CLEANER HEAD MEMBER, CLEANER HEAD ASSEMBLY AND WET CLEANING APPARATUS

FIELD OF THE INVENTION

This invention relates to a cleaner head member that is attachable and/or detachable from a cleaner head of a wet cleaning apparatus. The invention also relates to a cleaner head assembly comprising the cleaner head member and the cleaner head. The invention further concerns a wet cleaning apparatus comprising the cleaner head member or the cleaner head assembly.

The cleaner head member and wet cleaning apparatus can be used, for example, for cleaning a floor, an indoor surface, or a window.

BACKGROUND OF THE INVENTION

Wet cleaning apparatuses, for example wet mopping devices, are known which remove water from a surface to be cleaned. Such wet cleaning apparatuses can also apply cleaning liquid, e.g. water, to the surface to be cleaned, and then remove the liquid, e.g. with a suitable cloth.

Some wet cleaning apparatuses have cleaning liquid delivery functionality for delivering the cleaning liquid to the surface to be cleaned. There can be a risk that delivery of the cleaning liquid is poorly controlled, for example resulting in non-uniform or uneven delivery of the cleaning liquid across the surface to be cleaned, insufficient cleaning liquid being supplied to the surface to be cleaned and/or soaking of the environment with excessive amounts of the cleaning liquid.

Certain wet cleaning apparatuses may include powered pick-up functionality for removing the water from the surface to be cleaned. Wet vacuum cleaners, for instance, may pick up liquid by generating sufficient airspeed (e.g. at least 10 m/s) and/or brushpower to exert enough shear force on liquid droplets to cause them to enter the device. Typical power consumption values for such wet vacuum cleaners are relatively high, for example in the order of several hundred watts.

Further challenges can arise when the wet cleaning apparatus is arranged to deliver cleaning liquid as well as pick up the liquid using suction. Providing both

functionalities can, in at least some designs, risk that the cleaning liquid is suboptimally delivered to the surface to be cleaned and/or used inefficiently.

SUMMARY OF THE INVENTION

The invention is defined by the claims.

According to examples in accordance with an aspect of the invention, there is provided a cleaner head member attachable to and/or detachable from a cleaner head of a wet cleaning apparatus, the cleaner head member comprising: a cleaning liquid outlet structure for delivering cleaning liquid towards a surface to be cleaned; a dirt inlet structure for receiving dirty liquid from the surface to be cleaned; and a connector that is connectable to a complementary connector of the cleaner head, the connector comprising: at least one dirt channel for transporting the dirty liquid away from the dirt inlet structure; and at least one cleaning liquid channel for supplying the cleaning liquid towards the cleaning liquid outlet structure.

The connector can be regarded as a multi-fluid channel connector in which the at least one dirt channel and the at least one cleaning liquid channel are integrated.

By the cleaner head member being attachable to the cleaner head, the cleaner head member may, for example, be attached to the cleaner head to replace a previously used cleaner head member.

The capability to detach the cleaner head member from the cleaner head may facilitate cleaning of one or both of the cleaner head member and the cleaner head. Alternatively or additionally, detachment of the cleaner head member may enable replacement of the cleaner head member, for instance when the cleaner head member becomes overly worn.

Each of the at least one cleaning liquid channel may be separate from each of the at least one dirt channel in the connector. Due to the dirt channel(s) being separate from the cleaning liquid channel(s) in the connector, there may be a greater chance of the cleaning liquid reaching the cleaning liquid outlet structure, and hence more of the cleaning liquid may be able to reach the surface being cleaned. The cleaning liquid may consequently be used more efficiently.

Moreover, by separating the dirt channel(s) and the cleaning liquid channel(s) from each other in the connector, the risk of the cleaning liquid interfering with dirt pick-up functionality may be reduced.

For example, the connector comprises wall(s) arranged between the dirt channel(s) and the cleaning liquid channel(s), which wall(s) keep the dirty liquid in the dirt channel(s) separate from the cleaning liquid in the cleaning liquid channel(s).

In some embodiments, the connector comprises a snap-fit connector. This may provide a reliable connection, e.g. sealed connection, between the connector and the complementary connector.

Alternatively or additionally, the snap-fit connector may facilitate connection and/or disconnection of the connector and the complementary connector to/from each other, and can thus assist attachment and/or detachment of the cleaner head member to/from the cleaner head.

In some embodiments, the cleaner head member comprises alignment and/or attachment features, provided in addition to the connector, for aligning and/or attaching the cleaner head member to the cleaner head. Inclusion of such alignment and/or attachment features may mean that the connector need not be solely relied upon to ensure suitable alignment and attachment of the cleaner head member to the cleaner head. Accordingly, robustness of alignment and/or attachment between the cleaner head member and the cleaner head may be enhanced, and stress on the connection between the connector and the complementary connector can be relieved.

In at least some embodiments, the cleaner head member comprises a support substrate. The support substrate may, for example, be regarded as a main body of the cleaner head member, e.g. mopping pad.

In such embodiments, the connector may, for example, be provided in and/or on the support substrate.

In some embodiments, the support substrate comprises a bottom surface for facing, in use, the surface to be cleaned. In such embodiments, the connector may be arranged in and/or on a top surface of the support substrate that, in use, faces away from the surface to be cleaned.

The top surface of the support substrate may provide a convenient, and in particular easily accessible, location for positioning the connector. Thus, the cleaner head member may be more easily attached to and/or detached from the cleaner head.

In some embodiments, the cleaning liquid outlet structure and/or the dirt inlet structure is/are recessed into and/or embossed on the bottom surface of the support substrate.

Thus, one or both of the cleaning liquid outlet structure and the dirt inlet structure may be conveniently arranged to deliver cleaning liquid towards and/or draw dirty liquid away from the surface to be cleaned.

In some embodiments, the cleaner head member is an elongate cleaner head member, and the cleaning liquid outlet structure is an elongate cleaning liquid outlet structure whose length spans, at least, a majority of the elongate cleaner head member's lengthways dimension. Alternatively or additionally, the dirt inlet structure may be an elongate dirt inlet structure whose length spans, at least, a majority of the elongate cleaner head member's lengthways dimension.

Thus, the cleaning liquid may be delivered and/or dirty liquid may be aspirated across the length of the cleaner head member, thereby providing favorable wetting of and/or liquid removal from the surface to be cleaned.

In at least some embodiments, the support substrate is a pliable support substrate. Such a pliable support substrate can assist the cleaner head member to follow contours on the surface being cleaned. Alternatively or additionally, the pliability of the pliable support substrate may assist cleaning of the cleaner head member after use, for example involving wringing liquid from the cleaner head member and/or washing the cleaner head member in the user's washing machine.

Such cleaning of the cleaner head member, e.g. when detached from a cleaner head of the wet cleaning apparatus, may assist to remove dirt particles that may build up inside and clog the cleaner head member during use.

In embodiments in which the support substrate is a pliable support substrate, the support substrate may be formed from any suitable pliable material. In some embodiments, the pliable material forming the pliable support substrate comprises a polymeric material and/or elastomeric material.

Particular mention is made of silicone rubber and ethylene-vinyl acetate, in other words a copolymer of ethylene and vinyl acetate, for the pliable material.

In embodiments in which the pliable support substrate is formed from ethylene-vinyl acetate, ethylene may, for example, account for 60 to 90 wt.% of the copolymer.

Other polymeric and/or elastomeric materials, such as a polydiene, e.g. polybutadiene, a thermoplastic elastomer, and so on, can also be contemplated for the pliable material.

Alternatively or additionally, the pliable material can be less than 50 Shore A, preferably less than 20 Shore A, most preferably less than 10 Shore A.

In a non-limiting example, the pliable material is 4 Shore A silicone rubber.

In some embodiments, the pliable support substrate is formed from a closed cell foam material, for example an ethylene-vinyl acetate closed cell foam material.

Such a closed cell foam material may facilitate an efficient (and inexpensive) production/assembly process for fabricating the cleaner head member.

It is noted that the connector may be subjected to significant mechanical stress, particularly in embodiments in which the support substrate is pliable such that the user is able to fold or wring the cleaner head member.

Thus, in some embodiments, a flexible reinforcement member is arranged around at least part, e.g. the entirety of, the connector. This flexible reinforcement member can provide strain relief for protecting the connector-comprising part of the cleaner head member.

The flexible reinforcement member can be a separate part that is affixed to the support substrate or can be molded with the support substrate, for example in a so-called 2K injection molding process in which the support substrate is molded in an initial molding step, and the flexible reinforcement member is molded onto the support substrate in a subsequent molding step.

Alternatively or in addition to the flexible reinforcement member, the substrate may comprise one or more flexing zones adjacent to the connector, with such flexing zone(s) being more susceptible to flexing than regions of the support substrate adjacent to the flexing zone(s). The flexing zone(s) can assist to protect the connector from damage caused by folding or wringing of the cleaner head member.

In such embodiments, the connector may be arranged in-between a first flexing zone and a second flexing zone of the one or more flexing zones. Thus, the connector may be arranged in a central or intermediate region of the cleaner head member that is less prone to flexing.

The flexing zone(s) can be implemented in any suitable manner. In some embodiments, the flexing zone(s) comprise(s) one or more trenches defined in a surface of the support substrate adjacent to the connector.

Such trench(es) can, for example, be regarded as folding line(s) along which the support substrate is preferentially foldable compared to the part of the cleaner head

member in which the connector is arranged. Thus, the trench(es) can assist to protect the connector from damage caused by folding or wringing of the cleaner head member.

In such embodiments, the connector may be arranged in-between a first trench and a second trench of the one or more trenches. Thus, the connector may be arranged in a central or intermediate region of the cleaner head member that is less prone to folding.

