C. F. JOHNSON.

CARBURETER.

APPLICATION FILED JUNE 26, 1915.

Patented May 24, 1921.

2 SHEETS—SHEET 1.

1,378,867.

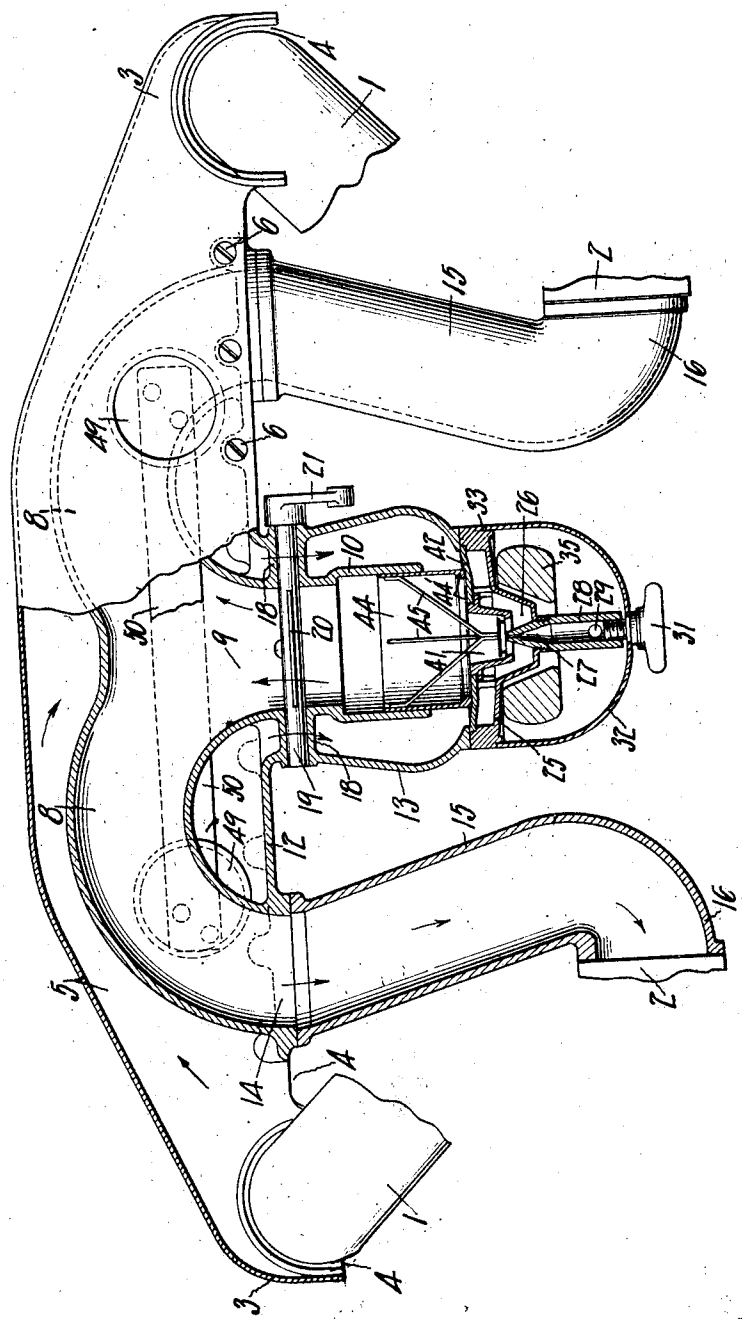


Fig. 1.

