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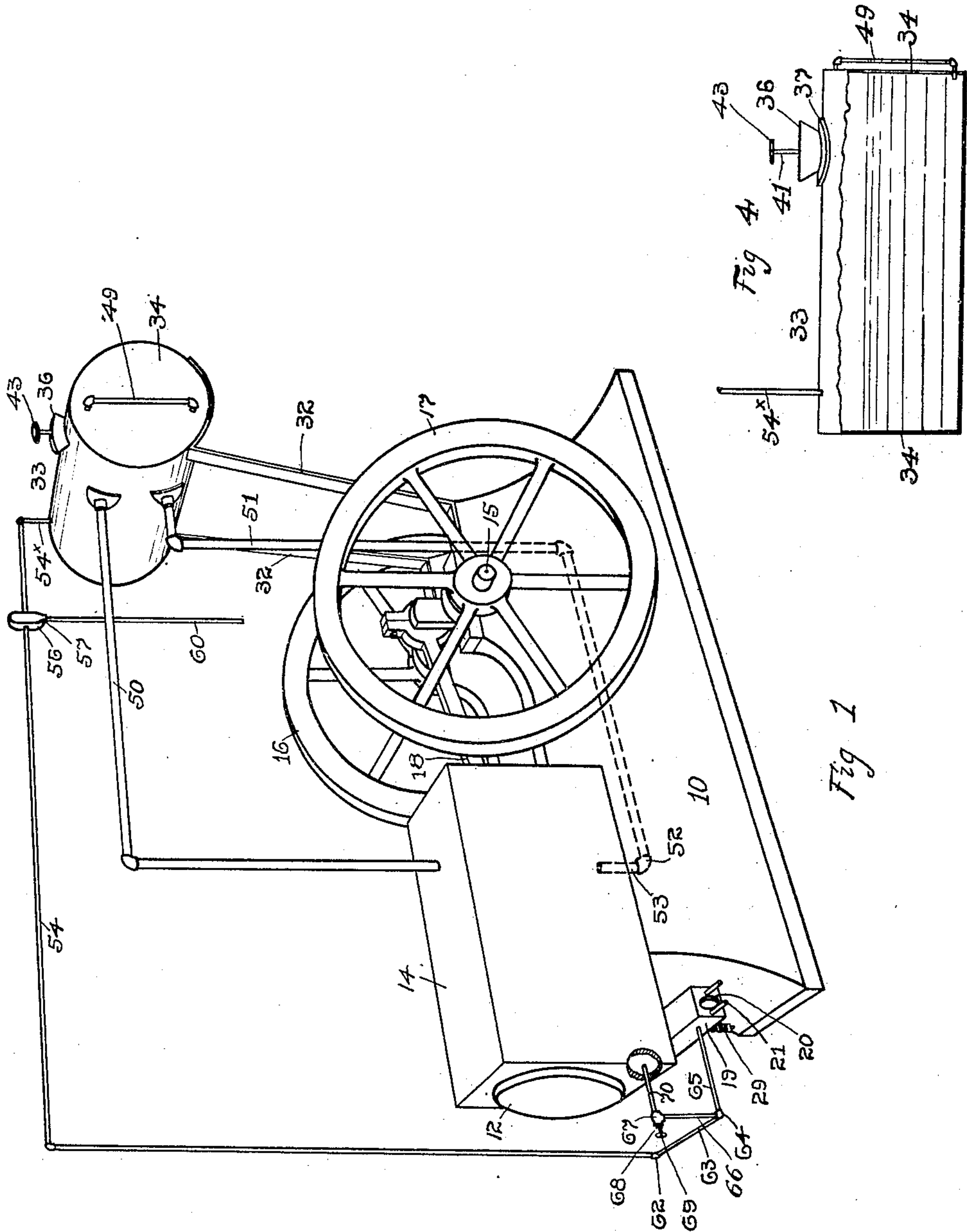
PATENTED SEPT. 10, 1907.

J. W. BURKETT.

GAS ENGINE.

APPLICATION FILED NOV. 24, 1905.

