United States Patent

[11] **3,595,481**

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[21] Appl. No. **834,096**
[22] Filed **June 17, 1969**
[45] Patented **July 27, 1971**
[73] Assignee **Judd Ringer Corporation**
Eden Prairie, Minn.

[54] **FOGGER ATTACHMENT FOR INTERNAL COMBUSTION ENGINES**
6 Claims, 6 Drawing Figs.

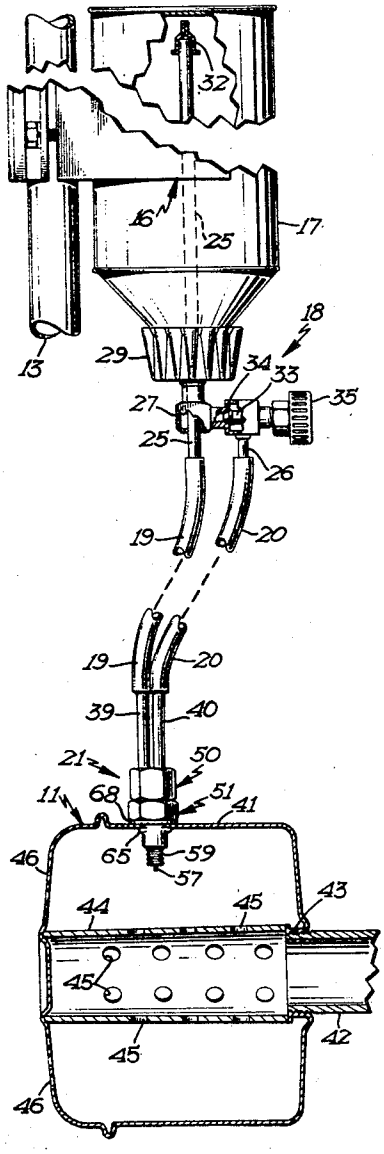
[52] **U.S. Cl.** **239/129,** 239/346, 239/DIG. 6
[51] **Int. Cl.** **B05b 1/24**
[50] **Field of Search** ..... 239/129, 345, 346, 367, DIG. 6; 85/70

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ABSTRACT: A fogging attachment for an internal combustion engine in which a container of vaporizable insecticide solution may be coupled through two conduits to the muffler of the engine by a fitting which has a cylindrical stem adapted to extend through a cylindrical opening in the wall of the muffler and to be secured to the muffler by a deformable sleeve which is deformed to engage the inner wall of the sleeve, said stem having a cylindrical opening divided by a divider plate into two semicylindrical openings, each of which communicates with one of the two conduits.



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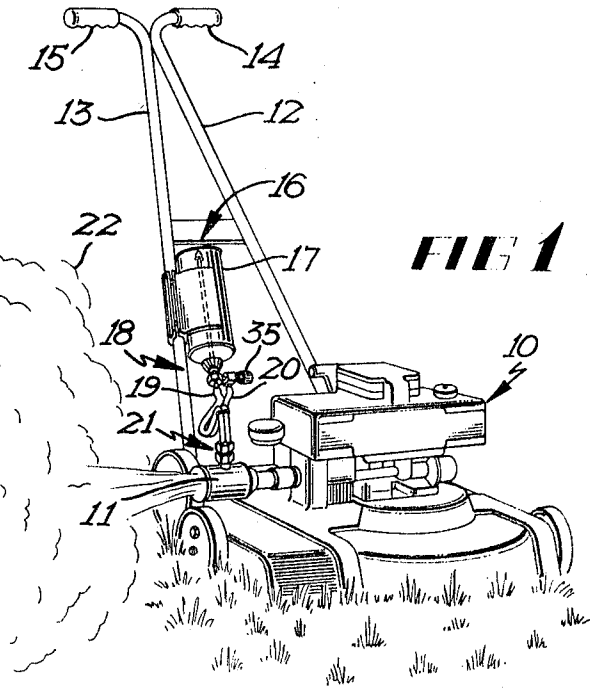


