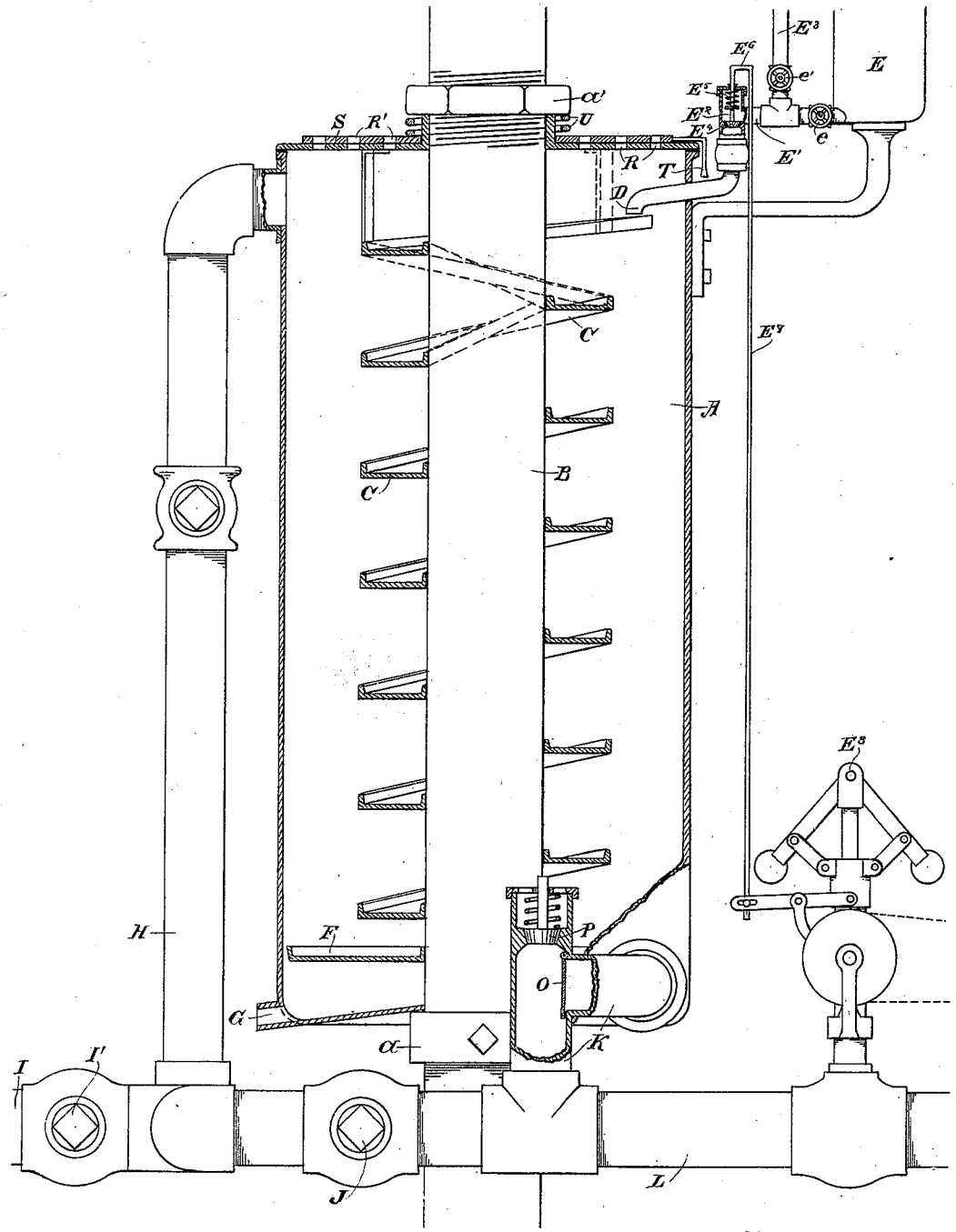
No. 651,017. Patented June 5, 1900.

