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F. W. SICKLES.

CARBURETER.

APPLICATION FILED NOV. 9, 1906.

Fig. 2.

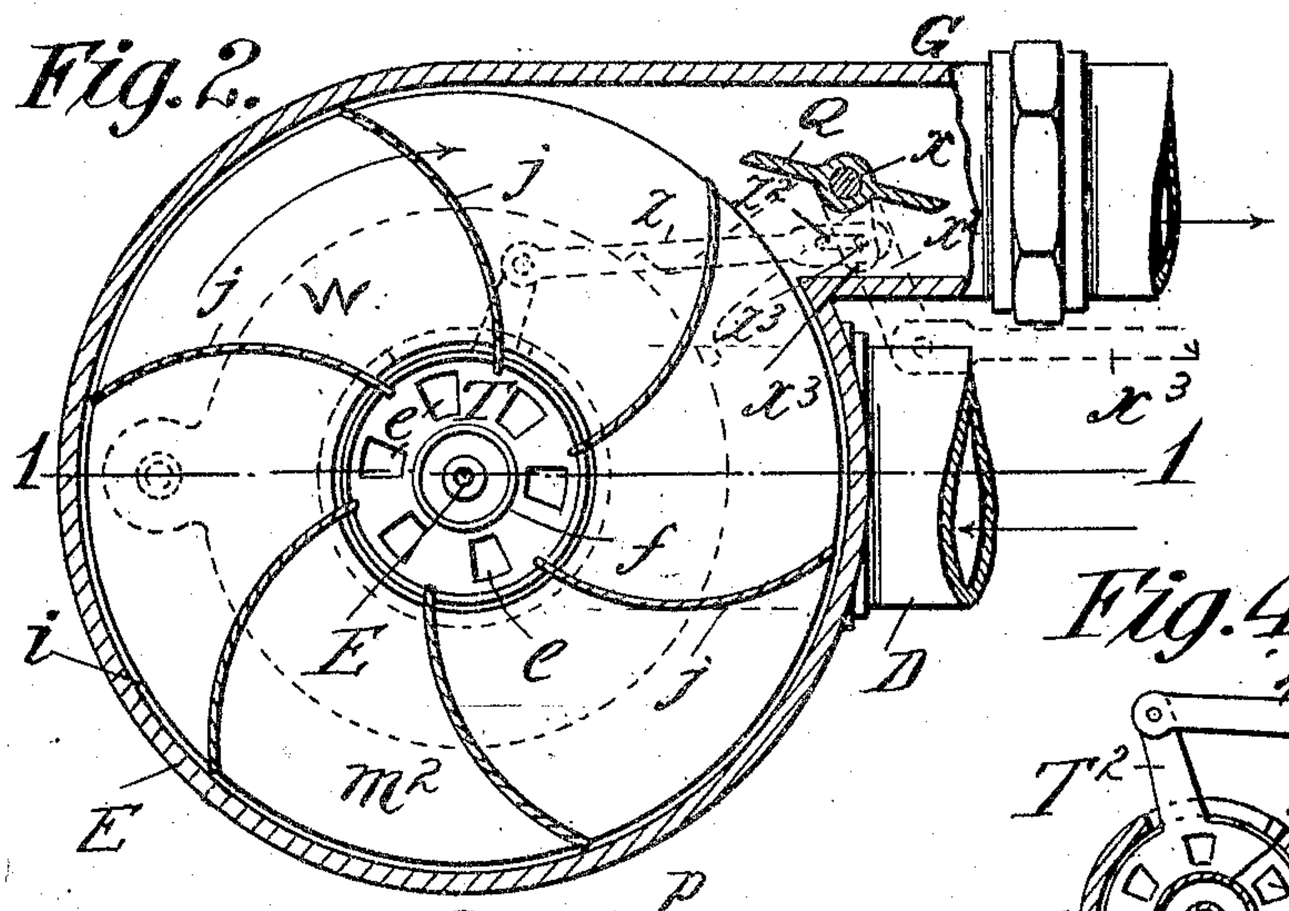

Fig. 5.

