SUPPORTING BODY FOR SCAFFOLD POLES OF A POSITION SCAFFOLDING

Inventors: Elmar Nuchter, Augsburg (DE); Botho Kikut, Augsburg (DE)

Correspondence Address:
MCGLEW & TUTTLE, PC
P.O. BOX 9227
SCARBOROUGH STATION
SCARBOROUGH, NY 10510-9227 (US)

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ABSTRACT
A supporting body (2) is provided for the scaffold poles (3) of a position scaffolding (1) for positioning one or several tension jacks (29) or other functional elements. The supporting body (2) includes a joint (19) for connecting to a manipulator (30) and several double clamp devices (32) provided with paired clamping elements (4) for the cantilever fixation of the scaffold pole (3). The double clamp devices (32) includes parallel adjacent bars (5, 14, 16, 17) which are jointed to the supporting body (2) and form at least one pole reception area (8) whose cross section is adapted to the scaffold pole.
SUPPORTING BODY FOR SCAFFOLD POLES OF A POSITION SCAFFOLDING

CROSS REFERENCE TO RELATED APPLICATIONS


FIELD OF THE INVENTION

[0002] The present invention pertains to a support body for scaffold poles for forming a positioning scaffold with support body for the scaffold pole of a positioning scaffold for positioning individual working elements or a plurality of working elements, especially tensioners or other functional elements, wherein the support body has a function for connection to a manipulator and a plurality of clamped fastenings for the scaffold poles.

BACKGROUND OF THE INVENTION

[0003] Such a positioning scaffold with a support body is known from DE 200 00 645 U1. The central support body can be connected to a robot or the like. The positioning scaffold comprises one or more, preferably tubular scaffold poles, which form a three-dimensional rod assembly, carry a plurality of working elements and are connected to the support body. The scaffold poles extend continuously beyond the support body and are fastened to the support body in a centered manner with clamping fastenings located far apart from one another.

[0004] The problem with this prior-art means is that the continuous tubes for holding the grippers or the like must be completely disassembled in case of a crash of the robot. Damage to tubes on one side of the support body may lead to deformations and damage on the other side. In case of great overhang of the scaffold poles, it is frequently necessary to use a so-called double-tube technique, in which a second tube, extending in parallel to the tube carrying the working element, must be used in addition to the tube carrying the working tube to stabilize this first tube carrying the working element. This leads to long repair times during the replacement of the continuous scaffold poles.

SUMMARY OF THE INVENTION

[0005] Thus, the basic object of the present invention is to show a better support body and to reduce the repair effort in case of damage.

[0006] The present invention accomplishes the object with a double clamping means with the individual scaffold poles arranged floatingly on the support body, so that only the individual scaffold pole arranged floatingly must be repaired or replaced in case of a crash of the robot, which can be carried out especially easily when connecting the individual scaffold pole to the support body.

[0007] A web plate made of a lightweight material, for example, a light metal casting part, with a base plate and webs made integrally or arranged thereon, which are used for reinforcement, is used as the support body. In addition, two parallel webs arranged adjacent to one another can be used to fasten a scaffold pole. Only one of these webs is equipped here with positive-locking connection means for receiving and axially positioning the scaffold pole.

[0008] The positive-locking connection means are known from DE 200 00 645. They comprise a centering bolt, which is inserted into fitting centering holes of the parts to be connected to one another, and it is necessary in terms of function that only one of these webs be connected to these positive-locking connection means.

[0009] A constellation is thus obtained in which an individual scaffold pole is anchored in two adjacent webs of the support body, and one of these webs has the positive-locking connection means and the other only secures the dimensional stability of the scaffold pole. As a result, the individual scaffold pole can be fastened floatingly at the edge area of the support body.

[0010] The webs of the support body are advantageously provided with preferably semicircular recesses, in which the scaffold poles are guided and fixed by the clamping elements. An individual support body, which preferably consists of a light metal casting part, can thus be used in a modular manner by milling out the recess for the scaffold pole on a case-by-case basis, deciding in the particular case only whether the milling is to be carried out corresponding to the cross section of the scaffold pole in a semicircular or prismatic pattern.

