May 8, 1928. 1,668,601

A. C. PETERSON

CHARGE PREPARING COOLING UNIT

Filed May 6, 1924 3 Sheets-Sheet 1

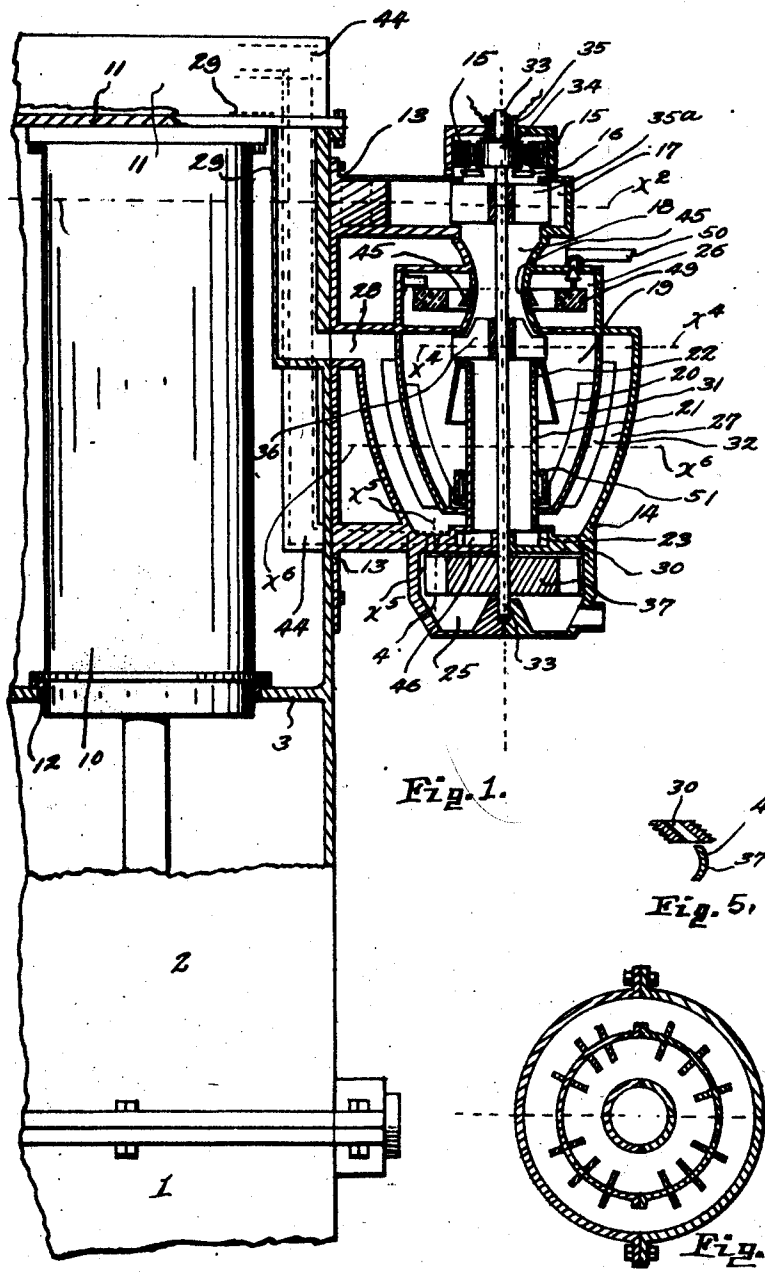


Fig. 1.

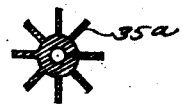


Fig. 3.

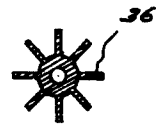


Fig. 4.




Fig. 5.



Fig. 6.

Inventor

Adolphe C. Peterson.

By Adolphe Peterson.

