No. 751,292. PATENTED FEB. 2, 1904.

J. M. JOHANSON.

MIXER FOR GASOLENE ENGINES.

APPLICATION FILED MAR. 7, 1903.

NO MODEL.

Fig 1

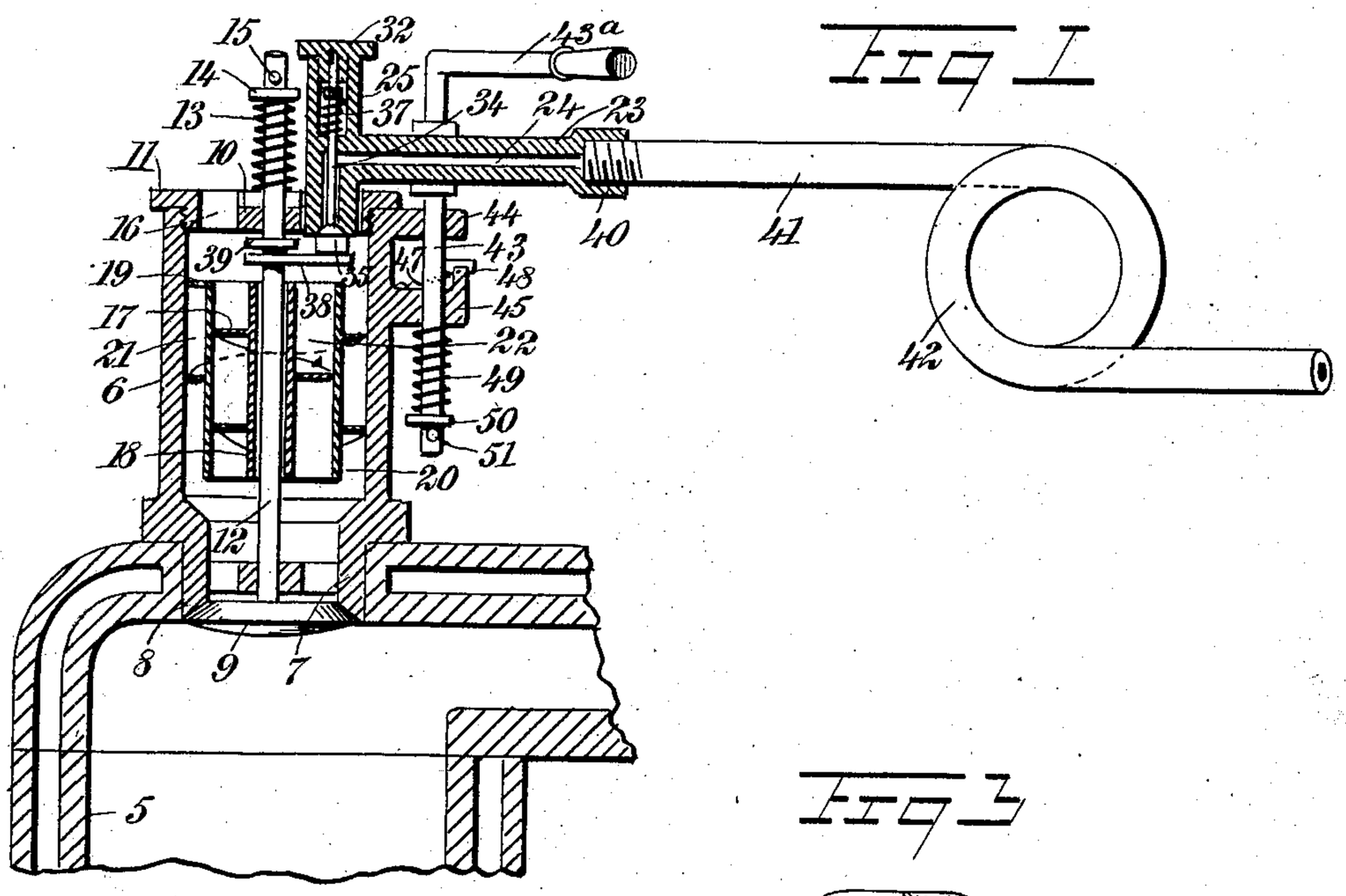


