FUEL SUPPLY MEANS FOR INTERNAL COMBUSTION ENGINES

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This invention relates in general to fuel supply means, and more especially to supplying fluid fuel to air in the formation of a combustible charge for internal combustion engines.

More particularly, it relates to combustible charge or mixture formation in cooperation with an instrumentality such as a rotary blower for the principal purpose of finely dividing, atomizing and uniformly distributing the fuel throughout the air, as an incident to movement of the air by the blower or the like toward the combustion chambers. The blower in these applications of the invention, may serve principally as a charge forming or mixing and advancing instrument or may have the well understood functions of a supercharger, with incidental improvement of the quality of the charge by its action upon the fuel in the presence of the combustion supporting air.

A principal use of engines provided with superchargers is in aircraft; the invention is therefore valuable in connection with aircraft engines, and the present description is devoted principally to such applications, wherefrom the characteristics and advantages of the invention structures in other uses or adaptations will readily be understood.

A principal object of the invention is to supply liquid fuel to the charging blower of an engine in such a manner that the fuel is properly broken up, atomized and uniformly distributed through the air charge, and at the same time to avoid disadvantageous localization, condensation or re-collection of the fuel, or undesired accumulation of the fuel in liquid form on walls of the apparatus.

Another principal object is to dispose in an advantageous manner of the fuel which frequently unavoidably redeposits or collects and flows on wall surfaces. This object is attained in accordance with the invention, as generally stated, by providing in favorable locations with reference to such collecting surfaces, means or formations by which the collected fuel is redeposited into the air stream in a favorable manner.

A more particularly stated object is to cause fuel which may unavoidably accumulate in liquid form in the absence of such a blower, to be again discharged from the accumulating surfaces, re-delivered into the flowing air in a favorable manner, or re-atomized and redistributed through the air flows; in brief, to cause such fuel accumulations to be again taken up in a proper manner by the air stream and carried in the desired condition to the engine heads.

I have found that in systems of this class, in which it is attempted to utilize the rotary distributor or blower, as a charge former, that is as a means for atomizing the fuel as, for example, by a simple application of a fuel feeding device at or near the center of the blower or supercharger, while the fuel is moved outward and atomized with ample vigor, the advantages which might be expected from this action are not fully, or in some cases at all satisfactorily realized. Especially the desired final atomization and incorporation of the fuel into the air as the charge passes away from the blower and goes to the engine combustion chambers, is not obtained; but on the contrary, the fuel seems to issue principally, if not entirely, on some outward wall of an outer ring or equivalent structure which receives the air delivery, at such low velocity that it tends chiefly to collect and fall or run to some bottom point of the system by the action of gravity; and, of course, in such case this substantial part of the fuel is not properly incorporated into the air body.

In one instance, rotation of a centrifugal supercharger wheel without a surrounding casing demonstrated that the fuel would indeed fly off from the wheel in a highly atomized state. Visual examination of the interior with a covering or casing in place showed that the fuel left the impeller wheel at such high velocity that it impinged upon the surrounding walls, to which it adhered by surface tension, and then flowed along the walls rather sluggishly under the influence of the various air currents. This difficulty was aggravated when so-called diffuser blades were used between the periphery of the centrifugal fan and the outer collecting chamber. These blades are ordinarily used to create spiral passages of diverging form or increasing sectional area in order to slow down the air and convert its high velocity and low density into lower velocity and higher density. In this case the fuel tended to collect on the positive or high pressure sides of the diffuser blades and thence drain off into the bottom of the outer collecting ring.

The invention was developed from these considerations upon the theory or in accordance with the general concept that the just stated phenomena or results are probably inherent in instrumentalties, such as blowers, when used for the present purpose, and that the desired final result should be obtained by not endeavoring fundamentally to alter the structure or general operation of the blower with respect to its char-
acteristic action on the liquid fuel, but that associated structures or wheel elements should be so devised or modified that they would, so to speak, take advantage of the blower characteristic.

