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[Continued on next page]

(54) Title: FLUID FILTER

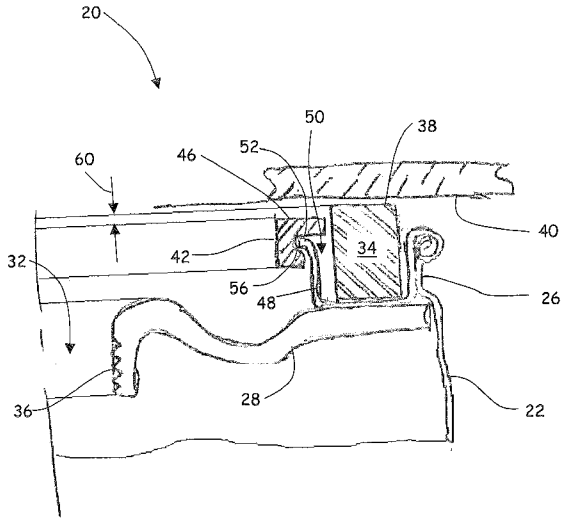


FIG. 2

(57) Abstract: A fluid filter such as an oil filter for a vehicle is provided. The fluid filter includes a body. A plate is coupled to one end of the body, the plate having a first surface and a threaded portion having a thread pitch. A seal is disposed adjacent the plate, the plate having a second surface opposite the plate. A stop member is disposed adjacent the plate, the stop member having a third surface offset from the second surface.

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— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

FLUID FILTER

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a non-provisional patent application which claims the benefit of U.S. Provisional Patent Application number 61/499,395 filed June 21, 2011, the entire contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] The subject matter disclosed herein relates to a fluid filter and in particular to a removable automotive fluid filter having features for assisting installation.

[0003] Vehicles having internal combustion engines, such as automobiles for example, typically have replaceable filters that remove contaminants from the fluid. For oil lubrication fluids, the oil will be periodically drained and replaced with new oil. The oil lubrication system includes a filter that removes particulates from the oil during operation. Usually, this filter is replaced at the same time the oil is changed, since the filtering medium within the filter will gradually become less effective over time as the particulate becomes trapped within the filter.

[0004] The removal and installation of an oil filter is usually accomplished using a specifically designed tool, sometimes referred to as a filter wrench. Since the lubrication system is under pressure, the oil filter is installed to a particular torque level to ensure a desired seal between the filter and the engine. Typically, the installation requires the operator to turn the filter a predetermined amount, such as 3/4 to 1 turn once the filter seal contacts the engine surface. It should be appreciated that under tightening may result in oil leakage and over tightening the oil filter may result in difficulty in removing the oil filter during the next oil change.

[0005] Accordingly, while existing automotive fluid filters are suitable for their intended purposes, the need to improvement remains particularly in providing a fluid filter that assists the operator in installing the filter in a desired location.

BRIEF DESCRIPTION OF THE INVENTION

[0006] According to one aspect of the invention, a fluid filter is provided. The fluid filter includes a body and a plate coupled to one end of the body, the plate having a first surface and a threaded portion having a thread pitch. A seal is disposed adjacent the plate, the plate having a second surface opposite the plate. A stop member is disposed adjacent the plate, the stop member having a third surface offset from the second surface.

[0007] According to another aspect of the invention, another fluid filter is provided. The fluid filter includes a body having a closed first end and a second end. A tapping plate is coupled to the second end, the tapping plate having a first surface and a threaded portion having a thread pitch. A channel member is coupled between the tapping plate and the body, the channel member defining an area with an open side opposite the first end. A sealing member is disposed within the area, the sealing member having a second surface offset a first distance from the open side. A stop member is coupled to the channel member, the stop member having a third surface disposed between the first surface and the second surface.

[0008] According to yet another aspect of the invention, yet another fluid filter is provided. The fluid filter includes a body having a closed first end and a second end. A channel member having an outer diameter is coupled to the second end, the channel member defining an annular slot having an open side. A seal member is disposed within the annular slot, the seal member having first surface offset from the open side. A stop member is coupled to an inner diameter of the channel member, the stop member having a second surface disposed between the open side and the first surface.

[0009] These and other advantages and features will become more apparent from the following description taken in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWING

[0010] The subject matter, which is regarded as the invention, is particularly pointed out and distinctly claimed in the claims at the conclusion of the specification. The foregoing and other features, and advantages of the invention are apparent from the following detailed description taken in conjunction with the accompanying drawings in which:

[0011] FIG. 1 is a perspective view of a fluid filter in accordance with an embodiment of the invention; and

[0012] FIG. 2 is a partial side sectional view of the fluid filter of Figure 1.

