

(No Model.)

2 Sheets—Sheet 1.

J. HODGKINSON & J. H. DEWHURST.
GAS ENGINE.

No. 347,603.

Patented Aug. 17, 1886.

Fig. 1.

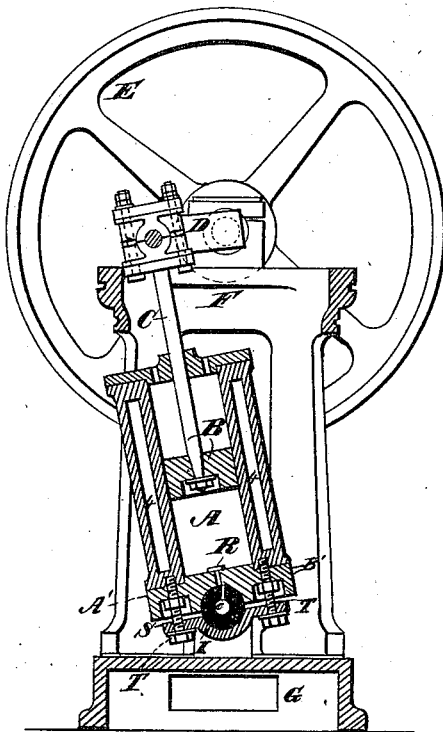
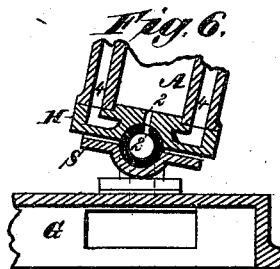
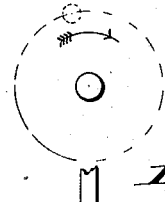
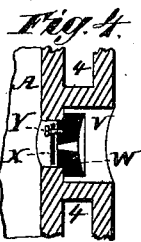
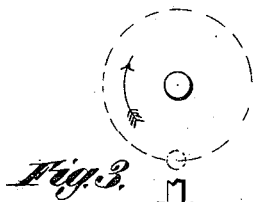
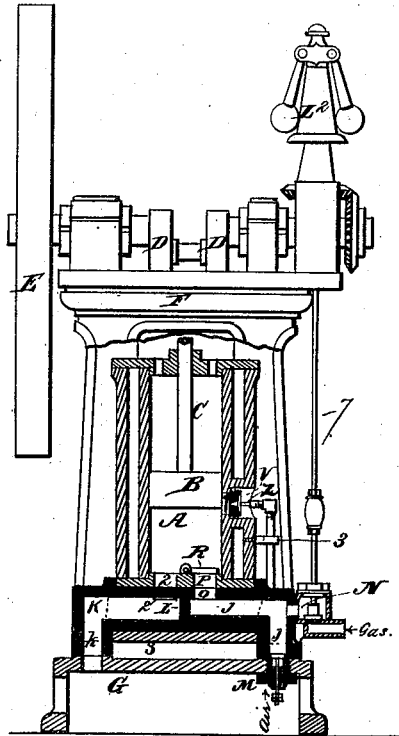


Fig. 2.



Witnesses:
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H. A. Rutherford

Inventors:
James Hodgkinson
John H. Dewhurst.
By James C. Norris, Atty.

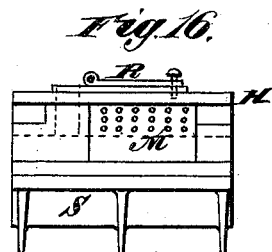
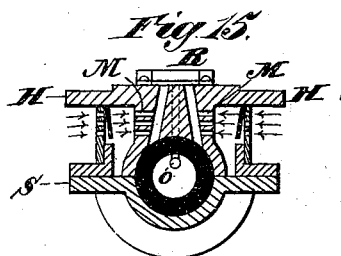
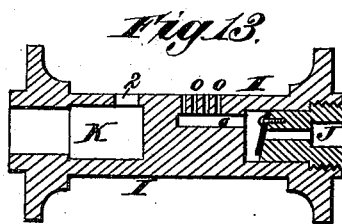
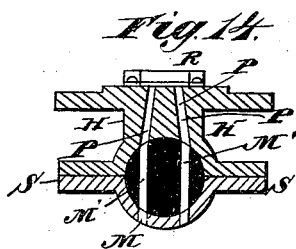
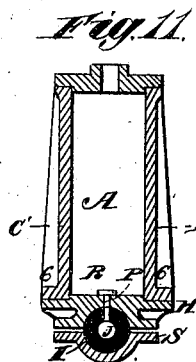
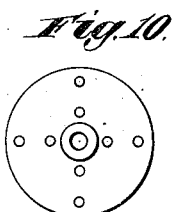
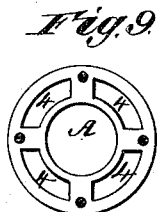
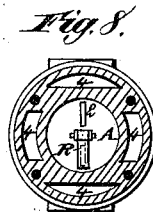
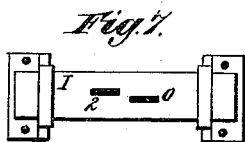
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GAS ENGINE.