In a manner which would in effect correct the stated faults and produce the desired approximated to a theoretically perfect mixture in the final discharge zone; that is, the area in which the mixture is considered completed.

In attempting to make this general concept effective in one way it was found that the desired result is closely approximated, or attained by shaping the enclosure or passage surrounding the blower to provide a generally conical direction.

Form air passage, in which a part of the outer conical surface intercepts the spray from the impeller wheel; this collected liquid then flows along the surface to a sharp edge, which, as conveniently described, overhangs a generally annular recess which forms an eddy or whirl chamber posterior to the edge in the general direction of air and fuel flow. In operation, the fuel previously intercepted by the conical surface is thrown off from the sharp edge in a fine spray, but at a lower velocity than that of the wheel tips, with the result that a greatly reduced proportion of the fuel is thrown out upon the outer containing walls. The air passage beyond this whirl chamber is substantially part of the generally expanding area, to give the desired change of flow rate in the air passing through; that is, to slow down air to a speed approximate to that at which it is withdrawn from this final mixing zone by the “suction” strokes of the engine pistons.

The characteristics and advantages of the invention are further sufficiently explained in connection with the following detail description of the accompanying drawings, which show certain representative embodiments. After considering these examples, skilled persons will understand that many variations may be made without departing from the principles disclosed; and I contemplate the employment of any structures, arrangements or modes of operation that are properly within the scope of the appended claims.

Fig. 1 is partly in elevation and partly in section at the axial plane of the blower wheel.

Fig. 2 is a section at 2—2 Fig. 1.

Fig. 3 is an enlarged section in an axial plane of a part of the casing structure.

Fig. 4 is a perspective and sectional detail of a shaft enclosing body representing one embodiment of this feature.

Fig. 5 is a section in an axial plane of the blower, showing certain modifications of the rotor and a modified and improved fuel supply means, constituting one embodiment of this feature of the invention.

In Fig. 1, the wheel I may be any known or suitable supercharger rotor, used primarily for supercharging, or disregarding the supercharging function more or less, may be used principally as a rotary mixer or distributor. Usually it unavoidably and desirably has a supercharging effect. It is sufficient hereafter to refer to this element in a broad sense as an impeller or blower, and either term is intended to avoid any limitation as to detail structure of this element, except as may be required by the invention. Similarly, in describing various parts of the air passage and rotor casing, while the language may be applied closely to the structure shown, it will be understood that there may be great variation in the form or arrangement of these parts.

As here shown, the air passage leading to the blower includes an intake pipe 3 and an elbow 5 which is extended to form one wall 7 of the rotor casing. The other casing wall 8 is extended to form the principal part of the annular discharge or delivery chamber 11, so-called with relation to the blower, since the compressed mixture is delivered by it into this chamber. Otherwise, this chamber may be described as a “collecting ring.” One face of the chamber is closed by a part of the plate 1. Pipes 15 in spaced relation about the delivery chamber carry the mixture to the engine heads. In the intake pipe 3 is a typical throttle valve 15, and inserted in the elbow is an injection valve or spray valve 17, representing broadly any known or suitable means of introducing the fuel into the air line. The valve proper 19 is normally sealed by a spring 21 of suitable pressure. The injection device delivers the fuel in a conical sheath toward the blower wheel entrance.

A pump 22 supplies fuel at proper pressure to the injection valve. The pump 23 is shown in one preferred location, or in a location which is in some cases practically essential, that is in about the position shown in Fig. 1, at the outward side of the supercharger, away from engine, requires that a pump driven by shaft 25 leading from a convenient rotating part of the engine must pass through a part of the air space between the wheel tips and the delivery chamber.

As shown, the portion of the shaft 25 located in such space is enclosed in a body 27 which is a part of the shaft bearing or is a bearing sleeve support. This body 27 is later referred to as an obstructing body, or a partially obstructing body, for reasons as will appear. As so far described, the structure is or may be ordinary or typical. In such a typical structure, it was found that a large proportion of the fuel was thrown off from the wheel in such manner that it collected on a surface or surfaces of outward portions of the delivery or discharge wheel enclosure, and when the so-called diffuser blades were used (not here shown) there was no improvement, but re-collection of the fuel was increased or aggravated. Preceding discussion is sufficient as to these disadvantageous characteristics.

