A device for fastening objects on an exterior surface of a building or an object, the device having a carrying part and a covering part. The carrying part has the function of statically supporting the object to be fastened, and the covering part has the function of sealing the object to be fastened with respect to the exterior surface of the building or object and is arranged for that purpose on the exterior side of the exterior surface of the building or object. Connecting parts for the object to be fastened protrude from the carrying part through openings in the covering part. The covering part is a dimensionally stable body and the relative position of the covering part with respect to the carrying part can be adjusted in the direction perpendicular to the building or object surface.
Fig. 1
DEVICE FOR FASTENING OBJECTS

[0001] The invention relates to a device for fastening objects to an outer surface of a building or object.

[0002] A typical application according to the invention for the device relates to the fastening of solar modules, antennae, anchorage points, air-conditioning devices or safety barriers to buildings (flat roofs, attics) or to objects.

[0003] DE 10 2010 036 305 A1 describes the fastening of a carrying structure on a flat roof, wherein the outermost layer of the flat roof is a damp-proof layer which is supported on an insulating layer which is not capable of bearing a load. The carrying structure has a connecting flange protruding over the damp-proof layer and a carrying part supported on a lower substructure. The damp-proof layer is clamped between said two parts. The clamping force is identical to that force with which the connecting flange is held on the carrying part.

[0004] DE 10 2009 043 808 A1 proposes placing a U profile, to which parts protruding over a roof surface can be fastened, by the base surface thereof on the roof surface and connecting said U profile to the building by means of screws which run through the center of the base surface. The channel-like space surrounded by the U profile can be upwardly sealed by a further profile which is clamped onto the webs of the U profile. Sealing strips are arranged between roof surface and base surface of the profile. The force with which the U profile is pulled onto the roof is inevitably identical to the force with which said sealing strips are loaded.

[0005] DE 10 2010 016 677 A1 presents a fastening device for fastening solar modules to a flat roof. The device has a dish-like base plate which rests on the sealing film of the roof surface and is connected to the carrying structure of the roof via screws. Connecting parts for superstructural parts protrude over the roof from the base plate. Said connecting parts can be, for example, threaded bolts. It is also proposed to cover the base plate by a further sealing film, wherein said further sealing film is welded or adhesively bonded to the sealing film of the roof surface by means running annularly around the base plate, and above the base plate, has openings through which the connecting parts for superstructural parts protrude.

[0006] JP 2011174360 A presents a device for fastening a solar panel on a roof. The device has a supporting part and a covering part, wherein the supporting part has the statically supporting function and the covering part the sealing function. The covering part is a dimensionally stable body which is provided with a seal and is anchored on the supporting part via a screw and a sealing ring. The connecting bolt protrudes from the supporting part through an opening in the covering part. It is disadvantageous that there is only one central connecting bolt via which the covering part is pressed against the surface of the roof. It is therefore not possible to adjust the contact pressure at the edge regions of the covering part or to set said contact pressure to be different, as is necessary, for example, if the connecting bolt and the roof surface do not enclose an angle of 90°. The possibilities for attaching an object to the single connecting bolt are also limited, and a correction of the angle is not possible.

[0007] In addition, the fastening devices of the documents mentioned have the disadvantage that the sealing function thereof cannot be checked with simple means. DE 441 6884 A1 discloses a connection part which is adhesively bonded onto the rear side of a solar panel. The device has a cavity between the connection part and the surface of the solar panel, which cavity is connected to the surroundings by a venting bore. The venting bore has the effect that, when an adhesive is introduced through a central bore, a connection to the outside remains open, via which air can escape from the cavity which is intended to be filled with adhesive, and that excess adhesive can escape. Once the device has been mounted, there is no longer any cavity between holder and underlying surface and the venting bore is also closed by adhesive. It is disadvantageous that the bore in the cavity cannot be used for a leak test after the fastening.