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Witnesses.
Robert Everett,

J. A. Rutherford

Inventors.
James Hodgkinson
By John H. Dewhurst.

James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

JAMES HODGKINSON AND JOHN HENRY DEWHURST, OF MANCHESTER,
COUNTY OF LANCASTER, ENGLAND.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 347,603, dated August 17, 1886.

Application filed May 19, 1886. Serial No. 292,670. (No model.) Patented in England March 25, 1884, No. 5,412.

To all whom it may concern:

Be it known that we, JAMES HODGKINSON, of the firm of Hodgkinson & Co., (Limited,) Ordsall Machine Works, -Woden Street, Salford, Manchester, England, and JOHN HENRY DEWHURST, of the same place, have invented new and useful Improvements in Gas-Engines, (for which patent has been obtained in Great Britain No. 5,412, March 25, 1884,) of which the following is a specification.

Figure 1 is a sectional elevation of our improved gas-engine. Fig. 2 is a part side and sectional elevation of same; Figs. 3, 4, 5, 6, 7, 8, 9, and 10, enlarged detail views of certain parts; Figs. 11 and 12, modified forms of cylinder; Figs. 13 and 14, modified form of hollow journal; Figs. 15 and 16, still another modification of journal and bottom of cylinder.

A is the oscillating cylinder; B, the piston; C, the piston-rod; D, the crank; E, the fly-wheel; F, the frame or stand, and G the bottom or foundation plate.

The oscillating cylinder A is provided with the loose bottom H, on the under side of which is formed the semicircular recess, bored to fit and swivel on the fixed circular hollow bearing or journal I, being secured by the loose semicircular cap or cover S and the bolts T. The inside of the bearing or journal I is constructed so as to form the mixing and admission chamber J and the exhaust-chamber K, each being divided by the partition L.

In the foundation plate G is fixed the inlet air-valve M, over which is fixed the bottom end of the mixing or admission chamber J. In the upper end of the latter is fixed the gas-valve N. When the engine is set in motion, atmospheric air is drawn through the valve M and combustible gas through the valve N into the mixing-chamber J, from whence the explosive mixture passes through the port O in the journal I and the port P in the cylinder, the ports being full open when the crank is on the bottom center, as in Fig. 3. The admission-port P is fitted with the wing or hinged valve R which automatically closes when the pressure in the cylinder exceeds the external or the pressure in the mixing-chamber J. As the crank advances the cyl-

inder A oscillates and closes the admission-port O in the fixed journal I before or otherwise the charge in the cylinder is ignited and pressure generated, as in Fig. 1, thereby preventing the escape of the gas and air or explosive mixture from the cylinder into the admission or mixing chamber.

On the side of the cylinder is provided the opening V, placed at a suitable height from the bottom of the cylinder or the commencement of the stroke to admit of the requisite charge of explosive mixture of gas and air, the position being regulated according to the maximum power the engine is intended to drive. In the opening V is fixed the conical valve-seating W, to which is fixed the metallic valve X, mounted loosely on the set-screw Y. (Shown more clearly in Fig. 4.) When the piston has traveled up to and past this opening or otherwise, as in Fig. 2, the flame from the gas-jet Z is drawn into the cylinder and ignites the charge therein, thus creating the necessary pressure to force the piston to the end of its forward stroke and close the valve X. The gas-jet Z is mounted on a swivel at the bottom end, so as to allow of its oscillating with the cylinder, being held in position by the stay 3. The engine being single-acting, the piston B is carried over the top center and through the remaining part of the revolution by the momentum of the fly-wheel E, fixed on the crank-shaft, the exhaust being discharged during the return-stroke of the piston through the ports 2, which are disposed in the cylinder bottom H and the fixed journal I, so that the exhaust is released when on the top center or immediately before, as in Fig. 5, which, by the oscillation or movement of the cylinder, gradually opens until full open at half-stroke, as in Fig. 6, after which point they again gradually close, this being effected when the crank is directly opposite the point at which they opened.

