April 10, 1956 D. M. HARVEY 2,741,237

TOP CYLINDER VAPOR LUBRICATOR

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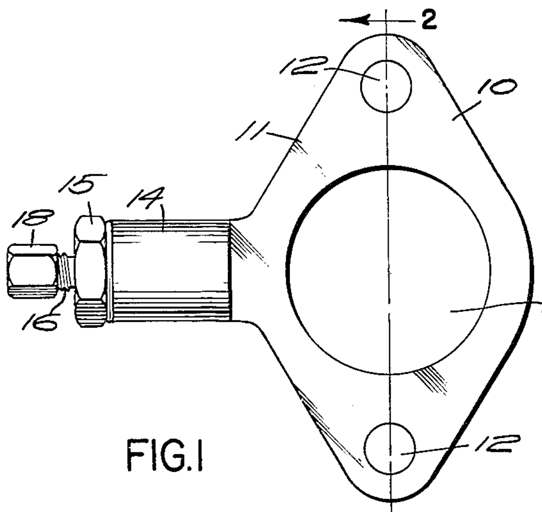

FIG.1

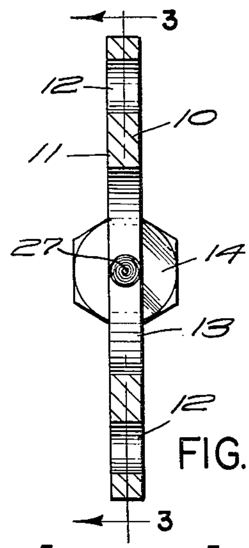

FIG.2

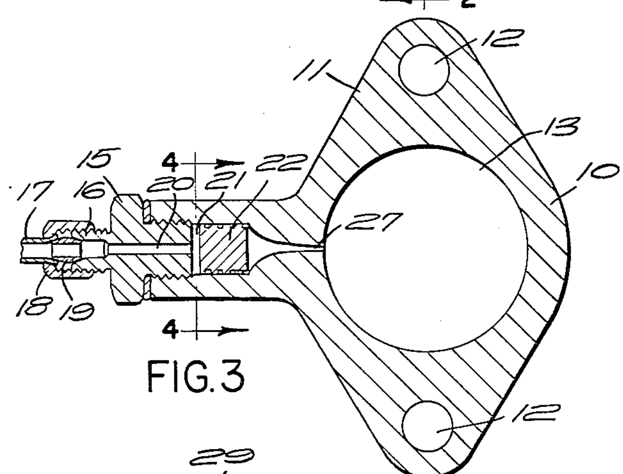

FIG.3

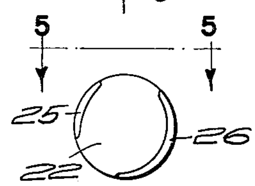

FIG.4

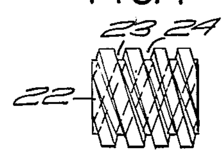

FIG.5

