G. A. BARBER & R. J. G. McKNIGHT.

CARBURETER.

APPLICATION FILED APR. 3, 1916.

1,235,180.

Patented July 31, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

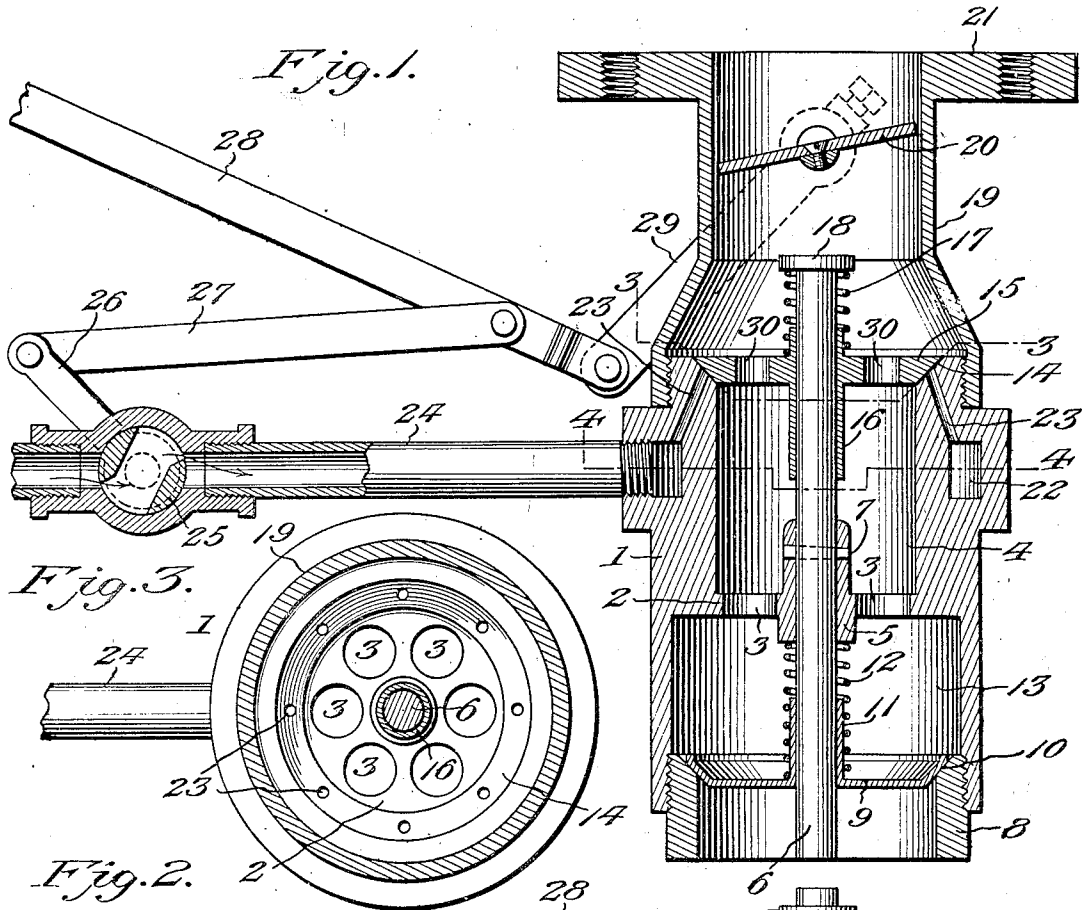


Fig. 3.

Fig. 2.