[0008] Proceeding from the prior art, it was the object for the inventor to provide a device for fastening objects to an outer surface of a building. In comparison to the devices discussed, the device to be provided is intended to be advantageous to the effect that the sealing effect between the device and the building outer surface is reliably maintained for years, can be brought about in a simple manner, and is adjustable and that it permits a simple, adjustable fastening of objects.

[0009] The starting point for achieving the object is a design according to DE 10 2010 016 677 A1, according to which the device has a carrying part and a covering part, wherein the carrying part has the statically supporting function for the objects to be fastened and the covering part takes on the sealing function in relation to the building outer surface, and wherein connecting parts for the objects to be fastened protrude from the carrying part through openings in the covering part. As a fundamental improvement according to the invention in this regard, it is proposed to form the covering part as a dimensionally stable body and to design the relative position of the covering part in relation to the carrying part to be adjustable in the direction normal to the building surface.

[0010] By means of the feature according to the invention, the contact pressure force between covering part and building outer surface can be adjusted in the optimum manner for the required sealing effect irrespective of the holding effect of the device. The effect which is therefore achievable and is substantially better is that the sealing surface between covering part and building outer surface is maintained for years despite adverse variations in the weather and temperature fluctuations.

[0011] The term “dimensionally stable body” means a body which is not entirely or virtually entirely deformable without an elastic restoring force, like a cable or a film, but instead provides a significant resistance force to deforming forces.

[0012] The disadvantages of the fastening device in JP 2011174360 A are avoided, by instead of the one central fastening bolt, at least two, preferably three, fastening bolts protruding through the covering part. It is additionally advantageous that the weight of the object is absorbed by two or more threaded bolts and also the contact pressure force, which is independent of said weight, is applied to the covering part at two or more points. Less stringent requirements regarding the dimensioning of the bolts and the material thickness of the covering part therefore emerge as additional benefits. In addition, the contact pressure force at the edge regions of the covering part against the seal can be adjusted in different ways via two or more connecting bolts and a correction of the angle of the covering part with respect to the fastening bolts can be undertaken. The effect achieved by this is that the sealing effect can be produced in a simple manner even in the event of uneven roof surfaces or the device being installed somewhat obliquely (the angle between fastening bolts and roof surface is not 90°).

[0013] A further aspect of the invention resides in the provision of a simple possibility for leak testing the device. A
valve (i.e. an optionally closable opening) leads through a bore in the covering part into the space between covering part and carrying part, or building surface. After the device is installed, a pressure difference in relation to the surroundings can therefore be produced by means of a pump and it is possible to measure how rapidly said pressure difference dissipates once the pump has been switched off. The tightness of the device can therefore be measured.

[0014] The invention is illustrated with reference to a drawing.

[0015] FIG. 1 shows a lateral sectional view of an exemplary device according to the invention arranged on a roof surface.

[0016] According to FIG. 1 the exemplary device according to the invention is arranged on the outer side of a sealing film 10 belonging to the roof and is connected in a statically supporting manner to the roof substructure 20 lying under the sealing film 10.

[0017] The device illustrated has a carrying part 1 which is a flat plate in the shape of a circular disk. Said carrying part is pressed onto the roof substructure 20 and held thereon by a screw 3 which runs through a bore in the center of said carrying part and through a bore in the sealing film 10 and is in threaded engagement with the roof substructure 20.

[0018] Connecting parts which, in the example illustrated, are formed by through bolts 4 are anchored on the carrying part 10. Said connecting parts serve for fastening the object to be anchored to the roof by means of the device, such as, for example, a solar module.

[0019] In the advantageous embodiment illustrated, at least two, preferably three through bolts 4 protrude away from the building outer surface normally to that building outer surface on which the device is to be fitted. Said through bolts 4 are not arranged here in a row next to one another but rather, in the advantageous case, according to which three through bolts 4 are used, said through bolts are arranged at the corner points of an (imaginary) triangle, preferably an equilateral triangle, the center of gravity of which lies on the center axis of the carrying part 1. The three through bolts 4, in the advantageous embodiment thereof, form the three legs of a tripod to which an object is to be fastened, wherein the angular alignment of the object is adjustable by the fact that the longitudinal regions at which said object is fastened precisely to the individual through bolts are adjustable differently for each through bolt 4.

