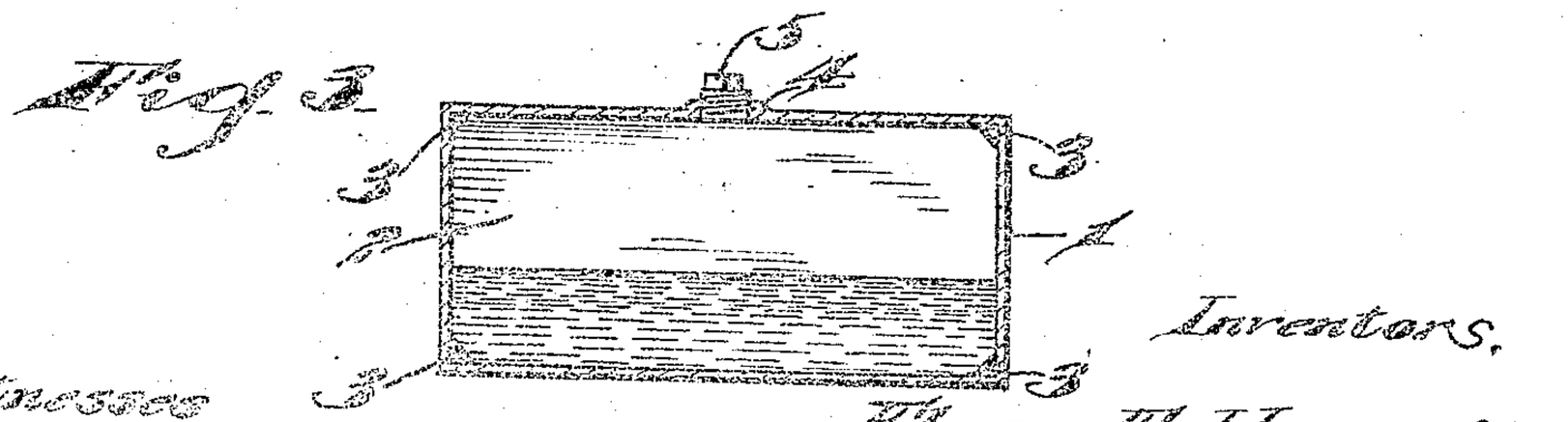


Fig. 3.



Witnesses

John Rosemund.

R. A. Frenkel.

Inventors,

Elmer E. Hancock

By Clarence F. Arnold,

Joshua R. H. Potts,

Attorney

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Fig. 4.

