H. N. EDENS.

CARBURETER.

APPLICATION FILED JAN. 23, 1914.

1,237,490.

Patented Aug. 21, 1917.

2 SHEETS—SHEET 1.

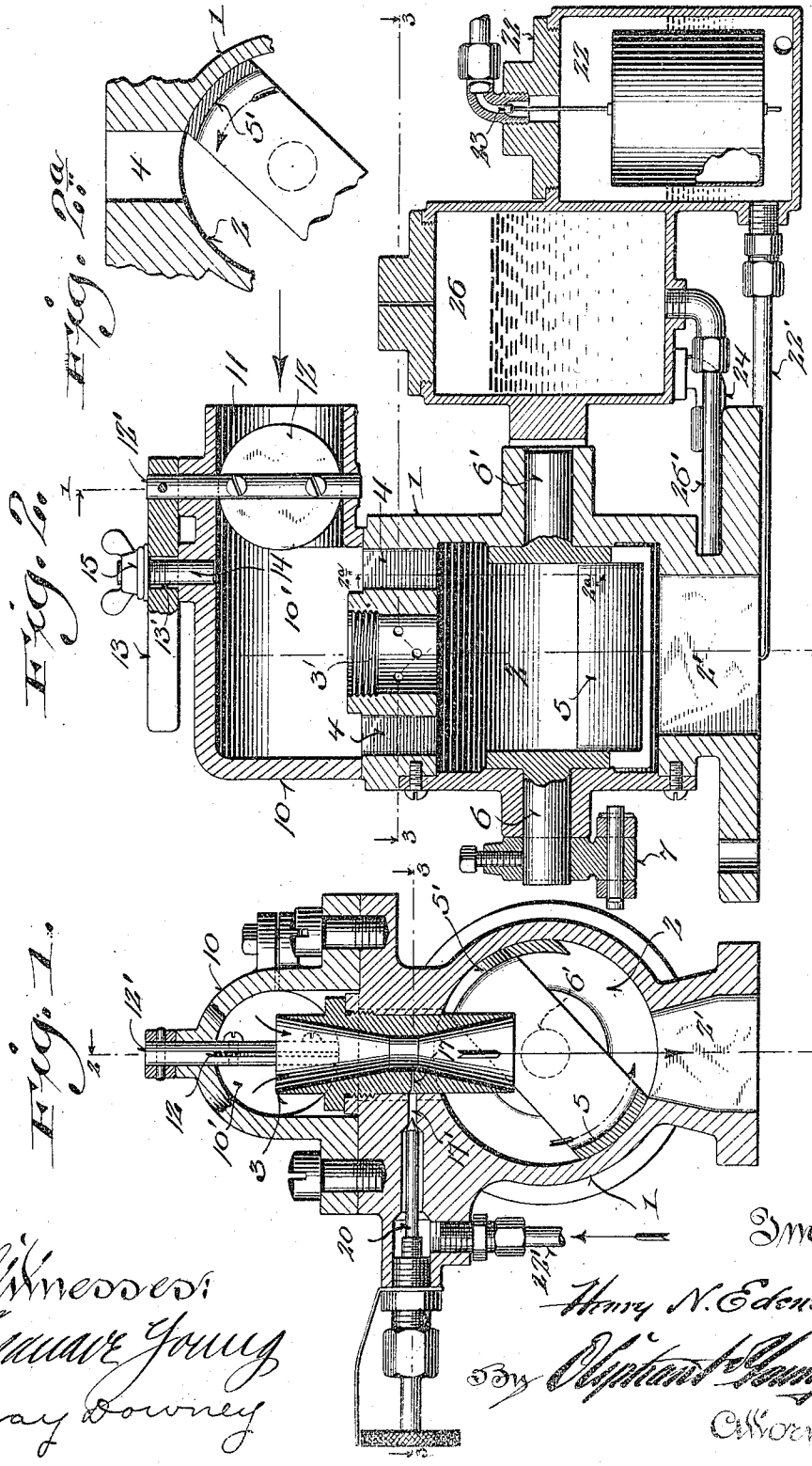

Fig. 2a.

Fig. 2.

Fig. 1.

