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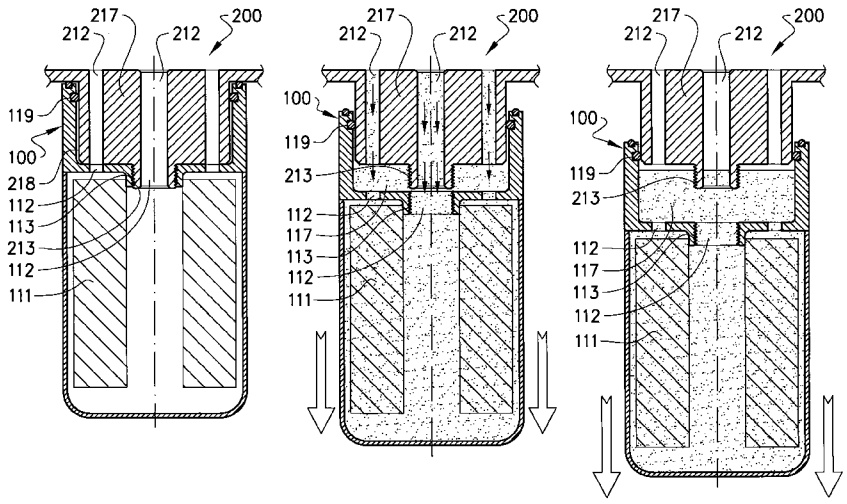



FIG. 4a FIG. 4b FIG. 4c

(57) Abstract: The present disclosure relates to a filter assembly (100) for a liquid system having a filter mount (200) to which said filter assembly (100) is mountable, the filter assembly extends along a longitudinal axis (L) from a distal end (102), to be arranged distally of said filter mount (200), to a proximal end (116), to be arranged proximally to said filter mount (200); and comprises a mount fixation arrangement (113) adapted to provide fixation between said filter assembly (100) and said filter mount (200). The filter assembly (100) comprises an inner wall (115), delimiting a filter mount accommodating space (117), which is open to the proximal end (116) and configured to receive liquid during removal of said filter assembly (100) from said filter mount (200).

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# FILTER ASSEMBLY, FILTER MOUNT AND FILTER ARRANGEMENT

The present disclosure relates to a filter assembly for a liquid system having a filter mount to which said filter assembly is mountable. The filter assembly comprises a filter element, and a mount fixation arrangement is adapted to provide fixation between said filter element and said filter mount. The present disclosure also relates to a filter mount and to a filter arrangement.

## BACKGROUND

Filter arrangements for removing impurities from liquids, such as oil, are commonly used in vehicles, e.g. in hydraulic systems, engine lubrication systems, and fuel systems. The filter arrangements are then arranged in liquid connection to the relevant system, such that liquid may enter the filter arrangement, wherein particles or other impurities may be removed, and the cleaned liquid may then exit the filter arrangement and return to the relevant system.

Filter arrangements may generally comprise a filter mount, connected to or a part of the relevant system, and a filter assembly comprising a filter element, which is removably connected to the filter mount. Accordingly, once its service life is up, a filter assembly may be removed from the filter mount, and replaced by a new filter assembly.

During service of a vehicle, for example during a service of an engine, changing liquid and liquid filters is therefore a common workshop procedure.

In many filter arrangements, the filter assembly is vertically arranged and mounted to the filter mount, meaning that removal of a filter assembly from the corresponding filter mount involves movement of the filter assembly vertically downwards from the filter mount.

When the filter assembly is to be replaced, the filter arrangement may be completely filled with liquid, and, moreover, liquid may be present in the filter mount and in the liquid system. When the filter assembly is removed from the filter mount, there is a risk that the liquid contained in the filter mount and in the liquid system pours downwards via the filter assembly connection, resulting in liquid spill over workshop workers and/or the surrounding environment such as an engine compartment. Moreover, there is also a risk for liquid spill occurring when the removed liquid filter assembly, being filled with used

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liquid, is to be handled. Liquid spill is naturally a nuisance to the workers, and increases the service time since additional time is necessary for cleaning up. Hence, there is a need for a filter arrangement which diminishes the risk for liquid spill during replacement of a filter assembly.

The service time for performing a change of liquid filters should preferably be minimised in order to save work and costs. To this end, there is a need for a filter arrangement which is designed such that the replacement of a liquid filter assembly may be made quickly and securely.

An incorrectly mounted liquid filter assembly may result in insufficient sealing between the filter assembly and the filter mount. This in turn may cause liquid to leak during use of the system comprising the liquid filter arrangement. Leaks may or example occur as fine high pressure liquid mist becoming sprayed out in the system, or in the form of a high velocity liquid jet. Such leaks may in turn cause different problems. Accordingly, there is a need to provide a filter arrangement which enables secure attachment between a filter assembly and a filter mount.

## SUMMARY OF THE INVENTION

One object of the invention is to provide a filter assembly, which creates conditions for an efficient filter exchange, and more particularly a reduced spillage of liquid during filter exchange, and provides for an operationally secure connection.

The above-mentioned object is met by a filter assembly for a liquid system having a filter mount to which said filter assembly is mountable, the filter assembly extending along a longitudinal axis (L) from a distal end, to be arranged distally of said filter mount, to a proximal end, to be arranged proximally to said filter mount; the filter assembly comprising a mount fixation arrangement adapted to provide fixation between the filter element and the filter mount and an inner wall, delimiting a filter mount accommodating space, which is open to the proximal end and configured to receive liquid during removal of said filter assembly from the filter mount.

The provision of the filter mount accommodating space hence provides a volume, which, when the filter assembly is removed from the filter mount, and the filter mount removed

from the filter mount accommodating space, is rendered available for residual liquid from the filter mount.

The filter assembly is generally adapted for vertical arrangement, i.e. with the proximal end in a vertically upward direction, and the distal end in a vertically downward direction. Hence, liquid from the filter mount may pour into the filter mount accommodating space by action of gravity. Accordingly, the risk for liquid spill during dismounting of the filter assembly from the mount may be diminished. Also, the volume of the filter mount accommodating space may contribute to lesser risk of liquid spill when handling the removed filter assembly.

Advantageously, the filter mount accommodating space is configured to allow mounting and removal of said filter assembly to a filter mount portion of said filter mount by movement of said filter assembly in relation to said filter mount between a distal position, wherein said filter mount portion is partially received by said open proximal end of said filter assembly , and a proximal position, wherein said filter mount portion is fully received in said filter mount accommodating space .

Advantageously, said inner wall of said filter assembly comprises either a circumferential sealing member or a circumferential sealing member reception area , for forming a circumferential sealing arrangement with a corresponding circumferential sealing member reception area or circumferential sealing member of said filter mount portion .

Accordingly, circumferential sealing between the inner wall of the filter mount accommodating space and the outer wall of the filter mount portion may be achieved during removal of the filter assembly from the filter mount.

Advantageously, said sealing member or sealing member reception area is configured to provide a liquid tight seal between said inner wall and said filter mount portion during removal of the filter assembly, resulting in an under pressure urging any residual liquid present in said liquid system towards said filter mount accommodating space during removal of said filter assembly from said filter mount .

Accordingly, the under pressure created in the filter mount accommodating space when the filter assembly is removed from the filter mount will suck residual liquid present in the

filter mount to the filter mount accommodating space, where the liquid may be received as described in the above.

Said mount fixation arrangement may be arranged inside said filter mount accommodating space and at an axial distance from the open proximal end .

Advantageously, said mount fixation arrangement may be arranged concentrically around a centre axis of the filter assembly.

Accordingly, a convenient fixation which may be adapted to present liquid systems may be provided.

Advantageously, the filter assembly may comprise a filter element and liquid communication means adapted to provide liquid communication between the filter element and the filter mount.

Advantageously, the mount fixation arrangement comprises a tubular member forming the liquid communication means between the filter mount accommodating space and the filter element.

Accordingly, the tubular member may serve both as a mount fixation arrangement and as liquid communication means. To perform the mount fixation, the tubular member may be provided with axial fixation means, such as inner or outer threads.

Advantageously, the inner wall may comprise a first portion extending in an axial direction of the filter assembly.

Advantageously, the sealing member or sealing member reception area is provided in the first inner wall portion facing radially inwards.

Advantageously, the filter mount accommodating space extends between said open proximal end and a distal bottom end, the distal bottom end preferably forming a bottom wall extending transversely to a longitudinal axis L along the filter assembly.

Advantageously, the tubular member extends through the distal bottom end, preferably though said bottom wall.

The mount fixation arrangement may comprise fixation means for fixation of said filter assembly to said filter mount, said fixation means extending along an axial fixation length (FL) parallel to said longitudinal axis (L).

The fixation length is the length along the longitudinal axis along which the filter assembly is moved distally in relation to the filter mount for removal thereof, and during which the fixation arrangement provides some axial fixation. In other words, once the filter assembly has been moved a distance equal to the fixation length from a fixed position, the fixation means is no longer active to axially retain the filter assembly to the filter mount. For example, if the fixation means is a threading, the fixation length will generally correspond to the axial length of the threading. Once the filter assembly is moved a distance distally from a fixed position at the filter mount corresponding to the fixation length, the filter assembly will be completely unscrewed from the fixation to the filter mount.

The circumferential sealing member or the circumferential sealing member reception area of said inner wall of said filter assembly may be arranged to, during relative movement of the filter assembly in relation to the filter mount, provide circumferential sealing along an axial sealing length (SL).

The sealing length is the length along the longitudinal axis, during which the sealing arrangement provided by the circumferential sealing member or – reception area and the corresponding reception area or circumferential sealing member, is active to provide a liquid tight seal between the filter mount and the filter assembly, during removal of the filter assembly from the filter mount. As explained in the above, the circumferential sealing is to provide an underpressure in the filter mount accommodating space during removal of the filter assembly from the filter mount. To this end, the circumferential sealing should be maintained during at least a portion of the axial movement of the filter assembly necessary for the removal of the filter assembly from the filter mount.

Advantageously, the sealing length (SL) is equal to or greater than said axial fixation length (FL). When the sealing length is equal to the axial fixation length, circumferential sealing between the filter assembly and the filter mount is ensured during the entire

unlocking of the fixation means. Even more preferred, the sealing length may be greater than the axial fixation length. In this case, the sucking effect resulting from the underpressure created in the filter mount accommodating space during removal of the filter assembly from the filter mount may be prolonged by the circumferential sealing being enabled during axial movement of the filter assembly past the release of the fixation arrangement.

In accordance with embodiments, the inner wall of the filter assembly may comprise the circumferential sealing member. Such embodiments may be advantageous in that the circumferential sealing member will be provided as a portion of the filter assembly, and hence the sealing member will be replaced each time the filter assembly is replaced. Accordingly, it may be ensured that the sealing member is always in a good condition, diminishing the risk for damage of wear of the sealing member.

The filter mount accommodating space may extend between said open proximal end and a distal bottom end, and wherein said circumferential sealing member is circumferentially arranged along said inner wall between said open end and said distal bottom end, preferably adjacent said open end. Preferably, said circumferential sealing member is positioned in the close vicinity of the open end.

The inner wall may form a proximal edge facing towards said proximal direction, and said sealing member may be arranged on said proximal edge.

In this case, the sealing member may accomplish not only circumferential sealing, but also sealing in an axial direction between said proximal edge and a distal end surface of the filter mount.

Where the circumferential sealing member is arranged in said filter assembly, said sealing length may be defined by said distance from said circumferential sealing member to said bottom end.

The sealing member may be any sealing member being suitable for the intended purpose. For example, the sealing member may be an O-ring.

In accordance with embodiments, the inner wall of the filter assembly may comprise the circumferential sealing member reception area. In such embodiments, the sealing member will instead be provided by the filter mount. This might be advantageous in situations where it is not necessary to replace the sealing member with a new sealing member, each time the filter assembly is replaced.

The inner wall may extend in parallel to said longitudinal axis for forming said circumferential sealing member reception area.

Advantageously, the circumferential sealing member reception area is arranged to allow translational axial movement between said filter mount accommodating space and said filter mount portion.

Since axial retention necessary for securing the filter assembly to the filter portion is provided by the fixation means, the circumferential sealing arrangement need not provide any such retention. Indeed, it may be preferred that the circumferential sealing arrangement does not provide axial retention. In particular for cases where the sealing length is greater than the fixation length, it is desired that the additional distance provided by the filter mount accommodating space does not result in unnecessary prolonged times needed for removing the filter assembly from the filter mount. Accordingly, the circumferential sealing arrangement may advantageously enable axial translation movement of the filter assembly in relation to the filter mount.

To this end, the inner wall may advantageously be free from axial retention means.