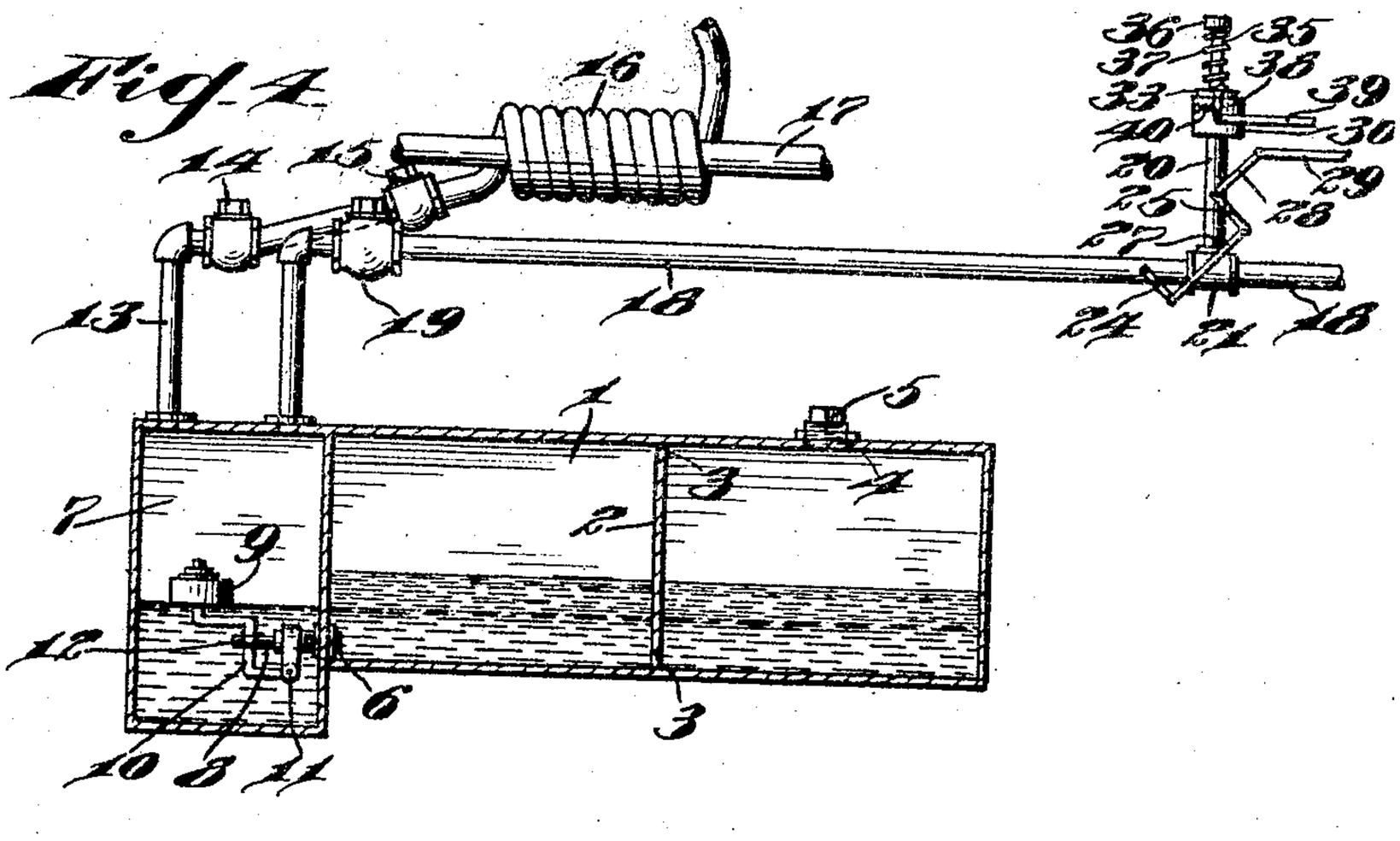


Fig. 5.

