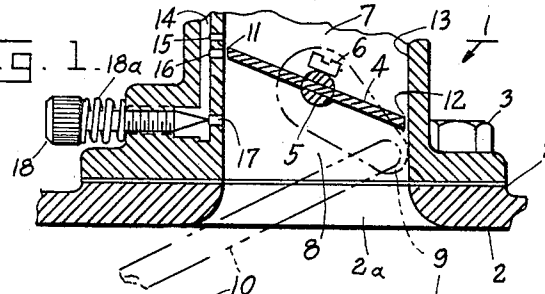
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CARBURETOR

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Fig. 1.



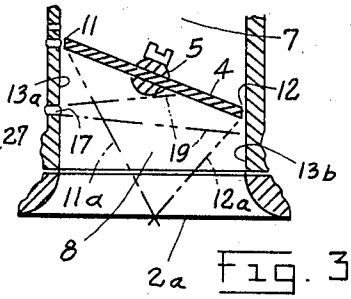
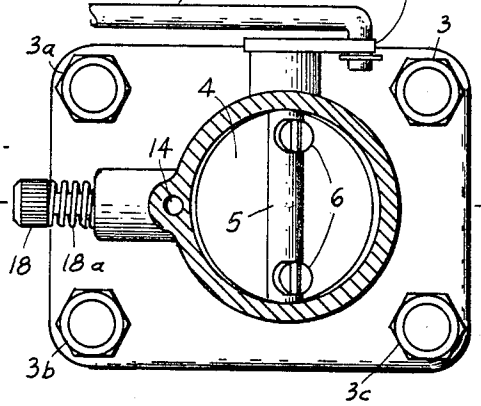


Fig. 3.

Fig. 2.



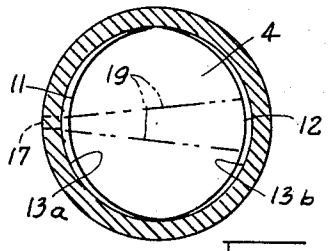


Fig. 4.

Fig. 6.

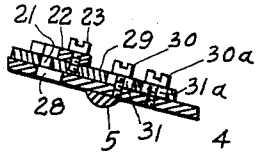
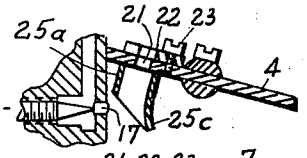


Fig. 10.



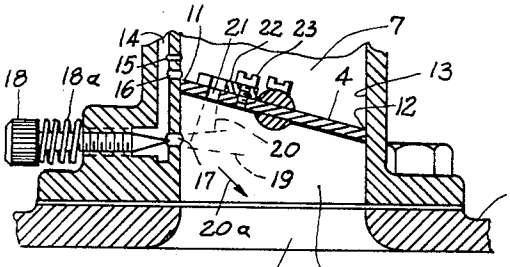


Fig. 5.

2a 8

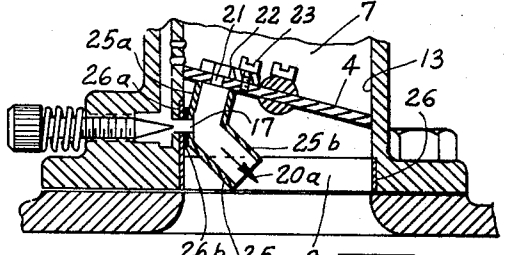


Fig. 8.

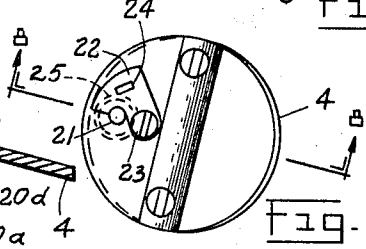


Fig. 9.

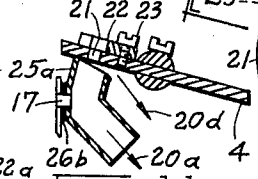


Fig. 11.

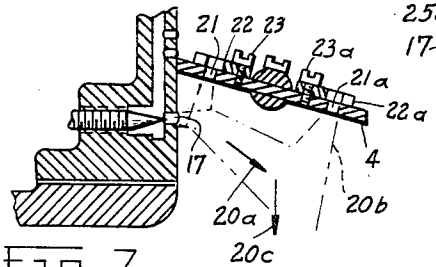


Fig. 7.

