J. W. BRODERICK.

CARBURETER.

APPLICATION FILED FEB. 26, 1907.

907,123.

Patented Dec. 22, 1908.

3 SHEETS—SHEET 1.

FIG. 3.

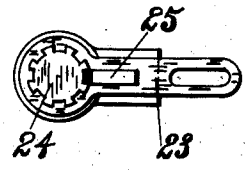


FIG. 2.

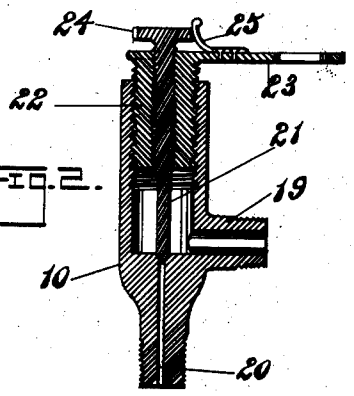
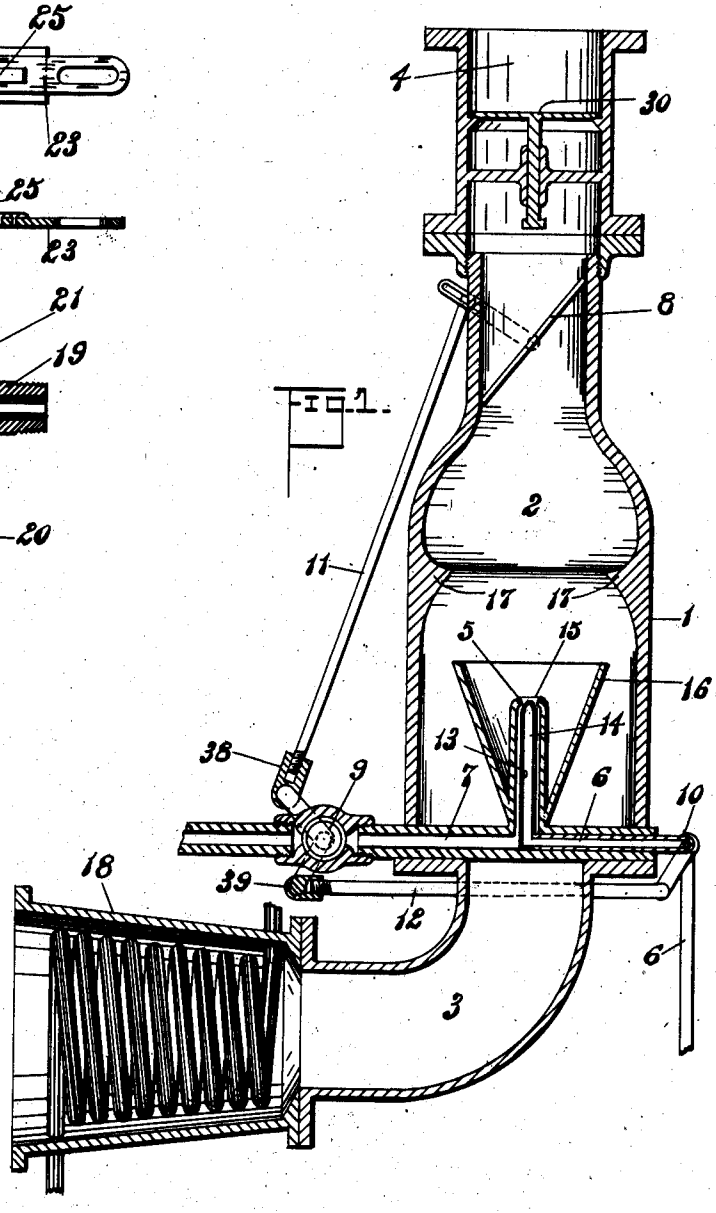


FIG. 1.



