The invention relates to a mounting arrangement for curtain-type facade facing tiles according to the preamble of Claim 1.

From AT-B-381 747 a device for fastening facade tiles is known. For this purpose a fastening device, consisting inter alia of carrier sections, is disposed between the building wall or the brickwork and the facade tile. The free end of the fastening device directed towards the facade tiles is provided on its upper and lower sides with vertically aligned pins. The pins serve to mount two facade tiles disposed one above the other. For this purpose holes, in which the pins engage, are provided on the corresponding bottom and top edge surfaces of the facade tiles.

In order to enable facing tiles of stone, or a similar material which like stone reacts in a fracture-sensitive manner to forcing, to be fastened without forcing on a facade structure, it is in addition known (US-A-3,561,102) to provide facing tiles with grooves in which arms of carrier sections engage, particularly in the corner regions. Either these arms are short in length or bearing sections are provided at points on the arms to support the facing tiles on the arms, in order to prevent forcing over the entire length of the facing tile, for example if the arms are deformed in curves as a result of deformation in the facade structure. Particularly under wind loads, that is to say wind suction or wind pressure, heavy forces are exerted on the facing tile edge strips which bound the arms and which have a relatively slight thickness, so that the edges of the facing tiles frequently break off. Deformation of the substructure, that is to say for example thermal deformation of the posts and crossbeams of the facade structure, may also subject the facing tiles to forcing, which may likewise give rise to the breaking-off of the edge regions.

It has been found that facade facing tiles of stone break either in the region of the grooves in which

the carrier section arms engage or in the centre of the tile when subjected to violent force, for example by vandalism, shock loads from equipment moving over them, such as hoisting cages for window cleaning, and so on. This is frequently accompanied by material damage or danger to persons if parts of the facing tiles fall off.

The problem underlying the invention is that of providing a mounting for curtain-type facade facing tiles of stone or a similar material, by means of which the dropping of broken pieces is reliably prevented when reliable prevention of breakage of the edge regions as a result of external action is not possible.

According to the invention this problem is solved by a mounting arrangement having the features of Claim 1.

Advantageous developments can be seen in subclaims 2 to 13.

Through the provision of a ductile, that is to say elastic, adhesive in the space bounded by the grooves and the arms of the carrier sections, broken pieces of the facade facing tiles are held on the carrier sections whether the fracture of the facing tile starts from the middle or occurs only in the edge region. Adhesive bonding in the full-length groove prevents broken pieces of the facade facing tiles from falling out.

The fastening sections, which preferably consist of an elastic material, preferably have a length of about 150 mm and are disposed at a distance of about 100 mm from the corners. Through the provision of the fastening sections, two-point mounting of the facade tiles is achieved, so that no forcing action can be transmitted from the facade substructure into the facing tiles. In order to reduce or eliminate punctiform loads, the remaining gap is filled with a ductile, that is to say elastic, adhesive.

The adhesive is preferably ductile and/or water-proof and/or temperature-resistant, so that security against falling-off is achieved over an unlimited or at least lengthy period of time.

The adhesive is preferably a silicone adhesive and the fastening sections are likewise preferably composed of a silicone.

In order to prevent the penetration of moisture into the grooves, the grooves in the facade facing tiles are preferably sealed at the end faces.

When, in a development of the invention, each carrier section is mounted at both ends for rotation about a vertical axis and in addition is mounted at one end for reciprocating displacement in the direction of the pivot pin at the other end, a statically determinate mounting is obtained for each facing tile, without moments acting on the substructure. If the carrier sections are disposed with their holding arms extending not horizontally but at an angle to the horizontal, particularly vertically, the dead weight of each facing tile is supported separately. Consequently, no forcing action be exerted on the facing tile through deformation of the substructure or through wind loads or thermal deformation, since no moments can be transmitted. The arms thus cannot transmit any heavy forces to the edge regions bounding the grooves in the facing tile, so that the breaking-off of these edge regions is reliably prevented.

In another development the extension arm in conjunction with a holding arm forms an L-shape if the carrier section is to be disposed at the top edge of the uppermost facing tile or at the bottom edge of the lowermost facing tile. On the other hand the extension arm, in conjunction with two holding arms extending in opposite directions at its end, forms a T-shape if the carrier section is to be used for mounting two facing tiles disposed side by side.

In an alternative development, great torsional stiffness is obtained as a result of the U-shaped configuration of the carrier section, which by means of the legs of the U embraces the associated bearing section, so that great distances between posts or

crossbeams of a facade structure can be bridged over without entailing impermissible deformation of the carrier sections.

The construction of one bearing pivot pin as a movable bearing displaceable, in the direction of the longitudinal axis of the carrier section, towards or away from the other bearing pivot pin associated with it, serves to enable deformations in the substructure and/or the facing tiles to be tolerated without transmission of moments to the facing tiles. If holding arms engage only in two mounting grooves lying opposite one another in each facing tile, this construction enables the inside walls of the mounting grooves to be supported over their full length on the holding arms without forcing. In order to eliminate forcing still more reliably, strips or sections of elastic material, such as rubber or plastics material, are preferably provided, which are disposed on the holding arms and on which the latter support the side walls of the mounting grooves.

The invention is explained more fully below with the aid of one exemplary embodiment. In the drawings:

Figure 1 is a section through a carrier section on which two facade facing tiles of stone are disposed, and

Figure 2 is a section on the line II-II in Figure 1.

