L. ATWOOD.

COMPOUND INDUCTION VALVE FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED MAY 23, 1913.

1,112,188. Patented Sept. 29, 1914.

Fig. 1.

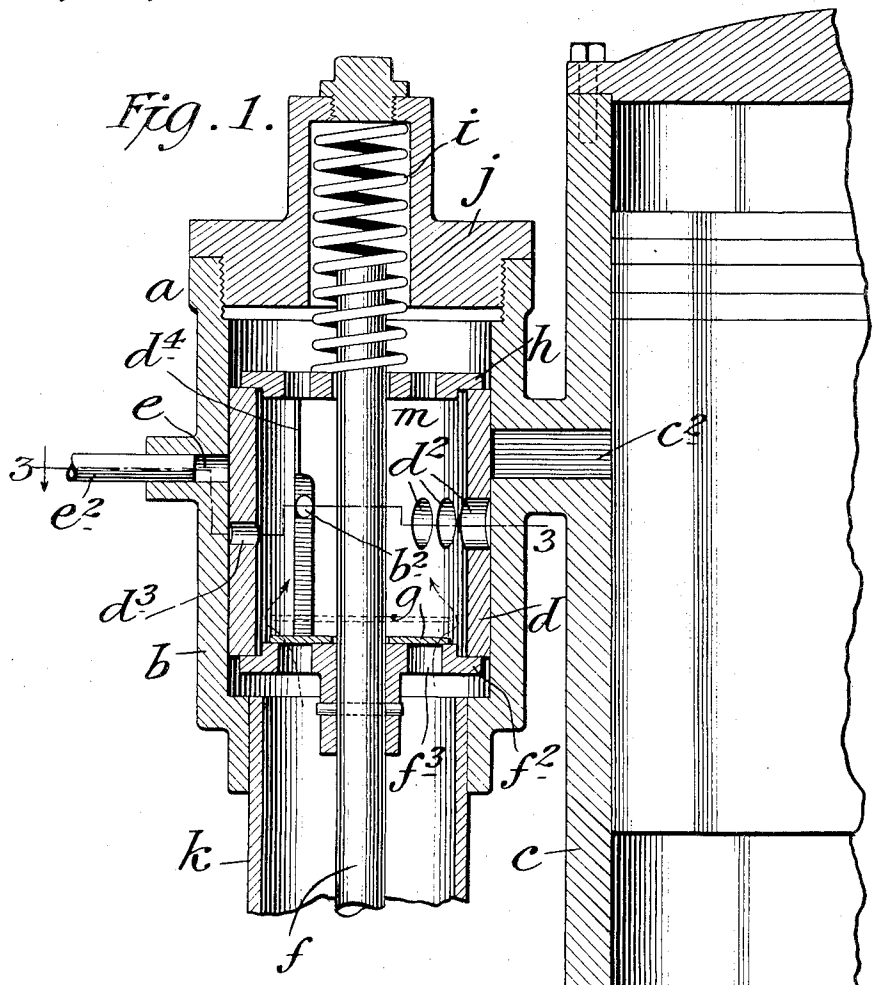


Fig. 2.

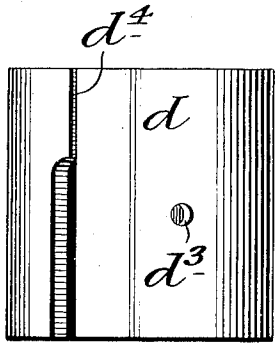
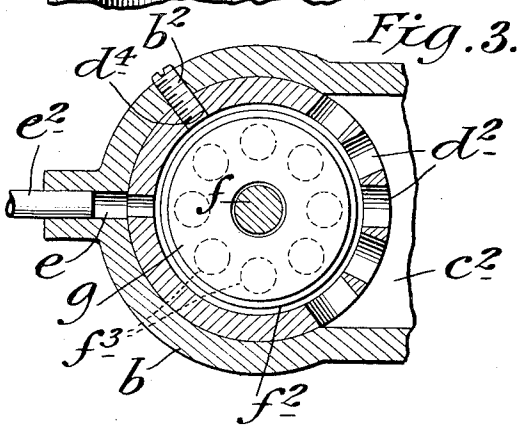


Fig. 3.



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UNITED STATES PATENT OFFICE.

