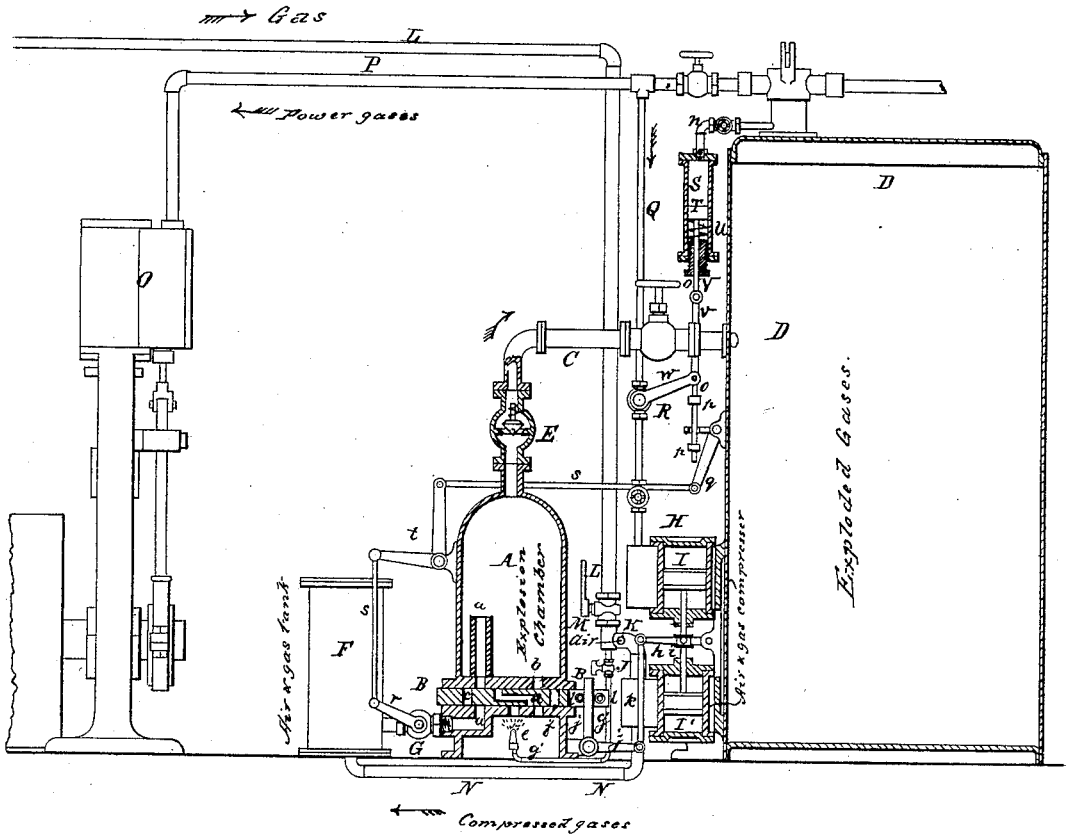
(No Model.)

R. BOEKLEN.

GAS MOTOR.

No. 384,673. Patented June 19, 1888.



Witnesses.
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GAS-MOTOR.

SPECIFICATION forming part of Letters Patent No. 384,673, dated June 19, 1888.

Application filed August 31, 1885. Renewed September 24, 1887. Serial No. 250,585. (No model.)

To all whom it may concern:

Be it known that I, REINHOLD BOEKLEN, a citizen of the United States of America, and a resident of the city of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Motive-Power Apparatuses from Illuminating or Fuel Gas, of which the following is a specification.

Heretofore in motive power obtained by the explosion of illuminating or fuel gas, as in the cylinder against the piston, and a ponderous fly-wheel of a gas-engine, by the rapid explosion and concussion against the inertia of the piston and fly-wheel and with the short period of stored heat, a great deal of the original force of each explosion is lost, and the motion of the engine, especially when only single-acting and with periodical explosions, is very irregular and not adaptable for driving dynamo-electric and other machines requiring regular motion. Carrying on the burning of the gas within the working-cylinder of the engine is injurious and prevents proper lubrication of the piston, and necessitates frequent repairs and is ruinous to the engine.

The object of this invention is to gain the full power made by the explosion of the gas and store the same in succession in a suitable large reservoir, and from there to furnish and feed regularly a proper double-acting or continuously-moving engine without burning gas in its cylinder and with even and automatic pressure, to provide for proper lubrication of the same, and obtain the suitable durability and even power to adapt the engine for driving machinery requiring regular motion.

The drawing annexed represents a sectional side elevation of the machinery and apparatus according to my invention for producing the motive power from explosion of illuminating or fuel gas.

A represents a gas-exploding chamber, made of strong metal. It has in its bottom the opening *a*, for admitting gas and air into the chamber, and the opening *b*, for exhausting products of combustion from said chamber A. In said bottom is arranged a horizontal slide-valve, B, having the port *c*, periodically meeting the opening *a*, to admit a charge of compressed gas and air into the chamber, and having a port, *d*, periodically making a communication between a gas-jet, *e*, and said opening *a*, for igniting the charge in the chamber, and having also a port, *f*, periodically meeting the opening *b*, for exhausting products of combustion from said chamber A, and with said chamber is connected on its top, by means of the pipe C, a large receiver, D, for storing the products of explosion of the gases from the chamber A, for which purpose a suitable check-valve, E, is provided on the pipe C. The bottom of the chamber A is connected to a small storing-tank, F, containing compressed gas or a mixture of coal or fuel gas with air, and its discharge is furnished with the regulating-cock G, through which the gas passes into the port *c* and the opening *a* and the chamber A.

