G. W. WELLER.

GAS ENGINE.

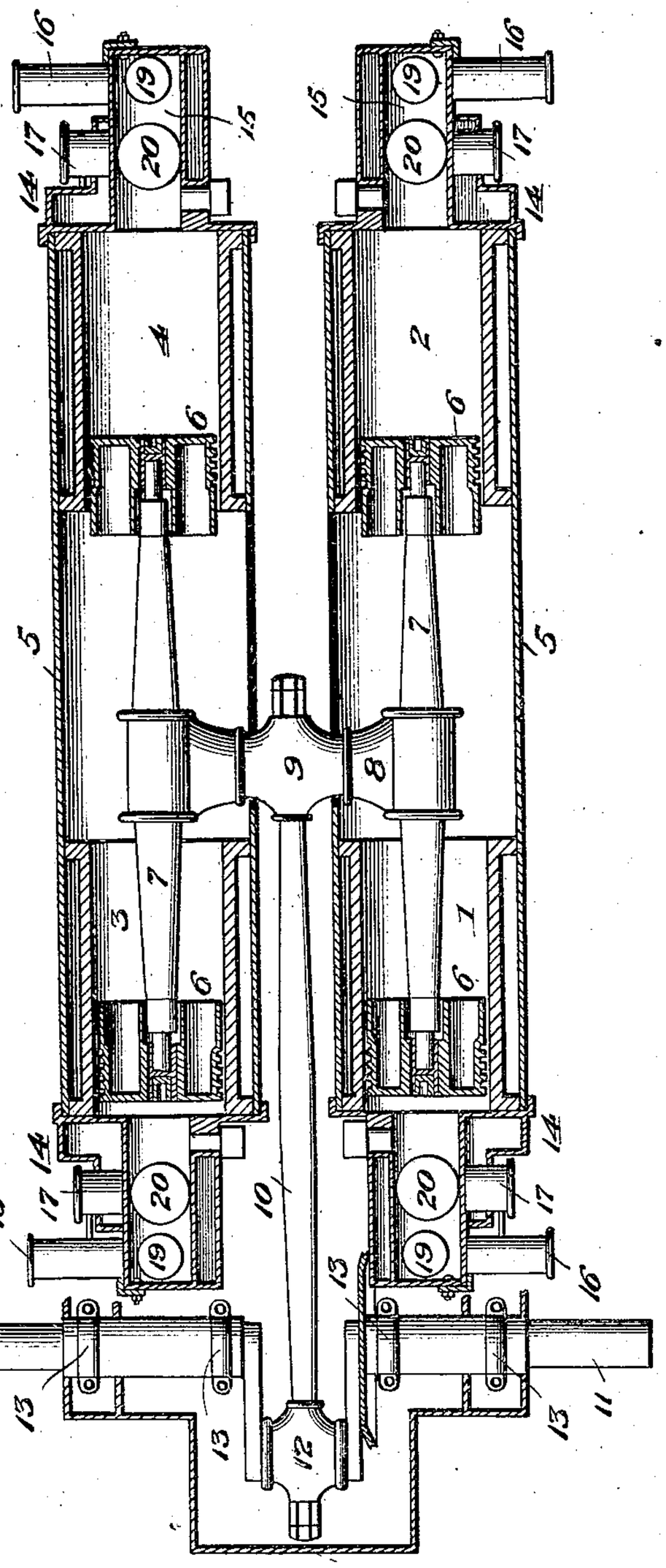
APPLICATION FILED JULY 30, 1906.

951,353.

Patented Mar. 8, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 3.

