F. E. BOWERS.

CARBURETER.

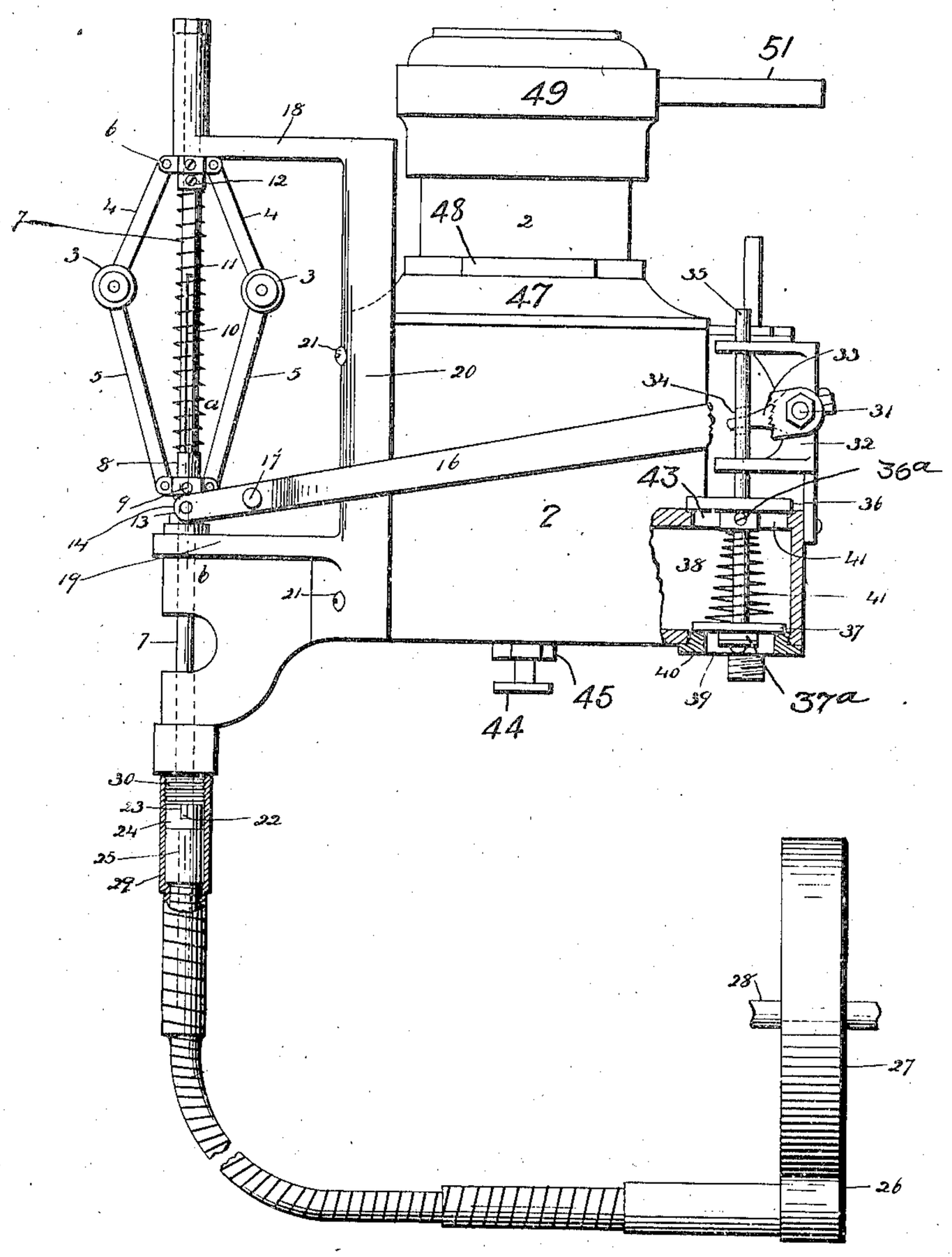
APPLICATION FILED MAR. 30, 1908.

