

Description

The present invention relates to a connecting element for a pole in accordance with the preamble to Patent Claim 1 and as is also known from FR-A-2494353 or EP-A-44057.

In prior art trestles or three-dimensional frameworks, scaffold poles are often connected to one another via junction members in such a manner that the end portion of one scaffold pole is detachably screwed to a junction member which is secured laterally to another scaffold pole or supporting column. When such a three-dimensional framework is being erected, it is often desired to insert a scaffold pole for example between two junction members without displacing them spatially, in order to leave room free for the screws which are secured to the end portions of the scaffold pole prior to the screwing-on.

The prior art three-dimensional frameworks are not equal to such a special task. In contrast, the invention shows a way of also taking this additional task into consideration while at the same time providing a connecting element which also permits easy assembly of the scaffold poles used in such three-dimensional frameworks for which preference has in recent times been evident.

According to the invention, this problem is resolved by a connecting element according to the characterising part of Patent Claim 1.

Further advantageous developments of the invention indicated in the dependent Claims.



The invention is explained in greater detail hereinafter by describing an example of embodiment shown in the accompanying drawings, in which:

Fig. 1 shows a diagrammatic illustration explaining the principle on which a scaffold pole provided with a connecting element according to the invention works, compared with one according to the prior art.

Fig. 2 shows a diagrammatic illustration in section through the end portion of a scaffold pole to which the threaded insert of a connecting element according to the invention has been secured.

Fig. 3 shows a detailed illustration of this threaded insert in cross-section and in side elevation.

Fig. 4 shows a cross-sectional illustration of a threaded bolt for such a connecting element.

Fig. 5 shows the longitudinal and cross-sections of a hexagonal sleeve for it.

Fig. 6 shows the cross-section through a covering sleeve for this connecting element.

Fig. 7 shows a diagrammatic illustration in cross-section of such a connecting element prior to assembly.

Fig. 8 shows the corresponding illustration after assembly.

Fig. 9 shows a diagrammatic illustration of another sleeve of a connecting element according to the invention, which sleeve is to be secured to an end portion of a scaffold pole.

Fig. 10 shows a detailed illustration of a sleeve head of this sleeve, in cross-section,

Fig. 11 shows a side view of a threaded bolt for such a connecting element,

Fig. 12 shows the longitudinal and cross-sections of a hexagonal sleeve for it,

Fig. 13 shows a detailed view of a screw insert for it,

Fig. 14 shows a diagrammatic illustration in cross-section of such a connecting element prior to assembly,

Fig. 15 shows an illustration of the spherical junction member,

Fig. 16 shows a side view of a scaffold pole without the connecting element,

Fig. 17 shows a diagrammatic illustration in cross-section of another embodiment of such a connecting element,

Fig. 18 shows a diagrammatic illustration in cross-section of a further embodiment of such a connecting element wherein a rotary connection is provided between a guide sleeve and the sleeve head,

Fig. 19 shows a diagrammatic illustration in cross-section of an embodiment with two springs,

Fig. 20 shows a perspective illustration of a guide sleeve with angled over elongated lateral apertures adapted for a bayonet fitting,

Fig. 21 shows a plan view of a modified form of guide sleeve in which the elongated aperture has one end bent at an angle,

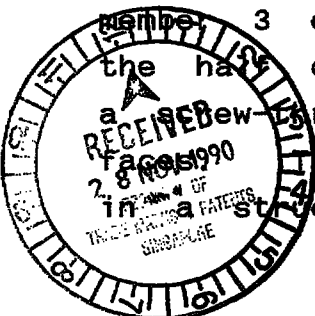
Fig. 22 shows a plan view of a further modified form of guide sleeve with an S-shaped lateral aperture,

Fig. 23 is a plan view of a further modified form of guide sleeve with an obliquely extending lateral aperture,

Fig. 24 is a diagrammatic illustration in cross-section of a guide sleeve provided with a reinforcing sleeve and

Figs. 25 to 27 show various modified forms of scaffold pole in cross-section.

In Fig. 1, two scaffold poles 1 and 2 are shown to each of which there is secured a respective junction member 3 or 4. Such a junction member may for example be the head of a flat hexagonal prism which is provided with a threaded hole at each of the three smaller side faces. The scaffold poles 1 and 2 are so rigidly mounted in a structure not shown in the drawing that the axis of

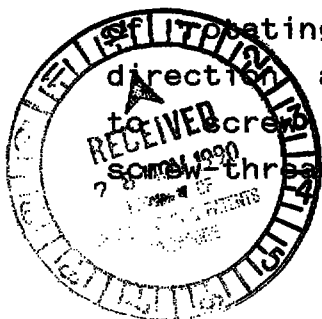


symmetry of a screw-threaded hole 5 of the junction member 3 and the axis of symmetry of a screw-threaded hole 6 in the junction member 4 lie in a straight line.

