

W. H. SCHOONMAKER.
INTERNAL COMBUSTION ENGINE.
APPLICATION FILED JUNE 9, 1904.

1,121,137.

Patented Dec. 15, 1914.

2 SHEETS-SHEET 1.

Fig 1

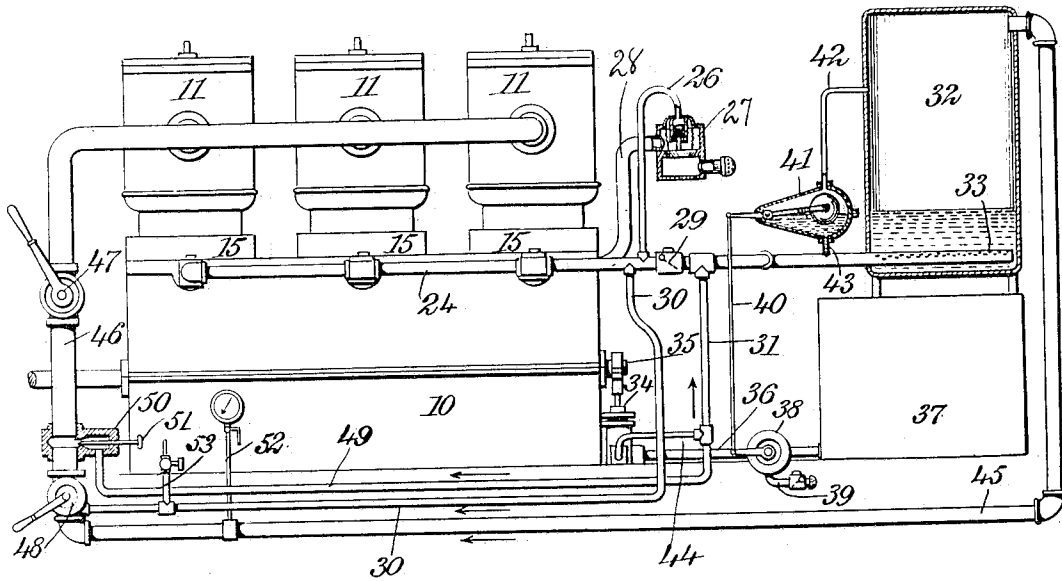


Fig 4

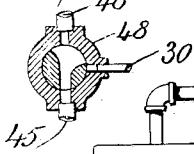
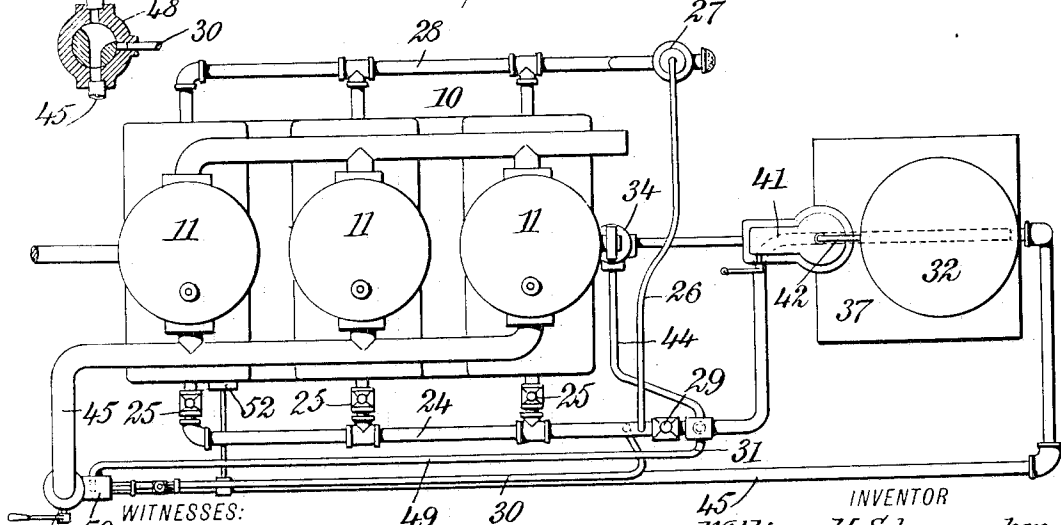


Fig 2

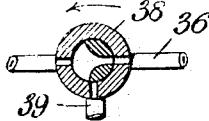


WITNESSES:

H. Walker,

Geo B. Owens.