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A. C. PETERSON

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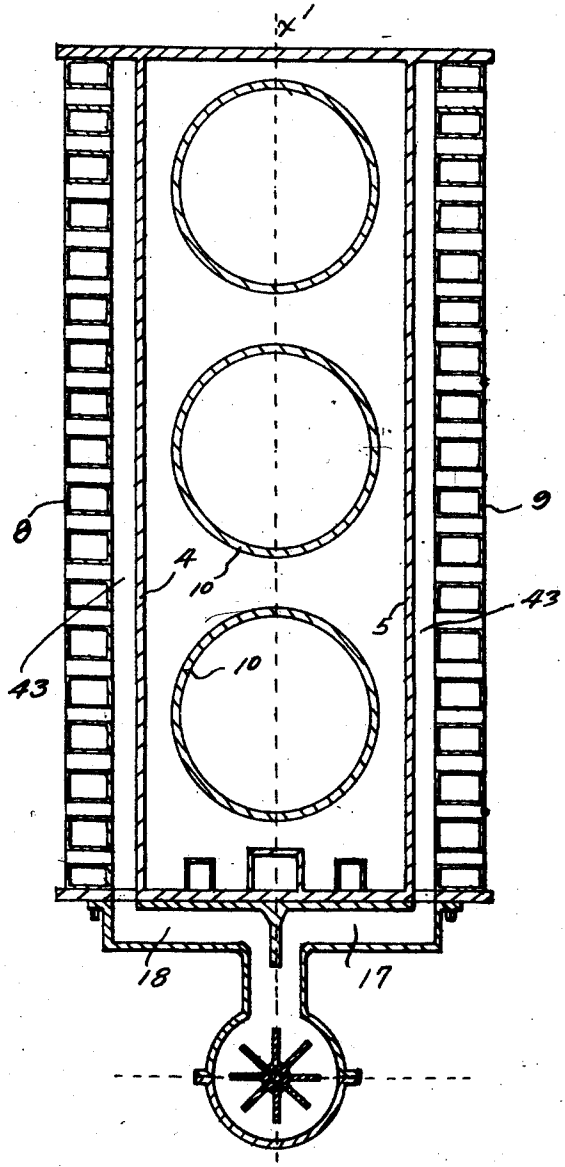


Fig. 2.

Inventor

Adolphe C. Peterson.

By Adolphe Peterson.

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A. C. PETERSON

CHARGE PREPARING COOLING UNIT

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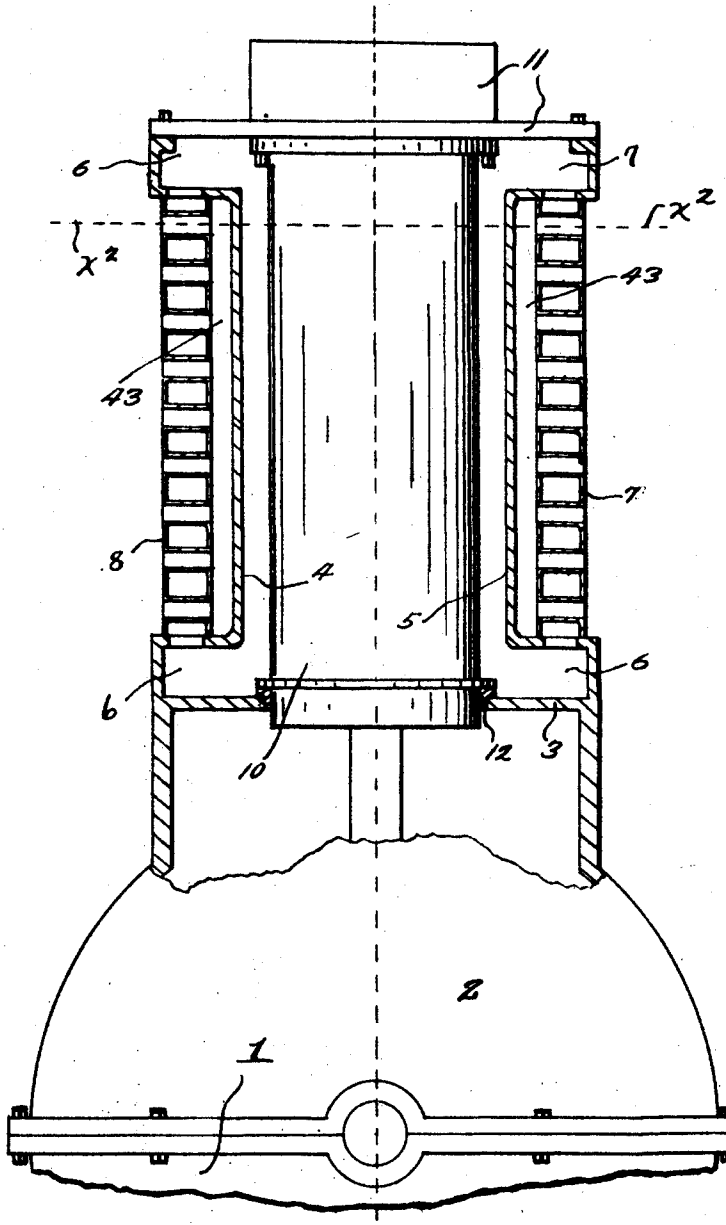


Fig. 1.

