No. 765,629. PATENTED JULY 19, 1904.

P. MURRAY.

MEANS FOR SUPPLYING LIQUID FUEL TO EXPLOSIVE ENGINES.

APPLICATION FILED OCT. 17, 1901.

NO MODEL. 3 SHEETS—SHEET 1.

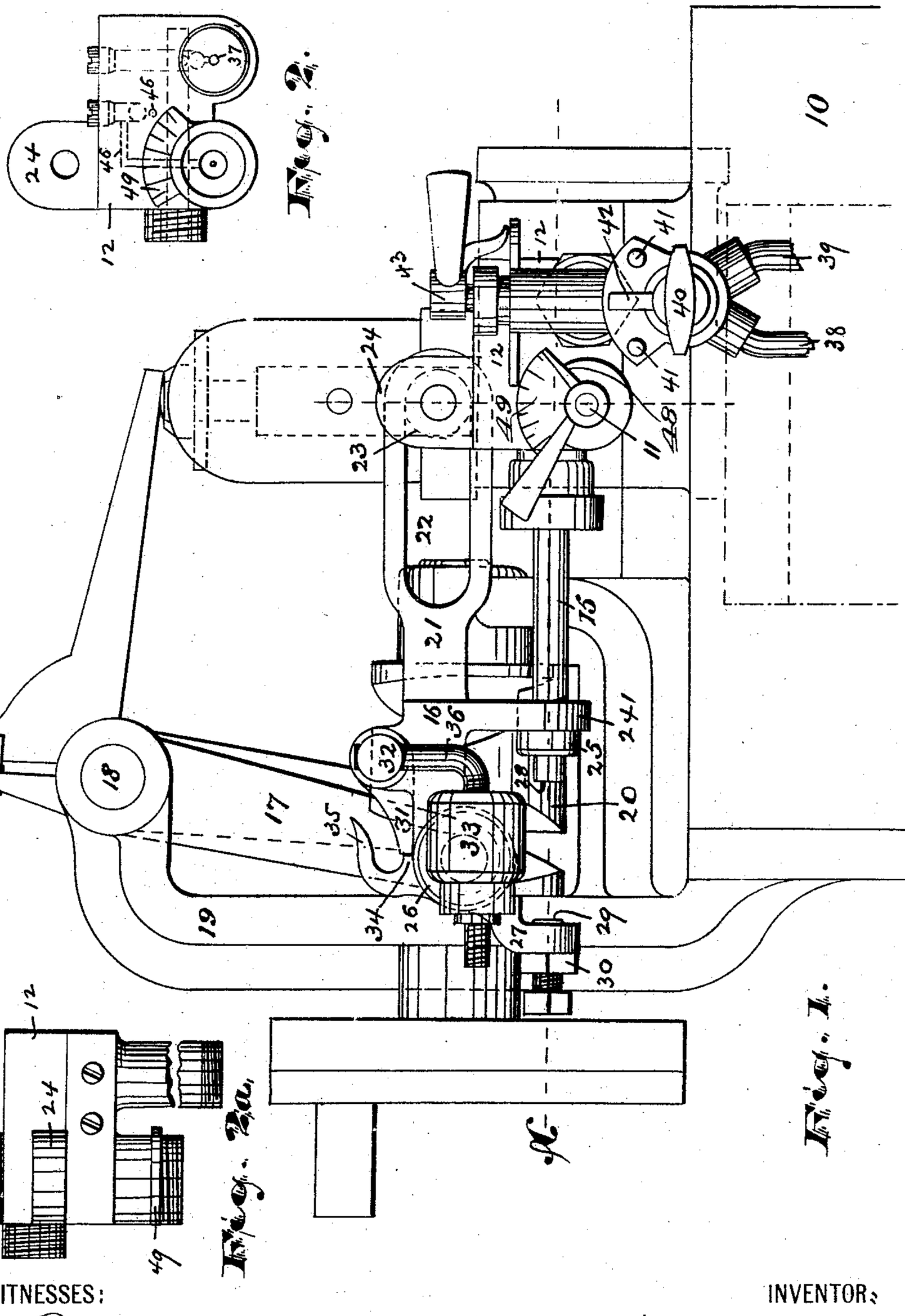

Fig. 1.