The sealing length (SL) may be defined by said axial extension of said circumferential sealing member reception area.

Advantageously, the filter mount accommodating space may extend between said open end and a bottom end, and said circumferential sealing member reception area extends between said open end and said bottom end.

Advantageously, the sealing arrangement may be arranged to provide constant sealing contact with said outer wall of said filter mount portion during said removal of the filter assembly. With constant sealing contact is meant that the circumferential sealing provides

the same sealing function all the way along the movement of the filter assembly distally from the filter mount, along the sealing length. In other words, the sealing arrangement provides a constant sealing contact during the motion of the filter assembly along the sealing length.

Such a constant sealing contact may be achieved e.g. by a sealing member in the form of an O-ring moving along a sealing member reception area in the form of a cylindrical wall. The constant sealing contact will in this case be achieved by a surface of the O-ring being in constant contact with the cylindrical wall.

The filter assembly may comprise a secondary axial sealing member. Said secondary axial sealing member may be provided to form an axial seal between the filter assembly and the filter mount. An axial seal will generally perform liquid tight sealing between the filter assembly and the filter mount only when the parts are in a fixed use position.

The volume defined by the filter mount accommodating space may be selected so as to correspond to an expected amount of residual liquid present in the filter mount when the filter assembly is to be replaced. As such, the volume may vary depending on the liquid system, the vehicle, service ranges etc.

However, for some applications, the filter mount accommodating space may define a volume of at least 50 cm3, preferably at least 100 cm3, most preferred at least 200 cm3.

In a second aspect of the invention, there is provided a filter mount for a liquid system for mounting a filter assembly in liquid connection with said liquid system,
said filter mount extending along a longitudinal axis (L) from a proximal end, to be arranged to said liquid system; to a distal end, from which said filter assembly is to be attached, the filter mount comprising a filter fixation arrangement adapted to provide fixation between said filter assembly and said filter mount, and an outer wall, delimiting a filter mount portion, extending towards a distal end and configured to be received in a filter mount accommodating portion configured to receive liquid from the filter mount during removal of the filter assembly from the filter mount.

It is to be understood, that the features described in connection with the second aspect of the invention are generally filter mount counterparts to the features described in the above

in relation to the first aspect of the invention. Accordingly, the description of advantages and other explications made in the above regarding the features of the first aspect of the invention may be similarly applied to the second aspect of the invention.

The filter mount portion may be configured to allow mounting and removal of said filter assembly by movement of said filter assembly in relation to said filter mount between a distal position, wherein said filter mount portion is partially received by said open proximal end of said filter assembly, and a proximal position, wherein said filter mount portion is fully received in said filter mount accommodating space.

The outer wall of said filter mount may comprise either a circumferential sealing member or a circumferential sealing member reception area, for forming a circumferential sealing arrangement with a corresponding circumferential sealing member reception area or circumferential sealing member of said filter mount accommodating space.

The sealing member or sealing member reception area may be configured to provide a liquid tight seal between said inner wall and said filter mount accommodating space during said removal of the filter assembly, resulting in an under pressure urging any residual liquid present in said liquid system towards said filter mount accommodating space during removal of said filter assembly from said filter mount.

The filter fixation arrangement may extend proximally into said filter mount portion from the distal bottom end.

The filter fixation arrangement may be arranged concentrically around a centre axis of the filter mount.

The filter mount may comprise liquid communication means adapted to provide liquid communication between said filter assembly and said filter mount.

The filter fixation arrangement may comprise a through bore forming said liquid communication means between said filter mount portion and said filter assembly.

The outer wall may comprise a first portion extending in an axial direction of the filter mount.

The sealing member or sealing member reception area may be provided in the first portion of the outer wall facing radially outwards.

The filter mount portion may extend between a proximal end and the distal bottom end, the distal bottom preferably forming an outer bottom wall extending transversely to a longitudinal axis L along the filter mount.

The through bore may extend through the distal bottom end, preferably though said outer bottom wall.

The mount fixation arrangement may comprise fixation means for fixation of said filter assembly to said filter mount, said fixation means may extend along an axial fixation length (FL) parallel to said longitudinal axis (L). The circumferential sealing member or the circumferential sealing member reception area of said outer wall of said filter mount may be arranged to, during relative movement of the filter assembly in relation to the filter mount, provide circumferential sealing along an axial sealing length (SL), wherein said sealing length (SL) is equal to or greater than said axial fixation length (FL).

The outer wall may comprise said circumferential sealing member.

The filter mount portion may extend between said proximal end and a distal bottom end , and the circumferential sealing member may be circumferentially arranged along said outer wall, preferably adjacent said distal bottom end.

The outer wall may form a distal edge facing towards said distal direction, and said sealing member may be arranged on said distal edge.

The sealing length may be defined by said distance from said circumferential sealing member to said proximal end.

The sealing member may be an O-ring.

The outer wall may comprise said circumferential sealing member reception area.

The outer wall may extend in parallel to said longitudinal axis for forming said circumferential sealing member reception area.

The circumferential sealing member reception area may be arranged to allow translational axial movement between said filter mount accommodating space and said filter mount portion.

The outer wall may be free from axial retention means.

The sealing length (SL) may be defined by said axial extension of said circumferential sealing member reception area.

The filter mount portion may extend between said proximal end and said bottom distal end, and said circumferential sealing member reception area extends between proximal end and said bottom distal end.

The sealing arrangement may be arranged to provide constant sealing contact with said inner wall of said filter mount accommodating space during said removal of the filter assembly.

The fixation arrangement may comprise fixation means, preferably a threading.

The filter mount may comprise a secondary axial sealing member.

The filter mount portion may define a volume of at least 50 cm3, preferably at least 100 cm3, most preferred at least 200 cm3.

In a third aspect of the invention, there is provided a filter arrangement for a liquid system, said filter arrangement comprising a filter mount for connection to said liquid system, and a filter assembly, releasably connectable to said filter mount and comprising a filter element, said filter assembly extending along a longitudinal axis (L) from a distal end, to be arranged distally of said filter mount, to a proximal end, to be arranged proximally to said filter mount; the filter arrangement comprising
fixation means adapted to provide fixation between said filter assembly and said filter mount.

The filter assembly comprises an inner wall, delimiting a filter mount accommodating space, which is open to the proximal end;
said filter mount comprising an outer wall, delimiting a filter mount portion, said filter mount accommodating space and said filter mount portion being configured such that, when the filter assembly is fixed to the filter mount the filter mount accommodating space receives said filter mount portion, and, during removal of said filter assembly from the filter mount, the filter mount accommodating space receives liquid from the filter mount.

It is to be understood, that the features described in connection with the third aspect of the invention are generally filter arrangement counterparts to the features described in the above in relation to the first aspect of the invention. Accordingly, the description of advantages and other explications made in the above regarding the features of the first aspect of the invention may be similarly applied to the third aspect of the invention.

The filter mount accommodating space may be configured to allow mounting and removal of said filter assembly to said filter mount portion of said filter mount by movement of said filter assembly in relation to said filter mount between a distal position, wherein said filter mount portion is partially received by said open proximal end of said filter assembly, and a proximal position, wherein said filter mount portion is fully received in said filter mount accommodating space.

The filter arrangement may further comprise a circumferential sealing arrangement, providing a liquid tight seal between said filter mount accommodating space and said filter mount portion during removal of said filter assembly from the filter mount, resulting in liquid present in said liquid system being urged towards said filter mount accommodating space.

The sealing arrangement may provide constant sealing contact during removal of the filter assembly from the filter mount.

The filter arrangement may comprise a circumferential sealing member and a corresponding circumferential sealing member reception area, for forming said circumferential sealing arrangement between said filter mount accommodating space and said filter mount portion.

The fixation arrangement may comprise fixation means for axial fixation of said filter assembly to said filter mount, said fixation means extending along an axial fixation length (FL) parallel to said longitudinal axis (L); and said circumferential sealing arrangement being arranged to provide circumferential sealing along an axial sealing length (SL), wherein said sealing length (SL) is equal to or greater than said axial fixation length (FL).

The filter arrangement may comprise liquid communication means adapted to provide liquid communication between said filter element and said filter mount.

In particular, the filter assembly may be a filter assembly in accordance with the first aspect of the invention.

The filter mount may be a filter mount in accordance with the second aspect of the invention. Else, the filter mount may be a filter mount adapted to form an arrangement in accordance with the third aspect of the invention in combination with a filter assembly in accordance with the second aspect of the invention.

The present invention will now be further described using exemplary embodiments as depicted in the enclosed drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates generally an engine with replaceable liquid filter assemblies;
Fig. 2 illustrates generally the removal of a liquid filter assembly in accordance with an embodiment from the engine of Fig. 1;
Figs 3a to 3c illustrate an embodiment of a filter arrangement comprising a filter assembly and a filter mount;
Figs 4a to 4c illustrate the removal of a filter assembly from a filter mount, in accordance with the embodiment of Figs 3a to 3c;
Figs 5a and 5b illustrate another embodiment of a filter arrangement comprising a filter assembly and a filter mount;
Figs 6a to 6c illustrate another embodiment of a filter arrangement comprising a filter assembly and a filter mount;
Figs 7a to 7b illustrate another embodiment of a filter arrangement comprising a filter assembly and a filter mount; and

Figs. 8a to 8b illustrate another embodiment of a filter arrangement comprising a filter assembly and a filter mount.

Like reference numbers denote like feature in all of the figures. For clarity and/or for efficiency, all reference numbers are not repeated on all drawings.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Fig. 1 illustrates an engine 1 comprising a filter section 2 comprising a number of removable filter assemblies. In the illustrated embodiment, the engine is a truck engine, and the filter assemblies are oil filter assemblies connected to an oil circulation system.

However, the disclosure is not limited to such use. Instead, it may be understood that the features and advantages presented herein are applicable also to other types of liquid filter assemblies, for other types of liquids and in other applications.

Fig. 2 illustrates how a filter assembly 100 is removed from a filter mount 200 by axial movement in a longitudinal direction distally from the filter mount 200. More specifically, the filter assembly 100 is rotated around its centre axis for unscrewing the filter assembly from the filter mount 200. The filter assembly 100 comprises a housing 110, which contains a filter element 111 (not shown in Fig. 1).

Fig. 3a illustrates the filter assembly 100 according to an embodiment of the invention, Fig. 3b illustrates a corresponding embodiment of the filter mount 200, and Fig. 3c illustrates a corresponding embodiment of a filter arrangement 300 comprising the filter assembly 100 and the filter mount 200 of the previous figures.

Fig. 3a illustrates the filter assembly 100 being mountable to the filter mount 200 of Fig. 3b.

The filter assembly 100 extends along a longitudinal axis L from a distal end 102, to be arranged distally of said filter mount 200, to a proximal end 103, to be arranged proximally to said filter mount 200. For accomplishing the desired filtering of liquid, the filter assembly 100 comprises a filter element 111.

The filter assembly 100 comprises liquid communication means 112 adapted to provide liquid communication between said filter 111 and said filter mount 200.

Moreover, the filter assembly 100 comprises a mount fixation arrangement 113 adapted to provide fixation between said filter 111 and said filter mount 200.

In the embodiment of Fig. 3a, the mount fixation arrangement 113 comprises a tubular member which also forms a liquid communication means 112 between a filter mount accommodating space 117 and said filter element 111.

In the Fig. 3a embodiment, the mount fixation arrangement 113 is arranged concentrically around a centre axis of the filter assembly.

The mount fixation arrangement 113 comprises fixation means 114 for accomplishing fixation of the filter assembly 100 to the filter mount 200 via corresponding fixation means 214 provided on the filter mount 200. In the illustrated embodiment, the fixation means 114 consists of a threading internally arranged in said tubular member.

As mentioned in the above, the tubular member also provides a liquid communication means 112, for providing liquid communication with the filter mount via a corresponding liquid communication means 212 of the filter mount 200.

Additional liquid communication means 112 are arranged at a radial distance to the tubular member, and having corresponding liquid communication means 212 in the filter mount 200.

The filter assembly 100 comprises an inner wall 115, delimiting the filter mount accommodating space 117, which is open to the proximal end 116 of the filter assembly 100. The filter mount accommodating space 117 is configured to receive liquid from the filter mount during removal of said filter assembly.

Hence, in the embodiment of Fig. 3a, the tubular member forming the mount fixation arrangement 113 is integrally formed with the bottom end 116' delimiting the filter mount accommodating space 117, and extends distally towards the filter element 111.

The filter mount accommodating space 117 is configured to allow mounting and removal of said filter assembly 100 to a filter mount portion 217 of the filter mount 200.

