T. J. McCARTHY.

GAS STARTER FOR INTERNAL COMBUSTION ENGINES.

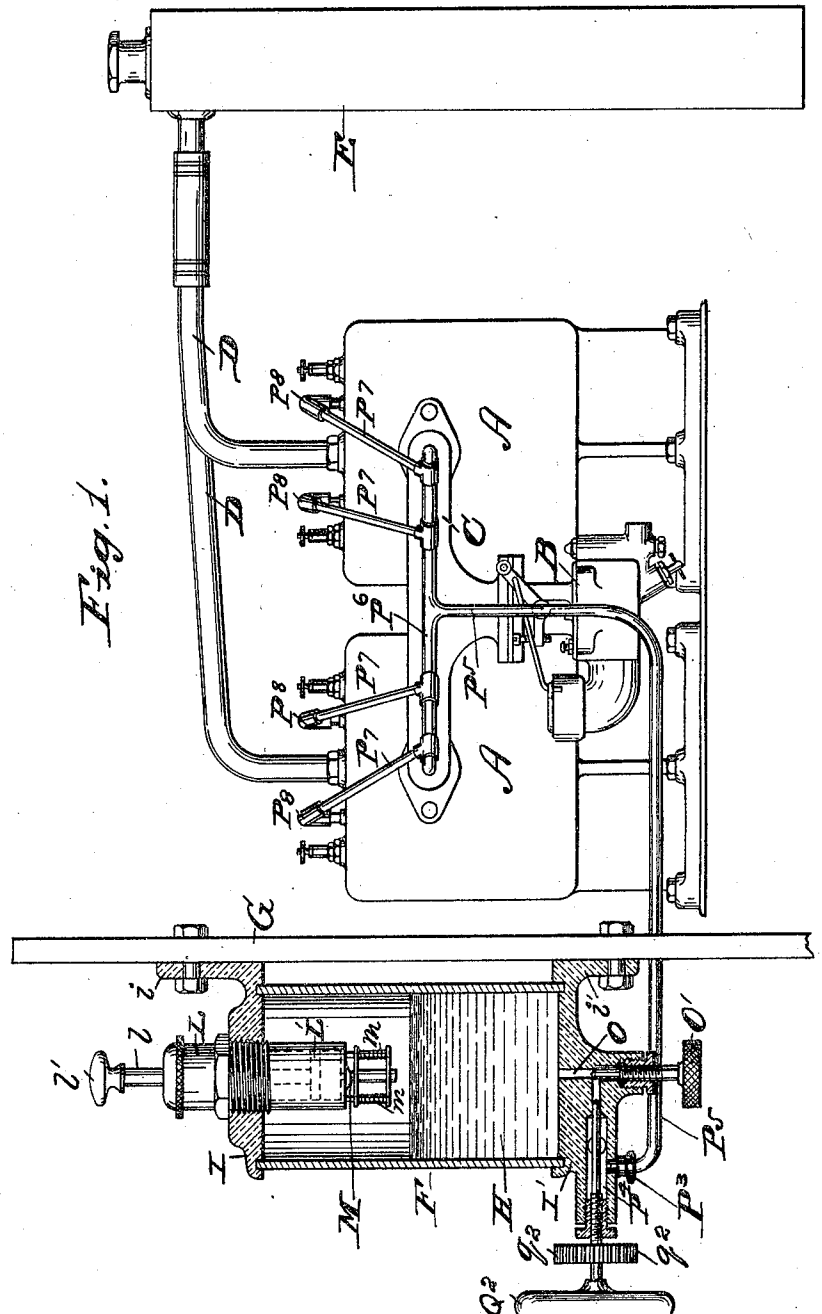
APPLICATION FILED JULY 17, 1912.

1,046,825.