Fig. 2a.

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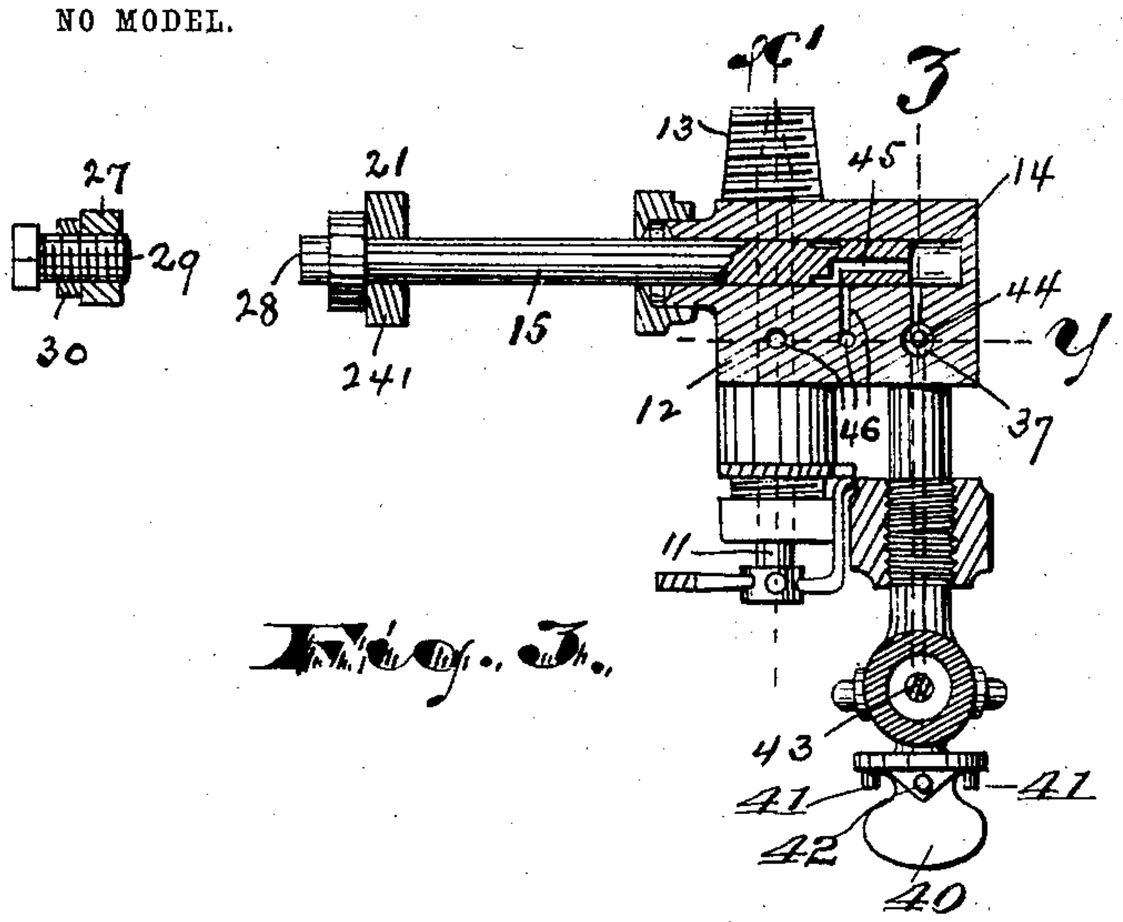

Fig. 3.