Said mounting or removal of the filter assembly 100 to/from the filter mount 200 is accomplished by movement of said filter assembly 100 in relation to said filter mount 200 between a distal position, wherein said filter mount portion 217 is partially received by said open proximal end 116 of said filter assembly 100, and
a proximal position, wherein said filter mount portion 217 is fully received in said filter mount accommodating space 117. In the proximal position, the filter assembly 100 is fixated to the filter mount 200, and ready for use (see Fig. 3c.).

In the embodiment of Fig. 3a, the inner wall 115 of the filter assembly 100 comprises a circumferential sealing member 119, for forming a circumferential sealing arrangement with a corresponding circumferential sealing member reception area 218 of the filter mount portion 217.

The sealing member 119 and the corresponding circumferential sealing member reception area 218 are configured to provide a liquid tight seal between said inner wall 115 and said filter mount portion 217 during said movement from said proximal to said distal position, resulting in an under pressure urging any residual liquid present in said liquid system towards said filter mount accommodating space 117 during removal of said filter assembly 100 from said filter mount 200.

In the embodiment of Fig. 3a, the inner wall 115 forming the filter mount accommodating space 117 comprises a first portion extending in an axial direction along the longitudinal axis L of the filter assembly. Here, the inner wall 115 forms a generally cylindrical inner surface.

The sealing member 119 is provided in the first inner wall portion facing radially inwards. In the illustrated embodiment, the sealing member 119 is an O-ring being mounted in a receiving track extending along the inner periphery of the inner wall 115, adjacent the open proximal end 116.

The filter mount accommodating space 117 extends between the open proximal end 116 and a distal bottom end 116', where the bottom wall extending transversely to a longitudinal axis L along the filter assembly is formed.

The tubular member comprising the fixation arrangement 113 and forming a liquid connection 112 extends in an axial direction through the bottom wall at the distal bottom end 116'. Also, the other liquid connections 112 extend through the bottom wall.

The mount fixation arrangement 113 comprises fixation means 114 for fixation of said filter assembly 100 to said filter mount 200. In the illustrated embodiment, the fixation means are in the form of a threading 114. The fixation means 114 extends along an axial fixation length FL parallel to the longitudinal axis L.

The circumferential sealing member 119 is, as mentioned in the above, arranged adjacent the open end 116 of the filter assembly 100.

The inner wall 115 forms a proximal edge 108 at the open end 116, the proximal edge facing towards the proximal direction. A secondary axial sealing member 109 is arranged on said proximal edge 108. In the illustrated embodiment, the secondary axial sealing member 109 consists of an O-ring arranged in a receiving track of the proximal edge 108.

Fig. 3b illustrates the filter mount 200 to which the filter assembly 100 of Fig. 3a is mountable.

The filter mount 200 extends along a longitudinal axis L from a proximal end, to be arranged to said liquid system; to a distal end, from which said filter assembly 100 is to be attached, and comprises liquid communication means 212 adapted to provide liquid communication between said filter assembly 100 and said filter mount 200, and a filter fixation arrangement 213 adapted to provide fixation between said filter assembly 100 and said filter mount 200.

The filter mount 200 comprises an outer wall 215, delimiting a filter mount portion 217, extending towards a distal end 216' and configured to be received in the filter mount accommodating portion 117 of the filter assembly of Fig. 3a.

The filter fixation arrangement 213 is adapted to provide fixation between said filter assembly 100 and said filter mount 200. In the embodiment of Fig. 3b, the filter fixation arrangement 213 comprises a tubular member which also forms a liquid communication means 212 between said filter mount portion 217 and said filter assembly 100.

Hence, the filter fixation arrangement 213 corresponds in shape and size to the mount fixation arrangement 113 of the filter assembly 100 for a tight fit and is arranged concentrically around a centre axis of the filter mount 200.

The filter fixation arrangement 213 comprises fixation means 214, in the illustrated embodiment the consisting of a threading, externally arranged on said tubular member.

As mentioned in the above, the tubular member also provides a liquid communication means 212. Additional liquid communication means 212 are arranged at a radial distance to the tubular member, corresponding to the additional liquid communication means 112 in the filter assembly 100.

In the illustrated embodiment, the outer wall 215 of the filter mount portion 217 comprises a circumferential sealing member reception area 218, for forming a circumferential sealing arrangement with the circumferential sealing member 119 of said filter mount accommodating space 117.

To provide the sealing member reception area 218, the outer wall 215 comprises a first portion extending in an axial direction of the filter mount. Hence, the outer wall 215 will form an essentially cylindrical outer surface, facing radially outwards.

At a distal end 216' of the mount portion, an outer bottom wall extending transversely to a longitudinal axis L is formed. The tubular member forming the filter fixation arrangement 213 extends distally from said outer bottom wall.

The circumferential sealing member reception area 218 is in this embodiment formed by the cylindrical outer wall 215, being free from any axial retention means. Hence, the sealing member reception area 218 is arranged to allow translational axial movement between said filter mount accommodating space 117 and said filter mount portion 217, during removal of the filter assembly 100 from the filter mount 200.

Fig. 3c illustrates the filter arrangement 300 comprising the filter assembly 100 of Fig. 3a and the filter mount 200 of Fig. 3b.

In Fig. 3c the arrangement is illustrated in a use position where the filter assembly 100 is fixated to the filter mount 200 and ready for use. The internal threading 114 of the mount fixation arrangement 113 of the filter assembly 100 is fully engaged with the external threading 214 of the filter fixation arrangement 213 of the filter mount 200. The filter mount portion 217 is fully received in the filter mount accommodating space 117.

The circumferential sealing member 119 provided on the inner wall 115 of the filter mount accommodating space 117 is in contact with the sealing member receiving area 218 provided by the outer wall 215 of the filter portion 217, so as to provide a liquid tight seal.

The secondary axial sealing member 109 provided on the proximal end 108 of the filter assembly 100 is in sealing contact with a transversal mount portion arranged at the proximal end of the filter mount portion 217, so as to provide a liquid tight seal.

When in use, the filter arrangement 300 will be connected to a liquid system, so as to enable circulation of the liquid through the filter 111. To this end, liquid may flow e.g. into the filter assembly 100 via the centrally arranged liquid communications 212, 112, through the filter, and out from the filter assembly via the circumferentially arranged other liquid communications 112, 212. Naturally, an opposite flow direction may also be envisaged.

In the illustrated embodiments, the circumferentially arranged other liquid communications 212, 112, are illustrated as being longitudinally aligned in the sections of the figures. However, since the filter assembly 100 and filter mount 200 of the illustrated embodiments are fixated using threads, and accordingly the filter assembly is rotated into a fixed position at the filter mount 200, such an exact alignment might be difficult to perform in practice. To enable liquid to flow between the liquid communications 112, 212 of the filter assembly 100 and the filter mount 200, even when the communications are not aligned, a liquid communication space of some sort may be provided extending circumferentially between liquid communications. For example, a circular indentation may be provided in the flilter assembly and/or in the filter mount, and the liquid communications 112, 212 may open to said circular indentation. Accordingly, even if the liquid communications 112, 212

of the filter assembly and of the filter mount are not aligned, liquid may flow from the liquid communication of the filter mount 212, via the circular indentation, and to a liquid communication of the filter assembly 112, and vice versa.

Figs 4a to 4c illustrate the filter arrangement of Fig. 3c during the procedure of removing the filter assembly 100 from the filter mount 200, when the filter assembly 100 and filter mount 200 both contains liquid, as may be the case when a filter assembly is to be replaced.

In Fig. 4a, the arrangement is illustrated in the fixed use position, similar to Fig. 3a. When the filter arrangement has been in use in a liquid system, the filter and the filter mount may both contain liquid, and liquid may be present in the system beyond the illustrated portion of the filter mount 200.

For removal of the filter assembly 100 from the filter mount 200, the filter assembly is moved in a distal direction along the arrows in Fig. 4b. To accomplish this movement, the respective threadings of the fixation arrangements must be unthreaded. Accordingly, in practice, a worker will rotate the filter assembly 100 around the longitudinal axis L to accomplish axial movement of the filter assembly 100 in a distal direction so as to reach the position illustrated in Fig. 4b.

During said axial movement, the filter mount accommodating space 117 will be gradually removed from the mount portion 217. The circumferential sealing member 119 will continuously form a seal with the corresponding sealing member receiving area 218, such that the filter mount accommodating space 117 is sealed while removed from the mount portion 217. Accordingly, liquid present in the filter mount 200 will be urged towards the freed portion of the filter mount accommodating space 117. Hence, liquid may flow in the liquid communications 212 of the filter mount portion 217 towards the filter mount accommodating space 117, where the liquid may be received..

In the situation illustrated in Fig. 4b, the respective fixation arrangements 113, 213, i.e. the threadings 114, 214 have just been released. For continued removal of the filter assembly 100 from the filter mount 200, the filter assembly 100 is further moved in a distal direction from the filter mount 200. In this embodiment, the design of the respective portions allow

for a straight translational movement along the longitudinal axis L from the position illustrated in Fig. 4b, to the situation illustrated in Fig. 4c.

In Fig. 4c, the filter arrangement 100 is almost removed from the filter mount 200. The figure illustrates the final position wherein the sealing member 119 may still form a liquid tight seal with the sealing member reception area 218. Hence, until this position is reached, sealing between the filter mount accommodating space 117 and the filter mount portion 217 is present. Residual liquid present in the system will hence be urged towards the filter mount accommodating space 117 during the entire removal procedure, until this position is reached.

For complete removal of the filter assembly 100 from the filter mount 200, the filter assembly 100 is moved yet a small distance in a distal direction, the sealing will break, and the filter assembly 100 be removed from the filter mount 200. The filter mount accommodating space 117 will now contain liquid which may easily be disposed. If desired, a lid might be provided fitting over the open end 116 of the filter assembly 100, so as to facilitate handling of the removed filter assembly 100.

In the above it is explained how, for release of the respective fixation arrangements 113, 213, the filter assembly 100 is moved an axial distance in relation to the filter mount 200, as illustrated between Figs. 4a and 4b. This distance is referred to herein as the fixation length FL (see Figs. 3a-3c). In this case, the fixation length FL corresponds to the extension of the respective threadings 114, 214.

Sealing contact between the inner wall 115 of the filter mount assembly 100 and the outer wall 215 of the filter mount 200 is also achieved during the release of the respective fixation arrangements. However, sealing contact is also achieved after said fixation arrangements are released, as illustrated between Figs. 4b and 4c. The axial distance which the filter assembly 100 is moved while said sealing contact is intact, is referred to herein as a sealing length SL (see Figs. 3a-3c).

Advantageously, as in the illustrated embodiment, the sealing length SL is greater than the fixation length FL. As in the illustrated embodiment, removal of the filter assembly 100 from the filter mount 200 might necessitate a rotational movement over the fixation length FL, but only a translational movement over the remainder of the sealing length SL, once

the fixation length FL is passed. Accordingly, the arrangement of a space for receiving liquid as proposed herein may be made without necessitating substantially prolonged mounting and dismounting processes.

In the illustrated embodiment, the sealing arrangement 119 is arranged to provide constant sealing contact with said outer wall 215 of said filter mount portion 217 over the entire sealing length SL. This is because the surface of the O-ring sealing to the outer surface of the mount portion 200 will form a constant contact surface during the axial movement of the filter assembly. Hence, the sealing effect will be constant, and not vary, during the removal of the filter assembly. This is advantageous in that the sucking effect provided towards the filter mount accommodating space 117 will be ensured throughout the removal procedure, until the end of the sealing length SL.

Figs 5a and 5b illustrate another embodiment of a filter assembly 100 and a filter mount 200, respectively. Only features which differ from those described in relation to Figs 3a-3c, and 4a-4c will be described in the below. For other features, reference is made to the description of the aforementioned embodiments.

In Fig. 5a, it may be seen how the inner wall 115 of the filter assembly 100 comprises a circumferential sealing member reception area 118. To this end, the inner wall 115 extends in parallel to the longitudinal axis L for forming said circumferential sealing member reception area 118.

In Fig. 5b, it is illustrated how the filter mount 200 comprises a circumferential sealing member 219. The circumferential sealing member 219 is circumferentially arranged along an outer wall 215 of the filter mount, adjacent the distal bottom end 216'.

The circumferential sealing member 219 and the circumferential sealing member reception area 118 will form a liquid tight seal between the filter assembly 100 and the filter mount 200 when the filter assembly 100 is attached to or removed from the filter mount 200, in a similar manner as described in relation to Figs. 3a-3c, 4a-4c.

In the embodiment of Fig. 5a, the fixation arrangement 113 is in the form of an externally threaded tubular member extending from the distal bottom end 116' and proximally into the filter mount accommodating space.