Fig 3



INVENTOR
William H. Schoonmaker

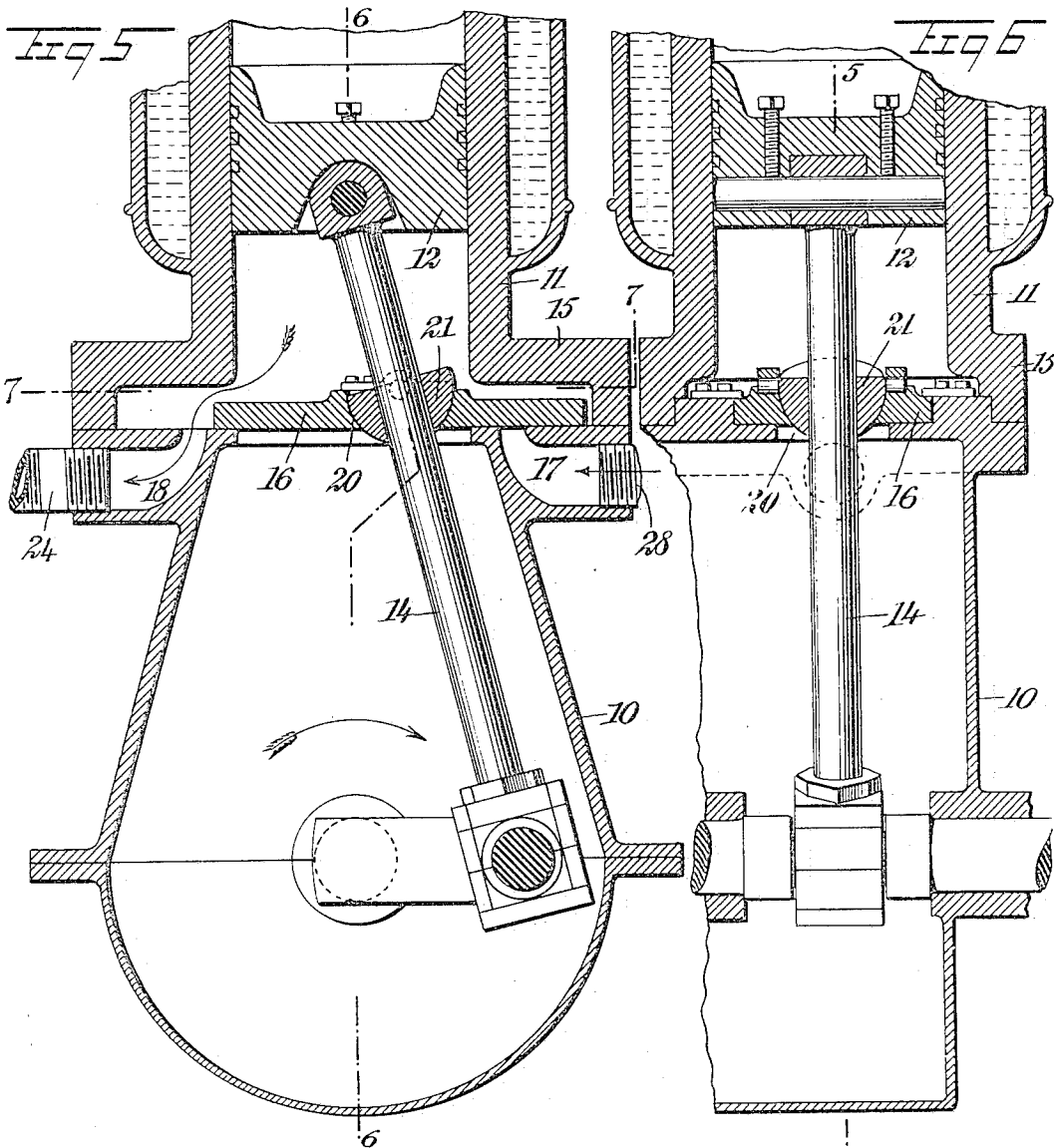
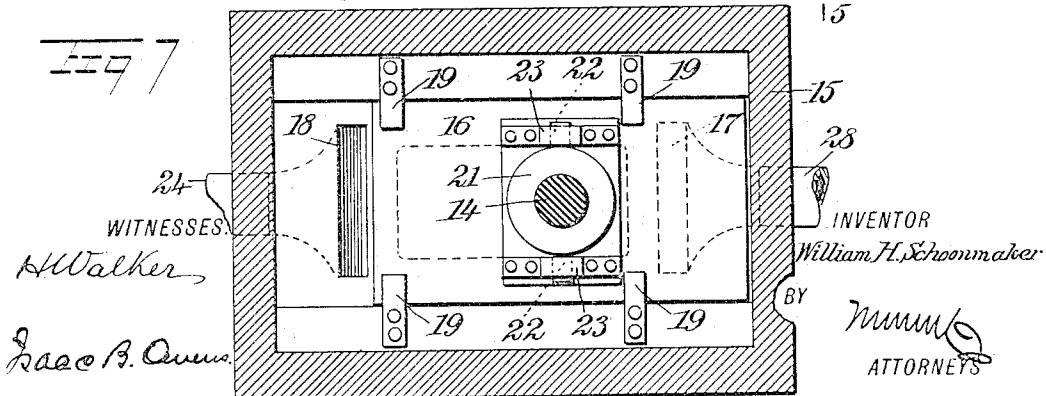
BY *Mumuk*
ATTORNEYS

