OBJECT ASSEMBLY AND METHOD FOR FASTENING AN OBJECT

The invention relates to an object arrangement comprising an object, in particular a sanitary object, which is secured to a fixing structure.

It is generally known to secure all kinds of objects to fixing structures. To this end, the objects to be secured usually have a mounting surface. Such a mounting surface may be a single continuous surface, but may alternatively consist of several partial surface areas.

In a conventional mounting arrangement according to the prior art, the mounting surface or its partial surface areas come into contact with a fixing surface area of the fixing structure opposite the mounting surface or the respective partial surface area, in particular directly.

Usually, the mounting surface or its partial surface areas lie in a single plane. The same applies to the fixing surface on the fixing structure. This creates a statically stable, non-tipping arrangement.

The invention is intended for use, in particular, with sanitary objects, but is not limited to these.

The term ‘sanitary object’ is preferably understood to mean any object that can be used in a sanitary area, e.g. a toilet bowl, a washbasin or vanity unit, a bidet, a urinal, a cupboard, etc. Such sanitary objects are usually secured either standing or suspended from a fixing structure in order to be usable.

An object, preferably a sanitary object, is secured to a fixing structure in particular by means of screws or threaded bolts as fasteners, which are anchored in the fixing structure and pass through mounting recesses in the object, preferably a sanitary object.

A fixing structure is preferably understood to mean an architectural, structural installation or arrangement to which an object, preferably a sanitary object, can be secured, e.g. a wall or a floor or a ceiling of a property; however, other objects may also form a fixing structure to which the securing of objects, in particular sanitary objects, may be intended.

For example, a freestanding washbasin, as a sanitary object, can be mounted upright on a vanity unit acting as a fixing structure. A fixing structure is thus preferably part of a property or may itself be a mobile object.

To ensure the sanitary object is used as intended, the fixing structure, particularly in the vicinity of its fixing surface area, preferably features the necessary sanitary connections, preferably pipework for the water supply and waste water drainage.

According to the current state of the art, a sanitary object is normally secured directly onto a fixing surface area of the fixing structure, or at most with the interposition of a thin decoupling layer, e.g. made of non-woven fabric for acoustic decoupling. Even with such a decoupling layer, a sanitary object appears, visually, to be secured directly to the fixing structure because the decoupling layer has a visually negligible installation height, in particular less than 2 millimetres.

For decades, this method of directly securing sanitary objects to fixing structures has been the norm, resulting in sanitary objects and fixing structures being combined into an arrangement that, whilst stable, is visually bulky; it lacks visual elegance and lightness, and the object is lost as a standalone object.

The same problem arises with other objects outside the field of sanitary applications. Here too, the need for structurally sound fixing creates the problem that the object visually merges, at least in part, with the fixing structure and loses its visual individuality. This is particularly problematic in the case of sophisticatedly designed objects, including sanitary objects, which are intended to create a desired effect in their own right.

Against this background, it is an object of the invention to provide an object arrangement and a method for securing an object to a fixing structure, by means of which a structurally stable fixing is achieved whilst maintaining a sense of visual ‘lightness’, in particular by visually separating the secured object from the fixing structure.

According to the invention, this problem is solved by the fact that, in an object arrangement of the type mentioned at the outset, in particular a sanitary object arrangement, a spacer is arranged between the object and the fixing structure, wherein the spacer is formed from a transparent material, in particular from an uncoloured transparent material, in particular which is thus to be understood as being crystal-clear, at least in its volume.

According to the invention, the spacer is thus preferably situated between the mounting surface of the object or its partial surface areas and a fixing surface area of the fixing structure opposite the mounting surface or the partial surface areas, preferably without the interposition of any further elements. The spacer thus preferably constitutes the sole element that provides spacing between the object and the fixing structure.

This preferably achieves the result that the object is secured to the fixing structure without, or at least without significantly affecting, the colour rendering of the light passing through the spacer, in particular whilst the fixing surface area of the fixing structure remains visible through the transparent spacer. This creates a visual effect whereby the object appears to float in front of the fixing structure, as the spacer itself recedes visually into the background—if not becoming essentially invisible—due to its transparent material.

The object is thereby set apart from the fixing surface of the fixing structure and can thus exert its visual impact independently of the fixing structure. Particularly in sanitary applications, e.g. when suspending toilet bowls, bidets or washbasins from a wall as a fixing structure, this transforms the solid, bulky sanitary object into a visually light and elegant, one might say artistic sculpture, because its stability

and weight are visually negated and the sanitary object appears to float freely – seemingly at odds with the required structural stability and its necessary plumbing connections – yet in fact is both statically secured to the fixing structure to the required extent via the spacer and features the necessary water connections, in particular, the water connection is achieved via at least recess in the spacer, which passes through the spacer; however, this is preferably barely or not at all visually perceptible, because, due to the higher optical density of the spacer's material, any light emanating from the structures or elements passing through the spacer does not reach the user standing in front of the object as a result of internal total reflection.

The material of the spacer is preferably understood to be uncoloured and transparent if the material used is not artificially coloured and/or achieves a colour rendering index (CRI) of greater than 80 Ra, preferably greater than 90 Ra, and more preferably greater than 95 Ra, particularly when illuminated by sunlight as the reference light.

Furthermore, in accordance with the invention, the spacer achieves a statically secure fastening of the object, in particular the sanitary object, to the fixing structure, preferably because the mounting surface of the object is, at least predominantly, preferably entirely, and in particular any partial surface areas of the mounting surface that may be present are, at least predominantly, preferably all, indirectly supported by the spacer on the fixing structure. Thus, even when the interposed spacer is used, all forces acting on the object are absorbed by the fixing structure.

