

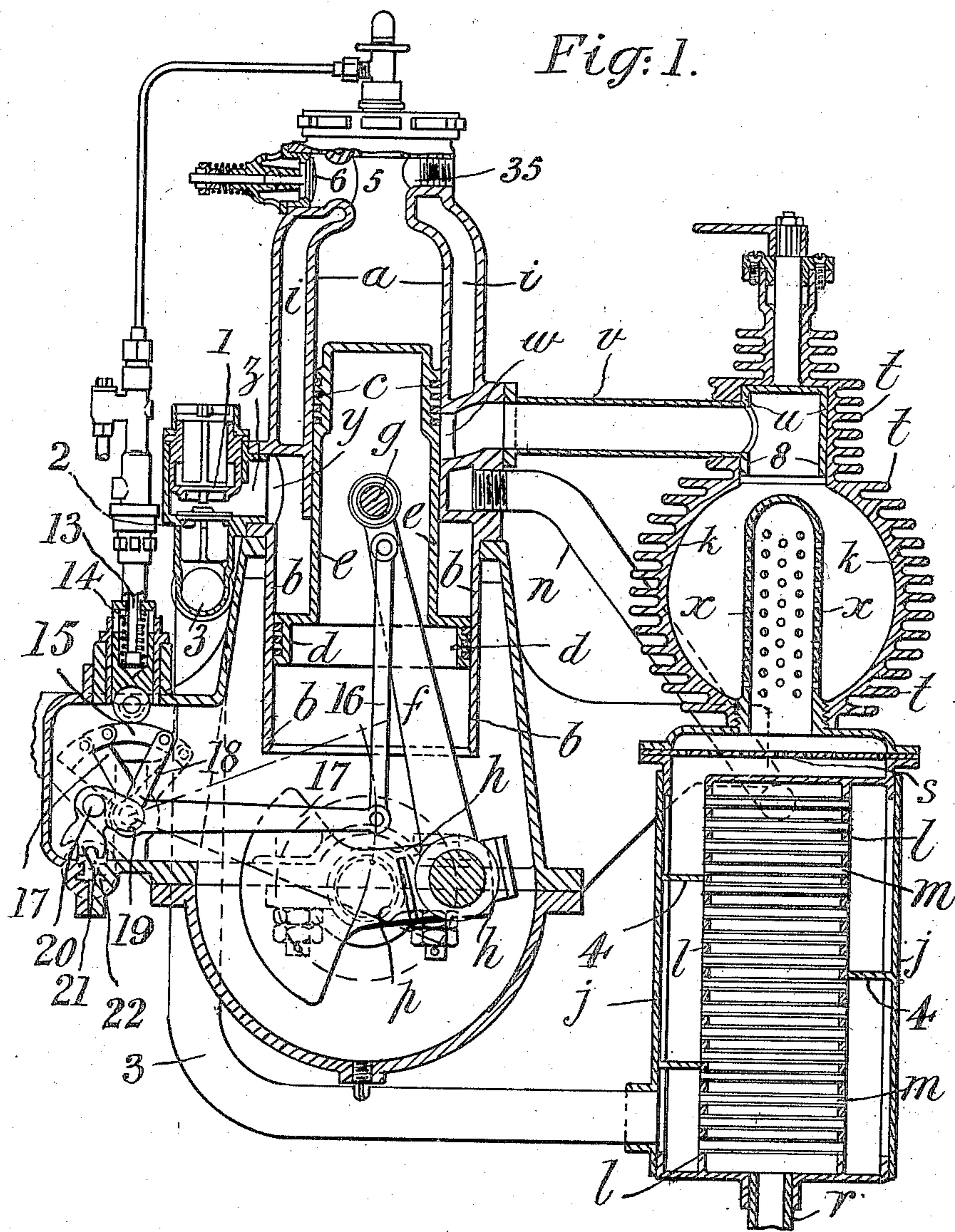
No. 859,501.

PATENTED JULY 9, 1907.

F. LAMPLUGH:
INTERNAL COMBUSTION ENGINE.

APPLICATION FILED SEPT. 7, 1906.