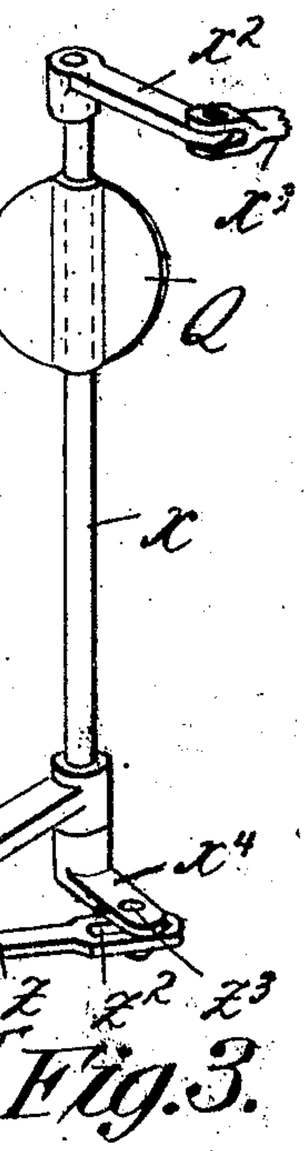

Fig. 4

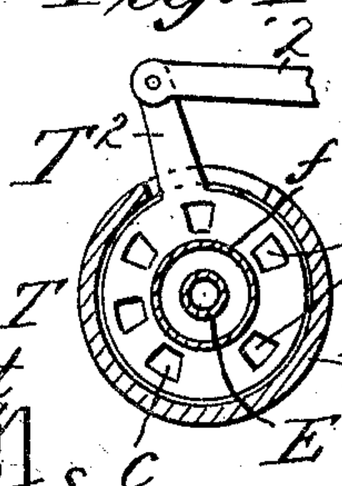

Fig. 1.

Fig. 3.

Witnesses,
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UNITED STATES PATENT OFFICE.

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CARBURETER.

No. 864,111. Specification of Letters Patent. Patented Aug. 20, 1907.

Application filed November 9, 1906. Serial No. 342,709.

To all whom it may concern:

Be it known that I, FRANK W. SICKLES, a citizen of the United States of America, and a resident of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Carbureters, of which the following is a full, clear, and exact description.

This invention relates to carbureters of the character most commonly employed in conjunction with gasolene engines and has for its object to provide improvements in the apparatus to result in a better operation of the carbureter and a largely increased reliability and efficiency of the gas engine with which it may be combined.

The invention comprises improved arrangements and provisions whereby, by the employment of a rotary fan, in a chamber therefor, into which the gasolene nozzle pipe is directed, and into which the air supplying conduit leads, and which chamber has a conduit leading therefrom for connecting with the gasolene engine cylinder or cylinders, the gasolene and air are not only thoroughly commingled in said chamber, but will be introduced into the engine cylinders, not only by the suction action of the pistons, but also by the positive forcing action of the rotary fan, assuring a full cylinder of gas.

The carbureter also comprises improved means for the continuous driving of the fan; and the invention furthermore comprises improved means for increasing and diminishing the quantities of air which may be drawn into the carbureter and delivered therefrom quantitively proportionate, as desired relatively to the quantity of the liquid fuel permitted to be delivered.

The improved carbureter is hereinafter fully described in connection with the accompanying drawings and set forth in the claims.

In the drawings,—Figure 1 is a central vertical sectional view of the carbureter. Fig. 2 is a horizontal section on line 2—2, Fig. 1. The line 1—1, on Fig. 2 indicates the plane of section of Fig. 1. Fig. 3 is a horizontal sectional view on line 3—3, Fig. 1., Fig. 4 being a horizontal section of parts on the lower plane indicated by line 4—4, Fig. 1. Fig. 5 is a perspective view showing conjointly operating valves or dampers for regulating the air admission into and the vapor egress from the carbureter.

Similar characters of reference indicate corresponding parts in all of the views.