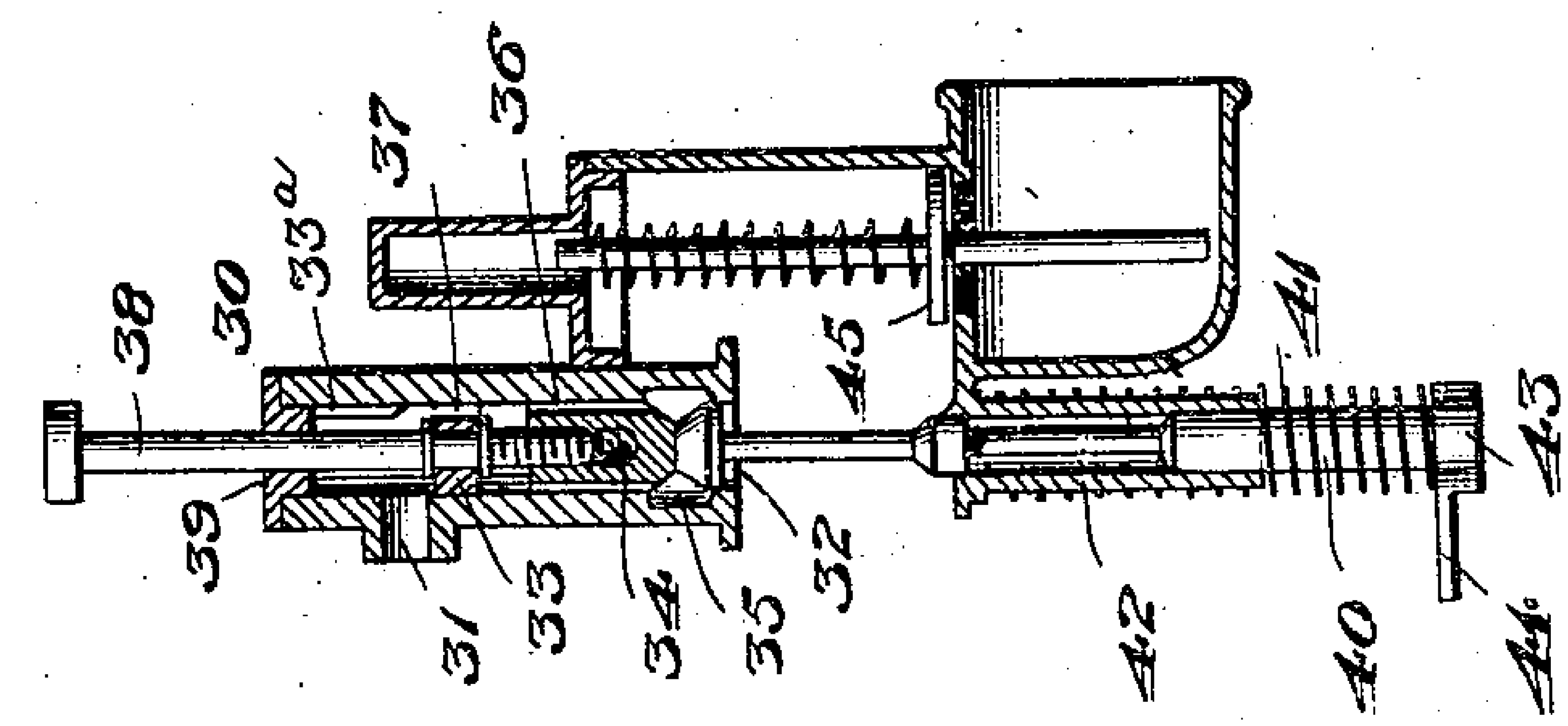
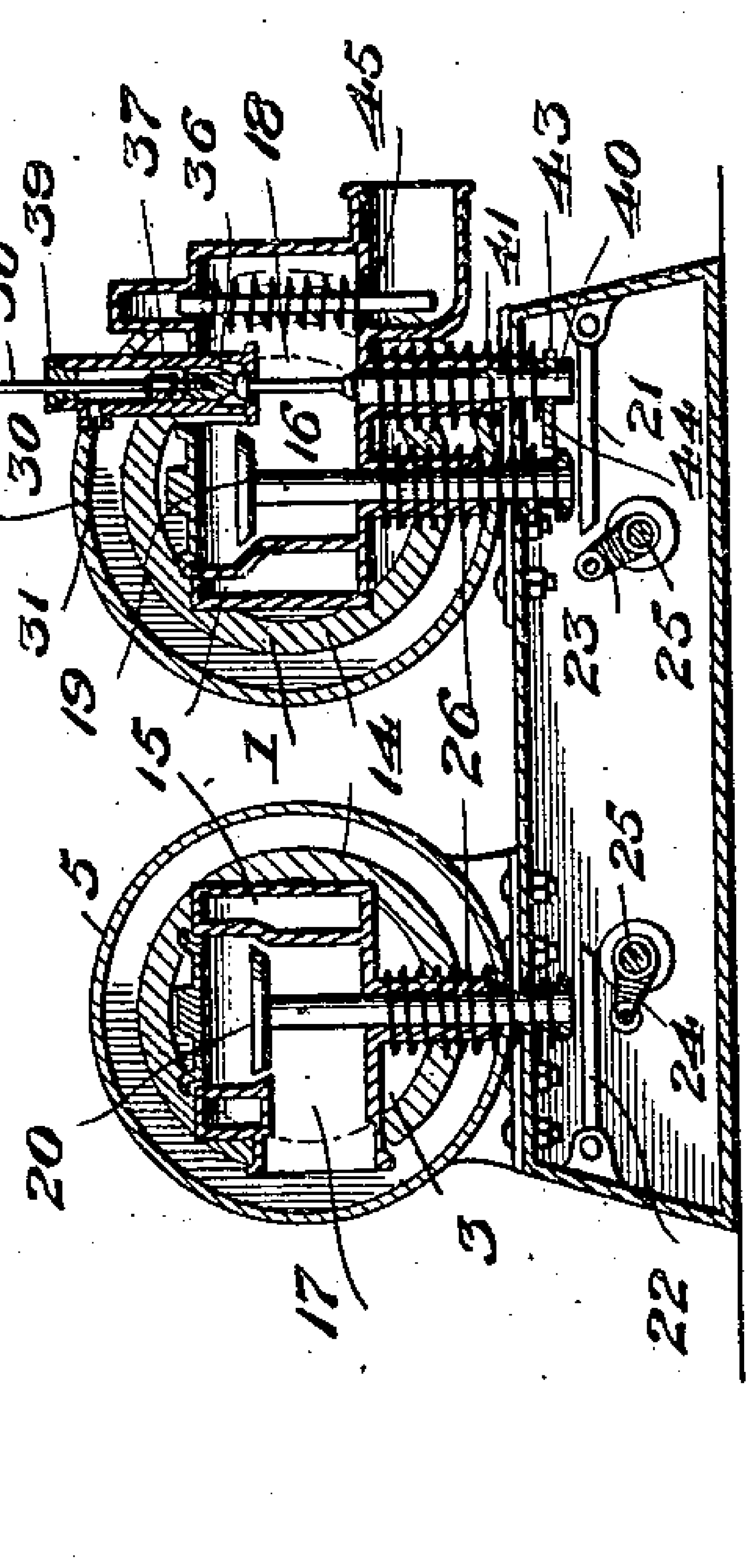


