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
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 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 view drawn to line 2—2 of FIG. 1;

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-
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 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.

1 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:
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.