[0013] The detailed description explains embodiments of the invention, together with advantages and features, by way of example with reference to the drawings.

DETAILED DESCRIPTION OF THE INVENTION

[0014] Fluid filters are used with in a wide variety of applications, such as internal combustion engines for example, to remove contaminants such as a particulate from a fluid stream. The fluid filters are installed to provide a desired level of sealing between the fluid filter and the corresponding equipment (e.g. the engine). It is desirable to have the fluid filter installed without under tightening, which could result in leakage, or over tightening which could make it difficult to remove the filter after a period of operation. Embodiments of the present invention include a member that allows the operator to tighten the filter against a positive stop that provides for a desired sealing level.

[0015] Referring to FIGS. 1 and 2, there is shown an fluid filter 20, such as a replaceable oil filter for an internal combustion engine. The filter 20 includes a generally hollow cylindrical body 22 that defines a space for a filter medium (not shown). One end 24 of the body 22 is closed. The end 24 may include one or more surfaces that allow a user to couple a tool to the filter 20. An opposite end 26 is enclosed by a tapping plate 28. The tapping plate 28 may be coupled to the body 22 by a crimped connection for example. The tapping plate 28 may include one or more openings 30, 32 to allow a working fluid to enter and exit the filter 20. In one embodiment, the opening 32 includes a threaded portion 36 that is sized to couple to a threaded member on an engine. In one embodiment, the threaded portion 36 has a 3/4 inch major diameter with 16 threads per inch or 13/16 inch diameter with 16 threads per inch (American Standard) . In embodiments having a metric thread, the threaded portion 36 may be sized as a 20mm x 1.5, 18mm x 1.5, or 22mm x 1.5 thread (ISO Metric).

[0016] Coupled to the end 26 is a seal, such as gasket 34. The gasket 34 forms a seal between the filter 20 and mating system (e.g. an internal combustion engine). It should

be appreciated that the integrity of the seal formed by the gasket 34 on an adjoining surface will depend the amount of compression of the gasket 34. It is desirable to have the compression fall within a range to avoid under compressing or over compressing the gasket. In an automotive application a compression created by rotating the filter 20 three-quarters to one turn after the contact surface 38 engages the surface 40 (Figure 2). It should be appreciated that in many applications, it is difficult for the installer to see the filter and judge whether the filter has been turned the desired amount.

[0017] In the exemplary embodiment, the filter 20 includes a stop member 42. The stop member 42 is disposed between the contact surface 38 and a surface 44 of the tapping plate 28. The stop member 42 includes a surface 46 that is offset from the contact surface 38. During installation, the stop member 42 contacts the surface 40 preventing further tightening of the filter 20. Therefore, the amount of offset between the surfaces 38, 46 determines the amount of compression of the gasket 34. In the exemplary embodiment, the offset is about three-quarters of the thread pitch of threaded portion 36. In one embodiment, the offset is about 0.045 inches (1.145 mm).

[0018] Referring to Fig. 2 a sectional view is shown of fluid filter 20. A channel member 48 may be coupled, such as by welding for example, between the tapping plate 28 and the body 22. The channel member 48 has a generally thin walled body with an inner diameter adjacent the opening 32 and an outer diameter adjacent the body 22. The inner diameter and outer diameter define an annular channel 50 having an open end. The channel 50 is sized to receive the gasket 34 such that the contact surface 38 is offset from the open end of the channel 50.

[0019] The channel member 48 further includes a lip 52 disposed along an inner diameter. In one embodiment the stop member 42 is coupled to the inner diameter of the channel member 48. In one embodiment, the stop member 42 has a slot 56 is sized to receive the lip 52. Adjacent the slot 56 the stop member 42 has the surface 46 that is offset from the contact surface 38 by a distance 60. In one nonlimiting embodiment, the distance 60 is sized to be about three-quarters of the pitch of threaded portion 36. In one nonlimiting embodiment, the distance 60 is about 0.045 inches (1.145 mm). The stop member 42 may be made from a suitable light-weight, low cost moldable plastic material, such as nylon for

example. The use of nylon as a material for the stop member 42 may provide advantages in that it reduces the risk of marring the interface with surface 40.