A. L. NAVONE.

CARBURETER.

(Application filed Sept. 26, 1899.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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CARBURETER.

SPECIFICATION forming part of Letters Patent No. 651,017, dated June 5, 1900.

Application filed September 26, 1899. Serial No. 731,759. (No model.)

To all whom it may concern:

Be it known that I, ANTONIO L. NAVONE, a citizen of the United States, residing at Calistoga, county of Napa, State of California, have invented an Improvement in Hydrocarbon-Gas Generators; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an apparatus for generating explosive vapor from suitable hydrocarbon liquid, and mixing the same with air in proper proportions for the purpose required.

It consists of an arrangement of apparatus and devices by which the desired result may be obtained, and which will be more fully explained by reference to the accompanying drawing, in which the figure is a vertical section of an apparatus adapted for the purpose.

The generator consists of an exterior closed case A, which is here shown as supported directly upon the exhaust-pipe B, which conveys the waste products of combustion from the exhaust of an explosive-engine in which the gas is to be used. The products of combustion passing through this pipe are discharged at any convenient point, and the heat produced by their discharge through the pipe is sufficient for the purpose of vaporizing the liquid hydrocarbon.

The generator-case A is removably supported upon the pipe by means of a collar or support *a*, fixed upon the pipe at a suitable point, and the bottom of the generator is fitted to rest upon this support.

The cap or cover of the generator is retained in place by a nut *a'*, which serves when screwed down to hold the generator firmly in place upon the pipe. By removing the nut and disconnecting pipes it is possible to remove the generator for any purpose.

Within the generator is a spirally-disposed channel C. This channel is made, as shown, in sections by taking channeled steel about an inch, more or less, in width and having upturned flanges which may be about one-eighth or three-sixteenths of an inch high. This channeled steel is heated and coiled closely around the pipe B, preferably being closed together when it is coiled, so that any irregularities in the curve may be straightened by hammering the superposed coils, one resting upon the other, and after a sufficient length has been coiled to give the desired length of spiral to extend from near the top to near the bottom of the case A the coils may be separated, so as to provide for the proper grade and rapidity of flow. This coil surrounding the exhaust-tube B is supported by it and is thus easily removed whenever desired, by taking off the cover of the case A, as will be hereinafter described. The exhaust-pipe becomes intensely heated by the passage through it of the hot vapors, and if the coil is cast or formed as a part of the pipe the oil will be too much heated; but by making it separate from the pipe this excessive heating is prevented. Below the coil and surrounding the pipe B is a pan F, into which the lower end of the spiral or coil trough discharges.

The material to be treated, which may be heavy unrectified petroleum or any of the lighter products, or a combination of the two, is contained in a receptacle, as shown at E, and a pipe E' connects with a valve-chamber E^2, into which the oil is first delivered. The flow from the chamber E may be controlled by a cock, as shown at *e*. If two qualities of material are to be used jointly, the second quality may be furnished through a pipe E^3, having a controlling-cock *e'*, so that the proportions of the two are properly controlled, and the material unites in the pipe E' and flows into the valve-chamber E^2.

E^4 is a valve, here shown as being pressed downward by a spring E^5, which normally holds it closed against its seat with a certain tension. The stem of this valve extends up through the top of the valve-chamber E^2 and is there connected with an arm E^6, and this arm is connected by a wire, rod, or other device E^7 with a governor E^8, of any suitable description, driven from the engine. This governor acts, when running at slow speed, to hold the connection E^7 and the arm E^6 down, thus compressing the spring E^5 and allowing more of the oil to flow through the valve-opening, and when the engine runs at too high a speed the movement of the governor will release these parts, allowing the spring to act and close the valve to a greater or less extent, as required. The governor regulates the flow of gas to the engine and also the supply of oil to the gen-

