

The invention concerns an anchoring strap for connection with a threaded rod fitted with a nut, especially as an upper section of an anchoring fixture for a cladding panel anchoring, the anchoring strap consisting of sheet metal having a window, the lower edge of which, arched out of the plane containing the central axis of the threaded rod, forms a support surface for the nut or a washer lying under it.

These types of anchoring straps are used for the introduction of tensile forces into tension bars which have a screw thread at least at their ends. In this case, the anchoring strap forms a flat lug at the end of the threaded rod which, for example, is used for connection to a surface of another component by means of a bolt or a similar member.

It is common to all applications of these types of anchoring straps that the introduction of force into the threaded rod should take place as far as possible without bending moments, as otherwise the loading capacity of the connection is considerably reduced.

A typical application for this type of anchoring strap is for cladding panel anchorings which are used to hang cladding panels a short distance in front of external walls of constructions. In these cladding panel anchorings, the anchoring strap forms the upper section of the anchoring which is attached to the outside wall which carries the cladding panel by means of a sleeve-plug.

In such a known cladding panel anchoring (EP-A-237 998) which has also found acceptance to a large extent in practice, the anchoring strap which forms the upper section of the anchoring consists of a sheet part folded together in two layers. The folded edge is situated at the upper edge of the anchoring strap. The lower edge of the window punched in both sheet-metal layers is formed here by two sheet-metal webs which lie on each other on their two side edges and are joined to each other, for example by rivets. In each case, the central sections of the two sheet-metal webs are arched outwards in opposite directions into an approximately semi-cylindrical bell, which together form a sleeve through which the threaded rod is pushed. In each case, the top edge of the two sheet-metal webs forms the supporting surface for the washer lying under the nut. This supporting surface thus extends largely symmetrically on both sides of the plane of the anchoring strap which contains the central axis of the threaded rod, this plane, in the known upper section of the cladding, being at the same time the dividing plane of the two sheet-metal layers.

In this manner, in fact a centric and therefore torque-free introduction of tensile force from the anchoring strap into the threaded rod is achieved; manufacture of the anchoring strap is, however, relatively expensive because of the required double-layer construction, especially as the window must be punched in both layers of sheet metal. Because of the deformations to be made in the lower section of the anchoring strap, the holes for the rivet connection cannot be produced beforehand, but have to be produced after the process of deformation, which involves additional labour costs.

In addition also, inaccuracies in manufacture must be avoided which would lead to the two halves of the supporting surface formed by the two sheet-metal layers being offset against each other, as this might result in turn in an eccentric introduction of force, thus causing a bending moment.

The task of the invention, therefore, is to construct an anchoring strap of the kind mentioned at the beginning, so that this can be made in a simpler manner than hitherto, and that this is suitable also for the introduction of very high tensile forces into the threaded rod.

This task is solved according to the invention by the anchoring strap being constructed in one layer, by an upper sheet-metal web forming the lower edge of the window in its central section being arched towards one direction approximately in the shape of a semi-cylindrical shell from the plane of the anchoring strap, by the two side sections of the upper sheet-metal web lying in the zone of the supporting surface being arched in the opposite direction from the plane of the anchoring strap and a retaining clip for the threaded rod being arched outwards from the plane of the anchoring strap in an opposite direction to the central section of the upper sheet-metal web.

Through the sections arched outwards in both directions from the plane of the anchoring strap on the single-layer upper sheet-metal web, an introduction of tensile force which is as far as possible centric and thus free from torque is achieved from the anchoring strap into the nut and from this into the threaded rod, without a double-layer type of sheet-metal web being necessary for this. The single-layer manufacture of the anchoring strap is considerably simplified in comparison with a folded double-layer type. It has also been demonstrated that, in comparison with the double-layer type, comparatively very high tensile forces can be transmitted, without an unacceptable deformation or fracture in the zone of the sheet-metal web occurring.

The two side sections of the sheet-metal web are preferably arched outwards from the plane of the anchoring strap by about 20-40% of the amount of arching of the central section. The required arching of the central section emerges through the diameter of the threaded rod, as this central section encloses half the threaded rod.

The retaining clip arched in an opposite direction to the central section of the upper sheet-metal web is firstly used to keep the threaded rod in its position in the anchoring strap. According to one especially preferred practical form of the invention, it is arranged that the retaining clip is formed by a sheet-metal web, each arched in an opposite direction to the upper sheet-metal web. It is thus achieved that the retaining clip is also executed in one piece with the anchoring strap and it can be produced without an additional operation.

It is especially advantageous if the upper sheet-metal web is supported in an axial direction on the sheet-metal web which forms the retaining clip. Because of this, the carrying capacity of the upper sheet-metal web is further increased substantially.

In the same manner, underneath the central sheet-metal web which forms the retaining clip, a lower sheet-metal web can be arranged and in each case arched in an opposite direction to the latter. Preferably, the cross-sectional shape of this lower sheet-metal web is again the same as that of the upper sheet-metal web. The central sheet-metal web can also be supported again on the lower sheet-metal web in an axial direction. The sheet-metal webs thus lying behind each other in the axial direction of the threaded rod, supported against each other, arched in each case consecutively in an opposite direction, together form a dimensionally stable bridge which can be highly loaded in the axial direction, for absorbing the tensile forces introduced from the threaded rod, the threaded rod being received and guided as in a sleeve between the central sections of the sheet-metal webs in each case arched in opposite directions on alternate sides.

A practical example of the invention which is shown in the drawing is explained below in more detail:

Fig. 1 shows a front view of an anchoring strap which forms an upper section of the anchoring of a cladding panel anchoring.