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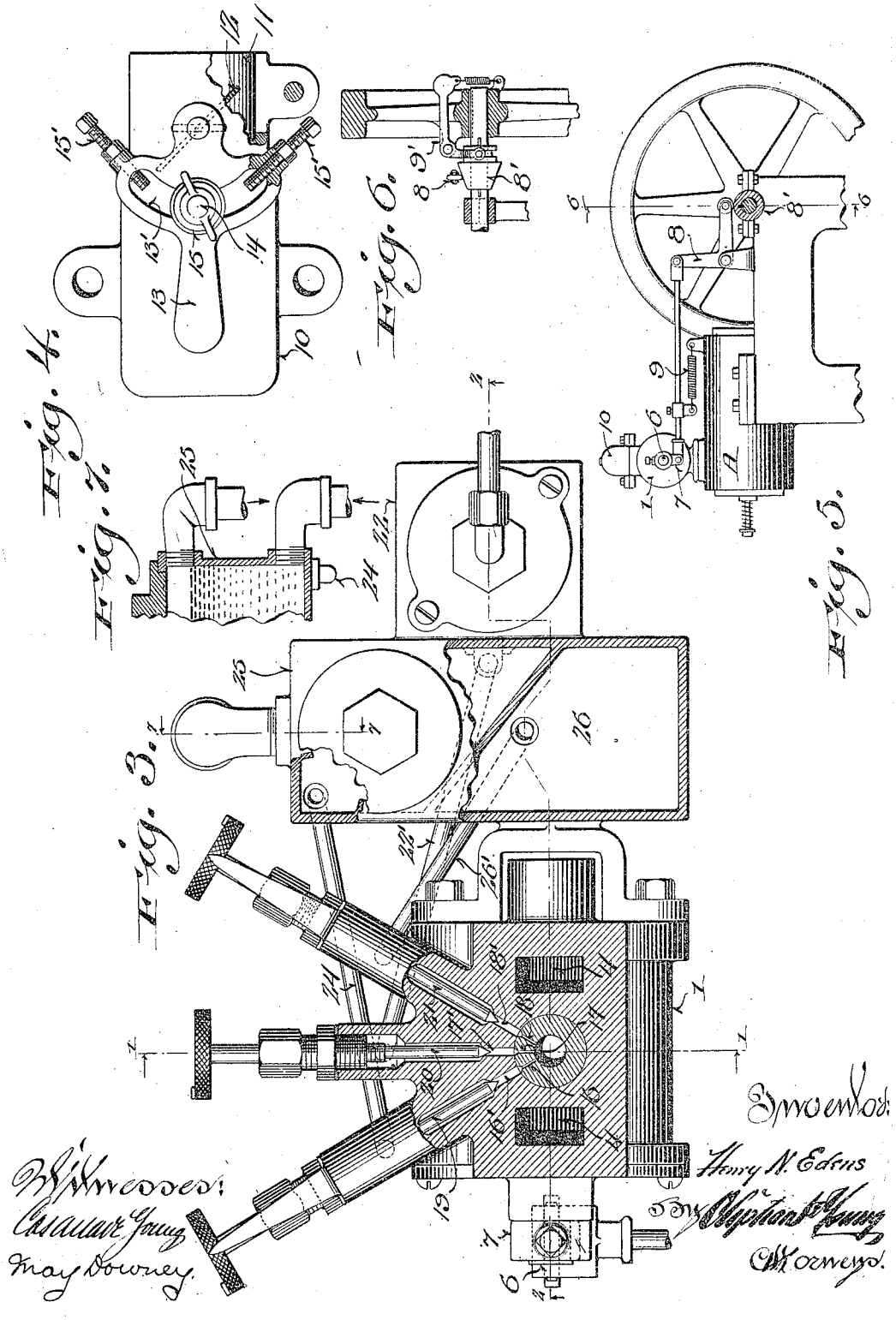

UNITED STATES PATENT OFFICE.

HENRY N. EDENS, OF NEW HOLSTEIN, WISCONSIN.

CARBURETER.

1,237,490. Specification of Letters Patent. Patented Aug. 21, 1917.

Application filed January 23, 1914. Serial No. 813,840.

To all whom it may concern:

Be it known that I, HENRY N. EDENS, a citizen of the United States, and resident of New Holstein, in the county of Calumet and State of Wisconsin, have invented certain new and useful Improvements in Carbureters; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention refers to carbureters, its primary object being to provide means for automatically controlling the supply of fuel oil from a predeterminedly fixed flow orifice through variation of a partial vacuum induced by restricting and increasing air passages through the carbureter. The essential feature of my invention for attaining the above mentioned ultimate result is the provision of an air nozzle of the Venturi tube type operating in conjunction with a valve-controlled air port, through which nozzle an air current is maintained having a constant high velocity. My invention is particularly designed for use in connection with kerosene as a fuel, having an auxiliary supply of gasolene that is adapted to be utilized as a starting medium.

