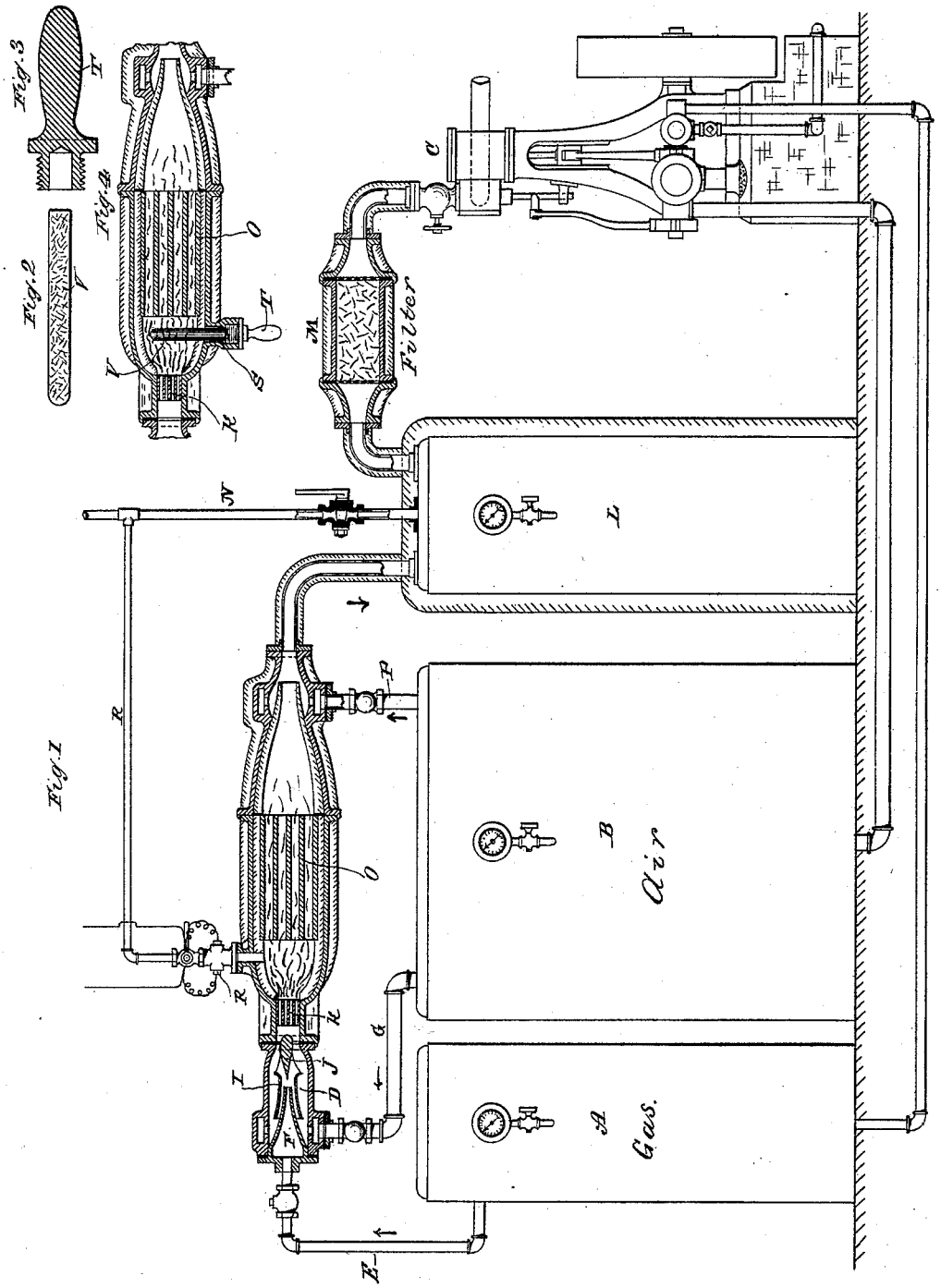
(No Model.)

J. C. BECKFELD & A. SCHMID.

GAS ENGINE.

No. 421,477. Patented Feb. 18, 1890.



Witnesses
Robt. F. Gaylord
Raphael Netter

Inventors
J. Charles Beckfeld &
Albert Schmid
By their Attorneys
Duncan, Curtis & Page.

UNITED STATES PATENT OFFICE.

JOHN CHARLES BECKFELD AND ALBERT SCHMID, OF ALLEGHENY, PENNSYLVANIA.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 421,477, dated February 18, 1890.

Application filed July 18, 1889. Serial No. 317,929. (No model.)

To all whom it may concern:

Be it known that we, JOHN CHARLES BECKFELD, a citizen of the United States, and ALBERT SCHMID, a citizen of the Republic of Switzerland, both residing in Allegheny, in the county of Allegheny, and in the State of Pennsylvania, have invented certain new and useful Improvements in Gas-Engines, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

In a patent of the United States granted to us May 14, 1889, No. 403,294, we have shown and described an air and gas engine which contained the following among other parts common to these devices: a mixing-chamber into which air and gas from separate reservoirs are conducted and mixed, a combustion-chamber into which the mixed gases from the mixing-chamber are forced and where they are burned, and an automatic pressure-regulating device determining an unchangeable excess of pressure in the mixing-chamber above that in the combustion-chamber. It is necessary to practical working that this excess of pressure in the mixing-chamber should be maintained, as otherwise, for instance, when the expanded gases are shut off from the cylinder of the engine, the pressure in the combustion-chamber increases, and should it equal, or nearly so, the pressure in the mixing-chamber the flow of the gas will be interrupted and the flame extinguished. The means shown in our said patent for preventing this is a regulator of any proper description, which under the influence of an increasing pressure in the combustion-chamber operates to relieve said pressure by opening an outlet or escape tube. We have found that we may effect a similar result by using a reservoir of suitable dimensions between the combustion-chamber and the working-cylinder or engine proper, and providing therefor an outlet or escape tube, which, being constantly open, prevents the accumulation in the combustion-chamber at any time of sufficient pressure to extinguish the flame.