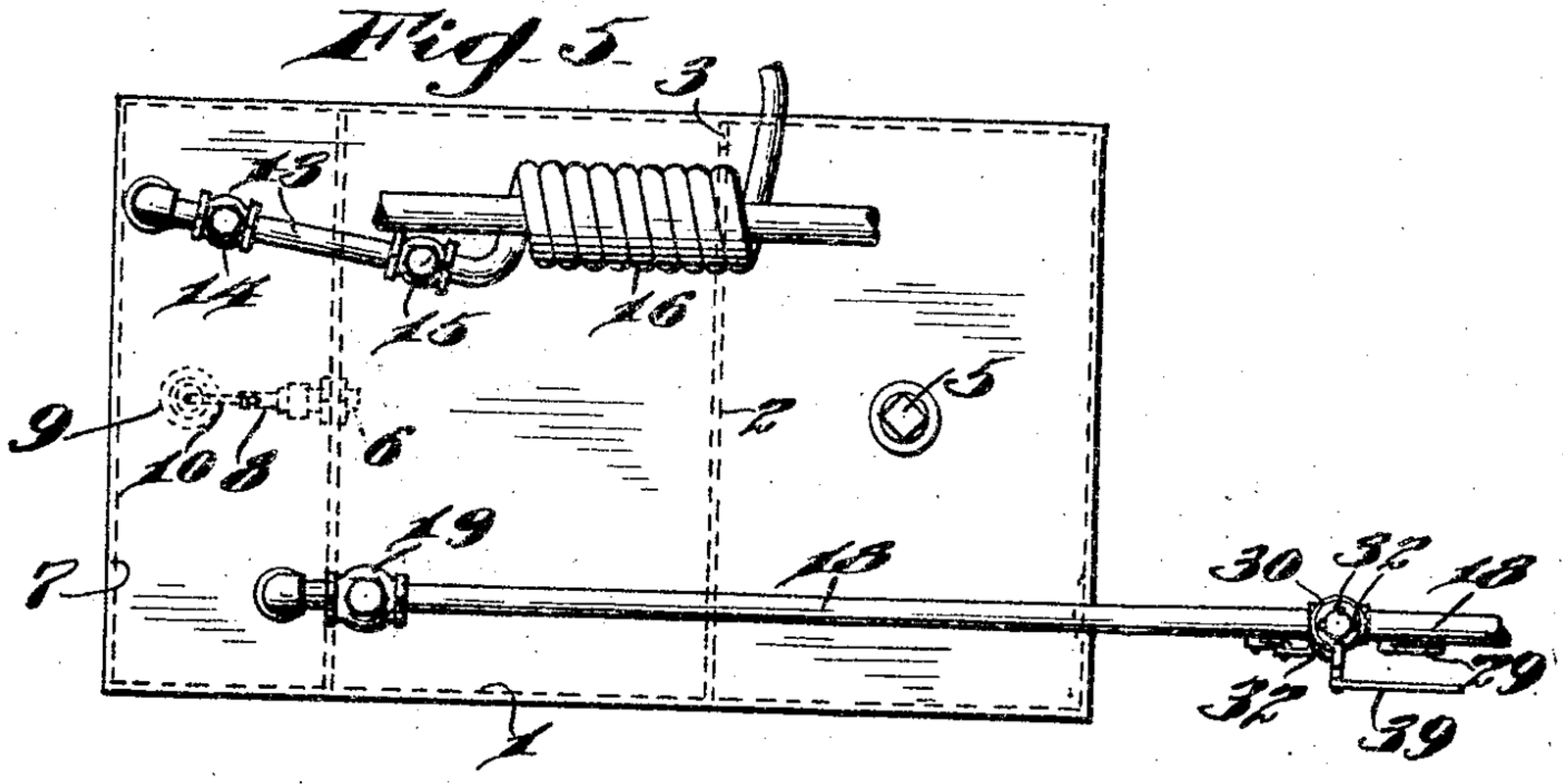
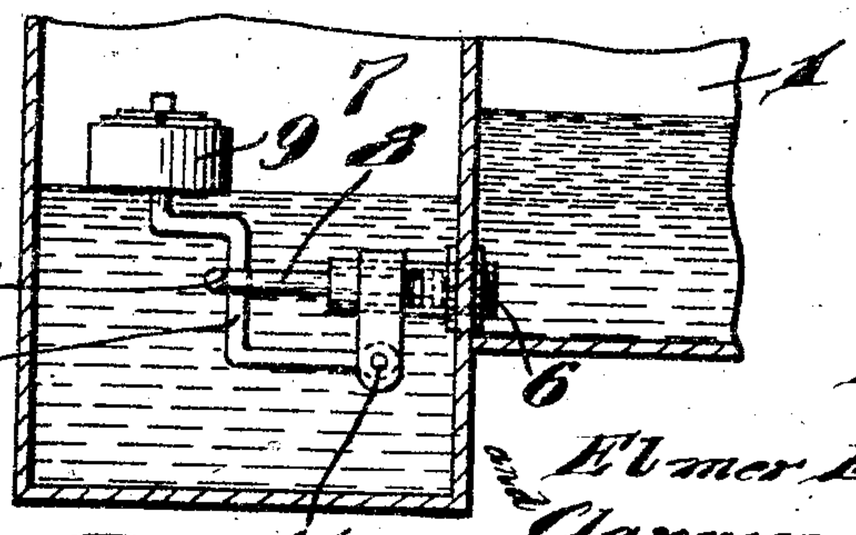


Fig. 6.



