

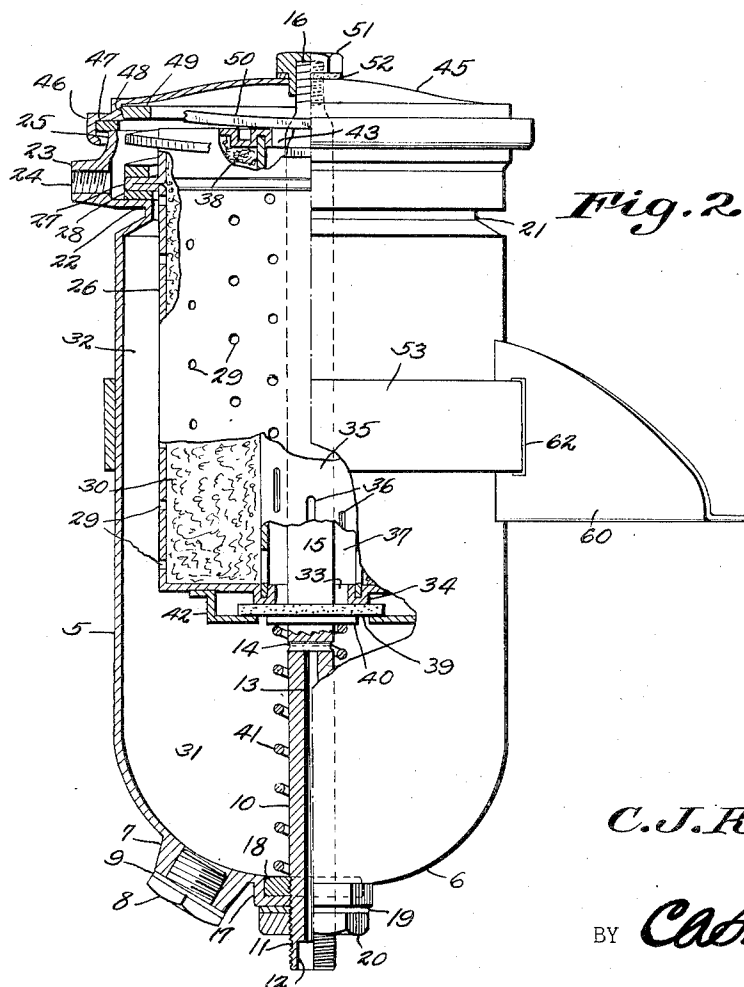
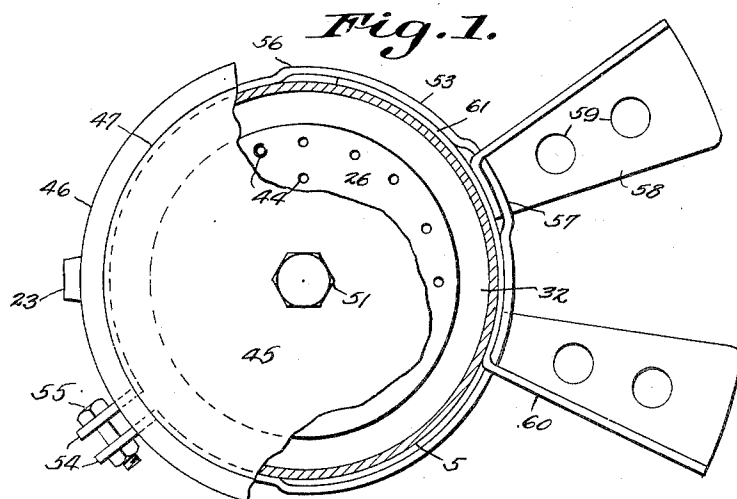
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OIL FILTER

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## OIL FILTER

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1 Claim. (Cl. 210—140)

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This invention relates to oil filters, such as are most commonly used on automotive vehicles, but which can be used as a part of any lubricating system requiring a filter of the general type.

An important object of the invention is to provide a filter as described novelly formed and arranged as to its component parts to provide an improved filter action, with all portions of the filter material utilized therein being equally impregnated by oil passing through the filter, thus to prevent undue clogging of any particular portion of the filter material, and also to improve and prolong the cleansing action of said material.

Another important object is to provide a filter of the character stated wherein a considerable amount of the dirt and grit carried by the oil will be removed therefrom before passage of the oil into the filter material.

Still another object is to provide a filter of the type in which the parts are easily separable, for ready substitution of a new filter cartridge, and for cleansing of the entire device when desired.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts, hereinafter more fully described and pointed out in the claims, it being understood that changes may be made in the construction and arrangement of parts without departing from the spirit of the invention as claimed.

Referring to the drawings:

Figure 1 is a top plan view of a filter constructed in accordance with the invention, portions being shown in horizontal section.

Figure 2 is a view partly in side elevation and partly in vertical section.

Referring to the drawings in detail, 5 is a metal casing, formed open at its upper end and having a curvingly depressed bottom 6. Adjacent the center of the bottom, a nipple 7 is formed on the casing, this having a threaded opening receiving drain plug 8. A washer 9 is interposed between the plug and the nipple, to prevent leakage.