Fig. 1 also shows a scaffold pole 7 which is provided at each of its ends with a connecting element 8 or 9 according to the invention, in the open state, as well as a scaffold pole 10 which comprises a closed connecting element 11 or 12 at each of its ends. Of the connecting elements 8, 9, 11, 12, only a covering sleeve can in each case be seen in Fig. 1, out of each of which a screw 13 or 14 projects in the closed state. Compared with a scaffold pole according to the invention of length L in the open state, a scaffold pole 15 of nominal length L according to the state of the art has the disadvantage that because of the projecting screws 16 and 17, it cannot be screwed into the screw-threaded holes without shifting the scaffold poles 1 and/or 2 out of place for assembly if the effective distance between the front sides of the junction members 5 and 6 is also equal to L .

Now, the scaffold with the connecting elements according to the invention works as follows:

As a result of the covering sleeves 11 and 12 being rotated about their axes of symmetry in the one direction, the screws 13 and 14 also rotate but at the same time they undergo an axial displacement until they disappear into the interior of the covering sleeve. At this point in time, the total length of the scaffold pole 7 with the two connecting elements 8 and 9 in the open state is equal to L , so that it can easily be inserted between the junction members 5 and 6 so that as a result of rotating the covering sleeves 8 and 9 in the other direction and about their axis of symmetry it is possible to screw the screws, emerging rotating, into the screw-threaded holes 5 and 6. Dismantling is extremely



simple entailing rotation of the covering sleeves in the opening direction.

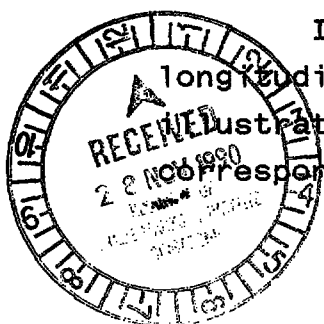
The end portion of a scaffold pole 20 shown in Fig. 2 comprises a bore 21 in which a threaded insert 31 is connected which is fixed at the end face and the axial internal bore 23 of which has a screw thread. The connection between the screw-threaded insert 31 and the scaffold pole 20 may be effected by adhesion or by screwing in for example.

Fig. 3 shows in detail a screw-threaded insert 31 which has not only an internal thread over the entire length LE but preferably also has an external thread of length LA. One end of this screw-threaded insert is constructed in the form of a hexagonal head 32.

Fig. 4 shows a screw-threaded bolt 41 of total length LB of which a portion of the length LH' is provided with a screw thread while a portion of the length LE' is smooth; a third portion of the length LE corresponds to the head 42, the diameter of which is DC, while at a distance $L_h < LH'$ from the tip, the screw-threaded portion has a through bore 43.

Fig. 5 shows a hexagonal sleeve 51 in the form of a hexagonal prism of length LP which is bored through axially and which is provided with an elongated lateral aperture 52 of length Lp and width Ld. A second elongated aperture, not shown in the drawing, may appropriately be made symmetrically to the first aperture with respect to the axis of rotation.

In Fig. 6, a sectional view transversely to the longitudinal axis of the covering sleeve 61 is illustrated, the outside diameter DA of which preferably corresponds to the outside diameter of the inside diameter



Da of which is somewhat greater than the outside diameter of the hexagonal sleeve 51. In this case, the covering sleeve 61 has on one side a portion 62 which is tapered so that the diameter DA' of the left-hand end face is somewhat smaller than the diameter DA. Substantially in the middle of the peripheral surface of the covering sleeve 61 there is a screw-threaded hole 63 through which a set screw not shown in the drawings, for example a hexagon socket set screw, can be screwed on in order to clamp the hexagonal sleeve 51 firmly in the interior of the covering sleeve in the installed state.

The elements 41, 51 and 61 are assembled as follows (Figs. 7, 8):

The screw-threaded bolt 41 the outside diameter DB of which corresponds to the inside diameter De of the screw-threaded insert 31, is screwed onto the screw-threaded insert 31 in the interior 21 of the scaffold pole 20 (Fig. 2) until its portion of length LH' has come through the screw-threaded insert 31; at this point in time, the screw-threaded bolt 41 is free to rotate inside the screw-threaded insert 31 since the length LE' is somewhat greater than the length LE and the diameter Db of the smooth portion of the screw-threaded bolt is somewhat smaller than the diameter De.