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COMPOUND INDUCTION-VALVE FOR INTERNAL-COMBUSTION ENGINES.

1,112,188. Specification of Letters Patent. Patented Sept. 29, 1914.

Application filed May 23, 1913. Serial No. 769,401.

To all whom it may concern:

Be it known that I, LEONARD ATWOOD, a citizen of the United States of America, and a resident of Farmington, county of Franklin and State of Maine, have invented certain new and useful Improvements in Compound Induction-Valves for Internal-Combustion Engines, of which the following is a specification.

This invention has reference to improvements in power engines and pertains particularly to internal combustion engines in which the pressure for driving the piston is obtained by igniting an explosive mixture of air and combustible fuel in the cylinder of the engine. The combustible fuel used in internal combustion engines usually consists of light hydrocarbons, such as gasolene, which is rather expensive.

The present invention has for its special object to provide a simple and effective means for admitting into the cylinder or combustion chamber, preferably into the explosion zone of a motor or engine, an auxiliary or explosive medium for controlling the combustion and for mixing combustible fuel of different specific gravities. Thus, crude oil may be chiefly used and stored in the fuel tank, which crude oil is then mixed with gasolene in a novel manner. Likewise, crude oil or gasolene may be enriched by introducing and mixing therewith illuminating gas or hydrogen. By these media the combustion in the working cylinder is greatly assisted. Hydrogen gas and atmospheric air may also be mixed before it passes into the working cylinder, where the fuel and such mixture is ignited producing an increased effect. These desirable objects have been primarily attained by virtue of a novel compound induction valve. This valve is attached to the cylinder on one side and adapted to register with the same at the time it is taking its explosive charge, while at the opposite side the compound valve has a conduit leading to a reservoir of auxiliary fuel.

The novel induction valve is so constructed and of such form that it is balanced all the time and remains tight under all conditions. The novel valve remains free from carbonization because it is located outside of the working cylinder. The valve is noiseless in its operation and cheaply to construct and may be quickly and easily detached for inspection.

In order to render the invention entirely clear, reference is made to the accompanying drawing in which:

Figure 1 represents in longitudinal central section a portion of the working cylinder with a compound induction valve for introducing auxiliary fuel attached thereto, embodying in desirable form the present improvements. Fig. 2 shows in elevation, an inner detail portion of the valve. Fig. 3 is a cross-section of the compound induction valve, on line 3—3 of Fig. 1.

Similar characters of reference denote like parts in all the figures.

In the drawings *a* designates my improved induction valve, which comprises, in the form of construction shown, a cylindrical casing *b* formed with or attached to a piston cylinder *c*, of an internal combustion engine. Slidably mounted within the casing *b*, is a tubular valve member *d*, having constant expansive contact against the inner wall of the casing *b*, so as to maintain a noiseless coaction between the said valve and its casing and also to free the inner wall of the casing from any particles due to carbonization during the operation of the engine. The valve member *d* is provided with a series of horizontally alined ports d^2, which are adapted to register at the time the cylinder is taking its explosive charge, with a passage c^2 connecting with the interior of the working cylinder *c*. The valve member *d* is further provided at the opposite side with a port d^3, which registers, when the valve member *d* is in its raised position, with an auxiliary fuel inlet *e*, that connects with a suitable compression tank for auxiliary fuel (not shown) by means of the conduit e^2. The valve member *d* is longitudinally divided as shown at d^4 and in order to give the walls thereof an outward spring action, the inner face is first finished after which the outward face is finished, as is well known to those skilled in this art. The divisional cut d^4 is enlarged or widened from the bottom up to a pre-determined distance, to receive a pin b^2, fixed in the wall of the valve casing *b*, so as to hold the valve member *d* against circumferential movement.

A vertically reciprocating stem or rod *f* operated by the rotation of the crank shaft of the engine by means of a suitable timing cam ranges longitudinally of the casing *b* and carries in fixed relation a spider or disk f^2. The spider is provided with apertures

f^3 formed therethrough. On the top of said spider is supported a gravity plate g normally closing the apertures f^3. The peripheral edge of the spider or disk f^2 contacts with the lower end of the valve member d, and controls the elevation of said valve member through the rod f. The perforated plate h is forced downwardly upon the top edge of the valve member d by a spiral spring i housed within a cap member j which is threaded into the top of the casing as shown in Fig. 1.