A second part of our invention consists in the employment in the combustion-chamber of a refractory body which will be rendered incandescent by the heat of the flame directed upon it and which will serve to reignite the flame in the event of an accidental extinguishment thereof.

A third part of the invention resides in the provision which we make for primarily igniting the gaseous mixture. For this purpose we form in the combustion-chamber an opening, preferably screw-threaded, into which we thrust a torch or igniter composed of any suitably refractory or slowly-combustible body—such as carbon—raised to incandescence or a sufficiently high temperature to ignite the gas. These and other improvements are illustrated in the accompanying drawings.

Figure 1 is a side elevation and part section of an entire engine containing our improvements above referred to. Fig. 2 is a side view of the torch or igniter. Fig. 3 is a socket or handle for supporting the same and closing the opening in the combustion-chamber. Fig. 4 is a sectional view of the combustion-chamber, showing the torch or igniter in place.

A represents a gas-reservoir. B the air-reservoir, and C the working parts of the engine, including the cylinder and piston, crank-shaft, and pumps. These parts being common to gas-engines of this type, are not described in detail, their construction being well understood.

D is what is known in these engines as a "mixing-chamber." The gas under pressure is admitted thereto through a pipe E, entering the conical compartment or nozzle F. The air, also under compression, is admitted through pipe G through an annular chamber H. The end of the nozzle F projects into a cone practically closed at its smaller end by a solid deflector J. The gas issuing from the nozzle F draws the air through the cone I, as in an injector, whereby the air and gas become thoroughly mixed. The mixed gases pass from the mixing-chamber through a perforated block or partition K, and into the combustion-chamber. The purpose of the partition is to allow the gases to pass through, but prevent the flame in the combustion-chamber from running back into the mixing-chamber.

Between the combustion-chamber, where the volume of the air and gas is increased by their combustion, and the engine-cylinder, is a reservoir or storage-reservoir L, into which the expanded gases are compressed, and when so desired a scrubber or filter M. A pipe N leads from the reservoir and is provided with a valve through which a constant escape of the products of combustion may be permitted. The temperature resulting from the combustion of the gas being very high, it is cooled before passing to the engine by a supply of air through a pipe P.

In the combustion-chamber we place the body O, which will become incandescent under the heat of the flame. This may be of various forms and of various materials. In the drawings we show a perforated cylindrical body of fire-clay or the like.

The ignition of the gas may be primarily effected in the usual way—that is to say, two insulated wires may be secured in a tube R, leading from the combustion-chamber, and a spark passed between them while the gas is flowing through said pipe. After being ignited the gas is shut off from the pipe by a suitable valve. We have devised, moreover, the apparatus shown in Figs. 2, 3, and 4 for igniting the gas.

S is an opening in the wall of the combustion-chamber.

T is a socket or handle which may inserted and screwed tightly into the opening, and V represents a combustible body, preferably coke or carbon, which is consumed very slowly, which may be inserted in the handle or device T and introduced thereby into the combustion-chamber.

While the engine is in normal operation it will be observed that the passage of the products of combustion through the engine maintains the proper relative pressures in the mixing and combustion chambers. Should the main or throttle W be closed, or the flow of gas in other ways interrupted, a sufficient difference in pressure will still be preserved by the continuous flow or escape of gas through the pipe N from the reservoir L. The quantity of gas thus escaping is not enough to sensibly impair the efficiency of the engine.

This engine may be used for any of the usual purposes.

What we claim is—

1. In a gas-engine, the combination of a mixing-chamber communicating with a source of air and a source of gas, a combustion-chamber into which the mixed air and gas is caused to flow, and where it is continuously burned, the said combustion-chamber being provided with a constantly-open outlet or discharge opening to the atmosphere.

2. The combination, with the cylinder of a gas-engine, of a mixing-chamber, sources of air and of gas connected therewith, a combustion-chamber into which the mixed air and gas passes, and where it is continuously burned, and a receiver for the expanded gases, located between the engine-cylinder and the combustion-chamber, as set forth.

3. The combination, with the engine-cylinder of a gas-engine, of a mixing-chamber, sources of air and of gas connected therewith, a combustion-chamber into which the mixed air and gas passes, and where it is continuously burned, the said chamber being provided with a constantly-open outlet or discharge opening to the atmosphere, and a receiver for the expanded gases located between the engine-cylinder and the combustion-chamber, as set forth.

4. The combination, with a combustion-chamber having an opening in its wall or side, of the socket or holder adapted to close said opening, and a carbon stick or rod inserted in said socket, as set forth.

JOHN CHARLES BECKFELD.
ALBERT SCHMID.

Witnesses:
J. M. TATE, Jr.,
W. D. UPTEGRAFF.