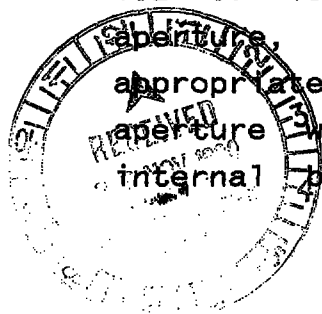
Then the hexagonal sleeve 51 is mounted on the projecting portion of the screw-threaded bolt 41, which can be done without delay because the outside diameter Db of the screw-threaded bolt 41 is smaller than the inside diameter Dp of the hexagonal sleeve 51 which, in addition, does not have any screw thread. In a further step, a clamping pin is loosely guided through the aperture 52 in the screw-threaded insert 51 and is firmly gripped in the bore 43 in the screw-threaded bolt 41. Thus the effect is achieved that the hexagonal sleeve 51 and the

screw-threaded bolt 41 can jointly rotate but in such a manner that although during the rotary movement the screw-threaded bolt also moves simultaneously in an axial direction, the hexagonal sleeve does not undergo any axial displacement because the clamping pin is displaced inside the elongated aperture 52 during rotation. For the purposes of the invention, therefore, the covering sleeve 61 is not absolutely necessary; it may however be used for aesthetic reasons. Instead of the hexagonal sleeve, a different kind of sleeve may also be used.

The sleeve head 130 illustrated in Fig. 10 has a bore 131 in which a sleeve 121 (Fig. 9) can be connected, fixed at the end face, for example by adhesion or by welding, while the axial internal bore of the sleeve 121 preferably has no screw thread. The sleeve 121 and sleeve head 130 form a sleeve insert. The connection between the sleeve insert and the scaffold pole 10 (Fig. 1) may be effected for example by adhesion or by screwing-in.

Fig. 11 shows a screw-threaded bolt 141 of total length $MB + Me$ of which one portion of the length MH' is provided with a screw thread and one portion of the length $MB - MH'$ is smooth; the portion of the length Me corresponds to the head 142, the diameter of which is QC , while at a distance $Mh < MH'$ from the tip of the screw-threaded bolt, the screw-threaded portion has a through bore 143.

Fig. 12 shows a hexagonal sleeve 151 in the form of a hexagonal prism of length MP which is bored through axially and is provided with an elongated lateral aperture 152 of length Mp and width Md . A second elongated aperture, not illustrated in the drawings, may appropriately be made symmetrically with the first aperture with respect to the axis of rotation. The internal bore in the prism may be round or hexagonal for



example (Fig. 12). At the end, the hexagonal sleeve 151 has an end face 153 with an axial bore of diameter Q_p .

Fig. 13 shows a side view and a cross-sectional view transversely to the longitudinal axis of a guide or screw insert 161 with a screw-threaded portion 162, the outside diameter of which corresponds to the outside diameter of the screw-threaded hole 5 in the scaffold pole 1 (Fig. 1). In this case, the screw insert 161 comprises at one side a portion 163 which is made hexagonal in shape with the screw-threaded bore 164 into which the screw-threaded bolt can be screwed. Substantially in the middle of the peripheral surface of the screw insert 161 and perpendicular to it, there is a screw-threaded hole 165 through which a set screw 171 shown in Fig. 4, for example a hexagon-socket set screw, can be screwed on in order to guide the screw insert 161 in the installed state.

The elements 141, 151 and 161 are assembled as follows (Fig. 14):

The screw-threaded bolt 141, of which the outside diameter Q_B of the thread corresponds to the inside diameter Q_e of the screw insert 161, is introduced into the interior of the scaffold pole through the internal bore in the sleeve insert 121, 130 (Figs. 9 and 10), until its portion of length MH' has come through the sleeve insert, the screw-threaded bolt 141 always being capable of rotating freely inside the sleeve insert since the inside diameter of the sleeve 121 is somewhat greater than the diameter Q_B of the screw-threaded bolt.