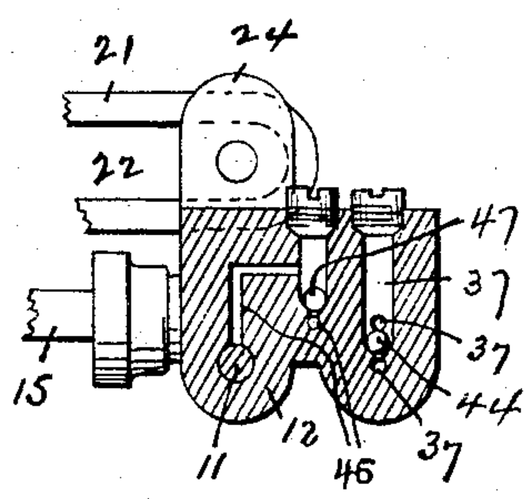

Fig. 4.

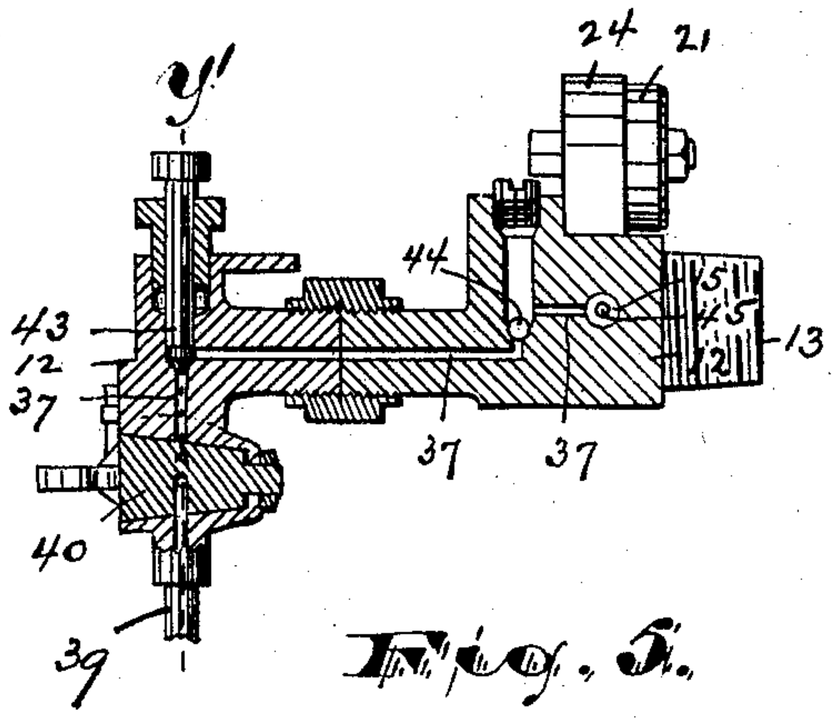

Fig. 5.

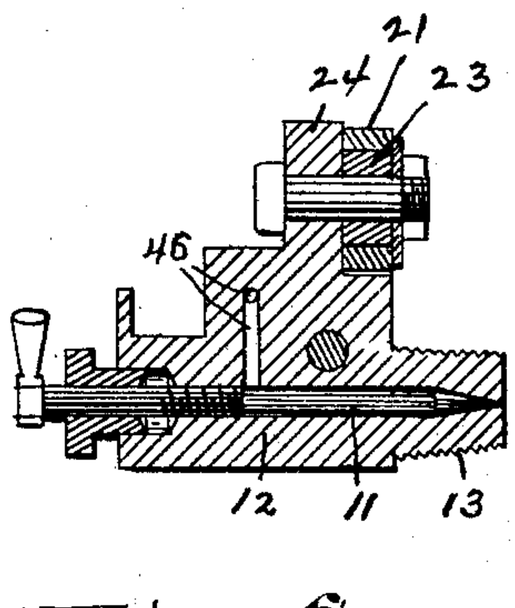

Fig. 6.

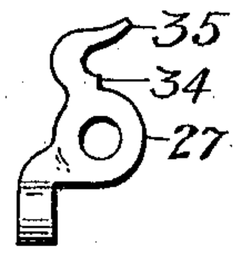

Fig. 9.

