C. A. INGRAHAM.

GAS MOTOR.

APPLICATION FILED MAR. 5, 1915.

1,184,650.

Patented May 23, 1916.

3 SHEETS—SHEET 1.

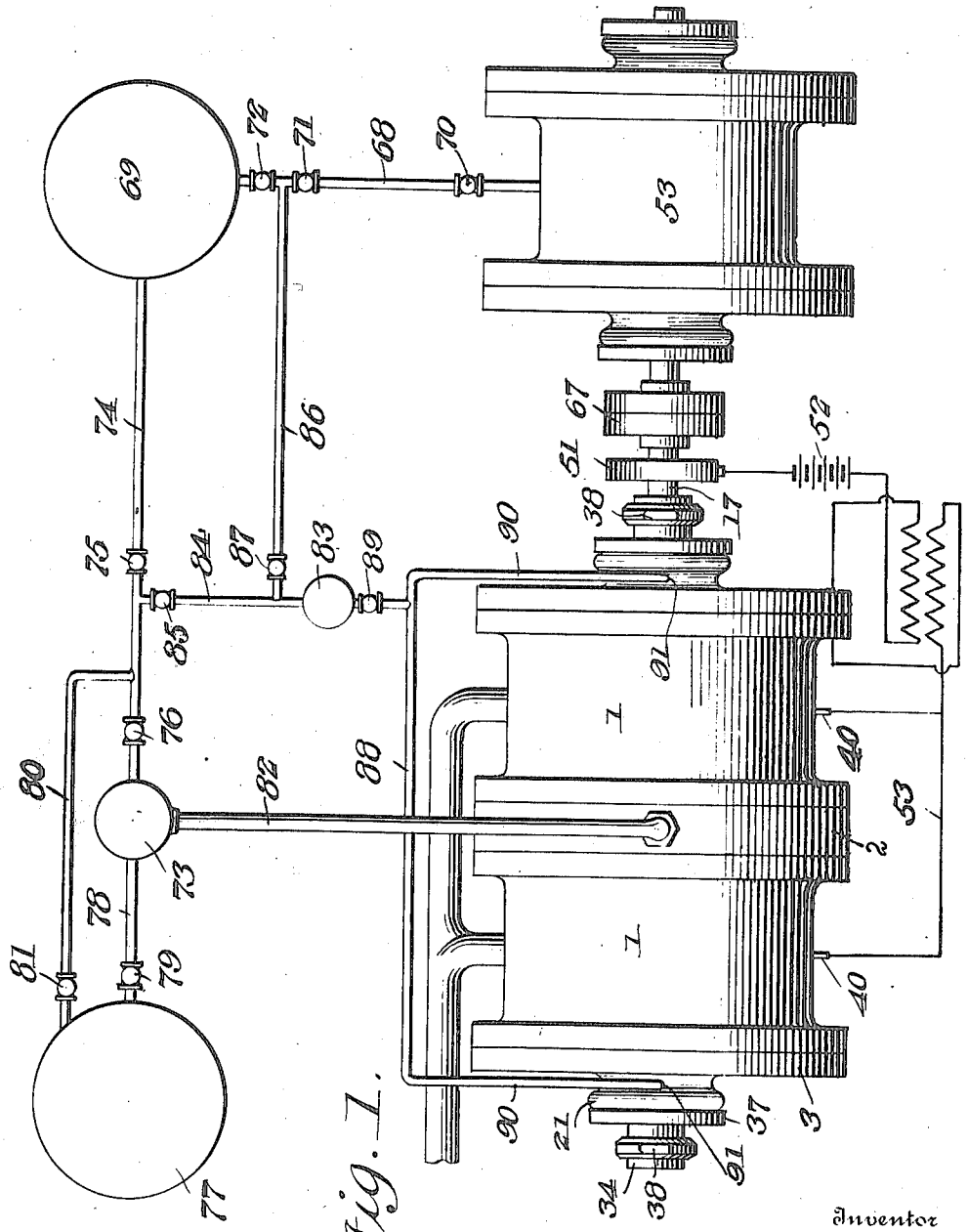


Fig. 1.