Patented Dec. 10, 1912.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses
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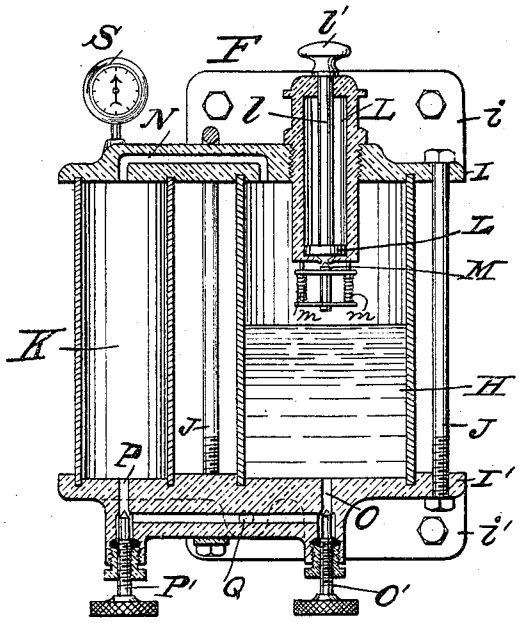

Fig. 2.

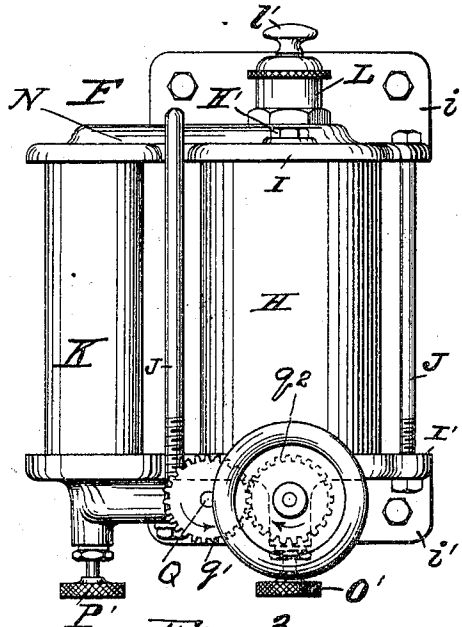

Fig. 3.

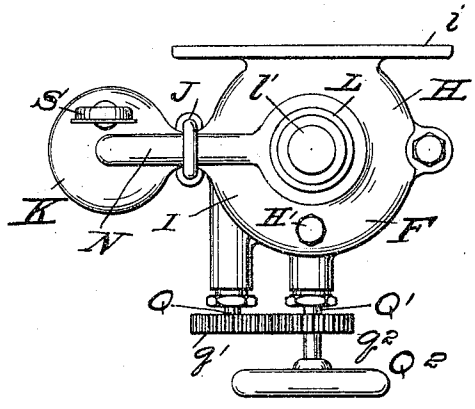

Fig. 4.

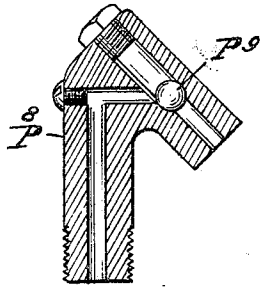

Fig. 5.

Witnesses

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4 SHEETS—SHEET 3.

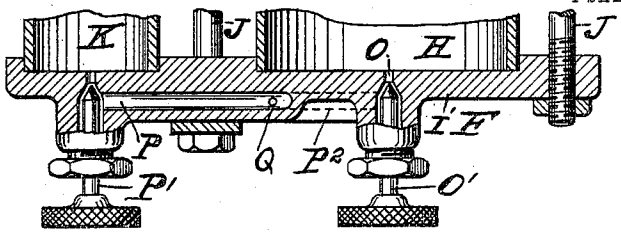

Fig. 7.

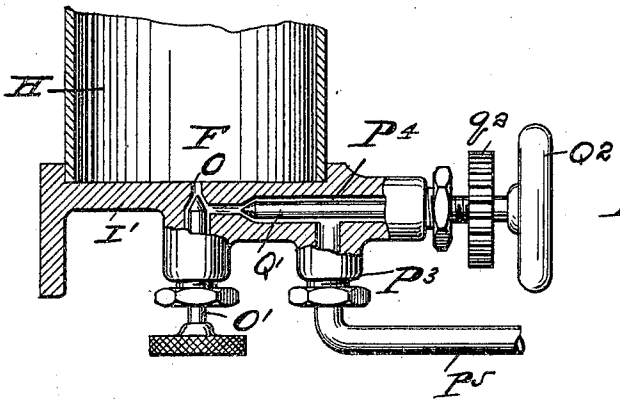

Fig. 8.