Witnesses

John. Rheinauld.

P. J. Henkel

Inventors

Elmer E. Hancock

and

Clarence F. Arnold,

By Joshua R. G. Potts.

Attorney

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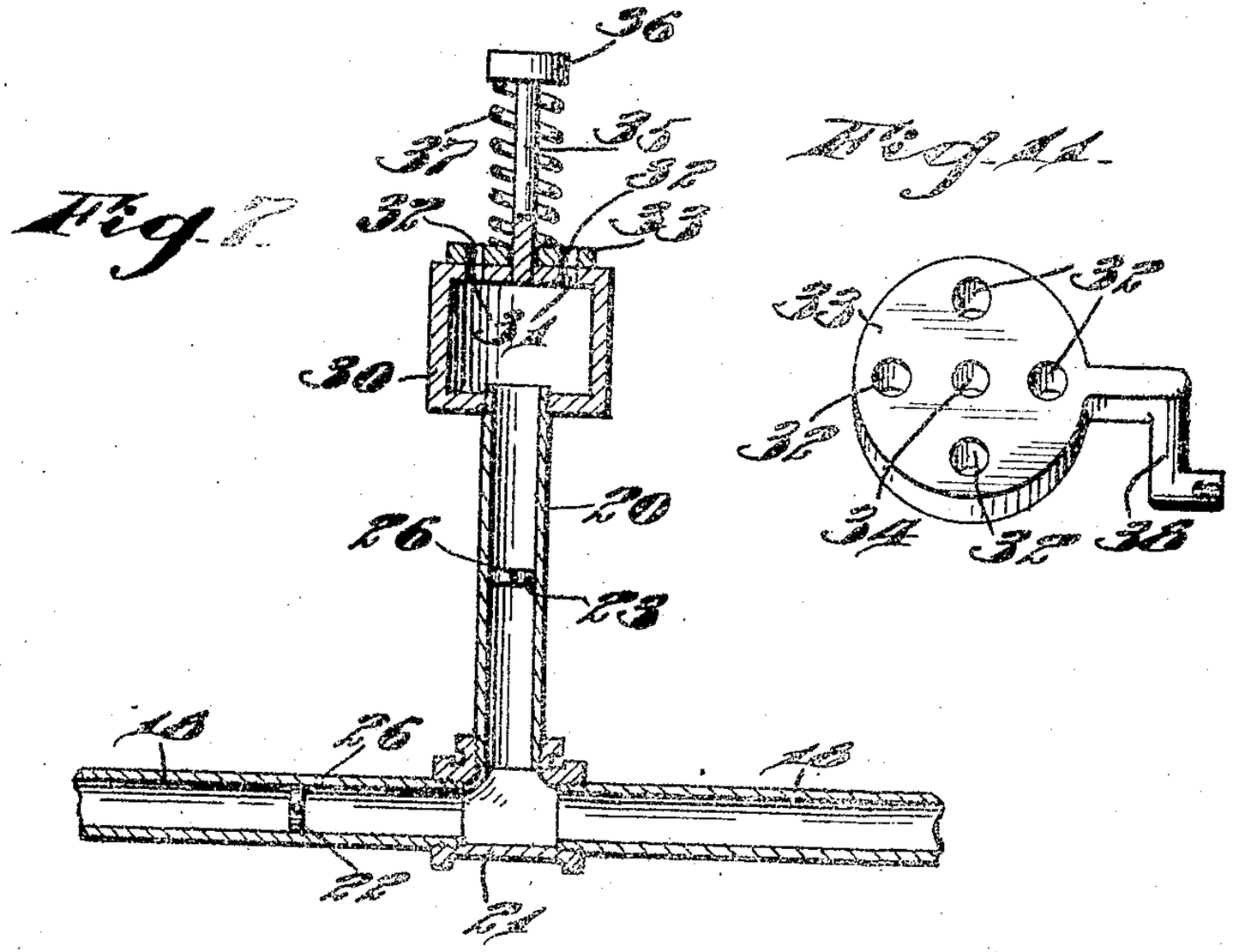
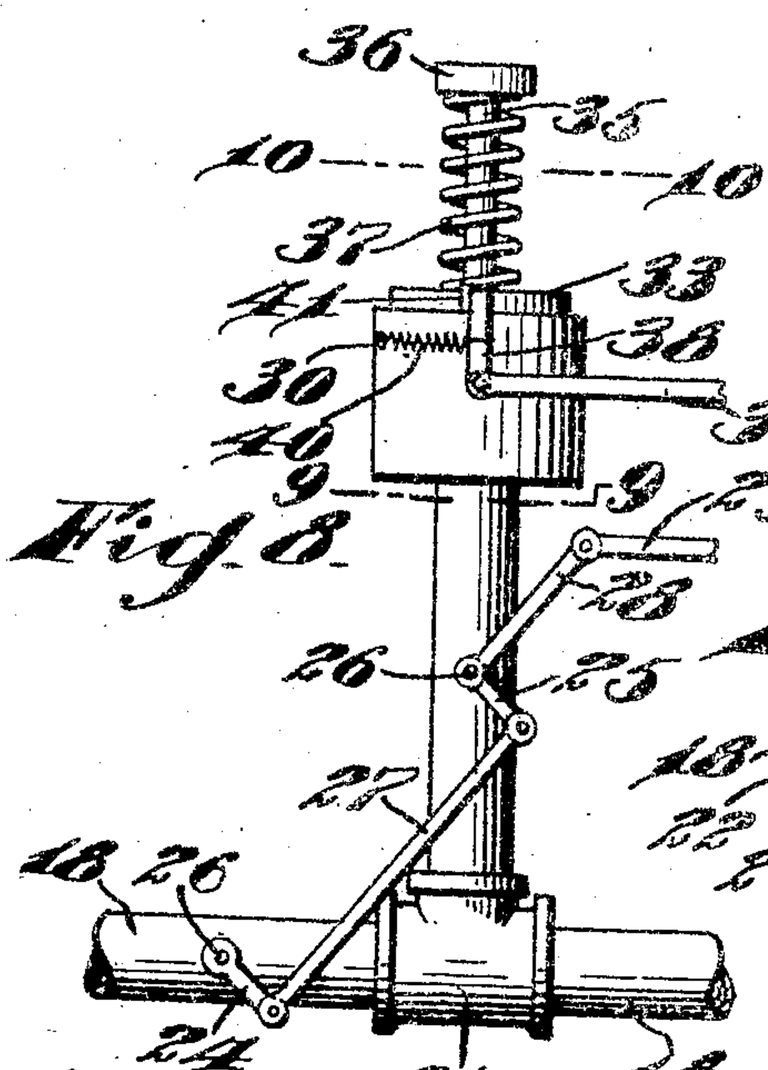
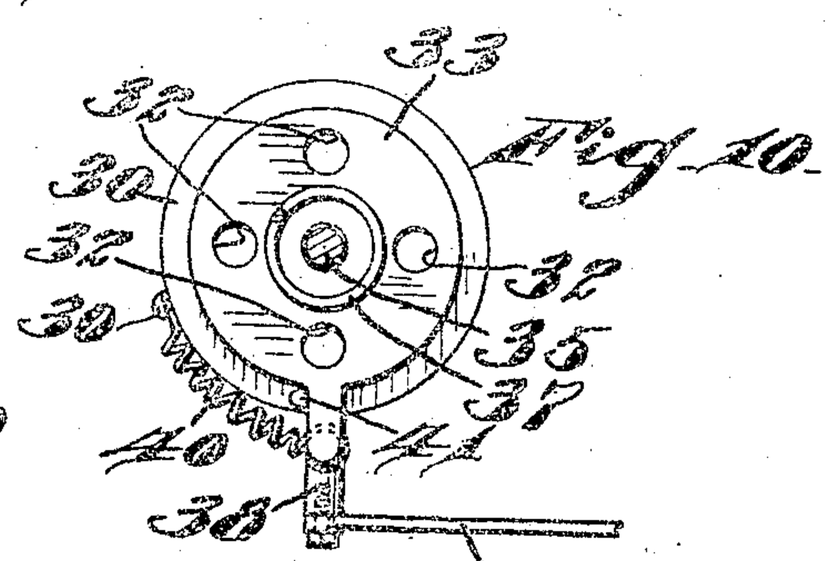
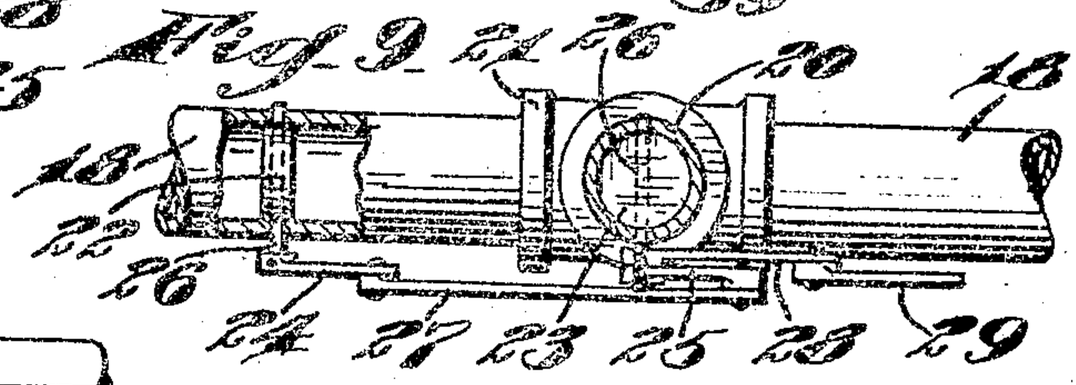
3 SHEETS—SHEET 3.