[0011] Of course, numerous embodiments are conceivable within the framework of the present invention. For example, it is possible that the individual web is arranged in a frame-like manner on a top side of the support body only, from which follows that the position of the scaffold poles is parallel to the top side of the support body. However, it is also possible, on the other hand, that at least two webs are arranged on the two opposite top sides of the support body, as a consequence of which a bi-level arrangement of the scaffold poles is possible.

[0012] However, this measure also offers the possibility of arranging parallel scaffold poles, which have a stabilizing effect, on one top side and the underside of the support body, which may happen especially in case of widely projecting structures. On the other hand, this possibility of bilateral arrangements of webs on the top sides of the support body offers the possibility of arranging scaffold poles in opposite directions.

[0013] If permitted by the stability of the support body, recesses may be provided in the base plate of the support body between the outer web pairs. This helps reduce the weight of the support body.

[0014] However, outwardly extending web pairs may also be provided on the circumference of the support body in order to arrange additional scaffold poles at right angles to the scaffold poles mentioned in the introduction.

[0015] Furthermore, provisions are made for the webs to be reinforced with ribs among each other, which enhances the stability of the support body.

[0016] A junction for connection to a robot is preferably provided in the central area of the support body. It is recommended that the flange plate used for this purpose be thickened at the base plate of the support body in order to
bring about increased rigidity of the connection. At the same time, it is recommended that the flange plate be reinforced by radial ribs against the inner webs.

[0017] Even if such a flange plate is not present, transverse arrangement of ribs in relation to the webs is recommended.

[0018] To enhance the many different possible uses of the positioning scaffold, the support body has flange surfaces for fastening other, separate double clamping means with clamping elements, which make it possible to arrange scaffold poles at right angles to the position of the scaffold poles anchored in the webs. Such clamping elements may have a molding, which has a base plate for fastening on the support body as well as two parallel webs, which are arranged at spaced locations from one another and in which recesses, which are open on one side, are present for receiving a scaffold pole, the molding being connected to the scaffold pole by clip fastening in conjunction with a positive-locking centering point on one of the webs.

[0019] Such an arrangement can enhance the stability of the support body, so that the latter only needs to be designed as a metal plate.

[0020] The positive-locking connection means may also comprise a straight pin and a fitting hole, the straight pin passing at least partly through the base plate, optionally the web of the lower part of the clamping element as well as the associated scaffold pole to form the positive-locking connection.

[0021] The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference is made to the accompanying drawings and descriptive matter in which a preferred embodiment of the invention is illustrated.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] In the drawings:

[0023] FIG. 1 is a cross sectional view through a support body with webs extending on one side for receiving a scaffold pole;

[0024] FIG. 2 is a cross sectional view along line II-II through the support body according to FIG. 1;

[0025] FIG. 3 is a vertical sectional view through a support body with webs arranged on both sides;

[0026] FIG. 4 is a top view of a support body with webs arranged in parallel to one another;

[0027] FIG. 5 is a cross sectional view through a clamping element flanged to the support body along line V-V in FIG. 4;

[0028] FIG. 6 is a longitudinal sectional view through a support body with a molding made integrally on one side;

[0029] FIG. 7 is a top view of a support body with optionally longitudinally and transversely extending webs and a flange plate;

[0030] FIG. 8 is a cross sectional view through the support body according to FIG. 7 along line VIII-VIII;

[0031] FIG. 9 is a top view of a support body with intersecting webs and diagonal ribs;

[0032] FIG. 10 is a partial sectional view through a support body with webs arranged at right angles to one another;

[0033] FIG. 11 is a view showing a robot with a positioning scaffold,

[0034] FIG. 12 is a bottom view of the positioning scaffold with a support body and floatingly mounted scaffold poles according to arrow XII in FIG. 11;

[0035] FIG. 13 is a perspective view of the top side of a support body; and

[0036] FIG. 14 is a perspective view of the underside of the support body from FIG. 13.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0037] Referring to the drawings in particular, the present invention pertains to a positioning scaffold (1), which is guided by a manipulator (30), preferably a multiaxial industrial robot, and comprises a plurality of scaffold poles (3) and a support body (2). Working elements (29), which may be, e.g., grippers, tensioners, suction devices or other functional elements, may be mounted on the scaffold poles (3). Such a positioning scaffold (1) is preferably used as a gripping means (28) for components (33), especially body parts of vehicles, and its general design is known from DE 2000 00 645 U1. FIGS. 11 and 12 show the positioning scaffold (1) and its connection to the robot hand (31) of a six-axis articulated arm robot (30).