Inventor

Adolphe C. Peterson.

By Adolphe Peterson.

Patented May 8, 1928. 1,668,601

# UNITED STATES PATENT OFFICE.

ADOLPHE C. PETERSON, OF MINNEAPOLIS, MINNESOTA.

## CHARGE-PREPARING COOLING UNIT.

Application filed May 6, 1924. Serial No. 711,514.

My invention relates to internal combustion engines and particularly to an improved means embodying charge preparing features and cooling features wherefore it is called a charge preparing-cooling unit.

The principal objects of my invention are, to provide a means which will prepare a charge for an internal combustion engine in such manner that the charge will be clean, properly commingled with fuel, properly heated in the most acceptable manner to promote general engine efficiency, to provide a means which will thoroughly remove from the inspirated air any foreign particles of dust or other matter, to provide a means which will thoroughly segregate from a carburetted air stream the unvaporized particles or the particles which are not very finely atomized, to provide a means which will thoroughly vaporize the particles of fuel segregated from the carburetted air stream, to provide a means which will prepare a thoroughly vaporized fuel admixture with air, to provide a means which will utilize the energy of the exhaust gases to thoroughly atomize and vaporize the fuel commingled with the air, to provide a means for cooling an engine which will be very simple in connection with the other means provided by the device, to provide in connection therewith and for other independent use a novel radiator and cylinder assembly which will be simple, efficient and durable in service and more cheaply constructed than the usual, to provide in connection with air cleaning means also air cooling means, and in general to provide an improved charge preparing and cooling means.

The principal devices and combinations of devices comprising my invention are as hereinafter described and defined in the claims.

In the accompanying drawings which illustrate my invention, like characters refer to like parts throughout the several views.

Referring to the drawings:

Figure 1 is a view chiefly in vertical cross section on the line $X^1$ $X^1$ of Figure 2 showing my device as it is applied to an engine of the multi cylinder type, some parts being shown in full side elevation and some parts being broken away.

Figure 2 is a view chiefly in horizontal cross section on the line $X^2$ $X^2$ of Figure 1.

Figure 3 is a view in horizontal cross section on the line $X^2$ $X^2$ of Figure 1, this view being a detail cross section of the air blower.

Figure 4 is a view in horizontal cross section on the line $X^4$ $X^4$ of Figure 1 showing the cross section of the exhaust gas turbine rotor.

Figure 5 is a view in vertical cross section on the line $X^5$ $X^5$ of Figure 1 through one blade of the turbine rotor and one nozzle as located above it.

Figure 6 is a view in horizontal cross section on the line $X^6$ $X^6$ of Figure 1.

Figure 7 is a view in vertical cross section through the axis of one of the cylinders 10 on a plane at right angles to that of Figure 1.

Referring to the drawings, the numeral 1 indicates the usual lower half of an internal combustion engine, whereon is secured by bolting or otherwise a so-called block-casing which is preferably cast of aluminum or other light metallic alloy or metal and embodies in one casting or unit the upper half of the crank case, that is the section 2, also a horizontal wall 3 wherein are holes through which the cylinder barrels are dropped, also an integral water or other fluid cooling casing which embodies on each of the long sides of the block-casing an interior wall 4 and 5 respectively also on each side a lower radiator outlet passage 6 and an upper radiator inlet passage 7 and a rectangular opening between the passages 6 and 7 formed in the body of the block-casing wherein radiator cores 8 and 9 respectively may be mounted. Cylinder barrels 10 rigidly bolted at their upper ends each to the under side of a unit block head 11 are placed with their lower ends protruding downward through the holes in the wall 3, packing rings 12 being placed so as to form water tight jointure between the sides of the respective cylinder barrels and the wall 3. The unit block head 11 is bolted down rigidly upon the upper end of the block-casing as shown whereby an interior cooling liquid space is formed all about the cylinder barrels, the cooling space having communication freely by the upper and lower passages 6 and 7 respectively with the radiator core members 8 and 9 on each side, whereby a free thermo-siphonic circulation may be had.