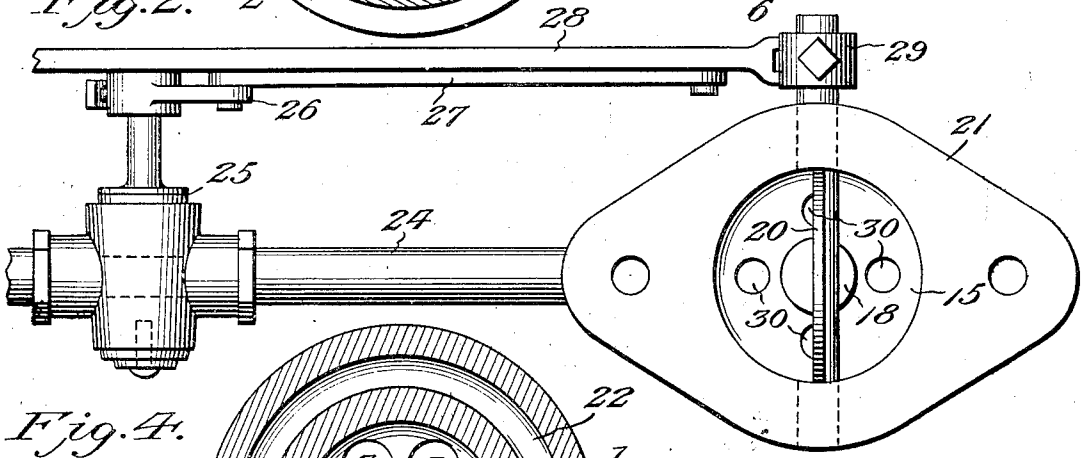
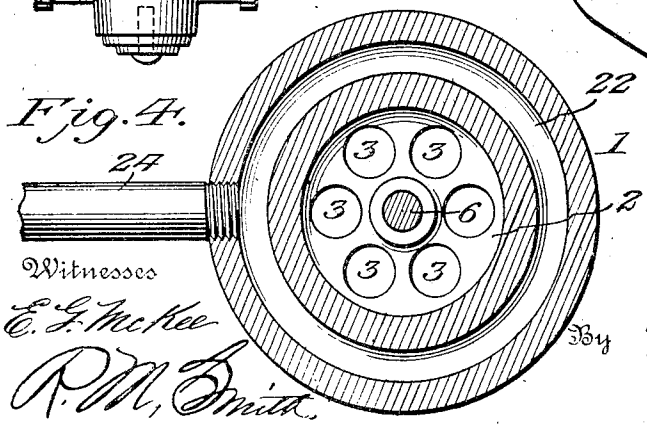


Fig. 4.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 5.