With the above objects in view the invention consists in certain peculiarities of construction and combination of parts as hereinafter set forth with reference to the accompanying drawings and subsequently claimed.

In the drawings

Figure 1 represents a longitudinal sectional view of a carbureter embodying the features of my invention, the section being indicated by line 1—1 of Fig. 2;

Fig. 2, a central sectional elevation of the same, the section being indicated by line 2—2 of Fig. 1;

Fig. 2ª, a detailed section illustrating one of the air ports leading to the mixing chamber of the carbureter and an associated controlling valve therefor;

Fig. 3, a plan view of the carbureter, the same being partly broken away and in section, the section being indicated by line 3—3 of Figs. 1 and 2;

Fig. 4, a detailed plan view of the air intake hood;

Fig. 5, a diagrammatic view showing a gas engine in elevation equipped with a carbureter embodying the features of my invention under governor control;

Fig. 6, a detailed cross-section of the engine shaft showing a fragment of the governor mechanism, and

Fig. 7, is a detailed view showing the kerosene reservoir partly broken away and in section, particularly illustrating the feed and overflow pipe connections with said reservoir.

Referring by characters to the drawings, 1 represents a casing having a cylindrical mixing chamber 2 formed therein and provided with a delivery port 2′, through which port the fuel charge is discharged into the combustion end A of an engine cylinder, as best shown in Fig. 5 of the drawings. As best shown in Figs. 1 and 2, of the drawings, a partition wall of the mixing chamber 2 is provided with a threaded aperture 3′ for the reception of an air nozzle 3, which nozzle extends into the mixing chamber, having a throat flared in opposite directions toward its ends from a contracted waistline in the form of a double cone frustum or Venturi tube. The purpose of this peculiarly shaped nozzle is to obtain a restrictive area and a correspondingly high velocity at the point of fuel admission.

The partition wall of the mixing chamber 2 is also provided with an alined twin auxiliary ports 4, 4, which ports are upon opposite sides of the air nozzle for convenience in structural arrangement. The auxiliary ports 4, 4, together with the delivery port 2′ constitute air passages that are controlled by an oscillatory throttle valve, the same being in cylindrical shell-like form having a grid-bar 5 which controls the mixing chamber delivery port and a corresponding grid bar 5′ that is adapted to control the auxiliary air port, the bar, as shown, being centrally recessed to permit clearance of the air nozzle 3. The grid-bars of the throttle-valve are connected by heads from which extend trunnions 6, 6′, the same being journaled in hubs that project from the ends of the casing 1 or caps thereof. The trunnion 6 extends beyond the contiguous casing cap and carries an arm 7, which arm, as best shown in Fig. 5, is linked to one arm of a bell-crank lever 8, the opposite arm thereof being in contact

with a governor-controlled cam 8′ in opposition to a coiled spring 9 that is connected to the valve-gear, whereby the said throttle valve is held full open, as shown in Fig. 1 of the drawings, when the engine is at rest or running under maximum load conditions. The cam 8′ is in spline connection with the engine shaft and is moved back and forth relative to the bell-crank lever under control of a governor mechanism 9′, whereby the position of the throttle-valve is automatically controlled to restrict or increase the flow of air through the carbureter.

An air-receiving hood 10 is fitted over the top of the carbureter casing, the same encasing the air nozzle and auxiliary mixing chamber ports, to thus form an air collecting chamber 10′ therefor. The hood has an air intake mouth 11, which mouth is equipped with an air regulating valve 12 of the butterfly type, whereby the volume of air admitted to the carbureter is regulated. The air regulating valve is predeterminedly set for the amount of air required for maintaining the maximum engine load. With this adjustment in view, the valve 12 is mounted upon a stem 12′ that extends through the hood and secured to said stem is a handle 13 having a semi-circular slot 13′ therein, through which is extended a set-screw 14. The set-screw is engaged by a binding-nut 15, whereby the handle may be locked in any predetermined position, limit of the movement of the valve being regulated by means of set-screws 15′ which are adjustably mounted at the ends of the circular slot and adapted to engage the stop-screw 14. By this mechanism the air intake valve is predeterminedly set to permit the proper amount of air to enter the carbureter for forming a gas mixture necessary for the maximum load conditions of the engine.