Principal features of the invention as represented by this, which is one preferred, embodiment, are now described.

The air space or passage 28 beyond the supercharge wheel has a form which may most conveniently be described as conical and somewhat converging, the conical contour being, as previously mentioned, largely or principally for the purpose of intercepting the spray from the wheel at a desired or favorable location. The converging characteristic is in some cases non-essential. At a point or in an annular passage which may best be stated as a region wherein sufficient convergence has been obtained, and also in a zone or plane (with reference to the planes of wheel rotation) which preferably is in what may be described as a well-overflowing relation to the wheel, a casing part or specifically the wall 7 is formed to provide a sharp edge 31, which is external (with respect to fluid flow) and preferably as shown immediately at, an annular recess 33, constituting a whirl or eddy chamber. Also, preferably, as shown, the edge 31 is in inward projecting or overlapping relation to the farther side of the channel; or, as otherwise stated, in such a projecting or overlapping relation to the surface 35 beyond the channel, so that the main
path of air flow from and beyond the edge is presumably substantially as indicated by the broken line 37 Fig. 3, the general character of air flow in the recess being probably about as indicated by the light arrows.

At or about a radial position somewhat outward from the edge and channel, say at a position 38 which is one at which the air flow presumably has "filled" the passage, the passage area preferably begins and may continue to diverge (if so required) approximately as shown in Fig. 1, in a manner generally conforming to the atomizing characteristics of velocity and density of the flowing charge of the fuel.

The casing wall 17 in this example so formed as to provide a surface 41 which extends into the general path of air flow somewhat more abruptly than the surface extending from the wall, thus the surface 41 is an example of a surface or surface formation favorably located to receive and collect fuel particles. In brief, it is a favorably located collecting surface of the character referred to early above. It will also be understood that the sharp edge 41 and the whirli chamber 33 in a broad sense represent any suitable means for returning into the air stream in a favorable manner the fuel which accumulates upon the collecting surface. The drawings are almost self-explanatory in regard to operation, in view of previous discussion.

A major part of the moving air and of the entrained fuel tends to strike against the collecting surface 41, and a considerable proportion of the fuel collects thereon and flows to the edge 31, from which it is driven off in the form of a fine spray or practically by an atomizing action, at a greatly retarded speed in relation to the air speed in that zone. The whirli chamber 33 posterior to the projecting flange formation which carries the edge 31, receives a certain part of the air, which circulates in this chamber under the law of eddy flow; and the fuel issuing therefrom along the chamber surface adjacent the edge, in cooperation with the more direct flow of the main stream, causes the fuel to be blown off in a generally inward and forward direction, as approximately indicated at 43.

The fuel, moving at a relatively slow rate, is moreover introduced into the air stream at a zone in which the air speed tends to become or has been substantially accelerated, so that after reintroduction of the fuel there is less tendency to again throw it off or out of the air body against an outer wall surface, such as the inner surface of the chamber wall 45; or, in brief, the mixture formed by reintroduction of fuel in the described manner is naturally in a more stable condition than at points anterior to the collecting surface and discharging edge.

The particular design of Fig. 1 is adapted to an engine the design of which requires a lateral offset of the outer collecting ring or delivery chamber 14, in relation to the exit annulus of the mixing space. In such a case it was found that there was a tendency, due to centrifugal force, for a certain part of the fuel thrown off at the edge 31 to collect again on some necessarily inwardly projecting or, so to speak, rechurned, recess of the casing wall, and the fuel thereon is in the present embodiment provided at the positive pressure side of the passage, and preferably at the mouth thereof, where the air flow issues into the collecting ring, a second discharging or redistributing edge 47 anterior to an annular eddy current recess or chamber 45; and the surface 51 adjacent anterior to the edge 47 may be considered a second fuel receiving or collecting surface disposed in a favorable position for receiving a redeposit of fuel, while edge 41 with its eddy chamber 45 represents a second redistributing means.