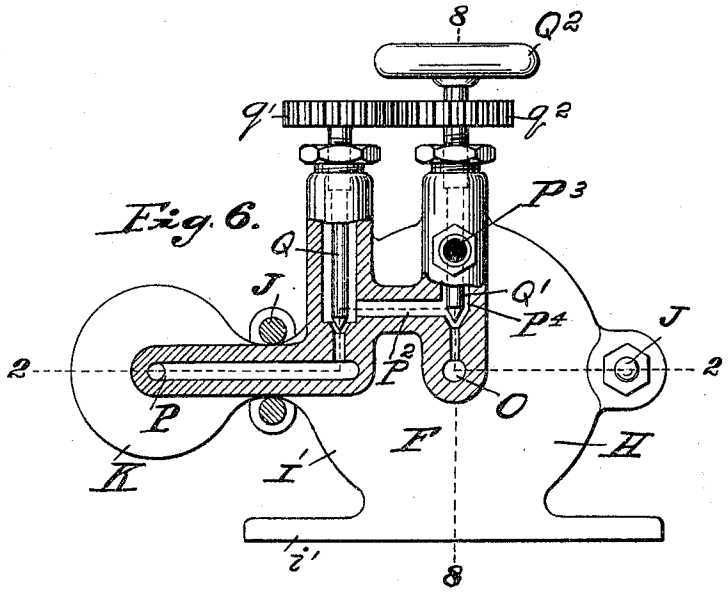

Fig. 6.

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4 SHEETS—SHEET 4.

Fig. 12.

Fig. 9.

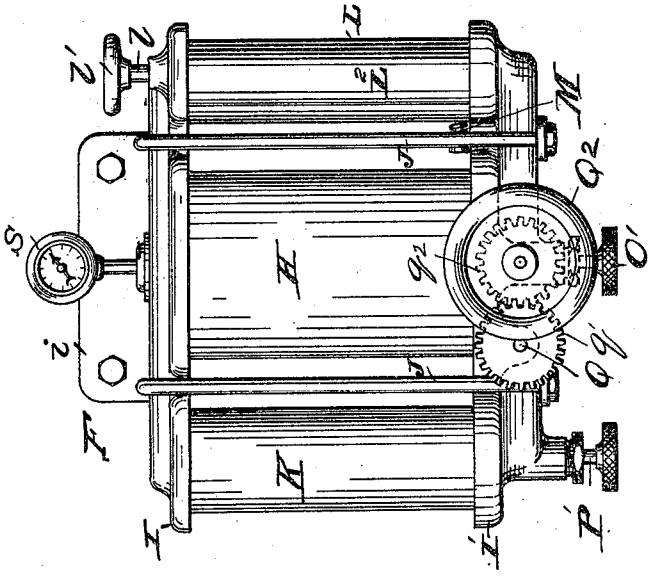


Fig. 11.