3 SHEETS—SHEET 1.



Witnesses
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Emily Lee

Inventor
Frederick Lamplough
By Smith Bros.
Attorneys

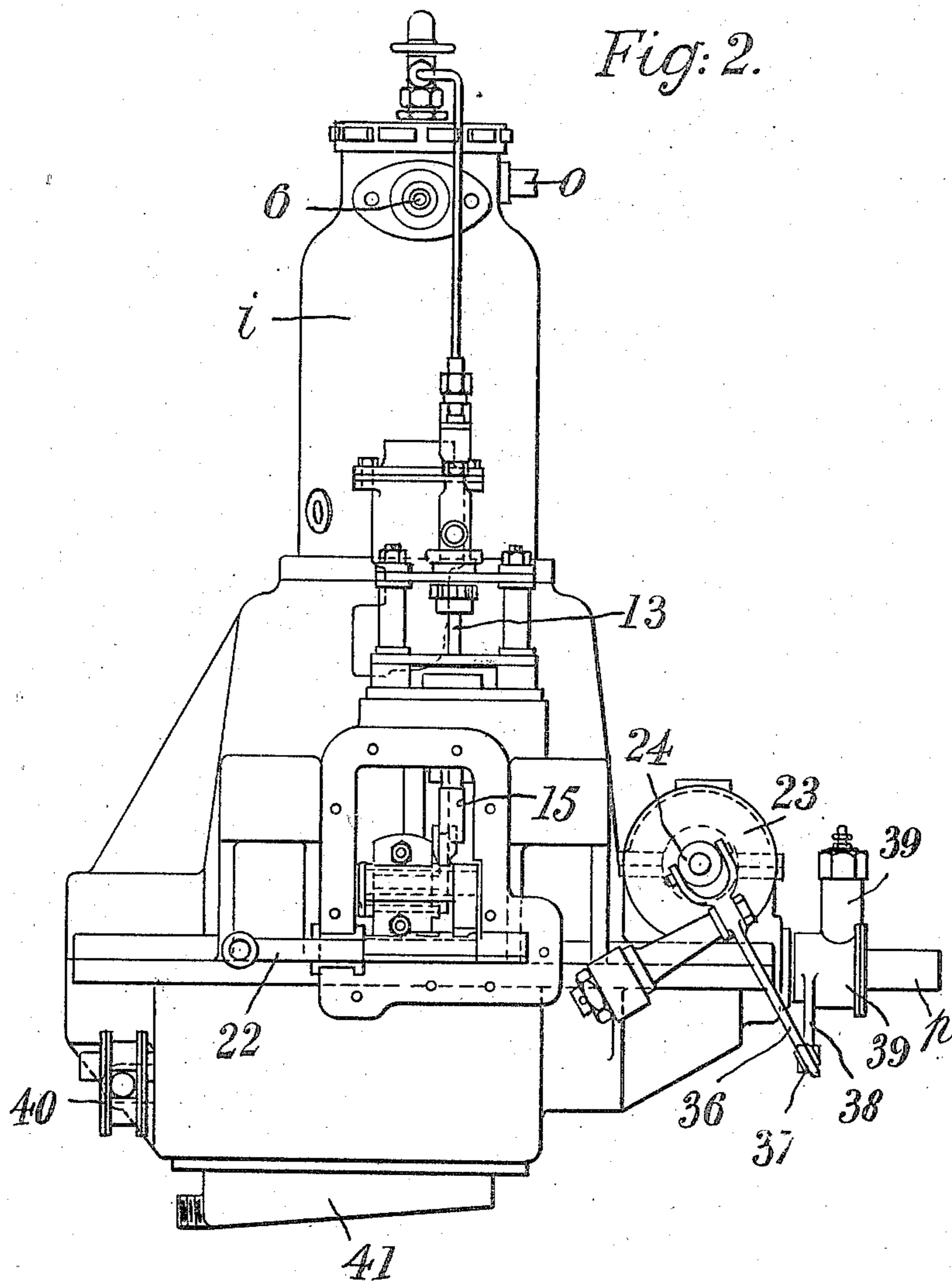
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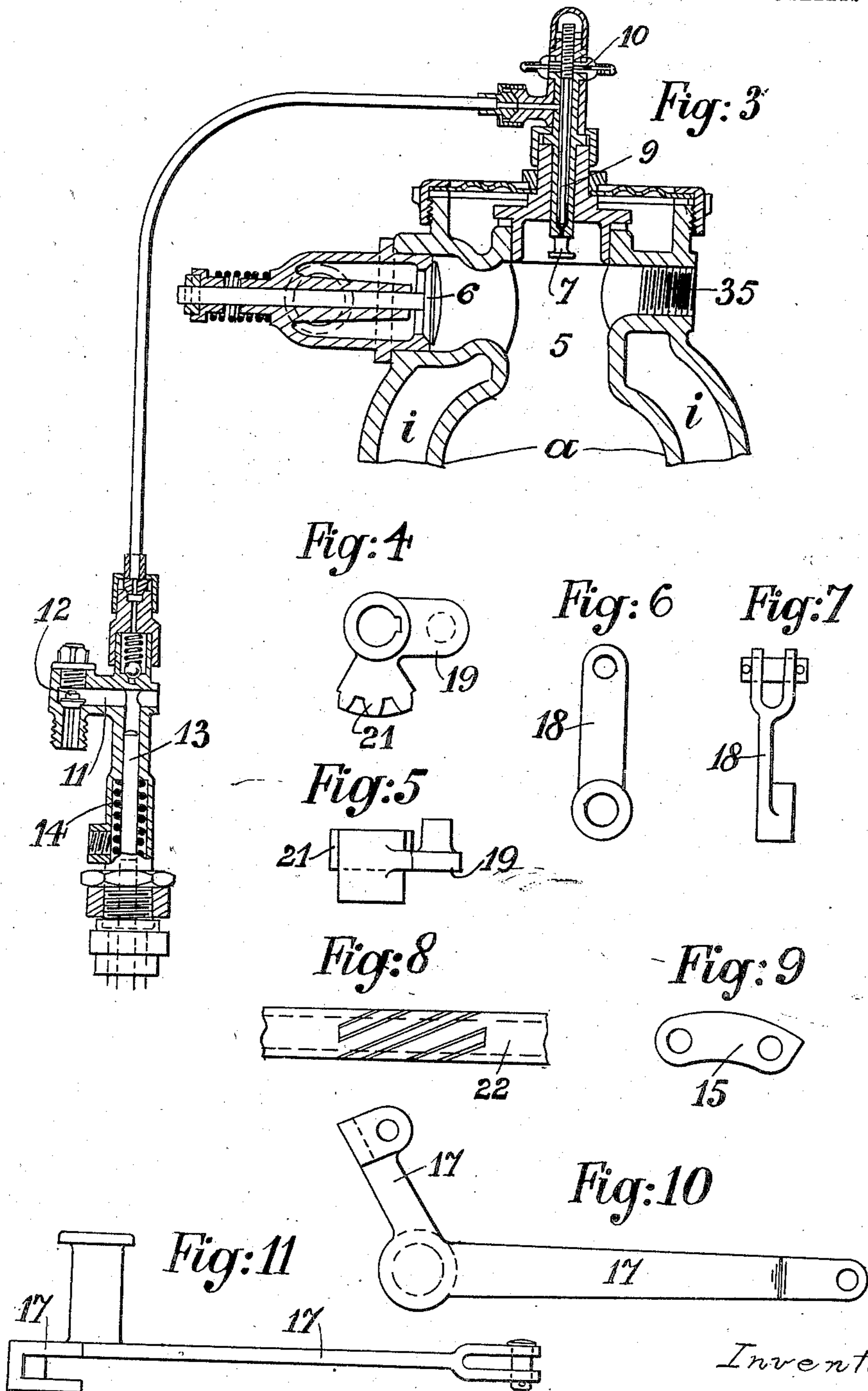
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3 SHEETS—SHEET 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