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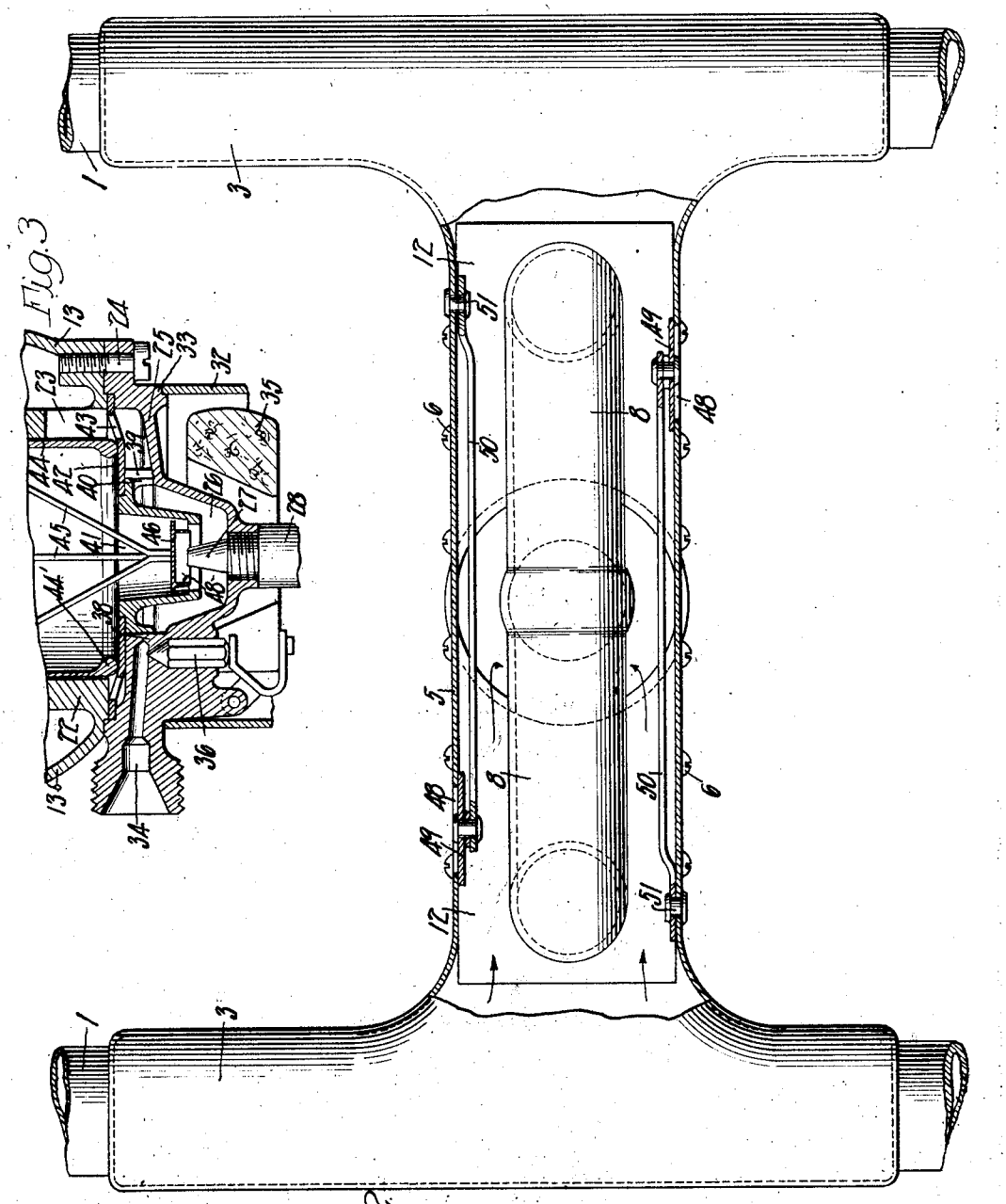


Fig. 2

Fig. 3

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CARBURETER.

1,378,867. Specification of Letters Patent. Patented May 24, 1921.

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To all whom it may concern:

Be it known that I, CHESTER F. JOHNSON, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Carbureter, of which the following is a specification.