Fig. 2 shows a side view of the cladding panel anchoring, the upper anchoring section of which is shown in Fig. 1, and

Fig. 3 shows a section along the line III-III in Fig. 2.

The upper anchoring section of the cladding panel anchoring shown in the drawing is an anchoring strap 1 which is bent in one layer from sheet metal and punched. The anchoring strap 1 has an upper section 3 forming a slight angle on a bending edge 2 which is used in the practical example illustrated for fastening to an external surface of a building. The main section 4 of the anchoring strap 1 extends obliquely downwards from this upper section 3, which lies for the most part flat in a plane 5 (Fig. 3) and in which an oblong window 6 (Fig. 1) is punched. The window 6 extends into the upper section 3 and forms a recess there for a sleeve plug 7 or the like supporting the cladding panel anchoring.

A threaded rod 8 forms a tension rod which is connected at its lower end to a lug 9. The lug 9 encloses a transverse rod 10 in a recess of a cladding panel 11 (Fig. 2).

The threaded rod 8, the central axis 12 of which lies in the plane 5 of the anchoring strap 1, as can be seen from Figs. 2 and 3, projects with its end into the window 6 and supports a nut 13 there, under which lies a washer 14. The nut 13 is supported above the washer 14 on the lower edge of the window 6. This lower edge is formed from an upper sheet-metal web 15 which joins together the two side sections of the anchoring strap 1. This upper sheet-metal web 15 is arched outwards in its central section 16 (Fig. 3) approximately in the shape of a semi-cylindrical shell towards the one direction from the plane 5 of the anchoring strap 1. On both sides of this lie the side sections 17 of the upper sheet-metal web 15, which are likewise arched outwards from the plane 5, but in a direction opposite to the central section 16.

The arching of these side sections 17 is also less and only about 20-40% of the amount of arching of the central section 16.

In Fig. 3 the external diameter of the washer 14 is drawn in as a dot-dash circle. It is recognised that the cross-hatched surface lying within this circle forms the supporting surface 18 for the washer 14 and that this supporting surface 18 has sections situated on both sides of the plane 5.

Underneath the upper sheet-metal web 15 there is a central sheet-metal web 19 which is separated from the upper sheet-metal web 15 by a cut 20 which runs transversely. The central sheet-metal web 19 is arched in the same way as the upper sheet-metal web 15, but in the opposite direction. The central sheet-metal web 19 forms in the first place a retaining clip for the threaded rod 8 in the anchoring strap 1; in the second place, the central sheet-metal web 19 supports the upper sheet-metal web 15, however at the two points of contact in the zone of the cut 20 in an axial direction, so that its carrying capacity is increased for absorbing the tensile forces from the threaded rod 8.

Underneath the central sheet-metal web 19, a lower sheet-metal web 21 is arranged, which again is arched in an opposite direction to the central sheet-metal web 20 and therefore in the same way as the upper sheet-metal web 15. In the zone of a cut 22 running transversely which separates the sheet-metal webs 19 and 21 from each other, these are supported mutually. If it has previously been described that one of the sheet-metal webs is arched in an opposite direction to the other, in each case this is intended to express that each of these sheet-metal webs 15, 19 or 21 has a central section arched outwards in the one direction from the plane 5 and on both sides of it has two side sections arched in the opposite direction. Because of this identical deformation of the sheet-metal webs 15, 19 and 21, their extended lengths are in each case the same, so that during manufacture of the sheet-metal webs 15, 19 and 21, no expansions or upsetting deformations are necessary in individual sheet-metal webs.

An especially favourable distribution of the load onto the individual sheet-metal webs 15, 19 and 21 results if the upper sheet-metal web 15 is of a broader type than the sheet-metal webs 19 or 21. The width of the upper sheet-metal web 15 is preferably between one and a half times and double the width of the central sheet-metal web 19.



Patent Claims

1. Anchoring strap for connection to a threaded rod (8) provided with a nut, especially as an upper anchoring section for a cladding panel anchoring, the anchoring strap (1) consisting of sheet metal having a window (6), the lower edge of which, arched outwards from the plane of the anchoring strap (1) which contains the central axis of the threaded rod (8), forms a supporting surface for the nut (13) or a washer (14) lying under it, characterised in that the anchoring strap (1) is constructed in one layer, that an upper sheet-metal web (15) forming the lower edge of the window (6) is arched outwards in its central section (16) towards the one direction approximately in the shape of a semi-cylindrical shell from the plane (5) of the anchoring strap (1), that the two side sections (17) of the upper sheet-metal web (15) in the zone of the supporting surface (18) are arched outwards in the opposite direction from the plane (5) of the anchoring strap (1), and that a retaining clip (19) for the threaded rod (8) is arched outwards in an opposite direction to the central section (16) of the upper sheet-metal web (15) from the plane (5) of the anchoring strap (1).
2. Anchoring strap according to Claim 1, characterised in that the two side sections (17) of the upper sheet-metal web (15) are arched outwards by about 20-40% of the amount of the arching of the central section (16) from the plane (5) of the anchoring strap (1).
3. Anchoring strap according to Claim 1, characterised in that the retaining clip is formed from a sheet-metal web (19), arched in each case in an opposite direction to the upper sheet-metal web (15).
4. Anchoring strap according to Claim 3, characterised in that the upper sheet-metal web (15) is supported on the sheet-metal web (19) forming the retaining clip (19) in an axial direction.
5. Anchoring strap according to Claim 3, characterised in that underneath the central sheet-metal web (19) forming the retaining clip (19), a lower sheet-metal web (21) is arranged and in each case arched in an opposite direction to the latter.
6. Anchoring strap according to Claim 5, characterised in that the central sheet-metal web (19) is supported on the lower sheet-metal web (21) in an axial direction.