

The invention relates to a facade structure as is described in Claim 1.

EP-A-0 050 838 discloses a facade structure which comprises posts and crossmembers between which glazings and/or panels are arranged. The glazing and/or the panels is/are fastened via pressing strips. Interior and exterior seals are provided on the corresponding parts, the space enclosed by the posts, the crossmembers, the glazings and/or the panels and the pressing strips being designed, by a drainage means provided at the crossover point, as a relieved space. In this arrangement, the inner seals form a largely air-tight sealing plane. The disadvantage with said known facade structure is that drainage can take place, merely at the crossover region of posts and crossmembers, via an element designed in the manner of a tile. There is thus no drainage in the horizontal direction over the entire extent of the glazings and/or panels. Nothing can thus be done to prevent the situation where water running off along the glazings and/or panels does not drip off at the bottom border of the corresponding elements, but penetrates, into the region of the adjoining rebate spaces and/or separation joints, towards the inside behind the glazings and/or panels and runs off on the inner side thereof. This results in condensation in the interior of the facade, with adverse consequences for this region.

The object of the present invention is to propose a facade structure in the case of which, at the upper edge of each facade zone, effective drainage to the outer side of said structure takes place in a simple manner, in order to avoid the undesired penetration of moist room air or even water into certain regions of the facade.

Said object is achieved by the features specified in Claim 1.

The proposed solution is achieved in that water penetrating into the space behind the pressing strips is reliably prevented from passing through the inner sealing plane in order to accumulate behind the glazings and/or panels. Water-tight partitioning is achieved by the

proposed design. The inner seal, which is arranged on the interior, is responsible for air-tightness. This thus achieves the important vapour-tightness on the warm side and the sealing principle of pressure equalization, according to which principle water barrier and air-sealing barrier are to be positionally separated from one another. Each facade zone, and thus each individual glass and/or panel zone, is ventilated and drained without there being any danger of water penetrating. In this arrangement, the expansion joints are designed such that the inner sealing plane is also air-tight at these locations. The pressing strips are fastened on metal profiles which, in turn, are arranged, via insulating rails, on the outer surfaces of the posts and cross-members. In order to discharge the water, through-passage openings are formed in the pressing strips. The channels formed by the metal profiles, the insulating rails and the pressing strips constitute closed, water-tight ducts which ensure that, inter alia, the water accumulating on the upper side of the insulating rails can be reliably discharged out of the corresponding space to the outside and does not penetrate more deeply into the facade.

According to a preferred further development of the invention, the assembly and expansion joints of the water-discharging channels are sealed with the aid of silicone putty or by prefabricated rubber mouldings.

Due to the ventilation provided, there is no differential pressure at the assembly and the expansion joints or at sealing joints, even if there is a sustained build-up of air from wind acting on the facade. This is achieved in that a high degree of air-tightness is produced on the inner side, likewise with the aid of silicone putty or by rubber mouldings, which air-tightness reduces the differential build-up from the outside to the inside. Due to the design, no water can reach these inner joints which are sealed with respect to air, with the result that, due to this absence of water, water cannot be transported to the inside, even if the joint has slight defects, although there is a certain

leakage rate for air which, however, is negligible overall. The deciding factor for relocating the pressure reduction to the inner side is that the cavity behind the water-deflecting layer is sufficiently ventilated. The ventilation automatically effects immediate drying of the leakage air which has penetrated from the inside and is initially moist due to the fact that it originates from the room. This prevents condensation or ice forming at the cold locations of the outer region of the facade.

Water which has come in is discharged to the outside again and again at the water-discharging channels and cannot penetrate more deeply into the structure.

According to a preferred embodiment, the pressing strips are anchored on the metal profiles by clipping them on or fitting them in. It is thus possible to fasten the pressing strips on the posts and crossmembers without screws. The elastic force which is necessary after clipping on or anchoring is achieved by the seals between the pressing strips and the glazings or panels.

According to a further preferred embodiment, the pressing strips are arranged, via insulating rails, in an off-centre manner on the outer surface of the posts and crossmembers. In the case of this embodiment, the glazings or panels are pushed in between the seals on the outer side of the posts and crossmembers and the inner side of the pressing strips until the opposite border of the glazing or of the panel can be guided past the edge of the pressing strip. Thereafter, the glazing or the panel is pushed back until it is seated on the blocks arranged on the insulating rails.

