United States Patent [19]

Johnson

[11] **3,887,467**

[45] **June 3, 1975**

[54] **OIL COOLER AND FILTER CONTAINER FOR ENGINE**

[76] Inventor: **Andrew L. Johnson,** 5346 Greenleaf, Skokie, Ill. 60076

[22] Filed: **Oct. 1, 1973**

[21] Appl. No.: **402,471**

[52] **U.S. Cl.** **210/186;** 210/232

[51] **Int. Cl.** **B01d 35/18**

[58] **Field of Search** ..... 210/232, 184, 185, 186, 210/187, DIG. 17, 167, 168, 440, 443, 457

[56] **References Cited**

UNITED STATES PATENTS

1,900,821	3/1933	Kline	210/186 X
2,358,933	9/1944	Lance	210/168 X
2,463,800	3/1949	Pate	210/186
2,468,866	5/1949	Collier	210/457 X
2,902,163	9/1959	Humbert, Jr.	210/440
3,294,240	12/1966	Kolte	210/184 X
3,640,390	2/1972	Goy et al.	210/186

Primary Examiner—Theodore A. Granger
Attorney, Agent, or Firm—Darbo, Robertson & Vandenburgh

[57] **ABSTRACT**

A unit fits on a spin-type oil filter mount. The case of this unit holds a replaceable cartridge filter and the exterior wall is finned. The oil flow through the unit is directed along the fins to cool the oil and through the filter to clean the oil.

8 Claims, 3 Drawing Figures

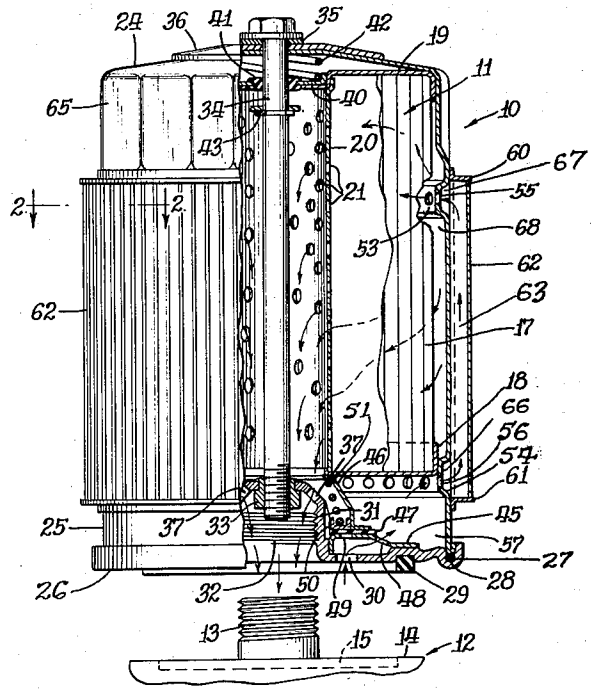


Fig. 1.

