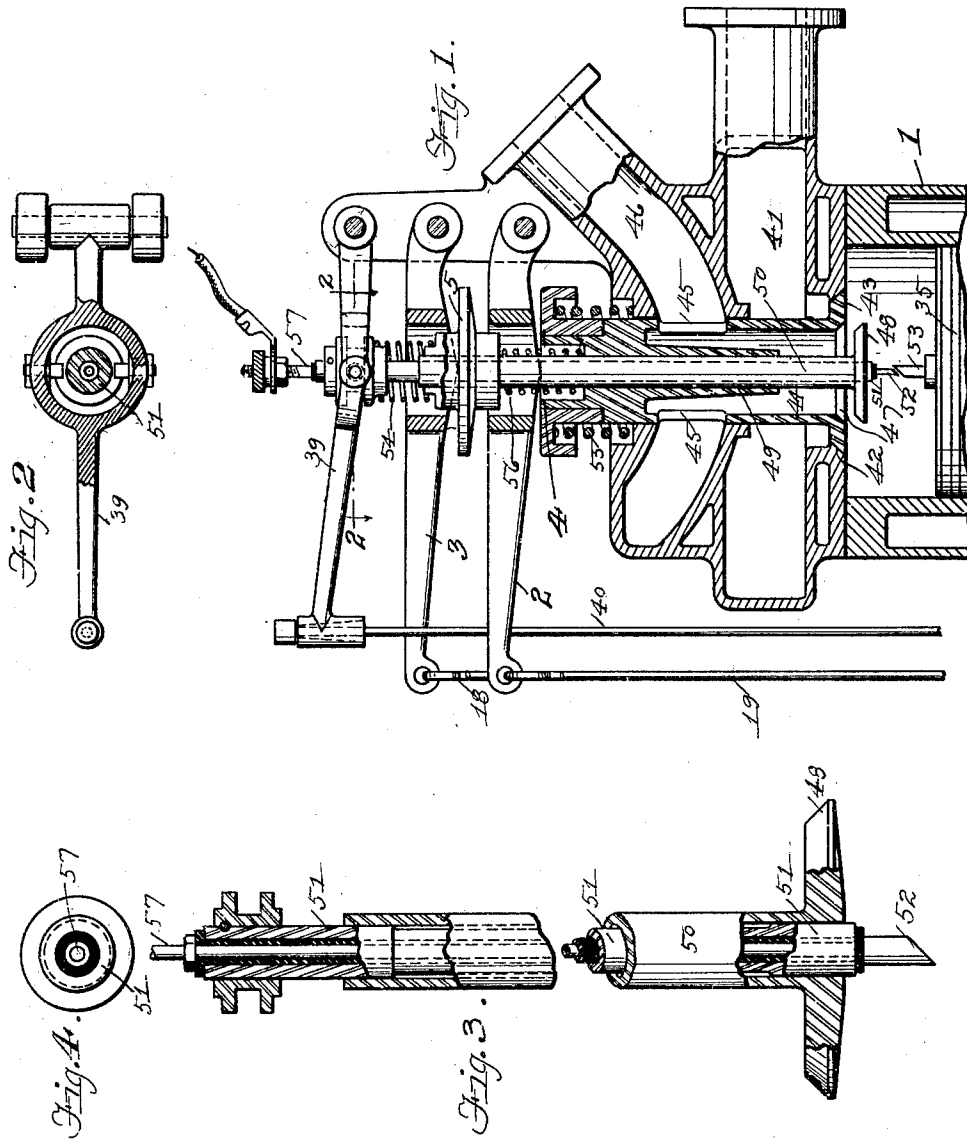


Jan. 24, 1928.

1,657,108

O. B. CLEMENS  
ENGINE

Filed July 23, 1925



Witness:

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# UNITED STATES PATENT OFFICE.

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## ENGINE.

Application filed July 23, 1925. Serial No. 45,603.

The present invention relates to engines and particularly to internal-combustion engines; and its object is, generally, to provide an engine improved in various respects hereinafter appearing; and more particularly, to provide improved valve mechanism for operating the engine; and further, to provide improved charge-firing means for an internal-combustion engine; and further, to provide improved valve mechanism and charge-firing means in combination.

