

(No Model.)

I. N. HOPKINS.
GAS ENGINE.

No. 306,924.

Patented Oct. 21, 1884.

Fig. 1.

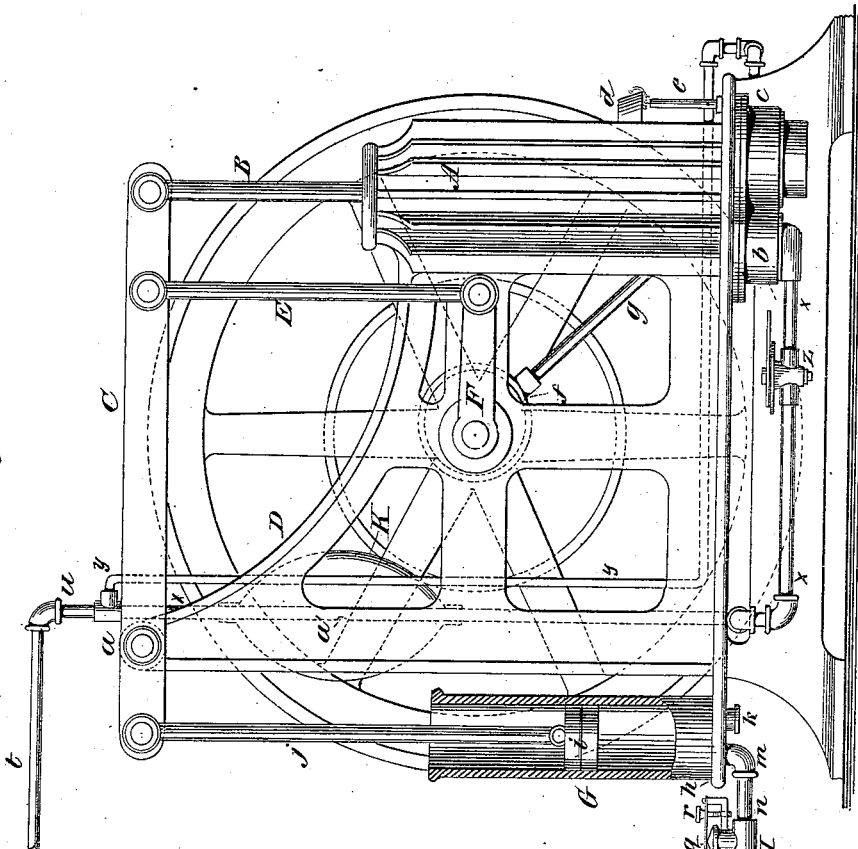


Fig. 2.

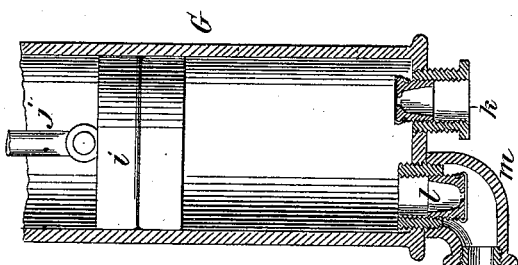
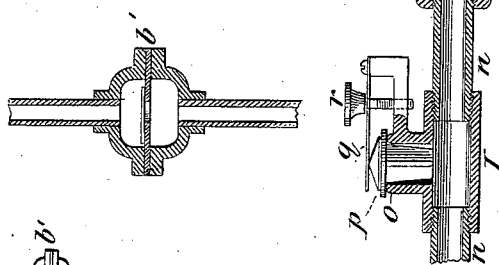


Fig. 3.



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I. NEWTON HOPKINS, OF BROOKLYN, NEW YORK.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 306,924, dated October 21, 1884.

Application filed December 12, 1883. (No model.)

To all whom it may concern:

Be it known that I, I. NEWTON HOPKINS, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Gas-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to the class of engines in which an explosive mixture of gas and air, or highly-combustible vapor and air, is drawn into the cylinder and then exploded to propel the piston; and it consists in apparatus for generating an explosive mixture consisting of a light hydrocarbon and air.

My improvement is more particularly designed for application to the gas-engine patented by George M. Hopkins, September 4, 1883, No. 284,555; but it may be applied to other forms of gas-engine with equal facility.