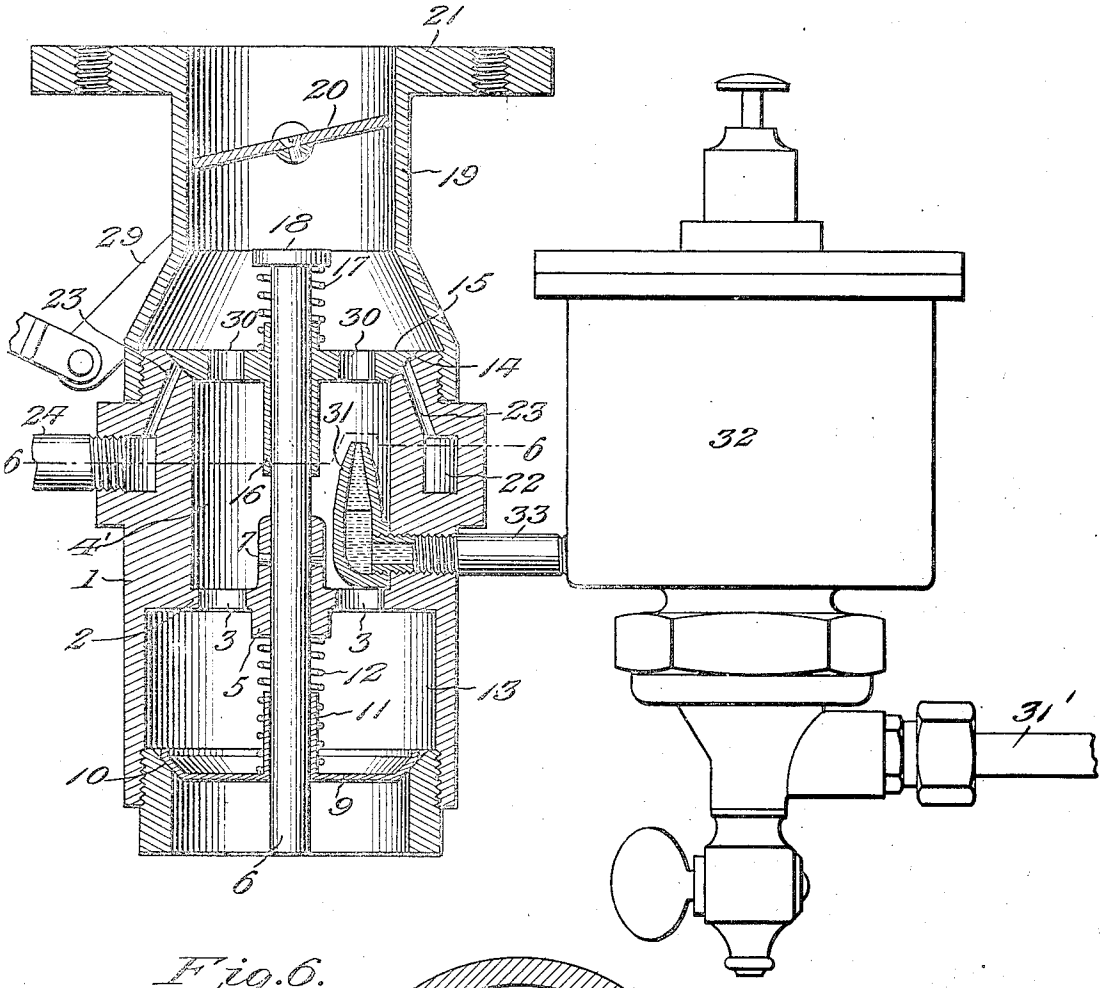
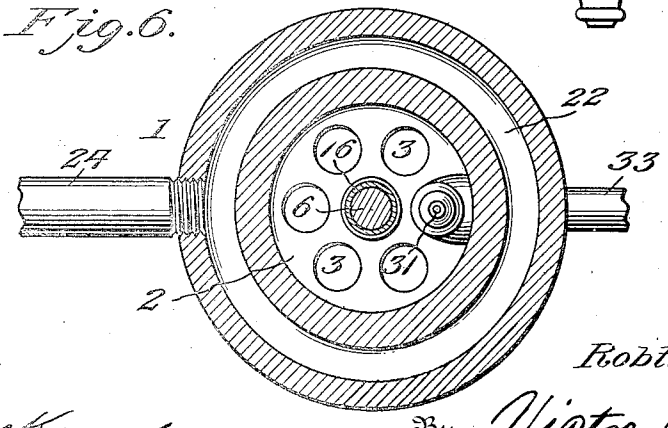


Fig. 6.



Witnesses

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UNITED STATES PATENT OFFICE.

GUY A. BARBER AND ROBERT J. G. McKNIGHT, OF WILKINSBURG, PENNSYLVANIA.

CARBURETER.

1,235,180. Specification of Letters Patent. Patented July 31, 1917.

Application filed April 3, 1916. Serial No. 88,585.

To all whom it may concern:

Be it known that GUY A. BARBER and ROBERT J. G. McKNIGHT, citizens of the United States, residing at Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to carbureters, one of the principal objects of the invention being to produce a carbureter especially designed for the use of natural gas in the operation of internal combustion engines used in self-propelled vehicles, the carbureter embodying special means for mixing air with the natural gas so that an explosive mixture is delivered to the combustion chamber or chambers of the engine.

A further object in view is to provide a novel valve construction forming an essential feature of the invention whereby the air inlet valve of the carbureter is caused to open prior to the opening of the fuel valve thereby insuring the mixing of air with the fuel before passing by the throttle or butter fly valve at the discharge end of the carbureter.

A further object of the invention is to provide in connection with the fluid controlling valve and the throttle or butter fly valve, and connections between said valves whereby the compressed fluid valve is opened slightly in advance of the throttle valve, in order that the supply of natural gas or other fluid under compression may reach the mixing chamber and combine with the air just before the throttle valve is opened to a degree sufficient to provide for acceleration of the engine.