In some embodiments, the cleaner head member comprises a cover member arranged over at least the dirt inlet structure. For example, the cover member may be arranged over the dirt inlet structure and the cleaning liquid outlet structure.

In some embodiments, the cover member comprises a porous layer arranged over at least the dirt inlet structure. Pores of the porous layer can receive dirty liquid from the surface being cleaned. For example, an underpressure generator included in the wet cleaning apparatus can cause the dirty liquid to be drawn into the pores of the porous layer.

In some embodiments, the porous layer comprises one or more of a woven fabric, a microfiber woven fabric, a mesh, and a perforate membrane.

According to another aspect there is provided a cleaner head assembly comprising: the cleaner head member according to any of the embodiments described herein; and a cleaner head to which the cleaner head member is attachable and/or detachable, the cleaner head comprising said complementary connector, the complementary connector comprising: at least one dirt conduit arranged to transport the dirty liquid away from the at least one dirt channel; and at least one cleaning liquid conduit being arranged to supply the cleaning liquid to the at least one cleaning liquid channel.

Each of the at least one cleaning liquid conduit may be separate from each of the at least one dirt conduit in the complementary connector.

In some embodiments, the cleaner head comprises an exterior portion that faces, in use, the surface to be cleaned, with the complementary connector being set back from the exterior portion. In such embodiments, the connector may be arranged to protrude into the cleaner head, beyond the exterior portion, in order to connect to the complementary connector.

This arrangement of the complementary connector may assist to minimize the risk of damage, e.g. abrasion etc., to the complementary connector that may otherwise occur should the complementary connector, when disconnected from the connector, protrude from the exterior portion, e.g. from the bottom of the cleaner head.

In some embodiments, the cleaner head assembly, e.g. the cleaner head or the cleaner head member, comprises a seal arrangement arranged to: hermetically seal a fluid

connection between the at least one dirt channel and the at least one dirt conduit, and hermetically seal a fluid coupling between the at least one cleaning liquid channel and the at least one cleaning liquid conduit. In this way, leakage of cleaning liquid and underpressure via the connection provided by the connector and the complementary connector may be minimized or prevented.

The seal arrangement may be included in the cleaner head, e.g. in the complementary connector thereof, rather than in the cleaner head member.

Thus, more complex elements, in this case the seal arrangement, may be beneficially shifted from the cleaner head member, e.g. mopping pad, which may be a replaceable and/or machine washable part, to a non-consumable and non-machine washable part, namely the cleaner head.

In some embodiments, the connector and the complementary connector are connectable to each other via a snap-fit connection. In such embodiments, the connector may include the above-mentioned snap-fit connector, with the complementary connector including a complementary snap-fit connector.

The snap-fit connection can be implemented in any suitable manner. In some embodiments, the snap-fit connection comprises a spring-loaded snap-fit mechanism.

Such a spring-loaded snap-fit mechanism can assist to ensure optimal performance, as well as durability of the cleaner head assembly.

In some embodiments, the snap-fit connection comprises projecting element(s) included in one of the connector and the complementary connector, with the projecting element(s) being each receivable, via a spring-loaded snap-fit, in a slot included in the other of the connector and the complementary connector.

In some embodiments, the projecting element(s) protrude from the connector.

In such embodiments, the projecting element(s) can additionally help to protect a sealing area around the dirt channel(s) and the cleaning liquid channel of the connector.

According to a further aspect there is provided a wet cleaning apparatus comprising: the cleaner head member according to any of the embodiments described herein or the cleaner head assembly according to any of the embodiments described herein; a cleaning liquid supply for supplying cleaning liquid for delivery towards the surface to be cleaned via the at least one cleaning liquid channel and the cleaning liquid outlet structure; and an underpressure generator for providing suction to the surface to be cleaned via the at least one dirt channel and the dirt inlet structure.

Inclusion of the cleaning liquid supply and the underpressure generator may enable the wet cleaning apparatus to supply cleaning liquid to the surface to be cleaned as well as to remove dirt, e.g. dirty liquid, from the surface to be cleaned.

The cleaning liquid supply may, for example, comprise a cleaning liquid reservoir and a delivery arrangement, e.g. a delivery arrangement comprising a pump, for transporting the cleaning liquid towards the surface to be cleaned via the cleaning liquid outlet structure and the plurality of openings.

When the delivery arrangement comprises a pump, the cleaning liquid may be actively fed to the cleaning liquid outlet structure. In other embodiments, no pump may be included in the delivery arrangement, such that the cleaning liquid is passively fed to the cleaning liquid outlet structure.

In some embodiments, the cleaning liquid supply is configured to provide a continuous delivery of the cleaning liquid towards the surface to be cleaned. Such continuous delivery may, for instance, be provided at the same time as the underpressure generator is supplying suction to the cleaner head member.

The cleaning liquid supply and the underpressure generator may, for instance, be configured such that the flow of the cleaning liquid being delivered is equal to or lower than the flow provided by the underpressure generator.

This may assist to ensure that the surface to be cleaned does not become excessively wet with the cleaning liquid.

The wet cleaning apparatus may be, for example, a wet mopping device, a window cleaner, a sweeper, or a wet vacuum cleaner, such as a canister-type, stick type, or upright type wet vacuum cleaner. The wet cleaning apparatus may in some examples be a robotic wet vacuum cleaner or a robotic wet mopping device configured to autonomously move the cleaner head member on the surface to be cleaned, such as the surface of a floor.

Particular mention is made of the wet cleaning apparatus being a wet mopping device.

The wet cleaning apparatus may be a battery-powered (or battery-powerable) wet cleaning apparatus, such as a battery-powered (or battery-powerable) wet mopping device, in which the cleaning liquid supply and/or the underpressure generator, e.g. pump, is/are powered (or powerable) by a battery electrically connected (or connectable) thereto.

These and other aspects of the invention will be apparent from and elucidated with reference to the embodiment(s) described hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the invention, and to show more clearly how it may be carried into effect, reference will now be made, by way of example only, to the accompanying drawings, in which:

FIG. 1A provides an exploded view of a cleaner head assembly according to an example;

FIG. 1B provides a cutaway view of the cleaner head assembly shown in FIG. 1B;

FIG. 1C provides a perspective view of part of a top side of the cleaner head assembly shown in FIGs. 1A and 1B;

FIG. 2A provides a cutaway view of a cleaner head member according to an example;

FIG. 2B provides a perspective view of a top side of the cleaner head member shown in FIG. 2A;

FIG. 3 provides a perspective view of a top side of a cleaner head member according to another example; and

FIG. 4 provides a perspective view of a top side of a cleaner head member according to a further example.

DETAILED DESCRIPTION OF THE EMBODIMENTS

The invention will be described with reference to the Figures.

It should be understood that the detailed description and specific examples, while indicating exemplary embodiments of the apparatus, systems and methods, are intended for purposes of illustration only and are not intended to limit the scope of the invention. These and other features, aspects, and advantages of the apparatus, systems and methods of the present invention will become better understood from the following description, appended claims, and accompanying drawings. It should be understood that the Figures are merely schematic and are not drawn to scale. It should also be understood that the same reference numerals are used throughout the Figures to indicate the same or similar parts.

Provided is a cleaner head member for attaching to and/or detaching from a cleaner head of a wet cleaning apparatus. The cleaner head member comprises a cleaning liquid outlet structure for delivering cleaning liquid towards a surface to be cleaned, and a dirt inlet structure for receiving dirty liquid from the surface to be cleaned. The cleaner head

member further comprises a connector for connecting to a complementary connector of the cleaner head. The connector comprises at least one dirt channel for transporting the dirty liquid away from the dirt inlet structure, and at least one cleaning liquid channel for supplying the cleaning liquid towards the cleaning liquid outlet structure. Each of the at least one cleaning liquid channel is, for example, separate from each of the at least one dirt channel in the connector, such that the cleaning liquid and the dirty liquid cannot mix within the connector.

Additionally provided is a cleaner head assembly comprising the cleaner head member and the cleaner head.

Further provided is a wet cleaning apparatus comprising the cleaner head member or the cleaner head assembly, together with a cleaning liquid supply and an underpressure generator.

FIG. 1A provides an exploded view of a cleaner head member 100 and a cleaner head 102 according to an example. The cleaner head member 100 is attachable to and/or detachable from the cleaner head 102.

By the cleaner head member 100 being attachable to the cleaner head 102, the cleaner head member 100 may, for example, be attached to the cleaner head 102 to replace a previously used cleaner head member 100.

The capability to detach the cleaner head member 100 from the cleaner head 102 may facilitate cleaning of one or both of the cleaner head member 100 and the cleaner head 102. Alternatively or additionally, detachment of the cleaner head member 100 may enable replacement of the cleaner head member 100, for instance when the cleaner head member 100 becomes overly worn.

The cleaner head member 100 may be supplied to a user separately from the cleaner head 102 or the wet cleaning apparatus, for example when the cleaner head 102/wet cleaning apparatus is already in the user's possession or the cleaner head 102/wet cleaning apparatus is sourced separately from the cleaner head member 100.

In some embodiments, the cleaner head member 100 and the cleaner head 102 are included in a cleaner head assembly 104. In such embodiments, the cleaner head 102 and the cleaner head member 100 of the cleaner head assembly 104 may be conveniently supplied to the user, for example with the cleaner head member 100 already attached to the cleaner head 102 or with the user being required to assemble the cleaner head assembly 104 by attaching the cleaner head member 100 to the cleaner head 102.

The cleaner head member 100 or the cleaner head assembly 104 may be included in a wet cleaning apparatus that also includes a cleaning liquid supply for supplying cleaning liquid to the cleaner head member 100.