FIG 1

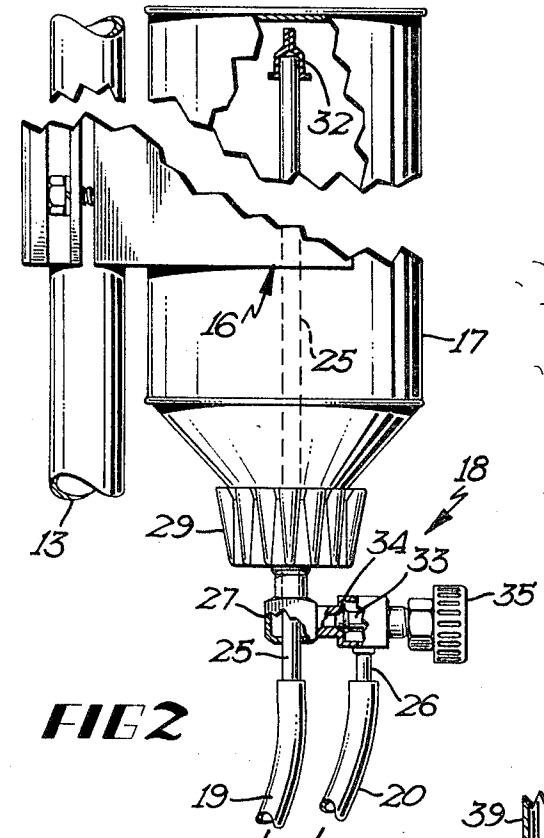


FIG 2

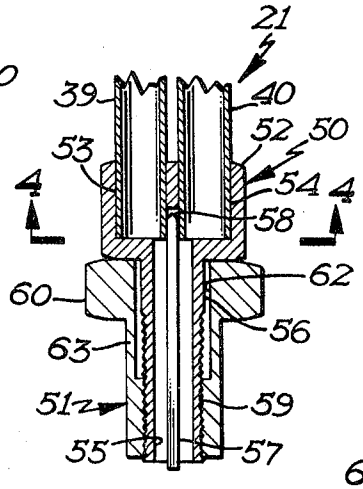


FIG 3

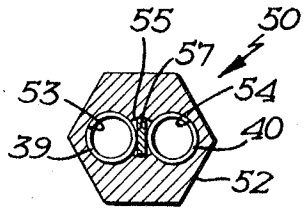
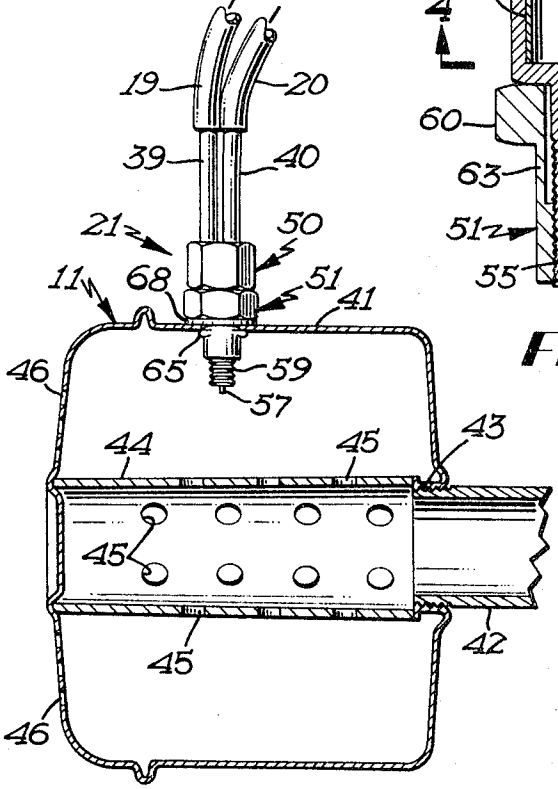