Fig. 2



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UNITED STATES PATENT OFFICE.

GILES W. WELLER, OF KIMBERLY, NEVADA.

GAS-ENGINE.

951,353. Specification of Letters Patent. Patented Mar. 8, 1910.

Application filed July 30, 1906. Serial No. 328,386.

To all whom it may concern:

Be it known that I, GILES W. WELLER, a citizen of the United States, residing at Kimberly, in the county of White Pine and State of Nevada, have invented certain Improvements in Gas-Engines, of which the following is a specification.

My invention relates to internal combustion engines, and has particular reference to the provision of a carbureter or vaporizer by which the elements constituting the carbureted air or gas are thoroughly mixed in proper proportions before entering the cylinders.

The primary object of my invention, therefore, is to provide a peculiar form of carbureter by means of which the feeding of the hydrocarbon fluid can be regulated and its admixture with air effected by a simple and compact arrangement forming part of the engine-cylinder.

Other objects and advantages of the invention will hereinafter appear, and what I claim as novel in the particular construction and combination of parts will be specifically set forth in the appended claims.

In the accompanying drawings, which form a part of this specification, Figure 1 is a horizontal sectional view of a four-cylinder engine, showing an application of my invention. Fig. 2 is a vertical transverse sectional view through the cylinder heads of one pair of cylinders. Fig. 3 is an enlarged detail sectional view of the vaporizer.

Like numerals of reference indicate like parts in all the views of the drawings.

As illustrated in the drawings I have shown my invention applied to a four cylinder engine, in which the cylinders, 1, 2, 3 and 4 are arranged in tandem pairs parallel to each other and spaced apart, said cylinders being provided with water-jackets 5 which are extended to connect the companion cylinders and form an intermediate casing. Each cylinder is provided with the usual reciprocating type of piston 6. The pistons of each pair of cylinders are directly connected together by a piston-rod 7, and said rods are connected together at an intermediate point by means of a cross-head 8, which pass through openings therefor in the aforesaid casing. On the cross-head is swiveled a coupling 9, forming the attachment for the rods 10 10 that connect with the crank-shaft 11 and travel or reciprocate between the pairs of cylinders. The connection of the rods with the crank-shaft is by means of a coupling 12, similar to the coupling 9 on the cross-head, and the crank-shaft is journaled in any approved type of bearings, as 13. In this manner the pistons are all connected together so that they will move in unison, and the pistons of the two pairs of cylinders are correspondingly arranged while the valve mechanisms and sparking devices are so timed relatively that the several pistons will successively receive an explosive impulse.