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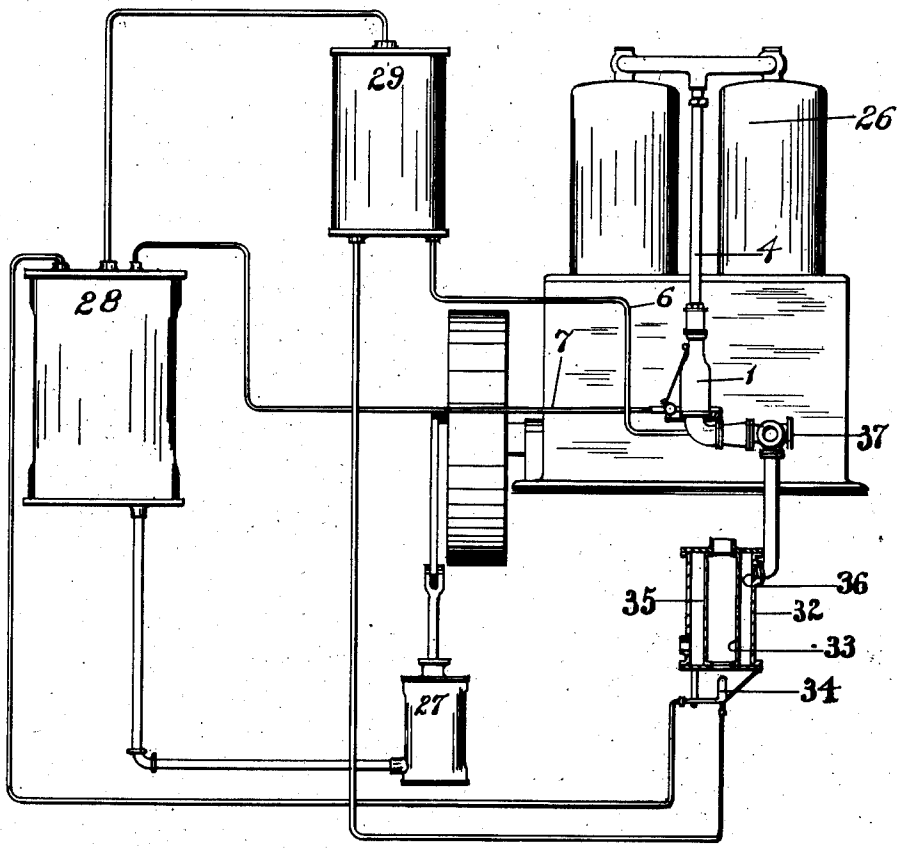
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3 SHEETS—SHEET 2.

FIG. 4.



WITNESSES

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3 SHEETS—SHEET 3.

FIG. 5.

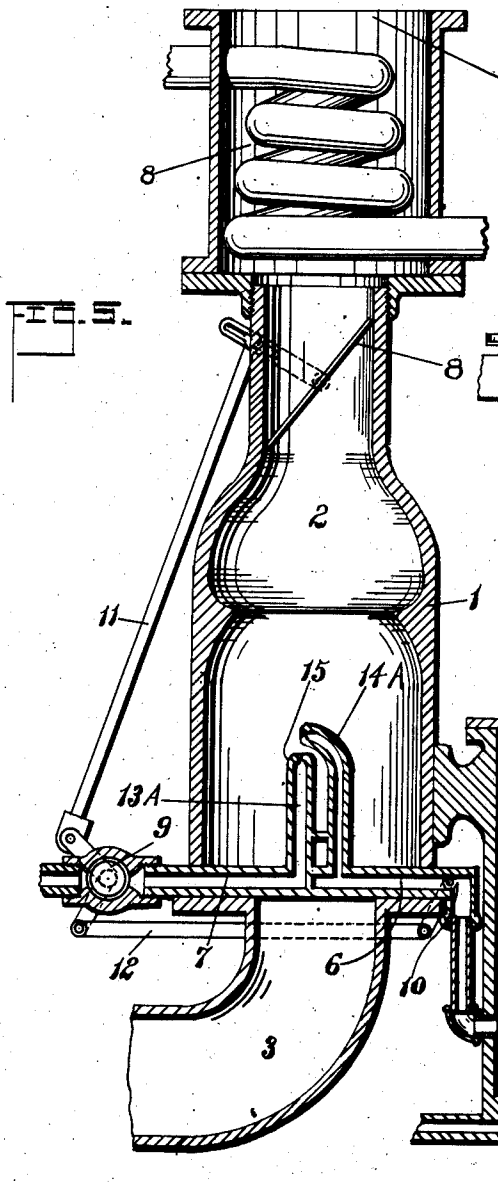
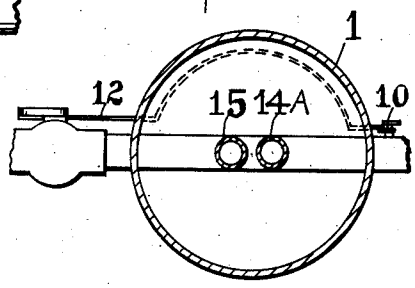