FREDERICK LAMPLOUGH, OF LONDON, ENGLAND.

INTERNAL-COMBUSTION ENGINE.

No. 859,501.

Specification of Letters Patent.

Patented July 9, 1907.

Application filed September 7, 1906. Serial No. 333,665.

To all whom it may concern:

Be it known that I, FREDERICK LAMPLOUGH, a subject of the King of Great Britain, residing at London, England, have invented new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

The invention relates to that type of internal combustion engine in which the carbureting liquid is injected into the cylinders by a pump.

10 The object of the present invention is to construct improved means whereby the action of the pump may be regulated so that more or less carbureting liquid may be injected into the cylinder, according to requirements and to provide a diaphragm controlled needle valve to the petrol nozzle.

15 The invention is illustrated in the accompanying drawings in which:—

20 Figure 1 is a sectional elevation of an improved internal combustion engine with the invention applied thereto. Fig. 2 is an elevation of the engine drawn at right angles to Fig. 1. Fig. 3 is an enlarged sectional elevation of the upper parts of Fig. 1. Figs. 4 to 11 are detail views of various parts of the regulating means for the oil-injecting pump.

25 In all the figures like letters and numerals of reference indicate the same parts.

30 *a* is the smaller cylinder, *b* the larger cylinder, *c* the smaller piston and *d* the larger piston; *e* is a tubular prolongation connecting the two pistons. *f* is the connecting rod which at one end is pin jointed at *g* while the other end passes out through the open end of the cylinder *b* and is connected to the crank *h* on the shaft *p*, *i* is a water jacket surrounding the smaller or firing cylinder *a*.

35 In conjunction with this engine is employed a small surface condenser *j* for the purpose of cooling the exhaust gases and assisting in the formation of a vacuum and in conjunction with this condenser a silencer *k* is employed.

40 The condenser *j* with its water chamber *l* tubes *m*, baffle plates *n*, inlet pipe *r*, and perforated top plate *s*, together with the spherical silencer chamber *k* perforated dome *z* therein, and the external radiating gills *t* and conducting chamber *u* connecting with the exhaust pipe *v* do not form an essential part of the particular improvement herein claimed as new.