[0020] To install the filter 20, the maintenance personnel first remove the old filter from the system (e.g. the internal combustion engine, not shown). With the old filter removed, the personnel couple the threaded portion 36 to the corresponding threaded stem on the system. The personnel continue to rotate the filter 20 until the surface 58 contacts the surface 40 of the system. Once the surfaces 40, 46 are in contact, the further rotation of the filter 20 will be inhibited and the personnel will know that the gasket 34 has been compressed to the desired amount. It should be appreciated that the filter 20 provides advantages in allowing a desired seal to be formed between the filter and the system without the installer having to monitor the number of turns or the amount that the filter 20 is rotated.

[0021] It should be appreciated that while the embodiments herein describe the stop member 42 as being arranged radially inward from the gasket 34, this is for exemplary purposes and the claimed invention should not be so limited. In one embodiment, the stop member is arranged radially outward from the gasket. In still another embodiment, the stop member is integrated into the channel member 48. In still another embodiment, the stop member is integrated into the gasket 34. In yet another embodiment, the stop member is coupled or integrated into the tap plate. In still another embodiment, the stop member is integrated into the body 22.

[0021] While the invention has been described in detail in connection with only a limited number of embodiments, it should be readily understood that the invention is not limited to such disclosed embodiments. Rather, the invention can be modified to incorporate any number of variations, alterations, substitutions or equivalent arrangements not heretofore described, but which are commensurate with the spirit and scope of the invention. Additionally, while various embodiments of the invention have been described, it is to be understood that aspects of the invention may include only some of the described embodiments. Accordingly, the invention is not to be seen as limited by the foregoing description, but is only limited by the scope of the appended claims.

CLAIMS:

1. A fluid filter comprising:

a body;

a plate coupled to one end of the body, the plate having a first surface and a threaded portion having a thread pitch;

a seal disposed adjacent the plate, the plate having a second surface opposite the plate;

a stop member disposed adjacent the plate, the stop member having a third surface offset from the second surface.

2. The fluid filter of claim 1 wherein the third surface is offset from the second surface by about an amount equal to three-quarters of the thread pitch.

3. The fluid filter of claim 2 wherein the threaded portion has 16 threads per inch.

4. The fluid filter of claim 1 wherein the offset is about 0.045 inches.

5. The fluid filter of claim 1 wherein the third surface is disposed between the first surface and the second surface.

6. The fluid filter of claim 5 wherein the stop member is made from a plastic material.

7. A fluid filter comprising:

a body having a closed first end and a second end;

a tapping plate coupled to the second end, the tapping plate having a first surface and a threaded portion having a thread pitch;

a channel member coupled between the tapping plate and the body, the channel member defining an area with an open side opposite the first end;

a sealing member disposed within the area, the sealing member having a second surface offset a first distance from the open side; and,

a stop member coupled to the channel member, the stop member having a third surface disposed between the first surface and the second surface.

8. The fluid filter of claim 7 wherein the third surface is offset from the second surface by a second distance, the second distance being about three-quarters of the thread pitch.

9. The fluid filter of claim 8 wherein said first distance is larger than said second distance.

10. The fluid filter of claim 9 wherein the second distance is about 0.045 inches.

11. The fluid filter of claim 7 wherein the channel member includes a lip disposed on an inner diameter.

12. The fluid filter of claim 11 wherein the stop member is coupled to the lip.

13. The fluid filter of claim 12 wherein the stop member is made from a plastic material.

14. A fluid filter comprising:

a body having a closed first end and a second end;

a channel member having an outer diameter coupled to the second end, the channel member defining an annular slot having an open side;

a seal member disposed within the annular slot, the seal member having a first surface offset from the open side; and,

a stop member coupled to an inner diameter of the channel member, the stop member having a second surface disposed between the open side and the first surface.

15. The fluid filter of claim 14 wherein the second surface is offset from the first surface by about 0.045 inches.

16. The fluid filter of claim 14 wherein the channel member includes a lip portion along the inner diameter.

17. The fluid filter of claim 16 wherein the stop member includes a slot disposed along an outer diameter.

18. The fluid filter of claim 17 wherein the lip portion is disposed within the stop member slot.

19. The fluid filter of claim 14 further comprising a tapping plate coupled to the body on the second end, the tapping plate including a threaded portion having a thread pitch.

20. The fluid filter of claim 19 wherein the second surface is offset from the first surface by about three-quarters of the thread pitch.