Fuel collected on the surface 51 has its speed reduced by the friction of the wall and is blown off from the edge 47 at a reduced speed in relation to the general speed of air flow, but with sufficient velocity to produce effective atomization, and especially this second collecting and distributing means largely or practically entirely avoids the tendency which would otherwise exist in a casing design of this character to produce an undesirable amount of fuel collection upon an outer limiting surface such as that of wall 45.

The structure of Fig. 1, thus embodying two distinct collecting or re-collecting and redistributing arrangements, is an example of a multiple or "stage" arrangement of such means or devices, referred to early above.

Referring further to Fig. 1, the body 27 above mentioned represents what is in some cases a necessary partially obstructing body in the air space or zone of air flow beyond the blower wheel.

Since any such obstructing body tends to collect fuel in a manner analogous to the tendency, in typical structures, of fuel to collect upon moving casing surfaces, as quite fully analyzed above, the invention includes as an important feature, means or an arrangement by which such an obstructing body is so formed as to interrupt the air stream and to receive the unavoidable deposit of fuel, in an advantageous manner, and also to redischarge this fuel into the air flow in a desirable way.

Thus, as shown in Figs. 1, 2 and 4, the body 27 at its anterior side (with relation to flow) is of approximately stream-line contour. For this purpose the body has an enlargement 53 at its anterior side, the surface 55 of which is of substantially stream-flow form. The main surfaces of the body extend to lines generally parallel to the shaft axis, at which are formed sharp edges 57; and the posterior surface adjacent these edges is formed to provide shallow incurved recesses 59 which have a tendency or action similar to that of the eddy chamber 33.

The operation here is quite analogous to that of the redistributing edges 31; or 41, as sufficiently explained by the representation of fuel flow in Fig. 2, the collected fuel has its speed reduced by the friction of the wall and is blown off of the distributing edges of the obstructing body at a reduced speed, relatively to air flow, is atomized by the rapidly moving air, and re-enters the flow space. The same means may be adopted with regard to any other obstructing body which may be located in the air space.

Fig. 5 illustrates one principal variation in the invention mode or means for collecting and redistributing fuel; that is, an expedient which may be substituted for the surface 41 and eddy chamber 33 Fig. 1, for example. This represents one example of a case early above mentioned, namely, one in which the collecting and redistributing means is associated with or carried by the blower wheel. Thus, as shown in Fig. 5, a plate or shroud 61 of suitable shape, usually conforming closely to the inner surface of the adjacent portion of elbow 5 and plate 7, with running clearance, is secured to edges of the blower blades 63. The posterior edge 65 of this shroud, located substantially inward in relation to the general contour of the adjacent wall surface 67 (at the positive pressure side of the space) con-
stitutes a discharging edge analogous to the edge 31 Fig. 1; and the shroud surface 69 adjacent the edge constitutes a collecting surface leading to the edge, and acting in a substantially similar manner to surface 41 of Fig. 1, except that of course in this case the discharging edge is moving at high speed. The fuel is discharged from the shroud edge in such manner that it does not reach, or a major portion of it does not reach the adjacent stationary wall surface.

Desirably the posterior edge surface of the shroud is beveled in a manner indicated at 71, this formation tending to produce the sharp discharging edge located somewhat inwardly from the general contour of the adjacent casing wall.

If necessary or desirable, an annular eddy chamber such as 73 may be provided in the wall 7 adjacent the shroud edge 65, and will have in cooperation with the edge an action analogous to that of the chamber 33 and edge 41 of Fig. 1. In some cases collecting and discharging means of this type, i.e., associated with the rotor, may be employed in combination with collecting and discharging means of the stationary type, i.e., such as edge 31 and eddy chamber 33 of Fig. 1.