FIG. 6.



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UNITED STATES PATENT OFFICE.

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CARBURETER.

No. 907,123. Specification of Letters Patent. Patented Dec. 22, 1908.

Application filed February 26, 1907. Serial No. 359,426.

To all whom it may concern:

Be it known that I, JOHN W. BRODERICK, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

My invention relates to improvements in carbureters, such as are employed in connection with internal combustion engines using oil as fuel. Most of such carbureters heretofore commonly used are not well adapted for using the heavier grades of gasolene, kerosene, and heavier oils, but substantially require the use of the light oils which, when sprayed into air, even fairly cold air, evaporate or vaporize almost instantly. Such light oils are growing scarce and high in price, and I aim by my invention to provide a carbureter which will use efficiently much heavier oils.

According to my invention, the oil or liquid fuel used is projected as a jet or vapor atomized to a condition of impalpable fineness, into a body of air to be drawn into the engine cylinder; such atomization being performed by means of a jet of air under pressure, supplied from any convenient source, such for example as a special compressor driven by the engine to which such carbureter supplies vapor.

As will be shown hereafter, the construction of the carbureter is such that not only is the oil, even if fairly heavy, atomized to impalpable fineness, but it is mixed thoroughly with the entering body of air. Means are provided for regulating the supply of air under pressure for atomizing the oil, for regulating the supply of oil to the atomizer, for throttling the current of mixed air and oil vapor, for preventing the action of the engine from reacting on the atomizer to prevent or interfere with efficient atomization of the oil, and for heating the entering air at will to cause it to absorb and carry efficiently the atomized oil.

My invention consists in an atomizer arranged to discharge oil vapor into a mixing chamber and operated by compressed air; in means for heating the air, either before mixture with the atomized oil or afterward; in means for regulating at will the rate of flow of oil, air under pressure, and mixed air and oil vapor; in means for preventing the action of the engine from interfering with the action of the atomizer and in various other features herein described and more particularly pointed out in the claims.

In the accompanying drawings I illustrate certain forms of carbureters embodying my invention.

In said drawings: Figure 1 shows a central vertical section of one form of said carbureter; Fig. 2 shows an axial section of the needle valve thereof; Fig. 3 an end view of the adjusting devices of such needle valve; Fig. 4 a diagrammatic view showing said carbureter supplying gas to an engine which latter in turn, operates an auxiliary pump supplying air under pressure for the atomizer of said carbureter; Fig. 5 shows a central vertical section of an alternative form of carbureter; and Fig. 6 shows a horizontal section of the carbureter, looking downward.