FIG 4



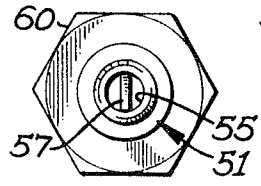


FIG 5

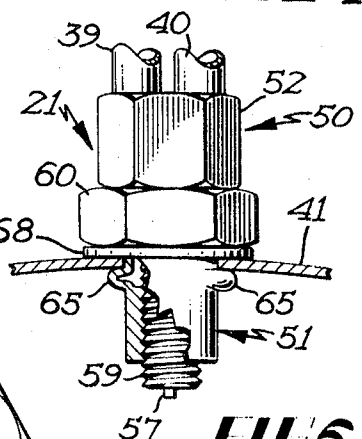


FIG 6

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FOGGER ATTACHMENT FOR INTERNAL COMBUSTION ENGINES

BACKGROUND OF THE INVENTION

Various arrangements have been proposed for generating an insecticide fog in connection with the operation of an internal combustion engine. A common application is that in connection with lawn mowers where the lawn mower in the normal course of its mowing operation covers the entire yard. By having the internal combustion engine of the mower used to produce an insecticide fog, it is possible in connection with the mowing operation to destroy many of the objectionable insects such as mosquitoes. The conventional way of doing this is to have a container of insecticide with a connection between the container and the muffler of the internal combustion engine, the connection allowing the insecticide to flow at a controlled rate into the hot muffler. The insecticide is in solution with a volatile medium and upon the solution of the insecticide and the volatile medium hitting the hot muffler, the solution is volatilized and blown out through the muffler in a fog which will travel for a substantial distance and settle over the adjoining vegetation. In order to insure continued flow of the insecticide it is necessary to have some means for introducing gas into the container to replace the insecticide that is being drawn; otherwise, a vacuum if formed in the can of the insecticide and the flow of the insecticide will cease. One method that has been employed for this purpose is to provide a second conduit from the muffler to the top of the container, this permitting the flow of gas from the muffler to the container. This involves the use of two conduits and hence a relatively complicated connection to the muffler. For this reason, it has been proposed in the past to provide a special muffler with the necessary connections for two conduits, this muffler being used to replace the existing muffler on the internal combustion engine. Since these mufflers come in a wide variety of sizes and are often located in relatively inaccessible positions, it has been necessary to provide a considerable variety of mufflers in order to make them adaptable to various appliances driven by internal combustion engines. Often, the substitution of the special muffler for the one originally provided is extremely difficult because of the location of the muffler and the fact that rust quickly forms on such mufflers in use.

SUMMARY OF THE INVENTION

The present invention is concerned with a fogger attachment for internal combustion engines in which it is possible to readily connect a plurality of conduits from a container of insecticide to an already existing muffler without removing the muffler and with a minimum amount of tools.

In may device, I employ a fitting having a circular stem designed to be inserted through a single circular hole in a muffler, the stem being divided into two semicylindrical passages each of which is in communication with one of the conduits leading to and from the container of insecticide. The fitting is connected to the muffler by the use of a surrounding sleeve of deformable metal which is threadedly connected to the stem of the fitting and which upon relative rotation of the sleeve and stem on the outer side of the muffler, when the unit is inserted through an opening in the muffler, causes deformation of the sleeve to engage the inner wall of the muffler and retain the fitting in position. The stem and sleeve are each preferably provided with a bolt head which bolt heads are adapted to engage each other and which facilitate relative rotation of the sleeve and the stem. The head of the stem is provided with two closely spaced cylindrical openings into which two cylindrical pipes connected to the conduit are inserted and the stem has a single cylindrical passage with a divider plate extending centrally through it and disposed at its inner end between the inner ends of the two pipes in communication with the interior passages of the two pipes. The divider plate is preferably wedged between the inner ends of the pipes so as to form two separate conduits through the stem. The divider plate has an effective width slightly in excess of the inner diameter of the single cylindrical passage so that the divider plate tightly engages the walls of the cylindrical passage and acts to divide the same into the semicylindrical passages.

Further objects and features of the invention will be apparent from a consideration of the accompanying specification, claims and drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a lawn mower showing my improved fogger attachment secured thereto;

FIG. 2 is an elevational view, with portions broken away, of my improved fogger attachment, the attachment being shown as secured to a muffler of a mower, the muffler being shown in section;

FIG. 3 is a vertical sectional view through the fitting used to attach the two conduits to the muffler, this fitting being shown in the form which it assumes prior to being applied to the muffler;

FIG. 4 is a sectional view taken along the line 4–4 of FIG. 3 in the direction of the arrows adjacent that line;

FIG. 5 is a plan view of the underside of the fitting of FIG. 3; and

FIG. 6 is an elevational view, partly in section, of the lower fitting after being secured to a muffler, the figure being on a somewhat larger scale than in FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, there is shown in perspective a typical application for the fogger attachment of the present invention. The numeral 10 indicates the operative part of a power mower driven by a four-cycle internal combustion engine having a muffler 11. Secured to the carriage of the mower 10 is the handle bar consisting of two tubular rods 12 and 13 which are pivotally secured at their bottom to the carriage of the mower and which are bent outwardly at their upper ends and provided with handle grip members 14 and 15. The tubular rods 12 and 13 are preferably secured together near their upper ends in any suitable manner.