The pipe k is suitably secured to and in communication with the casing b of the valve. Through the pipe k the fuel charge, consisting of crude oil or gasolene, is passed up into the valve member d and through the ports d^2 of said valve member. From the ports d^2 the fuel charge passes into the cylinder through the passage c^2 when said ports d^2 register with said passage c^2. It will be seen from the foregoing description that the space within the tubular valve member d, constitutes a mixing chamber m, in which heavy fuel, such as crude oil, which possesses relatively poor combustible qualities may be mixed with, and enriched by, a suitable quantity of auxiliary fuel such as light, highly combustible hydrocarbons or illuminating gas or hydrogen. This auxiliary fuel enters the mixing chamber m through the conduit e^2 when the port d^3 registers therewith, which takes place at approximately the same time when the normal fuel charge passes through the ports d^2 into the cylinder. In this manner, a cheap and effective explosive charge is introduced into the working cylinder.

The present compound induction valve for introducing, assisting or auxiliary fuel and mixing the same with the combustible charge for the purpose of enriching said charge or producing more effective explosive mixtures, has been primarily devised for use in internal combustion engines, especially for the purpose of dispensing wholly or partly with the use of the rather expensive light liquid hydrocarbons. As hereinbefore stated, inexpensive crude oil, for instance, may be stored in the fuel tank and mixed with or enriched by auxiliary fuel by virtue of the novel compound induction valve.

I claim as my invention:—

1. A compound induction valve for mixing high and low grade combustible fuel, comprising a casing with inlet port to the cylinder of an engine, a tubular slidable valve member longitudinally slotted in expansive contact with the interior surface of the casing and operated by the crank shaft, means in the bottom portion of said valve member for admitting intermittently the low grade fuel charge, and means in said valve member for the admission of high grade fuel and for the discharge of the mixed fuel into the cylinder.

2. A compound induction valve for mixing high and low grade fuel, comprising a casing with inlet port to the cylinder of an engine, a crank shaft operated tubular valve member within the casing in expansive contact with said casing and having a longitudinal slot with enlarged portion, a pin reaching into said slot horizontally alined ports in the valve member adapted to register periodically with the inlet port to the cylinder, an inlet port opposite said horizontal ports for the admission of high grade fuel, and means for keeping said ports normally closed.

3. A compound induction valve for mixing high and low grade fuel, comprising a casing with inlet port to the cylinder of an engine, a crank shaft operated tubular valve member having a longitudinal slot with enlarged portion and in expansive contact with the inner surface of the casing, a pin reaching into the enlarged portion of the slot, means in the bottom portion of said valve member to introduce intermittently low grade fuel, horizontally alined ports in the valve member adapted to register periodically with the inlet port to the cylinder, an inlet port for high grade fuel opposite said horizontal ports, and means for keeping said ports normally closed.

4. A compound induction valve for mixing high and low grade fuel, comprising a casing with inlet port to the cylinder of an engine, a crank shaft operated valve rod, a longitudinally movable valve member within the casing around said rod, a spider on the rod having apertures and contacting with the lower end of the valve member, a gravity plate normally closing said apertures, a perforated top plate on the valve member, a coiled spring pressing the top plate normally down, means in the valve member adapted to communicate with the cylinder and means for introducing auxiliary fuel when the cylinder takes its fuel charge.

5. In a compound induction valve for mixing high and low grade fuel, a tubular slidable valve member having a longitudinal slot with enlarged bottom portion and adapted to make expansive outer surface contact, a pin reaching into the enlarged slot portion, a bottom disk or spider with apertures contacting with the lower end of the valve member, a gravity plate normally closing said apertures, a perforated top plate, means to press said top plate normally downward, horizontally alined ports centrally within the valve member adapted to communicate periodically with the cylinder, and a high grade fuel inlet at approximately the same height as the horizontally alined ports.

6. In a compound induction valve for internal combustion engines, a valve casing, a tubular slidable valve member in expansive contact with said casing and having a longitudinal slot with enlarged portion, a pin reaching into said enlarged portion of the slot to prevent circumferential movement, means to introduce separately low grade fuel and high grade fuel into the tubular valve member where said fuel mixes, and means for discharging the mixed fuel into the cylinder.

Signed at Boston, Mass., 21st day of May, 1913.

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Witnesses:

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