997,232.

Patented July 4, 1911.

2 SHEETS—SHEET 1.

Fig 1.



Witnesses
C. J. Reed.
C. L. Reed

Fredson E. Bowers
Inventor
By Seymour & Earle
Attys

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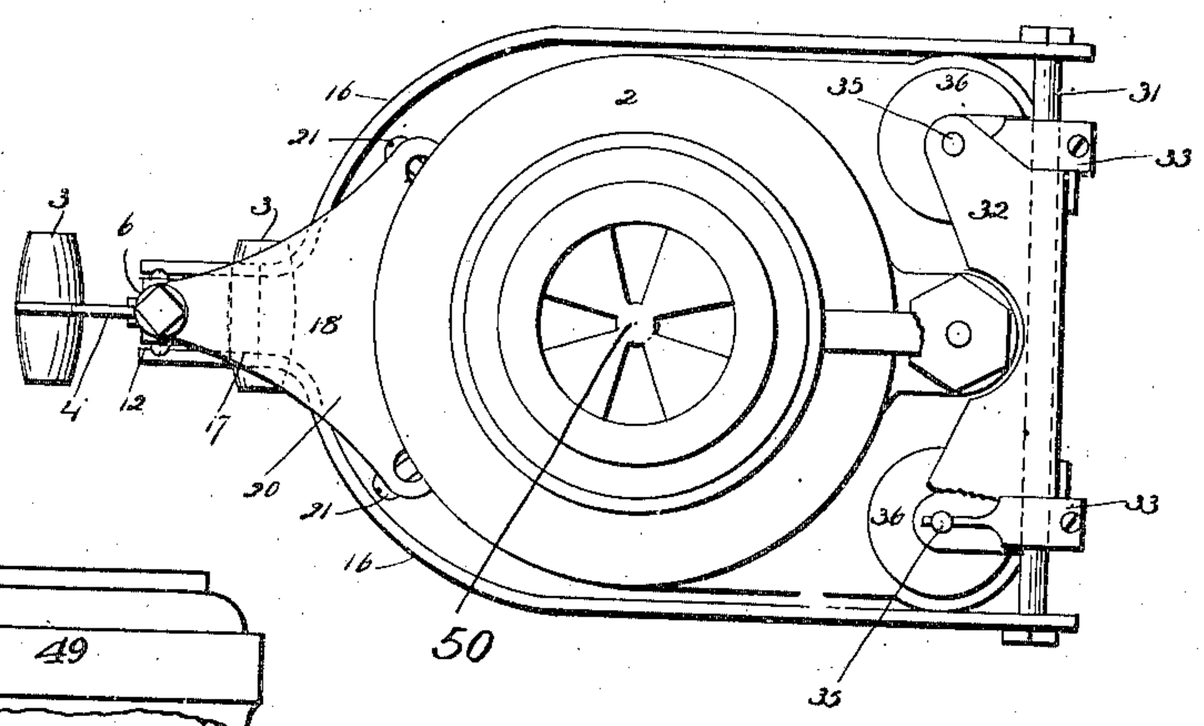
2 SHEETS—SHEET 2.