A can of a volatile solution of insecticide is indicated by the reference numeral 17 and is detachably secured to a tubular rod 13 of the handle bar by a suitable holder 16. This holder is clamped onto the tubular rod 13 and has two resilient gripping arms in which the can 17 is firmly held. The can has a fitting 18 on its lower end to which two conduits 19 and 20 are connected, these conduits being connected to a fitting 21 which extends into the muffler 11. The conduit 20 is provided for supplying insecticide solution to the interior of the muffler and the conduit 19 for permitting air pressure to enter the can 17 to replace the liquid which is drawn from can 17. In devices of this type, the insecticide which is in solution in a suitable volatile material such as mineral seal oil, passes at a controlled rate into the muffler 11 where it is vaporized, due to the extremely high temperature within the muffler, to generate a dense fog 22 of insecticide. It will be readily apparent that in applications such as this, it is necessary that the fitting 21 be capable of connecting the two conduits 19 and 20 to the interior of the muffler.

Referring now to FIG. 2, the fitting 18 connected to the lower end of can 17, the fitting 21 and the connecting conduit are shown in more detail. A portion of the can 17, the tubular rod 13 and the can holder 16 are broken away in FIG. 2. Also, portions of the fitting 18 are broken away and shown in section to better show the construction of the fitting. It will be noted that the fitting 18 has two pipes 25 and 26. Pipe 25 extends through and is secured in a fluidtight manner to a housing 27 which is, in turn, connected by a screw thimble member 29 to the threaded lower end of the can. This screw thimble member 29 is secured to the same threaded opening as that to which the closure member of the can is secured prior to use of the can 17. The pipe 25 extends upwardly through the fitting 18 and is designed to extend for substantially the full length of

the can as shown in dotted lines. At its upper end, it has secured thereto a rubber valve member **32** which has a slit therethrough at its upper end. The two portions separated by the slit are designed to spread apart to permit the passage of gas outwardly but to prevent the passage of liquid into the pipe **25**. Thus, the rubber valve member **32** acts as a check valve permitting gas to leave pipe **25** but preventing liquid from entering the pipe. The pipe **26** is secured in a fluidtight manner to the housing **27**. Liquid leaving the can **17** passes down around the pipe **25** and longitudinally through the housing **27** to the pipe **26**. The passage of fluid is controlled by a valve having a valve stem **33** which has a valve member adapted to seat against a valve seat **34**. The valve stem is adjusted by means of a knurled knob **35** secured to the stem **33**. The stem **33** is preferably secured by screw-threaded connections to the housing **27** so that rotation of knob **35** adjusts the longitudinal position of stem **33**. Flow of liquid from the can **17** of insecticide can thus be interrupted or permitted depending upon the position of knob **35**.

Secured to the two pipes **25** and **26** are the two conduits **19** and **20**, these being in the form of flexible hoses of a suitable material designed to resist the relatively high temperatures adjacent the muffler and not to be attacked by the oil in which the insecticide is dissolved. Such materials are well known in the art and need not be specifically described here. The lower ends of hoses **19** and **20** are secured to two pipes **39** and **40** forming a part of the fitting **21**. The fitting **21** is secured to the cylindrical housing **41** of the muffler **11**. This muffler **11** is connected to the exhaust pipe **42** by a suitable threaded connection **43** between the exhaust pipe and the housing **41** of muffler **11**. The pipe **42** communicates with the tubular baffle member **44** which has a number of perforations therethrough indicated by the reference numeral **45**. Exhaust gas entering the tubular baffle **44** is forced to pass out through the openings **45** into the outer portion of the housing **41** from which the exhaust gas passes out into the atmosphere through a large number of small openings **46** in the end of the muffler. The effect of the baffle **44** and the outer housing is to reduce the effect of the noise of the explosions taking place within the cylinder or cylinders of the internal combustion engine. It will be readily apparent that the tubular baffle **44** becomes extremely hot due to the high temperature of the exhaust gas. Any insecticide allowed to fall on this tubular baffle **44** is immediately vaporized and is forced out with the exhaust gas through the openings **46**. Due to the pressures created by vaporization of the gas the the large number of fine openings **46**, the result is that a very dense and fine fog results. This fog can be propelled a substantial distance due to the pressures built up within the muffler along with the pressure of the exhaust gas entering the muffler through the exhaust conduit **42**.

