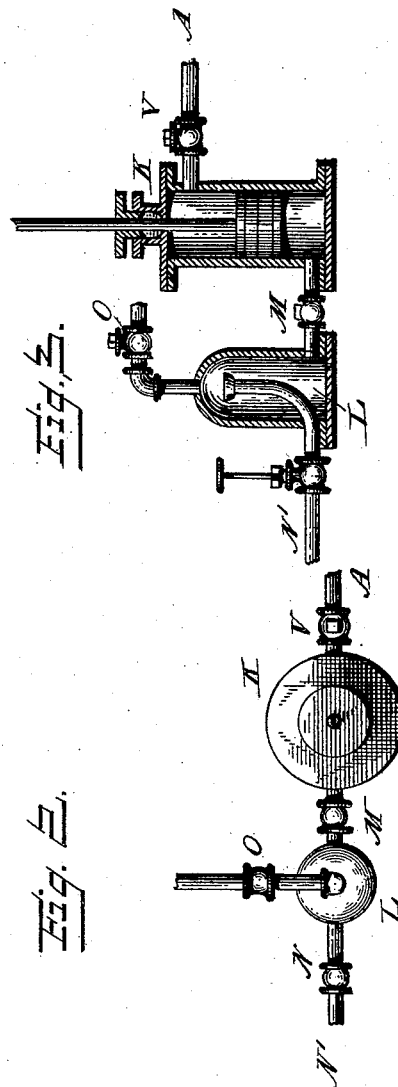
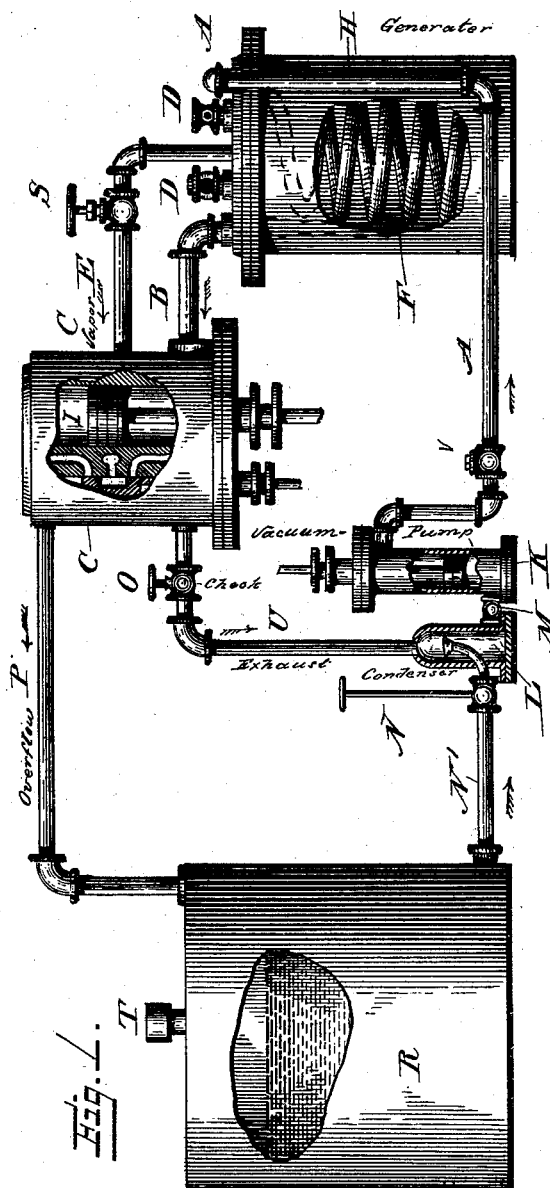


(No Model.)

P. J. McMAHON.  
AMMONIACAL GAS ENGINE.

No. 343,600.

Patented June 15, 1886.



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

PATRICK J. McMAHON, OF TANGIPAHOA, LOUISIANA.

## AMMONIACAL-GAS ENGINE.

SPECIFICATION forming part of Letters Patent No. 343,600, dated June 15, 1886.

Application filed February 9, 1885. Serial No. 155,425. (No model.)

*To all whom it may concern:*

Be it known that I, PATRICK J. McMAHON, a citizen of the United States, residing at Tangipahoa, in the parish of Tangipahoa and State of Louisiana, have invented a new and useful Improvement in Ammonical-Gas Engines, of which the following is a specification.