With the above and other objects in view, the invention consists in the novel construction, combination and arrangement of parts, as herein described, illustrated and claimed.

In the accompanying drawings:—

Figure 1 is a diametrical section through the main body of a carbureter embodying the present invention, showing also a portion of the fluid supply pipe and valve, and the throttle and fluid valve operating connections.

Fig. 2 is a plan view of the same showing the throttle valve at full opening.

Fig. 3 is a cross section on the line 3—3 of Fig. 1.

Fig. 4 is a cross section on the line 4—4 of Fig. 1.

Fig. 5 is a view partly in diametrical section and partly in elevation of a complete carbureter adapted for the use of natural gas or the like and also gasolene or other hydrocarbon.

Fig. 6 is a cross section on the line 6—6 of Fig. 5.

Referring to the drawings 1 designates the main body or casing of the carbureter of this invention, the same being provided between the top and bottom thereof with a cross web 2 having formed therein a circular series of ports 3 through which the air passes into the air chamber 4 located directly above the web 2.

The web 2 is formed at the center thereof with a sleeve 5 through which is inserted a guide 6 shown in the form of a pin or rod, the same being held stationary by means of a key 7 inserted through said guide and the sleeve 5.

The lower end of the body 1 is internally threaded as shown to receive a tubular and removable valve seat 8 in conjunction with which operates an air inlet valve 9 having a cone-shaped working face 10 which cooperates with a corresponding working face of the valve seat 8. The valve 9 is provided with a central sleeve or runner 11 movable longitudinally of the guide 6, the valve 9 being held normally seated by means of a coiled expansion spring 12 which is interposed between the valve 9 and the bottom of the sleeve 5. An air chamber 13 is thus provided between the valve 9 and the web 2.

In the upper part of the body 1, the latter is provided with a conical valve seat 14 in connection with which a fuel valve 15 coöperates, said valve being likewise provided with a conical working face. The valve 15 is formed with a central sleeve or runner 16 which is slidable longitudinally of the guide 6, and said valve is held normally seated by means of a coiled expansion spring 17 which is interposed between the valve 15 and a head or annular shoulder 18 on the guide 6. The upper neck portion 19 of the carbureter is shown as threaded thereon and detachable from the main body 1 and contains the usual butter fly or throttle valve 20, the carbureter as a whole being provided with the usual attaching flange 21 by means of which the carbureter may be secured to an engine or to the intake pipe or manifold thereof.

The body 1 of the carbureter is also formed with an annular fluid chamber 22 which surrounds the air chamber 4 and is intersected by a circular series of jet passages 23 which open through working faces of the valve seat 14. Natural gas or other fluid is conducted to the annular chamber 22 by means of a pipe or other suitable connection 24 having incorporated therein a compressed fluid valve 25, the pipe or connection 24 leading to a compressed fluid storage tank or reservoir or container of any suitable description (not shown). The valve 25 has an operating lever 26 which is connected by a link 27 to a throttle valve operating member 28 which is connected to the throttle lever 29 as shown in Fig. 1. The connections just described are so arranged that the valve 25 is opened a little in advance of the throttle valve 20 in order that the compressed fluid may enter the annular fluid chamber 22 so as to be ready to be discharged from the jet openings 23 immediately upon the lifting of the fuel valve 15 from its seat caused by the rush of air from the bottom to the top of the carbureter, said rush of air being in turn brought about by the suction of the piston or pistons in the combustion chamber or chambers of the engine. The fuel valve 15 is formed with a circular series of ports 30 the combined capacity of which is less than the combined capacity of the ports 3 in the web 2.

The carbureter is also adapted to use gasolene or other hydrocarbon by the means illustrated in Fig. 5 in which 31 designates a liquid fuel nozzle discharging upwardly within the carbureting chamber 4′ and communicating with a float and fuel chamber 32 by means of a pipe or other connection 33. The chamber 32 is of the usual construction, containing the usual float which controls the supply of hydrocarbon to the mixing chamber above the valve 15 by regulating the level of hydrocarbon in said chamber.