It will be readily apparent that it is impossible to employ conventional means for securing the conduits **19** and **20** to the muffler **11**. In the first place, it is virtually impossible to gain access to the interior of the muffler. This is because the muffler housing **41** is permanently secured to the baffle tube **44**. After mufflers of this type have been in use for a very short period of time, they acquire a coating of rust due to the high temperatures involved and the problem of securing any pipe to such a muffler is much greater than would be the case if the muffler were smooth and free of such rust. It is furthermore desirable that only one fitting be employed for securing the two conduits **19** and **20** to the muffler. These mufflers are often located in inaccessible points and it is often difficult to find a spot on the muffler which is accessible for the drilling of even one hole. It is for this reason that in many prior types of muffler attachments, a replacement muffler with the necessary fittings has been provided. As pointed out above, the drawback to this is that in order to enable these mufflers to be applied to a wide variety of mowers and other internal combustion engine operated appliances with which they are to be employed, it is necessary to provide a considerable variety of mufflers. Furthermore, the replacement of a muffler in some inaccessible location such as the underside of the motor is often very difficult, particularly when the muffler has already become rusted and is readily removable.

With my present invention, it is possible to secure the conduits **19** and **20** to a muffler such as muffler **11** with a minimum of effort and through a single opening in the muffler. The fitting **21** will now be described in more detail with reference to FIGS. **3**, **4** and **5**.

Referring to FIG. **3**, the fitting **21** generally comprises an inner stem member **50** to which the pipes **39** and **40** are secured and an outer deformable sleeve member **51** which extends through the opening in the muffler **11** and is deformed to grip the interior wall of the muffler housing **41**. The stem member **50** has an enlarged hexagonal bolt head portion **52** into which are drilled two cylindrical apertures **53** and **54**. The two pipes **39** and **40** are pressed into these apertures **53** and **54** and secured thereto in a fluidtight manner in any suitable manner such as being brazed therein.

The stem member **50** has a stem portion **56** which has a central passage **55** of circular cross section. This passage has a diameter sufficiently large that it overlaps with the interiors of pipes **39** and **40** when secured in passages **53** and **54**. A divider plate **57** in the form of an elongated strip of very hard material and of an effective width slightly in excess of the interior diameter of passage **55** is secured in the passageway **55** centrally thereof being wedged therein. The divider plate **57** may have corrugations to impart some lateral resilience thereto to facilitate forcing it into passage **55**. The upper end of the divider plate **57** is wedge shaped and the upper end is forced between the lower ends of the two pipes **39** and **40** forming a seal therebetween. The lower end of the divider plate **57** preferably projects slightly below the lower end of passageway **55** to minimize any tendency of the fluids in the two semicylindrical passages from mingling with each other. It will be apparent that the divider plate **57** divides the cylindrical passage **55** into semicylindrical passages, one of which communicates with pipe **39** and the other of which communicates with pipe **40**. The entire assembly of the stem member **50** is preferably brazed to seal pipes **39** and **40** in the head portion **52** and to seal the divider plate **57** to the pipes **39** and **40** and to the interior wall of passage **55**.

The sleeve member **51**, of relatively soft metal, is threadedly secured at **59** over the stem portion **56** of stem member **50**. At the upper end, the sleeve **51** is provided with a hexagonal bolt head **60**. The upper portion of the sleeve **51** is provided with an inner bore **62** which is of substantially larger internal diameter than the outer diameter of the adjacent portion of stem **56**, this bore **62** extending down to the threaded portion thereof engaged with the stem **56**. This leaves a portion **63** which is relatively thin as compared with the thickness of the rest of the sleeve member **51**.