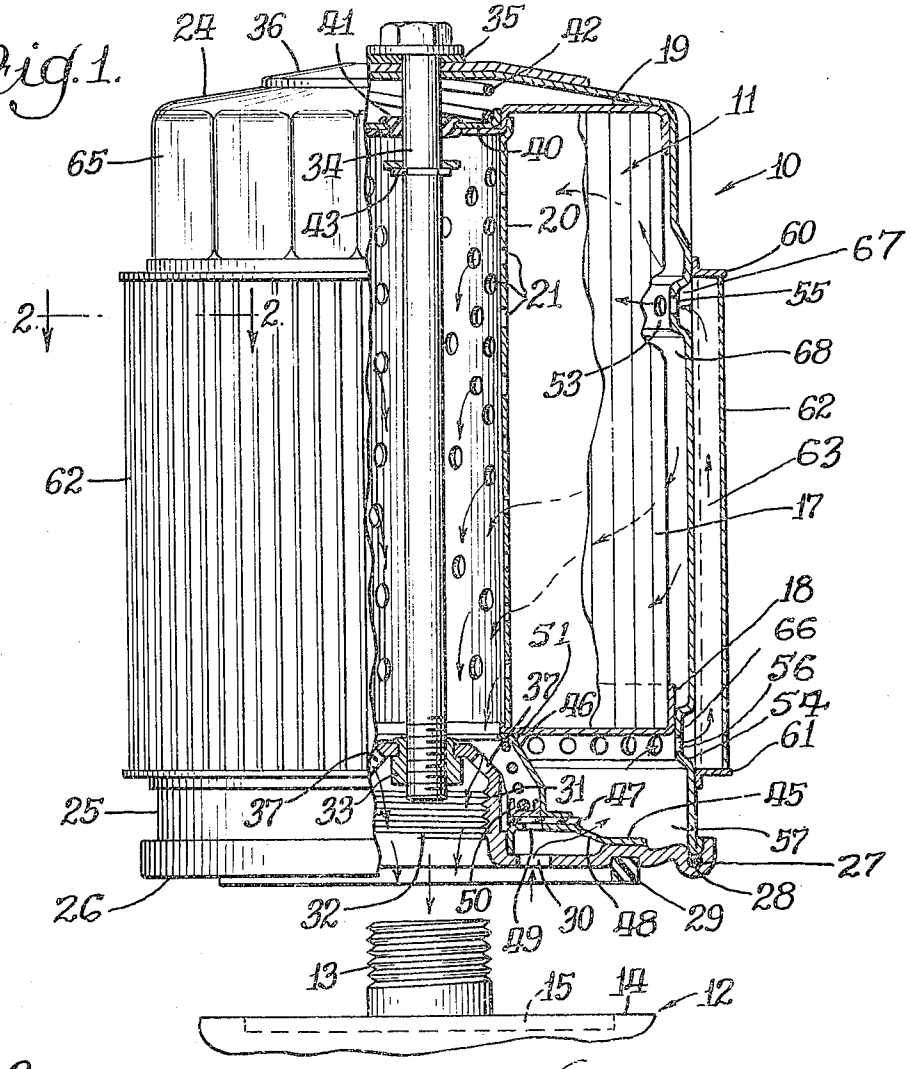


Fig. 2.

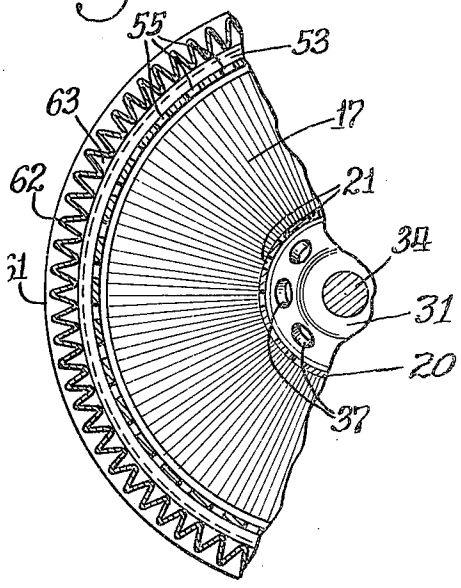
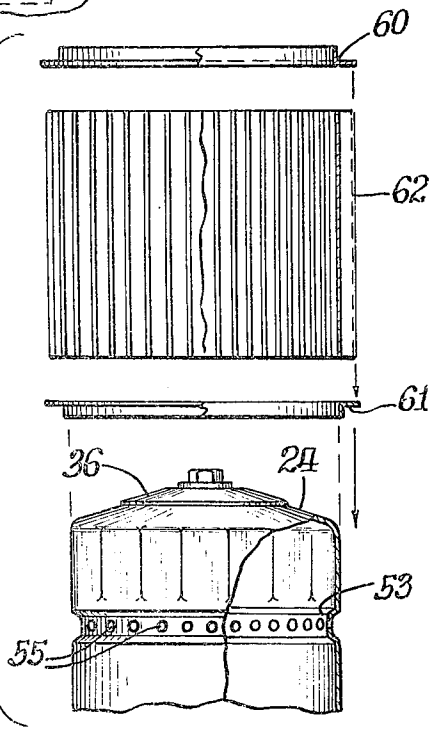


Fig. 3.



