

Oct. 18, 1966

P. L. FRANCOIS

3,279,609

SCREW ON TYPE FILTER

Filed March 3, 1964

FIG. 1

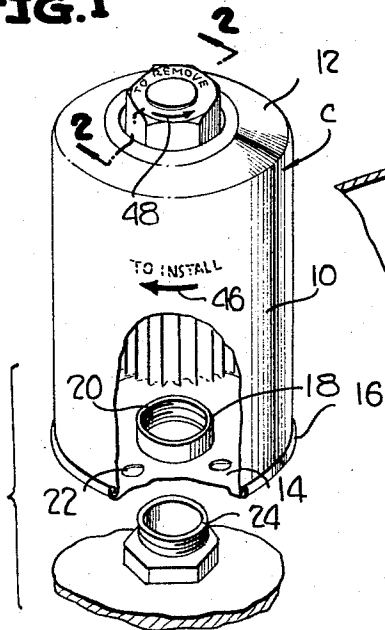


FIG.2

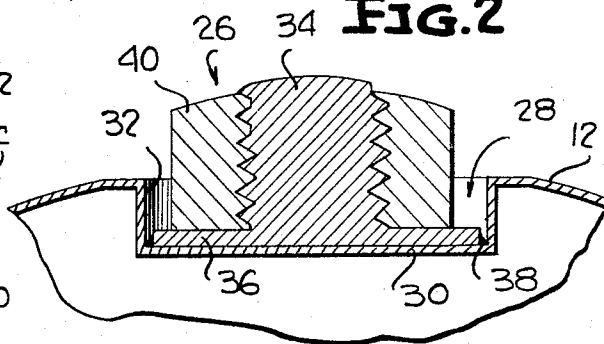


FIG.3

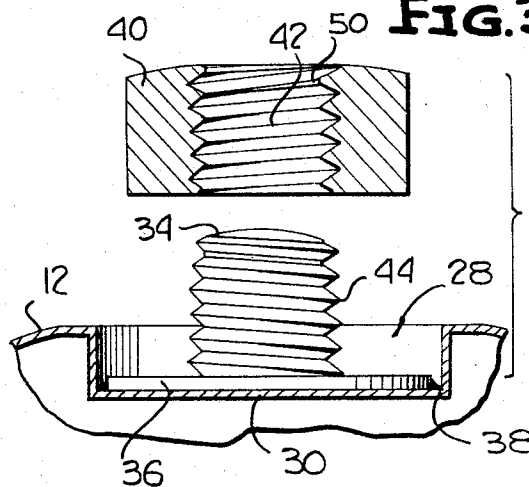


FIG.4

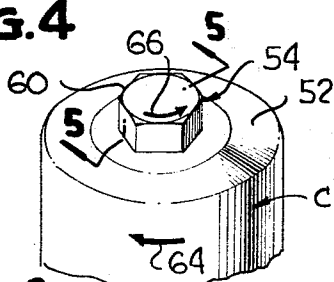


FIG. 5

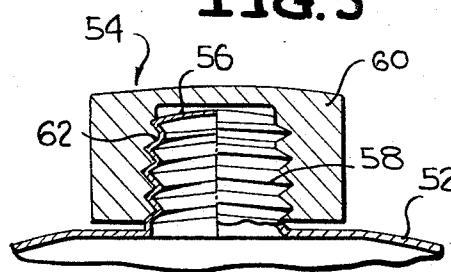


FIG.6

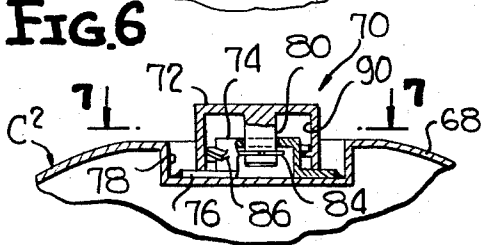
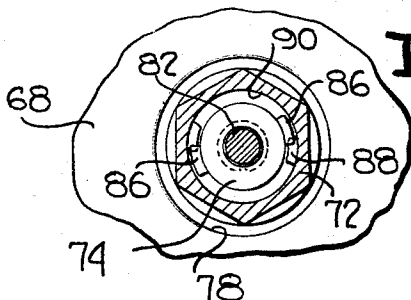