Witnesses

Thos. Rosemund.

P. H. Krenkel.

Inventors.

Elmer E. Hancock

Clarence P. Arnold,

By

Joshua R. H. Potts.

Attorney

UNITED STATES PATENT OFFICE.

ELMER E. HANCOCK AND CLARENCE F. ARNOLD, OF PHILADELPHIA, PENNSYLVANIA.

GAS-GENERATOR.

951,501. Specification of Letters Patent. Patented Mar. 8, 1910.

Application filed November 9, 1909. Serial No. 526,948.

To all whom it may concern:

Be it known that we, ELMER E. HANCOCK and CLARENCE F. ARNOLD, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Gas-Generators, of which the following is a specification.

Our invention relates to improvements in gas generators, particularly designed for use in connection with internal combustion engines, and especially adapted as a producer for the explosive mixture for engines, such as used on motor vehicles, dispensing with the ordinary carbureter.

A further object is to provide an improved apparatus of this character, which will enable the operator to regulate the mixture of hydro-carbon vapor and air in just the desired proportions, and in just the desired quantity, and which will be protected against any danger from back fire from the engine.

A further object is to provide an improved apparatus of this character, which will insure the same, or practically the same mixture in all climates and weather, as means are provided whereby the air is subjected to heat to be thoroughly dried before admixture with the hydro-carbon vapor.

With these and other objects in view, the invention consists in certain novel features of construction, and combinations and arrangements of parts as will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings, Figure 1, is a diagrammatic view partly in longitudinal section illustrating a preferred form of our improvements. Fig. 2, is a top plan view of Fig. 1. Fig. 3, is a view in cross section on the line 3—3 of Fig. 1. Fig. 4, is a view similar to Fig. 1, but illustrating a modification. Fig. 5, is a plan view of Fig. 4. Fig. 6, is an enlarged fragmentary view illustrating the float valve construction. Fig. 7, is an enlarged view in section through the auxiliary air supply inlet. Fig. 8, is a view in elevation of the auxiliary air inlet showing the operating mechanism for the regulating dampers. Fig. 9, is a view in section on the line 9—9 of Fig. 8. Fig. 10, is an enlarged view in section on the line 10—10 of Fig. 8, and Fig. 11, is a detail perspective view of the auxiliary air inlet disk.

