

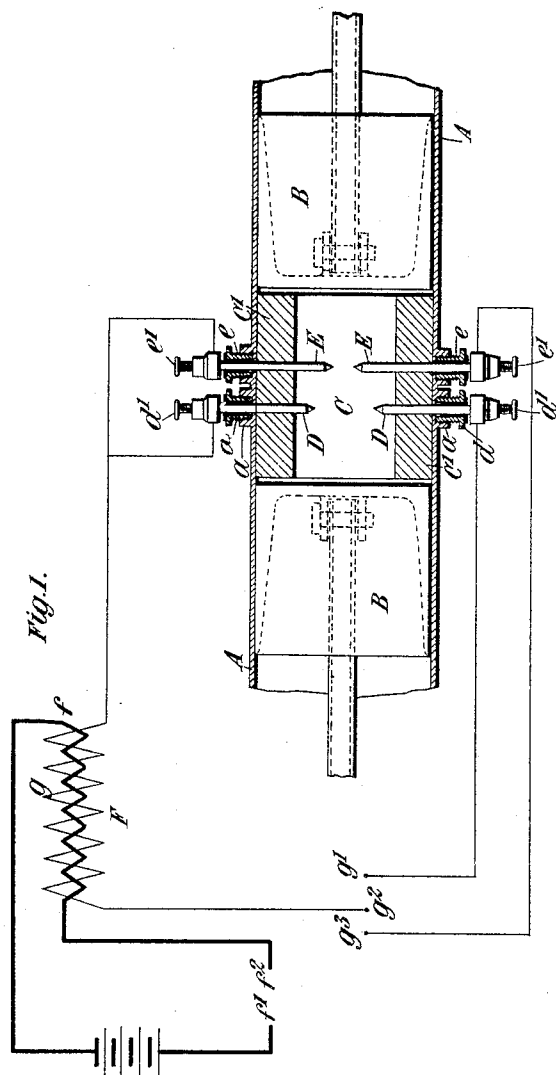
(No Model.)

2 Sheets—Sheet 1.

W. ROWBOTHAM.
OIL, GAS, OR LIKE ENGINE.

No. 578,266.

Patented Mar. 2, 1897.



Witnesses:
Geo. W. Rea,
Robert Everett,

Inventor.
Walter Rowbotham.
By James L. Norris,
Atty.

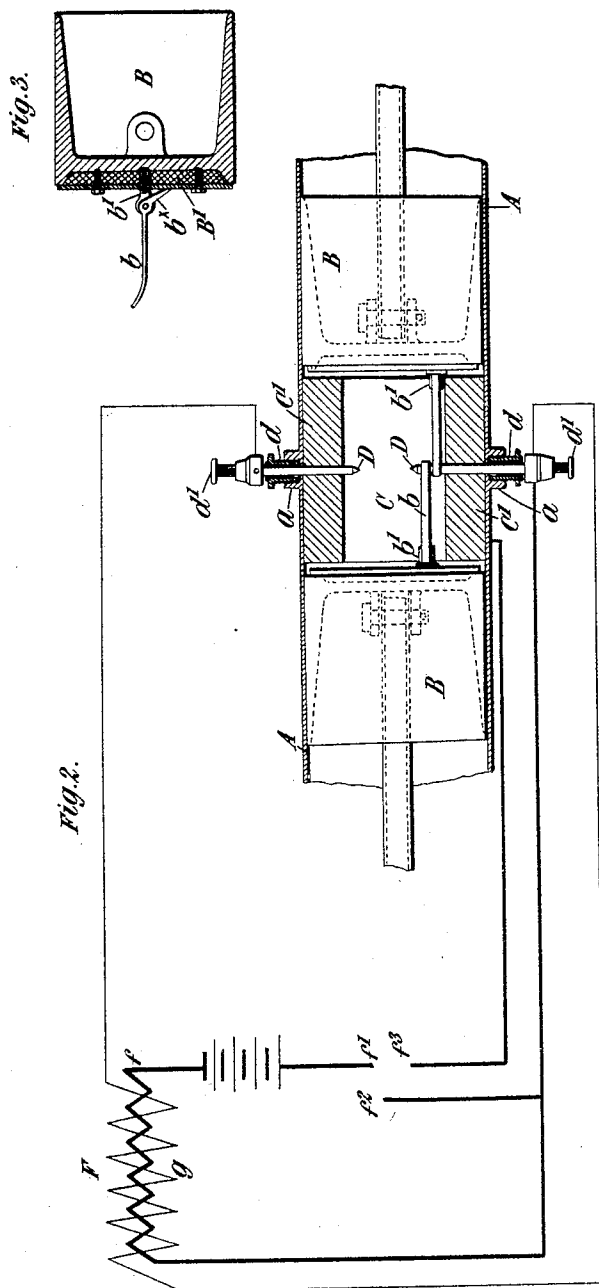
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UNITED STATES PATENT OFFICE.