Such a cleaning liquid supply may, for example, comprise a cleaning liquid reservoir and a delivery arrangement, e.g. a delivery arrangement comprising a pump, for transporting the cleaning liquid towards the surface being cleaned 105.

In some embodiments, the wet cleaning apparatus includes an underpressure generator, e.g. a pump, for providing suction to the cleaner head member 100.

This suction may facilitate removal of dirt, e.g. dirty liquid, from the surface being cleaned 105 using the wet cleaning apparatus, as will be described in more detail herein below.

In some embodiments, the wet cleaning apparatus includes, together with the cleaner head member 100 or the cleaner head assembly 104, the cleaning liquid supply and the underpressure generator.

Thus, the wet cleaning apparatus may be able to supply cleaning liquid to the surface being cleaned 105 as well as being capable of removing dirt, e.g. dirty liquid, from the surface being cleaned 105.

In some embodiments, the cleaning liquid supply is configured to provide a continuous delivery of the cleaning liquid towards the surface to be cleaned 105. Such continuous delivery may, for instance, be provided at the same time as the underpressure generator is supplying suction to the cleaner head member 100.

The cleaning liquid supply and the underpressure generator may, for instance, be configured such that the flow of the cleaning liquid being delivered is equal to or lower than the flow provided by the underpressure generator.

This may assist to ensure that the surface to be cleaned 105 does not become excessively wet with the cleaning liquid.

For example, the flow of cleaning liquid may be in the range of 20 to 100 cm^3/minute, and the flow provided by the underpressure generator may be in the range of 40 to 2000 cm^3/minute, more preferably 80 to 750 cm^3/minute, even more preferably 100 to 300 cm^3/minute, and most preferably 150 to 300 cm^3/minute.

The cleaner head member 100 may have any suitable shape. In some embodiments, such as shown in FIG. 1A, the cleaner head member 100 is an elongate cleaner head member 100. Such an elongate cleaner head member 100 can be regarded as having an elongate shape whose lengthways dimension is larger than its width, for instance such that a

footprint of the cleaner head member 100 on the surface being cleaned 105 is oblong, or is at least substantially oblong.

Alternatively or additionally, the cleaner head member 100 can be regarded as a flat mop, e.g. a flat mop that is attachable to and/or detachable from a cleaner head 102 in the form of a nozzle.

Such a cleaner head 102, e.g. nozzle, may be of a wet cleaning apparatus or appliance that generates underpressure for suction, and delivers cleaning liquid, e.g. water, to distribute to the surface to be cleaned 105, for example a floor.

The wet cleaning apparatus may be, for example, a wet mopping device, a window cleaner, a sweeper, or a wet vacuum cleaner, such as a canister-type, stick type, or upright type wet vacuum cleaner. The wet cleaning apparatus may in some examples be a robotic wet vacuum cleaner or a robotic wet mopping device configured to autonomously move the cleaner head member 100 on the surface to be cleaned 105, such as the surface of a floor. Particular mention is made of the wet cleaning apparatus being a wet mopping device.

The wet cleaning apparatus may be a battery-powered (or battery-powerable) wet cleaning apparatus, such as a battery-powered (or battery-powerable) wet mopping device, in which the cleaning liquid supply and/or the underpressure generator, e.g. pump, is/are powered (or powerable) by a battery electrically connected (or connectable) thereto.

In some embodiments, such as shown in FIG. 1A, the cleaner head 102 comprises a support element 106, e.g. a rigid support element 106, for supporting the cleaner head member 100 thereon when the cleaner head member 100 is attached to the cleaner head 102.

The support element 106 can be formed from any suitable material. In some embodiments, the support element 106 is formed from a plastic material, e.g. a thermoplastic material.

The support element 106 can be fabricated in any suitable manner. In some embodiments, the support element 106, e.g. the support element 106 formed from the plastic material, is fabricated by a molding process, for instance by injection molding.

More generally, and referring now to FIG. 1B, the cleaner head member 100 comprises a connector 108, in other words an interface part, that is connectable to, in other words interfaceable with, a complementary connector 110 of the cleaner head 102.

A cleaning liquid duct between the cleaner head member 100 and the cleaner head 102 can be provided by the connection between the connector 108 and the complementary connector 110 when the cleaner head member 100 is attached to the cleaner

head 102. The cleaning liquid supply may, for example, be fluidly connected to the cleaner head member 100 via the cleaning liquid duct.

In addition to the cleaning liquid duct, the connection between the connector 108 and the complementary connector 110 may provide a sealed dirt duct between the cleaner head member 100 and the cleaner head 102 when the cleaner head member 100 is attached to the cleaner head 102. The underpressure generator may, for example, be fluidly connected to the cleaner head member 100 via the sealed dirt duct.

The sealed dirt duct may assist to minimize or avoid leakage of the underpressure at the connection between the cleaner head 102 and the cleaner head member 100 defined by the connector 108 and the complementary connector 110.

The complementary connector 110 may be mounted in the cleaner head 102 in any suitable manner. In some embodiments, and still referring to FIG. 1B, the cleaner head 102 comprises an exterior portion 111 that faces, in use, the surface to be cleaned 105, with the complementary connector 110 being set back from the exterior portion. In such embodiments, the connector 108 may be arranged to protrude into the cleaner head 102, beyond the exterior portion 111, in order to connect to the complementary connector 110. This arrangement of the complementary connector 110 may assist to minimize the risk of damage, e.g. abrasion etc., to the complementary connector 110 that may otherwise occur should the complementary connector 110, when disconnected from the connector 108, protrude from the exterior portion 111, e.g. from the bottom of the cleaner head/nozzle 102.

It is noted that the cleaner head member 100, e.g. flat mop/mopping pad, may be stored separately from the cleaner head 102 (e.g. may be stored separately from the cleaner head-comprising wet cleaning apparatus), which can increase the risk of damage to the cleaner head 102, and particularly the complementary connector 110 thereof. This risk can be mitigated by setting the complementary connector 110 back from the exterior portion 111, such that the exterior portion 111 rather than the complementary connector 110 contacts an external surface, e.g. floor.

Hence the complementary connector 110 of the cleaner head 102 can be well-protected during storage and may be safely placed on the surface to be cleaned 105, e.g. floor, without the cleaner head member 100, e.g. flat mop/mopping pad, having to be attached thereto.

In some embodiments (not shown in the Figures), the attachment of the cleaner head member 100 to the cleaner head 102 is defined by connection of the connector 108 and the complementary connector 110 to each other. Alternatively, and referring to FIGs.

1A and 1B, the cleaner head member 100 may comprise alignment and/or attachment features 112A, 112B, provided in addition to the connector 108, for aligning and/or attaching the cleaner head member 100 to the cleaner head 102.

In such embodiments, the alignment and/or attachment features 112A, 112B may be configured to align with and/or attach to complementary alignment and/or attachment elements 113A, 113B included in the cleaner head 102.

In this manner, the connector 108 need not be solely relied upon to ensure suitable alignment and attachment of the cleaner head member 100 to the cleaner head 102. Accordingly, robustness of alignment and/or attachment between the cleaner head member 100 and the cleaner head 102 may be enhanced, and stress on the connection between the connector 108 and the complementary connector 110 can be relieved.

In some embodiments, such as shown in FIG. 1A, the alignment and/or attachment features 112A, 112B are included in a support substrate 114 of the cleaner head member 100.

For example, the alignment and/or attachment features 112A, 112B include one or more openings and/or recesses defined in the support substrate 114, with the opening(s) and/or recess(es) being arranged to receive alignment and/or attachment elements 113A, 113B in the form of protrusion(s) that protrude from the cleaner head 102.

Such protrusion(s) may, for example, in use protrude from the support element 106 of the cleaner head 102 towards the surface to be cleaned 105.

It is noted that the alignment and/or attachment features 112A, 112B may, for example, include central alignment and/or attachment features 112A and peripheral alignment and/or attachment features 112B arranged further from a center of the cleaner head member 100 than the central alignment and/or attachment features 112A.

In such embodiments, the central alignment and/or attachment features 112A may align with and/or attach to complementary central alignment and/or attachment elements 113A included in the cleaner head 102, and the peripheral alignment and/or attachment features 112B may align with and/or attach to complementary peripheral alignment and/or attachment elements 113B included in the cleaner head 102.

More generally, and still referring to FIGs. 1A and 1B, the cleaner head member 100 comprises a cleaning liquid outlet structure 115 for delivering the cleaning liquid towards the surface to be cleaned 105, and a dirt inlet structure 116A, 116B for receiving dirty liquid from the surface to be cleaned 105.

Thus, the cleaner head member 100 can deliver the cleaning liquid for cleaning the surface to be cleaned 105, as well as picking up liquid from the surface being cleaned 105.

In some embodiments, and irrespective of whether or not the support substrate 114 includes the above-mentioned alignment and/or attachment features 112A, 112B, the support substrate 114 may include a bottom surface 114A for facing, in use, the surface to be cleaned 105.

In such embodiments, the cleaning liquid outlet structure 115 and/or the dirt inlet structure 116A, 116B may be recessed into and/or embossed on the bottom surface 114A of the support substrate 114.

In embodiments in which the cleaning liquid outlet structure 115 is recessed into the bottom surface 114A of the support substrate 114, the cleaning liquid outlet structure 115 may comprise, e.g. be defined by, a groove defined in and extending across at least part of the bottom surface 114A. An example of a cleaning liquid outlet structure 115 in the form of such a groove is shown in FIGs. 1A and 1B.

A width of the groove may be, for example, 1 to 5 mm, such as about 2 mm.

In embodiments in which the cleaner head member 100 is an elongate, e.g. oblong, cleaner head member 100, a length of the groove may span, at least, a majority of the cleaner head member's 100 lengthways dimension.