Inasmuch as the valve mechanism and vaporizer device are the same on every cylinder a description of those on one will answer for all.

14 designates the cylinder-head, which is provided with the valve-chamber 15, the gas-inlet 16 and the exhaust 17, the inlet-chamber being extended to one side, as at 18, to provide a mixing chamber for the hydrocarbon fluid and air. The inlet-valve 19 and the exhaust-valve 20 are provided with the usual stems which pass downward through suitable bosses on the cylinder-head so that their lower ends will be in the path of the tappets 21 and 22, which latter are operated by suitable cams 23 and 24 on the usual valve-operating shaft 25, the said valves being seated by the springs 26, as is usual.

Extending through the top of the cylinder-head into the mixing chamber 18 is a feed-valve for the gasolene or other hydrocarbon fluid, said valve comprising the valve-casing 30, having the inlet 31, and the outlet 32, and provided with a valve-plug adapted to open and close the inlet and outlet openings alternately to discharge only a certain amount of gasolene into the mixing chamber at each operation of the plug. The plug consists of two parts, the upper part 33 for opening and closing the inlet and the lower part 34 for opening and closing the outlet, the said last mentioned part being cut away circumferentially at its lower end to provide in conjunction with a recess in the casing a liquid chamber 35. Said part 34 is also provided with channels 36 at its sides, which permit a flow of the liquid to the chamber 35, and the upper part 33, which closes the inlet, has a channel 37, opposite the inlet so as to permit of a flow of gasolene around the same when the plug is below the inlet, in which latter position the outlet valve is closed, said channel 37

being closed, when the plug is raised, by means of the rib 33ª. The part 33 is connected to the part 34 by means of a screw 38, which is threaded in an opening in the upper end of the part 34 and therefore adjustable to increase or decrease the space or intermediate cavity formed between said parts 33 and 34 and thereby regulate the amount of gasolene discharged from the valve, the said screw passing upward through the cap 39 so that it may be conveniently adjusted. The stem 40 of this feed-valve extends down through a boss or tube 41 on the cylinder-head and is adapted to be operated by the tappet 21 which operates the gas-inlet valve, and so that both of them will be operated simultaneously. The gasolene feed-valve is seated by means of a spring 42 interposed between the cylinder-head and a foot-piece 43 on the lower end of said stem, similar to the other valves, and said foot-piece is provided with a finger or projection 44 which overlaps a foot-piece on the stem of the gas-inlet valve 16, to insure a simultaneous movement of these valves. In conjunction with this gasolene feed-valve there is the usual spring-actuated air inlet valve 45, which is opened automatically by the suction created by the backward movement of the piston, said air inlet valve being located beyond the feed-valve so that the gasolene will mix with the air on its way to the engine cylinder.

Any approved form of sparking device may be used in connection with the engine and suitably located to ignite the gases after compression in the engine-cylinders.

The operation of the working parts of each cylinder will be readily understood from the foregoing description in connection with the accompanying drawings, for upon the rearward movement of the piston the inlet valve 19 and gasolene feed-valve 30 will be opened through the intervention of the tappet 21 and cam 23, and as the air is drawn through the mixing chamber 18 from the air-inlet valve 45 it will be charged with a proper amount of gasolene generating a gas that is drawn into the engine-cylinder by the suction created by the movement of the piston filling the cylinder and valve-chamber, and at the end of the outward movement of the piston the valves 45, 30 and 19 will all close automatically. Upon the return stroke of the piston the gas is compressed and at the proper time a sparking device (not shown) is operated, causing a spark which ignites the gas and gives an explosive impulse to the piston driving it rearward, and upon the return of the piston the outlet or exhaust valve 20 is opened by the cam 24 permitting the exploded gases to escape; after which the piston again moves rearward taking in another supply of gas, and so on. This operation is repeated in the other cylinders and so that the several pistons will receive an explosive impulse in succession; that is to say, when the cylinder 1 is taking in a supply of gas cylinder 2 is compressing its supply of gas previously taken in, while cylinder 3 is receiving an explosive impulse and cylinder 4 is exhausting. Thus the successive explosive impulses are transmitted to the crank-shaft successively and upon each half rotation of said shaft.