[0038] The positioning scaffold (1) has a three-dimensional rod assembly, which is known per se and comprises intersecting or longer scaffold poles (3), which are connected to a central support body (2).

[0039] Contrary to the state of the art, the scaffold poles (3) are anchored floatingly at webs (5), which are located at the central support body (2). The central support body (2) is therefore formed from lightweight material, especially manufactured from a light metal casting part.

[0040] In the exemplary embodiment shown in FIG. 1, the webs (5) extend on one side from the base plate (9) of the support body (2). As is clearly shown in FIG. 2, the webs (5) have rod mounts (8), whose circumference is adapted to the cross section of the scaffold pole to be connected. The webs (5) thus form the lower, stationary part of a clamping element (4), which comprises the said lower part and a clip (11), between which the scaffold pole (3) is firmly clamped.

[0041] It is of special significance here that two parallel webs (5), which are arranged at spaced locations from one another and where positive-locking centering means in the form of a centering hole (7) and a centering pin (6) are provided in one web (5) only, are provided for each scaffold pole (3). The adjacent web (5) is intended only to secure the position of the scaffold pole (3).

[0042] Another scaffold pole (3), in which a web (5) is used as a base plate for the screw (23) connection of a clip (11) for bracing a scaffold pole (3), may be arranged in parallel hereto according to FIG. 1. Two webs (5), which are
arranged in parallel to one another and of which only one has a centering (6, 7), are provided in this case as well.

[0043] Outwardly projecting webs (5, 14) are provided on both outer sides (12, 13) of the central support body (2) in the example according to FIG. 3. The outwardly projecting webs (14) are provided for mounting a connecting rod (15), which has causally the task of fixing the position of a projecting scaffold pole (3). What is not shown in FIG. 3 shows that the connection rod (15) is fixed in the right-hand part of the figure, which is not shown, by an outer web (14).

[0044] This arrangement does not rule out that the outer webs (14) may also be provided to mount floating scaffold poles (3), without these having to be used to stabilize the original scaffold pole (3). FIGS. 13 and 14 show such an arrangement.

[0045] It is also shown in this example that a clamping element (4) for receiving a transversely positioned scaffold pole (3) can be arranged at right angles to the scaffold pole (3).

[0046] Furthermore, it is shown in the exemplary embodiments according to FIG. 4 that the outline of a central support body (2) may consist of webs (5) arranged in parallel to one another and that scaffold poles (3) arranged three-dimensionally can be connected to the support body (2).

[0047] Perforations (21) may be present between the individual webs (5) in order to reduce the weight of the individual support body (2).

[0048] The example according to FIG. 5 shows a clamping element (4), whose base plate (22) is fastened by means of a screw (25) to a machined surface (26) of the support body (2). The base plate (22) of the clamping element (4) has a central centering hole (7), through which extends a centering pin (6), which connects, on the one hand, the base plate (9) of the support body (2) to the scaffold pole (3) via the base plate (22) of the clamping element (4). The axial mounting of the scaffold pole (3) at the support body (2) is thus centered.

[0049] FIG. 6 shows, in addition to FIG. 3, an arrangement of the central support body (2), to the machined surface (26) of which a molding (24) is fastened by means of a screw connection (25), which molding has upright webs (5). An individual scaffold pole (3) is fastened in these webs (5) in the manner described in the introduction. In the exemplary embodiment, the molding (24) preferably consists of a light metal casting, into which the rod mounts (8) according to FIG. 2 are introduced. However, the molding (24) may also be manufactured by machining.

