

The invention relates to a securing element according to the precharacterising clause of the main claim and to a facing board according to the precharacterising clause of patent claim 5.

Securing elements that can be anchored positively in drilled holes having an undercut are known. In the case of those securing elements, an expansible sleeve that can be pushed onto an expander member can engage positively in the undercut in the region of the base of the drilled hole. Those securing elements are not, however, very suitable for drilled holes of very little depth.

To secure facing boards, which have only a small thickness, it is possible to make drilled holes having an undercut, but only very little depth, in the back of the facing board. Conventional securing elements with expansible sleeves are not very suitable for this area of use. Since it is generally necessary to provide a plurality of securing elements on each facing board, the construction and mounting of those securing elements should be as simple as possible. The problem on which the invention is based is, therefore, to provide a securing element for undercut drilled holes of little depth that can be inserted positively into the undercut drilled hole and is as simple as possible in construction. The securing element is intended to be suitable especially for securing facing boards.

This problem is solved by means of the features listed in patent claim 1. All that is required to mount the securing element in a drilled hole having an undercut is to place the securing element with the end face of the expander cone at the base of the drilled hole and then, using a tubular tool, to press down the ring that has been bent into a roof-shape. The outer edges of the ring

press against the wall of the drilled hole in the region of the undercut and thus anchor the securing element positively in the drilled hole. The securing element comprises essentially a threaded bolt made of steel, at one end of which the expander cone is formed. The expansible element that has been bent into a roof-shape is a steel ring that is approximately oval in its unbent state. In the bending region this ring may be of reduced dimensions, that is to say that the ring has two portions of reduced dimensions opposite one another in its middle. These portions of reduced dimensions not only facilitate the bending of the ring into a roof-shape, but act as a zone in which upsetting can take place when the ring is being braced in the drilled hole. This allows optimum bracing of the ring in the region of the undercut, without excessively high expansion forces being produced. In the bending region, it is possible for two indentations to be stamped into the ring, opposite one another, which indentations likewise assist the bending and optimum bracing of the ring in the drilled hole.

In order to obtain a facing board having reliable securing elements that are nevertheless of simple construction, a facing board having the features of claim 5 is proposed. A facing board equipped on the back with the securing elements according to the invention can be secured very reliably. If, in addition, a spacer sleeve that rests on the expander cone or on the ring and projects slightly at the back of the facing board is placed over the threaded shaft, tearing of the securing element out of the drilled hole can be prevented even if a nut screwed onto the threaded rod is tightened with a torque that is too great per se; the expansion forces that are produced are taken up by the spacer sleeve.

The outer diameter of the spacer sleeve is matched to

the diameter of the drilled hole, with the result that the spacer sleeve also simultaneously centres the securing element in the drilled hole and takes up the bending forces acting on the securing element.

Instead of a spacer sleeve, it is also possible for a plastics disc to be placed over the threaded shaft. The plastics disc is braced against both the expansible element and the outer surface of the facing board by means of a nut screwed onto the threaded shaft. The centering projection of the plastics disc that engages in the drilled hole presses at the same time against the raised portions of the portions of the ring that have been bent over into a roof-shape, with the result that plastic and resilient deformation of the centering projection on the one hand produces more uniform pressure on the expansible element and on the other provides lasting and vibration-proof bracing. At the same time, the sealing lip of the plastics disc is pressed firmly against the outer surface of the facing board, with the result that optimum sealing of the drilled hole is ensured. By way of the plastics disc, moreover, the threaded bolt is supported laterally yet, owing to the plastics material, flexibly.

In order to increase the resiliency and upsetting capability of the plastics disc to compensate for tolerances in the depth of the drilled hole and/or in the height of the expansible element, it is advantageous to provide the end face of the plastics disc opposite the centering projection with a recess. The recess allows the plastics disc to bend sufficiently far to enable it to rest against the nut that serves for bracing.

The invention is explained in detail below with reference to embodiments shown in the drawing.

Figure 1 shows a securing element, having a ring that has been bent into a roof-shape, that is to be inserted into a facing board,

Figure 2 shows the ring according to Figure 1 in its unbent state, from above,

Figure 3 shows the ring according to Figure 2 in a side view,

Figure 4 shows a facing board with an anchored securing element onto which a spacer sleeve has been placed, and

Figure 5 shows a further embodiment of a spacer ring in a half-sided cut-away view.

Figure 6 shows a variant of the expansible element.

Figure 7 shows the securing element anchored in the facing board and braced by a plastics disc.

Figure 1 shows a facing board 1 having a drilled hole 2 that has an undercut 4 in the region of the base 3 of the drilled hole. Such an undercut can be made using conventional abrading devices and is not a subject of the present application.

A securing element 5, with its expander cone 6, can be inserted into the drilled hole 2. Above the expander cone 6 is a ring 7, bent into a roof-shape, through the opening 8 in which (Figure 2) a threaded rod 9 projects upwards. The ring 7 is bent sufficiently far to allow it to be inserted with the securing element into the bore 2 in the facing board 1 that is shown in section.

In its unbent state, the ring 7 is approximately oval in shape, as can be seen in the plan view in Figure 2. The two rounded sides 10, 11 opposite one another are markedly wider than are the straight portions 12, 13 of reduced dimensions. The portions 12, 13 of reduced dimensions facilitate the bending of the ring 7 and serve at the same time as a zone in which upsetting can take place when the ring is pressed down and braced in the drilled hole (Figure 4).