If the pressing strips are connected to a plurality of legs on the metal profiles, the through-passage openings, through said legs, intended for discharging the water are arranged in an offset manner.

If the connection of the insulating rails to the crossmembers and the metal profiles is not absolutely water-tight, then a sealing layer, for example consisting of silicone, may be provided.

In a further development of the invention,

sealing mouldings for sealing the inner sealing plane in an air-tight and water-tight manner are arranged on the crossover points of posts and crossmembers. Said sealing mouldings are designed preferably in the form of troughs or cups and, by means of a leg, engage over the insulating rails with the metal profile. The sealing mouldings have to be designed such that they rest in an absolutely leak-tight manner against the outer contour of the posts and crossmembers. It is possible to arrange, between the sealing mouldings and the posts and crossmembers, a sealing material which prevents capillary action.

In order to prevent water from being able to pass from one glass zone into a glass zone arranged therebeneath, the metal profile, fastened on the crossmember via the insulating rails, exhibits preferably a downwardly extending outer leg, beneath which a pressing strip arranged on a post engages by means of an end portion. Consequently, each glass zone can be drained individually, and the situation where penetrated water can accumulate in a large quantity in the lower region of a building facade does not arise.

In a further development of the invention, in order to form a horizontal joint for vertical expansions, a bush is fastened in the upper end region of the posts of one facade zone, and the lower ends of the posts of a facade zone arranged thereabove are plugged onto such bushes. It is thus possible for posts of each facade zone to be able to expand in length independently of one another.

Slots are preferably formed on the post which can be displaced on the bush, and pins which engage into the slots are provided on the bush.

In a further development of the invention, the crossmembers butt flush against the posts and are connected to the posts via pins. In particular, ducts are formed in the crossmembers, the pins can be displaced in the ducts before the crossmembers are fastened on the posts, bores for receiving the pins are formed in the side surfaces of the posts, and, after having been

inserted into the bores in the posts, said pins can be fixedly clamped on the crossmembers. This ensures that the crossmembers can carry out the relatively small length expansions of from 1 mm to 2 mm without uncontrolled forces being exerted on the posts.

In order to improve the partitioning with respect to the penetration of water, a region of the crossmembers preferably engages over the front sides of the posts. Suitable cutting of the ends of the crossmembers renders the gap on the front side of the posts, in the crossover regions of post and crossmember, minimal.

Instead of, or in addition to, sealing mouldings, of a [sic] sealing composition, which preferably consists of silicone, may be arranged in the space which is enclosed by the posts and crossmembers, the glazings and panels and the pressing strips.

Exemplary embodiments of the invention are explained in more detail hereinbelow with reference to the drawing, in which:

Figure 1 shows a front view of a facade comprising a number of zones,

Figure 2 shows a zone of the facade according to Figure 1, comprising three crossmembers and two posts,

Figure 3 shows the connection of two posts of two facade zones arranged one above the other, in accordance with III of Figure 2,

Figure 4 shows a representation analogous to Figure 3, in which the arrangement of the pressing strips on the posts can be seen,

Figure 5 shows a section along line V-V of Figure 2,

Figure 6 shows a section analogous to Figure 5, with a modified design of the crossmember ends,

Figure 7 shows a section according to VII of Figure 2,

Figure 8 shows a section according to VIII of Figure 2,

Figure 9 shows a section along line IX-IX of Figure 2,

Figure 10 shows a section along line X-X through a post according to Figure 2,

Figure 11 shows a section along line XI-XI through a crossmember according to Figure 2, and

Figure 12 shows a section analogous to Figure 11, with a modified embodiment of a crossmember.

Figure 1 shows a front view of part of a facade with a multiplicity of facade zones 10, 12 and 14. Only some of the zones 12 and 14 are represented. Each zone 10 comprises a left-hand post 16, a right-hand post 18, a lower crossmember 20, an upper crossmember 22 and a central crossmember 24. A glazing 26 is arranged between the crossmembers 22 and 24, a panel 28 is provided above the crossmember 22, and the crossmembers 20 and 24 enclose a panel 30. The left-hand post 16 is, at the same time, to be regarded as the right-hand post for the adjacent zone, and the right-hand post 18 serves, at the same time, as the left-hand post for the facade zone 10 which adjoins on the right.