WALTER ROWBOTHAM, OF BIRMINGHAM, ENGLAND.

OIL, GAS, OR LIKE ENGINE.

SPECIFICATION forming part of Letters Patent No. 578,266, dated March 2, 1897.

Application filed April 30, 1896. Serial No. 589,776. (No model.)

To all whom it may concern:

Be it known that I, WALTER ROWBOTHAM, electrical engineer, a subject of the Queen of Great Britain, residing at 27 Vittoria Street, Birmingham, England, have invented certain new and useful Improvements in Oil, Gas, or Like Engines, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates more particularly to that class of motor-engines worked by explosive or combustible mixtures of air and gas or air and hydrocarbon or other oil, which mixtures are ignited within the working cylinder or within a chamber communicating with the said cylinder.

The chief object of my invention is to subject the explosive mixture to the action of a silent electric discharge, preferably while the said mixture is under compression in the cylinder or combustion-chamber. This electric discharge greatly assists in vaporizing the oil, augments the explosive force of the explosive mixture, renders the combustion of the explosive mixture more perfect, and facilitates its ignition. These advantages I believe to be due to the presence of nascent oxygen produced by the action of the silent electric discharge on the explosive mixture.

In the accompanying drawings I have shown advantageous methods of carrying my invention into practice.

Figure 1 is a longitudinal section of the working cylinder of an engine in which two pistons are employed and in which the combustion-chamber is situated between the said pistons. Fig. 2 is a similar view, but shows a modified arrangement for effecting the ignition of the charge. Fig. 3 is a longitudinal section of one of the pistons shown in the last-mentioned figure.

A is the cylinder, B B the pistons, and C the space or combustion-chamber wherein the explosive charges or mixtures are admitted and ignited.

C' is a lining of refractory material, such as asbestos or indestructible porcelain, with which this space or chamber is preferably provided, and B' is similar material, with which the inner ends of the pistons may likewise be provided. This lining and facing material serves to confine the heat and insu-

late the combustion-chamber from the metallic parts of the engine.

Referring more particularly to Fig. 1, D D are two electrodes or terminals of an electric circuit, the said electrodes being composed of metal with points of platinum or other suitable material and projecting into the aforesaid space or chamber C. The inner ends of these electrodes are situated at such a distance apart as to avoid "sparking," and their outer ends are mounted in adjustable holders *d d*, which are screw-threaded or otherwise formed, to permit the distance between the said electrodes to be conveniently regulated by adjusting the holders in sockets *a a*, with which the wall of the cylinder A is provided. The aforesaid electrodes D are insulated from their holders by suitable insulating material and are furnished with binding-screws *d'* for the electric conductors to be connected thereto. These electrodes D are hereinafter referred to as "silent-discharging" electrodes.

E E are other electrodes, which are mounted in insulated holders *e e*, similar in construction to the holders *d d*, and which may likewise be adjustable in sockets on the cylinder A, so that the distance apart of their inner ends can be regulated to insure that a spark or sparks will leap from one to the other for igniting the explosive charge when the electric current is allowed to pass between the said electrodes. These electrodes are hereinafter referred to as "sparking" or "ignition" electrodes. *e' e'* are binding-screws on these electrodes for enabling electric conductors to be connected to them.