The block-casing has attached at its side wall at one end the charge preparing unit which consists principally of two castings 13 and 14, the casting 13 being bolted to the

block-casing as shown and the casting 14 being bolted to the casting 13, the two castings 13—14 having such form that between there is formed at the upper end a chamber wherein two field magnets 15 of a dynamo-generator are located, immediately below that chamber an air inspiration chamber having air ports 16 through which atmospheric air may be inspired, immediately below that chamber an air blower chamber 17, immediately below that chamber a Venturi-chamber 18, immediately there-below a retort-vaporizer chamber 19 within which a gas collecting hood 20 is formed and a central tube 21 having small inlet ports 22 and being open at its upper end as shown to the retort chamber, immediately therebelow a delivery chamber 23, immediately there below an exhaust turbine rotor chamber 24, and immediately there below an exhaust delivery chamber 25. The two castings 13—14 are so formed that when united they form between them the chambers described, and they also form about the Venturi-chamber 18 a float chamber 26 and immediately about the retort chamber 19 an exhaust gas jacket chamber 27 having an inlet conduit 28 conducting exhaust gas from the exhaust manifold 29 in the block casing, also exhaust gas nozzles 30 in the lower part around the wall above the turbine rotor chamber 24, also heat flanges 31 and 32 extending vertically on the inside walls of the retort chamber and on the outside walls of the retort chamber, respectively.

A rotor shaft 33 is rotatably mounted in bearings between the castings 13—14 as shown so as to be rotatable upon a vertical axis, it being noted that ball bearings may preferably be used, and is so stationed between the castings 13—14 that units which it bears secured to rotate with it rotate as follows: an armature 34 rotatable in the dynamo generator chamber, having a commutator and allied brushes 35; an air blower 35ª rotatable in the air blower chamber 17; a separator or segregator blower 36 rotatable as to part of its length in the lower end of the Venturi chamber 18 and as to the nethermost end of its length in the upper part of the retort-vaporizer chamber 19, and an exhaust turbine rotor 37 rotatable in the turbine rotor chamber 24 immediately below the nozzles 30.

The air blower 35ª has such relation to the air blower chamber and the Venturi chamber, and the air inspiration ports 16 have such comparatively large size (preferably comparatively larger than that as shown which is not necessarily to the most effective scale) that the air blower draws a comparatively large volume of air from the atmosphere and under centrifugal stress impels the larger part of the air stream centrifugally outward and through conduits 38—39 passing through casting 13 to ports 40—41 admitting the air streams to spaces 42—43 immediately within each radiator core member 8—9 such that the air may pass in small streams through the radiator core members to the atmosphere. However a small part of the air inspirated by blower 35 is drawn by the suction from the engine manifold 44 inward and down from the lower side of the air blower 35 whereby that portion of the air stream is segregated from the major part of the air stream carrying the dust and other foreign particles, and that minor portion of the air stream then passes downward through the Venturi chamber 18 where it has mixed with it liquid fuel or fuel emerging from the fuel nozzles 45—which receive fuel from the float chamber 26 and carries the fuel downward with it to the segregator blower 36 where the unvaporized or larger fuel particles are by centrifugal stress segregated outward from the air stream or carburetted air stream and pass by the centrifugal stress radially outward to the inner side walls of the retort vaporizer chamber 19 where they are immediately vaporized by the heat of the retort walls or flow downward and are progressively heated and vaporized by the heat flanges and walls and as vaporized the vaporized gas then passes inward and under the gas-collecting hood 20 through the ports 22 into the interior of the tube 21 where this vaporized fuel gas is then returned to and mixed with the air or carburetted air flowing downward through the tube 21 directly from the Venturi chamber 18 through the segregator blower 36. The reunited stream of air or carburetted air and fuel gas then passes into the delivery chamber 23 and thence through conduits 46 which deliver to and through the conduits 47 in the block casing to the inlet manifold and valve ports of the engine (the latter not shown) to the cylinders as necessary to secure the engine cycle operation.

The exhaust gas from the engine manifold flows through the heating jacket about the retort vaporizer chamber 19 and thence through the exhaust gas nozzles 30 in small streams directly tangentially against the blades 48 of the turbine rotor 37 thereby driving it and its rotatably related air blower 35 and segregator blower 36 at a high rate of speed to secure the functioning described. The float chamber receives fuel as governed by the float 49 from a fuel supply conduit 50. The float 49 is preferably constructed in two halves whereby it may be more readily assembled with the halves of the unit, such two-part construction of the float being not shown however in detail as it is a mere constructional detail.

An electrical heating unit 51 having a substantially circular form is placed about the tube 21 near its lower end but just above the

inside bottom of the retort vaporizor chamber 19 and is adapted to be heated by any electrical current supply means (not shown) for initial heating of the segregated flow of liquid fuel in starting of the engine from cold. Such electrical heating means is merely auxiliary and need not be used after starting or at all depending on the conditions of operation and the fuel, and it is to be noted that instead of such electrical auxiliary or initial heating means any initial heating means may be used.