The present invention has reference to a carbureter for internal combustion engines, and its object is to provide means whereby the ingoing air, after passing over the exhaust manifold or other heated portion of the engine, is first brought into heating relation to the mixture passage at a point in the latter between the fuel nozzle and the intake of the engine, then passes through that portion of the mixing chamber adjacent the nozzle and from thence through the heated portion of the mixture passage into the engine. In this manner, a large quantity of the heat that would otherwise be lost is utilized for heating the air supply before it contacts with the fuel and for afterward maintaining the fuel mixture at a temperature at which condensation or deposition is wholly or partly eliminated, whereby important economies are obtained. The invention further consists in means by which the temperature of the air being admitted to the mixing chamber is automatically controlled, together with an arrangement of passages whereby the device is adapted for use on an engine having a plurality of rows of cylinders, the heads of which are spaced apart from each other; also in the details of construction shown, described and particularly pointed out in the claims.

In the drawings, which illustrate a preferred embodiment of my invention, Figure 1 is a fear elevation through the device, parts being broken away, showing its relation to the exhaust manifolds and the intakes of the engine. Fig. 2 is a plan view corresponding to Fig. 1, parts being broken away. Fig. 3 is a fragmentary vertical section at right angles to Fig. 1.

Similar reference characters refer to like parts throughout the several views.

1 indicates the usual exhaust pipes or manifolds and 2 the intake manifolds of an engine, the cylinders of which (not shown) may be arranged in V relation to the crank shaft, as in the well known eight and twelve cylinder types. Mounted on and extending across between the exhaust manifolds is a semi-tubular cover plate that comprises the ends 3 (which open downwardly along the sides of the exhaust manifolds at 4), and the cross piece 5 by which they are joined. As shown, the cover plate is of substantially H shape in plan, but it obviously might be U shaped or otherwise.

From the above it will of course be understood that the axis of the crank shaft of said eight and twelve cylinder engines lies at right engles to the plane of the paper in Fig. 1 and in a vertical plane between the cylinders 2; in other words, that the cover plate is intersected by the vertical plane through the axis of the crank shaft.

The cover plate is attached by screws 6 along its edges to and forms a part of a cross header that comprises the oppositely extending curved conduits 8 which merge into one another at 9 and pass downwardly to form the wall 10 of a mixing chamber. The cross header also comprises the transverse wall 12 by which the sides of the cover plate are joined, and the tubular wall 13 spaced apart from and inclosing the wall 10 of the mixing chamber. The elements 5—12—13 constitute a jacket for the conduit 8—10—14. From the portions 14 of the conduits 8, the latter are continued downwardly by means of the pipe sections 15, preferably separate from the remainder of the header and having the out-turned lower ends 16 by which they are attached to the intake manifolds 2. The walls 10 and 13 may be connected by the perforated bosses 18 through which extends a shaft 19 equipped with the usual throttle valve 20 and actuated by the lever 21; these walls may also be joined along their lower edges at intervals by the posts or webs 22 (Fig. 3) between which the air passages 23 are formed.

Attached to the lower end of the wall 13 by screws 24 (Fig. 3) or in any other desired manner is a float chamber cover 25 having a cup-shaped central depression 26 into which the fuel nozzle 27 is threaded, said nozzle including the downwardly extending body portion 28 perforated at 29 and threaded to receive the end of a clamping nut 31 whereby the cup-shaped float chamber body 32 is secured in position against a shoulder 33 on the cover. Fuel is admitted to the float chamber through the passage 34 and its level is governed by the float 35 and valve 36 in a well known manner.

The cover 25 is provided with an annular upstanding flange 38, perforated at 39, which

inclo s the downturned perforated flange 40 on the strangle tube 41, the latter of which is spaced somewhat from the cover and extends down into the depression 26. A diaphragm 42, clamped between the wall 13 and the cover, and provided with the perforations 43, holds the strangle tube in position. Slidable vertically within the mixing chamber is a tubular valve 44 to which is secured the spider 45 which leads downwardly to the disk 46 located slightly above the nozzle 27 when the valve is in closed position, as shown, this disk preferably being provided with the downwardly extending annular flange 48. It will be noted that the valve 44 is provided with a rounded lower edge 44'.