2 SHEETS—SHEET 1.



WITNESSES:

Hugh B Hull
S. L. C. Hasson

INVENTOR

John W. Burkett
BY
Richard Manning
ATTORNEY

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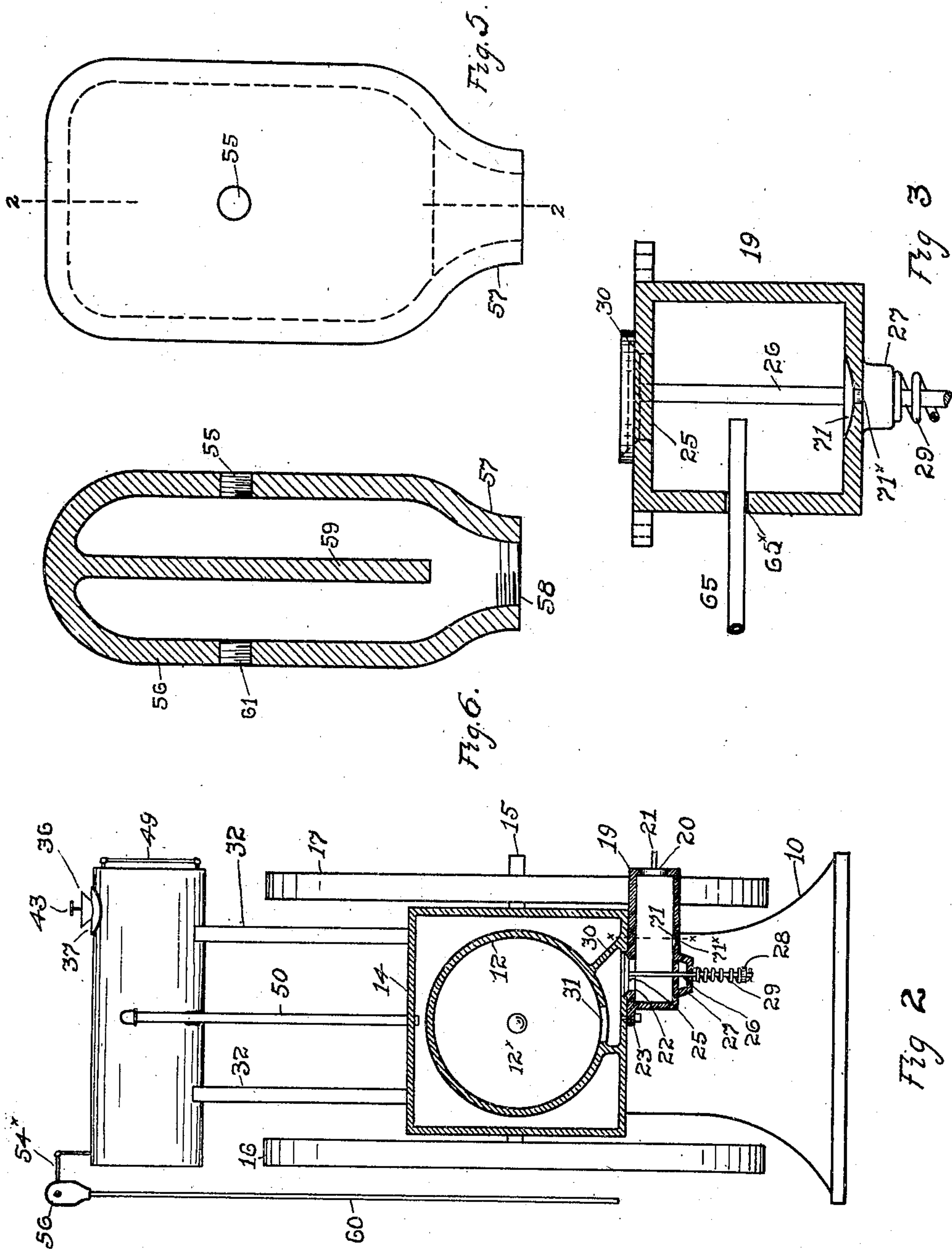
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UNITED STATES PATENT OFFICE.

JOHN W. BURKETT, OF KANSAS CITY, MISSOURI, ASSIGNOR TO THE KANSAS CITY HAY PRESS COMPANY, A CORPORATION OF MISSOURI.

GAS-ENGINE

No. 865,677.

Specification of Letters Patent.

Patented Sept. 10, 1907.

Application filed November 24, 1905. Serial No. 288,933.

To all whom it may concern:

Be it known that I, JOHN W. BURKETT, a citizen of the United States of America, residing at Kansas City, in the county of Wyandotte and State of Kansas, have
5 invented certain new and useful Improvements in Gas-Engines; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

The objects of the invention are—first—to obtain in a gas engine a high degree of vapor compression and prevent liability of pre-ignition. Second—to absorb the heat of the cylinder arising from the ignited gas.
15 Third—to reduce the quantity of water required for cooling the cylinder to the minimum. Fourth—the regulation of the supply of steam in the suction of the engine, and, fifth—to provide for the condensation of the steam in its passage from the tank to the intake
20 valve.