FIG. 7



INVENTOR
PAUL L. FRANCOIS

BY *Shemaker and Mattare*
ATTORNEYS

1

3,279,609

SCREW ON TYPE FILTER

Paul L. Francois, Gastonia, N.C., assignor to Wix Corporation, Gastonia, N.C., a corporation of North Carolina

Filed Mar. 3, 1964, Ser. No. 349,015
13 Claims. (Cl. 210-232)

This invention relates generally to the class of filters, such as filters used upon engines for filtering oil and more particularly filters for use upon motor vehicle engines.

The invention of the present application is particularly directed to motor vehicle oil filters of the screw-on throw away type wherein the filter unit housing or shell carries means at one end for threadably attaching it to a mounting forming a part of or carried by the motor vehicle engine.

Motor vehicle oil filters of the screw-on throw away type conventionally have one end of the filter unit shell or housing closed by a plate carrying or formed at its center with an internally threaded sleeve or a nut for threaded connection with a mounting stud carried by the engine body or an element connected to the engine body. Filtered oil passes from the filter shell through such stud into the engine.

The closure plate forming a part of the shell or housing also has oil inlet ports or apertures therethrough and means is provided whereby, when the shell is threadably coupled with the mounting stud, an oil seal is formed or established between the closure plate and a surface of the engine around and outwardly of the oil inlet ports.

The filter structure is threaded onto its mounting or supporting stud by hand and it can be turned by hand sufficiently tight to establish the desired fluid tight seal between the end closure plate and the adjacent or opposing surface of the engine or a body carried by the engine. However, after the filter has been in use for a relatively long time the threaded connection between the closure plate of the filter and the stud upon which the filter is mounted, becomes extremely tight and considerable difficulty is experienced in unthreading or unscrewing the filter from its mounting, for replacement.

In the light of the foregoing, it is a particular object of the present invention to provide a housing or shell structure for a screw-on throw away type filter, with means whereby a wrench or other suitable tool may be applied to the housing to facilitate unscrewing the filter from its mounting.

It is a further object of the present invention to provide a structure with means for applying to the shell a tool by which the unscrewing of the shell can be effected, wherein such means is so formed, designed or constructed as to frustrate any attempt by a person threading the filter onto its mounting, to use a wrench or other tool in connection with such operation.

It is, accordingly, a further object to provide a filter structure housing having means associated therewith whereby removal of the filter from its mounting can be easily effected in the event that the mounting connection has tightened to such an extent that it cannot be removed by hand, while preventing the use of any gripping means other than the hand for threading the filter onto its mounting whereby damaging of the shell or the seal between the end closure of the shell and the adjacent surface of the engine or other part, could occur.

The invention in its broadest aspect consists in mounting upon the outer or head end of filter can or housing, a body of suitable form to be grasped by a wrench, pliers or other implement and in forming the mounting or coupling between such body and the wall of the can, with a coupling which permits a degree of rotation of the body. This coupling is such that upon rotation of the body in

2

one direction it will be shifted or fed axially to a position where it will become fixed and the rotary motion thereof will then be transmitted to the can in a direction to unscrew the filter from its mounting.

Such coupling between the body and the can is, however, of a character which upon reverse rotation of the body, the body will either merely rotate freely with respect to the can or will become completely detached from the can and therefore, since such reverse rotation of the body would be in a direction which the can would be turned for screwing it into position, a wrench or other tool could not be used to tighten the filter on its mounting.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawing forming a part of the specification, it being understood, however, that the invention is not limited to a strict conformity with a showing of the drawings but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as defined by the appended claims.

In the drawings:

FIGURE 1 is a view in perspective of a conventional, more or less diagrammatically illustrated, can or housing of a screw-on throw away type oil filter having associated therewith one embodiment of the present invention, a portion of the can being broken away and the can being shown in separated relationship with a mounting stud.

FIGURE 2 is a sectional view taken substantially in the plane of section line 2-2, the view being on an enlarged scale.

FIGURE 3 is a view corresponding to FIGURE 2 but showing the can attached threaded stud in elevation and the nut removed therefrom and in section.