My invention relates to the application of a condenser and vacuum-pump to an ammonical-gas engine, whereby the back-pressure on the surface of the liquid of reabsorption (and consequently upon the engine) is obviated, and in its stead a vacuum is maintained in the condenser and on the exhaust side of the piston, and the pump which exhausts the condenser circulates the liquid which absorbs the gas in the condenser through the coil in the generator and jacket of engine-cylinder.

Referring to the drawings, Figure 1 is an elevation, with parts shown in section, of an ammoniacal-gas engine and generator with the pump and condenser attached, also showing the tank which contains the liquid to reabsorb the gas. Fig. 2 is a plan view of the pump and condenser; and Fig. 3 is an enlarged sectional view of the pump and condenser.

Like letters indicate like parts in all the figures.

In Fig. 1, H is the gas-generator inclosing the coil F.

C C is the jacket inclosing the cylinder I.

R is a common tank to contain the liquid for absorbing the gas as it is exhausted from the engine.

K is the vacuum-pump, and L the condenser.

S is a throttle-valve in the pressure-pipe E, which admits the gas from the generator to work the engine.

U is the exhaust-pipe from the engine to the condenser L.

O is a check-valve in the exhaust-pipe.

N is an injection-valve to admit the solution of reabsorption to the condenser, as may be required.

M is a check-valve between the condenser and pump.

A is the discharge-pipe from the pump K, and is connected with one end of the pipe forming the coil F in the generator H. The

pipe B is connected with the other end of said coil and with the jacket C C, inclosing the cylinder I.

The pipe P is an overflow from the top of the jacket C C to the tank R.

The mode of operation is as follows: The gas taken from the generator, after operating the piston of the engine, is exhausted into the condenser L, where it is met by a jet of the solution of reabsorption admitted through the injection-valve N, and gives out in this solution the heat it took to evaporate it in the generator. This heated solution is withdrawn from the condenser L and circulated by the pump K through the pipe A, coil F, cylinder-jacket C C, and through the pipe P into the tank R. While passing through the coil F, which is immersed in the liquid ammonia in the generator, it transmits the heat back to this liquid, which is being continually taken from it by the evaporation of the gas, and thus supplies the heat to keep up the evaporation so long as a sufficient surface of the coil is covered with ammonia. From the coil this liquid passes through the jacket C C, where it prevents the cylinder from getting too cold, (which would be the case with an exposed cylinder,) and superheats the gas during expansion or while throttling. This liquid becomes reduced in temperature by the time it reaches the tank R, where it is at its lowest point when again required for injection. This arrangement for the different parts is adopted for the purpose of illustration; but the different parts can be distributed around as may be required for any purpose or location, only maintaining the proper connections; and their forms also may be modified to suit any particular requirement—as, for instance, if the engine were required to propel a street-car, the solution of reabsorption in the tank R could be contained in tubes under the seats.

Having described my invention and its operation, what I claim is—

1. In an engine of the class described, the combination, with the reabsorbing-tank and with the generator and cylinder, of a vacuum-pump communicating with the jacket of the cylinder, and an overflow-pipe from the cylinder-jacket to the tank, substantially as specified.

2. In an engine of the class described, an exhaust-pipe provided with a check-valve and communicating with a condenser arranged between and communicating with both a vacuum-pump and a reabsorbing-tank, substantially as specified.

3. In an engine of the class described, an exhaust-pipe provided with a check-valve and communicating with a condenser arranged between and communicating with both a vacuum-pump and a reabsorbing-tank by means of an injector, substantially as specified.

4. The combination of the cylinder I, having jacket C, the generator H, pipe E, having throttle S, pipe B, communicating with said jacket, overflow-pipe P, and tank R, substantially as specified.

5. The combination of the vacuum-pump K, condenser L, check-valve M, pipe A, having valve V, generator H, pipe B, cylinder I, having jacket C, pipe E, having throttle S, pipe U, having check-valve O, injector N, overflow P, and tank R, substantially as specified.

6. The combination of the case H, pipes E and A, coil F, and pipe B, and tank R, having communication with pipes B and A, substantially as specified.

P. J. McMAHON.

Witnesses:

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