In a preferred embodiment, it is envisaged that the edge surface areas of the spacer extending between the object and the fixing structure, in particular, at least those edge surface areas visible during normal use, are designed to be clearly transparent, in particular polished, particularly in sections, and preferably all edge surface areas.

Preferably, the transparency of the edge surface areas ensures that the edge surface areas visible to an observer are themselves not, or only barely, recognisable as boundary surface areas of the spacer, particularly as these have no light-scattering function, but preferably, at most, a light-refracting function. Light can therefore pass through such a clear, transparent edge surface area virtually unhindered, in particular without scattering, in both directions, provided it is not trapped inside the spacer under conditions of total internal reflection, which further reduces visual perceptibility.

Alternatively, however, these edge surface areas may also be designed in a different manner to scatter light, e.g. by being matt or satin-finished. Even in such an embodiment, the visual lightness of the object's securing and its visual separation from the fixing structure, as achieved by the invention, is at least largely retained due to the existing translucency of the material in the edge surface area.

The term edge surface areas refers in particular to those surface areas of the spacer which extend between the two contact surfaces of the spacer, via which the spacer makes contact with the object on the one hand and the fixing structure on the other. In particular, when the object arrangement is in its mounted state, these edge surface areas form the surfaces on the outer periphery of the spacer that are generally visible.

It is further preferred that the thickness of the spacer has a value of greater than or equal to 10 mm, preferably greater than or equal to 15 mm, more preferably greater than or equal to 20 mm, and even more preferably greater than or equal to 25 mm, in particular wherein the thickness has a value of less than or equal to 35 mm, preferably less than or equal to 30 mm. The thickness is considered in the direction of the spacing between the two contact surface areas of the spacer. A particularly preferred embodiment is achieved when the thickness of the spacer lies between 10 mm and 20 mm, preferably when it is 15 mm.

These values achieve a sufficiently good visual effect whilst keeping material usage within economically reasonable limits, in particular without exaggerating the effect to an unrealistic degree.

Where the specific details set out below require a particular orientation of the spacer for the sake of clarity, this refers to its orientation between the object and the fixing structure when installed in accordance with its intended purpose, in a manner that also allows for the intended use of the object.

Preferably, a transparent plastic is selected as the material, in particular polymethyl methacrylate (PMMA), polycarbonate or polyethylene terephthalate glycol (PET-G).

In particular, a plastic has the advantage of being reversibly deformable under the typical fixing forces and torques applied to sanitary objects, which offers the benefit that, in the case of sanitary objects such as toilet bowls, bidets and washbasins, an additional water seal between the object and the fixing structure is not required; otherwise, with sanitary objects and their conventional fixing method, this would be formed by a visually unattractive silicone joint. In the invention, however, the material of the spacer can preferably be deformed in a sealing manner, ideally to the extent of completely sealing any gaps between the object and the fixing structure.

Glass, particularly white glass, remains a preferred alternative material. The term white glass is generally understood to refer to a type of glass in which the iron oxide content is at least reduced or eliminated compared with standard green glass.

In particular, polymethyl methacrylate (PMMA), and in particular also glass, remains highly recyclable without involving so-called downcycling during the recycling process. Spacers manufactured from this material can be broken down into their constituent components through chemical recycling in order to produce new components – whilst maintaining virtually the same product quality.

Furthermore, the spacers of the invention may be manufactured from recycled material. This conserves resources and prevents waste, thereby demonstrating that the spacers according to the invention are environmentally friendly and sustainable.

In a preferred embodiment, the spacer is configured as a plate with two contact surfaces, preferably arranged parallel and opposite one another, the contact surfaces being spaced apart by the thickness of the plate, between which edge surface areas of the spacer extend, whereby at least a partial area of all edge surface areas, preferably all edge surface areas of the spacer, does not/do not project outwards beyond the contour of the object, in particular not beyond the contour of the object extending around the mounting surface.

If it is not established that all of the edge surface areas do not protrude outwards beyond the contour, the invention provides for example, that a partial area of the edge surface areas which do not protrude outwards beyond the contour is preferably formed by an edge surface area of the spacer lying at the top in the assembled state, in particular extending substantially horizontally at least partially in one direction, in particular parallel to the fixing surface.

The assembled state is preferably one in which the contact surface of the spacer that contacts the fixing surface on the fixing structure and the contact surface of the spacer that contacts the mounting surface (or its partial surfaces) of the object each lie in a vertical plane.

This preferably ensures that the spacer, at least in the upper edge surface area—which a user looks at during normal use—and preferably in all edge surface areas, does not protrude outwards beyond the object in the region of its mounting surface, but rather, if anything, follows the same contour as the object.

Preferably, it is not only intended that all of the edge surface areas do not protrude outwards beyond the contour, but also that the spacer, at least in some areas—and preferably along all edge surface areas—recesses inwards behind the contour

of the object. Viewed in a projection perpendicular to the mounting direction, the edge surface areas thus lie within the contour and/or within the object.

In particular, it is envisaged that at least one edge surface area of the spacer which, in the assembled state—in particular in the aforementioned assembled state—is situated at the top, and preferably also a respective lateral edge surface area—in particular one which, in the assembled state, extends from top to bottom—is set back inwards behind the contour of the object. For example, in a further embodiment, the distance of a lateral edge surface area from the contour may decrease from top to bottom. A lower edge surface area may preferably also be set back, or at least not protrude, and in particular may be flush with the contour.

In all embodiments in which at least a partial area of all edge surface areas is set back inwards behind the contour of the object, the cross-section of the spacer—viewed perpendicular to the direction of assembly, and in particular the cross-section of the spacer's contact surface that contacts the object —is smaller than the cross-section of the contour.