erator, so that the supply of oil is always proportioned to the amount of gas which the engine is using. Thus if the load on the engine is regular and steady the flow of liquid may be adjusted and there will be little or no variation; but if the load is variable this construction automatically regulates the supply of oil and also of gas at the same time. Thus when once adjusted to the work which the engine is to perform no further attention is necessary. From the valve-chamber E^2 the liquid passes by gravitation and is delivered by a suitable discharge-nozzle D into the upper end of the spiral trough C, through which it flows around the exhaust-pipe B, and being in contact with this pipe the heat will vaporize all or almost all of the liquid before it reaches the bottom. Any portion which may remain unvaporized at the lower end of the spiral will be discharged into the pan F, where it is still subjected to heat from the pipe B to complete the vaporization of all that is capable of being so vaporized. Any surplus will overflow from the pan and fall upon the bottom of the case A. This bottom is made concaving upwardly in the center, and the periphery being lower than the center any overflow will pass to the outside and may be discharged through a drain-pipe G. In order to supply air to be mixed with the vapor thus produced, an air-supply of any suitable character may be brought to the apparatus through the pipe I. From this pipe a pipe H discharges into the upper part of the generating-chamber, and the air and the vapor produced in the chamber will be mixed in proportion depending upon the supply of air furnished. This supply is regulated in the first instance by a cock I', and, if desired, another cock may be fixed in the pipe H for the same purpose.

L is a pipe leading to the engine, and K is a branch bringing the mixed air and vapor to the pipe L, into which it discharges. The pipe K connects with the generator-case A at any desired point, and the gas from the generator is thus led through it and the pipe L to the engine, where its admission is controlled in the usual manner by valves. (Not here shown.)

In order to vary the proportions of gas and air after they have left the generator, I have shown a connection between the supply-pipe I and the conducting-pipe L, and by means of a cock J any desired amount of air may be introduced into the pipe L to mix with the explosive compound already delivered thereto from the generator. In this manner I am enabled to control the explosive proportions of the gas very closely. The connection between the pipe K and the generator is made through the valve-chamber, containing a hinged or other valve O, opening outwardly from the generator for the flow of gas, but adapted to close the passage in case of any explosion or pressure from the engine which might injuriously affect the generator if allowed to enter it. Connected with this valve-chamber is an outwardly-opening spring-pressed valve P, which serves as a safety-valve and which will be opened against the pressure of its spring in case of any unusual pressure from the engine.

The top of the generator-case A has perforations made in it, as shown at R, and upon this perforated top is a rotatable plate S, having corresponding openings or perforations R'. This plate may be turned so that the openings R' coincide with those shown at R, in which case air may be admitted to the generator through these openings in case more air is required than is passing through the pipe H. The constant action of the engine serving as a suction-pump to draw the vapor from the generator to itself will also draw air in through any openings or passages which may be provided for the purpose. An arm or handle T is fixed to the turnable plate S, and by moving this the plate may be adjusted to suit. This plate is held in close contact with the top R by means of a spring U, and the tension of this spring is adjusted by turning the nut A' down more or less. In case of any pressure within the generator greater than is desirable this pressure will either escape through the openings R R' when they are coincident, or when the plate S has been turned so that these openings are closed it acts as a safety-valve, the pressure overcoming the tension of the spring U, and lifting the plate S bodily so that vapor can escape through the openings R R'.

Sufficient heat may be applied through the tube B to start the apparatus by means of a heater of any desired description applied within the pipe B below the generator; but after sufficient gas has been generated to start the engine the exhaust products therefrom will be sufficient.

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

1. An apparatus for generating explosive gas from hydrocarbon liquid, consisting of a closed exterior case, a pipe extending vertically through the case to receive and conduct the hot exhaust-vapors from an engine, a spiral trough, coiled about and supported upon said pipe within the case, means for supplying hydrocarbon liquid into the upper end of the trough, means for supplying air within the case to be mixed with said vapor, and means for discharging the mixed explosive vapor from the generator.

