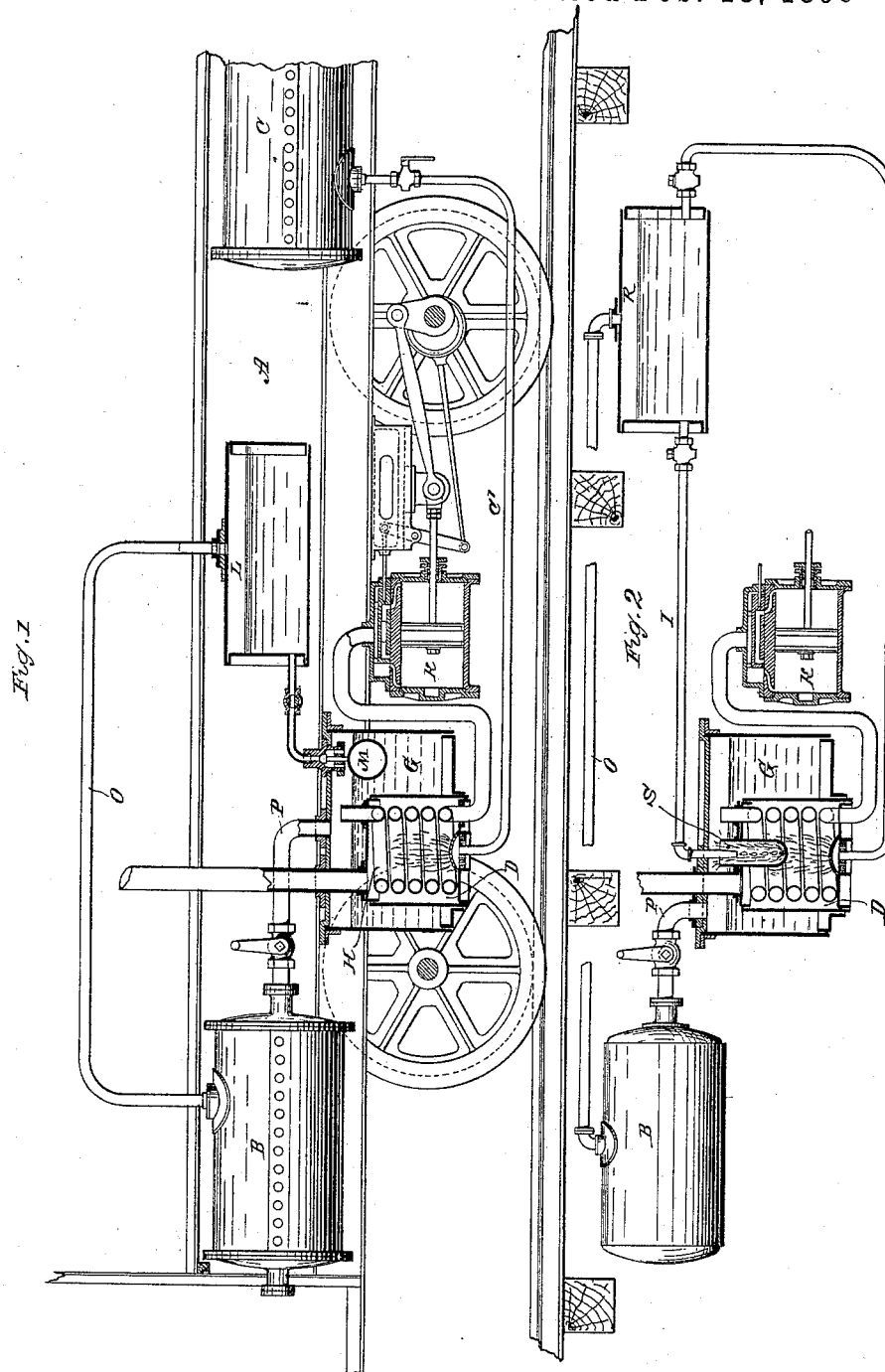


(No Model.)

J. C. BECKFELD & A. SCHMID.
GAS ENGINE.

No. 421,475.

Patented Feb. 18, 1890



Witnesses
Robert F. Gaylord
Ernest Lloyd Benson

Inventors
John Charles Beckford
Albert Schmid
By their Attorneys
Duncan Carter Page

UNITED STATES PATENT OFFICE.

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

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 421,475, dated February 18, 1890.

Application filed July 12, 1889. Serial No. 317,280. (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 at Allegheny, in the county of Allegheny and 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.

The object of this invention is to improve the construction and operation of gas, gas and air, or air engines, particularly those designed for use on tram-cars or other vehicles; and it consists, first, in providing in a novel manner a supply of water or other fluid and vaporizing the same under conditions which permit it to unite with the gas on its way to the working-cylinder; and, secondly, in providing an additional and better means of heating the fluid.