Should there be a desire to use sealant, e.g. silicone, in the transition area between the object and the spacer and/or between the spacer and the fixing structure – in particular as silicone joints or silicone seams – the invention offers the advantage that the sealant, which often has an unattractive appearance, is not visually perceptible. Preferably, however, the invention offers the advantage of being able to dispense with sealant altogether.

In all embodiments in which at least one upper edge surface area and the respective lateral edge surface areas, and in particular also any lower edge surface area, are set back inwards behind the contour, the spacer is preferably removed from the field of vision of a person standing in front of the object. In this case, the spacer may also be made of a non-transparent material, in particular any material.

It may be provided, particularly in an embodiment in which the spacer lies inwards behind the contour of the object at all edge surface areas, that the distance of a respective edge surface area—in particular at least the outer edge surface area—from the contour is the same throughout. In this case, the edge surface area runs parallel to the extension of the contour. The outer cross-sectional shape of the spacer then preferably corresponds to the cross-sectional shape of the contour multiplied by a factor less than 1.

Preferably, the invention provides that the distance of an edge surface area (in particular an upper and/or lateral edge surface area) situated inwards behind the contour from the contour is a dimension which is less than or equal to the thickness of the spacer. Preferably, the distance is 50% to 75% of the thickness of the spacer, preferably 60% of the thickness of the spacer. If a spacer is, for example, 25 mm thick, then the distance of the edge surface area—in particular at least of an upper, and preferably also of a lateral edge surface area—from the contour is preferably 15 mm.

The contour of the object, in particular of the sanitary object, is preferably understood as the outer boundary line of the cross-section of the object—viewed perpendicular to the mounting direction (the direction perpendicular to the fixing surface of the fixing structure)—in the plane of the mounting surface or in a region/plane lying within the object just before the plane of the mounting surface, in particular one that lies parallel to the plane of the mounting surface.

Here, and also in the following, a region or plane just in front of the plane of the mounting surface is preferably understood to be a region or plane which lies no more than 15 mm, preferably no more than 10 mm, and most preferably no more than 5 mm in front of the plane of the mounting surface within the object. The inclusion of such a region is due to the fact that objects, in particular sanitary objects, are frequently designed with rounded edges adjacent to the mounting surface plane, so that the cross-section of the object exactly within the mounting

surface plane is smaller than the actual and visually perceptible cross-section of the object.

In one possible embodiment, the invention provides that the edge surface areas are formed, either throughout or at least predominantly, perpendicular to the surface of the fixing structure and/or the mounting surface of the object, or perpendicular to the contact surfaces of the spacer, which contact the aforementioned surfaces after assembly.

The term perpendicular to the surface of the fixing structure is preferably understood to mean that a normal vector on an edge surface area runs parallel to the fixing surface of the fixing structure.

This design provides a simple means of manufacturing a plate as a spacer, e.g. by cutting processes such as laser cutting, particularly in the case of transparent plastics. Laser cutting has the advantage that the cut surfaces forming the edge surface areas are generally sufficiently clear and transparent, and do not require any further polishing, although polishing is possible.

A preferred embodiment provides that the cross-section of the spacer’s contact surface in contact with the mounting surface of the sanitary object and/or the cross-section of the spacer’s contact surface in contact with the fixing structure is smaller than, or at most equal to, the cross-section of the fixture in the plane of the mounting surface or in a region/plane immediately prior to the plane of the mounting surface. This ensures that neither of the spacer’s two contact surfaces protrudes outwards beyond the contour of the object, as each of these contact surfaces is at most equal to, or smaller than, the cross-sectional area of the object in the relevant plane.

In one embodiment, for example, it may be provided that a region of the spacer between the two contact surfaces—which may be of equal or different sizes—has a cross-section smaller than the cross-section of either of the two contact

surfaces. A maximum tapering of the spacer may thus be present in the thickness direction between the two contact surfaces.

A further preferred embodiment provides that the cross-section of the contact surface of the spacer that contacts the fixing structure is smaller than the cross-section of the contact surface of the spacer that contacts the mounting surface of the sanitary object.

Preferably, this results in the spacer tapering in cross-section towards the fixing structure. Such tapering may, for example, be stepped or, preferably, uniform or continuous, in particular linear or curved.

Preferably, a taper may be provided at all edge surface areas, i.e. circumferentially around the entire spacer, preferably uniformly throughout or, for example, only at an upper edge surface area within the field of view.

In general, a taper may preferably be formed in the thickness direction of the spacer, either linearly or in a curved manner.

Alternatively, a taper is provided only, or at least, on a sub-area of the edge surface area viewed in the circumferential direction, preferably on an upper edge area of the spacer, particularly when the spacer is arranged on a vertical wall as a fixing structure. In this case, the upper edge surface area represents the top view area that is immediately visible to an observer. In this case, the remaining edge surface areas may preferably be oriented perpendicular to the fixing surface.

In all designs that provide for tapering, it is preferable for the cross-section of the spacer’s contact surface—which comes into contact with the mounting surface of the object—to be the same size as the cross-section of the object in the plane of the mounting surface or in a region/plane immediately prior to the plane of the mounting surface; in particular, this ensures that, despite the tapering, the mounting surface of the object is supported across its entire area.

A preferred embodiment provides that, when a spacer is used on a wall as a fixing structure, an upper edge surface region of the spacer, in particular one that runs, at least in some areas, parallel to the fixing surface of the fixing structure, is lowered over the entire thickness of the spacer at a constant distance below the upper contour line exhibited by the cross-section of the object in the plane of the mounting surface or in a region/plane immediately prior to the plane of the mounting surface. In this design, the upper edge surface area is thus stepped down below the upper contour or edge of the object and is consequently less visually noticeable; however, this design entails that the mounting surface at the object is not supported across its entire area.