Figure 2 shows an enlarged representation of a facade zone 10. The posts 16 and 18 are of a continuous design over the entire zone 10, and the crossmembers 20, 22 and 24 butt flush against the posts 16 and 18.

Figure 3 shows the design of a horizontal joint between the post 18 of the facade zone 10 and a post 32 of a facade zone 12 arranged therebeneath. Inserted in the upper end of the post 32 is a bush 34, of which the outer contour is complementary to the inner contour of the posts 18 and 32. The bush 34 is fastened in the post 32 via screws 36 and bolts 38. Formed on the side surfaces of the end region of the post 18 are slots 40 into which there engage pins 42 which are fastened on the bush 34. This results in additional guidance of the post 18 on the bush 34.

The upper end of the post 32 is designed in the form of an L with a projecting narrow leg 44, and the lower end of the post 18 is designed in a complementary L-shaped manner with a projecting wide leg 46. This makes it possible for a crossmember 48 to be able to be connected on the post 18. The gap 50 left between the posts 18 and 32 is approximately 8 mm, so that account is taken of a theoretically possible length expansion.

The crossmember 48 comprises a box profile 52 in

which there are formed ducts 54 and 56 which serve for the fastening of the crossmember 48 on the post 18. Accommodated in the ducts 54 and 56 are pins, of which the function is explained in more detail with reference to Figures 5 and 6. Integrally formed on the box profile 52 are legs 58 and 60 which form undercut grooves in which seals may be received if the fastening of panels of a large wall thickness is to take place.

On the front side of the box profile 52, insulating rails 62 and 64 are fastened in undercut grooves, a metal profile 66 being arranged at the other end of said insulating rails. The metal profile 66 exhibits a hook-shaped leg 68 and an L-shaped, downwardly directed leg 70. The legs 68 and 70 serve for the fastening of a pressing strip 72, by means of which a glazing or a panel is fastened. Pressing strips 74 and 76 arranged coaxially on the posts 18 and 32, respectively, are represented by chain-dotted lines. It can be seen that the pressing strip 76 exhibits, at its upper end, a tapered portion 78 which is located beneath the leg 70 of the metal profile 66. This ensures that any water penetrating from the space between the posts, the crossmembers, the glazings and the pressing strip cannot penetrate into the pressing strip 76, but is guided to the outside at this pressing strip 76. The pressing strip 72 exhibits a hook-shaped leg 80 and a leg 84 provided with latching extensions 82, interlocking of the pressing strip on the metal profile 66 taking place by means of said legs. The design of the seals and of the spaces enclosed by the facade elements can be seen with reference to Figures 10 to 12.

Figure 4 shows a section through the arrangement according to Figure 3, it being possible to see the overlapping of the pressing strip 74 by a downwardly extending outer wall 86 in the crossover region of the pressing strips 74, 76 and 72. In this representation, the pressing strip 72 is represented by broken lines.

Figure 5 shows a section through the post 18 above the horizontal joint with the post 32 arranged therebeneath. The bush 34 is indicated within the post

18, it being possible for the post 18 to be displaced on said bush. The crossmember 24 of the facade zone 10 and a crossmember 88 of an adjacent facade zone abutt against the side surfaces of the post 18. Pins 90 and 92 are guided displaceably in the ducts 54 and 58 [sic], respectively. After pushing the crossmember 54 [sic] into the position which it is intended to assume on the post 18, the pins 90 and 92 are pushed, by means of a suitable tool, out of the ducts 54 and 58 [sic] until the heads of the pins engage into bores 94 and 96, respectively, in the side wall of the post 18. When the heads project into the interior of the post 18, a suitable tool, for example a pliers-like tool, is used to deform the ducts 54 and 56 at the location at which annular grooves 98 and 100 are formed in the pins 90 and 92, respectively. The pins 90 and 92 are then anchored fixedly on the crossmember 24, and the heads of the pins can move in the through-passage bores 94 and 96 and accompany changes in the length of the crossmember 24 by sliding. The crossmember 88 is fastened on the opposite side wall of the post 18 in a manner analogous to that in which the crossmember 24 is fastened.