In the drawings,—A represents an annular gasolene receptacle, of which *a* represents the float chamber and B the float,—C representing the liquid fuel inlet controlled by a weighted valve *b* subject to actuation through the lever b^2 by the float whereby a practically uniform quantity of gasolene may be maintained in the float chamber up to the level, for instance represented by the line *y*—*y*.

D represents a comparatively large conduit for air, the same comprising a quarter bend coupling *d*, the upwardly extended portion of which is fitted within the lower portion of the central opening in the annular float receptacle A,—the air coming through this conduit D being, accordingly as preferred, atmospheric air or heated air supplied from a muffler appurtenant to the gasolene engine in conjunction with which the carbureter is used.

f represents a tube vertically and centrally disposed within the central opening in the gasolene receptacle, the same being open at its top and bottom; and centrally within and separated from the wall of the tube *f* is the gasolene nozzle pipe E having the jet opening at its upper end, in the axis of the carbureter and slightly above the liquid fuel level.

g represents a gasolene way leading from the bottom of the receptacle A to connection with the lowered end of the nozzle pipe E; and *h* represents a needle valve for regulating the amount of the liquid fuel which may be delivered in conjunction with a comparatively large or small proportion of air through the carbureter.

F represents a hollow casting or casing of cylindrical form having a circular fan chamber *i* therein, provided with a depending circular internally threaded flange j^2 screw engaged on the upper portion of the gasolene receptacle and having a central circular opening *k*, the inner wall of which is closely fitted about the inner circular wall k^2 of the receptacle, these connected or engaged parts making the upper closure for the receptacle.

G represents a tangentially arranged conduit or hollow limb horizontally leading from the fan chamber and for connection with the gasolene engine cylinder.

W represents an axially vertical rotary fan in and substantially filling the said circular fan chamber *i*.

The approximately radiating blades of the fan are curved from their inner to their outer end, as shown in Fig. 2, and are carried between upper and lower plates *m*, m^2, the lower plate being constructed with a circular aperture of about the same diameter as the opening within the gasolene tank; and the blades are recessed at their inner and lower portions, as represented at *n*, to provide a gasolene and air entrance space which is in communication with the radiating spaces between the blades and upwardly into or towards which the circular vertical air passages through the carbureter and nozzle pipe are directed.

The fan case F is internally screw threaded near the upper edge of its surrounding vertical wall and receives the engagement therewithin of an edgewise threaded cap or cover *o*, the same having a central vertical hol-

therethrough for one bearing of the vertical and upwardly extending fan shaft or arbor, the upper journal of which has bearing in a journal hole formed in the horizontal portion *p* of a bracket M which is supported on the cover of the fan case.

The fan shaft is provided with a friction wheel N, the same comprising a disk of leather or other appropriate frictional material *q* clamped between metallic sections q^1 and q^2, the leather disk being of slightly greater diameter than the metallic section. The said friction wheel is vertically adjustable on the shaft L and has the set screw for confining it higher or lower relatively to the axis of the friction disk O, as may be desired.

The friction disk O is carried on an arbor P horizontally journaled in bearings therefor in the intermediate portion of the bracket M, and is provided with a grooved pulley *s* for receiving the driving engagement therewith of a band *t*, a continuous progressive movement of which is to be imparted from any driven part of the gasolene engine or other source of power or medium of transmission. The bracket is shown as having a circular cavity or chambered enlargement *u* within its side towards the disk in which is nested a helical spring *v* which reacts against a washer *w* between which and another washer w^2 are a plurality of anti-friction balls, one of said washers being loose relatively to the shaft while the other is affixed to, and rotates as one with, the shaft. The shaft having a degree of end play in its bearing the disk thereon is kept in yielding contact against the edge of the friction wheel on the fan shaft to drive the latter comparatively fast or slow accordingly as the wheel is positioned farther or nearer to the center of the disk.

A circular damper plate or valve Q is movably mounted axially vertically within the tangentially arranged conduit G leading from the fan chamber, the same being carried by a vertical stem or spindle *x* which is journaled through the upper and lower walls of the said conduit. The said stem has at its upper end a lever arm x^2 receiving connection therewith of an actuating rod x^3 the same being understood as extended from any conveniently accessible location; and the said stem has at its lower end another lever arm x^4.