Alternatively, it is envisaged that, when using a spacer on a wall as a fixing structure, an upper edge surface area of the spacer—in particular one that runs, at least in some areas, parallel to the fixing surface of the fixing structure—is designed to slope downwards from the object towards the fixing structure in height, at least in some areas, and in particular over its entire extent.

Such a sloping configuration may, for example, be at least partially linear in its slope, or initially sloping downwards and then rising again, in particular forming a groove.

In a preferred embodiment, it is therefore also provided that an upper edge surface area forms or comprises a groove which runs parallel to the surface of the fixing structure, preferably with the groove being positioned closer to the fixing structure than to the object, and in particular with the groove adjoining the fixing surface of the fixing structure.

This preferably ensures that dirt or even splash water can collect in this groove and be cleaned away more easily there.

Such a groove in the upper edge area, particularly when it extends across the entire thickness of the spacer, has the further advantage that it acts as a concave lens for light emanating from the interior of the spacer, causing elements

necessarily present within the spacer or passing through it, such as fastening elements or pipework elements, appear smaller when viewed from the outside, thereby reducing their visual impact.

The invention may also generally provide that the edge surface areas of the spacer are, at least in some regions, inclined at an angle that deviates from a perpendicular orientation of the edge surface areas relative to the fixing surface, in particular such that light from the interior of the spacer is refracted away from an observer compared to the perpendicular orientation.

For example, this can be achieved by the surface normal on an edge surface area having a component directed towards the fixing surface, in particular intersecting it. Since a light beam emerging from the interior of the spacer is refracted away from the surface normal, the deviation of the surface normal from a position parallel to the fixing surface towards the fixing surface causes the refracted light beam to shift towards the fixing surface as well, and thus move away from an observer compared to the situation if the surface normal were parallel to the fixing surface or, when viewed in the thickness direction of the spacer, the edge surface area were perpendicular to the fixing surface. This design therefore also allows light originating from elements present within the spacer to be moved out of an observer’s field of view.

The invention may also provide that the edge surface areas of the spacer, at least in some regions and preferably entirely, have a reflection-reducing surface coating or surface treatment. Such an anti-reflective coating or treatment further reduces the visual perceptibility of the edge surface areas as the boundary surfaces of the spacer.

A preferred further development of the invention provides that pipework elements and/or fastening elements passing through the spacer carry a mirror-like reflective sleeve, or that the surface of bores or recesses in the spacer for the passage of pipework elements and/or fastening elements is coated with a mirror-like finish. A sleeve may, for example, be designed as a polished and/or chrome-plated metal

sleeve, e.g. made of aluminium. A plastic sleeve may also be coated with a mirror-like finish to form a sleeve in accordance with the invention.

Another preferred embodiment provides that the spacer comprises at least one of the functional elements mentioned below. Such a functional element may, for example, be arranged in or on at least one recess of the spacer, preferably in at least one recess on a lower edge surface area or in the contact surface of the spacer facing the object or the fixing structure.

For example, a functional element may be formed by a lighting device, in particular one based on LEDs (light-emitting diodes) as the light source. By means of the at least one lighting device, the light emitted by the at least one light source can preferably be coupled into the transparent material, in particular such that it can propagate within it, at least in certain areas, according to the principle of total internal reflection, and can preferably also emerge from the spacer via edge surface areas. This enables the object to be illuminated near the mounting surface, with the light preferably radiating outwards around the mounting surface; in particular, this can produce a streak light effect, specifically a structured or patterned streak light effect, on the fixing surface.

In order to achieve light extraction from edge surface areas which guide the light under conditions of total internal reflection, it may, for example, be provided that these or other edge surface areas have a structure that disrupts total internal reflection. For example, such an edge surface area may be designed to scatter light either in sections or across its entire surface, e.g. by being matt or satin-finished.

The lighting device may be powered by a power source arranged within the spacer as a further functional element, for example by at least one battery, or via an external power connection. Provision may be made to control the lighting device by means of a control device integrated into the spacer, e.g. in response to an external signal or a measured value detected by a sensor.

A preferred embodiment provides that a lighting device comprises a plurality of individual light sources, in particular a plurality of individual LEDs, in particular wherein the light sources/LEDs are arranged side by side on a circuit board strip, the light sources being arranged circumferentially around an element penetrating the spacer.

In a preferred embodiment, such a penetrating element may, for example, be formed by the waste water pipe and/or the flush water pipe of a toilet bowl. This embodiment has the advantage that there is no shading of the light caused by the penetrating element, as the light is effectively emitted into the spacer from the element itself.

In a preferred further embodiment, the light sources are arranged on a ring emitting light radially outwards, which is situated in a recess in the spacer penetrated by the element or on the penetrating element itself.

Another possible design may provide for the light sources, in particular those arranged side by side on a circuit board strip, to be seated in a groove arranged in the spacer, which groove is routed in the spacer, at least partially around at least one recessed area, in particular a single recessed area, which is provided in the spacer for the passage of fastening elements and/or pipework elements through the spacer. Preferably, the groove is formed from one of the mounting surfaces of the spacer towards the other mounting surface. A circuit board strip is preferably positioned in the groove such that the light sources/LEDs shine through outward-facing edge surface areas of the spacer. The groove preferably has a depth that is greater than or equal to the width of the circuit board strip and less than the thickness of the spacer.

Preferably, the plurality of light sources is connected by means of a cable to another functional element, in particular a power source and/or control device, with the cable preferably guided in a groove or channel in the material of the spacer.

For example, a functional element may be configured as a signal generator for producing an acoustic or optical signal, in particular for generating a sequence of tones or voice output. For example, a signal perceptible to the user may be generated in this way, e.g. depending on an operating state of the object; for instance, in the case of a toilet bowl, when a user sits down and/or stands up and a sensor detects this.