The corresponding fixation arrangement 213 of the filter mount 200 comprises an internally threaded through bore 213, extending proximally from the distal end 216' of the filter mount portion 217.

Figs. 6a to 6c illustrate another embodiment of a filter assembly 100 and a filter mount 200. Only features which differs from those described in relation to Figs 3a-3c, and 4a-4c will be described in the below. For other features, reference is made to the description of the aforementioned embodiments.

The filter assembly 100 and filter mount 200 comprises tubular members similar to those described in relation to Figs. 3a to 3c. However, in these embodiments, the centrally arranged tubular members form liquid connections 112, 212 only.

The respective fixation arrangements 113, 213 are instead arranged at the proximal ends of the filter assembly 100 and the filter mount 200, respectively.

In Fig. 6a, an internally threaded portion 113 is arranged adjacent the open end 116 of the filter assembly 100, and in Fig. 6b and externally threaded portion 213 is arranged adjacent a proximal end 216 of the filter mount portion 217.

Moreover, an axial sealing member 109 is arranged surrounding the central tubular member providing a liquid connection 112, for providing an axial seal to a corresponding portion f the distal end 216' of the filter mount.

Figs. 7a to 7b illustrate another embodiment of a filter assembly 100 and a filter mount 200. Only features which differ from those described in relation to Figs 3a-3c, and 4a-4c will be described in the below. For other features, reference is made to the description of the aforementioned embodiments.

The fixation arrangements 113, 213 of the embodiments of Figs 7a and 7b are similar to those described in the above in relation to Figs. 5a and 5b.

The inner wall 115 of the filter assembly 100 forms a proximal edge 108 at the open end 116, the proximal edge facing towards the proximal direction. A circumferential sealing

member 119 is arranged on said proximal edge 108, so as to form a seal in a radially inward direction towards a corresponding circumferential sealing receiving area 218 of the filter mount.

To this end, the sealing member 119 is formed as a flattened ring, having a rim protruding radially inwards from said proximal edge 108. The sealing member 119 will also form a seal in an axial direction, being effective in the fixed position as illustrated in Fig. 7b, where the sealing member 119 is in axial sealing contact with the filter mount 200.

Figs. 8a to 8b illustrate another embodiment of a filter assembly 100 and a filter mount 200. This embodiment is similar to the embodiment of Figs. 5a and 5b, but illustrates how a previous, conventional filter assembly and filter mount may be adapted to form an embodiment in accordance with Figs. 5a and 5b.

In Figs 8a and 8b, the filter mount 200 comprises a first filter mount part 200' and a second filter mount part 200". The first filter mount part 200' may be a part of a conventional filter mount. The second filter mount part 200" forms the filter mount portion 217 to be received in a filter mount accommodating space 117 of the filter assembly 100. The second filter mount part 200" is arranged at the first filter mount part 200' so as to be connected to a liquid system.

In Figs 8a and 8b, the filter assembly 100 comprises a first filter assembly part 100' and a second filter assembly part 100". The first filter assembly part 100' may be a conventional filter assembly, comprising liquid connections 112 and a fixation arrangement 113' for connection to a conventional filter mount 200'. The fixation arrangement 113' comprises a tubular member extending proximally, and provided with an external threading. The second filter assembly part 100" comprises a wall delimiting a filter mount receiving portion 117, which is configured to receive fluid from the filter mount during removal of the filter assembly 100 from the filter mount 200. The second filter assembly part 100" comprises liquid connections 112 corresponding to the liquid connections of the first filter assembly part 100', and a fixation arrangement 113". The fixation arrangement 113" of the second part 100" comprises an internally threaded through bore, which is fixated to the fixation arrangement 113' of the first part 100'. A portion of the fixation arrangement 113' of the first part 100' extending proximally of the second part 100" is available to accomplish fixation to the filter mount 200.

Naturally, many variants and embodiments are conceivable by a person skilled in the art. For example, the illustrated embodiments all include fixation arrangements where the fixation is performed within or by a housing of the filter assembly. However, the fixation arrangement might instead comprise fixation means such as bolts, snap connections or other types of means, extending radially beyond the housing of the filter assembly or the outer wall 115 of the filter mount portion 217.

In the illustrated embodiments, the distal bottom end 116' of the filter assembly, and the corresponding distal end 216' of the filter mount portion 217 extend in an essentially perpendicular direction to the longitudinal axis L. However, this shape may naturally be varied.

The invention has above been described for an oil filter arrangement. The invention is however not limited to an arrangement for filtering an engine oil, but may be applied for filtering other fluids, such as a fuel or coolant for the internal combustion engine.

CLAIMS

1. A filter assembly (100) for a liquid system having a filter mount (200) to which said filter assembly (100) is mountable,
said filter assembly extending along a longitudinal axis (L) from a distal end (102), to be arranged distally of said filter mount (200), to a proximal end (116), to be arranged proximally to said filter mount (200);
said filter assembly comprising:
a mount fixation arrangement (113) adapted to provide fixation between said filter assembly (100) and said filter mount (200),
characterized in
that said filter assembly (100) comprises an inner wall (115), delimiting a filter mount accommodating space (117), which is open to the proximal end (116) and configured to receive liquid during removal of said filter assembly (100) from said filter mount (200).

2. A filter assembly in accordance with claim 1, wherein said filter mount accommodating space (117) is configured to allow mounting and removal of said filter assembly (100) to a filter mount portion (217) of said filter mount (200) by movement of said filter assembly (100) in relation to said filter mount (200) between
a distal position, wherein said filter mount portion (217) is partially received by said open proximal end (116) of said filter assembly (100), and
a proximal position, wherein said filter mount portion (217) is fully received in said filter mount accommodating space (117).

3. A filter assembly in accordance with claim 1 or 2, wherein said inner wall (115) of said filter assembly (100) comprises either a circumferential sealing member (119) or a circumferential sealing member reception area (118), for forming a circumferential sealing arrangement with a corresponding circumferential sealing member reception area (218) or circumferential sealing member (219) of said filter mount portion (217).

4. A filter assembly in accordance with claim 3, wherein said sealing member (119) or sealing member reception area (118) is configured to provide a liquid tight seal between said inner wall (115) and said filter mount portion (217) during removal of the filter assembly (100) resulting in an under pressure urging any liquid present in said liquid

system towards said filter mount accommodating space (117) during removal of said filter assembly (100) from said filter mount (200).

5. A filter assembly in accordance with any preceding claim, wherein said mount fixation arrangement (113) is arranged inside said filter mount accommodating space (117) and at an axial distance from the proximal end (116).

6. A filter assembly in accordance with any preceding claim, wherein said mount fixation arrangement (113) is arranged concentrically around a centre axis of the filter assembly.

7. A filter assembly in accordance with any preceding claim, wherein said filter assembly comprises a filter element (111) and liquid communication means (112) adapted to provide liquid communication between said filter element (111) and said filter mount (200).

8. A filter assembly in accordance with claim 7, wherein said mount fixation arrangement (113) comprises a tubular member forming said communication means (112) between said filter mount accommodating space (117) and said filter element (111).

9. A filter assembly in accordance with any preceding claim, wherein the inner wall (115) comprises a first portion extending in an axial direction of the filter assembly.

10. A filter assembly in accordance with claim 3 and 9, wherein said sealing member (119) or sealing member reception area (118) is provided in the first inner wall portion facing radially inwards.

11. A filter assembly in accordance with any preceding claim, wherein the filter mount accommodating space extends between said open proximal end (116) and a distal bottom end (116'), the distal bottom end (116') preferably forming a bottom wall extending transversely to the longitudinal axis (L) of the filter assembly.

12. A filter assembly in accordance with claim 8 and 11, wherein the tubular member extends through the distal bottom end (116'), preferably though said bottom wall.

13. A filter assembly in accordance with any one of the claims 4 to 12, when dependent on claim 3, wherein said mount fixation arrangement (113) comprises fixation means (114) for fixation of said filter assembly (100) to said filter mount (200), said fixation means (114) extends along an axial fixation length (FL) parallel to said longitudinal axis (L); and
said circumferential sealing member (119) or said circumferential sealing member reception area (118) of said inner wall (115) of said filter assembly (100) is arranged to, during relative movement of the filter assembly in relation to the filter mount, provide circumferential sealing along an axial sealing length (SL),
wherein said sealing length (SL) is equal to or greater than said axial fixation length (FL).

14. A filter assembly in accordance with any one of the claims 4 to 13, when dependent on claim 3, wherein said inner wall (115) comprises said circumferential sealing member (119).

15. A filter assembly in accordance with claim 14, wherein said filter mount accommodating space extends between said open proximal end (116) and a distal bottom end (116'), and wherein said circumferential sealing member (119) is circumferentially arranged along said inner wall (115) between said open end (116) and said distal bottom end (116'), preferably adjacent said open end (116).

16. A filter assembly in accordance with claim 14, wherein said inner wall (115) forms a proximal edge (108) facing towards said proximal direction, and said sealing member (119) is arranged on said proximal edge.

17. A filter assembly in accordance with claim any one of claims 14-16, when dependent on claim 11, wherein said sealing length (SL) is defined by a distance from said circumferential sealing member (119) to said bottom end (116').

18. A filter assembly in accordance with any one of the claims 4 to 13, when dependent on claim 3, wherein said inner wall (115) comprises said circumferential sealing member reception area (118).

19. A filter assembly in accordance with claim 18, wherein said inner wall (115) extends in parallel to said longitudinal axis for forming said circumferential sealing member reception area (118).

20. A filter assembly in accordance with claim 18 or 19, wherein said circumferential sealing member reception area (118) is arranged to allow translational axial movement between said filter mount accommodating space (117) and said filter mount portion (127).

21. A filter assembly in accordance with any one of the claims 18 to 20, wherein said inner wall (115) is free from axial retention means.

22. A filter assembly in accordance with any one of said claims 18 to 21, when dependent on claim 13, wherein said sealing length (SL) is defined by an axial extension of said circumferential sealing member reception area (118).

23. A filter assembly in accordance with any one of said claims 18 to 22, wherein said filter mount accommodating space (117) extends between said open end (116) and a bottom end (116'), and said circumferential sealing member reception area extends between said open end (116) and said bottom end (116').

24. A filter assembly in accordance with any one of the claims 4 to 23, when dependent on claim 3, , wherein said sealing arrangement is arranged to provide constant sealing contact with an outer wall (215) of said filter mount portion (217) during said removal of the filter assembly (100).

25. A filter assembly in accordance with any one of the preceding claims, wherein said mount fixation arrangement (113) comprises a mount fixation means (114), preferably a threading.

26. A filter assembly in accordance with any one of said preceding claims, wherein said filter assembly (100) comprises a secondary axial sealing member (109).

27. A filter assembly in accordance with any one of said preceding claims, wherein said filter mount accommodating space (117) defines a volume of at least 50 cm3, preferably at least 100 cm3, most preferred at least 200 cm3.

28. A filter mount (200) for a liquid system for mounting a filter assembly (100) in liquid connection with said liquid system,
said filter mount (200) extending along a longitudinal axis (L) from a proximal end, to be arranged to said liquid system; to a distal end, from which said filter assembly (100) is to be attached, said filter mount comprising
a filter fixation arrangement (213) adapted to provide fixation between said filter assembly (100) and said filter mount (200),
characterized in
said filter mount (200) comprising an outer wall (215), delimiting a filter mount portion (217), extending towards a distal end (216') and configured to be received in a filter mount accommodating portion (117) configured to receive liquid during removal of said filter assembly (100) from said filter mount.

29. A filter mount in accordance with claim 28, wherein said filter mount portion (217) is configured to allow mounting and removal of said filter assembly (100) by movement of said filter assembly (100) in relation to said filter mount (200) between
a distal position, wherein said filter mount portion (217) is partially received by said open proximal end (116) of said filter assembly (100), and
a proximal position, wherein said filter mount portion (217) is fully received in said filter mount accommodating space (117).

30. A filter mount in accordance with claim 28 or 29, wherein said outer wall (215) of said filter mount (200) comprises either a circumferential sealing member (219) or a circumferential sealing member reception area (218), for forming a circumferential sealing arrangement with a corresponding circumferential sealing member reception area (118) or circumferential sealing member (119) of said filter mount accommodating space (117).

31. A filter mount in accordance with claim 30, wherein said sealing member (219) or sealing member reception area (218) is configured to provide a liquid tight seal between said inner wall (215) and said filter mount accommodating space (117) during said removal of the filter assembly (100), resulting in an under pressure urging any liquid present in said liquid system towards said filter mount accommodating space (117) during removal of said filter assembly (100) from said filter mount (200).

32. A filter mount in accordance with any one of the claims 28 to 31, wherein said filter fixation arrangement (213) extends proximally into said filter mount portion (217) from said distal bottom end (216').