The annular space between the air tube *f* which is open at its top and bottom, and the inner circular wall of the annular gasolene receptacle is provided with an annular plate R having a series of apertures *e* in circular arrangement; and fitted about the lower portion of the air tube *f* and sustained by the lower end flange f^2 thereof is a partially rotatable register plate T having a circular series of holes adapted to register with, or to be offset from, the hole *e* of the plate R. The register plate has a lever arm T^2 pivoted to which is one end of a link *z*, the other end having a slot z^2 in which plays with a lost motion a stud z^3 projected from the lower lever arm x^4 of the damper valve stem.

Assuming that the damper valve is completely closed, the movements of the stem *x* for so closing it will also close the register valve; and then assuming it is desired to start the engine, a rotational movement of the stem in small degree will cause a partial opening of the damper valve so that, initially, a rich charge (the proportion of air being only such as will pass upwardly through the tube *f*) may be delivered into the cylinder, and then when full free charges of the vapor are desired to be delivered into the cylinder after the engine is well under way, a suitably proportionate amount of air being introduced with the gasolene, the further movement of the valve stem through its operating connection to nearly or fully open the damper valve will correspondingly nearly or fully open the air register or valve.

By the employment of a fan above and as a part of the carbureter, the liquid fuel and air brought into intimate relations within the dome shaped space at the lower central portion of the fan, as acquired by the recessed formations of the fan blades, as shown at *n*, will become thoroughly mixed and driven forcibly into and through the conduit G and thence into the engine cylinder or cylinders under the impetus of the fan additional to the suction action in the cylinder or cylinders by the engine piston or pistons, assuring always a full cylinder of gas with the advantages consequent thereto.

The driving means for the rotary fan here illustrated and described, is one which precludes breakage of the parts and driving connections in cases of "back firing". It will further be appreciated that under some running conditions, and when the throttle or damper valve is closed and a body of compressed air is confined in the fan case, a slipping in the frictional driving devices will be possible to prevent injurious results within the carbureter.

The fan case together with the fan driving means may be readily bodily disconnected from the remainder of the carbureter as is found to be very desirable at times for adjustment, repairing, or replacement of parts.

This invention has been embodied in carbureters different from the one here shown as to matters of detail construction, with corresponding advantageous results following the employment of the carbureter designed as constructed specifically as here shown; and I may, therefore, depart from the precise structural form of parts and details which are here illustrated without departing from my actual invention and without sacrificing the advantages thereof.

I claim:—

1. A carbureter comprising an annular axially vertical receptacle having a central upwardly open passage therethrough and having a tube vertically and centrally disposed within said passage open at top and bottom, a nozzle tube centrally within, and separated from the walls of, said tube, and a valve-provided way leading from the annular receptacle to said nozzle tube, a cylindrical enlarged casing provided above the receptacle and to the center of which said central opening in the receptacle communicates, and having a tangentially located conduit leading therefrom towards the cylinder, an axially vertical rotary fan in said chamber, and means for rotating the fan.

2. A carbureter comprising a central vertically apertured annular receptacle, a cylindrical casing thereabove into the chamber of which the center opening through the receptacle leads and having a conduit leading therefrom for connection with a gas engine cylinder, a nozzle pipe within said central opening directed upwardly towards said chamber, and a valv[illegible] conduit connecting the receptacle with said nozzle pip[illegible] an axially vertical fan in said chamber having the blades thereof recessed at their inner and lower portions to provide a gasolene and air entrance space in communication with the radiating spaces between the blades, and means for rotating said fan.

3. A carbureter comprising a central vertically apertured annular receptacle, a cylindrical casing thereabove into the chamber of which the central opening through the receptacle leads, and having a conduit leading therefrom, a nozzle pipe within said central opening and directed up-

wardly towards said chamber, a valved conduit connecting the receptacle with said nozzle pipe, a rotary fan in said chamber having a central upwardly extended shaft provided with a wheel, a friction disk in facewise contact against the edge of said wheel, a spring for forcing the disk yieldingly to such contact, and means for rotating the friction disk.