The invention consists in the novel construction and combination of parts such as will be first fully described and then specifically pointed out in the claims.

In the drawings—Figure 1 is a view in perspective
25 of a gas engine with the carbureter and igniter removed showing the gas and vapor mixing chamber and inlet valves, the water supply tank and novel features of the invention upon the tank and engine. Fig. 2 is a view in elevation taken from the rear end of the engine showing the cylinder and water jacket and gas and vapor
30 mixing chamber in vertical section. Fig. 3 is an enlarged vertical sectional view of the gas and vapor mixing chamber or case taken at right angles to and upon the line *z z* on Fig. 2 looking toward the rear end of the case. Fig. 4 is a side view of the water supply tank
35 with the casing partially removed between the ends showing the valved water intake and the water gage. Fig. 5 is a detail side view of the steam condensing trap or case connected with the outgoing steam supply on the water tank showing the diaphragm or by pass in
40 dotted lines. Fig. 6 is an enlarged vertical sectional view of the steam condensing case taken at right angles to and upon the line *z z* on Fig. 5.

Similar numerals of reference indicate corresponding
45 ing parts in all the figures of the drawings.

Referring to the drawings 10 indicates the base frame supporting the engine. Upon the rear end of the frame is mounted the engine cylinder 12 around which extends the water jacket or case 14. Upon the forward
50 end of the frame 12 is mounted the crank shaft 15, upon the ends of which shaft are the respective balance and drive wheels 16 and 17. 18 indicates the piston rod connected with the crank shaft 15, and 12 \times indicates the piston. 19 indicates the gas and vapor mixing

case which as shown is rectangular in form and bolted
55 to the under surface and at the rear end of the water case or jacket 14 as seen in Figs. 1 and 2.

In the forward end of the gas and vapor mixing case is an opening 20 for the reception of gas from the gas carbureter (not shown) the pins 21 on the outer ends of
60 the case and on each side of the opening being means of attachment for the carbureter. In the top of the gas and vapor mixing chamber 19 beneath the cylinder 12 is an opening or inlet 22, and in the bottom of the case or water jacket 14 directly above the opening 22 is
65 an opening 23 in which is a valve seat and seated in said valve seat is a valve 25. With the valve 25 is connected a valve stem 26 the lower end of which stem extends downwardly through the bottom of the case 19, and also through a boss 27 on the under side of said bot-
70 tom of said case and to a considerable distance below the outer surface of said boss. The lower end of the valve stem 26 is screw threaded and provided with a nut 28. Extending around the valve stem 26 is a spiral
75 spring 29, one end of which spring bears upon the nut 28 and the other end upon the outer surface of the boss 27.

Within the case or jacket 14 and extending around the opening 23 is a neck 30 connected with the bottom of said case, the upper end of the neck being con-
80 nected with the outer surface of the cylinder 12. In the cylinder 12 is an opening 31 leading within the neck 30. The construction of the parts of the gas engine as above described are common in all gas or
85 gasolene engines and also the gas igniting devices require no special mention as these devices are well known and any of which may be employed.

With the forward end of the engine supporting or base frame are connected the lower ends of the bars
90 32 and with the upper ends of said bars is connected a water supply tank 33 which is designed to hold the water requisite for the daily use in the engine and compared with the ordinary water tanks in use is smaller in water capacity.

The tank 33 as shown is cylindrical in form and the
95 bars 32 are secured to the side and lower portion of the casing adjacent to the ends 34 of the tank. In the upper portion of the side of tank 33 near one end is an opening for the introduction of water to the tank extending around which opening is a receptacle or
100 cup 36, upon the lower end of which cup is a flange 37 which extends outwardly and is bolted to the side of the casing of the tank. Within the receptacle 36 is an ordinary valve and valve stem 43.

With one end 34 of the water tank 33 is connected a
105 water gage 49 this gage having connections with the upper and lower parts of the said tank.

Within the portion of the side of the water tank 33

toward the engine and intermediate the top and bottom of the tank and below the ordinary water line or surface of the water is connected one end of an incoming water conducting pipe 50, the other end of which
 5 pipe extends horizontally a short distance to a position above the water jacket 14 and is then bent at right angles and its lower end extended downwardly through the top of the case or water jacket and a slight distance within the space between the cylinder 12
 10 and the said water jacket as seen in Fig. 2.