Fig. 5 also shows that when desired the other casing wall such as 9 may have therein adjacent to the rotor blade ends an annular eddy chamber formation 75 providing also a redischarging edge 77 to dispose of fuel accumulating on the rotor surface 79, or the adjacent stationary wall surface leading to the discharging edge.

Now considering the full disclosure of Fig. 5, in one aspect of the invention, it represents, in so far as Fig. 1, a more or less conventional design so far as the rotor and casing are concerned, with provision in relation to or in conjunction with the rotor and casing walls, of invention means for properly disposing of the fuel accumulation.

Fig. 5 also practically represents a case in which redistributing means may be provided in fixed position on each of the two opposite casing walls. This will readily be understood by simply supposing in Fig. 5 that the shroud 61 is removed, whereupon the structure will be as just described, this representing one preferred embodiment of the stated case.

Fig. 5 also illustrates a detail feature of importance, consisting in a special arrangement or shaping of the tip edges 81 of the rotor vanes. Thus, as shown, these edges are sloped or curved slightly outwardly from certain side edges of the blades toward the other side edges, at which said tip edges practically merge into the redistributing edge 65 of the shroud. The liquid fuel naturally tends to collect on the faces of the blades and to flow thereon to the tip edges 81, and the stated special formation of these edges is for the purpose of leading this liquid along such edges to the favorably located discharging edge 65 of the shroud. The law of liquid adhesion and flow is such that liquid on a rotating surface such as a blade surface naturally tends to run or creep along any peripheral edge to a radially outward-most point or localizing formation, such as the points at which the edges join or merge into the distributing edge 65.

Fig. 5 also illustrates principal variations in the mode or means for initially introducing fuel into the air stream and also for effecting a substantially equi-angular distribution of the fuel spray in the zone in which the fuel first closely approaches the entrance of the blower wheel. A part of the total air supply in this case introduced into a tube 83 which enters elbow 5 and extends toward the wheel at an axis. Fuel is introduced into the air tube 83 in a suitable manner, as, for example, by so-called "suction" from a nozzle 85 centered in the tube. The discharging end of tube 83 represents broadly a nozzle or discharge point at which the highly fueled column of air is discharged in the zone of the wheel entrance.

To effect the desired substantially uniform circular distribution of this rich mixture, I partially or practically enclose this discharge nozzle in a chamber defined by a fitting 87, which is in this instance connected to rotate with the wheel. The sheath or shroud consisting of the fitting wall 89 surrounding the tube end, is provided with a plurality of uniformly spaced slots 91 constituting rotary nozzles with surfaces 83 directed in a favorable relation to the wheel. The fitting or chamber 87 also preferably has a flat face 95 adjacent the nozzle formations. The rim or wall 89 of the rotary fitting tends to act as a diffuser, so that the combined air and fuel issuing from the nozzle 89 impinges upon the face 95, and principally at the center or central area thereof. The proper discharge of the fueled air at or toward the desired central portion of the baffling area 95 is facilitated by providing at the discharge end of tube 83 a formation or by inserting therein a ring 97 with a generally conical inward face, acting more or less as a nozzle and especially tending by reaction upon fuel entrained in the moving air to direct the 35 fuel toward the central area of the baffling surface 95. By this means or arrangement the combined fluid and especially the fuel content will, before it takes a motion of rotation, tend to spread equally in all directions across the face 95, and therefrom to be fed equally out through the slots or nozzles 91.

The purpose of this initial equal distribution is to secure equalized final distribution of the fuel from the tips of the wheel blades, or, in other words, by the described arrangement, uniform amounts of charged air are caused to be introduced into each inter-blade space at the entrance, and therefore the proportions of the total fuel discharged from the inter-blade spaces are equalized. This feature is advantageously employed in conjunction with other principal features of the invention in some cases, or may be utilized generally in a fuel supply system employing a blower, rotary distributor or supercharger, without regard to other features of the present invention.