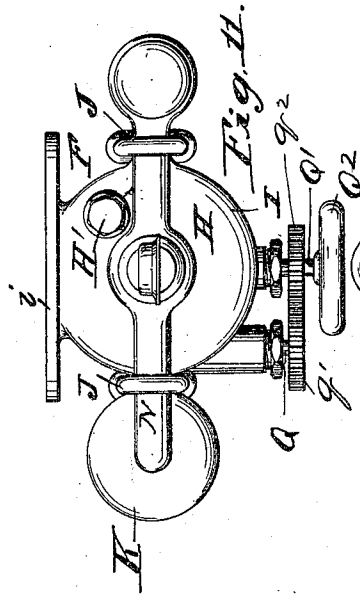
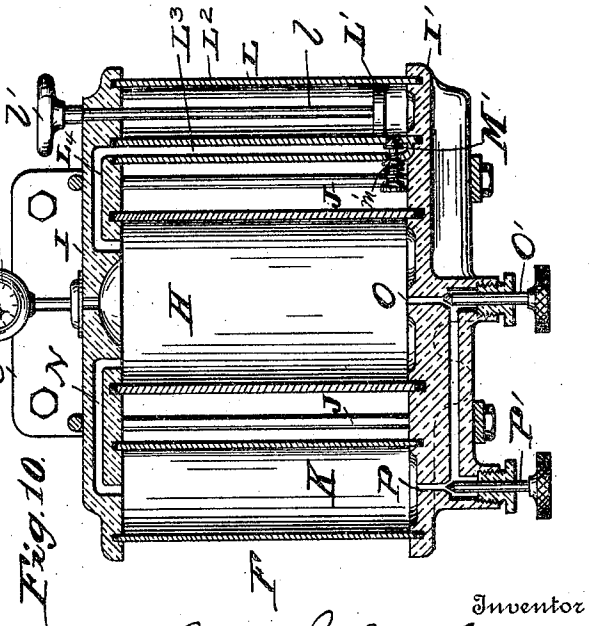


Fig. 10.



Witnesses

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UNITED STATES PATENT OFFICE.

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GAS-STARTER FOR INTERNAL-COMBUSTION ENGINES.

1,046,825. Specification of Letters Patent. Patented Dec. 10, 1912.

Application filed July 17, 1912. Serial No. 709,851.

To all whom it may concern:

Be it known that I, THOMAS J. McCARTHY, citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Gas-Starters for Internal-Combustion Engines, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to an improvement in gas starters for internal combustion engines, shown in the accompanying drawings and more particularly set forth in the following specification and claims.

The object of my invention is to provide a device which may be secured to the dashboard of an automobile or other location convenient to the engine,—the construction being such that two chambers are provided adjacent to each other; one to receive gasolene and the other a charge of compressed air, the chambers communicating with each other and directly with the respective cylinders of the engine or with the manifold, or both.

A further object of the invention is to provide for the compression of air in the gasolene chamber of the device and in the air chamber adjacent thereto, and for the regulation of the volume of gasolene and air discharged from the respective chambers into a suitable mixing chamber from which the gas passes under compression to the several cylinders of the engine or its fuel feed manifold connected thereto.

Other advantages and improvements will hereafter appear.

In the drawings accompanying this specification:—Figure 1 is a central vertical section through the gasolene chamber of the device showing the pipe connection between it and the respective cylinders of an internal combustion engine. Fig. 2 is a central vertical section through the gasolene and air chambers of the device, the section being at right angles to that shown in Fig. 1 and on line 2—2 of Fig. 6. Fig. 3 is a side elevation of the device. Fig. 4 is a plan view of the same. Fig. 5 is a sectional view of a detail showing the check valve to control "back firing." Fig. 6 is an inverted plan view of the device with parts broken away and in section. Fig. 7 is a central vertical section of a fragmentary portion of the gasolene and air chambers disclosing the ports through the lower wall. Fig. 8 is a central vertical section of a fragmentary portion of the gasolene chamber on line 8—8 of Fig. 6. Fig. 9 is a front elevation of a modification of the device. Fig. 10 is a vertical cross-sectional view of the same. Fig. 11 is a plan view of the modification shown in Fig. 9. Fig. 12 is a cross-sectional view through the pump cylinder shown in Fig. 9.

Referring now to the letters of reference placed upon the drawings:—A represents an internal combustion engine; B its carbureter; C the fuel manifold connected with the carbureter and the respective cylinders of the engine; D the water circulating pipes leading to the radiator E. These several elements are of the usual type are shown in order to disclose more clearly the operation of my invention.

F is my improved starting device and consists of a gasolene chamber H preferably formed of glass tubing in order that the volume of gasolene contained therein may be more readily determined. The tube is supported between an upper and lower plate I and I′, the plates being joined together by suitable connecting bolts J.