45 The larger cylinder *b* has a port *y* which opens into a valve chamber *z* having an outlet or exhaust valve *1* communicating with the atmosphere and an inlet valve *2* communicating with a pipe *3* leading from the outer casing *j* of the condenser. The firing chamber *5* has an air inlet valve *6* which is opened by the partial vacuum in the firing chamber *5* and this latter is also provided with a nozzle *7* through which petrol is pumped by the apparatus hereinafter described. 55 A valve *8* regulates the amount of depression in the cir-

cuit between the exhaust port *w* and the inlet valve *2*. The petrol nozzle *7* is provided with a check needle valve *9* controlled by a diaphragm *10*.

The suction chamber *11* of the petrol pump communicates with the petrol tank which latter is under slight pressure and such chamber *11* is provided with a non-return valve *12*; its plunger *13* is pressed downwards by a spring *14* and is forced upwards by an arc or quadrant *15* operated by a rod *16* pivoted at one end 65 to the connecting rod *f* of the engine and at the other end to an L shaped lever *17*, the shorter arm of which latter is pivoted to one end of the quadrant *15*. The quadrant *15* is pivoted at its other end to one end of a link *18* the other end of which is pivoted to a bell-crank lever *19* mounted on a shaft *20* and having a toothed segment *21* formed thereon. A sliding rod *22* has inclined or skew gear teeth which gear with the toothed segment *21* the teeth of which are correspondingly formed. This sliding rod *22* is operated by connections capable of being operated by the driver from his seat. By these means the quadrant *15* is caused to rise or fall at one end according to requirements and thereby gives a larger or smaller delivery of petrol by altering the stroke of the pump. 75 80

The needle valve *9* of the spray nozzle *7* is caused to open by the pressure of petrol when forced through by the pump, and it immediately closes by the action of the diaphragm *10* when the pump plunger *13* has reached the end of its stroke. 85

The valve *8* is caused to synchronize in its motion with the movement of the sliding-rod *22* so that according to the amount of opening of valve *8* so must the motion of the sliding-rod be varied. The varying degrees of vacuum will cause the cylinder *a* to fill with more or less air consequently a proportionately smaller or larger charge of petrol must be injected. According to the strength of the explosion, so is the quantity of petrol admitted to the explosion chamber. As this mixture is very rich round the point of firing, it is easily fired, although close to the piston *c* there may be simply a layer of air. The speed of the engine is thereby controlled. 90 95

The action of the engine is as follows:—On the firing stroke the larger piston *d* creates a partial vacuum in the condenser casing *j* and as soon as the smaller piston *c* has passed the exhaust port *w* the partial vacuum sucks out the products of combustion and creates a partial vacuum in the firing chamber *5* sucking in fresh air through the inlet valve *6*. On the return stroke the larger piston *d* ejects the gases through the exhaust valve *1* and the smaller piston *c* compresses the fresh air in the firing chamber *5*. During the return stroke a certain amount of petrol has been pumped into the firing chamber *5* and is fired in the ordinary way. 100 105 110

An engine constructed as above described works as

a two cycle engine although it accomplishes the equivalent to a suction stroke, compression stroke, firing stroke and exhaust per revolution in perfect rhythm without the aid of timing gear.

5 What I claim is:—

1. In an internal combustion engine, the combination of a pump having a suction chamber communicating with the petrol tank, a non-return valve in said suction chamber, a pump-plunger pressed downwards by a spring and
10 forced upwards by a quadrant, an L shaped lever pivotally connected by its shorter arm to one end of the quadrant, and by its longer arm to the engine connecting rod, to move the quadrant to and fro under the petrol pump-plunger, a lever mounted on a shaft and having a skew
15 toothed segment formed thereon, a link connecting said lever with one end of the quadrant, and a sliding rod having skew teeth thereon gearing with the toothed segment.
2. In an internal combustion engine, the combination

of a pump having a suction chamber communicating with the petrol tank, a non-return valve in said suction chamber, a diaphragm-controlled needle valve to the petrol
20 nozzle, a pump-plunger pressed downwards by a spring and forced upwards by a quadrant, an L shaped lever pivotally connected by its shorter arm to one end of the quadrant and by its longer arm to the engine connecting
25 rod, to move the quadrant to and fro under the petrol pump-plunger, a lever mounted on a shaft and having a skew toothed segment formed thereon, a link connecting said lever with one end of the quadrant, and a sliding rod
30 having skew teeth thereon gearing with the toothed segment.

In witness whereof I have hereunto set my hand in presence of two witnesses.

FREDERICK LAMPLOUGH.

Witnesses:

WM. GIRLING,
A. NUTTING.