As the features of novelty in this invention consist, mainly, in details of construction, we refer now to the accompanying drawings for a description thereof.

Figure 1 is a side view and part section of an engine mounted on a car or other vehicle. Fig. 2 is a modification of the same, partly in section.

A designates the body of a car or other vehicle upon which the engine is mounted.

B is a tank or reservoir for compressed air; C, another tank for the gas or other fuel.

D is the combustion-chamber, into which leads the gas or oil pipe E. From the combustion-chamber extends a chimney or flue F for the draft, which maintains the flame in the burner F.

The combustion-chamber D is surrounded by a pressure box or chamber G, into which the air from the tank B is conducted. This box or chamber being kept at a high temperature by the combustion-chamber, the air therein is expanded. In the combustion-chamber and surrounding the flame is a coil of pipe H, one end of which extends up and opens into the chamber G. The other end of the said pipe leads to the valve of the working-cylinder K. The air on its passage, there-

fore, from the tank B to the cylinder passes through the chamber G.

L is a water-reservoir, with a pipe therefrom leading into the chamber G; but its orifice and consequent discharge of water therefrom are controlled by a float-valve M, or similar device, whereby the water in chamber G is never permitted to rise above a certain level. A pipe O connects the tank B with the upper part of the reservoir L, thus maintaining a pressure above the water or other liquid which tends to force it into the vaporizing-chamber G when the valve M is open.

The purpose and operation of these devices are as follows:

The chamber G is filled to a certain level below the orifice of the pipe H and the flame lighted. When the temperature is sufficiently high, the air-pipe P is opened to admit compressed air into the expansion-chamber G on its way to the cylinder. The heat also vaporizes the water in chamber G, and the steam, mingling with the expanded air, passes into the working parts of the engine and affords lubrication. Oil may be injected in any proper way into the chamber G. As the water in chamber G is vaporized and passes off as steam, a fresh supply is obtained from the reservoir L through the valve-controlled pipe therefrom.

It will be understood that so far as this invention is concerned the temperature of vaporization of the fluid received from the reservoir L is largely immaterial and the engine may be driven by the vaporization of fluids which require heat at a comparatively low temperature to convert them into vapor.

In the modification of the invention shown in Fig. 2 a petroleum or hydrocarbon tank R is shown in place of the gas-reservoir. The oil therein has a pressure above it from the pipe connecting with the air-tank.

In addition to the parts shown and described in the previous figure, and which are advantageously used in Fig. 2, we provide a cap or receptacle S, opening into the vaporizing-chamber G and extending down into the combustion-chamber. A small pipe I leads from the oil-reservoir and extends into the vaporizing-chamber, where it opens immediately above the said receptacle S. The pressure

in the reservoir R forces the hydrocarbon drop by drop through the contracted orifice of the pipe I, which, falling into the receptacle S, raised to a high temperature by the flame in the combustion-chamber, is immediately volatilized or ignited, thus greatly aiding in the expansion of the air and efficiency of the engine.

Having now described our invention, what we claim is—

1. In a gas or air engine, the combination of a closed vaporizing-chamber, an air-reservoir connecting with the working-cylinder through the vaporizing-chamber, a reservoir of fluid connected with and adapted to maintain a supply of fluid in the vaporizing-chamber, and a combustion-chamber for heating the said fluid in the chamber and the air in its passage to the cylinder, as set forth.

2. In a gas or air engine, the combination, with a gas or equivalent reservoir, a combustion-chamber, and a vaporizing-chamber, of an air-reservoir connected with the vaporizing-chamber, an air-pipe leading from the interior of the vaporizing-chamber to the cylinder and carried in proximity to the flame, a water or fluid reservoir, a pipe connecting the same with the vaporizing-chamber, and

an automatic valve controlling the supply of fluid from said reservoir, as set forth.

3. In a gas or air engine, the combination of a combustion-chamber, a vaporizing-chamber surrounding the same, a water-supply connected with the vaporizing-chamber, a receptacle or body in the vaporizing-chamber, adapted to be heated by the flame of the combustion-chamber, and a pipe from an oil tank or reservoir, adapted to drop a hydrocarbon or similar liquid into the heated receptacle, as herein set forth.

4. In a gas-engine, the combination of the combustion-chamber, the vaporizing-chamber surrounding the same, an air-reservoir, and pipes leading into and out of the vaporizing-chamber, a cup or receptacle opening into the vaporizing-chamber and extending into the vaporizing-chamber, and a hydrocarbon or liquid conducting pipe entering the vaporizing-chamber and adapted to deposit the liquid into the said receptacle, as set forth.

JOHN CHARLES BECKFELD.
ALBERT SCHMID.

Witnesses:

J. W. TATE, Jr.,
W. D. UPTGRAFF.