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2 SHEETS—SHEET 2.



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H. Walker

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UNITED STATES PATENT OFFICE.

WILLIAM H. SCHOONMAKER, OF MONTCLAIR, NEW JERSEY.

INTERNAL-COMBUSTION ENGINE.

1,121,137.

Specification of Letters Patent. Patented Dec. 15, 1914.

Application filed June 9, 1904. Serial No. 211,803.

To all whom it may concern:

Be it known that I, WILLIAM H. SCHOONMAKER, a citizen of the United States, and a resident of Montclair, in the county of Essex and State of New Jersey, have invented a new and Improved Internal-Combustion Engine, of which the following is a full, clear, and exact description.

The invention relates to an internal combustion engine intended particularly for use in connection with a liquid fuel, and it provides for the employment of a receiver carrying a certain quantity of fuel through which air is forced, thus forming a vapor which is kept stored at a certain pressure in the receiver, the vapor or mixture of air and fuel being conducted to the engine cylinder and burned in the usual manner.

The invention also involves the use as an auxiliary, of an independent means for mixing the liquid fuel and air so that the fuel mixture may be retained by these devices independently of and, if desired, in addition to the means first described for supplying the mixture.

The invention also involves a certain novel construction of the engine cylinder whereby air is compressed on the out-stroke of the piston, this compressed air being used in the formation of the combustible mixture above referred to.

The invention involves various other features of major or minor importance, as will be fully set forth hereinafter.

Reference is had to the accompanying drawings forming part of this specification, in which drawings like reference characters indicate like parts throughout the several views, and in which—

Figure 1 is a side elevation of the apparatus with parts in section; Fig. 2 is a plan view of the same; Fig. 3 is a sectional view showing the three-way cock used in connection with a gasoline pump; Fig. 4 is a detail section showing the three-way cock used in connection with the air and fuel mixture pipes to control the flow to the engine; Fig. 5 is a sectional view on the line 5—5 of Fig. 6, particularly illustrating the compressor feature of the invention; Fig. 6 is a section on the line 6—6 of Fig. 5; and Fig. 7 is a horizontal section on the line 7—7 of Fig. 5.

10 indicates the base or frame of the engine, on which are mounted the cylinders 11. While I have here illustrated three cylinders

it will be apparent that the number is not material.