What is claimed is:

1. A fuel supply system for an engine comprising a rotary blower, a blower casing, an air passage leading to the casing and blower intake, means for supplying fuel in a direction generally toward the blower intake, means providing a surface in the discharge portion of the blower casing in overhanging relation to the blower blades and in a favorable location to receive a collection of liquid fuel from the air stream, and means by which fuel so collected is discharged into the air stream at a relatively reduced speed and in an atomized state.

2. A fuel supply system comprising a rotary blower, a blower casing, an air passage leading to the casing and blower intake, means for supplying fuel in a direction generally toward the blower intake, means providing a surface in the discharge portion of the blower casing in overhanging relation to the blower blades and in a favorable location to receive a collection of liquid fuel from the air stream, and means by which fuel so collected is discharged into the air stream at a relatively reduced speed and in an atomized state.
casing in overhanging relation to the blower blades and in a favorable location to receive a collection of liquid fuel from the air stream, and means by which fuel so collected is redischarged into the air stream at a relatively reduced speed and in an atomized state, said means being associated with the blower rotor.

3. A fuel supply system comprising a rotary blower, a blower casing, an air passage leading to the casing and blower intake, means for supplying fuel in a direction generally toward the blower intake, means in the discharge portion of the casing providing a whirler chamber having a surface in overhanging relation to the blower blades and in a favorable location to receive a collection of liquid fuel from the air stream, and means by which fuel so collected is redischarged into the air stream at a relatively reduced speed and in an atomized state; said means being stationary in relation to the blower rotor.

4. In a fuel supply system of general character described, a rotary blower, an air passage leading to the blower, means for supplying fuel generally toward the blower generally, a blower casing having a whirler chamber with a projecting surface in a position to receive a liquid fuel deposit, and adjacent means whereby the deposited fuel is redischarged into the air stream at a relatively low velocity and in substantially atomized condition, said surface having a posterior discharging edge, the surface edge and chamber together with the air flow cooperating to drive fuel collected on the surface from the edge into the air stream in substantially atomized state and at a reduced velocity.

5. In a fuel supply system of general character described, a rotary blower, an air passage leading to the blower, means for supplying fuel generally toward the blower generally, a blower casing having a whirler chamber with a projecting surface in a position to receive a liquid fuel deposit, and adjacent means whereby the deposited fuel is redischarged into the air stream at a relatively low velocity and in substantially atomized condition, said surface having a posterior discharging edge, the surface edge and chamber together with the air flow cooperating to drive fuel collected on the surface from the edge into the air stream in substantially atomized state and at a reduced velocity.

6. In a fuel supply system of general character described, a rotary blower, an air passage leading to the blower, means for supplying fuel generally toward the blower generally, a blower casing having a whirler chamber with a projecting surface in a position to receive a liquid fuel deposit, and adjacent means whereby the deposited fuel is redischarged into the air stream at a relatively low velocity and in substantially atomized condition, the casing being formed to provide an air space intermediate the blower and an outer collecting zone which is of generally conical disc form and leading to an annular discharge chamber in laterally offset position.

7. In a fuel supply system of general character described, a rotary blower, an air passage leading to the blower, means for supplying fuel generally toward the blower generally, a blower casing having a whirler chamber with a projecting surface in a position to receive a liquid fuel deposit, and adjacent means whereby the deposited fuel is redischarged into the air stream at a relatively low velocity and in substantially atomized condition, the casing being formed to provide an air space intermediate the blower and an outer collecting zone which is of generally conical disc form and leading to an annular discharge chamber in laterally offset position.

8. In a fuel supply system of general character described, a rotary blower, an air passage leading to the blower, means for supplying fuel generally toward the blower generally, a blower casing having an annular recessed whirler chamber with a surface in a position to receive a liquid fuel deposit, and adjacent means whereby the deposited fuel is redischarged into the air stream at a relatively low velocity and in substantially atomized condition, the casing being formed to provide an air space intermediate the blower and an outer collecting zone which is of generally conical disc form and leading to an annular discharge chamber in laterally offset position.