Figure 3 shows, in side view, that indentations 14 are formed in the region of the portions of reduced dimensions on the underside of the ring 7. Like the portions of reduced dimensions, the indentations 14 in the two portions 12, 13 of reduced dimensions facilitate the bending of the ring 7 into a roof-shape and facilitate the upsetting of the ring material in those regions.

Figure 4 shows a securing element inserted into a facing board 1 with a positive fit, the lateral edges 10, 11 of the pressed-down ring 7 resting against the wall of the bore 2 in the region of the undercut 4. When the ring 7 is pressed down, it is possible not only for the ring to expand in the direction of the arcuate sides 10, 11, but for it to expand also in the region of the portions 12, 13. When the ring 7 is pressed down, the portions 12, 13 come to rest on the expander cone 6 and there are pressed downwards, and hence outwards, by the mounting tool 15. The mounting tool 15 is a tubular element which, before a spacer ring 16 is put on, is pushed onto the securing element 5 in order to push down the ring 7 into the shape shown in Figure 4. The spacer ring 16 is then pushed over the threaded rod 9 and inserted into the drilled hole 2, centering, and producing lateral support for, the threaded rod 9.

Figure 5 shows a different embodiment of a spacer element 17. The bore in this spacer element 17 is matched to the shape of the expander cone 6 and can thus penetrate further into the drilled hole 2 and come to rest on the top of the ring 7. The dimensions of the two spacer rings 16, 17 are chosen such that they project slightly at the edge 19 of the mouth of the drilled hole 2.

The variant of the expansible element shown in Figure 6 has three portions of the ring 7 bent over into a roof-shape. The bent-over ends 20 of these portions of the ring lie on one plane and on the same diameter. This results in a three-point contact between the ends 20 and the conical outer surface of the expander cone 6. When the expansible element is pressed down in order to anchor the securing element 5 in the drilled hole 2, the three ends 20 are bent uniformly into the undercut 4. This results in a somewhat more advantageous distribution of force and centering of the securing element 5 in the drilled hole.

In order to anchor the threaded bolt 9 in the bore 2, provided with an undercut 4, in the facing board 1, the expansible element 7 has been driven onto the expander cone 6 of the threaded bolt using a hammering-in tool. The plastics disc 21 is then placed over the shaft of the threaded bolt 9 so that the centering projection 22 engages in the drilled hole 2 in the facing board 1. Using a nut 23, the plastics disc is then braced in such a manner that the end face 24 of the centering projection 22 presses on the expansible element 7 and the sealing lip 25 presses on the outer surface of the facing board 1. Plastic deformation of the end face 24 of the centering projection 22 results in a bracing effect that presses the expansible element 7 constantly onto the

expander cone 6 and thus secures the anchoring. To compensate for tolerances both in the depth of the drilled hole and in the height of the expansible element 7, the plastics disc 21 additionally has a recess 26 which allows the plastics disc 21 to bend, if necessary, sufficiently far to enable it to rest against the nut 23.

The securing of the facing board 1 to the support 27 of a sub-structure secured, for example, to masonry is effected by means of a further nut 28, between which nut 28 and the nut 23 the support 27 is braced.

It is also possible to push the expansible element 7 directly onto the expander cone 6 of the threaded bolt by means of the plastics disc 21 and the nut 23, with the result that no hammering-in tool is needed for the anchoring.



Patent claims

1. Securing element made of metal, having a threaded shaft and an expander cone insertable into an undercut in a drilled hole of little depth, onto which expander cone can be pushed an expansible element through which the threaded shaft passes, especially in the form of a securing element for facing boards, characterised in that the expansible element is an at least approximately oval metal ring (7) bent into a roof-shape, the bent-over ends (10, 11) of the ring resting on the conical outer surface of the expander cone (6).

2. Securing element according to claim 1, characterised in that the wall portion of the ring (7) has reduced dimensions in the bending region (12, 13).

3. Securing element according to claim 1 or claim 2, characterised in that the wall portion of the ring (7) has indentations (14) in the bending region.

4. Securing element according to any one of the preceding claims, characterised in that, in the unbent state, the ring (7) has a greater maximum external diameter than does the undercut (4) in the drilled hole (2) into which the securing element (5) is to be inserted.

5. Facing board having at least one drilled hole with an undercut into which a securing element according to any one of the preceding claims is inserted, characterised in that the ring (7) is pushed onto the expander cone (6) and the outer edge of the ring (7) rests in the undercut (4), against the wall of the drilled hole.

6. Facing board according to claim 5, characterised in



that a spacer sleeve (16, 17) is placed over the threaded shaft (9), above the ring (7), the outer diameter of which sleeve is the same as the minimum diameter of the drilled hole (2).

7. Facing board according to claim 6, characterised in that the spacer sleeve (16, 17) is supported at one end on the expander cone (6) or on the expanded ring (7) and at the other end projects slightly at the edge (19) of the mouth of the drilled hole (2).

8. Securing element according to claim 1, characterised in that the expansible element has at least three ring portions bent over into a roof-shape, the bent-over ends (20) of which lie on one plane and on the same diameter.

9. Securing element according to claim 1, characterised in that a plastics disc (21) is placed over the threaded shaft (9), the edge of the disc that sits on the facing board (1) being in the form of a sealing lip (25), and the disc having a centering projection (22) that engages in the drilled hole (2) and presses on the expansible element (7) that has been pushed onto the expander cone (6).

10. Securing element according to claim 9, characterised in that the end face of the plastics disc (21) that is opposite the centering projection (22) is provided with a recess (26).

11. Securing element according to claims 9 and 10, characterised in that the height of the recess (26) and the sealing lip (25) corresponds approximately to the thickness of the plastics disc (21) in the region of the recess.