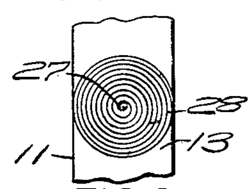

FIG.6

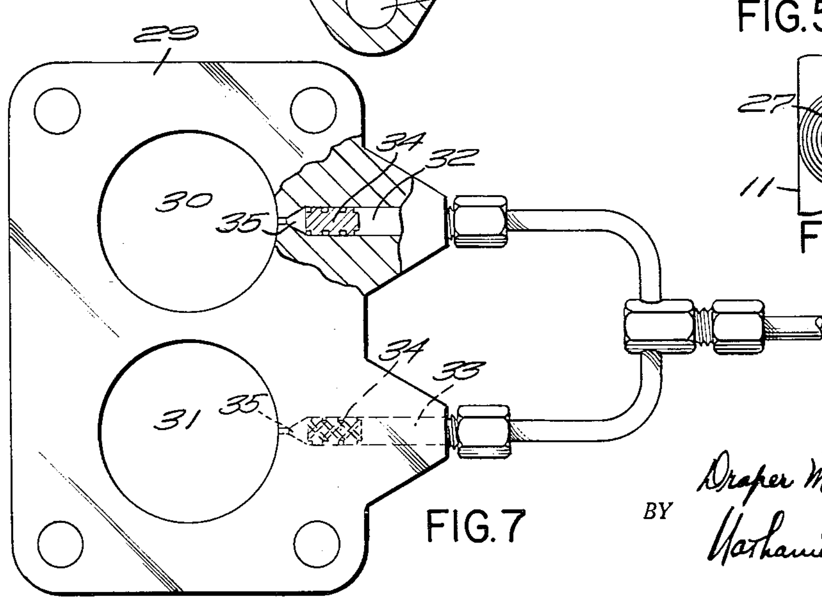

FIG.7

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FIG. 8

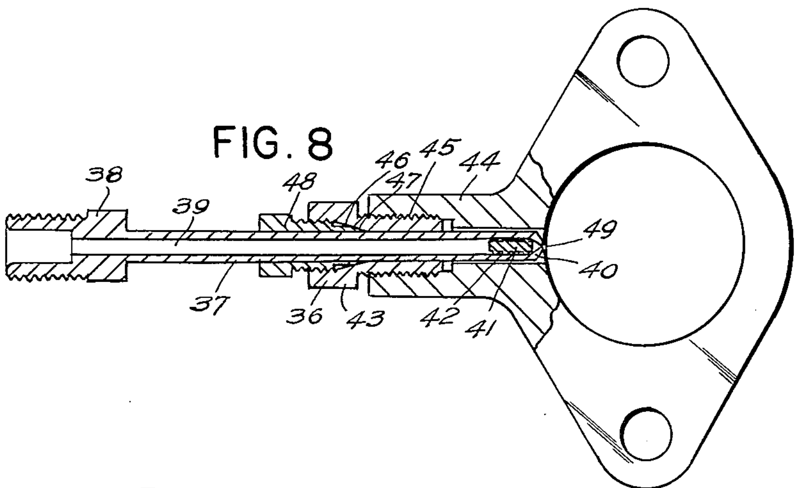


FIG. 9

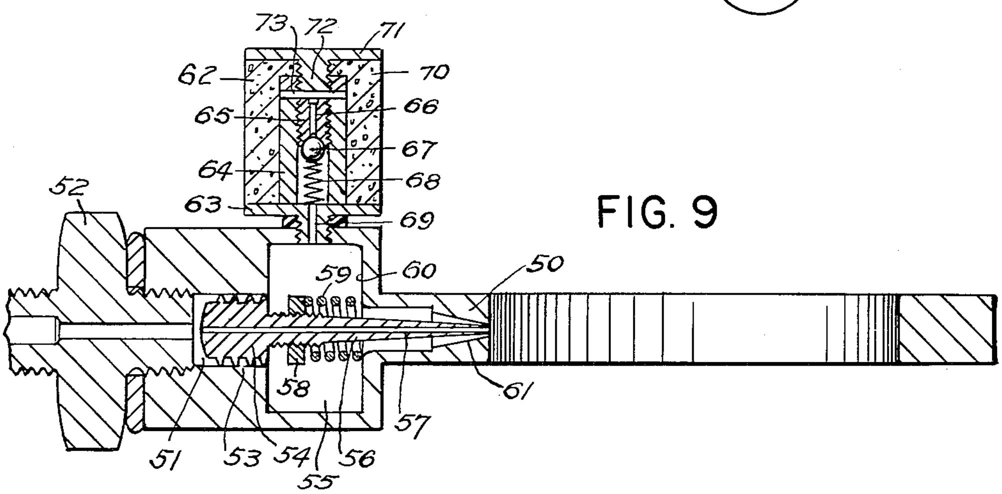
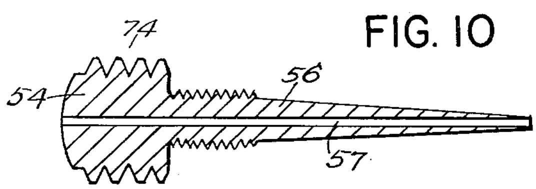


FIG. 10



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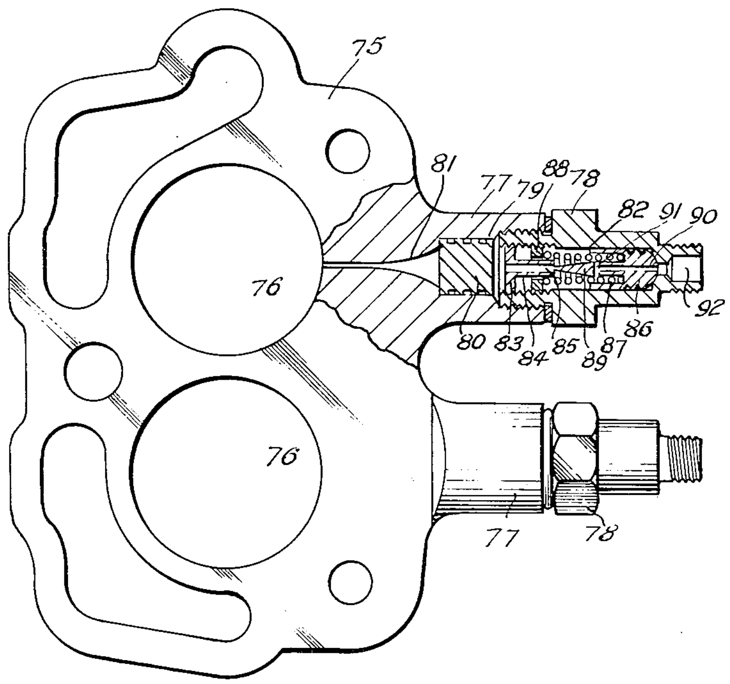