H represents a small reciprocating pressure feed-pump, provided with the usual power-cylinder, I, having the automatic valve and the pump-cylinder I′, with proper suction and discharge valves, similar as with ordinary steam-pumps. To the suction of this pump is connected the pipe J, which has an air-inlet, K, and is attached to the gas pipe L, having the regulating-cock M, and with the gas-pipe L is connected also the small pipe *g*, on which the gas-burner for the gas-jet *e* is attached to furnish gas to the said jet constantly. The discharge of the pump-cylinder I′ is connected with the small storing-tank F by means of the pipe N, delivering in said tank a suitable combination of air and illuminating or fuel gas suitably compressed for powerful explosion in the chamber A.

O represents a suitable reciprocating double-acting piston engine. It may be a rotary engine, or it may be a steam-engine on hand in the building. It is connected, by means of the supply-pipe P, with the receiver D, from which it receives pressure of the gas or products of combustion of the explosions stored therein. Said receiver may be a tank or boiler on hand in the building; and from said pipe P is also power of the receiver D furnished to the power-cylinder I of the pump H by means of the pipe Q, which is furnished with the regulating valve or cock R, so that by this means the pump H is caused to reciprocate. Its piston-rod is connected with the horizontal lever *h* by means of a grooved collar, *i*, and the slide-valve B is connected with the two-armed or

bell-crank lever *j*, having one of its arms connected with the lever *h* by means of the link *k*, the other arm passing between two studs attached to the slide-valve B. By this means a reciprocating motion is imparted from the pump and its piston-rod to the slide-valve B, so that at a certain period of the motion of said valve the chamber A receives a charge of explosive gas by the opening *a* meeting the port *c* at a period soon after ignition, and explosion takes place by the port *d* making communication between the opening *a* and the gas-jet *e*, and at a period after the port *f* meets the opening *b* and allows a discharge of the products of combustion left in the chamber A, either partially into a natural-draft chimney or wholly into a vacuum-chamber provided. Each explosion caused in the chamber A causes the check-valve E to rise and admit the pressure into the receiver D, in which it is stored for use.

To render the apparatus automatically operating, I provide an inverted pressure-cylinder, S, in which is employed a piston, T, and under this piston is arranged a spiral spring, U, resting upon a screw or adjustable collar, V. The top of the cylinder is connected with the interior of the receiver D by the pipe *n* to receive its pressure. The piston T has a rod, *o*, connected with the valve R by means of the link *v* and the crank *w* on said valve. The spring U is adjusted by the screw-collar V, to allow a suitable compression of the spring by the pressure from the receiver D upon the piston T and the suitable opening of the valve R to furnish the pump H with a suitable speed. As soon as the pressure in the receiver rises, either by reason of a surplus supply from the chamber A or by reason of a less consumption of the engine O, said piston T is caused to a further compression of the spring U and, in consequence, a closing of the valve R. Should, however, the pressure in the receiver D still rise, as in case of stopping the consumption of the engine entirely, a provision is made by said piston-rod *o*, having an extension furnished lower with certain collars, *p p*, of which one of them in this case is brought in contact with the two-armed lever *q*, and the valve G has a crank, *r*, which is connected to the secondary arm of the lever *g* by means of the links *s s* and the intermittent lever *t*, pivoted on the chamber A. By this means the valve G is closed, and in consequence the explosives are entirely stopped from charging the receiver D until its pressure becomes reduced by consumption of the pump or engine, upon which the spring U causes the piston T to rise and open the valves G and R, causing the resumption of the motion by the pump, the valve B, and the explosion charging the receiver D. The gas-jet *e* is left burning at all times. Instead of the gas-jet *e*, electric ignition may be preferable in certain cases.

What I claim, and desire to secure by Letters Patent, is—

1. The combination, with a motor or engine, of a receiver, D, a chamber, A, and a pump, H, and slide-valve B, substantially as and for the purpose herein stated.

2. The combination, with the motor or engine O, of the receiver D and the chamber A and its openings *a* and *b*, with the check-valve E and pipe C, and the pump H, with the pipe L and its cock M and air-inlet K, and the pipe Q, with the valve R, and the tank F, with the pipe N and valve G, and the slide-valve B and its ports *c*, *d*, and *f*, and the gas-jet *e*, substantially as and for the purpose herein mentioned.

3. The combination, with the motor or engine O, of the receiver D and chamber A and the pump H and tank F, with the slide-valve B and its gearing, with the pump H and its ports *c*, *d*, and *f*, with the pipe C and check-valve E, and the pipe P, Q, N, and L, and the air-inlet K, and the valves G, M, and R, and the cylinder S, the piston T, the spring U, and the gearing herein shown and connected with the valves R and G, substantially for automatic operation of the production of the motive power herein set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 19th day of August, 1885.

REINHOLD BOEKLEN.

Witnesses:
ROBERT A. POTTER,
ROBERT M. POTTER.