[0050] The example according to FIG. 7 shows the top view of a support body (2), in the center of which a flange plate (19) with the screw connections (20) for fastening to an industrial robot is located. FIG. 8 shows in a cross section herefor that the flange plate (19) may be thickened and reinforced with ribs (27) opposite the webs (5).

[0051] The partial section of a support body (2) according to FIG. 10 shows a transverse arrangement of different webs (5) with their rod mounts (8), which represents another variant to the arrangement of a three-dimensional rod assembly.

[0052] In the different exemplary embodiments, the parallel webs (5) are arranged at a short distance from one another, which is substantially smaller than the extension of the support body (2) in the direction of the distance. The distance between the webs is selected to be such that it corresponds to the necessary span for the floating mounting of the scaffold poles (3). This applies to both the webs (5) of the support body (2) formed integrally at the base plate (9) and the webs (5) of the separate molding (24), which is screwed or connected in any other desired manner to the support body (2) or the base plate (9) thereof.

[0053] In both cases, the parallel webs (5) form a double clamping means (32) with the correspondingly narrow clips (11) with a pair of spaced clamping points (4) for the floating mounting of the rods. The double clamping means (32) are preferably arranged at the edge (18) of the support body (2) or in the area adjacent to the said support body (2). FIGS. 4, 6 and 13, 14 show this arrangement.

[0054] The support body (2) is designed as a web plate with the said base plate (9) and preferably webs (5) extending away therefrom at right angles. The drawings show different exemplary embodiments herefor: FIGS. 13 and 14 show such a web plate with view of the top side and the underside in a perspective view. The webs (5) may be located on one or both outer sides or surfaces (12, 13) of the base plate (9).

[0055] In the exemplary embodiments according to FIGS. 4, 7 and 9, there is, at least on one side of the base plate (9), a web (16) located on the outside, which is arranged on the circumference or the edge (18) of the preferably rectangular base plate (9) in a circular pattern and forms a kind of frame. The webs (17) located on the inner side, which are arranged in parallel thereto, preferably have all the same distance from the outer web (16) and are arranged in the pattern of a latticework, which mutually intersect each other. As is illustrated especially in FIGS. 7 and 13, 14, the distance between the outer and inner webs (16, 17) is selected to be such that at least one rod mount (8) and a scaffold pole (3) that can be fastened there can be accommodated between them. Due to the intersecting inner webs (17), the support body (2) is additionally reinforced.

[0056] The rectangular elongated support body (2) according to FIGS. 13 and 14 shows, analogously to FIG. 8, the webs (17) extending longitudinally and transversely on the top side (12). Only transversely extending inner webs (17) are present on the underside (13) on the narrow sides of the support body (2). Scaffold poles (3) may be fastened floatingly on the top side (12) on all four sides of the support body (2). Floating mounting of additional scaffold poles (3) extending along the support body (2) is possible on the underside (13). Rod mounts (8) that are flush in height at the top and at the bottom are present at the webs (5, 16, 17) at the front sides or narrow sides of the support body (2).

[0057] The support body (2) may be used when needed. The base plate (9) has a plurality of perforations (21) on the entire surface, the remaining plate areas having reinforcing ribs (27).

[0058] FIGS. 13 and 14 illustrate, furthermore, that the webs (5, 16, 17) may have a plurality of prefabricated rod mounts (8) with screw holes (10) and partly with prepared insertion holes for centering pins (6). The scaffold poles (3) may be fastened with clips (11) here when needed and at the desired site. The rod mounts (8) and the holes may be
machined from the material of the web or formed there integrally during the manufacture of the support body (2). As an alternative, they may be in the form of prepared inserts, which optionally consist of another material and are mounted into fitting recesses of the web.