33. A filter mount in accordance with any one of the claims 28 to 32, wherein said filter fixation arrangement (213) is arranged concentrically around a centre axis of the filter mount.

34. A filter mount in accordance with any one of the claims 28 to 33, wherein the filter mount (200) comprises liquid communication means (212) adapted to provide liquid communication between said filter assembly (100) and said filter mount (200).

35. A filter mount in accordance with claim 34, wherein said filter fixation arrangement (213) comprises a through bore forming said liquid communication means (212) between said filter mount portion (217) and said filter assembly (100).

36. A filter mount in accordance with any one of the claims 28 to 35, wherein the outer wall (215) comprises a first portion extending in an axial direction of the filter mount (200).

37. A filter mount in accordance with claims 30 and 36, wherein said sealing member (219) or sealing member reception area (218) is provided in the first portion of the outer wall (215) facing radially outwards.

38. A filter mount in accordance with any one of the claims 28 to 37, wherein the filter mount portion (217) extends between a proximal end (216) and said distal bottom end (216'), the distal bottom end (216') preferably forming an outer bottom wall extending transversely to a longitudinal axis L of the filter mount.

39. A filter mount in accordance with claims 35 and 38, wherein the through bore extends through the distal bottom end (216'), preferably though said outer bottom wall.

40. A filter mount in accordance with any one of the claims 31 to 39, when dependent on claim 30, wherein said mount fixation arrangement (213) comprises fixation means (214) for fixation of said filter assembly (100) to said filter mount (200), said fixation

means (214) extends along an axial fixation length (FL) parallel to said longitudinal axis (L); and

said circumferential sealing member (219) or said circumferential sealing member reception area (218) of said outer wall (215) of said filter mount (200) is arranged to, during relative movement of the filter assembly in relation to the filter mount, provide circumferential sealing along an axial sealing length (SL),

wherein said sealing length (SL) is equal to or greater than said axial fixation length (FL).

41. A filter mount in accordance with any one of the claims 31 to 40, when dependent on claim 30, wherein said outer wall (215) comprises said circumferential sealing member (219).

42. A filter mount in accordance with claim 41, wherein said filter mount portion (217) extends between a proximal end (216) and a distal bottom end (216'), and wherein said circumferential sealing member (219) is circumferentially arranged along said outer wall (215), preferably adjacent said distal bottom end (216').

43. A filter mount in accordance with claim 41, wherein said outer wall (215) forms a distal edge (208) facing towards said distal direction, and said sealing member (219) is arranged on said distal edge.

44. A filter mount in accordance with any one of the claims 41 to 43, when dependent on claim 40, wherein said sealing length (SL) is defined by a distance from said circumferential sealing member (219) to said proximal end (216').

45. A filter mount in accordance with any one of the claims 31 to 40, when dependent on claim 30,, wherein said outer wall (215) comprises said circumferential sealing member reception area (218).

46. A filter mount in accordance with claim 45, wherein said outer wall (215) extends in parallel to said longitudinal axis for forming said circumferential sealing member reception area (218).

47. A filter mount in accordance with claim 45 or 46, wherein said circumferential sealing member reception area (218) is arranged to allow translational axial movement between said filter mount accommodating space (117) and said filter mount portion (217).

48. A filter mount in accordance with any one of the claims 45 to 47, wherein said outer wall (215) is free from axial retention means.

49. A filter mount in accordance with any one of the claims 45 to 47, when dependent on claim 40, wherein said sealing length (SL) is defined by said axial extension of said circumferential sealing member reception area (218).

50. A filter mount in accordance with any one of the claims 45 to 49, wherein said filter mount portion (217) extends between said proximal end (216) and said bottom distal end (216'), and said circumferential sealing member reception area extends between proximal end (216) and said bottom distal end (216').

51. A filter mount in accordance with any one of the claims 31 to 50, when dependent on claim 30 , wherein said sealing arrangement is arranged to provide constant sealing contact with said inner wall (115) of said filter mount accommodating space (117) during said removal of the filter assembly (100).

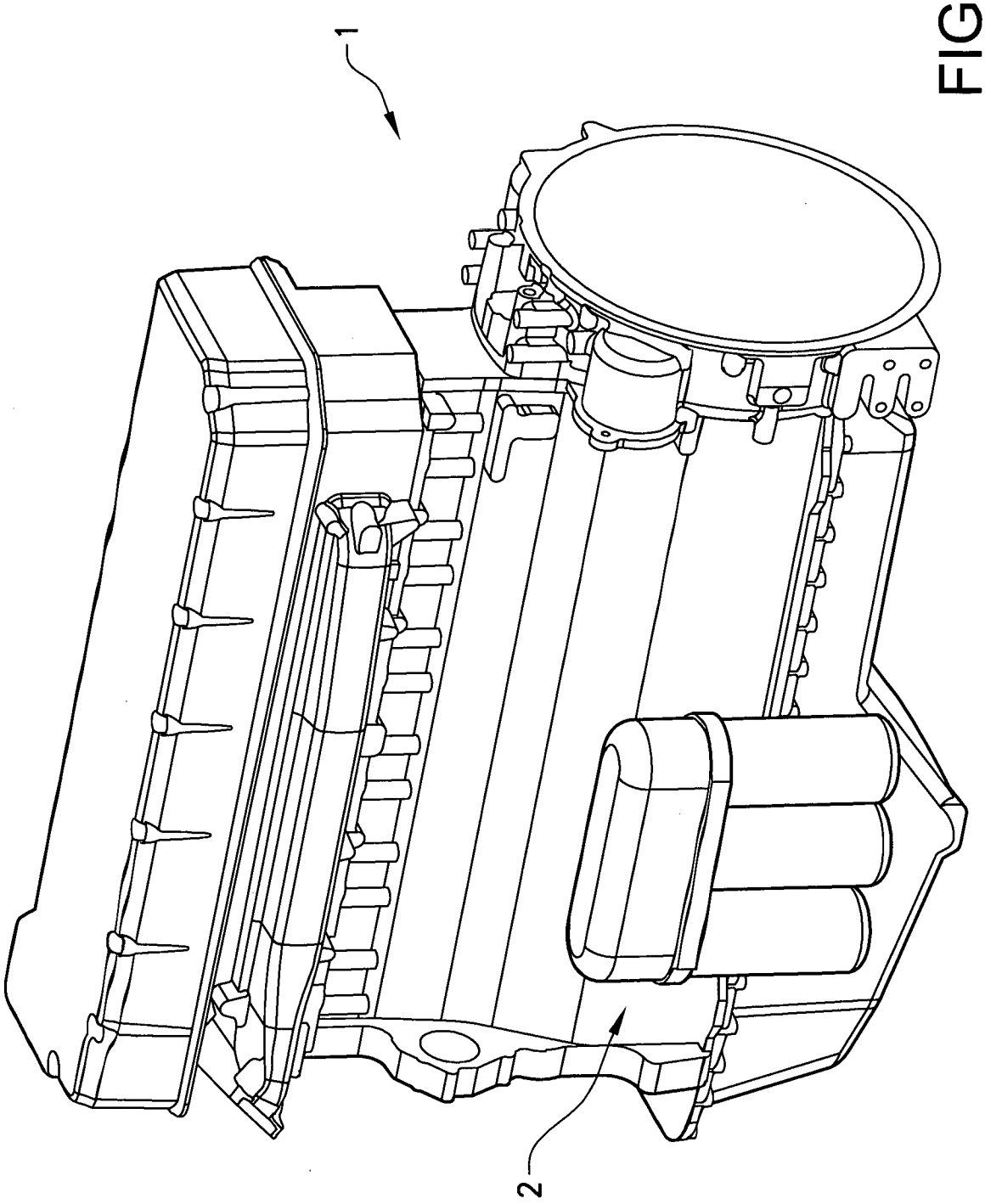
52. A filter mount in accordance with any one of the claims 28 to 51, wherein said fixation arrangement (213) comprises a fixation means (214), preferably a threading.

53. A filter mount in accordance with any one of the claims 28 to 52, wherein said filter mount (200) comprises a secondary axial sealing member (209).

54. A filter mount in accordance with any one of the claims 28 to 53, wherein said filter mount portion (217) defines a volume of at least 50 cm3, preferably at least 100 cm3, most preferred at least 200 cm3.

55. A filter arrangement for a liquid system, said filter arrangement comprising a filter mount (200) in accordance with any one of claims 28-54 and a filter assembly (100) in accordance with any one of claims 1-27.