Fig 2



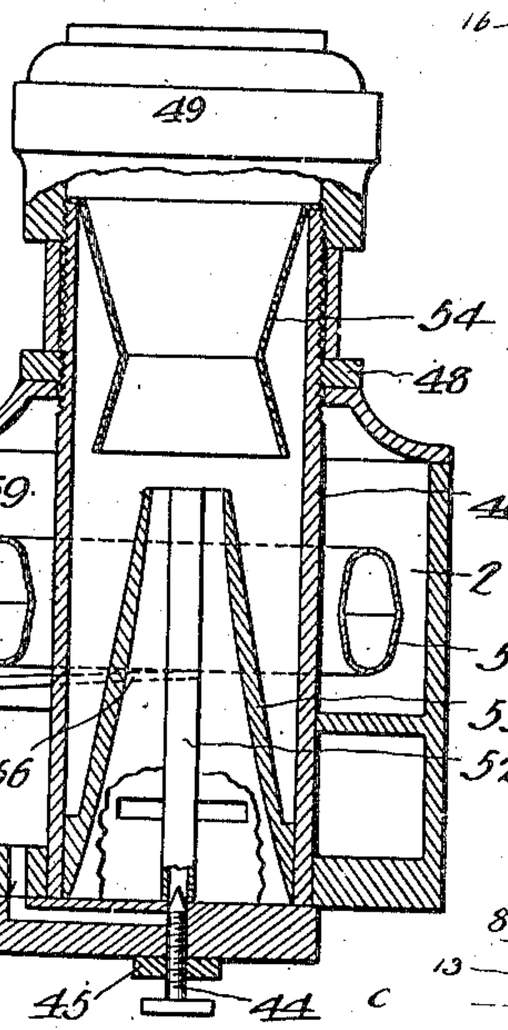


Fig. 3

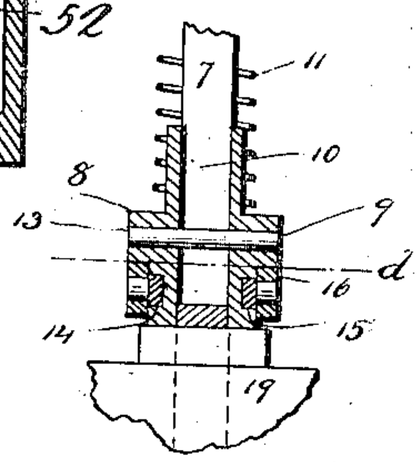


Fig. 4.

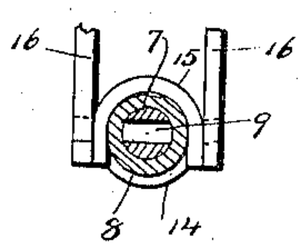


Fig. 5.

Witnesses
C. J. Reed.
C. L. Reed.

Frederick E. Bowers
Inventor
by Seymour & Earle
Atty

UNITED STATES PATENT OFFICE.

FREDSON E. BOWERS, OF NEW HAVEN, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE GILBERT MANUFACTURING CO., OF NEW HAVEN, CONNECTICUT, A CORPORATION.

CARBURETER.

997,232. Specification of Letters Patent. **Patented July 4, 1911.**

Application filed March 30, 1908. Serial No. 424,258.

To all whom it may concern:

Be it known that I, FREDSON E. BOWERS, a citizen of the United States, residing at New Haven, in the county of New Haven and State of Connecticut, have invented a new and useful Improvement in Carbureters; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1 a view partly in elevation and partly in section of a carbureter provided with an air regulator and connected with a motor for operation thereby. Fig. 2 a plan view thereof. Fig. 3 a broken view thereof in vertical longitudinal section. Fig. 4 a broken view in vertical section on the line *a—b* of Fig. 1. Fig. 5 a broken view in horizontal section on the line *c—d* of Fig. 4.

My invention relates to an improvement in carbureters for supplying internal combustion motors with a combustible vapor mixture, the object being to mechanically utilize the speed of the motor for operating the supplemental air-valves of the carbureter instead of relying upon the suction produced by the motor for the same purpose and at the same time to provide for operating supplemental air-valves by suction when the engine is laboring, as in hill-climbing, and the speed is slow.

With these ends in view my invention consists in the combination, in a carbureter, with means for supplying a fixed amount of combustible vapor, of one or more supplemental air-valves, a mechanical regulator for the same, and means for driving the regulator from one of the running parts of the engine supplied with vapor by the carbureter.

My invention further consists in a carbureter having certain details of construction and combinations of parts as will be hereinafter described and pointed out in the claims.

In practicing my invention, I may employ any ordinary carbureter and any ordinary motor.