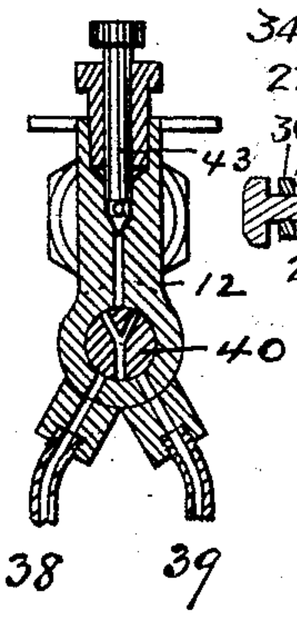

Fig. 7.

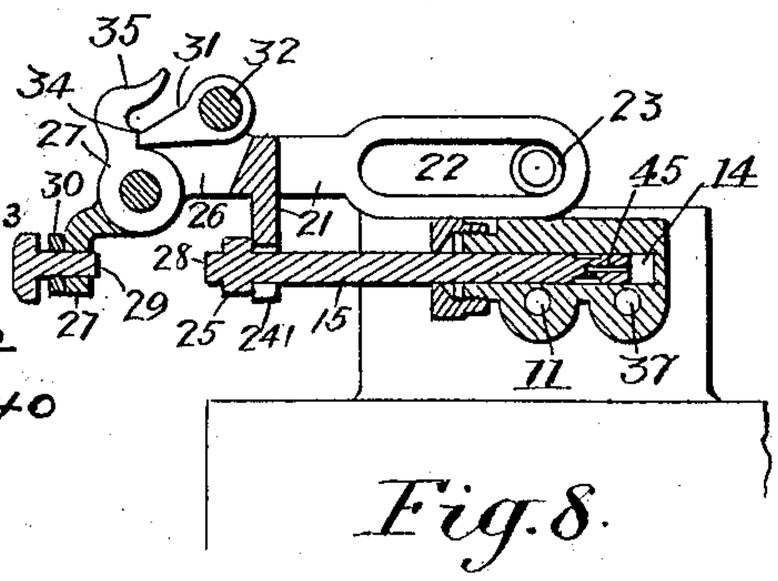

Fig. 8.

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NO MODEL. 3 SHEETS—SHEET 3.