9. In a fuel supply system of general character described, a rotary blower, an air passage leading to the blower, means for supplying fuel generally toward the blower generally, a blower casing having a wall with a surface in a position to receive a liquid fuel deposit, and adjacent means whereby the deposited fuel is redischarged into the air stream at a relatively low velocity and in substantially atomized condition, said surface having a posterior discharging edge, the casing being shaped to provide an air space leading to an annular discharge chamber, a casing wall having substantially at the entrance of said air space into said discharge chamber a fuel collecting surface in generally projecting relation to air flow and terminating in a fuel discharging edge.

10. In a fuel supply system of general character described, a rotary blower, an air passage leading to the blower, means for supplying fuel generally toward the blower generally, a blower casing having a wall with a surface in a position to receive a liquid fuel deposit, and adjacent means whereby the deposited fuel is redischarged into the air stream at a relatively low velocity and in substantially atomized condition, said surface having a posterior discharging edge, the casing being shaped to provide an air space leading to an annular discharge chamber, a casing wall having substantially at the entrance of said air space into said discharge chamber a fuel collecting surface in generally projecting relation to air flow and terminating in a fuel discharging edge.

11. A fuel supply system for general purposes described, comprising an air passage, fuel supply means, and a blower rotor in the passage, a blower casing and a plate carried by the rotor and forming an air passage wall, said wall having a liquid fuel collecting surface with a discharge edge from which collected fuel is blown across the air stream in atomized condition, the passage having posteriorly adjacent said discharge edge an annular eddy chamber formed in the casing.

12. A fuel supply system for purposes described, comprising a blower rotor, a rotor casing and a partially obstructing body in the air space outside the rotor, said body being enlarged at its anterior side in respect to flow direction, said enlargement and the body generally being of substantially stream-line contour.

13. A fuel supply system for purposes described, comprising a blower rotor, a rotor casing,
and a partially obstructing body in the air space outside the rotor, the body being of streamline contour and having at its posterior side a fuel redistributing edge.

14. A fuel supply system for purposes described, comprising a blower rotor, a rotor casing, and a partially obstructing body in the air space outside the rotor, the body being of streamline contour and having at its posterior side and at opposite locations thereof substantially parallel fuel redistributing edges.

15. A fuel supply system for purposes described, comprising a blower rotor, a rotor casing, and a partially obstructing body in the air space outside the rotor, the body having at its posterior side a fuel redistributing edge, and also having adjacent said edge an eddy flow recess.

16. A fuel supply system for purposes described, comprising a blower rotor, a rotor casing, and a partially obstructing body in the air space outside the rotor, the body having at its posterior side and at opposite locations thereof substantially parallel fuel redistributing edges, and also having adjacent edges eddy flow promoting depressions.

17. The structure defined in claim 13 with the addition of a fuel supply pump at one side of the casing, and a pump drive shaft passing through said body.

18. A fuel and air supply system for an engine comprising a blower, a casing therefor having walls forming a discharge passage, one of said walls being inclined to the axis of the blower to overhang the same and having means formed therein for collecting liquid fuel and causing an eddy current of air, said means being adapted to deliver the collected liquid fuel to the air stream flowing along the wall.

19. A fuel and air supply system for an engine comprising a blower, a casing therefor, an air passage leading to the casing and blower intake, means for supplying liquid fuel into the air passage, said casing having walls forming a fuel and air discharge passage from the blower, one of said walls having a protuberance thereon extending within the discharge passageway, said protuberance having a curved recess formed therein terminating in a sharp edge extending in the direction of flow for collecting liquid fuel and delivering it to the air flow within the discharge passage.

20. A fuel and air supply system comprising a blower, a casing therefor, an air passage leading to the casing and blower intake, means for supplying liquid fuel into the air passage, said casing having radially extending walls forming a fuel and air discharge passage from the blower, one of said walls having an annular protuberance thereon extending within the discharge passageway, said protuberance having an annular recess of curvilinear cross section formed therein terminating in a sharp edge extending in the direction of flow for collecting liquid fuel and delivering it to the air flow within the discharge passage.

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