FIG. 11

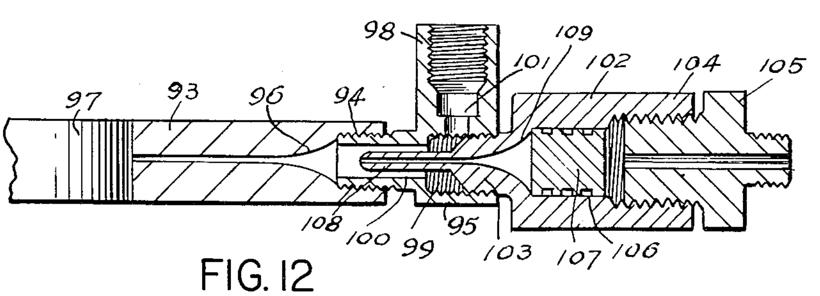

FIG. 12

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TOP CYLINDER VAPOR LUBRICATOR

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Application January 27, 1951, Serial No. 208,197

3 Claims. (Cl. 123—196)

This application is a continuation in part of application Serial No. 98,009, filed June 9, 1949, for Top Cylinder Vapor Lubricator.

The present invention relates to top cylinder lubricators for automotive engines, and has particular reference to arrangements for introduction of an oil spray into the engine manifold.

The principal object of the invention is to inject a finely atomized oil spray to commingle and be dispersed in an inflowing fuel charge.

Another object of the invention is to inject the finely atomized oil spray into the manifold in the form of a rotating cone.

A further object of the invention is to vaporize and disperse the oil into a stream of carrier air at a point closely adjacent the point of injection into the manifold.

An additional object of the invention is to reduce fractional cracking of an inflowing fuel charge by coating the particles thereof with lubricant.

With the above and other objects and advantageous features in view, the invention consists of a novel method and a novel apparatus more fully disclosed in the detailed description following in conjunction with the accompanying drawings, and more specifically defined in the claims appended thereto.

In the drawings,

Fig. 1 is a plan view of an illustrative bracket plate embodying the invention;

Fig. 2 is a section of the line 2—2 of Fig. 1;

Fig. 3 is a transverse section on the line 3—3 of Fig. 2;

Fig. 4 is a section on the line 4—4 of Fig. 3;

Fig. 5 is a plan view of the whirl element of Fig. 4;

Fig. 6 is an enlarged end view of the bracket plate at the injection opening;

Fig. 7 is a sectional view similar to Fig. 2 of an illustrative multiple bracket plate construction;

Fig. 8 is a sectional view of an adjustable nozzle connection;

Fig. 9 is a sectional view of a modified construction of the bracket plate.

Fig. 10 is an enlarged view of the bracket plate piston of Fig. 9;

Fig. 11 is a plan view, partly in section of a modified bracket plate construction; and

Fig. 12 is a sectional view of a modified bracket plate nozzle arrangement.

It has been found desirable to disperse top cylinder lubricating oil into an inflowing fuel charge for an automotive engine in finely atomized form, and in a spray pattern which does not deflect the fuel charge flow path, to commingle with and be thoroughly dispersed in the fuel charge, whereby the fuel particles become surface oil-coated. To this end, I provide a bracket plate construction which vaporizes and atomizes top cylinder oil or oil-air mixture, and injects the fine vapor through a dispersing nozzle into the path of the fuel charge in the form of a whirling expanding cone, the parts being arranged to eliminate oil drop formation and resulting formation of deposits and sludge on the injection nozzle.

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Referring to the drawings, the bracket plate **10** is shaped to correspond to an engine manifold, and includes a plate body **11** having bolt openings **12** and a central opening **13** which forms part of the fuel charge path when the bracket plate is installed. An integral extension **14** is internally threaded to receive a nipple **15** which has a threaded terminal **16** for receiving the end of an oil and air mixture conduit **17**, by means of a lock nut **18** and a bored spreader **19**.