For example, a functional element may be provided by a sensor for measuring an operational state of the object, in particular wherein the sensor is configured as a motion detector or force sensor or vibration sensor or optical sensor (e.g. a light barrier). For example, the sensor can be used to detect the use of an object, such as a toilet bowl, when a user is sitting on it and a sensor—for example, a force sensor—measures the resulting force load. For example, it may be provided that a sensor, preferably an optical sensor, is used to detect the movement of a part of the object, in particular the opening and/or closing of a toilet seat, and, depending on this, to trigger an action via another functional element, e.g. via the signal generator.

A functional element may also be constituted by a signal input, in particular for triggering an action of another functional element in response to a signal received from an external source. Such a signal received from an external source may, for example, originate from a home automation system and may be triggered, for example, when a user enters a room containing the object. The signal may, for example, originate from a motion detector in the home automation system that is external to the spacer. The signal may, for example, trigger a function of the lighting device and/or the signal generator. The signal input may, for example, be wired or implemented using radio technology.

A functional element may also be configured as a control device for controlling another functional element, in particular a lighting device or a signal generator. Preferably, the control device is configured to carry out the control operation in response to a signal from another functional element, e.g. in response to a

received measurement value from a sensor, in particular a sensor mentioned above, or a received signal.

For example, the control device may receive the force signal from a force sensor or the signal from an optical or other sensor and, depending on this, control the lighting device and/or the signal generator.

For example, a functional element may also be configured to comprise at least one energy source, in particular a battery or a rechargeable battery, for supplying power to at least one other functional element.

The aforementioned functional elements, listed by way of example, may be implemented individually and in any combination on or within the spacer. There may be wired and/or wireless electrical connections between different functional elements, enabling them to exchange information or signals with one another. Cables for connecting two or more functional elements may be routed through grooves and/or channels in the material of the spacer, which run between the connected functional elements.

In particular, it is envisaged to combine at least one lighting device and/or a signal generator with a sensor and a control device, in particular also with a power source provided in or on the spacer or an external power source, which control device controls these depending on the sensor’s measured value. A signal input may additionally be provided.

A particularly preferred embodiment provides for the spacer to be formed as a plate with a U-shaped cross-section, in particular as a plate with a U-shaped cross-section perpendicular to the direction of spacing between the object and the fixing structure.

Preferably, the U-shaped plate has a base which, when installed as intended, is situated at the top of the arrangement, with a downward-extending leg having a free end arranged on each side of the base; preferably, the legs taper towards

their free ends and/or are inclined towards one another, in particular, a single recess is formed between the legs and the base, through which fastening elements and/or pipework elements of the object are passed.

It is further preferred that a groove for accommodating a functional element, in particular for accommodating a lighting device, preferably for accommodating a circuit board strip comprising light sources, be provided along the course of the legs, in particular also extending along the course of the base, preferably with the groove being spaced further from the outward-facing edge surface areas of the legs than from the edge surface areas of the legs facing inwards towards the single recess. The position of the groove may be selected such that fastening forces act through the spacer in the area of the legs, laterally on the outside next to the groove.

It is further preferably provided here that a power source for supplying the lighting device is arranged within the single recess, in particular on the inner side of one of the legs.

The invention offers the advantage of enabling object arrangements according to the invention to be produced, either originally or retrospectively, from a known object arrangement of the prior art, by inserting, for the purpose of securing an object—in particular a sanitary object—to a fixing structure, a spacer made of a transparent material, in particular an uncoloured transparent material, between the mounting surface of the object and the fixing structure. For this purpose, a plate made of a transparent material, in particular an uncoloured transparent material, preferably with clearly transparent edge areas, is used as a spacer when securing the object, in particular a sanitary object, to a fixing structure, in particular to achieve a visual effect of the object appearing to float in front of the fixing structure.

The invention is explained in more detail with reference to the figures.

Figures 1A and 1B show, in two different views, a first embodiment of the invention using a toilet bowl as object 1, which is secured on a wall as fixing structure 2 by means of a spacer 3 made of a transparent plastic, e.g. PMMA / acrylic glass. Both the fixing screws/threaded rods and the water supply and waste water pipes pass through the spacer 3; in Figure 1B, this is shown with a dotted line only for the waste water pipe 4.

The spacer 3 has a typical thickness within the preferred range of 10 mm to 35 mm, in particular 25 mm, whereby its edge surface areas 3a, which form the visible outer periphery of the spacer 3, are preferably made to be clear and transparent, e.g. by subsequently polishing the edge surface areas 3a produced during a cutting process.

In this embodiment, it can be seen that the edge surface areas 3a are oriented perpendicular to the surface of the wall 2 on which the toilet bowl 1 is secured, and also to the opposing contact surfaces of the spacer 3, across the entire circumferential periphery of the spacer 3.

The spacer 3 has a uniform cross-section throughout its entire thickness, whereby the contour of the cross-section of the spacer 3 is identical in shape to, or scaled down by a factor relative to, the contour of the cross-section of the toilet bowl 1 in plane E, in which the mounting surface 1a of the toilet bowl lies, or in a plane E1 explained below; or the contours of both the spacer 3 and the toilet bowl 1a lie at least substantially on top of one another.

By securing the toilet bowl 1 indirectly via the spacer 3 made of transparent material, preferably with clear, transparent edge areas, and by adapting the outer cross-section of the spacer 3 to the cross-section of the toilet bowl 1 in the plane of its mounting surface 1a or the plane E1 described below, a visual impression is created, in which the toilet bowl appears to float in front of the wall 2, whilst being securely secured to the wall 2 and, in particular, featuring all necessary water connections.

In contrast to Figures 1A and 1B, Figures 2A and 2B show, in the same views, a second embodiment in which the spacer 3 is designed such that its cross-section tapers on all sides from the contact surface against which the toilet bowl 1 rests towards the contact surface against which the wall 2 rests, tapers linearly in this example, so that all edge surface areas 3a are inclined towards the wall 2; in particular, they are no longer oriented perpendicular to the wall 2.