Witnesses

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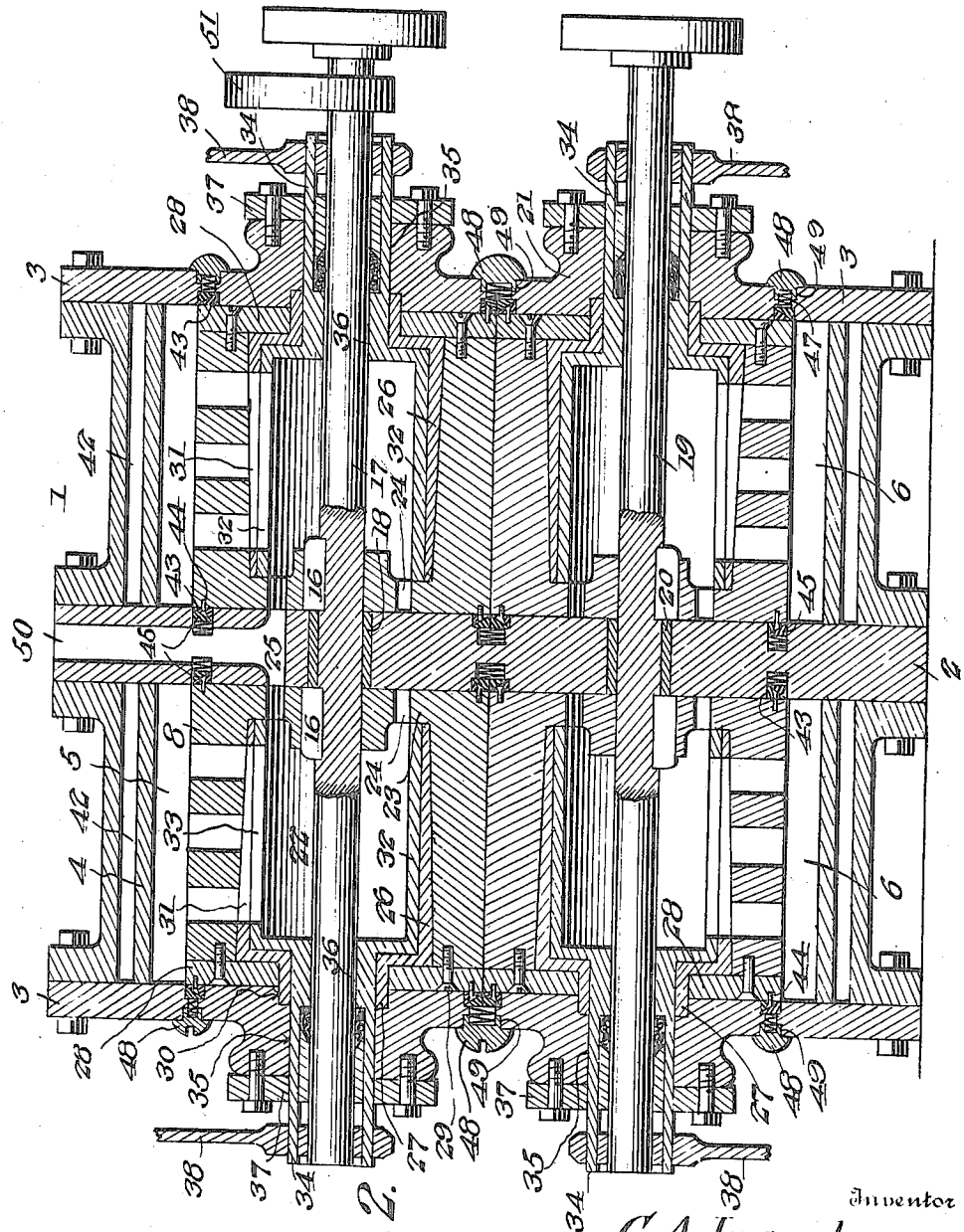


Fig. 2.

Witness

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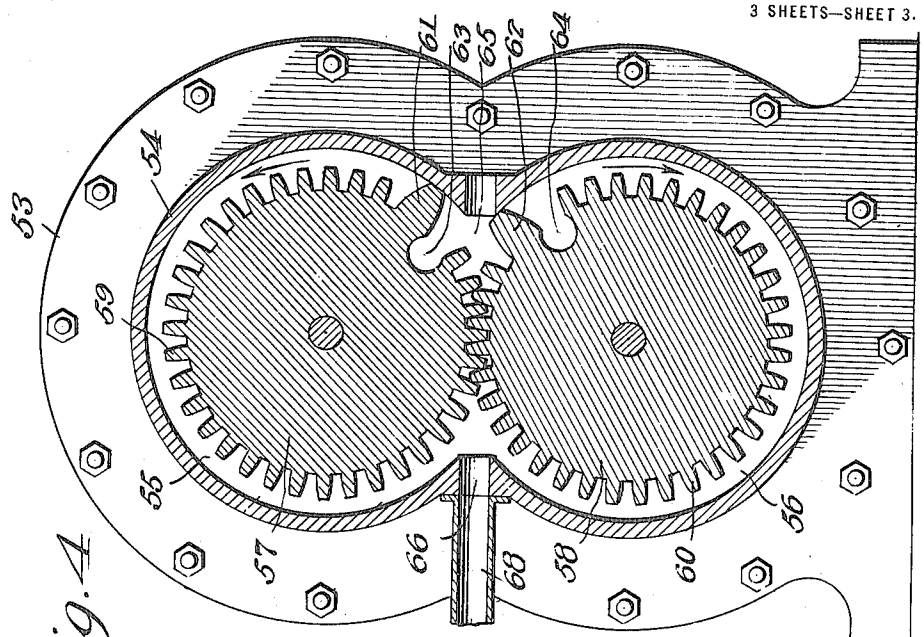