OIL COOLER AND FILTER CONTAINER FOR ENGINE

BACKGROUND AND SUMMARY OF THE INVENTION

It has long been recognized that excessive heat has a deleterious effect on the lubrication oil of an internal combustion engine, and also that one procedure for cooling an internal combustion engine can be a cooling of the oil. Oil coolers are employed on many internal combustion engines, but, of course, they add expense to the cost of an engine. The usual passenger automobile does not go to the expense of incorporating an oil cooler as such. Oil coolers are made for passenger cars, however, and often are added when the car is to be used for heavy duty purposes, such as the pulling of a house trailer for example. The cost of such a cooler plus the expense of installation is not inappreciable. Consequently, many owners of passenger vehicles do not add them even when the step is almost a necessity because of the severe service that will be required of the automobile. Even a person who does not subject his automobile to severe use, but merely drives it long distances at comparatively high speeds can benefit by additional oil cooling, but does not add it to the car because of the additional expense.

The principal object of the present invention is to provide a simple and relatively inexpensive apparatus for adding an oil cooler to a conventional internal combustion engine. Invariably an automobile has an oil filter. The present invention takes advantage of this situation, and adds oil cooling capabilities to the oil filter. Thus the labor involved in adding an oil cooler to most automobiles is no more than that labor involved in changing the oil filter. A further advantage is that the oil cooler apparatus is simple in construction and thus adds little in cost to that of the usual replacement oil filter.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view, partially broken away, of an embodiment of the invention;

FIG. 2 is a partial section as viewed at line 2—2 of FIG. 1; and

FIG. 3 is an exploded view of the portions added to an oil filter case to supply oil coolant capabilities thereto.

DESCRIPTION OF SPECIFIC EMBODIMENT

The following disclosure is offered for public dissemination in return for the grant of a patent. Although it is detailed to ensure adequacy and aid understanding, this is not intended to prejudice that purpose of a patent which is to cover each new inventive concept therein no matter how others may later disguise it by variations in form or additions or futher improvements.

The illustrated embodiment basically includes only two components. That is, a case, generally **10,** and a filter cartridge **11.** The unit is intended to be applied to a "spin-type" oil filter mount, generally **12,** on an internal combustion engine. Such a mount includes a projecting conduit **13** with a pipe thread thereon. There is a flat area **14** against which a gasket on the filter abuts and within that flat area is a recess **15.** The oil flow to the filter on such a mount is from said recess to the filter and then returning to the engine through threaded conduit **13.**

The filter cartridge **11** employed in the disclosed embodiment is a conventional, shelf item. It comprises a treated paper filtering element **17,** the ends of which are closed by cover plates **18** and **19.** There is an inner tube **20** having openings **21** therein, through which the oil flows to get from the space enclosed by the filtering element **17.**

The case, generally **10,** comprises a deep dish member formed by an end **24** and an annular wall **25,** which are integral with each other. The other end of the deep dish member is open and this open end of the member is closed by an end in the form of detachable mount **26.** Mount **26** has a peripheral groove **27** holding a seal **28,** which groove receives the open end of the deep dish member. Mount **26** holds an elastomeric gasket **29.** Within the space encompassed by this gasket are oil flow openings **30.** The mount includes a central boss **31** having threads **32** on the interior thereof to engage the threaded conduit **13** of the engine filter mount **12.** The center of boss **31** rotatably holds a threaded nut **33** which engages an axially positioned bolt **34.** Bolt **34** holds the deep dish member **24, 25** and the detachable mount **26** together. A gasket **35** is positioned between the head of the bolt and a reinforcing washer **36** on end **24** of the case. The central boss **31** has openings **37** therein to permit oil to flow from the central area about bolt **34** to the interior of threaded pipe **13.**

A washer **40** having a central elastomeric portion **41** bears against end **19** of the filter by reason of the urging of spring **42.** Thus this provides a seal about the end of the filter and also holds the filter so that the other end **18** thereof is against the other end of the filter case. A C-ring **43** seated in a suitable groove in bolt **34** prevents the washer **40, 41** and the spring **42** from coming off the bolt when the unit is disassembled for replacement of the filter cartridge.