In carrying out my invention as herein shown, I employ a centrifugal regulator comprising two weights 3 carried by two upper links 4 and two lower links 5, the upper ends of the upper links being pivotally connected with a head 6 mounted upon and revolving with the regulator-shaft 7 and the lower ends of the lower links being pivoted to a vertically movable head 8 mounted upon the said shaft 7 and connected therewith for revolution thereby by a pin 9 passing through a vertical slot 10 therein. A helical spring 11 encircling the said shaft is interposed between the said head 8 and a collar 12 located adjacent to the head 6 and made vertically adjustable on the shaft to vary the tension of the spring to suit the particular motor with which the carbureter is used. The head 8 is provided at its lower end with a collar 13 formed with an annular groove 14 receiving shoes 15 pivotally mounted in the adjacent ends of the arms 16 of a lever-like yoke, these arms being connected by means of a brace 17. The shaft 7 has bearing at its upper and lower ends in the arms 18, 19, of a bracket 20 secured by screws 21 to the reservoir 2 of the carbureter, the projecting lower end of the shaft being furnished with a plate-like key 22 entering a notch 23 in a coupling-head 24 on the end of a flexible shaft 25 connected at its opposite end with a pinion 26 meshing into a wheel 27 driven by the motor to which the vapor is supplied by the carbureter. The motor is not shown, but is represented for the purposes of this case, by means of the said wheel 27 and its shaft 28. The head 24 is held in engagement with the key 22 by means of a sleeve 29 internally threaded at its upper end for being screwed upon a threaded nipple 30 through which the lower end of the shaft 7 projects and which is attached to the lower end of the bracket 20. The regulator shaft 7 will thereby be driven from the motor and the weights 3 will rise and fall, and raise and lower the head 8 as the speed of the motor and hence centrifugal force varies. Such regulators are called "ball-regulators", and this term I shall hereafter employ in a generic sense to designate all such regulators. The opposite ends of the lever-arms 16 aforesaid are connected with a horizontally arranged rock-shaft 31 mounted in a bracket 32 secured to the reservoir 2 and provided with two inwardly projecting rock-arms 33 respectively entering vertical slots 34 in two vertically arranged valve-stems 35

each carrying an upper valve 36 fastened to it by a screw 36ª and an independently movable double-acting lower valve 37 resting upon a nut 37ª applied to the extreme lower end of the stem, the said valves 36 and 37 being supplemental air-valves for the carbureter. A spring 41 encircling the lower end of each valve-stem 35 exerts a constant effort to hold the lower valve 37 over an air-port 39 formed in a plug 40 entering the bottom of the reservoir 2 of the carbureter proper, the said port 39 opening outward to the atmosphere, and inward to the concentric air-passage 38 of the carbureter. The upper valve 36 controls an air-port 43 formed in the carbureter proper and opening outward to the atmosphere and downward into the concentric air-passage 38 aforesaid. The said upper valves 36 are normally held upon their seats by the tension of the helical spring 11 acting through the lever-arms 16. Under the construction described, the upper supplemental air-valves 36 will never be lifted from their seats to admit air through the ports 40 except by the positive action of the centrifugal governor which will at the same time lift the double-acting supplemental air-valves 37 from their seats. In other words, the upper valves 36 will never be operated without operating the valves 37 also, but inasmuch as the lower valves 37 are loosely mounted upon the valve-stems 35, they are capable of being operated independently thereof by suction, for which reason I have described them as double-acting valves. Their operation by suction will be referred to later on.

