(No Model.)

J. A. EWINS.

GAS ENGINE.

No. 278,421. Patented May 29, 1883.

FIG. 1.

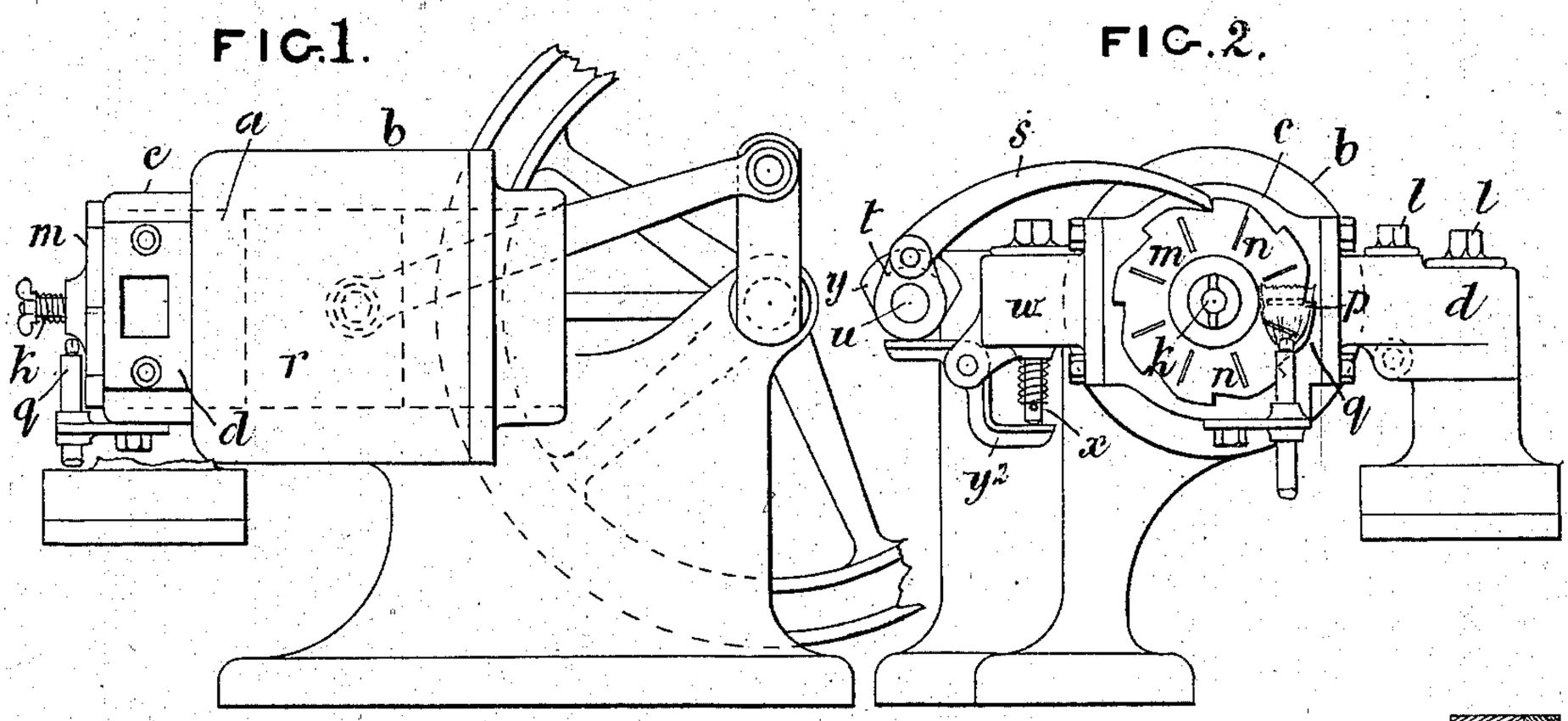


FIG. 2.