Fig 3

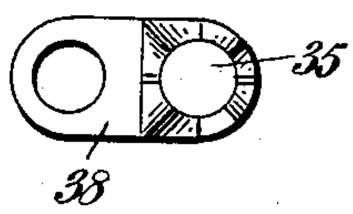
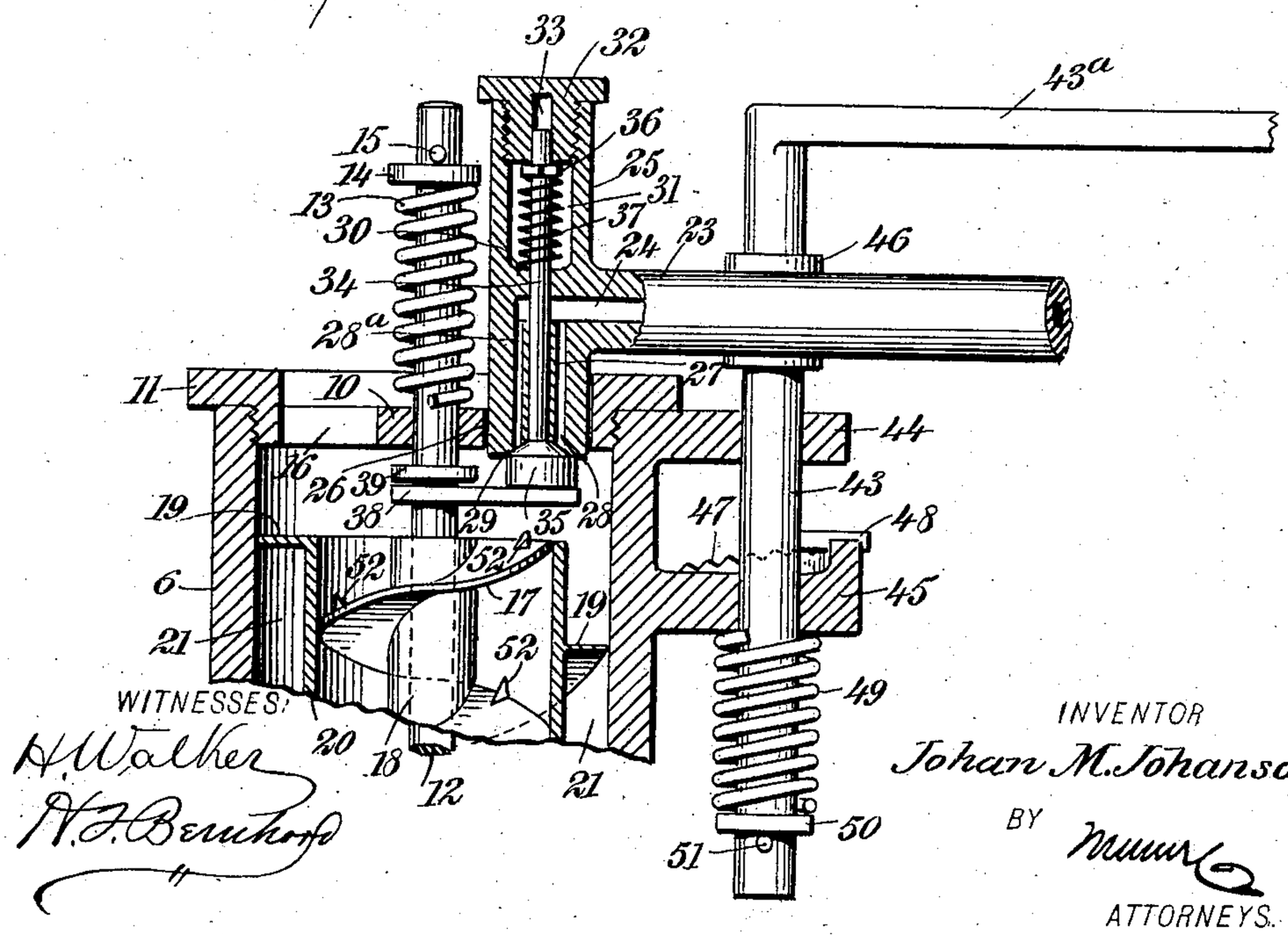


Fig 2



No. 751,292. Patented February 2, 1904.

UNITED STATES PATENT OFFICE.