The details of these fuel feeding elements proper are quite similar to those shown in my prior Patent Number 1059368 of April 22, 1913; and the operation thereof is as follows: The primary air passing down between the walls 10 and 13 flows through the openings 43 and 39 and down toward the nozzle, then upwardly past the nozzle and through the strangle tube. In this movement it impinges on the disk 46 and is deflected outwardly and, acting conjointly with the suction in the mixing chamber, causes the disk to elevate the valve 44 to a greater or less degree to admit the necessary amount of auxiliary air directly into the mixing chamber. While this construction is desirable, it will be understood that the air circulating and heating features of the invention are applicable in connection with fuel-supplying elements of widely different character. The rounded lower edge 44' prevents whistling of the air as it passes into the mixing chamber.

The cover plate is pierced, preferably at the sides, to form openings 48 which the closures 49 approach or recede from through the action of the thermostat bars 50 secured to the cover plate by rivets 51.

In the use of the device, heated air is drawn through the openings 4 and passes along between the wall 12 and the cross piece 5 of the cover plate, then downwardly between the walls 10 and 13 as indicated by the arrows. In this movement it heats the header 8 and the mixing chamber 10. The air then sweeps past the nozzle and through the mixing chamber as stated above, after which it rises through the heated header and flows to the engines through the conduits 15. Should the temperature of the fuel mixture rise too high, the thermostat bars 50 swing the closures 49 to partly or entirely open the openings 48, and the reverse action takes place upon the temperature falling to an undesirable degree. Thus the fuel mixture may be maintained at the temperature of maximum efficiency regardless of changes in the weather.

It is clear that many changes may be made in the details of construction without departing from the spirit of my invention; for example, the device may be adapted to the usual four and six cylinder engines. I do not, therefore, wish to be limited otherwise than as indicated by the subjoined claims.

I claim:

1. In combination with spaced exhaust pipes of an internal combustion engine, a conduit for heated air extending across between the exhaust pipes and having intake openings adjacent thereto, a fuel feeding device supported by the air conduit, said fuel feeding device comprising a fuel reservoir, a nozzle and a mixing chamber, a fuel-mixture conduit leading from the mixing chamber to the engine, said fuel-mixture conduit being arranged in such manner with respect to the air conduit as to be heated by warm air as it passes through the latter and before said warm air reaches the fuel mixture conduit.

2. In combination with spaced exhaust pipes of an internal combustion engine, a conduit for heated air extending across between the exhaust pipes and having intake openings adjacent thereto, a fuel feeding device supported by the air conduit, said fuel feeding device comprising a fuel reservoir, a nozzle and a mixing chamber, a fuel-mixture conduit leading from the mixing chamber to the engine, said fuel-mixture conduit passing through said air conduit for a considerable portion of its length whereby the fuel-mixture conduit is heated and condensation of fuel is wholly or partly prevented, said air conduit extending to and around the mixing chamber to supply air and heat thereto.

3. In combination with independent spaced exhaust manifolds of an internal combustion engine, said manifolds being separate from one another and serving different cylinders, a fuel nozzle and means for supplying fuel thereto, a fuel-mixture conduit leading from the fuel nozzle to the engine, means for forming an air conduit, said air conduit being divided and having intake openings located in proximity to the several exhaust pipes whereby air entering the conduit is heated, said fuel-mixture conduit passing through the air conduit.

4. In combination with a plurality of spaced and separate intake manifolds of an internal combustion engine, said manifolds being arranged on opposite sides of the central longitudinal vertical plane of the engine, an exhaust pipe, a fuel nozzle and means for supplying fuel thereto, a divided fuel-mixture conduit leading from the fuel nozzle to the several intake manifolds, means for forming an air conduit having an opening located in proximity to the exhaust pipe whereby air entering the conduit

is heated, the divided portion of said fuel-mixture conduit passing through the air conduit for a considerable portion of its length whereby condensation of fuel is wholly or partly prevented.