When it is desired to insert the fitting **21** into a muffler, a hole is drilled through the muffler wall substantially corresponding in diameter to the external diameter of the lower portion of sleeve member **51**. The coupling **21** with the pipes **39** and **40** secured thereto is then inserted through this opening. Wrenches are then applied to the bolt heads **52** and **60** of the stem member **50** and the sleeve member **51**, respectively. A fibrous gasket **68** of suitable heat-resisting material such as asbestos is first interposed between the bolt head **60** and the wall **41** of the muffler. Wrenches are then applied to the bolt heads **52** and **60** and manipulated so as to draw members **50** and **51** toward each other. Since the bolt head **60** of sleeve member **51** is already in engagement with the bolt head **52** of stem members **50**, it is impossible for these portions of the two members to move together. The result is that a force is applied to the lower portion of sleeve member **51** tending to draw it upwardly. This results in the weakened portion **63** of sleeve member **51** being buckled outwardly to form a ridge **65** shown in FIGS. **2** and **6**. This ridge **65** will firmly engage the inner surface of wall **41**, clamping the fitting **21** in position. The hoses **19** and **20** are then cut to size and forced over the ends of pipes **25**, **39**, **26** and **40**.

It will be readily apparent from the above that with the fitting **31**, it is possible with a single opening through the muffler wall **41** to connect the two pipes **39** and **40** through two separate passages with the interior of muffler **11**. This single opening through the muffler wall **41** can be drilled at almost any location since regardless of the direction in which pipes **39** and **40** extend, it is still possible to connect these pipes with the pipes **25** and **26** of fitting **18** due to the resiliency of the hoses **19** and **20**. Furthermore, one or the other of the pipes **39** and **40** can be bent after the unit **21** has been secured to muffler **11** in order to facilitate the connection of the hoses **19** and **20** thereto. It is thus possible regardless of the condition or location of the muffler **11** to secure the fogging attachment in cooperative relation with the muffler **11**. This, furthermore, is accomplished with a relatively simple fitting requiring a minimum amount of machining.

I claim as my invention:

1. In an insecticide fogging attachment for an internal combustion engine having an exhaust gas muffler,

a container of a vaporizable insecticide solution, two conduits of circular cross section for extending from said container to the muffler of the internal combustion engine,

a first fitting for coupling said conduits to the bottom of said container, said fitting having means for coupling one of said conduits to the interior of said container with one end of said conduit adjacent the bottom of the container for delivery of insecticide from said container to the muffler and for coupling the other of the conduits to the interior of said container with one end of said conduit adjacent the top of the container for conveying gas from the muffler to the top of said container to replace the insecticide drawn therefrom,

and a second fitting remote from said first fitting for coupling the other ends of said two conduits to the muffler, said fitting having at one end two circular cylindrical passages of substantially the same diameter as the external diameter of said conduits and in which the other ends of said conduits are secured, said second fitting further having at its opposite end a cylindrical stem adapted to extend through a circular opening in said muffler and to be secured thereto, said stem having two semicylindrical passages in said stem, each of which partially overlies and is connected with a different one of said two cylindrical passages.

2. The fogging attachment of claim **1** in which a sleeve of relatively soft metal surrounds and is threadedly engaged with and abuts a shoulder on the stem of said first fitting so that when said first fitting is inserted through a cylindrical opening and said sleeve and stem are relatively rotated, said sleeve is compressed to engage the inner wall of said muffler.

3. The fogging attachment of claim **2** in which both said stem and said sleeve of relatively soft metal have bolt heads which are adapted to engage each other and which facilitate relative rotation of said sleeve and said stem.

4. The fogging attachment of claim **1** in which said stem has a single cylindrical passage with a divider plate extending centrally therethrough and being disposed at its inner end between the inner ends of said conduits to form said two semicylindrical passages.

5. The fogging attachment of claim **4** in which said divider plate has its inner end engaging and wedged between the inner ends of said conduits.

6. The fogging attachment of claim **4** in which said divider plate has an effective width slightly in excess of the inner diameter of said single cylindrical passage so that said divider plate tightly engages the wall of said cylindrical passage and acts to divide the same into said semicylindrical passages.