In more general terms, the cleaning liquid outlet structure 115 may be an elongate cleaning liquid outlet structure 115 whose length spans, at least, a majority of the elongate cleaner head member's 100 lengthways dimension.

In embodiments in which the cleaning liquid outlet structure 115 is embossed on the bottom surface 114A of the support substrate 114, the cleaning liquid outlet structure 115 may comprise, e.g. be defined by, an arrangement of protruding elements protruding from the bottom surface 114A and extending across at least part of the bottom surface 114A, with cleaning liquid path(s) being defined between protruding elements of the arrangement of protruding elements.

It is noted that the cleaning liquid outlet structure 115 can be provided in any suitable manner, for example by pressing a stamp, e.g. a heated stamp, into the material, e.g. closed cell foam material, constituting the support substrate 114 and/or by one or more of laser cutting and milling of the material constituting the support substrate 114. Alternatively or additionally, the cleaning liquid outlet structure 115 may be provided by molding, e.g. injection molding, of the support substrate 114.

Reaction injection molding can, for example, be employed for fabricating the support substrate 114, particularly when the support substrate 114 is formed from a closed cell foam material.

In some embodiments, the dirt inlet structure 116A, 116B comprises at least one dirt inlet groove defined in and extending across at least part of the bottom surface 114A.

Alternatively or additionally, the dirt inlet structure 116A, 116B may comprise, e.g. may be defined by, an arrangement of protruding elements protruding from the bottom surface 114A and extending across at least part of the bottom surface 114A, with dirt path(s) being defined between protruding elements of the arrangement of protruding elements.

The dirt inlet structure 116A, 116B can be provided in any suitable manner, for example by pressing a stamp, e.g. a heated stamp, into the material, e.g. closed cell foam material, constituting the support substrate 114 and/or by one or more of laser cutting and milling of the material of the support substrate 114. Alternatively or additionally, the dirt inlet structure 116A, 116B may be provided by molding, e.g. injection molding, such as reaction injection molding, of the support substrate 114.

In some embodiments, and as best shown in FIG. 1A, the dirt inlet structure 116A, 116B comprises a first dirt inlet structure 116A and a second dirt inlet structure 116B that are arranged to receive liquid from different areas of the surface to be cleaned 105.

In such embodiments, the first dirt inlet structure 116A may extend along at least part of the cleaner head member's 100 lengthways dimension, and the second dirt inlet structure 116B may also extend along at least part of the cleaner head member's 100 lengthways dimension but with the first dirt inlet structure 116A being separated from the second dirt inlet structure 116B across the width of the support substrate 114.

In embodiments in which the dirt inlet structure 116A, 116B comprises the first dirt inlet structure 116A and the second dirt inlet structure 116B, the cleaning liquid outlet structure 115 may be arranged in-between the first dirt inlet structure 116A and the second dirt inlet structure 116B.

This arrangement may provide efficient cleaning liquid delivery to and liquid pick-up from the surface being cleaned 105.

A bulk of the support substrate 114 may provide a flow barrier for liquid so that the liquid from the surface being cleaned 105 and the cleaning liquid delivered towards the surface being cleaned 105 respectively follow the flow paths defined by the dirt inlet structure 116A, 116B and the cleaning liquid outlet structure 115.

In some embodiments, such as shown in FIGs. 1A and 1B, the cleaning liquid outlet structure 115 is separated from the dirt inlet structure 116A, 116B by region(s) 118A, 118B of the support substrate 114.

By the region(s) 118A, 118B of the support substrate 114 separating the dirt inlet structure 116A, 116B from the cleaning liquid outlet structure 115, the risk of cleaning liquid in the cleaning liquid outlet structure 115 being drawn directly into the dirt inlet structure 116A, 116B can be lessened or removed. Thus, there may be a greater chance of the cleaning liquid reaching the surface being cleaned 105. The cleaning liquid may consequently be used more efficiently.

More generally, the support substrate 114 may be a pliable, in other words flexible, support substrate 114.

Such a pliable support substrate 114 can assist the cleaner head member 100 to follow contours on the surface being cleaned 105. Alternatively or additionally, the pliability of the pliable support substrate 114 may assist cleaning of the cleaner head member 100 after use, for example involving wringing liquid from the cleaner head member 100 and/or washing the cleaner head member 100 in the user's washing machine.

Such cleaning of the cleaner head member 100, e.g. when detached from the cleaner head 102, may assist to remove dirt particles that may build up inside and clog the cleaner head member 100 during use.

In embodiments in which the support substrate 114 is a pliable support substrate 114, the support substrate 114 may be formed from any suitable pliable material. In some embodiments, the pliable material forming the pliable support substrate 114 is a polymeric material and/or elastomeric material.

Particular mention is made of silicone rubber and ethylene-vinyl acetate, in other words a copolymer of ethylene and vinyl acetate, for the pliable material.

In embodiments in which the pliable support substrate 114 is formed from ethylene-vinyl acetate, ethylene may, for example, account for 60 to 90 wt.% of the copolymer.

Other polymeric and/or elastomeric materials, such as a polydiene, e.g. polybutadiene, a thermoplastic elastomer, and so on, can also be contemplated for the pliable material.

Alternatively or additionally, the pliable material can be less than 50 Shore A, preferably less than 20 Shore A, most preferably less than 10 Shore A.

In a non-limiting example, the pliable material is 4 Shore A silicone rubber.

In some embodiments, the pliable support substrate 114 is formed from a closed cell foam material, for example an ethylene-vinyl acetate closed cell foam material.

Such a closed cell foam material may facilitate an efficient (and inexpensive) production/assembly process for fabricating the cleaner head member 100.

The connector 108, in other words interface part, may be provided in and/or on, e.g. mounted to, the support substrate 114.

In some embodiments, and as best shown in FIG. 1B, the connector 108 is provided on, e.g. mounted to, a top surface 114B of the support substrate 114, which top surface 114B, in use, faces away from the surface to be cleaned 105.

In some embodiments, the connector 108 is permanently affixed to the support substrate 114.

Such mounting and/or permanent affixing of the connector 108 to the support substrate 114 can be implemented in any suitable manner, for example by at least part of the connector 108 being clamped between layers of the cleaner head member 100 and/or by adhering the connector 108 to the support substrate 114, e.g. using adhesive and/or adhesive tape.

In some embodiments, the connector 108 is an integral part of the support substrate 114. In other words, the connector 108 may be formed by the support substrate 114.

This can be implemented, for example, when injection molding is used to fabricate the support substrate 114.

More generally, the connector 108 can be made of any suitable material, e.g. a rigid material or a flexible material. In at least some embodiments, the connector 108 is formed from a plastic material.

In some embodiments, and referring again to FIG. 1A, the cleaner head member 100 comprises a cover member 117 arranged over at least part of the bottom surface 114A of the support substrate 114. The support substrate 114 and the cover member 117 can, for example, be regarded as stacked layers of the cleaner head member 100.

The cover member 117 may be formed from any suitable material. In some embodiments, the cover member 117 comprises a plastic material.

In some embodiments, the cover member 117 comprises at least one selected from polyester and polyamide. Alternatively or additionally, the cover member 117 can comprise a porous layer arranged over the bottom surface 114A of the support substrate 114. Pores of the porous layer can receive dirty liquid from the surface being cleaned 105. For

example, the underpressure generator included in the wet cleaning apparatus can cause the dirty liquid to be drawn into the pores of the porous layer.

In some embodiments, the porous layer comprises one or more of a woven fabric, e.g. a microfiber woven fabric, a mesh, and a perforate membrane.

Such a mesh, e.g. a monofilament mesh, and/or perforate membrane may represent a relatively straightforward way of providing pores with a well-defined geometry, which may be beneficial for reasons explained below.

In the case of a mesh, e.g. monofilament mesh, the pores may be defined by the manner in which the wires, e.g. polymer wires, of the mesh are woven and/or welded. In such embodiments, the pores may have, for example, a square cross-sectional shape.

For instance, the porous layer may comprise, e.g. be defined by, a plain weave woven mesh or a twill weave woven mesh.

In embodiments in which the porous layer comprises, e.g. is defined by, a woven fabric, e.g. a microfiber woven fabric, the woven fabric can comprise, for example, polyester fibers, polyamide fibers, and combinations of polyester and polyamide fibers.

It is noted that the term "microfiber woven fabric" as used herein may refer to a fabric formed of synthetic fibers, with the fabric being formed of threads whose titre is less than 1 decitex.

In at least some embodiments, the cover member 117 is a pliable cover member 117.

Such a pliable cover member 117 can assist the cleaner head member 100 to follow contours on the surface being cleaned 105 and/or may assist cleaning of the cleaner head member 100 after use, for example involving wringing of the cleaner head member 100 and/or washing of the cleaner head member 100 in the user's washing machine.

In embodiments in which the support substrate 114 is a pliable support substrate 114, the pliable cover member 117 may be included, together with the pliable support substrate 114, in the cleaner head member 100.

In some embodiments, the cover member 117 covers at least the dirt inlet structure 116A, 116B. In such embodiments, the dirt inlet structure 116A, 116B can receive liquid initially received by the cover member 117, e.g. initially received in the pores of the porous layer thereof.

The cover member 117 can, for example, cover the cleaning liquid outlet structure 115 and the dirt inlet structure 116A, 116B. Thus, the cover member 117, e.g. the

porous layer thereof, can assist to distribute cleaning liquid to the surface being cleaned 105, as well as assisting to remove dirty liquid from the surface being cleaned 105.

The cover member 117 can be attached to the support substrate 114 in any suitable manner. In at least some embodiments, the cover member 117, e.g. the porous layer thereof, is permanently affixed to the support substrate 114 so as to cover at least the dirt inlet structure 116A, 116B.