5. In combination with a plurality of spaced exhaust pipes of an internal combustion engine, a conduit for heated air extending across between the exhaust pipes and having intake openings adjacent thereto, a fuel feeding device supported by the air conduit, said fuel feeding device comprising a fuel reservoir, a nozzle and a mixing chamber, a fuel-mixture conduit leading from the mixing chamber to the engine, said fuel-mixture conduit being arranged in such manner with respect to the air conduit as to be heated by warm air passing through the latter, said air conduit having a second opening in its wall between the first mentioned openings and the mixing chamber, and a thermally controlled closure for one of the openings whereby the temperature of the air passing to the mixing chamber is regulated.

6. In combination with a plurality of spaced exhaust pipes of an internal combustion engine, a conduit for heated air extending across between the exhaust pipes and having intake openings adjacent thereto, a fuel feeding device supported by the air conduit, said fuel feeding device comprising a fuel reservoir, a nozzle and a mixing chamber, a fuel-mixture conduit leading from the mixing chamber to the engine, said fuel-mixture conduit being arranged in such manner with respect to the air conduit as to be heated by warm air passing through the latter, said air conduit having a second opening in its wall between the first mentioned openings and the mixing chamber, and a thermally controlled closure for the second opening, whereby the temperature of the air passing to the mixing chamber and of the fuel mixture passing from the mixing chamber to the engine is regulated.

7. In combination with a plurality of spaced intake manifolds of an internal combustion engine, an exhaust pipe, a fuel nozzle and means for supplying fuel thereto, a divided fuel-mixture conduit leading from the fuel nozzle to the several intake manifolds, means for forming an air conduit having an opening located in proximity to the exhaust pipe whereby air entering the conduit is heated, said fuel-mixture conduit passing in such relation to the air conduit as to be heated thereby for a considerable portion of its length, whereby condensation of fuel is wholly or partly prevented, said air conduit having a second opening, said second opening being located between the first opening and the mixing chamber, and a thermally controlled closure for one of the openings whereby the temperature of the air passing to the mixing chamber is regulated.

8. In combination with a plurality of spaced intake manifolds of an internal combustion engine, an exhaust pipe, a fuel nozzle and means for supplying fuel thereto, a divided fuel-mixture conduit leading from the fuel nozzle to the several intake manifolds, means for forming an air conduit having an opening located in proximity to the exhaust pipe whereby air entering the conduit is heated, said fuel-mixture conduit passing in such relation to the air conduit as to be heated thereby for a considerable portion of its length, whereby condensation of fuel is wholly or partly prevented, said air conduit having a second opening, said second opening being located between the first opening and the mixing chamber, and a thermally controlled closure for the second opening whereby the temperature of the air passing to the mixing chamber is regulated.

9. In combination with means for conducting the exhaust gases of an internal combustion engine, said means comprising a plurality of exhaust manifolds spaced apart from each other, a conduit for heated air extending across transversely in reference to the exhaust manifolds and having intake openings adjacent thereto, a fuel feeding device supported by the air conduit, said fuel feeding device comprising a fuel reservoir, a nozzle and a mixing chamber, a fuel-mixture conduit leading from the mixing chamber to the engine, said fuel-mixture conduit being arranged in such manner with respect to the air conduit as to be heated by warm air as it passes through the latter and before said warm air reaches the fuel mixture conduit.

10. In combination with spaced exhaust conduits of an internal combustion engine, a conduit for heated air extending across between the exhaust conduits and having an intake opening adjacent one of the exhaust conduits, a fuel feeding device supported by the air conduit, said fuel feeding device comprising a fuel reservoir, a nozzle and a mixing chamber, a fuel-mixture conduit leading from the mixing chamber to the engine, said fuel-mixture conduit being arranged in such manner with respect to the air conduit as to be heated by warm air as it passes through the latter and before said warm air reaches the fuel mixture conduit.