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Fig. 12.

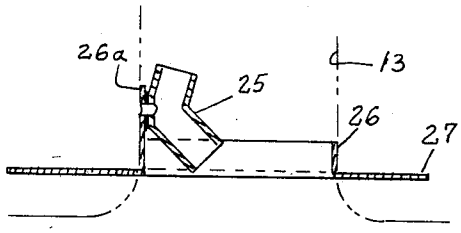


Fig. 13.

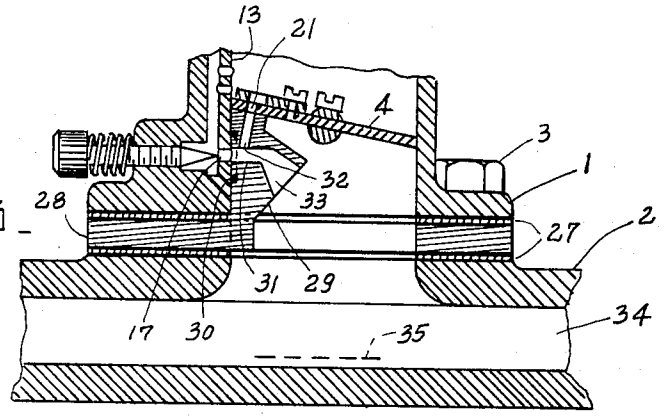


Fig. 14.

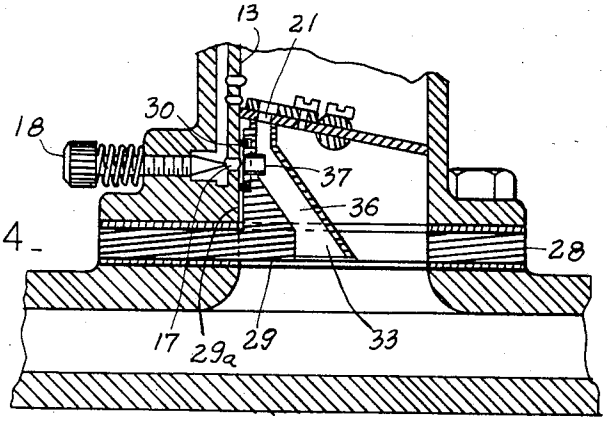
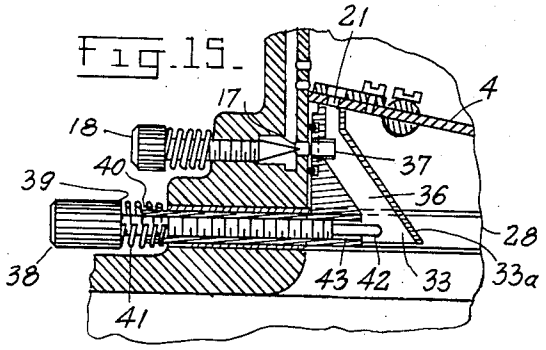


Fig. 15.



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United States Patent Office 3,410,539 Patented Nov. 12, 1968

3,410,539

CARBURETOR

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Filed Apr. 21, 1966, Ser. No. 544,246
10 Claims. (Cl. 261—41)

ABSTRACT OF THE DISCLOSURE

A carburetor for improving combustion of an internal combustion engine during closed throttle operation. An orifice is formed in the throttle valve for passing idling air when the throttle valve is closed. In one form of the invention the orifice for passing the idling air and the orifice for admitting rich fuel mixture are oriented such that the envelopes of idling air and rich fuel mixture are collided in a zone removed from the wall of the carburetor to produce proper atomizing of the fuel. In other forms of the invention the envelopes are collided in a mixing conduit and the mixture is guided to a zone adjacent the center of the flow passage through the carburetor. Adjusting means is usually provided for adjusting the orifices to regulate the flow of air and rich fuel to adjust the idling speed of the engine. The adjustment for the orifice through the valve is arranged to be made by the use of a tool inserted through the carburetor throat.