These and any other objects hereinafter appearing are attained by, and the invention finds preferable embodiment in, the structure hereinafter particularly described in the body of this specification and illustrated by the accompanying drawings, in which:—

Figure 1 is an axial sectional view of a portion of an internal-combustion engine's cylinder and of its ports, and showing its valves and means for operating the same, and its charge-firing means;

Figure 2 is a transverse sectional view of parts thereof taken on line 2—2 of Figure 1;

Figure 3 is a view of one of the valves of the engine, partially sectioned diametrically to show parts within; and

Figure 4 is a top plan view of the same.

In the embodiment of the invention chosen for illustration by the drawings and for detailed description in the body of this specification, an internal-combustion engine's cylinder 1 with operating parts is shown. This cylinder has the exhaust port 41 leading from the cylinder's head and provided with a valve seat 42. The reciprocating valve 43 seating in this seat and controlling the exhaust has an axially-extending passage 44 provided with ports 45 leading from the combustible fluid's intake 46, and has also and at the inner end of said passage a valve seat 47. A second valve 48 controlling the intake and seating in the seat 47 reciprocates in said passage, sliding in a bearing 49 in the stem of valve 43. In the stem 50 of valve 48 reciprocates a plunger 51 having at its inner end an electric contact 52 adapted to engage the other contact 53 carried by the piston 35 when the same is at or near its inmost position. The plunger, after being moved inwardly by the lever 39, is suddenly withdrawn to disconnect these contacts, and thus fire the combusti-

ble fluid charge, by a spring 54. The valves 43 and 48 are pressed into seating position by the springs 55 and 56 respectively, spring 55 being stiffer than spring 56, and spring 56 being stiffer than spring 54.

As indicated in Figure 1, the cylinder, the two valves 43 and 48 and the plunger 51 through which extends the electric conductor 57, are axially concentric, so that the operation of introducing the combustible fluid into the cylinder, the operation of exhausting the products of combustion therefrom and the operation of firing the charge may all be as effective and suddenly complete as possible.

The lever 2 engaging the upper end 4 of the hollow stem of valve 43 moves it, against the pressure of spring 55, to open position; the lever 3 engaging the upper end 5 of the hollow stem of valve 48 moves it, against the pressure of spring 56, to open position; and the levers 2, 3 and 39 are operated by rods 19, 18 and 40 respectively whose movements are governed, in properly timed relation, by any well-known means employed in such engines for operating their valves.

The invention being intended to be pointed out in the claims, is not to be limited to or by details of construction of any embodiment thereof illustrated by the drawings or hereinafter described.

I claim:

1. In an internal-combustion engine: a cylinder having in its head an exhaust port; a piston in the cylinder; a reciprocating valve controlling said port and having an axially-extending passage provided with an intake port and a valve seat; a valve having a reciprocating movement in and relatively to the first-mentioned valve and seating in the second-mentioned seat and controlling the intake port; an electric-conducting plunger slidable in the second-mentioned valve in its axial direction and having an electric contact inside the cylinder; an electric contact carried by the cylinder's piston and adapted to be brought into and out of electric connection with the first-mentioned contact by the interrelative movements of the plunger and the piston.

2. In an internal-combustion engine: a cylinder having in its head an exhaust port; a piston in the cylinder; a reciprocating valve controlling said port and having an axially-extending passage provided with an intake

port and a valve seat; a valve having a reciprocating movement in and relatively to the first-mentioned valve and seating in the second-mentioned seat and controlling the intake port; an electric-conducting plunger slidable in the second-mentioned valve in its axial direction and having an electric contact inside the cylinder; an electric contact carried by the cylinder's piston and adapted to be brought into and out of electric connection with the first-mentioned contact by the interrelative movements of the plunger and the piston, the valves and the plunger being substantially concentric axially.

3. In an internal-combustion engine: a cylinder having in its head an exhaust port; a piston in the cylinder; a reciprocating valve controlling said port and having an axially-extending passage provided with an intake port and a valve seat; a valve having a reciprocating movement in and relatively to the first-mentioned valve and seating in the second-mentioned seat and controlling the intake port; an electric-conducting plunger slidable in the second-mentioned valve in its axial direction and having an electric contact inside the cylinder; an electric contact carried by the cylinder's piston and adapted to be brought into and out of electric connection with the first-mentioned contact by the interrelative movements of the plunger and the piston, the valves being spring-pressed to seating position and said plunger being spring-pressed to separate said contacts; means operated by the engine for moving the valves from seating position and the plunger to contacts-connecting position in timed interrelation.

In testimony whereof I have hereunto set my hand at Grand Rapids, Michigan, this 21st day of July, 1925.

OSCAR B. CLEMENS.