The inlet manifold and exhaust manifold and induction and exhaust means of the engine is merely diagrammatically shown in part only as it is contemplated that the novel means be merely connected to operate as shown with any induction or exhaust means. It is to be noted that the dynamo-generator 15—34 may be used as a motor to drive the shaft 33 and its other rotatable parts in initial driving of the shaft 33 in starting to secure better starting but that it need not be so used, and also that the dynamo-generator 15—34 may be omitted altogether from the construction as a part of the rotational elements revolvable by shaft 33. In some constructions other blower means for furnishing the cooling air current may be provided, or auxiliary power means may be provided to drive the shaft 33, that is to assist in its driving, depending on the volume of air desired and number of units employed with the shaft 33. It is to be noted also that the novel charge preparing means may be used without the novel cooling means shown, and the novel dust eliminating means may be used without the using of the surplus air for cooling means as shown. It is to be noted also that I intend the device, in practical use to be used particularly with a novel form of exhaust drive rotator or turbine construction which may be cheaply made and efficient but which is the subject particularly of another application for patent.

While I have shown particular devices and combinations of devices in the illustration of my invention, I contemplate that other detailed devices and combinations of devices may be used in the realization of my invention without departing from the scope and spirit of my invention.

What I claim is:

1. A rotor adapted to be driven by the exhaust gas from an internal combustion engine, an air blower driven by the exhaust gas driven means and moving a comparatively large volume of air, and a conduit leading from the blower whereby a smaller volume of air is drawn from the stream moved by the air blower in such way that the smaller volume is free of foreign particles or dust and the larger volume stream carries the dust particles, and means whereby the smaller volume air stream is passed to the cylinders of an internal combustion engine.

2. A rotor adapted to be driven at high rotative speed and having means blowing a large volume of air, means whereby a portion of the air passes from the blowing means and carries foreign particles with it and passes through an internal combustion engine cooling means, means whereby a volume of air is drawn from the blowing means in such manner that the foreign particles are expelled from it with the volume passing to the cooling means and whereby the cleaned volume of air passes to an internal combustion engine cylinder.

3. A rotor adapted to be driven at high rotative speed and having means blowing a large volume of air, means whereby a portion of the air passes from the blowing means and carries foreign particles with it and passes through an internal combustion cooling means, means whereby a volume of air is drawn from the blowing means in such manner that the foreign particles may pass away from it with the volume of air passing to the cooling means, and whereby the cleaned volume of air passes through a carburetting means to the cylinders of an internal combustion engine.

4. In an internal combustion engine, a block casting comprising a crank case portion and a casing wherein cylinders may be located and having side depressions in each of which radiator members may be stationed and connect with cooling spaces within the block casting, and a cylinder unit attachable to the head of the block casting and having individual cylinders depending in the casing of the block casting into individual cylinder apertures to the crank portion.

5. In an internal combustion engine, a block casting comprising a crank case portion and a casing wherein cylinders may be located and having side depressions in each of which radiator members are stationed and connect with cooling space within the block casting, and a cylinder head attachable to the head of the block casting and having attached to the cylinder head individual cylinders depending into the casing of the block casting and through apertures in the wall of the casing to the crank portion interior.

6. In an internal combustion engine, a block casting comprising a crank case portion and a casing wherein cylinders may be located and having side depressions wherein radiator members are located and connect with the space within the block casting, a cylinder head bearing attached individual cylinders and attached to the head of the block casting, and a charge preparing unit attached to the end of the block casting and having mounted therein at right angles to the engine crank shaft a revolvable shaft bearing an air impeller, passages whereby air drawn from

the atmosphere by the impeller is directed in part so as to carry solid or dust particles with it through the radiator members as cooling air and whereby the remaining portion of the air freed from the solid or dust particles is directed through a carburetting chamber of the charge preparing unit to an inlet manifold delivering to the engine cylinders.

7. In an internal combustion engine, a block casting comprising a crank case portion and a casing wherein cylinders may be located and having side depressions wherein radiator members are located and connect with the space within the block casting, a cylinder head bearing attached cylinders depending downwardly into the block casting, the cylinder head attached to the head of the block casting, and a charge preparing unit attached to the end of the block casting and having mounted at right angles to the engine crank shaft a revolvable shaft bearing an impeller whereby air is drawn from the atmosphere and passages whereby part of the air is directed so as to carry solid and dust particles with it through the radiator members as cooling air and whereby the remaining portion of the air is directed through a carburetting chamber receiving fuel therein and thence through a chamber wherein unvaporized fuel particles are directed into a heating chamber and thence through a conduit whereby the fuel particles vaporized are restored to the carburetted air stream and directed to a manifold delivering to the engine cylinders.