JOHAN M. JOHANSON, OF CAMBRIDGE, MASSACHUSETTS.

MIXER FOR GASOLENE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 751,292, dated February 2, 1904.

Application filed March 7, 1903. Serial No. 146,604. (No model.)

To all whom it may concern:

Be it known that I, JOHAN M. JOHANSON, a subject of the King of Sweden and Norway, and a resident of Cambridge, in the county of Middlesex and State of Massachusetts, have invented a new and Improved Mixer for Gasolene-Engines, of which the following is a full, clear, and exact description.

This invention relates to improvements in mixers for gasolene-engines; and one object that I have in view is the provision of means by which a hydrocarbon fuel is atomized and intimately mixed with air to produce a combustible mixture adapted to produce an explosive charge when admitted to the piston-cylinder.

A further object of the invention is to provide means for regulating the quantity of hydrocarbon fuel adapted to be supplied at regular intervals to the mixer irrespective of the vibration due to the operation of the engine and to also secure the operation of the fuel-valve in a way to admit stratified air and fuel to the piston-cylinder.

Further objects and advantages of the invention will appear in the course of the subjoined description, and the novelty will be defined by the annexed claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional elevation through the intake portion of an explosive-engine equipped with a carbureter constructed in accordance with my invention. Fig. 2 is an enlarged sectional view through certain parts of the improved carbureter, and Fig. 3 is a detail plan view of a part of the fuel-inlet valve.

5 designates a portion of the piston-cylinder forming a part of an explosive-engine. To this cylinder is firmly secured the shell or casing 6 of my improved carbureter, said shell or casing having an inwardly-extended tubular neck 7, which terminates in a flaring face 8, adapted to form the seat for the intake-valve 9 of the engine. The outer end of the casing 6 is internally threaded to receive a screw cap or head 10, the same being formed with a flange 11, adapted to rest on the end portion of the casing 6. The intake-valve 9 is provided with an elongated stem 12, arranged to pass loosely through a guide-opening formed centrally in the cap 10, and around the outer portion of this valve-stem 12 is fitted a coiled spring 13, one end of which is seated against the cap 10, while the other end acts against a collar 14, which is held in place on the valve-stem by a pin or key 15. The spring 13 impels the valve-stem 12 in an outward direction to hold the valve 9 against its seat 8; but this valve is adapted to open automatically at stated periods for the admission of the combustible charge into the piston-cylinder of the engine in a manner well understood by those skilled in the art. The cap 10 of the casing 6 is provided with one or a series of air-inlet openings, one of which is indicated at 16, thus making provision for the free inlet of atmospheric air into the casing 6.

One of the important features of my invention is the provision of means within the casing 6 for the purpose of imparting a spiral motion to the air traversing the casing, and another feature consists in dividing the air into two currents, each of which is given a spiral motion and adapted to traverse diffusion-surfaces over which are spread thin films of hydrocarbon, whereby the air-currents are adapted to absorb the hydrocarbon and the currents are caused to strike or impinge one against the other, with a view to effecting thorough atomizing of the hydrocarbon.

I prefer to employ two helical bafflers which are of right and left hand thread, respectively, said bafflers being disposed one within the other, as shown by the drawings. The inner baffler 17 is provided with a tubular body 18, which incloses the valve-stem 12 loosely in a way to permit said stem to have free slidable movement in said body. The outer baffler 19 has a tubular body 20, and these bafflers 17 19 are of spiral form, one being right-handed and the other left-handed. The body 20 of the outer helical baffler surrounds the inner helical baffler 17, and these bafflers, with their tubular bodies, are secured in place within the casing 6 to occupy stationary positions

therein. The outer baffler 19 fits snugly to the inner surface of the casing 6, and in like manner the inner baffler 17 occupies a snug relation to the tubular body 20 of the outer baffler. The tubular body 20 is of such diameter and arranged within the casing 6 in such a way as to make a spiral passage 21 which is of the same cross-sectional area as the spiral passage 22 which is formed within the tubular body 20 by the inner baffler 17, whereby air-currents of equal volume are adapted to traverse the spiral passages formed by the helical bafflers and the body 20 with the casing 6. The baffler 17 terminates at its lower end a suitable distance above the lower extremity of the tubular body 20, and in like manner the outer baffler 19 terminates above the lower open end of the tubular body, thus leaving certain portions of the passages 21 22 free from the helical bafflers, in which vacant portions of the passages the air-currents are free to expand and come periodically to a state of rest as respects the spiral motion given thereto by traversing the helical bafflers 17 19.