The webs (16), which are located on the outside and project away from the base plate (9) in one direction or two directions, are, furthermore, advantageous for the arrangement of scaffold poles (3), which extend at right angles to the direction of the plate, as this is shown in FIGS. 8 and 10. Webs (5) located at mutually spaced locations from one another, which receive the transversely located scaffold pole (3), may extend at mutually spaced locations from the ends of these outer webs (16) at right angles thereto. As an alternative, such a web (16) may form a fastening surface for a molding (24) provided with webs (5) or for a so-called clamping element (4);

The clips (11) are fastened in threaded holes (10) at the webs (5) by means of screw connections (23) in these and in other cases as well. The clips (11) preferably have essentially the same width as the webs (5, 14, 16, 17) and have the same shell shape as the rod mounts (8). Their length may optionally be reduced, so that a gap and a clamping action develop at the connection point. According to FIG. 10, positive-locking connection means (6, 7) may likewise be used here for determining and fixing the position of the transversely located scaffold poles (3). The arrangement is similar to that in FIG. 5.

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

1. A support body for scaffold poles of a positioning scaffold for positioning individual working elements or a plurality of working elements the support body comprising:
   a manipulator connection junction for connection to a manipulator and a plurality of clamped fastenings for the scaffold poles
   a plurality of double clamping means with pairs of said clamping elements each for the floating fastening of one scaffold pole.
2. A support body in accordance with claim 1, wherein the double clamping means has parallel adjacent webs.
3. A support body in accordance with claim 2, wherein the parallel webs have a distance that is substantially smaller than the extension of the support body in the direction of the distance.
4. A support body in accordance with claim 2, wherein the webs have at least one rod mount with a cross section adapted to the scaffold pole.
5. A support body in accordance with claim 1, wherein together with a clip, the rod mount forms one of said clamping elements for fastening a scaffold pole.
6. A support body in accordance with claim 1, wherein one of the pairs of said clamping elements is equipped with positive-locking connection means for fixing the position of the scaffold pole.
7. A support body in accordance with claim 1, wherein a centering pin is arranged at one of the pairs of said rod mounts.

8. A support body in accordance with claim 2, wherein the webs are arranged at the support body or at a molding fastened thereto.
9. A support body in accordance with claim 1, wherein the support body consists of a lightweight material formed as a light metal casting.
10. A support body in accordance with one claim 2, further comprising a base plate, at the edge of which one or more said webs are located on an outside.
11. A support body in accordance with claim 10, wherein said webs include a web extending circularly in a frame-like pattern arranged at the edge of the base plate.
12. A support body in accordance with claim 2, wherein the parallel webs include webs located on an inner side arranged distributed in a latticework pattern at the support body.
13. A support body in accordance with claim 10, wherein the webs are arranged at one or both outer sides of the base plate.
14. A support body in accordance with claim 10, wherein the base plate is recessed locally between the parallel webs.
15. A support body in accordance with claim 10, wherein additional webs are arranged on the circumference of the support body in such a way that they extend at right angles to a plane of the base plate.
16. A support body in accordance with claim 1, wherein the webs are reinforced among each other with ribs.
17. A support body in accordance with claim 1, wherein the junction is arranged centrally at the support body and has a thickened flange plate with said screw holes, which said flange plate is arranged at the base plate.
18. A support body in accordance with claim 17, wherein the flange plate is reinforced by radial ribs against the webs located on the inside.
19. A support body in accordance with claim 1, wherein the support body has flange surfaces prepared by machining for fastening moldings or said clamping elements for said scaffold poles.
20. A support body in accordance with claim 19, wherein the molding has a base plate (22) for fastening at the support body as well as two parallel webs arranged at spaced locations from one another, in which there are recesses that are open on one side for receiving a scaffold pole, wherein the molding is connected to the scaffold pole by a clip fastening in conjunction with a positive-locking centering point at one of the webs.
21. A support body in accordance with claim 1, wherein the positive-locking connection means comprise a centering pin and a centering hole.
22. A support body in accordance with claim 1, wherein the centering pin passes at least partly through the base plate, optionally the web of the lower part of the clamping element as well as the associated scaffold pole to form the positive-locking connection.
23. A support body in accordance with claim 1, wherein the support body forms a positioning scaffold with a plurality of floatingly mounted scaffold poles and the working elements therein.