H′ is a filler cap in the plate I by removing which the chamber may be charged with gasolene or other suitable fuel.

K is a compressed air chamber also preferably formed of tubing and supported between the upper and lower plates as in the case of the gasolene chamber,—a tight joint being secured in each case by employing suitable gaskets at the ends of the tubes.

i and *i′* are flanges projecting from the respective plates I and I′, pierced for the passage of bolts, by means of which the device is secured to the dashboard G of an automobile or other convenient support.

L is a reciprocating plunger pump mounted upon the plate I, its cylinder projecting into the gasolene chamber H.

L′ is the pump plunger from which rises a projecting stem *l*, provided at its outer end with a suitable knob or handle *l′* by which it may be manually operated.

M is a check valve adapted to close the port through the lower end of the pump

against the escape of air delivered into the gasolene chamber, by the operation of the plunger.

m, m, are springs which serve to force the check valve to its seat.

N is a port in the plate I for the passage of air from the gasolene chamber H into the compressed air chamber K.

O is a port leading from the bottom of the gasolene chamber H,—the volume of gasolene that may be discharged being under the control of the valve O′.

P is a port in the lower plate I′ to deliver air from the compressed air chamber K.

P′ denotes a valve to regulate the volume of air delivered from the compressed air chamber.

Q is a valve for controlling the delivery of air from said chamber after passing the valve P′.

Q′ denotes a valve for controlling the further delivery of gasolene after passing the valve O′.

Q^2 indicates a handle controlling the operation of the valve Q′, its valve stem being provided with a gear q^2 meshing with a similar gear q' mounted on the stem of the valve Q;—it will be obvious that upon operating the handle Q^2, the valves Q and Q′ will be simultaneously actuated.

P^2 is a port connecting the port P with the port O from the gasolene chamber, under the respective control of the valves Q and Q′.

P^3 is a depending nipple leading into the mixing chamber P^4 in turn connected with the port P^2.

P^5 denotes a pipe leading from the nipple to the manifold P^6.

P^7 are pipes leading from the manifold P^6 to the fittings P^8 in turn connected with the respective cylinders of the engine. The fittings P^8 are provided with suitable ball or check valves P^9 to insure against back firing. While I have not shown a connection between the manifold P^6 and the engine manifold C, the same may be provided if desired.

S is a pressure gage connected with the air chamber K.

Having indicated the several parts by reference letters, the construction and operation of my device will be readily understood. The chamber H having been charged with gasolene through the opening closed by the filler cap H′, the valve O′ is adjusted to admit of a sufficient flow of gasolene from the chamber through the port O,—the too rapid flow of gasolene being controlled by the valve Q′. The plunger pump L is then actuated to suitably compress the air in the gasolene and air chambers, as indicated by the pressure gage S, the check valve M closing upon each operation of the plunger to maintain the pressure in the chamber. The valves Q and Q′ are then adjusted by operating the handle Q^2 whereupon the air from the chamber K passes out through the ports P and P^2 under pressure, mingling with the gasolene released through the port O into the mixing chamber P^4, where an explosive mixture is formed which then passes through the nipple P^3 by way of the pipe P^5 to the manifold P^6 and thence by pipes P^7 to the respective cylinders of the engine. The ignition circuit is now closed in the usual way to fire the charge in the cylinder, thereby causing the engine to "turn over";—whereupon it will operate under its own power. It will be obvious that the check valves P^9 in the several fittings P^8 serve to prevent "back firing" in the several pipes leading to the engine, as previously explained;—in place of the ball check shown any suitable form of check valve may be employed.

In the modification shown in Figs. 9, 10, 11, and 12, the pump L is located at one side of the gasolene chamber, its cylinder L^2 being provided with an air port L^3 connecting with the port L^4 in the plate I leading into the gasolene chamber; the gasolene chamber being connected with the compressed air chamber K by means of the port N, as in the construction previously described. A check valve M′ controlled by a spring m', is provided in the port L^3 to prevent the return of the air when forced into the gasolene and air chambers.