8. A centrifugal air blower having the form and size to move a comparatively large volume of air, a means driving the blower at high rotative speed, a conduit leading centrally from the blower whereby a smaller volume of air is drawn from the larger volume stream moved by the air blower in such way that the smaller volume stream is free of foreign particles or dust and the larger volume stream carries the dust particles, and means whereby the smaller volume stream is passed to the cylinders of an internal combustion engine.

9. A passage having an air inlet and an air outlet, a centrifugal blower in the passage adapted to move a comparatively large volume of air, a means driving the blower at high rotative speed, a conduit leading from the vortex formed by the blower whereby a smaller volume stream may be drawn from the larger volume stream moved by the blower in such manner that the smaller volume stream is free of foreign particles or dust and the larger volume stream carries the dust particles, and means whereby the smaller volume air stream is passed to the cylinders of an internal combustion engine.

10. In an internal combustion engine, a block casting comprising a crank case portion and a casing wherein cylinders may be located and having side depressions wherein radiator members are located and connect with the space within the block casting, a cylinder head bearing attached individual cylinders and attached to the head of the block casting, and a charge preparing unit having mounted therein a revolvable shaft bearing an air impeller, passages whereby air drawn from the atmosphere by the impeller is directed in part so as to carry solid or dust particles with it through the radiator members as cooling air and whereby a portion of the air freed from the solid or dust particles is directed through a carburetting chamber of the charge preparing unit to an inlet manifold delivering to the engine cylinders.

11. In an internal combustion engine, a block casting comprising a crank case portion and a casing wherein cylinders may be located and having side depressions wherein radiator members are located and connect with the space within the block casting, a cylinder head bearing attached individual cylinders and attached to the head of the block casting, a charge preparing unit having mounted therein a revolvable shaft bearing an air impeller and a separator impeller, and passages whereby the air impeller draws a large volume of air from the atmosphere and whereby a portion of the air is directed through the radiator members carrying solid or dust particles with it and whereby another portion of the air freed from the solid or dust particles is directed through a carburetting chamber receiving liquid fuel from a fuel nozzle therein and thence through the separator impeller from whence unvaporized or large fuel particles are thrown into a vaporizing chamber and thence through a passage where the large fuel particles as vaporized are returned to the stream and thence through an inlet manifold to the engine cylinders.

12. A charge preparing unit comprising a revolvable shaft bearing an air impeller and a separator impeller, a means revolving the revolvable shaft, a carburetting chamber having a fuel nozzle and a related liquid fuel supplying source, a vaporizing chamber having related heating means, a conduit delivering to internal combustion engine cylinders, an atmospheric air port and a discharge port whereby the air impeller may receive air from the atmosphere and discharge to the atmosphere carrying solid and dust particles with the air to the atmosphere, and a passage whereby a portion of the air moved by the air impeller is drawn from the air impeller approximately at a central location respecting its path of rotation and directed through the carburetting chamber thence through the separator impeller from whence unvaporized or large fuel particles

are thrown into the vaporizing chamber and thence to the conduit delivering to the internal combustion engine cylinders, and a passage whereby vaporized fuel may be delivered from the vaporizing chamber to the conduit delivering to the internal combustion engine cylinders.

13. A charge preparing unit comprising a revolvable shaft bearing an air impeller and a separator impeller, a means revolving the revolvable shaft, a carburetting chamber having a related liquid fuel supply source, a vaporizing chamber having a related heating means, an internal combustion engine having related radiator cooling means and an inlet manifold, passages related to the air impeller whereby a large volume of air is drawn from the atmosphere and directed through the radiator cooling means drawing with it solid or dust particles and whereby another portion of the air drawn from the atmosphere is drawn from the air impeller approximately at a central location respecting its path of rotation and directed through the carburetting chamber and thence through the separator impeller from whence unvaporized fuel particles are thrown to the vaporizing chamber and thence to the engine manifold, and means whereby vaporized fuel may be delivered from the vaporizing chamber to the stream passing to the engine manifold.

In witness whereof I have hereunto set my hand this 4th day of May, 1923.

ADOLPHE C. PETERSON.