While not necessarily limited to such application, the present invention concerns improvements in the operation and effectiveness of carburetors for internal combustion engines having socalled butterfly valves. More particularly, the invention concerns the idling phase of such devices or analogous phases, e.g. rapid deceleration and slow-speed cruises.

Conventional arrangements of this kind require that the butterfly valve be cracked open for purposes of idling so that a volume of air deemed sufficient be allowed to enter all along the edges of the butterfly valve into a chamber below, where it is to be combined with a rich mixture of fuel and air entering in the form of a jet. The air so admitted around the butterfly valve is serving two indispensible functions. It provides the oxygen necessary for the combustion of the fuel. It also serves as the vehicle for the fuel on its way to the cylinders in which the combustion takes place. However, for the effective operation of the engine, it is not only necessary to provide oxygen and fuel in sufficient quantities, that is in a proper ratio of fuel to air, but the fuel must be uniformly distributed throughout the mixture and divided to a proper degree of fineness. Moreover, in engines having several cylinders which are all supplied off a common intake manifold which in turn is supplied by one or several carburetors, it is desirable to supply all cylinders uniformly, lest the engine run rough. Such rough running is uneconomical because, in order to provide the minimum condition for one cylinder, others must be over-supplied. It also results in excessive incidence of waste products, on account of the incomplete combustion by over- as well as under-supply of some of the cylinders, which of late have become a matter of public concern, as they contribute to air pollution in the form of smog.

For reasons developed later in this paper, the conventional arrangements are not fully effective in delivering to the intake manifold a mixture of fuel and air which has optimum characteristics. The shortcoming is inherent in the design of conventional arrangements which peculiarly fail to maximize the potential of the two moving principles—the rich fuel-air mixture jetting into the air passing the butterfly valve—for the purpose of achieving the ideal mixture of air and fuel or at least its practicable

approximation. In mechanical terms, conventional devices are inadequate because the special requirements of carburetion in the idle phase are served only by provisions for the special delivery of the rich fuel mixture, while the air is admitted in the same manner as for full speed operation, by admitting it all around the butterfly valve which is opened for this purpose.

In contrast with such conventional devices, the arrangement according to the invention provides for a butterfly valve which is completely closed in the idling operation so that substantially no air is passing along its edges. One or more ports are provided in the body of the butterfly valve through which the necessary air is admitted in such a way that substantially all incoming air collides with all of the incoming rich fuel mixture. This results first in a better atomization of the incoming fuel. A second advantage is the more uniform distribution of the fuel in the air. Since the mixture resulting from the collision will move in a direction determined by the directional and kinetic characteristics if the two colliding streams, it is possible to control its movement by appropriate manipulation of the colliding streams. While these advantages further purely technical desiderata of automotive design, they are especially significant in the context of air pollution, as they improve the operation of motor vehicles especially in the large cities where most of the driving consists of idling, low-speed, or rapid deceleration within the familiar pattern of stop-and-go.

It is one object of the invention to provide a carburetor especially adapted to the requirements of idling, low-speed, and rapid deceleration.

It is another object of the invention to provide a carburetor which will allow a more accurate management of the air passing through the butterfly valve.

It is a further object of the invention to provide a carburetor in which air and fuel are more effectively mixed.

It is a fourth object of the invention to provide a carburetor in which the mixing of air and fuel can be more effectively controlled.

It is a fifth object of the invention to provide a carburetor which will deliver a uniform mixture of air and fuel to a predetermined point in the intake manifold.

It is a sixth object of the invention to provide a carburetor which will reduce the incidence of waste products which contribute to air pollution in the form of smog.

It is a seventh object of the invention to provide a carburetor in which the motive power in the air stream passing the butterfly valve and the rich fuel mixture jet passing the idle adjustment screw are utilized to achieve a better mixing of the air and fuel required for the idle, low-speed, and analogous operations.

It is an eighth object of the invention to provide ways and means whereby the other objects of the invention can be economically achieved in newly manufactured as well as in present carburetors.