12 indicates the pistons, and 14 the connecting rod, both of which may be of any form desired. At the outer or lower end of the cylinder is formed a case 15, in which is arranged a slide valve 16 adapted alternately to cover two ports 17 and 18. The slide valve is held in position by cleats 19 attached to the case 15, and overhanging the slide valve as shown. The slide valve is formed with a central opening 20, through which the connecting rod 14 passes, and around the rod is arranged a semi-spherical member 21, the rod sliding through this member and said member being arranged to roll freely in the cavity 20, the walls of which correspond to the semi-spherical formation of the member 21, which latter is provided with trunnions 22 rockably mounted in boxes 23 attached to the slide valve 16. With this arrangement, as the connecting rod 14 swings from side to side during the operation of the engine, a reciprocal movement is imparted to the slide valve 16, causing the ports 17 and 18 to be alternately uncovered. On the up-stroke of the piston the port 18 is covered and the port 17 uncovered and atmospheric air will then be drawn into the lower part of the cylinder. Upon the down stroke of the piston the port 17 will be covered and the port 18 uncovered, thus forcing the air out from the lower part of the cylinder through the port 18. This structure provides an effective means for compressing the air, and at the same time it allows a much higher compression to be attained by utilizing the upper side of the piston. Since the lower part of the cylinder alone forms the compression chamber, and the contents of this being much less than the contents of the lower part of the cylinder and the crank case, it follows that a much higher compression is attained than in the form of engine in which the air or mixture is compressed in a closed crank case.

As shown best in Figs. 1 and 2, a pipe 24 is provided with branches communicating respectively with the port 18. Said branches have check valves 25 to prevent the return of the pressure to the engine cylinders. From the pipe 24 a branch 26 passes to an automatic inlet valve 27. This valve 27 controls communication between the inlet pipe 28 and the atmosphere. Said pipe 28

passes by means of branches, as shown, to the inlet port 17. The valve 27 is so arranged that when a certain predetermined pressure has been developed in the pipe 26 the valve will be closed, thus cutting off the air supplied to the pumping end of the cylinder or cylinders 11, and stopping the generation of further pressure in the pipe 24 and its connections. When, however, this pressure drops below the predetermined point, the valve 27 opens and compression is renewed. The pipe 24 is provided with a check valve 29, on the opposite sides of which are located pipes 30 and 31 both communicating with the pipe 24. Said pipe 24 continues into the receiver 32, the end of the pipe within the receiver being perforated as indicated at 33, whereby to finally divide the air passing from the pipe. 34 indicates the gasolene or other liquid fluid pump, which is driven from the crank shaft 35 of the engine. Said pump communicates by a pipe 36 with the gasolene tank 37. Interposed in the pipe 36 is a three-way valve 38, which is so arranged that upon the movement of the plug of the valve the pump 34 will be placed in communication either with the gasolene tank 37 or the atmosphere, the latter through a connection 39. This valve 38 is actuated by the height of the gasolene within the receiver 32, this being effected through a connection 40 with a float located in a float case 41. Said pipe is in connection with the receiver 32 by a pipe 42 and with the pipe 24 by means of a branch 43.

Gasolene is supplied to the pipe 24 at the side of the check valve 29 adjacent to the receiver 32, and consequently to the receiver, through the pipe 31 which connects with the pump 34, by means of a branch 44. By this arrangement a certain body of gasolene will be maintained in the bottom of the receiver 32, and a current or currents of air will be forced continually through the pipe 24 into the receiver, thus carbureting the air. The vapor thus formed will be retained in the upper part of the receiver 32, and is drawn off from the same by means of a pipe 45 passing to the inlet port of the cylinder or cylinders as will be herein-after explained. The vapor or explosive mixture pipe 45 communicates with a pipe 46 forming a continuation thereof, and leading to the inlet ports of the several cylinders of the engine. This pipe 46 is provided with a throttle 47 by means of which the engine may be controlled, and the pipe 46 is also provided with a three-way valve 48 as best shown in Fig. 4. Said valve communicates with the pipe 45 and with the pipe 30 leading from the pipe 24. By means of this valve the air pipe 30 may be cut off completely, and the pipe 46 opened to full communication with the mixture pipe

45, or the mixture pipe may be cut off and the air pipe opened, as desired. From the pipe 44 a gasolene pipe 49 passes, this pipe extending to a casing 50 in communication with the pipe 46 and containing a needle valve 51. These devices enable me to operate the engine wholly from the mixture derived through the pipe 45, the air pipe 30 being cut off and the needle valve 51 being in closed position. If, however, it is desired for any reason to vaporize the gasolene directly in the pipe 46, this may be done by throwing the valve 48 to close the pipe 45, and open the air pipe 30, this pipe opening into the three-way valve 48. The air passing through the pipe 46 will atomize the gasolene passing the valve 51 and form an explosive mixture which may be conducted to the cylinders and compressed and burned in the usual manner.