This ensures that, when viewed by a user standing in front of the toilet bowl 1, the edge surface areas 3a are at least partially—or, depending on the angle of inclination, completely—concealed behind the edges 1b of the toilet bowl 1, which delimit the mounting surface 1a in plane E. In this embodiment, despite the tapering of the spacer 3, full-surface support of the mounting surface 1a in plane E is achieved, because the spacer 3 preferably has the same cross-section there as the toilet bowl 1.

Figures 3A and 3B show, in the same views, a third embodiment in which the tapering of the adapter plate 3 is provided only in the upper edge area 3a, which a user looks directly at from above. The other edge surface areas 3a are oriented perpendicular to the surface of the wall 2 in the sectional views shown.

Figure 4 shows a further variant, in which the upper edge surface area 3a of the spacer 3 comprises a groove 3b, in particular, in which the upper edge surface area 3a is designed to slope downwards towards the wall 2 in a first partial surface area, which is closer to the toilet bowl 1, and in particular slopes linearly, whilst in a second partial surface area, which is closer to the wall 2 than the first partial surface area, it features a channel 3b. The channel 3b makes it easier to collect and clean away any dirt or splash water that accumulates. The other edge surface areas 3a may, for example, be designed as shown in Figures 2b or 3b.

Figure 5 shows a further variant in which the upper edge area 3a features a channel 3b across its entire thickness extending between the toilet bowl 1 and wall 2. Here too, the other edge areas 3a may, for example, be configured as shown in Figures 2b or 3b.

In this embodiment, the channel 3b acts as a concave lens for light emerging from the spacer—such as that originating from fixing elements or pipework—so that these elements, insofar as they are visible, appear smaller than they actually are. This significantly reduces the visual prominence of these elements. Preferably, the two contact surfaces of the spacer 3 are shaped to correspond to the cross-section of the toilet bowl in plane E. In this design, the spacer 3 is also tapered to a maximum degree between the two contact surfaces.

Figure 6A shows a further embodiment in which the upper edge surface area 3a is lowered in height below the upper edge 1b of the toilet bowl 1 in plane E, with this edge surface area 3a being oriented perpendicular to the fixing surface of the wall 2. This also causes the upper edge surface area 3a to be out of a user's immediate field of view, or rather below this upper edge of the toilet bowl 1. Lowering the upper edge surface area 3a below the upper edge 1b corresponds to the edge surface area being set back inwards behind the edge 1b or contour.

Here too, the other edge surface areas 3a may, for example, be configured as shown in Figures 2b or 3b. According to Figure 6B, however, the lateral edge surface areas 3a are also configured to recede inwards behind the contour of the toilet bowl, in the same way as the upper edge surface area 3a.

Preferably, the amount by which the upper edge surface area 3a is recessed below the upper edge 1b of the toilet bowl 1, or the distance of the lateral edge surface areas from the contour, in one possible embodiment, corresponds to the thickness of the spacer 3, or in another possible embodiment, to 50% to 75% of the thickness, in particular 60% of the thickness of the spacer 3.

Figure 7 illustrates that, in the case of an object 1 manufactured in accordance with specific production techniques—such as the toilet bowl 1 shown with rounded edges 1b at the transition to the mounting surface 1a, which is depicted in a highly exaggerated manner in Figure 7—it is advisable to design the cross-section or the contour of the cross-section of the spacer 3, which is not shown here, particularly at its contact surface facing the object 1 or the fixing structure 2, not to be

precisely adapted to the cross-section of the object 1 at the location of plane E of the mounting surface 1a, but rather to the cross-section of the object 1 at a distance in front of the mounting surface 1a, in this case plane E1, whereby this plane E1 is at a distance from plane E which is preferably less than 15 mm, more preferably less than 10 mm, and most preferably less than 5 mm. Plane E1 should preferably be at a minimum distance from plane E such that plane E1 lies outside a manufacturing-related rounding.

The use of plane E or plane E1, as described here, to define the contour is preferably employed in all possible embodiments of the invention.

Figure 8A shows an embodiment in which a lighting device 5 is integrated into the spacer 3, for example arranged in a recess in the lower edge surface region 3a. This allows light 6 to be coupled into the spacer 3, which passes through the spacer 3 and propagates within it, at least in some regions, according to the principle of total internal reflection. The light 6 can, for example, emerge from the edge surface areas on all sides.

Figure 8B shows an alternative embodiment in which the lighting device 5 comprises a plurality of light sources 5a, in particular LEDs, arranged in a ring-shaped configuration around the flushing water pipe 4 and/or the waste water pipe 4 of the toilet bowl 1 in the circumferential direction. As a result, the light 6 emanates from the respective pipe, so that no shadowing effect occurs through it. The annular arrangement of light sources 5a may be formed by a ring with light sources 5a emitting radially outwards, which is slid onto the respective pipe 4 and supported by it, or which is secured to or within the edge of the recess in the spacer 3 through which the respective pipe passes. The ring may, for example, be formed by a ring-shaped, curved circuit board strip with light sources.

Figure 9 shows a further embodiment in which a signal generator 7, in this case preferably a sound generator 7, is arranged within the spacer 3. This can, for example, be activated in response to a measured value recorded by the sensor 8. For example, at least one sound or a voice message can be played when the

sensor 8 indicates a monitored operating state, such as a user sitting down or standing up. The control device for activating the sound generator 7 in response to the measured value from the sensor 8 may be integrated into the sound generator 7 or arranged externally to it within the spacer 3.