These and other objectives of the invention are described below in connection with certain specific embodiments of the invention and illustrated in the drawings in which:

FIG. 1 shows a cross-section through part of a conventional carburetor along the line 1—1 in FIG. 2;

FIG. 2 shows a plan view of a section through a conventional carburetor; (such, as in FIG. 1);

FIG. 3 shows selected details of FIG. 1 to illustrate the mixing process in conventional carburetors;

FIG. 4 shows selected details of FIG. 2 to illustrate other aspects of the mixing process in conventional carburetors;

FIG. 5 shows the basic concept of the invention applied to the conventional arrangement shown in FIG. 1, some of the details conforming to a cross-section taken along the line 8—8 in FIG. 9;

FIG. 6 shows a special embodiment of the invention in application to the butterfly valve shown in FIG. 5;

FIG. 7 shows a further embodiment of the invention, generally conforming to the disclosure of FIG. 5;

FIG. 8 shows a further embodiment of the invention, partially in cross-section taken along the line **8**—**8** in FIG. 9;

FIG. 9 shows a top view of the butterfly valve according to the invention;

FIG. 10 shows further details of the concept disclosed in FIG. 5 in combination with elements of the embodiment of FIG. 8;

FIG. 11 shows further details of the concept disclosed in FIG. 7 in combination with elements of FIG. 8;

FIG. 12 shows a practical modification of existing parts for the purpose of practicing the invention according to FIG. 8;

FIGS. 13, 14 and 15 show further possibilities of practicable embodiments of the invention, partly in section.

FIGS. 1 and 2 show, for reference only, a conventional carburetor, generally indicated at **1**, attached to an intake manifold **2** above a hole **2***a* by means of screws **3**, **3***a*, **3***b* and **3***c*. A butterfly valve **4**, on a shaft **5** and fastened by means of screws **6**, divides a vertical air passage formed by a wall **13** into an upper chamber **7** and a lower chamber **8**. An arm **9** is attached to the shaft **5** and controlled by a rod **10** whereby the shaft **5** and thus the butterfly valve **4** may be moved to various positions by the driver of the vehicle during the acceleration and cruising phases. Conventional means (not shown) are provided, commonly in the form of a fine thread adjustment screw, to define some preferred position of the butterfly valve **4** in the idling operation in which it is not subject to the control of the driver, necessary adjustments being made before the vehicle is put to its normal use. Occasionally, special arrangements are made which allow the driver to make adjustments by means of a choke lever even during normal operation. It is the typical feature of conventional arrangements that for the purpose of the idle adjustment the butterfly valve is opened slightly, so that a sufficient quantity of air may pass between the cylindrical wall **13** and the upper edge **11**, and the lower edge **12** of the butterfly valve **4**. For purposes of illustration, the space made available for the passage of air in FIG. 1 has been vastly exaggerated. In practical terms, the butterfly valve **4** is "barely cracked open".

As is generally known in the art, the intake manifold **2** (FIG. 1) communicates with the pistons of the engine (not shown) through valves, in such a manner that the receding pistons will create a suction effect by causing lower-than-ambient air pressure in the intake manifold **2**. This suction will operate through a hole **2***a* in the intake manifold **2** to draw air all along the edges **11** and **12** of the butterfly valve **4**, so that it passes from the upper chamber **7** into the lower chamber **8**.

The conventional arrangement also provides for a supply of fuel which enters the lower chamber **8** by virtue of the same suction which draws air past the butterfly valve **4**, as explained above. The fuel is drawn from a reservoir (not shown) through a duct **14**, past ports **15** and **16** which are at this time operative to allow the aspiration of some air from the upper chamber **7** into the fuel moving in the duct **14**, and further past an idle adjustment screw **18** in the form of a needle valve which controls the volume of what now constitutes a rich mixture of fuel and air, to a port **17** from which the rich mixture emerges in the form of a jet aimed to traverse the lower chamber **8**. The duct system provided for the delivery of the rich fuel mixture to the chamber **8**, commonly in the form of holes cored or drilled in the wall of the carburetor, is generally so arranged that fuel will not enter the lower chamber **8** by gravitational flow, nor syphon into it, but must be drawn in by the positive force of suction. However, such arrangements are well known in the art and need not be explained here.