2. In a generator for producing explosive vapors from hydrocarbon liquid, an exterior closed case, a vertical pipe extending centrally through said case, a collar or support fixed upon the pipe upon which the bottom of the case rests, a nut fitting the pipe above the case pressing upon the top or cover thereof and removably securing the case upon the pipe.

3. In a generator for producing explosive

vapor from hydrocarbon liquids, an exhaust-pipe from the engine, an exterior case removably supported upon said pipe, a spiral trough coiled around said pipe, means for supplying hydrocarbon liquid to the upper end of the trough, means for supplying air to be mixed with the vapor produced within the case, a perforated top for said case, a plate or disk resting upon said top having openings, means by which said openings may be made to coincide with those in the top or cut off therefrom, and a spring by the tension of which the disk is held in contact with the top of the case, and removable to act as a pressure-relief therefor.

4. In a generator for producing explosive vapors from hydrocarbon liquid, a heating-pipe, an exterior case surrounding and supported upon said pipe, a spiral channel coiled and fitting around said pipe, with means for supplying the hydrocarbon liquid to the upper end and withdrawing the residue below, means for supplying air to be mixed with the vapor thus produced, consisting of a top for the case having holes made therein, a turnable spring-pressed disk fitting said top and having corresponding holes, and means by which said plate may be turned to either cut off communication through the holes, or to bring the holes into line and regulate the supply of air through them to the interior of the case.

5. An apparatus for producing an explosive vapor from hydrocarbon liquid consisting of a central heating-pipe, a spiral channel coiled around said pipe, an exterior closed case removably mounted and supported upon the pipe, a source of supply from which the hydrocarbon liquid is delivered into the upper end of the spiral channel, a pan surrounding the supporting-pipe into which the lower end of the channel discharges and from which pan surplus material is allowed to overflow, an upwardly-concaved bottom to the case upon which the residue is received and directed to the outside, and a discharge-passage through which it may pass from the generator.

6. In an apparatus for producing explosive vapor from hydrocarbon liquid, a closed case, a heating-pipe upon which the case is removably supported, a spiral channel surrounding the pipe within the case, its inner periphery contacting with the pipe, means for supplying hydrocarbon liquid to the upper end of the spiral channel to flow around the pipe and be heated thereby, an air-supply pipe opening into the case, with means by which the supply may be regulated, a discharge-pipe through which the explosive vapors are delivered and conducted to the engine, and a second air-supply pipe connecting directly with the engine-pipe, with controlling-cock whereby air may be independently supplied to said pipe and mixed with the gas after it leaves the generator.

7. In an apparatus for producing explosive vapors from hydrocarbon liquid, a closed case, a heating-pipe passing through said case and upon which it is supported, a spiral channel fitting around the pipe within the case, means for supplying liquid to be vaporized at the upper end of the channel, a receiving-pan into which surplus is discharged at the lower end, and an overflow and discharge passage, means for supplying air to be mixed with the vapor produced within the case, a perforated top for said case, a spring-pressed disk fitting upon said top and normally closing the openings therein, said disk being adapted to yield to internal pressure and act as a safety-valve for the case.

8. In an apparatus for producing explosive vapor from hydrocarbon liquid, an exterior closed case, a heating-pipe upon which it is supported, a spiral channel coiled and fitting around said pipe within the case, means for supplying hydrocarbon liquid to said channel, consisting of one or more reservoirs with connecting-pipes, a valve-chamber and valve through which the liquid passes to the generator, and a connection between said valve and the engine-governor whereby the supply to the generator is controlled.

9. In a generator for gas, an exterior case, a heating-pipe extending vertically therethrough, and an independent detachable spiral trough coiled about the heating-pipe.

In witness whereof I have hereunto set my hand.

ANTONIO L. NAVONE.

Witnesses:
W. H. PORTER,
I. WIXOM.