[0020] The carrying part 1 is covered with respect to the exterior by a shell-shaped covering part 2 which is pulled over the carrying part and by the free end surface of the lateral surface thereof bears, with the interposition of a seal 6, against the sealing film 10 of the roof.

[0021] The threaded bolts 4 run through bores in the base surface of the shell-shaped covering part 2. The covering part 2 is pressed against the sealing film 10 of the roof, and therefore also in the direction of the carrying part 1, by means of nuts 5 which are screwed onto the threaded bolts 4 on the outer side of the covering part 2 and bear against the covering part 2. Depending how far said nuts 5 are screwed, the covering part 2 is advanced more or less closely to the sealing film 10 of the roof, and therefore the seal 6 is pressed more or less strongly. The force with which pressure is exerted on the sealing surfaces between sealing film 10 and covering part 2 can therefore be adjustable infinitely variably and substantially independently of the load which the device supports.

[0022] The seal 6 is preferably composed of a rubber-elastic material and can be, for example, an O-ring.

[0023] So that moisture does not penetrate into the space between covering part 2 and carrying part 1 through those bores at which the threaded bolts 4 run through the covering part 2, the nuts 5 are intended to fit tightly on the threaded bolts 4, that is with an interference fit, and tightness also has to prevail at the surface region between nuts 5 and covering part 2. This can be achieved by a sealing ring (not illustrated) being placed between nuts 5 and covering part 2 or by the nuts 5 themselves, which do not actually have to support too much load, being composed of a relatively flexible material, such as typically a thermoplastic, which, upon pressing against the covering part 2 is deformed to such an extent that tightness is produced.

[0024] In an optional development of the device according to the invention, a valve 7 (i.e. an optionally closable opening) leads through a bore in the covering part 2 into the space between covering part 2 and covering part 1. After the device has been installed, a pressure difference in relation to the surroundings can therefore be produced in said space by means of a pump, and it can be measured how rapidly said pressure difference dissipates once the pump has been switched off. It can therefore be measured whether the space between covering part 2 and covering part 1 is readily sealed or not in relation to the surroundings.

[0025] Patent Claims

[0026] 1. A device for fastening objects to an outer surface of a building or object, wherein the device has a carrying part (1) and a covering part (2), wherein the carrying part (1) has the statically supporting function for the object to be fastened and the covering part (2) the sealing function in relation to the building outer surface or object outer surface, and, for this purpose, is arranged on the outer side of the outer surface of the building or object, wherein the covering part (2) is a dimensionally stable body, and the relative position of the covering part (2) in relation to the carrying part (1) is adjustable in the direction normal to the building surface or object surface, characterized in that at least two connecting parts for the object to be fastened protrude from the carrying part (1) through openings in the covering part (2).  

[0027] 2. The device as claimed in claim 1, characterized in that the covering part (2) is anchored on the carrying part by means of screws.

[0028] 3. The device as claimed in either of claims 1 or 2, characterized in that the covering part (2) is shell-shaped, and in that the free end surface of the lateral surface thereof is arranged facing the building outer surface.

[0029] 4. The device as claimed in one of claims 1 to 3, characterized in that a seal (6) is fitted between covering part (2) and building outer surface or object outer surface.

[0030] 5. The device as claimed in claim 4, characterized in that the seal (6) is composed of a rubber-elastic material.

[0031] 6. The device as claimed in one of claims 1 to 5, characterized in that the connecting parts are three threaded bolts (4) which are oriented normally to the building outer surface, and in that the direct connection lines between the individual axes of said threaded bolts (4) together constitute a triangle in the projection onto a plane lying normally to the threaded bolts (4).