Proceeding in the following discussion from the fact that the suction caused by the pistons of the engine causes the simultaneous entry of air around the butterfly valve **4** and of a rich fuel mixture through port **17**, it is important to examine the mechanics of the collision between these two streams in the lower chamber **8**. The air passing the butterfly valve **4** will enter in the form of two crescent-shaped streams between the sections **13***a* and **13***b* of the wall **13** on the one and the upper edge **11**, and lower edge **12** of the butterfly valve **4** on the other hand, as shown in FIG. 4. These two streams of air will fan out somewhat as they pass below the butterfly valve **4**, as shown in FIG. 3. The jet of the rich fuel mixture will also spread upon entry into the chamber **8**. Since the reasons for such spreading are generally known, they shall not be detailed here.

Examination of FIGS. 3 and 4 shows that the jet of the rich fuel mixture, bounded by line **19**, will encounter a relatively small portion of the first air sheet which is shown as bounded by the wall section **13***a* and the line **11***a*. It has been established that the jet of the rich fuel mixture is not broken up in this collision. Most of it survives and traverses the space below the butterfly valve **4**, as shown in FIG. 3.

Depending upon the arrangement, all or part of the surviving jet may then strike the butterfly valve **4**. Such collision of the massive jet of relatively raw fuel with a solid body results in a consolidation of the course fuel particles on the butterfly valve **4** in the form of droplets which run to the edge **12** and pass into the second air sheet bounded by the line **12***a* and the wall section **13***b*. If the surviving jet does not strike the butterfly valve **4**, it collides once more with a relatively small part of the second air sheet and, not being completely dissipated in the air, strikes the wall section **13***a*. The consequences of striking this solid body are the same as described above. Runs of fuel droplets are formed which pass along the wall downward.

The consolidation of fuel particles at any stage of the process of carburetion is obviously opposed to the functional assignment of the carburetor. It results at least in an insufficient division of the fuel but certainly also in an uneven distribution of the fuel in the air. In the now common multi-cylinder engines, it is furthermore detrimental to have an undue concentration of fuel anywhere near the circumference of the hole **2***a*, as the action of the various pistons sets off suction trains in various directions which will draw primarily air near the lower edge of the hole **2***a*. Heavily concentrated mixture or droplets which routinely occur at a particular location may thus result in feeding an unduly rich, yet ill divided mixture of air and fuel to particular cylinders.

The shortcomings of the conventional arrangement may be summarized as follows. Only a fraction of the atomizing effect of the air passing the butterfly valve **4** is utilized. The fuel is not evenly distributed in the chamber **8**. The consolidation of fuel particles defeats the purpose of the carburetor.

The inventive concept is shown in FIG. 5 in its fundamental application. A butterfly valve **4**, substantially identical with that of FIGS. 1, 2, 3 and 4, is provided on the shaft **5** and controlled as explained above by a rod **9** and arm **10** (these parts are not detailed in FIG. 5 for the sake of simplicity). The slightly inclined position of the butterfly valve **4** is desirable to avoid a binding of its edges **11** and **12** against the wall **13** of the large air passage. The contact of the edges **11** and **12** is ideally utilized to define the idle position of the butterfly valve **4** in relation to the air passage and also to insure a relatively airtight seal all around the circumference of the butterfly valve **4**. It is intended that all air admitted into the lower chamber **8** from the upper chamber **7** shall pass through a port **21** which is so located that the air will emerge from it in the form of a jet or envelope bounded by a line **20** and intercepting the jet or envelope of the rich fuel mixture