A removable bolt 10 extends from top to bottom of the filter. The projecting lower end 11 of the bolt is threaded, and formed in this end is a socket 12 adapted to receive, and to be suitably connected to in any suitable manner, a tube member which is part of the lubricating system, and which has not been illustrated, since it is wholly conventional.

In the lower portion of the bolt 10, and com-

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municating with the socket 12, is an axial bore 13, constituting an inlet passage whereby the oil is fed into the filter. This bore opens into a transverse opening 14 formed in the bolt, and the oil proceeds through the opening 14 into the casing. Above the opening 14, the bolt 10 is formed solid as at 15, and is solid to its reduced threaded upper end 16.

To secure the bolt in position at the bottom of the casing 5, I provide a depression 17 formed at the center of the bottom 6. A nut 18 is threaded on the bolt 10. Nut 18, after being threaded on the bolt, can be spot welded thereto, if desired, since it is not contemplated that it need be removed. The nut is non-circular as to its outer surface, and the depression 17 is formed correspondingly, thus to support the bolt firmly to the bottom 6 and to prevent relative rotation.

A washer 19, to prevent leakage, is positioned on the projecting lower end of the bolt, and a lock nut 20 is threaded on said lower end to secure the part firmly.

Near its upper end, the casing 5 is pressed inwardly as at 21 to provide an annular seat or ledge 22 that extends inwardly, and constitutes a support for a filter cartridge in a manner to be presently described.

Above the seat 22, there is projected outwardly from the casing 5 a nipple 23, having a threaded opening 24, that constitutes the outlet for the cleansed oil, said outlet opening 24 being threaded for coupling to the lubricating system through which the oil passes after leaving the filter.

The upper edge 25 of the casing 5 is pressed inwardly to a slight extent, as readily apparent from Fig. 2.

The filter cartridge 26 is preferably of metal material, and is closed at top and bottom. Near the upper end of the cartridge, the side wall thereof is crimped to provide a flange 27 that is supported by the seat 22. A gasket 28 is interposed between the flange and the seat, to prevent leakage between the inlet and outlet chambers of the filter.

The side wall of the filter 26 is formed around this entire periphery with spaced openings 29, that constitute inlets for oil passing into the cartridge. These openings terminate approximately in the vicinity of the flange 27, and short of the upper end of the cartridge.

The cartridge is filled with filter material 30, which is of any suitable type, though preferably shredded cotton or waste is used.

The bottom of the filter cartridge is positioned

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at a substantial distance above the bottom 6 of the casing, and this defines a lower reservoir 31, communicating at its upper end with an annular passage 32 for oil forced up from the reservoir, the oil being then directed through the openings 29 in the side wall of the cartridge.

In the imperforate bottom of the filter cartridge is formed a central opening 33 of a diameter somewhat larger than the diameter of the bolt 10. The portion of said cartridge bottom surrounding this opening is crimped as at 34 to provide an annular groove receiving the lower end of a tubular member 35, which may be of metal or fiber material. The tubular member 35 is formed end to end with spaced longitudinally directed slots 36, which are preferably disposed in staggered relation.

The tubular member 35 is of substantially larger diameter than the diameter of the bolt 15, so that there is thus defined an annular passage 37 surrounding the bolt, into which is directed the cleansed oil, said oil passing into the passage through the slots 36.

The upper end wall of the filter cartridge 26 is also provided with a crimped portion 38, so as to receive the upper end of the tubular member 35.

Fitted snugly to the bolt 10, and pressed tightly against the crimped portion 34 of the filter cartridge, is a seal 39, preferably of cork material, though any other resilient and leak-preventive material can be used. A washer 40 presses against the under side of the seal 39, and a spring 41 is held under compression between the washer and the nut 18, so that the seal 39 is pressed tightly against the crimped portion 34, thus to prevent oil from passing from the reservoir 31 directly into the opening 33.

Depending from the bottom of the filter cartridge is an inwardly flanged and centrally apertured bearing ring 42, that supports the seal 39. In this connection, the construction embodied at the lower end of the filter cartridge is such, as will be noted, as permits deviation of the cartridge 26 relative to the bolt 10 that extends through it, so that they need not be aligned axially with complete accuracy. It sometimes happens that when a cartridge is positioned in a casing, it does not seat in a manner whereby it would be in full axial alignment with the parts associated with the cartridge. This results in interior leaks with the result that oil may leave the filter without being cleansed. Using a construction as described, it will be observed that the filter cartridge does not have to seat with complete exactness, and if it deviates from a position of proper alignment with the bolt, communication is nevertheless prevented between the inlet chamber and outlet chamber, except of course through the filter material 30.

In the upper end wall of the filter cartridge is formed a large central opening 43, through which the upper portion of the bolt passes. Cleansed oil proceeding upwardly through the passage 37 moves into the outlet chamber of the filter through this opening. Oil can also enter the outlet chamber through openings 44 (Fig. 1) disposed in the upper end wall of the filter cartridge, and such oil, as will be appreciated, would not pass through the slots 36.