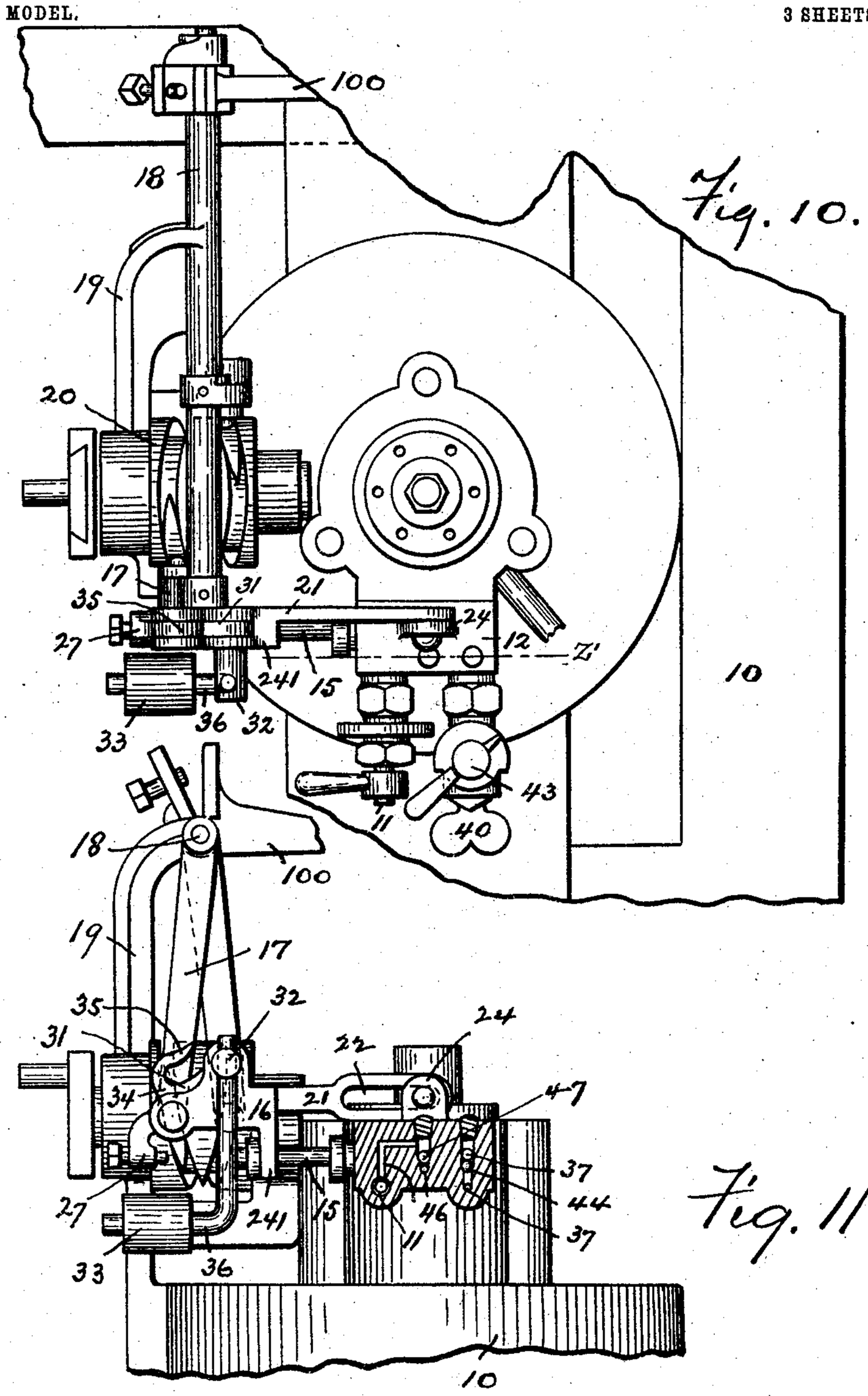

Fig. 10.

Fig. 11

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No. 765,629. Patented July 19, 1904.

UNITED STATES PATENT OFFICE.

PETER MURRAY, OF JERSEY CITY, NEW JERSEY, ASSIGNOR OF ONE-HALF TO AGNES L. AITCHESON AND JOHN LEACH, OF JERSEY CITY, NEW JERSEY.

MEANS FOR SUPPLYING LIQUID FUEL TO EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 765,629, dated July 19, 1904.

Application filed October 17, 1901. Serial No. 78,933. (No model.)

To all whom it may concern:

Be it known that I, PETER MURRAY, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Means for Supplying Liquid Fuel to Explosive-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to numerals of reference marked thereon, which form a part of this specification.

The objects of this invention are to secure a more perfectly uniform supply of liquid fuel to the atomizer or evaporator of an engine or to the explosion-chamber thereof, to enable the character of the supply of fuel to be changed during the pumping operation or while the engine is in motion, to enable the stroke of the pump-plunger to be conveniently changed in length while the engine is in motion and to thereby change the quantity of fuel supplied to the engine, and to obtain other advantages and results, some of which may be referred to hereinafter in connection with the description of the working parts.