Figure 1 shows a facade post 10, on which a carrier section 14 is fastened by means of a bearing section 12. As can be seen in Figure 2, carrier sections 14 and 16 are fastened on the bearing section 12 in order to carry facade facing tiles 18, 20 of stone which are disposed side by side. In the section shown in Figure 1 another facing tile 22 is disposed under the facing tile 18. Like the carrier section 16, the carrier section 14 is disposed in a statically determinate manner on bearing sections 12, that is to say one end of the carrier section 14 is fastened to the bearing section 12 via a

movable bearing 25, while the other end of the carrier section 14, like the end of the carrier section 16, is fastened to a bearing section by means of a fixed bearing 24. The fixed bearing 24 is constructed such that the carrier section 16 can make a rotary movement about a bearing pin 26, while the movable bearing 25 has a construction such that each carrier section 14, 16 is displaceable on a pin 28, so that movements of the facade structure cannot give rise to a forcing action in the carrier sections 14 and 16. In the region of the movable bearing 25 the carrier section 14 has a slot 30, in which the pin 28 is received. The bearing section 12 is screwed to the post 10 by means of screws 32. The carrier section 14 has a U-shaped cross-section comprising a base 34 and two legs 36, 38 extending at right angles to the latter. The legs 36 and 38 engage over the bearing section 12. On the outside of the base 34 the leg 38 is continued to form an extension 40, at the end of which two arms 42 and 44 respectively, extending at right angles thereto, are formed. The arm 42 serves to support the facing tile 18, while the arm 44 fastens the facing tile 22 at the top edge. On the carrier section 16 shown in Figure 2 an arm 46 supports the facing tile 20.

At a distance of about 100 mm from the vertical edge surface 48 of the facing tile 20 a fastening section 50 is pushed onto the arm 46. The fastening section 50 has a length of about 150 mm. A corresponding fastening section is disposed on the arm 46 in the other corner region of the facing tile 20. The facing tile 18 is supported by means of a fastening section 52 on the arm 42 of the carrier section 14. A second fastening section is disposed on the arm 42 in the opposite corner region of the facing tile 18. The facing tiles 18, 20 and 22 are provided on the edge surfaces with grooves 54, 56 and 58 respectively, in which the arms 42, 46 and 44 respectively of the carrier sections 14 and 16 engage. The space bounded by the walls of the respective grooves 54, 56 and 58 and the respective arms 42, 46 and 44 is

filled with a silicone adhesive 60, 62 and 64 respectively. By means of the silicone adhesive the facing tiles are bonded to the carrier sections. If a facing tile should break through the action of an external force, the broken fragments will be held on the carrier sections by the adhesive action, so that they cannot fall off and cause damage or injure persons.

In order to prevent the penetration of moisture into the grooves, they are provided at their free end faces with weather sealing 66, 68. This sealing may preferably be composed of a silicone material.

Patent claims

1. Mounting arrangement for curtain-type facade facing tiles (18, 20, 22) of stone or a similar material, comprising carrier sections (14, 16) engaging in full-length engagement in the facing tiles by means of holding arms (42, 44, 46) in mounting grooves (54, 56, 58) in two opposite edge faces of the facing tiles, characterised in that fastening sections (50, 52) are pushed onto the holding arms (42, 44, 46) in the corner regions of the facing tiles and the gaps remaining between the holding arms and the walls of the mounting grooves are filled with an adhesive (60, 62, 64).

2. Mounting arrangement according to Claim 1, characterised in that the fastening sections (50, 52) have a length of about 150 mm and are disposed at a distance of about 100 mm from the corners of the facing tiles.

3. Mounting arrangement according to Claim 1 or 2, characterised in that the adhesive (60, 62, 64) is ductile, waterproof and temperature-resistant.

4. Mounting arrangement according to one of the preceding Claims, characterised in that the fastening sections are elastic.

5. Mounting arrangement according to one of the preceding Claims, characterised in that the adhesive is a silicone adhesive.

6. Mounting arrangement according to one of the preceding Claims, characterised in that the fastening sections are composed of silicone.

7. Mounting arrangement according to one of Claims 1 to 6, characterised in that the grooves (54, 56) in the facing tiles (18, 20) are provided at the end faces with sealing (66, 68).

8. Mounting arrangement according to one of Claims 1 to 7, characterised in that each carrier section (14, 16) is connected in each of its end regions to a bearing pivot pin (24, 25) of a bearing section (12) which is arranged at right angles to the longitudinal axes of the

* C L M S *

holding arms (42, 44, 46) of the carrier sections (14, 16) and parallel to their common plane, one of said bearing pivot pins (25) being in addition longitudinally displaceable, as a movable bearing, in the direction of the longitudinal axis of the carrier section (14, 16).

9. Mounting arrangement according to one of the preceding Claims, characterised in that each carrier section (14, 16) has a U-shaped cross-section comprising a base (34) and two legs (36, 38) at right angles thereto, in that one leg (38) is provided with an extension arm (40) extending beyond the base (34), and in that at least one holding arm (42, 44) extends at right angles to said extension arm (40) at the end of the latter.

10. Mounting arrangement according to Claim 9, characterised in that the legs (36, 38) of the U of the carrier sections (14, 16) engage around the bearing sections (12).

11. Mounting arrangement according to one of Claims 8 to 10, characterised in that the bearing pivot pin (25) in the form of a movable bearing has a slot arrangement (30) which is formed in the associated bearing section (12) and/or end region of the legs.

12. Mounting arrangement according to one of the preceding Claims, characterised in that the bearing sections (12) are screwed to the posts or crossbeams.

13. Mounting arrangement according to one of the preceding Claims, characterised in that the carrier sections (14, 16) are made of metal, such as aluminium or special steel.

14. Mounting arrangement according to one of the preceding Claims, characterised in that the carrier sections extend horizontally and are attached to an outer wall construction of a building or to posts or crossbeams of a facade construction.

15. Mounting arrangement according to one of the preceding Claims, characterised in that the dead weight of the facing tiles is supported independently of the

* C L M S *

holding arms of the carrier sections.

* C L M S *