It can be seen from Figure 5 that the box profile of the crossmembers 24 and 88 is shorter, and that at least part of the insulating rails, with the metal profile fastened on the front side, projects beyond the box profile and is brought directly up to the insulating rails 102 and 104 and the metal profile 106, which [lacuna] on the front side of the post 18 which is likewise designed as a box profile. Formed in the metal profile 66 of the crossmember 24 is a duct 108 in which a pin 110 is fastened by one end and of which the other end engages displaceably into a corresponding duct 112 in the metal profile 114 of the crossmember 88. It can further be seen from Figure 5 that the metal profile 106 is designed with hook-shaped leg [sic] 116 and 118, on which a pressing strip 120 is fitted or clipped by means of hook-shaped legs 122 and 124.

Figure 6 corresponds essentially to the construction

according to Figure 5, the difference being that the front surfaces of the metal profiles 66 and 114 are drawn towards one another, with the result that only a narrow gap 126 is formed. This gap 126 prevents water from entering in behind the pressing strips.

Figure 7 shows the attachment of the crossmember 22 on the post 18. The crossmember 22 is likewise designed as a hollow box profile and is approximately L-shaped in cross-section. A duct 130 is formed in the lower front corner and a duct 132 is formed in the right-hand upper corner, fastening pins 134 and 136, respectively, being inserted in said ducts. Integrally formed on in front of the duct is an undercut longitudinal groove 138 which serves to receive seals which rests [sic] on the rear side of a glazing or of a panel. A correspondingly designed undercut groove 140 is formed in front of the duct 132, said undercut groove 140 serving to receive a seal if fastening of a panel of a large wall thickness is to take place. Fastened on the front side of the crossmember 22 are insulating rails 142 and 144 on which there is arranged, in turn, a metal profile 146. The metal profile 146 exhibits, in turn, a duct 148 in which a fastening pin 150 is received. The metal profile 146 is designed in the same way as the metal profile 66 according to Figure 4 and serves for the clipping-on or fitting-in of a horizontally arranged pressing strip 152. On the front side of the post 18 there is fastened, via insulating rails 154, a metal profile 156 on which pressing strips 158 and 160 are fitted. The pressing strip 160 engages, by means of its upper end, beneath the downwardly directed leg 162 of the metal profile 146, and the pressing strip 158 engages, at its lower end, over both the leg 162 and the upper end of the pressing strip 162 [sic]. The crossmember shown in Figure 7 serves, on its upper side, for fastening a panel of a large wall thickness and, on the underside, for fastening a glazing.

The crossmember 164 shown in Figure 8 is designed analogously to the crossmember 22, the difference being that a seal 166 is provided at the upper right-hand

corner, for fastening a glazing, and a seal 168 is provided at the lower right-hand corner of the hollow box profile, for fastening a panel. The crossmember shown in Figure 8 is designed mirror-invertedly with respect to the crossmember shown in Figure 7, the difference being that, in the case of this crossmember too, the leg 170 of the metal profile 172 is directed downwards and not upwards. The design and arrangement of the pressing strips is the same as for the embodiment according to Figure 7.

Figure 9 shows a section through the post 18 above the crossmember 22 and a crossmember 174, arranged coaxially with respect to the crossmember 22, of an adjacent facade zone. It can be seen that the post 18 has undercut grooves 176 and 178 formed on its outer side, said grooves being provided for fastening seals for resting on the rear side of glazings. Fastened in narrow undercut grooves 180 and 182 are insulating rails 184 and 186 which, at their opposite ends, are received in correspondingly designed grooves of a metal profile 188. A pressing strip 190 is fitted in, or clipped on, the metal profile 188. In the case of the post and crossmember facades described with reference to the figures, glazing takes place from the outside. The glazing is seated on blocks which are arranged on the insulating rails and the metal profile of a crossmember. When all the borders of the glazing rest on posts and crossmembers, the pressing strips are fitted in. Since elastic seals are arranged between the posts and crossmembers and the inner side of the glazing and between the outer side of the glazing and the rear side of the pressing strips, the pressing strips can be pressed and fitted in. The seals then press the hook-shaped legs of the pressing strips into the hook-shaped legs on the metal profiles, this resulting in durable interlocking.