The electric circuits for supplying current to the silent-discharging and sparking electrodes are advantageously arranged in the manner illustrated in the drawings, where, in Fig. 1, F is an induction-coil, the primary winding *f* of which is in circuit with an electric battery or other source of electric supply. This circuit *f* is opened and closed by means of contacts at *f' f'*. The secondary winding *g* of the induction-coil is in circuit with both the electrodes D and E and is provided with contacts *g' g' g'*. The contacts *f' f'* in the primary circuit and the contacts *g' g' g'* in the secondary circuit are so arranged, in conjunction with some moving part of the engine,

that at and during compression of the explosive charge by the inward stroke of the pistons B the primary contacts f' f^2 and the secondary contacts g' g^2 are closed, so that the silent-discharging electrodes D come into
 5 action. When the pistons terminate their inward stroke and the explosive charge is under full compression, the said contacts g' g^2 are opened and the contacts g^2 g^3 are closed, the contacts f' f^2 still remaining closed. The
 10 silent-discharging electrodes are thus thrown out of circuit and the sparking electrodes E brought into operation, thereby igniting the charge. All the contacts then open and come
 15 into action again at the next inward stroke of the pistons.

In Fig. 2 I have shown a modification in which sparking electrodes of the kind represented in Fig. 1 are dispensed with and in
 20 lieu thereof each piston is provided with a pivoted finger b , carried by a bracket b' . These fingers have tailpieces b^x , which rest against the ends of the pistons and retain the fingers in proper position to enable them to come into
 25 sliding contact with one of the silent-discharging electrodes when the pistons arrive in proximity to each other, as shown in the drawings. The circuits and contacts may in
 30 this case be arranged as follows: F is the induction-coil, the primary winding f of which is in circuit with an electric supply and with the pivoted fingers b through the cylinder A or other
 35 metallic part of the engine. One of the electrodes D is also included in this circuit. This circuit is provided with contacts at f' f^2 f^3 . The secondary winding g of the induction-coil is in circuit with both of the electrodes D. The said contacts f' f^2 f^3 are operated by
 40 some moving part of the engine, so that during the inward stroke of the pistons B and the compression of the explosive charge the contacts f' f^2 are closed, whereby the silent-discharging electrodes D come into operation.
 45 As the pistons B terminate their inward stroke and the charge becomes fully compressed the contacts f' f^2 are opened and the contacts f' f^3 are closed, whereby igniting sparks are pro-

duced as the fingers b b leave the electrode D and thus ignite the charge. All the circuits are then opened and come into operation
 50 again at the next instroke of the pistons.

I do not confine myself to the manner of effecting the ignition of the charge by the electric circuits and contrivances above described, 55 as any other suitable means may be employed for the purpose. Although in the drawings I have shown an engine provided with two pistons I wish it to be understood that my invention is also applicable to engines having
 60 only one piston.

What I claim is—

1. The combination with the working cylinder or combustion-chamber of an explosive-engine, of electrodes arranged to pass a silent
 65 electric discharge through the explosive mixture in said cylinder or chamber, substantially as described and for the purpose specified.

2. The combination with the working cylinder or combustion-chamber of an explosion-engine, of adjustable electrodes which are so
 70 arranged that a silent electric discharge is passed through the explosive mixture while the latter is under compression for the purpose specified.

3. The combination with the working cylinder or combustion-chamber of an explosion-engine, of two pairs of electrodes one pair acting as sparking or ignition electrodes and the
 80 other as silent-discharging electrodes for the purpose specified.

4. The combination with the silent-discharging electrodes of sparking contact devices for igniting the explosive mixture the said sparking devices consisting of pivoted
 85 fingers carried by the pistons and sliding on one of the aforesaid silent-discharging electrodes as the pistons complete their inward stroke substantially as described.

In testimony whereof I have hereunto set
 90 my hand this 10th day of April, 1896.

WALTER ROWBOTHAM.

Witnesses:

ARTHUR A. BERGIN,
 WM. MELLOCH-JACKSON.