Having thus described my invention, I claim:

1. In a gas engine of the character described, the combination with the cylinder head having the usual gas inlet and exhaust valves and a mixing chamber beyond the gas inlet valve, of a gasolene feed-valve depending into the mixing chamber and having an inlet opening at its upper end and an outlet opening at its lower end and a plug adapted to alternately close the inlet and outlet openings; together with means for operating the plug simultaneously with the operation of the gas inlet valve.

2. In a gas engine, the combination with the cylinder head having the usual gas inlet and exhaust valves and a mixing chamber below the gas inlet valve, of a gasolene feed valve depending into the mixing chamber and comprising a casing or tube with an inlet opening at its upper end and an outlet opening at its lower end, a plug located in the casing having a cavity at its lower end forming a liquid chamber and a cavity near its upper end forming an auxiliary liquid chamber, and means for increasing and decreasing the size of said latter cavity.

3. In a gas engine, the combination with the cylinder head having the usual gas inlet and exhaust valves, a mixing chamber below the gas inlet valve and a spring actuated air inlet valve at the outer end of said chamber, of a gasolene feed valve depending into the mixing chamber and comprising a casing or tube having inlet and outlet openings at its upper and lower ends, respectively, a plug located in the tube and having a cavity at its lower end forming a liquid chamber and a cavity near its upper end forming an auxiliary liquid chamber, and means for increasing and decreasing the size of said latter cavity, said plug being so arranged as to close the feed opening when raised to open the outlet, and means for operating said valve simultaneously with the operation of the gas inlet valve.

4. In a gas engine, the combination with the cylinder head having the usual gas inlet and exhaust valves, a mixing chamber below the gas inlet valve and a spring-actuated air inlet valve at the outer end of the mixing chamber, of a gasolene feed valve depending into the mixing chamber and comprising a tube with inlet and outlet openings at the

upper and lower ends respectively, a two-part plug adapted to open and close said openings alternately and provide a liquid space between them, and a screw connecting the parts of the plug to adjust one with respect to the other so as to increase or decrease the liquid space; together with means for operating the valve simultaneously with the operation of the gas inlet valve.

5. In a gas engine, the combination with the cylinder head having the usual gas inlet and exhaust valves, of a mixing chamber below said inlet valve, a spring-actuated air inlet at the outer end of said mixing chamber, a gasolene feed valve depending into the mixing chamber and comprising a tube with inlet and outlet openings at its upper and lower ends respectively, a two-part plug adapted to open and close said openings alternately and provide a liquid space between them, the lower part of the plug having a circumferential cavity forming an auxiliary liquid space communicating with the other space by channels, and a screw connecting the parts of the plug to adjust one with respect to the other and increase or decrease the liquid space between them, said screw projecting up through the casing of the valve; together with means for operating the valve simultaneously with the operation of the gas inlet valve.

6. In a gas engine, the combination with the cylinder-head having a gas inlet valve, a mixing chamber below said inlet valve and a spring actuated air inlet valve at the outer end of said mixing chamber, of a gasolene feed-valve depending into the mixing chamber through the top of the cylinder-head comprising a casing or tube having inlet and outer openings at the upper and lower ends respectively, a vertically movable plug adapted to close said openings alternately and provided with a liquid space at its lower end, and a stem depending from the plug through the bottom of the cylinder-head; together with a tappet extending beneath the stems of the aforesaid inlet and feed valves, and a cam for operating said tappet.

7. In a gas engine, the combination with the cylinder-head having a gas inlet valve, a mixing chamber below said inlet valve and a spring-actuated air inlet valve at the outer end of said mixing chamber, of a gasolene feed-valve depending into the mixing chamber through the top of the cylinder head comprising a casing or tube having inlet and outlet openings at its upper and lower ends respectively, a two-part vertically movable plug adapted to open and close said openings alternately, a screw connecting said parts of the plug to provide a variable liquid space between them, a stem depending from the plug through the bottom of the cylinder-head, and a foot-piece on the lower end of the stem having a projection which overlaps a shoulder on the lower end of the stem of the gas inlet valve; together with a tappet passing under the stems of the gas-inlet and the gasolene feed valves, and a cam operating said tappet, substantially as shown and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GILES W. WELLER.

Witnesses:
G. F. BOREMAN,
JOHN M. HOWE.