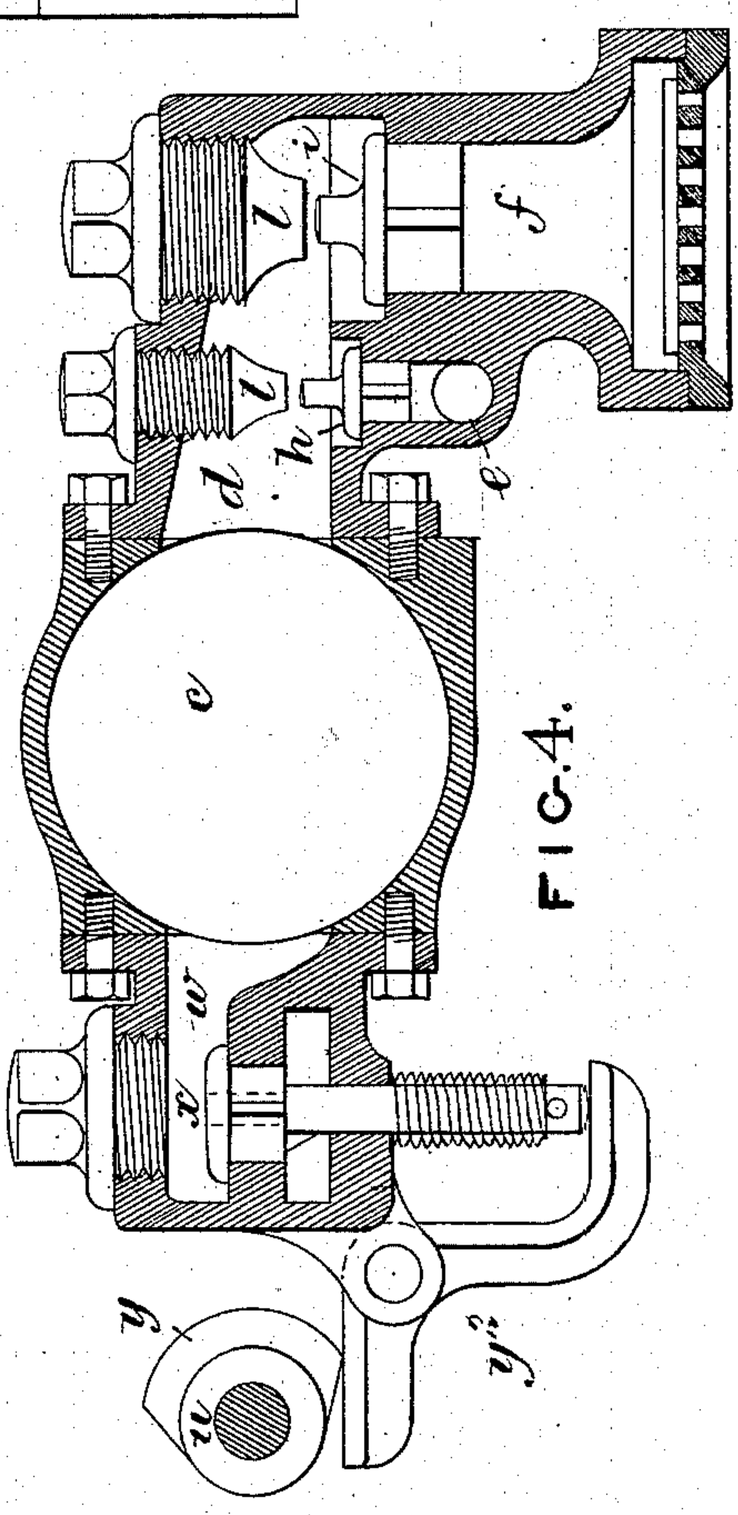
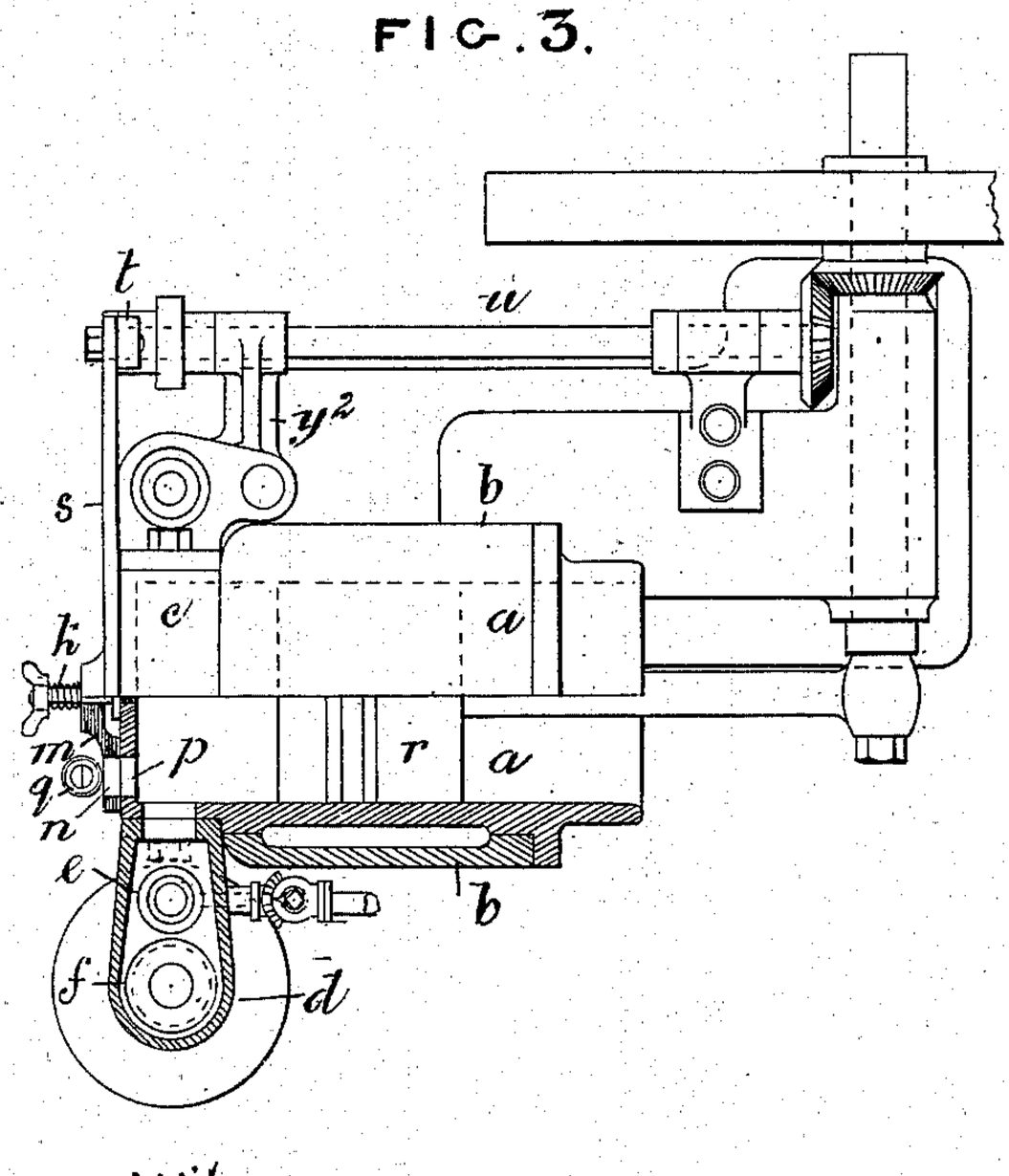