It can be seen from Figure 7 that the insulating rail 142 and the metal profile 146 form a channel in which water can be guided to the outside. If the connection between the insulating rail 142 and the

crossmember 22 and the metal profile 146 is not sufficiently leak-tight, a silicone layer may additionally be arranged on the upper side of the insulating rail 142. As soon as water accumulates in the space between the border of the glazing and the insulating rail 142, this water can be guided to the outside via the metal profile. The leg 200 of the pressing strip 152 is, then, designed with through-passage bores 202 which guide the water in the pressing strip 152 downwards. Bores 206 are formed, in the lower leg 204 of the pressing strip, offset with respect to the bores 202, it being possible for accumulated water to be guided, through said bores 206, outside to the front of the facade. It is thus possible to drain each glazing zone of the facade, and, correspondingly each panel zone of the facade, separately. In the case of the arrangements shown, it is ensured that the pressure in the space enclosed by the posts, crossmembers, the borders of the glazing and/or panels and the pressing strips is equalized with respect to the atmosphere and is thus relieved, with the result that water cannot be sucked into said space. It is further ensured that the second sealing plane, i.e. the sealing between the glazing or a panel and the posts and crossmembers, is air-tight and water-tight, with the result that moisture cannot pass behind the glazing and/or the panels.

Figure 10 shows a post 210 in the form of a box profile, on the front side of which insulating rails 214, 216 are fastened, offset with respect to the longitudinal centre axis 212, in undercut grooves. Fastened at the front ends of the insulating rails is a metal profile 218, which is, at the same time, to be regarded as a pressing strip. Seals 224 and 226 are fastened in undercut grooves 220 and 222, respectively, which are formed on the longitudinal borders of the box profile 210. Seals 228 and 230 are fastened on the rear side of the pressing strip 218, which is likewise designed as a box profile. The fastening of glazings 232 and 234 [sic] takes place in that the glazing 232 is pushed in between the seals 224 and 228 until its border rests against the insulating

5 rail 214 and the middle leg 234 of the pressing strip 218. In this position, the opposite border of the glazing 232 can be pushed behind the leg of a pressing strip on the adjacent post, after which the glazing 232 is displaced to the left until it assumes a position which is shown in relation to glazing 233. In the case of this embodiment, there is no additional pressing strip which is fitted in on a metal profile, but rather metal profile and pressing strip are designed in one piece. The seals 10 224 and 226 effect air-tight and water-tight sealing between the posts 210 and the glazings 232 and 233, and the space 236 enclosed behind the pressing strip 218 is relieved. By virtue of the seals 224 and 226, the vapour-tightness on the warm side and the sealing principle of 15 pressure equalization are achieved, according to which principle water barrier and air-sealing barrier are to be positionally separated from one another.

The thrust-type post connection of the outer metal profile 218 to the inner post 210 results in a 20 statically effective cross-section over the overall depth, whereas, in the case of the conventional structure, the outer screwed-on pressing or covering strip is not statically effective, with the result that the known structures are of a considerably smaller static 25 overall height and, accordingly, require more material for the same degree of rigidity.

Figure 11 shows a crossmember 240 on which glazings 242 and 244 are fastened. Arranged on the front side of the crossmember 240 is a seal 246, and provided 30 on the inner side of a pressing strip 248 is a seal 250 which rests on the outer surface of the glazing 242. The pressing strip 248 is interlocked on a metal profile 252 which is fastened on the crossmember 240 via insulating rails 254. Both the configuration and the function of 35 said exemplary embodiment correspond to the exemplary embodiments which have been described with reference to Figures 3 to 10.