Fig. 4.

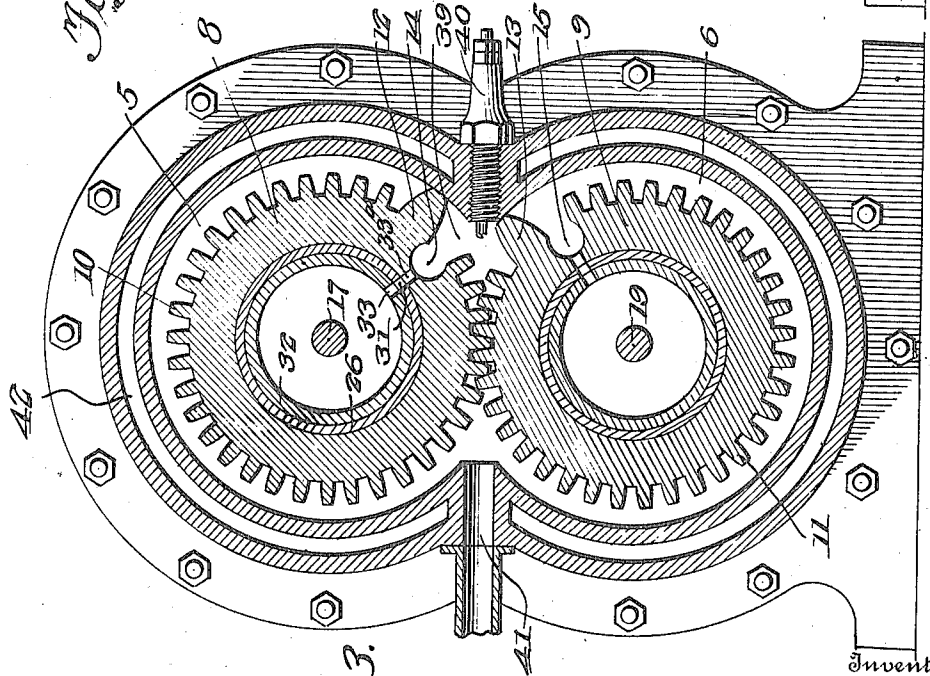


Fig. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES A. INGRAHAM, OF WENDELL, IDAHO.

GAS-MOTOR.

1,184,650. Specification of Letters Patent. Patented May 23, 1916.

Application filed March 5, 1915. Serial No. 12,324.

To all whom it may concern:

Be it known that I, CHARLES A. INGRAHAM, a citizen of the United States, residing at Wendell, in the county of Gooding and State of Idaho, have invented new and useful Improvements in Gas-Motors, of which the following is a specification.

This invention is an improved gas motor, or gas machine for using gas as fuel for the generation of power, and adapted to be operated by an explosive mixture of air and the gas or vapor of gasoline, petroleum, and other like fluids and also adapted to be operated by an explosive mixture of air and natural or artificial gas.

The invention consists in the construction, combination, and arrangement of devices hereinafter described and claimed.

In the accompanying drawings:—Figure 1 is a plan of a gas motor or machine constructed and arranged in accordance with my invention. Fig. 2 is a vertical sectional view of the same. Fig. 3 is a vertical transverse sectional view of the same. Fig. 4 is a similar view of the air compressor.

In the embodiment of my invention I provide a casing 1 which is here shown as comprising a partition or inner wall 2, a pair of heads or outer walls 3 and a body, 4, the body being provided with bores 5—6 each of which is nearly a complete cylinder.