11. In combination with a plurality of spaced intake manifolds of an internal combustion engine, said manifolds being located on opposite sides of the central longitudinal vertical plane of the engine, means located between the manifolds for conducting a combustible mixture of air and fuel to both manifolds, a single means for forming the combustible mixture, and means including

jacket forming means for the mixture forming means whereby heat from the engine is applied to both mixture forming and conducting means to elevate the temperature of the mixture and to prevent condensation.

12. In combination with a plurality of spaced intake manifolds of an internal combustion engine, an exhaust pipe, a fuel nozzle and means for supplying fuel thereto, a divided fuel-mixture conduit leading from the fuel nozzle to the several intake manifolds, means for forming an air conduit having an opening located in proximity to the exhaust pipe whereby air entering the conduit is heated, said fuel-mixture conduit passing through the air conduit for a considerable portion of its length including a considerable portion of the length of the divisions thereof whereby condensation of fuel is wholly or partly prevented.

13. In combination with a plurality of spaced substantially parallel exhaust manifolds of an internal combustion engine, said manifolds lying on opposite sides of the longitudinal vertical plane through the axis of the crank shaft of said engine, a single fuel feeding means for the engine located intermediate between the exhaust manifolds, and means whereby heat from the exhaust manifolds is applied to the fuel feeding means to cause vaporization of the fuel.

14. In combination with a plurality of spaced exhaust manifolds of an internal combustion engine, said manifolds lying on opposite sides of the longitudinal vertical plane through the axis of the crank shaft of said engine, a fuel feeding means for the engine located intermediate between the exhaust manifolds, means whereby heat from the exhaust manifolds is applied to the fuel feeding means to cause vaporization of the fuel, and thermally controlled means for regulating the application of the heat in accordance with weather conditions.

15. In combination with a plurality of spaced intake manifolds of an internal combustion engine, means supported between the manifolds for forming and supplying a combustible mixture of fuel and air to both manifolds, means whereby heat from the engine is intimately applied to the mixture supplying means to elevate the temperature of the mixture and to prevent condensation of fuel in the mixture forming and supplying means, and thermally controlled means for regulating the application of the heat in accordance with weather conditions.

16. In combination with a plurality of spaced intake manifolds of an internal combustion engine, means extending across between the manifolds for forming and supplying a combustible mixture of fuel and air to both manifolds, and means for transferring heat separately from heated portions of the engine corresponding, respectively, to the manifolds to the mixture forming and supplying means to elevate the temperature of the mixture and to prevent condensation of fuel.

17. In combination with a plurality of spaced intake manifolds of an internal combustion engine, means extending across between the manifolds for forming and supplying a combustible mixture of fuel and air to both manifolds, means for transferring heat separately from heated portions of the engine corresponding, respectively, to the manifolds to the mixture forming and supplying means to elevate the temperature of the mixture and to prevent condensation of fuel, and thermally controlled means for regulating the application of the heat in accordance with weather conditions.

18. In combination with a plurality of spaced intake manifolds of an internal combustion engine, said manifolds being located on opposite sides of the central longitudinal vertical plane of the engine, means extending across between the manifolds for forming and supplying a combustible mixture of fuel and air to both manifolds, means for transferring heat separately from heated portions of the engine corresponding, respectively, to the manifolds to the mixture forming and supplying means to elevate the temperature of the mixture and to prevent condensation of fuel, and thermally controlled means for regulating the application of the heat in accordance with weather conditions, said thermally controlled means including means for separately regulating the application of heat from the separate heated portions of the engine.

19. In combination with a plurality of spaced manifolds of an internal combustion engine, said manifolds lying on opposite sides of the longitudinal vertical plane through the axis of the crank shaft of said engine, a single fuel feeding means for the engine located intermediate between the manifolds, a divided conduit for conducting fuel mixture from the fuel feeding means to the manifolds, and means, independent of the cooling means for the engine, for applying heat from said engine to the fuel mixture conduit.