A cover is designated 45, and this has a peripheral depending flange 46 intumed at its lower edge. The cover seats on the impressed upper edge of the casing, an annular sealing ring 47 being interposed therebetween.

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The cover 45 is also flanged inwardly near its periphery, as shown at 48, thus defining a seat for the upper end 49 of a spring 50. Spring 50 is preferably, though not necessarily, rectangular in cross section, and at its upper end may be formed to fit snugly in the inwardly flanged portion 48 of the cover. By reason of this construction, the cover can be removed without disengagement of the upper end of the spring from the cover. The lower end of the spring presses downwardly against the flange 27, and thus holds the cartridge 26 firmly pressed against the seat 22 of the casing.

A nut 51 threads on the upper end of the bolt 10, and interposed between the nut 51 and the cover 45 is a sealing washer 52 to prevent leaks.

The filter can be mounted on any suitable structural part of the vehicle. To this end, I provide a single encircling strap 53 of resilient metal material, the ends of which are extended outwardly as spaced ears 54 receiving fastening means 55 whereby the strap is tightly clamped to the casing. The medial portion of the strap is pressed outwardly as at 56, and part of this medial portion is further outpressed as at 57, to accommodate the inner end of a bracket 58 having openings 59 to receive a fastening means whereby the bracket can be connected to a structural part of the vehicle.

A bracket 60 slides on the medial portion 56 of the strap 53, this bracket having a curved extension 61 that is interposed between the casing wall and the strap 53. It will thus be observed that bracket 60 is slidably adjustable around the casing, so that it can be positioned to accommodate various structural designs in vehicles to which the filter is to be attached.

The operation of the filter is as follows: Oil passes into the filter through the inlet passage 13, and proceeds into the inlet chamber of the filter, this chamber being defined by the lower reservoir 31, and the annular passage 32 that surrounds the side wall of the filter cartridge. When the oil passes out of the openings 14, it spreads out under the imperforate bottom of the cartridge as it passes into the lower reservoir 31. A preliminary deposit of grit and dirt gravitates to the bottom of the lower reservoir 31 during this action. The oil is now forced upwardly through the passage 32, and enters all the openings 29, moving radially and inwardly through the filter material 30. The oil now enters the inner chamber, the passage 37 defined between the tubular member 35 and bolt 10 constituting a lower extension of said inner chamber. The oil thus passes into the inner chamber from top to bottom of the tubular member 35, thus being effectively cleaned by reason of its having passed through the filter material 30. Some of the oil passes through the openings 44 in the upper end of the filter cartridge, to facilitate the flow of the oil through the filter.

The remaining portion of the outlet chamber of which the passage 37 is a part, is defined between the cover 45 and the flange 27.

Thus, the oil is forced through the outlet opening 24, leaving the filter after having been effectively cleansed. The advantages and important characteristics of the filter may now be readily noted. The filter is capable of easy assembly and disassembly, and permits ready substitution of new cartridges as necessary. The life of each cartridge is believed prolonged by the fact that all the filter material is impregnated to an equal extent, since oil enters and leaves the cartridge simultaneously, practically from top to bot-

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tom of the cartridge. Prolongation of the life of the cartridge is further provided for by the fact that much of the grit and dirt finds its way to the bottom 6 of the casing, before the oil moves into the cartridge.

Additionally, the particular formation of the casing, cartridge, and cover, are such that all parts are positioned securely therein, with leaks between the inlet and outlet chambers being effectively prevented, as well as leaks from the casing itself. The seal arrangement at the lower end of the cartridge permits a certain amount of misalignment of the cartridge in the casing, without detracting in any way from the efficiency of the filter.

It will be appreciated that the spring 50 will be of greater strength than the spring 41 so that the spring 50 will sealably engage the cartridge flange against the ledge of the casing, while placing the spring 41 under compression to an extent as will cause the spring 41 to urge the gasket 39 upwardly against the seat 34 of the cartridge.

What is claimed is:

In a filter a casing open at its upper end; a cover for the casing; a main bolt extending upwardly through the center of the casing and through the cover; means at the upper end of the bolt for sealably engaging the periphery of the cover against the casing; an inwardly directed annular ledge on the upper end of the casing; a cartridge having an out-turned flange at its upper end supported on said ledge and having an axial passage the wall of which is substantially spaced from and surrounds the main bolt, the wall of said passage being well spaced from the main bolt from end to end of the passage; a spring held under

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compression between the flange and the cover and urging the cartridge downwardly for sealing engagement of the flange and ledge; an annular seat formed on the cartridge at the lower end of said passage; an annular supporting bracket depending from the lower end of the cartridge and surrounding said seat; a resilient gasket surrounding the bolt and supported by the bracket in position below the seat, whereby upward pressure against said gasket will force the peripheral portion of the gasket into sealing engagement against the seat; and a spring of lesser strength than the first spring and interposed between the lower end of the cartridge and the bottom of the casing, said last mentioned spring being placed under compression by the downwardly urged cartridge to urge said gasket upwardly into sealing engagement against the seat when the cartridge is seated in the casing.

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