FIGURE 4 is a perspective view of the outer end of a can, corresponding to that shown in FIGURE 1 but illustrating another embodiment of the invention.

FIGURE 5 is a sectional view taken substantially on line 5-5 of FIGURE 4 and illustrating the nut supporting stud formed as an integral part of the can wall.

FIGURE 6 is a sectional view of the outer end of the can or housing taken in approximately the same plane as indicated for the sections 2-2 and 5-5 and illustrating a third embodiment of the invention wherein overlapping flanges carried by the rotary body or nut and the stud function similarly to screw threads.

FIGURE 7 is a sectional view taken substantially on the line 7-7 of FIGURE 6.

Referring now more particularly to the drawings and directing attention first to FIGURES 1 to 3 inclusive, the reference character C generally designates the filter element encasing can or housing of a filter structure of the screw-on throw away type.

The can side wall is designated 10 and this merges at one end into the end wall 12 or outer end wall as distinguished from the opposite or mounting end wall.

The said opposite or mounting end wall of filters of the type under consideration, conventionally embodies a wall plate or closure 14 which is joined in a suitable manner as indicated at 16, to the end of the wall 10.

A portion of the wall 10 is broken away to facilitate the illustration and description of the mounting end wall or closure 14 as having at the center thereof the construction which facilitates attaching the filter to a mounting stud forming a part of or carried by an element of the engine in association with which the filter is used. Such construction is here shown as consisting of an inwardly extending internally threaded sleeve or mounting nut 18, the threads of which are designated 20.

The wall or closure plate 14 is also illustrated as having a series of apertures 22 therein. These apertures are disposed around the sleeve or mounting nut 18 and provide

3

means for the inflow of oil which is to be filtered while the sleeve or mounting nut permits the outflow of filtered oil into and through a threaded supporting stud such as that illustrated below the plate 14 and generally designated 24. This mounting stud would be a part of or carried by the engine in association with which the filter is used.

In accordance with the invention, the outer end wall 12 of the can carries a threaded stud and nut unit which is generally designated 26.

The unit 26 may be mounted directly upon the domed surface of the wall 12 but it is preferably set down part way into a well 28 which is formed by an impressed portion of the wall 12 so as to have a bottom 30 and low wall 32.

The stud of the unit 26 is designated 34 and while this may be positioned to rest directly upon the bottom 30 of the well, it is preferably formed integrally with the base plate 36 which rests upon the bottom of the well and the periphery of the plate is welded to the bottom of the well as indicated at 38.

The nut portion of the unit 26 is designated 40 and, as shown, this has threads 42 designed to engage the threads 44 of the stud.

The threads 42 and 44 of the stud and nut are here illustrated as left hand threads while the threads 20 of the sleeve or mounting nut 18 are right hand threads. Accordingly, in mounting the filter the can would be rotated in the direction indicated by the arrow 46 thereon and if a tool should be applied to the nut 40 with the idea that by its use the filter could more tightly be applied, it would be seen that since the hand of the threads for the unit 26 is opposite to that of the threads 20, the nut would unthread itself or come off of the stud and thus a tool could not be used to tighten the filter on the stud 24.

In order to make effective use of the unit 26 in the event that the filter structure becomes so tight upon the mounting stud 24 that it cannot be unscrewed by hand, a wrench or other tool applied to the nut 40 to turn the nut counterclockwise or in the direction of the arrow 48 thereon, would cause the nut 40 to be fed down towards the plate 36 to a tight or fixed position whereupon the torque would then be transmitted to the can so that the filter would be reversely turned and unthreaded from the mounting stud 24.

Obviously, if the threads 20 of the mounting sleeve 18 are right hand threads then the threads of the nut and stud unit 26 would be opposite or left hand threads.

In order to avoid accidental escape of the nut 40 from the stud 34 in the handling of the filter suitable means may be provided for locking the nut on the stud as, for example, the threads may be distorted in a suitable manner to accomplish this. For example, in threading the nut a tap may be employed which is provided on its entering end with a thread of slightly different pitch less in depth than the other threads throughout its length and of a shape to properly form the expanding or distorting thread 50. Such a tap is passed through the nut and stopped as it reaches the outer end of the nut, thereby cutting standard threads in the nut except at the extreme outer edge thereof. Nut locking means of this character is illustrated in the Patent 1,447,056. However, any other suitable means may be employed for preventing accidental escape of the nut from the stud and while such a means is desirable, it is to be understood, nevertheless, that the lack of such means would have no effect upon the operativeness of the invention.

