J. ROBSON.

Gas-Engine.

No. 220,174. Patented Sept. 30, 1879.

Fig: 1.

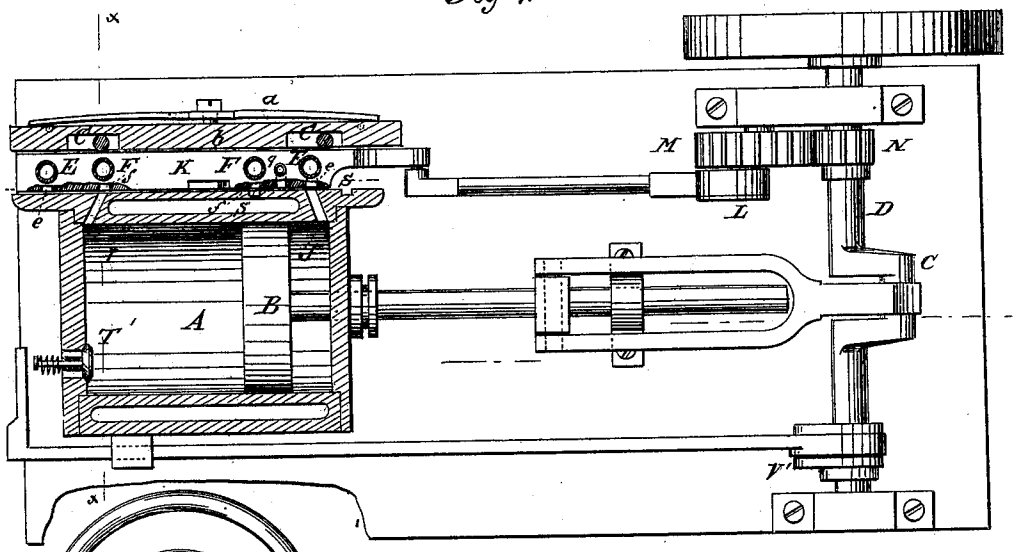


Fig: 2.

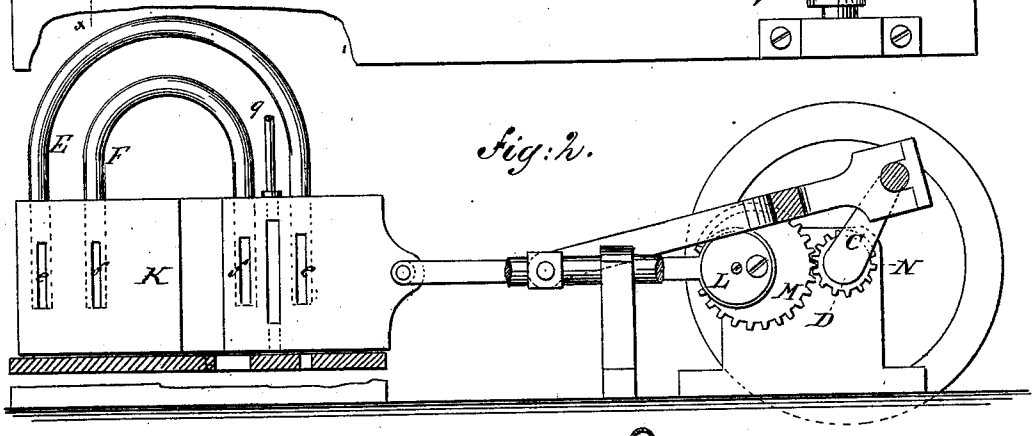
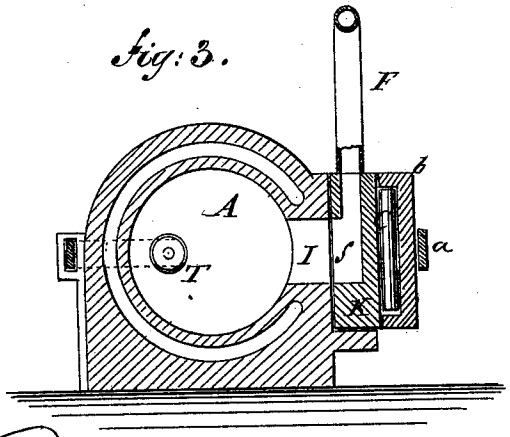


Fig: 3.