A rotor 8 is arranged in each bore 5 and a rotor 9 is arranged in each bore of the cylinder 6. The rotors are provided with coengaging longitudinally arranged spurs 10—11. The diameter of each rotor is somewhat less than that of the chamber in which it is arranged to rotate and each rotor is provided, in addition to the spur teeth 10 and 11 with a piston tooth which is larger than the spur teeth and projects radially from the rotor so far as to bear closely against the wall of the cylinder in which said rotor revolves. The piston teeth of the rotors, 8, are indicated at 12 and those of the rotors 9 are indicated at 13. The rotors 8 and 9 are also respectively provided with recesses 14—15 which correspond in size and shape with the piston teeth so that the recess of each rotor affords clearance for the piston tooth of the mating rotor. Each rotor is also provided with a gas chamber as hereinafter described.

The upper rotors 8 are keyed as at 16 on a shaft 17 which is mounted in a bearing 18 in the partition wall 2. The lower rotors 9 also having a common shaft 19 which has a bearing 20 in the partition wall and is also mounted in bearings 21 on the heads 3.

A gas chamber is here shown at 22 and in the upper rotors 8, each of said rotors having one of said chambers. Each gas chamber is cylindrical, closed at the inner end, next the inner or partition wall 2 as at 23 and provided with spaced ports 24 which are coincident with a circular port 25 in the opposing side of said inner or partition wall. A fixed sleeve 26 is provided for each rotor 8. Said sleeves are cylindrical interiorly and tapered toward the inner end, exteriorly, and fit snugly against the correspondingly shaped walls of the gas chambers 22. Each fixed sleeve is open at its inner end and is provided at its outer end with a reduced outwardly extending cylindrical portion 27 which passes through a central opening in a head or outer member 28 of the rotor 8 in which said sleeve is arranged. The head is here shown as secured in place by screws 29. The outwardly extending end of each reduced cylindrical portion 27 of the fixed sleeves 26 is arranged in an opening 30 in the head 3. Each fixed sleeve is provided on one side, at a suitable point, with a longitudinal slot or port 31. The gas chamber of the lower rotor is identical in construction with that of the upper rotor as here shown

A regulating sleeve 32 is arranged in each fixed sleeve 26 and adapted to turn therein and provide with a port 33 which will be turned into or out of register with the port 31. Each rotor 8 also has a port 33ª which communicates with the recess 14 and registers momentarily at each rotation of said rotor with the port 31 and also with the port 33, if the regulating sleeve has been so adjusted.

Each regulating sleeve is provided at its outer end with a tubular extension 34 which has its bearing in the reduced tubular portion 27 of the fixed sleeve and also has a bearing as at 35 in the head 3, said tubular extension forming also a bearing 36 for the shaft 17. A packing box 37 is provided for each bearing 35 and to the outer end of each tubular extension or spindle 34 of the regulating sleeves is attached a lever 38. Hence the regulating sleeves may be turned to start or stop the motor and also to regulate the speed thereof and the quantity of explosive mixture supplied thereto at each rotation of the rotors.

The space in the casing, on one side and between the piston teeth of the rotors forms an explosive chamber 39 one of these chambers being for each pair of rotors. A spark plug 40 is provided for each explosion chamber and the casing is provided with exhaust ports 41. The casing is also formed with a water jacket 42 around the cylindrical portions in which the rotors operate.

Beveled packing rings 43 are secured on the ends of the rotors by screws 44 and are engaged by correspondingly shaped junk rings 45 which together with the packing rings are arranged in annular grooves or channels 46 on the opposing sides of the heads and partition wall of the casing. Springs 47 are also arranged in said recesses and press the junk rings closely against the packing rings to prevent leakage around the ends of the rotors and tensioning screws 48 are also provided which are threaded in openings 49 in the heads of the casing and engage the springs 47 in the heads.

The partition or inner wall of the casing has a gas inlet duct 50 which communicates with the annular ports 25 and hence serves to supply an explosive mixture of gas and air to the gas chambers of the rotors 8. The shaft 17 operates a circuit breaker of standard construction and which is indicated at 51 and said circuit breaker is included in circuit with the spark plugs and with a battery or generator 52 by conductors 53.

An air compressor 53 is arranged near the end of the motor and is similar in construction thereto, comprising a casing 54, having communicating cylinders 55—56 and rotors 57—58 which are respectively arranged for rotation in said cylinders and are provided with coengaging spurs 59—60, and are also provided respectively with piston teeth 61—62 and recesses 63—64 for clearing such piston teeth. The space in one side of the cylinder and between the piston teeth of the rotors forms an intake chamber 65 for the admission of air and which is driven before the piston teeth in the direction indicated by the arrows in Fig. 4 and is compressed in the cylinders by the action of the piston teeth of the rotors and discharged through the port 66. The shaft of the upper rotor of the air compressor is connected to the shaft of the upper rotors of the motor by a suitable coupling 67 so that the air compressor is driven by the motor. The discharge port of the air compressor is connected by a pipe 68 to a compressed air storage tank 69. Said pipe has a check valve 70 and is also provided with valves 71—72. A carbureter 73 is connected by a pipe 74 to the compressed air storage tank, said pipe having valves 75—76. A tank 77, for gasolene or other suitable liquid hydrocarbon is connected by a pipe 78 to the carbureter and said pipe has a valve 79. A pipe 80 connects the tank 77 with the pipe 74 at a point between the valves 75—76 and is provided with a valve 81. A pipe 82 leads from the carbureter to the gas supply duct 50 of the motor.