A separate outgoing water supply pipe 51 is connected at one end with the same side of tank 33 with which pipe 50 is connected and with the lower portion of the side and bottom of said tank. The other
 15 end of pipe 51 extends downwardly to a position a short distance below a line projected from the under surface of the water jacket 14, and is bent at right angles and extended to a position directly beneath the water jacket and provided with an elbow 52, with
 20 which elbow is connected a short pipe 53, which extends through the bottom of the water jacket and a slight distance within the space between the water jacket and cylinder 12.

With the top portion of the side of the tank 33 is
 25 connected a steam supply pipe which is in separate parts 54, 54 \times one part 54 \times being connected at one end with the said portion of the tank, the other end extends within an opening 55 in the side of a condensing case or trap 56. This case resembles an inverted
 30 flask and is flat upon each side, the sides and ends of the case terminating in a neck 57. This neck extends downwardly and within the neck is a screw threaded passage 58. Within the case 56 is a partition or diaphragm 59 which is connected with the
 35 ends of the case at a point equidistant from the sides and extends from the inner surface of the upper end of the case downwardly to a position a short distance above the neck 57 so as to form a by pass for the steam. In the screw threaded opening 58 in the neck 57 is
 40 inserted one end of a drip pipe 60 the other end extending downwardly the desired distance.

In the opposite side of the case 56 to that having the opening 55 is a screw threaded opening 61 in which is inserted one end of the other portion 54 of the steam
 45 pipe, the other end of which pipe extends to a point a short distance in rear of a vertical line extending through the rear end of the cylinder 12 of the engine and is bent at right angles and extended downwardly to a position opposite the gas and vapor mixing case
 50 19, upon which end is an elbow 62 with which elbow is connected one end of a short length of pipe 63. Upon the other end of pipe 63 is a three way pipe joint 64 and with this joint is connected one end of a short length of pipe 65 the other end of which pipe
 55 extends through an opening 65 \times —see Fig. 3. in the other side of the gas and vapor mixing case 19 at a point opposite the valve stem 26 the pipe 65 terminating near said valve stem. With the upwardly extended opening of the three way pipe joint 64 is
 60 connected the lower end of a short length of pipe 66, the upper end of said pipe extending to a position opposite the lower portion of the rear end of the water jacket 14, and is connected with the side of a valve casing 67 in which valve casing is a valve stem 68
 65 and upon the outer end of the stem is a hand wheel

69. With the inner end of the valve casing 67 is connected one end of a short length of pipe 70 the other end of which pipe extends through the end of the water jacket into the space between the inner surface of the end of the water jacket and the cylinder 12 of
 70 the engine. In the inner surface of the bottom of the gas and vapor mixing chamber is a depression 71 and in said depression is an outlet 71 \times extending through the bottom of the case. This depression is adjacent to the valve stem and directly beneath the
 75 inner end of the pipe 65 and into which the water falls in the initial operation of the engine from condensation of the steam from said pipe as well as from the walls of the gas and vapor mixing case.

In operation the water is supplied to the tank 33
 80 through the receptacle 36 in sufficient quantity to fill the tank and permit of an overflow into the pipes 50 and 51 to the space within the water jacket surrounding the cylinder 12. This space being filled with water and also the tank to the level above pipe
 85 50 the valve 43 is closed. The valve stem 68 is then operated by the hand wheel 69 to admit a slight quantity of water from the water jacket into the gas and vapor mixing case 19 which falls or drips into the depression 71 in the bottom of the said case an excess of
 90 water passing from the case through the orifice 71 \times . The carbureted gas is then supplied to the gas and vapor mixing case 19 through the opening 20 from the carbureter or other source of gas supply. The gas under the suction of the engine raises the inlet valve 23
 95 and at the same time this suction of the engine takes up the water in the depression 71, in the case 19, and the water and gas is drawn simultaneously within the cylinder 12. The gas is then ignited in the usual manner and the initial movements of the piston accelerated
 100 by turning the drive wheel 17 and under the repeated explosions of the gas the water admitted with the gas prevents pre-ignition and the force of the explosions are communicated to the drive and balance wheels. As soon as the engine has been operated a short time the
 105 valve 68 is closed. The heat caused by the ignition of the gas will obviously heat the cylinder and this heat will be absorbed by the water in the water jacket surrounding the cylinder, the temperature of the water being gradually raised and circulation of the water
 110 formed in the water tank 33, the high degree of heat of the cylinder finally producing steam. As soon as steam is generated in the tank it passes into the steam pipe 54 \times through the steam condensing trap 56 and the lower edge or by pass of the diaphragm 59, thence
 115 upwardly and into the other portion 54 of the steam pipe, the condensed water being discharged from the pipe 60. The steam which now passes through pipe 65 into the gas and vapor mixing chamber is mixed with the carbureted gas in the mixing case 19 and passes
 120 into the cylinder 12 vaporized with the gas and affords an element upon which the piston acts to compress and the piston is given an impetus with the expansion of the steam when the piston has compressed the mixture of the gas and steam during the time the ignition of
 125 the gas occurs. The steam however takes up the heat which is caused by the ignited gas preventing pre-ignition from the heated cylinder and an equilibrium of heat is maintained upon the inner and outer surfaces of the cylinder which cannot exceed 212° F. and
 130