The invention consists in the improved means for supplying an explosive-engine with fuel and for regulating and controlling the supply of such fuel and in the arrangements and combinations of parts of the same, all substantially as will be hereinafter set forth, and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like numerals of reference indicate corresponding parts in each of the several figures, Figure 1 is a side view of the upper part of an explosive-engine to which my improvements have been applied. Fig. 2 is a detail side view of a pump casing or body. Fig. 2ª is a detail plan of the same. Fig. 3 is a sectional view of my improved pump and appliances and coöperating parts, the section being taken at line x of Fig. 1. Fig. 4 is a section taken at line y of Fig. 3. Fig. 5 is a section taken through line z, and Fig. 6 is a section taken through line x', of Fig. 3. Fig. 7 is a section taken at line y' of Fig. 5. Fig. 8 is a section taken in the vertical longitudinal plane of the piston of the pump, showing more clearly the relation of the piston-reciprocator to the piston; and Fig. 9 is a detail view of a certain loose hammer adapted to be normally locked. Fig. 10 is a plan of the pump in its relation to the engine; and Fig. 11 is a side elevation of the same, partly in section on line z', Fig. 10.

In said drawings, 10 indicates the cylinder of an explosive-engine to the top of which, adjacent to the vaporizer or atomizer of said engine, is arranged the pumping and fuel regulating apparatus embodying the present invention. The fuel is sprayed into the atomizer through the passage of a needle-valve 11, the body or casing 12 of which is screwed upon the cylinder or an extension of the cylinder-head containing the vaporizer, the said body or casing being provided with a threaded nozzle 13, permitting such arrangement. In the same body or casing 12 with the needle-valve 11 is formed a pump chamber or boring 14, Fig. 3, in which is arranged a piston or pump-plunger 15, by means of which the liquid hydrocarbon fuel is forced in measured quantities into the vaporizer or atomizer. Said piston or plunger 15 is moved back and forth by means of pump-operating means operated by the engine and described more or less fully in the specification of a contemporaneous application of even date herewith, said means including a sliding piston-reciprocator 16, pivotally connected with the arm 17, loosely suspended from a shaft 18, carried in turn by a bracket 19, said arm 17 being oscillated by a cam 20 and means for rotating the same clearly described in said contemporaneous application. Said piston-reciprocator 16 is of peculiar construction and serves to regulate and control the movements of the pump-piston, so that the liquid fuel will be fed to the atomizer or vaporizer in quantities commensurate with the varying requirements of the engine. Said reciprocator 16 comprises a slid-

ing piece 21 of irregular shape, which at one end is pivotally connected to the free end of the oscillating arm 17 and at the opposite end is longitudinally slotted, as at 22, and rests on a roller or block 23, pivoted or secured upon the pump-body or an extension 24 thereof. Said reciprocator-piece 21 has an arm or projection 241, which extends into engagement with the pump-piston 15, said arm being perforated, preferably, to receive said piston. Said arm in its outward movement engages the nut or shoulder 25 of said piston, and thus moves said piston outward with respect to its cylinder or chamber 14, and thus draws into said chamber a measure of liquid fuel. At or near its pivotal connection with the arm 17 said piece 21 is provided with ears 26, between which is pivoted on the same pin or shaft by which the said piece 21 is connected to the arm 17 a driver or hammer 27, adapted to engage the extremity 28 of the piston or plunger 15 and force the same inward, and thus in turn force the hydrocarbon fluid fuel from the pump-chamber 14 into the vaporizer or atomizer or explosion-chamber of the engine. The bearing 29 of the driver or hammer 27 is adjustable in its relation to said hammer, being preferably formed upon a screw seated in said hammer and locked on its seat by a lock-nut 30. Normally said hammer 27 is rigid in its relation to the reciprocating piece 21, being locked to or on said piece by a latch or keeper 31, adapted to hold said parts in rigid relation while the engine is working at a desired normal speed. Should the speed of the engine increase beyond the said desired normal, the said latch or keeper 31 will release itself from its locked engagement, and to this end said latch or keeper is constructed so as to automatically release itself by being pivoted at 32 upon the sliding piece 21, the shaft or pivotal pin 32 having bearings in the piece 21 and having a weight 33 attached thereto, so as to cause or effect a turning of the latch and a release thereof from the shoulder 34 of the hammer 27 when the speed of the reciprocating piece 21, quickened by the increasing speed of the engine, passes above the desired normal rate.