When the hexagonal sleeve 151 is mounted from the side provided with the end on the projecting portion of the screw-threaded bolt 141 which can be readily achieved because the outside diameter Q_B of the screw-threaded bolt

141 is smaller than the inside diameter of the bore in the end of the hexagonal sleeve 151 which, in addition, does not have a screw thread. In a further step, a helical spring 172 (Fig. 14) is guided loosely over the screw-threaded bolt 141 and the screw-threaded bolt 141 is screwed into the bore 164 in the screw insert 161. Thus the effect is achieved that the screw insert 161 and the screw-threaded bolt 141 are able to move jointly in an axially sprung manner but so that, in a rotary movement, the screw-threaded bolt 141 is also able to move simultaneously in an axial direction, the hexagonal sleeve 151 does not experience any axial displacement.

The screw-threaded bolt 141 (Fig. 14) could also be provided with a screw thread over its entire length MB (Fig. 11). The spring 172 could also be of a different type and/or may be disposed outside the interior of the guide sleeve. The internal bore in the sleeve 31, 121 and 221 may also be smooth.

In the case of the example shown in Figs. 12 and 13, the set screw 171 may be omitted. The junction member 3 shown in Fig. 1 may of course also be made spherical.

The junction member shown by way of example in Fig. 15 has a spherical shape with a plurality of flattened places 201, 202..., each of which is provided with a screw-threaded hole into each of which a tubular member can be screwed in order to be able to erect a framework by means of a plurality of tubular elements and junction members.

The tubular member illustrated in Fig. 16 has a circular cross-section and is provided with longitudinal grooves 211, 212... Such tubular members, which may also be rectangular, are for example known from CH-PS-588 233.

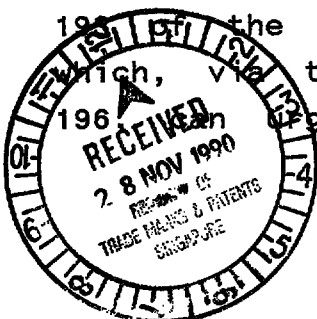
Instead of the screw insert 161 according to Fig. 13, the connecting element shown in Fig. 17 has a simpler guide insert 261.

The scaffold pole (Fig. 1) with connecting elements according to Figs. 9 to 17 works as follows:

The screws 13 and 14 are resiliently mounted and, as a result of being pushed gently, can experience an axial displacement until they disappear into the interior of the covering sleeve. At this moment, the total length of the scaffold pole 7 with the two connecting elements 8 and 9 in the open state is equal to L so that it can be easily inserted between the junction members 3 and 4 so that by rotating the covering sleeves 8 and 9 in the appropriate direction about their axis of symmetry, it is possible to screw the screws which emerge as they are rotated into the screw-threaded holes 5 and 6. Dismantling is carried out in the simplest of ways by rotating the covering sleeves in the direction of opening.

The connecting element according to Fig. 18 comprises a guide sleeve 181 adapted to be inserted into a central bore in the sleeve head of a sleeve insert 182 in order to form a rotary connection by means of a spring ring 185 which can be inserted in radial annular slots 183, 184, as a result of which an end face 186 of the guide sleeve 181 could also be omitted.

The sleeve insert 191 of the connecting element according to Fig. 19 comprises an inner sleeve or bush which is provided with a central bore 192 in such a way that inserted between the end of this bore and the head 193 of the screw-threaded bolt 194 there is a spring 195 which, via the screw-threaded bolt 194 and a set screw 196, can urge a guide sleeve 197 towards the sleeve head



198 of the sleeve insert, in which the bush 191 is mounted.

The guide sleeve according to Fig. 20 consists of a tubular body 221 which is provided with an elongated lateral aperture 222 wherein the ends of the aperture 222 are each extended in opposite directions at right-angles to the axis of rotation of the tubular body 221, one extended aperture 223 preferably having a circular widened portion while the other extended aperture has a semi-circular widened portion. A guide sleeve according to Fig. 20 or a simpler one having only one extended aperture may be used instead of the elements 51 (Figs 5, 7, 8), 151 (Figs. 12, 14), 181 (Fig. 18) and 197 (Fig. 19), while the guide sleeve may comprise an end face, not shown in Fig. 20, like the end face 153 of the sleeve 151 (Fig. 12).

In the tubular guide sleeve 225 according to Fig. 21, the one end 227 of the elongated aperture 226 is bent at an angle w with respect to the axis of rotation of the sleeve and the angle w may have any value between 0 and 90°.