Referring first to Figs. 1 to 4 inclusive, 1 designates the casing of the main section of the carbureter, 2 a mixing chamber therein, 3 an air inlet pipe, 4 a passage leading to the engine or other object to which the combustible mixture of air and atomized oil is to be delivered, 5 an atomizer, 6 a pipe for supplying thereto the oil to be atomized, 7 a pipe for supplying to the atomizer the air under pressure for effecting the atomization, 8 a throttle valve of the butterfly type near the outlet to chamber 2, 9 a valve controlling the supply of air under pressure through pipe 7, 10 a valve for controlling the supply of oil to the atomizer, 11 a link operatively connecting valves 8 and 9, and 12 a link operatively connecting valves 9 and 10; the construction being such that when the throttle valve is closed or opened more or less, as such a valve frequently is for regulating the speed and power of the engine to which the oil vapor is supplied, the supply of air and oil will be regulated proportionately.

The atomizer shown in Fig. 1 is of familiar construction, comprising an annular air passage 13 connected with air supply pipe 7, and a central passage 14 for the oil, connected to pipe 6, said passage 13 having just above the orifice at the upper end of passage 14 a contraction leading to a contracted orifice 15. It is well known that when oil is supplied to the inner passage of such an atomizer, and air under pressure is supplied to such an annular passage, the oil issuing from passage 14 is atomized effectively and projected as a fine vapor into the space beyond, the fineness of the spray depending upon the viscosity and other quali-

ties of the oil, the proportions of the parts, the air pressure used, and other well known conditions.

Air from the air inlet pipe 3 enters the space around the atomizer 5 through the bottom thereof and passes up around the atomizer; and to prevent interference of such air current with the atomizing of the oil and the spreading out of the oil cloud formed by the atomizer, I provide around said atomizer 5 a flaring deflector 16. Above said deflector the chamber is contracted slightly, as indicated at 17, so that the annular air envelop rising around the oil cloud projected from the atomizer is caused to turn inward and mingle with such oil cloud; the mixing occurring mainly within mixing chamber 2. In this way I produce within the carbureter a body of air having in mechanical suspension a mist of exceedingly fine droplets of oil. Such a mixture ignites substantially as readily as a mixture of gas and air; but the condition of minute subdivision of the oil in suspension in the air favors greatly the evaporation of the oil to a true gas before it reaches the engine cylinder, and it is improbable that in most cases any oil, as such, reaches the engine cylinder. It will be noted, however, that the mixture of the oil vapor with the air is accomplished without the fractional evaporation common in many carbureters, which leads to the deposit of a portion of the heavier constituents of the oil used and is one of the great obstacles to the use of kerosene, the highly volatile constituents of which are relatively small in amount.

In order to facilitate the absorption of the oil vapor in the air I commonly heat the latter, either initially, as indicated in Fig. 1, or after mixture with the oil vapor as indicated in Fig. 5, referred to below. In Fig. 1 I show for this purpose a chamber 18, attached to air supply pipe 3, in which is a pipe coil through which may be passed the engine exhaust, or a portion of it, or the jacket water from the engine, or steam or other heating fluid from any convenient source.

The needle valve 10 controlling the supply of oil is shown particularly in Figs. 2 and 3, and comprises a valve body having an inlet connection 19, a discharge duct 20, a valve plug 21 for closing the same more or less, and means for adjusting said plug. For quick adjustment of said valve, a bushing 22 screwing into the end of the valve body is provided, said bushing having an arm 23 connected to the link 12 for operating the valve; and for closer and permanent adjustment of the valve, the plug 21 screws into said bushing 22, the threads connecting the plug and bushing being relatively fine as compared with the threads connecting the bushing and valve body. The valve plug 21 has a head 24 provided with notches, into which a locking spring 25 is adapted to enter to hold the plug in adjustment with respect to said bushing 22.

In Fig. 4 I have shown an engine 26 taking fuel from a carbureter such as shown in Fig. 1, and in turn operating a compressor 27 delivering air under pressure into a tank 28, from which the pipe 7 for supplying air under pressure to the atomizer leads. As indicated in this figure, the oil is supplied to this atomizer from a pressure tank 29, air pressure above the oil being supplied from the same air tank 28.