23 designates a valve-casing which is provided with a longitudinal passage 24, said valve-casing terminating in a head 25, which lies in a vertical position and at right angles to the length of the casing 23. The lower portion of the head 25 is shown by the drawings as being fitted loosely in an opening 26 in the cap 10 of the carbureter-casing 6, and this lower portion of the valve-casing head is provided with a guide-passage 27 for a valve-stem and with two fuel-ducts 28 28[a]. The fuel-ducts are on opposite sides of the valve-stem passage 27, and they are of smaller area than said passage. The lower end of the valve-casing head 25 has a countersunk or conical face, which forms a valve-seat 29, and the fuel-ducts 28 28[a] extend from the passage 24 of the valve-casing to and through the valve-seat 29. (See Fig. 2.) The head 25 is also provided with a partition 30 and with an air-chamber 31, said partition serving to separate this air-chamber from the passage 24. The upper end of the valve-casing head 25 is threaded for the reception of a cap 32, which is provided with a guide-passage 33 for the upper extremity of a valve-stem 34, the same passing through the passage 27 in the lower part of the valve-head.

The fuel-valve 35 is made in one piece with the stem 34, and it is disposed normally below the extremity of the valve-casing head 25, so as to be in facing relation to the valve-seat 29, thereby closing the fuel-ducts 28 28[a] in the valve-casing. The valve-stem 34 is provided with a nut or collar 36, against which acts a coiled spring 37, which is housed in the air-chamber 31 of the valve-casing, said spring tending to normally hold the valve 35 on the seat 29 against the fuel-pressure in order to close the fuel-passages and cut off the escape of fuel from the valve-casing into the carbureter-casing 6. The fuel-valve 35 is attached to or engages with a shank or plate 38, fitted to the stem 12 of the inlet-valve 9, and above this shank 38 is a collar 39, which is made fast with said valve-stem and is adapted to travel therewith. I prefer to make the shank or plate 38 fast with the valve 35 and to fit this shank or plate loosely on the inlet-valve stem 12, whereby the fuel-valve 35 is capable of a limited independent movement with relation to its seat and to the travel of the valve-stem 12; but this valve 35 is adapted to be opened by the collar 39 striking against the shank or plate 38, thus automatically opening the fuel-valve when the inlet-valve 9 is operated.

The valve-casing 23 is expanded at its outer free end to form a coupling 40, into which is screwed a length of a fuel-supply pipe 41, the latter being provided with a coil 42, which gives the desired flexible movement to the fuel-inlet pipe. With this valve-casing 23 is operatively engaged an adjusting-spindle 43, the latter passing loosely through outstanding lugs 44 45, which are shown by the drawings as being integral with the carbureter-casing 6. The operative engagement between the spindle 43 and the valve-casing 23 is effected by the employment of collars 46, engaging with said casing and the spindle, the upper end of said spindle being furnished with a suitable handle or crank 43[a]. The lower lug 45 on the carbureter-casing is provided with a series of step-shaped shoulders 47, with either of which is adapted to engage a radial stud or finger 48, which is made fast with the adjusting-spindle 43. The lower part of this spindle is extended below the lug 45 to receive a coiled spring 49, the upper end of which bears against the fixed lug 45, while its lower end is seated on a collar or washer 50, which is held in place on the spindle by a pin or key 51. The spring 49 tends to normally depress the spindle 43 in a downward direction, thereby holding the stud or finger 48 in engagement with one of the shoulders 47 on the fixed lug, and this depression of the spindle is communicated to the casing 23. The pin 48 serves to lock the spindle against movement due to the jar or vibration of the engine when it is in operation; but the spindle may be manipulated by hand in a way to adjust the entire valve-casing relatively to the head 11 of the carbureter-casing 6.