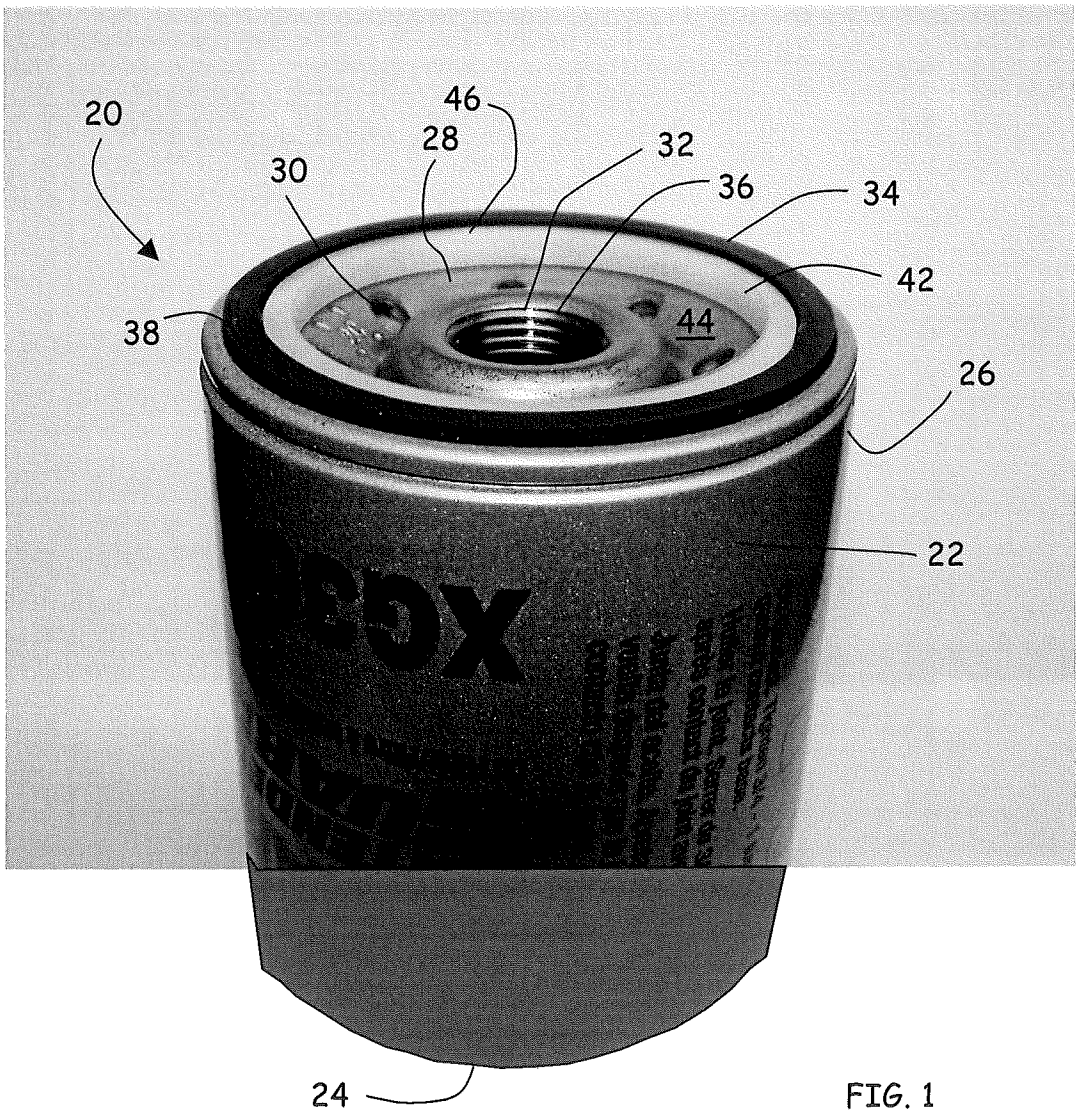


FIG. 1

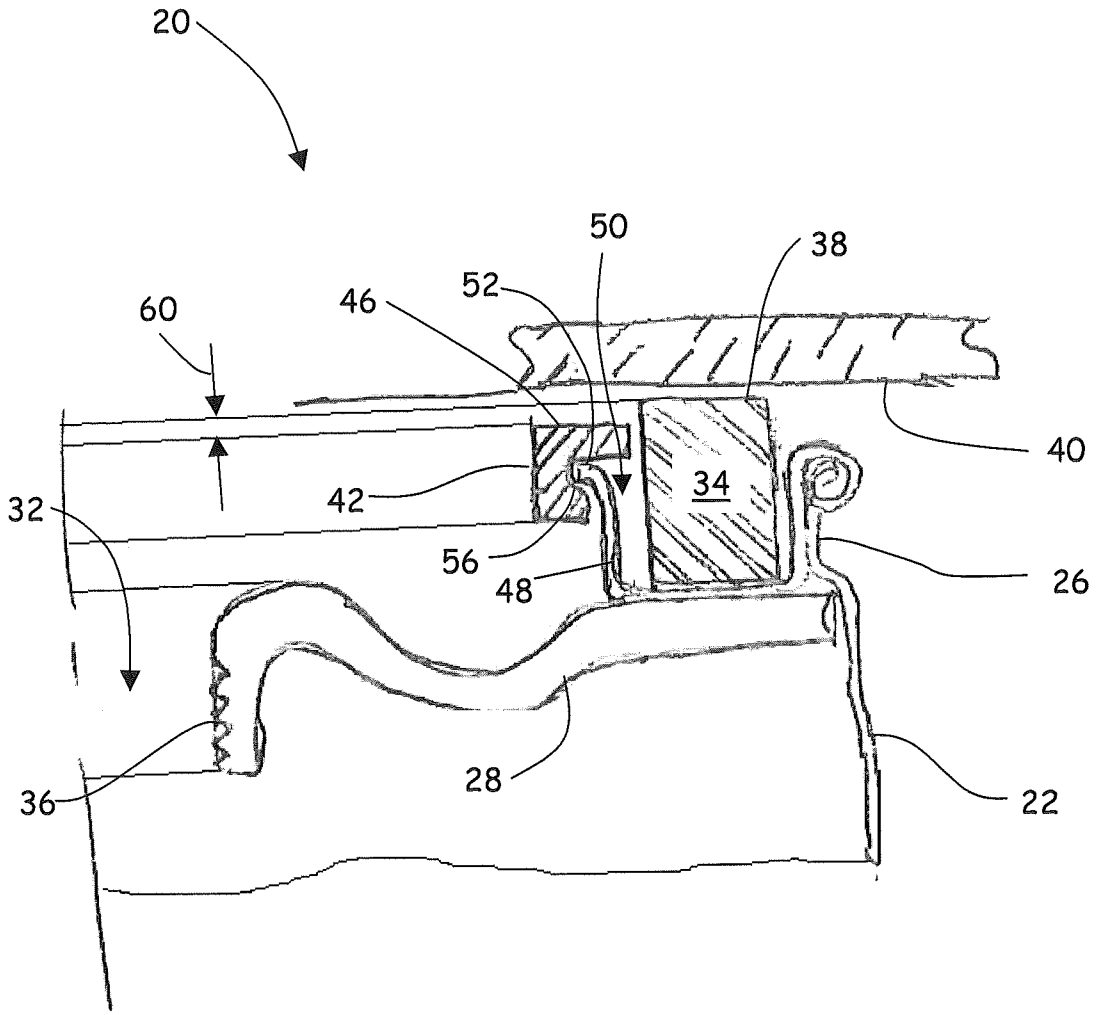


FIG. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/030543

A. CLASSIFICATION OF SUBJECT MATTER

F01M 11/03(2006.01)i, B01D 27/08(2006.01)i, B01D 35/30(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F01M 11/03; B01D 35/30; B01D 27/08; B65D 41/06; B01D 35/02; B01D 35/14

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: filter, seal, stop

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	JP 10-151303 A (EIKEN KOGYO KK) 09 June 1998 See abstract, paragraphs 0015-0020, page 3, and figures 1-3.	1-10,14,15,19,20 11-13,16-18
X A	KR 10-2005-0070396 A (HYUNDAI MOTOR COMPANY) 07 July 2005 See abstract, pages 2,3, and figures 2-4.	1,3,7,14,19 2,4-6,8-13,15-18 ,20
X A	US 2007-0034631 A1 (TAKAHIRO MINOWA et al.) 15 February 2007 See abstract, paragraphs 0060,0061,0064,0065, page 4, and figures 2,8.	1,3 2,4-20
X A	US 05876600 A (MATSUBARA; KAZUKI et al.) 02 March 1999 See abstract, columns 3,4, and figure 1.	1,3 2,4-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 OCTOBER 2012 (15.10.2012)	**16 OCTOBER 2012 (16.10.2012)**

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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