In some embodiments, the cover member 117 is sealingly attached to the support substrate 114 around the dirt inlet structure 116A, 116B. This sealing attachment may assist to maintain an underpressure in the dirt inlet structure 116A, 116B with or without the flow being applied by the underpressure generator included in the wet cleaning apparatus.

The sealing attachment can be implemented in any suitable manner, such as by gluing and/or welding the cover member 117, e.g. the porous layer thereof, around the dirt inlet structure 116A, 116B.

Ultrasonic welding may, for example, be used to permenantly affix the support substrate 114 to the cover member 117, e.g. the porous layer thereof. Alternatively or additionally, an adhesive and/or adhesive tape may be employed to affix, e.g. permanently affix, the support substrate 114 to the cover member 117, e.g. to the porous layer thereof.

In some embodiments, the cleaner head member 100, e.g. the cover member 116 thereof, comprises a surface interaction layer for contacting the surface to be cleaned 105.

In embodiments in which the porous layer is included in the cover member 116, the surface interaction layer can be arranged on the porous layer so that the surface interaction layer separates the porous layer from the surface to be cleaned 105.

In such embodiments, the surface interaction layer can be arranged on the porous layer in any suitable manner. For example, the surface interaction layer can be attached to the porous layer via sewing and/or using an adhesive.

Once attached to each other, e.g. via sewing and/or adhesive, the porous layer-surface interaction layer assembly may be arranged on, e.g. affixed to, the support substrate 114, for example via adhesive between the porous layer and the support substrate 114.

It is noted that in embodiments in which the cleaner head member 100 includes the surface interaction layer and the porous layer, the surface interaction layer may be more water permeable than the porous layer.

It is also noted at this point that the clean and dirty liquid distribution can be tuned by balancing the resistance of the cover member 117, e.g. the porous layer, for example

via selection of the material(s) and its surface area. Alternatively or additionally, different shapes and patterns of the dirt inlet structure 116A, 116B, e.g. groove(s), and the cleaning liquid outlet structure 115, e.g. groove(s), may be employed.

More generally, and referring again to FIG. 1B, the connector 108, which can be regarded as a multi-fluid channel connector 108, comprises at least one dirt channel 119A, 119B for transporting the dirty liquid away from the dirt inlet structure 116A, 116B. The connector further comprises at least one cleaning liquid channel 120 for supplying the cleaning liquid towards the cleaning liquid outlet structure 115.

The connector 108 may thus provide an integrated connector 108 for coupling the wet cleaning apparatus's underpressure generator and cleaning liquid supply respectively to the dirt inlet structure 116A, 116B and the cleaning liquid outlet structure 115 of the cleaner head member 100.

Each of the at least one cleaning liquid channel 120 may be separate from each of the at least one dirt channel 119A, 119B in the connector 108. Thus, there may be no mixing of the cleaning liquid and the dirty liquid within the connector 108.

Due to the dirt channel(s) 119A, 119B being separate from the cleaning liquid channel(s) 120 in the connector 108, there may be a greater chance of the cleaning liquid reaching the cleaning liquid outlet structure 115, and hence more of the cleaning liquid may be able to reach the surface being cleaned 105. The cleaning liquid may consequently be used more efficiently. Moreover, by separating the dirt channel(s) 119A, 119B and the cleaning liquid channel(s) 120 from each other in the connector 108, the risk of the cleaning liquid interfering with dirt pick-up functionality may be reduced.

For example, the connector 108 comprises wall(s) arranged between the dirt channel(s) 119A, 119B and the cleaning liquid channel(s) 120, which wall(s) keep the dirty liquid in the dirt channel(s) 119A, 119B separate from the cleaning liquid in the cleaning liquid channel(s) 120.

The cleaning liquid outlet structure 115 can be connected to the cleaning liquid channel(s) 120 of the connector 108 in any suitable manner. In some embodiments, and referring to FIG. 1B, the support substrate 114 delimits one or more cleaning liquid outlet passages 121 that fluidly couple the cleaning liquid outlet structure 115 to the cleaning liquid channel(s) 120 included in the connector 108.

Alternatively or additionally, the support substrate 114 may delimit one or more dirt inlet passages 122A, 122B that fluidly couple the dirt inlet structure 116A, 116B to the dirt channel(s) 119A, 119B included in the connector 108.

It is noted that in embodiments in which the dirt inlet structure 116A, 116B includes the first dirt inlet structure 116A and the second dirt inlet structure 116B, the at least one dirt channel 119A, 119B can include a first dirt channel 119A for fluidly connecting to the first dirt inlet structure 116A, and a second dirt channel 119B for fluidly connecting to the second dirt inlet structure 116B.

In such embodiments, the first dirt channel 119A may be fluidly connected to the first dirt inlet structure 116A via a first dirt inlet passage 122A delimited by the support structure 114, with the second dirt channel 119B being fluidly connected to the second dirt inlet structure 116B via a second dirt inlet passage 122B delimited by the support structure 114.

Turning to the complementary connector 110, the complementary connector 110 may itself include at least one dirt conduit 123A, 123B arranged to transport the dirty liquid away from the at least one dirt channel 119A, 119B of the connector 108.

The complementary connector 110 can also include at least one cleaning liquid conduit 124 arranged to supply the cleaning liquid to the at least one cleaning liquid channel 120 of the connector 108.

In such embodiments, each of the at least one cleaning liquid conduit 124 may be separate from each of the at least one dirt conduit 123A, 123B. In this way, there may be no mixing of the cleaning liquid and the dirty liquid within the complementary connector 110.

It is noted that the dirt conduit(s) 123A, 123B of the complementary connector 110 can, for example, include a first dirt conduit 123A for fluidly connecting to the first dirt channel 119A of the connector 108, and a second dirt conduit 123B for fluidly connecting to the second dirt channel 119B of the connector 108.

In some embodiments, and as best shown in FIG. 1C, the complementary connector 110 comprises at least one dirt tubing attachment member 125A, 125B for fluidly connecting tubing to the dirt conduit(s) 123A, 123B. The tubing may fluidly connect the dirt conduit(s) 123A, 123B to the underpressure generator, e.g. via a dirty liquid collection tank.

In embodiments in which the at least one dirt conduit 123A, 123B comprises the first dirt conduit 123A and the second dirt conduit 123B, the dirt tubing attachment member(s) 125A, 125B can include a first dirt tubing attachment member 125A for connecting the first dirt conduit 123A to the tubing, and a second dirt tubing attachment member 125B for connecting the second dirt conduit 123B to the tubing.

Alternatively or in addition to the dirt tubing attachment member(s) 125A, 125B, the complementary connector 110 can include at least one cleaning liquid tubing attachment member 126 for fluidly connecting cleaning liquid tubing to the cleaning liquid conduit(s) 124. Such cleaning liquid tubing may connect the cleaning liquid conduit(s) 124 to the cleaning liquid supply of the wet cleaning apparatus.

The connector 108 can have any suitable design. In some embodiments, and as best shown in FIGs. 1B and 2A, the connector 108 comprises a plurality of protruding members, in each of which protruding members one of the dirt channel(s) 119A, 119B and the cleaning liquid channel(s) 120 is at least partly defined.

In other words, the connections, through which the dirt channel(s) 119A, 119B and the cleaning liquid channel(s) 120 extend, can protrude outwardly from the cleaner head member 100.

This can assist secure attachment to the cleaner head 102, e.g. nozzle, to create an effective seal.

The protruding members may protrude from a base member 127 included in the connector 108, e.g. in an upward direction away from the top surface 114B of the support substrate 114.

The protruding members are, for example, linearly arranged, e.g. along the width of the cleaner head member 100.

Such a linear arrangement of the protruding members can, for instance, comprise a pair of peripheral protruding members on either side of a central protruding member, with the first dirt channel 119A being at least partly defined in one of the peripheral protruding members, the second dirt channel 119B being at least partly defined in the other of the peripheral protruding members, and the cleaning liquid channel 120 being at least partly defined in the central protruding member.

It is noted that the protruding members can be made of a rigid material or a flexible material. In some embodiments, the protruding members are each included in a single molded part, e.g. injection molded part.

Such a molded part can, for example, be affixed, e.g. glued, to the support substrate 114, for example to the top surface 114B of the support substrate 114.

The complementary connector 110 can have any suitable design. In some embodiments, and referring to FIG. 1C, the complementary connector 110 comprises a set of cap members 128A, 128B, 129 that each fit over one of the protruding members included in the connector 108.

In such embodiments, a first cap member 128A may fit over the protruding member in which the first dirt channel 119A is at least partly defined, a second cap member 128B may fit over the protruding member in which the second dirt channel 119A is at least partly defined, and a third cap member 129 may fit over the protruding member in which the cleaning liquid channel 120 is defined.

In some embodiments, the cleaner head assembly 104, e.g. the cleaner head 102 and/or the cleaner head member 100, comprises a seal arrangement 130A, 130B, 131 arranged to hermetically seal a fluid connection between the at least one dirt channel 119A, 119B and the at least one dirt conduit 123A, 123B, and to hermetically seal a fluid coupling between the at least one cleaning liquid channel 120 and the at least one cleaning liquid conduit 124. In this way, leakage of cleaning liquid and underpressure via the connection provided by the connector 108 and the complementary connector 110 may be minimized or prevented.

The seal arrangement 130A, 130B, 131 may be included in the cleaner head 102, e.g. in the complementary connector 110 thereof, rather than in the cleaner head member 100.

Thus, more complex elements, in this case the seal arrangement 130A, 130B, 131, may be beneficially shifted from the cleaner head member 100, e.g. mopping pad, which may be a replaceable and/or machine washable part, to a non-consumable and non-machine washable part, namely the cleaner head 102.