The fuel-passages 28 28[a] are so disposed relatively to the tubular body 20 of one baffler that the passage 28[a] will admit the hydrocarbon into the inner passage 22, which is formed between the tubular bodies 18 20, whereas the other fuel-passage, 28, occupies such relation to the carbureter that a portion of the hydrocarbon will flow into the outer spiral passage 21 between the carbureter-casing 6 and the tubular body 20, thus insuring the uniform

distribution of the hydrocarbon to the two passages. Each helical baffler 17 19 of the carbureter is provided with a series of prongs or lips 52, which are adapted to catch the gasolene and retain it until such time as it is taken up by the air. These projections are set at an angle, so that any hydrocarbon retained by them has a tendency to flow slowly toward the center of the tubular body 18 or 20 irrespective of the centrifugal action which may be set up by the current of inrushing air at the time that the engine takes its charge through the valve 9. The series of projections on the helical bafflers insures a slow flow of the hydrocarbon when priming the mixer preparatory to starting the engine, said priming being effected by striking the protruding end of the intake-valve stem 12 a light blow, thereby causing the fuel-inlet valve 35 to admit sufficient hydrocarbon for the first explosion. In charges following the first the hydrocarbon is caught and spread out in a thin film over the walls of the tubular bodies 18 20 and the upper faces of the spiral bafflers 17 19, because it will be readily understood that the hydrocarbon being heavier than air, owing to the centrifugal action of the inrushing air-current, gathers in larger quantity about the projections 52.

It will be seen that in the operation of the carbureter the inrushing currents of air will be given a spiral motion, because the currents are confined by the helical bafflers, but when the currents pass the lower ends of these bafflers they are free to expand and spread out all around the tubular bodies, whereby the exit of the air-currents laden with hydrocarbon from the tubular bodies will cause one current to impinge against the other, and thereby insure a thorough atomizing of the hydrocarbon. It will also be understood that surface carburation takes places from the time that the air-currents and the hydrocarbon enter the casing 6 and the tubular body 20 until such currents emerge from the lower ends of the spiral passages. Owing to the opposite motion of the air-currents and the expansive action of the current in the tubular body 20, the hydrocarbon is atomized, and at the time that the combined currents of air and vapor strike the cylindrical offset below the spiral passages the current or mixture comes to a standstill so far as its helical motion is concerned, its downward motion, however, being continued until it passes the inlet-valve and into the cylinder. Of course the inlet-valve and the parts of the carbureter are heated, and by the time that the combustible mixture impinges the inlet-valve, which is the hottest part of the carbureter, the gasification of the mixture is complete. The passage of the combustible charge by the intake-valve 9 tends to keep the latter in a reasonably cool condition.

It will be understood that the fuel-inlet valve 35 is under the direct control of the intake-valve 9; but if the fuel-inlet valve depended solely for its action upon the travel of the intake-valve the quantity of gasolene admitted by said valve 35 could not be varied, because at slow speed of the engine too much gasolene would be admitted and at high speed the valve would admit a quantity too small to give the best results when exploding the combustible mixture, it being understood that a certain amount of hydrocarbon under a certain pressure flows through a non-variable opening in a certain time. I overcome this objection, however, by arranging this fuel-valve 35 in such a way that I can utilize the full stroke of the intake-valve 9 or any fraction thereof, thus suiting the time that the fuel-valve remains open to the requirements of the engine. The control of the fuel-valve 35 is obtained by the employment of the spindle 43 with the spring 49 and the pin 48, the latter having engagement with one or the other of the step-shaped shoulders 47 in a way to permit the adjustment of the parts of the valve mechanism without exposing said adjusting devices to displacement by the jarring or vibrating motion of the engine. The spring 37 tends to promptly return the fuel-valve 35 to its seat 29. The cap 32 at the upper extremity of the valve-casing head 25 serves two purposes: first, it closes the air-chamber 31, in which air is gradually compressed by the inflow of hydrocarbon through the passage 24 and the fuel-passages 28 28^a, such compression of the air taking place until the valve 35 is opened by the action of the intake-valve 9, at which period the air causes the hydrocarbon to be rapidly discharged over the fuel-valve 35, and, secondly, the cap 32 affords easy access to the internal parts of the valve mechanism in order to ascertain whether the hydrocarbon flows properly from the tank and through the pipe 41, which has communication with the passage 24. The coil 42 secures the hinged effect which is desirable in this style of hydrocarbon-regulator, and it obviates leakage of the hydrocarbon which is liable to take place when a "swing-joint" is used in the gasolene-feed pipe.