4. A carbureter comprising a central, vertically apertured annular receptacle, a cylindrical casing thereabove into the chamber of which the central opening through the receptacle leads and having a conduit leading therefrom, and a nozzle pipe within said central opening and directed into said chamber, a valved conduit connecting the receptacle with said nozzle pipe, a rotary fan in said chamber having a central upwardly extending shaft provided with a wheel vertically adjustable thereon, a friction disk in facewise contact against the edge of said wheel, a spring for forcing the disk yieldingly to such contact, and means for rotating the friction disk.

5. A carbureter comprising an annular receptacle, a cylindrical fan casing thereabove into the chamber of which the central opening through the receptacle leads and having a conduit leading therefrom for connection with a gas engine cylinder, a nozzle pipe within said central opening and directed upwardly towards said chamber, a valved conduit connecting the receptacle with said nozzle pipe, a horizontal apertured wall across the opening through the receptacle, an apertured register plate movably fitted to open and close the apertures in said wall, a valve or damper in said conduit leading from the said fan-chamber, having an actuating stem, a connection between the said stem and said register plate, whereby the latter may be operated by said stem, a bladed fan in said fan chamber and means for rotating it.

6. A carbureter comprising an annular receptacle having the central opening passage therethrough vertical, a nozzle tube centrally within the vertical opening through said receptacle, a valve-provided conduit leading from the receptacle to the lower end of said nozzle tube, and the said opening through the receptacle having a lower wall provided with a circularly arranged series of apertures, and having an apertured register plate movable in relation thereto and provided with a lever arm, a cylindrical casing provided above the receptacle and to the center of which said central opening of the receptacle communicates, and having a tangentially located conduit leading therefrom for connection with a gas engine cylinder, a valve or damper in said conduit having an operating stem and means for operating said stem, a lost motion connection between the said stem and the register lever-arm, whereby said valve may have extents of opening, and closing movements before the register will have opening and closing movements imparted thereto, an axially vertical rotary fan in said chamber, and means for rotating the fan.

7. A carbureter comprising an annular gasolene receptacle, the central opening therethrough being vertical and having a tube vertically and centrally disposed within said opening, open at top and bottom, a nozzle tube centrally within and separated from the wall of said receptacle, and a valve provided conduit leading from the gasolene receptacle to the lower end of said nozzle tube, an enlarged cylindrical casing provided above the receptacle and to the center of which said central opening in the receptacle, and the tube within said opening, communicate, having a tangentially located conduit leading therefrom for connection with an engine cylinder, an axially vertical rotary fan in said chamber, and means for rotating it, an apertured wall across the space between the boundary of said receptacle opening and the tube therewithin, an apertured register plate immovably fitted against the said apertured wall and having a lever arm, a damper in said conduit leading from the fan chamber, and having a vertically operating stem provided at one portion with a lever, through means of which it is operated, and having at the other portion thereof a lever arm, and a link pivoted to the lever arm of said register plate having a stud and slot connection with the second named lever arm of the said damper stem.

8. A carbureter comprising a central vertically apertured annular receptacle, a cylindrical fan casing thereabove into the chamber of which the central opening through the receptacle leads and having a conduit, leading therefrom, for connection with an engine cylinder, a nozzle pipe within said central receptacle opening directed upwardly towards the said chamber, and a valved conduit connecting the receptacle with said nozzle pipe, a bracket supported on said fan casing having at its upper part a horizontally extended arm, a rotary fan in said chamber having a central shaft vertically extended and journaled through the top of said fan casing and in said horizontal arm of the bracket and provided with a wheel, a shaft journaled horizontally through an intermediate part of said bracket, having on its outer end a driving pulley, and having on its inner end a friction disk in facewise bearing against the edge of said fan-shaft-wheel, and a spring disposed in a chamber therefor in the bracket for forcing the disk yieldingly against said wheel.

Signed by me at Hartford, Connecticut in presence of two subscribing witnesses.

FRANK W. SICKLES.

Witnesses:
JOSEPH L. BARBOUR,
E. M. EVANS.