The seal arrangement 130A, 130B, 131 can have any suitable design. In some embodiments, and referring again to FIG. 1B, the seal arrangement 130A, 130B, 131 comprises a first elastomeric seal member 130A for hermetically sealing a first fluid connection between the first dirt channel 119A and the first dirt conduit 123A, a second elastomeric seal member 130B for hermetically sealing a second fluid connection between the second dirt channel 119B and the second dirt conduit 123B, and a third elastomeric seal member 131 for hermetically sealing the fluid coupling between the cleaning liquid channel 120 and the cleaning liquid conduit 124.

It is noted that the cleaner head member 100, e.g. flat mop, can, for example, comprise three hermetically sealable connections designed for engagement with the cleaner head 102, e.g. nozzle. In this example, two of the hermetically sealable connections, namely the hermetically sealable connections through which the first and second dirt channels 119A, 119B extend, are for establishing a circuit and pump mechanism responsible for providing underpressure to the dirt inlet structure 116A, 116B, in other words suction zone, of the

cleaner head member 100. The remaining hermetically sealable connection, namely the hermetically sealable connection through which the cleaning liquid channel 120 extends, is for establishing a separate circuit and pump mechanism responsible for dispensing cleaning liquid to the cleaning liquid outlet structure 115, e.g. the cleaning liquid outlet structure 115 provided in/on the bottom surface 114A of the support substrate 114.

Referring to FIG. 2A, the solid black arrow 132A denotes delivery of cleaning liquid to the cleaning liquid outlet structure 115 via the cleaning liquid channel(s) 120 of the connector 108, and the solid black arrow 132B denotes delivery of the cleaning liquid from the cleaning liquid outlet structure 115 towards the surface to be cleaned 105, e.g. via the cover member 117 (not shown in FIG. 2A).

The arrows 133A in FIG. 2A are intended to represent suction of dirty liquid from the surface to be cleaned 105 into the dirt inlet structure 116A, 116B, e.g. via the cover member 117, such as via the porous layer thereof. The arrows 133B denote transport of the dirty liquid from the dirt inlet structure 116A, 116B to the dirt channel(s) 119A, 119B of the connector 108 via the dirt inlet passage(s) 122A, 122B, and the arrows 133C represent transport of the dirty liquid downstream of the connector 108, e.g. in the dirt conduit(s) 123A, 123B of the complementary connector 110.

The connector 108 may comprise a snap-fit connector. This may provide a reliable connection, e.g. sealed connection, between the connector 108 and the complementary connector 110. Moreover, the snap-fit connector may facilitate connection and/or disconnection of the connector 108 and the complementary connector 110 to/from each other, and can thus assist attachment and/or detachment of the cleaner head member 100 to/from the cleaner head 102.

The snap-fit connection can be implemented in any suitable manner. In some embodiments, the snap-fit connection comprises a spring-loaded snap-fit mechanism. Such a spring-loaded snap-fit mechanism can assist to ensure optimal performance, as well as durability of the cleaner head assembly 104.

In some embodiments, and referring to FIGs. 1B, 2A and 2B, the snap-fit connection comprises projecting element(s) 134 included in one of the connector 108 and the complementary connector 110, with the projecting element(s) being each receivable, via a spring-loaded snap-fit, in a slot included in the other of the connector 108 and the complementary connector 110. This design can assist to ensure optimal connection.

In some embodiments, the projecting element(s) 134 protrude from the connector 108, e.g. away from the base member 127 thereof.

In such embodiments, the projecting element(s) 134 can additionally help to protect a sealing area around the dirt channel(s) 119A, 119B and the cleaning liquid channel 120 of the connecto 108.

It is noted that the connector 108 may be subjected to significant mechanical stress, particularly in embodiments in which the support substrate 114 is pliable such that the user is able to fold or wring the cleaner head member 100.

Thus, in some embodiments, such as shown in FIG. 3, a flexible reinforcement member 135 is arranged around the connector 108. This flexible reinforcement member 135 can provide strain relief for protecting the connector-comprising part of the cleaner head member 100.

The flexible reinforcement member 135 can be a separate part that is affixed to the support substrate 114 or can be molded with the support substrate 114, for example in a so-called 2K injection molding process in which the support substrate 114 is molded in an initial molding step, and the flexible reinforcement member 135 is molded onto the support substrate 114 in a subsequent molding step.

Alternatively or in addition to the flexible reinforcement member 135, and referring now to FIG. 4, the substrate may comprise one or more flexing zones 136A, 136B adjacent to the connector 108, with such flexing zone(s) 136A, 136B being more susceptible to flexing than regions of the support substrate 114 adjacent to the flexing zone(s) 136A, 136B. The flexing zone(s) 136A, 136B can assist to protect the connector 108 from damage caused by folding or wringing of the cleaner head member 100.

In such embodiments, the connector 108 may be arranged in-between a first flexing zone 136A and a second flexing zone 136B of the one or more flexing zones 136A, 136B. Thus, the connector 108 may be arranged in a central or intermediate region of the cleaner head member 100 that is less prone to flexing.

The flexing zone(s) 136A, 136B can be implemented in any suitable manner. In some embodiments, such as shown in FIG. 4, the flexing zone(s) 136A, 136B is/are in the form of one or more trenches defined in the top surface 114B of the support substrate 114 adjacent to the connector 108. Such trench(es) can, for example, be regarded as folding line(s) along which the support substrate 114 is preferentially foldable compared to the part of the cleaner head member 100 in which the connector 108 is arranged.

In such embodiments, and still referring to FIG. 4, the connector 108 may be arranged in-between a first trench and a second trench of the one or more trenches. Thus, the

connector 108 may be arranged in a central or intermediate region of the cleaner head member 100 that is less prone to folding.

Regarding the porous layer that can be included in the cover member 117, it is noted that the porous layer may assist to maintain an underpressure in the cleaner head member 100, with or without a flow being applied by the underpressure generator included in the wet cleaning apparatus.

When the porous layer is dry, the porous layer may be regarded as being in an "air transport state" in which air is transported through each of the dry pores of the porous layer. A "liquid transport state" corresponds to liquid, e.g. water, being transported through the (wetted) pores of the porous layer. When there is no longer a feed of liquid to the pores, a "fluid block state" may be adopted. The "fluid block state" corresponds to the state at which the surface tension of the (residual) liquid retained in the wetted pores of the porous layer prevents fluid transport through the pores. In the latter state, a surface or barrier is created at the boundary between air and liquid, e.g. water. This barrier can assist to maintain the underpressure between the porous layer and the underpressure generator. The pressure needed to "break" this barrier can be termed a "breaking pressure".

In some embodiments, pores of the porous layer extend across the porous layer's thickness and open out at opposite sides of the porous layer, with a linear central axis of each pore extending across the thickness and passing through an intermediate point surrounded by a pore wall of the respective pore; the pore wall being arranged about the linear central axis. In such embodiments, each pore can be regarded as a through-hole that axially extends through the thickness of the porous layer.

A path of least resistance to fluid flow across the porous layer may be defined along the linear central axes of the pores.

Pores of the porous layer, whose linear central axis extends across the porous layer's thickness and passes through an intermediate point surrounded by a pore wall of the respective pore, are considered to be better defined than, for example, pores defined between fibers of a woven fabric.

In particular, the pores of the porous layer may have a pore size distribution that can be selected to be separate from, in other words not overlapping with, a pore size distribution of a further porous layer, e.g. the surface interaction layer, arranged on the porous layer. In particular, the pore size distribution of the porous layer may be shifted to larger pore sizes than the pore size distribution of the further porous layer.

This may mean that dirt particles that are sufficiently small to initially pass through the further porous layer also pass through the porous layer when the porous layer and the further porous layer are subjected to the underpressure generated by the wet cleaning apparatus's underpressure generator. This may make the porous layer less liable to be clogged by such dirt particles during use.

Such pores can be defined in any suitable manner, for example by laser ablation of a polymeric membrane, or by a woven structure of a mesh, e.g. a monofilament mesh.

In some embodiments, each pore of the porous layer has a polygonal, e.g. square, or circular cross-sectional shape perpendicular to the linear central axis. Such a polygonal, e.g. square, or circular cross-sectional shape perpendicular to the linear central axis may mean that the pore wall provides a consistent surface, in particular a relatively well-defined rim between a surface of the pore wall and exterior surface(s) of one or both sides of the porous layer. This can assist to increase the breaking pressure.

The rim between a surface of the pore wall and an exterior surface of the porous layer may, for example, have a radius of curvature of 0.1 μm to 3 μm.

Such a radius of curvature, which may be significantly smaller than the pore radius, may assist to prevent the size of the liquid-air interface/surface from growing when pressure is applied. This may prevent the increase in force on the surface (force being equal to pressure multiplied by area), hence prevents the surface's edge from being overloaded sooner, thereby keeping the surface from collapsing/"exploding".

It is noted that such well-defined pores of the porous layer contrast with the pores defined between fibers of a woven fabric in which a range of contact angles are effectively provided around the surfaces delimiting a given pore. The shapes of the upstream and downstream openings of such a woven fabric pore are also not as well-defined as the upstream and downstream rims of the porous layer. This means that in the case of a pore of a woven fabric, there may always be a place in the pore where the contact angle reaches its limit so that the liquid barrier can no longer maintain its position. The resultant barrier movement may enlarge the surface area on which the pressure acts; the total force on the barrier increasing, making it harder for the rest of the barrier to maintain its position, with further movement resulting, and so on. This issue may be addressed by the well-defined pore geometry of each of the pores of the porous layer according to embodiments of the present disclosure.

In summary, a contact angle between liquid and the surface of the porous layer may always be present; an increase in pressure may move an edge of the barrier to a new position of equilibrium; if this shifting occurs while the barrier remains relatively small, higher breaking pressures can be obtained; if the shifting occurs while significantly increasing the surface area of the barrier, the breaking pressure may be lower.