Having thus described my invention, what I claim is:—

1. In a device of the class described, a liquid fuel chamber, an air chamber, means for compressing the air in both chambers, means for controlling the discharge of liquid from the fuel chamber, means for controlling the delivery of air from the air chamber whereby it may be caused to commingle with the liquid fuel to vaporize the latter prior to its delivery into the cylinder of an internal combustion engine to start the engine, and means for conducting the vapor to the engine.

2. In a device of the class described, a liquid fuel chamber, an air chamber communicating with said fuel chamber, means for putting air under compression in both chambers, means for controlling the discharge of liquid fuel from the fuel chamber, means governing the delivery of air from said air chamber through the liquid fuel discharged from the fuel chamber whereby the liquid may be vaporized independently of the operation of the engine with which it may be connected, and means for delivering the explosive mixture obtained by the passage of air through the liquid fuel to an internal combustion engine to start the latter.

3. In a device of the class described, a liquid fuel chamber, an air chamber communicating with the fuel chamber, means

independent of the operation of the engine with which it may be connected for placing the air in both chambers under compression, means for governing the discharge of air and fuel from said chambers to a mixing chamber to vaporize the liquid, the mixing chamber, and suitable pipe connections to conduct the explosive mixture from the mixing chamber to the cylinder of an internal combustion engine.

4. In a device of the class described, a liquid fuel chamber, an air chamber communicating with the fuel chamber, a pump adapted to place the air in said chambers under compression, a mixing chamber, ports leading from the air and fuel chambers to the mixing chamber, valves for controlling the delivery of air and liquid fuel to said mixing chamber to create an explosive mixture, and suitable piping for conducting the explosive mixture from the mixing chamber to an engine.

5. In a device of the class described, a chamber for liquid gasolene, an air chamber, communicating ports between the air and gasolene chambers, a pump to place air under compression in each of said chambers, valves for controlling the delivery of air and gasolene under pressure to a mixing chamber to form an explosive mixture, and pipes for delivering the explosive mixture produced through the commingling of the air and gasolene to an internal combustion engine to start the latter.

6. In a device of the class described, a chamber for liquid gasolene, an air chamber in open communication therewith, a pump for compressing air in each of said chambers, valves adapted to be simultaneously operated controlling the delivery of air and liquid gasolene to a mixing chamber to form an explosive mixture independently of the operation of the engine, and piping for delivering the explosive mixture to an internal combustion engine to start the latter.

7. In a device of the class described, a chamber for liquid fuel, an air chamber, a port leading from the air chamber to the fuel chamber, a pump for placing the air under compression in both chambers, valves for regulating the volume of air and liquid discharged from the respective chambers, a pair of valves geared together for simultaneous operation controlling the commingling of the air and liquid fuel to form an explosive mixture prior to the operation of the engine, and suitable piping to deliver the explosive mixture to an internal combustion engine to start the latter.

8. In a device of the class described, a chamber for liquid fuel, an air chamber, a port leading from the air chamber to the fuel chamber, a pump for placing the air under compression in both chambers, valves for regulating the volume of air and liquid discharged from the respective chambers, a pair of valves geared together for simultaneous operation controlling the commingling of the air and liquid fuel to form an explosive mixture prior to the operation of the engine, suitable piping to deliver the explosive mixture to an internal combustion engine to start the latter, and suitable check valves in line with said piping, substantially as described.

9. In a device of the class described, a liquid fuel chamber, an air chamber, means for compressing the air in both chambers, means for controlling the discharge of liquid from the fuel chamber, means for controlling the delivery of air from the air chamber whereby it may be caused to commingle with the liquid fuel discharged from the fuel chamber to vaporize the latter, said means for compressing the air being adapted to force the explosive mixture into the cylinder of an internal combustion engine prior to the engine operating under its own fuel, whereby the engine may be started upon the charge being fired, substantially as described.

In testimony whereof, I sign this specification in the presence of two witnesses.

THOMAS J. McCARTHY.

Witnesses:
GRACE E. WYNKOOP,
SAMUEL E. THOMAS.