which is indicated by the line **19**. This collision will have an atomizing effect upon the jet of the rich fuel mixture, resulting in a new mixture which will depart the site of the collision in a direction generally indicated by the arrow **20***a*. The actual direction of the new mixture depends upon the direction of air stream passing the port **21** (hereafter designated as stream **20**) and the direction of the rich fuel jet (hereafter designated as jet **19**). It is also affected by the quantities of air and fuel passing in the two streams **19** and **20** and is therefore subject to variation which may be controlled by adjustment by means of the adjustment screw **18** and special control means provided for the port **21**. Such control means may take the form of a lid or valve **22** (FIGS. 5 and 9) which is rotatable about and arrestable by a screw **23** and may be set to reduce the cross-section of the port **21**. Such setting may be accomplished by tapping the lid **22** into a desired position. However, a slot **24** has been found useful for this purpose. If the working end of a screwdriver is inserted into slot **24**, the setting operation can be accomplished with greater ease and accuracy. A further means to control the collision of the stream **20** with the jet **19** is shown in FIG. 6. The place of the port **21** is taken here by a slot **28** while the port **21** is located in a slide **29** which may be set under the guidance of screws **30** and **30***a*, which also serve to arrest it in a preferred position, so that the port **21** occupies various positions in the slot **28**. Such manipulation of the point of origin of the stream **20** will affect the collision with the jet **19** and the lid **22** affords thereafter further possibilities of adjustment, in the manner described. It will be observed that elongated slots **31** and **31***a* embrace the screws **30** and **30***a* to allow the setting of the slide **29**. Since the slide **29** is longer than the distance between the shaft **5** and the edge **11** of the butterfly valve **4**, it is necessary to remove part of the shaft **5**. This is entirely within conventional construction and causes no difficulty.

The arrangement according to the invention, as described so far, is effective, by means of the various adjustments, to bring substantially all air in the stream **20** into collision with substantially all of the rich fuel mixture in the jet **19**. By manipulation of the stream **20** and the jet **19**, the quality of the mixture leaving the site of the collision and the direction of the departure may be controlled. The arrangement disclosed in FIGS. 5 and 6 may thus be utilized to deliver a mixture of fuel and air which conforms to a preferred standard of quality to be center of the hole **2***a* in the intake manifold **2** where it will be available for further transport to the various cylinders.

FIG. 7 shows a further application of the concept of a collision of substantially all air admitted through the butterfly valve with substantially all of the rich fuel mixture entering through port **17**. A second part **21***a* is provided in the butterfly valve **4** and controllable by a lid **22***a* with a screw **23***a*. The stream of air admitted through the port **21***a* is designated as **20***b* and it may be manipulated in the same manner as the stream **20** discussed in connection with FIG. 5. Thus, it would be possible to allot equal shares of air to streams **20** and **20***b*, or to favor one over the other, or to shut either off completely, e.g. to have stream **20***b* serve the entire function of stream **20** in FIG. 5. One function intended for stream **20***b* is to effect a collision of fresh air with the mixture which resulted from the first collision which then moves in the direction **20***a*. This second collision serves to further atomize the fuel and to impart to the mixture leaving the site of the second collision a direction of movement which is generally parallel to the center of the air passage formed by the wall **13**, as indicated by the arrow **20***a*. It is obvious that the provision of a second port **21***a* augments the disclosure of FIGS. 5 and 6 when it is used to handle all air being admitted through the butterfly valve **4**. If the port **21***a* is used in conjunction with the port **21**, it supplements the disclosure of FIGS. 5 and 6.

FIG. 8 shows essentially the concept of FIG. 5, but subjected to the regimen of a guide tube **25** which receives the air passing from the port **21** with its upper end **25***a*. The collision of the air with the jet of rich fuel mixture is confined to the center part of the guide tube **25** and the resultant mixture departs through the lower end **25***b*. The inventor has found this to be an effective arrangement. The guide tube **25** is attached by means of a solder deposit **26***b* to an upright tab extending from a ring **26** which is imbedded in the wall **13** of the carburetor throat. However, any conventional method of maintaining the guide tube **25** in the position shown would suffice.

An approach to the conversion of existing carburetors for the utilization of the arrangement of FIG. 8 is shown in FIG. 12. The Guide tube **25** is attached to a tab **26***a* extending from a ring **26** which forms an integral part of a gasket plate **27**. While it would be generally desirable to have the ring **26** imbedded in the wall **13**, its insertion in a throat which has not been modified would be acceptable since the arrangement according to FIG. 8 delivers the idle mixture to the center of the chamber **8** so that the edge of the ring **26** would not impair its flow. The theoretical impairment of the massive flow in the full-speed operation may be disregarded as negligible in practical terms. The same observation can be made for the presence of the guide tube **25** in the path of the mixture of fuel and air passing in the full-speed operation.