1 represents a tank or reservoir, which is preferably strengthened by a partition plate 2, the latter having its corners cut away as shown at 3 to permit free circulation of air and liquid hydro-carbon throughout the tank. The liquid is supplied to tank 1 through an opening 4 in the top of the tank, normally closed by a plug 5, and escapes from the tank through a pipe 6 into a chamber 7, preferably secured to and forming a part of tank 1, but having its bottom in a lower plane as shown. The pipe 6 is normally closed by means of a valve 8, operated by a float 9, to maintain a uniform level in chamber 7, said float 9 being secured to an angular lever 10, the latter pivoted to an arm 11 on pipe 6, and extending through a slot 12 in the stem of valve 8, so that as the float rises and falls, the valve 8 will be moved to open and close the passage from the tank to chamber 7.

In the form shown in Figs. 1 and 2, an air inlet pipe 13 extends down into chamber 7 below the liquid level in the latter, so that the air entering the chamber is compelled to bubble up through the liquid and become highly impregnated with the hydro-carbon vapor. This inlet pipe 13 is provided with a stop cock 14 to regulate the flow therethrough, and also with a check valve 15 to allow the flow in but one direction only, and said air pipe 13 is coiled as shown at 16 around a heating pipe 17, the latter may, if desired, serve as the exhaust pipe from the engine, so that the air in the coil 16 will be heated before p ssing into chamber 7.

In the modification shown in Figs. 4 and 5, the structure is precisely like that above set forth, except that the air inlet pipe 13 communicates with an opening in the top of chamber 7 above the liquid level, and near one end of the chamber, while the outlet pipe 18 communicates with an opening in the top of chamber 7 near its opposite end, thus compelling the air to pass practically throughout the length of chamber 7 and take a large content of hydro-carbon vapor.

In the preferred form shown in Figs. 1 and 2, the air inlet pipe 13, preferably enters the chamber about the middle, but in other respects these two forms or constructions are alike.

The outlet pipe 18 above referred to is

provided with a check valve 19, and also with a branch pipe 20, which we shall term the auxiliary air inlet. A suitable T-coupling 21 being provided at the juncture of pipes 18 and 20. These pipes 18 and 20 are provided with valves or dampers 22 and 23 respectively, which are mounted to swing within the pipes and regulate the opening or passage through them. Crank arms 24 and 25 respectively are secured to trunnions 26 of dampers 22 and 23 respectively, outside of the pipes, and are connected by a link 27. A second crank-arm 28 is secured to the trunnion 26 of damper 23, and is connected to an operating rod 29 adapted to extend to a point convenient to the operator, so that by moving this rod 29, both dampers 22 and 23 will be simultaneously turned to regulate the flow of gas and the inlet of the auxiliary air supply.

On the upper end of pipe 20, a cap 30 is provided in its upper end with a circular series of perforations 31, with which the perforations 32 in a disk 33 on top of cap 30 normally register. This disk 33 is made with a central opening 34 adapted to receive a rod 35 secured in cap 30 and turn freely thereon. The upper end of this rod 35 is provided with a nut or head 36, and a coiled spring 37 is located around the rod 35 and bears at its respective ends against head 36 and disk 33, so as to normally hold the latter tight against the top of cap 30. An angle or crank-arm 38 is made integral with disk 33, is connected to an operating rod 39, is also connected to one end of a spring 40, the other end of said spring being secured to the cap 30, so as to normally hold the arm 38 in contact with a pin 41 projecting outwardly from the cap 30. This pin 41 limits the rotary movement of the disk in one direction, while the rod 39 is adapted to be moved by the operator to turn disk 33 and move the perforations 32 in the disk out of register with the openings 31 in cap 30, and hence shut off, or partially shut off the auxiliary supply of air. Should there be a back fire from the engine, the pressure within pipes 18 and 20, if the disk 33 is turned so as to close the opening 31, will move the disk 33 longitudinally of rod 35, against the action of spring 37 to permit the back fire and pressure to escape without doing any injury. The pin 41 is of sufficient length to allow the necessary movement of the disk without escaping from its engagement with the pin.