In FIGURES 4 and 5 an embodiment of the invention is illustrated wherein the stud of the stud and nut unit is pressed, molded or otherwise formed from the metal of the can wall. In this second embodiment the can is generally designated C' and the outer end portion only is illustrated in FIGURE 4. The outer end or domed end wall of this embodiment is designated 52.

4

The stud and nut unit of the second embodiment is generally designated 54. As shown in the enlarged sectional view forming FIGURE 5, the stud of this unit, designated 56, forms an integral extension axially outwardly of the wall 52 and is pressed or otherwise worked to provide it with the screw threads 58. These threads, like the threads 54, are shown as being left hand threads.

The nut of the unit 54 is designated 60 and this is provided with threads 62.

As in the first described embodiment, the threads 58 and 62 will be of opposite hand to the threads at the lower end of the filter structure, not shown in FIGURE 4, but in FIGURE 4 the arrows 64 and 66 upon the can wall and the nut 60, respectively, designate the direction for turning the can to thread it into working or mounted position and the direction to turn the nut 60 to have it locked down so as to facilitate the unscrewing of the can from its mounting.

FIGURES 6 and 7 illustrate another form of nut and stud unit.

In this illustration of the other or third embodiment of the invention of the can body is generally designated C'' and the outer end wall or head wall is designated 68.

In this third embodiment the nut and stud unit upon the outer end wall of the can is generally designated 70. The nut of this unit is designated 72 while the stud is designated 74 and is shown as being formed with or mounted upon the plate 76 which is welded in position within the well 78 similarly to the structure illustrated in FIGURES 1 to 3.

As shown, the stud 74 is hollow, being open at the bottom end and having an opening 80 through the top thereof and the nut 72 is also hollow, having the open bottom end to receive the stud 74.

A finger 82 is carried within the nut and depends from the top thereof as shown and extends through the opening 80 in the stud. The end of the finger 82, within the hollow stud, has secured thereto the snap ring 84 which prevents the escape of the nut from the stud as will be readily apparent, while at the same time permitting the nut to be turned or rotated with respect to the stud.

The exterior surface of the stud 74, which is circular as shown in FIGURE 7, carries at least two short spirally directed fins 86 which are positioned or set to function as right hand threads.

Cooperating with the fins 86 are similar fins 88 carried on the inner side of the hollow nut 72 and also spirally directed around the inner side of the curved wall surface 90 of the hollow nut. These fins 88 are so disposed that upon rotating the nut clockwise or as for a left hand thread they will ride over the fins 86 of the stud so that the nut will turn freely and cannot be locked to the stud whereas upon reverse rotation of the nut the fins 88 of the nut will ride against the undersides of the fins 86 and will fix or lock the nut down against rotation before they can pass between the fins 86 and plate 76 lying therebeneath. Thus, it will be seen that the functioning of the fins 86 and 88 is the same as the screw threads hereinbefore described in connection with the nut and stud units 26 and 54.

From the foregoing it will be readily seen that there is provided by the present invention a novel protective means associated with the can housing for the filter element of a filter structure, whereby the damaging of the filter structure and particularly the seal between the end closure plate and an adjacent part of the engine on which the filter is mounted, will be avoided in the event that the person applying the filter to its mounting stud endeavors to use a tool or wrench. Removal of the filter, however, if it should become stuck or too tight to be removed by hand, can be readily accomplished by the use of a wrench or like implement applied to the nut at the outer end of the can since the nut can only turn a short distance before it becomes locked against further movement, whereupon

the unscrewing of the can by the use of the wrench is readily accomplished.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, since the scope of the invention is defined by the appended claims rather than by the description preceding them, and all changes that fall within the metes and bounds of the claims or that form their functional as well as conjointly cooperative equivalents, are therefore intended to be embraced by those claims.