Figure 10 shows a structurally preferred embodiment of the spacer 3, in which the latter is designed as a plate with a U-shaped cross-section, in particular as a plate with a U-shaped cross-section perpendicular to the direction of the spacing between the object and the fixing structure. Object 1 and fixing structure 2 are not shown here.

Here, the spacer 3 has a base 3c, which, when installed as intended, is positioned at the top of the arrangement; on each side of this base there is a downward-extending leg 3d with a free end, preferably such that the legs 3d taper towards their free – in this case lower – ends and/or are inclined towards one another.

In this embodiment, only a single recess 3e is formed between the legs 3d and the base 3c, through which fastening elements 13 and/or pipework elements 4 of the object 1 are passed, which are shown here as dotted lines.

Figure 10 further illustrates, in the top view, that the edge surfaces 3a of the spacer 3 are all located on the inside relative to the contour K of a toilet bowl in the region of its contact surface/mounting surface, in particular the contour in the plane E or E1, which is shown here as a dotted line on the outside of the spacer 3. Alternatively, it may also be provided that the outer edge surface region 3a follows the same contour as contour K. According to the invention, however, the cross-section of the spacer 3 does not extend beyond contour K at any point.

The embodiment shown here provides for a groove 11, designed to accommodate a functional element—in particular, here to accommodate a lighting device 5, preferably to accomodate a circuit board strip 5b comprising light sources 5a—to run along the course of the legs 3d, and in particular also along the course of the base 3c. In this context, the groove 11 is preferably spaced further from the

outward-facing edge surface areas 3a of the legs 3d than from the edge surface areas 3a of the legs 3d that face inwards towards the single recess 3e.

The lower part of Figure 10 shows a detailed view of the groove 11 with the circuit board strip 5b and the light sources/LEDs carried by it, the light emission direction of which is directed outwards.

In this embodiment, it may be preferable for all, or at least the outward-facing edge surface areas 3, to be designed to diffuse light, e.g. by matting or satin-finishing the surface. However, the edge surface areas 3a may also be polished.

A power source 12 for supplying the lighting device 5 is arranged in the single recess 3e, in particular on the inner side of one of the legs 3d, and is connected to the lighting device 5 via cables. Alternatively, a power source may also be arranged externally to the spacer 3. The depiction of the power source 12 here therefore does not limit the U-shaped design of the spacer 3.

Due to the U-shaped design, the single recess 3e is open at the bottom, which allows access to the recess 3e so that, if necessary, further required elements—such as the functional elements mentioned above—can be arranged between object 1 and the fixing structure 2. The specific internal configuration of the edge surfaces 3a, which delimit the single recess 3e, is irrelevant to the invention. The specific embodiment shown here is therefore not to be understood as limiting the invention.

Claims

1. Object arrangement comprising an object (1), in particular a sanitary object (1), which is secured to a fixing structure (2)**, characterised in that** between the object (1), in particular its mounting surface (1a), and the fixing structure (2), in particular a fixing surface area of the fixing structure (2) opposite the mounting surface (1a), a spacer (3) is arranged, wherein the spacer (3) is formed from a transparent material, in particular from an uncoloured transparent material.

2. An arrangement according to claim 1, **characterised in that** the edge surface areas (3a) of the spacer (3) extending between the object (1) and the fixing structure (2), in particular at least those edge surface areas (3a) visible during normal use, preferably all edge surface areas (3a), are clear and transparent, in particular are polished or matted.

3. An arrangement according to one of the preceding claims, **characterised in that** the thickness of the spacer (3) is greater than or equal to 10 mm, preferably greater than or equal to 15 mm, more preferably greater than or equal to 20 mm, and most preferably greater than or equal to 25 mm, in particular where the thickness is less than or equal to 35 mm, preferably less than or equal to 30 mm.

4. An arrangement according to one of the preceding claims, **characterised in that** the material of the spacer (3) is selected from one of the following: transparent plastic, in particular polymethyl methacrylate (PMMA) or polycarbonate or polyethylene terephthalate glycol (PET-G) or glass, in particular white glass.

5. An arrangement according to one of the preceding claims, **characterised in that** the spacer (3) is formed as a plate with two contact surfaces,

preferably parallel and opposite one another, spaced apart by the thickness of the plate, between which edge surface areas (3a) of the spacer (3) extend, wherein at least a partial area of all edge surface areas (3a), preferably all edge surface areas (3a) of the spacer (3), do not project outwards beyond the contour of the object (1).

6. An arrangement according to one of the preceding claims, **characterised in that** the edge surface area (3a) are formed everywhere**,** or at least predominantly, perpendicular to the surface of the fixing structure (2).

7. An arrangement according to one of the preceding claims, **characterised in that** the cross-section of the contact surface of the spacer (3) in contact with the mounting surface of the sanitary object and/or the cross-section of the contact surface of the spacer (3) in contact with the fixing structure (2) (3) is smaller than, or at most equal to, the cross-section of the object (1) in the plane (E) of the mounting surface (1a) or in a region/plane (E1) in front of the plane (E) of the mounting surface (1a).

8. An arrangement according to claim 7, **characterised in that** the cross-section of the contact surface of the spacer (3) contacting the fixing structure (2) is smaller than the cross-section of the contact surface of the spacer (3) contacting the mounting surface (1a) of the object (1).

9. An arrangement according to one of the preceding claims, **characterised in that,** when a spacer (3) is used on a wall as the fixing structure (2), an upper edge surface region (3a) of the spacer (3), in particular one that runs, at least in some areas, parallel to the fixing surface of the fixing structure (2),

    a. is lowered over the entire thickness of the spacer (3) at a constant distance below the upper contour line which the cross-section of the object (1) exhibits in the plane (E) of the mounting surface (1a) or in

a region (a plane (E1)) in front of the plane (E) of the mounting surface (1a), or

b. is designed to slope downwards from the object (1) towards the fixing structure (2) in height, at least in some areas, in particular over its entire extent, and in particular is designed to slope downwards linearly at least in some areas,

and, in particular, wherein a lateral edge surface ares is also formed so as to recede inwards behind the lateral contour line at a constant distance or at a distance that decreases from top to bottom, and/or, preferably, wherein a constant distance or a maximum distance from the contour line lies in the range of 50% to 75%, preferably 60%, of the thickness of the spacer (3).