It will readily be seen that a stratified charge can be introduced into the piston-cylinder by my improved carbureter mechanism, because the spindle 43 can be shifted in a way to permit the fuel-valve 35 to open just a trifle before the intake-valve 9 reaches the limit of its stroke. The charge thus admitted consists of pure air until such time as the fuel-valve 35 opens and remains open until the intake-valve 9 shall have passed the first part of its return stroke, the mixture remaining in the carbureter being drawn into the piston-cylinder in the interval between the closing of the fuel-valve 35 and the intake-valve 9, so that atmospheric air remains in the mixer. If "back fire" occurs for any reason in the mixer, no damage will result,

because the gases resulting from the explosion are free to pass out through the air-ports 16 in the cap 10 of the carbureter.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A carbureter having a casing, a plurality of spiral bafflers therein, and means for separating the bafflers and producing a plurality of spiral passages in the casing, said spiral bafflers terminating above the separating means and forming a chamber in the casing, with which chamber communicate said spiral passages.

2. A carbureter having a casing, concentric bodies therein, and spiral bafflers disposed relatively to the casing and the concentric bodies therein and forming a plurality of spiral passages arranged one within the other.

3. A carbureter of the class described, having a casing provided with an air-inlet, spiral passages disposed one within the other and oppositely threaded, and means for admitting hydrocarbon to the respective passages.

4. A carbureter of the class described, having a casing provided with an air-inlet, helical bafflers disposed within said casing and one within the other to form independent spiral passages therein, and means for admitting hydrocarbon to said casing.

5. A carbureter of the class described, having a casing provided with an air-inlet, helical bafflers threaded oppositely and disposed within said casing to form independent spiral passages therein, and means for admitting hydrocarbon to the respective spiral passages.

6. A carbureter of the class described, having a casing, a tubular body therein, helical bafflers within the casing and the tubular body, said bafflers being separated one from the other and forming independent spiral passages within said casing, and means for admitting hydrocarbon to the respective passages.

7. A carbureter of the class described, having a casing provided with an air-inlet, spiral bafflers threaded oppositely to each other and provided with tubular bodies, said bafflers being disposed within the casing to form spiral passages therein, and the bafflers being separated one from the other by the tubular bodies thereof, and means for admitting hydrocarbon to the respective spiral passages.

8. A carbureter of the class described, having a casing provided with an air-inlet, a spiral baffler having a tubular body, another spiral baffler within said tubular body, and means for admitting hydrocarbon to the casing and to the tubular body, said spiral bafflers terminating above the lower end of said tubular body, for the purpose described, substantially as set forth.

9. In a carbureter, the combination with a carbureter-casing, and an intake-valve, of a valve-casing fitted loosely to said carbureter-casing, a fuel-valve supported by the valve-casing and controllable by the intake-valve, an adjusting-spindle having pivotal connection with the valve-casing, a spring acting on the spindle for moving the valve-casing normally toward the carbureter-casing, and means for locking the spindle to maintain the valve-casing in predetermined variable positions relative to the carbureter-casing.

10. In a carbureter, the combination with a carbureter-casing, and an intake-valve, of a valve-casing fitted to said carbureter-casing, a fuel-valve mounted in the valve-casing and controllable by the intake-valve, stepped bearings on the carbureter-casing, a spindle connected to the valve-casing and having a finger adapted to engage either of the stepped bearings, and a spring acting on the spindle.

11. In a carbureter of the class described, the combination of a casing, a series of step-shaped shoulders thereon, a spring-controlled spindle having a finger arranged to rest on one of the shoulders of the series, a valve-casing connected with said spindle and fitted to the carbureter-casing, an intake-valve having a stem, and a fuel-valve fitted to the valve-casing and provided with means adapted to be controlled partly by the travel of the intake-valve.

12. In a carbureter of the class described, the combination with a carbureter-casing having separate spiral passages, of a valve-casing provided with independent fuel-ducts and with an air-chamber in communication with said fuel-passages, a cap for closing the air-chamber, and a fuel-valve having a spring-controlled stem fitted to the valve-casing and arranged to close the fuel-ducts therein.

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

JOHAN M. JOHANSON.

Witnesses:
CHARLES E. ANDERSON,
OLAF BERGH-MYHRER.