The nipple **15** has a fluid passage **20** for conveying an oil-air mixture to a cylindrical whirl chamber **21**, in which a mixture whirl device **22** is mounted. The preferred whirl device is in the form of a cylinder having double helical flow channels **23**, **24** extending peripherally more than 360 degrees, see Fig. 5 one of these flow channels having an inlet **25**, see Fig. 4, which is relatively shallow and near the surface, and the other channel having an inlet **26** which is deeper as illustrated.

The helical channels impart a high whirling rotational velocity to the air and oil mixture which is subject to centrifugal separation and is then remixed as it whirls through the nozzle outlet, which is in the wall of an injecting nozzle **27** and into the central opening **13**, to exit in the form of a whirling expanding cone extending directly across the path of the fuel charge. The thoroughly atomized oil commingles with the fuel charge without deflecting the charge, and the fuel particles become coated with a very fine oil surface film, whereby cracking and separation of the fuel ingredients are greatly reduced.

The nozzle injection end of the bracket plate around the nozzle **27** is preferably spirally grooved, as indicated at **28** in Fig. 6, whereby collection of oil in drops and accumulation of deposits around the nozzle are eliminated, as the whirling motion of the oil and air spins any oil particles or drops out into the charge stream.

The above bracket plate construction thus includes a flow passage which receives an air and an oil stream, separates the air and oil in a whirl device, and remixes the air and oil to atomize the oil and to project the mixture out of an injecting nozzle in the form of a whirling conical spray. The whirl device may be fixed in the bracket plate mixing chamber, or may be loosely mounted to rotate if desired.

The bracket plate of Fig. 1 is designed for manifolds of the Chevrolet, Plymouth, and Pontiac type. For larger engines of the Buick, Cadillac, and Lincoln type it is preferred to use a bracket plate of double throat type, such as illustrated in Fig. 7. In this construction the bracket plate **29** has two openings **30**, **31**, and two chambers **32**, **33** which receive air and oil, or air and oil mixture, each chamber having a whirl device **34** and a mixture injecting nozzle **35**, whereby two spirally whirling conical oil sprays are injected into the fuel charge.

When the engine construction is such that use of a standard type bracket plate is precluded, it is desirable to provide an elongated connection which may be adjusted in length to be mounted in the bracket plate or which, for some engine constructions, may be slidably mounted in a nipple connection for extending into the manifold. A preferred construction for such installations is illustrated in Fig. 8, wherein a grip lock arrangement **36** is mounted to slidably grip an elongated nozzle element **37**. The nozzle element **37** has an enlarged threaded end **38** to be connected to a supply conduit for oil and air mixture, the mixture traversing a central passageway **39** to an injection nozzle **40**; a whirl device **41**, preferably having double helical threads **42**, is positioned in the passageway **39** adjacent the nozzle **40**, whereby the oil and air mixture whirls to separate and remix, and forms a whirling oil vapor stream as it exits from the nozzle.

The grip lock arrangement **36** includes a shell **43** which may if desired be threaded into a bracket plate **44** having a bore **45** to receive the nozzle element, the shell **43** being internally tapered as indicated at **46** to receive the tapered end **47** of a compression sleeve **48** and internally threaded to receive external threads on the compression sleeve, whereby the nozzle element is firmly gripped when the compression sleeve **48** is threaded into the shell **43**. The nozzle element should be mounted so that the nozzle **40** is flush with the bracket plate flow opening **49**, as the outflowing oil and air spray then traverses the charge in the form of a whirling hollow cone.

The bracket plate and its associated parts may be modified to maintain a constant injection pressure for an oil-air spray, or to provide mixture air for an oil supply so as to produce a fully vaporized injection mixture. As illustrated in Fig. 9, the bracket plate **50** has a chamber **51** at its intake end, which is internally threaded to receive a supply nipple **52**. The chamber **51** has a bore **53** in which a piston **54** is slidably mounted and an enlarged recess **55** in which an extension **56** of the piston is positioned; the piston and its extension, which is of elongated tapered form, have a longitudinal bore **57** for passage of fluid such as air and oil mixture, or oil.

The extension **56** is threaded to adjustably receive a spring abutment washer **58** and a coil spring **59** engages the washer and an outer wall **60** of the enlarged recess **55** in the chamber **51**, the recess **55** then tapering as illustrated to provide an injection nozzle **61** into which the forward end of the extension **56** extends in spaced relation to the walls of the nozzle **61**.