52 indicates a gage for determining pressure in the pipe 45 and receiver 32, and 53 indicates a nipple and valve adapted to be placed in communication with a hand pump whereby the system may be primarily charged with air upon starting the engine.

From the foregoing explanation the manner of operating and using the engine will be apparent to skilled engineers.

Various changes in the form, proportions and minor details of my invention may be resorted to at will without departing from the spirit and scope thereof; hence I consider myself entitled to all such variations as may lie within the terms of my claims.

Having thus described my invention I claim as new, and desire to secure by Letters Patent:

1. An internal combustion engine comprising a cylinder and piston and air compressor, a liquid fuel reservoir, a connection between said reservoir and the compressor, a connection between the reservoir and the engine cylinder, a three-way valve in the last-named connection, an air pipe leading to the said valve, a valve controlled inlet into the last named connection adjacent to the three-way valve, and means for leading the liquid fuel to the said valve controlled inlet.

2. An internal combustion engine comprising a cylinder and piston and an air compressor, a liquid fuel reservoir, a connection between the compressor and the fuel reservoir, and a connection between the fuel reservoir and the cylinder, a three-way valve in the last named connection, an air pipe leading to said valve from the compressor, a valve controlled inlet into the last named connection adjacent to the three-way valve, and a liquid fuel pipe leading to said valve controlled inlet from the fuel source.

3. An internal combustion engine comprising a cylinder and piston and an air compressor, a fuel reservoir and means es-

establishing communication between the compressor and the fuel reservoir, means establishing communication between the fuel reservoir and the engine cylinder, a fuel pump, a valve controlling the supply to said pump, and a float actuated by the height of the liquid fuel in the reservoir, said float operating said valve, a connection between the pump and the fuel reservoir, a connection between the pump and the communication between the fuel reservoir and engine cylinder, a three-way valve in said communication between the said reservoir and engine cylinder, and a connection between the compressor and the three-way valve.

4. The combination with an internal combustion engine of a liquid fuel chamber, a source of compressed air, means for leading the compressed air to the liquid fuel chamber, whereby to maintain in the chamber a constant supply of fuel vapor under pressure, means establishing communication between said chamber and the admission port of the engine, and controllable air and liquid fuel supplies leading into said communication between the liquid fuel chamber and the admission port, whereby to adjust the proportions of the combustible mixture.

5. The combination with an internal combustion engine, of means for generating and maintaining a supply of explosive mixture under pressure of a quantity greater than a single charge of the engine, means establishing communication between said supply and the admission port of the engine, and means for supplying liquid fuel directly to said communication means.

6. The combination with an internal combustion engine of means for generating

and maintaining a supply of combustible mixture under pressure of a quantity greater than a single charge of the engine, and means for establishing communication between said supply and the admission port of the engine, and controllable air and fuel supplies leading to said communication, whereby to permit of the adjustment of the proportions of the mixture.

7. The combination with a two cycle internal combustion engine of means for generating and constantly maintaining a body of combustible mixture under pressure and of a quantity greater than a single charge of the engine, means establishing communication between said body and the admission port of the engine, and controllable air and fuel supplies leading into said communication, whereby to admit of adjusting the proportions of said mixture on its way to the admission port.

8. The combination with an internal combustion engine, of means for forming and maintaining a body of combustible mixture of air and fuel under pressure, means for conducting portions thereof to the admission port of the engine, controllable means for supplying hydrocarbon to such mixture on its way to the engine, and controllable means for supplying air to such mixture, whereby to regulate the quality of such mixture.

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

WILLIAM H. SCHOONMAKER.

Witnesses:

ISAAC B. OWENS,
JNO. M. RITTER.