Undue pivotal or turning movement of the latch or keeper 31 is prevented by a stop-arm 35, formed upon the hammer.

The weight 33 is adjustable on an arm 36, by which the said weight is attached to the pivot 32, as shown.

When the hammer is unlocked in its relation to the reciprocating piece, the piston or plunger 15 will not be driven inwardly thereby, the friction of the piston in its bearings being such as not to be overcome by the forward movement of the loose hammer. Thus no fuel will be driven into the vaporizer, the generation of power will be temporarily stopped, and the speed of the engine will be reduced to the desired normal. The latch will then again drop into locking engagement with the hammer.

The outward movement of the reciprocating piston to the position shown in Fig. 3 serves to effect an inflow of liquid through the irregular-flow passage 37 from the liquid-supply pipes 38 39. One of said pipes is in connection with a reservoir having one variety of hydrocarbon—such as naphtha or gasolene, for example—and the other pipe leads to a reservoir having another variety of hydrocarbon, such as kerosene-oil. Said reservoirs are not shown in the drawings. Said pipes communicate with the said passage 37 through a two-way cock 40, by means of which the passage 37 may be either closed or opened to one or other of the said pipes. The ports or passages of the cock may be brought to proper coincidence by means of suitable stops 41 and a finger 42.

To regulate the flow of liquid through the passage 37, I prefer to employ a regulating-valve 43, (shown clearly in Fig. 5,) and to prevent backflow of the liquid I provide a check or stop valve 44, which is preferably a ball-valve, as shown. The liquid having been drawn into the pump-chamber 14, upon the return or inward movement of the piston the ball-valve is closed and the liquid is forced through a passage 45 in the piston to a passage 46 in the pump-body leading to the passage for the needle-valve 11, the said needle-valve near its inner end being somewhat reduced in diameter to permit a flow to and through the valve-seat into the vaporizer.

The discharge-passage 46 is closed during its outward or suction stroke by means of a ball-valve 47, (shown in Fig. 4,) which is caused to hug its seat by the suction of the piston.

The needle-valve may be provided with an index-hand 48 and dial-plate 49, whereby the engineer may easily determine the relation of said valve to its seat.

To close communication between the pump-piston-chamber 14 and the discharge-passage 46 during the suction or exhaust stroke of the piston of the engine, and thus prevent the suction of said engine-piston from drawing into the atomizer an excessive supply of hydrocarbon, I have formed the passage 45 in the pump-piston 15, as shown in Fig. 3, in which said passage 45 is shown to extend from the extremity of the piston 15, where it enters the chamber 14 longitudinally through the piston, to a point distant from said piston extremity greater than the distance between the posts or passages 37 to 46. At its inner end the passage 45 opens laterally, so as to lie in open communication with the passage 46 during the greater part of its stroke. Because of the greater length of imperforate surface at the side of the piston 15 back from its extremity it is obvious that the passage 46 will be closed before the passage 37 is opened

and the motor-piston will be prevented from drawing the explosive fluid from the supply-passage 37 when drawing a supply of air and fuel from the atomizer.

Having thus described the invention, what I claim as new is—

1. The combination with the engine, of a pump having a piston for forcing hydrocarbon liquid into the explosion-chamber, evaporator or atomizer thereof, and a piston-reciprocator comprising a sliding piece 21, having an arm or extension for engaging and operating the piston in one direction, a hammer pivoted on said piece and adapted to move the piston in the opposite direction, a weighted latch or stay for locking said hammer, and means for reciprocating the said sliding piece.

2. The combination with the explosive-engine, of a pump having a piston for forcing hydrocarbon liquid into said engine, and a piston-reciprocator comprising a piece having an arm or extension engaging the piston to move the same longitudinally in one direction, a hammer loose upon said piece and adapted to drive the piston in the opposite direction, a latch for normally locking said loose hammer with respect to the said piece, and means for reciprocating said piece, substantially as set forth.