thus abrogating the necessity of a large water circulation to draw off the heat from the cylinder and affording with the steam produced a water tank supply of minimum proportions. The tank 33 when supplied with water enables the engine to be operated a longer time without renewing the supply, the height of which water can be observed in the water gage 49. In a portable gasoline engine this advantage of a small tank of water affording all of the water necessary for cooling is obvious and the engine may be employed in various places and for a long period of time with one supply of water to the tank.

I do not limit myself to the source of supply of steam from the tank, as other sources may be had, the means of steam supply shown being preferred and the location of the water tank may be in any desired place above the engine so as to obviate the necessity of a pump for water circulation.

Such modifications of the invention may be employed as are within the scope of the invention.

Having fully described my invention what I now claim as new and desire to secure by Letters Patent is:—

1. In a gas engine a cylinder and its piston and a water jacket upon said cylinder and a suitable source of water supply, a gas and vapor mixing case on the cylinder and an inlet valve, a steam supply pipe having a suitable source of supply of steam connected with the said inlet valve casing and a valved branch pipe leading from the water jacket to the steam pipe.

2. In a gas engine the combination with a cylinder and a water jacket upon said cylinder, a water supply tank, ingoing and outgoing water circulating pipes connected with said tank and with the said water jacket, a gas and vapor mixing case connected with said cylinder and a gas inlet valve a steam supply pipe connected with the said tank and the said gas and vapor mixing case, and a valved conductor for conducting initially water from the water jacket to the gas and vapor mixing case.

3. In a gas engine the combination with the cylinder and the water jacket upon said cylinder having a suitable

source of water supply, a gas and vapor mixing case upon said cylinder having a depression and an outlet for the escape of water, a gas inlet valve in said case and a valved conductor leading from the water jacket to the said depression in the gas and vapor mixing case.

4. In a gas engine a cylinder and a water jacket upon said cylinder, a water supply tank and an ingoing water circulating pipe connected with the side of said tank and the upper portion of the said water jacket and an outgoing water circulating pipe connected with the lower portion of said water jacket and the bottom of said water tank, a gas and vapor mixing case connected with said cylinder a gas inlet valve on said case leading to said cylinder, a steam supply pipe connected with the top of said water tank and the said gas and vapor mixing case and a valved branch pipe leading from the water jacket to the steam pipe.

5. In a gas engine a cylinder, a water jacket upon said cylinder, a water tank ingoing and outgoing water circulating pipes connected with the side and bottom of said tank respectively and with the respective lower and upper portions of said water jacket, a gas and vapor mixing case connected with said cylinder and a gas inlet valve and stem in said case and a steam supply pipe connected with the top of said water tank at one end and having the other end extending through the wall of said gas and vapor mixing case into said case, said gas and vapor mixing case having a depression and an outlet for the escape of the water or condensed steam which may accumulate at the time the engine does not make steam.

6. In a gas engine a cylinder and a water jacket upon said cylinder, a water tank and suitable supports therefor, ingoing and outgoing water circulating pipes connected with the side and bottom of said water tank respectively and with the respective lower and upper portions of said water jacket, a gas and vapor mixing case connected with said cylinder and a gas inlet valve and a steam supply pipe connected with the top of said water tank at one end and having the other end extending through the wall of said gas and vapor mixing case, a branch pipe connected with said steam pipe leading into the water jacket and a valve casing and valve in said pipe.

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Witnesses:

EDWIN M. METCALF.

JANE A. LOE.