Figure 1 in the drawings is a side elevation showing the apparatus partly in section. Fig. 2 is a vertical transverse section of the air-pump and valves connected therewith, and Fig. 3 is a vertical section of the check-valve placed in the pipe leading from the carburetor.

The cylinder A contains a piston having a rod, B, connected with the lever-arm C, pivoted at *a* to the frame D. The lever-arm C is connected by a rod, E, with the crank F on the main shaft of the engine. A gas-check valve, *b*, and air-supply valve *c* communicate with the cylinder through a passage common to both valves. An ignition-valve, *d*, communicates with the cylinder and admits flame from a gas-burner, *e*, when the piston passes the said ignition-valve. The engine is provided with an ordinary exhaust-valve, operated by the eccentric *f* through the rod *g*. These devices are shown in the patent of George M. Hopkins above referred to, and form no part of my present invention, except so far as they are combined with my invention for generating and using an explosive mixture of light hydrocarbon.

On an extension, *h*, of the base of the gas-engine is secured an air-pump, G, whose cylinder contains a piston, *i*, connected by a rod, *j*, with an extension of the lever-arm C beyond its pivot. In the bottom of the pump are two

ordinary air-valves, *k l*, the valve *k* opening inward directly from the external air, the valve *l* opening outward into the elbow *m*, the said elbow *m* communicating by the tube *n* with the carburetor H.

In the tube *n* is placed a relief-valve, I, consisting of the valve-seat *o*, valve *p*, spring *q* pressing the valve *p* to its seat, and the adjusting-screw *r* for regulating the pressure of the spring on the valve.

The carburetor H is formed of an oblong vessel, with one or more rows of wick-filled holes, *s*, in its top. The upper ends of the wicks are inclosed by a tight-fitting cover, J, leaving a passage for air above the wicks. The tube *n* communicates with one end of the cover J, and from the opposite end a tube, *t*, extends to the supply-pipe *u* of the engine. A by-pass tube, *v*, provided with a stop-cock, *w*, connects the tubes *n* and *t*, and permits of regulating the richness of the gas by allowing more or less air to pass around the carburetor. The supply-pipe *u* is divided into two branches, *x y*, the branch *x* extending through the rubber gas-bag K to the gas-valve *b*, and is provided with a regulating-cock, *z*. The branch *x* communicates with the bag K through a hole, *a'*, in the portion of the pipe inclosed by the bag. The branch *y* is connected with the gas-burner *e* at the ignition-valve. An ordinary check-valve, *b'*, is placed in the tube *t* to prevent the flow of gas from the bag to the carburetor.

The body of the carburetor having been filled with gasoline or other light hydrocarbon, the engine is made to revolve a few times by hand, when the air-pump G draws in air and forces it through the cover J and over the wicks of the carburetor, when it is charged with the vapor of the hydrocarbon and forms a combustible mixture. This mixture is conveyed by the tube *t* and supply-pipe *u* and its branches *x y* to the bag K and burner *e*. The gas is lighted at the burner *e*, and some of it is allowed to pass through the cock *z* and valve *b*, and then into the cylinder, after mingling with air entering the valve *c*. As the piston in the cylinder A passes the ignition-valve *d*, flame from the burner *e* explodes the charge in the cylinder, propelling the piston upward and imparting motion to the fly-wheel, whose momentum carries the piston through its downward stroke, discharging the products of com-

bustion, and then carries the piston upward until another charge of explosive mixture is drawn into the cylinder and exploded. After starting in the manner described, the motion
5 of the engine will be sustained by repetitions of the explosion, and the pump G will continue to supply air to the carburetor so long as the engine is in motion. Should the engine run light and require little gas, the surplus air
10 escapes at the relief-valve I, and prevents injury to the gas-bag or overpressure in the pump and pipes.

The carburetor may be located near the engine, or the pipes may be extended, so as to

admit of placing the carburetor out of doors, 15 if desired.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

A gas-supply system for gas-engines, consisting of an air-pump, G, carburetor H, tubes
20 *n t*, gas-supply pipe *u*, having branches *x y*, gas-bag K, gas-valve *b*, air-valve *c*, and the igniting-burner *e*, as described.

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Witnesses:

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