In some cases, the alternate opening and closing of the admission port or ports of the engine may cause a pulsating action in the fuel supply pipe, which possibly might interfere with the atomizing of the oil in the carbureter. Therefore in such cases I provide a simple check valve 30 which closes in case of back flow of gas in the engine supply pipe, but is normally kept open by the flow of gas toward the engine. This check valve is also useful to protect the carbureter and the explosive mixture therein in case of back fire from the engine into its supply pipe.

In Figs. 5 and 6 I illustrate a similar carbureter, except that a slightly different form of atomizer is used; the oil duct, 14^A, being located at one side of the air tube, 13^A, and turned over at the end so that its orifice is directly in line with the blast of air issuing from said air tube. In this second form of carbureter, also, I have shown the flow of the oil controlled by a float valve 31, as well as by a needle valve 10; the use of such float valves being common when the oil is drawn into the carbureter by gravity or when the pressure under which the oil is fed to the carbureter is low. In Fig. 5 I have also shown the air heating device 18 located beyond the mixing chamber 2.

In starting up the carbureter and engine, particularly in cold weather, it will frequently be desirable to heat the air initially from a source external to the engine. To this end I may provide, as indicated in Fig. 4, an auxiliary air heater 32, adapted to heat the air by means of a flame. In the construction shown, the heater 32 has a central flue 33, at the bottom of which is an ordinary atomizing burner 34; and around said flue is an air heating chamber 35, the outlet 36 of which may be connected to the inlet pipe 3 of the carbureter, by a three-way valve 37.

In order to permit adjustment of the relative positions and degree of opening of the various valves, I connect the link 11 to the arm of butterfly valve 8 by a clamp working in a slot of said arm, so that the point of connection may be shifted in or out as desired; and I further connect said link to the arm of valve 9 by a screw-connection 38 per-

mitting lengthening and shortening of said link at will. I provide a similar screw-connection 39 in link 12, so permitting relative adjustment of the action of valves 9 and 10.

What I claim is:—

1. In a carbureter, the combination of a tubular mixing chamber having closed sides and an open bottom, an atomizer projecting into the mixing chamber upward through said open bottom and having separate passages with adjacent nozzles, means for supplying fuel and air under pressure to said nozzles, and an upwardly and outwardly flaring protector closed at its lower small end against the outside of the atomizer and extending upward beyond the nozzles.

2. In a carbureter, the combination of a mixing chamber, an atomizer arranged to discharge into said mixing chamber, means for supplying fuel and air under pressure to said atomizer, rotary valves adapted to regulate the flow of air to said atomizer and of fuel-charged air from the carbureter, and a rod connecting said valves at points radially outward from their axes of rotation.

3. In a carbureter, the combination of a mixing chamber, an atomizer arranged to discharge into said mixing chamber, means for supplying fuel and air under pressure to said atomizer, rotary valves adapted to regulate the flow of air to said atomizer and of fuel-charged air from the carbureter, radial arms projecting from the axes of rotation of said valves, and longitudinally adjustable means connecting said arms.

4. In a carbureter, the combination of a mixing chamber, an atomizer arranged to discharge into said mixing chamber, means for supplying fuel and air under pressure to said atomizer, rotary valves adapted to regulate the flow of air to said atomizer and of fuel-charged air from the carbureter, arms extending outward from the axes of rotation of said valves, one of said arms being slotted, and a rod connecting said arms and being adjustable in the said slot.

5. In a carbureter, the combination of a mixing chamber, an atomizer arranged to discharge into said mixing chamber, means for supplying fuel and air under pressure to said atomizer, rotary valves adapted to regulate the flow of air and of fuel to said atomizer and of fuel-charged air from the carbureter, and means for operating all said valves together.

6. The combination of a mixing chamber having an outlet and an air inlet, an atomizer adapted to project fuel vapor into said mixing chamber, a burner arranged to supply heated air to said air inlet of the mixing chamber, a fuel reservoir, means for supplying fuel from said reservoir to said atomizer and said burner, and means for supplying air under pressure to said atomizer and said burner.

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