The tubular guide sleeve 227 according to Fig. 22 has a curved or S-shaped aperture 228 and the guide sleeve 229 according to Fig. 23 has an elongated and obliquely extending aperture 230, one end of which may be provided with a bent back extension 231. The guide sleeves according to Figs. 21 to 23 may also be used instead of the elements 51, 151, 181 and 197, in which case the spring 172 and the end face 153 (Fig. 14) could be omitted because, upon rotation of the guide sleeve 225, 227 or 229, the pin introduced into the aperture 226', 228' or 230 is automatically pushed forwards, facilitating screwing of the screw-threaded bolt into the screw-threaded hole in a junction member.

The reinforced sleeve according to Fig. 24 comprises a tubular guide sleeve 241, for example in accordance with one of the Figs. 20 to 23 and possibly even without the circular, semi-circular or bent back extensions 223, 224 and 231 otherwise provided (Figs. 20, 23). The guide sleeve 241 is introduced into the interior of a reinforcing sleeve 242 in such a way that the outside diameter of the guide sleeve 241 corresponds to the inside diameter of the reinforcing sleeve 242. The connection between the sleeve 242 and the sleeve 241 can be established by screwing-in, adhesion, pressing-in and so on. If necessary, a relative movement between the two sleeves can be prevented by a screw 243. The sleeve 242 may have a circular aperture 244 or one which is transversely widened, through which a guide pin 245 of a threaded bolt 246 is accessible.

In the assembled state, the sleeve 241 and the sleeve 242 may have a common bore 247 through which a locking screw can be screwed into the screw-threaded bolt 246.

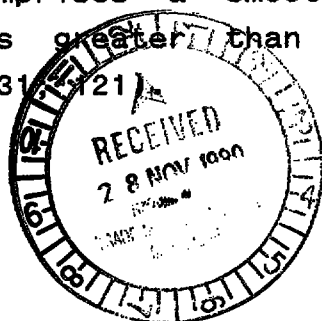
The working principle of a connecting element with a sleeve according to one of Figs. 20 to 24 is, in itself, the same as with the connecting elements already described. One difference resides in that the force needed to screw the threaded bolt 246 into a junction member is transmitted via the pin 245 which must therefore be appropriately dimensioned. On the other hand, the pin 171 according to Fig. 14 serves to hold the screw-threaded bolt 141 in any desired position with the fingers, preferably with the thumb.

The scaffold poles according to Figs. 25 and 26 comprise longitudinal slots 251, 252 or 261, 262 respectively, into which the edges of walls can be introduced as a result of a slight axial rotation of the scaffold pole. In contrast to this, a simple cylindrical scaffold pole 270 is shown in Fig. 27.



Patent Claims

1. A connecting element for a pole of a three-dimensional framework in which the connecting element comprises a threaded bolt (41; 141) which can be rotationally mounted at one end of the pole (20) as well as a sleeve (51; 151) with an axial through bore (53) into which the screw-threaded bolt (41; 141) can be introduced and in which a pin (43; 171) can be introduced loosely through an elongated aperture (52; 152) extending along the peripheral surface of the sleeve (51; 151) and can be connected to the screw-threaded bolt (41), characterised in that the screw-threaded bolt (141) can be connected to a guide insert (161; 261) guided by the sleeve (151) in that a pin can be introduced loosely through the elongated aperture (152) present on the peripheral surface of the sleeve (151) and can be wedged firmly in an aperture (165) in the guide insert (161) or in that the sleeve (241) provided with the elongated aperture is introduced into a further larger reinforcing sleeve (242).
2. A connecting element according to Claim 1, characterised in that the connecting element comprises a sleeve insert (31; 130; 121) which can be rigidly connected to one end of a pole (20) which is to be used and which comprises a through bore for the threaded bolt (41; 141).
3. A connecting element according to Claim 2, characterised in that the screw-threaded bolt (41; 141) comprises a smooth portion, the length (LE') of which is greater than the length (LE) of the sleeve insert (31; 121).



4. A connecting element according to any one of Claims 1 to 3, characterised in that a spring (172) is present which urges the sleeve (151) against a sleeve insert (130; 121) which can be mounted on the end of the pole (10).
5. A connecting element according to Claim 4, characterised in that the spring is a helical spring (172) situated in the interior of the sleeve (151).
6. A connecting element according to any one of Claims 1 to 5, characterised in that the aperture (222; 226; 228; 230) in the sleeve (221; 225; 227; 229) comprises a deflected extension (224; 226'; 228'; 231) at least at one end.
7. A connecting element according to any one of Claims 1 to 6, characterised in that the connecting element comprises a covering sleeve by which the sleeve (51; 151; 221; 229; 242) can be covered and to which it is connected.

Eight sheets of drawings