FIG. 10 shows a modified application of the principle disclosed in FIG. 8. The upper end **25***a* of the guide tube **25** is integrally attached to the underside of the butterfly valve **4** and moves with it. In the idle phase, it serves as a guide means for the stream of air passing from the port **21**, delivering it in compact form to the site of the collision with the jet of the rich fuel mixture coming from the port **17**. A lower lip **25***c* is provided substantially in the geometric path of the rich fuel mixture to delimit its movement in the mixing chamber in any event and to guide the mixture resulting from the collision to a predetermined area within the mixing chamber with somewhat more freedom than is allowed by the guide tube **25** in FIG. 8.

FIG. 11 shows the principle disclosed in FIG. 8 in combination with that of FIG. 7. A guide tube **25** is provided as in FIG. 8. However, the upper end **25***a* is cut at an angle, so that it does not make a close contact with the butterfly valve **4**, a gap being left on the inside through which a stream of air **20***d* bypasses the collision in the guide tube **25** in order to combine later with the product of the collision, which then moves in the direction **20***a*, in a less violent manner, but essentially on the same theory as disclosed in connection with FIG. 7.

FIG. 12, showing a practical application of the inventive concept with emphasis on cost reduction and ease of installation, has been discussed above.

FIG. 13 shows another low cost approach in practicing the invention. An interponent **28** is sandwiched between the carburetor **1** and the intake manifold **2**. It is contemplated that this solution would be particularly economical even though it requires two gaskets **27** instead of the one in the conventional arrangement. Gaskets are inexpensive and since they are identical, no stocking problem arises. The interponent **28** may be inexpensively die cast for use without reworking or special adaptation. An O ring may be provided as shown to take up any tolerances which cannot be controlled in mass production. The function of the interponent is described as follows. An upright member **29**, which extends from the body of the interponent **28**, contains a duct **32** which guides the air passing through the port **21** in the butterfly valve **4** into a horizontal passage **31** which receives the rich fuel mixture from the port **17** and conducts the mixture resulting from the collision between the fresh air and the rich fuel mixture to a discharge passage **33** which is aimed at some preferred part of the mixing chamber, for example the center. While it would be possible, and might in many cases be desirable, to provide passages in the upright member **29** which follow the operative principle of the guide tube **25**, the

inventor has found it advantageous in certain cases to conduct the mixture resulting from the collision of the fresh air with the rich fuel mixture horizontally and to discharge it after such horizontal movement through a flared or funnel-shaped discharge passage.

FIG. 14 deals further with the problem of possible practical applications of the invention to existing devices but also to newly manufactured carburetors. The substantially horizontal passage **31** in FIG. 13 is now designated as **36** and oriented in the general direction of the flow indicated at **20***a* in FIG. 5. A flared terminal passage **33** is provided as in FIG. 13 to allow expansion of the mixture of air and fuel being delivered to the intake manifold. However, a special tubular port **37** is provided which extends into the passage **36** to forestall the possibility of back pressure into the port **17** in cases in which extreme conditions require a favoring of the fresh air flow in the adjustment of the mixing ratio which has been referred to earlier. By way of further illustration of the practical aspects, a space **29***a* is shown between the upright member **29** and the wall **13**. Such a space may be the result of unintended tolerance in the parts. It may also be intentionally provided to manufacture and assemble less costly. The O ring **30** insures that the rich fuel mixture coming from the port **17** reaches the site of the collision with the fresh air undiminished by leakage.

FIG. 15 shows the structure of FIG. 14 with provisions for a choking effect upon the mixture without impairment of the ratio of fuel to air. A choke valve **38** in the form of a conventional needle valve is provided in the interponent **28** into which a hole **43** has been drilled and tapped for this purpose. The choke valve **38** is settable against the pressure of a spring **41** from a first position in which its point **42** is substantially retracted from the passage **33** to another position in which is provides maximum obstruction in the passage **33**. The point of maximum obstruction is defined by an end **40** on the interponent **28** which stops the screw when its shoulder **39** comes in contact with it. While such setting for the maximum obstruction may define some preferred setting for minimum admission of the mixture of fuel and air, which otherwise, and especially in view of manufacture for various, differing conditions may be provided by adjusting the cross-section (in a plane perpendicular to the section shown in FIG. 15) of the passage **33** with respect to that of the point **42**, it also serves to prevent that excessive advance of the throttle valve **38** result in damage to the delicate wall section **33***a*. In general terms, FIG. 15 is merely illustrative of the principle of providing a throttle down stream from the site of the collision of the rich fuel mixture with the fresh air coming from the port **21**. Many differing arrangements may be found to achieve the same effect, and provide an idle speed adjustment.