In some embodiments, the thickness of the porous layer is less than 200 μm, preferably less than 100 μm. Such a maximum thickness may contribute to minimizing of flow resistance through the porous layer.

The thickness of the porous layer can be determined by using a precision gauge and two ground metal plates (with the upper plate by which the normal pressure is applied being 70 mm x 30 mm, and the lower plate on which the sample of the porous layer is supported having a larger area than the 70 mm x 30 mm surface of the upper plate for ease of alignment) for receiving the porous layer therebetween. The arrangement is configured to apply a pressure normal to the sample of the porous layer (70 mm x 30 mm) of 864.2 N/m^2. The relevant measurement parameters are provided in Table 1:

Metal plate parameters	Length	70 mm	Area of sample	2100 mm^2
	Width	30 mm	Total mass	185 g
	mass	85 g	Total force	1.81 N
	Fn (gauge force)	100 g	Pressure	864.2 N/m^2

Table 1

In some embodiments, the cover member 117 comprises the further porous layer, e.g. the surface interaction layer, for contacting the surface to be cleaned 105, with the porous layer being interposed between the further porous layer and the support substrate 114.

Liquid received from the surface being cleaned 105 may be transported through pores of the further porous layer to the pores of the porous layer.

The further porous layer may be arranged on the porous layer in any suitable manner. In some embodiments, the further porous layer is detachable from the porous layer, for example to facilitate cleaning of one or both of the porous layer and the further porous layer. Alternatively or additionally, detachment of the further porous layer may enable the further porous layer to be replaced without having to replace the porous layer at the same time.

In some embodiments, the further porous layer, e.g. the surface interaction layer, is in the form of a disposable, e.g. single-use, cloth or wipe.

The further porous layer, e.g. the surface interaction layer, can be formed from any suitable material, such as viscose, polyester or polyvinylalcohol.

Preferably the material forming the further porous layer, e.g. the surface interaction layer, is biodegradable and/or sustainable.

The further porous material, e.g. the above-mentioned cloth or wipe, can be fixed to the cleaner head member 100, the cleaner head 102 and/or the support substrate 114 in any suitable manner, for example via hooks-loops fasteners and/or via flexible grippers.

In embodiments in which the flexible grippers are employed, such flexible grippers may, for example, be integrated into the pliable material of the support substrate 114.

In other embodiments, the porous layer and the further porous layer are permanently affixed to each other, for example via sewing, welding, e.g. ultrasonic welding, and/or via an adhesive.

Such permanent attachment of the porous layer and the further porous layer to each other may make manufacture of the cleaner head member 100 simpler and less expensive.

In some embodiments, the further porous layer comprises one or more woven fabric layers, e.g. one or more microfiber fabric layers.

The woven fabric layer(s) can comprise, for example, polyester fibers, polyamide fibers, and combinations of polyester and polyamide fibers.

The further porous layer may, more generally, be formed from a polyester and/or a polyamide.

In some embodiments, a pore size distribution of the porous layer spans a range of pore sizes whose smallest pore size is larger than a largest pore size of a range of pore sizes spanned by the further porous layer.

This may mean that dirt particles passing through the further porous layer may also pass through the porous layer when the porous layer and the further porous layer are subjected to the underpressure generated by the wet cleaning apparatus's underpressure generator.

This may make the porous layer less liable to be clogged by such dirt particles during use because dirt particles that are sufficiently small to initially pass through the further porous layer also pass through the porous layer.

In some embodiments, the pores of the porous layer are exclusively arranged in a region of the porous layer that remains in contact with the further porous layer.

The maintaining of contact between the further porous layer and the porous layer may mean that any "broken" pores in the porous layer may be kept supplied with liquid from the further porous layer, and thereby "repaired". This can assist maintenance of the underpressure between the underpressure generator and the porous layer.

Alternatively or additionally, the further porous layer may have a porous structure configured to enable lateral fluid transport in a first direction within the further porous layer as well as fluid transport in a second direction across a thickness of the further porous layer towards the porous layer. Such a porous structure may be provided, for example, by the further porous layer comprising, e.g. being defined by, the one or more woven fabric layers.

The lateral fluid transport provided in the further porous layer can assist to keep the porous layer supplied with liquid, thereby helping to repair broken pores of the porous layer.

ASTM F316 – 03, 2019, Test A provides a bubble point pressure measurement. Whilst this standard method was developed for nonfibrous membrane filters, the procedure can be replicated for the porous layer, as well as for the further porous layer when present.

The bubble point test for determining the limiting pore diameter, in other words maximum pore size, is, in summary, performed by prewetting a sample of the porous layer, increasing the pressure of gas upstream of the porous layer at a predetermined rate, and watching for gas bubbles downstream to indicate the passage of gas through the pores, e.g. maximum diameter pores, of the porous layer.

In common with the membrane filters described in ASTM F316 – 03, 2019, Test A, the porous layer may (at least to an approximation depending on the pore structure/type of porous layer) have discrete pores extending from one side of the porous layer to the other, similarly to capillary tubes. The bubble point test is based on the principle that a wetting liquid is held in these capillary pores by capillary attraction and surface tension, and the minimum pressure required to force liquid from these pores is a function of pore diameter. The pressure at which a steady stream of bubbles appears in this test is termed the "bubble point pressure".

It is noted that ASTM F316 – 03, 2019, Test A is based on an approximation of the pores as capillary pores having circular cross-sections, and hence the limiting pore diameter should be regarded as merely an empirical estimate of the maximum pore diameter based on this premise.

The testing apparatus mandated in ASTM F316 – 03, 2019, Test A is replicated, as is the test procedure.

1. The sample of porous layer (2 inch (50.8 mm) diameter, held in a circular holder such as to have an open/active area having a diameter of 47 mm), is wetted completely by floating it on a pool of the liquid (noting that a vacuum chamber may be used to assist in wetting the sample, if necessary). For water-wettable samples, the sample is placed in water and soaked fully.

2. The wet sample of porous layer is placed in the filter holder of the test apparatus.

3. A fine (100 by 100) mesh is placed onto the sample of porous layer; the fine mesh being a first part of the 2-ply construction mandated by the standard.

4. The second part of the 2-ply construction, in the form of a perforated metal component to add rigidity, is placed on the fine mesh.

5. A support ring is placed onto the stack and secured in place using bolts. A slight gas pressure can be applied at this point to eliminate possible liquid backflow.

6. The perforated metal component is covered with 2 to 3 mm of test liquid (Type IV water as mandated by the standard when the sample is wettable with water).

7. The gas pressure is then raised and the lowest pressure at which a steady stream of bubbles rises from the central area of the reservoir is recorded (see Fig. 5 of ASTM F316 – 03, 2019, Test A; noting that bubbles observed at the edge of the reservoir are neglected for the bubble point determination).

It is suitable to first raise the pressure relatively quickly, e.g. at about 200 Pa/second, to roughly determine the bubble point. Pressure can then be relieved from the sample to allow the water to run back into the sample. The pressure is then raised to roughly 80% of the expected pressure value, maintained at the 80% level for about 15 seconds (to ensure all "free" water is pressed out of the sample), and then raised again at a lower rate of ≤ 50 Pa/second until the constant flow of bubbles was observed.

The limiting pore diameter, d, is then determined from the recorded bubble point pressure, p, using equation 1 of ASTM F316 – 03, 2019, Test A: $d = C\gamma/p$, where γ is the surface tension in mM/m (72.75 for distilled water at 20°C), and C is 2860 when p is in Pa.

In some embodiments, the porous layer has a limiting pore diameter, as measured using ASTM F316 – 03, 2019, Test A, that is less than or equal to 105 μm. The 105 μm upper limit for the limiting pore diameter, equivalent to a minimum bubble point

pressure of 2000 Pa, may assist to ensure that sufficient underpressure is maintainable by the porous layer.

Alternatively or additionally, the porous layer has a limiting pore diameter, as measured using ASTM F316 – 03, 2019, Test A, that is greater than or equal to 6 µm. It has been found empirically that a limiting pore diameter equal to or greater than 6 µm may assist to maintain a relatively large underpressure whilst ensuring that pores still enable efficient liquid transport therethrough. The latter may also be assisted by minimizing the thickness of the porous layer.

In some embodiments, the porous layer has a limiting pore diameter, as measured using ASTM F316 – 03, 2019, Test A, that is greater than or equal to 8 µm, most preferably greater than or equal to 11 µm.

In some embodiments, the limiting pore diameter of the porous layer as measured using ASTM F316 – 03, 2019, Test A is 11 to 15 µm.

It has been observed that "self-repair" of "broken" pores of the porous layer, e.g. when the porous layer is employed together with the above-mentioned further porous layer, e.g. a further porous layer made of a woven fabric, may be enhanced when the limiting pore diameter of the porous layer is 11 to 15 µm.

In some embodiments, the further porous layer has a limiting pore diameter, as measured using ASTM F316 – 03, 2019, Test A, equal to or less than 105 µm and/or equal to or greater than 15 µm.

It has been found empirically that a limiting pore diameter of the further porous layer being equal to or greater than 15 µm may assist to maintain a relatively large underpressure whilst ensuring that pores are sufficiently large for efficient liquid transport through the further porous layer.

Equivalently, a bubble point pressure of the further porous layer as measured using ASTM F316 – 03, 2019, Test A may be equal to or less than 13500 Pa.

In some embodiments, a limiting pore diameter of the further porous layer as measured using ASTM F316 – 03, 2019, Test A is equal to or less than 105 µm. This upper limit for the limiting pore diameter assists to ensure that sufficient underpressure is maintainable by the further porous layer.