FIG. 1



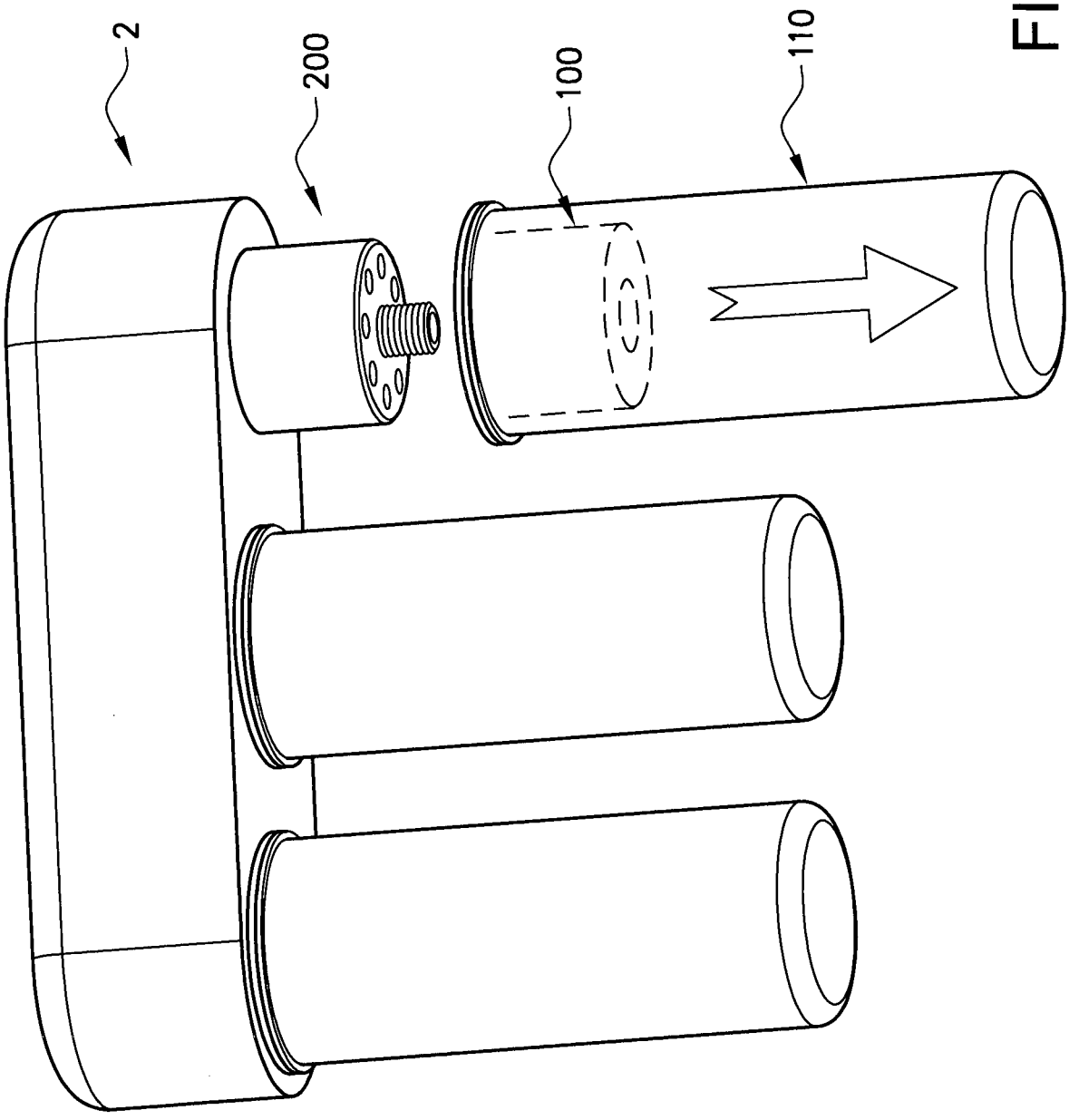



FIG. 2

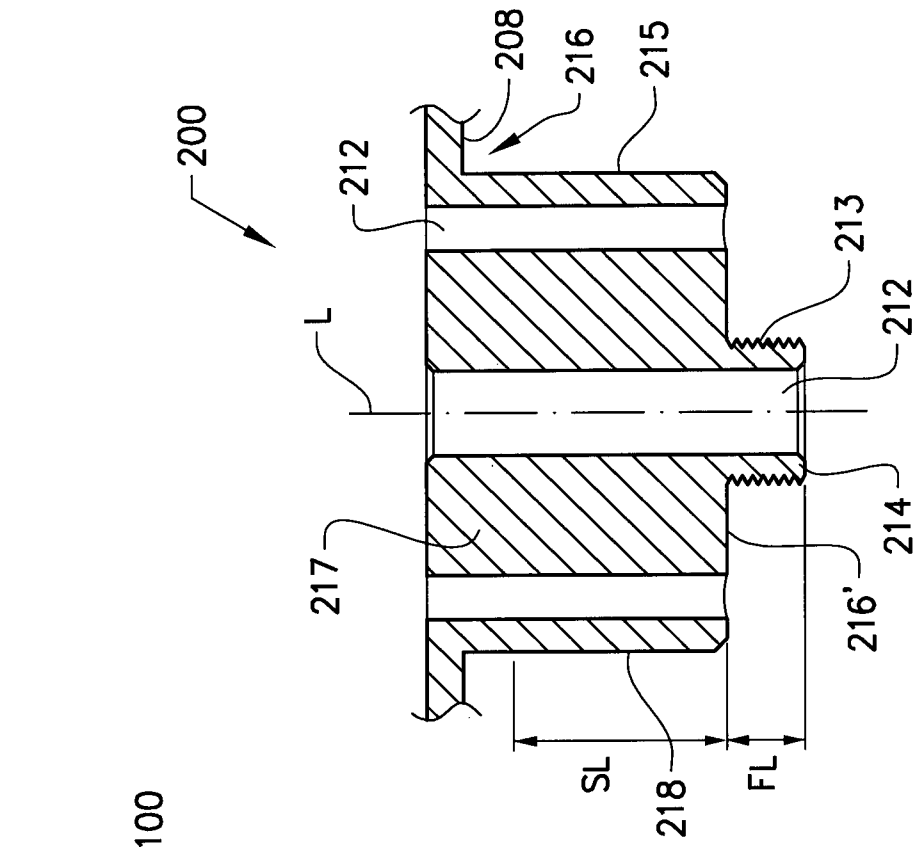

200
208
216
215
212
213
212
L
214
217
216'
SL
218
FL

FIG. 3b

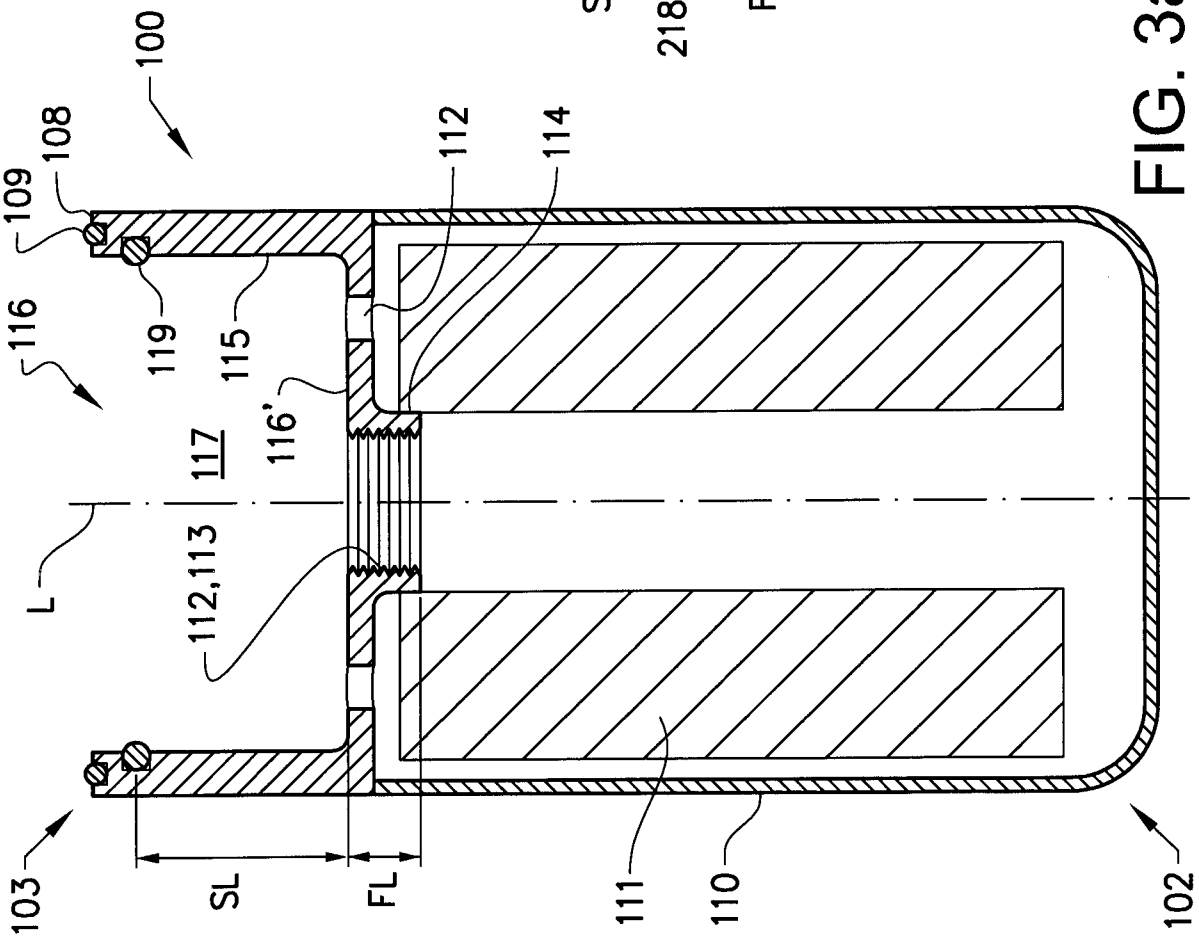

100
108
109
112
114
116
119
115
116'
117
L
112,113
103
SL
FL
111
110
102

FIG. 3a

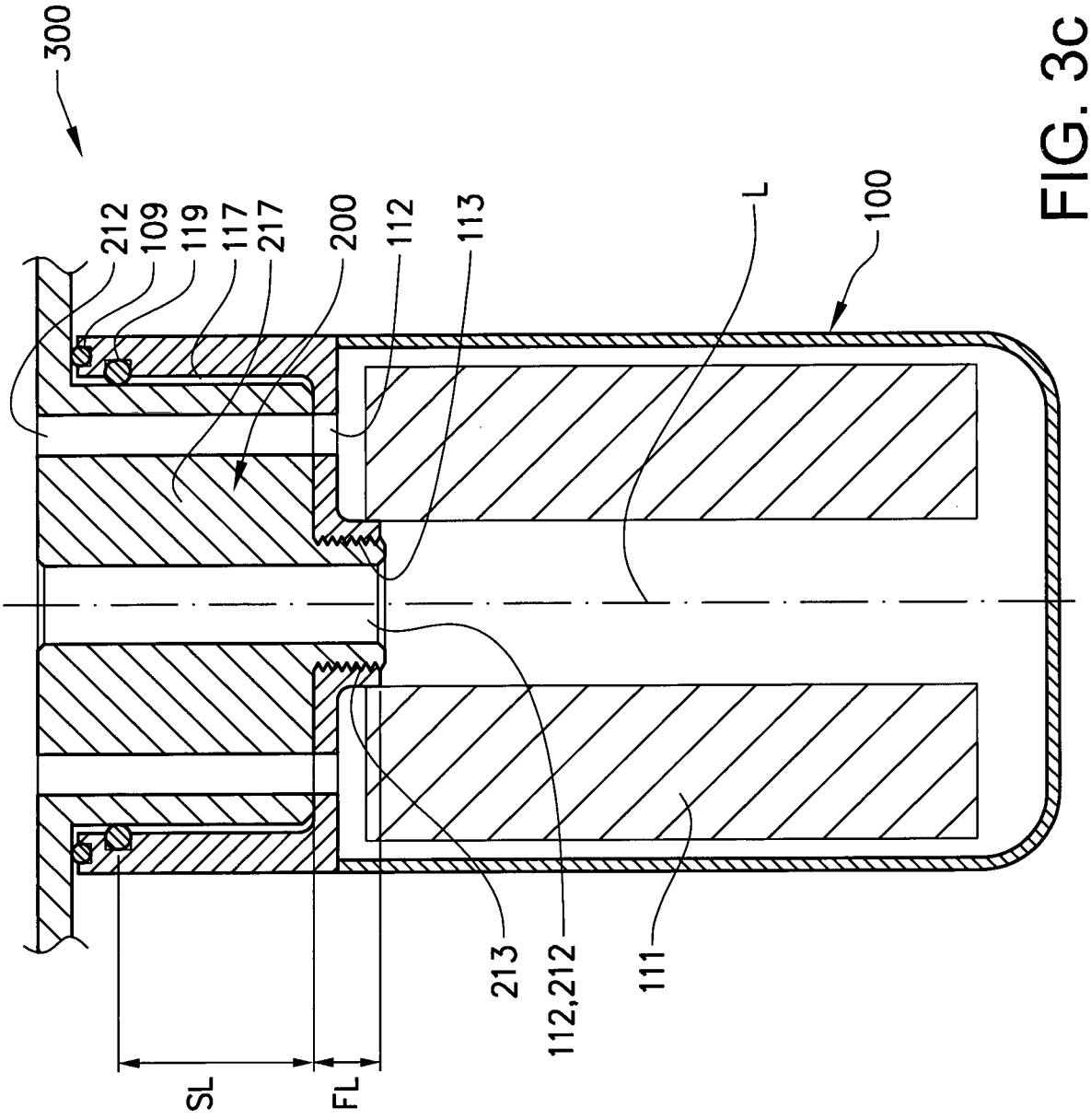



FIG. 3c

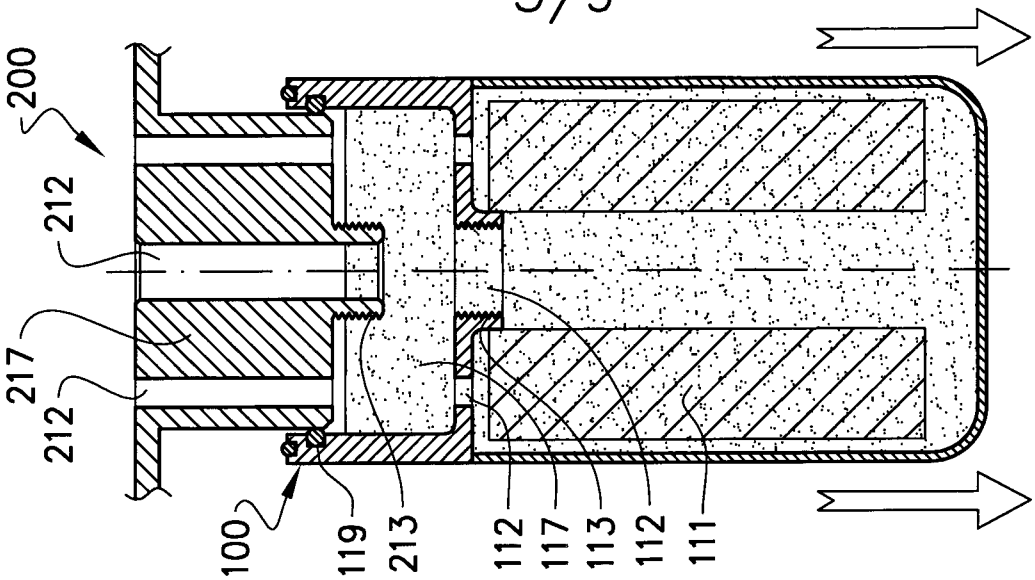



FIG. 4c

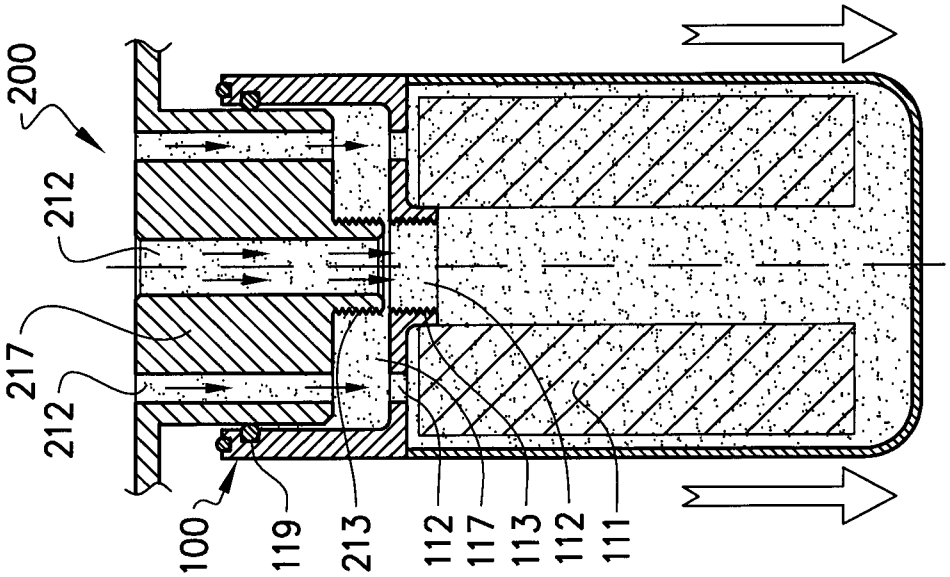



FIG. 4b

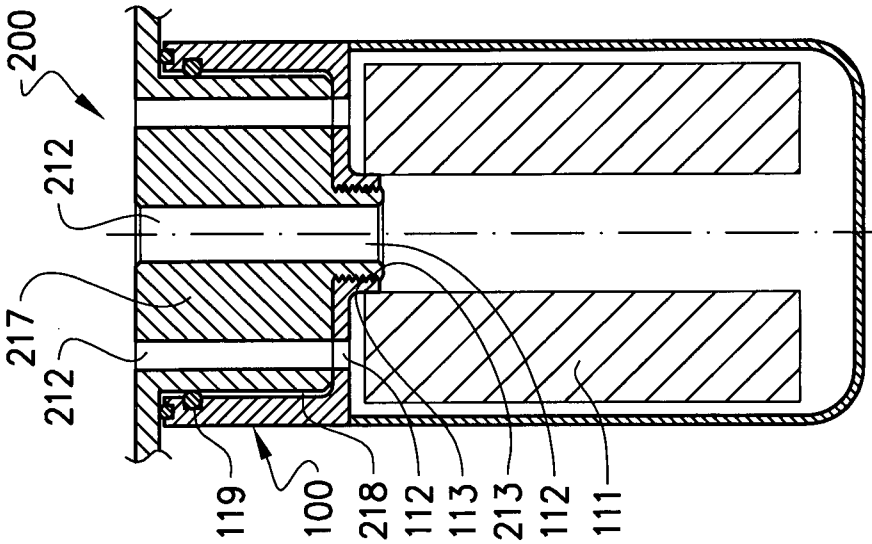



FIG. 4a

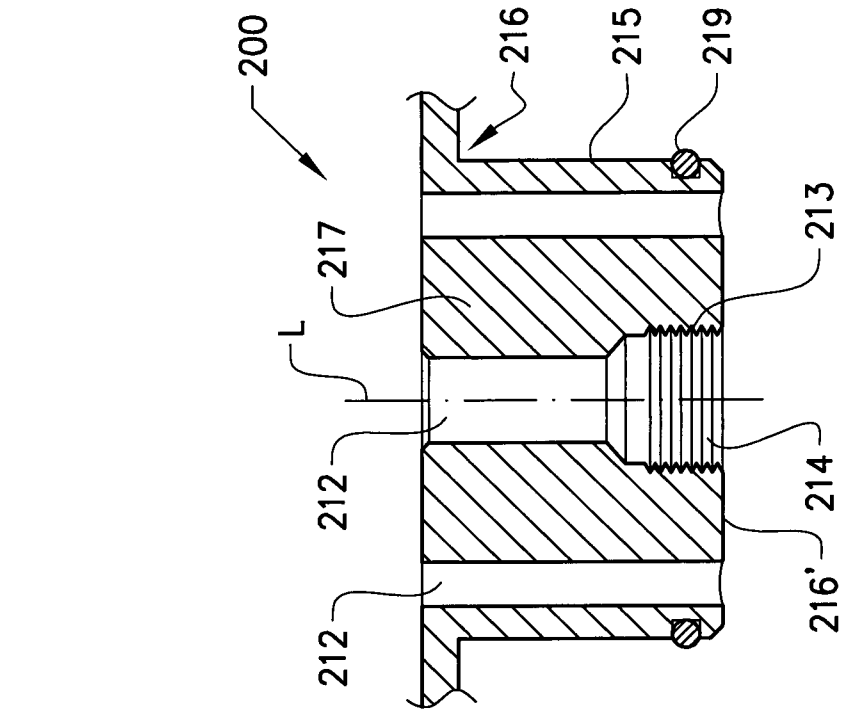

200
216
215
219
213
217
L
212
214
216'
212

FIG. 5b

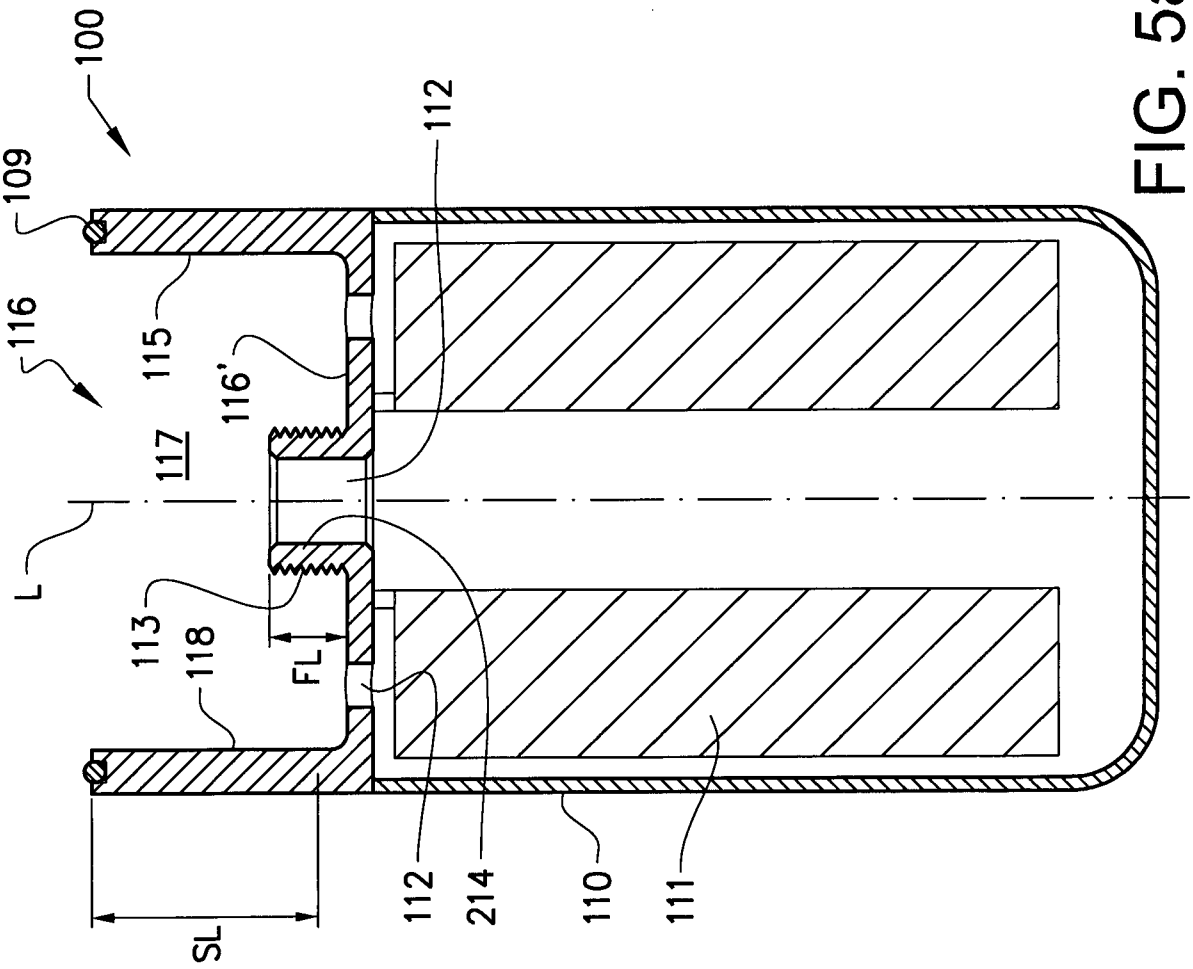

100
109
112
116
115
116'
117
L
113
118
FL
SL
112
214
110
111

FIG. 5a

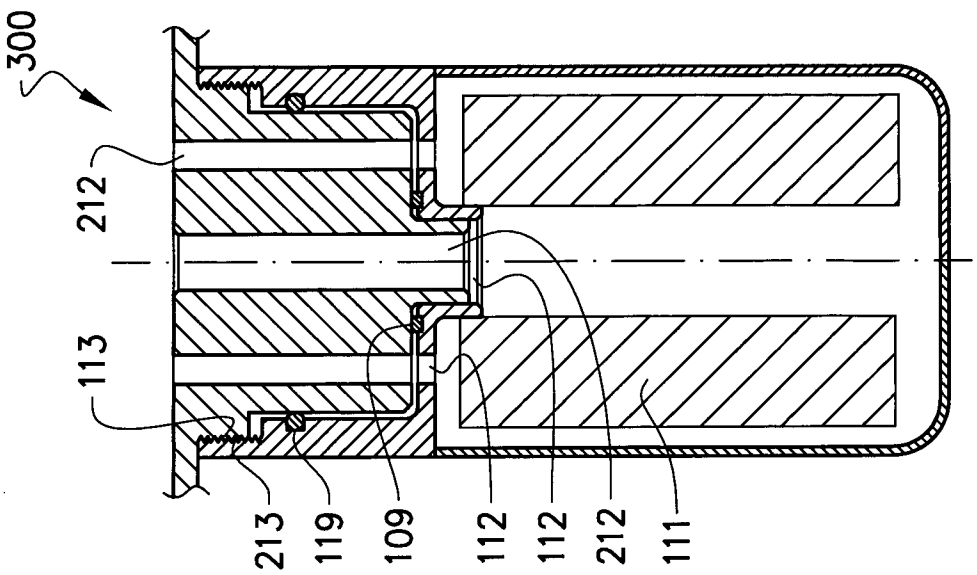