As shown, the carbureter proper consists of a reservoir 2 entered at the bottom by a centrally arranged adjustable gasolene needle-valve 44 provided with the usual check-nut 45. The said reservoir 2 contains a mixing-tube 46 rising through it and projecting above it, the space between the tube 46 and the top of the reservoir being closed in by a cap 47 held in place by a nut 48 screwed upon the tube 46. The upper end of the tube 46 is surmounted by a valve-case 49 containing a throttle-valve 50 operated by an outwardly projecting arm or lever 51. The gasolene needle-valve 44 enters a tubular spray-nozzle 52 rising within a cone 53 located within the lower end of the said mixing-tube 46 the upper end of which contains an upper cone 54 of hour-glass form. Within the said reservoir 2, I locate an annular float 55 encircling the mixing-tube 46 and free to rise and fall with the rise and fall of gasolene in the reservoir 2 for controlling the inlet of the gasolene into the reservoir. For this latter purpose, I locate, beneath the said float, an operating-lever the inner arm 56 of which partly embraces the mixing-tube 46 so as to be engaged by the lower face of the annular float 55. The said lever is hung upon a horizontal pivot 57 and formed with an outer arm 58 arranged to receive the downward thrust of a helical spring 59 surrounding the stem 60 of a gasolene inlet needle-valve 61 entering a plug-like valve seat 62 and controlling the inlet of gasolene into the reservoir 2, the valve 61 and its stem 60 being located midway between the two vertically arranged valve stems 35 already described. A passage 63 conducts the gasolene from the reservoir 2 to the lower end of the spray-nozzle 52 its admission to which is regulated by the needle valve 44. When the gasolene falls sufficiently in the reservoir to permit the float 53 to engage with the lever arm 56, the weight of the float depresses the same, turning the lever on its pivot 57 and lifting its short outer arm 58 against the tension of the spring 49, whereby the needle-valve 61 is lifted from its seat 52 and gasolene allowed to flow freely into the reservoir 2 until the float has been lifted entirely away from the lever arm 56, after which the spring 59 asserts itself to depress the needle-valve 61 and so shut off the further inlet of gasolene through the valve seat 62. In this way by the rising and falling of the float 55, the feeding of the gasolene into the reservoir 2 is controlled exactly in accordance with its consumption, which, as already explained, is regulated by the needle-valve 44. The needle-valve 44 and the spray-nozzle supply the fixed amount of vapor necessary for starting the motor and running it, though not for meeting the ordinary demands of usage upon it.

Before proceeding to a description of the operation of my improvement, it may be stated that carbureters for supplying internal combustion motors with a combustible vapor mixture, have, as heretofore constructed, been operated as to the intake of supplemental air by the suction developed by the motor. The speed of the motor causes variations in the suction and therefore to a certain extent the motor may be relied upon to automatically regulate the density and quantity of the mixture supplied to it. Theoretically a motor might therefore be relied upon to supply itself with combustible vapor of an approximately proper density and in an approximately proper quantity. But practically motors greatly vary in their suction-creating power according to the construction and conformation of their parts, to their condition at any particular time and to the inertia of their parts. Some motors on account of the construction and conformation of their parts produce better and more even suction than other motors, while the same motor will develop better and more even suction at one time than at other times according to the adjustment and condition of its parts. Fur-

thermore, the suction developed by all motors rises and falls with the movement of its piston so that even under the most favorable conditions the amount of suction developed by a motor and transmitted to a carbureter will constantly fluctuate. On the other hand, my improvement does not make the amount of supplemental air supplied to the carbureter depend upon the suction developed by the motor, but rather upon the speed of the motor, a running part of the motor being used to operate a ball-regulator which in turn operates the supplemental air-valves which are thus, in a sense, positively operated by the motor.