As best shown in Fig. 3, the air nozzle 3 at its waist-line is provided with a plurality of radially disposed minute orifices 16, 17 and 18, that register with and form continuations of similarly disposed ducts 16′, 17′ and 18′ extending through the casing 1 and these ducts are respectively controlled by pin-valves 19, 20 and 21. The central duct 17′ is connected to a water-supply reservoir 22 by a pipe 22′, the said reservoir being arranged with a float-controlled valve 23, whereby the water is maintained at a predetermined level below the point of discharge. Thus water is raised and fed by suction to the combustion chamber of the engine cylinder for hydrating the fuel charge, whereby the kerosene which is utilized as a fuel is prevented from premature explosion. The valve-controlled duct 16′ is connected by a pipe 24 to a kerosene reservoir 25, which reservoir is provided with a feed-supply pipe and an upper overflow pipe in order that a predetermined quantity of kerosene can be maintained constantly within the reservoir and upon a lower level than the point of discharge. The kerosene reservoir, as shown, is one compartment of a container, the companion compartment 26 of which is adapted to carry an auxiliary gasolene supply to be utilized as a starting medium for the engine. The gasolene reservoir or compartment 26 is connected by a pipe 26′ to the valve-controlled duct 18′, it being understood that the gasolene or auxiliary oil supply is also upon a lower level than the discharge orifice which communicates with the air nozzle 3. Thus the several fluids, to wit, kerosene, gasolene and water are all elevated by suction.

In starting the engine, the operator first introduces gasolene as a fuel medium by manipulating the valve which controls the duct 18′ and the engine will start in the ordinary manner due to the explosion of a charge of carbureted air. Thereafter the supply of gasolene is cut off and kerosene is substituted as a fuel by a manipulation of the valve which controls duct 16′, water being also admitted to the carbureter by manipulation of the valve-controlling duct 17′. The fuel supply to the carbureter is regulated by adjusting the fuel valve for no load and the amount of fuel for a maximum load is controlled by adjusting the air valve which restricts the intake mouth of the hood. In the operation, should the engine be running light or free, its acceleration will cause the governor to act, whereby the throttle-valve will restrict the passage of air through the auxiliary port 4, 4. Hence the combined air passages from the collecting chamber 10′ being now of less area than the valve-controlled air-inlet mouth, no appreciable vacuum impulse will result within said collecting chamber and the velocity of the air currents passing through the nozzle 3 will be practically the only force exerted to draw the fuel oil therein, whereby the fuel supply is reduced and the charge of oil is thus automatically regulated in proportion to the load. When the load of the engine is gradually increased it is manifest that the governor-controlled throttle-valve will increase the area of the combined air passages leading to the mixing chamber and at the point where the said air passages become greater in area than the valve-controlled inlet mouth 11 of the collecting chamber, the vacuum is proportionately increased, causing a corresponding increase of the suction force to be applied to the fuel orifice within the air nozzle, whereby the charge is increased in richness. Thus it is seen that a fixed oil feed orifice will automatically adjust the supply in proportion to the load, varying the quantity of fuel supplied by the suction force caused through the partial vacuum and that

a constant current of air of high velocity is caused to travel through the nozzle irrespective of the load, due to the throttle-valve control, which valve regulates the vacuum induced in the receiving chamber as previously described.

I claim:

A carbureter including a cylindrical mixing chamber having an air and fuel inlet port in its peripheral wall and having auxiliary air inlet ports at the sides of said first port, an outlet port in the peripheral wall of the chamber, a valve including opposed bars disposed longitudinally against the inner periphery of the chamber, bars connecting the ends of the first bars, journal pintles carried by said connecting bars, the first named bars being adapted to simultaneously close the auxiliary air inlet ports and the outlet port, and one of said bars being cut away to provide a clearance for the air and fuel inlet port in closing position of said bars.

In testimony that I claim the foregoing I have hereunto set my hand at New Holstein, in the county of Calumet and State of Wisconsin, in the presence of two witnesses.

HENRY N. EDENS.

Witnesses:
ARTHUR C. DEIK,
B. F. ARPS.