3. The combination with the explosive-engine, of a pump having a piston for forcing hydrocarbon liquid into said engine, and a piston-reciprocator having a part for moving the piston in one direction and a pivotally-loose hammer for moving the piston in the opposite direction, and a latch or stay for normally fastening the loose hammer and adapted to release from said loose hammer when the reciprocator assumes an abnormally high speed, substantially as set forth.

4. The combination with the explosive-engine, of a pump having a piston, and a piston-reciprocator carrying a fixed part and a loose part each adapted to engage the piston and move said piston longitudinally one in one direction and the other in the opposite direction, and having a weighted latch or stay for normally holding said loose part, substantially as set forth.

5. The combination with the explosive-engine, of a fuel-pump having a reciprocating piston, and a piston-reciprocator having a fixed arm to engage said piston, a loose hammer with an adjustable bearing 29 to engage the piston and move it in an opposite direction from that effected by the fixed arm, and a latch or stay for normally holding said loose hammer, substantially as set forth.

6. The combination, in an explosive-engine, of a fuel-pump having a piston or plunger, and a piston-reciprocator having a fixed arm and loose pivoted hammer for engaging the piston and forcing it in opposite directions, and a pivotal weighted latch adapted to normally engage the pivoted hammer and hold it a fixture of said reciprocator, substantially as set forth.

7. The combination, in an explosive-engine, of a fuel-supply pump having a piston, a reciprocator adapted to be moved by power from the engine, said reciprocator comprising a sliding piece slotted at one end and adapted to be pivoted to the motive means at the other and having a fixed arm to engage the piston and force it in one direction, a movable hammer pivoted on said slotted piece, to strike the piston and force it in the opposite direction and a latch or stay also pivoted on said slotted piece and adapted to engage said movable hammer and stay its movements of said slotted piece under normal conditions, substantially as set forth.

8. The combination, with the reciprocating piece 21, carrying a fixed arm and a loose hammer each having a bearing to engage the piston and move the same longitudinally one in one direction and the other bearing in the opposite direction, a weighted latch or stay carried loosely on said reciprocating piece and normally adapted to fix the hammer upon said reciprocating piece, means for reciprocating said piece, a pump-body adapted to be attached to an explosive-engine and having a piston-chamber therein in communication with a spray-opening, a valve for regulating the quantity of outflowing fuel to said spray-opening, a piston adapted to be engaged by the said fast and loose bearings, a fuel-supply passage leading to said piston-chamber, means for preventing backflow of fuel in said fuel-supply passage and means for preventing backflow of fuel through the passage leading to the spray-opening, substantially as set forth.

9. The combination in a pump for feeding hydrocarbon liquid to an engine of the pump-body having a piston-chamber, a needle-valve chamber, and passages through which the fuel may be forced by suction and pressure into said chambers, and a passage through which the fuel may be driven to the engine, of a needle-valve arranged in said needle-valve chamber adapted to spray the oil under pressure after leaving the piston-chamber and a piston arranged in said piston-chamber and having therein a passage permitting the flow of liquid from said piston-chamber to the said passages to the engine, substantially as set forth.

10. The improved pump, comprising a body having a piston-chamber and passages leading the liquid in thereto and out therefrom and a piston extending into said chamber and over the outpassage and having a passage where it lies in said piston-chamber adapted to conduct the liquid during its pressure-stroke from said piston-chamber to said outpassage, the inpassage to the piston-chamber being provided with a two-way cock, and supply-pipe

leading thereto and a regulating-valve by which the flow into the piston-chamber is controlled, substantially as set forth.

11. The improved pump, comprising a body having a piston-chamber and a passage leading the fuel liquid in thereto and a passage leading the fuel liquid out therefrom, each of said passages being provided with stop or check valves to prevent the back or return flow of liquid therethrough and a reciprocating piston and a reciprocator for operating the same back and forth, a two-way cock and a regulating-valve controlling the passage to said piston-chamber substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 24th day of September, 1901.

PETER MURRAY.

Witnesses:
CHARLES H. PELL,
C. B. PITNEY.