[0032] 7. The device as claimed in claim 6, characterized in that the triangle is equilateral.

[0033] 8. The device as claimed in one of claims 1 to 5, characterized in that the connecting parts are at least three
threaded bolts (4) which are oriented normally to the building outer surface or object outer surface.

[0034] 9. The device as claimed in claim 2 and claim 6 or claim 7 or claim 8, characterized that a nut (5) is in engagement with a threaded bolt (4) and bears against the covering part (2) from the side facing away from the carrying part (1).

[0035] 10. The device as claimed in one of claims 1 to 9, characterized in that a valve (7) is arranged in a bore which connects the space enclosed between the carrying part (1) and the covering part (2) to the surroundings.

[0036] 11. A device for fastening objects to an outer surface of a building or object, wherein the device has a carrying part (1) and a covering part (2), wherein the covering part (1) has the statically supporting function for the object to be fastened and the covering part (2) the sealing function in relation to the building outer surface or object outer surface, and, for this purpose, is arranged on the outer side of the outer surface of the building or object, and wherein one or more connecting parts for the object to be fastened protrude from the carrying part (1) through openings in the covering part (2), wherein the covering part (2) is a dimensionally stable body, and the relative position of the covering part (2) in relation to the carrying part (1) is adjustable in the direction normal to the building surface or object surface, characterized in that a valve (7) is arranged in a bore which connects the space enclosed between the carrying part (1) and the covering part (2) to the surroundings.

1. - 11. (canceled)
12. A device for fastening objects to an outer surface of a building or object comprising

- a carrying part that has the statically supporting function for the object to be fastened, said carrying part being fixed to the building or object and at least two connecting parts for the object to be fastened are fixed to the carrying part,

- a covering part, that has the sealing function in relation to the building outer surface or object outer surface, said covering part is arranged on the outer side of the outer surface of the building or object and is a dimensionally stable body, the relative position of said covering part in relation to said carrying part is adjustable in the direction normal to the building surface or object surface and said at least two connecting parts protrude from the carrying part through openings in the covering part.

13. The device as claimed in claim 12, wherein the covering part is anchored on the carrying part by means of screws.

14. The device as claimed in claim 12, wherein the covering part is shell-shaped and the free end surface of the lateral surface thereof is arranged facing the building outer surface.

15. The device as claimed in claim 12, wherein a seal is fitted between the covering part and the outer surface of the building or object.

16. The device as claimed in claim 15, characterized in that the seal is composed of a rubber-elastic material.

17. The device as claimed in claim 12, wherein the connecting parts are three threaded bolts which are oriented normally to the carrying part and the direct connection lines between the individual axes of said threaded bolts together constitute a triangle in the projection onto a plane lying normally to the threaded bolts.

18. The device as claimed in claim 17, wherein the triangle is equilateral.

19. The device as claimed in claim 12, wherein the connecting parts are at least three threaded bolts which are oriented normally to the building outer surface or object outer surface.

20. The device as claimed in claim 12, wherein nuts are fastened to the connecting parts said nuts bear against the covering part from the side facing away from the carrying part.

21. The device as claimed in claim 12, wherein a valve is arranged in a bore which connects the space enclosed between the carrying part and the covering part to the surroundings.

22. A device for fastening objects to an outer surface of a building or object comprising

- a carrying part that has the statically supporting function for the object to be fastened, said carrying part being fixed to the building or object,

- a covering part that has the sealing function in relation to the building outer surface or object outer surface and is arranged on the outer side of the outer surface of the building or object, said covering part is a dimensionally stable body and the relative position of said covering part in relation to said carrying part is adjustable in the direction normal to the building surface or object surface one or more connecting parts for the object to be fastened that are protruding from the carrying part through openings in the covering part

- a valve that is arranged in a bore which connects the space enclosed between said carrying part and said covering part to the surroundings.

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