From the foregoing description, taken in connection with the accompanying drawings, the operation of the carbureter will now be understood as follows. When the operator moves the member 28 in the direction to open the throttle valve 20 for the purpose of accelerating the engine, the compressed fluid valve 25 is first partially opened in advance of any effective degree of opening of the throttle valve 20, thus allowing the natural gas or other fluid to fill the annular chamber 22. Then as the movement of the member 28 is continued in the same direction, more fluid is admitted by the valve 25 to the annular chamber 22 and at the same time the air valve 9 is opened allowing a supply of air to pass into the air chamber 13 through the ports 3 into the chamber 4. The pressure of the air then lifts the valve 15 from its seat and takes up the gas or other fluid which is being discharged through the jet passages 23. In order to provide for a sufficient amount of air to produce an explosive mixture, the valve 15 is provided with the ports 30 above referred to. The greater the suction produced by the pistons of the engine, the greater the degree of opening of the air valve 9 and the fuel valve 15. Only a portion of the inrushing air is needed to take up the gas of other fluid discharged through the passages 23. The opening of the valve 15 is also assisted to some extent by the fluid under pressure conducted into the annular chamber 22 by the pipe 24. When the supply of natural gas or other fluid has become exhausted and it is desired to use gasolene or other hydrocarbon, the valve 25 may be temporarily disconnected from the operating member 28 and left in a closed position. Then the gasolene feed pipe 31′ may be opened by means of the usual stop cock or cut-off (not shown) whereupon the carbureter will operate after the manner of the present day float feed carbureter.

It will be understood that the valve 25 is never fully closed but that it is opened sufficiently to allow enough gas to pass to the carbureter to enable the engine to run at low throttle. Furthermore it is only necessary to have a very small pressure behind the gas, for example, a pressure of four ounces to the square inch and therefore the valve 15 takes care of this pressure and shuts off the gas automatically when the engine is not running, the spring tension on said valve being sufficient to overcome said slight pressure.

We claim:—

1. In a carbureter, a hollow and substantially cylindrical main body formed with an air chamber, a centrally arranged guide extending longitudinally within said body, an air admission valve at the receiving end of the air chamber slidably mounted on said guide, a fuel valve also slidably mounted on said guide and controlling the discharge end of the air chamber, the main body being formed with a valve seat for said fuel valve having a plurality of fuel jet passages intersecting said seat, means for supplying fuel to said jet passages under pressure, and means whereby the air admission valve is caused to open in advance of said fuel valve.

2. In a carbureter, a hollow and substantially cylindrical main body formed with an air chamber, a centrally arranged guide extending longitudinally within said body, an air valve slidable on said guide controlling the admission of air to the body of the carbureter, a fuel valve also slidably mounted on said guide and controlling the dis-

charge end of the air chamber, means whereby the air valve is caused to open in advance of said fuel valve, the main body being formed with an annular fuel chamber encircling the air chamber and having jet passages extending through the seat of the fuel valve, means for supplying fuel to said annular chamber under pressure, a valve controlling said fuel supply means, a throttle valve in the discharge end of the carbureter, and an operating member connected with said compressed fuel valve and throttle valve in such manner that the compressed fuel valve is moved toward its open position slightly in advance of the throttle valve.

3. In a carbureter, a hollow and substantially cylindrical main body formed with an air chamber, a centrally arranged guide extending longitudinally within said body, an air valve controlling the admission of air to the body of the carbureter, a fuel valve mounted on said guide and controlling the discharge end of the air chamber, means whereby the air valve is caused to open in advance of said fuel valve, said fuel valve being ported, and the ported area of said fuel valve being less than the capacity of the air chamber, a fuel nozzle discharging into said mixing chamber, and means for supplying fuel to said nozzle.

In testimony whereof we affix our signatures.

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ROBERT J. G. McKNIGHT.