Equivalently, a bubble point pressure of the further porous layer as measured using ASTM F316 – 03, 2019, Test A may be equal to or greater than 2000 Pa. Preferably, the bubble point pressure of the further porous layer is 7000 Pa to 9000 Pa.

More generally, the underpressure generator of the wet cleaning apparatus may subject the porous layer to the underpressure, preferably by being configured to generate a flow through the porous layer that is at most 2000 cm^3/minute.

In some embodiments, the underpressure generator is configured to supply said suction by providing a flow through the porous layer in the range of 15 to 2000 cm^3/minute, more preferably 80 to 750 cm^3/minute, even more preferably 100 to 300 cm^3/minute, and most preferably 150 to 300 cm^3/minute.

Such a flow, i.e. flow rate, may capitalise on the underpressure-maintaining capability of the porous layer, and may ensure sufficient liquid pick-up whilst limiting energy consumption.

The underpressure generator may be configured to provide a pressure difference between an inside of the wet cleaning apparatus and atmospheric pressure for drawing fluid through the porous layer, with the pressure difference being in a range of 2000 Pa to 15000 Pa, preferably 2000 Pa to 13500 Pa.

The pressure difference can be directly and positively verified in a given wet cleaning apparatus by, for example, drilling a hole in a tube of the wet cleaning apparatus that fluidly connects the underpressure generator and pores of the porous layer and using the hole to couple to a pneumatic pressure sensor itself having a tube with a membrane covering an end thereof; the sensor being thus connected using an airtight connection. The sensor may be arranged to avoid disturbing the flow, hence the skilled person will arrange the sensor to avoid, for instance, creating a bypass flow. No flow may be towards or from the sensor: only pressure is transmitted. In this way, the flow of the appliance may never be compromised (hence may remain at the set level in spite of the sensor installation).

The pressure sensor is connected between the porous layer and the underpressure generator and as close to the porous layer as possible, to minimise the influence of other factors, such as flow resistance etc., on the sensed pressure difference.

The sensing element/ membrane of the pressure sensor/gauge is ideally arranged/positioned in the pressure sensor so that the sensing element can be placed directly (without the requirement for connecting tubes) in the tube, or in a cavity behind the porous layer.

By positioning the membrane of the pressure sensor, in other words membrane pressure gauge, with the membrane positioned at, in other words in line with, the wall of the tube (or exposed to the cavity), measurement errors may be minimized, as will be appreciated by a person skilled in the art.

It is noted that air bubbles inside narrow tubes may generate resistance (capillary/surface tension effects), and hence may influence the measurement. Hence the skilled person will further appreciate that care is also to be taken that air bubbles (water-air surfaces) do not unduly influence the pressure difference measurement.

It is further noted that a column of water present between the pressure sensor and the porous layer should be deducted from the measurement result (if such a column of water is present during the measurement), to compensate for the static pressure generated by the column of water.

Once the pressure sensor is arranged as described above, it may be ascertained that maintenance of the underpressure is due to the porous layer, and the further porous layer when present, and not some other element, such as a valve. Any such element that influences the underpressure that is presented to the porous layer should be rendered inoperable for the purpose of performing the measurement.

Component(s) that dispense cleaning liquid (should the wet cleaning apparatus be configured to deliver cleaning liquid) is/are disengaged when performing the pressure difference measurement.

The wet cleaning apparatus is turned on (in the desired setting), so that the pick-up system comprising the underpressure generator is activated. Recording of data from the pressure sensor is started.

The pick-up area of the cleaner head member 100 is suspended in a layer of water, at max. 5 mm depth.

The pick-up area is then lifted from the water without tilting it in any way (so that the cleaner head member 100 remains in a cleaning position, as if it were positioned to clean the floor), so that the water is no longer touching the porous layer or the further porous layer, when present. At this point, “free water” will be removed from the porous layer (and the further porous layer, when present), all pores will go into their “blocked state”, and the breaking pressure is determinable. An equilibrium is established in an end regime in which the applied flow results in an underpressure which causes no more fluid blocks to break.

The breaking pressure obtained from this measurement result, at the end regime, is the “pressure difference between the inside of the wet cleaning apparatus and atmospheric pressure for drawing fluid through the porous layer.” It is verified from the measurement result whether or not the 2000 Pa to 15000 Pa range, or the 2000 Pa to 13500 Pa preferred range, is satisfied.

The underpressure generator may, for example, comprise a positive displacement pump, such as a peristaltic pump.

Such a positive displacement pump can assist to maintain the underpressure after the underpressure generator has been deactivated, e.g. switched off, because the pump design inherently restricts backflow from the pump outlet. This, in turn, may alleviate problematic liquid release from the porous layer, for instance following cleaning of the surface to be cleaned 105 and/or during stowing of the wet cleaning apparatus in a storage area after use.

It is reiterated that the wet cleaning apparatus may include a dirty liquid collection tank. In such embodiments, the underpressure generator may be arranged to draw liquid through the porous layer and to the dirty liquid collection tank, via the dirt inlet structure 116A, 116B and the dirt channel(s) 119A, 119B.

Variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of the drawings, the disclosure and the appended claims. In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality.

The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

If the term "adapted to" is used in the claims or description, it is noted the term "adapted to" is intended to be equivalent to the term "configured to".

Any reference signs in the claims should not be construed as limiting the scope.

CLAIMS

1. A cleaner head member (100) attachable to and/or detachable from a cleaner head (102) of a wet cleaning apparatus, the cleaner head member comprising:

a cleaning liquid outlet structure (115) for delivering cleaning liquid towards a surface to be cleaned (105);

a dirt inlet structure (116A, 116B) for receiving dirty liquid from the surface to be cleaned; and

a connector (108) that is connectable to a complementary connector (110) of the cleaner head, the connector comprising:

at least one dirt channel (119A, 119B) for transporting the dirty liquid away from the dirt inlet structure; and

at least one cleaning liquid channel (120) for supplying the cleaning liquid towards the cleaning liquid outlet structure.

2. The cleaner head member (100) according to claim 1, wherein each of the at least one cleaning liquid channel is separate from each of the at least one dirt channel in the connector.

3. The cleaner head member (100) according to claim 1 or claim 2, wherein the connector (108) comprises a snap-fit connector.

4. The cleaner head member (100) according to any one of claims 1 to 3, comprising alignment and/or attachment features (112A, 112B), provided in addition to the connector (108), for aligning and/or attaching the cleaner head member to the cleaner head (102).

5. The cleaner head member (100) according to any one of claims 1 to 4, comprising a support substrate (114), the connector (108) being provided in and/or on the support substrate.

6. The cleaner head member (100) according to claim 5, wherein the support substrate (114) comprises one or more flexing zones (136A, 136B) adjacent to the connector (108), the flexing zone(s) being more susceptible to flexing than regions of the support

substrate adjacent to the flexing zone(s), optionally wherein the connector is arranged in-between a first flexing zone (136A) and a second flexing zone (136B) of the one or more flexing zones.

7. The cleaner head member (100) according to claim 5 or claim 6, wherein a flexible reinforcement member (135) is arranged around at least part of the connector (108).

8. The cleaner head member (100) according to any one of claims 5 to 7, wherein the support substrate (114) comprises a bottom surface (114A) for facing, in use, the surface to be cleaned (105), the cleaning liquid outlet structure (115) and the dirt inlet structure (116A, 116B) each being recessed into and/or embossed on the bottom surface.

9. The cleaner head member (100) according to any one of claims 5 to 8, wherein the support substrate (114) is a pliable support substrate; optionally wherein the support substrate is formed from a closed cell foam material.

10. The cleaner head member (100) according to any one of claims 1 to 9, comprising a cover member (117) arranged over at least the dirt inlet structure (116A, 116B); optionally wherein the cover member (117) comprises a porous layer arranged over at least the dirt inlet structure (116A, 116B).

11. A cleaner head assembly (104) comprising:
the cleaner head member (100) according to any one of claims 1 to 10; and
a cleaner head (102) to which the cleaner head member is attachable and/or detachable, the cleaner head comprising said complementary connector (110), the complementary connector comprising:
at least one dirt conduit (123A, 123B) arranged to transport the dirty liquid away from the at least one dirt channel (119A, 119B); and
at least one cleaning liquid conduit (124), the at least one cleaning liquid conduit being arranged to supply the cleaning liquid to the at least one cleaning liquid channel (120).

12. The cleaner head assembly (104) according to claim 11, wherein the cleaner head (102) comprises an exterior portion (111) that faces, in use, the surface to be cleaned

(105), the complementary connector (110) being set back from the exterior portion, the connector (108) being arranged to protrude into the cleaner head, beyond the exterior portion, in order to connect to the complementary connector.

13. The cleaner head assembly (104) according to claim 11 or claim 12, comprising a seal arrangement (130A, 130B, 131) arranged to:

hermetically seal a fluid connection between the at least one dirt channel (119A, 119B) and the at least one dirt conduit (123A, 123B), and

hermetically seal a fluid coupling between the at least one cleaning liquid channel (120) and the at least one cleaning liquid conduit (124).

14. The cleaner head assembly (104) according to any one of claims 11 to 13, wherein the connector (108) and the complementary connector (110) are connectable to each other via a snap-fit connection.

15. A wet cleaning apparatus comprising:

the cleaner head member (100) according to any one of claims 1 to 10 or the cleaner head assembly (104) according to any one of claims 11 to 14;

a cleaning liquid supply for supplying cleaning liquid for delivery towards the surface to be cleaned (105) via the at least one cleaning liquid channel (120) and the cleaning liquid outlet structure (115); and

an underpressure generator for providing suction to the surface to be cleaned via the at least one dirt channel (119A, 119B) and the dirt inlet structure (116A, 116B).