The disclosure above and the drawings illustrate the invention in various forms and in its application to certain embodiments. However, to those skilled in the art many variations and other applications to widely differing embodiments will suggest themselves entirely within the concept of the invention and without departure from its spirit and scope. All such applicaions and uses are intended to be claimed below, description and drawings being intended as mere illustrations which do not limit the invention to particular uses within the devices to which it is applied nor to the art of carburetors generally.

It will be especially obvious to the skilled in the art that elements of the invention shown as incorporated in separate parts of the arrangement might advantageously be incorporated in common parts, especially when the invention is applied to carburetors newly manufactured according to the die casting in similar methods whereby it is possible to produce complicated parts.

I claim as my invention:

1. A carburetor comprising a tubular body member, a valve pivotally mounted in said member for movement between an open position to allow maximum fluid flow therethrough and a closed position preventing fluid flow therethrough, means for admitting a stream of a rich fuel mixture through the wall of the member downstream of the valve in its closed position, a single opening through the valve for passage of a stream of fluid therethrough, said opening and admitting means being oriented to direct the envelopes of the streams into an intersecting zone removed from the wall whereby the collided streams become intermixed to atomize the fuel, a conduit secured to the member and having one end thereof adjacent the opening in the valve, another end adjacent the center area of the member, and a passage between the ends of the conduit connecting the admitting means to the conduit whereby the streams intersect in the conduit and the mixture is exhausted in the center area of the member.

2. A carburetor as defined in claim **1**, wherein the conduit is an angulated tube, the end of the conduit adjacent the valve lying in a plane making a small divergent angle with the valve.

3. A carburetor as defined in claim **1** further including means mounting the valve and end of the conduit in sealing engagement with each other when the valve is in the closed position.

4. A carburetor as defined in claim **3** wherein the conduit is an angulated tube and the means for securing the tube to the member comprises a ring in the member, a tab extending from the ring, and means welding the tube to the tab.

5. A carburetor as defined in claim **3** wherein the means securing the conduit comprises a ring secured to the body and the conduit comprises an extension integral with the ring and positioned adjacent the tubular wall of the member, and sealing means sealing the admitting means and passage against escape of fluid between the wall and extension.

6. A carburetor as defined in claim **5** wherein the discharge opening is flared and makes an angle with the axis of the tubular member.

7. A carburetor as defined in claim **5** wherein the discharge opening is flared and is normal to the axis of the tubular member.

8. A carburetor as defined in claim **7** further including means in the conduit for obstructing the flow of fluid from the discharge opening.

9. A carburetor comprising a tubular body member, a valve pivotally mounted in said member for movement between an open position to allow maximum fluid flow therethrough and a closed position preventing fluid flow therethrough, means for admitting a stream of a rich fuel mixture through the wall of the member downstream of the valve in its closed position, a single opening through the valve for passage of a stream of fluid therethrough, said opening and admitting means being oriented to direct the envelopes of the streams into an intersecting zone removed from the wall whereby the collided streams become intermixed to atomize the fuel, a lid carried by the valve for movement over the opening to vary the size thereof, and means pivotally mounting the lid on the valve and a tool slot in the lid for engagement by a tool extended through the tubular member for shifting the angular position of the lid.

10. A carburetor comprising a tubular body member, a valve pivotally mounted in said member for movement between an open position to allow maximum fluid flow therethrough and a closed position preventing fluid flow therethrough, means for admitting a stream of a rich fuel mixture through the wall of the member downstream of the valve in its closed position, a single opening through the valve for passage of a stream of fluid therethrough, said opening and admitting means being oriented to direct the envelopes of the streams into an intersecting zone removed from the wall whereby the collided streams become intermixed to atomize the fuel, a tube secured to

one surface of the valve around the opening and a lid carried by the other surface of the valve for movement over the opening to vary the size thereof.

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