What is claimed is:

1. A screw-on throw away filter cartridge encasing shell having a body wall joined at one end to an outer end wall and having a mounting end wall at its other end provided with fluid inlet and outlet means, screw thread means carried by the mounting end wall for securing the shell with an encased filter cartridge in operative position, a stud on and extending axially of said outer end wall, a nut, means coupling the nut with said stud so that rotation of the nut in one direction thereon feeds the nut to a locked non-rotatable position, and said screw thread means being of a hand opposite to said one direction of rotation of said nut.

2. A filter cartridge encasing shell for a screw-on throw away type filter structure, said shell having a body wall joined at one end to an outer end wall and having a mounting end wall at its other end provided with fluid inlet and outlet means, a tubular threaded mounting nut carried by said mounting wall and providing the said fluid inlet means, a threaded stud on and extending axially of said outer end wall, a nut threaded on said stud, and the threads of said stud and the nut thereon being of opposite hand to the threads of said mounting nut.

3. A filter cartridge encasing shell for a screw-on throw away type filter, said shell having a body wall, an outer end wall and an opposite end mounting wall, said mounting wall having fluid inlet means and having a fluid outlet means of tubular internally threaded form, means forming a stud on and extending axially outwardly from the center of said outer end wall, a nut on said stud, means coupling said nut with said stud, so that rotation of the nut in one direction relative to the stud will effect movement of the nut toward the adjacent end wall to a secured position, and said threaded tubular means having the threads thereof of a hand opposite to the said one direction of rotation of said nut.

4. The invention as defined by claim 3, wherein the said means coupling the nut with the stud is a screw thread means.

5. The invention as defined by claim 3, wherein said stud is recessed into the said outer end wall.

6. The invention as defined by claim 3, wherein said stud is carried on a base plate and said base plate is secured to the said outer end wall.

7. The invention as defined by claim 3, wherein said outer end wall is formed with an outwardly opening well

and said stud is carried by a base plate supported on and fixed to the bottom of said well.

8. The invention as defined by claim 3, wherein said stud consists of an integral extension of the material of said outer end wall and the said means coupling said nut with the stud consists of a screw threaded formation of the said material of the stud and screw threads in the nut.

9. The invention as defined by claim 3, with means for preventing accidental separation of the nut from the stud by reverse rotation of the nut.

10. The invention as defined by claim 3, wherein the said means coupling the nut with the stud is a screw thread means and said screw thread means is formed to prevent accidental unscrewing of the nut from the stud.

11. A filter cartridge encasing shell for a screw-on throw away type filter, said shell having a body wall, an outer end wall, and an opposite end mounting wall, said mounting wall having fluid inlet means and having a fluid outlet means of tubular internally threaded form, means forming a stud on and extending axially outwardly from the center of said outer end wall, a nut on said stud, inter-engaging helix-like means carried by said stud and nut so that rotation of the nut in one direction will feed the nut toward the said end wall to a secured position and reverse rotation of the nut will move the nut away from the wall to release the nut from said secured position, and the said inter-engaging helix-like means and the threads of said internally threaded tubular means being of opposite hand so that the said inter-engaging helix-like means between the nut and the stud will be disengaged one from the other upon a predetermined extent of reverse rotation of the nut.

12. The invention as defined by claim 11, wherein said nut is hollow and has an open end directed toward the adjacent outer end wall of the shell and has a circular inner wall, the stud extending into the hollow nut and having a circular outer side wall, and said inter-engaging helix-like means comprises short spirally extending fins on the circular outer side wall of the stud and corresponding short spirally extending fins on the circular inner side wall of the nut, the fins carried by the nut being positioned to ride onto the fins of the stud upon rotation of the nut in said one direction.

13. The invention as defined by claim 12 wherein there is a swivel coupling between the nut and stud for limiting the axial movement of the nut away from the outer end wall of the shell when the fins are disengaged one from the other.

References Cited by the Examiner

UNITED STATES PATENTS

3,193,101	7/1965	Humbert	210—130
3,224,585	12/1965	Scavuzzo et al.	210—232

REUBEN FRIEDMAN, *Primary Examiner*.

C. M. DITLOW, *Assistant Examiner*.