Air is admitted to the recess **55** through an air flow unit **62** which is threaded into the upper wall of the recess. The unit **62** includes a plate **63** having a shell **64** extending upwardly, the shell being internally threaded to adjustably receive a washer **65** positioned below the upper end of the shell. The washer has a flow passage **66** against which a ball check valve **67** is resiliently pressed by a coil spring **68** which is adjusted to a desired tension by the washer **65** and engages the plate **63**, the plate and its threaded connection to the upper wall of the recess **55** having a flow passage **69**. Air is admitted through an annular filter ring **70** encircling the shell **65**, the ring **70** being held in place by a cap **71** which has a threaded stud **72** threaded into the upper portion of the shell **65**, which has a transverse passage **73** communicating with the flow passage **66**. The admission of air under regulated pressure establishes a pressure differential for the injected air-oil mixture.

When an oil-air mixture is supplied to the chamber **51** at the intake end of the bracket plate, it is drawn through the bore **57** and receives additional filtered air through the air flow unit **62**, the additional air enveloping the oil-air mixture to thoroughly mix and atomize the oil-air mixture, whereby a finely divided atomized oil spray discharges from the nozzle **61**. When oil or oil vapor or spray is supplied to the chamber **51**, filtered air is drawn in through the air flow unit to envelop the oil stream and thoroughly mix and vaporize the oil, whereby a finely dispersed air-oil stream enters the manifold from the nozzle **61**.

The piston **54** has V-shaped grooves **74**, see Fig. 10, which collect and retain oil, to provide an effective oil seal; when back pressure increases the piston **54** is pressed back to slightly increase the pressure of the oil or oil-air mixture.

A construction found suitable for a double throat type bracket plate is illustrated in Fig. 11, wherein the bracket plate **75** has two passages **76** for the fuel charge. Two bosses **77** on the plate are internally threaded to receive nipples **78** and have chambers **79** in which whirls **80**, preferably of the double threaded type, are positioned to receive oil and air mixture and to whirl the oil and air for passage to conical nozzles **81** which lead into the passages **76**.

The nipples **78** each have a central bore **82**, internally threaded at its bracket end to adjustably receive a disk **83** which has a central standard **84** provided with a flow passage **85**. A piston **86** is seated in the outer end of the bore **82**, and is annularly recessed to receive a coil spring **87** which abuts against a washer **88**, adjustably threaded into the forward part of the central bore **82**.

The piston **86** has a central extension **89** which is tapered to extend towards the flow passage **85**, and the piston has a central passage **90** and a cross passage **91** whereby flow of oil-air mixture from the inlet part **92** of the nipple through the flow passages and to the whirl **80** and the nozzle **81** is facilitated. The piston **86** may, if desired, be provided with V-shaped surface grooves to collect an oil seal.

When desired, the bracket plate may have a special nozzle formation to impart a whirling intermingling of oil and air, or oil-air mixture and additional air. To this end, the bracket plate **93**, see Fig. 12, has an inlet opening **94** to receive the threaded end of a fitting **95**, and a conical nozzle **96** to receive oil-air mixture from the fitting **95** for injection into the fuel charge passage opening **97**.

The fitting **95** includes an air supply part **98** which has a threaded bore **99** and an aligned air flow passage **100** leading to the nozzle **96**; an air inlet passage **101** is threaded to receive a filter cap or a ball check valve supply unit of the type shown in Fig. 9. An oil or oil-air supply unit **102** has its forward end **103** threaded to seat in the bore **99** and its rear end **104** internally threaded to receive a supply nipple **105**.

The supply unit **102** has a chamber **106** in which a whirl **107** of the type previously described is mounted, and a forward extension **108** which extends into the air flow passage **100**, the unit being shaped as a nozzle **109** to receive air and oil from the whirl and to project the mixture through the nozzle **109** into the annular stream of air around the extension **108**, whereby a thorough mixing is effected, to be again projected outwardly through the nozzle **96**.

Although I have disclosed specific structional embodiments of my invention, it is obvious that changes in the size, shape and arrangement of the parts may be made to suit different automotive engine requirements, without departing from the spirit and the scope of the invention as defined in the appended claims.

I claim:

1. A bracket plate construction for an engine manifold, comprising a plate body having a central fuel flow opening, a tubular extension integral with the plate body and threaded at its outer end to receive an oil-air mixture conduit, said extension and plate body being bored to provide a cylindrical whirl chamber and a conical injecting nozzle having its outlet in the central fuel opening, and a cylindrical whirl device in said chamber having peripheral helical flow channel means extending through at least 360 degrees, whereby the nozzle receives air and oil at high whirling rotational velocity and discharges the air and oil as an expanding whirling cone across the path of the inflowing fuel charge.

2. In the combination of claim 1, the wall of the fuel flow opening around the nozzle outlet being spirally grooved.

3. In the combination of claim 1, said peripheral flow channel means including double helical flow channels.

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