FIG. 3.



Witnesses.

George Shaw

Richard Skerrett

Inventor.

James Alfred Ewins

UNITED STATES PATENT OFFICE.

JAMES A. EWINS, OF BIRMINGHAM, COUNTY OF WARWICK, ENGLAND, ASSIGNOR TO TOM BIRKETT BARKER, OF SAME PLACE.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 278,421, dated May 29, 1883.

Application filed March 17, 1883. (No model.) Patented in England March 29, 1881, No 1,388, and in Belgium February 18 1882, No. 57,115.

To all whom it may concern:

Be it known that I, JAMES ALFRED EWINS, a subject of the Queen of Great Britain, residing at Birmingham, in the county of Warwick, England, have invented certain new and useful Improvements in Gas-Engines, (for which I have received Letters Patent in Great Britain, No. 1,388, dated March 29, 1881, and in Belgium, No. 57,115, dated February 18, 1882,) of which the following is a specification.

My invention has reference to the igniting appliances of gas-engines for exploding the mixture of gas and air by which the piston of the gas-engine is worked.

The igniting appliances constructed according to my invention consist, substantially, of a disk, plate, or valve having either a rectilinear or rotary motion, the said motions being either continuous or intermittent, the said plate being situated at the back or other convenient part of the explosion-chamber to which the mixture of gas and air is supplied. The said plate or valve is furnished with a slit or opening, or a series of equidistant slits or openings, the said slits or one of the said slits at each forward movement or impulse of the said plate or valve momentarily uncovering a hole or slit in the explosion-chamber, so that an external gas jet or flame situated near the last-named hole or slit is made to ignite the explosive mixture in the chamber and effect the propulsion of the piston. The said plate or valve may be worked by ratchet-gear from the principal shaft of the engine, or by toothed or other equivalent gearing.

Figure 1 of the accompanying drawings represents a front elevation of a portion of a gas-engine containing my improvements. Fig. 2 is an end elevation of the same. Fig. 3 is a plan of the same, partly in horizontal section, the sectional part exhibiting the igniting-plate at its point of ignition, and also exhibiting the water-jacket around the working-cylinder. Fig. 4 is a cross-section of the engine exhibiting the details of the air and gas inlet valves and exhaust-valves, the said Fig. 4 being drawn to a larger scale than Figs. 1, 2, and 3.

In the gas-engine represented a disk or plate having an intermittent rotary motion is employed, the said disk having a series of equidistant radial slots.