The operation is as follows: Atmospheric air is drawn in through pipe 13, is heated in the coil 16 by means of the exhaust pipe 17, and after mixing with the vapor in chamber 7, flows through pipe 18 where it is joined by the air through the auxiliary pipe 20. The operator can by means of rod 29 and the parts above explained, turn the dampers 22 and 23, so as to entirely close pipes 18 and 20, to shut off the explosive charge to the engine, and can open said pipes, so as to allow just the desired quantity of explosive mixture to flow to the engine. If he desires to change the proportion of the mixture, that is, a greater or less amount of air, he operates rod 39 to turn disk 33, and close or partly close the air inlets 31 in cap 30, thus making the mixture stronger or weaker as desired. Should there be back fire in the pipes, it will be relieved by means of the disk 33 as above set forth, and the fire cannot therefore get by check valve 19 and into the liquid hydro-carbon.

Various slight changes might be made in the general form and arrangement of parts described without departing from our invention, and hence we do not restrict ourselves to the precise details set forth, but consider ourselves at liberty to make such changes and alterations as fairly fall within the spirit and scope of the claims.

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

1. In a gas generator, the combination with a generating chamber adapted to contain liquid hydro-carbon, of an air inlet pipe communicating with said chamber, a gas outlet pipe communicating with said chamber, an auxiliary air inlet pipe communicating with said gas pipe, a combined air inlet and pressure relief valve on said auxiliary air inlet pipe, dampers in said auxiliary air inlet pipe and said gas pipe, and means for simultaneously moving said dampers.

2. In a gas generator, the combination with a generating chamber adapted to contain liquid hydro-carbon, of an air inlet pipe communicating with said chamber, a gas outlet pipe communicating with said chamber, an auxiliary air inlet pipe communicating with said gas pipe, a combined air inlet and pressure relief valve on said auxiliary air inlet pipe, dampers in said auxiliary air inlet pipe and gas pipe, trunnions on said dampers projecting through the pipes, crank-arms on said trunnions, a link connecting said crank-arms, a second crank-arm on one of said trunnions, and an operating rod connected to said last mentioned crank-arm.

3. In a gas generator, the combination with a generating chamber adapted to contain liquid hydro-carbon, of an air inlet pipe in said tank, a gas outlet pipe from said tank, an auxiliary air supply pipe communicating with said gas pipe, a cap on said auxiliary pipe having a series of inlets in its end, a spring pressed disk having rotary mounting against the end of said cap, and having perforations normally in register with the said inlets in said cap, and means for turning said disk.

4. In a gas generator, the combination with a generating chamber adapted to contain liquid hydro-carbon, of an air inlet pipe in said tank, a gas outlet pipe from said tank, an auxiliary air supply pipe communicating with said gas pipe, a cap on said auxiliary pipe having a series of inlets in its end, a spring pressed disk having rotary mounting against the end of said cap, and having perforations normally in register with the said inlets in said cap, a crank-arm on said disk, a spring connecting said crank-arm with said cap, a pin on said cap normally engaged by said arm to limit the turning movement of the disk in one direction, and an operating rod connected to said arm.

5. In a gas generator, the combination with a chamber adapted to contain liquid hydro-carbon, an air inlet in said chamber, a gas outlet pipe communicating with said chamber, an auxiliary air inlet pipe communicating with said gas pipe, a cap on the end of said auxiliary air inlet having perforations in its end, a rod secured to said cap, a head on said rod, a disk mounted to turn on said rod, and having perforations normally in register with the perforations in the cap, a spring around said rod holding said disk against the head, but permitting movement of said disk by excessive pressure and back fire in the pipe.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ELMER E. HANCOCK.
CLARENCE F. ARNOLD.

Witnesses:—
S. W. Foster,
R. H. Krenkel.