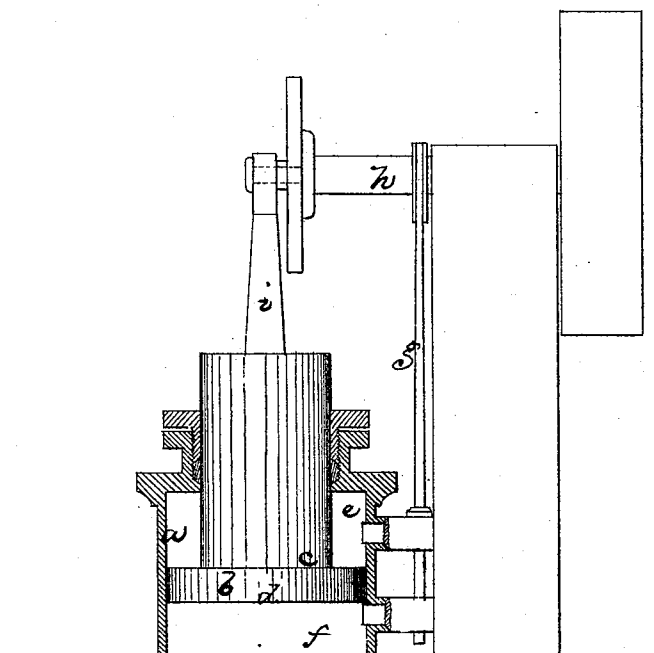


J. F. HASKINS.

Air and Gas Engines.

No. 129,337.

Patented July 16, 1872.



Witnesses.
M. W. Frothingham.
S. B. Hildes.

John F. Haskins,
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UNITED STATES PATENT OFFICE.

JOHN F. HASKINS, OF FITCHBURG, MASSACHUSETTS.

IMPROVEMENT IN AIR-AND-GAS ENGINES.

Specification forming part of Letters Patent No. 129,337, dated July 16, 1872.

To all whom it may concern:

Be it known that I, JOHN F. HASKINS, of Fitchburg, in the county of Worcester and State of Massachusetts, have invented an Improvement in Engines; and I do hereby declare that the following, taken in connection with the drawing which accompanies and forms part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

My invention relates to that class of engines in which the motive power is produced by the use of steam or vapor of water and of a vapor evolved from a highly-volatile liquid heated by the exhaust from the engine or the direct steam from the boiler. Heretofore, in obtaining motive power by thus twice using the steam—first by its direct expansion and next by using the same steam to heat and vaporize the volatile liquid—it has been customary to use two engines, working the first by the direct steam from the water-boiler, and working the second by a vapor generated by the action of the exhaust steam of the first to heat and vaporize a volatile liquid contained in a separate boiler. In my invention I make a trunk-engine and drive the piston by employing on one side of it the steam from the water-boiler, and upon the other side of it the steam or vapor from the volatile liquid heated and vaporized by the exhaust steam; and my invention consists in this new method of working an engine, or in a trunk or upright engine the cylinder of which has its two parts on opposite sides of the piston connected by suitable valve-chests and pipes, the one with a common steam-boiler heated and making steam in the ordinary manner, and the other with a boiler connected with and heated by the exhaust steam of the first, and containing a highly-volatile liquid, from which the exhaust steam evolves a vapor having a pressure equal to or exceeding the pressure of the direct steam.

In practice I prefer to use an engine substantially like that shown in the drawing, which represents the engine in sectional elevation.

a denotes the cylinder, upright in position, standing upon a suitable base or bed-plate. *b* is the piston, the upper surface *c* of which has an area or pressure-surface much less than the area or pressure-surface *d* of the under side thereof, the area being preferably about half the area of the under surface. *e* denotes the upper part and *f* the lower part of the cylinder, and the part *e* connects with a steam-passage leading to the steam-boiler, said passage being controlled by a slide-valve on a rod, *g*, worked by an eccentric on a shaft, *h*, a crank-wheel upon which shaft is jointed to the connecting-rod *i* of the piston. The lower part *f* connects with a vapor-passage controlled by another valve on the rod *g*, the upper or steam passage leading from an ordinary steam-boiler, and the lower or vapor passage leading from the boiler containing the volatile liquid, and by action of the valves the passages are alternately opened, so that the piston is reciprocated by the alternate and oppositely-applied pressure of two vapors—one the vapor of water and the other the vapor of a fluid which is vaporized at a temperature below 212° Fahrenheit—the steam and other vapor being both used at each revolution of the shaft to produce the complete reciprocation of the piston. One eccentric is used to actuate both valves, and one governor can be used to control the ingress of both fluids.

In this way a very economical-working engine may be produced, and an engine which is simple and inexpensive in construction.

I claim—

An engine constructed substantially as shown and described, and having its piston actuated by the pressure of ordinary steam upon one side of it, and by the pressure upon its opposite side of a vapor generated from a highly-volatile liquid by means of the exhaust steam.

JOHN F. HASKINS.

Witnesses:

FRANCIS L. HILLS,
FRANCIS GOULD.