The same letters of reference indicate the same parts in the several figures of the drawings.

a is the working-cylinder of the engine, provided with a water-jacket, *b*, for the circulation of water around the working-cylinder for keeping it cool. At the back of the said cylinder *a* is a chamber, *c*, into which the mixture of gas and air is drawn and in which it is exploded, the said chamber *c* forming a continuation of the working-cylinder of the engine. (See Fig. 3.) At one side of the explosion-chamber *c* is a mixing-chamber, *d*, to which the gas and air are supplied and in which they are mixed, *e* being the inlet gas-supply pipe, and *f* the inlet air-supply pipe; *h*, the valve of the gas-pipe, opening inward, and *i* the valve of the air-pipe, also opening inward. Stops *l l* limit the rising motion of the two valves *h i*. Communication is effected between the mixing-chamber *d* and the explosion-chamber *c* by means of the side passage shown in Fig. 4. Working against the back of the explosion-chamber *c* is the igniting appliance, consisting of the disk plate or valve *m*, having an intermittent rotary motion on the axis *k* and pressed against the chamber by a coiled spring. In the said plate, disk, or valve *m* is a series of radial holes or slits, *n*, and in the path of the said holes or slits a similar hole or slit, *p*, is made in the back of the explosion-chamber *c*. (See Fig. 3.) Stationed near the hole or slit *p* is an external gas jet or flame, *q*, by means of which the explosive mixture is ignited. At each forward movement or impulse of the igniting plate or valve *m* one of its holes, *n*, is momentarily brought over and made to coincide with the hole or slit *p* in the explosion-chamber *c*, and communication is thereby established between the external flame *q* and the gaseous mixture in the said chamber *c*. In consequence of the slight exhaust in the chamber *c* the flame is drawn into the said chamber and the said mixture is exploded and made to propel the piston *r*, as is well understood. It will be seen that the uncovering of the hole or slit *p* in the explosion-chamber *c* takes place

at the middle of each impulse or movement of the plate or valve *m*, the completing of the impulse of the said plate or valve re-covering the hole or slit *p* and cutting off communication with the flame *q*. In Fig. 3 one of the slits or holes *n* in the plate *m* and the slit or hole *p* in the explosion-chamber *c* are represented coinciding for igniting the gaseous mixture, and in Fig. 2 the slit or hole *p* (indicated in dotted lines) is shown covered by an unperforated part of the plate *m*.

The intermittent rotary motion of the igniting plate or valve *m* is represented in the drawings as being effected by ratchet-gear. On the edge of the plate *m* is a series of ratchet-teeth, with which a pawl, *s*, engages. The pawl *s* is worked by the crank *t* on the rotating shaft *u*, the said shaft taking its motion by bevel-gearing, as represented, from the principal shaft of the engine. I do not, however, limit myself to the arrangement represented for working the intermittent rotary igniting-plate *m*, as other equivalent gearing may be employed. Neither do I limit myself to the shape of the slits or openings *n*, as openings of any other form may be employed.

The gas and air are drawn into the mixing-chamber *d* through the pipes *e f* and valves *h i* and into the explosion-chamber *c* by the forward or advance motion of the piston *r* of the engine, and the products of combustion are ejected from the cylinder *a* through the exhaust-chamber *w* and the open exhaust-valve *x* by the back or return stroke of the said piston. This valve *x* is kept open during the whole of the back or return stroke of the piston by the action of the cam *y* on the shaft *u*, operating through the cranked lever y^2 on the spindle of the said valve, as best seen in Fig. 4.

The gas-engine described and represented is a single-acting one—that is, the piston is propelled in one direction only by the explosion of the gaseous mixture, the return or back motion of the piston being effected by the momentum of the fly-wheel; but by the addition of the igniting appliances and exhausting arrangement to the front end of the cylinder the engine may be made double-acting—that is, the piston may be propelled in both directions by the explosion of the gaseous mixture.

Although I have represented my invention as applied to a horizontal gas-engine, I wish it to be understood that my invention is applicable to any other form of gas-engine.

Having now described the nature of my invention and the manner in which the same is to be performed, I wish it to be understood that I claim as my invention—

In a gas-engine, the combination, with the piston, the explosion-chamber provided with a slit or opening for the admission of flame thereto, the slotted or perforated plate, disk, or valve, and the external permanent burner, of operating mechanism, as explained, for moving said plate, disk, or valve so as momentarily to uncover the aforesaid slit or opening during the advance of the piston and permit the flame of the permanent burner to be drawn into the explosion-chamber by the partial vacuum formed in said chamber by the advance of the piston, substantially as described.

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Witnesses:
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RICHARD SKERRETT.