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UNITED STATES PATENT OFFICE.

JAMES ROBSON, OF NORTH SHIELDS, COUNTY OF NORTHUMBERLAND, ENGLAND.

IMPROVEMENT IN GAS-ENGINES.

Specification forming part of Letters Patent No. **220,174**, dated September 30, 1879; application filed May 3, 1878.

To all whom it may concern:

Be it known that I, JAMES ROBSON, of North Shields, in the county of Northumberland, England, have invented new and useful Improvements in Gas-Engines, of which the following is a specification.

My invention relates to engines operated by the internal combustion of gas or vapor.

The invention consists in employing a piston and rod working in a cylinder closed at both ends.

I use the instroke of the piston to draw in on one side of it a charge of gas or vapor and air. On the return stroke this charge is forced through passages into a combustion-reservoir, and there retained until the piston returns to the back end of the cylinder. The reservoir is then made to communicate with the back or opposite side of the piston. The gases in the reservoir are then exploded by a flame; their expansion drives the piston forward, which, by its rod and connecting-rod to the crank, turns the shaft and fly-wheel. On the return of the piston the products of combustion are allowed to escape.

Two reservoirs can be used, each communicating with each alternate stroke of the piston.

Figure 1 is a sectional plan view. Fig. 2 is a side elevation, partly in section. Fig. 3 is a transverse section taken on line *x x* in Fig. 1.

Similar letters of reference indicate corresponding parts.

A is the cylinder inclosed in a water-jacket, with its piston B and rod passing through a packing-box in the cover, and connected to the crank and fly-wheel shaft C and D.

The two tubular combustion-reservoirs E and F communicate, by their ports *e f*, with the front or back side of the piston through ports I J, according to the position of the slide K. This slide is moved by an eccentric, L, fixed on the side of a toothed wheel, M, moved by a toothed wheel, N, of half its diameter fixed on the shaft D.

To start the engine the fly-wheel is moved round by hand, so that when the piston is moving from the front end of the cylinder to the back it becomes charged with a mixture of air and gas through the flap-valve in the front or crank end of the cylinder, provided with gas and air ports. On the piston moving to the rear end, it forces the gas and air into one or the other of the reservoirs E F through the front port, according to the position of the slide K. The air and gas are there retained by the slide, and when the piston returns to the back end the slide K opens its passage-ways from one end of the reservoir to the back side of the piston. It also brings either of the passages *e* or *f* into communication with either of the flames burning in the niches S S. This fires the gas mixture, causing it to expand in the passages and combustion-reservoirs, which, being in communication with the back side of the piston, drives it forward, and during this forward movement another charge is compressed into the other reservoir.

T′ is the escape-valve, worked by the eccentric V′ on the shaft D.

In Figs. 1 and 3 is shown the arrangement for keeping the slides up to the cylinder-face. *a* is a strong cruciform spring, held by bolts and nuts to the cylinder and pressing on the slide-case *b*. Between this case and the slide K are rollers C C, which reduce the friction from sliding to that of rolling on the back of the slide.

The supply of gas is regulated by a governor.

On starting the engine, gas may be sent round to the pipe *q* by a by-pass cock.

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

1. A gas-engine in which a charge of gas and air is drawn in on one side of a piston, and then compressed by alternate strokes into two reservoirs, the latter being brought into

alternate communication with opposite sides of the piston and the gases exploded, all constructed and arranged as set forth.

2. In a gas-machine, the arrangement of slide-valve, with tubular reservoirs attached, and friction-rollers on the back, arranged substantially as hereinbefore described.

3. The slide K, having ports *e f* and tubular reservoirs E F, in combination with the cylinder A, substantially as herein shown and described.

The above specification signed by me this 1st day of February, 1878.

JAMES ROBSON. [L. S.]

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