A tank 83 which contains lubricating oil is connected to the pipe 74 by a pipe 84 which has a valve 85. A pipe 86 connects the pipe 84 with the pipe 68 at a point between the valves 71—72 and is provided with a valve 87. An oil spray or feed pipe 88 leads from the oil tank 83, is provided with a valve 89 and is connected by branches 90 to oil feed ducts 91 which lead to the bearings of the rotors of the motor and air compressor.

When the motor is in operation the air compressor is operated thereby and serves to store compressed air in the tank 69. The compressed air is used to force gasolene from the tank 77 to the carbureter and also to supply the latter with air to form the explosive mixture provided for the operation of the motor. Compresesd air from the tank 69 also forces oil from the tank 83 to the bearings.

While I have herein shown and described a preferred form of my invention, I would have it understood that my improved invention may be changed without departing from the spirit of the invention and within the scope of the appended claims.

Having thus described my invention, I claim:—

1. In a motor of the class described the combination of a casing having a pair of nearly cylindrical chambers which communicate at a point between them, rotors of less diameter than said chambers, arranged for rotation therein, having interengaging gear teeth and each rotor also provided with a radially projecting piston tooth and a recess at one side of said tooth to clear the piston tooth of the other rotor, one of said rotors also having a gas chamber and ports leading therefrom to the recess of said rotor, said casing having a gas supply duct and a port at the discharge end of said duct, and said rotor having a port to periodically register with the port of the gas supply duct and correspondingly establish communication between the gas supply duct and the said chamber, the space in one side of the casing and between the piston teeth of the rotors forming an explosion chamber, said casing having an exhaust port at the side opposite said explosion chamber, and a fixed sleeve in the chamber of the chambered rotor and having a port to coact with the ports of said rotor to supply gas to the explosion chamber at each rotation of the rotors.

2. In a motor of the class described the combination of a casing having a pair of

nearly cylindrical chambers which communicate at a point between them, rotors of less diameter than said chambers, arranged for rotation therein, having interengaging gear teeth and each rotor also provided with a radially projecting piston tooth and a recess at one side of said tooth to clear the piston tooth of the other rotor, one of said rotors having a gas chamber and ports leading therefrom to the recess of said rotor, said casing having a gas supply duct and a port at the discharge end of said duct, and said rotor having a port to periodically register with the port of the gas supply duct and correspondingly establish communication between the gas supply duct and the said chamber, the space in one side of the casing and between the piston teeth of the rotors forming an explosion chamber, said casing having an exhaust port at the side opposite said explosion chamber, and a fixed sleeve in the chamber of the chambered rotor and having a port to coact with the ports of said rotor to supply gas to the explosion chamber at each rotation of the rotors, and a regulating sleeve valve arranged in said fixed sleeve adapted to be turned therein and having a port to control that of said fixed sleeve.

3. In a motor of the class described the combination of a casing having a pair of nearly cylindrical chambers which communicate at a point between them, rotors of less diameter than said chambers, arranged for rotation therein, having interengaging gear teeth and each rotor being also provided with a radially projecting piston tooth and a recess at one side of said tooth to clear the piston tooth of the other rotor, one of said rotors having a gas chamber and ports leading therefrom to the recess of said rotor, said casing having a gas supply duct and a port at the discharge end of said duct, and said rotor having a port to periodically register with the port of the gas supply duct and correspondingly establish communication between the gas supply duct and the said chamber, the space in one side of the casing and between the piston teeth of the rotors forming an explosion chamber, said casing having an exhaust port at the side opposite said explosion chamber, and a fixed sleeve in the chamber of the chambered rotor and having a port to coact with the ports of said rotor to supply gas to the explosion chamber at each rotation of the rotors, and a regulating sleeve valve arranged in said fixed sleeve, adapted to be turned therein and having a port to control that of said fixed sleeve, the fixed sleeve having a bearing in one side of the casing and said regulating sleeve having a bearing in which the axle shaft of the chambered rotor is mounted.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES A. INGRAHAM.

Witnesses:
J. W. FARIS,
FRED A. JACKSON.