In the use of my improvement, the motor is started in the usual way and with it the ball-regulator of the carbureter. The speed of the motor being increased or decreased in the usual way by an opening or closing movement of the throttle of the carbureter, it follows that the speed of the ball-regulator will increase or decrease with the speed of the motor with which it is connected. When the speed of the ball-regulator has passed the predetermined point represented by the tension of the spring 11, the ball-regulator will operate through the arms 16 to open the supplemental air-valves 36 and 37 and increase the amount of air supplied to the carbureter, whereby the volume of combustible vapor produced and supplied to the motor will be increased and consequently its richness decreased in approximately direct proportion to the increased speed of the motor. When the motor slows down the centrifugal force on the weights of the regulator will be correspondingly reduced and the valves 36 and 37 will be proportionately closed so as to reduce the amount of air taken into the carbureter through the valves 36 and 37, whereby the volume of the mixture is reduced and its richness increased. This automatic response of the carbureter in supplying to the motor a mixture adapted in density and quantity to the requirements of the motor at any given time is directly controlled by the speed of the motor and not by the suction developed by it. However, in order that the carbureter may not be deprived of suction as a means for increasing the amount of vapor supplied, the lower supplemental valves 37 are adapted, as already described, to respond to the action of suction by being made movable independent of the valve-stems 35 whenever the suction passes the tension represented by the springs 41 so that in case the speed of the motor is so much reduced that the ball-regulator is practically nullified in its action, the suction developed by the motor may come into play for taking the place, so to speak, of the ball-regulator in increasing the volume of vapor supplied to the motor. Suppose, for instance, that an automobile provided with my improved carbureter, is ascending a stiff grade at a slow speed with the throttle wide open. Under such circumstances, the action of the centrifugal regulator will be nullified on account of the slow speed of the engine; but as the throttle is wide open and as the engine is laboring, the suction will be very strong, and this strong suction is, under my improvement, availed of since it acts upon the valves 37 to open them and admit the additional vapor required by the motor to do its work in climbing the hill. On the other hand, if the engine is running at a high speed, the ball-regulator will be operated for positively lifting both the upper valves 36 and the lower valves 37 for admitting the necessary amount of vapor to the carbureter.

I claim:—

1. In a carbureter, the combination with means for supplying a fixed amount of combustible vapor, of a supplemental air-valve operable by suction, a mechanical regulator connected with the said valve for the mechanical operation thereof, and means for driving the said regulator from one of the running parts of the engine supplied with vapor by the carbureter.

2. In a carbureter, the combination with means for supplying a fixed amount of combustible vapor, of two supplemental air-valves one of which is operable by suction, a mechanical regulator connected with both of the said supplemental air-valves for mechanically operating the same concurrently, and means for driving the said regulator from one of the running parts of the engine supplied with vapor by the carbureter.

3. In a carbureter, the combination with means for supplying a fixed amount of combustible vapor, of a supplemental air-valve operable by suction, a mechanical regulator organized independent of, but attached to the said carbureter, and connected with the said supplemental air-valve for the mechanical operation thereof, and means for driving the said regulator from one of the running parts of the engine supplied with vapor by the carbureter.

4. In a carbureter, the combination with means for supplying a fixed amount of combustible vapor, of a supplemental air-valve operable by suction, a ball-regulator connected with the said valve for the mechanical operation thereof, and means for driving the said ball-regulator from one of the running parts of the engine supplied with vapor by the carbureter.

5. In a carbureter, the combination with means for supplying a fixed amount of combustible vapor, of a supplemental air-valve operable by suction, a ball-regulator, a lever connecting the said regulator and valve for the mechanical operation of the same, and means for driving the regulator from one

of the running parts of the engine supplied with combustible vapor by the carbureter.

6. In a carbureter, the combination with means for supplying a fixed amount of combustible vapor, of two valve-stems each furnished with a fixed upper valve and each furnished with a movable lower valve operable by suction, springs for the said lower valves, a mechanical regulator, a lever connecting the said regulator with the said valve-stems, and means for driving the regulator from one of the running parts of the engine supplied with combustible vapor by the carbureter, whereby the carbureter is automatically supplied with additional combustible vapor proportionate to the speed of the engine, by the lifting of the said valve-stems under the control of the regulator, and whereby the carbureter is supplied with additional combustible vapor proportionate to the amount of suction produced by the motor and acting upon the said lower valves.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

FREDSON E. BOWERS.

Witnesses:

FREDERIC C. EARLE,

GEO. D. SEYMOUR.