In the case of the exemplary embodiment according to Figure 12, a metal profile 266 is fastened, offset

with respect to the centre axis 262, on a crossmember 260 via insulating rails 264. A pressing strip 268 which serves for the fastening of glazings 270 and 272 is fitted in on said metal profile 266. The arrangement of the seals corresponds to the embodiment according to Figure 11. By virtue of the off-centre arrangement of the metal profile 266, it is possible to arrange the glazing 270 and 272 on the crossmember in a manner analogous to the exemplary embodiment according to Figure 10, in that first of all the border of the glazing is pushed in between the seals until the border of the glazing rests in the metal profile 266. After aligning the opposite border of the glazing of the [sic] pressing strip of an adjacent crossmember, the glazing is raised until the two horizontal borders of the glazing are located behind the pressing strips. The glazing 272 is supported via blocks which are provided at the corner regions. Blocks of this type are not represented in Figures 11 and 12.

In order to achieve the situation where the second sealing plane, i.e. the plane between the rear side of the glazing or of the panels and the front side of the posts and crossmembers, is also air-tight and water-tight in crossover regions, adapters or mouldings are provided, which are matched to the outer contour of the posts and crossmembers and give rise to the desired sealing action. If a horizontal joint is provided in a crossover region, it has to be ensured that absolute leak-tightness is also ensured in the joint region. Adapters or mouldings of this type are, for example, caps or of a cup design and, by means of an integrally formed leg, may engage over the insulating rail and the metal profile on a post or on a crossmember. Furthermore, it is possible to effect sealing with a pasty sealing means, for example silicone.

Patent Claims

1. Facade structure comprising glazings (26) and/or panels (28, 30) fastened on posts (16, 18) and crossmembers (20, 22, 24), inner seals being arranged between
5 the inner surface of the glazings (26) or of the panels (28, 30) and the outer surface of the posts (16, 18) and crossmembers (20, 22, 24), and outer seals being arranged between the outer surface of the glazings (26) or of the panels (28, 30) and the inner surface of the pressing
10 strips (72, 74, 76), in the case of which structure the space enclosed by the posts (16, 18), the crossmembers (20, 22, 24), the glazings (26) and/or the panels (28, 30) and the pressing strips (72, 74, 76) is designed as a relieved space, the inner seals form a largely air-
15 tight sealing plane, the facade is divided up into zones (10, 12, 14), and each zone individually absorbs the length expansions in the vertical and in the horizontal, characterized in that horizontally running, water-discharging channels are arranged on the upper edge of
20 each facade zone (10, 12, 14), the channels are formed by metal profiles (66; 146; 172; 252; 266), insulating rails (62, 64; 142, 144; 254, 264), which connect the metal profiles (66; 146; 172; 252; 266) to the crossmembers (20, 22, 24) and posts (16, 18), and pressing strips (72,
25 74, 76), and the pressing strips (72, 74, 76) are arranged on the metal profiles (66; 146; 172; 252; 266) via legs (200, 204), the water which accumulates in the channel, for discharge purposes, being guided to the outside via through-passage openings (202, 206) arranged
30 in the legs (200, 204) of the pressing strip (72, 74, 76).

2. Facade structure according to Claim 1, characterized in that the assembly and expansion joints of the water-discharging channels are sealed with the aid of
35 silicone putty or by prefabricated rubber mouldings, and/or in that a sealing composition, preferably silicone, is arranged in the corresponding space.

3. Facade structure according to Claim 1 or 2, characterized in that the pressing strips (120, 152) are



anchored on the metal profiles by clipping them on or fitting them in.

4. Facade structure according to one of Claims 1 to 3, characterized in that the pressing strips (218) are arranged, via insulating rails (214, 216), in an off-centre manner on the outer surface of the posts (210) and crossmembers.

5. Facade structure according to one of Claims 1 to 4, characterized in that sealing mouldings for rendering the inner sealing plane air-tight and water-tight are arranged on the crossover points of the posts and crossmembers.

6. Facade structure according to Claim 5, characterized in that the sealing mouldings are designed in the form of troughs or cups and, by means of a leg, engage over the insulating rails with the metal profile.

7. Facade structure according to one of Claims 1 to 6, characterized in that the metal profile (66) of the crossmembers (48) is designed with a downwardly directed leg (70), and in that the vertical pressing strip (76) engages, by means of an end portion (84), beneath the leg (70).