FIG. 6c

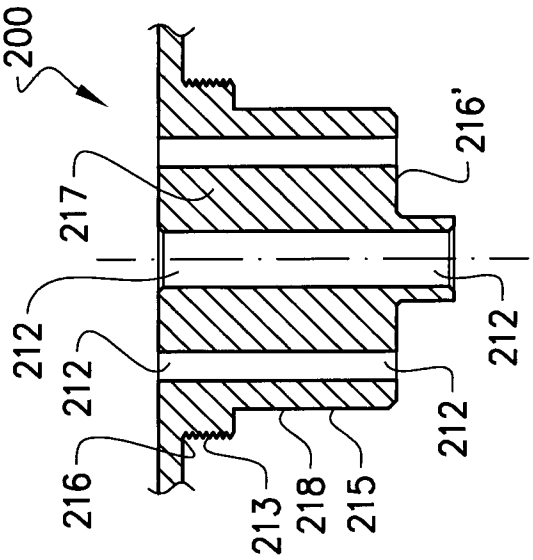



FIG. 6b

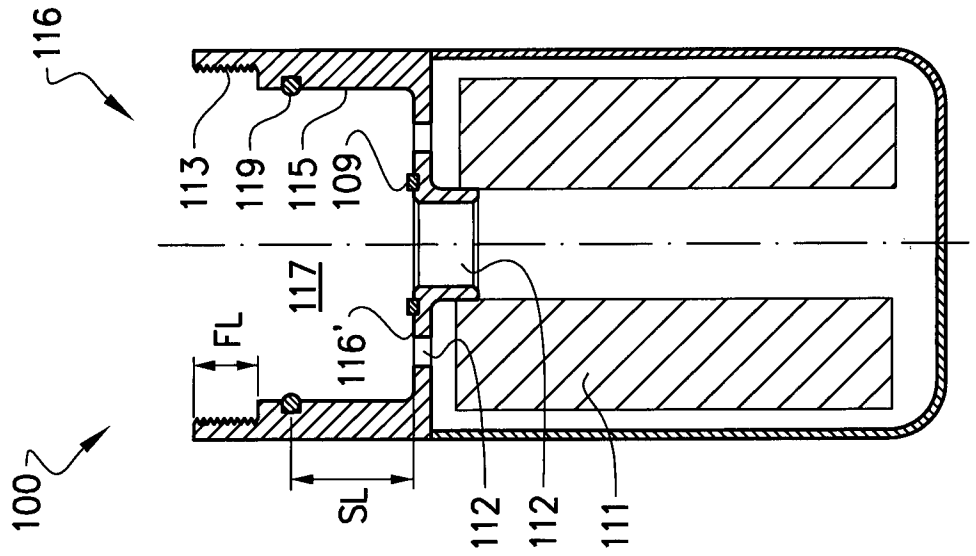



FIG. 6a

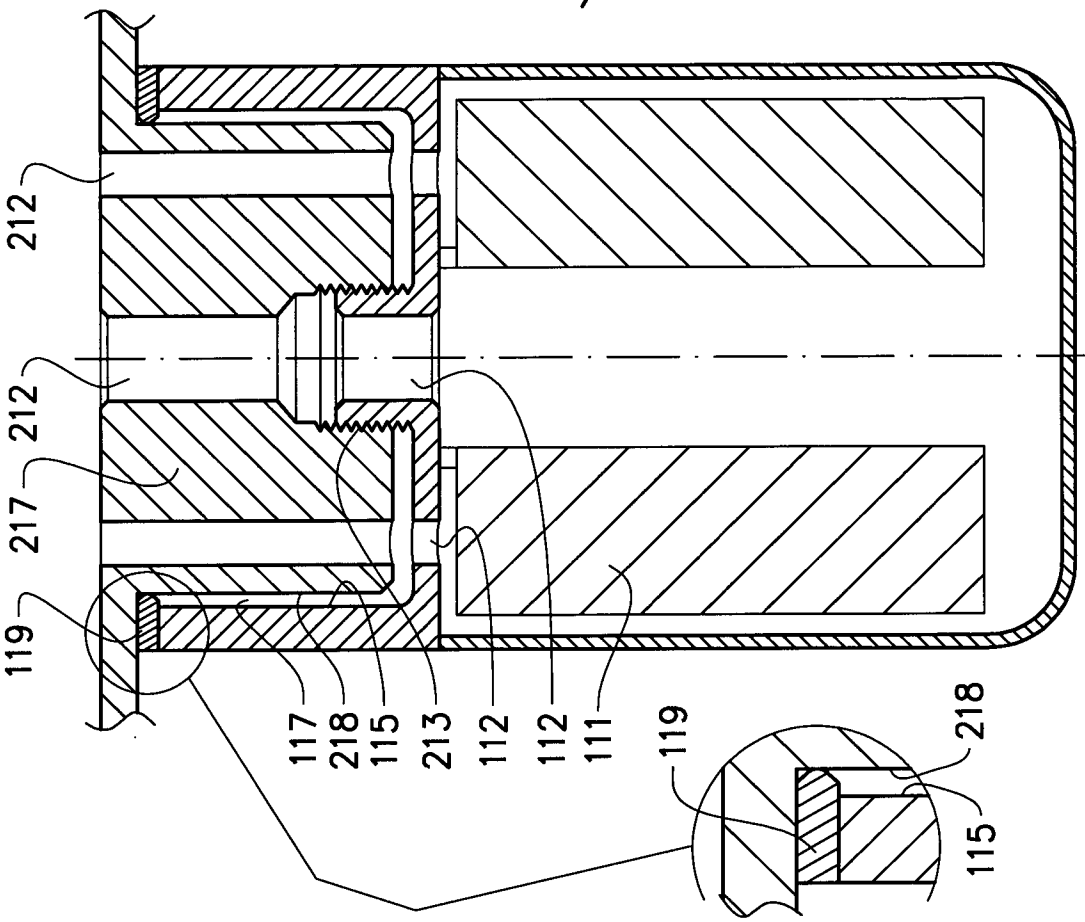

212
212
217
119
117
218
115
213
112
112
111
119
218
115

FIG. 7b

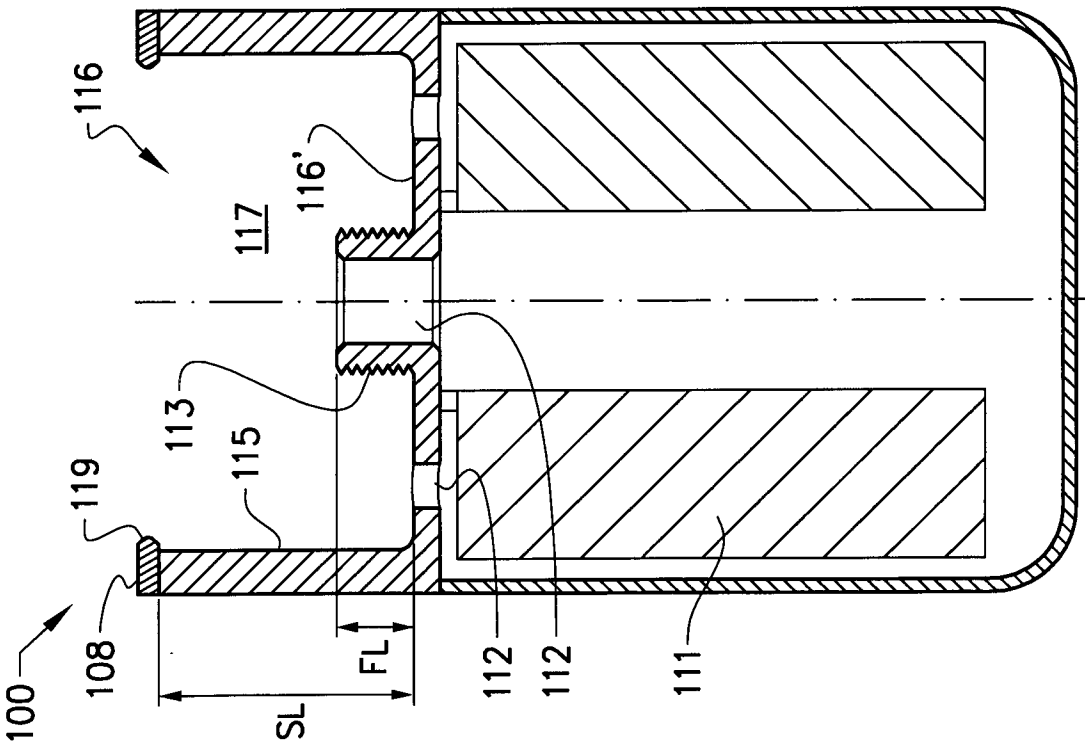

116
116'
117
113
115
119
108
100
FL
SL
112
112
111

FIG. 7a

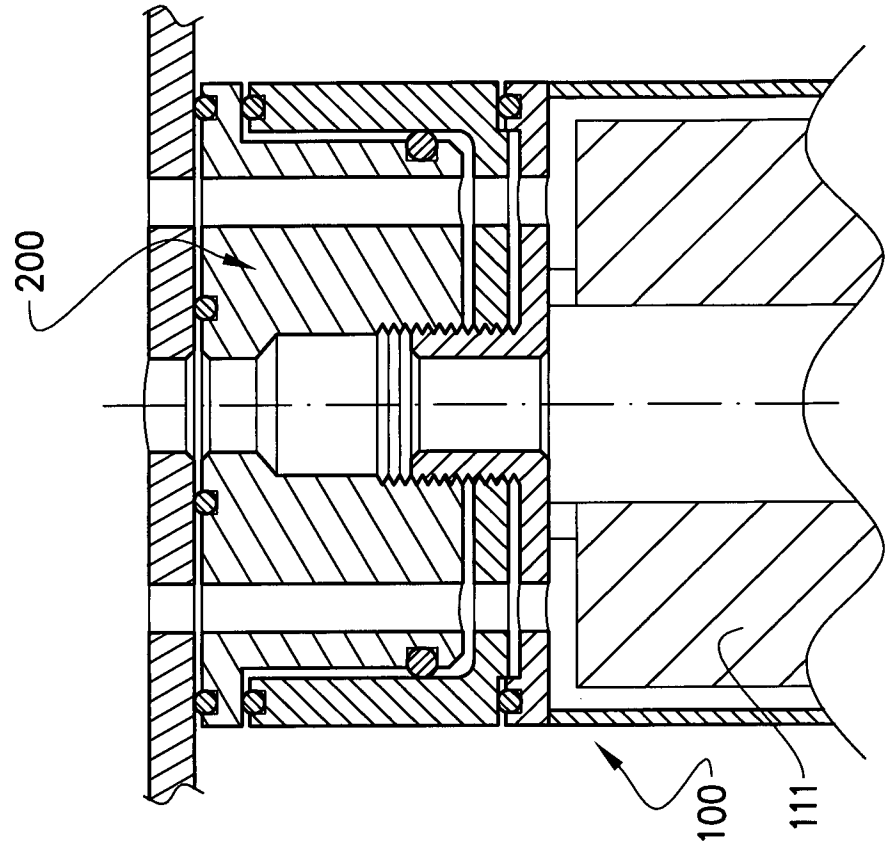

200
100
111

FIG. 8b

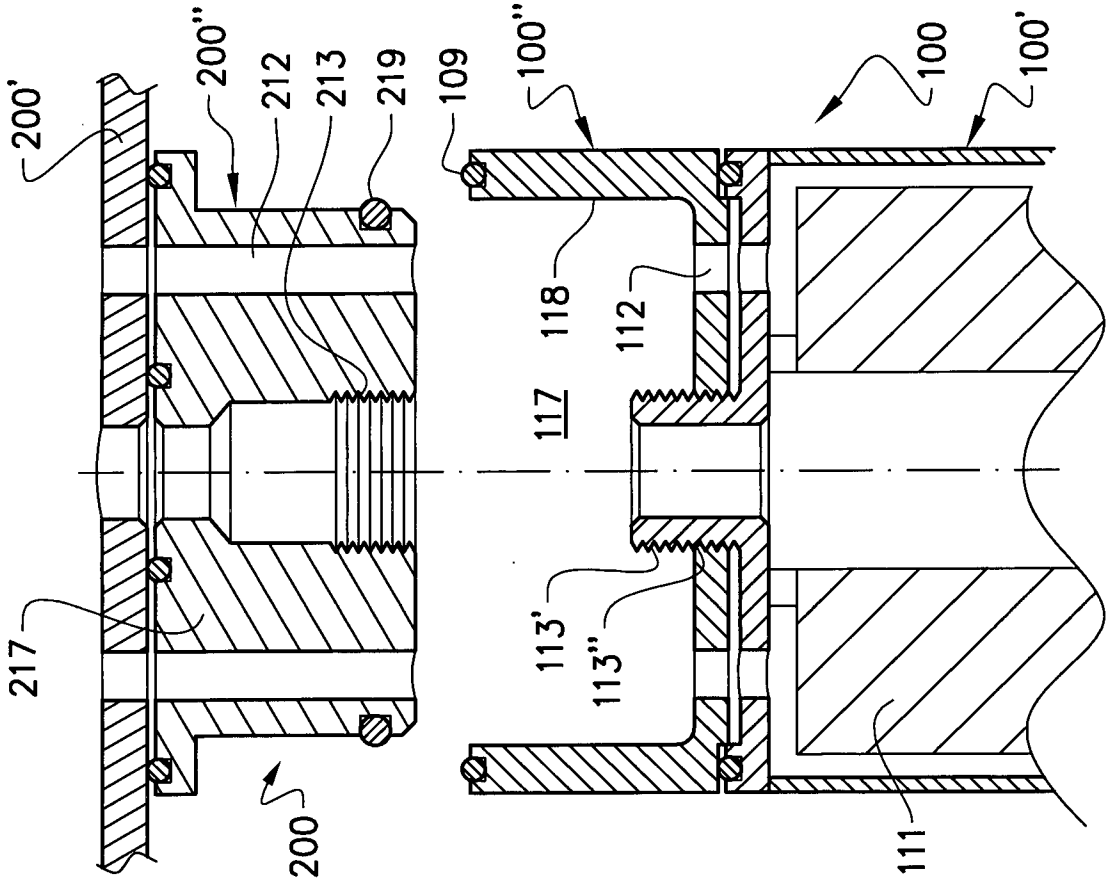

200'
200''
212
213
219
109
100''
100
100'
118
112
117
113'
113''
217
200
111

FIG. 8a

# INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/001812

A. CLASSIFICATION OF SUBJECT MATTER
INV. B01D35/16 B01D35/31 B01D27/08 F01M11/06
ADD.

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)
B01D F01M

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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| X | US 5 904 357 A (DEMIRDOGEN A CANER [US] ET AL) 18 May 1999 (1999-05-18) the whole document | 1-55 |
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| X | US 2009/145826 A1 (CALCATERRA FARRELL F [US] ET AL) 11 June 2009 (2009-06-11) abstract; figures | 1-27 |

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☒ See patent family annex.

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| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 20 August 2014 | 28/08/2014 |

| Name and mailing address of the ISA/ | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016 | Vedoato, Luca |

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