As a part of the mount end **26,** there is a pressure relief valve to let the oil bypass the filter when the filter becomes clogged. Such devices are conventional upon oil filters. This comprises a ring **45** and a sleeve **46** which hold an annular flat gasket **47** of elastomeric material therebetween. The ring **45** has a plurality of openings **48** and **49** therein. Openings **49** are normally covered by gasket **47.** To ensure that they remain covered there is an annular plunger **50** which is urged against the gasket **47** by a spring **51.** Thus the oil flow normally is through openings **48** to get to the oil cooler and filter. However, if the filter becomes clogged, the build-up of pressure will overcome the urging of spring **51** so that gasket **47** and plunger **50** will move up about the periphery of boss **31** (away from ring **45**) to permit oil to flow through openings **49** and about the periphery of boss **31** to reach openings **37** and thus return to the engine, bypassing the filter. The end **18** of the filter cartridge **11** seats against the top of the sleeve **46** and forms an oil tight seal at this point.

The annular wall **25** has two inward annular bands **53** and **54** formed therein. These bands have openings **55** and **56** therethrough. The end **18** of the filter cartridge has a peripheral contact with band **54** so as to prevent the flow of oil therebetween. Thus there is a space **57** between the end **18** of the filter cartridge and the end **26** of the case **10,** which space communicates both with openings **56** in the band and openings **48** and **30** in the mount **26.**

Surrounding that part of annular wall **25** which includes bands **53** and **54** and the part of the wall there-

between (all of which may be referred to herein as the inner wall) is an exterior wall formed by end rings **60** and **61** and an annular shell **62.** This defines spaces **53** through which the oil flows between openings **56** and **55.** This exterior wall is finned so as to increase the contact area for heat transfer. In the illustrated embodiment this finning takes the form of a corrugation of the annular shell **62** (as perhaps best seen in FIG. **2**) which corrugations extend parallel to the axis of the filter (the axis being depicted by bolt **34**). This increases the surface area of the shell both at the inside for contact with the oil, and at the outside for contact with the air. The inner tips of the corrugations are in contact with annular wall **25.** As a process of manufacture, the rings **60, 61** and the annular shell **62** would be slipped onto the deep dish component **24, 25,** as suggested by the illustration of FIG. **3.** The assembly would than be dipped in hot tin to solder these four components together and supply a protective coating.

In actual practice, when a car owner had his oil filter changed, he could substitute one of these units as a replacement. The unit would be threaded onto the engine mount **12** in the same manner as would be employed in normally replacing the filter. The portion **65** of the annular wall **25** is the same configuration as that employed on some oil filters to engage a special wrench for removing the oil filter. When the engine was running, the oil from space **15** of the engine mount **12** would flow in through openings **30** and **48** to space **57.** From space **57** it would go through openings **56** and be distributed about the periphery of the cooler through the annular recess **66** defined by the inward band **54.** The oil then would be forced to flow through the spaces **53** defined by the annular shell **62** and the inner annular wall **25.** At the other end of spaces **53** the oil would enter annular recess **67** defined by the inwardly projecting band **53.** Then the oil would again return to the inside of the annular wall **25** through openings **55.** About the periphery of the filter cartridge **11** there is a space **68** caused by the positioning of the filter cartridge within the annular bands **53** and **54.** This permits the oil to distribute itself uniformly about the exterior of the filter cartridge. After flowing through the filter cartridge the oil would pass through openings **21** into the center of tube **20,** thence through openings **37** to enter the threaded conduit **13** and return to the engine.

When the filter **11** became clogged, or it was otherwise due for replacement, the unit would be removed from the engine. Thereafter, bolt **34** would be unscrewed (holding nut **33** with a wrench) to permit the mount end **26** to be separated from annular wall **25.** After the two were separated, the cartridge **11** could be slid out of the deep dish member **24, 25.** This is facilitated by the urging of spring **42.** After removal of the filter cartridge a new one would be inserted. The bolt **34** would then be manipulated to reattach the end mount **26** to the deep dish member **24, 25.** These being assembled, the unit is then rethreaded onto mount **12.**

I claim:

1. In an oil filter apparatus for an internal combustion engine or the like, which apparatus includes a filter, a case about said filter, said case includes means whereby the oil is directed to flow in a path with the filter being transverse to a first part of said path so that the oil normally flows through the filter, the improvement comprising:

said means including a first wall about at least part of the periphery of the case and a second wall within said first wall, said walls defining a space therebetween which space is a second part of said path, said filter being within said second wall, said first wall including fin means to increase the heat transfer area of the wall, said fin means being in the form of corrugations in the first wall thereby increasing the surface area on both the interior and exterior of the wall,

said filter being a replaceable cartridge filter having two ends, said second wall having two inwardly extending annular bands with spaced openings through the bands, said first wall covering said bands, said case having means positioning said filter in a given location in said case such that said path and the openings in one band are beyond one end of the filter, said case being in separable parts with the line of separation extending other than through said first wall whereby access may be obtained to the interior of the case for replacement of the filter.

2. In an oil filter apparatus as set forth in claim **1,** wherein the case has a detachable mount at one end thereof with oil input and outlet openings at said end of the case, the improvement wherein said case is in two main parts, one part being said end and being relatively flat, the other part being in the form of a deep dish member, including an axial bolt holding the two parts together, said one end of the filter being adjacent said one end of the case and defining a space between said ends through which space said path passes.

3. In an oil filter apparatus for an internal combustion engine or the like, which apparatus includes a filter, a case about said filter, said case includes means whereby the oil is directed to flow in a path with the filter being transverse to a first part of said path so that the oil normally flows through the filter, the improvement comprising:

said means including a first wall about at least part of the periphery of the case and a second wall within said first wall, said walls defining a space therebetween which space is a second part of said path, said filter being within said second wall said filter being a replaceable cartridge filter having two ends, said second wall has two inwardly extending annular bands with spaced openings through the bands, said first wall covering said bands, said case having means including said bands positioning said cartridge filter in a given location within said second wall such that said path and the opening in one band are beyond one end of the filter, said case being in separable parts with the line of separation extending other than through said first wall whereby access may be obtained to the interior of the case for replacement of the filter.

4. In an oil filter apparatus which includes a case having an annular wall about an axis and two ends with one of said ends forming a detachable mount with oil inlet and outlet communication openings therein, an annular filter within said case, said case and filter being arranged so that the oil flows between a first space at the interior of the filter and a second space between the exterior of the filter and said annular wall, the improvement comprising:

said case means having portions defining an oil path from one of said spaces to one of said openings

without passing through said filter, said portions of said means defining a heat exchanger for the cooling of the oil moving in said path,

said portions including an exterior wall about part of said annular wall and defining a third space therebetween having two ends axially spaced from each other, said oil path extending through said third space from adjacent one end thereof to adjacent the other end thereof.

5. In an apparatus as set forth in claim **4,** wherein said exterior wall is formed of three components, two end rings and an annular shell, said end rings being bonded to the annular shell and the annular wall, said shell defining a plurality of corrugations extending parallel to said axis, said rings covering the ends of said corrugations.

6. In an apparatus as set forth in claim **5,** wherein said filter includes a cover plate at one end thereof, the improvement comprising:

said annular wall having an inwardly extending annular band seated against said cover plate, said annular wall having openings therethrough positioned beyond said cover plate in the direction away from said filter, said openings extending from the interior of the annular wall into said second space.

7. In an apparatus for an internal combustion engine or the like for filtering the engine oil and utilizing a fluid medium, such as air, to also cool the engine oil, which apparatus includes an annular filter, a case about said filter, said case includes means whereby the oil is directed to flow in a path with the filter being transverse to a first part of said path so that the oil normally flows through the filter, the improvement comprising:

said means including a first wall about at least part of the periphery of the case and an annular second wall within said first wall, said walls defining a space therebetween which space is a second part of said path, said filter being within said second wall, said first wall being comprised of three components, namely two end rings and a generally annular shell, said annular shell being corrugated sheet metal whereby the inner and outer surface areas of the shell are increased for greater contact with oil on the inside of the shell and said medium on the outside of the shell.

8. In an apparatus as set forth in claim **7,** wherein said shell has two ends, and said end rings are formed of sheet metal and are bonded both to the second wall and to the respective ends of said shell.

* * * * *