10. An arrangement according to one of the preceding claims, in particular according to claim 9, **characterised in that** an upper edge surface region (3a) forms a groove (3b) or comprises a groove (3b) which runs parallel to the surface of the fixing structure (2), preferably wherein the groove (3b) is arranged closer to the fixing structure (2) than to the object (1), in particular, the groove (3b) adjoining the fixing surface of the fixing structure (2).

11. An arrangement according to one of the preceding claims, **characterised in that** the edge surface areas (3a) of the spacer (3) are, at least in some regions, provided with an inclination which deviates from a perpendicular orientation of the edge surface regions (3a) relative to the fixing surface (2), in particular such that light from the interior of the spacer (3) is refracted away from an observer compared with the perpendicular orientation.

12. An arrangement according to one of the preceding claims, **characterised in that** the edge surface areas (3a) of the spacer (3) have**,** at least in some regions, a reflection-reducing surface coating or surface treatment.

13. An arrangement according to one of the preceding claims, **characterised in that** pipework elements (4) and/or fastening elements, which are passed through the spacer (3), are fitted with a mirror-like reflective sleeve, or the surface of recesses / holes in the spacer (3) for the passage of pipework elements (4) and/or fastening elements are coated with a mirror-like finish.

14. An arrangement according to any one of the preceding claims, **characterised in that** the spacer (3) comprises at least one of the following functional elements, in particular in at least one recess of the spacer (3), preferably in at least one recess at a lower edge surface area (3a) or in the contact surface facing the object or the fixing structure:

    a. at least one lighting device (5), in particular one capable of coupling light (6) into the transparent material, preferably light which can emerge from the spacer (3) via edge surface areas (3a), in particular wherein the edge surface areas (3a) comprise structures that disrupt total internal reflection,

    b. at least one signal generator (7) for generating an acoustic or optical signal, in particular for generating a sequence of tones or a voice output,

    c. at least one sensor (8) for measuring an operational state of the object, in particular wherein the sensor is designed as a motion detector, force sensor or vibration sensor,

    d. at least one signal input, in particular for triggering an action of another functional element in response to a signal received from an external source,

    e. at least one control device (9) for controlling another functional element (5, 7), in particular a lighting device (5) or a signal generator

(7), preferably in response to the measured value from a sensor (8) or a received signal,

f. at least one power source (12), in particular a battery or a rechargeable battery, for supplying power to at least one other functional element .

15. An arrangement according to claim 14, alternative a), **characterised in that** the lighting device (5) comprises a plurality of individual light sources (5a), in particular a plurality of individual LEDs, preferably arranged side by side on a circuit board strip,

a. wherein the light sources (5a) are arranged circumferentially around at least one element (4) passing through the spacer (3), preferably wherein the light sources (5a) are arranged on a ring emitting light radially outwards, which is situated in a recess in the spacer (3) penetrated by the element or on the penetrating element (4), or

b. wherein the light sources, in particular the light sources (5a) arranged side by side on a circuit board strip (5b), are seated in a groove (11) arranged in the spacer (3), which groove is routed in the spacer (3), at least partially around at least one recess area provided in the spacer for the passage of fastening elements and/or pipework elements (4) through the spacer (3).

16. An arrangement according to one of the preceding claims, **characterised in that** the spacer (3) is formed as a plate having a U-shaped cross-section, in particular as a plate having a U-shaped cross-section perpendicular to the direction of spacing between the object (1) and the fixing structure (2).

17. An arrangement according to claim 16, **characterised in that** the U-shaped plate has a base (3c) which, when the arrangement is assembled as intended, is situated at the top, on either side of which there is a

downwardly extending leg (3d) with a free end, preferably wherein the legs (3d) taper towards their free ends and/or are inclined towards one another, in particular wherein a single recess (3e) is formed between the legs (3d) and the base (3c), through which fastening elements (13) and/or pipework elements (4) of the object (1) are passed.

18. An arrangement according to claim 16 or 17, **characterised in that** a groove (11) for receiving a functional element, in particular for receiving a lighting device (5), preferably for receiving a circuit board strip (5b) comprising light sources (5a), is formed along the course of the legs (3d), in particular also along the course of the base (3c), preferably wherein the groove (11) is spaced further from the outward-facing edge surface regions (3a) of the legs (3d) than from the edge surface regions (3a) of the legs (3d) facing inwards towards the single recess (3e).

19. An arrangement according to any one of the preceding claims 16 to 18, **characterised in that** a power source (12) for supplying the lighting device (5) is arranged in the single recess (3e), in particular on the inner side of one of the legs (3d).

20. A method for securing an object (1), in particular a sanitary object (1), to a fixing structure (2), **characterised in that** a spacer (3) made of a transparent material, in particular an uncoloured transparent material, is inserted between the mounting surface (1a) of the object (1) and the fixing structure (2), in particular to form an arrangement according to one of the preceding claims.

21. Use of a plate made of a transparent material, in particular an uncoloured transparent material, preferably with clearly transparent edge areas (3a), as a spacer (3) when securing an object (1), in particular a sanitary object (1), to a fixing structure (2), in particular to achieve a visual effect of the object (1) appearing to float in front of the fixing structure (2), preferably wherein the plate is formed as a solid material apart from any necessary recesses

for the passage of fastening elements or pipework elements or for functional elements.