20. In combination with a plurality of spaced manifolds of an internal combustion engine, said manifolds lying on opposite sides of the longitudinal vertical plane through the axis of the crank shaft of said engine, a single fuel feeding means for the engine located intermediate between the manifolds, a divided conduit for conducting fuel mixture from the fuel feeding means to the manifolds, and means, independent of any water jacket which may be associated with said engine, for applying heat from said engine to the fuel mixture conduit.

21. In combination with a plurality of

spaced manifolds of an internal combustion engine, said manifolds lying on opposite sides of the longitudinal vertical plane through the axis of the crank shaft of said engine, fuel feeding means for the engine located intermediate between the manifolds, a divided conduit extending transversely of the engine for conducting fuel mixture from the fuel feeding means to the manifolds, and means, independent of the cooling means for the engine, for applying heat from said engine to the fuel mixture conduit at points between the point at which the fuel mixture conduit divides and the intake of the corresponding engine cylinders.

22. A cross header for internal combustion engines, fuel feeding means supported by the header near the middle thereof, said cross header including passages through which fuel mixture is delivered from the fuel feeding means in oppositely directed currents, and also including jackets for the first mentioned passages through which air is conducted to the fuel feeding means in currents directed oppositely to the first mentioned currents corresponding thereto, and means for heating said air.

23. The combination with an internal combustion engine having cylinders arranged in V-relation, a cross-header bridging the V of said cylinders, a fuel feeder supported thereon, said cross-header including passages disposed crosswise of the engine and extending in opposite directions from the central longitudinal plane thereof, through which fuel mixture may flow, and jacket means having passages through which gaseous fluid flows to heat the fuel mixture, the direction of flow of said fluid being such that the hottest portion of the fluid supplies heat to those portions of the first named passages farthest from the fuel feeder.

24. The combination with an internal combustion engine having cylinders arranged in V-relation, a cross header bridging the V of said cylinders and shaped in plan view to resemble the letter H, fuel feeding means supported on the cross-bar of the header substantially equally distant from the side bars thereof, said cross-header having passages through which fuel mixture is conducted from the fuel feeding means in oppositely directed currents, said cross-header including means for jacketing a part at least of each of said passages to provide for the passage of air for heating the walls thereof, and means for heating said air.

25. In an internal combustion engine, a cross header having a pair of side elements substantially parallel to each other and a tubular cross-element whereby the side elements are connected, fuel feeding means supported on the cross-element, the cross-element having passages through which warm fresh air is drawn in toward the fuel feeding means from the side elements and through which fuel mixture flows from the fuel feeding means toward the side elements.

26. An internal combustion engine comprising an intake manifold, an exhaust manifold, a fuel feeder, a conduit leading from the fuel feeder to the intake manifold, and a jacket through which fresh air is supplied to the mixture conduit, said jacket extending entirely around the fuel mixture conduit for a considerable proportion of the length thereof and having an intake opening in proximity to the exhaust manifold.

27. An internal combustion engine comprising an intake manifold, a fuel feeder, a conduit leading from the fuel feeder to the intake manifold, and a jacket through which fresh air is supplied to the mixture conduit, said jacket extending entirely around the fuel mixture conduit for a considerable proportion of the length thereof and having an intake opening in proximity to a highly heated portion of the engine.

28. The combination with an internal combustion engine having cylinders arranged in V-relation, a cross-header bridging the V of said cylinders, fuel feeding means supported by the header near the middle thereof, said cross-header including passages through which fuel mixture is delivered from the fuel feeding means in oppositely directed currents, and also including jackets for the first mentioned passages through which air is conducted to the fuel feeding means in currents directed oppositely to the first mentioned currents corresponding thereto, and means for heating said air.

In testimony whereof I have signed this specification.

CHESTER F. JOHNSON.