Fig. 7 is a plan of the journal I, showing the admission-port O and the exhaust-port 2. Fig. 8 is a plan through line A' B' in Fig. 1, showing the valve R over the admission-port P and the exhaust-port 2 in the cylinder bottom. Fig. 13 is another modification of the hollow bearing or journal I. Fig. 14 is a sec-

tional elevation of journal I, attached to the loose bottom H of the cylinder by the semi-circular cap or cover S. Fig. 15 is a sectional elevation of hollow journal I, loose bottom H, and air-ports; and Fig. 16 is a side elevation of Fig. 15.

The inlet for gas is by the orifice J and openings or ports O. The ports P in the loose bottom H are fitted with the wing or hinged valve R. Atmospheric air is admitted through the openings M on the side of the loose bottom H, as shown in Fig. 15, or through the ports M', as in Fig. 14. In these arrangements the mixing of gas and air takes place as they pass under the winged or hinged valve R into the cylinder, when the operation is as before stated. The exhaust is discharged during the return-stroke of the piston through the port 2 into the chamber K.

As the combustion of the gases in the interior of the cylinder creates a great amount of heat, it is necessary to cool the same, which is effected by providing the water-jackets 4, as shown in Figs. 1, 2, 3, 4, 5, 6, 8; and 9, Fig. 9 being a plan of the cylinder and jacket with the cylinder-cover removed, of which Fig. 10 is a plan of the cover. In very small engines made on this principle I may dispense with the water-jacket 4 and substitute the radiating surfaces or wings 6 on the exterior of the cylinder, as shown in Fig. 11, of which Fig. 12 is a plan through line C' D', so as to augment the area of the surfaces in contact with the outer atmosphere.

For the purpose of regulation of speed the engine is provided with the governor L², driven from the crank-shaft, and coupled by the adjustable rod 7 to the gas-valve N, which operates as follows: Suppose a portion of the load is thrown off. The tendency of the engine is to increase speed with the result of operating the governor and closing the thoroughfare in the gas-valve N, so as to diminish the quantity of gas, consequently reduced power from the explosion through too great a proportion of atmospheric air being admitted into the mixing-chamber, and vice versa in case the load is increased.

Gas-engines constructed according to my invention, although not shown on the drawings, can be coupled with two or more cylinders, as desired.

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

1. The hollow journal I, formed with the mixing and exhaust chambers and ports O and 2, in combination with the gas-cylinder mounted and oscillating upon said journal and controlling said ports, substantially as described. 55

2. In a gas-engine, the journal I, formed with ports for the passage of gas, in combination with the oscillating cylinder having a port with which the port in the cylinder communicates for the passage of the gas, said ports being controlled by the oscillation of the cylinder to close the ports before ignition of the gases in the cylinder, substantially as described. 60

3. In a gas-engine, the hollow journal I, formed with the mixing and exhaust chambers and ports O and 2, the oscillating cylinder mounted on said journal and provided with ports communicating with its ports, and the valve R to one of the ports in the cylinder to close the port when the internal pressure exceeds the external, substantially as described. 65

4. The combination of hollow journal I, divided by partition L, to form the admission and mixing chamber and exhaust-chamber, ports O and 2, and inlets M and N, oscillating cylinder A, provided with piston B, and formed with ports communicating with the mixing and exhaust chambers, opening V in the cylinder, provided with valve X, and the gas-jet Z, substantially as and for the purposes set forth. 70

5. The combination, with the hollow journal I, formed with the mixing and exhaust chambers and ports, of oscillating cylinder A, formed with ports communicating with those of the journal, the gas-valve N, cranks D, governor L², and rod 7, connecting the governor and valve N, substantially as described. 75

In witness whereof we, the said JAMES HODGKINSON and JOHN HENRY DEWHURST, have hereunto set our hands and seals this 20th day of April, A. D. 1886. 80

JAMES HODGKINSON. [L. S.]
JOHN HENRY DEWHURST. [L. S.]

Witnesses:

E. CHADWICK,
SAM'L. HODGKINSON.